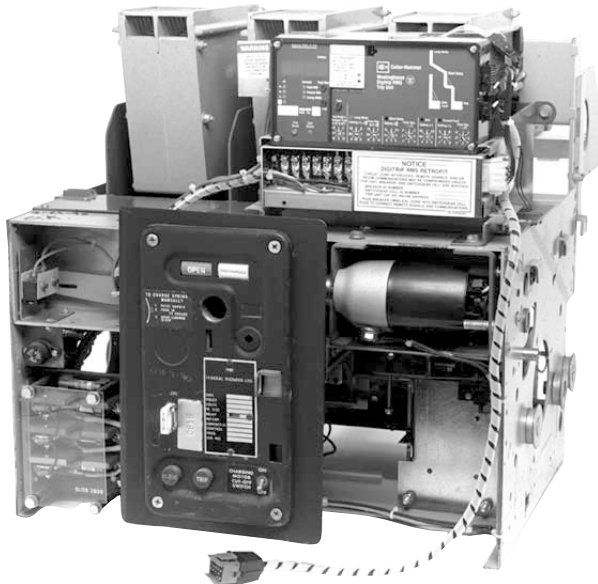




Digitrip Retrofit System for the Federal Pioneer 25-H(L)-2, 30-H(L)-3, and 30-3 Breakers



SAFETY PRECAUTIONS



WARNING

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

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

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

Cutler-Hammer Digitrip Retrofit Kits are available in a number of configurations that provide a wide range of features. The Digitrip System starts with the 510 Basic Kit which offers true RMS sensing, overcurrent protection, and self-testing features. Advanced Digitrip Retrofit Kits feature zone interlocking, digital alphanumeric displays, remote alarm signals, 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					
Breaker Mounted Control Power Transformer (CPT)					
Potential Transformer (PT) Module					
Auxiliary Switch					

Before Beginning the Retrofit Process

The Retrofit components and procedures are very similar for the Federal Pioneer 25-H(L)-2, 30-H(L)-3, and 30-3 Breakers. The only differences are in the mounting procedures for the Trip / Aux. CT Module, the PT Module (if ordered), and the Trip Finger.

For most photographs contained within this manual, a Federal Pioneer 30-H(L)-3 Breaker was used as the subject. Depending on the version and age of the Breaker being Retrofitted, some components / views may differ from those depicted in the manual.

Where the components and procedures differ between the 25-H(L)-2 and the 30-H(L)-3 / 30-3 Breakers, instructions will be given for both procedures and photos of both versions of the Breakers will appear.

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

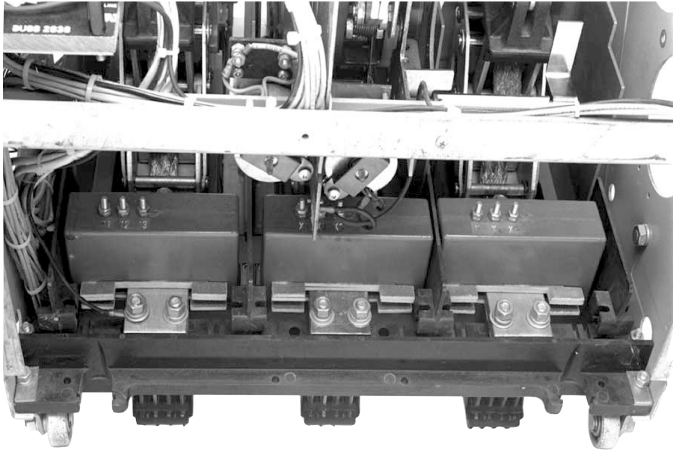
Follow the Federal Pioneer 25-H(L)-2, 30-H(L)-3, or 30-3 Instruction Manual, originally supplied with the Breaker, to perform the following procedures.

- A. Remove and scrap the original Sensors and mounting hardware.

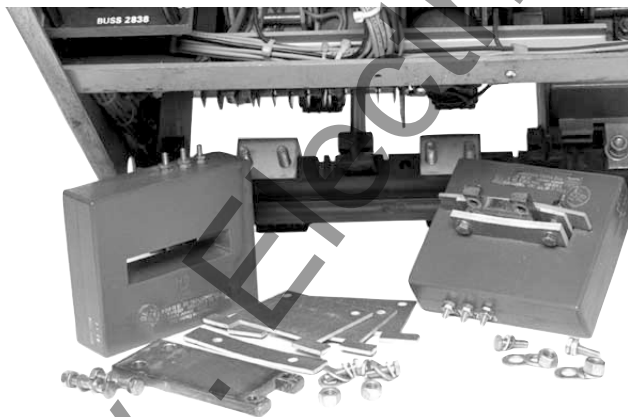
NOTE: To remove the original Sensors, the Copper Connectors must also be removed. The Copper Connectors and mounting hardware must be retained for use later in the Retrofit Process.

- B. Remove and scrap the original Trip Units, Mounting Brackets, and hardware.
- C. Remove and scrap the original Trip Actuator and mounting hardware.

Step 3: Installing the Sensors

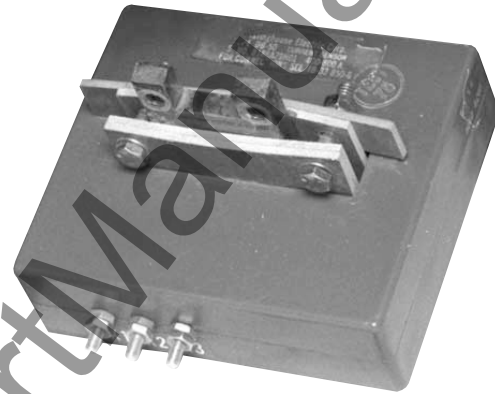


- A. With the Sensor Terminals facing you, insert an original Copper Connector through the Sensor. The Copper Connector must be inserted so that the larger holes are at the bottom.
- B. Insert two Glass Poly Spacers between the Copper Connector and the Terminal side of the Sensor as shown.



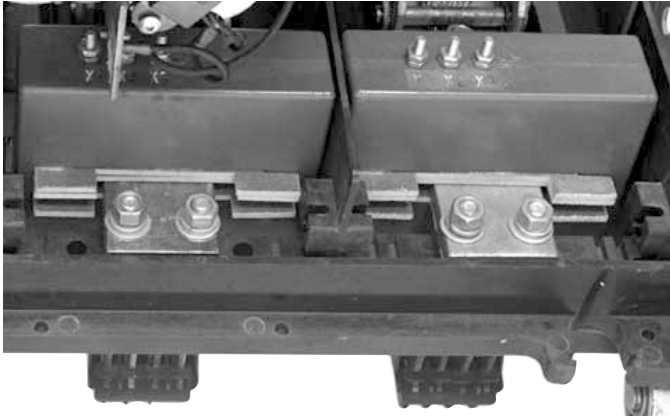
- C. Insert one Glass Poly Spacer between the Copper Connector and the side of the Sensor without the Terminals.

- D. Position a Glass Poly Mounting Plate on the side of the Copper Connector with only one Glass Poly Spacer as shown. Align the holes in the Mounting Plate with the holes in the Spacers. Secure the Mounting Plate to the Spacers using the (2) .250-20 x 1.50" bolts, (4) flat washers, (2) lock washers, and (2) nuts supplied.



- E. Repeat the process for the remaining two Sensors.
- F. Working from the inside of the Breaker, insert each Sensor in the Sensor openings in the Breaker Back Plate. Note that the Sensors are inserted so the Terminals are towards the inside of the Breaker.
- G. Align the holes in the Copper Connectors with the holes in the Breaker Back Plate.

- H. Secure the Copper Connectors to the Breaker Stabs using the original mounting hardware.



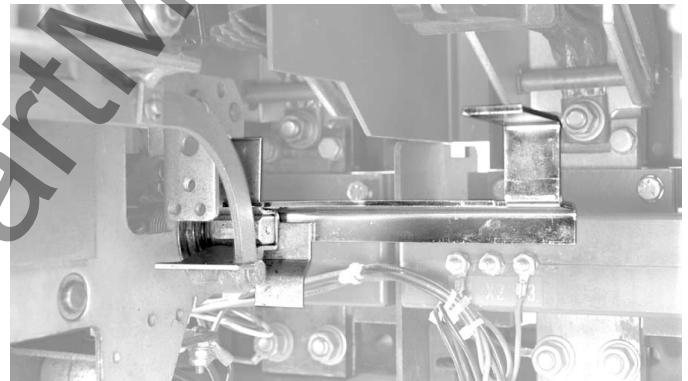
- I. *For Kits Supplied with a PT Module Only.* Leave one of the bottom bolts or nuts securing each of the three Copper Connectors loose at this time. They will be used later in the Retrofit process to connect the PT Wires.

Step 4: Installing the Trip Finger

25-H(L)-2 Breaker



30-H(L)-3 and 30-3 Breakers

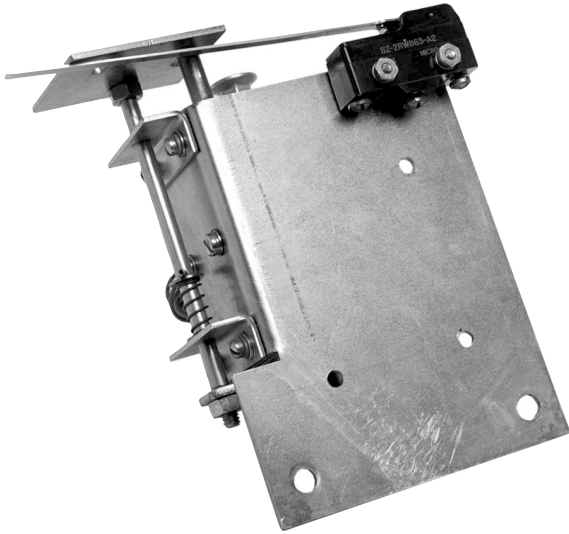


NOTE: The 25-H(L)-2 Breaker differs from the 30-H(L)-3 and 30-3 by having a longer Breaker Cross Bar and a Trip Paddle with a slightly different shape.

- A. Note the position of the original Trip Paddle.
- B. Remove the hardware that mounts the Trip Paddle to the Breaker Cross Bar.
- C. While keeping the Trip Paddle in its original position, place the supplied Trip Finger on top of the Trip Paddle.
- D. Align the holes in the Trip Finger and Trip Paddle with the hole in the Breaker Cross Bar. Secure the Trip Finger and Trip Paddle using the (1) .190-32 x 1.00" screw, (2) flat washers, (1) lock washer, and (1) nut supplied.

For Kits Supplied with an Aux. Switch Only.

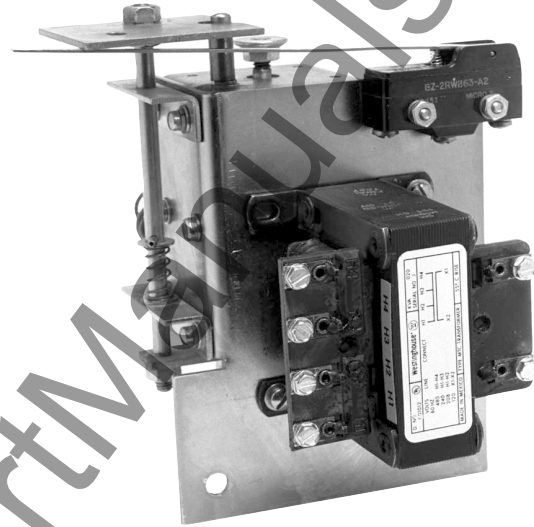
Step 5: Installing the Aux. Switch on the DTA Assembly



- A. Align the Microswitch with the holes in the top right corner of the DTA Mounting Bracket as shown. Note that the Microswitch Arm must be under the DTA Trip Plate.
- B. Secure the Microswitch to the DTA Mounting Bracket using the (2) .138-32 x 1.00" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.

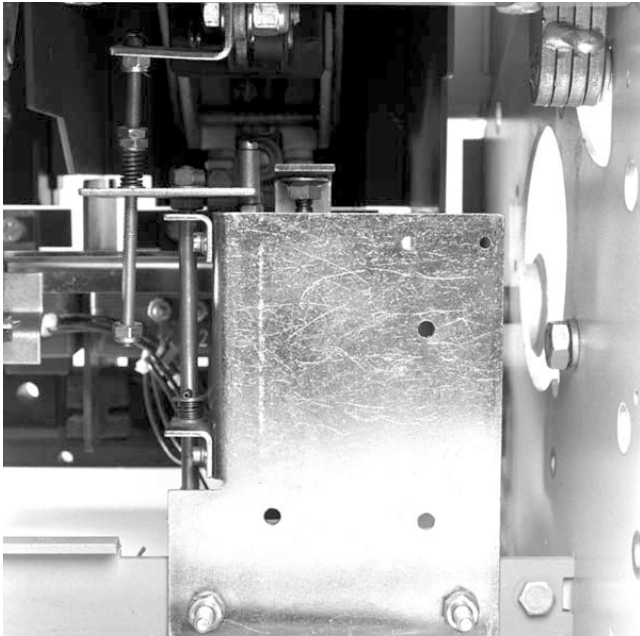
For Kits Supplied with a Breaker Mounted CPT Only.

Step 6: Installing the Breaker Mounted CPT on the DTA Assembly



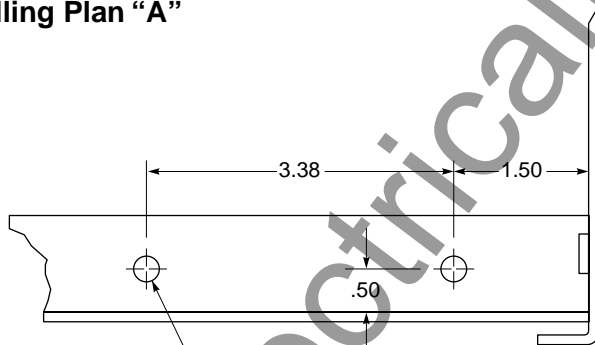
- A. Align the Breaker Mounted CPT with the three holes near the center of the DTA Mounting Bracket as shown. Note that the CPT must be mounted so that the four terminals are towards the DTA Reset Shaft.
- B. Secure the CPT to the DTA Mounting Bracket using the (3) .190-32 x 0.50" screws, (6) flat washers, (3) lock washers, and (3) nuts supplied.

Step 7: Installing the DTA Assembly and Reset Linkage



A. Drill two .281" holes in the Breaker Bottom Channel (See Drilling Plan A).

Drilling Plan "A"



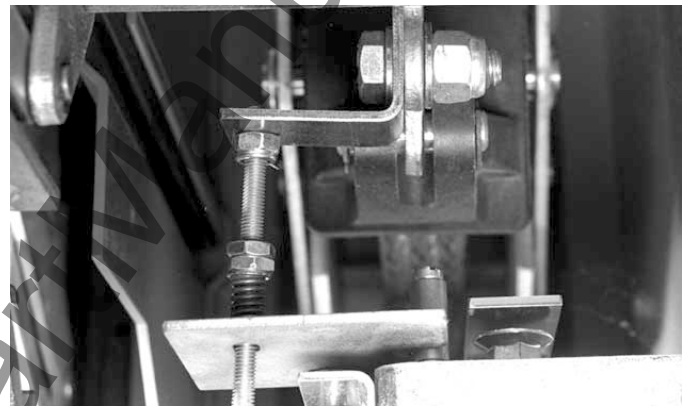
Drill .281 Dia. Hole (2)

NOTE: On some 25-H(L)-2, 30-H(L)-3, and 30-3 Breakers, these holes may be pre-drilled.

On some 25-H(L)-2, 30-H(L)-3, and 30-3 Breakers, a self adhesive wire clip may be attached between the holes. If so, the wire clip and all adhesive material must be removed from the Breaker Bottom Angle before the DTA Assembly is mounted.

B. Attach the Reset Linkage Assembly to the Connecting Arm Swivel using the (1) .375-16 x 1.00" bolt, (3) flat washers, and (1) lock nut supplied. Note that a flat washer must be inserted between the Reset Linkage Assembly and the Connecting Arm Swivel.

Do not fully tighten the nut. The Reset Linkage Assembly must be able to move on the Connecting Arm Swivel.



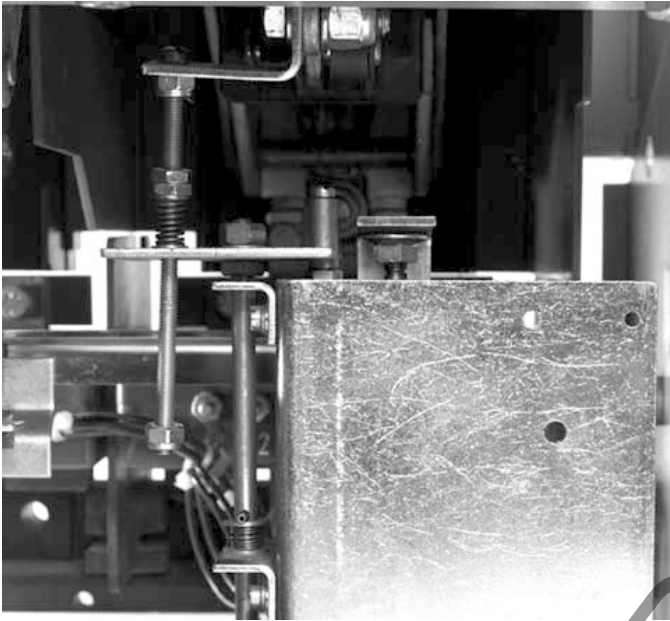
C. Slide the flat washer then the Reset Spring supplied onto the threaded Reset Linkage Shaft.

D. While holding the spring in place, insert the Reset Linkage Shaft into the hole in the Reset Plate on the DTA Assembly.

E. Apply upward pressure to compress the spring, then set the DTA Assembly in place as shown. Note that the flange nut on the DTA Shaft must be under the Trip Finger.

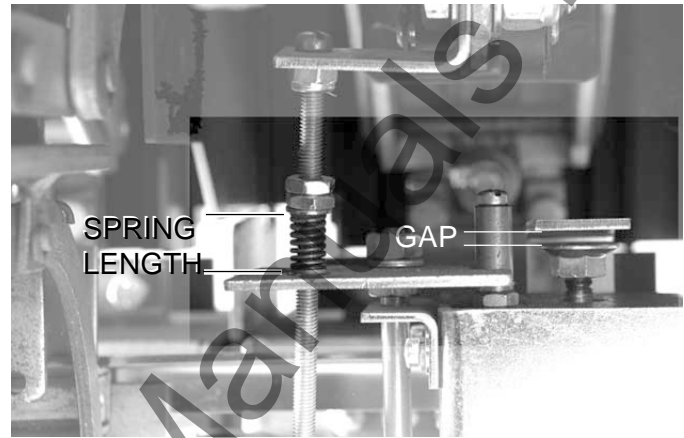
F. Install the .190-32 Nylock nut on the end of the Reset Linkage Shaft.

- G. Apply Loc-Tite® 242 to the threads then mount the DTA Assembly to the Breaker Bottom Channel using the (2) .250-20 x 1.00" bolts, (4) flat washers, (2) lock washers, and (2) nuts supplied.



- H. Wind the top DTA flange nut slightly down the DTA Shaft. Apply Loc-Tite® 242 to the DTA Shaft then wind the flange nut to the top of the DTA Shaft.
- I. With the Breaker in the "Open" position, check the gap between the DTA flange nut and the Trip Finger. The gap between the DTA flange nut and the Trip Finger should be .06".
- J. If the gap between the flange nut and the Trip Finger is incorrect, hold the DTA Shaft and adjust the position of the flange nut. Check the gap. Repeat if necessary.

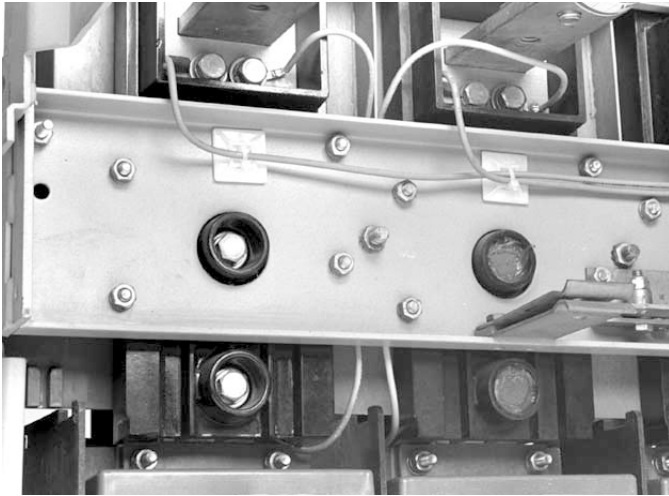
- K. Close the Breaker and check the length of the compressed Reset Spring. The compressed Reset Spring length should be .500".



- L. If the compressed Reset Spring length is incorrect, open the Breaker and adjust the nuts on the Reset Linkage Shaft. Close the Breaker and check the spring length. Repeat if necessary.
- M. After the adjustments are made and the correct Reset Spring length and DTA gap are achieved, return the Breaker to the open position.

For Kits Supplied with a Breaker Mounted CPT Only.

Step 8: Connecting the CPT to the Breaker Phase Connectors

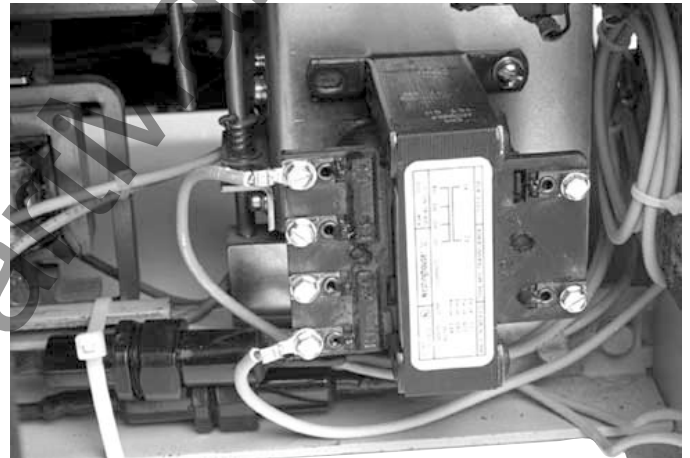


A. Position the fuses in an accessible location then mark and cut the Load Side of each High Voltage Fused Wire (HV Wire). Strip .250" from each Load Side HV Wire and attach a .138" ring terminal to each. Attach the HV Wires to the CPT terminals to achieve the required voltage. (See the following Table.)

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

NOTE: The power convention of the Federal Pioneer 25-H(L)-2, 30-H(L)-3, and 30-3 Breakers are 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**.

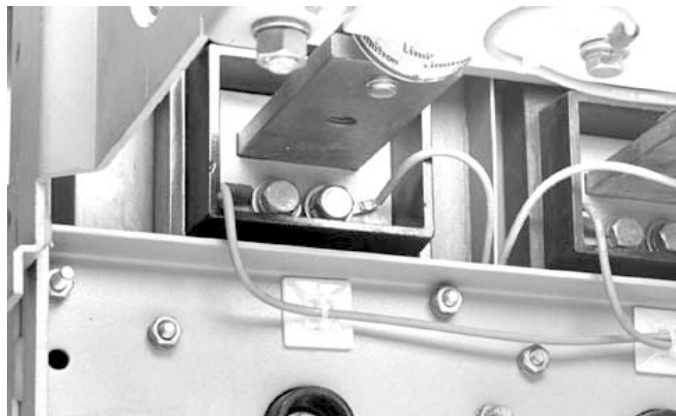


B. Route the HV Wires below the CPT, then towards the back of the Breaker. Feed the HV Wires through the opening between one of the Phase Connectors and the Breaker Back Panel.

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 Phase Connector.

C. Remove the one mounting bolt each from the Phase 1 and 2 or Phase 2 and 3 Phase Connectors.

- D. Cut the HV Wires to the appropriate length for attachment to the Phase 1 and 2 or Phase 2 and 3 Phase Connectors. Strip .250" from each HV Wire and attach a .375" ring terminal. Connect the HV Wires to the Phase Connectors using the original hardware.



Step 9: Installing the Aux. CT Module, Trip Unit, and PT Module (if Supplied)

If Retrofitting a 25-H(L)-2 Breaker

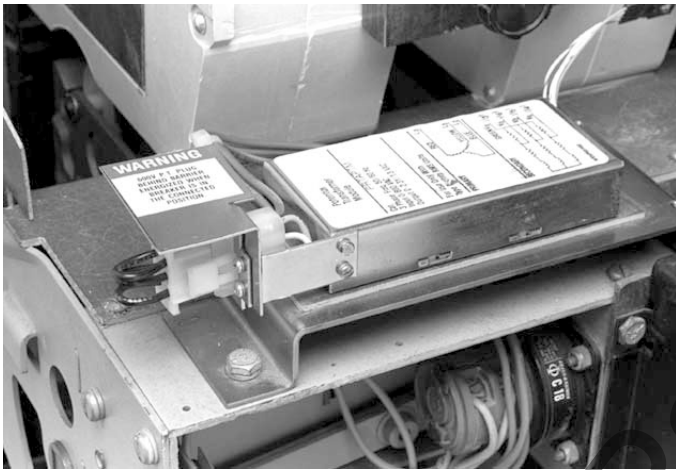


- E. Use the nylon wire ties provided to dress the HV Wires and keep them away from any moving parts within the Breaker.
- F. Attach the appropriate label for the Breaker in a clearly visible position. Three (3) labels are included with the CPT, one (1) for 480 Volt, one (1) for 240 Volt, and one (1) for 208 Volt systems.

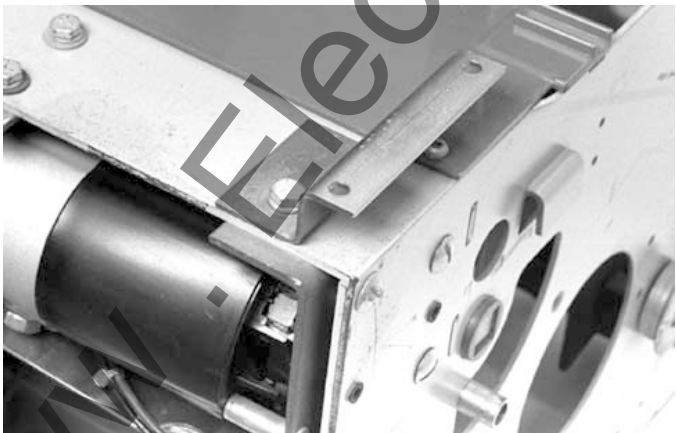
- A. *For Kits Supplied with a PT Module Only.* Align the holes in the Glass Poly PT Module Insulation and the PT Module with the left Aux. CT Module Mounting Bracket as shown. Mount the Insulation and PT Module to the mounting bracket using the (2) .138-32 x .500" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.



- B. Remove and save the existing hardware securing the top Breaker Platform to the left front corner and center of the Breaker.
- C. Align the left Aux. CT Module Mounting Bracket with the existing holes in the top Breaker Platform. Secure the Mounting Bracket to the Breaker Platform using the hardware removed in Step B.



- D. Remove and save the existing hardware securing the top Breaker Platform to the right front corner of the Breaker.
- E. Align the right Aux. CT Module Mounting Bracket with the existing hole in the right side of the top Breaker Platform. Secure the Mounting Bracket to the Breaker Platform using the hardware removed in Step D above.



- F. Mount the Trip Unit to the top of the Aux. CT Module as shown using the (2) .190-32 x 4.00" screws, (2) lock washers, (2) flat washers, and (2) spacers supplied. Note that the spacers are positioned between the top of the Aux. CT Module and the bottom of the Trip Unit. Do not tighten the screws at this time.
- G. Mount the left and right Trip Unit Support Clips to the sides of the Aux. CT Module and into the bottom front slots in the Trip Unit as shown. Secure using the (4) .190-32 x .375" screws, (4) flat washers, and (4) lock washers supplied.



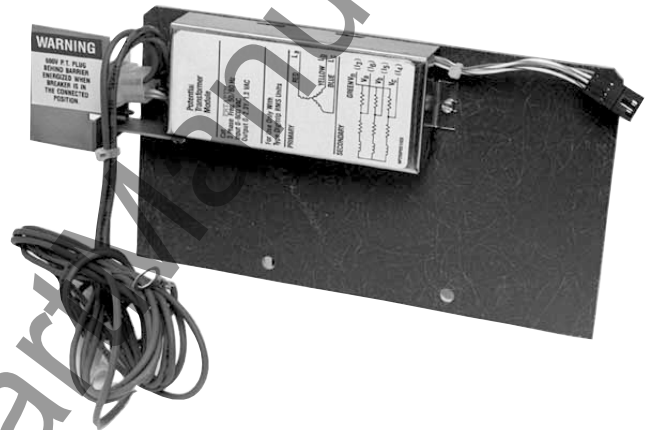
- H. Secure the Trip Unit by tightening the 4.00" screws installed in Step 9-F.
- I. Remove the Trip Unit Cover and install the Rating Plug supplied with the Retrofit Kit. Reinstall the Cover.
- J. Install the Aux. CT Harness between the Trip Unit and the Aux. CT Module.
- K. Install the Digitrip Nameplate on the top of the Trip Unit.

- L. Align the Aux. CT Module / Trip Unit Assembly with the holes in the right and left Aux. CT Module Mounting Brackets. Secure using the (4) .190-32 x .500" screws supplied.

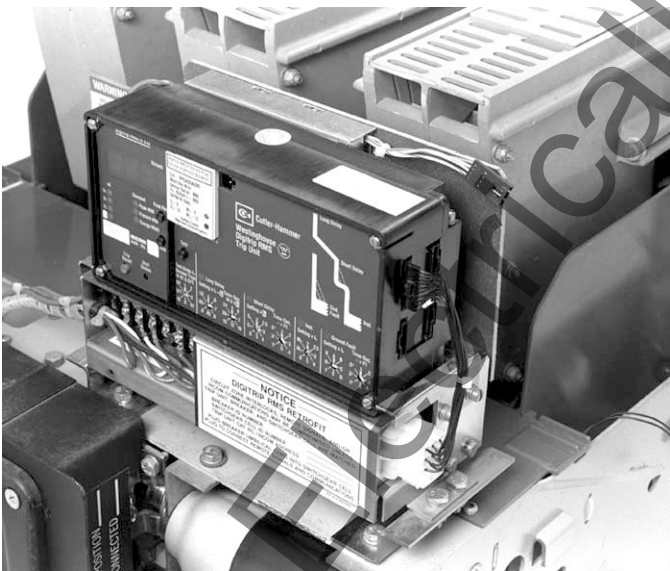


- B. Mount the Glass Poly Barrier to the back of Aux. CT Module using the (2) .190-32 x .380" screws, (2) flat washers, and (2) lock washers supplied.

For Kits Supplied with a PT Module Only.
The Glass Poly Barrier must be mounted so the PT Module will face the rear of the Trip Unit when mounted.



If Retrofitting a 30-H(L)-3 or 30-3 Breaker



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

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

- D. Mount the left and right Trip Unit Support Clips to the sides of the Aux. CT Module and into the bottom front slots in the Trip Unit as shown. Secure using the (4) .190-32 x .375" screws, (4) flat washers, and (4) lock washers supplied.



- E. Secure the Trip Unit by tightening the 4.00" screws installed in Step 9-C.

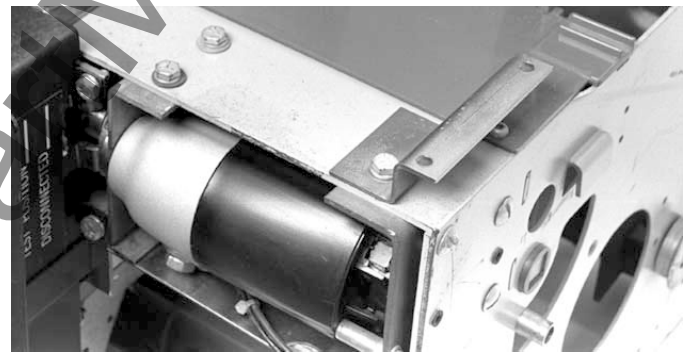
- F. Remove the Trip Unit Cover and install the Rating Plug supplied with the Retrofit Kit. Reinstall the Cover.

- G. Install the Aux. CT Harness between the Trip Unit and the Aux. CT Module.

- H. Install the Digitrip Nameplate on the top of the Trip Unit.



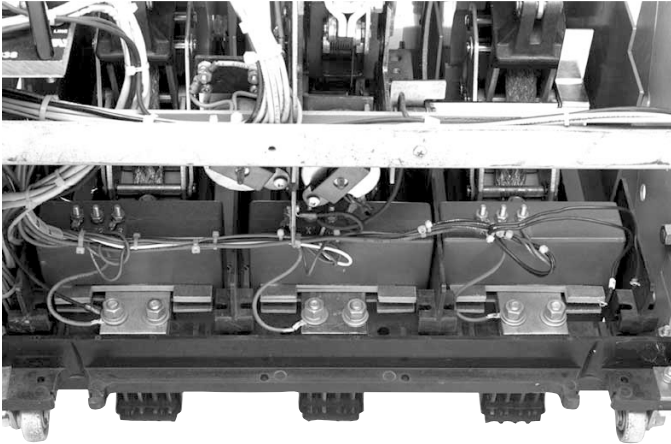
- I. Remove and save the existing hardware securing the top Breaker Platform to the right front corner of the Breaker.
- J. Align the right Aux. CT Module Mounting Bracket with the existing hole in the right side of the top Breaker Platform. Secure the Mounting Bracket to the Breaker Platform using the hardware removed in Step 9-I above.
- K. Align the left Aux. CT Module Mounting Bracket with the existing hole near the center side of the top Breaker Platform. Secure the Mounting Bracket to the Breaker Platform using the (1) .250-20 x 1.00" bolt, (2) flat washers, (1) lock washer, and (1) nut supplied.



- L. Align the Aux. CT Module / Trip Unit Assembly with the holes in the right and left Aux. CT Module Mounting Brackets. Secure using the (4) .250-20 x .750" screws, (8) flat washers, (4) lock washers, and (4) nuts supplied.



Step 10: Connecting the Sensor Harness and the PT Wires (if Supplied)



NOTE: The physical location at which the Sensor Harness connects to the Aux. CT Module is slightly different between a 25-H(L)-2 and a 30-H(L)-3 / 30-3 Breaker. On a 25-H(L)-2 Retrofit, the Sensor Harness is connected to the 7-Point Terminal Block mounted to the left of the Aux. CT Module. On a 30-H(L)-3 / 30-3 Retrofit, the Sensor Harness is connected directly to the terminals on the Aux. CT Module.

All other procedures for Sensor Harness installation are identical for these Breakers.

If Retrofitting a 25-H(L)-2 Breaker

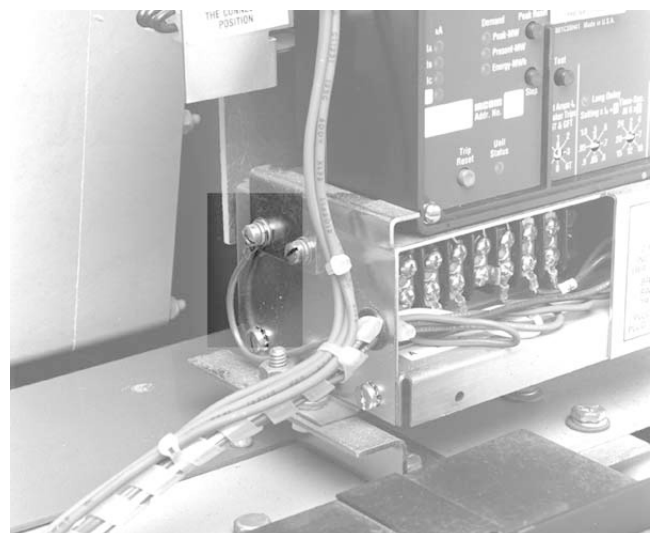
- A. Remove the 7-Point Terminal Block cover from the left side of the Aux. CT Module.
- B. Connect the Sensor Harness to the proper terminals of the 7-Point Terminal Block. Refer to Section 12 of the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications.

- C. Connect the green ground wire from the Sensor Harness (with the ring terminal) to the rear screw of the left Trip Unit Support Clip.



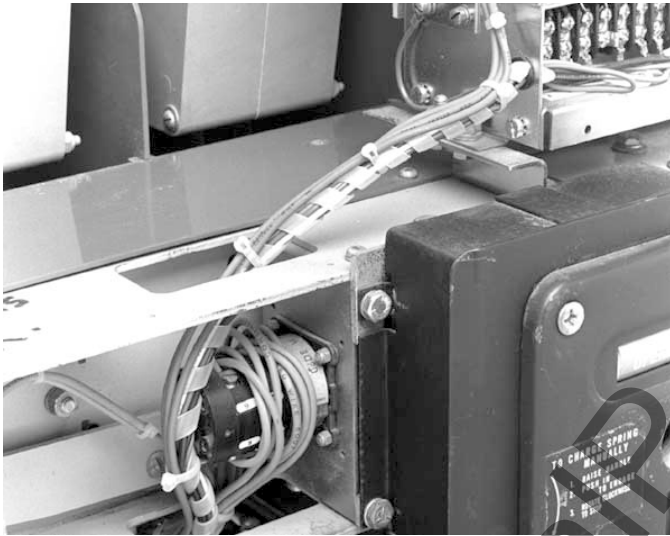
If Retrofitting a 30-H(L)-3 or 30-3 Breaker

- A. Feed the Sensor Harness through the hole in the left side of the Aux. CT Module.
- B. 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.
- C. Connect the green ground wire from the Sensor Harness (with the ring terminal) to the rear screw of the left Trip Unit Support Clip.



For All Retrofits

- D. Route the Sensor Harness through the existing cutouts in the top and middle Breaker Platforms, towards the bottom then along the left side of the Breaker.
- E. *For Kits Supplied with a PT Module Only.* Route the PT Wires along the same path as the Sensor Harness.



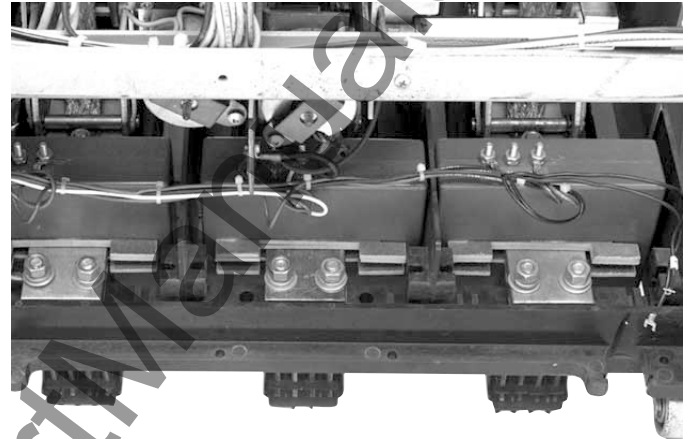
- F. Connect the ring terminals of the Sensor Harness to the Sensors. Refer to Section 12 of the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications. Depending on the Sensors supplied with the Retrofit Kit, the following conventions apply.

Sensor Style No.

- 8188A79H01: X1-X2 = 400 A
X1-X3 = 800 A
- 8188A81H01: X1-X2 = 300 A
X1-X3 = 600 A
- 8184A45H01: X1-X2 = 200 A

For Kits Supplied with a PT Module Only.

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



For Kits Supplied with a PT Module Only.

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

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

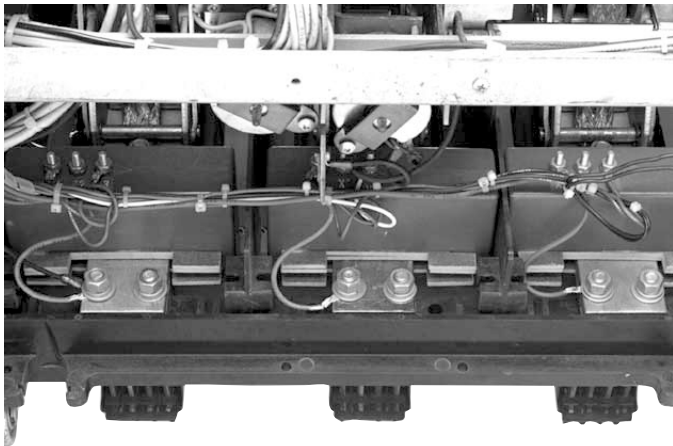
Route the PT Wires to a position suitable for attachment to the proper Copper Connector. Move the PT Wire markers to a position where they will still be attached to the wires after cutting. Cut the wires to length, strip each wire .250". If Retrofitting a 25-H(L)-2 Breaker, install a .250" ring terminal to each PT Wire. If Retrofitting a 30-H(L)-3 or 30-3 Breaker, install a .375" ring terminal to each PT Wire.

If Retrofitting a 25-H(L)-2 Breaker

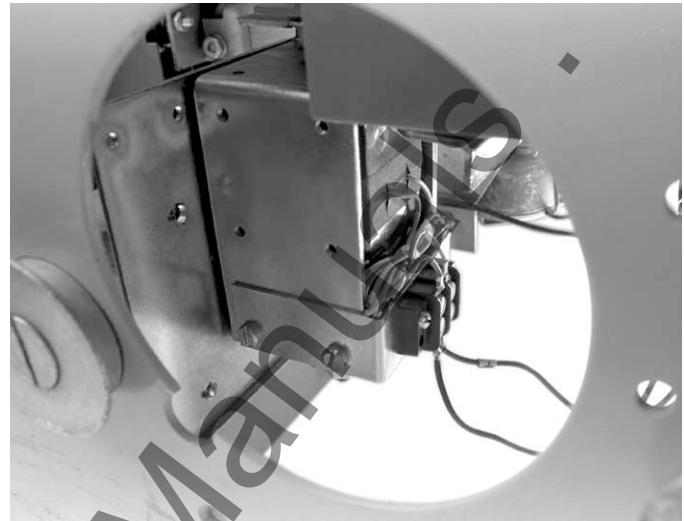
- H. Remove one hex head bolt and lock washer securing each of the selected Copper Connectors to the Breaker Stabs.

If Retrofitting a 30-H(L)-3 or 30-3 Breaker

- H. Remove one nut and lock washer from a bottom stud securing each of the selected Copper Connectors to the Breaker Stabs.
- I. Connect each PT Wire to its corresponding Copper Connector using the original hardware.



- J. Use the wire ties supplied to dress all wires and keep them away from any moving parts within the Breaker.

Step 11: Connecting the DTA Harness**If Retrofitting a 25-H(L)-2 Breaker**

- A. Connect the "+" wire of the DTA Harness to the "OP" terminal of the 7-Point Terminal Block and the unmarked wire to the "ON" terminal. Reinstall the 7-Point Terminal Cover.

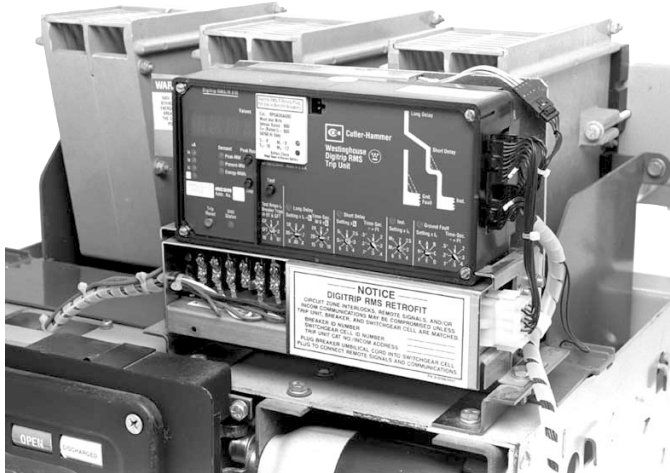
If Retrofitting a 30-H(L)-3 or 30-3 Breaker

- A. Connect the "+" wire of the DTA Harness to the "OP" terminal on the Aux. CT Module and the unmarked wire to the "ON" terminal.

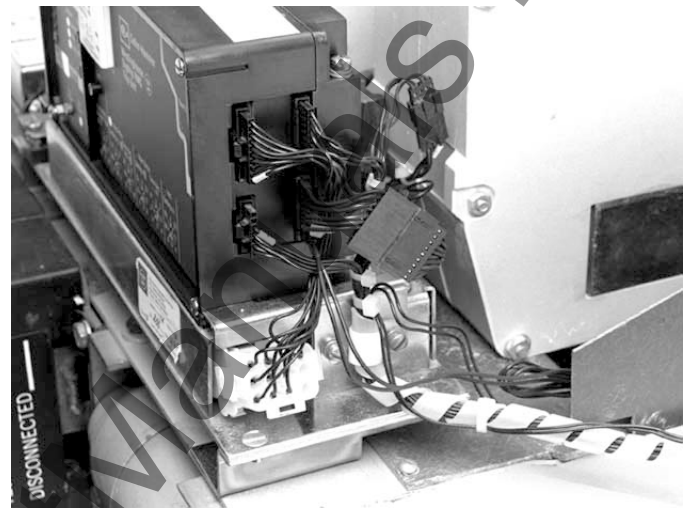
For All Retrofits

- B. Route the DTA Harness behind the Aux. CT Module towards the right side of the Breaker, then down behind the top Breaker Platform.
- C. Route the DTA Harness to the 2-Point Terminal Block mounted to the DTA Assembly. Connect the "+" wire to the same terminal as the "+" wire from the DTA. Connect the unmarked wire to the same terminal as the unmarked wire from the DTA.
- D. Use the wire ties supplied to dress all wires and keep them away from any moving parts within the Breaker.

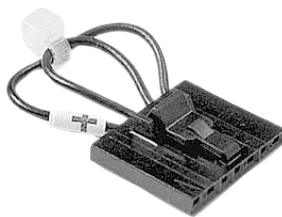
Step 12: Connecting the External Harness and Optional Components



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



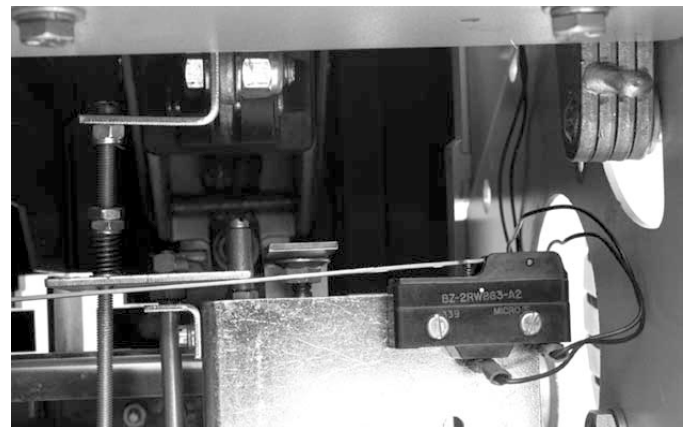
A. Connect the External Harness to the Trip Unit.



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

B. Remove one screw from the right hand Trip Unit clip. Secure the External Harness to the Trip Unit Clip using the (1) nylon wire clamp and the hardware just removed.

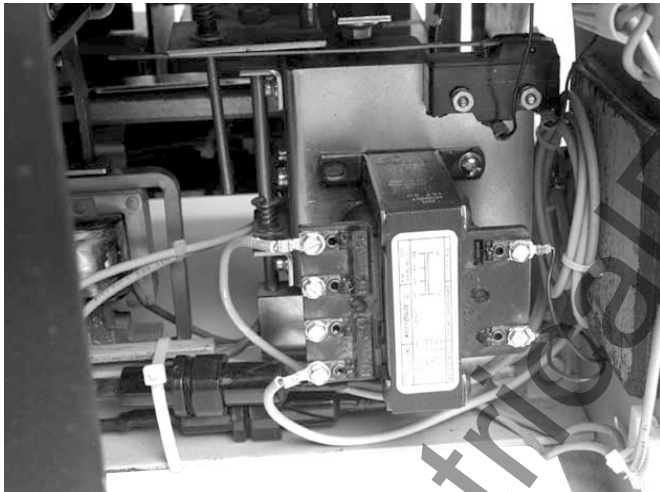
D. *For Kits Supplied with an Auxiliary Switch Only.* Connect the External Harness to the Auxiliary Switch by routing the two wires (with ring terminals) down from the External Harness to the Auxiliary Switch mounted on the DTA Assembly. Connect one (1) wire to the normally "Open" terminal and the other wire to the "Common" terminal of the Auxiliary Switch.



- E. *For Kits Supplied with a Breaker Mounted CPT Only.* Remove the 9-position 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.

Route the two wires down through the Breaker to the X1 and X2 terminals of the CPT. Assure that the wires are clear of any moving parts within the Breaker.

Cut the wires to length. Strip .250" of insulation and attach a .138" ring terminal to each wire. Connect the wires to the X1 and X2 terminals of the CPT.



- F. Use the nylon wire ties provided to dress all wires and harnesses to keep them away from any moving parts within the Breaker.

Step 13: 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 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 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 later in the Retrofit Process.

For Kits Supplied with a Cell Harness Only.

Step 14: 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 15: Installing the Retrofitted Breaker in the Cell



WARNING

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

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

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

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

**Digitrip Retrofit Kit Installation Components for the
Federal Pioneer 25-H(L)-2, 30-H(L)-3, and 30-3 Breakers**

Step	Description	Style No.	Qty.	Comment
Step 3	Sensor		3	See Pick List
	Sensor Mounting Parts	4A35716/17G04	1	
	Spacer		9	
	.250-20 × 1.50 Lng. Hex Bolt		6	
	.250 Flat Washer Stl.		12	
	.250 Lock Washer Stl.		6	
	.250-20 Nut Hex Stl.		6	
Step 4	Trip Finger Parts	4A35716/17G08	1	
	Trip Finger		1	
	.190-32 × 1.00 Lng. Screw Fil.		1	
	.190 Flat Washer Stl.		2	
	.190 Lock Washer Stl.		1	
	.190-32 Nut Hex Stl.		1	
Step 5	Aux. Switch Kit	4A35716/17G02	1	} Comm. Only
	Microswitch		1	
	.138-32 × 1.00 Lng. Screw Fil.		2	
	.138 Flat Washer Stl.		4	
	.138 Lock Washer Stl.		2	
	.138-32 Nut Hex Stl.		2	
	DTA Assembly		1	From Step 7
Step 6	Breaker Mounted CPT Kit	8259A91G05	1	} Each Size
	Ring Terminals (.138, .190, .250, .312, .375, .500)		2	
	CPT Mounting Parts	4A35706G02	1	} CPT Only
	.190-32 × .500 Lng. Screw Fil.		3	
	.190 Flat Washer Stl.		6	
	.190 Lock Washer Stl.		3	
	.190-32 Nut Hex Stl.		3	
	DTA Assembly		1	From Step 7

Digitrip Retrofit Kit Installation Components for the Federal Pioneer 25-H(L)-2, 30-H(L)-3, and 30-3 Breakers (Continued)

Step	Description	Style No.	Qty.	Comment
Step 7	Breaker Reset Parts	4A35716/17G07	1	
	Reset Linkage Assembly		1	
	.375-16 × 1.00 Lng. Hex Bolt		1	
	.375 Flat Washer Stl.		3	
	.375-16 Nut Hex Nylock		1	
	.190-32 Nut Hex Nylock		1	
	Spring		1	
	Flat Washer		1	
	DTA Assembly	4A35716/17G35	1	
	DTA Mounting Hardware	4A35716/17G09	1	
	.250-20 × 1.00 Lng. Hex Bolt		2	
	.250 Flat Washer Stl.		4	
	.250 Lock Washer Stl.		2	
	.250-20 Nut Hex Stl.		2	
	Loc-Tite® 242		1	
Step 8	Ring Terminals (.138, .190, .250, .312, .375, .500)		2	Each Size, From Step 6
Step 9	For 25-H(L)-2 Breakers Only			
	PT Module	6502C82G01	1	} Comm. Only
	.138-32 × .500 Lng. Screw F. H.		2	
	.138 Flat Washer Stl.		4	
	.138 Lock Washer Stl.		2	
	.138-32 Nut Hex Stl.		2	
	Ring Terminals (.190, .250, .312, .375, .500)		3	
	.138-32 × .375 Lng. Screw T.C.		2	
	PT Module Insulation		1	
	Aux. CT Module	6503C59G__	1	
	Aux. CT Module Assembly Parts	4A35716G05	1	
	Mounting Bracket R. H.		1	
	Mounting Bracket L. H.		1	
	.190-32 × .250 Lng. Screw Flat U.C.		4	
	Aux. CT Harness	6502C84G01	1	
	Trip Unit		1	See Pick List
	Trip Unit Assembly Parts	4A35716G06	1	
	Trip Unit Support Bracket R. H.		1	
	Trip Unit Support Bracket L. H.		1	
	Digitrip Nameplate		1	
	Spacer Brass		2	
	.190-32 × 4.00 Lng. Screw Fil.		2	
	.190-32 × .375 Lng. Screw Fil.		4	
.190 Flat Washer Stl.		4		
.190 Lock Washer Stl.		4		
Wire Clamp Nylon		2		

**Digitrip Retrofit Kit Installation Components for the
Federal Pioneer 25-H(L)-2, 30-H(L)-3, and 30-3 Breakers (Continued)**

Step	Description	Style No.	Qty.	Comment
Step 9	<i>For 30-H(L)-3 and 30-3 Breakers Only</i>			
	PT Module	6502C82G01	1	} Comm. Only
	.138-32 × .500 Lng. Screw F. H.		2	
	.138 Flat Washer Stl.		4	
	.138 Lock Washer Stl.		2	
	.138-32 Nut Hex Stl.		2	
	Ring Terminals (.190, .250, .312, .375, .500)		3	Each Size
	Aux. CT Module	6502C78G__	1	
	Aux. CT Module Assembly Parts	4A35717G05	1	
	Mounting Bracket R. H.		1	
	Mounting Bracket L. H.		1	
	.250-20 × .750 Lng. Hex Bolt		4	
	.250 Flat Washer Stl.		8	
	.250 Lock Washer Stl.		4	
	.250-20 Nut Hex Stl.		4	
	Aux. CT Harness	6502C84G01	1	
	Trip Unit		1	See Pick List
	Trip Unit Assembly Parts	4A35717G06		
	Trip Unit Support Bracket R. H.		1	
	Trip Unit Support Bracket L. H.		1	
	Barrier		1	
	Digitrip Nameplate		1	
	Spacer Brass		2	
	.190-32 × 4.00 Lng. Screw Fil.		2	
	.190-32 × .375 Lng. Screw Fil.		6	
	.190 Flat Washer Stl.		8	
	.190 Lock Washer Stl.		8	
Step 10	Sensor Harness Parts	4A35716/17G10	1	
	Sensor Harness		1	
	Wire Ties Nylon		8	
	Ring Terminals (.190, .250, .312, .375, .500)		3	Each Size, Comm. Only, From Step 9

**Digitrip Retrofit Kit Installation Components for the
Federal Pioneer 25-H(L)-2, 30-H(L)-3, and 30-3 Breakers (Continued)**

Step	Description	Style No.	Qty.	Comment
Step 11	Wire Ties Nylon		8	
Step 12	External Harness	6502C83G__	1	
	External Harness Parts	4A35716/17G11	1	
	Wire Clamp		2	
	.138-32 × .375 Lng. Screw T. C.		2	
Step 14	Cell Harness	6503C576__	1	Except 510 Basic

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

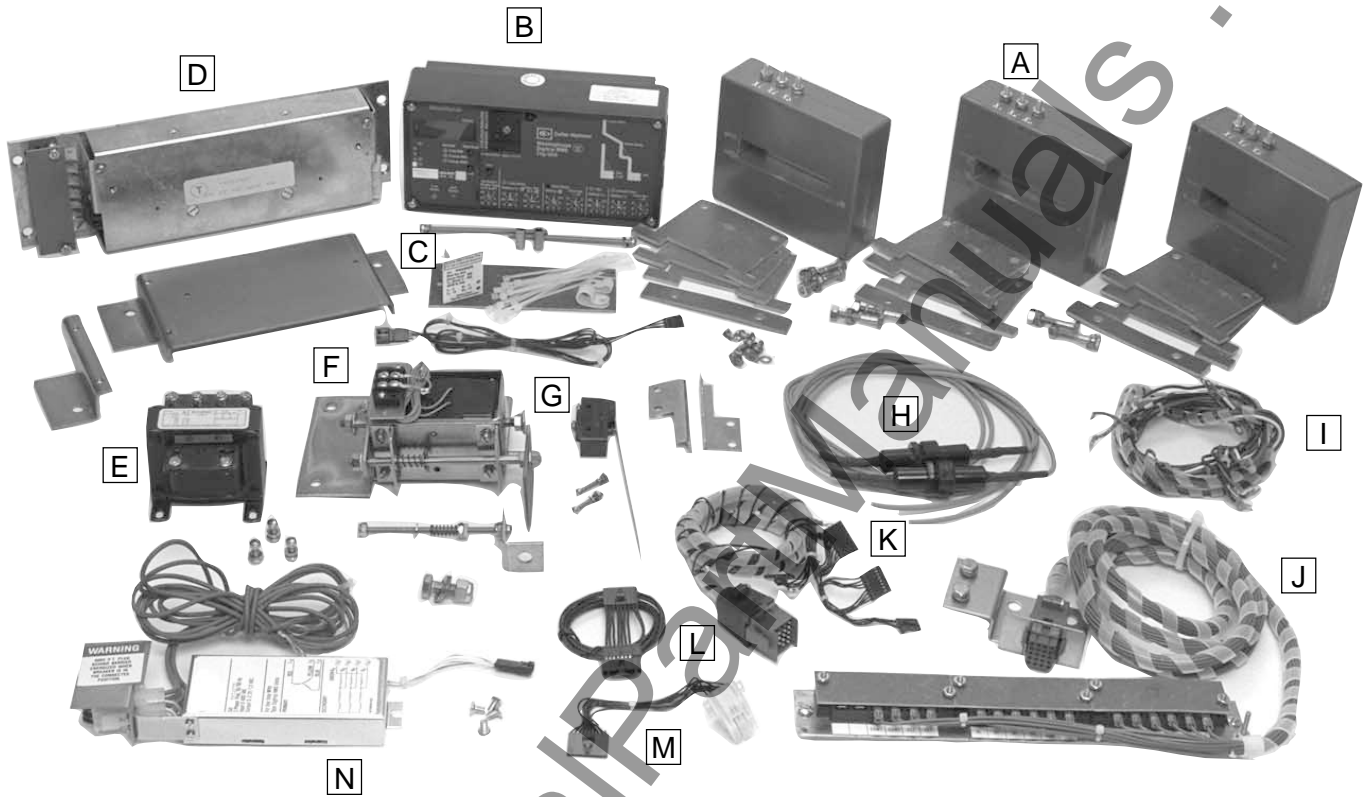
Torque Values for General Mounting and Screw Size Conversion

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

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

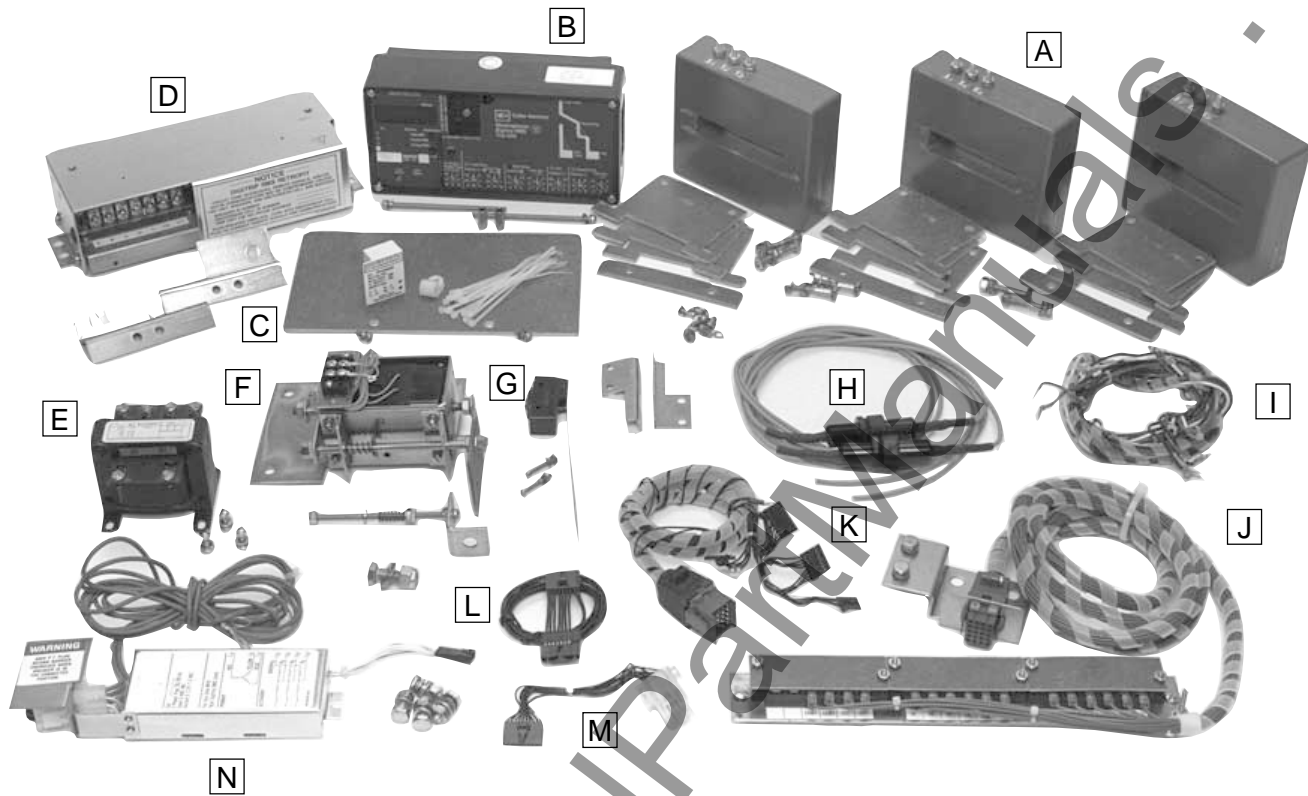
25-H(L)-2 Breaker



- A. Sensors
- B. Trip Unit
- C. Rating Plug
- D. Auxiliary CT Module
- E. CPT Kit (Optional)
- F. Direct Trip Actuator (DTA)
- G. Auxiliary Switch

- H. CPT HV Wires
- I. Sensor Harness
- J. Cell Terminal Block Assembly
- K. External Harness
- L. DTA Harness
- M. Auxiliary CT Harness
- N. PT Module

30-H(L)-3 and 30-3 Breakers



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

NOTES:

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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.

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