



**IL 33-DBC-1  
Digitrip Retrofit System for the  
Westinghouse DB-50 Series Breaker**

**Table of Contents**

<b>SAFETY PRECAUTIONS .....</b>	<b>1</b>
<b>Kit Components Table .....</b>	<b>2</b>
<b>Beginning the Retrofit Process .....</b>	<b>3</b>
Step 1: General Breaker Preparation .....	3
Step 2: Removing the Original Components .....	4
<i>For Breakers Equipped with the Original Electromechanical Trip Units .....</i>	<i>4</i>
<i>For Breakers Equipped with an Amptector or Other Trip System .....</i>	<i>4</i>
Step 3: Installing the Copper Connectors .....	4
Step 4: Installing the DTA Assembly .....	5
<i>Retrofitting a DBL-50 .....</i>	<i>6</i>
Step 5: Preparing the Trip Unit Assembly .....	6
Step 6: Installing the Trip Unit Assembly .....	8
Step 7: Connecting Sensor Harness and DTA Wires to the Aux. CT Module .....	9
Step 8: Connecting the PT Wires .....	10
Step 9: Installing the Sensors .....	11
Step 10: Installing the Breaker Mounted CPT .....	12
<i>For DB-50 Non-Fused Breakers Only .....</i>	<i>15</i>
<i>For DBL-50 Fused Breakers Only .....</i>	<i>16</i>
Step 11: Final Wiring and Harness Connection .....	17
Step 12: Testing the Breaker .....	18
Step 13: Mounting the Cell Harness .....	19
Step 14: Installing the Retrofitted Breaker in the Cell .....	19
<b>Kit Parts List .....</b>	<b>20</b>
<b>Torque Values for Copper BUS Connectors .....</b>	<b>22</b>
<b>Torque Values for General Mounting .....</b>	<b>23</b>
<b>Index .....</b>	<b>26</b>



### Digitrip Retrofit System for the Westinghouse DB-50 Series Breakers (Includes Single Position DB-50; Three Position, Spring Operated DB-50; Electrically Operated DB-50; and DBL-50 Fused Models)



#### 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.

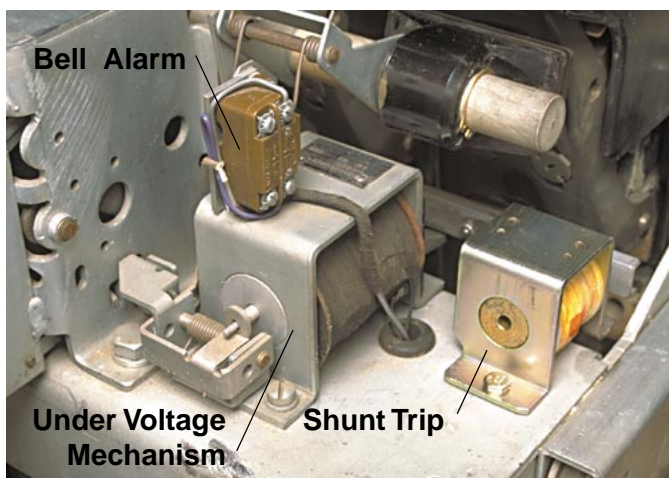
If you have any questions concerning the Retrofit Kit and / or the Retrofit process, contact Cutler-Hammer at 1-800-937-5487.

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					



**NOTE:** This Retrofit Kit IS NOT DESIGNED for use on any model of DB-50 Breaker equipped with a Bell Alarm or BOTH a Shunt Trip AND an Under Voltage Mechanism. If the Retrofitter attempts to modify the Breaker to accommodate this Retrofit Kit, or modify this Retrofit Kit to accommodate the Breaker, those actions will be at the sole responsibility and liability of the Retrofitter.

For more information, contact Cutler-Hammer at 1-800-937-5487.



### Step 1: General Breaker Preparation

Before attempting to remove the Breaker from the Cell or perform any Retrofit Operation, be sure to read and understand the Safety Precautions section of this manual. In addition, be sure to read and understand the *Instructions for the Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers* (Retrofit Application Data - Publication AD 33-855-1), supplied with the Digitrip Retrofit Kit.



### WARNING

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

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

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

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

**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 components and hardware will be used to complete each step in the Retrofit Process.



## Step 2: Removing the Original Components



Refer to the Westinghouse DB-50 Instruction Manual, originally supplied with the Breaker, to perform the following procedures.

- A. Remove the bottom Finger Clusters and set them aside for installation later in the Retrofit process.

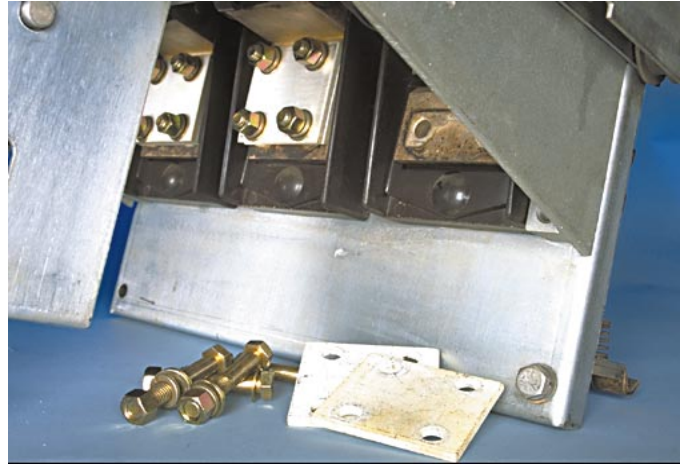
*For Breakers Equipped with the Original Electromechanical Trip Units.*

- B. Remove the four .500-13 bolts directly above each of the three bottom Breaker Stabs. As the bolts are removed, the original Electromechanical Trip Units will drop free. Scrap the Trip Units and all mounting hardware.
- C. Remove and scrap the three Electromechanical Trip Paddles from the Breaker Trip Bar. This will reduce the force required to trip the Breaker.

*For Breakers Equipped with an Amptector or Other Trip System.*

- C. Remove and scrap the Trip Mechanisms and all associated wiring, mounting brackets and hardware.

## Step 3: Installing the Copper Connectors



- A. Install a .500" flat washer on each of the (12) .500-13 x 3.00" bolts supplied. Working from the rear of the Breaker, insert the bolts into the holes from which the original Electromechanical Trip Unit mounting hardware was removed.
- B. Install (2) copper connectors on each set of .500" bolts. Secure the Copper Connectors using the (12) flat washers, (12) lock washers, and (12) nuts supplied.

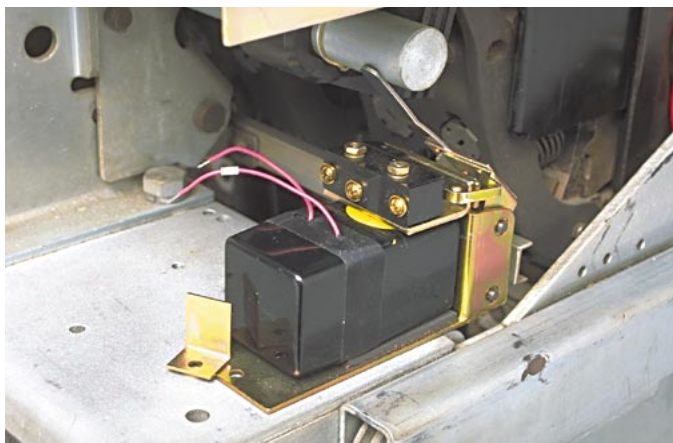
*For Kits Supplied with a PT Module Only.*

Leave one nut from each connector loose at this time. They will be used to connect the PT Wires later in the Retrofit process.

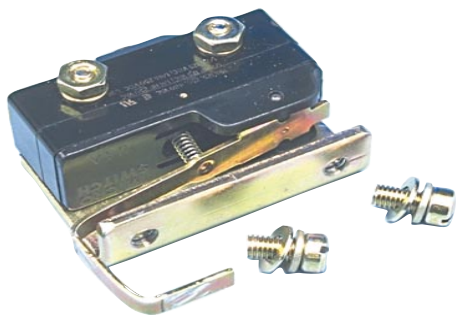




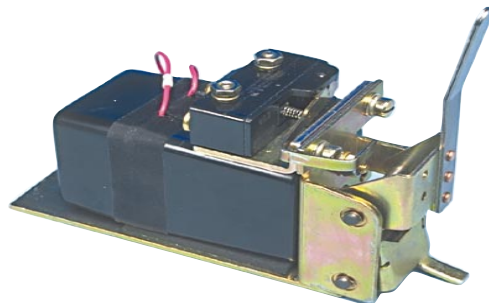
### Step 4: Installing the DTA Assembly



- A. Temporarily set the DTA Assembly in place on the right Breaker Platform and align the hole in the DTA Assembly with the existing hole in the Breaker Platform.
- B. Using the DTA Assembly as a template, mark the position of the second DTA Assembly mounting hole. Remove the DTA Assembly.
- C. Using a .219" drill bit, drill the second DTA Assembly mounting hole in the right side Breaker Platform. Care should be taken to insure that no drill shavings fall into the Breaker.
- D. *For Kits Supplied With An Auxiliary Switch Only.* Align the Microswitch with the holes in the Aux. Switch Mounting Bracket, as shown, then secure the Microswitch to the bracket using the (2) .138-32 x 1.00" screws, (2) flat washers, (2) lock washers, and (2) nuts provided.



Align the Aux. Switch Assembly with the holes in the DTA Assembly. Secure the Aux. Switch Assembly to the DTA Assembly, as shown, using the (2) .190-32 x .375" screws, (2) flat washers, and (2) lock washers provided.



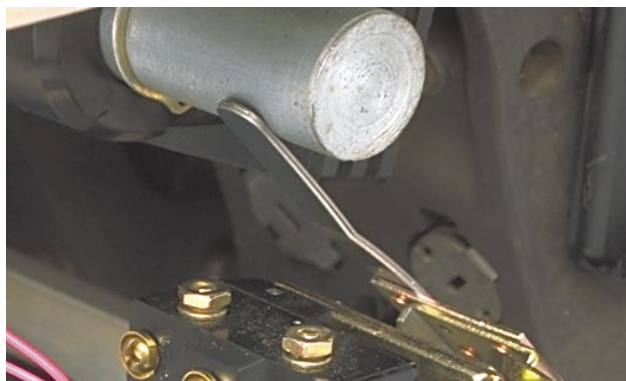
Insure that Aux. Switch moves to the "Closed" position when the DTA Reset Arm is moved towards the DTA.



### WARNING

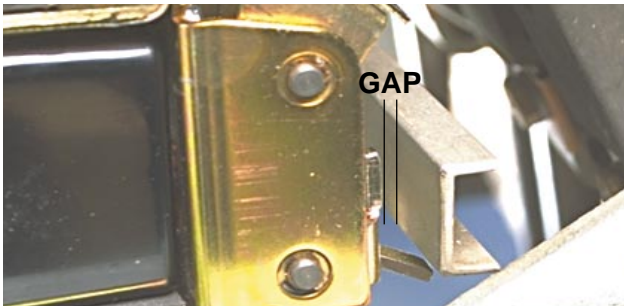
**The following steps must be performed with the Breaker in the CLOSED position. Guard against the Breaker unintentionally OPENING during these steps. Keep hands and fingers away from moving parts within the Breaker.**

- E. CLOSE the Breaker. With the Breaker in the CLOSED position, align the DTA Assembly with the existing hole and the hole drilled in Step 4-D. The DTA Reset Arm should be under the Breaker Cross Bar.



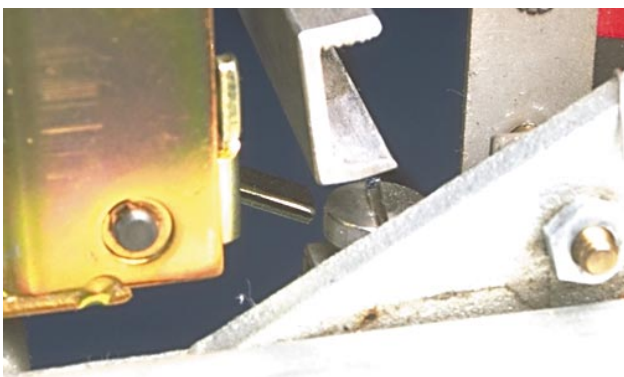


- F. Mount the DTA Assembly to the right side of the Breaker Platform using the DTA Mounting Clip, (1) .190-32 x .750" screw, (2) flat washers, (1) lock washer, and (1) nut, and the (1) .312-18 x .500" screw, (1) lockwasher and (1) flat washer provided.
- G. Check the gap between the DTA Trip Tab and the Breaker Trip Bar. The gap should be between .06 and .09". If not, trip the Breaker and bend the DTA Trip Tab. Close the Breaker again and check the gap, repeat the above if necessary.



- H. Return the Breaker to the OPEN position.

**NOTE: When Retrofitting a DBL-50, make sure there is no interference between the DTA Trip Linkage and the Breaker Limiter Tripping Screw on the Blown Fuse Indicator. If there is, modifications will have to be made by the Retrofitter. These modifications will be at the sole responsibility and liability of the Retrofitter.**



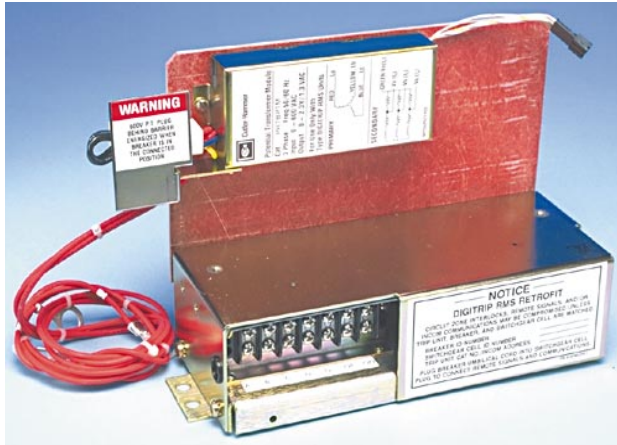
### Step 5: Preparing the Trip Unit Assembly



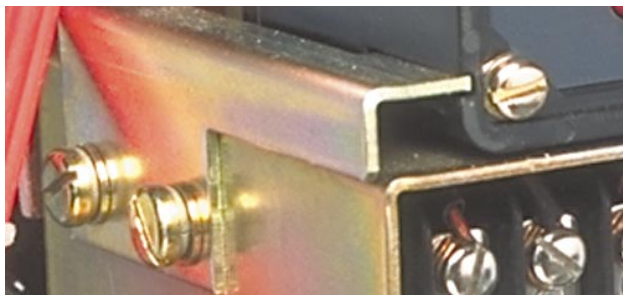
- A. Attach the Glass Poly Insulation Board to the back of the Aux. CT Module, as shown, using the (2) .190-32 x .625" screws, (2) lock washers, and (2) flat washers supplied.



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



- C. Route the PT Wires under the PT Module towards the right side of the Aux. CT Module.
- D. 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 brass 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.
- E. Mount the Trip Unit Mounting Brackets to the sides of the Aux. CT Module, as shown, using the (4) .190-32 x .625" screws, (4) lock washers, and (4) flat washers supplied, so they align with the slots and "pinch" the Trip Unit in place.



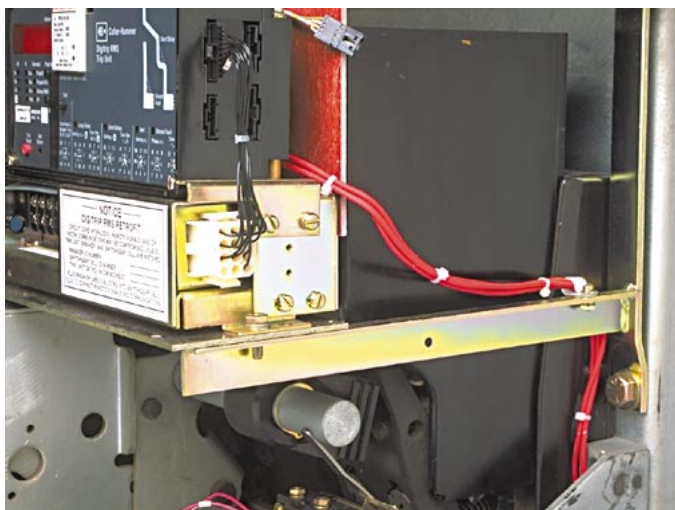
- F. Fully tighten 4.00" screws that secure the Trip Unit to the top of the Aux. CT Module.
- G. Remove the cover from the Trip Unit and install the Rating Plug. Replace the cover.
- H. Install the Digitrip Nameplate to the top of the Trip Unit.
- I. Connect the Aux. CT Harness to the Trip Unit and Aux. CT Module.







## Step 6: Installing the Trip Unit Assembly



A. Remove and scrap the existing .500" hardware that secures the top of the Breaker Lifting Bracket to the left and right side of the Breaker Frame.

B. Remove and scrap the existing .500" hardware securing the top of the Breaker Platform to the Breaker Frame (approximately 9.50" in below the Breaker Lifting Bracket hardware).

**NOTE: On DBL-50 Breakers, the bottom .500" hardware also secures the Fuse Tray to the back of the Breaker.**

C. Align the holes in right and left Trip Unit Assembly Mounting Brackets with the top mounting holes for the Breaker Platform. Secure the Trip Unit Assembly Mounting Brackets to the Breaker, as shown, using the (2) .500-13 x 1.50" bolts, (2) flat washers, (2) lock washers, and (2) nuts supplied. Do not fully tighten at this time.

D. Align the holes in the Breaker Lifting Bracket with the Trip Unit Assembly Mounting Brackets. Secure the Trip Unit Assembly Mounting Brackets and Breaker Lifting Bracket to the Breaker, as shown, using the (2) .500-13 x 1.50" bolts, (4) flat washers, (2) lock washers, and (2) nuts supplied. Tighten the .500" hardware.

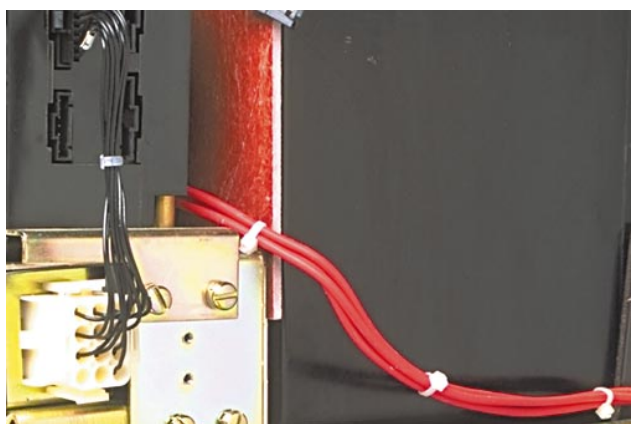


E. Set the Cross Brace on the Mounting Brackets. Align the left hole of the Cross Brace with the hole on the left Mounting Bracket. Secure the left side of the Cross Brace to the left Mounting Bracket with (1) .250-20 x .750" bolt, (1) lock washer, and (1) flat washer.

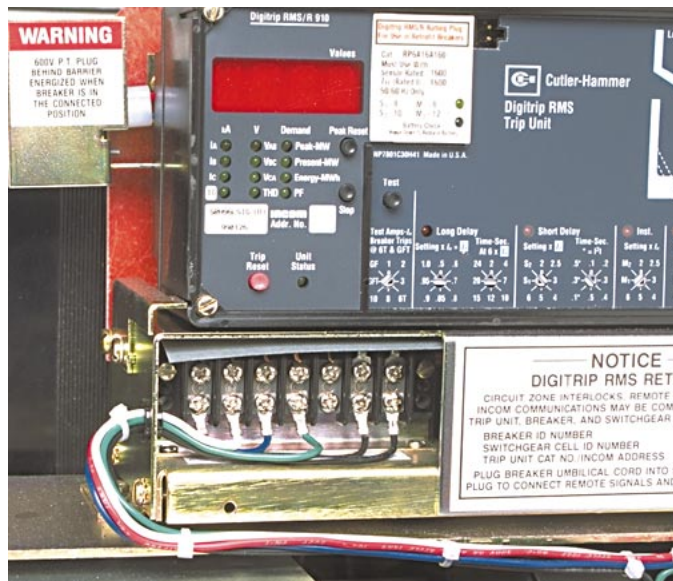
F. Set the Trip Unit Assembly on the Cross Brace, as shown, then align the hole on the right side of the Trip Unit Assembly with the hole in the right side of the Cross Brace and the right Mounting Bracket. Secure the Trip Unit Assembly and Cross Brace to the Mounting Bracket with (1) .250-20 x .750" bolts, (1) lock washer, and (1) flat washer.



- G. Align the hole on the left side of the Trip Unit Assembly with the hole in the center of the Cross Brace. Secure the left side of the Trip Unit Assembly to the Cross Brace with (1) .250-20 x .750" bolts, (1) lock washer, and (1) flat washer.
- H. *For Kits Supplied With A PT Module Only.* Temporarily route the PT Wires towards the right rear of the Breaker. The PT Wires will be connected later in the Retrofit Process.



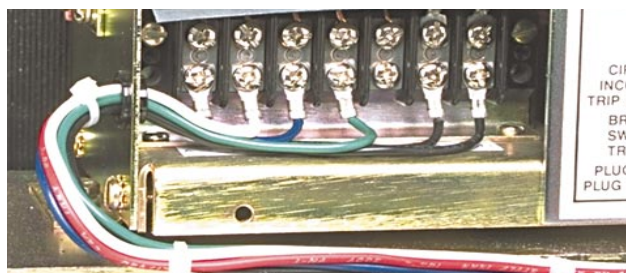
### Step 7: Connecting Sensor Harness and DTA Wires to the Aux. CT Module



- 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 of the Aux. CT Module. Refer to Section 12 of the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications.

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

- B. Connect the black DTA Extension Wires, contained in the Sensor Harness, to the terminals of the Aux. CT Module: positive (+) wire to the OP terminal and the unmarked wire to the ON terminal.

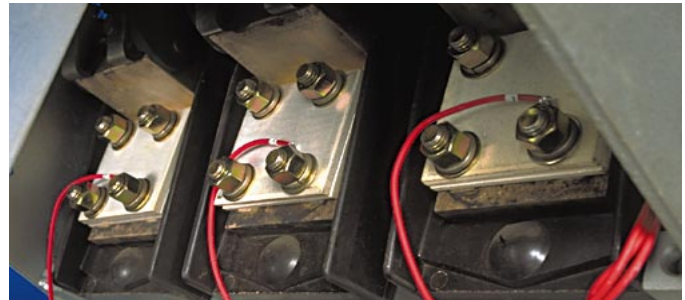




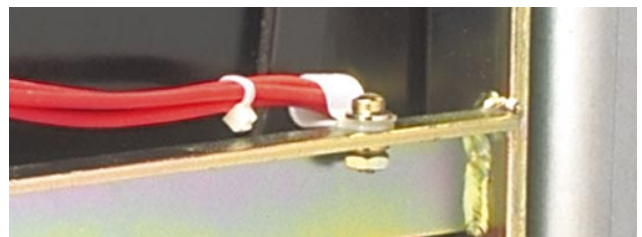
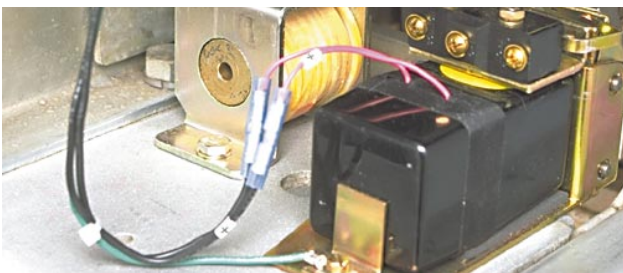
- C. Temporarily route the Sensor Harness along the front of the Aux. CT Module. Route the green wire (with ring terminal) down to the DTA Assembly.
- D. Remove and save the .190" hardware securing the front of the DTA and the DTA Mounting Clip.
- E. Align the ring terminal on the ground wire and the holes in the DTA Assembly and DTA Mounting Clip. Secure the ground wire ring terminal, DTA Assembly, and DTA Mounting Clip to the Breaker Platform using the .190" hardware just removed in Step D.
- F. Move the (+) wire marker along the positive DTA Wire until it is approximately one (1) inch from the DTA Assembly.
- G. Cut each of the DTA Wires approximately three (3) inches from the DTA Assembly. Strip an appropriate length of insulation from each wire.
- H. Move the (+) wire marker along the positive DTA Extension Wire until it is in a position to remain on the wire after cutting in the next Step I.
- I. Cut the DTA Extension Wires to a length appropriate to connect to the DTA Wires. Strip an appropriate length of insulation from each wire.
- J. Using the supplied wire splices, connect the DTA Extension Wires to the DTA Wires, positive (+) to positive (+) and unmarked to unmarked. Note that the 22 gage DTA Wires are to be inserted into the side of the wire splices containing the copper inserts.
- K. Secure the Sensor Harness to the front of the Aux. CT Module using the existing holes and the (2) nylon wire clamps, (2) .164-32 x .500" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.
- L. Route the Sensor Harness along the side of the right Trip Unit Assembly Mounting Bracket, then towards the top of the Breaker. Secure the Sensor Harness to the Trip Unit Assembly Mounting Bracket using the existing hole and the (1) nylon wire clamp, (1) .164-32 x .500" screw, (2) flat washer, (1) lock washer, and (1) nut supplied.

*For Kits Supplied with a PT Module Only.*

### Step 8: Connecting the PT Wires



- A. Route the PT Wires between the right Trip Unit Assembly Mounting Bracket and the right Arc Chute. Continue by routing the PT Wires down into the Breaker towards the Copper Connectors installed in Step 3.
- B. Secure the PT Wires to the side of the right Trip Unit Assembly Mounting Bracket, as shown, using the existing hole and the (1) nylon wire clamp, (1) .164-32 x .500" screw, (2) flat washer, (1) lock washer, and (1) nut supplied.



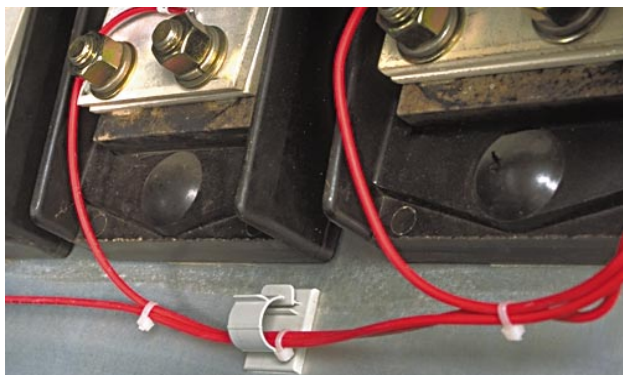




- C. Refer to Section 7-3, Power Flow Convention of the Retrofit Application Data, supplied with the Retrofit Kit for additional wiring information and to verify the Phase Convention used on this Breaker Application.

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

- D. The PT Wires are marked for connection to Phases 1, 2, and 3 with corresponding numbers. Route the PT Wires to a position suitable for attachment to the proper Phase Copper Connector. Move the PT Wire markers to a position where they will still be attached to the wires after cutting. Cut the wires to length, then strip an appropriate length of insulation from each PT Wire and install a .500" ring terminal to each PT Wire.
- E. Remove the nuts, lock washers, and flat washers from the hardware left loose on each Copper Connector in step 3-B.
- F. Connect each PT Wire to its corresponding Copper Connector using the flat washers, lock washers, and nuts just removed.



- G. Remove the protective cover from the adhesive pad on the back of the Self-Adhesive Wire Clamp. Secure the Clamp to the Breaker Back Plate with the Clamp opening facing upward. Route PT Wires through the Clamp as shown.

### Step 9: Installing the Sensors



- A. Slide a Sensor over each bottom Breaker Stab. The terminals of the Sensors must face downwards.
- B. Reinstall the Finger Clusters removed in Step 2A.



- C. Slide the supplied rubber grommet (oblonged) onto the Sensor Harness to an approximate position that will allow the Sensor Harness to be routed along the front of the Sensors.
- D. Route the Sensor Harness through the existing bottom slot in the right side of the Breaker Frame to the Sensors.





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

**Sensor Style No.**

8184A38H01	X1-X2 = 400 A
	X1-X3 = 600 A
	X1-X4 = 800 A
	X2-X5 = 1200 A
	X1-X5 = 1600 A

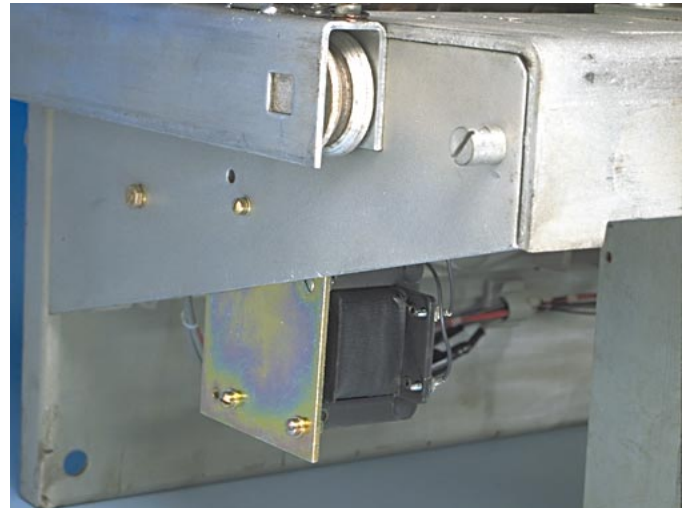
**Sensor Style No.**

8184A45H01	X1-X2 = 200 A
------------	---------------

- F. Install the rubber grommet in the existing bottom slot in the right side of the Breaker Frame.



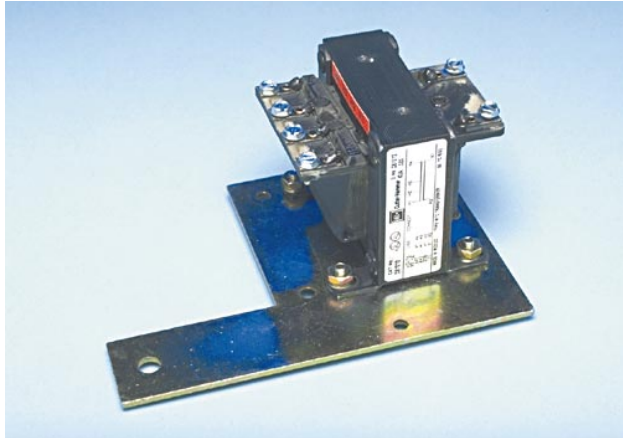
*For Kits Supplied with a Breaker Mounted CPT Only.*

**Step 10: Installing the Breaker Mounted CPT**

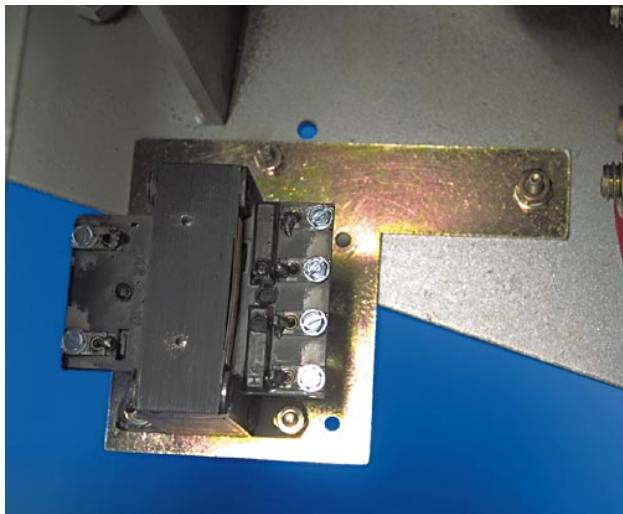
- A. Temporarily align the CPT Mounting Bracket with the existing holes in the left Breaker Frame, as shown.

**NOTE:** On some models of DB-50 Breakers, the hole used to mount the front of the CPT Mounting Bracket may not be present. In this case, use the CPT Mounting Bracket as a template, then mark and drill a .219" hole in the left Breaker Frame.

- B. Align the CPT with the holes in the CPT Mounting Bracket, as shown. Note that the side of the CPT with four (4) terminals faces the "L" side of the mounting bracket.
- C. Secure the CPT to the Mounting Bracket using the (2) .190-32 x .500 screws, (2) .190-32 x .500 flat head screws, (6) flat washers, (4) lock washers, and (4) nuts supplied. Note that the screws are inserted through the mounting bracket first, then through the CPT. Also note that the flat head screws are used in the holes nearest the long leg of the mounting bracket.



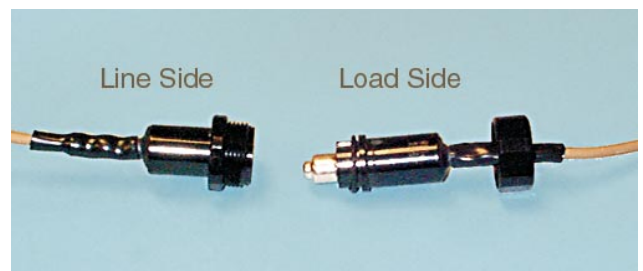
- D. Align then secure the CPT Assembly to the left Breaker Frame, as shown, using the hardware supplied: the (1) .250-20 x .750 bolt, (2) flat washers, (1) lock washer, and (1) nut in the rear hole; and the (1) .190-32 x 1.00 screw, (2) flat washers, (1) lock washer, and (1) nut in the front hole.



- E. The CPT Harness will connect the CPT to the Trip Unit. Temporarily position the plug-in connector of the CPT Harness near the right side of the Trip Unit. Route the CPT Harness down along the inside of the right Breaker frame, then across the bottom of the Breaker, past the Copper Connectors, then to the CPT Assembly.

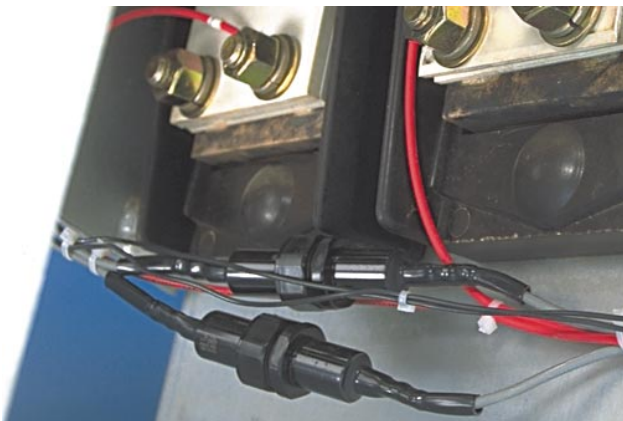
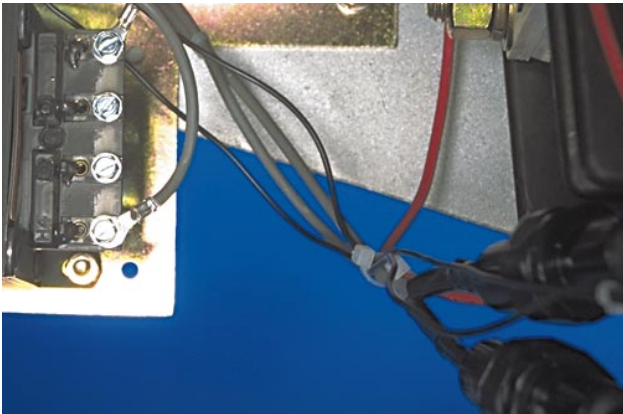
- F. Cut the CPT Harness to a suitable length for connection to the CPT Terminals. Strip an appropriate length of insulation and attach a .138" ring terminal to each wire of the CPT Harness. Connect the wires to the X1 and X2 terminals of the CPT Assembly.
- G. Route the CPT Harness through the Self-Adhesive Wire Clamp with the PT Wires.

**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.**

- H. Position the HV Wire Fuses in an accessible location, as shown, then mark and cut the Load Side of each HV Wire. Strip an appropriate length of insulation from each Load Side HV Wire and attach a .138" ring terminal to each. Attach the HV Wires to the CPT terminals to achieve the required voltage. (See the following table.)



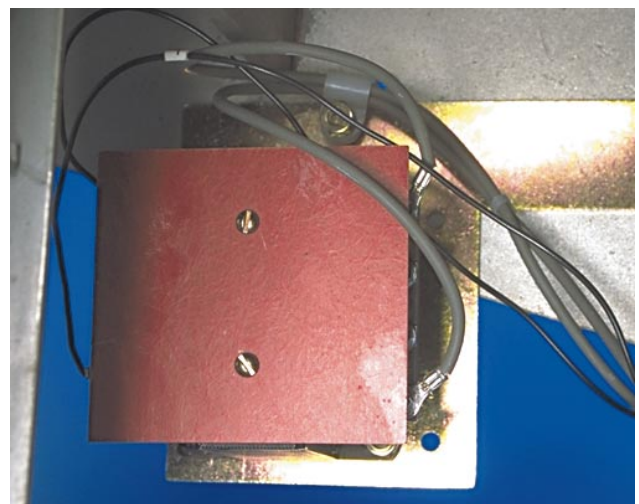
Voltage Required	CPT Terminals Used
600 Volt Circuit	H1 & H2
480 Volt Circuit	H1 & H4
240 Volt Circuit	H1 & H3
208 Volt Circuit	H1 & H2

**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.

- I. Secure the Load Side HV Wires to the right inside of the Breaker by sliding the supplied nylon wire clamp over the wires then installing the wire clamp on the .190-32 x 1.00" screw used to mount the front of the CPT Assembly. Use the (1) .190" flat washer, (1) lock washer, and (1) nut supplied to secure the wire clamp to the screw.



- J. Route the HV Wires through Self-Adhesive Wire Clamp with the CPT Harness and the PT Wires.
- K. Secure the insulation plate to the top of the CPT Assembly, as shown, using the (2) .138-32 x .375" thread cutting screws supplied.

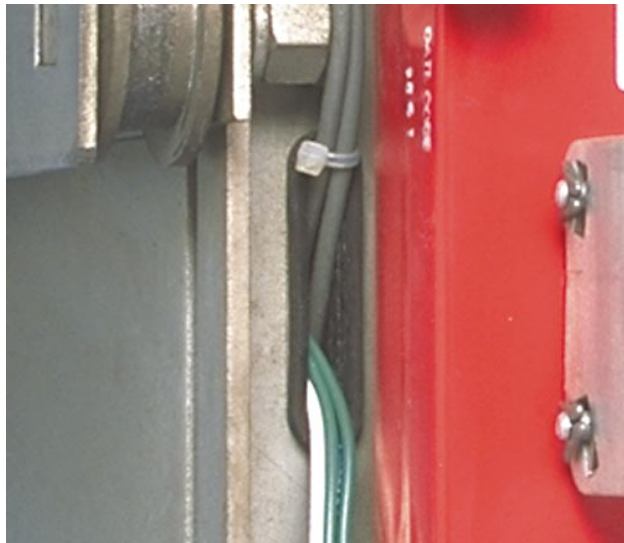




**NOTE:** The power convention of the DB-50 Breaker is normally *Top to Bottom*, meaning the Top Breaker Stabs are on the *Line Side* of the Breaker and the Bottom Breaker Stabs are on the *Load Side*.

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.

- L. Route the HV Line Side Wires through rubber grommet installed in the rear Breaker Frame in Step 9-D, then up towards the Phase 1 and 2, or Phase 2 and 3 Top Breaker Stabs.



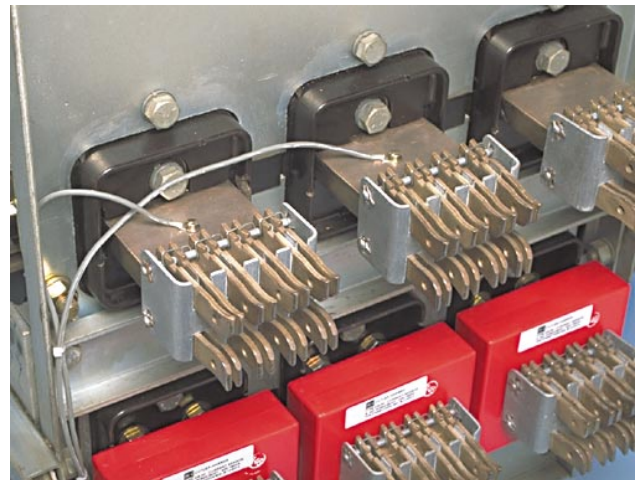
**NOTE:** The Line Side HV Wires are longer than necessary and are cut during the following steps. Before cutting the wires, be sure that sufficient length is left so that the HV Wire Fuses are accessible from the front of the Breaker and that the connections can be made to the correct Breaker Stabs.

*For DB-50 Non-Fused Breakers Only.*

- M. Using a .219" drill bit, drill one hole in Phase 1 and 2, or Phase 2 and 3 Breaker Stabs, as shown.

**NOTE:** For DB-50 Breakers equipped with Secondary Contacts, an angle drilled can be used so the contacts do not have to be removed.

- N. Cut the HV Wires to the appropriate length for attachment to the Phase 1 and 2, or Phase 2 and 3 Top Breaker Stabs. Strip an appropriate length of insulation from each HV Wire and attach a .190" ring terminal. Connect the HV Wires to the Breaker Stabs using the (2) .190-32 x 1.00" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.





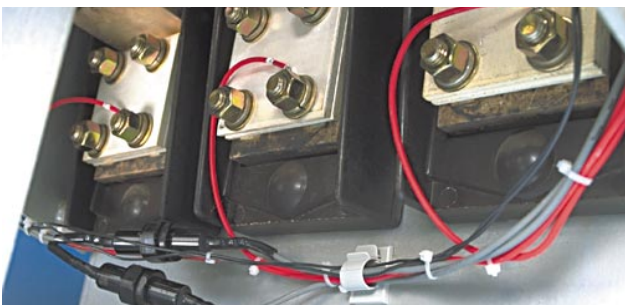
*For DBL-50 Fused Breakers Only.*

- M. Remove one (1) set of hardware securing the fuses from the Phase 1 and 2, or Phase 2 and 3 Breaker Stabs.
- N. Cut the HV Wires to the appropriate length for attachment to the Phase 1 and 2, or Phase 2 and 3 Top Breaker Stabs. Strip an appropriate length of insulation from each HV Wire and attach a .375" ring terminal. Connect the HV Wires to the Breaker Stabs using the hardware removed in the previous step.



*For All DB-50 Breakers.*

- O. Use the nylon wire ties and the Self-Adhesive Wire Clamp provided to secure the HV wires to the CPT Harness and, if applicable, the PT Wires.

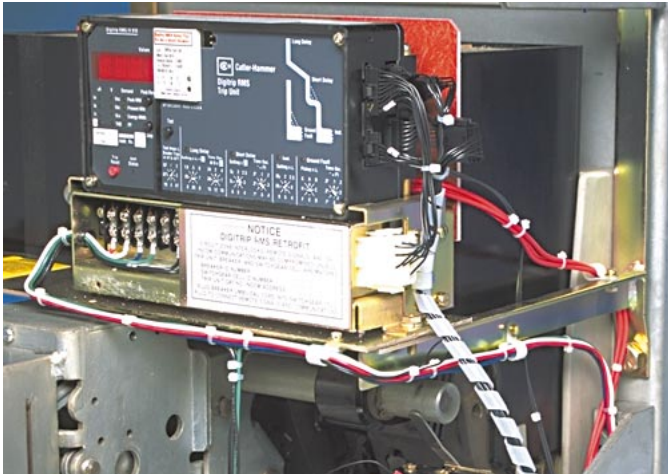


- P. Attach the appropriate label for the Breaker in a clearly visible position. Four (4) labels are included with the CPT, one (1) for 600 Volt, one (1) for 480 Volt, one (1) for 240 Volt, and one (1) for 208 Volt systems.





### Step 11: Final Wiring and Harness Connection



- A. Connect the External Harness to the Trip Unit.

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



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

- C. Secure the External Harness to the right side of the Aux. CT Module using the existing holes and the (2) nylon wire clamps and (2) .138-32 x .375" thread cutting screws.



- D. *For Kits Supplied with an Auxiliary Switch Only.* Connect the External Harness to the Aux. Switch by routing the two (2) wires (with ring terminals) from the External Harness, along the right Breaker Frame, down to the DTA Assembly. Connect one wire to the normally "Open" terminal of the Aux. Switch and the other wire to the "Common" terminal.
- E. *For Kits Supplied with a Breaker Mounted CPT Only.* Remove the External Harness plug installed in the Trip Unit. Insert the black plug of the CPT Harness into the same receptacle in the Trip Unit. Reinsert the External Harness Plug just removed into the female receptacle on the CPT Harness.
- F. Use nylon wire ties provided to secure all wires and harnesses away from any moving parts within the Breaker.



## Step 12: Testing the Breaker

- A. Measure the force necessary to trip the Breaker at the point where the Trip Finger contacts the adjusting screw. The force necessary to trip the Breaker **MUST NOT EXCEED** 3 lbs.
- B. The Retrofit must be tested using primary injection. Refer to Section 8 of the *Instructions for the Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers* (Publication AD 33-855-1, June 1997), supplied with the Retrofit Kit, for detailed testing procedures and specifications. For test information specific to the Trip Unit, refer to the IL publication supplied with the Retrofit Kit (see the Pick List for the IL number).
- C. While Section 8 of the Instructions for the Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers provides the information necessary for testing the Breaker, please keep the following notes in mind when reviewing other sections of the publication.

**Caution:** When all testing is complete, the Trip Unit must be reset. Failure to do so may cause the Battery in the Rating Plug to run down.

### Notes:

1. Publication AD-33-855 was created specifically for the “hundred” series (500, 600, 700, etc.) Retrofit Kits. Therefore certain sections and figures do not apply to the “ten” series (510, 610, 810, etc.) Retrofit Kits. Specifically, these are Sections 13 and 14, as well as Figures 3-2, 3-3, and 3-4.
2. *For All Kits Other Than 510 Basic.* If testing the Breaker with Short Delay or Ground Fault functions, be sure to either plug in the Cell Harness Assembly or use the Zone Interlock Shorting Plug. Failure to do so may result in shorter than expected trip times.

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

Confirm that the PowerNet communication wiring is correct by following the procedures detailed in Section 7.4 of the *Instructions for the Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers*. Note that for 810 and 910 Kits, the impedance between COM 1 and COM 2 should be between one (1) and three (3) ohms.

When testing is complete, disconnect the External Harness from the Cell Harness. Final External Harness connection will be performed in Step 13.



### Step 13: Mounting the Cell Harness

- A. The Cell Harness is to be mounted in the Breaker Cell. The connector end is to be mounted on the right front side of the Cell, in a location suitable for connection with the External Harness. The Terminal Blocks can be mounted anywhere space is available in the Cell as long as connection to the External Harness can be made.
- B. Route the Cell Harness wiring to keep it away from any moveable parts within the Cell Housing.

### Step 14: Installing the Retrofitted Breaker in the Cell



#### **WARNING**

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

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

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

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



**Digitrip Retrofit Kit Installation Components for Westinghouse DB-50 Series Breakers**

Step	Description	Style No.	Qty.	Comment
Step 3	Copper Connector		6	
	Copper Connector Mounting Hardware			
	.500-13 x 3.00 Lng. Hex Bolt		12	
	.500 Flat Washer Stl.		24	
	.500 Lock Washer Stl.		12	
	.500 Nut Hex Stl.		12	
Step 4	DTA Assembly	4A35630G02	1	
	DTA Mounting Hardware			
	Mounting Clip		1	
	.312-18 x .500 Lng. Screw F.H.		1	
	.312 Flat Washer Stl		1	
	.312 Lock Washer Stl		1	
	.190-32 x .750 Lng. Screw Fil.		1	
	.190 Flat Washer Stl.		2	
	.190 Lock Washer Stl.		1	
	.190-32 Nut Hex Stl.		1	
	Auxiliary Switch Kit	8188A38G01	1	
	Microswitch		1	
	Mounting Bracket		1	
	.190-32 x .375 Lng. Screw Fil.		2	
	.190 Flat Washer Stl.		2	Comm. Only
	.190 Lock Washer Stl.		2	
	.138-32 x 1.00 Lng. Screw Fil.		2	
	.138 Flat Washer Stl.		2	
	.138 Lock Washer Stl.		2	
	.138-32 Nut Hex Stl.		2	
Step 5	Trip Unit		1	See Pick List
	Rating Plug		1	See Pick List
	Aux. CT Module	6502C78G__	1	
	Aux. CT Harness	6502C84G__	1	
	RMS/R Conversion Parts	8188A35G01	1	
	Trip Unit Support Bracket R. H.		1	
	Trip Unit Support Bracket L. H.		1	
	Insulation Barrier		1	
	Digitrip Nameplate		1	
	.190-32 x 4.00 Lng. Screw Fil.		2	
	.190-32 x .625 Lng. Screw Fil.		6	
	.190 Flat Washer Stl.		8	
	.190 Lock Washer Stl.		8	
	Spacer Brass		2	

**Digitrip Retrofit Kit Installation Components for Westinghouse DB-50 Series Breakers (Continued)**

Step	Description	Style No.	Qty.	Comment
Step 5	PT Module	6502C82G01	1	Comm. Only
(Cont.)	PT Module Mounting Parts			
	.138-32 x .500 Lng. Screw Fil.		2	
	.138 Flat Washer Stl.		4	
	.138 Lock Washer Stl.		2	
	.138-32 Nut Hex Stl.		2	
	Ring Terminals (.190, .250, .312, .375, .500 - Each Size)		3	
	Wire Clamp		2	
Step 6	Trip Unit Assembly Mounting Parts			
	Mounting Bracket R. H.		1	
	Mounting Bracket L. H.		1	
	Cross Brace		1	
	.500-13 x 1.50 Lng. Hex Bolt		4	
	.500 Flat Washer Stl.		8	
	.500 Lock Washer Stl.		4	
	.500-13 Nut Hex Stl.		4	
	.250-20 x .750 Lng. Hex Bolt		3	
	.250 Flat Washer Stl.		3	
	.250 Lock Washer Stl.		3	
Step 7	Sensor Harness		1	
	Sensor Harness Mounting Parts			
	.164-32 x .500 Lng. Screw Fil.		3	
	.164 Flat Washer Stl.		6	
	.164 Lock Washer Stl.		3	
	.164-32 Nut Hex Stl.		3	
	Crimp Connector with Insert		2	
	Grommet Oblong		1	
	Wire Clamp		3	
Step 8	PT Wire Mounting Hardware			Comm. Only
	.250-20 x .500 Lng. Screw Sems		2	
	.164-32 x .500 Lng. Screw Fil.		1	
	.164 Flat Washer Stl.		2	
	.164 Lock Washer Stl.		1	
	.164-32 Nut Hex Stl.		1	
	Wire Clamp		1	
	Wire Clamp Self Adhesive		1	
Step 9	Sensor		3	See Pick List
	Grommet Oblong		1	From Step 7

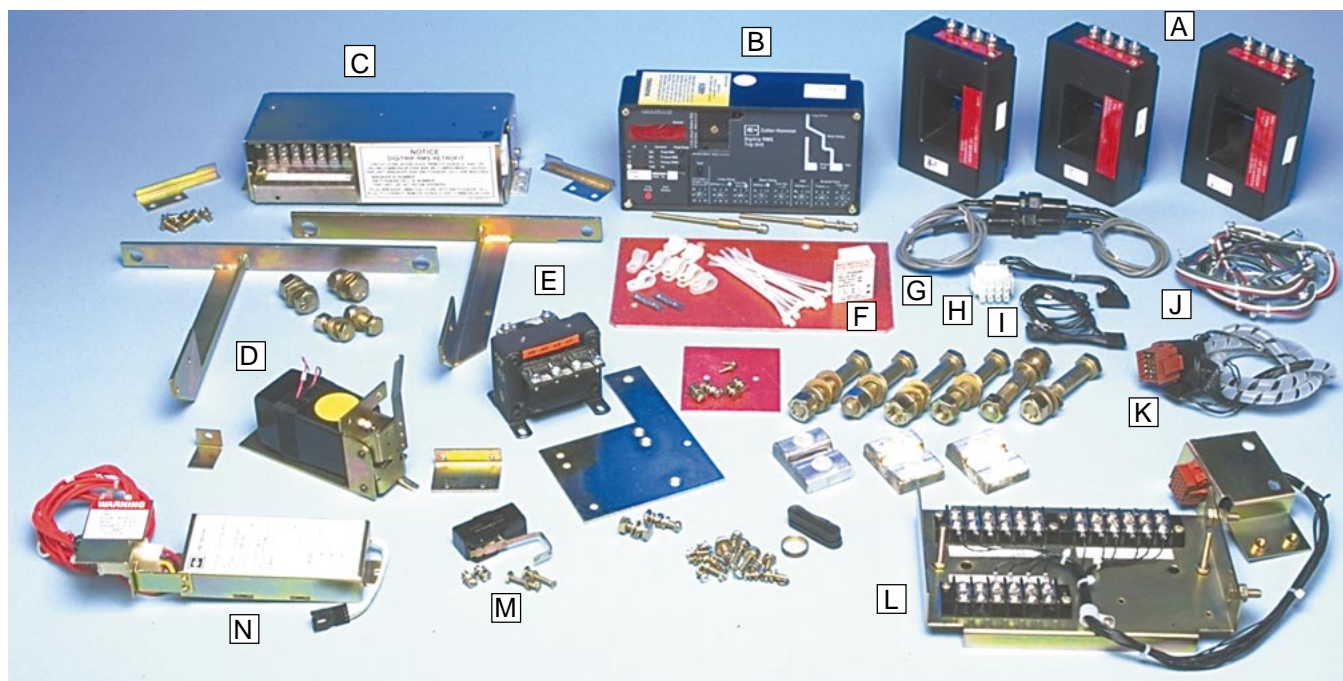
**Digitrip Retrofit Kit Installation Components for Westinghouse DB-50 Series Breakers (Continued)**

Step	Description	Style No.	Qty.	Comment
Step 10	Breaker Mounted CPT Kit	8259A91G05	1	CPT Only
	Ring Terminals (.138, .190, .250, .312, .375, .500 - Each Size)		2	
	CPT Mounting Parts			
	Mounting Plate		1	
	Insulation		1	
	Mounting Bracket		1	
	.250-20 x .750 Lng. Hex Bolt		1	
	.250 Flat Washer Stl.		2	
	.250 Lock Washer Stl.		1	
	.250-20 Nut Hex Stl.		1	
	.190-32 x 1.00 Lng. Screw Fil.		3	
	.190-32 x .500 Lng. Screw Fil.		2	
	.190-32 x .500 Lng. Screw F. H.		2	
	.190 Flat Washer Stl.		14	
	.190 Lock Washer Stl.		8	
	.190-32 Nut Hex Stl.		8	
Step 11	External Harness	6502C83G0	1	All Except 500
	External Harness Mounting Parts			
	Wire Clamp		2	
	.138-32 x .375 Screw T. C.		2	
	Wire Ties		2	
Step 13	Cell Harness	6502C71G0	1	All Except 500

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

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

### 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



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

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

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

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

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

**Cutler-Hammer**

130 Commonwealth Drive  
Warrendale, PA 15086



# INDEX

## B

Breaker	
General Preparation .....	3
Retrofit Kit Identification .....	2
Retrofitted Breaker Installation .....	19

## C

Cell Harness, Mounting of .....	19
Copper Connectors, Installation of .....	4
CPT	
Breaker Mounted CPT Installation .....	12
For DB-50 Non- Fused Breakers Only .....	15
For DBL-50 Fused Breakers Only .....	16

## D

DTA Assembly	
Installation .....	5
On DBL Breaker .....	6
Wiring to Aux. CT Module .....	9

## H

Harness Connection and Final Wiring .....	17
HV Wiring Connections .....	14

## K

Kit Component Table .....	2
Kit Parts List .....	20-22

## P

PT Wires Connection .....	10
Photos	
Family Photo .....	23

## R

Removal of Original Components	
With Original Electromechanical Trip Units ...	4
With Amptector or Other Trip System .....	4

## S

Safety Precautions .....	1
Sensor Harness	
Connections .....	9
Installation .....	11
Style Numbers .....	12

## T

Trip Unit Assembly	
Preparation .....	6
Installation .....	8
Testing the Breaker .....	18
Torque Values Tables .....	22 - 23

## V

Voltage Warning Labels .....	16
------------------------------	----