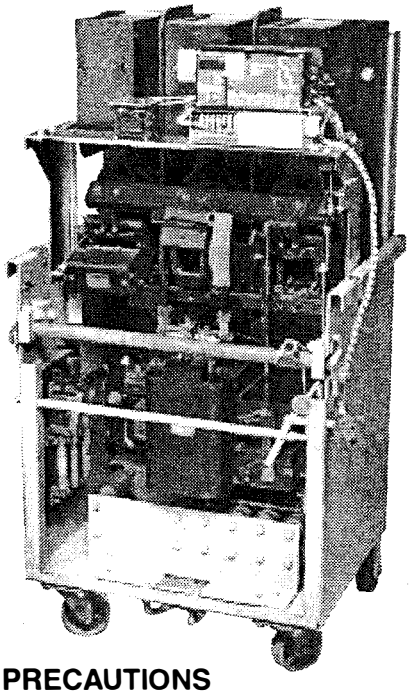
Digitrip Retrofit System for Westinghouse DA-75 Breakers



SAFETY PRECAUTIONS

WARNING

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

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

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

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

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

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

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

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

Step 1: General Breaker Preparation

Before attempting to remove the Breaker from the cell or perform any Retrofit Operation, be sure to read and understand the Safety Precautions section of this manual. In addition, be sure to read and understand the *Instructions for the Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers* (Retrofit Application Data - Publication AD 33-855-2), 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 seven (7) lbs.

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

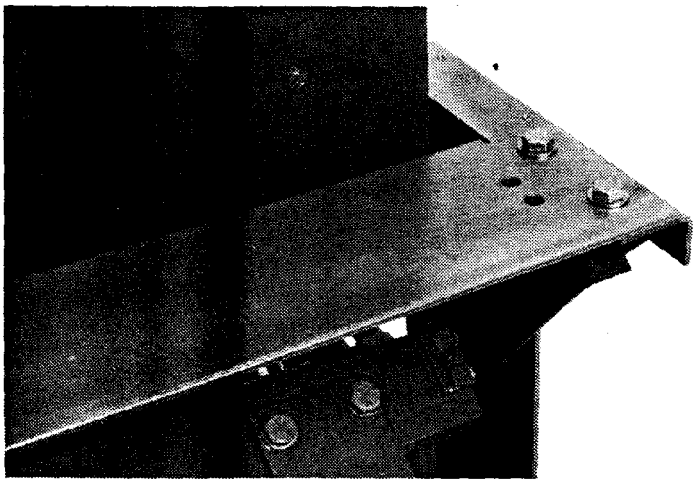
To begin the Retrofit Process, refer to the components list at the end of this manual. Layout the components and hardware according to the steps outlined. The components and hardware will be used to complete each step in the Retrofit Process.

Step 2: Removing the Original Electromechanical Trip Units

Refer to the Westinghouse DA-75 Instruction Manual, originally supplied with the Breaker, to perform the following procedure.

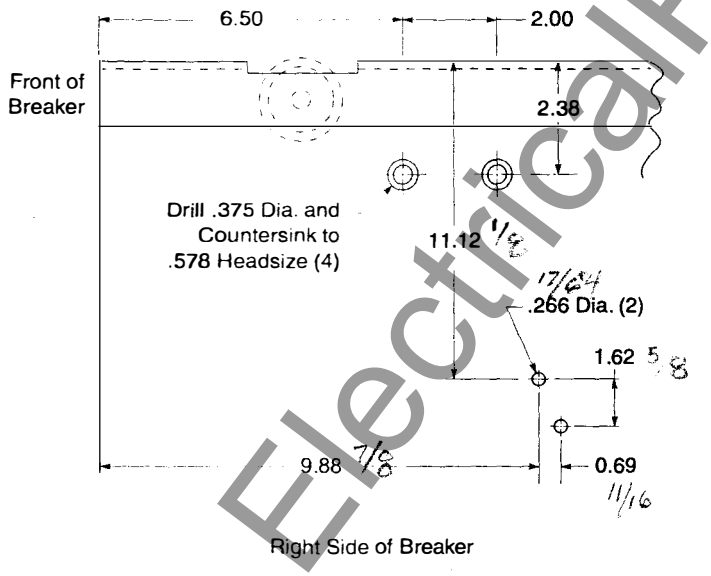
A. Remove and scrap the original Electromechanical Trip units and all associated hardware.

Step 3: Installing the Trip Unit Mounting Platform



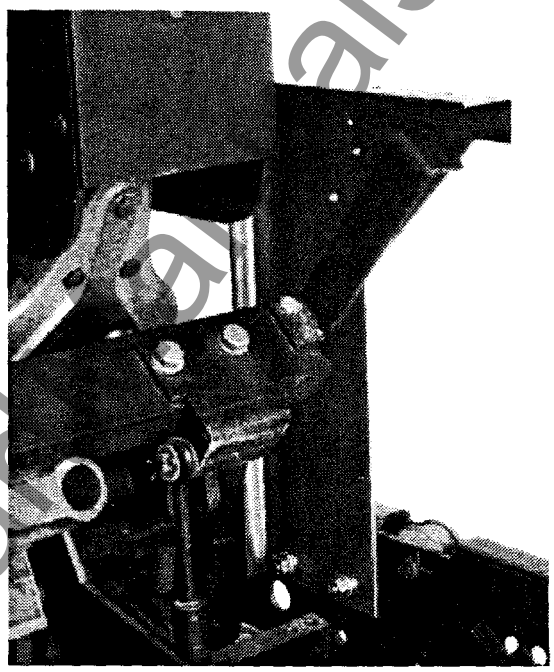
A. Using Drilling Plan A, drill and counter sink two (2) .375" holes in both the left and right Breaker Side Plates.

Drilling Plan "A"

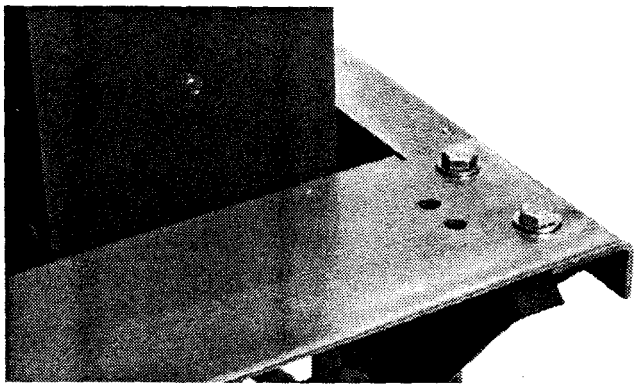


B. Again using Drilling Plan "A", drill two (2) .266" holes in the right Breaker Side Plate. These holes will be used later in the Retrofit Process to mount the DTA Assembly.

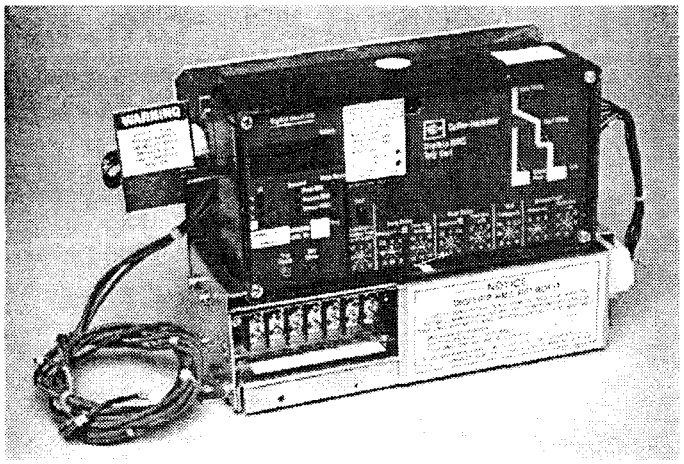
C. Mount the right and left Trip Unit Support Brackets to the Breaker side plates as shown, using the (4) .312-18 x .750" flat head screws, (4) flat washers, (4) lock washers, and (4) nuts supplied. Do not tighten the mounting hardware completely at this time.



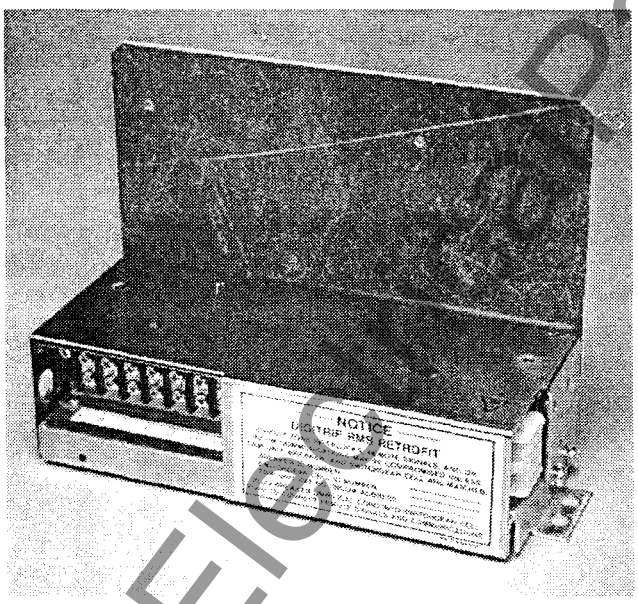
D. Mount the Trip Unit Mounting Platform to the Support Brackets using the (4) .312-18 **x** .750" bolts, (8) flat washers, (4) lock washers, and (4) nuts supplied. Tighten the hardware connecting the Mounting Platform to the Support Brackets, and then the Support Brackets to the Breaker side plates. Assure that the Mounting Platform and Support Brackets are square with the Breaker.



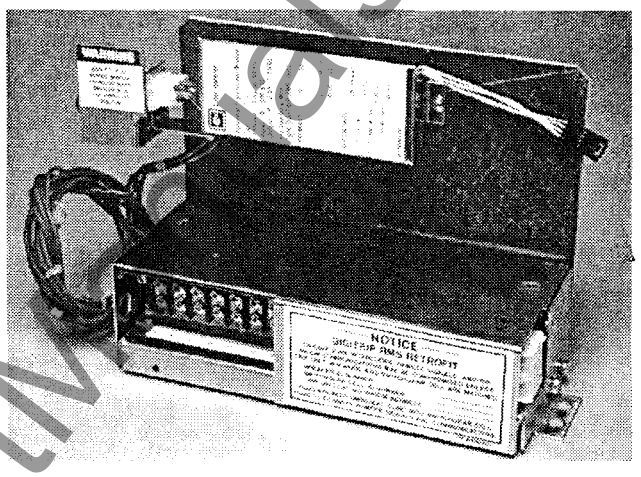
Step 4: Preparing the Trip Unit Assembly



A. Attach the Glass Poly Insulation Barrier to the back of the Aux. CT Module, as shown, using the (2) .190-32 x .375" screws, (2) lock washers, and (2) flat washers supplied.

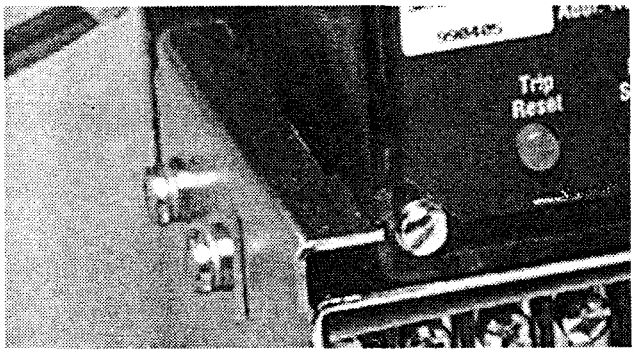


B. *For Kits Supplied with a PT Module Only.* Mount the PT Module to the Glass Poly Insulation Barrier, as shown, using the (2) .138-32 x .500" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.



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

D. Mount the Trip Unit Mounting Brackets to the sides of the Aux. CT Module, as shown, using the (4) .190-32 x .375" screws, (4) lock washers, and (4) flat washers supplied, so they align with the slots and "pinch" the Trip Unit in place.

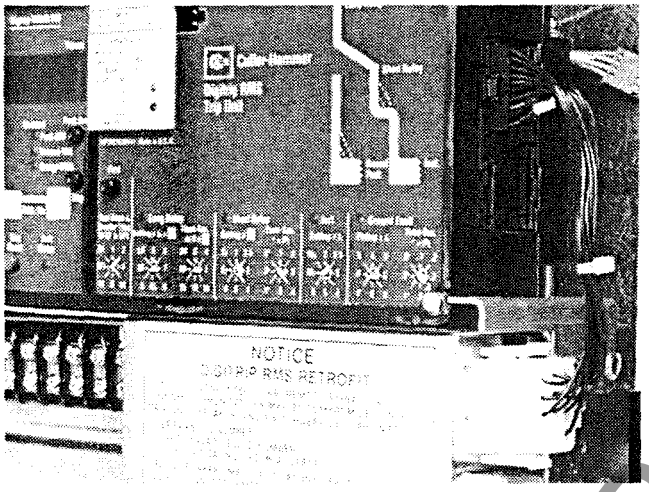


E. Fully tighten the 4.00" screws that secure the Trip Unit to the top of the Aux. CT Module.

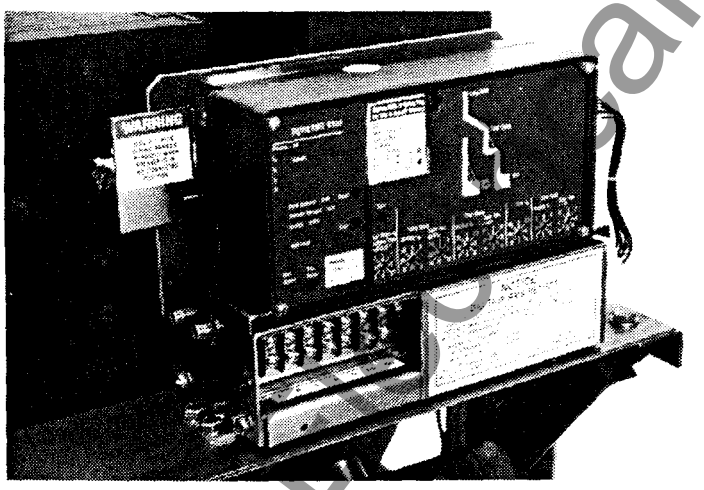
F. Remove the cover from the Trip Unit and install the Rating Plug. Replace the cover.

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

H. Connect the Aux. CT Harness to the Trip Unit and Aux. CT Module.



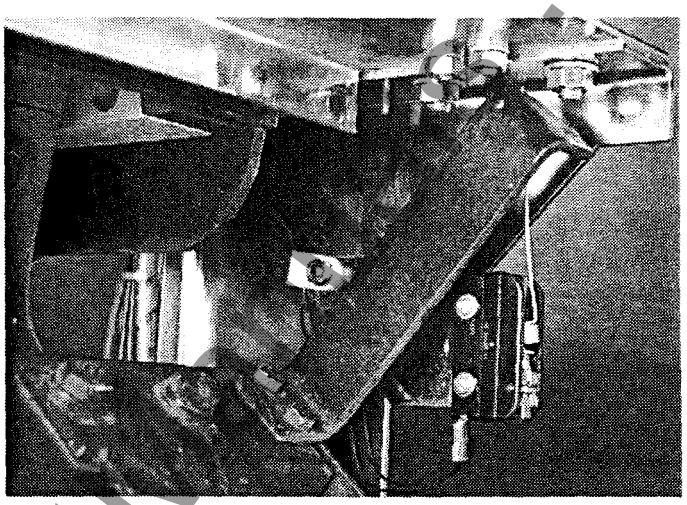
Step 5: Installing the Trip Unit



A. Mount the Trip Unit / Aux. CT Module Assembly to the Trip Unit Mounting Platform as shown, using the (4) .250-20 x .750" bolts, (8) flat washers, (4) lock washers, and (4) nuts supplied.

For Kits Supplied with an Auxiliary Switch Only.

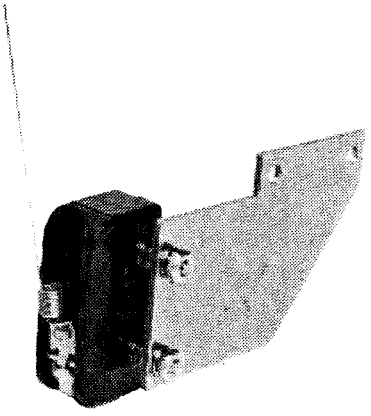
Step 6: Installing the Auxiliary Switch



A. Using diagonals, cut 2.625" off the Microswitch Spring Wire.

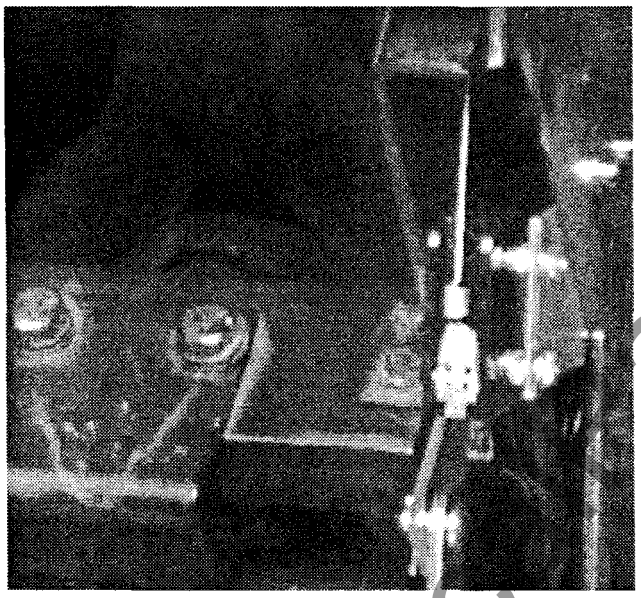
B. Mount the Microswitch to the Auxiliary Switch Mounting Bracket, as shown, using the (2) .138-32 x 1.25" screws, (8) flat washers, (4) lock washers, and (4) nuts supplied.

NOTE: To provide correct spacing, the hardware must be installed in the following order. Insert screws with flat washers installed through the switch. Install flat washers, lock washers, and tighten the nuts. Install another set of flat washers, then the mounting bracket, flat washers, lock washers, and nuts.

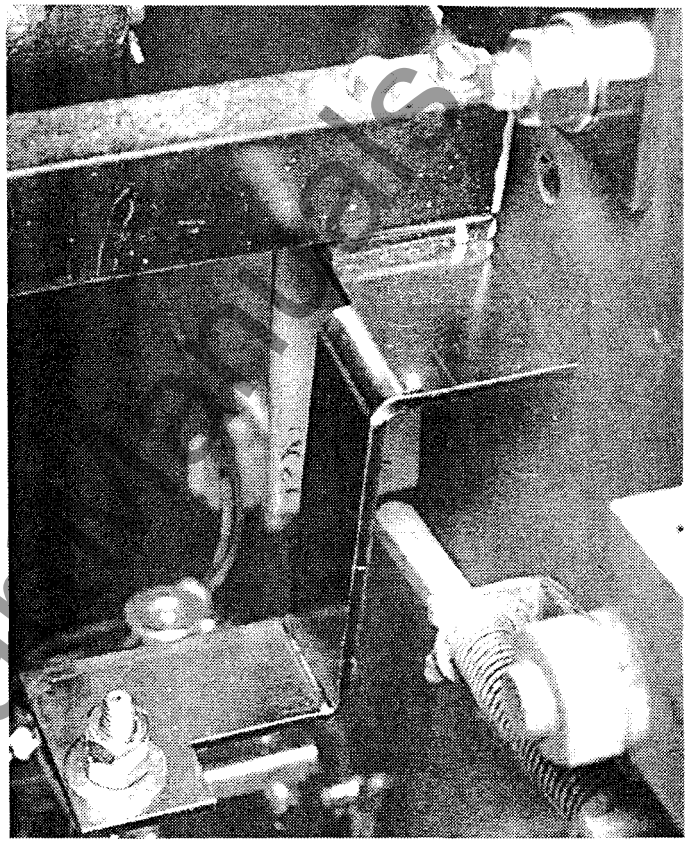


C. Making sure the Microswitch Spring Wire is behind the Interlock Bar, mount the Aux. Switch Assembly to the pre-drilled holes in the right Trip Unit Mounting Bracket, using the (2) .164-32 x .500" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.

Note that the Auxiliary Switch Wires (shown in the photo) will be connected later in the Retrofit Process.



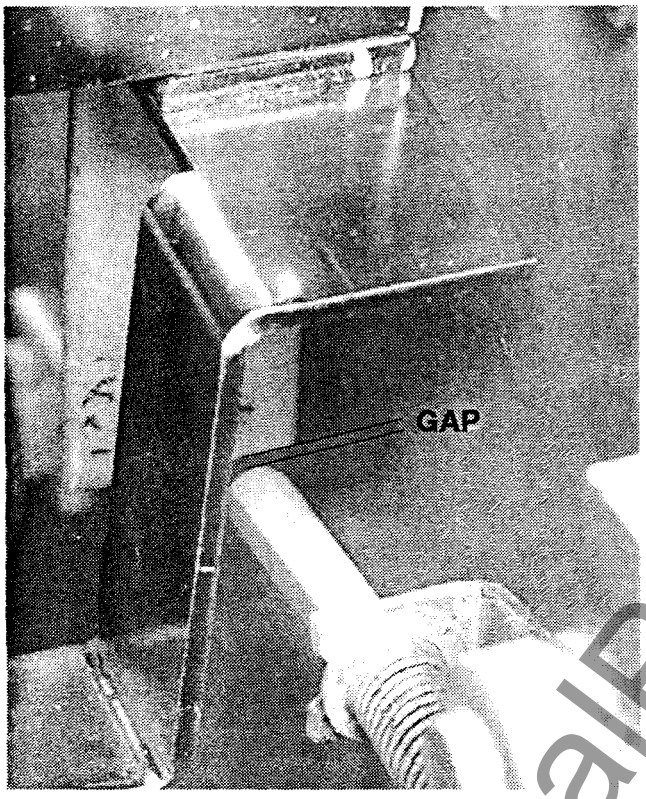
Step 7: Installing the Trip Finger



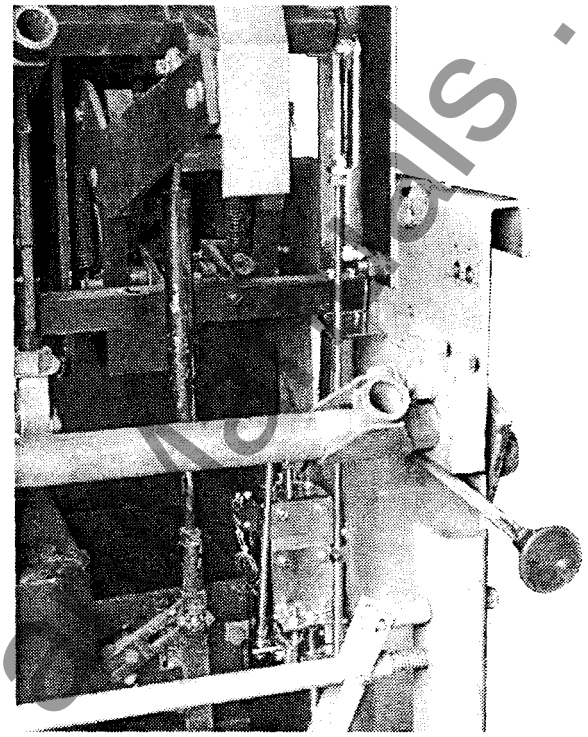
A. Note the position of the original Trip Finger and associated gap between the original Trip Finger and manual Trip Shaft. Remove and save the original Trip Finger but scrap the mounting hardware.

B. Align the original Trip Finger then the new Trip Finger with the holes in the bottom of the Breaker Trip Bar, as shown. Secure the original and new Trip Fingers to the Breaker Trip Bar using the (2) .190-32 x 1.75" screws, (2) flat washers, (2) wide flat washer, (2) lock washers, and (2) nuts supplied.

C. Verify that the original Trip Finger has been reinstalled in its initial position by checking the gap (noted in Step 6-A) between the original Trip Finger and manual Trip Shaft.



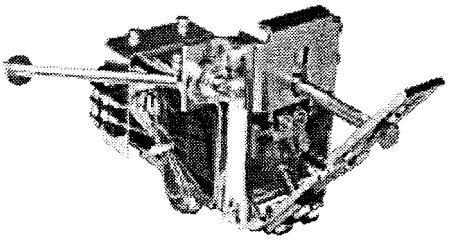
Step 8: Installing the DTA, Reset Arm, and Trip Link Assemblies



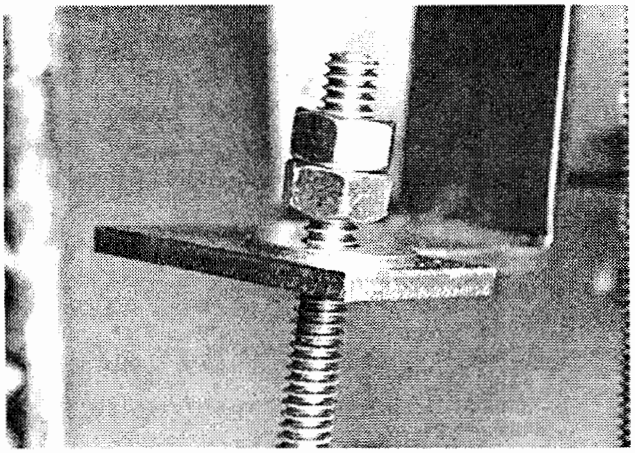
NOTE: The Trip Link Assembly, when installed, will have two (2) regular nuts and a flat washer on one end. The other end will have two (2) elastic stop nuts (one pre-installed by Cutler-Hammer) and a two (2) flat washers. The end with the elastic stop nuts will be connected to the DTA Trip Arm. The end with the regular nuts will be connected to the Trip Finger.

A. Install a .250" wide flat washer on the end of the Trip Link with the pre-installed elastic stop nut.

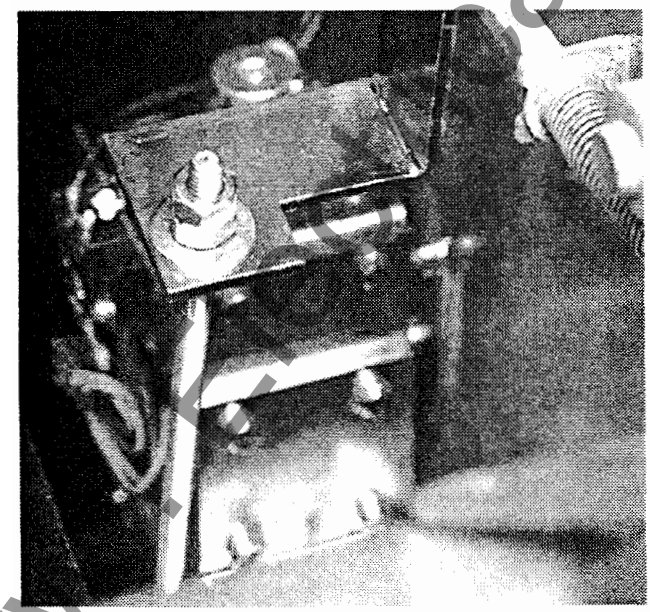
B. Insert the Trip Link into the slot in the DTA Trip Arm. Loosely install a .250" wide flat washer and a .250-20 elastic stop nut.



C. While holding the DTA Assembly near the holes drilled in the right Breaker Side Plate in Step 3-B, insert the Trip Link into the hole in the Trip Finger. Loosely install a .250" wide flat washer and two (2) .250-20 nuts.



D. Align the holes in the DTA Assembly with the holes drilled in the right Breaker Side Plate in Step 3-B. Secure the DTA Assembly to the right Breaker Side Plate using the (2) .250-20 x .750" screws, (2) lock washers, and flat washers provided.

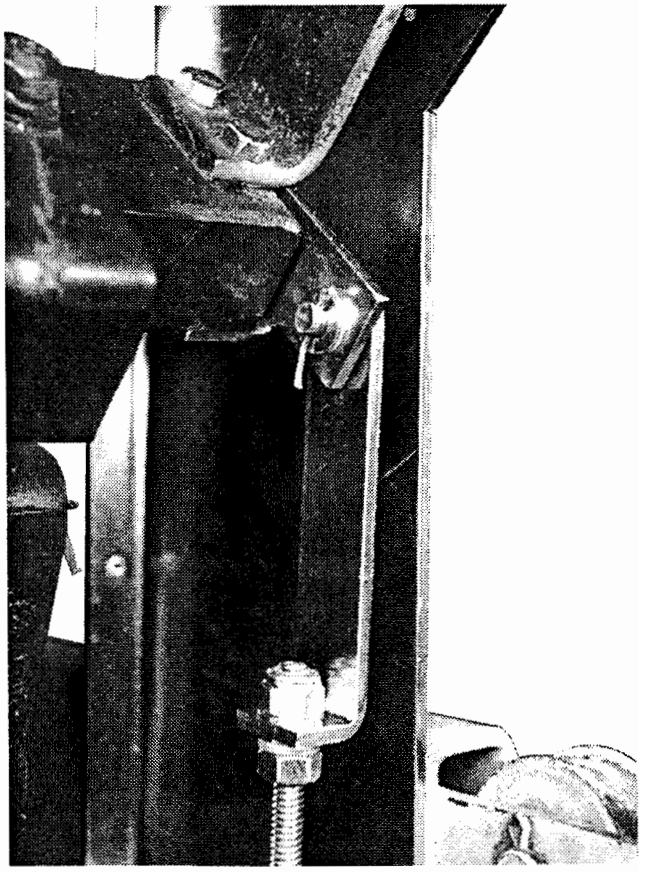


E. Remove and save the original Door Interlock from the right end of the Breaker Cross Bar, but scrap the original mounting hardware.

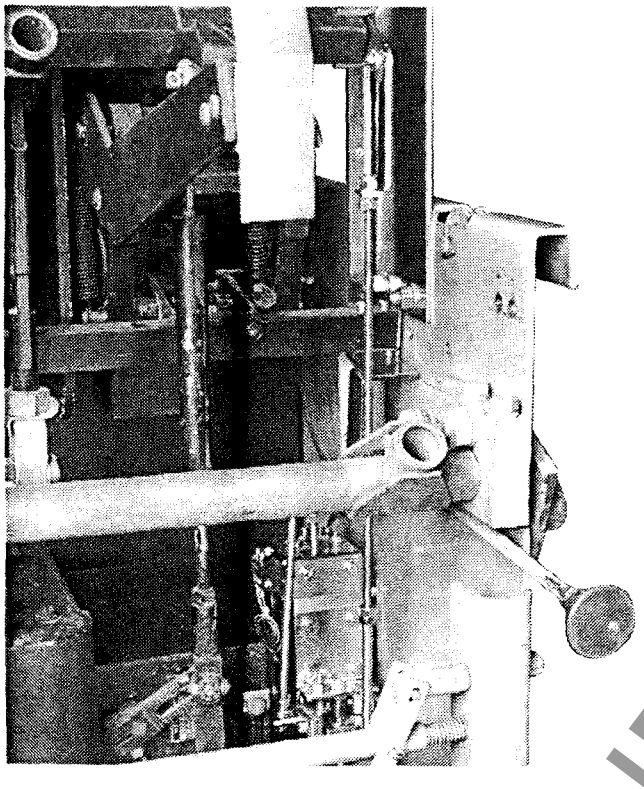
F. Remove and save the two (2) nuts, spring, flat washer, and wide flat washer from the bottom of the DTA Reset Assembly Shaft.

G. While holding the brass spacer in place on the Reset Assembly Shaft, insert the Shaft into the slot in the DTA Reset Arm. Loosely reinstall the wide flat washer, flat washer, spring, and nuts on the Reset Assembly Shaft.

H. Mount the top of the Reset Assembly to the bottom of the Breaker Cross Bar and the original Door Interlock to the top of the Cross Bar, in its original position, using the (2) .250-20 x 1.75" bolts, (4) flat washers, (2) lock washers, and (2) nuts supplied.

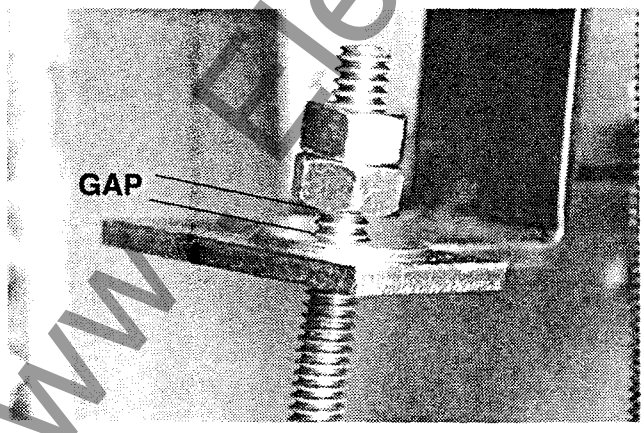


Step 9: Adjusting and Testing the DTA Assembly

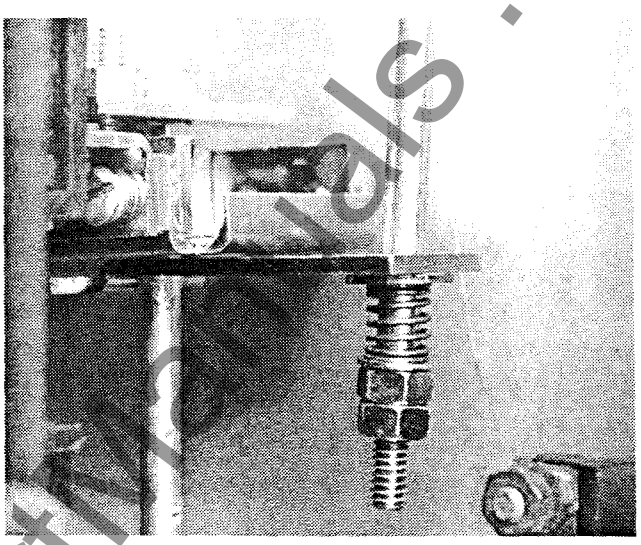


A. Remove the two (2) nuts from the top of the Trip Link Assembly.

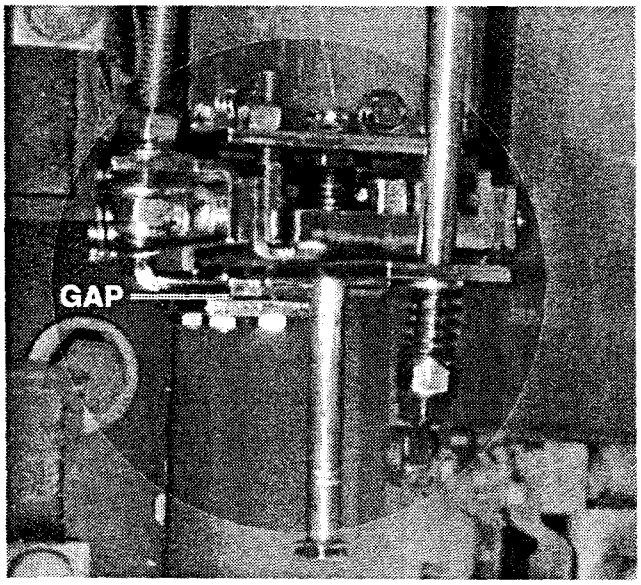
B. Apply Loc-Tite® 242 to the threads of the Trip Link Shaft. Reinstall the nuts and adjust until a gap of .190 to .250" is obtained between the bottom of the nut and the top of the flat washer. Firmly secure the lock nut against the adjusting nut.



C. Back off the nuts on the bottom of the DTA Reset Assembly Shaft and apply Loc-Tite® 242 to the threads.



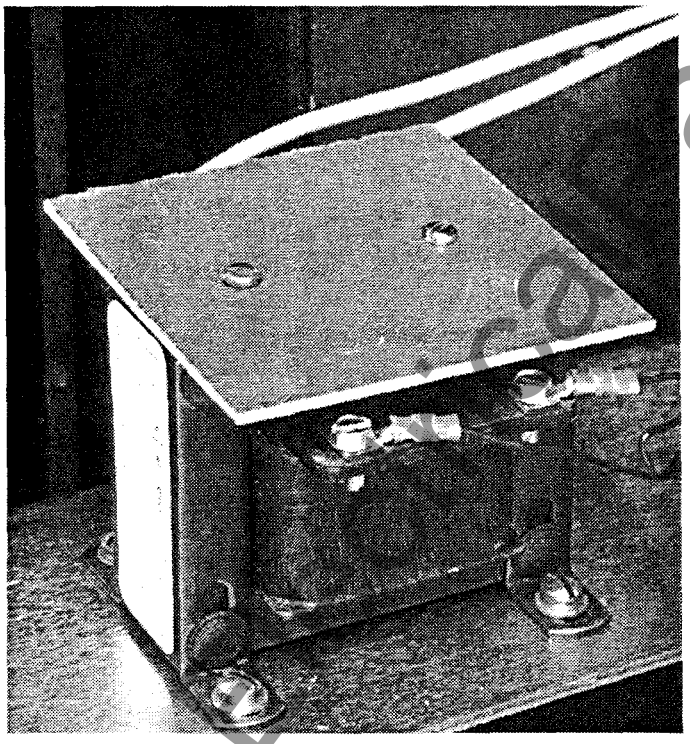
D. Adjust the nuts on the Reset Shaft until a gap of .06 to .09" is obtained between the Offset Arm and the plate on the bottom of the DTA Assembly. Firmly secure the lock nut against the adjusting nut.



E. Connect a 24 VDC power supply to the DTA terminals; positive to positive and negative to negative. Close the Breaker manually. Energize the DTA to trip the Breaker; de-energize when the Breaker trips. Make certain that the DTA resets. If the Breaker fails to properly trip or reset, make the necessary adjustments to insure a .190 to .250" gap between the bottom of the nut on the Trip Link Assembly and top of the flat washer, and a .06 to .09" gap between the Offset Arm and the plate on the bottom of the DTA Assembly.

For Kits Supplied with a Breaker Mounted CPT Only.

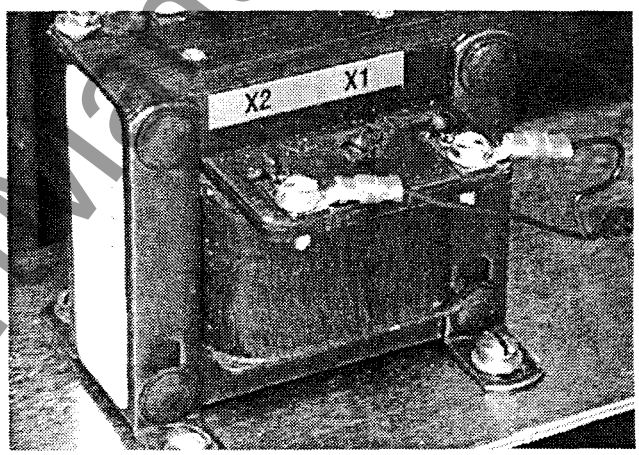
Step 10: Installing the Breaker Mounted CPT



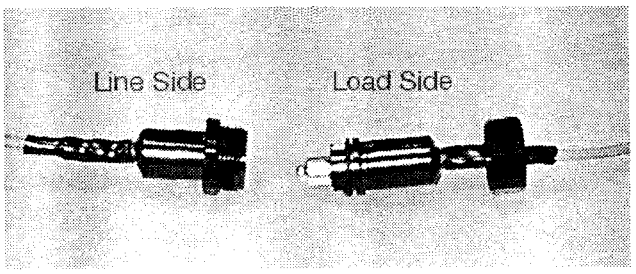
A. Align the holes in the Breaker Mounted CPT with the pre-drilled holes on the left side of the Trip Unit Mounting Platform. Secure the CPT to the Trip Unit Mounting Platform using the (4) .190-32 x .500" screws, (8) flat washers, (4) lock washers, and (4) nuts supplied. Note that the X1 and X2 terminals face the front of the Breaker.

B. Temporarily position the black plug of the CPT Harness near the right side of the Trip Unit.

C. Route the CPT Harness between the Trip Unit and the Glass Poly Insulation Barrier to the CPT. Cut the CPT Harness to an appropriate length. Strip .250" of insulation and attach a .138" ring terminal to each wire of the CPT Harness. Connect the CPT Harness wires to the X1 and X2 terminals of the CPT.



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.



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.

D. Position the fuses on the High Voltage (HV) Wires in an accessible location near the back of the DTA Assembly. Route the Load Side HV Wires up along the inside of the right Breaker Side Plate, then out of the Breaker and along the outside of the right Trip Unit Mounting Bracket.

NOTE: An optional routing path for the HV Wires is detailed later in this step.

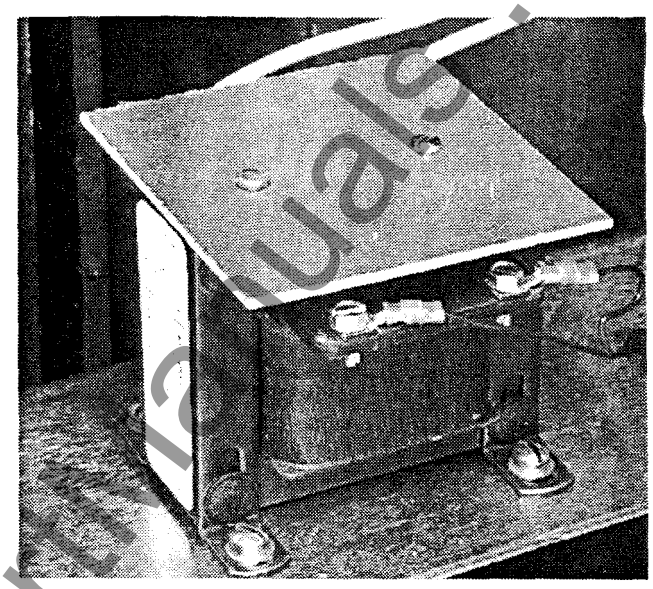
E. Feed the Load Side HV Wires between the Trip Unit and the Glass Poly Insulation Barrier to the Breaker Mounted CPT. Cut the Load Side of each HV Wire to an appropriate length for connection to the CPT.

F. Strip .250" from the Load Side HV Wires and attach a .138" ring terminal to each. Attach the HV Wires to the CPT terminals to achieve the required voltage (see the following table).

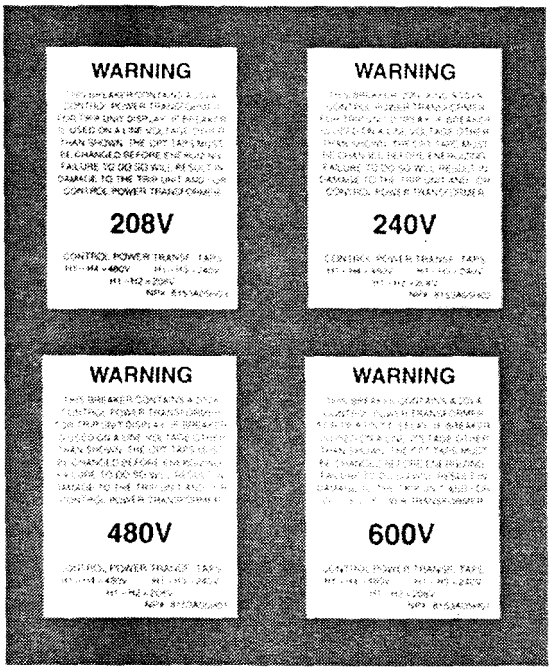
Voltage Required	CPT Terminals Used
600 Volt Circuit	H1 & H2
480 Volt Circuit	H1 & H4
240 Volt Circuit	H1 & H3
208 Volt Circuit	H1 & H2

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.

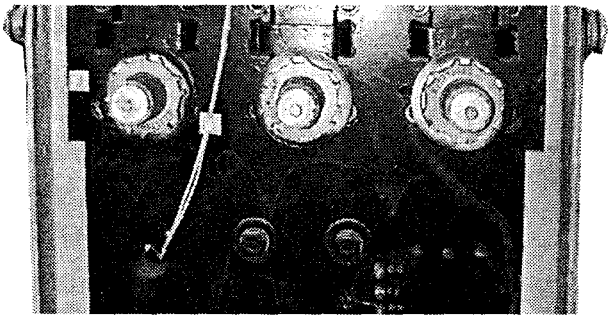
G. Attach the Glass Poly Insulation Plate to the top of the CPT, as shown, using the screws and lock washers supplied with the CPT kit.



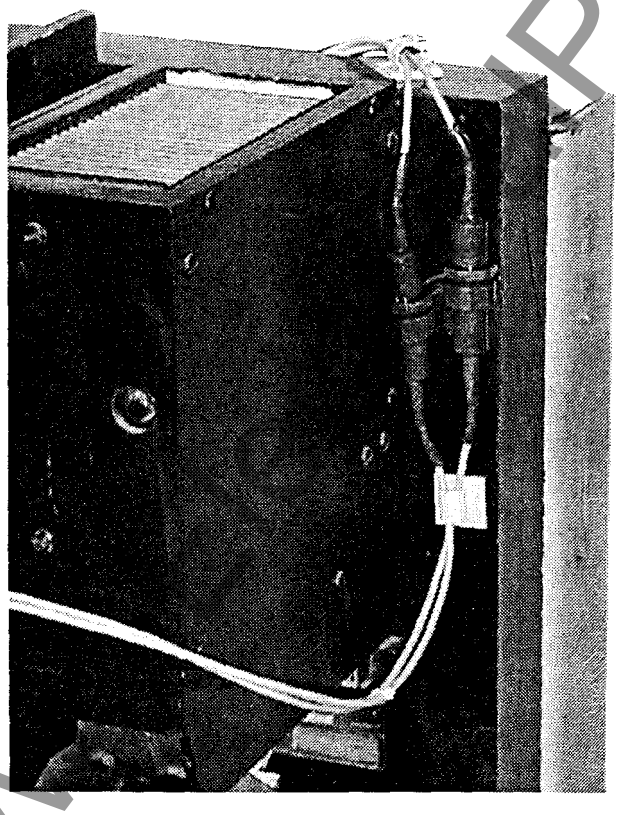
H. Attach the appropriate label for the Breaker in a clearly visible position. Four (4) labels are included with the CPT, one (1) for 600 Volt, one (1) for 480 Volt, one (1) for 240 Volt, and one (1) for 208 Volt systems.



I. Route the Line Side HV Wires to the rear of the Breaker through the opening in the Breaker Back Plate and along the rear of the Breaker to the top Phase Frames.



J. *Optional HV Wire Routing.* If the opening in the Breaker Back Plate does not exist, or if another Breaker Component is blocking the opening, the HV Wires can be routed to the right side of the Breaker then over the top of the Breaker Back Plate.



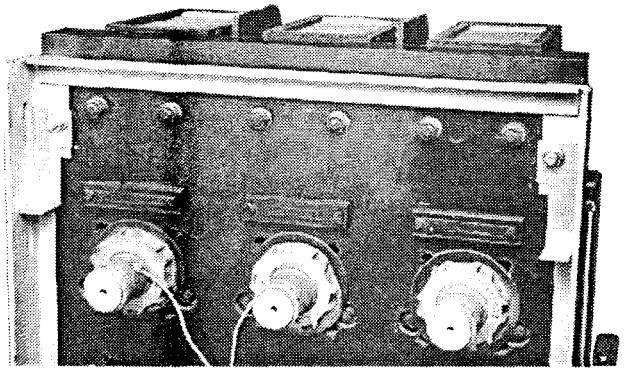
NOTE: The power convention of the Westinghouse DA-75 Series Breakers is normally *Top to Bottom*, meaning the Top Breaker Phase Frames are on the *Line Side* of the Breaker and the Bottom Breaker Stabs are on the *Load Side.*

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

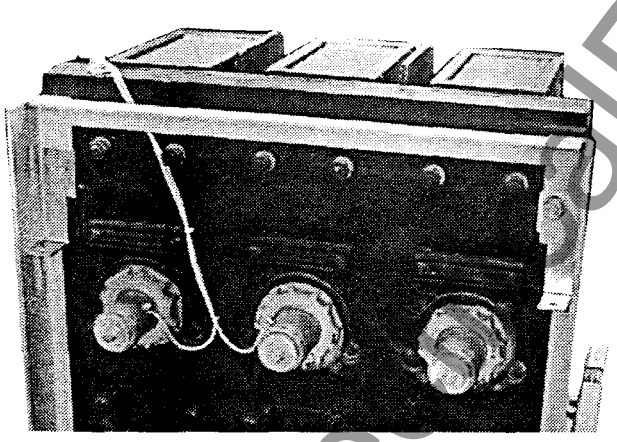
NOTE: The *Line Side* HV Wires are longer than necessary and are cut during the following steps. Before cutting the wires, be sure that sufficient length is left so that the connections can be made to the correct Breaker Stabs.

K. Drill and tap one hole in the top of the Phase 1 and 2 or Phase 2 and 3 Breaker Stabs to accept a .190-32" screw.

L. Cut the HV Wires to the appropriate length for attachment to the appropriate Phase Frames. Strip .250" from each HV Wire and attach a .190" ring terminal. Using the (2) .190-32 x .500" screws, (2) flat washers, and (2) lock washers supplied, connect the HV Wires to the appropriate Breaker Stabs.



"Optional Routing"

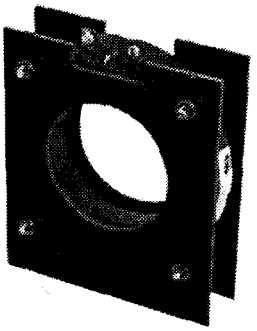


Step 11: Preparing the Sensors

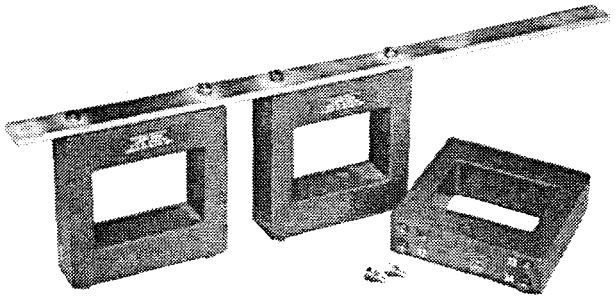
3,000 Amp Sensors Only

A. Place each Sensor between two Glass Poly Insulation Plates. The Sensor terminals should be positioned towards the cutouts in the Insulation Plates as shown.

B. Secure the Glass Poly Plates on either side of the Sensors using the (12) .250-20 x 2.00" bolts, (24) flat washers, and (12) elastic stop nuts supplied. Note that the bolts must be installed so that the bolt heads will be against the back of the Breaker and the stop nuts away from the Breaker (same side as the screw heads of the Sensor terminals). Do not over tighten the bolts.

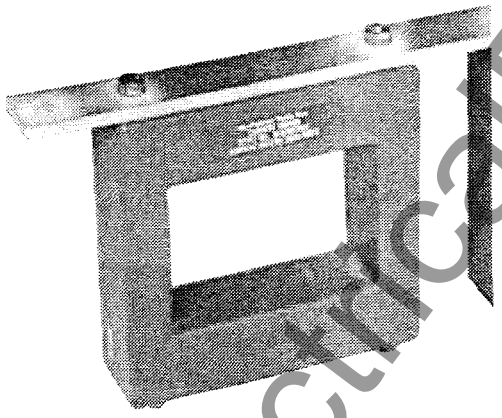


2,000 Amp Sensors Only



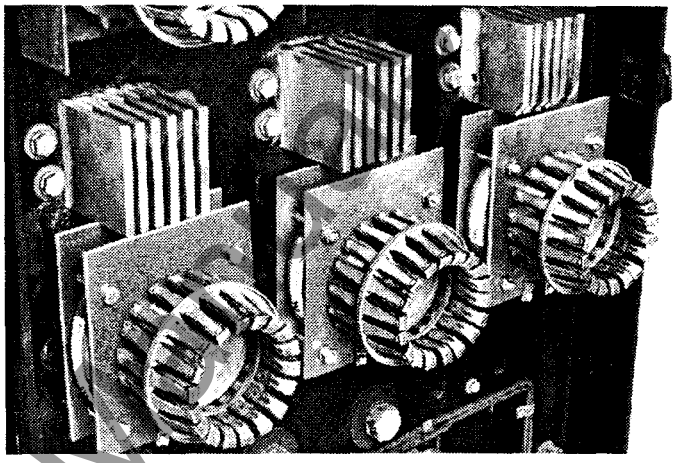
A. Align the holes in the Glass Poly Sensor Mounting Plate with the holes in the Sensors. Note that the Sensors should be positioned with the terminals down and the labels facing out.

B. Secure each Sensor to the Sensor Mounting Plate using the (6) .250-20 x .750" bolts, (6) lock washers, and (6) flat washers supplied.



Step 12: Installing the Sensors

3,000 Amp Sensors Only

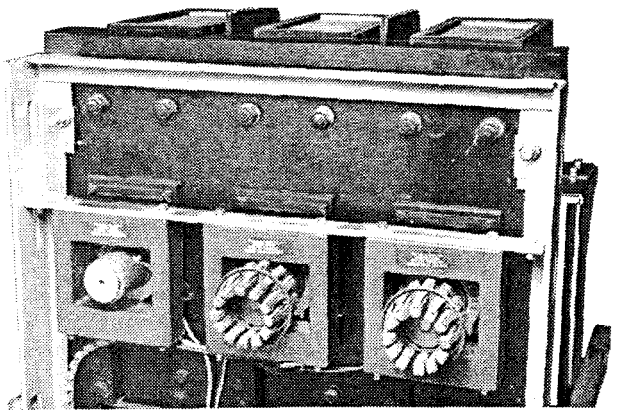


A. Remove and save the center bolts securing the bottom Finger Clusters to the Breaker Stabs. Remove the Finger Clusters.

B. Install a Sensor Assembly over each Breaker Stab, with the Sensor terminals pointing downward and the bolt heads outward as shown.

C. Reinstall the Finger Clusters and secure them using the original hardware.

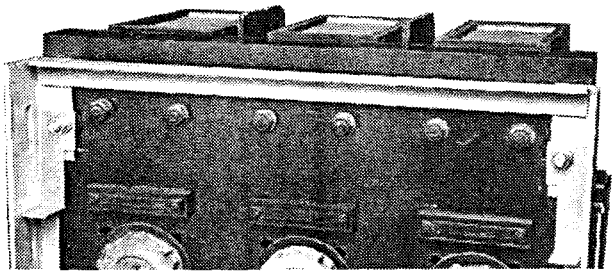
2,000 Amp Sensors Only



A. Remove and scrap the existing hardware that secures the Breaker Rear Frame to the Breaker Back Plate.

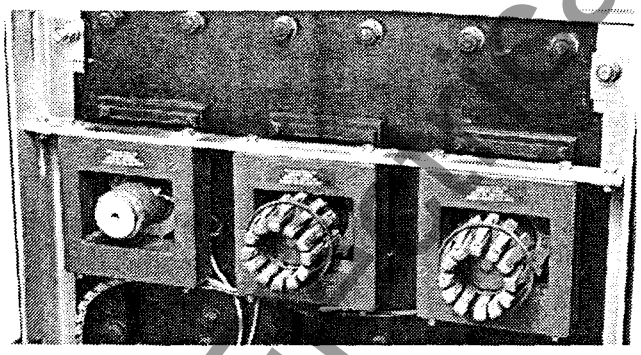
B. Align the supplied Sensor Mounting Brackets with the holes from which the hardware was just removed.

C. Secure the Sensor Mounting Brackets to the Breaker Rear Frame and Breaker Back Plate, as shown, using the (2) .500-13 x 4.00" bolts, (4) flat washers, (2) lock washers, and (2) nuts supplied.



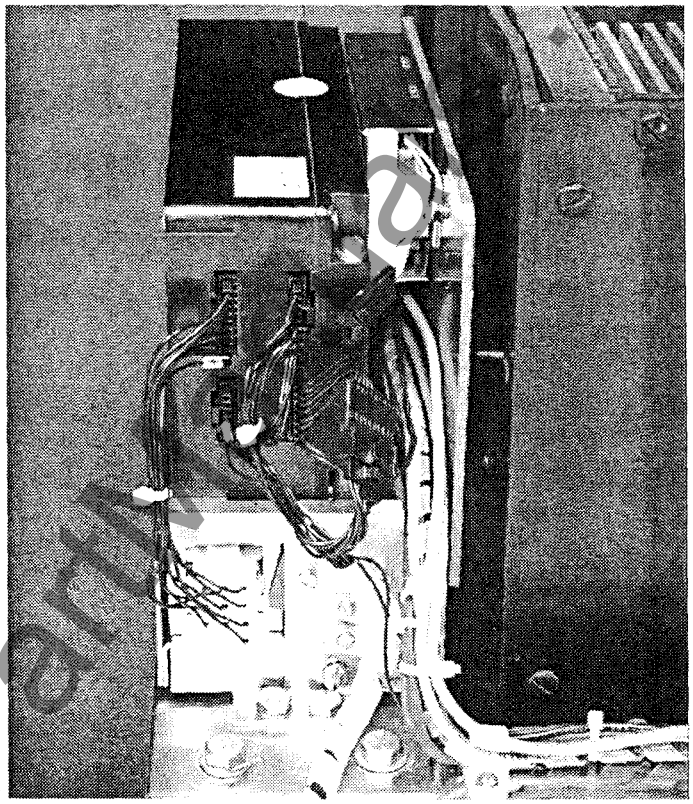
D. Align the Sensor Assembly with the top Breaker Stabs and the holes in the Sensor Mounting Brackets.

E. Secure the Sensor Assembly to the Sensor Mounting Brackets, as shown, using the (2) .250-20 x 1.00" bolts, (4) flat washers, (2) lock washers, and (2) nuts supplied.



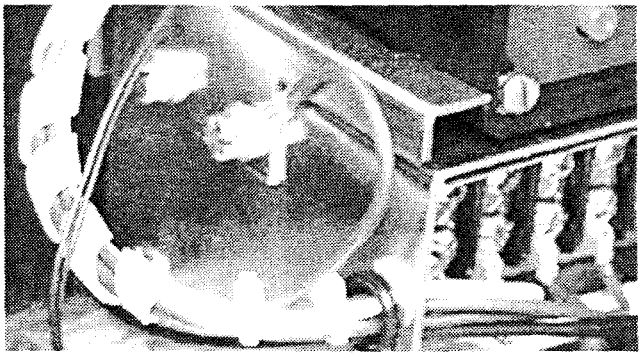
F. Reinstall the Finger Clusters and secure them using the original hardware.

Step 13: Final Connection of the Harnesses and Wiring



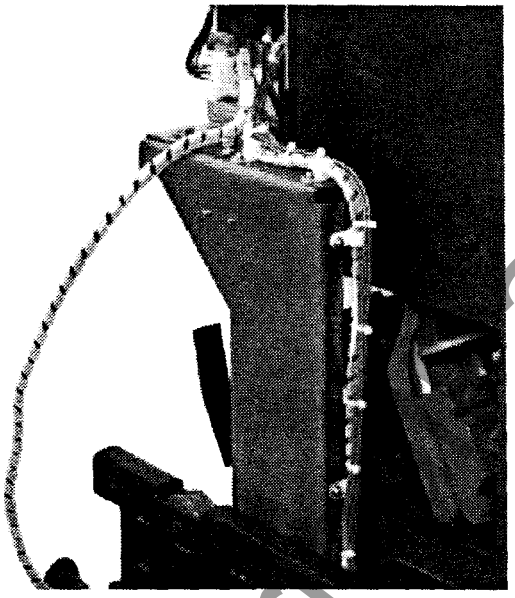
A. Feed the Sensor Harness through the hole in the left side of the Aux. CT Module. Connect the Sensor Harness to the proper terminals on the Aux. CT Module. Refer to Section 12 of the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications.

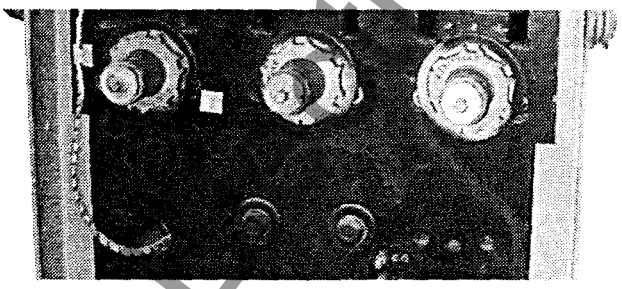
Connect the green ground wire from the Sensor Harness (with the ring terminal) to the screw in the left side of the Aux. CT Module.



NOTE: An optional routing path for the Sensor Harness is detailed later in this step.

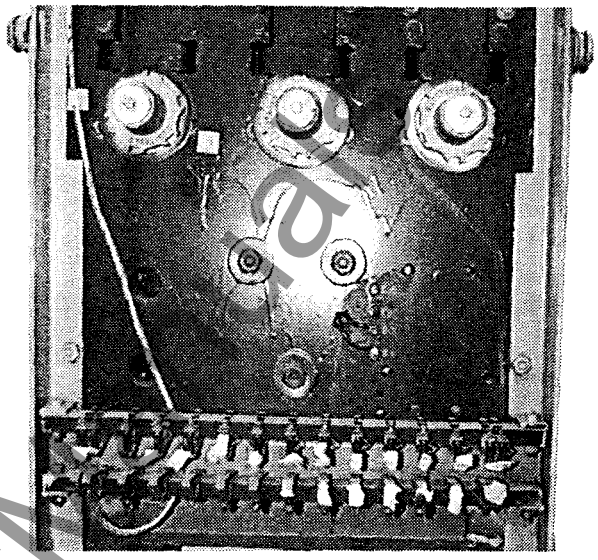
B. Route the Sensor Harness between the Glass Poly Insulation Barrier and the back of the Trip Unit, then down along the right Trip Unit Mounting Bracket and through the hole in the Breaker Back Plate as shown. Secure the Sensor Harness as shown using the wire clamps and (4) .138-20 x .375" thread cutting screws, (4) lock washers, and (4) flat washers supplied.





C. *Optional Sensor Harness Routing.* If the opening in the Breaker Back Plate does not exist, or if another Breaker Component is blocking the opening, the Sensor Harness can be routed out the bottom of the back of the Breaker, then up the back of the Breaker between the Breaker Back Plate and Secondary Contacts Mounting Bracket as shown.

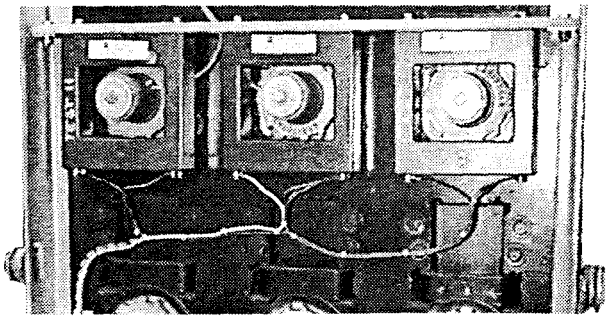
"Optional Routing"



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.

Sensor Style No.
8189A46H01 X1 - X2 = 2000 A
4A35613H01 X1 - X2 = 3000 A



E. *For Kits Supplied with a PT Module Only.* Refer to Section 7-3, Power Flow Convention of the Retrofit Application Data, supplied with the Retrofit Kit, for additional wiring information and to verify the Phase Convention used on this Breaker Application.

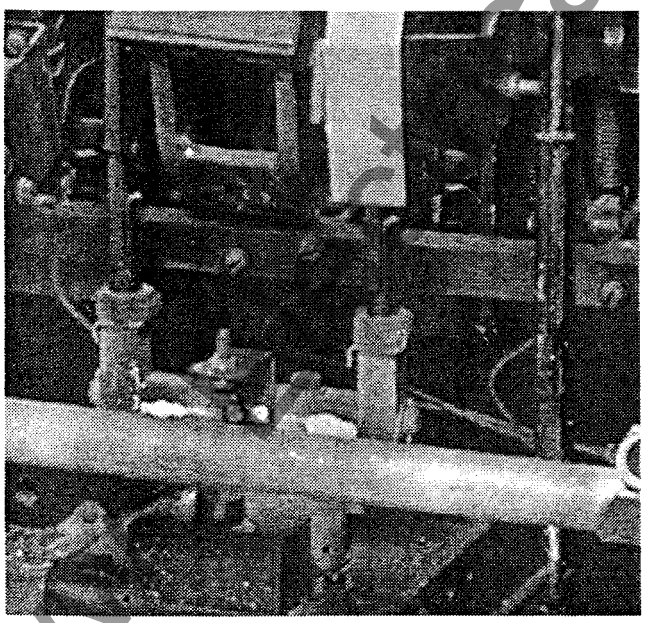
Route the PT Wires between the Glass Poly Insulation Barrier and the back of the Trip Unit, then down along the right Trip Unit Mounting Bracket to the area where the original Electromechanical Trip devices were removed (Step 2).

The PT Wires are marked for connection to Phases 1, 2, and 3 with corresponding numbers.

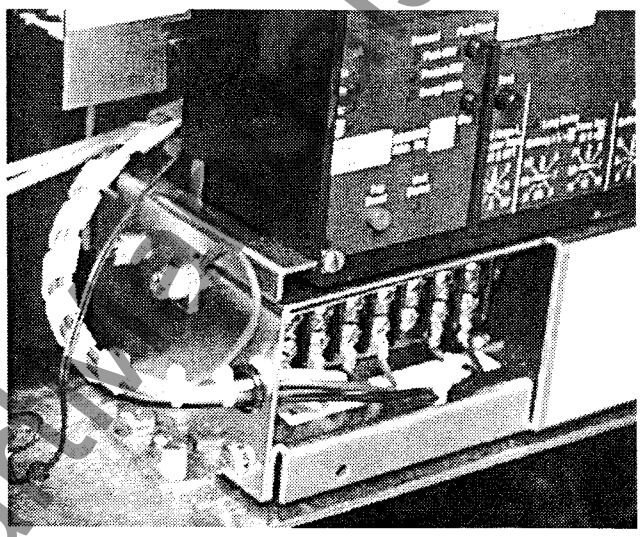
NOTE: Before cutting the PT Wires, verify the Phase Convention used on the Breaker Application.

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

Connect each PT Wire to the corresponding Breaker Bottom Stabs using the (3) .250-20 x .500" bolts, (3) lock washers, and (3) flat washers supplied.

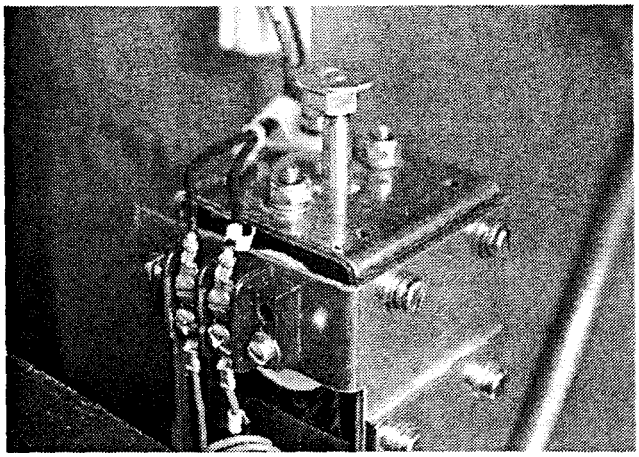


F. Feed the two wires from the DTA Extension Harness through the opening in the left side of the Aux. CT Module. Connect the DTA Extension Harness to the terminals of the Aux. CT Module: positive (+) wire to the OP terminal and the unmarked wire to the ON terminal.

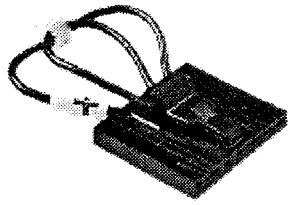


G. Route the DTA Extension Harness between the Glass Poly Insulation Barrier and the back of the Trip Unit, then down along the back edge of the right Trip Unit Support Bracket and into the Breaker to the DTA Assembly. Connect the wire from the DTA Extension Harness marked with "+" to the terminal to which the "+" DTA Wire is attached and the unmarked wire to the other terminal.

H. Secure the DTA Extension Harness to the DTA Assembly, as shown, using the wire clamp and (1) .138-32 x .375" screw, (1) lock washers, and (1) flat washer supplied.

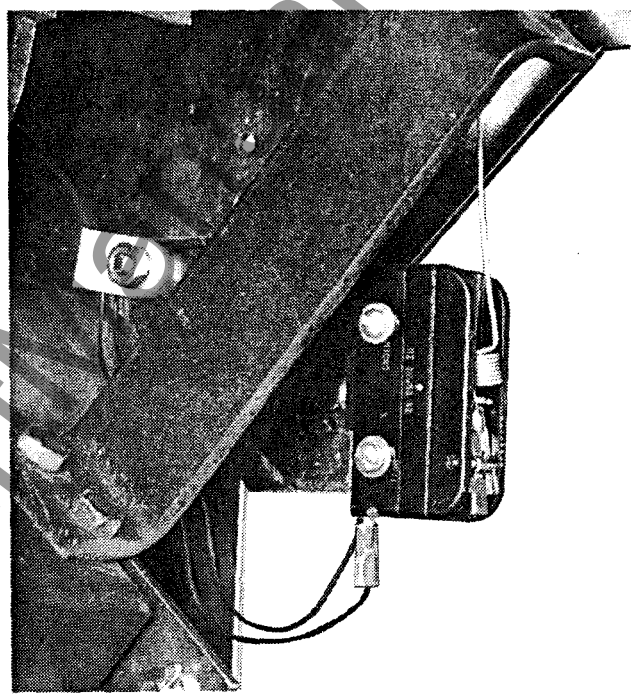


I. Connect the External Harness to the Trip Unit.



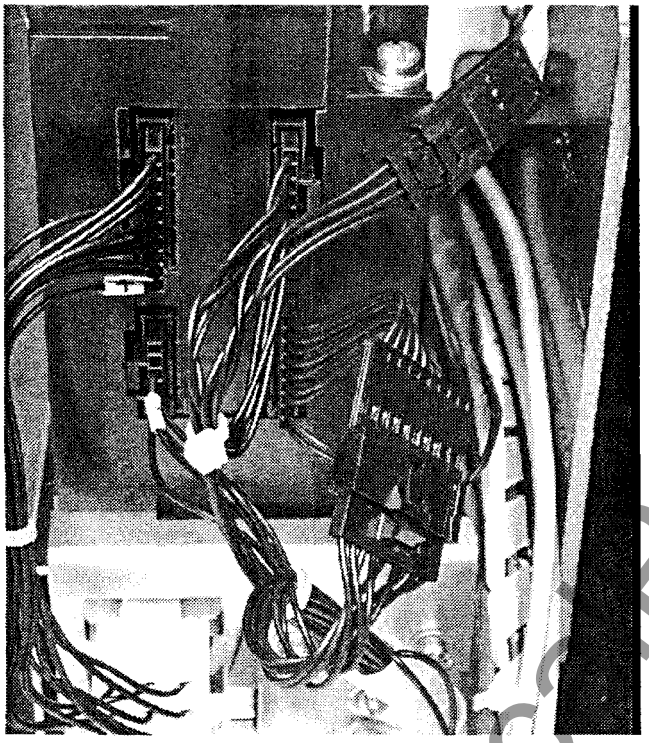
NOTE: For 510 Basic Retrofit Kits, the External Harness is the plug pictured above. It is to be plugged into the right side of the Trip Unit.

J. *For Kits Supplied with an Auxiliary Switch Only.* Connect the two wires (with ring terminals) from the External Harness to the Auxiliary Switch. Connect one wire to the normally Open terminal and the other wire to the Common terminal of the Auxiliary Switch.



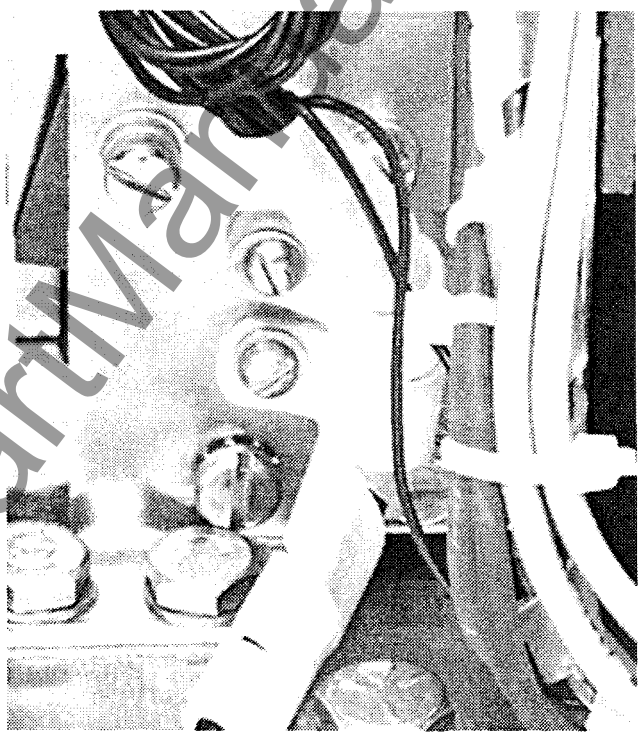
K. *For Kits Supplied with a PT Module Only.* Connect the PT Harness to the External Harness.

L. *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.



M. Use the wire ties, wire clamps, and self adhesive wire clips provided to dress all wires and harnesses to keep them away from any moving parts within the Breaker.

NOTE: The self adhesive wire clips should be attached to the right Breaker side panel to secure the Sensor Harness. The wire clamps should be attached to the hardware mounting the Aux. CT Module and the Trip Unit, as shown, to secure the Sensor Harness, External Harness, and PT Extension Harness.



Step 14: Testing the Breaker

A. Measure the force necessary to trip the Breaker at the point where the DTA impacts the Trip Finger. The force necessary to trip the Breaker MUST NOT EXCEED SEVEN (7) 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 in Step 15.

For Kits Supplied with a Cell Harness Only.

Step 15: Mounting the Cell Harness

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

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

Step 16: Installing the Retrofitted Breaker in the Cell

WARNING

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

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

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

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

Digitrip Retrofit Kit Installation Components for the Westinghouse DA-75 Breakers

Step	Description	Style No.	Qty.	Comment
Step 3	Trip Unit Support Parts	4A35842G07	1	
	Trip Unit Support Bracket R. H.		1	
	Trip Unit Support Bracket L. H.		1	
	.312-18 x .750 Lng. Screw Flat		4	
	.312 Flat Washer Stl.		4	
	.312 Lock Washer Stl.		4	
	.312-18 Nut Hex Stl.		4	
	Trip Unit Mounting Platform Parts	4A35842G08	1	
	Trip Unit Mounting Platform		1	
	.312-18 x .750 Lng. Hex Bolt		4	
	.312 Flat Washer Stl.		8	
	.312 Lock Washer Stl.		4	
	.312-18 Nut Hex Stl.		4	
Step 4	Trip Unit		1	See Pick List
	Rating Plug		1	See Pick List
	Aux. CT Module	6502C78G__	1	
	Aux. CT Harness	6502C84G01	1	
	Trip Unit Assembly Parts	4A35842G09	1	
	Mounting Bracket L. H.		1	
	Mounting Bracket R. H.		1	
	Insulation Barrier		1	
	Digitrip Nameplate		1	
	Spacer Brass		2	
	.190-32 x 4.00 Lng. Screw Fil.		2	
	.190-32 x .375 Lng. Screw Fil.		6	
	.190 Flat Washer Stl.		8	
	.190 Lock Washer Stl.		8	
	PT Module Kit	6502C82G01	1	Comm. Only
	.138-32 x .500 Lng. Screw		2	
	.138 Flat Washer		4	
	.138 Lock Washer		2	
	.138-32 Nut Hex Stl.		2	
	Ring Terminals (.190, .250, .312, .375, .500 - Each Size)		3	
Step 5	Trip Unit Assembly (From Step 4)		1	
	Trip Unit Mounting Hardware	4A35842G10	1	
	.250-20 x .750 Lng. Hex Bolt		4	
	.250 Flat Washer Stl.		8	
	.250 Lock Washer Stl.		4	
	.250-20 Nut Hex Stl.		4	
Step 6	Aux. Switch Kit	4A35842G02	1	Comm. Only
	Microswitch		1	
	Mounting Bracket		1	

Digitrip Retrofit Kit Installation Components for the Westinghouse DA-75 Breakers (Continued)

Step	Description	Style No.	Qty.	Comment
Step 6 (Cont.)	.164-32 x .500 Lng. Screw Fil.		2	Comm. Only
	.164 Flat Washer Stl.		4	
	.164 Lock Washer Stl.		2	
	.164-32 Nut Hex Stl.		2	
	.138-32 x 1.25 Lng. Screw Fil.		2	
	.138 Flat Washer Stl.		8	
	.138 Lock Washer Stl.		4	
	.138-32 Nut Hex Stl.		4	
Step 7	Trip Finger Mounting Hardware	4A35842G11	1	
	Trip Finger		1	
	Trip Link Assembly		1	
	.250 Wide Flat Washer Stl.		3	
	.250-20 Nut Hex Stl.		2	
	.250-20 Nut Elastic Stop		1	
	.190-32 x 1.75 Lng. Screw Fil.		2	
	.190 Flat Washer Stl.		2	
	.190 Wide Flat Washer Stl.		2	
	.190 Lock Washer Stl.		2	
	.190-32 Nut Hex Stl.		2	
Step 8	High Force Trip Actuator Assembly	4A35842G33	1	
	DTA Mounting Hardware	4A35842G12	1	
	.250-20 x .750 Lng. Screw Flat		2	
	.250 Flat Washer Stl.		2	
	.250 Lock Washer Stl.		2	
	Reset Assembly Parts	4A35842G13	1	
	Reset Assembly		1	
	.250-20 x 1.75 Lng. Hex Bolt		2	
	.250 Flat Washer Stl.		4	
	.250 Lock Washer Stl.		2	
	.250-20 Nut Hex Stl.		2	
	Loc-Tite® 242		1	
Step 10	Breaker Mounted CPT Kit	8259A91G05	1	CPT Only
	Ring Terminals (.138, .190, .250, .312, .375, .500 - Each Size)		2	
	CPT Mounting Parts	4A35842G20	1	
	Glass Poly Insulation Plate		1	
	.190-32 x .500 Lng. Screw Fil.		6	
	.190 Flat Washer Stl.		10	
	.190 Lock Washer Stl.		6	
	.190-32 Nut Hex Stl.		4	
	.164-32 x .500 Lng. Screw Fil.		2	
	.164 Flat Washer Stl.		4	

Digitrip Retrofit Kit Installation Components for the Westinghouse DA-75 Breakers (Continued)

Step	Description	Style No.	Qty.	Comment
Step 10 (Cont.)	.164 Lock Washer Stl.		2	
	.164-32 Nut Hex Stl.		2	
	Warning Label (208, 240, 480, & 600 Volt - 1 Each)		1	
	Wire Clamp Nylon		2	CPT Only
	Wire Clamp		2	
	Wire Clip		2	
	Wire Tie Nylon		8	
Step 11	Sensor 3000	4A35613H01	3	
	Sensor 2000	8189A46H01	3	
	Sensor Mounting Parts	4A35842G05	1	3000 Amp Only
	Glass Poly Mounting Plates		6	
	.250-20 x 2.00 Lng. Hex Bolt		12	
	.250 Flat Washer Stl.		24	
	.250-20 Elastic Stop Nut		12	
	Sensor Mounting Parts	4A35842G06	1	2000 Amp Only
	Mounting Plate		1	
	.250-20 x .750 Lng. Hex Bolt		6	
	.250 Flat Washer Stl.		6	
	.250 Lock Washer Stl.		6	
Step 12	Sensor Mounting Parts	From Step 11	1	2000 Amp Only
	Mounting Bracket R. H.		1	
	Mounting Bracket L. H.		1	
	.500-13 x 4.00 Lng. Hex Bolt		2	
	.500 Flat Washer Stl.		4	
	.500 Lock Washer Stl.		2	
	.500-13 Nut Hex Stl		2	
	.250-20 x 1.00 Lng. Hex Bolt		2	
	.250 Flat Washer Stl.		4	
	.250 Lock Washer Stl.		2	
	.250-20 Nut Hex Stl		2	
Step 13	Sensor Harness		1	See Pick List
	Sensor Harness Parts	4A35842G14	1	
	.138-20 x .375 Lng. Screw T. C.		4	
	.138 Flat Washer Stl.		4	
	.138 Lock Washer Stl.		4	
	Wire Clamp Nylon		4	
	Wire Clip		4	
	Wire Tie Nylon		8	
	DTA Extension Harness	6503C83G03	1	
	External Harness	6502C83G0__	1	

Digitrip Retrofit Kit Installation Components for the Westinghouse DA-75 Breakers (Continued)

Step	Description	Style No.	Qty.	Comment
Step 13 (Cont.)	External Harness Parts	4A35842G15	1	
	.138-32 x .375 Lng. Screw		2	
	.138 Flat Washer Stl.		2	
	.138 Lock Washer Stl.		2	
	Wire Clamp Nylon		2	
	Wire Clamp Nylon		4	
	Wire Tie Nylon		8	
	PT Wire Mounting Parts	4A35842G16	1	
	.250-20 x .500 Lng. Hex Bolt		3	Comm. Only
	.250 Flat Washer Stl.		3	
	.250 Lock Washer Stl.		3	
Step 15	Cell Harness	6503C57G_	1	Except 510 Basics

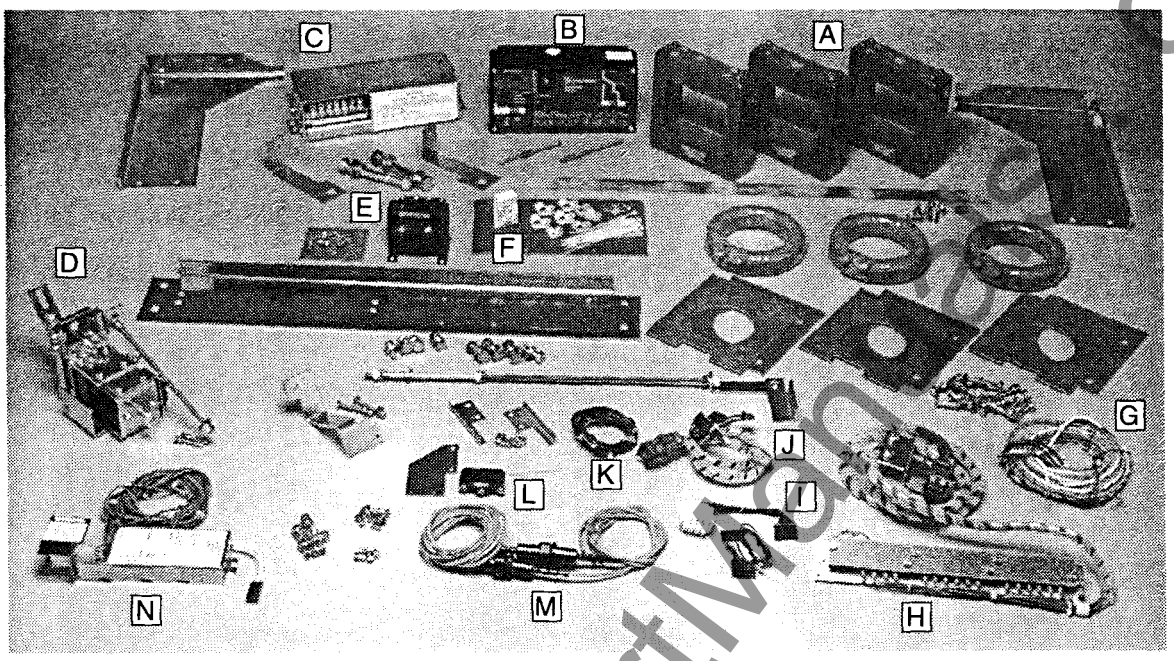
NOTE: Due to the wide vintage of breakers and the multiple functions of the Retrofit components, some excess hardware may remain when the Retrofit is complete.

Torque Values for General Mounting

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

Torque Values for Copper BUS Connectors

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



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

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