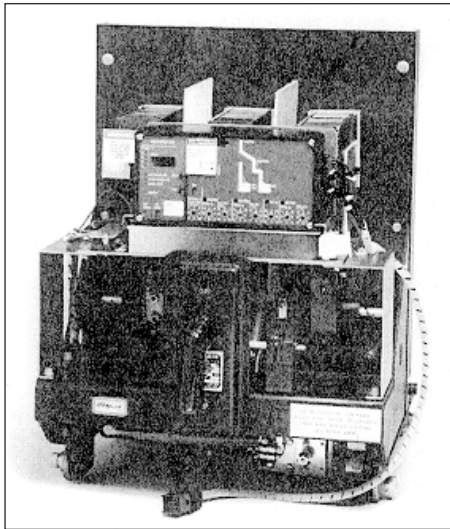




Digitrip Retrofit System for Roller-Smith RS-25A Breakers



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.**

INTRODUCTION

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

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

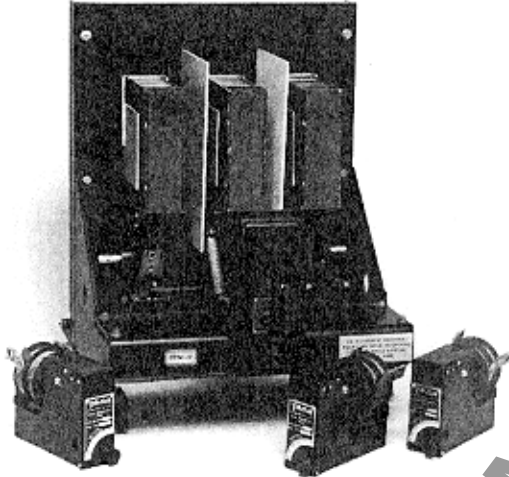
Components	510 Basic	510 with Zone Interlock	610	810	910
Trip Unit					
Rating Plug					
Auxiliary Current Transformer (CT) Module					
Auxiliary CT Harness					
Sensors					
Sensor Harness					
Direct Trip Actuator (DTA)					
Mounting Brackets and Hardware					
External Harness	Plug	1 Connector Harness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

Step 1: Trip Breaker and remove from Cell. Take Breaker to a clean well lit work bench to perform the Retrofit.

Before attempting to perform the Retrofit, be sure to read and understand the Retrofit Application Data supplied with this kit.

Refer to the components listing at the rear of this booklet. Lay out the components and hardware according to the steps as outlined. The components and hardware will be used to complete each assembly step that follows.

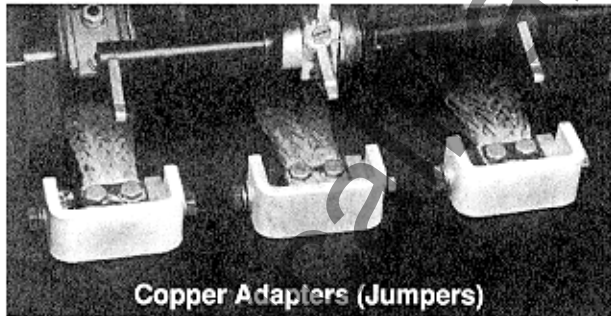
Step 2:



Electromechanical Trip Units

- A. Carefully lay the Breaker over on its back side.
- B. From the bottom front of the Breaker, remove the two bolts that attach the Copper Coil of the Electromechanical Trip Units to the Breaker Pole Units.
- C. From the bottom rear of the Breaker, remove the two bolts that attach each Trip Unit to the back plate of the Breaker.
- D. Remove and scrap the old Trip Units.

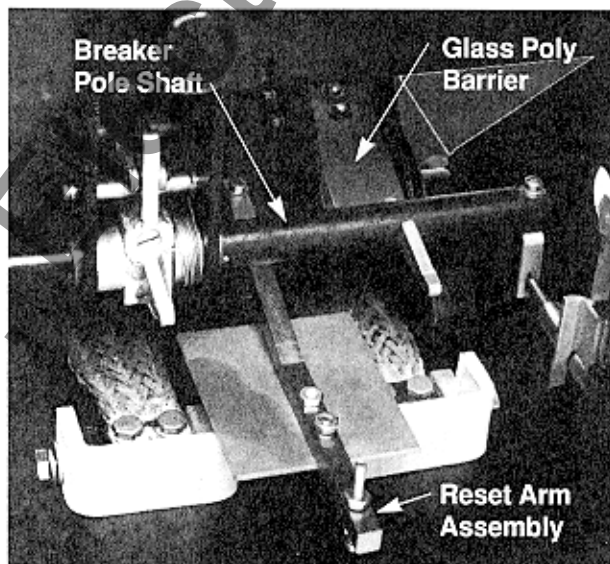
Step 3



Copper Adapters (Jumpers)

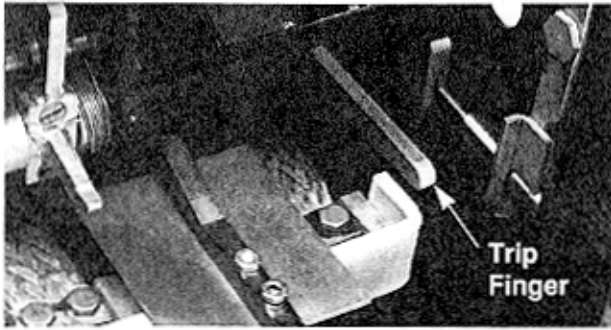
- A. Install a Copper Adapter on each Phase as shown with the hardware provided.
- B. Install an Insulating Cap on each bolt head.

Step 4:



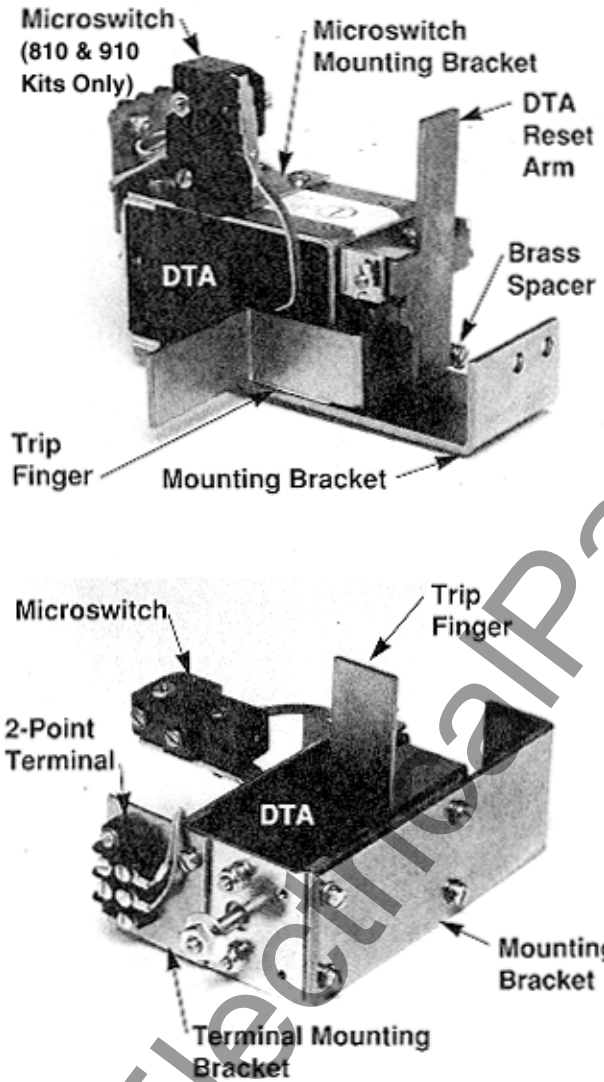
- A. Apply Loc-tite on the threads of the two mounting screws. Mount the DTA (Direct Trip Actuator) Reset Arm on the Breaker Pole Shaft between Phases 2 and 3 as shown. The Locking Plate goes on the rear and the screw heads to the front. The Glass Poly Barrier faces the rear of the Breaker.
- B. Remove and scrap the two screws from the front of the Phase 3 Pole Unit.
- C. Mount the Glass Poly Barrier on the front of Phase 3 Pole Unit as shown with the hardware provided.

Step 5:



- A. Remove and scrap the Trip Finger from the right end of the Trip Bar.
- B. Mount the new Trip Finger on the bottom of the Trip Bar as shown with the hardware provided. The straight side of the Trip Finger must face the front of the Breaker.

Step 6:



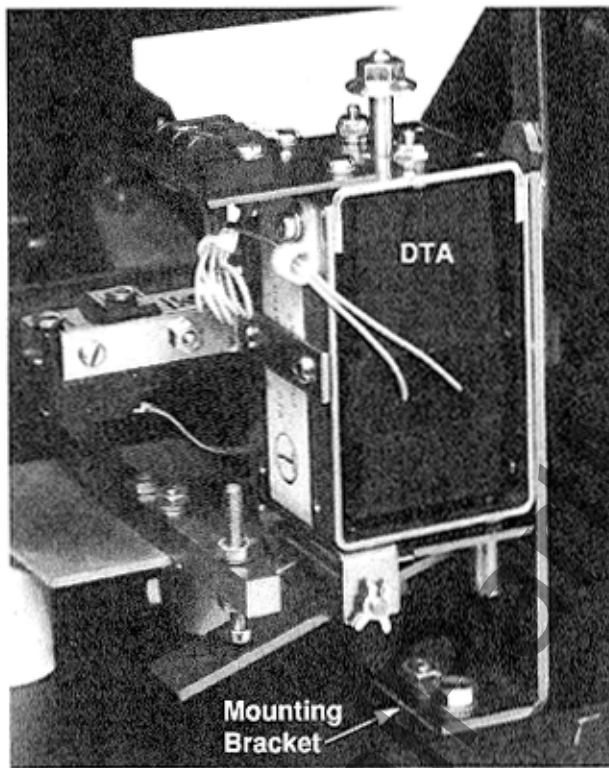
- A. Position the DTA with the wires out of the bottom and the Flange Nut away from you.
- B. Apply Loc-tite to the threads of the .164-32 x 1.0 long screw, slide the Brass Spacer over the screw and install the hex nut to lock the spacer against the screw head.
- C. Install the Brass Spacer Assembly in the bottom left hole in the end of the DTA.
- D. Apply Loc-tite to the threads on the end of the DTA Shaft. Slide the Trip Finger over the Spacer Assy. with the Finger going back over the DTA. Thread the Trip Finger all the way on the DTA Shaft. Install the Flange Nut with the flange facing you on the DTA Shaft to lock the Trip Finger in place.
- E. Mount the Pivot Mounting on the right side of the DTA as shown with the hardware provided.
- F. Position the Tabs of the DTA Reset Arm between the Tabs of the Pivot Mounting and align the holes. Slide the Pivot Pin through the holes and secure in place with a X-Washer on each end of the Pin.
- G. Remove and scrap the two screws from the left side of the DTA.
- H. Mount the Mounting Bracket on the left side of the DTA with the leg facing in and the holes on the bottom.

Step 6 I. Mount the 2 point Terminal Block on the Mounting Bracket as shown with the hardware provided.
(continued):

J. Rotate the DTA around to the other end, mount the Terminal Block Assy. on the left side with the Terminal Block facing you as shown with the hardware provided.

K. For RMS/R 810 & 910 Kits only. Cut 3.25 inches off the end of the Microswitch Lever. Mount the Micro-switch on the Mounting Bracket and the Mounting Bracket on the side of the DTA as shown with the hardware provided.

Step 7:



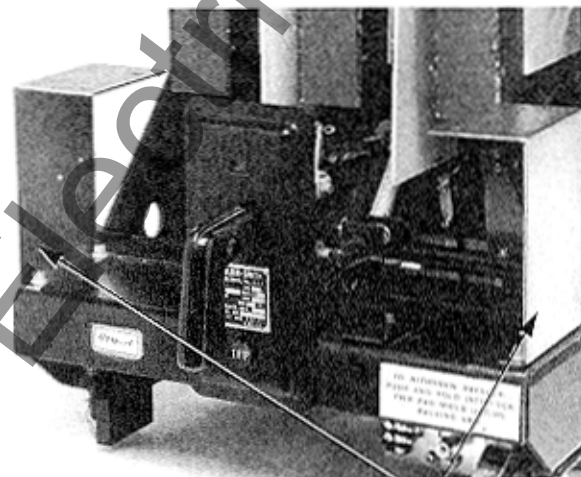
A. Mount the DTA Assembly on the back plate as shown using the two holes located there with the hardware provided.

B. For RMS/R 810 & 910 Kits only. Bend the Microswitch Lever so the switch is in the closed position when the Breaker is open.

C. Connect a 24V DC power supply to DTA Terminals, positive to positive and negative to negative. Close the Breaker manually. Energize the DTA to trip the Breaker, deenergize when Breaker trips. Make certain the DTA resets. If the Breaker fails to trip, adjust the position of the Trip Finger on the end of the DTA Shaft. If the DTA fails to reset, adjust the screw on the bottom of Reset Arm. Repeat until trip and reset are sure and positive.

D. Carefully stand the Breaker up.

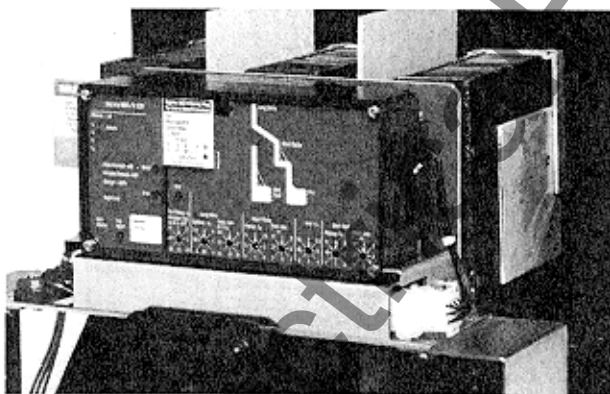
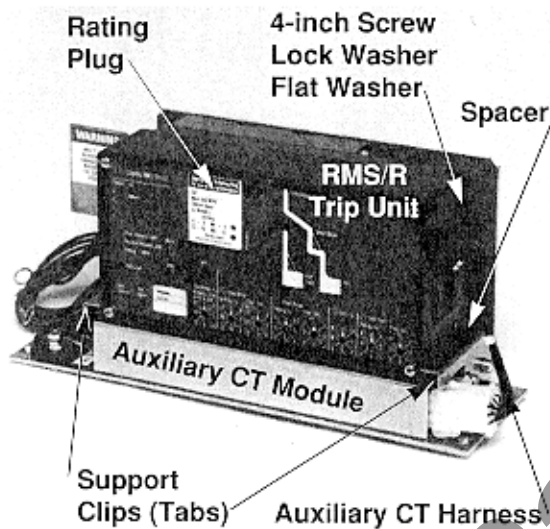
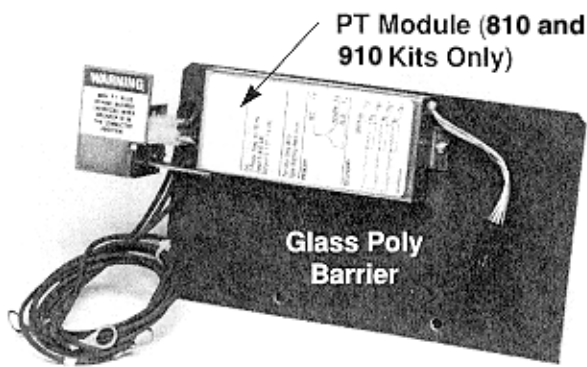
Step 8:



A. Remove one of the two bolts from the top left side of the Breaker Platform. Install the Trip Unit Mounting Bracket with the small leg on the bottom facing in using the bolt you just removed. Remove the other bolt and rotate the other end in place and replace the bolt. Tighten both bolts.

B. Remove one of the two bolts from the top right side of the Breaker Platform. Install the Trip Unit Mounting Bracket with the small leg on the bottom facing in using the bolt you just removed. Remove the other bolt and rotate the other end in place and replace the bolt. Tighten both bolts.

Step 9:



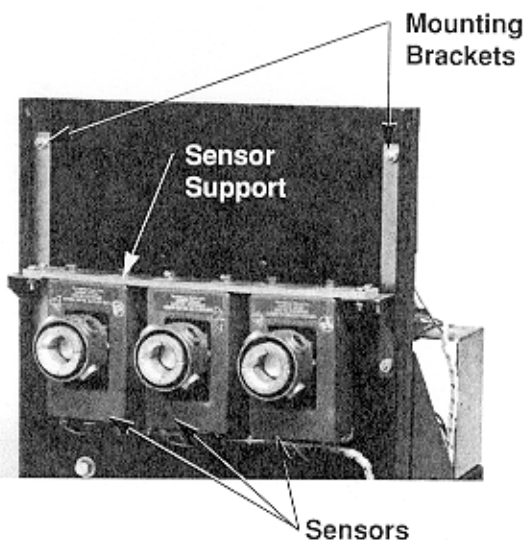
Step 10:

- A. For RMS/R 810 & 910 Kits only. Mount the PT Module on the Glass Poly Barrier as shown with the hardware provided.
- B. Mount the RMS/R Trip Unit on top of the Aux. CT Module with 4 inch long screws, washers and spacers as shown. Do not tighten firmly yet.
- C. Mount the left and right Trip Unit Support Clips on the sides of the Aux. CT Module with the tabs into bottom front slots of the Trip Unit.
- D. Tighten the 4 inch long screws.
- E. Mount the Glass Poly Barrier on the back of the Aux. CT Module as shown with the hardware provided. (810 & 910 Kits will have the PT Module on it.)
- F. Remove Trip Unit Cover and install Rating Plug, replace Cover.
- G. Install Aux. CT Harness between Trip Unit and Aux. CT Module.
- H. Mount the Trip Unit Assembly on top of the Trip Unit Mounting Brackets as shown with the hardware provided.

- A. Remove the top Finger Clusters.
- B. Mount a Sensor Mounting Bracket on each side of the back of the Breaker. Remove the top two hex nuts and washers from one side and slide the Mounting Bracket on the bolts. The tab should be nearest the bottom and face in. Replace the hex nuts and washers. Do the other side in the same manner.

Step 10

(continued):



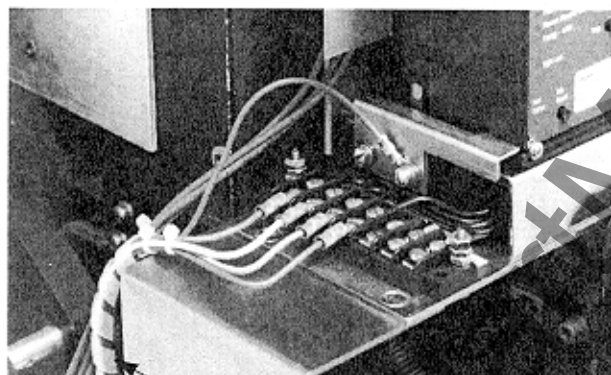
C. Slide a Sensor on each top Stud with terminals facing down and the nameplate facing you.

D. Install the Finger Clusters.

E. Mount the Sensor Support on top of Mounting Bracket tabs as shown with the hardware provided. The holes for mounting the Sensors are to be nearest the back plate.

F. Mount each Sensor on the bottom of Sensor Support as shown.

Step 11:



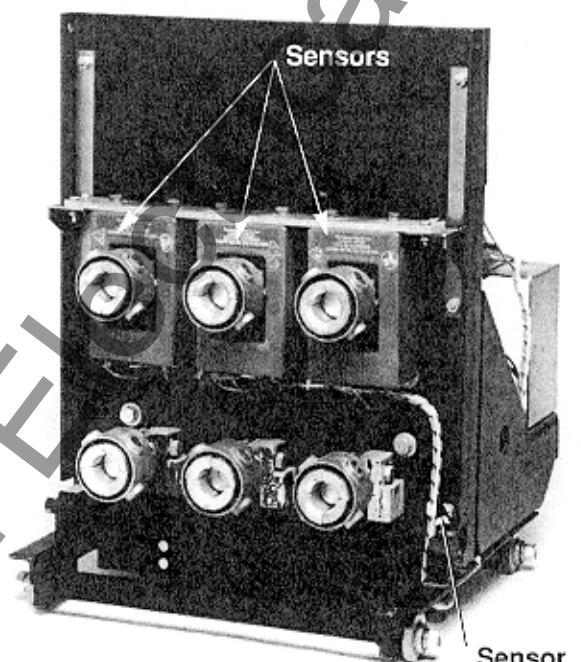
Sensor Harness

A. These instructions refer to the wiring diagrams in the Retrofit Application Data for proper connection and application.

B. Remove the cover from the 7 point Terminal Block on the Aux. CT Module. Connect the Snap Spade Terminals of the Sensor Wire Harness to the proper Terminals of the 7 point Terminal Block. (The long tan and green wires are for a remote Neutral Sensor on a 4W Ground Breaker. They should be removed if not required.)

C. Connect the green wire (Ring Terminal) to the front screw that attaches the Trip Unit Support Clip to the Aux. CT Module.

D. Route the Sensor Harness down and back along the bottom angle, under the back plate and up to the Sensors. Connect the Ring Terminals to the proper terminals of the Sensor per Connection Diagram.



Sensor Harness

Sensor Style No. 8187A54H01

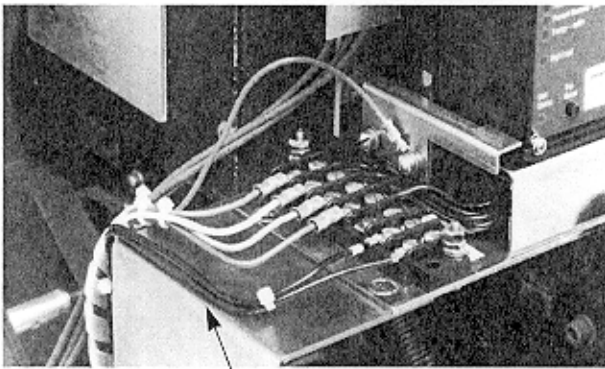
X1-X2 = 200A

X2-X4 = 400A

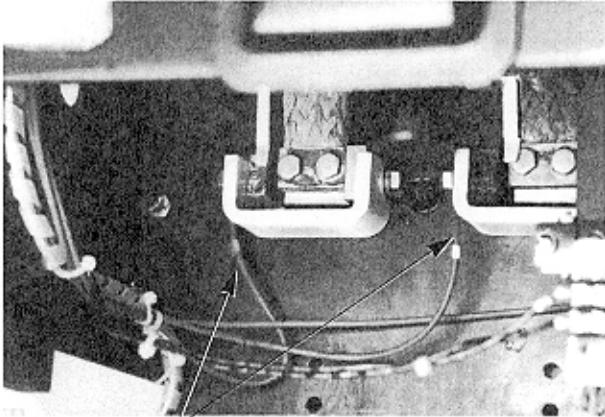
X1-X4 = 600A

Step 11

(continued):



DTA Extension
Harness



PT Wire
Harness

E. Connect the two wires of the DTA Harness to the 7 point Terminal Block on the Aux. CT Module. Connect the wire marked with + to the 'OP' Terminal and the unmarked wire to the 'ON' Terminal.

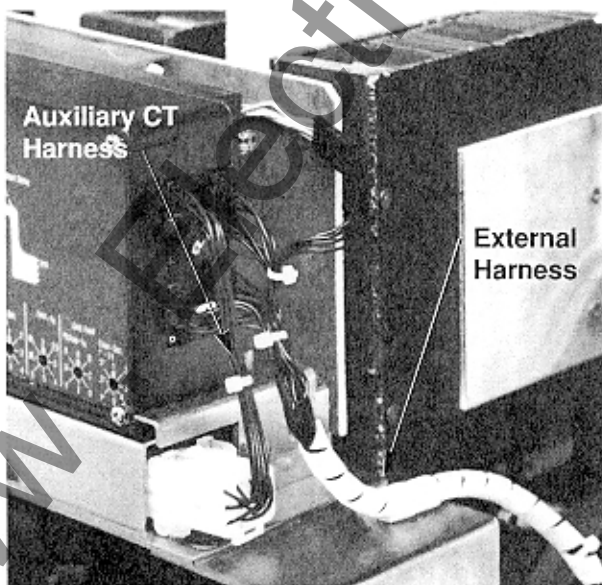
F. Route the DTA Harness down to the 2 point Terminal Block mounted on DTA. Connect the DTA Harness to terminals of the matching DTA wires.

G. Replace the Terminal Block Cover.

H. For RMS/R 810 & 910 Kits only. Route the 3 wires from the PT Module down to the Copper Adapters on the bottom studs. Cut the wire marked with Red to Phase 1. Cut marked with Yellow to Phase 2. Cut wire marked with Blue to Phase 3. Strip each wire 1/4 inch and install a .375 Ring Terminal on each. Attach each wire to the correct Phase using one of the mounting bolts.

I. Use wire ties provided to dress up wiring and keep it away from any interference of Breaker moving parts.

Step 12:



A. Plug the External Harness into the sockets on the right side of the Trip Unit.

B. Attach the External Harness with two nylon wire clamps using the holes located on top of the Trip Mounting Bracket as shown with the hardware provided.

C. For RMS/R 810 & 910 Kits only. Plug the plug from the External Harness into the socket of the PT Module.

Step 12

(continued):

Note: For RMS 510 Basic Retrofit Kits. The External Harness is the plug pictured at right. It is to be plugged into the right side of the Trip Unit.



D. For RMS/R 810 & 910 Kits only. Route the two wires with Ring Terminals from the External Harness down to the Microswitch. Connect one wire to the normally open terminal and the other wire to the common terminal.

E. Use wire ties provided to dress up wiring and keep it away from any interference of Breaker moving parts.

Step 13: The Cell Harness is to be mounted in the Breaker Cell. The Plug End is to be mounted on the right front side of the Cell. The Terminal Blocks can be mounted anywhere space is available in the Cell. With the Breaker in the Cell and the External Harness connected to the Cell Harness the Breaker should be free to go from the disconnect to the connected position, and all Retrofit Wiring should be out of the way.

Step 14: The Retrofit is now complete and ready to be tested.

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STEP 15: TESTING THE BREAKER

- A. Measure the force necessary to trip the Breaker at the point where the Trip Adjusting Screw Finger impacts the Breaker trip Plate. The force necessary to trip the Breaker **MUST NOT EXCEED THREE (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 33-855-2), supplied with the Retrofit Kit, for detailed testing procedures and specifications. For test information specific to the Trip Unit, refer to the IL publication supplied with the Retrofit Kit (see the Pick List for the IL number).
- C. While Section 8 of the *Instructions for the Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers* provides the information necessary for testing the Breaker, please keep the following notes in mind when reviewing other sections of the publication.

WHEN ALL TESTING IS COMPLETE, THE TRIP UNIT MUST BE RESET. FAILURE TO DO SO MAY CAUSE THE BATTERY IN THE RATING PLUG TO RUN DOWN.

NOTES:

1. *For All Kits Other Than 510 Basic.* If testing the Breaker with Short Delay or Ground Fault functions, be sure to either plug in the Cell Harness Assembly or use the Zone Interlock Shorting Plug. Failure to do so may result in shorter than expected trip times.
2. *For 810 and 910 Kits Only.* Without any power applied to the system (neither the 120 volt power supply nor the Aux. Power Module connected), plug the External Harness into the Cell Harness and check the impedance between COM 1 and COM 2. The impedance should be between one (1) and three (3) ohms. If the impedance is not within this range, trace

the wiring and examine each connection to assure its integrity.

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

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

**DIGITRIP RETROFIT KIT INSTALLATION COMPONENTS
FOR ROLLER-SMITH RS-25A BREAKERS**

STEP	DESCRIPTION	STYLE NO.	QTY.	COMMENTS
STEP 3	COPPER ADAPTER PARTS	8256A69G04	1	
	COPPER ADAPTERS		3	
	INSULATING CAP		6	
	.312-16 X .750 LNG HEX BOLT		6	
	.312 FLAT WASHER STL		6	
	.312 LOCK WASHER STL		6	
STEP 4	BREAKER RESET PARTS	8256A69G05	1	
	PHASE BARRIER PARTS	8256A69G06	1	
	RESET ARM ASSEMBLY		1	
	LOCKING PLATE		1	
	LOC-TITE 243		1	
	BARRIER		1	
	.190-32 X 1.50 LNG SCREW FIL		2	
	.190-32 X .750 LNG SCREW FIL		2	
	.190 FLAT WASHER STL		4	
	.190 LOCK WASHER STL		4	
	STEP 5	TRIP FINGER PARTS	8256A69G07	1
TRIP FINGER			1	
.190-32 X 1.25 LNG SCREW FIL			1	
.190 FLAT WASHER STL			1	
.190 LOCK WASHER STL			1	
STEP 6	DTA	8256A69G03	1	
	DTA TRIP FINGER PARTS	8256A69G08	1	
	DTA RESET PARTS	8256A69G09	1	
	DTA MOUNTING PARTS	8256A69G10	1	
	MICROSWITCH PARTS	8256A69G02	1	810/910 KITS ONLY
	TRIP FINGER		1	
	SPACER BRASS		1	
	PIVOT MOUNTING		1	
	PIVOT PIN		1	
	RESET ARM		1	
	DTA MOUNTING BRACKET		1	
	TERMINAL BLOCK MOUNTING		1	
	TERMINAL BLOCK 2 POINT		1	
	.164-32 X 1.00 LNG SCREW FIL		1	
	.164-32 X .375 LNG SCREW FIL		2	
	.164-32 X .250 LNG SCREW FIL		6	
	.164 FLAT WASHER STL		8	
	.164 LOCK WASHER STL		8	
	.164-32 NUT HEX STL		1	
	.250-20 FLANGE NUT		1	
	LOC-TITE 243		1	
	.188 X-WASHER STL		2	
	.138-32 X .500 LNG SCREW FIL		2	
	.138 FLAT WASHER STL		4	
	.138 LOCK WASHER STL		2	
	.138 NUT HEX STL		2	
	MICROSWITCH		1	810/910 KITS ONLY
MOUNTING BRACKET		1	810/910 KITS ONLY	
.164-32 X .250 LNG SCREW FIL		2	810/910 KITS ONLY	
.164 FLAT WASHER STL		2	810/910 KITS ONLY	

**DIGITRIP RETROFIT KIT INSTALLATION COMPONENTS
FOR ROLLER-SMITH RS-25A BREAKERS
(CONTINUED)**

STEP	DESCRIPTION	STYLE NO.	QTY.	COMMENTS
STEP 6 (CONT)	.164 LOCK WASHER STL		2	810/910 KITS ONLY
	.138-32 X 1.00 LNG SCREW FIL		2	810/910 KITS ONLY
	.138 FLAT WASHER STL		4	810/910 KITS ONLY
	.138 LOCK WASHER STL		2	810/910 KITS ONLY
	.138-32 NUT HEX STL		2	810/910 KITS ONLY
STEP 7	DTA MOUNTING HARDWARE	8256A69G11	1	
	.250-20 X 1.25 LNG HEX BOLT		2	
	.250 FLAT WASHER STL		4	
	.250 LOCK WASHER STL		2	
	.250-20 NUT HEX STL		2	
STEP 8	TRIP UNIT MOUNTING PARTS	8256A69G12	1	
	MOUNTING BRACKET LH		1	
	MOUNTING BRACKET RH		1	
STEP 9	RMS/R TRIP UNIT	1232C84G	1	
	AUX. CT MODULE	6503C59G	1	
	RATING PLUG	3D86709G	1	
	PT MODULE	6502C82G01	1	810/910 KITS ONLY
	AUX. CT HARNESS	6502C84G01	1	
	TRIP UNIT ASSEMBLY PARTS	8256A69G13	1	
	SUPPORT CLIP LH		1	
	SUPPORT CLIP RH		1	
	BARRIER GLASS POLY		1	
	DIGITRIP NAMEPLATE		1	
	.190-32 X 4.00 LNG SCREW FIL		2	
	.190-32 X .375 LNG SCREW FIL		6	
	.190-32 X .500 LNG SCREW FLAT		4	
	.190 FLAT WASHER STL		12	
	.190 LOCK WASHER STL		12	
	.190-32 NUT HEX STL		4	
	SPACER BRASS		2	
	.138-32 X .500 LNG SCREW FIL		2	810/910 KITS ONLY
	.138 FLAT WASHER STL		4	810/910 KITS ONLY
	.138 LOCK WASHER STL		2	810/910 KITS ONLY
.138-32 NUT HEX STL		2	810/910 KITS ONLY	
STEP 10	SENSOR 600A MR	8187A54H01	3	
	SENSOR MOUNTING PARTS	8256A69G14	1	
	MOUNTING BRACKET LH		1	
	MOUNTING BRACKET RH		1	
	SENSOR SUPPORT		1	
	.250-20 X .625 LNG HEX BOLT		6	
	.250 FLAT WASHER STL		6	
	.250 LOCK WASHER STL		6	
	.190-32 X .750 LNG SCREW FIL		4	
	.190 FLAT WASHER STL		8	
	.190 LOCK WASHER STL		4	
	.190-32 NUT HEX STL		4	

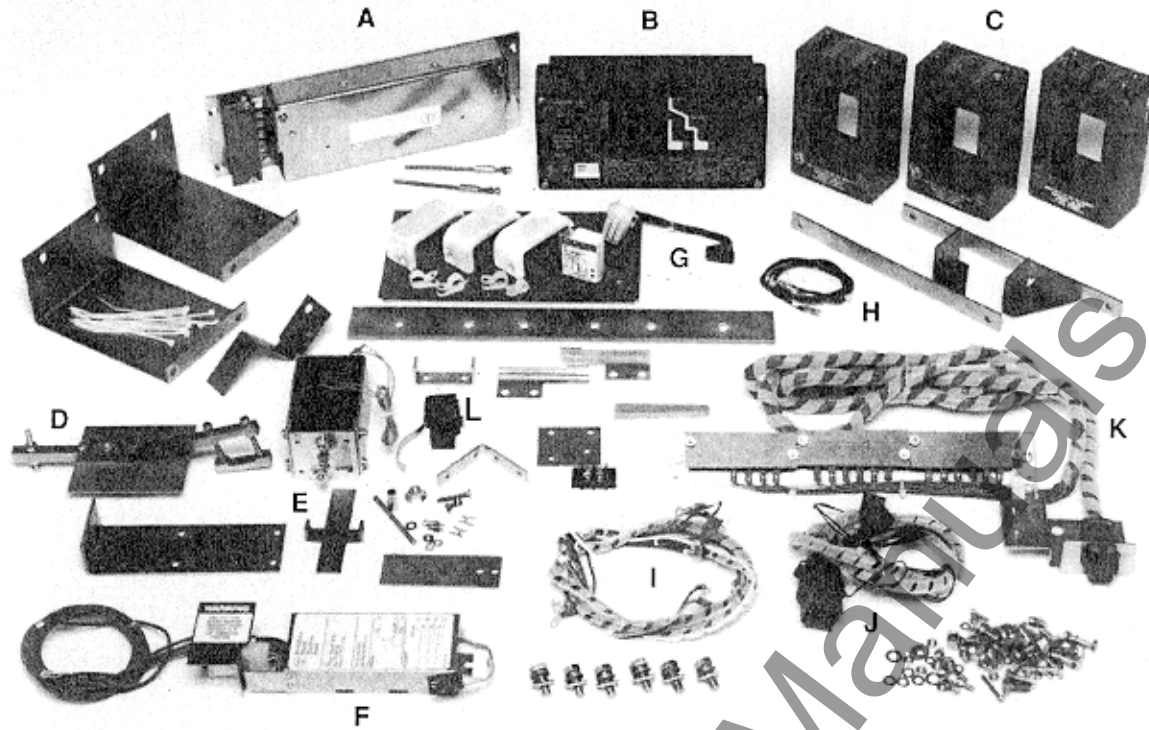
**DIGITRIP RETROFIT KIT INSTALLATION COMPONENTS
FOR ITE GE AKR-30 BREAKERS
(CONTINUED)**

STEP	DESCRIPTION	STYLE NO.	QTY.	COMMENTS
STEP 11	SENSOR HARNESS PARTS	8256A69G15	1	
	SENSOR HARNESS		1	
	DTA HARNESS		1	
	WIRE TIES NYLON		8	
	RING TERMINAL .375		3	810/910 KITS ONLY
STEP 12	EXTERNAL HARNESS PARTS	8256A69G16	1	
	EXTERNAL HARNESS	6502C83G__	1	
	WIRE CLAMPS NYLON		2	
	WIRE TIES NYLON		8	
	.164-32 X 1.00 LNG SCREW FIL		2	
	.164 FLAT WASHER STL		4	
	.164 LOCK WASHER STL		2	
	.164-32 NUT HEX STL		2	
STEP 13	CELL HARNESS		1	ALL EXCEPT 510 BASIC

NOTE: DUE TO THE WIDE VINTAGE OF BREAKERS AND MULTIPLE FUNCTIONS OF THE RETROFIT COMPONENTS SOME EXCESS HARDWARE MAY BE LEFT WHEN THE RETROFIT IS COMPLETE.

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TYPICAL RMS/R 810 RETROFIT KIT



- A. Auxiliary CT Module
- B. RMS/R Trip Unit Assembly
- C. Sensors
- D. Reset Arm Assembly
- E. Direct Trip Actuator and Hardware
- F. PT Module (*810 & 910 Kits Only*)
- G. Auxiliary CT Harness
- H. Actuator Extension Harness
- I. Sensor Harness
- J. External Wire Harness
- K. Cell Harness
- L. Microswitch (*810 & 910 Kits Only*)

Table 1 Torque Values for General Mounting and Screw Size Conversion

<i>Decimal Size (in)</i>	<i>Standard Size</i>	<i>Torque (in-lbs)</i>	<i>Torque (ft-lbs)</i>
.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 2 Torque Values for Copper BUS Connectors

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

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

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