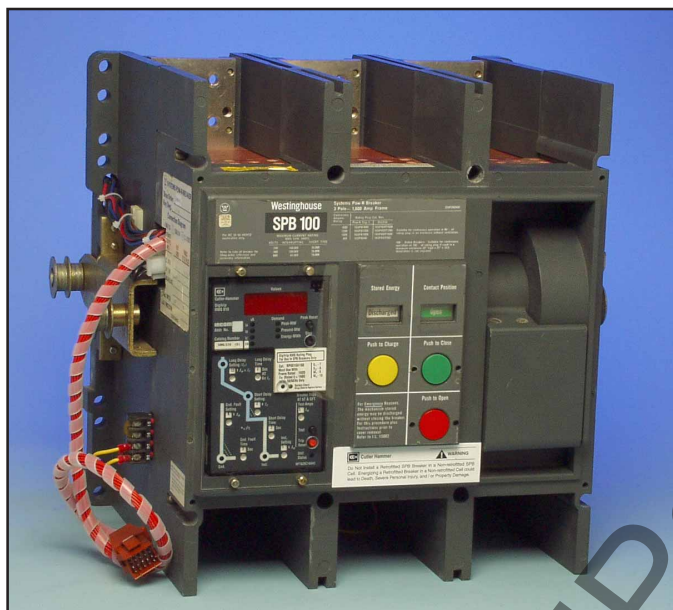




Digitrip Retrofit System for Westinghouse / Cutler-Hammer Small (400 to 2,000 A) and Large (2,500 to 5,000 A) SPB Breakers



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.**

NOTE: This Retrofit Kit is NOT DESIGNED for use on any model SPB Breaker equipped with a Bell Alarm. 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.



Digitrip Retrofit System for Westinghouse / Cutler-Hammer Small (400 to 2,000 A) and Large (2,500 to 5,000 A) SPB Breakers

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INTRODUCTION

Cutler-Hammer Digitrip Retrofit Kits are available in a number of configurations that provide a wide range of features. The Digitrip System for SPB Breakers starts with the 610 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.

Table 1 provides a quick reference of the components supplied with each level of Retrofit Kit. Before beginning the Retrofit process, take a minute to review the information contained in Table 1. It is important that the Retrofitter understands which level of Retrofit Kit is to be installed and which components are included with the Kit.

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

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

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

Table 1 Available Retrofit Kits

Components	610	810	910
Trip Unit			
Rating Plug			
Power Relay Module (ATR)			
Mounting Brackets and Hardware			
External Harness			
Cell Harness			
Potential Transformer (PT) Module			
Auxiliary Switch			

STEP 1: GENERAL BREAKER PREPARATION

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

**WARNING**

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

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

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

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.

NOTE: If the Instruction Manual and Wiring Diagram originally supplied with the SPB Breaker are available, have them on hand. They will be useful during the Retrofit Process.

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

STEP 2: REMOVING THE ORIGINAL COMPONENTS AND PREPARING THE BREAKER FOR RETROFITTING

- A. Remove the hardware securing the Trip Unit Cover to the Breaker Front Cover. Save the mounting hardware but scrap the Trip Unit Cover.

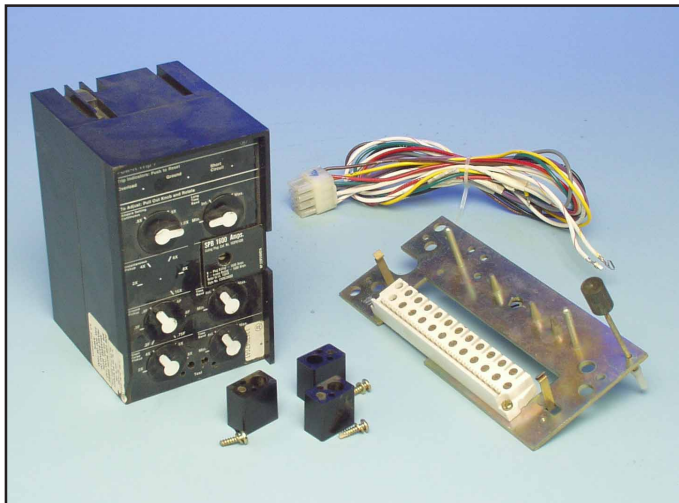


Fig. 1 Overview: Original Components Removed from the Breaker.

Refer to the Westinghouse / Cutler-Hammer SPB Instruction Manual, originally supplied with the Breaker, to perform the following procedures.



Fig. 2 Trip Unit Cover Removed from the Breaker Front Cover

- B. Remove and save the mounting hardware securing the Charging Handle to the Breaker. Remove and save the Charging Handle.

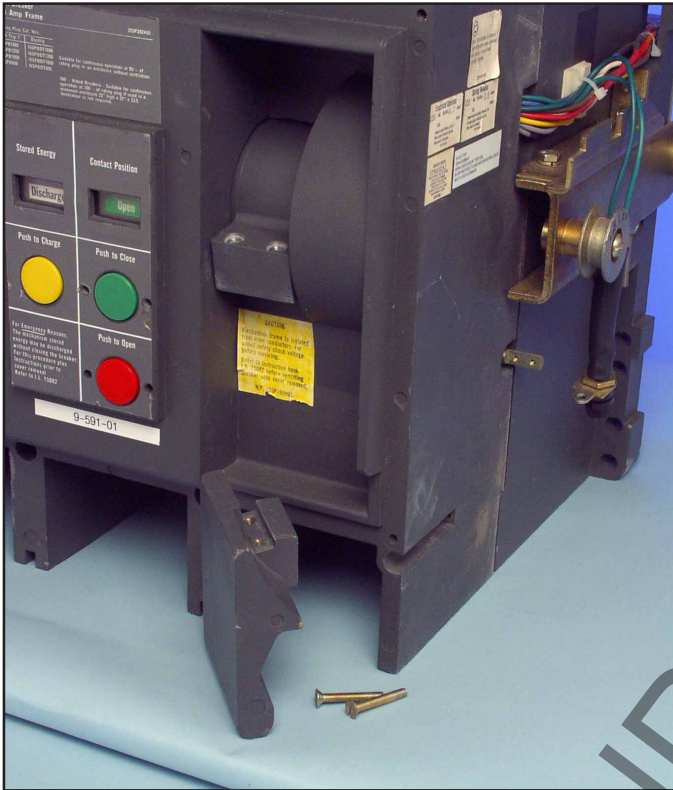


Fig. 3 Charging Handle Removed from the Breaker

- C. Remove and save the mounting hardware securing the Breaker Front Cover to the Breaker. Remove and save the Breaker Front Cover.

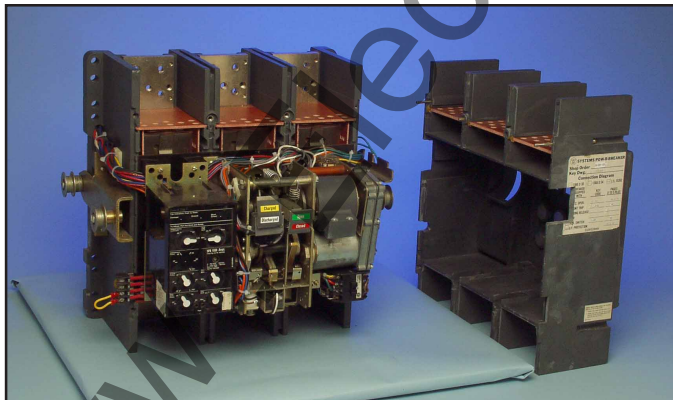


Fig. 4 Breaker Front Cover Removed from the Breaker

- D. Remove and scrap the original Trip Unit and, if applicable, the original Rating Plug.
- E. *For Large Frame SPB Breakers Only:* Depending on the Breaker being Retrofitted, remove and scrap the mounting hardware securing the Aux. CT Modules to the Aux. CT Module Assembly Mounting Bracket or the Trip Unit Mounting Module. The Aux. CT Modules will be reinstalled later in the Retrofit Process.

NOTE: On some older Large Frame SPB Breakers, the original Aux. CT Module Assembly Mounting Bracket may have to be cut in order to remove the Aux. CT Modules.

- F. Remove and scrap the mounting hardware securing the Trip Unit Mounting Module and Stand-offs to the Deck Plate. Scrap the Stand-offs. Move the Trip Unit Mounting Module slightly away from the Breaker.

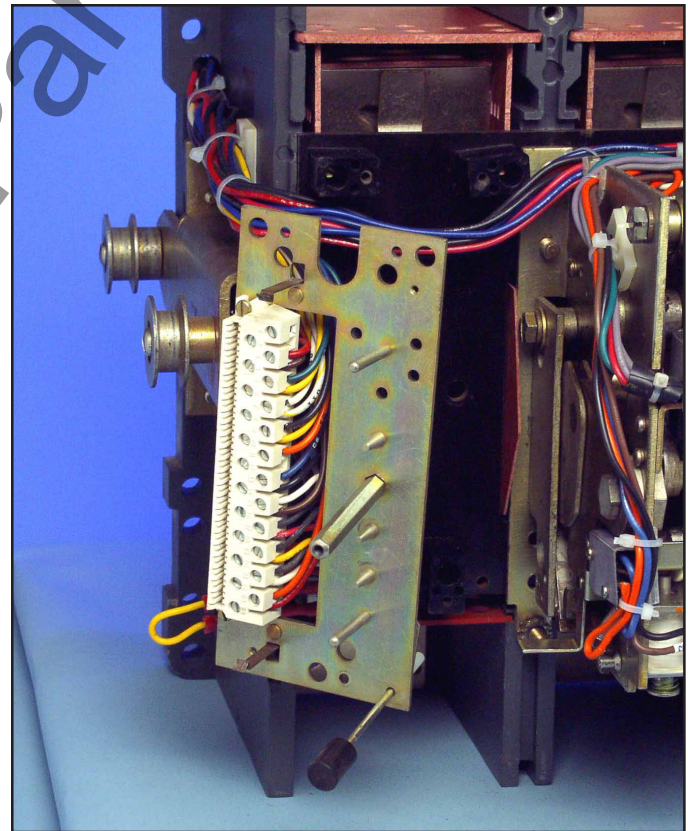


Fig. 5 Trip Unit Mounting Module Free from the Deck Plate

NOTE: In the next step, it is critical to correctly mark each wire connected to the 24-Pin Terminal Block. Failure to do so may prevent proper wiring of the Breaker throughout this Retrofit.

G. Carefully mark the terminal number on each wire connected to the 24-Pin Terminal Block. Disconnect each wire from the 24-pin Terminal Block on the Trip Unit Mounting Module. Scrap the original Trip Unit Mounting Module and the attached Trip Mechanism.

H. *For Behind the Door, Draw-out Breakers Only:* Remove and save the mounting hardware and bracket securing the A, B, C, and D Blocks to the rear of the Breaker. Release the C Block from the mounting bracket.

NOTE: If the Breaker being Retrofitted is equipped with a Bell Alarm, the C Block needs to be retained. Contact Cutler-Hammer at: 1-800-937-5487.

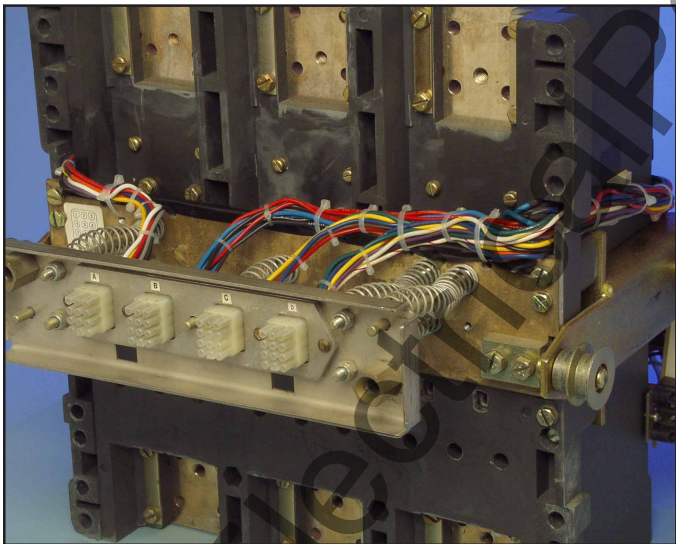


Fig. 6 Location of the A, B, C, and D Blocks on Behind the Door, Draw-out Breakers

Using the original mounting hardware, reinstall the mounting bracket, complete with the A, B, and D Blocks, on the rear for the Breaker.

NOTE: On Fixed Mounted, Through the Door SPB Breakers, the C and D Blocks and their associated wiring exit on the left side of the Breaker



Fig. 7 Location of the C and D Blocks on Fixed Mounted, Through the Door SPB Breakers

- I. After noting their location, cut the necessary wire ties, then remove and scrap the C Block and associated wires.
- J. Four (4) wires and their associated female connectors must be removed from the D Block. If the Breaker being Retrofitted is equipped with a Spring Release Coil (SRC), one (1) wire must also be removed from the A Block. These wires are listed in Table 2.

Table 2: Wires that Must Be Removed From the A & D Blocks

<i>Connection</i>	<i>Normal Wire Color</i>	<i>Normal A or D Block Location</i>
Spring Release Coil (SRC)	Brown	A-3
High Load (H.L.) Alarm	Orange	D-3
Short (S.) Out	Black	D-10
Negative Power	White / Yellow	D-11
Ground Fault Alarm	White / Red	D-12

NOTE: Please refer to the original wiring diagram supplied with the Breaker being Retrofitted to verify the connections, wire colors, and A or D Block locations BEFORE removing the wires.

- K. After verifying the correct wire and noting the location of the wire ties, cut the necessary wire ties and remove and scrap the one (1) wire (identified in Table 2) and its female connector from the A Block.
- L. After verifying the correct wires and noting the location of the wire ties, cut the necessary wire ties and remove and scrap the four (4) wires (identified in Table 2) and their female connectors from the D Block.

NOTE: The wire ties cut in the previous steps will be replaced later in the Retrofit Process.

- M. If the Breaker being Retrofitted has been upgraded in the past, or if it is equipped with a factory installed PT Module, remove and scrap the existing PT Module and mounting hardware. If the Breaker is not equipped with a PT Module, proceed to the next step

For Kits Supplied with an Auxiliary Switch Only.

STEP 3: INSTALLING THE AUXILIARY SWITCH

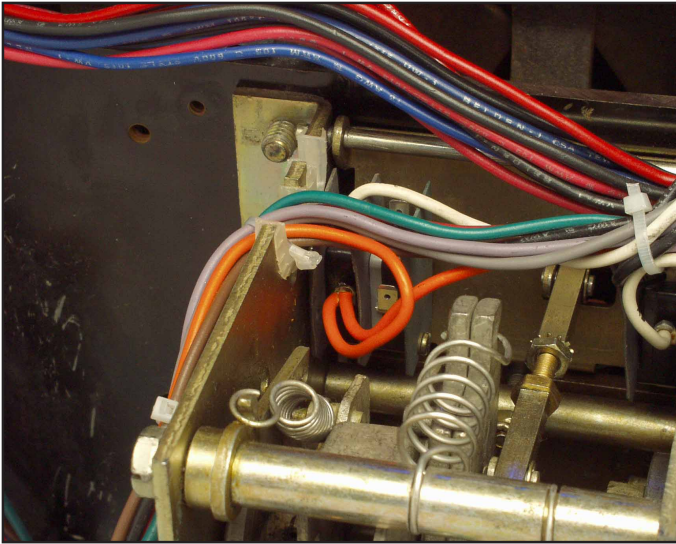


Fig. 8 Overview: Auxiliary Switch Installed in the Breaker

NOTE: Depending on the original configuration of the Breaker being Retrofitted, SPB Breakers may have been equipped with one (1) or more Auxiliary Switches when produced. All original Auxiliary Switches, originally installed in the Breaker, will be retained in this Retrofit.

For Breakers that DO NOT have an Existing Auxiliary Switch(es)

NOTE: If an Auxiliary Switch has been provided with the Retrofit Kit, but the Breaker being Retrofitted was not originally equipped with an Auxiliary Switch, you will need to use the Auxiliary Switch Mounting Bracket, spacers, and mounting hardware supplied with the Retrofit Kit.

If during the Retrofit you would like to update the Breaker to include a Closing Coil and / or Motor, contact Cutler-Hammer at: 1-800-937-5487.

For Breakers that DO have an Existing Auxiliary Switch(es)

- A. Note the location and orientation of any existing Auxiliary Switches.
- B. Using the original mounting hardware, reinstall the Charging Handle on the Breaker.
- C. If the Breaker being Retrofitted is equipped with an Under Voltage Mechanism, refer to the Westinghouse / Cutler-Hammer SPB Instruction Manual, originally supplied with the Breaker, and temporarily remove the Under Voltage Mechanism.
- D. CLOSE the Breaker.

NOTE: Throughout the Auxiliary Switch Installation procedure, be sure to keep hands and fingers away from any moving parts within the Breaker. Failure to do so could result in serious injury.

- E. With the Breaker in the CLOSED position, remove and save the hardware that secures the original Auxiliary Switch Assembly to the left Breaker Center Frame.

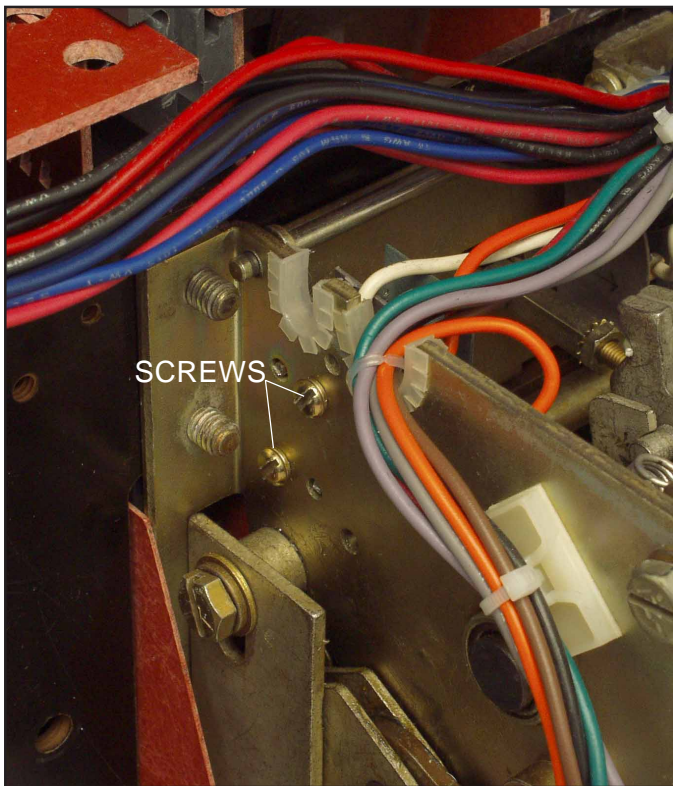


Fig. 9 Location of the Auxiliary Switch Assembly Mounting Hardware

- F. Noting that wires are attached to the existing Auxiliary Switch(es), carefully lift the Auxiliary Switch(es) partially out of the Breaker.
- G. Note the location of the existing Auxiliary Switch(es) and Insulation Barriers in relationship to the Auxiliary Switch Mounting Plate. Remove and scrap the two (2) screws securing the existing Auxiliary Switch(es) and Insulation Barriers.

NOTE: On some versions of SPB Breakers, spacers were used to “off set” the existing Auxiliary Switch(es) from the Auxiliary Switch Mounting Plate. If spacers were used in the original configuration, they should be retained when installing the new Auxiliary Switch.

NOTE: The screws supplied for use in the next step are longer than necessary and will be cut later in the Retrofit Process. The long screws are provided to allow for mounting of multiple Auxiliary Switches.

- H. Keeping the existing Auxiliary Switch(es) and Insulation Barriers in the same orientation, align the new Auxiliary Switch and Insulation Barriers to the right of the existing components. Using the two (2) .112-40 × 2.00” screws and (2) lock washers, secure the new and existing Auxiliary Switch(es) and Phase Barriers to the original Auxiliary Switch Mounting Plate.

NOTE: If an Auxiliary Switch has been provided with the Retrofit Kit, but the Breaker being Retrofitted was not originally equipped with an Auxiliary Switch, you will need to use the Auxiliary Switch Mounting Bracket, spacers, and mounting hardware supplied with the Retrofit Kit.

- I. Cut the Auxiliary Switch mounting screws flush with the Auxiliary Switch Mounting Plate.
- J. Using the original mounting hardware or the hardware supplied with the Retrofit Kit, re-install the Auxiliary Switch Assembly to the left Breaker Center Frame.

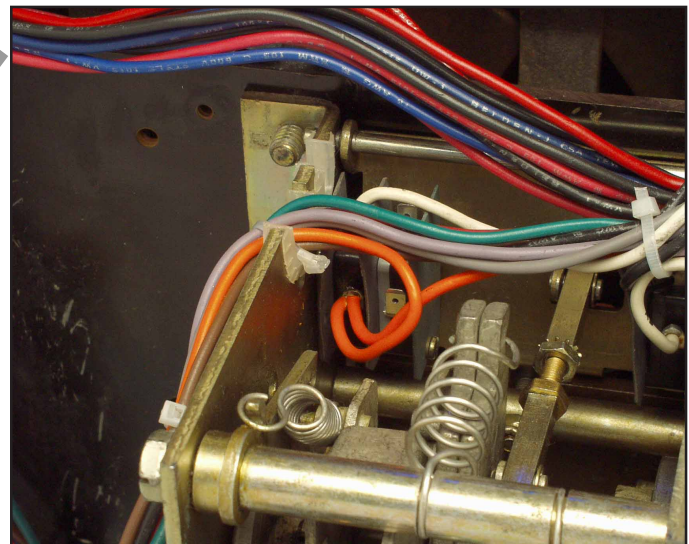


Fig. 10 Auxiliary Switch Assembly Reinstalled in the Breaker

NOTE: Wire connections to the new Auxiliary Switch will be made later in the Retrofit Process.

- K. Return the Breaker to the OPEN Position.

STEP 4: SPLICING THE EXISTING WIRING IN PREPARATION FOR TRIP UNIT MOUNTING MODULE INSTALLATION

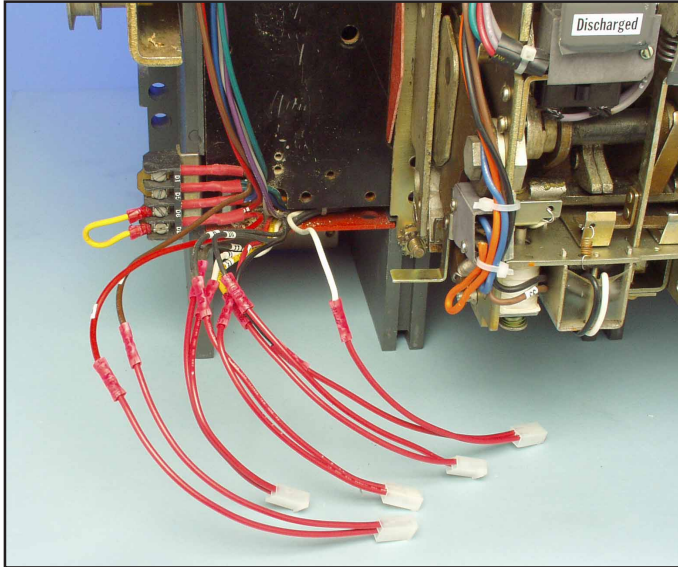


Fig. 11 Overview: Wire Splices in Preparation for Trip Unit Mounting Module Installation

There are five (5) Extension Harnesses, each consisting of one (1) snap-on connector and two (2) twelve inch (12") red wires, supplied with each Retrofit Kit. These Extension Harnesses allow for the necessary connections to the receptacles on the Printed Circuit Board (PCB) on the Trip Unit Mounting Module for both small and large frame SPB Breakers.

The Extension Harnesses should be cut to the proper length during the following steps. Be sure to leave enough length for the proper connections to be made and for the wires to be safely secured away from any moving parts within the Breaker. It is suggested that, as the Retrofitter is determining the necessary wire length, the Trip Unit Mounting Module be held roughly in its eventual mounting position on the Deck Plate. This will help in estimating the necessary length of the Extension Harnesses.

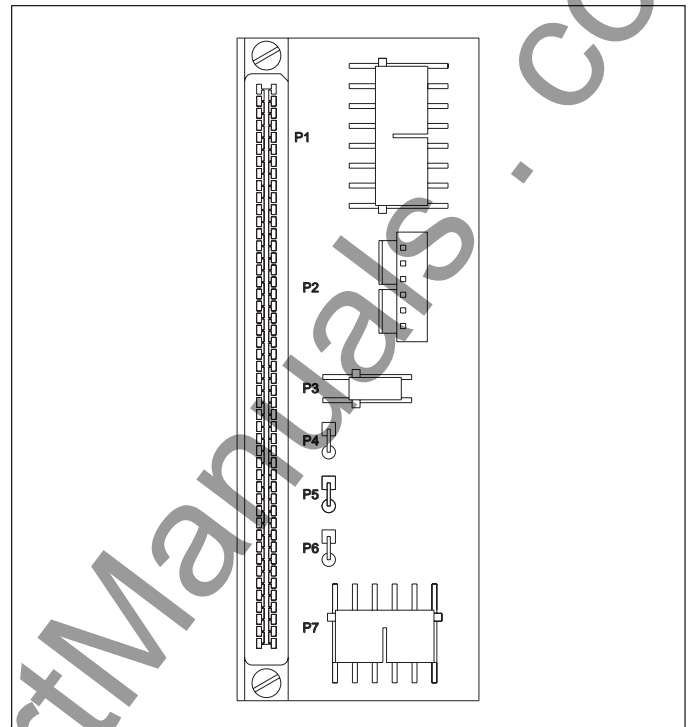


Fig. 12 Receptacle Positions on the Trip Unit Mounting Module PCB

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.

NOTE: Please refer to the original wiring diagram supplied with the Breaker being Retrofitted to verify the connections and wire colors BEFORE making the splices detailed in the following steps.

NOTE: Throughout this section, to insure clarity of directions, the wire positions on the Extension Harnesses' connectors will be referred to as detailed in Figure 13.

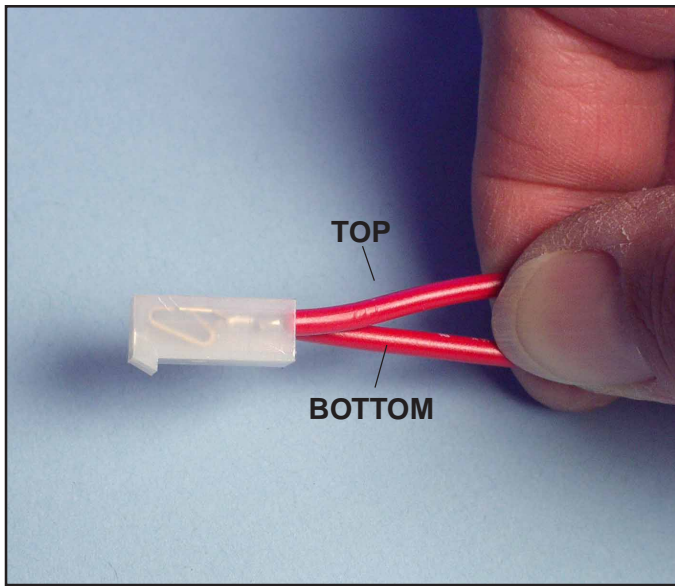


Fig. 13 Wire Position in Relationship to the Connector

NOTE: Throughout the procedures contained in this step, refer to the appropriate Tables and Figures (Table 3 and Figure 14 for Breakers equipped with a Ground Fault Transformer or Table 4 and Figure 15 for Breakers without a Ground Fault Transformer) for wire connection summary information.

- A. Strip an appropriate length of insulation from the ends of the Black and White wires coming from the Flux Transfer Shunt (FTST). Cut an Extension Harness to the proper length to allow the wires coming from the FTST to be connected to the P-3 receptacle on the Trip Unit Mounting Module. Strip an appropriate length of insulation from the ends of the wires on the Extension Harness. Using the (2) butt connectors supplied, connect the Black FTST wire to the Top position wire on the Extension Harness and the White wire to the Bottom position wire.

Table 3: Wire Splicing and Connection Information (with Ground Fault Transformer)

Wire Source	Wire Color - Top Position	Original 24-Pin Terminal Block Terminal Number	Wire Color - Bottom Position	Original 24-Pin Terminal Block Terminal Number	Trip Unit Mounting Module PCB Receptacle
Flux Transfer Shunt (FTST)	Black	14	White	15	P-3
Ground Fault Terminal Block*	Red #2	3	Brown #2	4	Top Position on P-1
Phase CT "A"	Black	21	White	22	Left Position on P-7
Phase CT "B"	Black	19	Yellow	20	Center Position on P-7
Phase CT "C"	Black	17	Red	18	Right Position on P-7

* On Large Frame Breakers, the Ground Fault Transformer is one of the Aux. CT Transformers.



Table 4: Wire Splicing and Connection Information (without Ground Fault Transformer)

<i>Wire Source</i>	<i>Wire Color - Top Position</i>	<i>Original 24- Pin Terminal Block Terminal Number</i>	<i>Wire Color - Bottom Position</i>	<i>Original 24- Pin Terminal Block Terminal Number</i>	<i>Trip Unit Mounting Module PCB Receptacle</i>
Flux Transfer Shunt (FTST)	Black	14	White	15	P-3
Phase CT "A"	Black*	21	Orange*	22	Right Position on P-7
Phase CT "B"	Black*	19	Orange*	20	Center Position on P-7
Phase CT "C"	Black*	17	Orange*	18	Left Position on P-7

* Wire color may vary by age of the Breaker being Retrofitted.

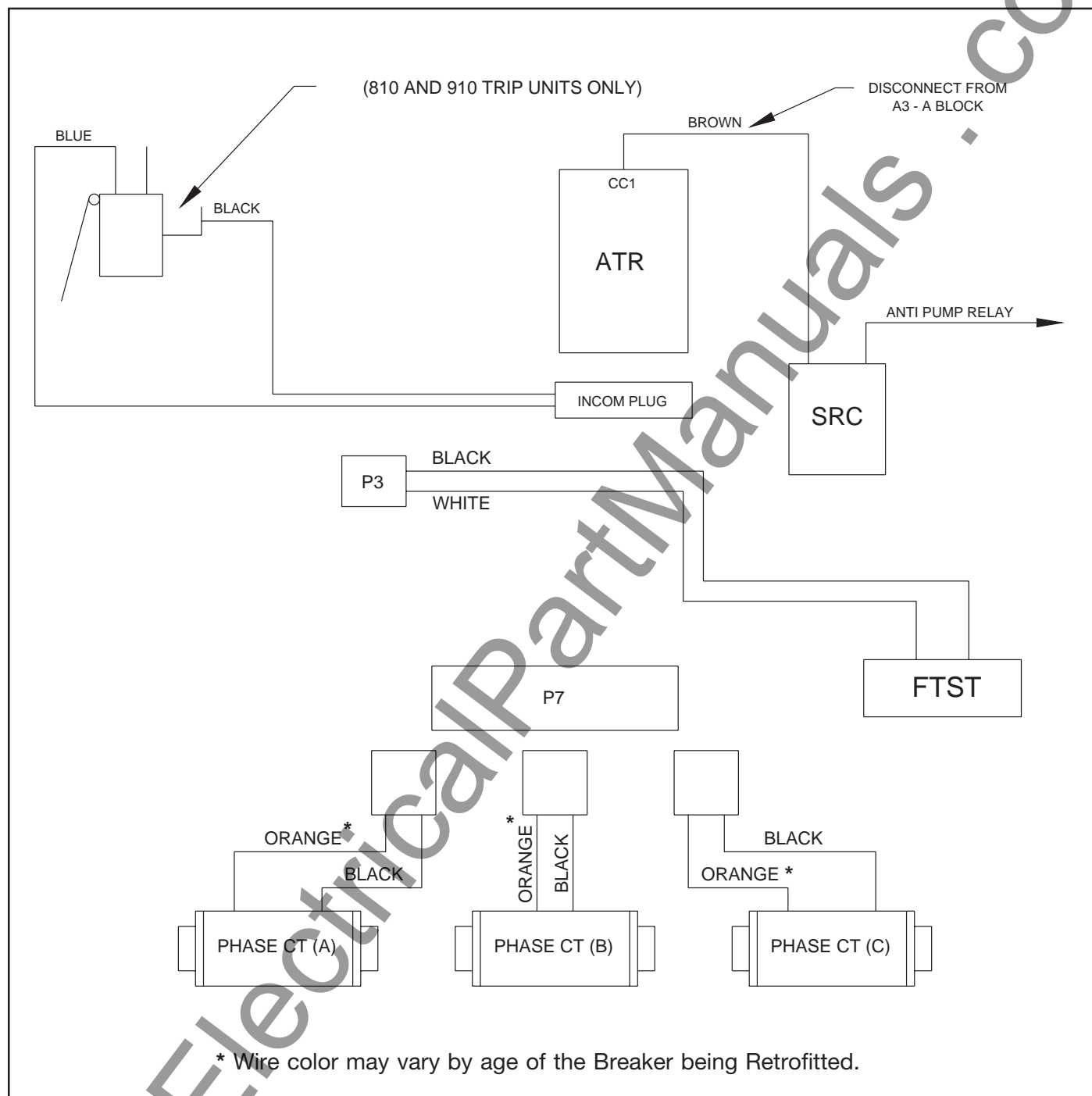


Fig. 15 Wiring Schematic for SPB Breakers without Ground Fault Transformer

For Breakers with a Ground Fault Transformer Only.

- B. Strip an appropriate length of insulation from the ends of the Red #2 and Brown #2 wires coming from the Ground Fault Terminal Block. Cut an Extension Harness to the proper length to allow the wires coming from the Ground Fault Terminal Block to be connected at the top position on the P-1 receptacle on the Trip Unit Mounting Module. Strip an appropriate length of insulation from the ends of the wires on the Extension Harness. Using the (2) butt connectors supplied, connect the Red #2 Ground Fault Terminal Block wire to the Top position wire on the Extension Harness and the Brown #2 wire to the Bottom position wire.
- C. Strip an appropriate length of insulation from the ends of the White wire coming from the Ground Fault Transformer and the Black wire coming from the "A" Phase CT. Cut an Extension Harness to the proper length to allow the wires coming from the "A" Phase CT to be connected at the left position on the P-7 receptacle on the Trip Unit Mounting Module. Strip an appropriate length of insulation from the ends of the wires on the Extension Harness. Using the (2) butt connectors supplied, connect the White "A" Phase CT wire to the Bottom position wire on the Extension Harness and the Black wire to the Top position wire.
- D. Strip an appropriate length of insulation from the ends of the Yellow wire coming from the Ground Fault Transformer and the Black wire coming from the "B" Phase CT. Cut an Extension Harness to the proper length to allow the wires coming from the "B" Phase CT to be connected at the center position on the P-7 receptacle on the Trip Unit Mounting Module. Strip an appropriate length of insulation from the ends of the wires on the Extension Harness. Using the (2) butt connectors supplied, connect the Yellow "B" Phase CT wire to the Bottom position wire on the Extension Harness and the Black wire to the Top position wire.

- E. Strip an appropriate length of insulation from the ends of the Red wire coming from the Ground Fault Transformer and Black wire coming from the "C" Phase CT. Cut an Extension Harness to the proper length to allow the wires coming from the "C" Phase CT to be connected at the right position on the P-7 receptacle on the Trip Unit Mounting Module. Strip an appropriate length of insulation from the ends of the wires on the Extension Harness. Using the (2) butt connectors supplied, connect the Red "C" Phase CT wire to the Bottom position wire on the Extension Harness and the Black wire to the Top position wire.

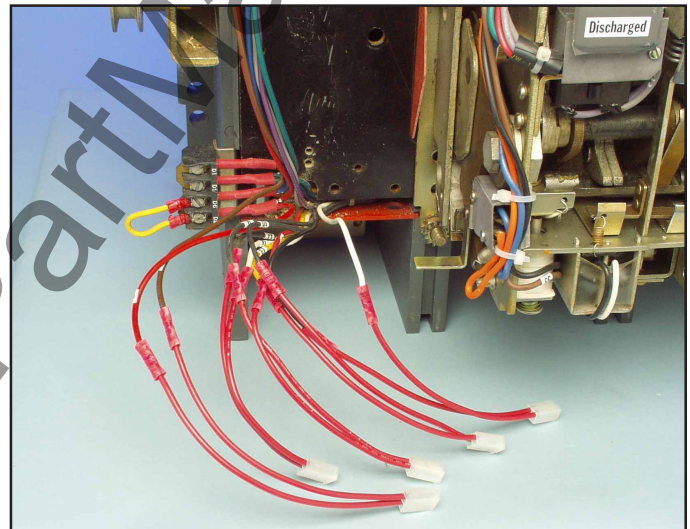


Fig. 16 Extension Harnesses Connected to the Existing SPB Wires

For Breakers without a Ground Fault Transformer Only.

- B. Strip an appropriate length of insulation from the ends of the Orange and Black wires coming from the "A" Phase CT. Cut an Extension Harness to the proper length to allow the wires coming from the "A" Phase CT to be connected at the left position on the P-7 receptacle on the Trip Unit Mounting Module. Strip an appropriate length of insulation from the ends of the wires on the Extension Harness. Using the (2) butt connectors supplied, connect the Orange "A" Phase CT wire to the

Bottom position wire on the Extension Harness and the Black wire to the Top position wire.

- C. Strip an appropriate length of insulation from the ends of the Orange and Black wires coming from the “B” Phase CT. Cut an Extension Harness to the proper length to allow the wires coming from the “B” Phase CT to be connected at the center position on the P-7 receptacle on the Trip Unit Mounting Module. Strip an appropriate length of insulation from the ends of the wires on the Extension Harness. Using the (2) butt connectors supplied, connect the Orange “B” Phase CT wire to the Bottom position wire on the Extension Harness and the Black wire to the Top position wire.
- D. Strip an appropriate length of insulation from the ends of the Orange and Black wires coming from the “C” Phase CT. Cut an Extension Harness to the proper length to allow the wires coming from the “C” Phase CT to be connected at the right position on the P-7 receptacle on the Trip Unit Mounting Module. Strip an appropriate length of insulation from the ends of the wires on the Extension Harness. Using the (2) butt connectors supplied, connect the Orange “C” Phase CT wire to the Bottom position wire on the Extension Harness and the Black wire to the Top position wire.

For Kits Supplied with a PT Module and when Being Installed on a SPB Small Frame Breaker Equipped with a Ground Fault Transformer Only.

STEP 5: INSTALLING THE PT MODULE ON THE BREAKER DECK PLATE

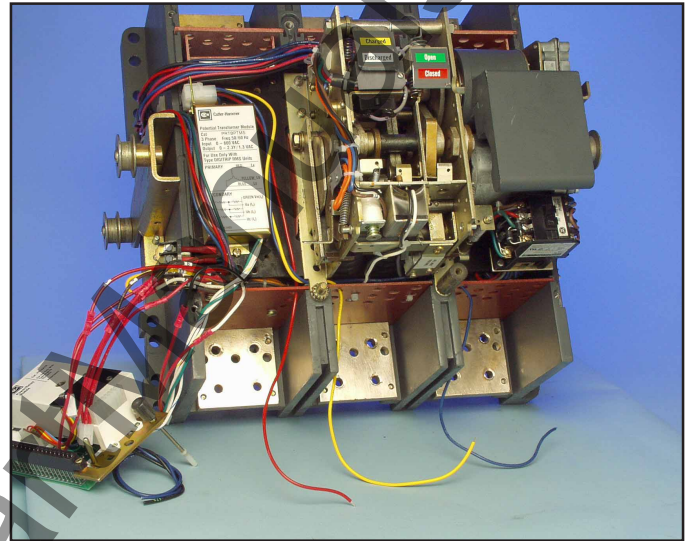


Fig. 17 Overview: PT Module Mounted to the Deck Plate on Small Frame SPB with Ground Fault Transformer

- A. Using Drilling Plan "A", drill two (2) 0.125" diameter holes in the Breaker Deck Plate.

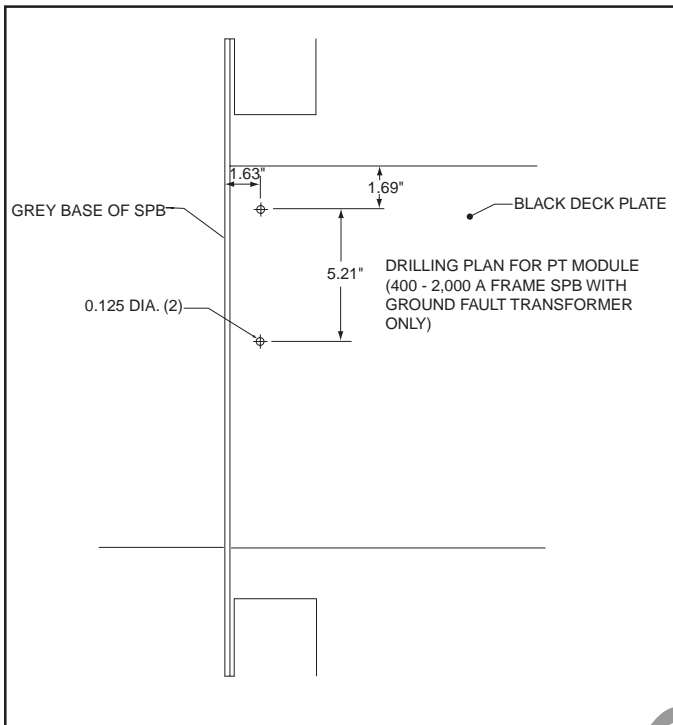


Fig. 18 Drilling Plan "A"

NOTE: Throughout this process, the PT Module is connected to the Trip Unit Mounting Module via a wiring harness. Care should be taken not to damage the PT Module, Trip Unit Mounting Module, or the wiring harness.

- B. Set the Trip Unit Mounting Module to the left of the Breaker, as shown. Align the PT Module with the holes drilled in the Breaker Deck Plate in Step 5-A. Using the (2) .138-20 x .375" thread cutting screws and (2) flat washers supplied, secure the PT Module to the Deck Plate.

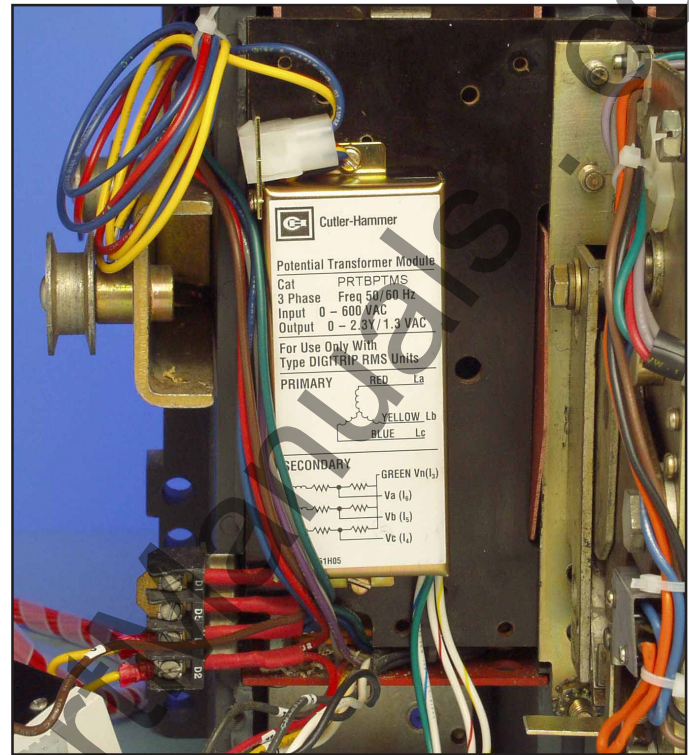


Fig. 19 PT Module Mounted to the Breaker Deck Plate

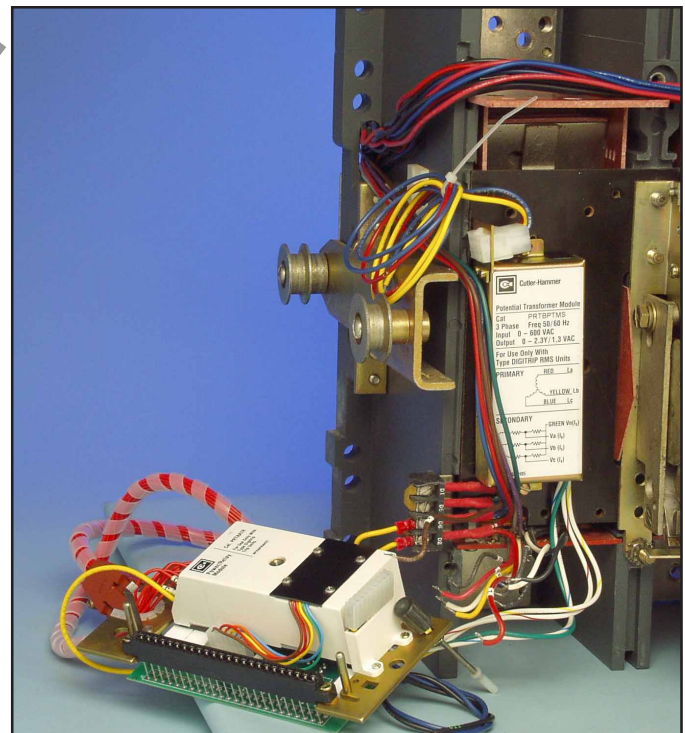


Fig. 20 Position of the Trip Unit Mounting Module during PT Module Installation

- C. Route the PT Wires, as shown, through the existing holes in the insulation plates then down towards the corresponding Phase CTs. The PT Wires must be connected in the following manner: Red to the "A" Phase CT; Yellow to the "B" Phase CT; and Blue to the "C" Phase CT.

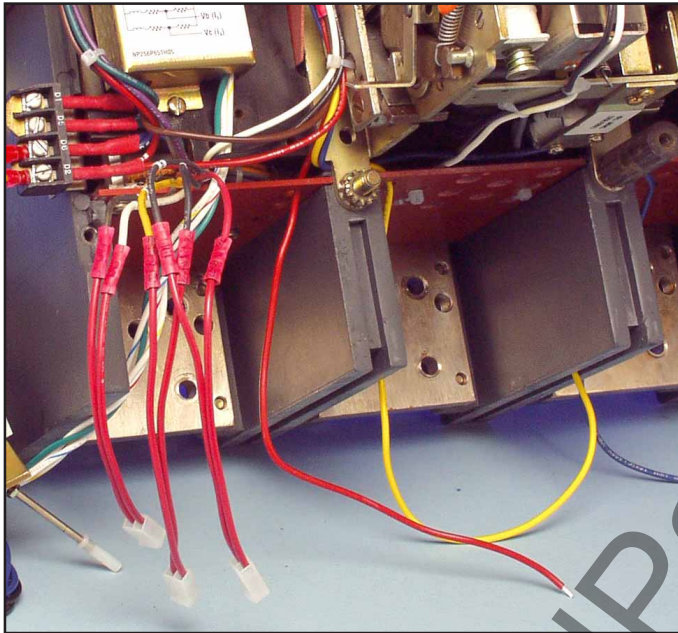


Fig. 21 Routing of the PT Wires

STEP 6: INSTALLING THE TRIP UNIT MOUNTING MODULE

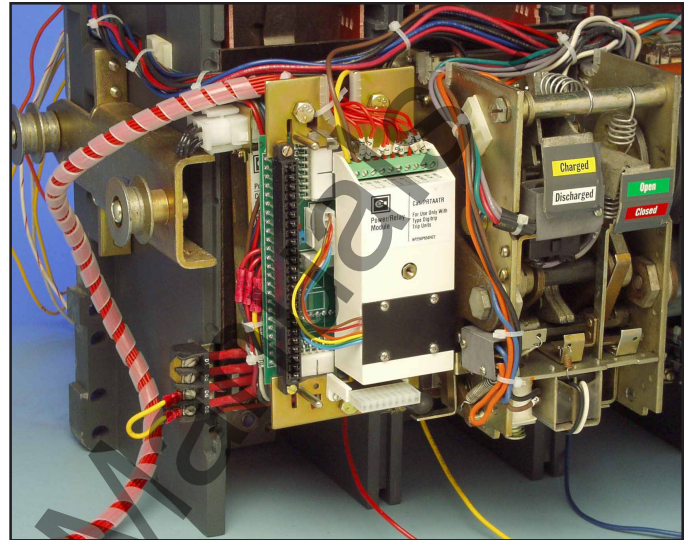


Fig. 22 Overview: Trip Unit Mounting Module Installed on the Breaker

- A. For very old SPB Breakers, using Drilling Plan "B", drill and tap (3) holes in the Breaker Deck Plate to accept .250"-20 bolts.

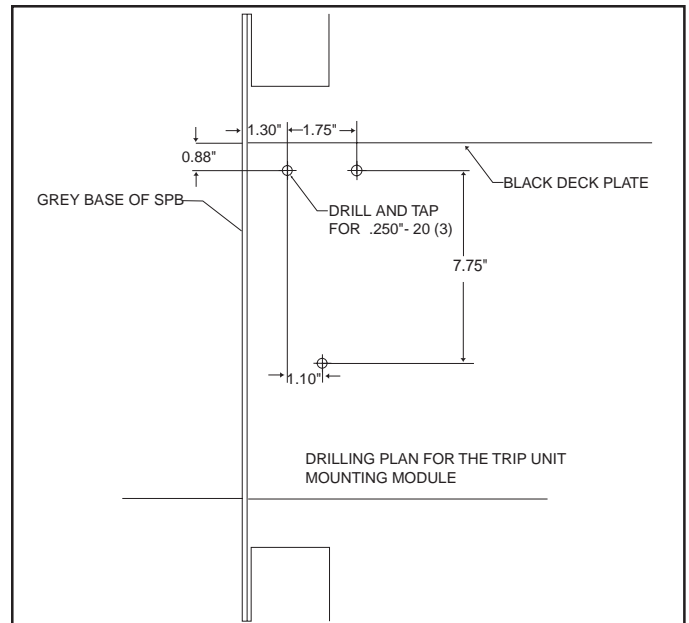


Fig. 23 Drilling Plan "B"

- B. For All Large Frame SPB Breakers Equipped with Aux. CTs: Using Drilling Plan "C", drill two (2) .312" holes in the Breaker Deck Plate.

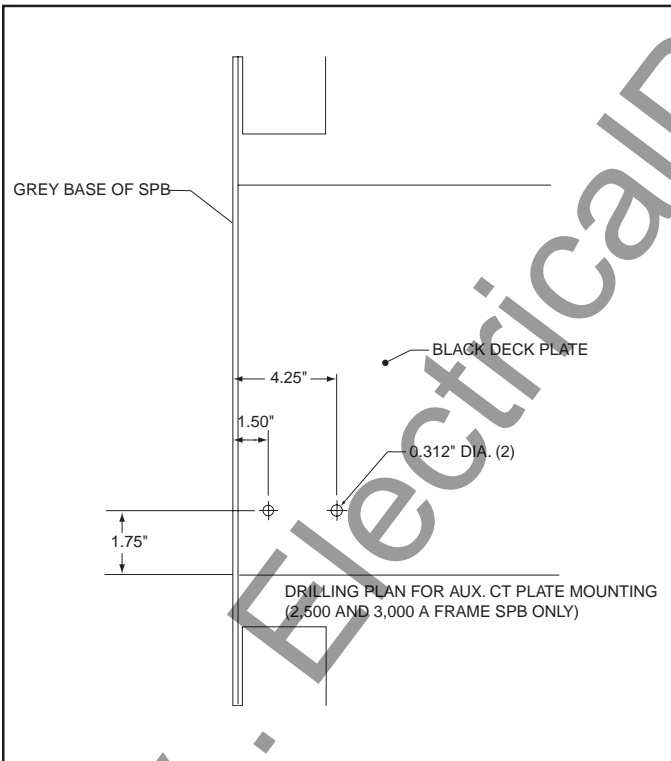
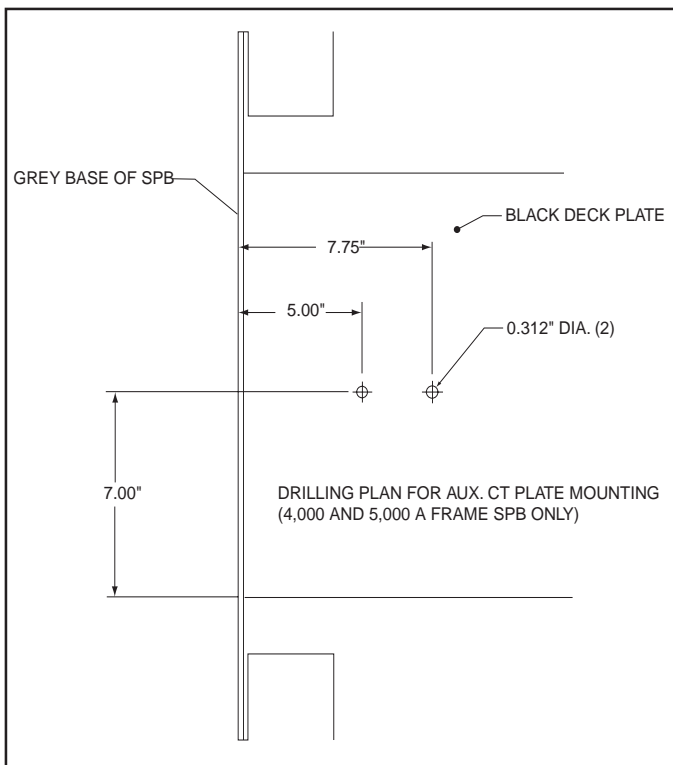


Fig. 24 Drilling Plan "C"

- C. Before installing the Trip Unit Mounting Module, install the Trip Plunger, as shown, on the Trip Unit Mounting Module.

Insure that the nuts on the Trip Plunger Rod are positioned as shown in Figure 25.



Fig. 25 Correct Installation and Positioning of the Nuts on the Trip Plunger Rod

- D. For All Large Frame SPB Breakers and Small Frame Breakers Not Equipped with a Ground Fault Transformer: Route the PT Wires, as shown in Figure 22, through the existing holes in the insulation plates then down towards the corresponding Phase CTs. The PT Wires will be connected in the following manner: Red to the "A" Phase CT; Yellow to the "B" Phase CT; and Blue to the "C" Phase CT.
- E. Align the Trip Unit Mounting Module with the existing holes in the Breaker Deck Plate. As the Trip Unit Mounting Module is being aligned with the holes in the Deck Plate, also align the Trip Plunger Rod with the guide hole in the Deck Plate.

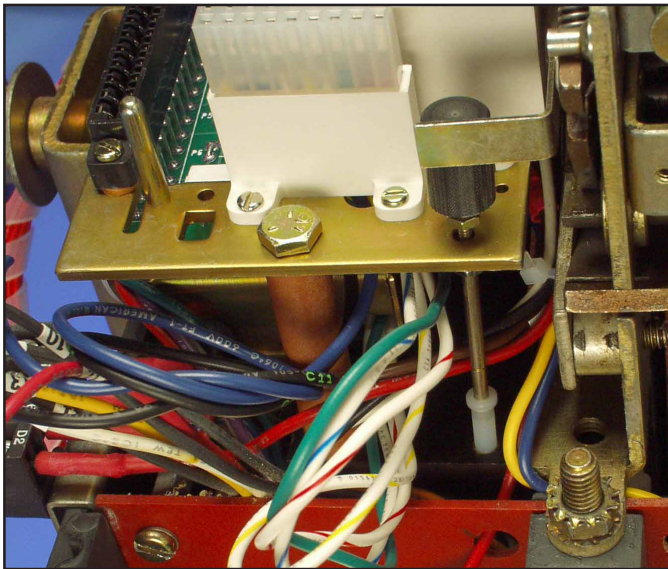


Fig. 26 Correct Alignment of the Trip Plunger Rod

- F. Using the (3) .250-20 × 2.50" bolts and (3) spacers supplied, secure the Trip Unit Mounting Module to the Breaker Deck Plate. Note that the External Harness, that comes pre-installed on the Trip Unit Mounting Module, should be routed towards the left side of the Breaker.

For Kits Supplied with an Auxiliary Switch Only:
Note also that the two (2) Auxiliary Switch wires (blue and black) should be routed towards the top of the Trip Unit Mounting Module then over towards the Auxiliary switch installed in Step 3.

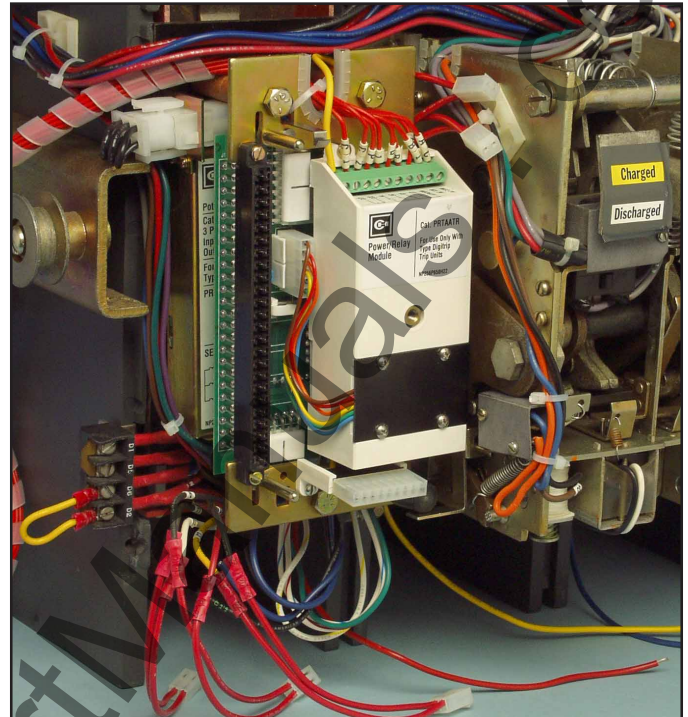


Fig. 27 Trip Unit Mounting Module Installed on the Breaker

- G. Remove and save the mounting hardware securing the ATR to the Trip Unit Mounting Module. Holding the ATR off to the side during the following steps will provide easier access to the receptacles on the Trip Unit Mounting Module PCB.

NOTE: Throughout this process, the ATR is connected to the Trip Unit Mounting Module via a wiring harness. Care should be taken not to damage the ATR, Trip Unit Mounting Module, or the wiring harness

NOTE: Please refer to the original wiring diagram supplied with the Breaker being Retrofitted to verify the connections, and wire colors BEFORE making the connections detailed in the following steps.

NOTE: Throughout the procedures contained in this step, refer to the appropriate Tables (Table 5 for Breakers equipped with a Ground Fault Transformer or Table 6 for Breakers without a Ground Fault Transformer) and Figure 27 for wire to PCB receptacle summary information.

Table 5: Wire Splicing and Connection Information (with Ground Fault Transformer)

<i>Wire Source</i>	<i>Wire Color - Top Position</i>	<i>Wire Color - Bottom Position</i>	<i>Trip Unit Mounting Module PCB Receptacle</i>
Flux Transfer Shunt (FTST)	Black	White	P-3
Ground Fault Terminal Block*	Red #2	Brown #2	Top Position on P-1
Phase CT "A"	Black	White	Left Position on P-7
Phase CT "B"	Black	Yellow	Center Position on P-7
Phase CT "C"	Black	Red	Right Position on P-7

* On Large Frame Breakers, the Ground Fault Transformer is one of the Aux. CT Transformers.

Table 6: Wire Splicing and Connection Information (without Ground Fault Transformer)

<i>Wire Source</i>	<i>Wire Color - Top Position</i>	<i>Wire Color - Bottom Position</i>	<i>Trip Unit Mounting Module PCB Receptacle</i>
Flux Transfer Shunt (FTST)	Black	White	P-3
Phase CT "A"*	Black	Orange	Left Position on P-7
Phase CT "B"*	Black	Orange	Center Position on P-7
Phase CT "C"*	Black	Orange	Right Position on P-7

* Wire color may vary by age of the Breaker being Retrofitted.

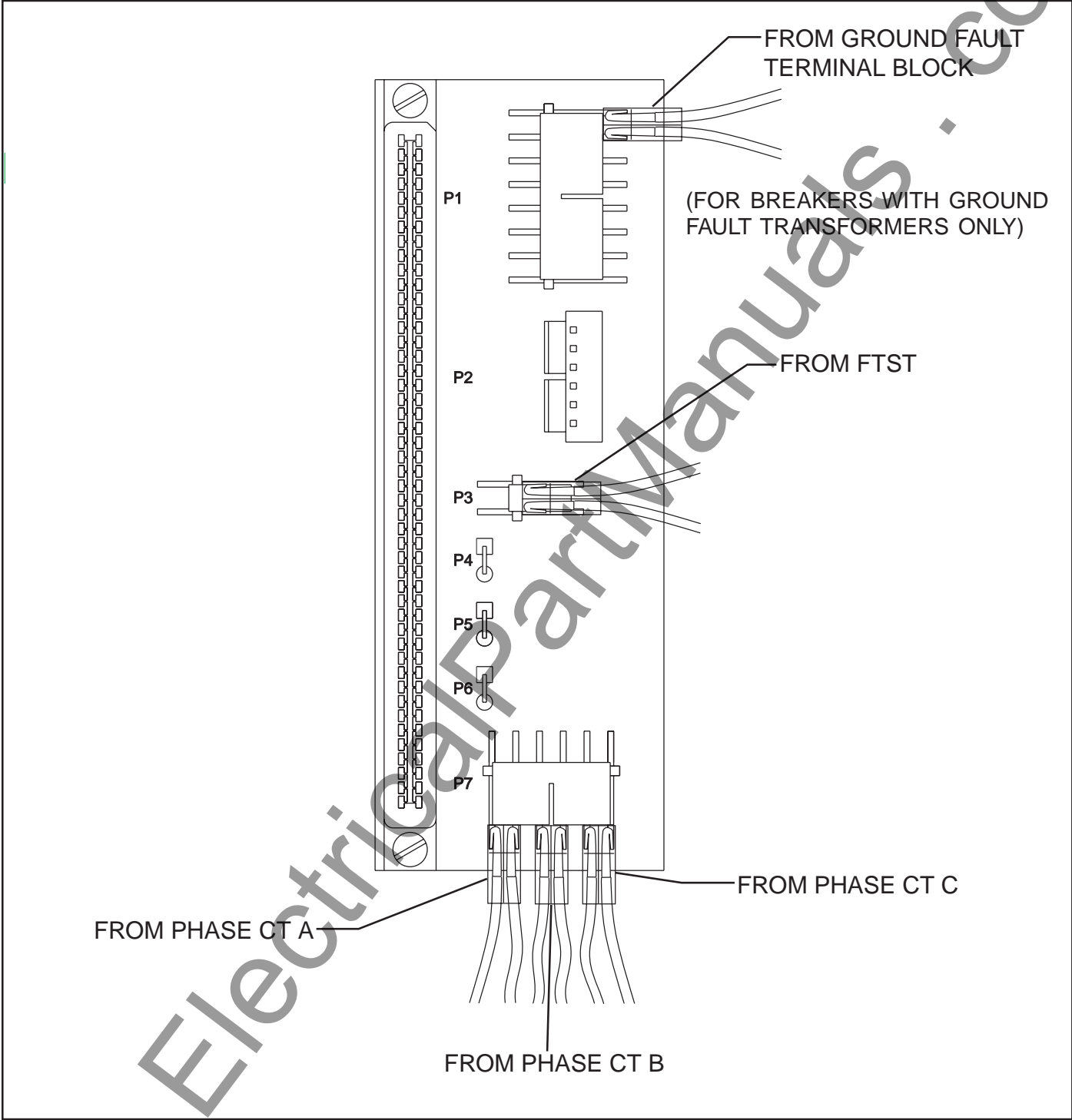


Fig. 28 Connections on the Trip Unit Mounting Module PCB

NOTE: All wire routing in Steps 6-F through 6-I must be behind the Trip Unit Mounting Module Plate as shown in Figure 28.

- H. Insert the FTST connector, installed in Step 4-A, into the P-3 receptacle on the Trip Unit Mounting Module PCB.
- I. *For Breakers Equipped with a Ground Fault Transformer Only:* Insert the Ground Fault Terminal Block connector, installed in Step 4-B, into the top two (2) pins in the P-1 receptacle on the Trip Unit Mounting Module PCB.
- J. Insert the Phase CT “A” connector, installed in Step 4-C or B, onto the two (2) pins furthest to the left in the P-7 receptacle on the Trip Unit Mounting Module PCB.
- K. Insert the Phase CT “B” connector, installed in Step 4-D or C, onto the two (2) pins at the center of the P-7 receptacle on the Trip Unit Mounting Module PCB.
- L. Insert the Phase CT “C” connector, installed in Step 4-E or D, onto the two (2) pins furthest to the right in the P-7 receptacle on the Trip Unit Mounting Module PCB.

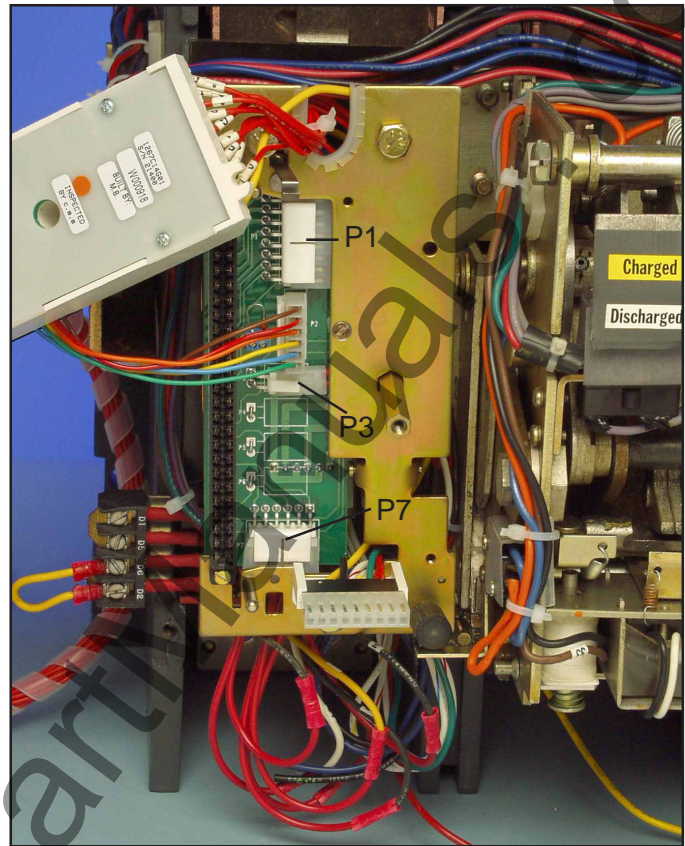


Fig. 29 Connections to the Receptacles on the Trip Unit Mounting Module PCB

- M. Using the original mounting hardware removed in Step 6-E, reinstall the ATR onto the Trip Unit Mounting Module.
- N. *For Breakers Equipped with a Spring Release Coil Only:* Connect the brown wire removed from the A-3 location in the A Block in Step 2-J to the CC-1 terminal on the ATR.

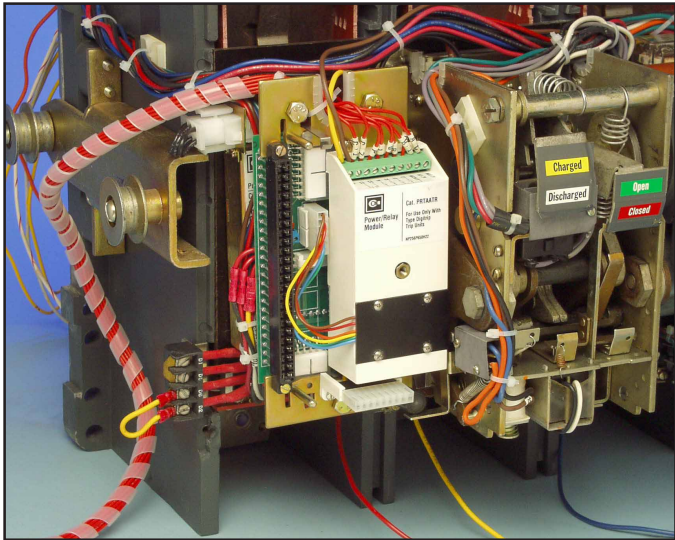
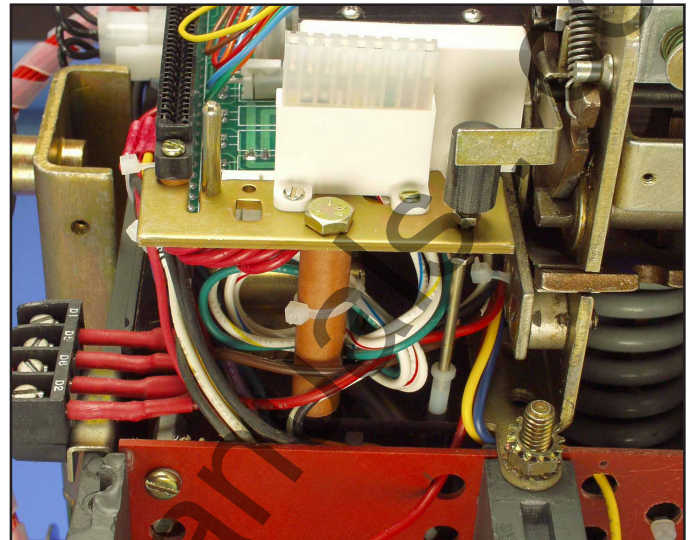
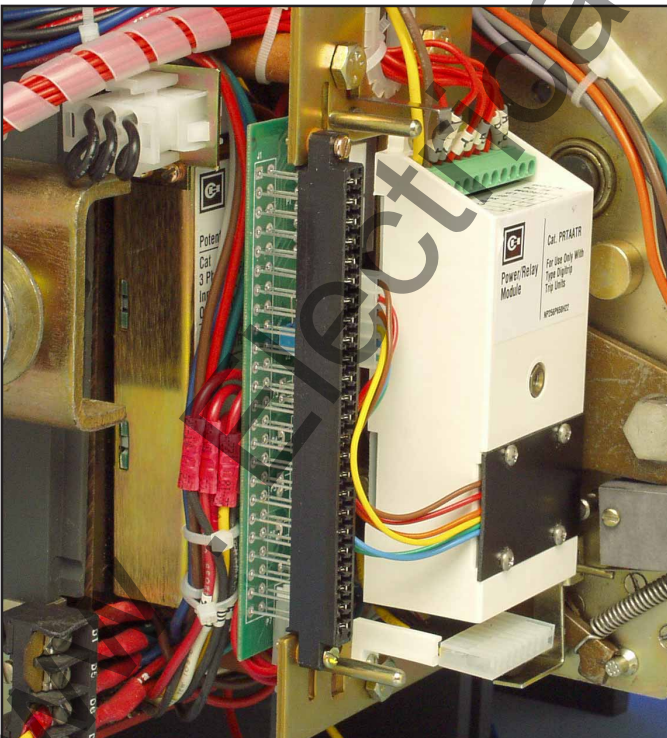


Fig. 30 ATR Reinstalled on the Trip Unit Mounting Module with SRC Wire Connected to the CC-1 Terminal

- O. Use the wire ties supplied to secure all wires behind the Trip Unit Mounting Module away from any moving parts within the Breaker. In addition, use a wire tie to secure the INCOM Plug to Trip Unit Mounting Module. This will prevent the INCOM Plug from coming out of its holder if the Trip Unit is removed.



Figs. 31 & 32 Wires Secured with Wire Ties

- P. 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.

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

Route the PT Wires to the appropriate Phase CTs. The PT Wires will be connected in the following manner: Red to the "A" Phase CT; Yellow to the "B" Phase CT; and Blue to the "C" Phase CT. Cut the wires to length, strip an appropriate length of insulation from each wire, and install a .375" ring terminal on each wire.

Connect the PT Wires to the appropriate top Phase CTs using the (3) .375-16 × .625" bolts, (3) lock washers, and (3) flat washers supplied.

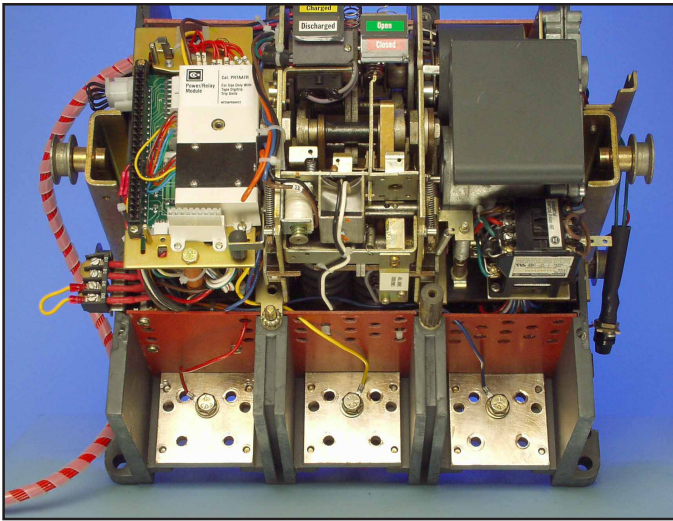


Fig. 33 PT Wires Connected to the Phase CTs

- Q. For Kits Supplied with an Auxiliary Switch: Route the Auxiliary Switch wires (blue and black) from the trip Unit Mounting Module to the Auxiliary Switch installed in Step 3. Connect the Blue wire to the blade closest to the back of the Breaker and the Black wire to the blade closest to the front of the Breaker, as shown.

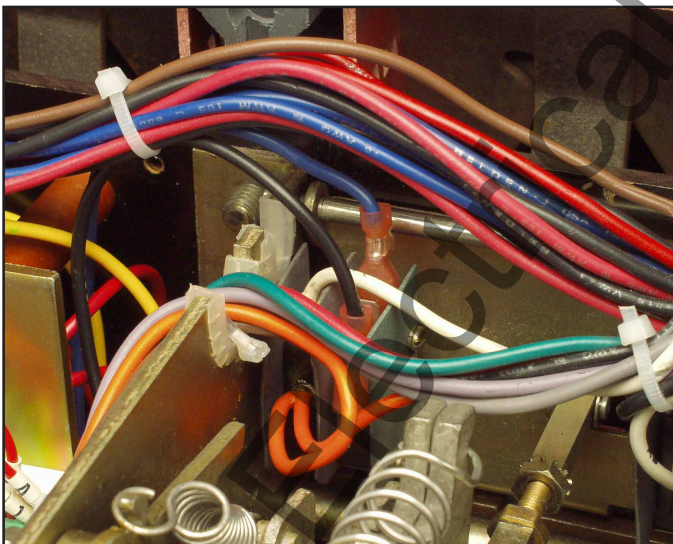


Fig. 34 Auxiliary Switch Wires Connected to the Auxiliary Switch

Use the wire ties supplied to secure the Auxiliary Switch Wires away from any moving parts within the Breaker.

For All Large Frame SPB Breakers Equipped with Aux. CTs.

- R. Align then secure the Aux. CTs, removed in Step 2-E to the new Aux. CT Mounting Bracket, as shown, using the (8) .138-20 x .375" thread cutting screws supplied.

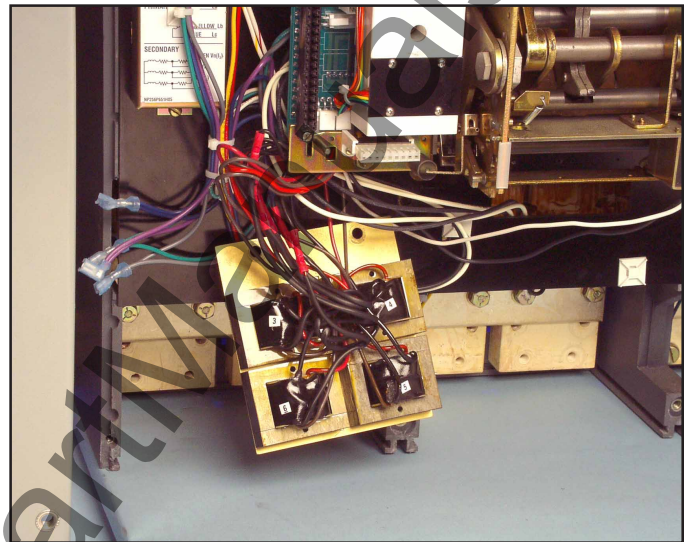


Fig. 35 Aux. CTs Installed in the New Aux. CT Mounting Bracket

- S. Align the Aux. CT Assembly with the holes drilled in the Breaker Deck Plate in Step 6-A. Using the (2) .250-20 x 2.50" bolts, (2) spacers, (2) flat washers, (2) lock washers, and (1) locking plate supplied, secure the Aux. CT Assembly to the Deck Plate.

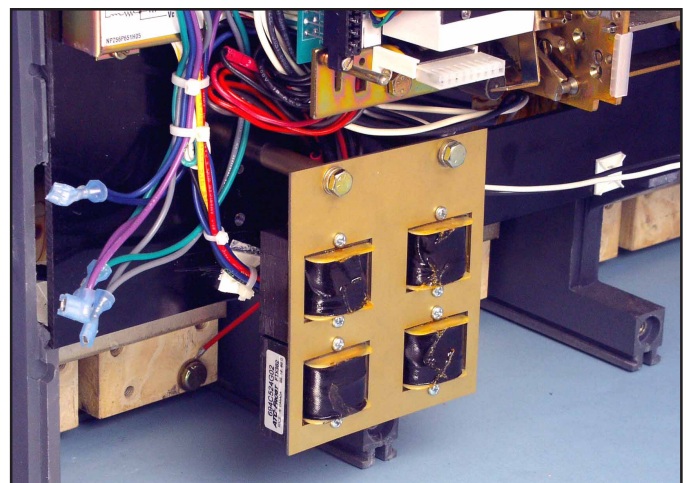


Fig. 36 Aux. CT Assembly Installed in the Breaker

STEP 7: INSTALLING THE TRIP UNIT AND RATING PLUG

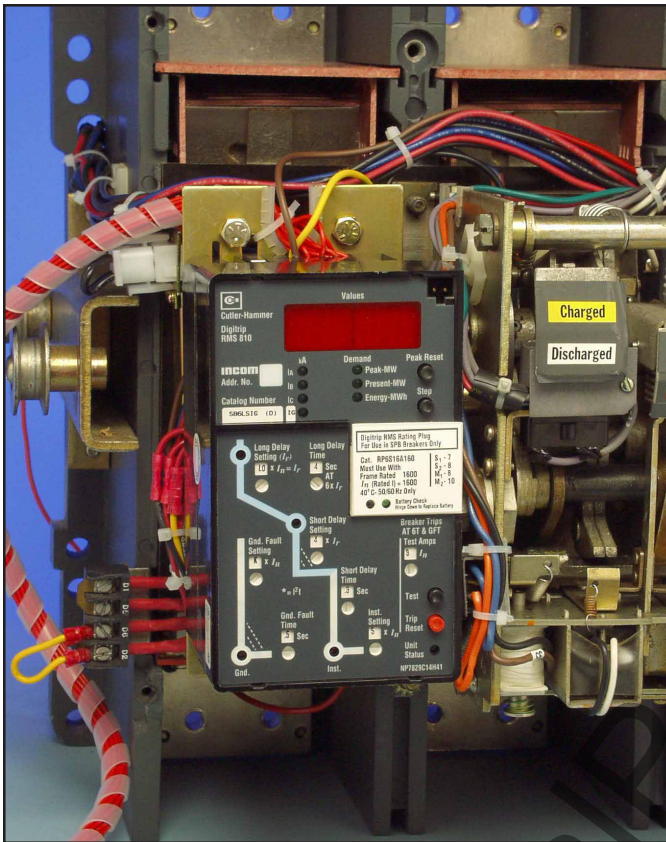


Fig. 37 Overview: Trip Unit and Rating Plug Installed on the Trip Unit Mounting Module

- A. Align the Trip Unit Edge Card with the Edge Card Receptacle on the Trip Unit Mounting Module. Insure that the spring clip attached to the trip Unit Mounting Module is above the top of the Trip Unit. Carefully plug the Trip Unit into the Trip Unit Mounting Module.



CAUTION

DO NOT APPLY UNDUE FORCE TO THE TRIP UNIT. IF IT DOES NOT PLUG EASILY INTO THE TRIP UNIT MOUNTING MODULE, MAKE SURE THE EDGE CARD IS PROPERLY ALIGNED WITH ITS RECEPTACLE. APPLYING UNDUE FORCE CAN DAMAGE THE TRIP UNIT AND / OR THE TRIP UNIT MOUNTING MODULE PCB.

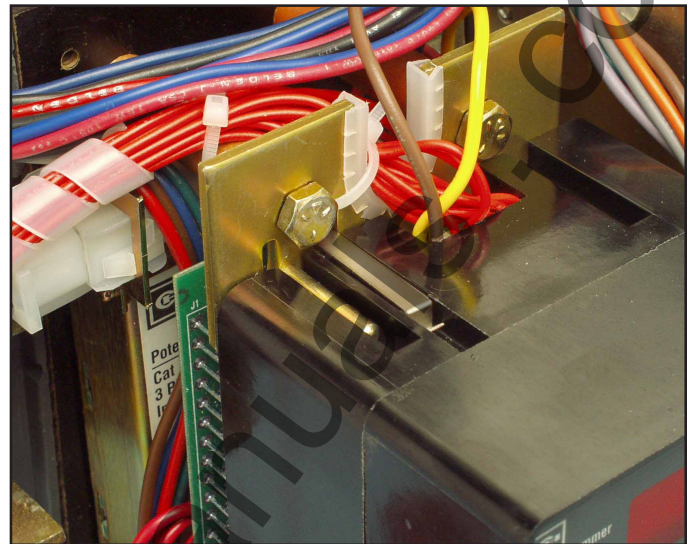


Fig. 38 Correct "Locked" Position of the Spring Clip with the Trip Unit Completely Plugged into the Trip Unit Mounting Module

- B. Insert the Rating Plug into its receptacle in the Trip Unit. Fully tighten the Rating Plug screw.

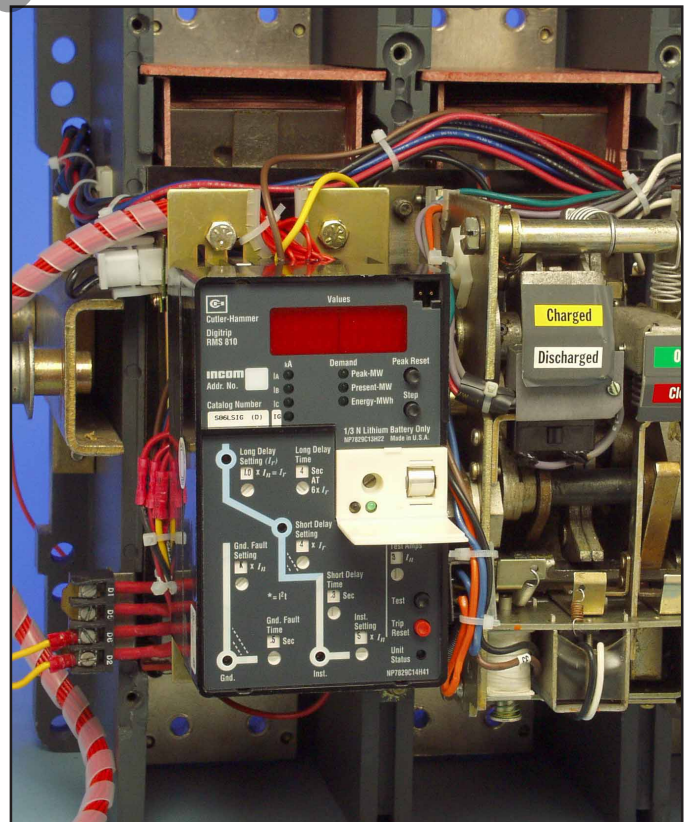


Fig. 39 Rating Plug Installed in the Trip Unit

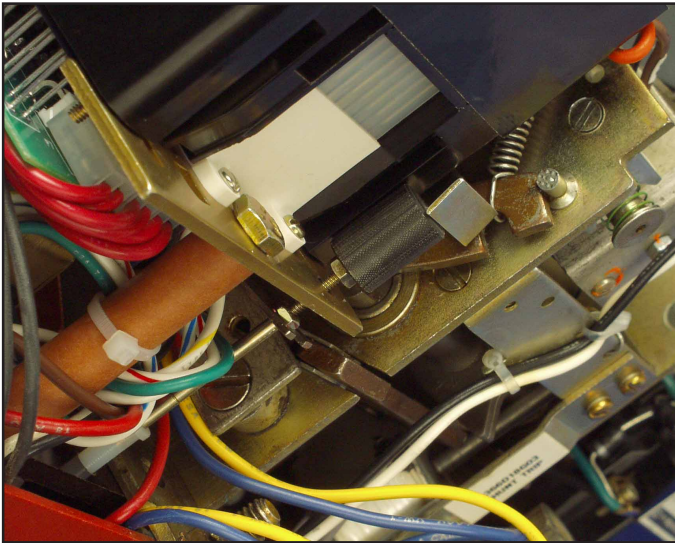
STEP 8: ADJUSTING THE TRIP SYSTEM

Fig. 40 Overview: Adjusting the trip System

- A. Tilt the Breaker backwards to gain access to the Trip Plunger. Screw the Trip Plunger lock nuts and the Plunger as far down the Trip Plunger Shaft as possible.

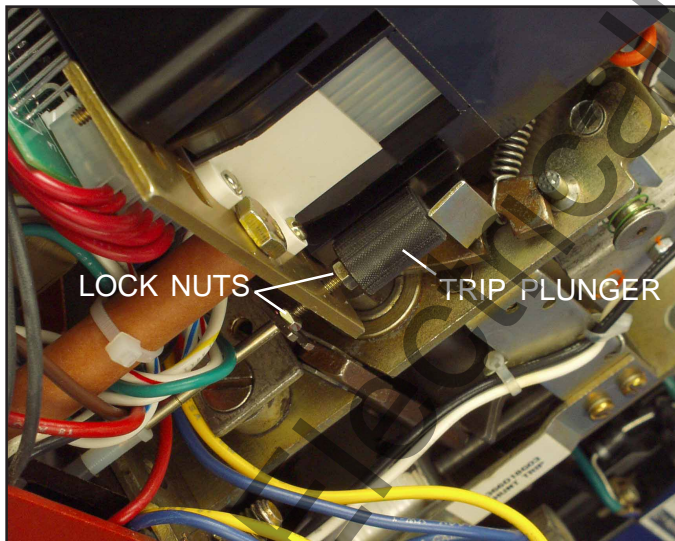


Fig. 41 Location of the Trip Plunger and Lock Nuts

- B. From its fully tightened position, turn the Rating Plug six (6) full turns counter-clockwise.

NOTE: Throughout the rest of this Trip System Setup procedure, be sure to keep hands and fingers away from any moving parts within the Breaker. Failure to do so could result in serious injury.

- C. “Close” the Breaker.
- D. Screw the Trip Plunger back up the Trip Plunger Shaft until the Breaker “Trips”. Temporarily tighten the lock nut against the back of the Trip Plunger.
- E. Again, fully tighten the Rating Plug screw and “Close” the Breaker.
- F. Begin turning the Rating Plug screw counter-clockwise. If the Trip System has been properly adjusted, the Breaker should “Trip” as the Rating Plug screw is turned out between six (6) and eight (8) turns.
- G. If the Breaker “Trips” when expected, back off the Trip Plunger lock nut and apply Loc-Tite® 243 to the threads of the Trip Plunger Shaft. Tighten the lock nut against the back of the Trip Plunger.
- H. Again test the Trip function by turning the Rating Plug Screw until it is fully tightened, Closing the Breaker, and turning the Rating Plug screw out between six (6) and eight (8) turns. If the Breaker again Trips, the Trip System setup is complete. If the Breaker does not Trip, repeat the adjustment procedures detailed above.
- I. Fully tighten the Rating Plug screw and close the Rating Plug Cover.

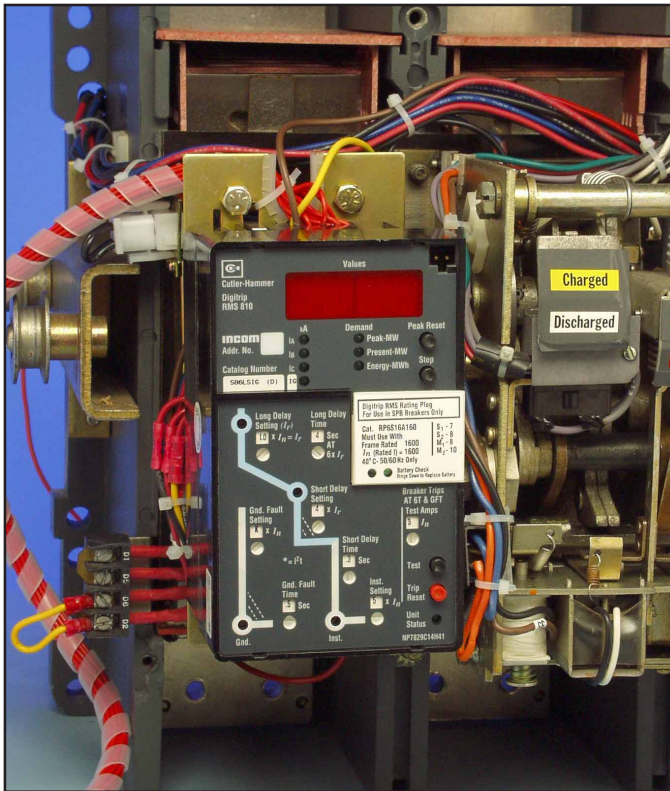


Fig. 42 Trip Unit and Rating Plug after Adjusting the Trip System

- J. Remove and save the mounting hardware securing the Charging Handle to the Breaker. Remove the Charging Handle.
- K. If the Breaker being Retrofitted is equipped with an Under Voltage Mechanism, reinstall the Under Voltage Mechanism using the original hardware removed in step 3-C.

For Kits Supplied with a PT Module Only and When Retrofitting Large Frame SPB Breakers Only.

STEP 9: INSTALLING THE PT JUMPER CABLE

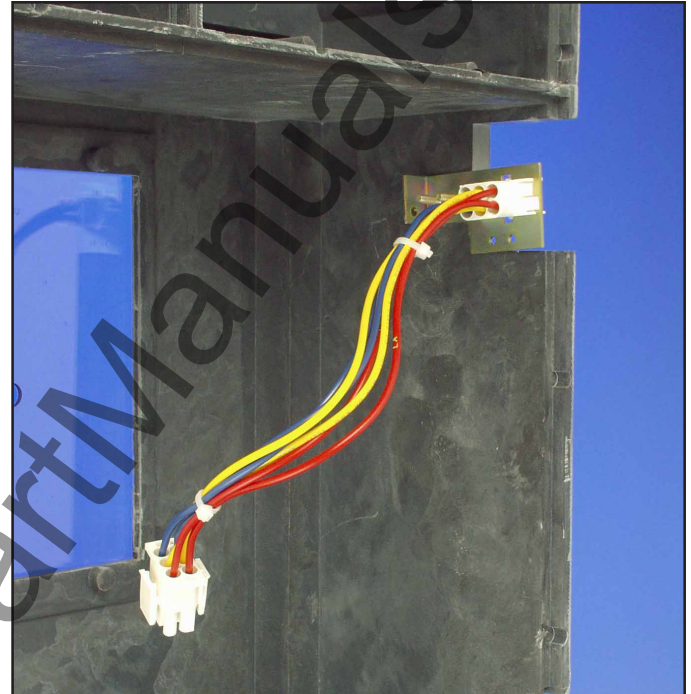


Fig. 43 Overview: PT Jumper Cable Installed in a Large Frame SPB Breaker Front Cover

- A. Using Drilling / Cutting Plan "D", enlarge the depth of the existing cut-out in the left side of the Breaker Front Cover to 1.75".
- B. Again using Drilling / Cutting Plan "D", drill two (2) .187" holes in the left side of the Breaker Front Cover.

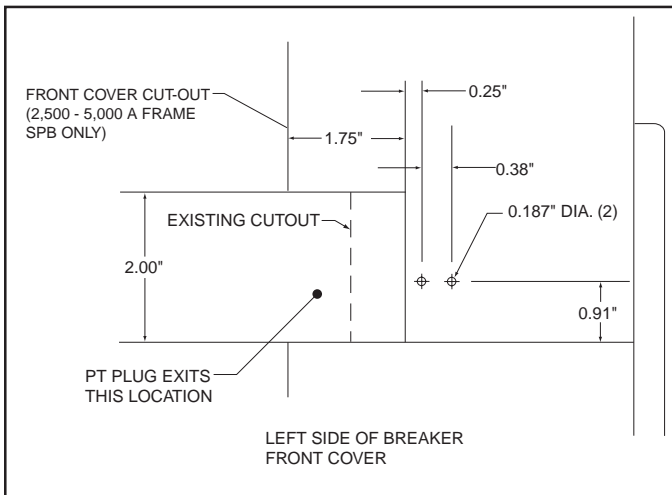


Fig. 44 Drilling / Cutting Plan "D"

- C. Align the PT Jumper Cable Mounting Bracket with the holes just drilled. Using the (2) .138-32 x .500" screws, (2) lock washers, and (2) flat washers supplied, secure the PT Jumper Cable Mounting Bracket, as shown, to the Breaker Front Cover.

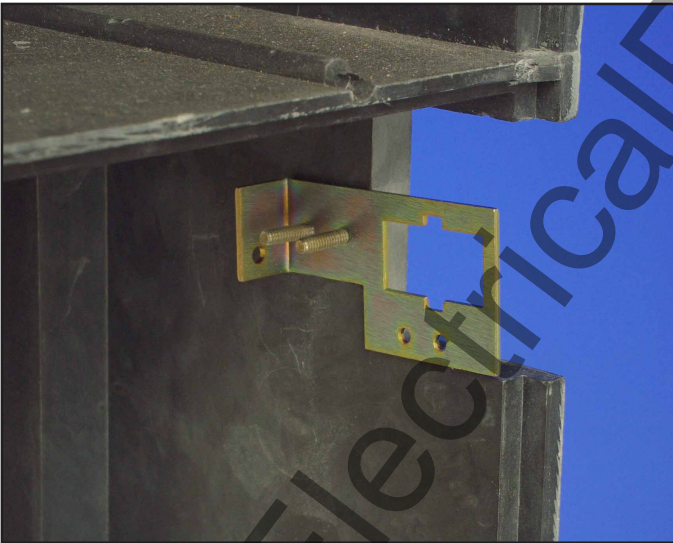


Fig. 45 PT Jumper Cable Mounting Bracket Installed on the Breaker Front Cover

- D. Align the female PT Jumper Cable connector with the cut-out in the PT Jumper Cable Mounting Bracket. Press the connector firmly into the mounting bracket until completely seated.

NOTE: When servicing the Breaker at a later date, insure that the PT Jumper Cable is disconnected before completely removing the Breaker Front Cover

STEP 10: INSTALLING THE APPLICABLE RETROFIT LABELS

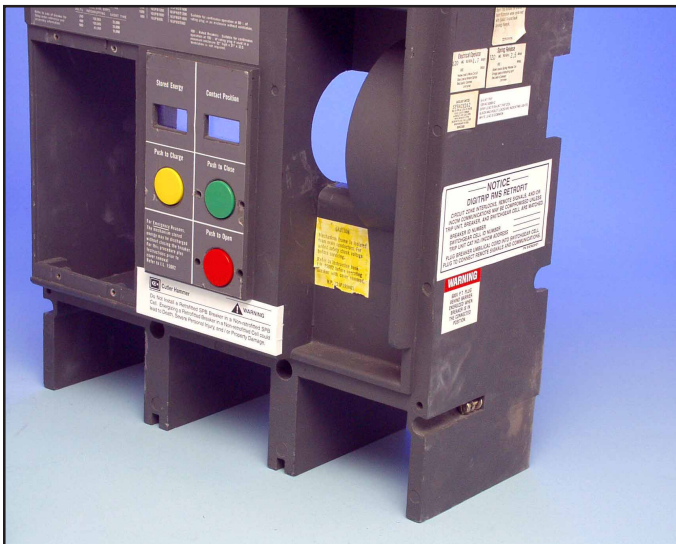


Fig. 46 Overview: Retrofit Labels Installed on the Breaker Front Cover

- A. Remove the protective backing then install the SPB Warning Label on the front of the Breaker Front Cover as shown.



Fig. 47 SPB Warning Label Location - Small Frame Breaker



Fig. 48 SPB Warning Label Location - Large Frame Breaker

- B. Remove the protective backing then install the Digitrip Retrofit Warning Label on the right side of the Breaker Front Cover as shown.
- C. For Kits Supplied with a PT Module Only: Remove the protective backing then install the PT Module Warning Label on the right side of the Breaker Front Cover as shown.



Fig. 49 Digitrip Retrofit and PT Module Warning Label Locations

STEP 11: INSTALLING THE TRIP UNIT AND BREAKER COVERS

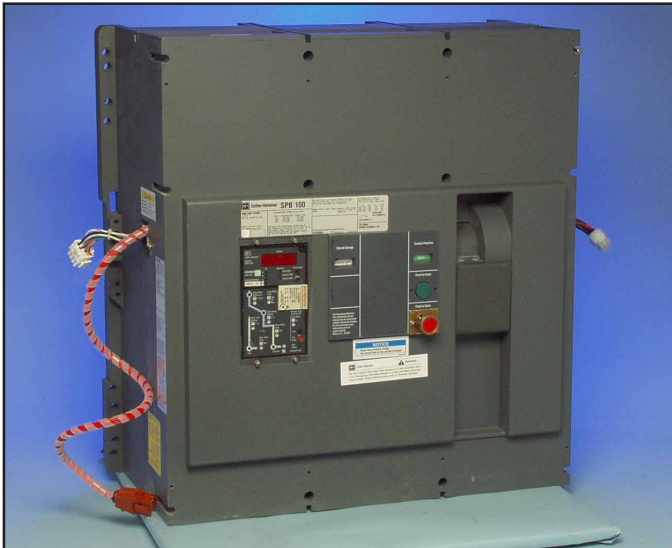


Fig. 50 Overview: Trip Unit and Breaker Covers Installed on the Breaker

- A. Align the new Trip Unit cover with the existing holes in the Breaker Front Cover. Using the original mounting hardware removed in Step 2-A, secure the Trip Unit Cover to the Breaker Front Cover.



Fig. 51 Trip Unit Cover Installed on the Breaker Front Cover

- B. *For Kits Supplied with a PT Module and When Retrofitting Large Frame SPB Breakers Only:* Set the Breaker Front Cover near the front of the Breaker. Connect the PT Jumper Cable male connector the PT Module female connector.
- C. Route the External Harness towards the left side of the Breaker. Insure that all wires have been wire tied in locations that keep them away from the Breaker front cover as well as any moving parts within the Breaker.
- D. Align the Breaker Front Cover with the Breaker. After insuring that the External Harness is positioned to line up with the existing cut-out in the left side of the Breaker Front Cover, push the Breaker cover onto the Breaker until it is completely seated. Using the original mounting hardware removed in Step 2-C, secure the Breaker Front Cover to the Breaker.

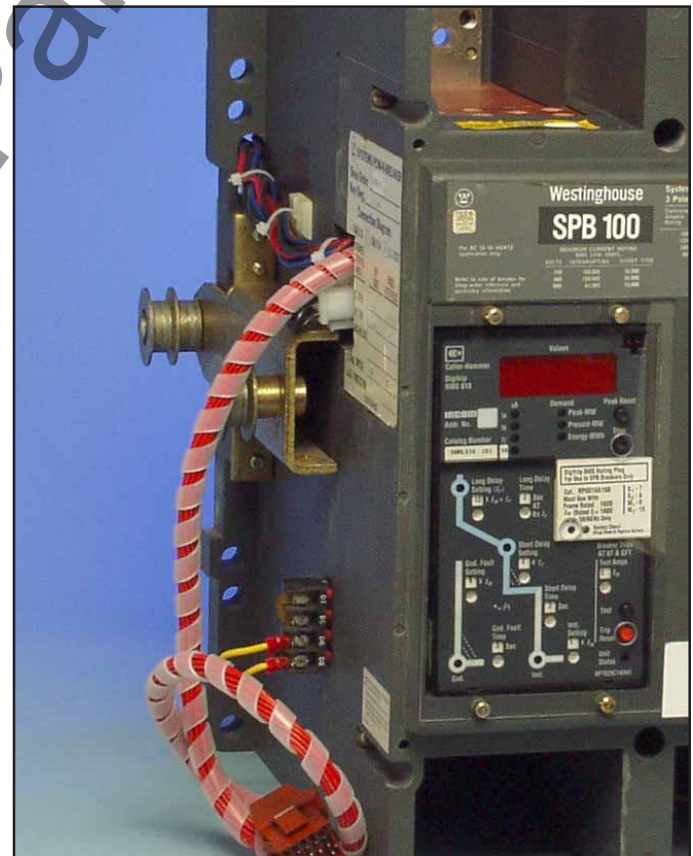


Fig. 52 External Harness Exiting the Breaker through the Existing Cut-out

- E. Using the original mounting hardware last removed in Step 8-I, install the Charging Handle on the Breaker.

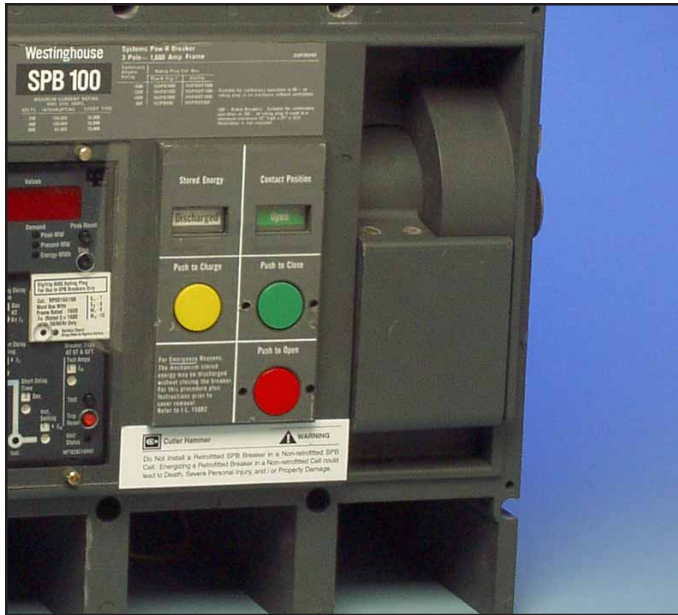


Fig. 53 Breaker Front Cover and Charging Handle Installed on a Small Frame Breaker

STEP 12: TESTING THE BREAKER

- A. The Retrofit must be tested using primary injection. Refer to Section 8 of the Instructions for the *Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers* (Publication AD 33-855-2), supplied with the Retrofit Kit, for detailed testing procedures and specifications. For test information specific to the Trip Unit, refer to the IL publication supplied with the Retrofit Kit (see the Pick List for the IL number).
- B. 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:

- For All Kits:** If testing a Breaker with Short Delay or Ground Fault functions, be sure to follow the instructions contained on the large yellow label on the side of the Breaker. Failure to do so may result in shorter than expected trip times.
- For Breakers with Zone Interlocking Only:** To defeat Zone Interlocking for testing, two (2) jumpers must be installed on Terminal Block # 1 on the Cell Harness: one (1) between the "SIN" and "SOUT" terminals; and one (1) between the "GIN" and "GOUT" terminals (see Figure 53).
- For Breakers with Negative Power Only:** To defeat Negative Power for testing, one (1) jumper must be installed on Terminal Block # 1 on the Cell Harness: between the "DG" and "NEG" terminals (see Figure 53).

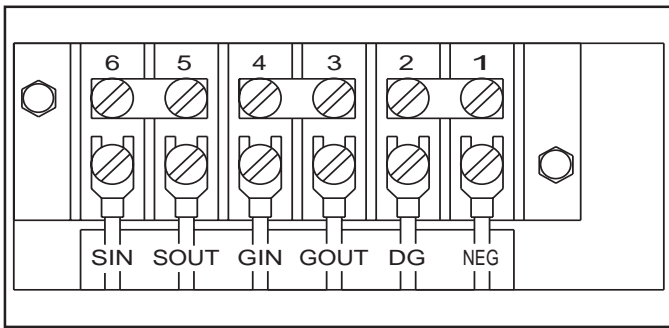


Fig. 54 Positions on Terminal Block # 1 on the Cell Harness

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

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

When testing is complete, disconnect the External Harness from the Cell Harness. Final External Harness connection will be performed later in the Retrofit Process.

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

STEP 14: INSTALLING THE RETROFITTED BREAKER IN THE CELL



WARNING

DO NOT LEAVE THE BREAKER IN AN INTERMEDIATE POSITION IN THE SWITCHGEAR CELL. ALWAYS LEAVE IT IN THE CONNECTED, DISCONNECTED, OR (OPTIONAL) TEST POSITION. FAILURE TO DO SO COULD LEAD TO IMPROPER POSITIONING OF THE BREAKER AND FLASHOVER, CAUSING DEATH, SERIOUS PERSONAL INJURY, AND / OR PROPERTY DAMAGE.

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

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

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

Digitrip Retrofit Kit Installation Components for Westinghouse / Cutler-Hammer Small (400 to 2,000 A) and Large (2,500 to 5,000 A) Frame SPB Breaker RMS/R Retrofits

NOTE: While there are thirty-four (34) different variations in the Retrofit Kits for the SPB Breakers, they all fall within two (2) main Cutler-Hammer "Style Numbers": 22C9115 - for 810 and 910 Retrofits and 22C9116 - for 610 Retrofits. Please refer to your "Pick List" for the individual "Group Numbers" for the parts included with your specific Retrofit Kit.

Step	Description	Qty.	Comment
Step 3	Auxiliary Switch Kit	1	Comm. Only
	Microswitch	1	
	Mounting Plate	1	
	Insulation Barrier	2	
	.112-40 × 2.00 Lng. Screw Pan Head	2	
	.112 Lock Washer Stl.	2	
	.164-65 × .313 Lng. Screw Pan Head	2	
	.164 Lock Washer Stl.	2	
	Stand-off	2	
Step 4	Wiring Kit	1	
	Extension Harness	5	
	Crimp-on Connectors (Butt Type)	10	
<i>SPB Small Frame Breaker Equipped with a Ground Fault Transformer Only</i>			
Step 5	PT Module	1	Comm. Only
	PT Module Mounting Parts	1	
	.375-16 × .625 Lng. Hex Bolt	3	
	.375 Flat Washer Stl.	3	
	.375 Lock Washer Stl.	3	
	.138-20 × .375 Lng. Screw T. C.	2	
	.138 Flat Washer Stl.	2	
	Ring Terminal (.375)	3	
Step 6	Trip Unit Mounting Module	1	
	ATR	1	
	Trip Linkage	1	
	Trip Plunger	1	
	External Harness	1	
	PT Module	1	Comm. Only
	Trip Unit Mounting Module Parts	1	
	.250-20 × 2.50 Lng. Hex Bolt	3	
	Spacer	3	
	Loc-Tite® 243	1	
	Digitrip Nameplate	1	
	Wire Tie Nylon	12	
	.375-16 × .625 Lng. Hex Bolt	From Step 5	Comm. Only
	.375 Flat Washer Stl.	From Step 5	
	.375 Lock Washer Stl.	From Step 5	
	Aux. CT Mounting Parts	1	Large Frame Only
	.250-20 × 2.50 Lng. Hex Bolt	2	
	.250 Flat Washer Stl.	2	
	.250 Lock Washer Stl.	2	

Digitrip Retrofit Kit Installation Components for Westinghouse / Cutler-Hammer Small (400 to 2,000 A) and Large (2,500 to 5,000 A) Frame SPB Breaker RMS/R Retrofits (Continued)

Step	Description		Qty.	Comment
Step 6	.138-20 × .375 Lng. Screw T. C.		8	Large Frame Only
(cont.)	Locking Plate		1	
	Spacer		2	
Step 7	Trip Unit	See Pick List	1	
	Rating Plug	See Pick List	1	
Step 9	PT Jumper Mounting Parts		1	Comm. Only; Large Frame Only
	Mounting Bracket		1	
	.138-32 × .500 Lng. Screw		2	
	.138 Flat Washer Stl.		2	
	.138 Lock Washer Stl.		2	
	PT Jumper Cable		1	
Step 10	SPB Retrofit Warning Label	From Step 11	1	
	Digitrip Nameplate	From Step 6	1	
	PT Warning Label		1	Comm. Only
Step 11	Trip Unit Cover Parts		1	
	Trip Unit Cover		1	
	SPB Retrofit Warning Label		1	
Step 13	Cell Harness	See Pick List	1	

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

Table 7 Torque Values for General Mounting and Screw Size Conversion

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

Table 8 Torque Values for Copper BUS Connectors

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

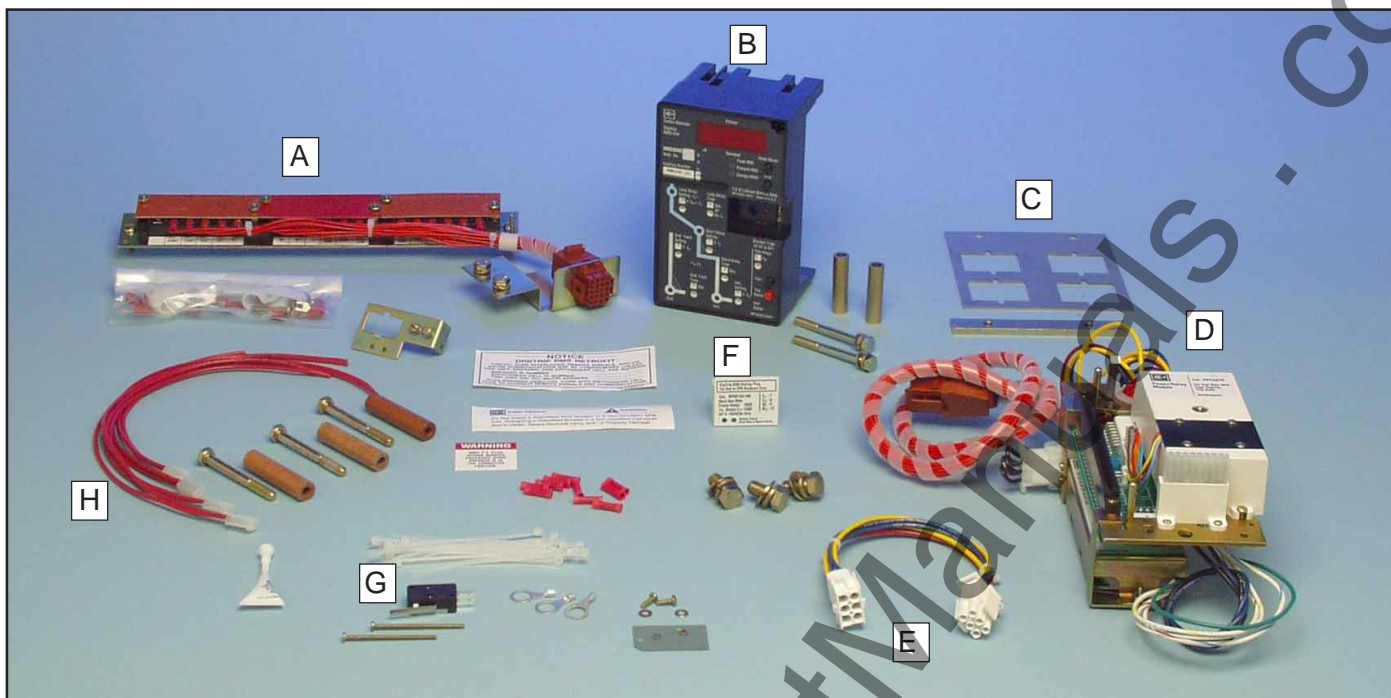


Fig. 55 Retrofit Components

- | | |
|----------------------------------|------------------------|
| A. Cell Harness | E. PT Jumper |
| B. Trip Unit | F. Rating Plug |
| C. Aux. CT Module | G. Auxiliary Switch |
| D. Trip Unit Mounting
Bracket | H. Extension Harnesses |

Notes

Notes

Notes

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

Phone: **1-800-937-5487**

Fax. (724) 779-5899

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

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

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