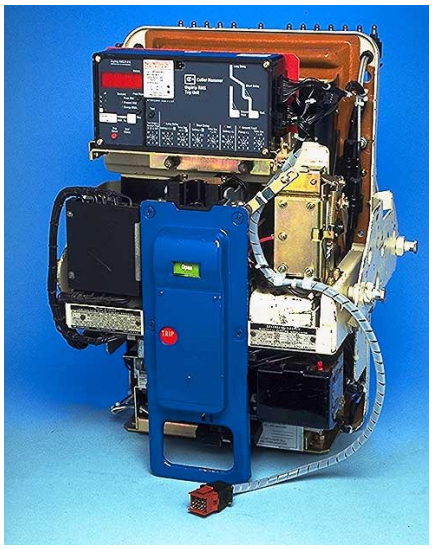
Digitrip Retrofit System for General Electric AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25 & AKU-3/3A-25, and Higher AK-25 Series Breakers



SAFETY PRECAUTIONS

⚠ WARNING

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

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

Digitrip Retrofit System for General Electric AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25 & AKU-3/3A-25, and Higher AK-25 Series Breakers

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INTRODUCTION

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

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

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

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

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

Table 1 Available Retrofit Kits

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

Beginning the Retrofit Process – Identifying the Breaker and the Retrofit Kit

Before beginning the Retrofit Process, it is important to verify exactly which version of the General Electric AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25, & AKU-3/3A-25, and Higher AK-25 Series Breaker(s) is to be Retrofitted to insure that the correct Cutler-Hammer Retrofit Kit(s) was ordered. Each Breaker must be identified using all of the following sources that are applicable:

1. Nameplate Information;
2. Breaker Rating;
3. Manually or Electrically Charged;
4. Electromechanical or Electronic Trip Units (including prior G. E. upgrades);
5. Fused or Non-Fused; and if fused
6. Location of the Fuses (on Top or Bottom Breaker Stabs)

Please refer to Tables 2 and 3 to verify that the first three (3) characters of the Digitrip Retrofit Kit Code Number correspond to the Breaker being Retrofitted. If you find that the Retrofit Kit does not match the Breaker, do not attempt the Retrofit. Contact your purchasing agent and have the correct Retrofit Kit ordered for the Breaker.

Following the Icons to a Successful Retrofit

During certain parts of the Retrofit Process, procedures may differ depending on the specific version of the Breaker being Retrofitted. To enable the Retrofitter to quickly identify the correct procedures for a specific Breaker, the following Icon System (contained in Tables 2 and 3) has been developed. As you are working through the procedures, follow the procedures that pertain to all versions of the Breaker (Steps without Icons) and the Steps specific to the version of the Breaker being Retrofitted (Steps identified with the Icon representing the specific Breaker).

Determining the Correct Icon for the Breaker Being Retrofitted

The AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25, & AKU-3/3A-25, and Higher AK-25 Series Breakers were produced in six (6) basic configurations. Table 1 lists the six (6) configurations and identifies the Icon associated with each configuration. To determine the correct Icon for the Breaker being Retrofitted, first determine the correct Icon for the specific configuration (Table 2), then find the applicable Retrofit Kit (Table 3 – Column 1) and type of existing Trip Units (Table 2 – Column 4) for the Breaker. The last Column will contain the Icon you should follow.

Table 2 Basic Breaker Configuration

Basic Breaker Configuration	*Basic Icon Shape*
Manually Operated – No Fuses	
Manually Operated – Top Fused	
Manually Operated – Bottom Fused	
Electrically Operated – No Fuses	
Electrically Operated – Top Fused	
Electrically Operated – Bottom Fused	

Table 3 Determining the Correct Icon to Follow Through the Retrofit Process

Digitrip Retrofit Kit Code	*Breaker ID*	*Type of Operation*	*Type of Existing Trip Units*	*Fuse Configuration*	*Icon*
G22	AK-2/2A-15	Manual	Electro-mechanical	N.A.	
G22	AK-2/2A-15	Manual	Electronic (See Note 1)	N.A.	
G26	AK-2/2A-25	Manual	Electro-mechanical	No Fuses	
G26	AK-2/2A-25	Manual	Electro-mechanical	Bottom Fused	

G26	AK-2/2A-25	Electric	Electro-mechanical	No Fuses	
G26	AK-2/2A-25	Electric	Electro-mechanical	Bottom Fused	
G36	AK-2/2A-25 AK-3/3A-25 AK-#/#A-25	Manual	Electronic	No Fuses	
G36	AK-2/2A-25 AK-3/3A-25 AK-#/#A-25	Manual	Electronic	Bottom Fused	
G36	AK-2/2A-25 AK-3/3A-25 AKU-#/#A-25	Electric	Electronic	No Fuses	
G36	AK-2/2A-25 AK-3/3A-25 AKU-#/#A-25	Electric	Electronic	Bottom Fused	
GU6	AKU-2/2A-25	Manual	Electro-mechanical	Top Fused	
GU6	AKU-2/2A-25	Electric	Electro-mechanical	Top Fused	
GU7	AK-2/2A-25 AKU-3/3A-25 AKU-#/#A-25	Manual	Electronic	Top Fused	
GU7	AK-2/2A-25 AKU-3/3A-25 AKU-#/#A-25	Electric	Electronic	Top Fused	

NOTE 1: If Retrofitting an AK-2/2A-15 Breaker that has been upgraded with Electronic Trip Units in the past, contact Cutler-Hammer for specific information and the additional components needed for the Retrofit.

STEP 1: GENERAL BREAKER PREPARATION

Before attempting to remove the Breaker from the Cell, or perform any Retrofit Operation, be sure to read and understand the Safety Precautions section of this manual. In addition, be sure to read and understand the *Instructions for the Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers* (Retrofit Application Data – Publication AD-33-855-2), supplied with the Digitrip Retrofit Kit.

⚠ WARNING

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

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

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

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

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

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

STEP 2: REMOVING THE ORIGINAL COMPONENTS

Follow the General Electric AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25, & AKU-3/3A-25, and Higher AK-25 Series Instruction Manual, originally supplied with the Breaker, to perform the following procedures.

NOTE: Steps 2-A through 2-F are optional procedures that will allow the Retrofit Process to be completed with greater ease.

Steps 2-G through 2-I MUST be completed. These steps detail the removal of original components that will be replaced during the Retrofit Process.

NOTE: In all photos used in the manual, the front and back frames of the Breaker are not separated. Therefore, if Steps 2-A through 2-F are followed, the photos may not exactly match the Retrofit being performed.

A. Remove the Arc Chute Retaining Bar from the front of the Breaker. Remove the three (3) Arc Chutes.

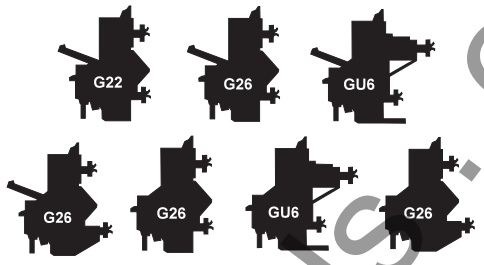
B. Remove the screw and elastic stop nut that connect the two (2) Insulated Connecting Links between the Mechanism and the Breaker Cross Bar. Remove the Links from the shoulder pins in the Mechanism.

C. Remove any Secondary Contact Mounting Frames from the rear of the Breaker. Remove any wire clamps that attach the Secondary Contact Wiring Bundle to the Breaker.

D. Remove the two (2) elastic stop nuts from the Arc Chute Retaining Studs.

E. Remove the elastic stop nuts which fasten the wrap-around portion of the Front and Back Frames of the Breaker. These nuts are located approximately two-thirds down from the top of the Breaker.

F. Remove the two (2) .250-20 bolts that fasten the Side Plate to the Back Frame. The Front and Back Frames can now be separated.



G. *For Breakers with Electromechanical Trip Units Only.* Remove and scrap all hardware securing the three (3) Electromechanical Trip Units in the Breaker. Scrap the Electromechanical Trip Units.

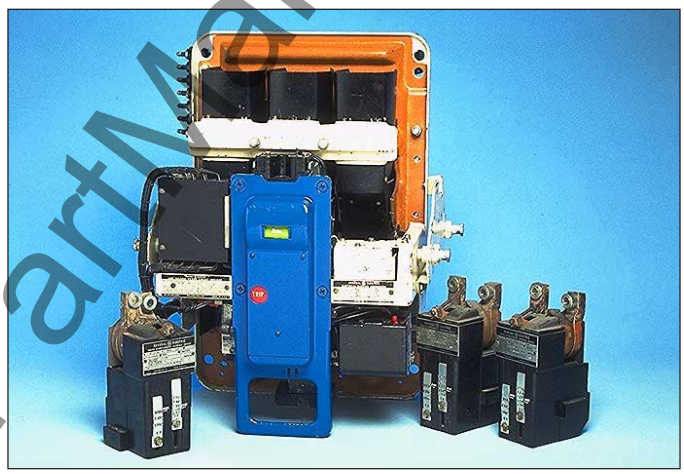
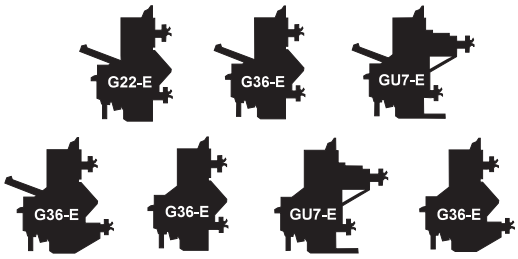


Fig. 1 Electromechanical Trip Units Removed from the Breaker

For Electrically Operated Breakers Originally Equipped with Electromechanical Trip Units Only. Remove and scrap the four (4) "C"-Shaped Trip Unit Mounting Brackets from the inside bottom of the Breaker Back Plate.



H. *For Breakers with Electronic Trip Units Only.* Remove and scrap all hardware securing the Electronic Trip Units, the Bottom Stud Assemblies, the Direct Trip Actuator, the Sensors, the Sensor Mountings, and the associated Wiring in the Breaker. Scrap all of these components.

Fig. 2 Electronic Trip Units Removed from the Breaker

I. For All Breakers. Remove the Phase 1 and Phase 3 Trip Paddles from the Breaker Trip Bar. The middle Trip Paddle (Phase 2) may be left on the Trip Bar.

NOTE: For Breakers originally fitted with a remotely mounted Neutral Sensor, the Neutral CT Disconnect must be removed and discarded.

Fig. 3 Neutral CT Disconnect

STEP 3: INSTALLING THE "Z"-SHAPED COPPER CONNECTORS

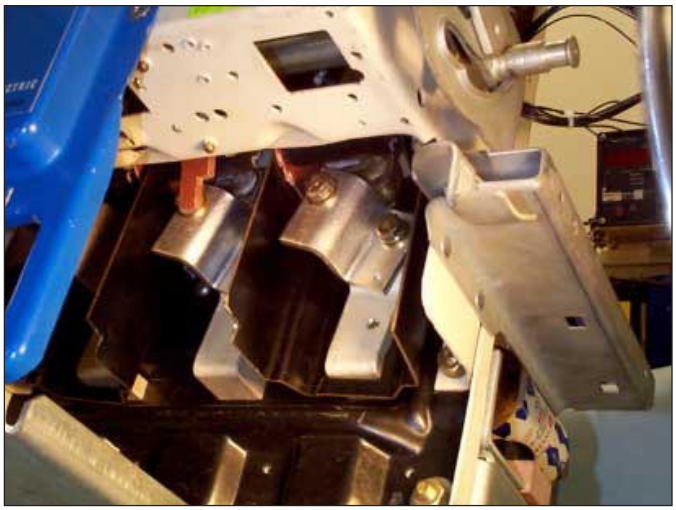
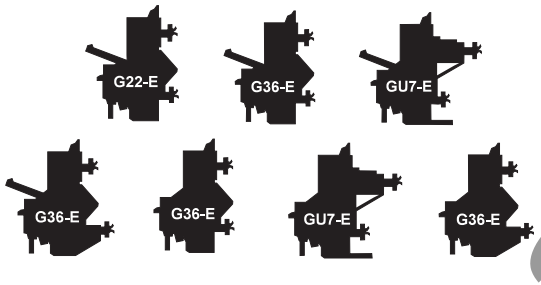


Fig. 4 Overview – Copper Connectors Installed in the Breaker



A. *For Breakers with Electronic Trip Units Only.* Align the three (3) new Bottom Studs with the mounting positions of the original Bottom Stud Assemblies. Secure the new Bottom Studs to the Breaker using the (6) .250-20 × .625" screws, (6) lock washers, and (6) flat washers supplied.

B. *For All Breakers.* Align the three (3) "Z"-Shaped Copper Connectors with the threaded inserts in the lower Stab Assemblies and the Pole Unit Coppers. Secure the "Z" Connectors to the Stab Assemblies and Pole Unit Coppers using the (6) .375-16 × 1.00" bolts, (6) lock washers, and (6) flat washers supplied.

NOTE: The .190-32 threaded hole in each "Z" Connector must be situated towards the bottom right of the Breaker. These holes will be used later in the Retrofit Process to connect the PT Wires for Communicating Kits supplied with a PT Module.

Fig. 5 Correct Orientation of the Copper Connectors

STEP 4: PREPARING THE AUX. CT MODULE ASSEMBLY

Fig. 6 Overview – Aux. CT Module Prepared to be Installed in the Breaker

A. Align the Aux. CT Module with the holes in the Aux. CT Module Mounting Bracket as shown. Secure the Aux. CT Module to the Mounting Bracket using the (2) .250-20 × .750" bolts, (4) flat washers, (2) lock washers, and (2) nuts supplied. Note that the bolts must be inserted through the Mounting Bracket first, then through the Aux. CT Module.

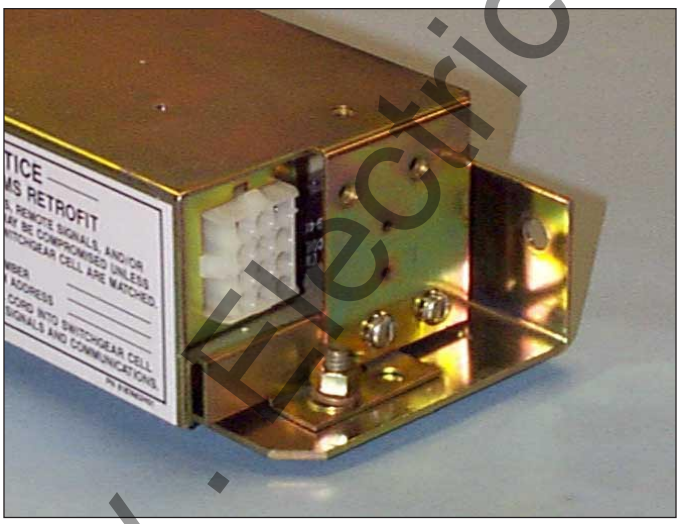


Fig. 7 Detail of the Aux. CT Module Mounting Hardware

B. *For Kits Supplied with a PT Module Only.* Align the Glass Poly Insulation Barrier and the PT Module with the holes on the top of the Aux. CT Module as shown. Secure the PT Module and Insulation Plate to the Aux. CT Module using the (2) .138-32 × .375" thread cutting screws, (2) lock washers, and (2) flat washers supplied.

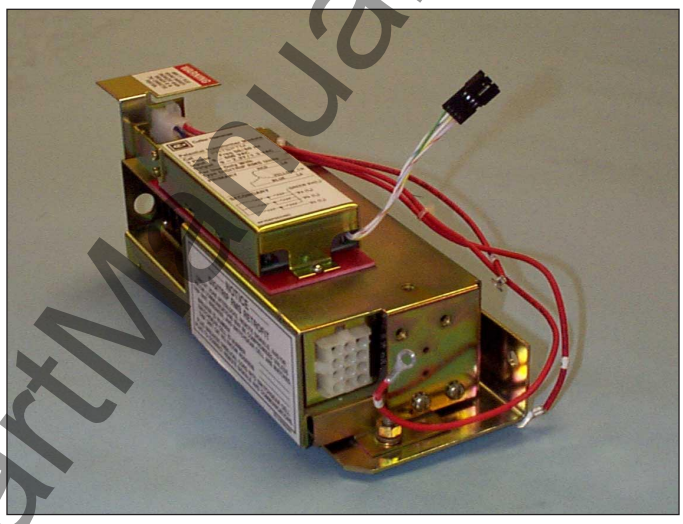


Fig. 8 PT Module Mounted to the Aux. CT Module

For Kits Supplied with a Breaker Mounted CPT Only.

C. Align the CPT Module with the holes in the CPT Mounting Bracket as shown. Secure the CPT Module to the CPT Mounting Bracket using the (2) .190-32 × .500" flat head screws, (2) flat washers, (2) lock washers, and (2) nuts supplied. Note that the flat head screws are used to secure the side of the CPT with the X2 and H4 terminals.

D. Align the CPT Assembly with the holes in the CPT Assembly Mounting Bracket as shown. Secure the CPT Assembly Mounting Bracket to the CPT Assembly using the (2) .190-32 × .625" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.

E. Temporarily set the CPT Module inside the Breaker near the bottom, front right corner. Temporarily route the plug-in connector on the CPT Harness up through the Breaker to the top of the Breaker Face Plate. Cut the wires of the CPT Harness to an appropriate length to connect to the CPT Module. Remove the CPT Module and Harness from the Breaker.

F. Strip an approximate length of insulation and attach a .138" ring terminal to each wire of the CPT Harness. Connect the CPT Harness wires to the X1 and X2 terminals of the CPT Module.

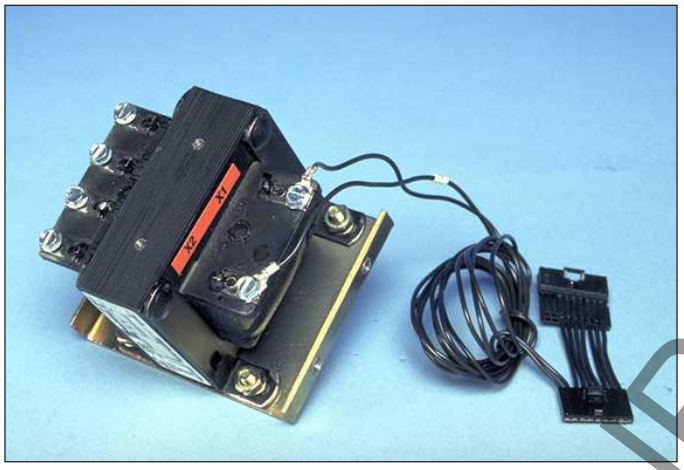


Fig. 9 CPT Harness connected to the CPT Module

G. Align the front and rear Insulation Barriers with the holes in the CPT Mounting Bracket as shown. Note that the larger, front Insulation Barrier is to be mounted on the side of the CPT Assembly with the X1 and X2 terminals. Also note that the smaller Insulation Barrier is offset towards the H4 terminal. Secure the Insulation Barriers to the CPT Assembly using the (4) .190-32 × .375" screws, (4) lock washers, and (4) flat washers supplied.

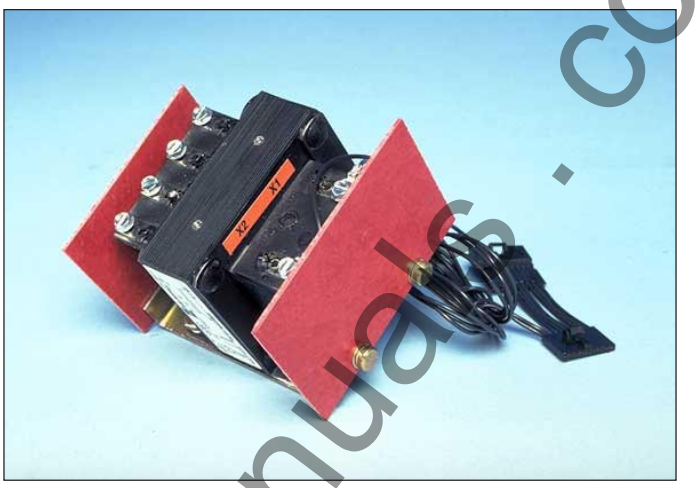


Fig. 10 Insulation Barriers Mounted to the CPT Assembly

H. Align the holes in the CPT Assembly Mounting Bracket with the holes in the right side of the Aux. CT Module. Secure the CPT Assembly Mounting Bracket to the Aux. CT Module using the (2) .190-32 × .375" screws, (2) lock washers, and (2) flat washers supplied.

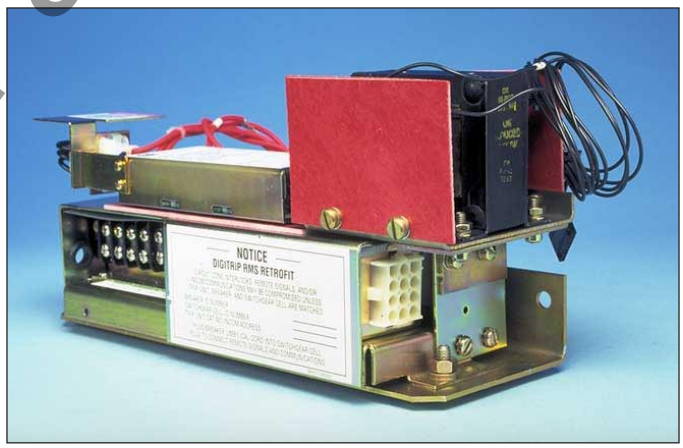


Fig. 11 CPT Assembly Mounted to the Aux. CT Module Assembly

I. Temporarily place the Aux. CT Module Assembly near its eventual mounting position in the bottom, rear of the Breaker.

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.

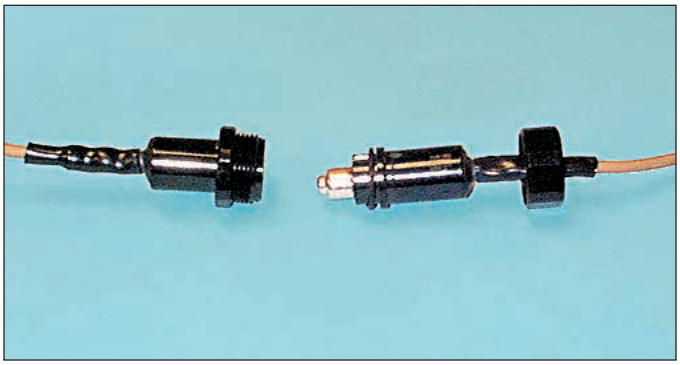


Fig. 12 Identification of the Line and Load Side HV Wires

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.

NOTE: The power convention of the General Electric AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25, & AKU-3/3A-25, and Higher AK-25 Series 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 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. The holes tapped to accept the .190" in the “Z”-Shaped Copper Connectors can be used to connect the HV Wires.

The following steps detail the procedure to install the HV Wires on a Breaker following the normal convention – the top Breaker Stabs are the Line Side of the Breaker.

J. Temporarily place the HV Fuses to the right of the Phase 3 Arc Chute, against the Breaker Back Plate.

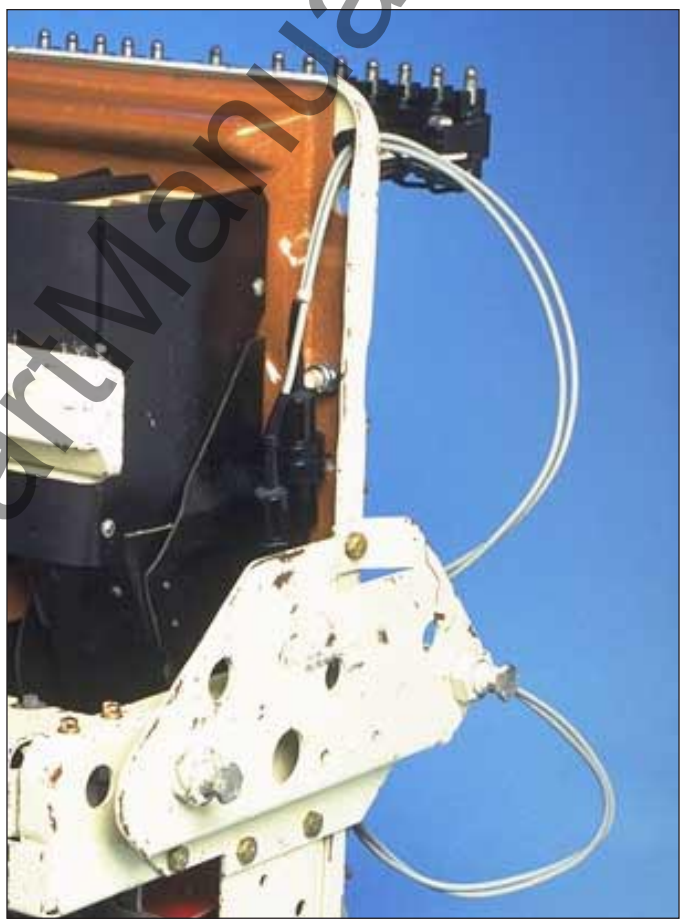


Fig. 13 Location of the HV Fuses

K. Route the Load Side HV Wires down into the Breaker to the CPT.

L. Cut the Load Side of each HV Wire to an appropriate length for connection to the CPT. Remove the Aux. CT Assembly and HV Wires from the Breaker.

M. Strip an appropriate length from the Load Side HV Wires and attach a .138" ring terminal to each. Attach the HV Wires to the CPT terminals to achieve the required voltage (see the following table).

Table 4 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.

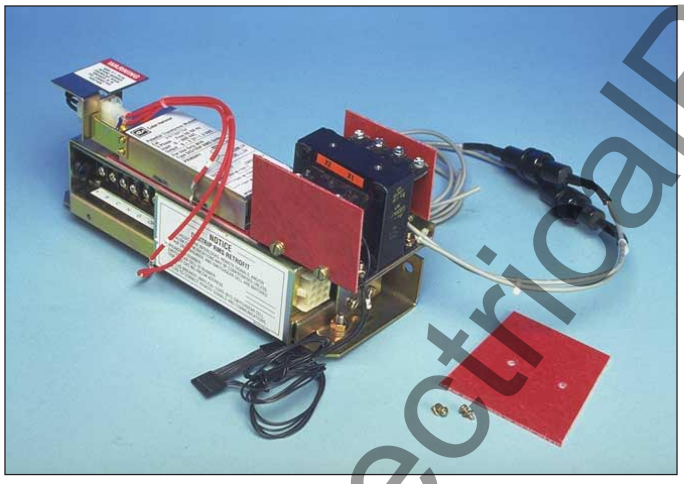


Fig. 14 HV Wires Attached to the CPT Module

N. Attach the Glass Poly Insulation Plate, supplied with the CPT Mounting parts, to the top of the CPT, as shown, using the screws, lock washers, and flat washers supplied with the CPT Kit and the CPT Mounting Parts. Note that Glass Poly Insulation Plate, supplied with the CPT Kit, is not used for this application.

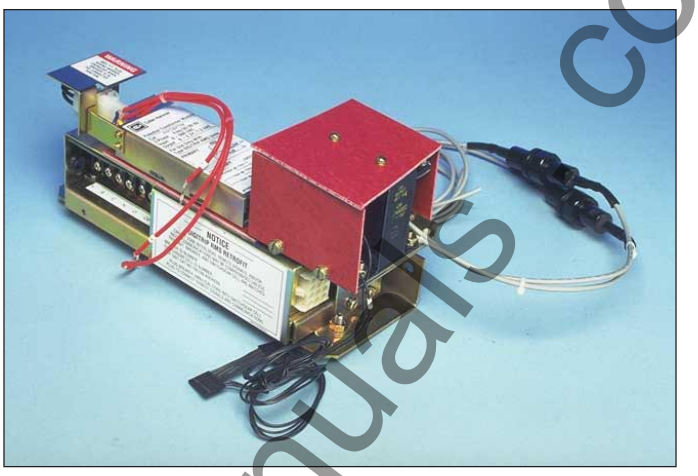


Fig. 15 Top Insulation Plate Mounted to the CPT Module

O. Attach the appropriate CPT Warning Label for the Breaker to a prominent position on the Breaker.

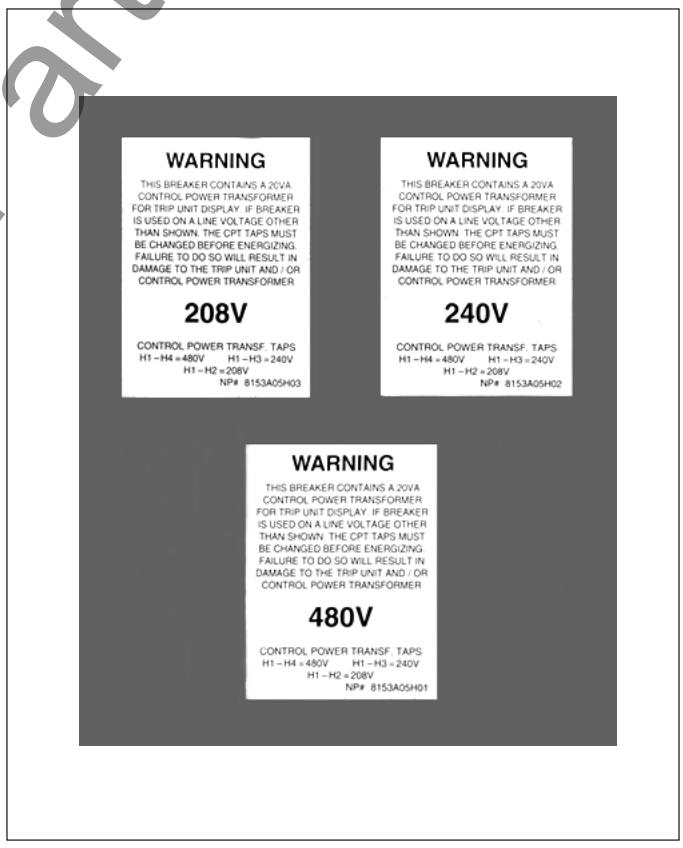


Fig. 16 Supplied CPT Voltage Labels

For Kits Supplied with a PT Module Only.

STEP 5: CONNECTING THE PT WIRES

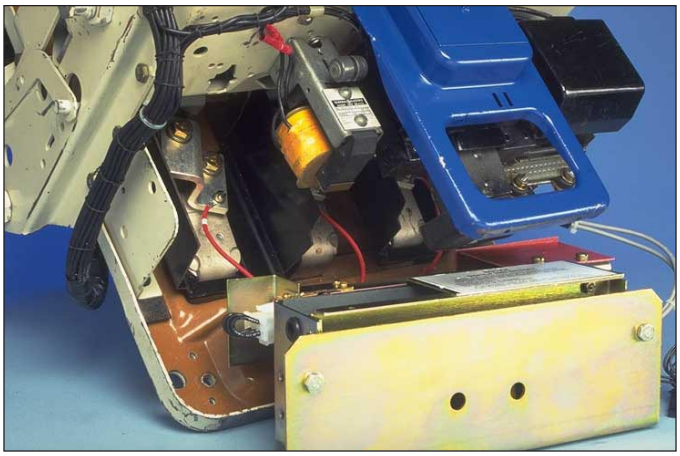


Fig. 17 Overview – PT Wires Connected to the Breaker

A. Notch the two (2), existing Inner Phase Insulation Barriers approximately 1.00" × 1.00" to allow the Aux. CT Module Assembly to be mounted to the rear of the Breaker.

B. Temporarily place the Aux. CT Module Assembly near its mounting position in the bottom, rear of the Breaker.

C. 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.

D. Route the PT Wires to the "Z"-Shaped Copper Connectors installed in Step 3.

   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.

E. Move the PT Wire markers to a position where they will still be attached to the wires after cutting. Cut the wires to a suitable length, strip each wire an appropriate length, and install a .190" ring terminal to each PT Wire.

F. Connect each PT Wire to the corresponding "Z"-Shaped Copper Connector using the (3) .190-32 × .375" screws, (3) lock washers, and (3) flat washers supplied.

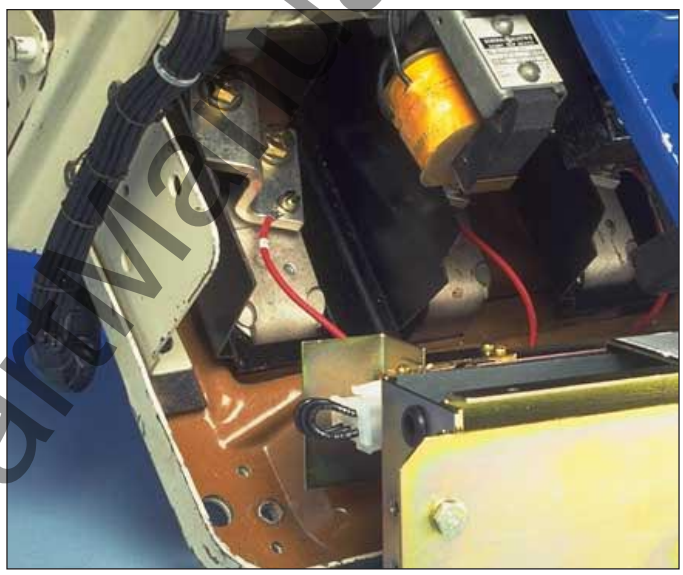


Fig. 18 PT wires Connected to the Copper Connectors

STEP 6: INSTALLING THE AUX. CT MODULE ASSEMBLY IN THE BREAKER

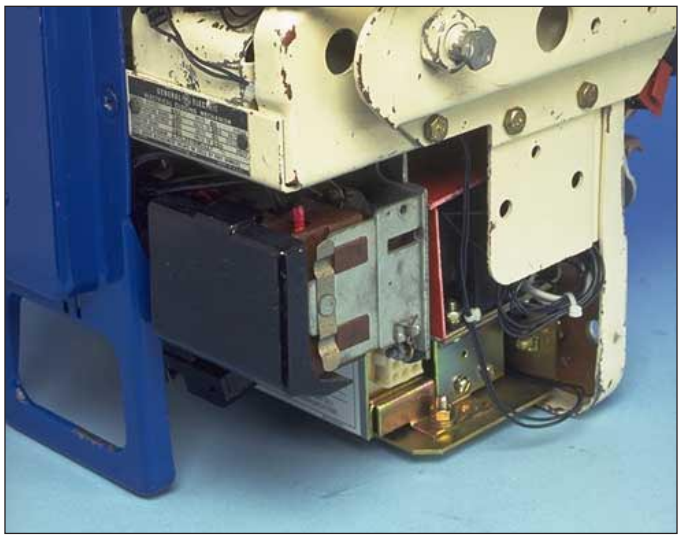
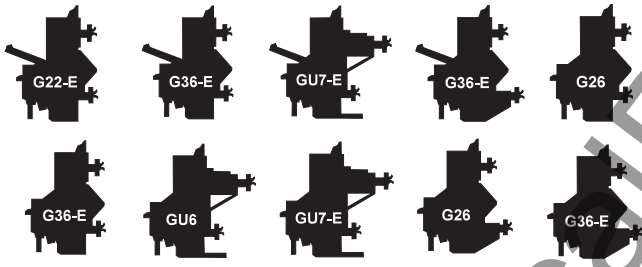


Fig. 19 Overview – Aux. CT Module Assembly Installed in the Breaker



A. *For Electrically Operated Breakers and Breakers Equipped with Electronic Trip Units Only.* Using a .312" drill bit, drill the bottom of the Breaker Back Plate per Drilling Plan "A".

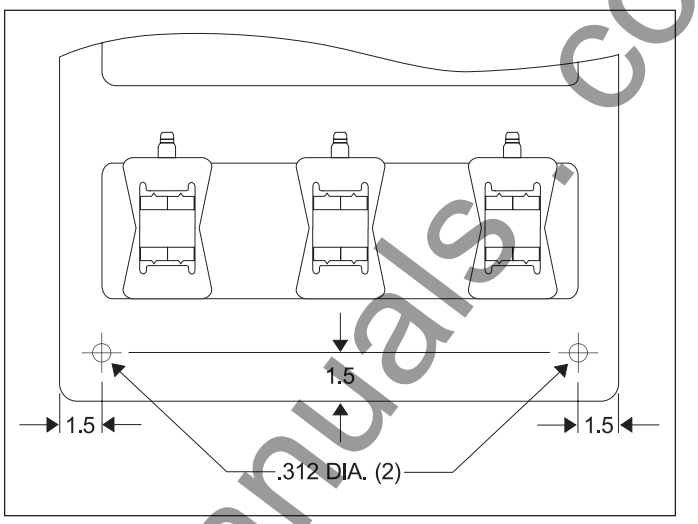


Fig. 20 Drilling Plan "A"

For All Breakers.

B. *For Kits Supplied with a Breaker Mounted CPT Only.* Install the supplied rubber grommet in the existing hole in the top, right corner of the Breaker Back Plate. Route the Line Side HV Wires to the right of the Breaker, then up and through the rubber grommet just installed. Insure that the HV Wires are clear of any moving parts within the Breaker.

Position the HV Fuses in approximately the same position as used to cut the Load Side Wires in Step 4. The Line Side HV Wires will be cut and attached later in the Retrofit Process.

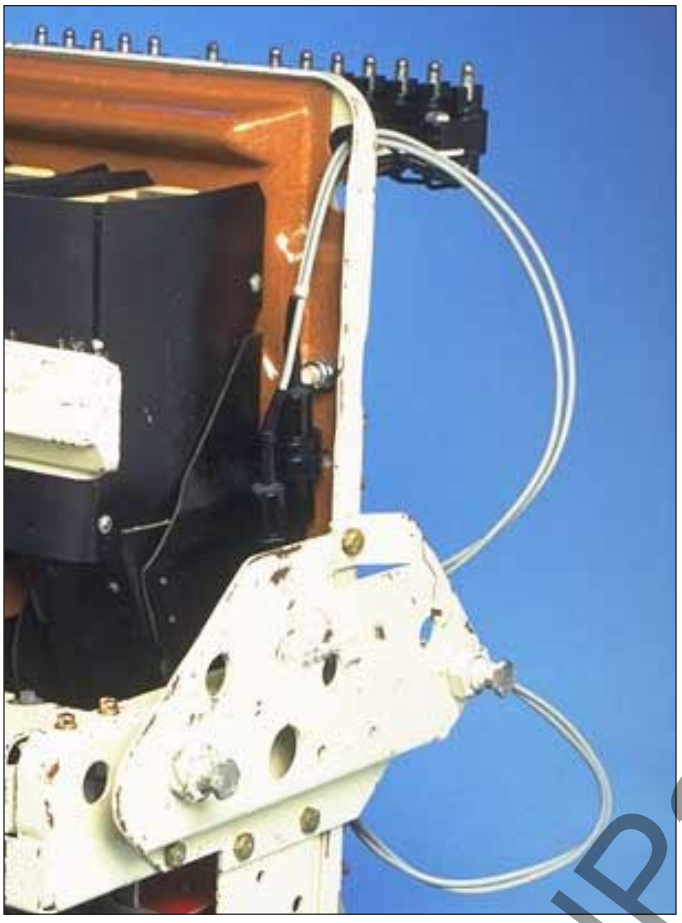


Fig. 21 Position of the HV Fuses

NOTE: The power convention of the General Electric AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25, & AKU-3/3A-25, and Higher AK-25 Series 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 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. The holes tapped to accept the .190" in the "Z"-Shaped Copper Connectors can be used to connect the HV Wires.

The Line Side HV Wires should be cut to a suitable length and connected to the Phase 1 & 2 or Phase 2 & 3 "Z"-Shaped Copper Connectors at this time using the supplied ring terminals and .190" hardware supplied.

Route the CPT Harness to the right of the Breaker, then up through the Breaker following the same path as the HV Wires, then to the front, center of the Breaker. Insure that the CPT Harness is clear of any moving parts within the Breaker. The CPT Harness will be connected later in the Retrofit Process.

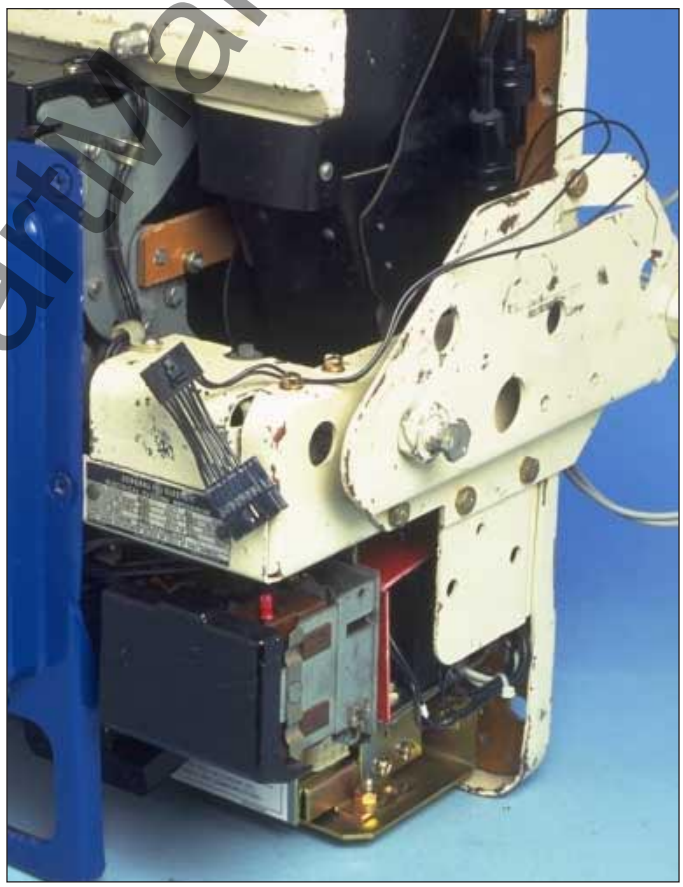


Fig. 22 Routing the CPT Harness

C. *For Manually Operated Breakers Originally Equipped with Electromechanical Trip Units Only.* Align the Aux. CT Module Assembly with the threaded holes in the original "C"-Shaped Trip Unit Mounting Brackets as shown. Secure the Aux. CT Module Assembly to the right and left "C"-Shaped Mounting Brackets, as shown, using the (2) .250-20 × .750" bolts, (2) flat washers, and (2) lock washers supplied.

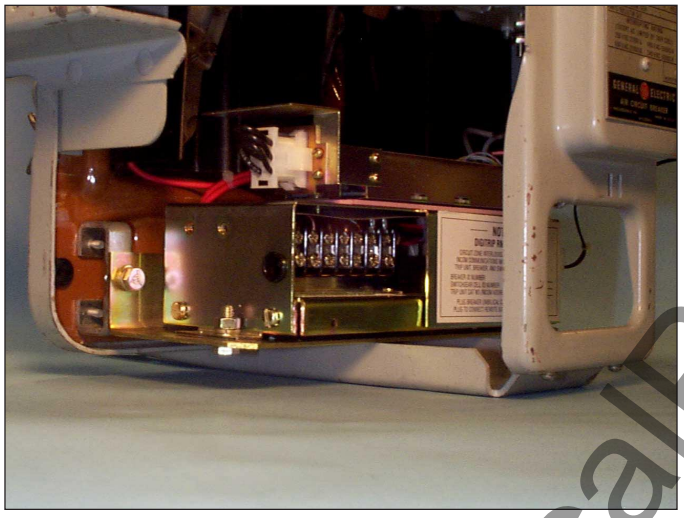
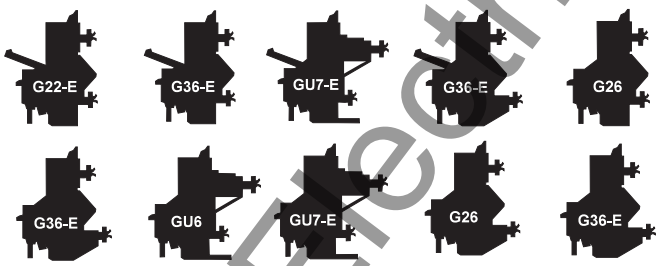


Fig. 23 Aux. CT Module Assembly Mounted to the "C" Shaped Brackets



D. *For Electrically Operated Breakers and Breakers Equipped with Electronic Trip Units Only.* Align the Aux. CT Module Assembly with the holes in the Breaker Back Plate drilled in Step 6-A. Secure the Aux. CT Module Assembly to the Breaker Back Plate, as shown, using the (2) .250-20 × 1.50" bolts, (4) flat washers, (2) lock washers, (2) .250-20 nuts, and (4) .312-18 nuts supplied. Note that the .312-18 nuts are used as spacers between the Aux. CT Module Assembly Mounting Bracket and the Breaker Back Plate.

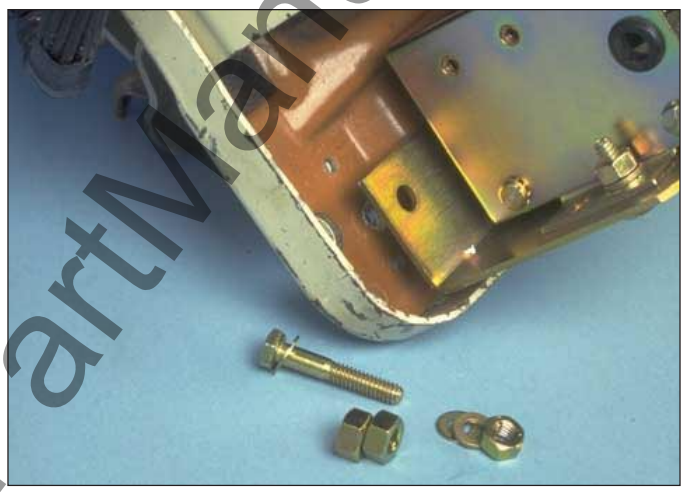


Fig. 24 Detail of Mounting Hardware

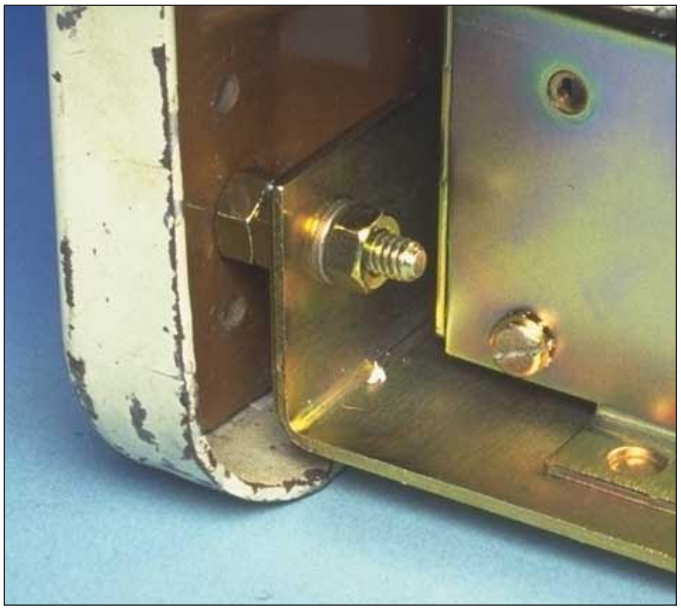


Fig. 25 Aux. CT Module Assembly Mounted to the Breaker Back Plate

STEP 7: INSTALLING THE DTA ASSEMBLY

Fig. 26 Overview – DTA Assembly Installed in the Breaker

A. *For All AK-2-15 & 25 and AKU-2-25 Series Breakers Only.* On some manually operated Breakers, it may be necessary to "Notch" the right rear of the DTA Mounting Bracket and DTA Assembly, as shown in Cutting Plans "A" and "B". This is to allow for clearance between the DTA Assembly and the Racking Handle Arm. This DOES NOT apply to the 2A Series Breakers.

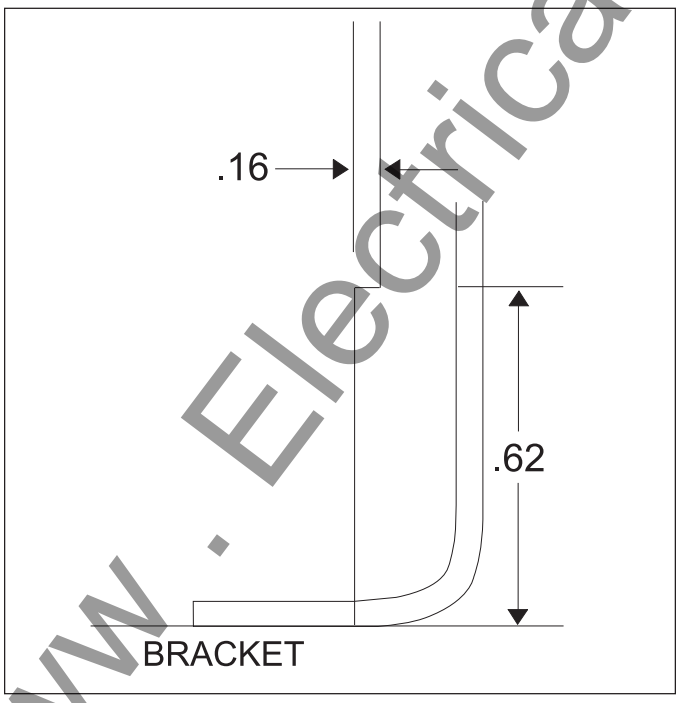


Fig. 27 Cutting Plan "A"

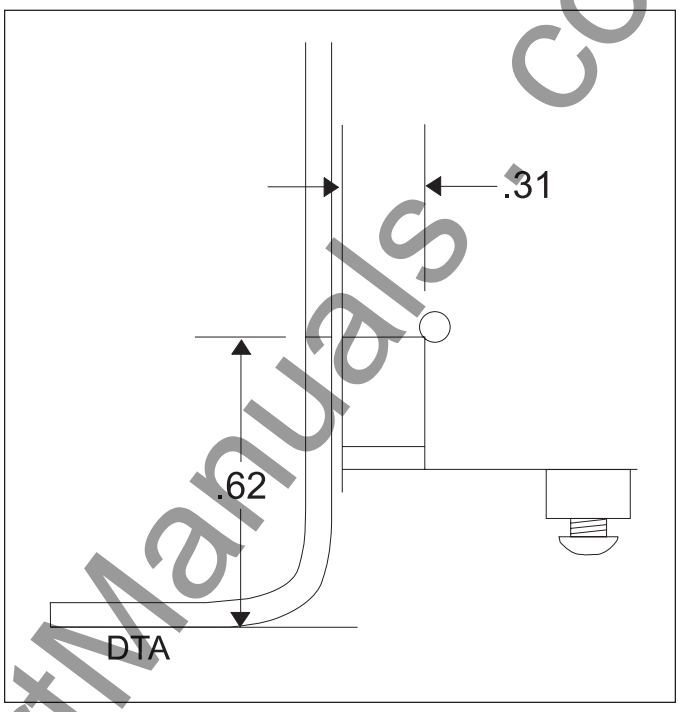


Fig. 28 Cutting Plan "B"

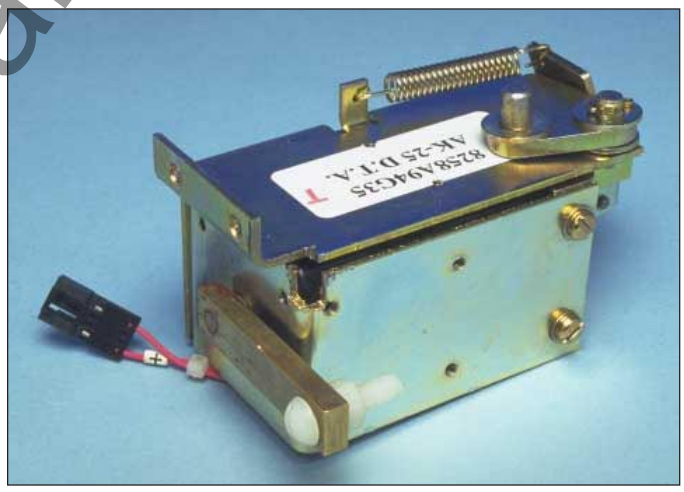


Fig. 29 Notched DTA Mounting Bracket

For All Breakers.

B. Attach the Trip Paddle to the Breaker Trip Bar, as shown, using the (1) .250-20 × .750" carriage bolt, (1) flat washer, (1) lock washer, and (1) .250-20 nut supplied. Do not fully tighten the hardware at this time.

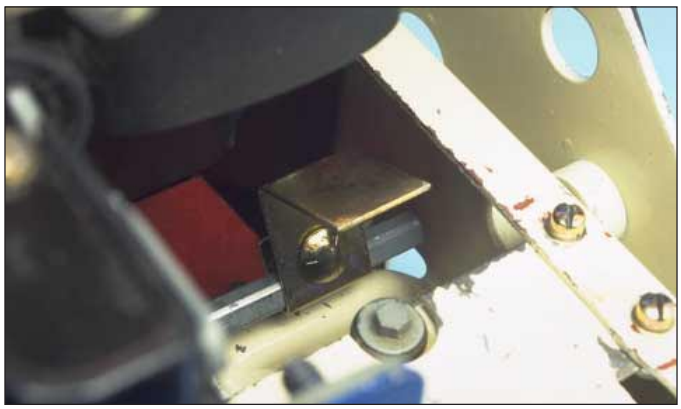


Fig. 30 Trip Paddle Mounted to the Breaker Trip Bar

C. Remove and save the cotter pin and washer that secures the Reset Arm to the DTA Reset Cam Assembly. Remove the Reset Arm.

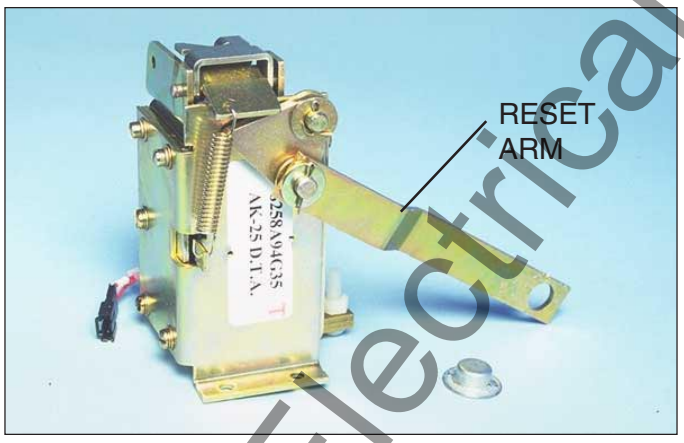


Fig. 31 Removing the Reset Arm

D. Slide the Reset Arm onto the right side of the Breaker Crossbar as shown. Install the supplied press nut on the end of the Breaker Crossbar to secure the Reset Arm. Care should be taken to not damage the Breaker Crossbar when installing the press nut.

Fig. 32 Installing the Press Nut

NOTE: If the front and rear Breaker Frames were separated during preparation of the Breaker for Retrofitting in Step 2, reassemble the front and rear Breaker Frames at this time. To do this, follow the procedures detailed in Step 2-A through Step 2-F in reverse order.

E. *For Kits Supplied with an Auxiliary Switch Only.* Align the fish paper insulation and the Microswitch with the existing tapped holes in the side of the DTA as shown. Secure the fish paper insulation and Microswitch to the DTA using the (2) .112-40 × .500" screws supplied.

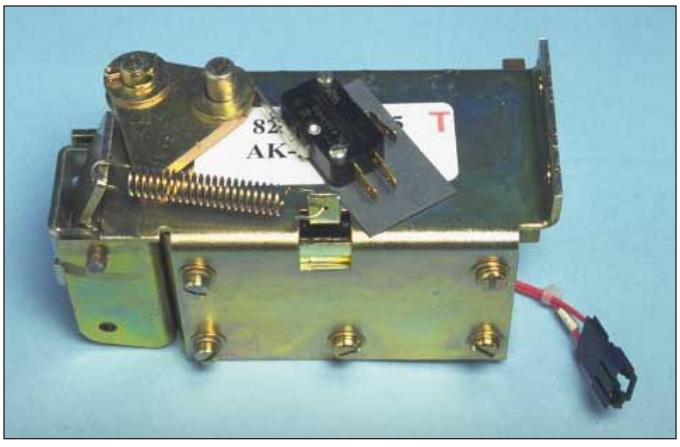
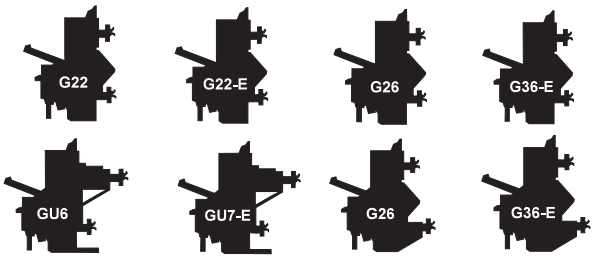


Fig. 33 Auxiliary Switch Mounted to the DTA Assembly



F. *For Manually Operated Breakers Only*. Align the DTA Assembly with the existing holes in the right side of the Breaker Platform, as shown. Secure the DTA Assembly to the Breaker Platform using the (2) .190-32 × .500" screws, (2) flat washers, (2) lock washers, and (1) .190-32 locking plate supplied.

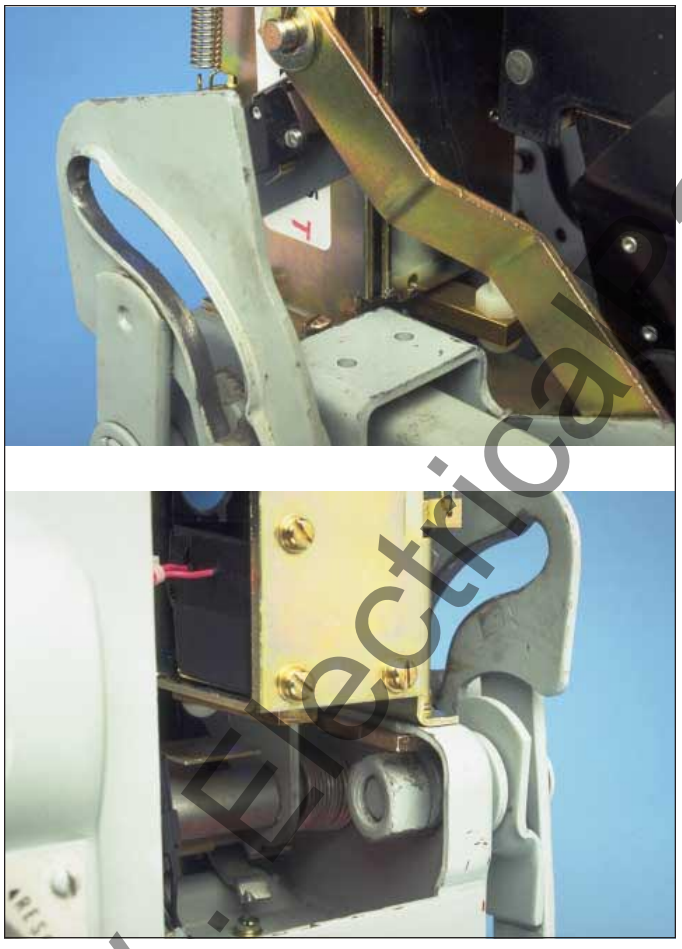
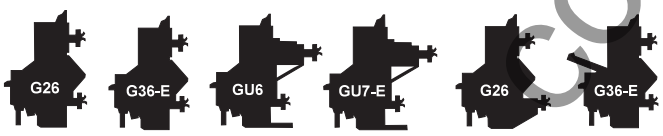


Fig. 34 DTA Assembly Mounted to the Breaker – Manually Operated



G. *For Electrically Operated Breakers Only.* Remove and scrap the two (2) screws that hold the existing Control Relay to the right side of the Breaker Platform. Gently lift the Control Relay up and out of the way to allow access to the platform directly below. Note that the Control Relay is still connected, via wires, to the Breaker.

Fig. 35 Temporary Removal of the Control Relay

Using a suitable epoxy adhesive (not provided), secure the supplied Insulation Barrier to the Breaker Platform, as shown, directly below the area where the Control Relay was mounted.

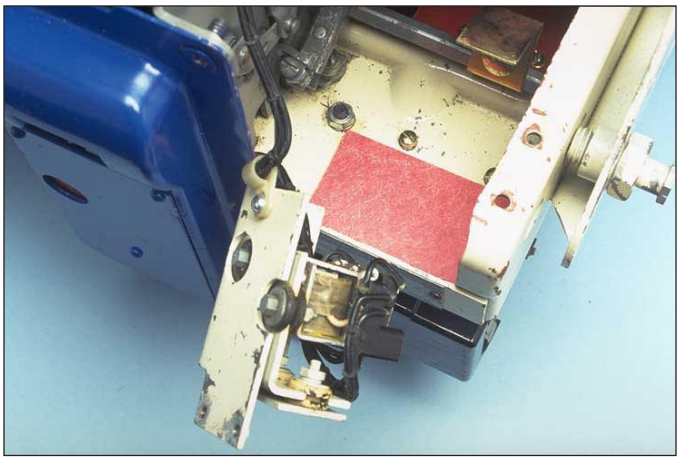


Fig. 36 Control Relay Insulation Barrier Installed in the Breaker

Align the DTA Assembly with the existing holes from above the right side of the Breaker Platform, as shown. Align the supplied spacer and the Control Relay from below the right side of the Breaker Platform, as shown. Secure the DTA Assembly, spacer, and Control Relay to the Breaker Platform using the (2) .190-32 × 1.00" screws, (2) lock washers, and (2) flat washers supplied. No locking plate is required since the holes in the Control Relay are tapped.

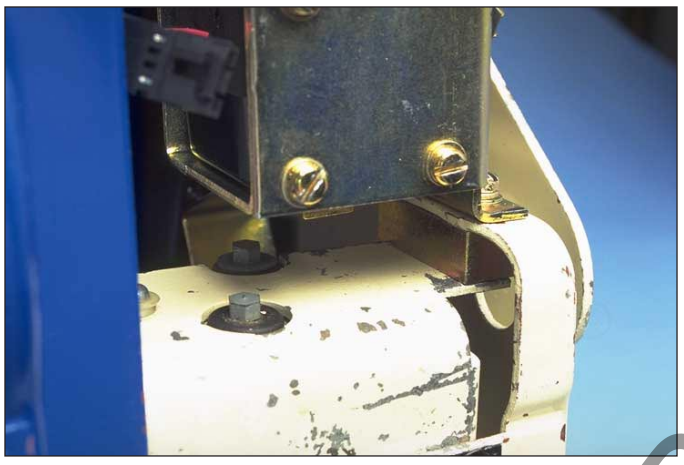


Fig. 37 PTA Assembly Mounted to the Breaker – Electrically Operated

For All Breakers.

H. Align the Reset Arm with the DTA Reset Cam Assembly. Secure the Reset Arm to the DTA Reset Cam Assembly using the original flat washer and cotter pin removed in Step 7 - B. Note that, as shown in the photo, the Cam Assembly must be pointing downward.

Fig. 38 Reset Arm Attached to the DTA Reset Cam Assembly

⚠ CAUTION

IF THE RESET ARM IS ATTACHED WITH THE CAM ASSEMBLY IN THE WRONG POSITION, THE DTA WILL NOT TRIP THE BREAKER.

I. Install the DTA Cross Brace, as shown, between the DTA Assembly and the existing Phillips head screw located on the top right of the Breaker Face Plate. Use the (1) .190-32 × .500" screw, (2) flat washers, (1) lock washer, .190-32 nut, and (1) .250-20 nut supplied to secure the DTA Cross Brace to the DTA Assembly.

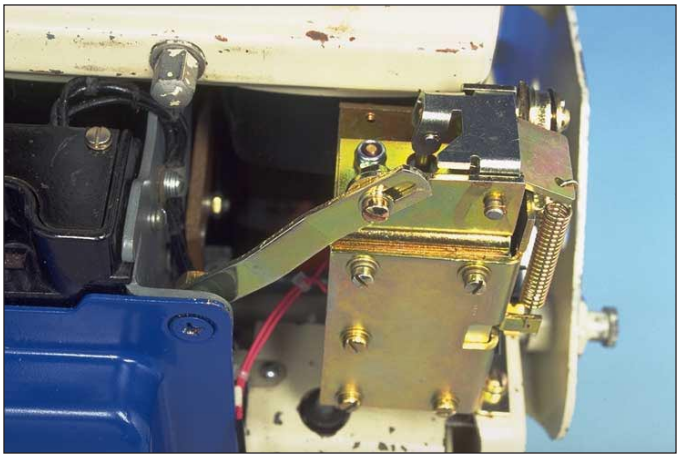


Fig. 39 DTA Cross Brace Secured to the Breaker and DTA Assembly

J. Move the Trip Paddle (installed in Step 7-A) along the Breaker Trip Bar until it is positioned directly under the nylon striking screw on the DTA Assembly. Tighten the Trip Paddle onto the Breaker Trip Bar.

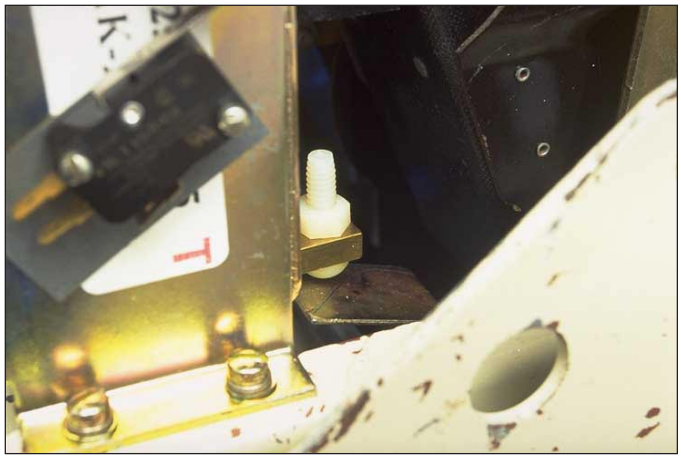


Fig. 40 Correct Position of the Trip Paddle

⚠ WARNING

THE FOLLOWING STEPS MUST BE PERFORMED WITH THE BREAKER IN THE CLOSED POSITION. GUARD AGAINST THE BREAKER UNINTENTIONALLY OPENING DURING THESE STEPS. KEEP HANDS AND FINGERS AWAY FROM MOVING PARTS WITHIN THE BREAKER.

K. CLOSE the Breaker. With the Breaker in the CLOSED position, check the gap between the head of the nylon DTA adjusting screw and the Trip Paddle. The gap should be between .06" and .09". If the gap is not within this range, loosen the stop nut and turn the DTA Adjusting screw until the required gap is obtained. Tighten the stop nut.

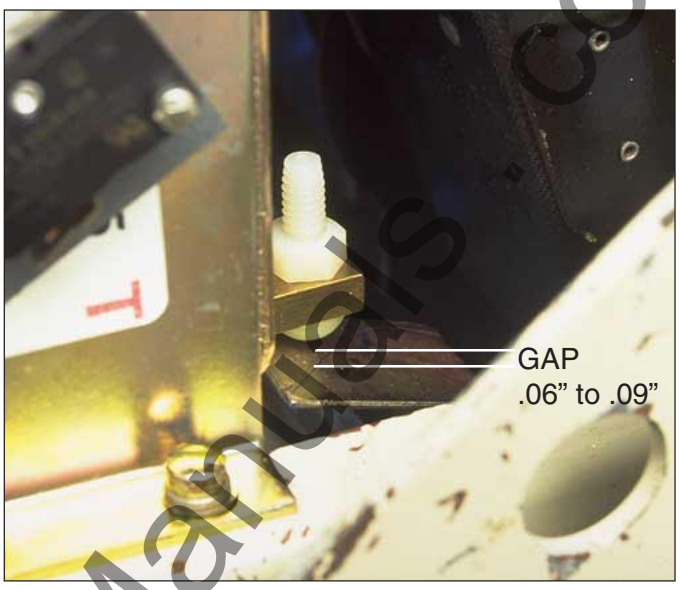
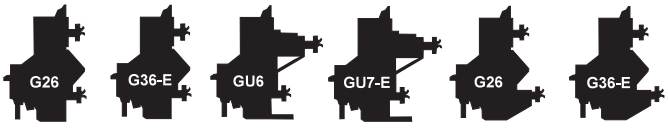


Fig. 41 Adjusting the Gap

L. Return the Breaker to the OPEN position.

STEP 8: INSTALLING THE TRIP UNIT

Fig. 42 Overview – Trip Unit Assembly Installed on the Breaker



NOTE: *For Electrically Operated Breakers Only.* If the Breaker being Retrofitted is equipped with a "Y" Relay, it must be relocated to allow for the proper installation of the Trip Unit Assembly. This relocation is the sole responsibility of the Retrofitter. A suggested relocation is shown in Repositioning Plan "A".

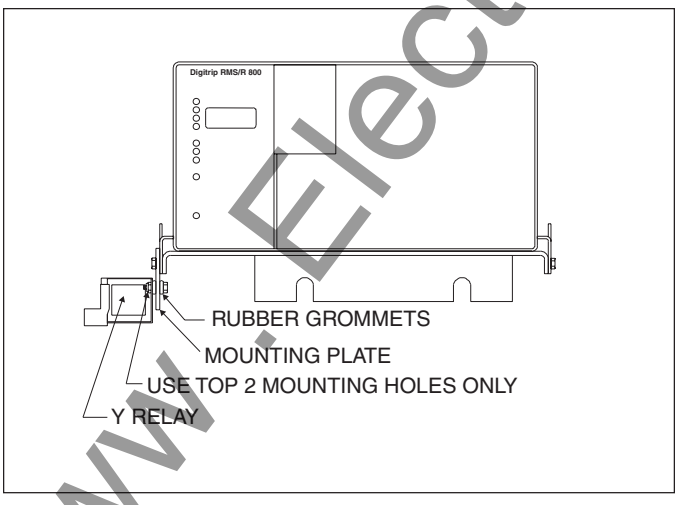


Fig. 43 Repositioning Plan "A"

For All Breakers.

A. Align the Trip Unit with the holes in the Trip Unit Mounting Bracket as shown. Secure the Trip Unit to the Trip Unit Mounting Bracket using the (2) .190-32 × 4.00" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.

B. Mount the Trip Unit Support Brackets to the sides of the Trip Unit Mounting Bracket, as shown, using the (4) .138-32 × .375" screws, (4) lock washers, (8) flat washers, and (4) nuts supplied. Note that the Support Brackets are installed so they "pinch" the Trip Unit in place.

Fig. 44 Mounting Bracket and Support Brackets Mounted to the Trip Unit

C. Mount the Insulation Barrier Mounting Clips to the inside of the left and right Support Brackets, as shown, using the (2) .164-32 × .312" screws, (2) lock washers, and (2) flat washers supplied. Note that the small leg of each Mounting Clip should be facing outwards.

D. Mount the Insulation Barrier to the Insulation Barrier Mounting Clips, as shown, using the (4) .112-40 × .250" screws, (4) lock washers, and (4) flat washers supplied.

Fig. 45 Insulation Barrier Mounted to the Trip Unit Assembly

E. Loosen the existing hardware securing the Arc Chute Retaining Bracket. Slide the Trip Unit Mounting Bracket between the mounting hardware and the Arc Chute Retaining Bracket as shown. Tighten the existing hardware to secure the Trip Unit Assembly to the Breaker.

F. Remove the Trip Unit Cover and install the Rating Plug. Replace the Trip Unit Cover.

Fig. 46 Trip Unit Assembly Mounted to the Breaker with Rating Plus Installed

STEP 9: INSTALLING THE SENSORS AND CONNECTING THE HV LINE SIDE WIRES

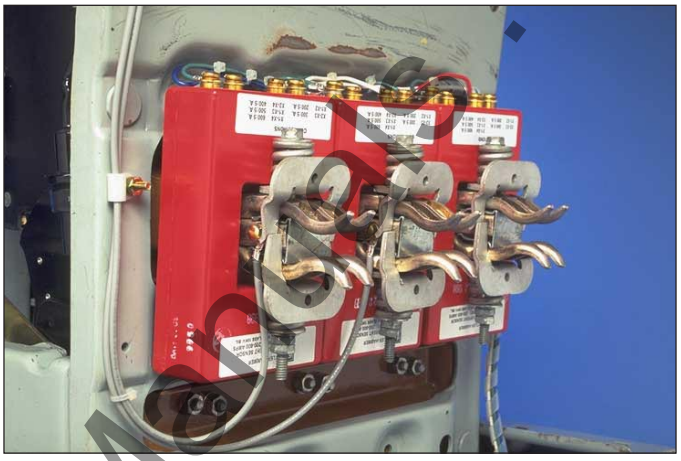


Fig. 47 Overview – Sensors Installed on the Breaker

A. Remove the Finger Clusters from the top Breaker Stab of each Phase.

NOTE: Measure and record the distance between the end of the bolt and nut securing the tension spring(s) to the Finger Clusters. This distance is critical to insure proper spring tension during reassembly of the Finger Clusters.

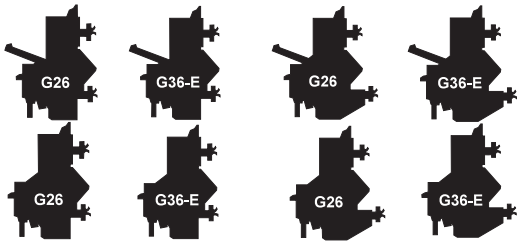
NOTE: When removing the Finger Cluster mounting hardware and tension springs, be sure to note their exact location. The exact location and orientation of these parts differ between versions of the Breaker. Refer to the distance between the end of the bolt and the nut, recorded at the beginning of this Step, when reinstalling the Finger Clusters. The distance MUST be the same to insure proper spring tension

For Kits Supplied with a Breaker Mounted CPT Only.

NOTE: The power convention of the General Electric AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25, & AKU-3/3A-25, and Higher AK-25 Series 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. The holes tapped to accept the .190" in the "Z"-Shaped Copper Connectors should have been used to connect the HV Wires in Step 6.



B. *For Non-Fused and Bottom Fused Breakers Only.* Drill and tap one hole in the side of the Phase 1 and 2 or Phase 2 and 3 top Breaker Stabs to accept a .190-32 screw. The holes should be drilled approximately .81" from the outer end of the Stab. It may be necessary to remove the Phase 2 Breaker Stab in order to drill the holes in the Phase 2 or Phase 1 Breaker Stabs.

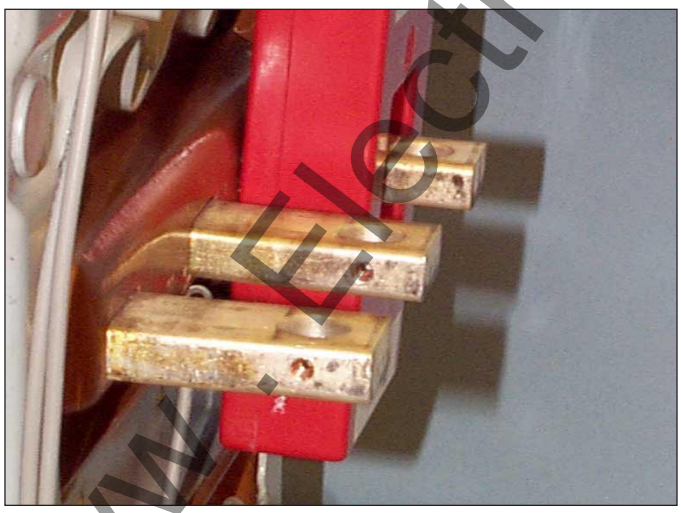
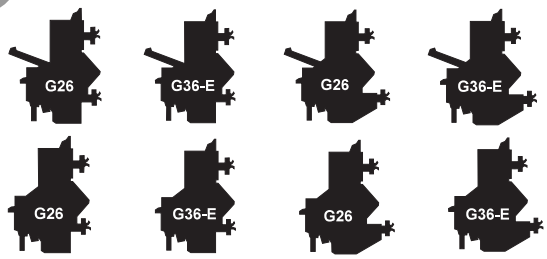


Fig. 48 Breaker Stabs Drilled and Tapped for HV Wire Connection

Because the AK-2/2A-15 Series Breakers have thinner Breaker Stabs, drill one .128" hole in the side of the Phase 1 and 2 or Phase 2 and 3 top Breaker Stabs. The holes should be drilled approximately .81" from the outer end of the Stab. It may be necessary to remove the Phase 2 Breaker Stab in order to drill the holes in the Phase 2 or Phase 1 Breaker Stabs.

For Top Fused Breakers Only. It is not necessary to drill holes in the Breaker Stabs of these Breakers. The Line Side HV Wires will be attached to the Fuse mounting Hardware.



C. *For AK/AKU-25 Series Breakers Only.* Slide one (1) Sensor over each of the top Breaker Stabs. Install the Sensors so that the labels are facing outward and the terminals are pointing upward.

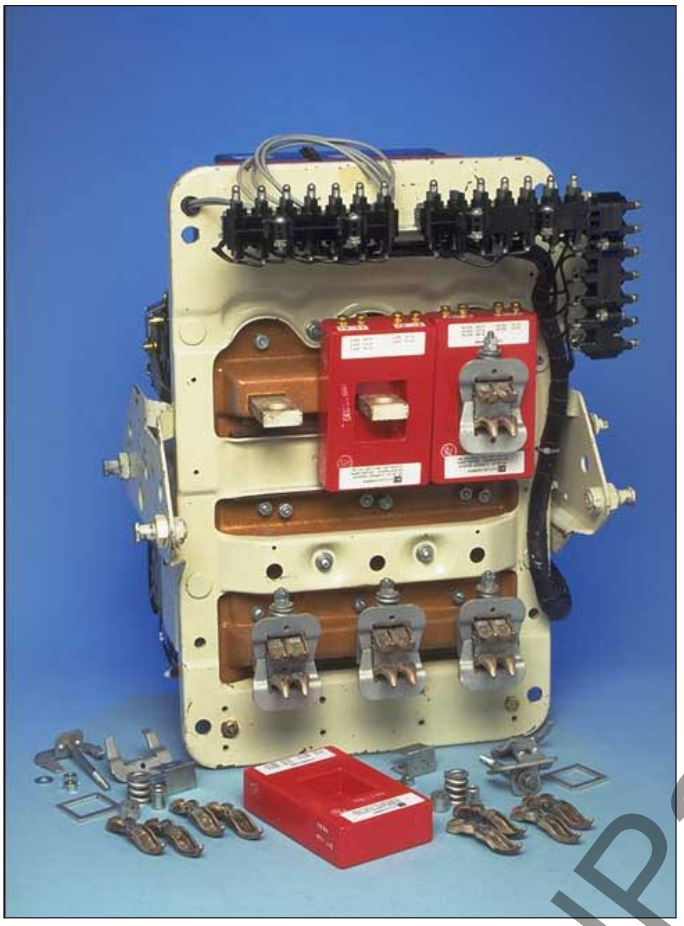
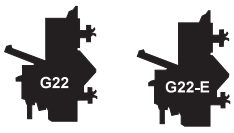


Fig. 49 Installing the Sensors – AK/AKU-25 Breakers



D. *For AK 2/2A-15 Series Breakers Only.* Because these versions of the Breaker have thinner Breaker Stabs, the use of spacers is necessary to correctly position the Sensors. Place the angled spacer on top of the Breaker Stab with the angle oriented towards the back of the Breaker. While holding the other spacer against the bottom of the Breaker Stab, slide one (1) Sensor over each of the top Breaker Stabs. Install the Sensors so that the labels are facing outward and the terminals are pointing upward.

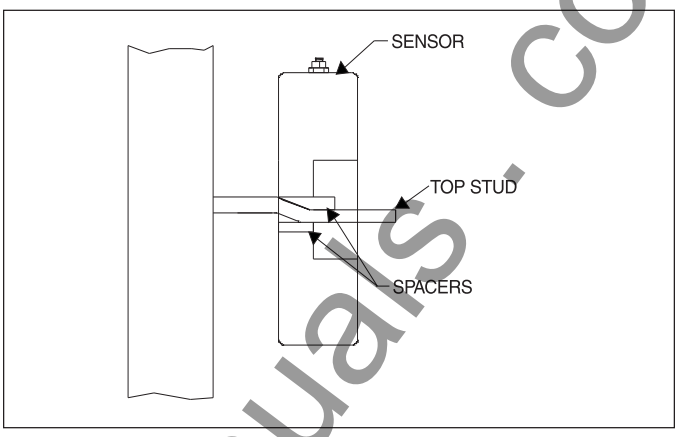


Fig. 50 Detail "A"

Fig. 51 Detail of Sensor Spacers

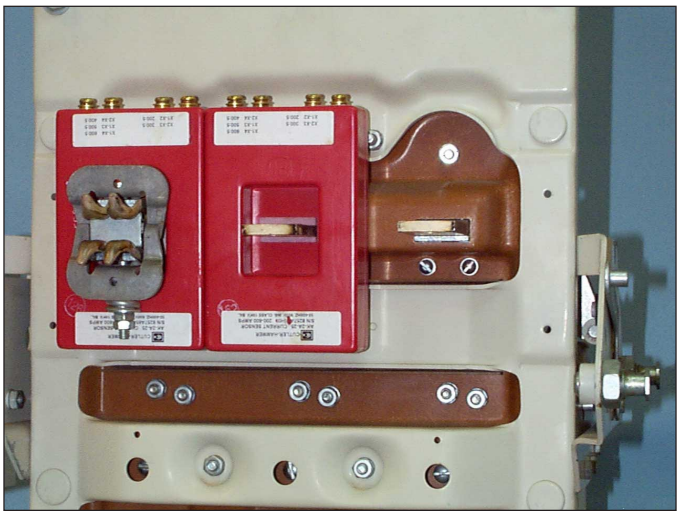


Fig. 52 Installing the Sensors – AK 2/2A-15 Series Breakers

E. *For Top Fused Breakers Only.* The Copper Connector that connects the Current Limiting Fuse to the Phase 2 Breaker Stab must be shortened to allow proper positioning of the Phase 2 Sensor. Remove the Copper Connector from the Breaker and cut the Copper Connector as shown in Cutting Plan "C".

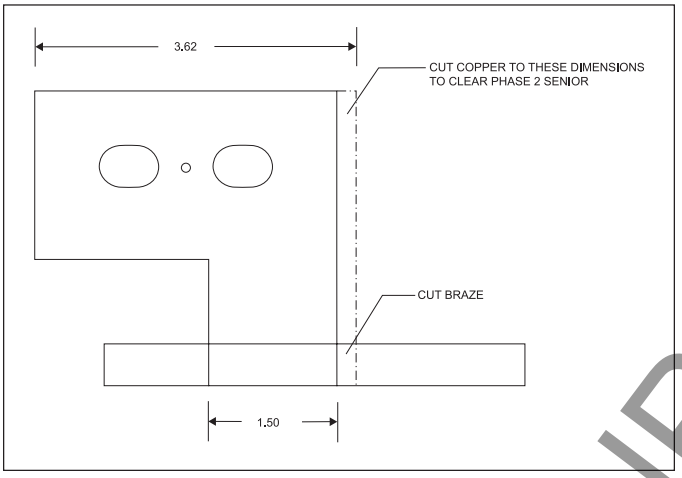


Fig. 53 Cutting Plan "C"

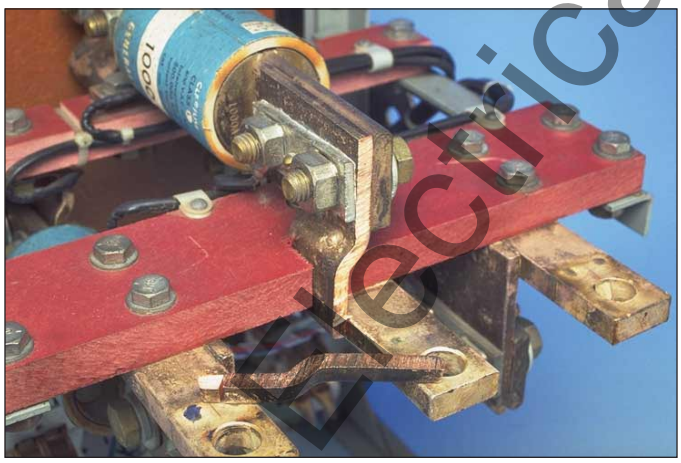


Fig. 54 Copper Connector After Cutting

F. Reinstall the Copper Connector using the original mounting hardware.

G. Slide the fish paper insulation supplied over the Phase 2 Breaker Stab.

Fig. 55 Fish Paper Installed on the Phase 2 Breaker Stab

H. Slide one (1) Sensor over each of the top Breaker Stabs. Install the Sensors so that the labels are facing outward and the terminals are pointing upward.

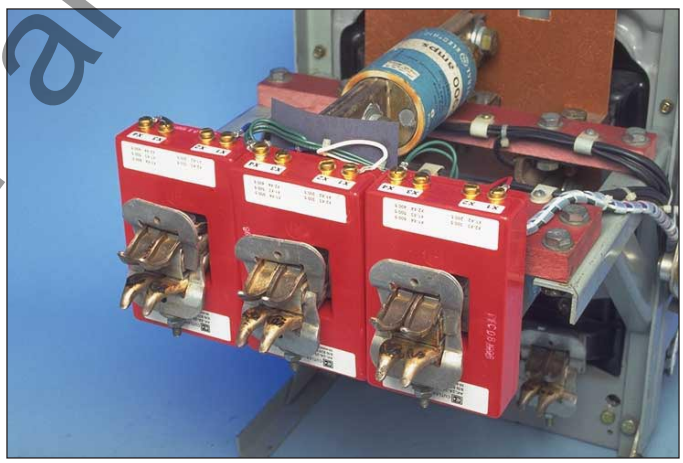
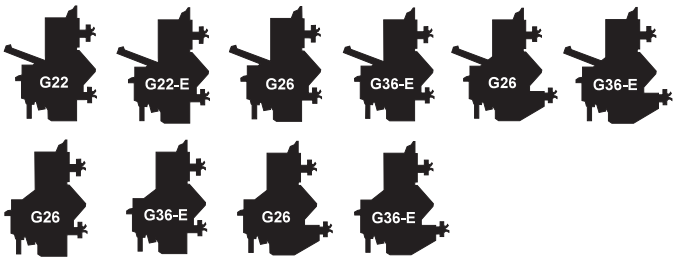


Fig. 56 Sensors Installed on the Breaker – Top Fused Breakers

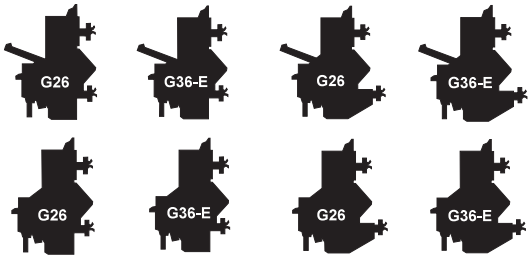
For All Breakers.

For Kits Supplied with a Breaker Mounted CPT Only.

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



I. *For Non-Fused and Bottom Fused Breakers Only.*



Cut the HV Wires to an appropriate length for attachment to the selected Breaker Stabs. Strip an appropriate length of insulation from each HV Wire and attach a .190" ring terminal. Using the (2) .190-32 × .500" screws, (2) lock washers, and (2) flat washers supplied, connect the HV Wires to the appropriate Breaker Stabs using the holes drilled and tapped in Step 9-B.

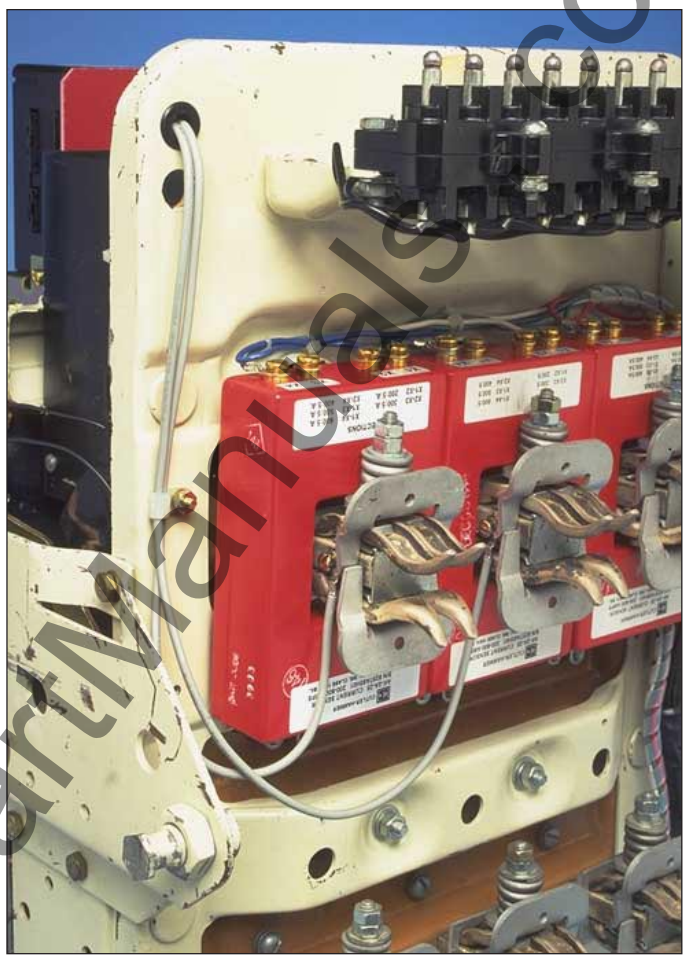


Fig. 57 HV Wires Connected to the Breaker Stabs – Non-fused and Bottom Fused Breakers

Cut the HV Wires to an appropriate length for attachment to the selected Breaker Stabs. Strip an appropriate length of insulation from each HV Wire and attach a .138" ring terminal. Using the (2) .138-20 × .375" thread cutting screws, (2) lock washers, and (2) flat washers supplied, connect the HV Wires to the appropriate Breaker Stabs using the holes drilled and tapped in Step 9-B.

J. *For Top Fused Breakers Only.* Cut the HV Wires to an appropriate length for attachment to the existing hardware securing the top fuse assembly to the selected Breaker Stabs. Strip an appropriate length of insulation from each HV Wire and attach a .500" ring terminal. Using the existing hardware, connect the HV Wires to the appropriate Breaker Stabs.

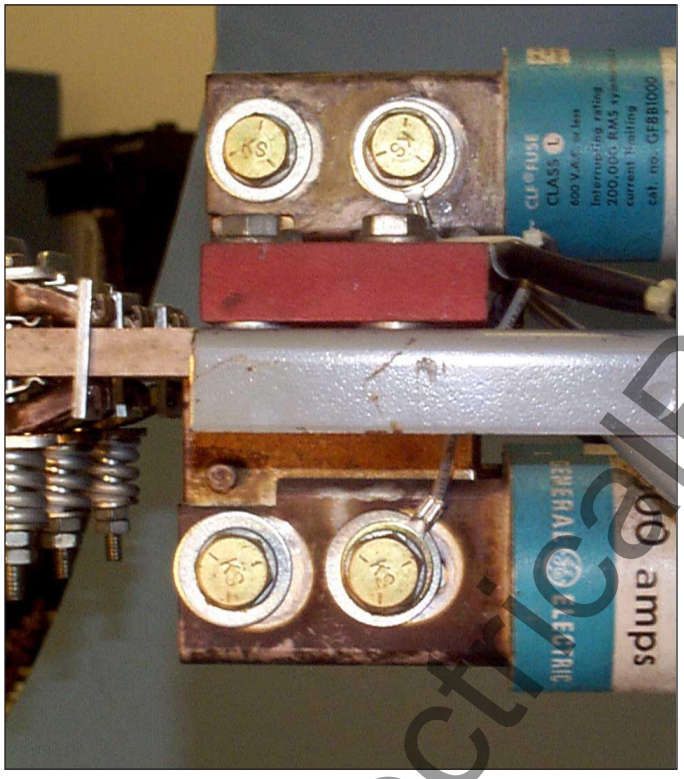


Fig. 58 HV Wires Connected to the Breaker Stabs – Top Fused Breakers

For All Breakers.

K. Reinstall the Finger Clusters removed in Step 9-A.

NOTE: When installing the Finger Clusters, be sure to reinstall the Finger Cluster Components, original mounting hardware, and tension springs in their original location and orientation. Refer to the distance between the end of the bolt and the nut, recorded at the beginning of this Step, when reinstalling the Finger Clusters. The distance MUST be the same to insure proper spring tension.

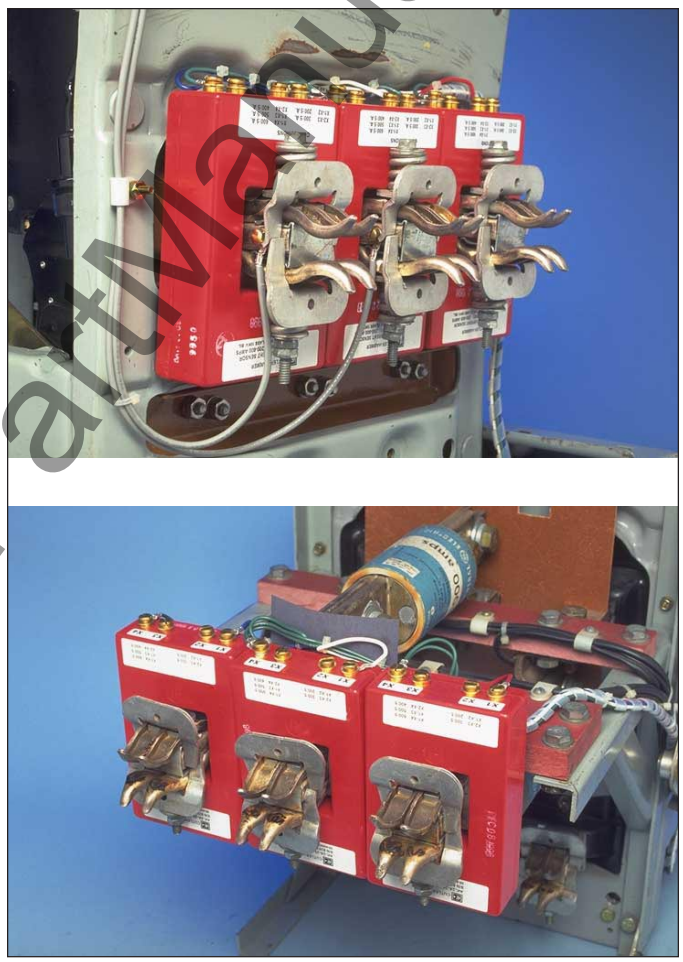


Fig. 59 Finger Clusters Reinstalled on the Breaker Stabs

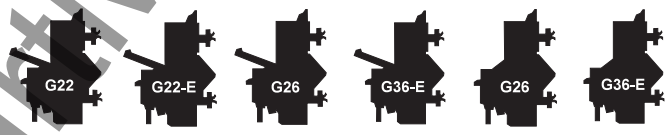
STEP 10: CONNECTING THE SENSOR HARNESS

Fig. 60 Overview – Installing the Sensor Harness

A. Feed the Sensor Harness through the grommet in the left side of the Aux. CT Module. Connect the Sensor Harness to the proper terminals on the Aux. CT Module. Refer to Section 12 of the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications. (The long tan and green wires are for a remote Neutral Sensor on a 4 Wire Ground Breaker. They should be removed if not required.)

   Connect the green ground wire from the Sensor Harness (with the ring terminal) to the existing hole in the left side of the Aux. CT Module using the (1) .190-32 × .375" screw, (1) lock washer, and (1) flat washer supplied.

Fig. 61 Sensor Harness Connected to the Aux. CT Module



B. *For Non-Fused Breakers Only.* Install the supplied rubber grommet in the existing hole near the bottom, left corner of the Breaker Back Plate. Feed the Sensor Harness through the grommet just installed, then up the rear of the Breaker towards the Sensors.

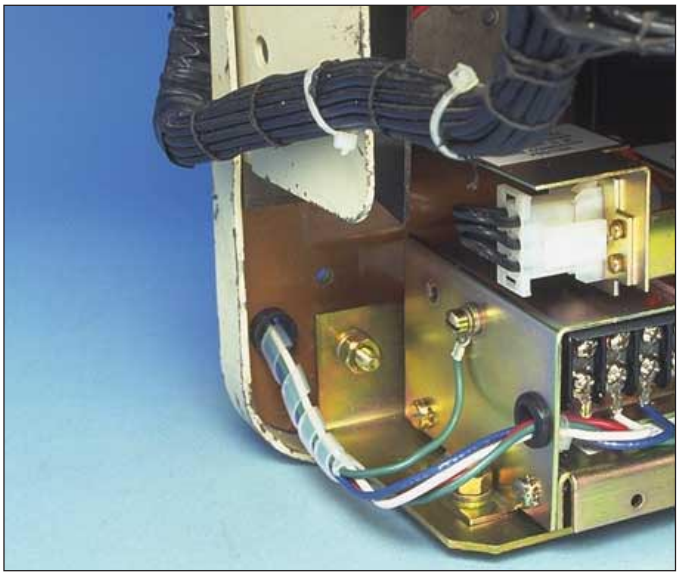
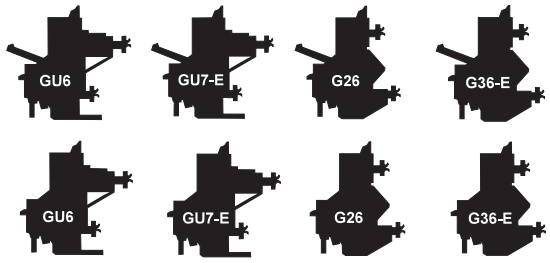


Fig. 62 Routing of the Sensor Harness – Non-Fused Breakers



C. *For Top and Bottom Fused Breakers Only.* Route the Sensor Harness, as shown, along the same path as the existing Fuse Indicator Wiring to the back of the Breaker, then up towards the Sensors. Use the supplied wire ties to secure the Sensor Harness to the Fuse Indicator Wiring.

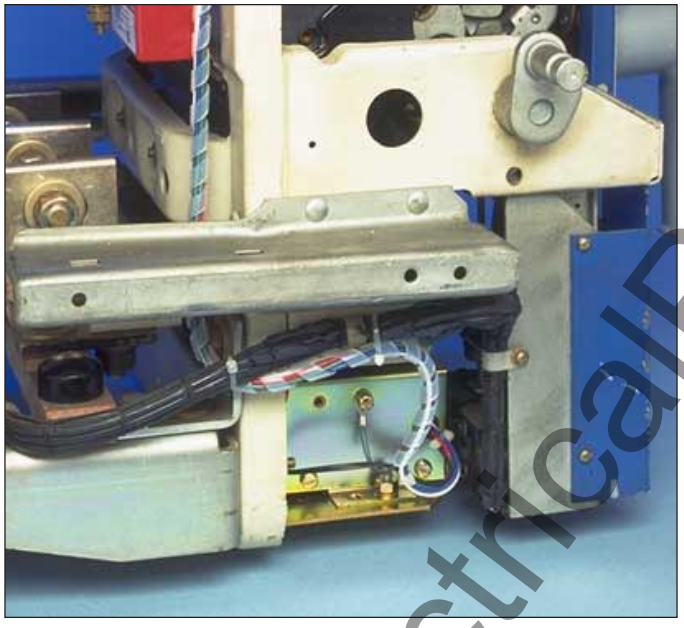


Fig. 63 Routing of the Sensor Harness – Fused Breakers

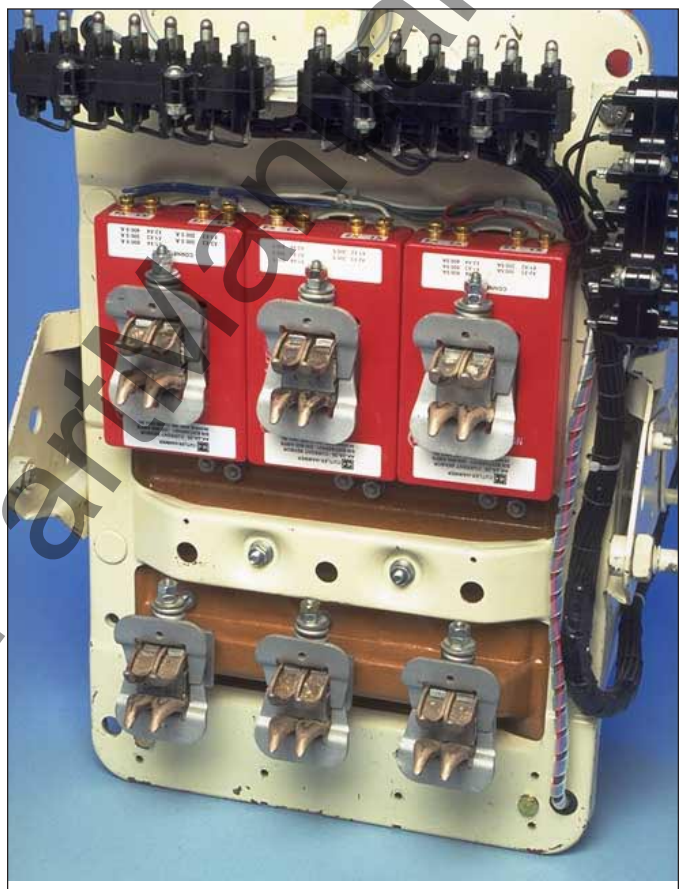
For All Breakers.

D. Route the Sensor Harness to the Sensors. 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 convention applies.

Table 5 Sensor Taps Ratings

Sensor Style No.	*Terminal Com.*	*Amps*
8257A65H01	X1- X4 =	600 A
	X2- X4 =	400 A
	X1- X2 =	200 A
8189A45H01	X1- X3 =	200 A



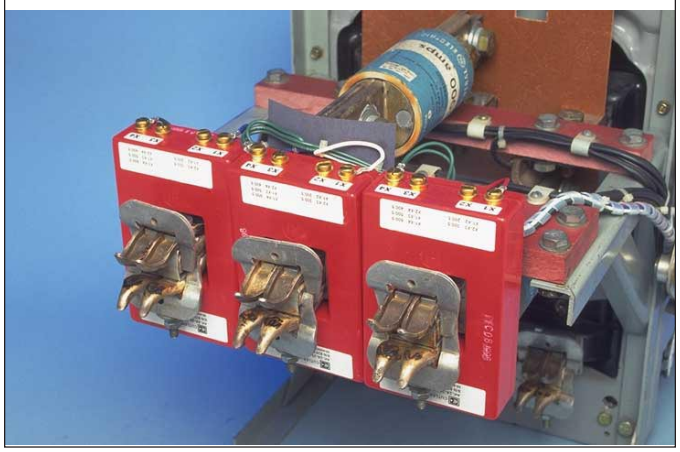


Fig. 64 Sensor Harness Connected to the Sensors

STEP 11: FINAL CONNECTION OF THE HARNESSES AND WIRING

Fig. 65 Overview – Final Wire and Harness Connecting

A. Plug the DTA Extension Harness into the receptacle on the DTA Harness. Route the DTA Extension Harness, as shown, down through the opening near the front, right corner of the Breaker Platform. Then route the DTA Extension Harness behind the Aux. CT Module Assembly to the left side of the Aux. CT Module.

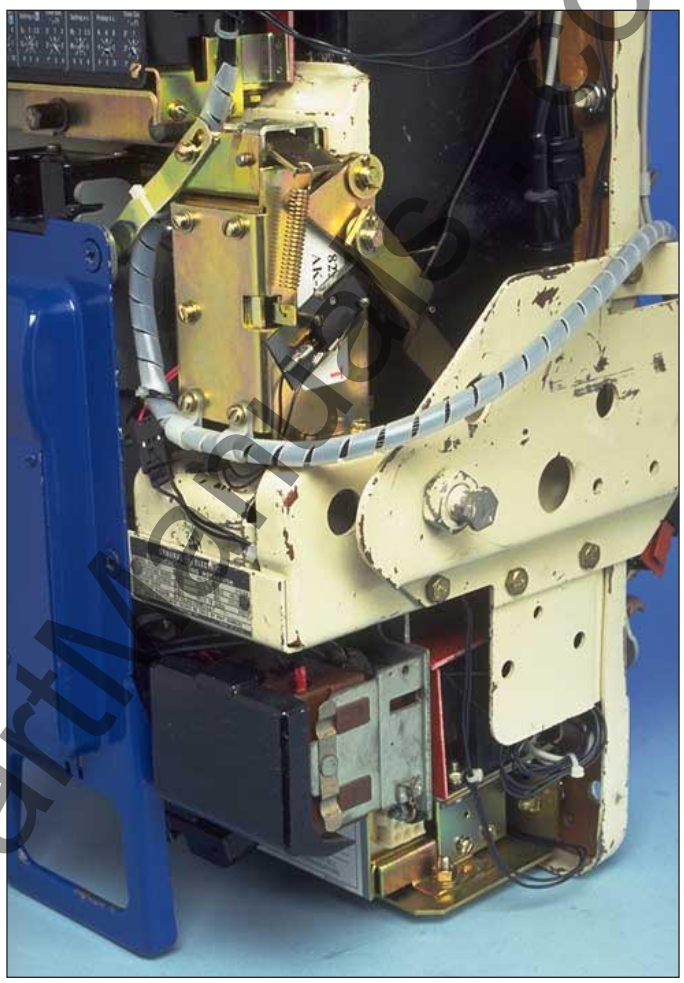


Fig. 66 DTA Extension Harness Connection and Routing

B. Feed the two wires from the DTA Extension Harness through the grommet in the left side of the Aux. CT Module. Connect the DTA Extension Harness to the terminals of the Aux. CT Module: positive (+) wire to the OP terminal and the unmarked wire to the ON terminal.

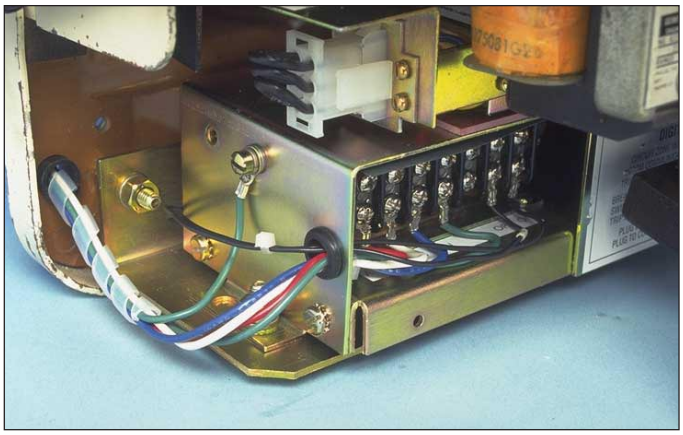


Fig. 67 DTA Extension Harness Connected to the Aux. CT Module

C. Plug the white connector on the Aux. CT Harness into the Aux. CT Module. Route the Aux. CT Harness up through the Breaker to the Trip Unit insuring that the harness is clear of all moving parts within the Breaker. Plug the Aux. CT Harness connector into its receptacle on the Trip Unit.

Fig. 68 Aux. CT Harness Connection and Routing

D. Plug the External Harness connectors into their respective receptacles on the right side of the Trip Unit.

Fig. 69 External Harness Connected to the Trip Unit

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

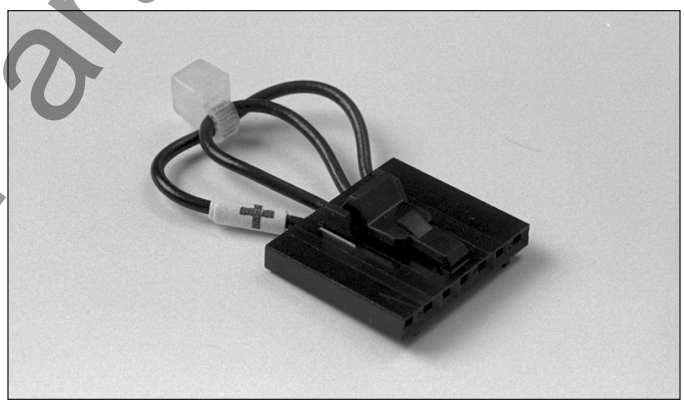


Fig. 70 510 Basic Kit External Harness Plug

E. Route the External Harness down along the DTA Brace then over to the bottom of the DTA mounting shown. Secure the External Harness to the bottom, front of the DTA, as shown, using the (2) wire clamps, (2) .164-32 × .375" screws, (2) lock washers, and (2) flat washers supplied.

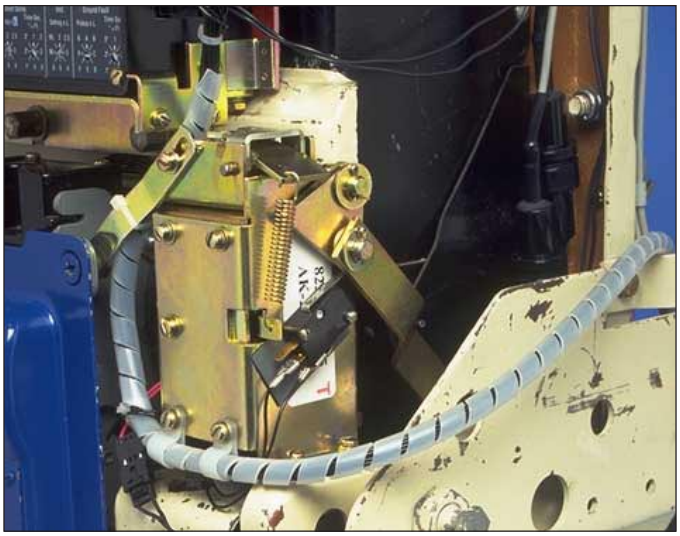


Fig. 71 External Harness Secured to the DTA Assembly

F. *For Kits Supplied with an Auxiliary Switch Only.* Cut the ring terminals off the two wires from the External Harness and replace with the female slide-on terminals provided. Connect one wire to normally open terminal and the other wire to the common terminal of the Auxiliary Switch.

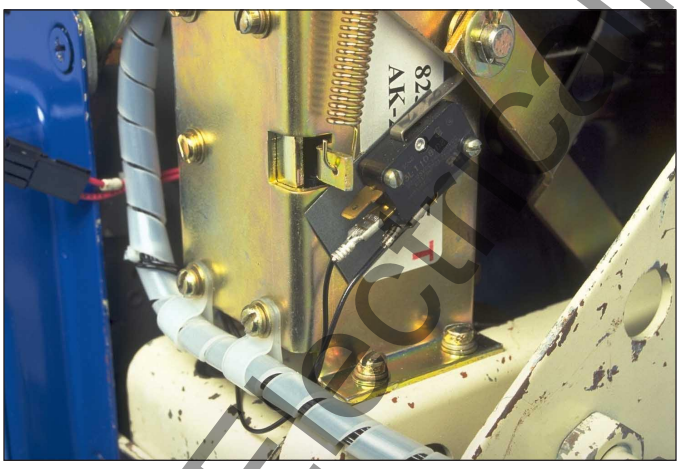


Fig. 72 External Harness Wires Connected to the Auxiliary Switch

G. *For Kits Supplied with a PT Module Only.* Plug the PT Extension Harness into the socket on the PT Module.

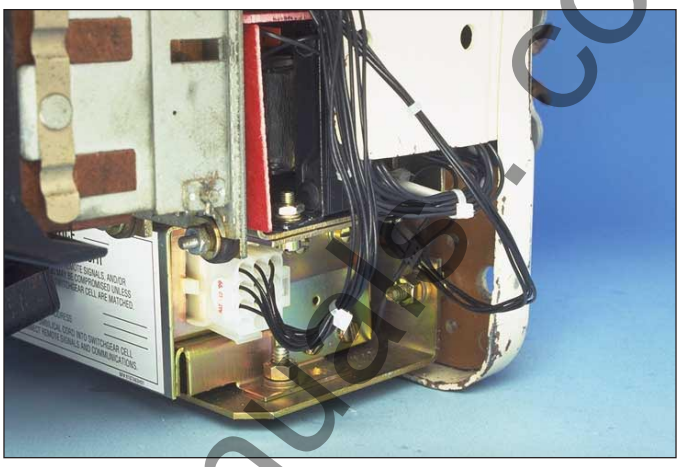


Fig. 73 PT Extension Harness Connected to the PT Module

Following the same path as the Aux. CT Harness, route the PT Extension Harness up to the Trip Unit and External Harness. Plug the connector on the PT Extension Harness into its receptacle on the Extension Harness.

H. *For Kits Supplied with a Breaker Mounted CPT Only.* Remove the External Harness plug installed in the Trip Unit. Insert the black plug from 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.

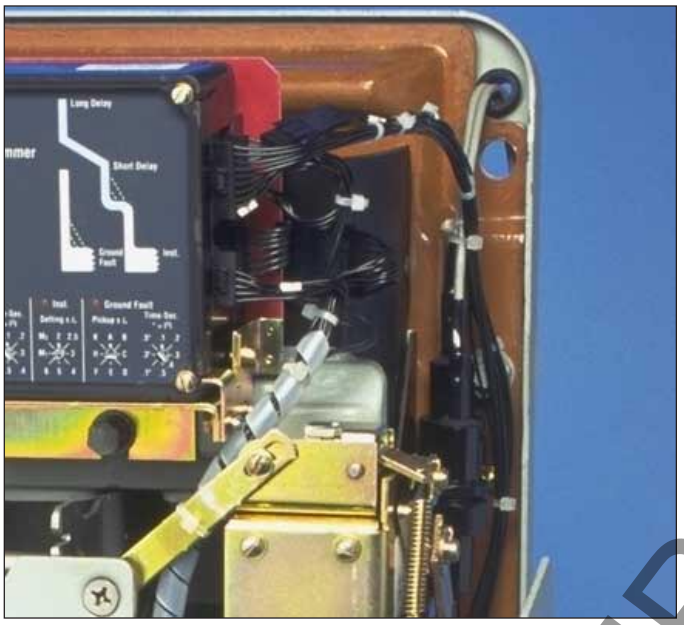


Fig. 74 CPT Harness Connected to the Trip Unit and External Harness

I. Use the wire ties and wire clamps supplied to dress all wires and harnesses to keep them 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 DTA impacts the Trip Paddle. The force necessary to trip the Breaker MUST NOT EXCEED THREE (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 33-855-2), 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. 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.

2. *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 later in the Retrofit Process.

For Kits Supplied with a Cell Harness Only.

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 moving 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 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 System for General Electric AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25, & AKU-3/3A-25, and Higher AK-25 Series Breakers

Step	Description	Style No.	Qty.	Comment
Step 3	Copper Connector Mounting Hardware	8258A94G01	1	
	"Z"-Shaped Copper Connector		3	
	.375-16 × 1.00 Lng. Hex Bolt		6	
	.375 Flat Washer Stl.		6	
	.375 Lock Washer Stl.		6	
	.250-20 × .625 Lng. Screw Fil.		6	
	.250 Flat Washer Stl.		6	
	.250 Lock Washer Stl.		6	
Step 4	Aux. CT Module	6502C78G__	1	
	Aux. CT Module Mounting Hardware	8258A94G06	1	
	Mounting Bracket		1	
	.250-20 × .750 Lng. Hex Bolt		2	
	.250 Flat Washer Stl.		4	
	.250 Lock Washer Stl.		2	
	.250-20 Nut Hex Stl.		2	
	PT Module Kit	6502C82G01	1	Comm. Only
	Glass Poly Insulation		1	
	PT Warning Label		1	
	Ring Terminals (.190, .250, .312, .375, .500)	Each Size	3	
	PT Module Mounting Hardware	8258A94G02	1	
	.190-32 × .375 Lng. Screw Fil.		3	
	.190 Flat Washer Stl.		3	
	.190 Lock Washer Stl.		3	
	.138-32 × .375 Lng. Screw T. C.		2	
	.138 Flat Washer Stl.		2	
	.138 Lock Washer Stl.		2	
	Auxiliary Switch Kit		1	
	Microswitch		1	
	Fish Paper Insulation		1	
	.112-40 × .500 Lng. Screw Fil		2	
	Terminals Female Slide On		2	
	Breaker Mounted CPT Kit	8259A91G05	1	CPT Only
	CPT Module		1	
	CPT Harness		1	
	High Voltage (HV) Wires		2	
	Glass Poly Insulation Plate	Not Used	1	
	Ring Terminals (.138, .190, .250, .312, .375, .500)	Each Size	2	
	CPT Mounting Parts	8258A94G20	1	
	CPT Mounting Bracket		1	
	CPT Assembly Mounting Bracket		1	
	Glass Poly Insulation Barrier Front		1	
	Glass Poly Insulation Barrier Rear		1	
	Glass Poly Insulation Barrier Top		1	

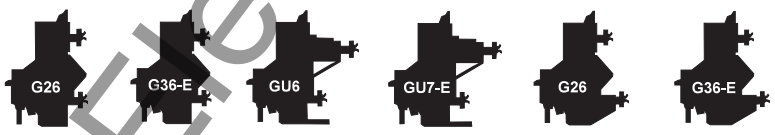
Digitrip Retrofit System for General Electric AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25, & AKU-3/3A-25, and Higher AK-25 Series Breakers (continued)

Step	Description	Style No.	Qty.	Comment
Step 4 (Cont.)	Warning Label (208, 240, & 480 Volt) Each		1	
	.190-32 × .625 Lng. Screw Fil.		2	
	.190-32 × .500 Lng. Screw F. H.		2	
	.190-32 × .500 Lng. Screw Fil.		2	
	.190-32 × .375 Lng. Screw Fil.		8	
	.190 Flat Washer Stl.		14	
	.190 Lock Washer Stl.		12	
	.190-32 Nut Hex Stl.		4	CPT Only
	.164-32 × .750 Lng. Screw Fil.		1	
	.164 Flat Washer Stl.		2	
	.164 Lock Washer Stl.		1	
	.164-32 Nut Hex Stl.		1	
	.138-20 × .375 Lng. Screw T. C.		2	
	.138 Flat Washer Stl.		4	
	.138 Lock Washer Stl.		4	
	Grommet Rubber		1	
	Wire Clamp Nylon		1	
	Wire Tie Nylon		6	
Step 5	Aux. CT Module Assembly	From Step 4	1	
	Ring Terminal .190	From Step 4	3	
	.190-32 × .375 Lng. Screw Fil.	From Step 4	3	Comm. Only
	.190 Flat Washer Stl.	From Step 4	3	
	.190 Lock Washer Stl.	From Step 4	3	
Step 6	Aux. CT Module Assembly	From Step 4	1	
	Grommet Rubber	From Step 4	1	CPT Only
	Aux. CT Module Mounting Parts	8258A94G07	1	
				
	.312-18 Nut Hex Stl.		4	
	.250-20 × 1.50 Lng. Hex Bolt		2	
	.250 Flat Washer Stl.		4	
	.250 Lock Washer Stl.		2	
	.250-20 Nut Hex Stl.		2	
				
	.250-20 × .750 Lng. Hex Bolt		2	
	.250 Flat Washer Stl.		2	
	.250 Lock Washer Stl.		2	

Digitrip Retrofit System for General Electric AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25, & AKU-3/3A-25, and Higher AK-25 Series Breakers (continued)

Step	Description	Style No.	Qty.	Comment
Step 7	Trip Paddle Parts	8258A94G08	1	
	Trip Paddle		1	
	.250-20 × .750 Lng Carriage. Bolt		1	
	.250 Flat Washer Stl.		1	
	.250 Lock Washer Stl.		1	
	.250-20 Nut Hex Stl.		1	
	DTA Assembly	8258A94635	1	
	Auxiliary Switch Kit	From Step 4	1	Comm. Only
	Microswitch	From Step 4	1	
	Fish Paper Insulation	From Step 4	1	
	.112-40 × .500 Lng. Screw Fil	From Step 4	2	
	Terminals Female Slide On	From Step 4	2	
	DTA Mounting Parts	8258A94G09	1	
	DTA Brace		1	
	Press Nut		1	
	.250-20 Nut Hex Stl.		1	
	.190-32 × .500 Lng. Screw Fil.		1	
	.190 Flat Washer Stl.		2	
	.190 Lock Washer Stl.		1	
	.190-32 Nut Hex Stl.		1	
	.164-32 × .375 Lng. Screw Pan Head		2	
	.164 Flat Washer Stl.		2	
	.164 Lock Washer Stl.		2	

	.190-32 × .500 Lng. Screw Fil.		2	
	.190 Flat Washer Stl.		2	
	.190 Lock Washer Stl.		2	
	.190-32 Locking Plate Stl.		1	



	Insulation Barrier		1	
	Spacer		1	
	.190-32 × 1.00 Lng. Screw Fil.		2	
	.190 Flat Washer Stl.		2	
	.190 Lock Washer Stl.		2	

Digitrip Retrofit System for General Electric AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25, & AKU-3/3A-25, and Higher AK-25 Series Breakers (continued)

Step	Description	Style No.	Qty.	Comment
Step 8	Trip Unit	See Pick List	1	
	Rating Plug	See Pick List	1	
	Trip Unit Assembly Parts	8258A94G10	1	
	Mounting Bracket		1	
	Insulation Barrier		1	
	Support Clip L. H.		1	
	Support Clip R. H.		1	
	Mounting Clip		2	
	Digitrip Nameplate		1	
	Spacer Brass		2	
	.190-32 × 4.00 Lng. Screw Fil.		2	
	.190 Flat Washer Stl.		4	
	.190 Lock Washer Stl.		2	
	.190-32 Nut Hex Stl.		2	
	.164-32 × .312 Lng. Screw Fil. Pan / Lock		2	
	.164 Flat Washer Stl.		2	
	.164 Lock Washer Stl.		2	
	.138-32 × .375 Lng. Screw Fil.		4	
	.138 Flat Washer Stl.		8	
	.138 Lock Washer Stl.		4	
	.138-32 Nut Hex. Stl.		4	
	.112-40 × .250 Lng. Screw Fil.		4	
	.112 Flat Washer Stl.		4	
	.112 Lock Washer Stl.		4	
Step 9	Sensor	8257A65H01	3	
	Sensor	8189A45H01	3	AK-15 Only

.190 Ring Terminal	From Step 4	2	CPT Only
.190-32 × .500 Lng. Screw Fil.	From Step 4	2	
.190 Flat Washer Stl.	From Step 4	2	
.190 Lock Washer Stl.	From Step 4	2	

.138-20 × .375 Lng. Screw T. C.	From Step 4	2	CPT Only
.138 Flat Washer Stl.	From Step 4	4	
.138 Lock Washer Stl.	From Step 4	4	

Digitrip Retrofit System for General Electric AK-2/2A-15, AK-2/2A-25, AKU-2/2A-25, AK-3/3A-25, & AKU-3/3A-25, and Higher AK-25 Series Breakers (continued)

Step	Description	Style No.	Qty.	Comment
Step 9 (Cont.)				
	Sensor Mounting Parts	8258A94G11	1	
	Spacer Top		3	
	Spacer Bottom		3	
				
	Sensor Mounting Parts	8258A94G15	1	
	Fish Paper Insulation		1	
	.500 Ring Terminal	From Step 4	2	CPT Only
Step 10	Sensor Harness Mounting Parts	8258A94G12	1	
	Sensor Harness	See Pick List	1	
	Grommet Rubber		1	
	.190 - 32 × .375 Lng. Screw Fil.		1	
	.190 Flat Washer Stl.		1	
	.190 Lock Washer Stl.		1	
	Wire Ties Nylon		6	
Step 11	DTA Extension Harness	6503C28G01	1	
	Aux. CT Harness	6502C84G02	1	
	External Harness	6502C83G__	1	
	.164 - 32 × .375 Lng. Screw Pan Head	From Step 7	2	
	.164 Flat Washer Stl.	From Step 7	2	
	.164 Lock Washer Stl.	From Step 7	2	
	PT Extension Harness	6502C85G01	1	Comm. Only
	Terminals Slide On	From Step 7	2	Comm. Only
	Harness Mounting Parts	8258A94G13	1	
	Wire Clamps Nylon		2	
	Wire Ties Nylon		6	
Step 14	Cell Harness	6503C57G__	1	All Except 500 Basic

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

Table 6 Torque Values for General Mounting and Screw Size Conversion

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

Table 7 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

Fig. 75 Retrofit Components

A. Sensors
B. Trip Unit
C. Aux. CT Module
D. Direct Trip Actuator (DTA)
E. CPT Kit (Optional)
F. Rating Plug
G. Bottom Studs
H. Aux. Switch
I. Aux. CT Harness
J. Sensor Harness
K. PT Module
L. External Harness
M. Cell Terminal Block
N. “Z-Shaped” Connectors
O. HV Wires

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

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

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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