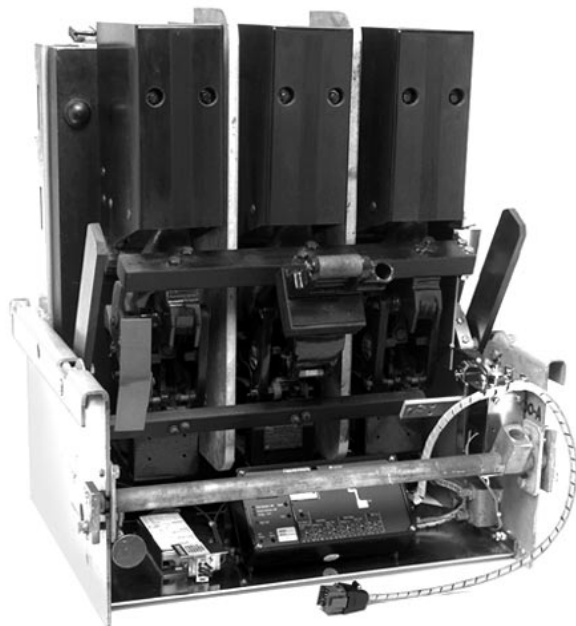




## Digitrip Retrofit System for the Westinghouse DA-50



### SAFETY PRECAUTIONS



#### WARNING

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

- Only qualified persons, as defined in the National Electric Code, who are familiar with the installation and maintenance of power circuit breakers and their associated switchgear assemblies should perform any work associated with these breakers.

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

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

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

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

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

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

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

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

Before beginning the Retrofit process, the Retrofitter should be aware that there are two distinctive "Versions" of the DA-50 Breaker. The main differences that will affect this Retrofit are the physical proportions of the Breaker Frame, the gap between the rear of the Breaker Frame and the Finger Cluster mounting, and the type of Finger Clusters utilized in the Breaker.

Throughout this manual, the two versions will be referred to as per the information supplied below.

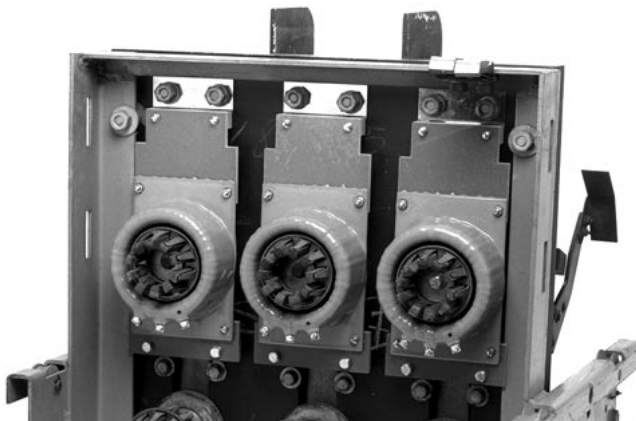
Version "S" (Spring):

- 10.50" High Side Rails
- Small Gap Between the Rear of the Breaker Frame and the Finger Cluster Mounting
- Girdle Spring Wrapped Finger Clusters



Version "T" (Tulip):

- 11.50" High Side Rails
- Large Gap Between the Rear of the Breaker Frame and the Finger Cluster Mounting
- Tulip Type Finger Clusters



This Retrofit Kit includes the parts necessary to Retrofit the DA-50 Breaker Version for which the kit was ordered. A Version "S" Breaker has been used for illustration throughout this manual. However, whenever the procedure, parts, specifications, etc. differ between Version "S" and Version "T" Breakers, these instructions will identify the differences to the Retrofitter.

### Step 1: General Breaker Preparation

Before attempting to remove the Breaker, 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 RMS/R 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 must not exceed 3 lbs.

To begin the Retrofit process, refer to the components list at the rear 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 of the Retrofit process.

### Step 2: Removing the Original Components



Following the Westinghouse DA-50 Instruction Manual, originally supplied with the Breaker, perform the following procedures.

- A. Elevate and support the front of the Breaker to allow adequate clearance to access the original Electromechanical Trip Units and mounting hardware.

**NOTE: The original Electromechanical Trip Units are filled with oil. Cover the area under each Trip Unit with an absorbent material to collect any oil that spills from the units during removal.**

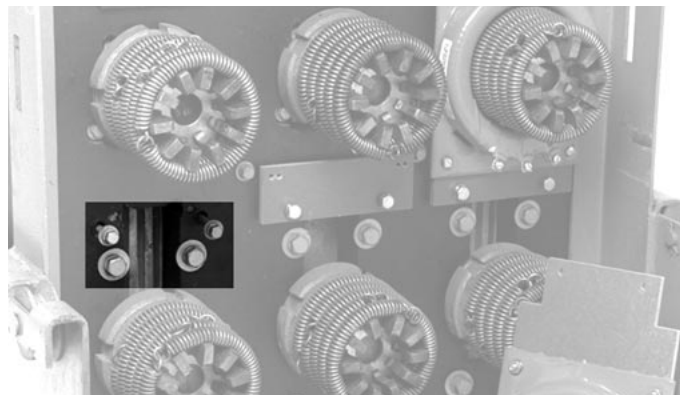
- B. Remove and scrap the three Electromechanical Trip Units and mounting hardware from the bottom front of the Breaker. After removal of the Trip Units, clean any residual oil from all Breaker surfaces and components.
- C. Remove and save the hardware that mounts the three Arc Chutes to the Breaker. Remove the Arc Chutes.

### Step 3: Installing the Sensors

- A. Working from the back of the Breaker, remove the hardware (six nuts, lock washers, and flat washers) that secure the Arc Chute Mounting Studs to the Breaker. Leave the studs in place.
- B. Install a metal Sensor Mounting Bracket on each pair of Arc Chute Mounting Studs. The Mounting Brackets must be installed with each bracket's "Step" facing away from the Breaker Back Plate. Loosely secure the Sensor Mounting Brackets using the original hardware (six nuts, lock washers, and flat washers). Do not tighten at this time.



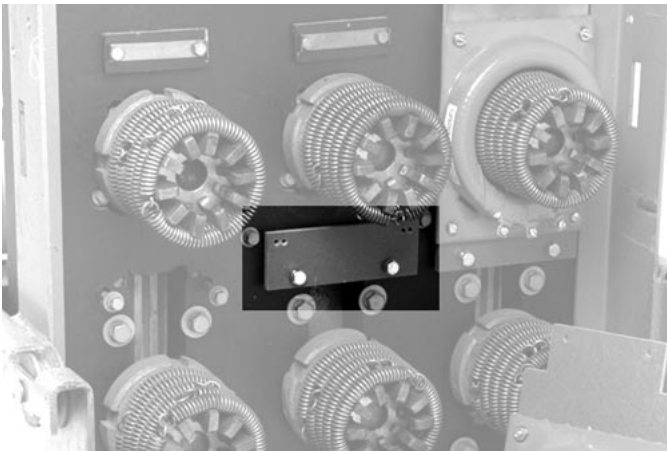
- C. Remove and discard the six bolts and washers (one row) located directly below each top Finger Cluster.



- D. Using the .190-32  $\times$  .875" pan head screws, lock washers, flat washers, and nuts provided, mount a Top Sensor Glass Poly Mounting Plate to the back of each Sensor. These are mounted to the Sensor mounting holes opposite the terminals. Note that the screws must be inserted from the rear of the Glass Poly Mounting Plate.



- E. Using the .250-20  $\times$  3.00" bolts, lock washers, and flat washers provided, mount a Glass Poly Spacer and a Sensor Glass Poly Mounting Plate to the Breaker. Do not tighten at this time.

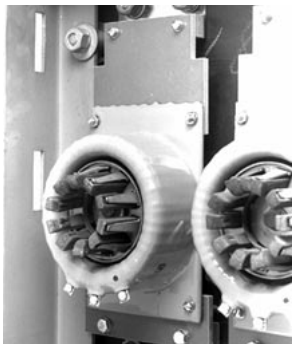


**NOTE:** Because of the physical differences between the Version "S" and "T" Breakers, different numbers of spacers are used for top and bottom Sensor Assembly mounting, as well as different screw lengths. See the following table and notes for specifics.

	Number of Spacers*		Length of Screws	
	Top	Bottom	Top	Bottom
Version "S"	0	1	.500"	.625"
Version "T"	2	3+	.625"	1.00"
		1 .250" $\times$ .75" washer		

\*Top spacers are inserted between the metal Sensor Mounting Bracket and the Top Sensor Glass Poly Mounting Plate.  
Bottom spacers are inserted between the Breaker Back Plate and the Bottom Sensor Glass Poly Mounting Plate.

- F. Position a Sensor Assembly, with the terminals facing downward, over each Finger Cluster. Align the holes in each Sensor Assembly with the holes in the Sensor Mounting Bracket (top) and Sensor Glass Poly Mounting Plate (bottom). Using the .190" pan head screws (see preceding table for specifics), lock washers, and flat washers provided, mount the Sensor Assemblies. Be careful not to strip the threads in the Glass Poly Mounting Plate.



- G. Center each Sensor on the Finger Cluster, then tighten the bolts that mount the bottom (and the nuts that mount the top) of each Sensor Assembly.
- H. Using the original hardware, reinstall the Arc Chutes.

#### Step 4: Installing the Retrofit Components on the Trip Unit Mounting Platform

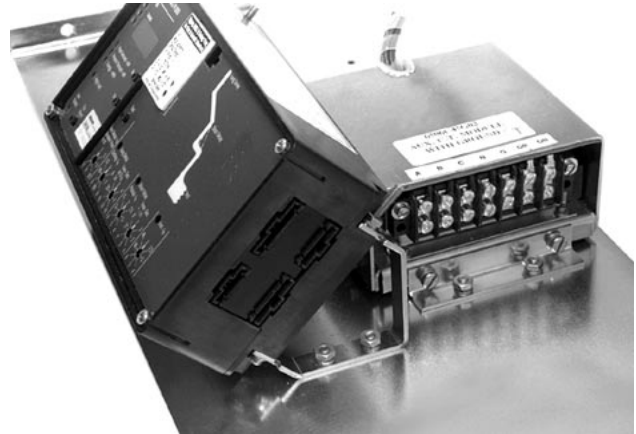
- A. Remove the two screws from the back of the Auxiliary Current Transformer (Aux. CT) Module. Using the original hardware removed from the back of the Module, and the two .190-16 × .500" pan head screws, lock washers, and flat washers provided for the front, mount the two Aux. CT Module Mounting Brackets to the Aux. CT Module as shown.



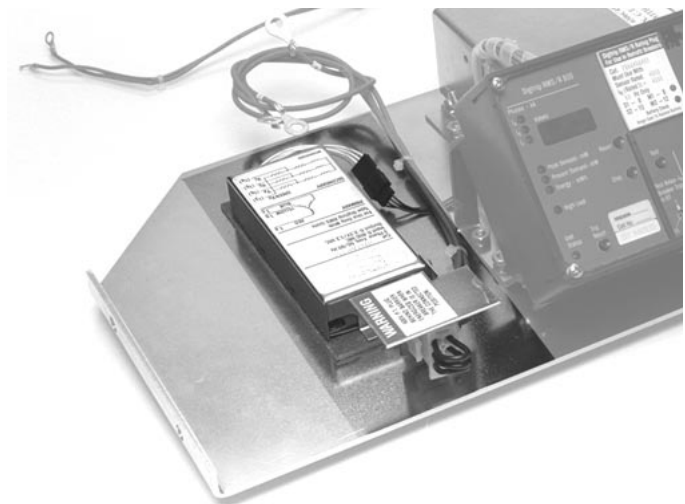
- B. Using the .190" screws (4" long), lock washers, flat washers, and nuts provided, mount the Trip Unit Mounting Brackets to the Trip Unit as shown. Note the Mounting Brackets are to be installed with the holes towards the bottom of the Trip Unit. Also note that the screws, with flat washers installed, are inserted from the bottom of the Trip Unit and the flat washers, lock washers, and nuts are installed from the top.



- C. Using the .190-32 × .500" pan head screws, flat washers, lock washers, and nuts provided, mount the Aux. CT Module Assembly and the Trip Unit Assembly to the Trip Unit Mounting Platform as shown.

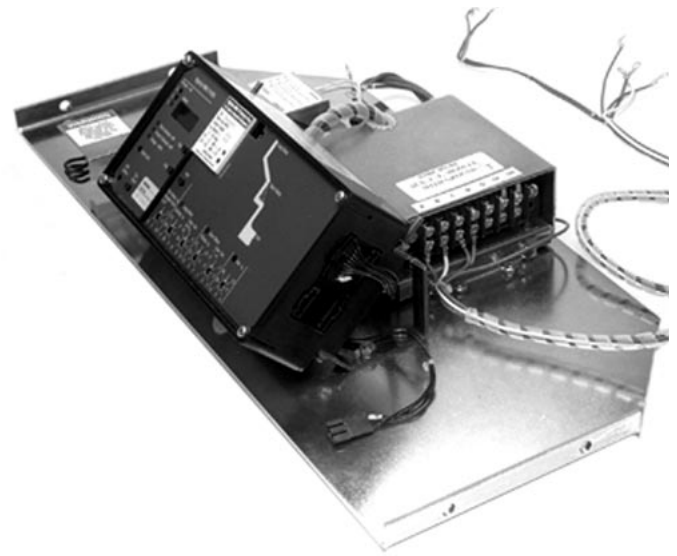


- D. Remove the Trip Unit Cover and install the Rating Plug. Replace the cover.
- E. *For Kits Supplied With a PT Module Only.* Align the Glass Poly Insulation Board and the Potential Transformer (PT) Module with the holes in the Trip Unit Mounting Platform. Using the .138-32 × .500" pan head screws, flat washers, lock washers, and nuts provided, mount the PT Module and Glass Poly Insulation Board to the Trip Unit Mounting Platform as shown.



F. *For Kits Supplied With a PT Module Only.*

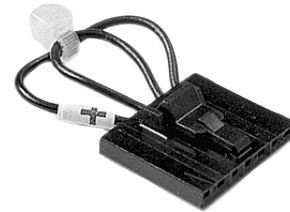
Plug the connector of the PT Extension Harness into the receptacle on the PT Harness. Route the PT Extension Harness between the Aux. CT Module and the Trip Unit Assembly.



- I. Connect the External Harness to the Trip Unit and the PT Extension Harness. Refer to the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications.

- G. Connect the Aux. CT Harness to the Aux. CT Module plug. Route the harness between the Aux. CT Module and the Trip Unit Assembly. Plug the other end of the Aux. CT Harness into its receptacle on the right side of the Trip Unit.

- H. 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.

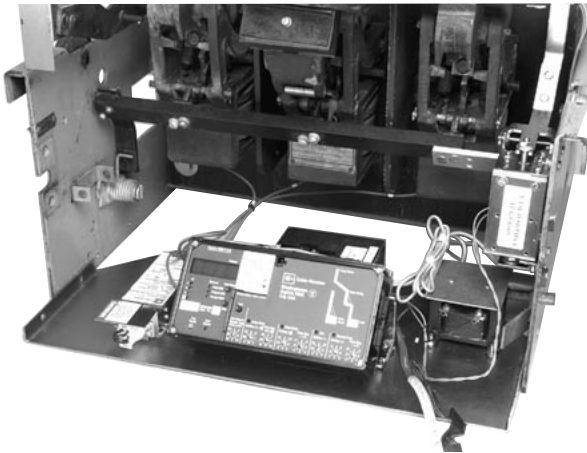


**NOTE: For RMS/R 510 Basic Kits, the External Harness is the plug pictured above. It is to be plugged into the right side of the Trip Unit.**

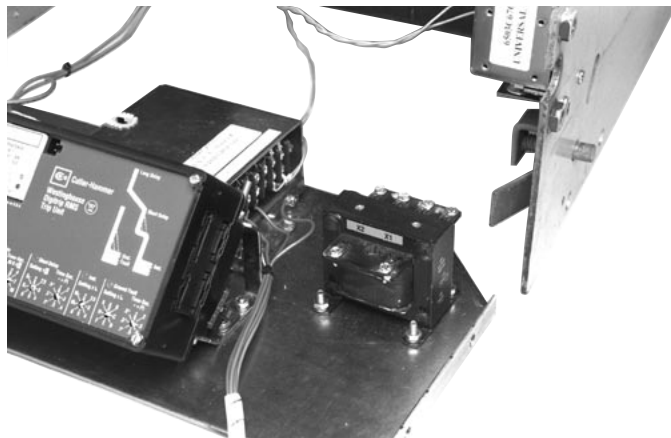
Remove a screw from the right side of the Aux. CT Module. Connect the ground wire ring terminal from the Sensor Harness to the cover of the Aux. CT Module using the screw just removed. The final configurations for the Sensor Harness and the PT Wire connections will be made later in the Retrofit process.

- J. Fold any excess length of the PT Extension Harness and secure using the wire ties provided. Tuck the excess harness between the Aux. CT Module and the Trip Unit Assembly.



**Step 5: Mounting the Breaker Mounted CPT**

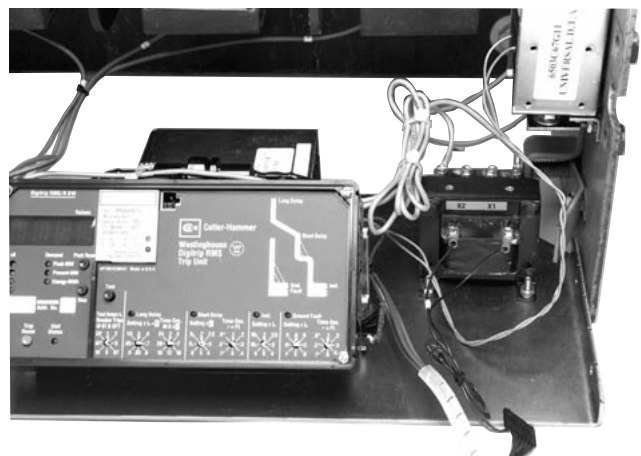
- A. Align the holes in the Breaker Mounted CPT with the predrilled holes in the Trip Unit Mounting Platform, as shown, then secure using the (4) .190-32 x .500" screws, (8) flat washers, (4) lock washers, and (4) nuts supplied. Note that the mounting screws must be inserted from the bottom of the Mounting Platform and that the X1 and X2 terminals must face the front of the Mounting Platform.



- B. Connect the CPT Harness wires to the X1 and X2 terminals of the CPT.
- C. Position the fuses on the High Voltage (HV) Wires in an accessible location, then cut the Load Side of each HV wire. Strip .250" from the Load Side HV Wires and attach a .138" ring terminal to each.

- D. Attach the HV Wires to the CPT terminals to achieve the required voltage (see the following table).

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



- E. 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.

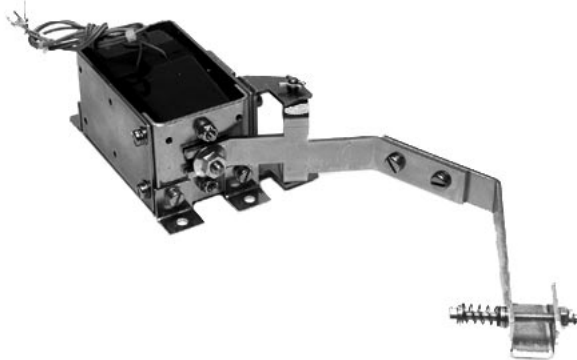




**Step 6: Assembling the Direct Trip Actuator (DTA) Assembly**

**NOTE: Loc-Tite® 242 should be applied to the threads of all screws and bolts used to assemble and mount the DTA Assembly.**

- A. Using the .164-32 × .312" pan lock screws with flat washers provided, mount the four DTA Mounting Brackets to the DTA as shown. Note that the long leg of each mounting bracket is attached to the DTA. Before tightening, assure that the brackets are squared with the bottom surface of the DTA.

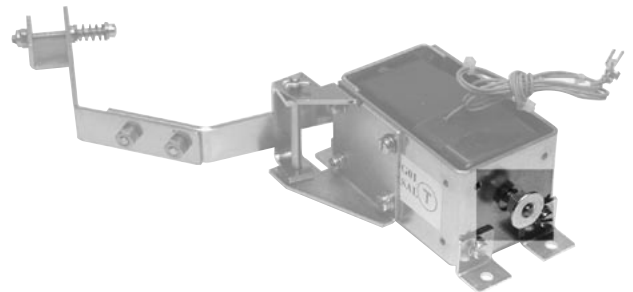


- B. Remove and discard the two screws from the front right side of the DTA Assembly. Using the .164-32 × .312" and 164-32 × .375" screws, lock washers, and flat washers provided, mount the Reset Arm Assembly to the DTA Assembly. Note that the fork of the Reset Arm goes around the DTA Shaft and under the Flange Nut.

**NOTE: The Flange Nut on the DTA Shaft at the Reset Fork should be loosened slightly, Loc-Tite® 242 applied, and retightened securely.**

- C. Install a Flange Nut with the wide end facing out. Thread it on to the DTA Shaft until it is flush with the end of the shaft.

**NOTE: Loc-Tite® 242 will be applied to the threads on the end of the DTA Shaft to secure the Flange Nut when final adjustment is made later in the Retrofit process.**

**Step 7: Assembling the Glass Poly Barrier and Auxiliary Switch**

- A. Using the .190" nylon screws provided, secure the Mounting Bracket to the Glass Poly Barrier as shown.



*For Kits Supplied With An Auxiliary Switch Only.*

- B. Cut 2.25" off the end of the Microswitch Lever.
- C. Using the .138" nylon screws, flat washers, lock washers, and nuts provided, mount the Microswitch to the Glass Poly Barrier as shown. Note that the screws are inserted through the Microswitch and then through the holes in the Barrier.

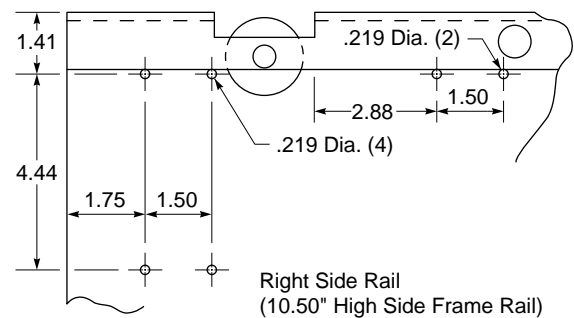


### Step 8: Drilling the Mounting Holes in the Breaker Frame

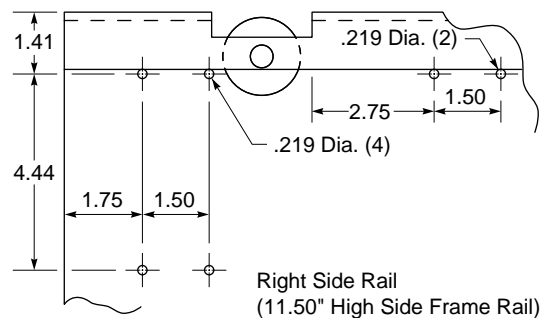
- A. For Version "S" Breakers, use Drilling Plan A and drill the six .219" diameter holes in the right Breaker Frame. These holes will be used to mount the DTA and the Glass Poly Barrier Assemblies later in the Retrofit process.

**NOTE: On Version "T" type Breakers, use Drilling Plan B.**

#### Drilling Plan "A"



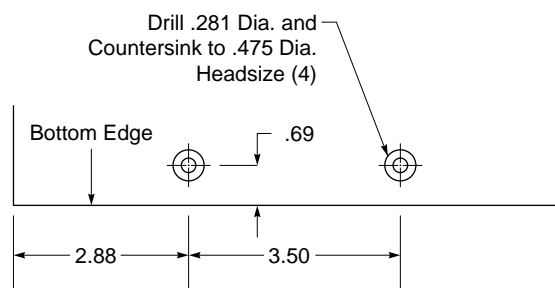
#### Drilling Plan "B"



- B. For Version "S" Breakers, use Drilling Plan C then drill and countersink two .281" diameter holes in both the right and left Breaker Frames. These holes will be used to mount the Trip Unit Mounting Platform and attached components later in the Retrofit process.

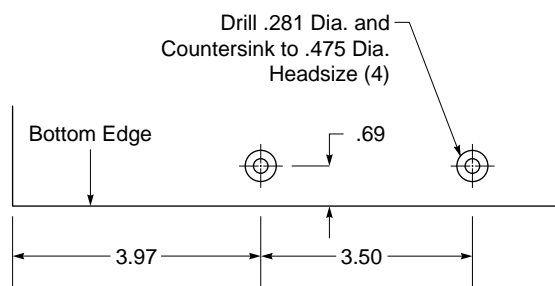
**NOTE: On Version "T" type Breakers, use Drilling Plan D.**

### Drilling Plan "C"



Right Side of Breaker Shown – Drill Both Sides  
(10.50" High Side Frame Rail)

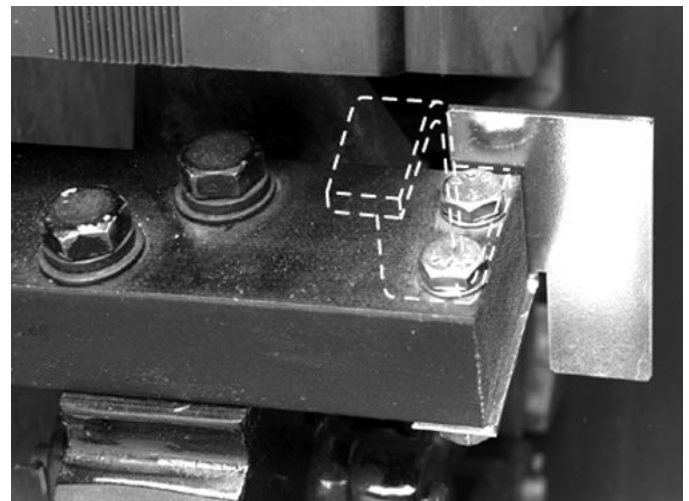
### Drilling Plan "D"



Right Side of Breaker Shown – Drill Both Sides  
(11.50" High Side Frame Rail)

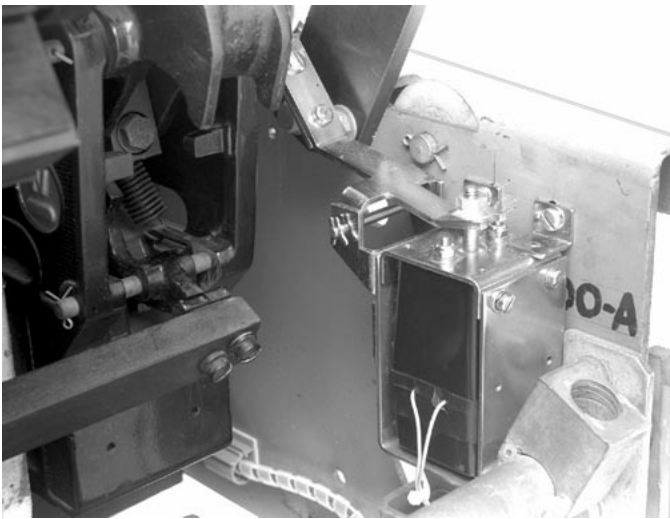
### Step 9: Installing the Striker Plate

- A. Remove and discard the original hardware that secures the Interlock Bracket to the Breaker Cross Bar. Note that some Models of the DA-50 Breaker were not equipped with an Interlock Bracket. However, the mounting holes will still be in the Breaker Cross Bar.
- B. Using the .250-20  $\times$  1.75" bolts, flat washers, lock washers, and nuts provided, mount the Striker Plate to the Breaker Cross Bar as shown. If the Breaker was equipped with an Interlock Bracket (shown as dashed lines in photo), the bracket should be reinstalled in its original position and secured with the new Striker Plate mounting hardware.

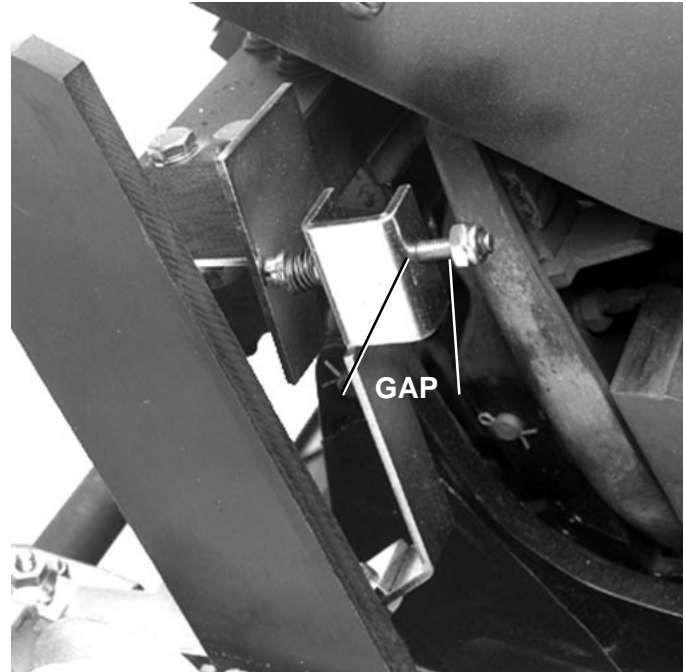


### Step 10: Installing the DTA Assembly

- A. Align the holes in the DTA Mounting Brackets with the holes drilled in the right Breaker Frame in Step 8. Using the .190-32  $\times$  .625" screws, flat washers, lock washers, and nuts provided, mount the DTA Assembly to the right Breaker Frame as shown. When positioning the DTA Assembly, assure that the Reset Lever is behind the Striker Plate.



- B. The DTA reset adjustment is achieved by turning the flange nut on top of the DTA shaft. If adjustment is required, remove the flange nut from the DTA shaft and apply Loc-Tite® 242 to the shaft threads. Then screw the nut onto the shaft, adjusting the gap to .19" - .25" as shown.



**NOTE:** To provide clearance for the Racking Mechanism Lock, the bottom front DTA Assembly mounting screw must be inserted with the screw head towards the outside of the Breaker.

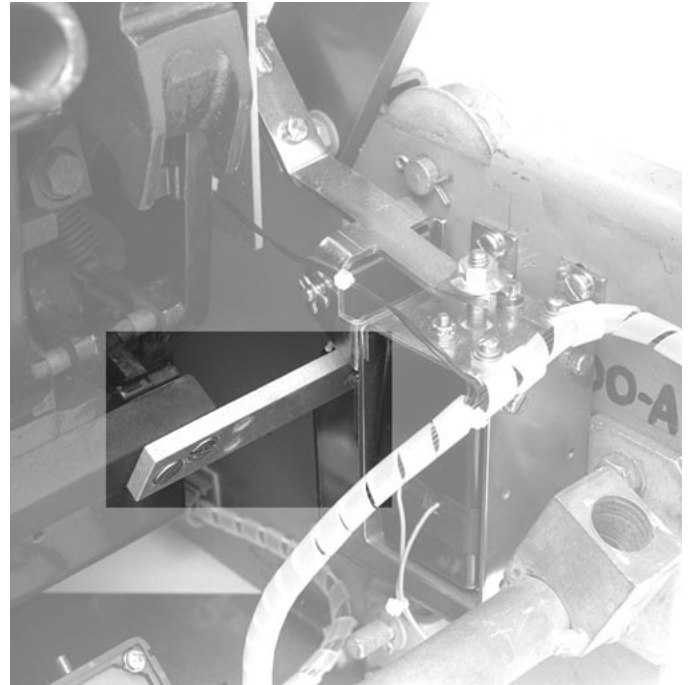


**Step 11: Installing the Glass Poly Barrier**

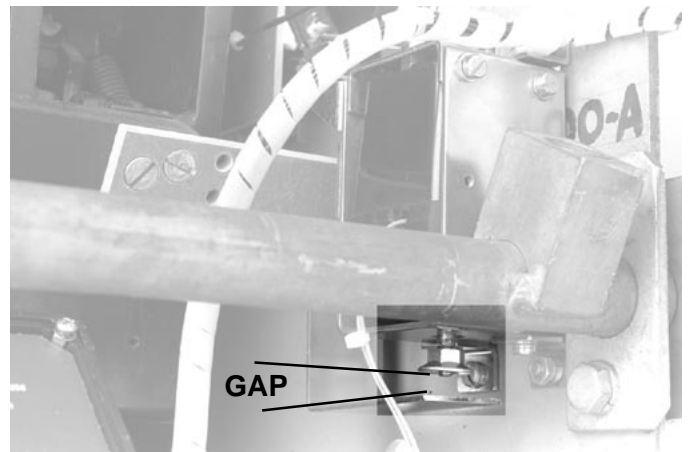
- A. Align the holes in the Glass Poly Barrier Mounting Bracket with the holes drilled in the right Breaker Frame in Step 8. Using the .190-32  $\times$  .500" screws, flat washers, lock washers, and nuts provided, mount the Glass Poly Barrier to the Breaker Frame as shown.



- B. Using the .250"  $\times$  1.25" flathead screws provided, mount the Trip Finger Assembly to the Breaker Trip Bar as shown.



- C. Back off the Flange Nut from the DTA Shaft and apply Loc-Tite® 242 to the threads of the shaft. Adjust the flange nut so that there is approximately a .06 min. - .09 max. gap between the flange nut and the Trip Finger.

**Step 12: Installing the Trip Finger Assembly**

**NOTE:** The Trip Finger Assembly is supplied with the Shunt Trip Bracket installed. If the Breaker being Retrofitted was not equipped with the optional Shunt Trip, remove the Shunt Trip Bracket before installing the Trip Finger Assembly.

- A. Remove and discard the two screws on the right end of the Breaker Trip Bar.

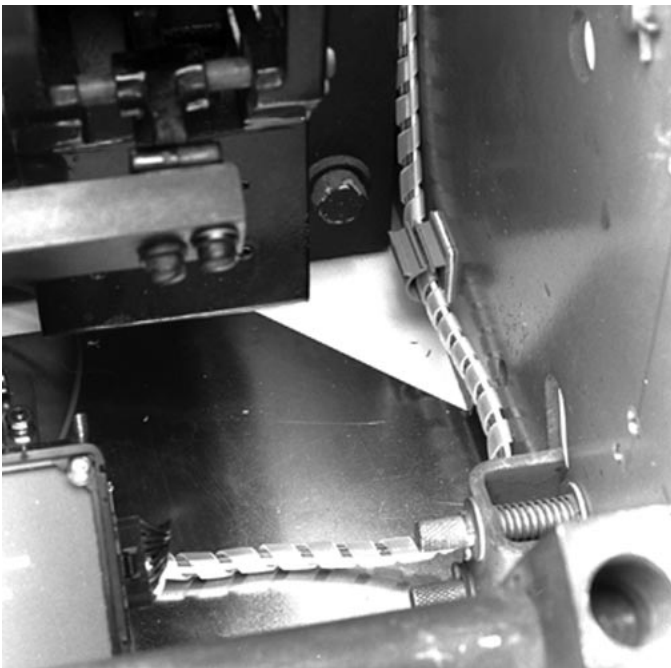
### Step 13: Installing the Trip Unit Mounting Platform Assembly and Final Wiring

**NOTE: For Steps 13 A through C, position the Trip Unit Mounting Platform Assembly in front of and as close to the Breaker as possible while still providing clearance to the components inside the Breaker.**

- A. Route the Sensor Harness from the Mounting Platform Assembly along the right side and then up and out the back of the Breaker, between the Breaker Frame and the Glass Poly Barrier.

Using the self-adhesive wire clip supplied, secure the Sensor Harness to the inside of the right Breaker Frame as shown.

**NOTE: To insure proper adhesion, clean the surface of the Breaker Frame before installing the wire clip.**

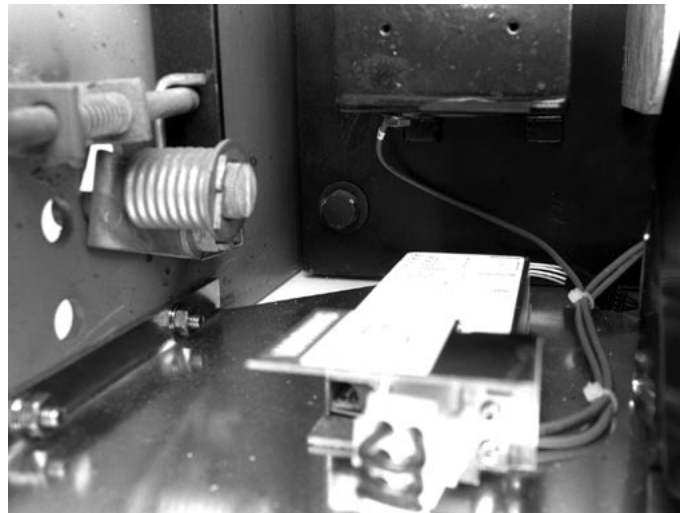


- B. Route the DTA Wires downward to the Aux. CT Module. Connect the DTA Wire marked "+" to the "OP" and the unmarked wire to the "ON" terminals of the Aux. CT Module.
- C. *For Kits Supplied With a PT Module Only.* Route the PT Wires towards the back of the Breaker. The wires are marked for connection to Phases 1, 2, and 3 with corresponding numbers.

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

Route the PT Wires to a position suitable for attachment to one of the corresponding holes used to mount the original Electromechanical Trip Units for each Phase. Move the wire markers to a position where they will still be attached to the wire after cutting. Cut the wires to length, strip each wire .250", and install a .250" ring terminal.

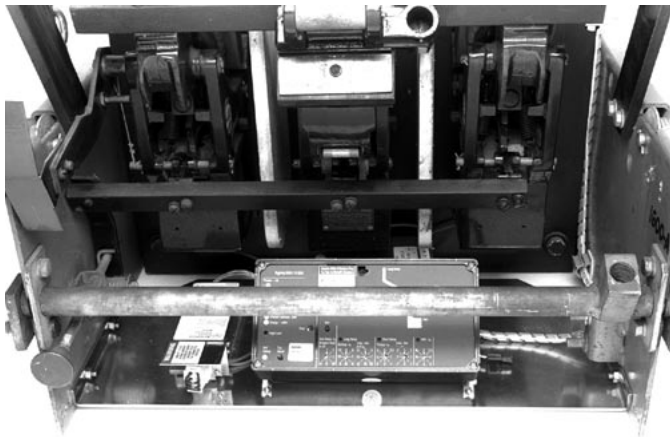
Using the .250 × .500" bolts, lock washers, and flat washers provided, connect each PT Wire to the appropriate Phase.



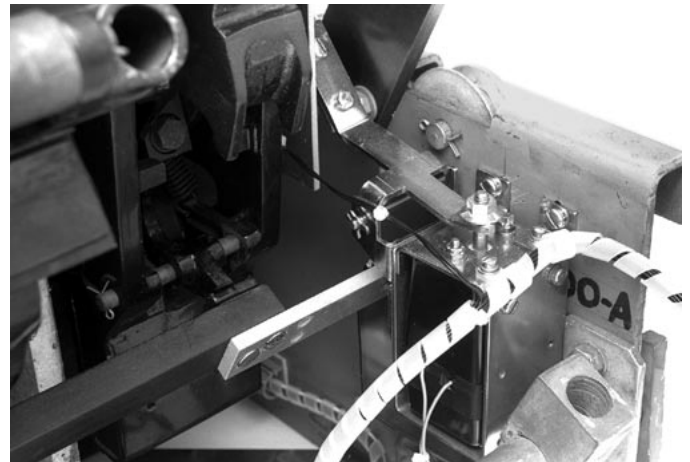
- D. *For Kits Supplied with a Breaker Mounted CPT Only.* Route the Line Side HV Wires along the same path as the Sensor Harness.

Remove the External Harness plug installed in the bottom rear socket on the right side of the Trip Unit. Insert the black plug of the CPT Harness into the same socket. Reinsert the External Harness plug just removed into the female receptacle on the CPT Harness.

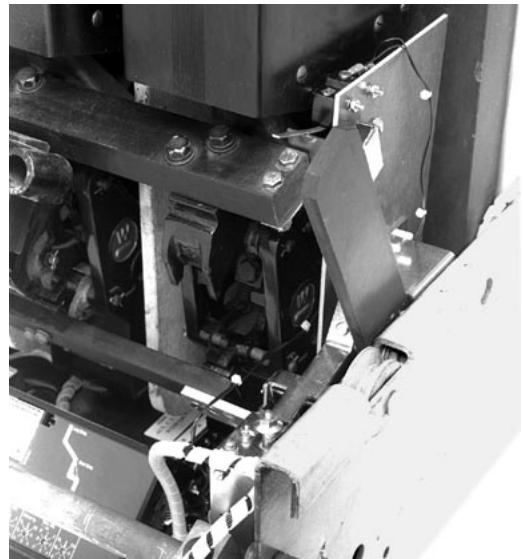
- E. While keeping all wires clear, slide the Mounting Platform Assembly into the bottom of the Breaker. Align the holes in the sides for the Mounting Platform Assembly with the holes drilled and countersunk in the right and left Breaker Frames in Step 8. Using the .250-20 × .750" flat head screws, flat washers, lock washers, and nuts provided, attach the Mounting Platform Assembly to the Breaker Frame.



- F. Route the External Harness towards the right side of the Breaker, then up towards the DTA Assembly. Remove the top front screw securing the DTA mounting bracket. Using the two wire clamps and the screws provided, secure the External Harness to the DTA.



- G. *For Kits Supplied With An Auxiliary Switch Only.* Route the two wires, with ring terminals, from the External Harness along the right side of the Breaker to the Microswitch Switch. Connect one wire to the normally "Open" terminal and the other wire to the "Common" terminal.





- H. *For Kits Supplied with a Breaker Mounted CPT Only.* Route the Line Side HV Wires along the right rear side of the Breaker to the bolts below the top Breaker Stabs.

**NOTE:** The power convention of the DA-50 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.

**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.

Cut the HV Wires to the appropriate length for attachment to the appropriate Breaker Stabs. Strip .250" from each HV Wire and attach a .250" ring terminal. Remove one bolt from either Phase 1 and Phase 2, or Phase 2 and Phase 3 Breaker Stabs. Using the hardware just removed, connect the HV Wires to the appropriate Breaker Stabs.

Attach the appropriate label for the Breaker to the Breaker in a clearly visible position. Three (3) labels are included with the CPT, one (1) for 480 Volt, one (1) for 240 Volt, and one (1) for 208 Volt systems.



- I. 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.

When wiring the Sensors supplied with the Retrofit Kit, the following convention applies.

X1 - X3 = Full Rating  
X1 - X2 = One-Half Rating

For Example:

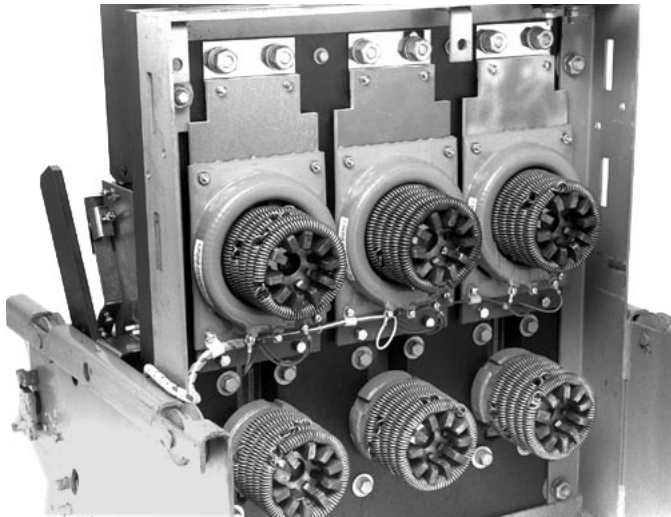
Version "S" Utilizing:

X1 - X3 = 1,600 A

X1 - X2 = 800 A

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

- J. Remove the bottom left Sensor mounting screw from each Sensor. Using the wire clamps provided and the screws just removed, secure the Sensor Harness to each Sensor Assembly.



- K. Use the nylon wire ties provided to dress all wiring to keep it away from any moving parts within the Breaker.

#### Step 14: For Breakers Fitted with the Shunt Trip Option Only.

- A. If the Breaker being Retrofitted was fitted with the Shunt Trip option, the Shunt Trip Shielding must be installed. Remove the screws from the top sides and bottom front center of the Shunt Trip Cover. Do not remove the Shunt Trip Cover. Scrap the screws removed from the sides. The screw removed from the front will be used to mount the new Shunt Trip Shielding.
- B. Place the Shunt Trip Shielding Bracket between the Glass Poly Insulation Plates. Using the .138-32 x .500" nylon screws, flat washers, lock washers, and nuts provided, attach the Insulation Plates to the bracket.
- C. Insert the Shunt Trip Shielding over the Shunt Trip Cover. Using the original screw from the front of the Shunt Trip Cover and the

.138 x .500" nylon screws provided for the sides, secure the Shunt Trip Shielding to the Shunt Trip.

#### Step 15: Testing the Breaker

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

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

#### Notes:

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

the Zone Interlock Shorting Plug. Failure to do so may result in shorter than expected trip times.

3. *For 810 and 910 Kits Only.*

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

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

**When the test is complete, disconnect the External Harness from the Cell Harness. Final External Harness Connection will be performed in Section 16.**

*For Kits Supplied With a Cell Harness Only.*

### Step 16: 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 on the Breaker. 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 17: 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 Installation Components for the Westinghouse DA-50 Series Breakers

Step	Description	Style No.	Qty.	Comment
Step 3	Sensor (1600-800/:5)	4A35628H01	3	
	Sensor (800-400/:5)	4A35690H01	3	
	Sensor (800-400/:5)	4A35646H01	3	
	Sensor (1600-800/:5)	4A35645H02	3	
	Sensor Mounting Parts	4A35633G04	1	
	Sensor Mounting Parts	4A35633G17	1	
	Sensor Mounting Bracket		3	
	Glass Poly Sensor Mounting		3	(Version "S")
	Glass Poly Sensor Mounting		3	(Version "T")
	Glass Poly Spacer		6	(Version "T")
	Glass Poly Mounting		3	
	Glass Poly Spacer		3	(Version "S")
	Glass Poly Spacer		9	(Version "T")
	.250-20 × 3.00 Lng. Hex Bolt		6	
	.250 Flat Washer Stl.		6	
	.250 Lock Washer Stl.		6	
	.190-32 × 1.00 Lng. Screw Fil.		6	
	.190-32 × .875 Lng. Screw Pan		6	
	.190-32 × .625 Lng. Screw Fil.		6	
	.190-32 × .500 Lng. Screw Fil.		6	
	.190 Flat Washer Stl.		24	
	.190 Lock Washer Stl.		18	
	.190-32 Nut Hex Stl.		6	
Step 4	Aux. CT Module	6506C45G__	1	
	Aux. CT Module Mounting Parts	4A35633G06	1	
	Mounting Bracket		2	
	.190-32 × .500 Lng. Screw Pan		4	
	.190-16 × .500 Lng. Screw T.C.		2	
	.190 Flat Washer Stl.		12	
	.190 Lock Washer Stl.		8	
	.190-32 Nut Hex Stl.		4	
	Aux. C.T. Harness	6502C84602	1	
	Trip Unit Assembly Parts	4A35633G05	1	
	Mounting Platform		1	
	Support Bracket		2	
	Digitrip Nameplate		1	
	.190-32 × 4.00 Lng. Screw Fil.		2	
	.190-32 × .500 Lng. Screw Pan		4	
	.190 Flat Washer Stl.		12	
	.190 Lock Washer Stl.		6	
	.190-32 Nut Hex Stl.		6	

**Digitrip Retrofit Installation Components for the Westinghouse DA-50 Series Breakers (Continued)**

Step	Description	Style No.	Qty.	Comment
Step 4	RMS/R Trip Unit		1	See Pick List
(cont.)	Rating Plug		1	See Pick List
	Trip Unit Mounting Parts	4A35633G07	1	
	.250-20 × .750 Lng. Screw F.H.		4	
	.250 Flat Washer Stl.		4	
	.250 Lock Washer Stl.		4	
	.250-20 Nut Hex Stl.		4	
	PT Module	6502C82G01	1	} Comm. Only
	PT Module Mounting Parts (From Step 7)		1	
	PT Module Insulation		1	
	.138-32 × .500 Lng. Screw Fil.		2	
	.138 Flat Washer Stl.		2	
	.138 Lock Washer Stl.		2	
	.138-32 Nut Hex Stl.		2	
	.250-20 × .50 Lng. Hex Bolt		3	
	.250 Flat Washer Stl.		3	
	.250 Lock Washer Stl.		3	
	PT Extension Harness	6502C83G04	1	
	Sensor Harness		1	
	Harness Mounting Parts	4A35633G08	1	
	Wire Clip		2	
	Wire Clamp Nylon		2	
	Wire Clamp Nylon		2	
	Wire Ties Nylon		8	
	External Harness	6502C83G__	1	
	External Harness Parts	4A35633G15	1	
	Wire Ties Nylon		6	
Step 5	Breaker Mounted CPT Kit	8259A91G05	1	} CPT Only
	CPT Mounting Parts	4A35633G20	1	
	Glass Poly Barrier		1	
	.190-32 × .500 Lng. Screw Stl.		4	
	.190 Flat Washer Stl.		8	
	.190 Lock Washer Stl.		4	
	.190-32 Nut Hex Stl.		4	
	Warning Label (208, 240, & 480 Volt - 1 each)		1	

**Digitrip Retrofit Installation Components for the Westinghouse DA-50 Series Breakers (Continued)**

Step	Description	Style No.	Qty.	Comment
Step 6	DTA Assembly	4A35633G33	1	
	DTA Assembly Parts	4A35633G09	1	
	Mounting Bracket		4	
	.164-32 × .312 Lng. Screw Pan / Lock		4	
	.164 Flat Washer Stl.		4	
	.250-20 Flange Nut		1	
	Loc-Tite® 242		1	
	DTA Reset Parts	4A35633G10	1	
	Reset Assembly		1	
	.164-32 × .375 Lng. Screw Fil.		2	
	.164-32 × .312 Lng. Screw Pan / Lock		2	
	.164 Flat Washer Stl.		4	
	.164 Lock Washer Stl.		2	
Step 7	Glass Poly Barrier Assembly Parts	4A35633G22	1	
	Glass Poly Barrier		1	
	Mounting Bracket		1	
	.190-32 × .625 Lng. Screw Nylon		3	
	Aux. Switch Kit	4A35633G02	1	Comm. Only
	Microswitch		1	
	.138-32 × 1.25 Lng. Screw Pan Nylon		2	
	.138 Flat Washer Stl.		4	
	.138 Lock Washer Stl.		2	
Step 9	Striker Plate Parts	4A35633G14	1	
	Striker Plate		1	
	.250-20 × 1.75 Lng. Hex Bolt		2	
	.250 Flat Washer Stl.		4	
	.250 Lock Washer Stl.		2	
	.250-20 Nut Hex Stl.		2	
Step 10	DTA Mounting Parts	4A35633G11	1	
	.190-32 × .625 Lng. Screw Fil.		4	
	.190 Flat Washer Stl.		8	
	.190 Lock Washer Stl.		4	
	.190-32 Nut Hex Stl.		4	
Step 11	Glass Poly Barrier Mounting Parts	4A35633G22	1	
	.190-32 × .500 Lng. Screw Pan		2	
	.190 Flat Washer Stl.		4	
	.190 Lock Washer Stl.		2	
	.190-32 Nut Hex Stl.		2	

**Digitrip Retrofit Installation Components for the Westinghouse DA-50 Series Breakers (Continued)**

<b>Step</b>	<b>Description</b>	<b>Style No.</b>	<b>Qty.</b>	<b>Comment</b>
Step 12	Trip Finger Parts	4A35633G12	1	
	Trip Finger Assembly		1	
	.250-20 × 1.25 Lng. Screw F.H.		2	
Step 13	Wire Clamp Nylon (From Step 4)		2	
	.250-20 × .750 Lng. Screw F.H. (From Step 4)		4	
	.250 Flat Washer Stl. (From Step 4)		4	
	.250 Lock Washer Stl. (From Step 4)		4	
	.250-20 Nut Hex Stl. (From Step 4)		4	
	.250-20 × .50 Lng. Hex Bolt (From Step 4)		3	} Comm. Only
	.250 Flat Washer Stl. (From Step 4)		3	
	.250 Lock Washer Stl. (From Step 4)		3	
	Warning Label (208, 240, & 480 Volt - 1 each) (From Step 5)		1	CPT. Only
Step 14	Shunt Trip Shielding Parts	4A35633G16	1	
	Glass Poly Insulation Plate		2	
	Mounting Bracket		1	
	.138-32 × .375 Lng. Screw Nylon		2	
	.138-32 × .500 Lng. Screw Nylon		2	
	.138 Flat Washer Stl.		2	
	.138 Lock Washer Ext.		2	
	.138-32 Nut Hex Stl.		2	
Step 16	Cell Harness	6503C57G__	1	

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 General Mounting**

<b>Decimal Size (in)</b>	<b>Standard Size</b>	<b>Torque (in-lbs)</b>	<b>Torque (ft-lbs)</b>
.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





- |    |                                   |    |                              |
|----|-----------------------------------|----|------------------------------|
| A. | Sensors                           | H. | Auxiliary Switch             |
| B. | Trip Unit Assembly                | I. | PT Extension Harness         |
| C. | Auxiliary CT Module and Mountings | J. | Auxiliary CT Harness         |
| D. | Reset Assembly                    | K. | External Harness             |
| E. | PT Module                         | L. | Cell Terminal Block Assembly |
| F. | Direct Trip Actuator (DTA)        | M. | Sensor Harness               |
| G. | Trip Finger Assembly              |    |                              |

### Torque Values for Copper BUS Connectors

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

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

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

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

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

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

**Cutler-Hammer**

130 Commonwealth Drive  
Warrendale, PA 15086