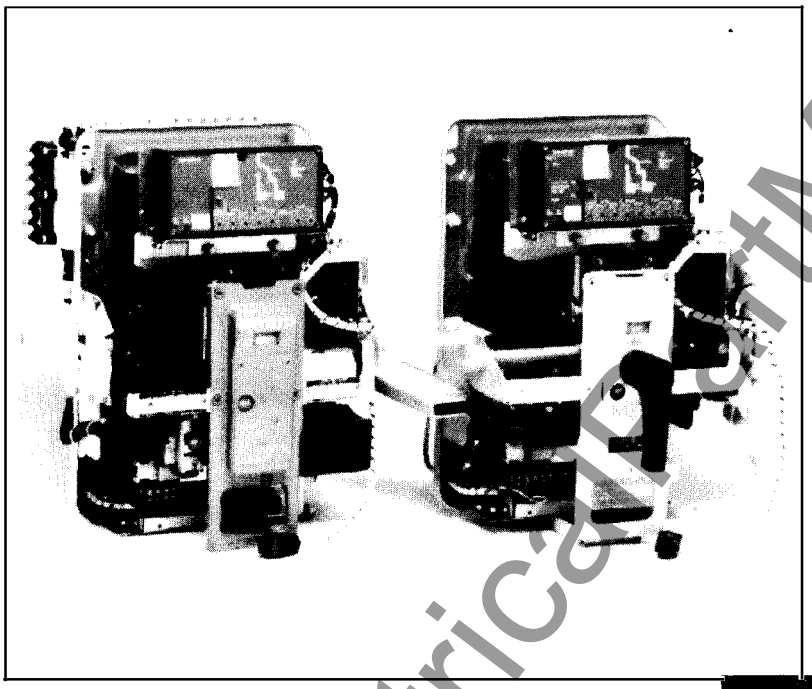
IL 33-856-1
February 1992

Westinghouse Digitrip Retrofit System for



GE AK-2-25 & GE AK-2A-25

Westinghouse Electric Corp.
Distribution & Control Business Unit
Five Parkway Center
Pittsburgh, PA 15220

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 lighted 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, TEST,** or **DISCONNECTED** 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 WILL LEAD TO DEATH, SEVERE PERSONAL INJURY AND/OR PROPERTY DAMAGE.**

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 a nuclear application. 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 Westinghouse'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, the Westinghouse Electric Corporation should be consulted.

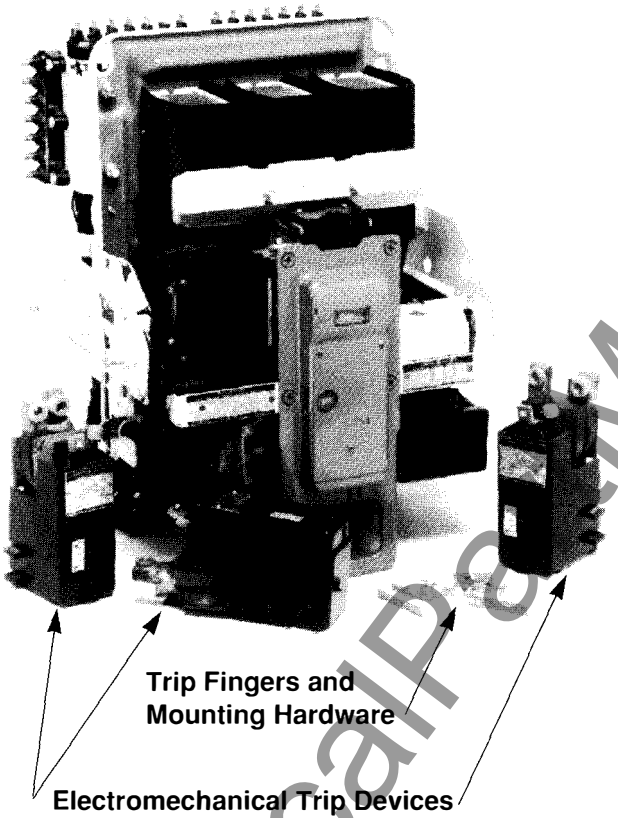
THERE ARE NO UNDERSTANDINGS, AGREEMENTS, REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OTHER THAN THOSE SPECIFICALLY SET OUT IN ANY EXISTING CONTRACT BETWEEN THE PARTIES. ANY SUCH CONTRACT STATES THE ENTIRE OBLIGATION OR SELLER. THE CONTENTS OF THIS DOCUMENT SHALL NOT BECOME PART OF OR MODIFY ANY PRIOR OR EXISTING AGREEMENT, COMMITTMENT OR RELATIONSHIP. In no event will Westinghouse be responsible to the user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss whatsoever including but not limited to damage to or loss of use of equipment, plant or power system, cost of capital, loss of profits or revenues, cost of replacement power, additional expenses in the use of existing power facilities, or claims against the user by its customers resulting from the use of the information, recommendations, descriptions and safety notations contained herein.

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:



Follow the General Electric Instruction Manual supplied with the breaker to perform the following steps.

Steps 2A through 2F are optional. Completion of these steps will allow later steps to be completed with greater ease.

A. Remove the Arc Chute Retaining Bar from the front of the Breaker. Remove the Three Arc Chutes.

B. Remove the screw and elastic stop nut that connect the two insulated connecting links between the the mechanism and the cross bar. Remove the links from the shoulder pins in the mechanism.

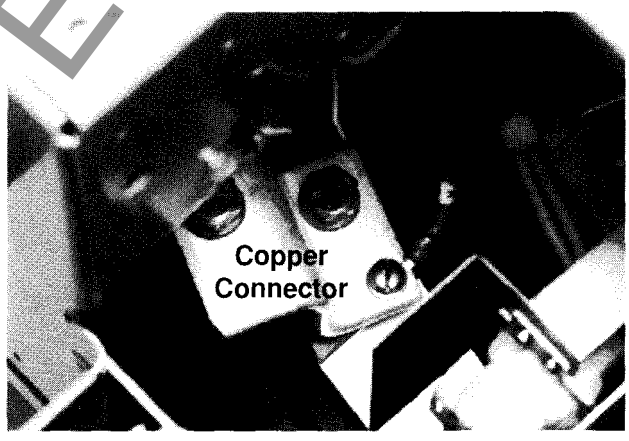
C. Remove any secondary contact mounting frames from the rear of the breaker. Remove any wire clamps that attach the secondary contact wiring bundle to the breaker.

D. Remove the two Elastic Stop Nuts from the Arc Chute Retaining Studs.

E. Remove the Stop Nuts which fasten the the wrap-around portion of the Front Frame the Back Frame of the Breaker. These nuts are located 2/3 down from the top of the breaker.

F. Remove the two .250-20 bolts that fasten the Side Plate to the Back Frame. The Front and Back Frames can now be separated.

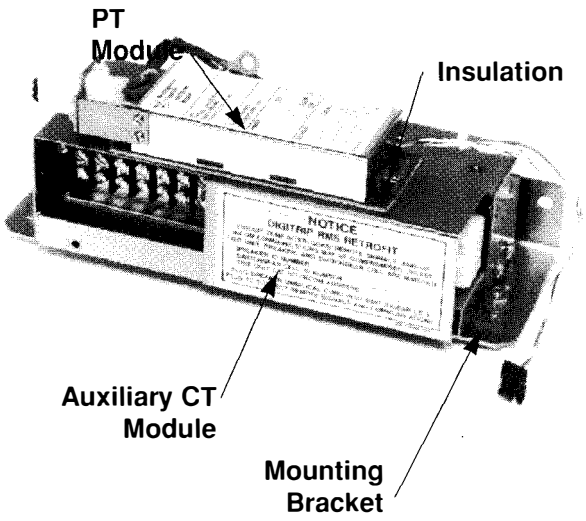
Step 3



A. Remove and scrap the screws and clamps from the bottom of each Electromechanica Trip Unit.

B. Remove and Scrap the two hex bolts from the copper coil of each Electromechanical Trip Unit.

Step 3
(continued):



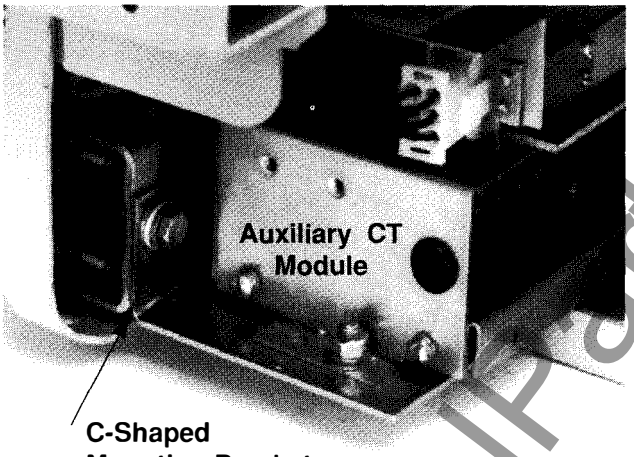
C. Remove and Scrap the screw from the top of each Electromechanical Trip Unit, this will free each Trip Unit. Remove and Scrap each Trip Unit.

D. *For Electrically Operated Breakers only.* Remove and Scrap the four C-Shaped Trip Unit mounting brackets from the bottom of the back plate.

E. Remove the Phase A and Phase C Trip Paddles from the Breaker Trip Bar. The middle Trip Paddle (Phase B) may remain, as it is riveted on.

F. Mount the three Z - shaped copper connecters provided to the treaded inserts in the lower stud assembly and the pole unit copper using the hardware provided.

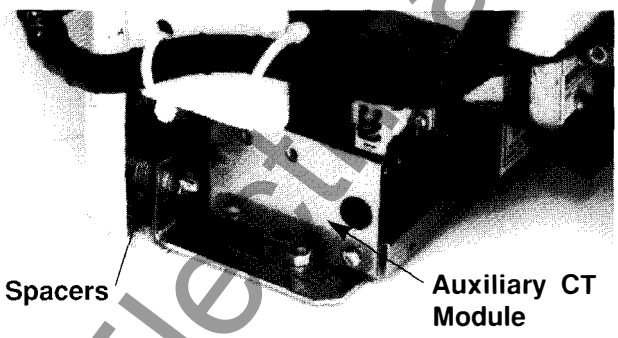
Step 4:



A. Mount the Aux. CT Module to the CT Module Mounting Bracket as shown with the hardware provided.

B. *For RMS/R 700 & 800 kits only.* Mount the PT module on top of the Aux. CT Module with the Glass Polyester Insulation Piece in between them. Use the self threading screws provided

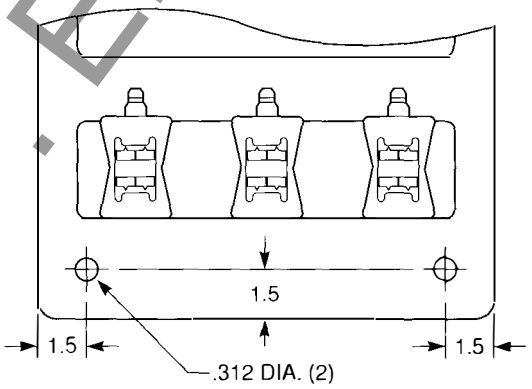
Step 5:



A. *For RMS/R 700 & 800 kits only.* Notch the two inner phase insulation barriers (.75" x .75") to allow the Aux. CT Module to be mounted to the rear of the Breaker.

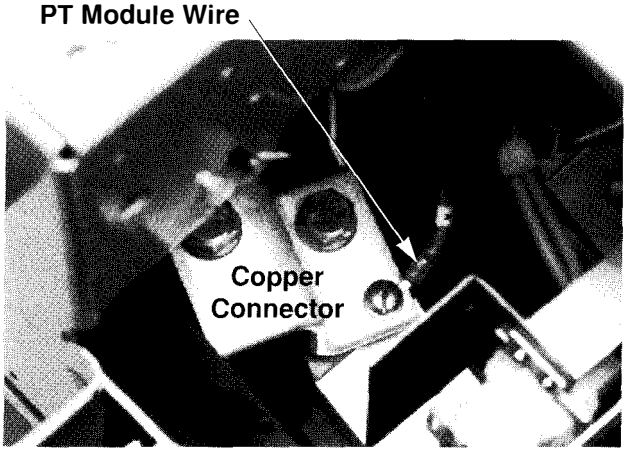
B. *For Manually operated Breakers only.* Attach the Aux. CT Module Assembly to the C-Shaped Trip Unit mounting brackets as shown with the hardware provided.

C. *For Electrically Operated Breakers only.* Drill the bottom of the back plate per Drilling Plan 'A'. Mount the Aux CT Module Assembly on the back plate using the holes just drilled with the hardware provided as shown. Extra nuts and washers that are supplied are to be used as spacers between the back plate and the mounting bracket.



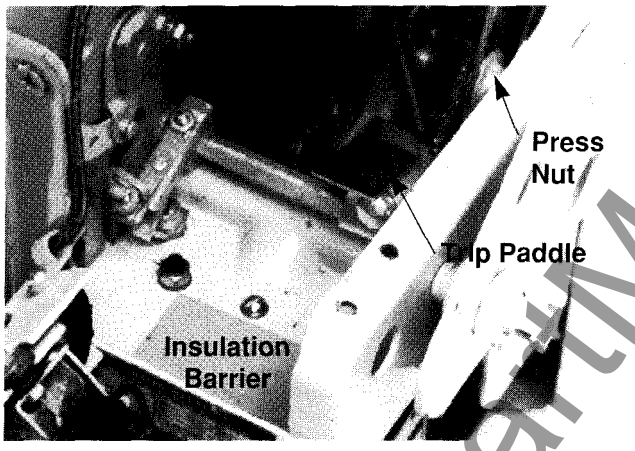
Drilling Plan "A"

Step 5
(continued):



D. *For RMS/R 700 & 800 Kits Only.* Route the 3 wires from the PT Module back to the Z-Shaped Copper Connectors. Cut the wire marked with red to Phase 1. Cut the wire marked with yellow to Phase 2. Cu the wire marked with blue to Phase 3. Strip the wires 1/4 inch and install a .190 Ring Terminal on each. Attach each wire to the tapped hole in the correct copper connector as shown with the hardware provided.

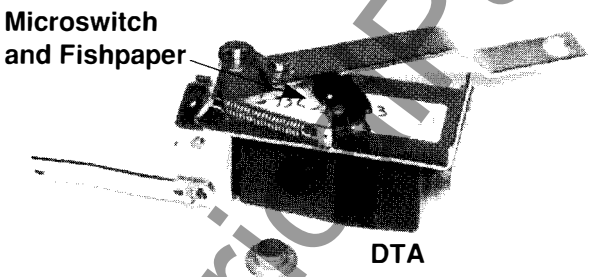
Step 6



A. Attach the Trip Paddle to the Breaker Trip Bar as shown with the hardware provided. Do not tighten firmley yet.

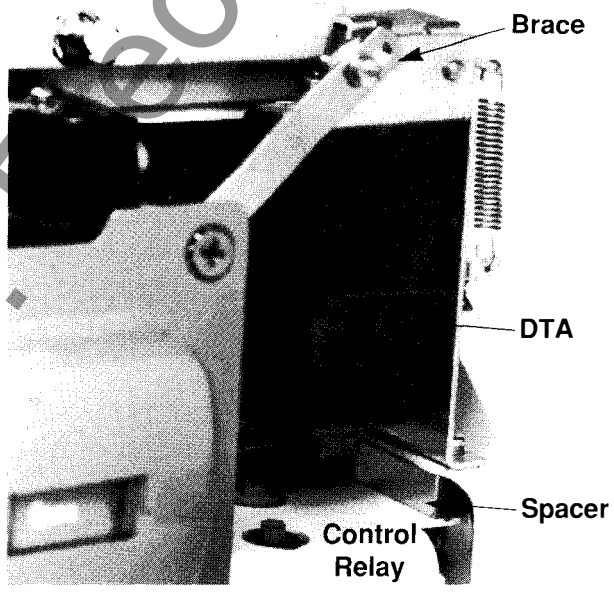
B. Remove the DTA (Direct Trip Actuator) Reset Arm from the DTA Reset Cam Assembly. Slide the Reset Arm onto the right side of the Breaker Crossbar as shown. Install the Press Nut on the end of the Breaker Crossbar to retain.

C. *For Breakers that were seperated only.* Reassemble the Front and rear frames at this time following Step 2 in reverse.



D. *For Electrically Operated Breakers only.* Remove the 2 screws that hold the control relay to the breaker platform. Gently lift the control relay up out of the way to allow access to platform directly below. Fasten the Insulation Barrier to the platform using a suitable Epoxy type adhesive (not provided) as shown.

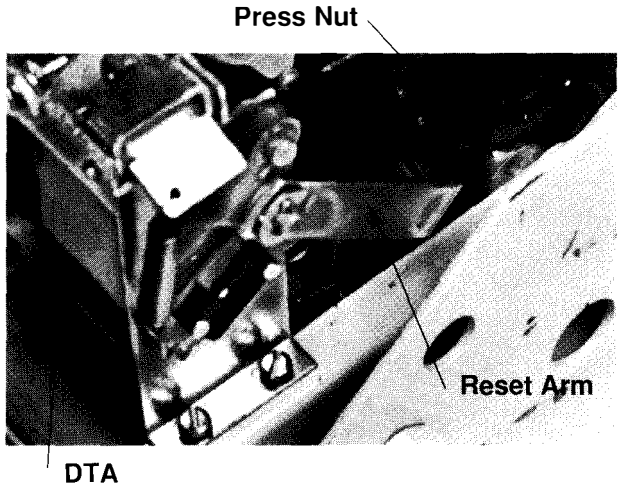
Step 7



A. *For RMS/R 700 & 800 Kits only.* Mount the Microswitch to the DTA with the fishpaper insulation between as shown with the hardware provided.

B. *For Electrically Operated Breakers only.* Mount the DTA (Direct Trip Actuator) on top of the right flange and the Spacer on the bottom between it and the Control Relay. Secure all three in place using the hardware provided. No nuts are required as the Control Relay has tapped holes for mounting.

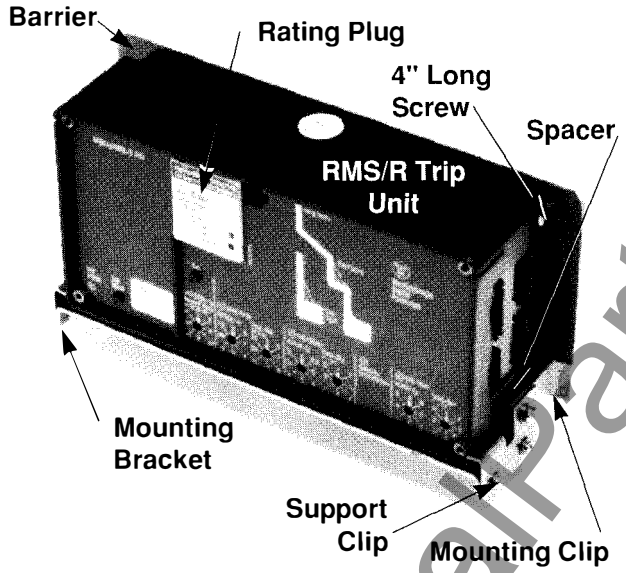
Step 7
(continued):



E. Mount the DTA Cross Brace between the DTA body and the existing Phillips head screw located on the top right of the breaker faceplate as shown. Use the provided hardware to secure both ends of the Cross Brace.

F. Slide the Trip Bar Finger so that it is positioned directly under the nylon striking screw on the DTA Assembly. Tighten the Trip Bar Finger.

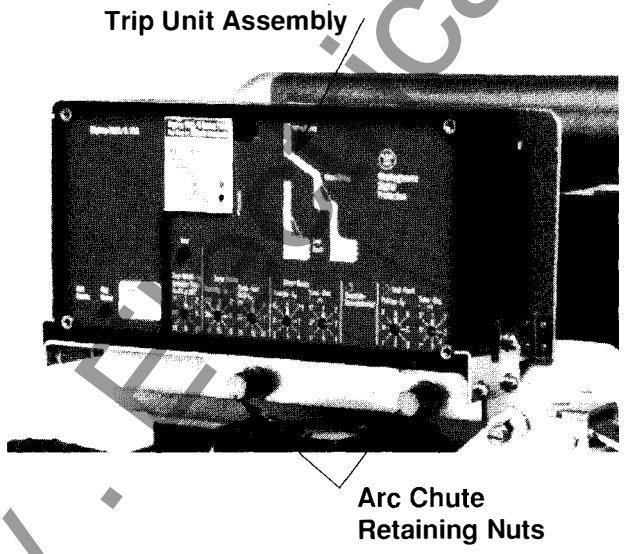
Step 8:



A. Mount the RMS/r Trip Unit on top or the Mounting Bracket with the 4 inch long screws, washers, hex nuts, and spacers.

B. Mount the left and right Trip Unit Support Brackets and to the sides of the Trip Unit Mounting Bracket as shown with the hardware provided. The tabs of the Support Brackets go into the bottom front slots of the Trip Unit.

C. Mount the Barrier Mounting Clips to the inside of the left and right Support Brackets as shown with the hardware provided. The small leg of each clip should be facing out.

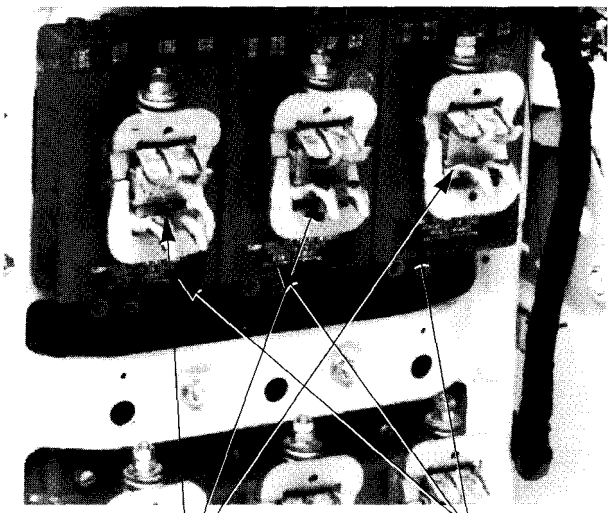


D. Attach the Barrier to the Mounting clips as shown with the hardware provided.

E. Remove the Trip Unit Cover and install the Rating Plug. Replace the cover.

F. Mount the Trip Unit Assembly on the Arc Chute Retaining Bracket as shown using the the existing captive hardware in the Retaining Bracket.

Step 9:



A. Remove the finger clusters from the top stud of each phase.

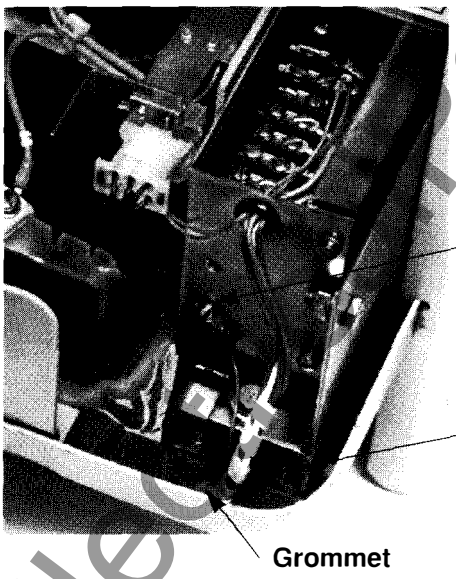
B. Slide one current sensor over each of the top studs. Orient the sensors such that the labels are facing out and the terminals are facing up.

C. Replace the finger clusters.

Step 10:

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

B. Route the Sensor Harness thru the grommet in the side of the Aux. CT Module. Connect the Snap Spade teminnals 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 top rear hole in the side of the Aux. CT Module Cover as shown with the hardware provided.

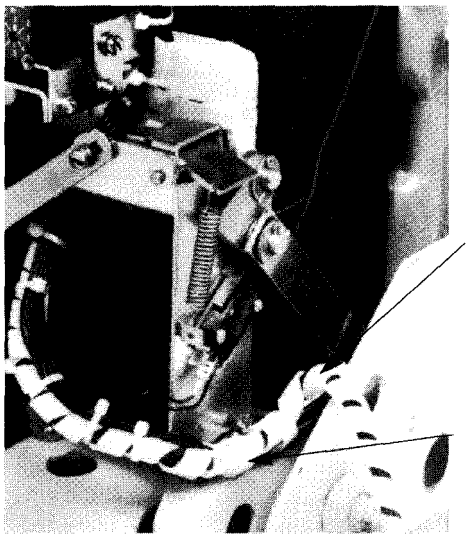
D. Install a grommet in the bottom right hole of the back plate. Route the Sensor Harness back thru the grommet and up to Sensors. Connect the Ring Terminals of the Sensor Harness to proper terminals of the Sensors. Secure the Sensor Harness to the Breaker with nylon wire ties and clamps as required.

Sensor Style No. 8257A65H01.
X1-X4 = 600A
X2-X4 = 400A
X1-X2 = 200A

E. Plug the DTA Extension Harness plug into the socket on the DTA. Route the Harness down to the Aux. CT Module and thru the thru the grommet to the 7 point Terminal Block. Connect the wire marked with + to the 'OP' Terminal and the unmarked wire to the 'ON' Terminal.

F. Plug the white plug of the Aux. CT Harness into the Aux. CT Module. Route the harness to the Ttip Unit and plug into the right side.

Step 11:

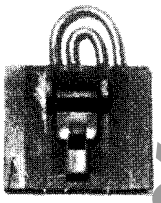


A. Plug the External Harness into the sockets on the right side of the RMS/R Trip Unit.

B. Route the External Harness down along the DTA Brace and over to the DTA mounting screws. Attach the External Harness to these screws with nylon wire clamps.

C. *For RMS/R 700 & 800 Kits only.* Cut the Ring Termials off the two wires from the External Harness and replace with the slide on terminals provided. Connect one wire to normally open terminal and the other wire to the common terminal of the Microswitch mounted on the DTA.

Note: For RMS 500 Basic Kits, the External Harness is the plug pictured at right. It it to be plugged into the corresponding receptacle coming out the rear of the Trip Box.



D. *For RMS/R 700 & 800 Kits only.* Plug the PT Extension Harness into the socket on the PT Module. Route the PT Extension Harness up to the External Harness and plug in.

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

Step 12: 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.

Step 13: The Retrofit is now complete and ready to be tested. See the Retrofit Application Data for test procedures.

DIGITRIP RETROFIT KIT INSTALLATION COMPONENTS FOR GE AK-2-25 AND AK-2A-25 BREAKERS

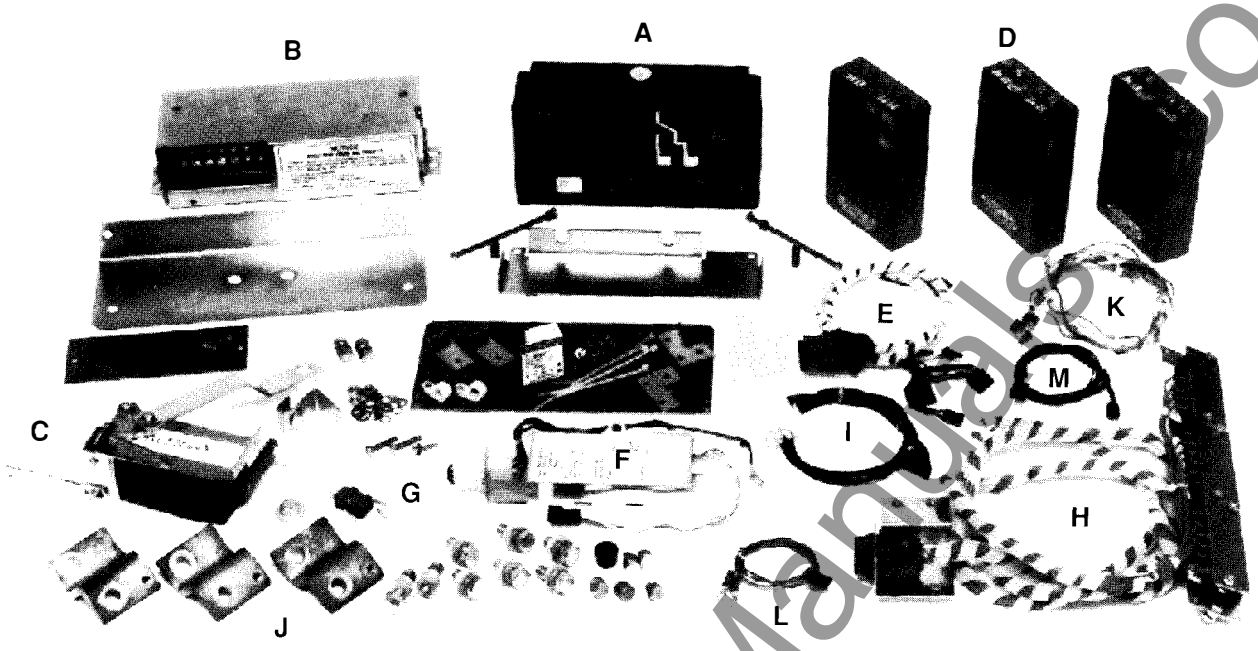
STEP	DESCRIPTION	STYLE NO.	QTY.	COMMENTS
STEP 3	COPPER CONNECTORS	8209A64H01	3	
	.375-16 X 1.25 LNG HEX BOLT		6	
	.375 FLAT WASHER STL		6	
	.375 LOCK WASHER STL		6	
STEP 4	AUX. CT MODULE	6502C78G__	1	
	PT MODULE KIT	8188A44G01	1	700/800 KITS ONLY
	MTG BRACKET			
	.250-20 X .750 LNG HEX BOLT		2	
	.250 FLAT WASHER STL		4	
	.250 LOCK WASHER STL		2	
	.250-20 NUT HEX STL		2	
	PT MODULE	6502C82G01	1	700/800 KITS ONLY
	PT MODULE INSULATION		1	700/800 KITS ONLY
	.138-32 X .375 LNG SCREW TC		2	700/800 KITS ONLY
	.138 FLAT WASHER STL		2	700/800 KITS ONLY
	.138 LOCK WASHER STL		2	700/800 KITS ONLY
STEP 5	AUX. CT MODULE ASSEMBLY (FROM STEP 4)		1	
	.250-20 X .750 LNG HEX BOLT		2	M.O. BREAKERS ONLY
	.250-20 X 1.50 LNG HEX BOLT		2	E.O. BREAKERS ONLY
	.250 FLAT WASHER STL		12	
	.250 LOCK WASHER STL		2	
	.250-20 NUT HEX STL		4	
	RING TERMINAL .190		3	700/800 KITS ONLY
	.190-32 X .375 LNG SCREW FIL		3	700/800 KITS ONLY
	.190 FLAT WASHER STL		3	700/800 KITS ONLY
	.190 LOCK WASHER STL		3	700/800 KITS ONLY
STEP 6	TRIP PADDLE		1	
	INSULATION BARRIER		1	700/800 KITS ONLY
	DTA RESET ARM (FROM DTA)		1	
	.250-20 X .750 LNG CRG BOLT		1	
	.250 FLAT WASHER STL		1	
	.250 LOCK WASHER STL		1	
	.190-32 NUT HEX STL		4	
	PRESS NUT		1	
STEP 7	DTA	693C370G03	1	
	AUXILIARY SWITCH KIT	8188A44G01	1	700/800 KITS ONLY
	DTA BRACE		1	
	SPACER		1	
	.190-32 X 1.00 LNG SCREW FIL		2	
	.190-32 X .500 LNG SCREW FIL		1	
	.190 FLAT WASHER STL		3	
	.190 LOCK WASHER STL		3	
	.190-32 NUT HEX STL		3	
	.250-20 NUT HEX STLL		1	
	MICROSWITCH	73430AV00A	1	700/800 KITS ONLY
	FISHPAPER INSULATION		1	700/800 KITS ONLY
	.112-40 X .500 LNG SCREW FIL		1	700/800 KITS ONLY

DIGITRIP RETROFIT KIT INSTALLATION COMPONENTS FOR GE AK-2-25 AND AK-2A-25 BREAKERS *(CONTINUED)*

STEP	DESCRIPTION	STYLE NO.	QTY.	COMMENTS
STEP 8	RMS/R TRIP UNIT	1232C84G__	1	
	RATING PLUG PR6A06A060	3D86709G04	1	
	TRIP UNIT ASSEMBLY PARTS	8188A49G01	1	
	MOUNTING BRACKET		1	
	BARRIER		1	
	SUPPORT CLIP LH		1	
	SUPPORT CLIP RH		1	
	MOUNTING CLIPS		2	
	DIGITRIP NAMEPLATE		1	
	.190-32 X 4.00 LHG SCREW FIL		2	
	SPACER BRASS		2	
	.190 FLAT WASHER STL		4	
	.190 LOCK WASHER STL		2	
	.190-32 NUT HEX STL		2	
	.164-32 X .25 LNG SCREW FIL		2	
	.164 FLAT WASHER STL		2	
	.164 LOCK WASHER STL		2	
	.138-32 X .375 LNG FIL SCREW		4	
	.138 FLAT WASHER STL		8	
	.138 LOCK WASHER STL		4	
	.138-32 NUT HEX STL		4	
	.112-40 X .250 LNG FIL SCREW		4	
	.112 FLAT WASHER STL		4	
	.112 LOCK WASHER STL		4	
STEP 9	SENSOR 600A MR	8257A65H01	3	
STEP 10	SENSOR HARNESS	6503C34G01	1	
	DTA EXTENSION HARNESS	6503C83G01	1	
	AUX. CT HARNESS	6502C84G02	1	
	GROMMET		1	
	.190-32 X .375 LNG SCREW FIL		1	
	.190 FLAT WASHER STL		1	
	.190 LOCK WASHER STL		1	
	NYLON WIRE TIES		6	
STEP 11	EXTERNAL HARNESS	6502C83G__	1	
	PT EXTENSION HARNESS	6502C85G01	1	700/800 KITS ONLY
	TERMINALS SLIDE ON		2	700/800 KITS ONLY
	NYLON WIRE CLAMPS		2	
	NYLON WIRE TIES		6	
STEP 12	CELL HARNESS	6503C57G__	1	ALL EXCEPT 500 BASIC

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

TYPICAL RMS/R 800 RETROFIT KIT



A. RMS Trip Unit Assembly
B. Auxiliary CT Module and Mounting
C. Direct Trip Actuator and Hardware
D. Sensors
E. External Wire Harness
F. PT Module *(700 & 800 Kits Only)*
G. Auxiliary Switch *(700 & 800 Kits Only)*
H. Cell Harness
I. Auxiliary CT Harness
J. Copper Adaptors
K. Sensor Harness
L. DTA Harness
M. PT Extension Harness

Westinghouse wishes 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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