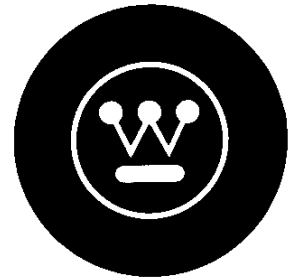


Instructions for the Retrofit of DB-15, DB-25, DB-50, DB-75 and DB-100 Low Voltage Breakers



**READ AND UNDERSTAND THESE INSTRUCTIONS
BEFORE ATTEMPTING ANY ASSEMBLY OR
OPERATION ON THE BREAKERS TO BE RETROFITTED**

SEE IMPORTANT DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITY ON NEXT PAGE

Westinghouse Electric Corporation
Switchgear Division, East Pittsburgh, Pa. 15112

I.B. 33-850-6B Effective March, 1985
Supersedes I.B. 33-850-6A dated February 1984

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SECTION 1 – GENERAL INFORMATION

INTRODUCTION

The retrofit kit which you have received contains all the necessary parts to convert your DB breaker from a device using a electro-mechanical tripping system to one which will have solid state tripping. To understand the transition, one should be acquainted with the basic components and their functions.

The circuit breaker is tripped on fault conditions by combined operation of three components:

- (a) Sensors – Quantity of Three
- (b) Amprector solid-state trip unit – Quantity of One
- (c) Actuator – Quantity of One

Schematically this can be shown in Figs. 1 and 6. This makes a very flexible system covering a wide range of tripping characteristics, due to the adjustable amptector and the range of sensors available. All necessary tripping energy is derived from the load current flowing through the sensors, no separate power source is required. The tripping characteristics for a specific breaker rating, as established by the sensor rating, are determined by the continuously variable settings of the Amprector static trip unit. This unit supplies a pulse of tripping current to the actuator which trips the breaker.

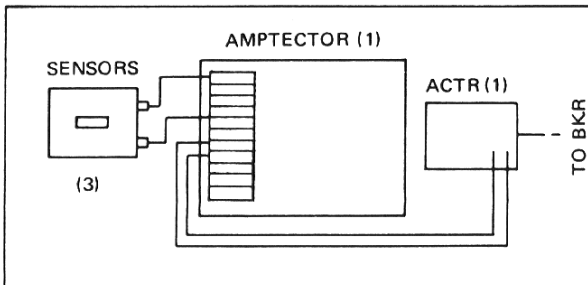


Fig. 1 Schematic of Solid State Tripping

SENSORS

The sensors produce an output proportional to the load current, so the breaker continuous current rating within the frame size can be changed simply by changing the tap setting or the sensors. Proper polarities must be maintained.

It is the sensor rating (or tap) that determines the actual current for one (1) per unit current on the amptector.

The following sensor ratings which are available on the retrofit kits are listed below.

Frame Size	Breaker Type	Current Ratings Available
225 Amperes	DB-15	100 to 225 Amperes
600 Amperes	DB-25	100 to 600 Amperes
1600 Amperes	DB-50	200 to 1600 Amperes
3000 Amperes	DB-75	2000 to 3000 Amperes
4000 Amperes	DB-100	4000 Amperes

All sensors are mounted on the rear lower studs on the back of the breaker base except for the DB-15 which has two sensors mounted on the upper rear studs and one in the center phase of the lower rear stud.

AMPECTOR

The Westinghouse Amprectors IA and IIA are a solid state device that provides adjustable overcurrent tripping for the retrofitted DB breaker. Only one amptector is required per breaker; it receives all of its energy from a set of sensors – one mounted on each pole of the breaker. It develops an output for its associated trip actuator, when preselected conditions of current magnitude and duration are exceeded. Amprector IIA does not have some features included in the Amprector IA. It does not include ground fault nor indicators for tripping on overload or short circuit.

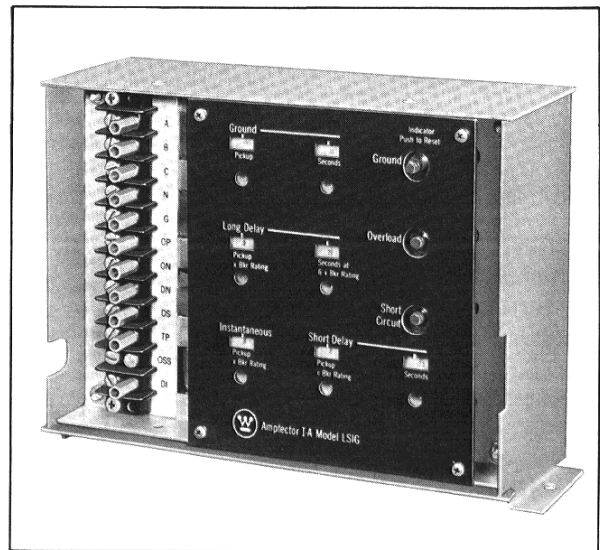


Fig. 2 Amprector IA

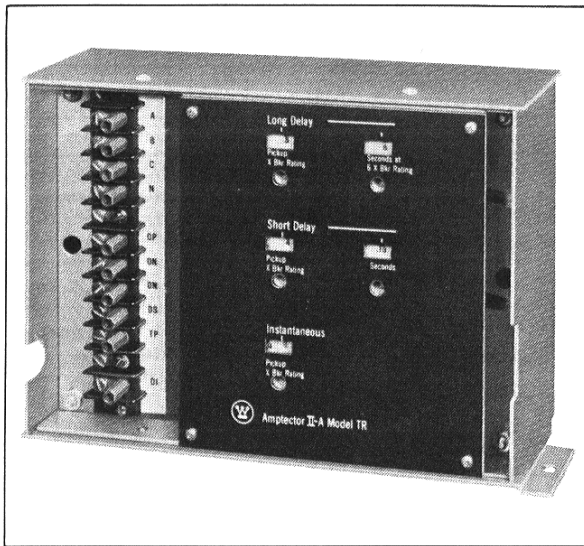


Fig. 3 Amprector IIA

The Amprector for retrofit is supplied with three models of combination of four (4) independent continuously adjustable overcurrent tripping functions:

- Long delay (L)
- Short delay (S)
- Instantaneous (I)
- Ground (G) (Not Available on Amprector IIA.)

The following combinations of the amprector are available LIG, LSG and LSG. For Amprector IA, and DU, SE and TR for Amprector IIA, where

DU (Dual) – Long Delay and Instantaneous

SE (Selective) – Long Delay and Short Delay

TR (Triple) – Long Delay, Short Delay and Instantaneous

ADJUSTMENTS

There are a maximum of seven (7) adjustable controls on the Amprector IA and five (5) on Amprector IIA, each can be adjusted with a screwdriver through openings in the front face plate, Fig. 2 and Fig. 3.

1. Long delay current pick-up
2. Long delay time
3. Short delay current pick-up
4. Short delay time
5. Instantaneous current pick-up
6. Ground current pick-up (Not Available on Amprector IIA)
7. Ground delay time (Not Available on Amprector IIA)

NOTE: The term “pick-up” as used here means the magnitude of current at which the amprector timing function begins.

Ranges

The ranges of pick-up current settings and time delay are shown by time characteristic curves, Fig. 4 and Fig. 5.

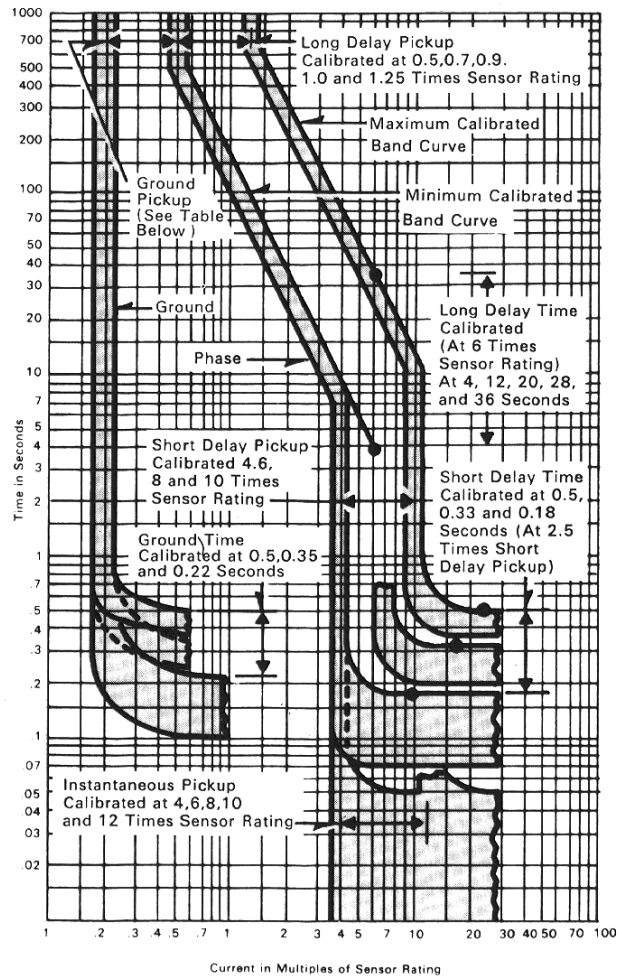


Fig. 4 Amprector IA Time Current Characteristics

ACTUATOR

When the actuator receives a tripping pulse from the Amprector, it releases a mechanical force to trip the breaker. The actuator is made up of a permanent magnet and a spring (see Fig. 6). When the breaker is open, the cross bar pushes the reset lever. The reset lever moves the plunger out, and the plunger then compresses the spring and pulls the keeper until it contacts the pole pieces of

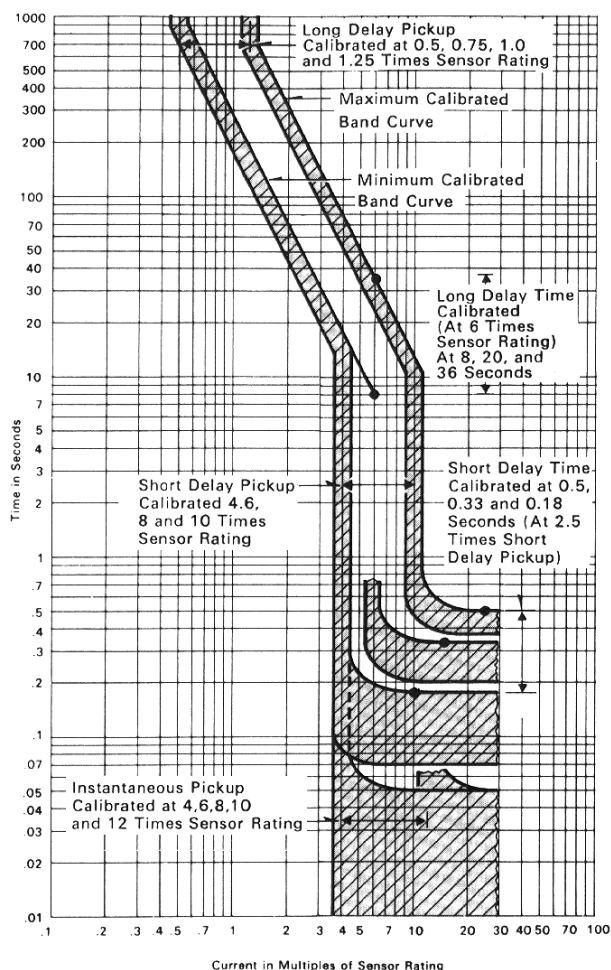


Fig. 5 Amptector IIA Time Current Characteristics

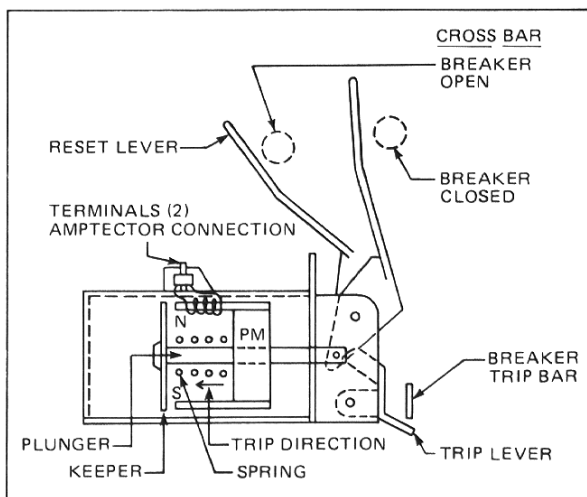


Fig. 6 Actuator Diagram

the magnet. Although the magnet cannot pull and reset the keeper against the force of the spring acting on the plunger, it can hold the spring force when the keeper is in contact with the magnet. A current pulse from the Amptector counteracts the effects of the permanent magnet allowing the spring to separate the keeper from the magnet and move the plunger to actuate the trip lever.

GROUND PROTECTION (Not Available on Amptector IIA)

All the Amptectors IA in retrofit kits are supplied with a ground element. The ground fault protection is provided by energizing this element with the residual of the currents (from the three properly polarized phase sensors in a 3-phase 3 wire system, or from the three phase sensors plus a neutral sensor in a 3-phase 4 wire system, or from a separate ground current sensor.) The Amptector IA can also be wired so that there is no ground fault protection (see Fig. 7).

The ground pick-up values as shown in Table A are the required currents to initiate the pick-up of the ground element and must be the actual current into the "G" terminal of the Amptector. It must be noted that when testing the Amptector for ground pick-up, the sensors may need to be disconnected in order to obtain the results in the table, otherwise higher currents may be required due to the exciting current lost to the sensors. The secondary test current is injected into a phase terminal say "A" and back out of "G".

Table A Ground Pick-up Values – Amperes	
(All Pick-up Values may vary $\pm 10\%$)	
Dial Settings	Secondary Current
A	1.0
B	1.5
C	1.9
D	3.0

SERVICING OF AMPTECTOR

The Amptector is the intelligence of the overcurrent protection provided by the breaker. This device is made up of many solid state components; the only moving parts are for the adjustments. All internal components and connections, including the printed circuit board, are coated to give effective environmental protection. The Amptector is not field serviceable and should give long trouble-free service.

Each Amptector includes terminal receptacles to permit easy field checking of operation and calibration with an external current source. A specially designed portable test device with a plug to match the Amptector receptacle is available and recommended to provide the utmost in simplicity for checking amptector operation. The tester can be plugged into any 120V 60 HZ outlet and can provide enough current to check any pick-up calibration. Accurate values for short time pick-up can be checked, to verify proper operation.

If there is any reason to suspect that the Amptector is not operating correctly, it should not be tampered with; since tampering could result in loss of vital overcurrent protection.

If the Amptector is not operating correctly a spare Amptector should be substituted and the questionable unit returned to the factory for service. Amptectors are not field repairable.

DISCRIMINATOR

The discriminator feature is included with any Amptector which does not include an instantaneous element. This feature provides fixed instantaneous tripping when a breaker is closed into a fault. Under normal conditions when normal current is flowing the discriminator inhibits the instantaneous feature of the Amptector and the breaker will operate within the specified time delays. It is not recommended that the instantaneous portion of the Amptector ever be "shorted". **Shorting will also remove the discriminator feature and the breaker could experience short circuit stresses above its interrupting capability.**

RETROFIT KIT

To simplify the changeover to solid state tripping Three types of Amptector IA are available, the LIG, LSG and the LSIG and Three types of Amptector IIA are available, the DU, SE, and TR. All applications can have a style numbered retrofit kit that will fulfill the required needs. Each styled number kit in Table B contains the appropriate Amptector, sensors, brackets and hardware.

REQUIREMENTS

Before proceeding with the conversion the following should be noted.

1. Items on hand:

Ratchet (3/8") socket set with 3/4", 9/16", 1/2", 7/16" sockets straight edge, scribe, center punch, file, screwdriver, hammer.

Electric drill, 1/8", 7/32", 11/32" #20 and #1 twist drills, 1/4-20 taps, 10-32 taps, tap holder, pliers.

Masking tape 1" wide (for DB-75, 100 only).

9 or 12 volt dry cell battery.

Test apparatus, such as Amptector Tester Style No. 140D481G02 or Multiamp tester.

2. Check items received against bill of material as listed for each type of breaker and for proper style numbered kit.

3. Operate the actuator a few times. Alternately pull back on the reset lever (see Fig. 6) and then trip by applying 9 to 12 volts D-C (be sure to use correct polarity) to the terminals.

NOTE: Arm must be manually reset after each operation.

4. Review the procedure for each type of breaker involved and the sensor tap connections for the various current ratings.

5. Review the photographs to acquaint yourself with the items and location.

6. Arc chutes need not be removed and breaker should be worked on in the upright position.

7. Extreme care should be taken on DB-75 and DB-100 that none of the steel filings fall into the mechanism when drilling and tapping the holes for mounting the amptector.

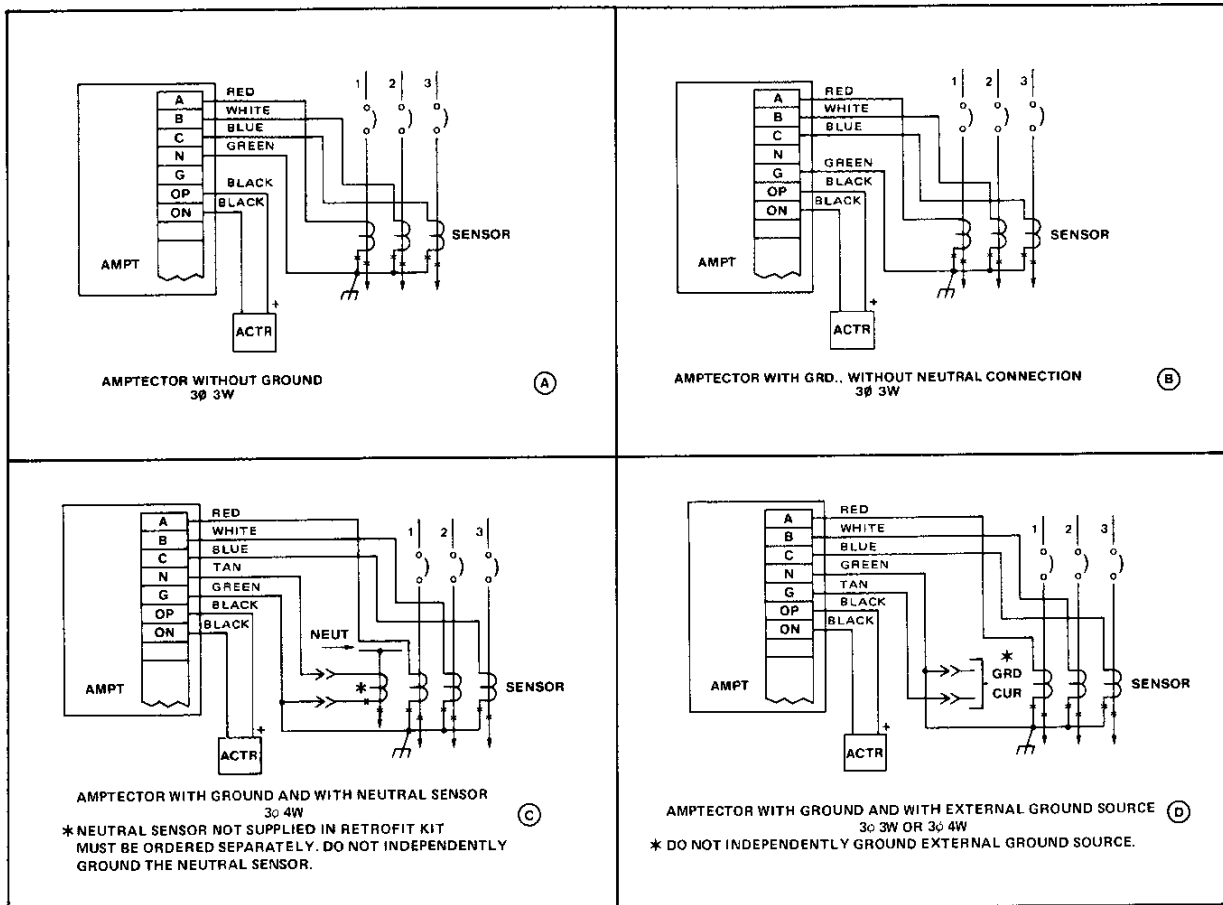


Fig. 7 Wiring Diagram

NOTE:

1. The above color coding is for the following wire harnesses:

S#6489C99G02 for DB-15
 S#6489C99G04 for DB-25
 S#6489C99G06 for DB-50
 S#6489C99G08 for DB-75
 S#6489C99G10 for DB-100

2. The wires connecting to the actuator (ACTR) are both black. One wire has a (+) plus marker on it and the correct polarity must be followed when making the connection.
3. Wiring harnesses that include connections for ground should be modified by removing those wires if ground is not utilized. These leads are purposely long enough to reach the secondary contacts and should be cut to suit if external sensor connections are not required.

Table B – Retrofit Kits

Breaker Type	Amptector Type IA ϕ	Sensor Tabs	Amptector IA Kit Style**	Amptector IIA Kit Style**
DB-15	LIG	100 to 225 Amperes	8184A50G01	8184A50G31
	LSG	100 to 225 Amperes	8184A50G02	8184A50G32
	LSIG	100 to 225 Amperes	8184A50G03	8184A50G33
DB-25	LIG	100 Amperes	8184A50G04	8184A50G34
	LSG	100 Amperes	8184A50G05	8184A50G35
	LSIG	100 Amperes	8184A50G06	8184A50G36
DB-25	LIG	200 to 600 Amperes	8184A50G07	8184A50G37
	LSG	200 to 600 Amperes	8184A50G08	8184A50G38
	LSIG	200 to 600 Amperes	8184A50G09	8184A50G39
DB-50	LIG	200 Amperes	8184A50G10	8184A50G40
	LSG	200 Amperes	8184A50G11	8184A50G41
	LSIG	200 Amperes	8184A50G12	8184A50G42
DB-50	LIG	400 to 1600 Amperes	8184A50G13	8184A50G43
	LSG	400 to 1600 Amperes	8184A50G14	8184A50G44
	LSIG	400 to 1600 Amperes	8184A50G15	8184A50G45
DB-75	LIG	2000 to 3000 Amperes	8184A50G16	8184A50G46
	LSG	2000 to 3000 Amperes	8184A50G17	8184A50G47
	LSIG	2000 to 3000 Amperes	8184A50G18	8184A50G48
DB-100	LIG	4000 Amperes	8184A50G19	8184A50G49
	LSG	4000 Amperes	8184A50G20	8184A50G50
	LSIG	4000 Amperes	8184A50G21	8184A50G51

** Standard Kit includes 3 Sensors.

ϕ Amptector IIA trip characteristics same as for Amptector IA except ground "G" is omitted.

Sensor Data

Breaker Type	Sensor Style #	Available Currents
DB-15	1789C48G43	100, 150, 225 Amperes (Connection, Fig. 16)
DB-25	8184A41H01	100 Amperes
DB-25	8184A39H01	200, 300, 400, 500, 600 Amperes (Connection, Fig. 22)
DB-50	8184A45H01	200 Amperes
DB-50	8184A38H01	400, 600, 800, 1000, 1200, 1600 Amperes (Connection, Fig. 23)
DB-75	8184A43H01	2000, 2500, 3000 Amperes (Connection, Fig. 25)
DB-100	8184A44H01	4000 Amperes

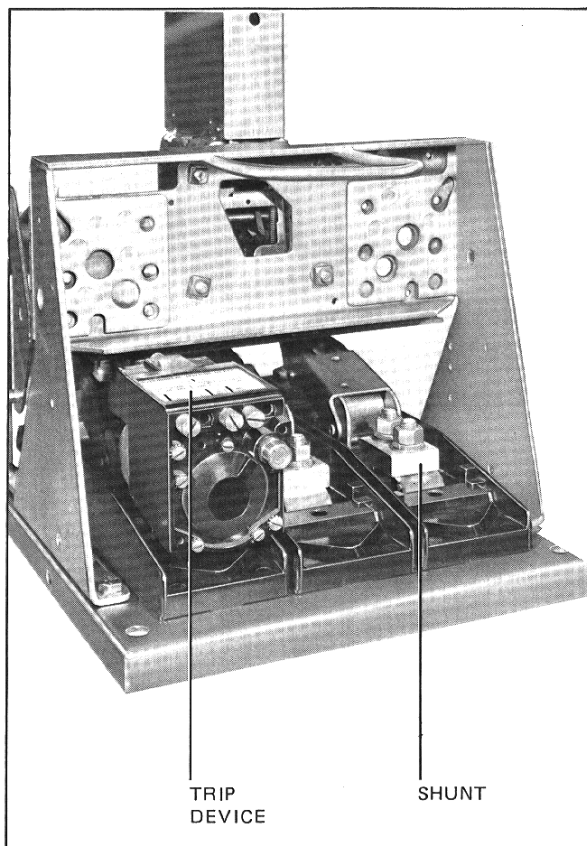


Fig. 8 Removal of Electro-Mechanical Trip Devices

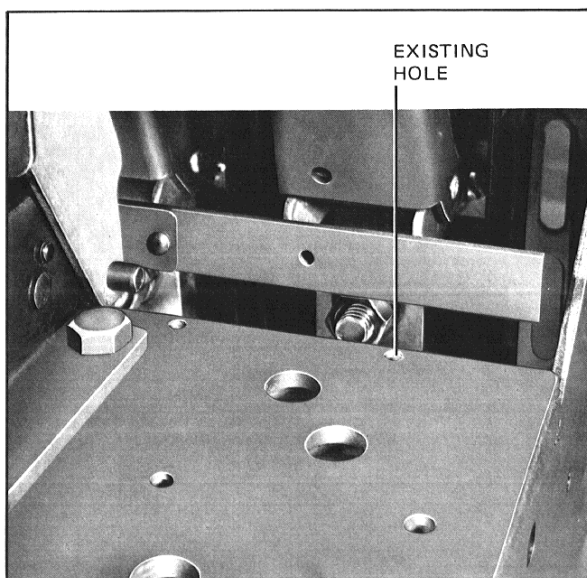


Fig. 9 Location of Existing Hole for Actuator

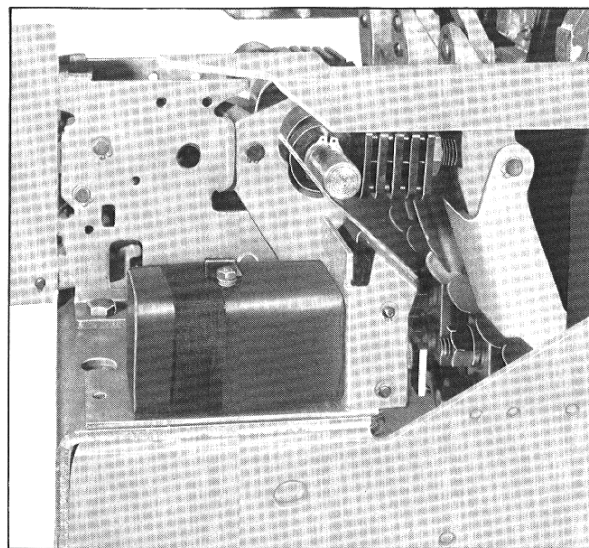


Fig. 10 Positioning of Actuator

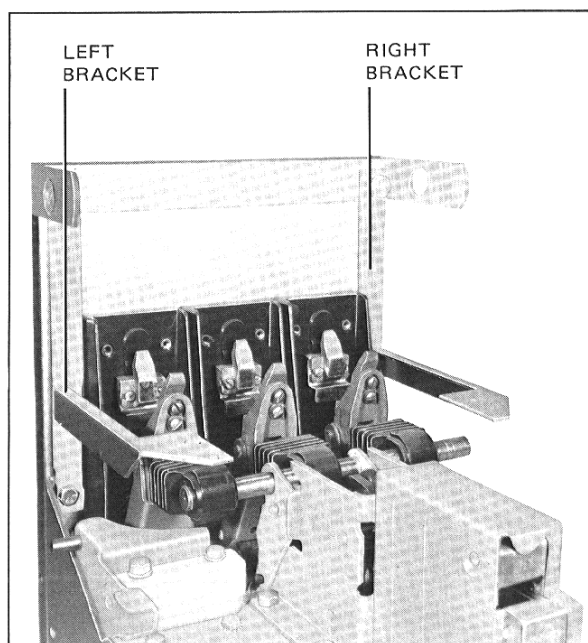


Fig. 11 Mounting of Amprector Bracket

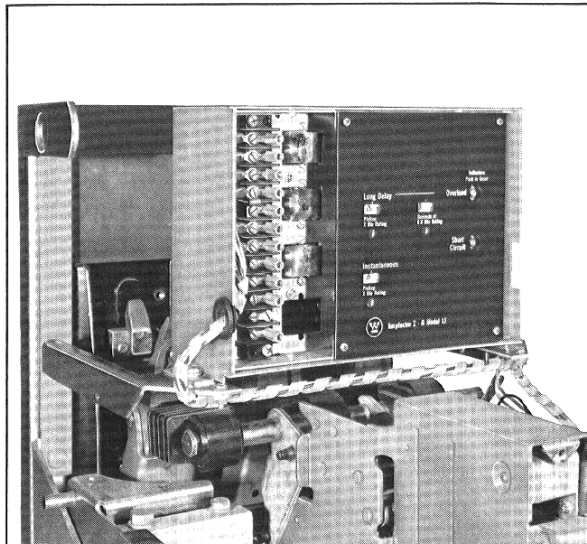


Fig. 12 Amptector Mounted with Wiring Harness

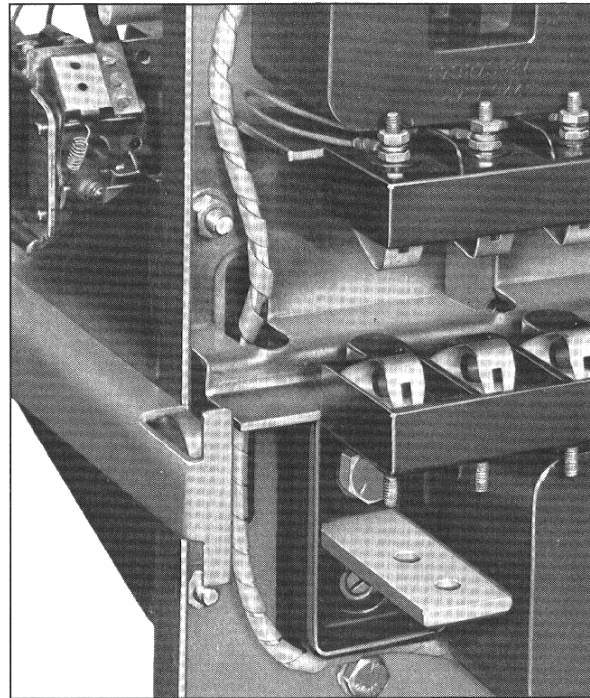


Fig. 14 Harness Threaded Through Upper Slot DB-15

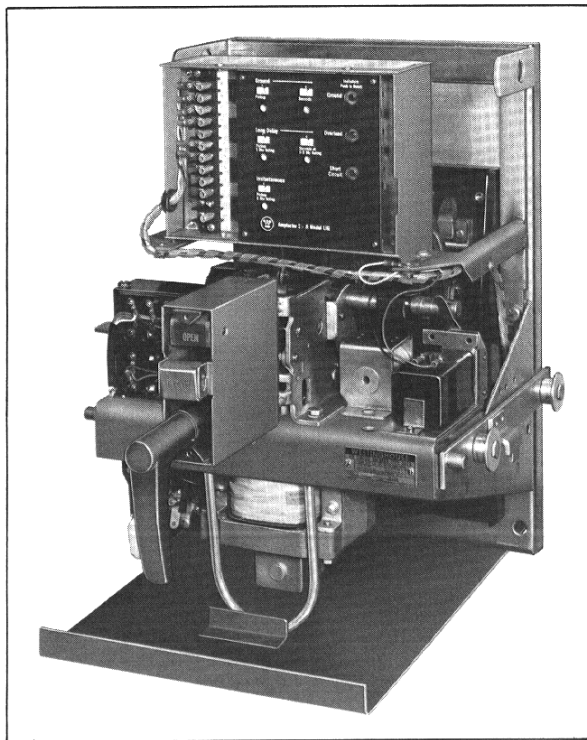


Fig. 13 Actuator Mounted and Wired on a DB-25 ACB

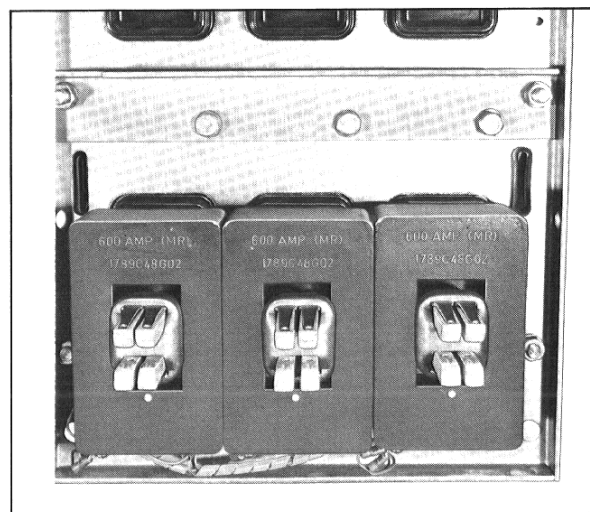


Fig. 15 Sensors in Place DB-25, Bottom Studs, Rear View

SECTION 2 – INSTALLATION INSTRUCTIONS FOR DB-15 BREAKER

REMOVAL OF ELECTRO-MECHANICAL TRIPS

- A. Remove items from box and check against the Bill of Material for appropriate parts for style numbered kit as ordered.

DB-15 RETROFIT KIT BILL OF MATERIAL

Quantity per Breaker	Description	Style Number
1	Amptector IIA	6997D20G00
1	Amptector IA	6998D02G00
1	Actuator	694C330G01
3	Sensors	1789C48G43
	(Multi-Currents 100-150-225 Amps See Fig. 16)	
1	Set Amptector Mounting Details	8271A10G01 or 3500D39G01 (Two brackets, left and right side plus plastic barrier)
1	Wiring Harness	6489C99G02
3	Copper Jumpers	1491 435
*1	Hardware Kit consisting of:	
**1	S#694C329H07 Bracket	
2	-.38-16 x 1.5 Hex Hd Bolts Stl	
2	-.38-16 Hex Hd Nut Stl	
2	-.38 Lock Washers Stl	
2	-.38 Flat Washer Stl	
4	-.25-20 x .5 Pan Hd Sems Scr Stl	
2	-.5-13 x 1.25 Hex Hd Bolts Stl	
6	-.5-13 x 2.25 Hex Hd Bolts Stl	
8	-.5-13 Hex Hd Nut Stl	
8	-.50 Lock Washers Stl	
8	-.50 Flat Washers Stl	
3	-.164-32 x .5 Mach Scr Stl	
3	-.164-32 Nut Stl	
3	-.164 Lock Washer Stl	
3	-.164 Flat Washer Stl	
1	-.190-32 x .75 Fil Hd Scr Stl	
1	-.190-32 Nut Stl	
1	-.190 Lock Washer Stl	
1	-.190 Flat Washer Stl	
2	-.138-32 Nut Brass	
2	-.138 Lock Washer Bronze	
2	-.138 Flat Washer Brass	
1	S#282498 Grommet	
3	S#120A842H04 Nylon Wire Clamp	
1	S#1440164 Grommet	

*NOTE: Kit may contain more hardware than required due to multi-purpose use.

- B. Familiarize yourself with right hand side view of breaker, see Fig. 16.

- C. Remove the three electro-mechanical trip units and replace with three copper jumpers using .5-13 x 2.25 bolts, see Fig. 8. On electrically operated breakers, the control relay must be removed before the left trip unit is removed. Replace the control relay after the shunt is installed. The existing barriers between the pole units can remain in place.

PLACEMENT OF ACTUATOR

- Using the existing .25-20 tapped hole in the breaker platform, Fig. 9 and .25-20 x .5 sems screw secure the Actuator to the breaker with the right edge of the Actuator base parallel to the side of the breaker platform, Fig. 13.
- Using a 9 to 12 volt transistor battery, close breaker and check tripping and reset functions of actuator, repeat numerous times to verify proper functioning. It may be necessary to bend reset arm for positive resetting of actuator.
- Using the Actuator as a template, drill and tap a .25-20 hole in the breaker platform at the left rear of the Actuator. Secure Actuator to platform using .25-20 x .5 sems screw, see Fig. 17.

PLACEMENT OF AMPTECTOR

- The Amptector Mounting details consist of two (2) "T" shaped brackets, one right and one left hand which are secured to the rear frame. Remove the existing bolts at top, place bracket over lift bracket and secure with .5-13 x 1.25 bolt, using the existing hole secure the bottom end of bracket with .38-16 x 1.5 bolt, Fig. 11.
- Once the brackets are secured the plastic barrier is mounted between them, this barrier acts as a shield between the Amptector and the front of the breaker arc chute, see Fig. 18.
- The Amptector is now mounted between the brackets using .25-20 x .5 fil. hd. screw, washers and the .25-20 threaded hole in the bracket, Fig. 12.

WIRING HARNESS AND SENSORS

- Dependent upon which Amptector was supplied, acquaint yourself with the appropriate wiring scheme, see Fig. 7. If ground element is not utilized remove the associated wiring from the harness.

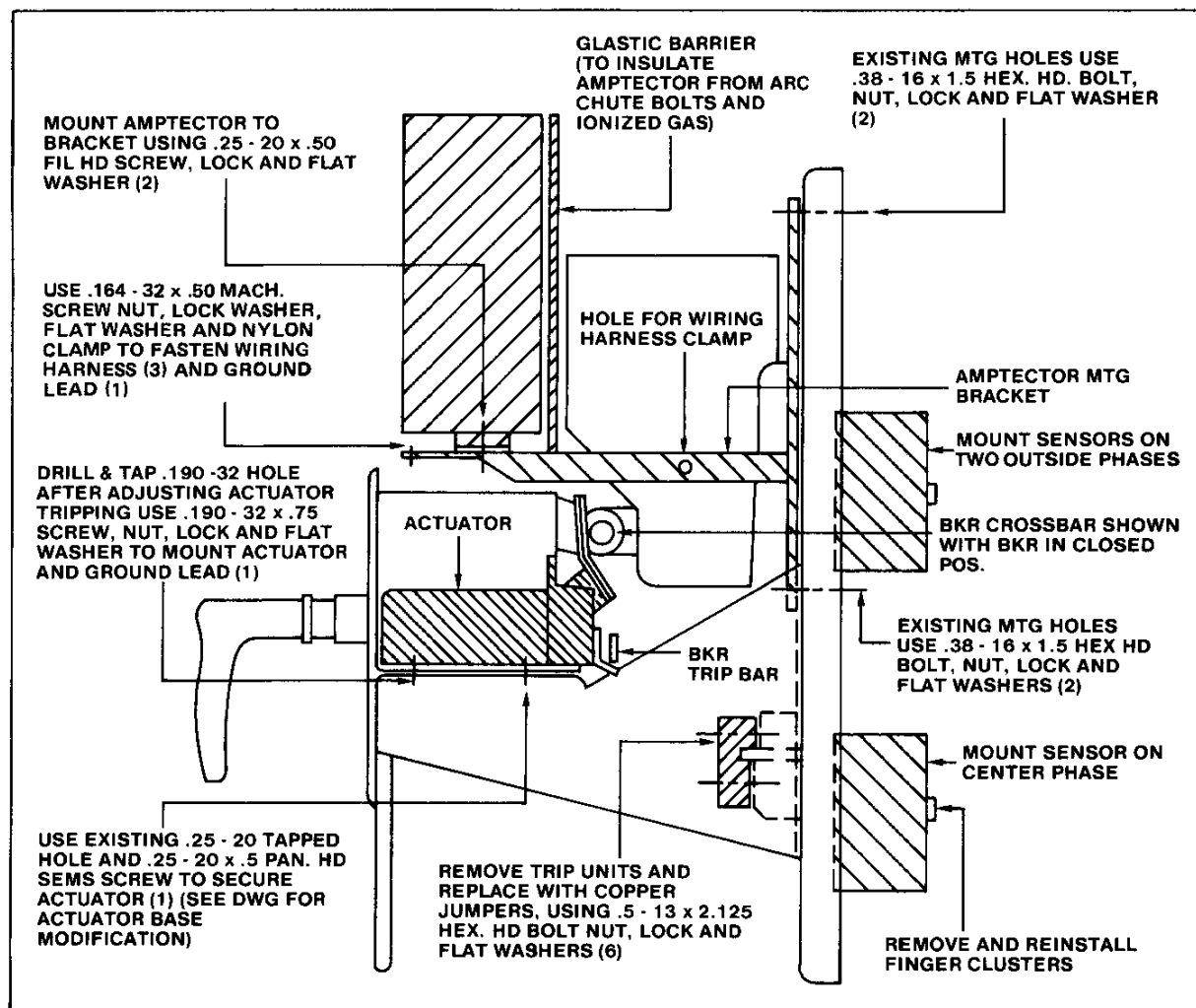


Fig. 16 Right Side View of DB-15

Type DB-15 Breaker Available Currents

<u>Desired Current</u>	<u>Sensor Style Number</u>	<u>and Correct Connections Are Taps</u>
100 Amperes	1789C48G43	X1* - X2
150 Amperes	1789C48G43	X1* - X3
225 Amperes	1789C48G43	X1* - X4

* = This terminal has polarity

2. Check each lug on the harness to ensure they are properly secured to the wires.
3. Slide the grommet over the front end of harness, connect colored wires to the Amp-jector per wiring diagram, then place grommet into split hole on the left side of Amp-jector. Attach the harness to the front of the Amp-jector using the nylon clamps and .164-32 x .50 mach. screws, nuts and washers, see Fig. 12.
4. Connect the black wires to the Actuator using the .138-32 nut lock and flat washer, see Fig. 13, being careful to observe polarity marks on one wire.
5. Connect the green wire to the end of the right Amp-jector support bracket using .164-32 x .5 mach. screws, nuts and washers. This now grounds the sensor star point, see Fig. 17.
6. Thread the sensor end of the harness through the lower slot in the right side of the breaker frame, viewing breaker from front, Fig. 14.
7. Remove the finger clusters from the top two outside studs, and from the middle bottom stud. Place the sensors on the top studs with the terminals of the sensors in the upright position (Fig. 18) and the bottom sensor terminal in the downward position. The lower end of the harness is slit into two groups for attaching to the sensors. The wires to the top sensors are brought upward along the frame while the portion to the lower sensor is brought down between the phases. Attach the wire ends to the sensors making positive that the polarities are correct.

Re-install the finger clusters and secure the wiring harness to the right hand Amp-jector mounting bracket using the nylon clamp and the .164 hardware.

NOTE: TO MAINTAIN PROPER POLARITY BECAUSE OF STAGGERED SENSOR MOUNTING ARRANGEMENT, (SEE FIG. 19) WIRE CONNECTIONS TO SENSOR IN PHASE TWO MUST BE REVERSED FROM THAT SHOWN IN FIG. 7.

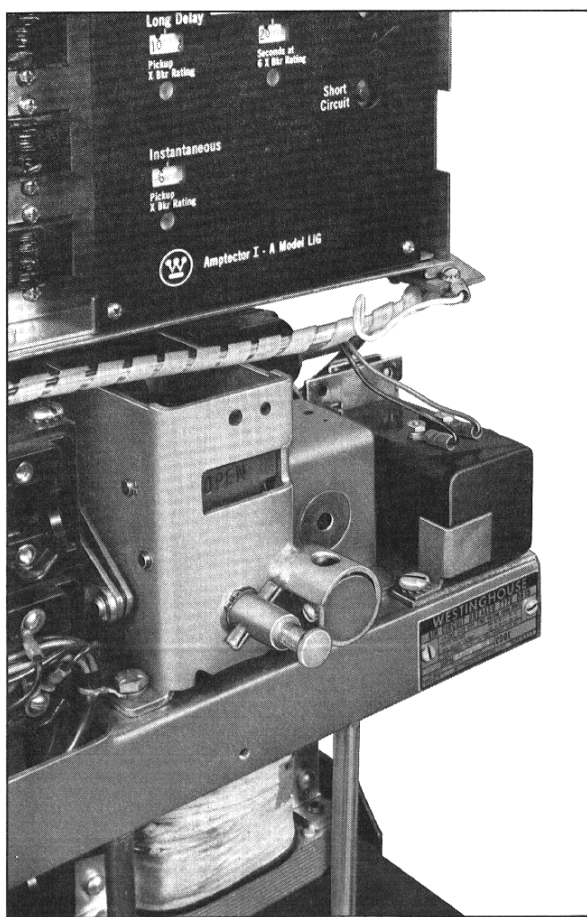


Fig. 17 Actuator Mounted on DB-15

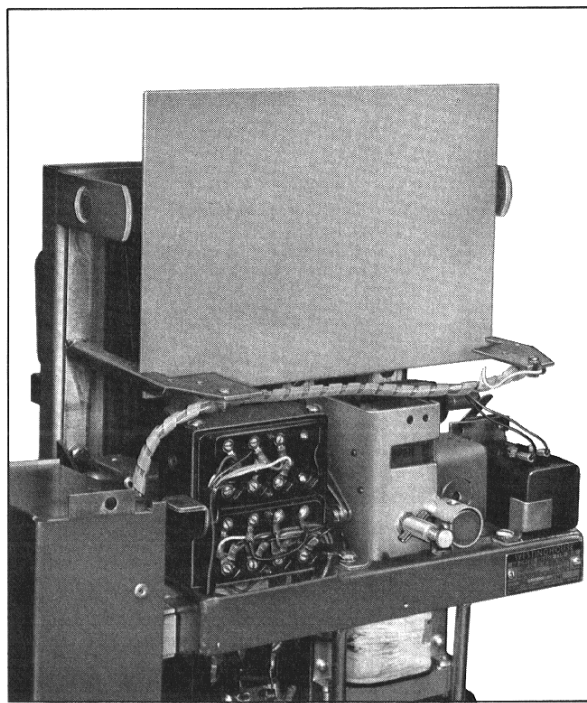


Fig. 18 Mounting of Barrier DB-15

TEST

Using the Amptector kit or power supply.

1. Check operation of the Amptector/Actuator system sufficient number of times to insure proper operation.
2. Set the Amptector dials to the required settings and verify that the Amptector is in calibration.
3. Record the settings to the side of the Amptector for a permanent record.

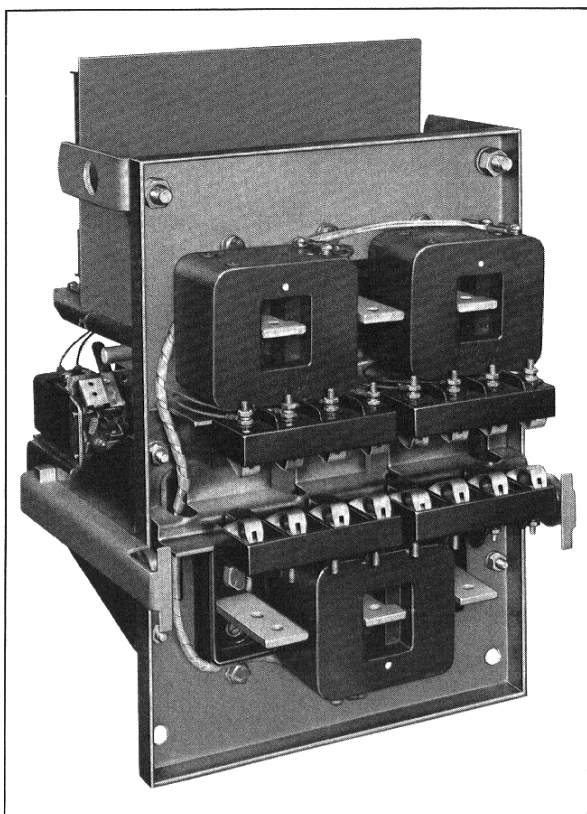


Fig. 19 *Mounting of Sensors and Harness DB-15*

SECTION 3 – INSTALLATION INSTRUCTIONS FOR DB-25 BREAKER

REMOVAL OF ELECTRO-MECHANICAL TRIPS

- A. Remove items from box and check against the Bill of Material for appropriate parts for style numbered kit as ordered.

- B. Familiarize yourself with right hand side view of breaker, see Fig. 22.

- C. Remove the three electro-mechanical trip units and replace with three copper jumpers using .5-13 x 2.25 bolts, Fig. 8.

DB-25 RETROFIT KIT BILL OF MATERIAL

Quantity per Breaker	Description	Style Number
1	Amptector IIA	6997D20G00
	Amptector IA	6998D02G00
1	Actuator	591C326G01
3	Sensors (100 Amps 200 thru 600 Amps) See Fig. 22	8184A41H01 8184A39H01
1	Set Amptector Mounting Details 8271A10G02 or 3500D39G02 (Two brackets left and right side)	
1	Wiring Harness	6489C99G04
3	Copper Jumpers	1491 435
*1	Hardware Kit Consisting of:	
2	-.38-16 x 1.5 Hex Hd Bolt Stl	
2	-.38-16 Hex Hd Nut Stl	
2	-.38 Lock Washer Stl	
2	-.38 Flat Washer	
2	-.50-13 x 1.5 Hex Hd Bolt Stl	
6	-.50-13 x 3.0 Hex Hd Bolt Stl	
8	-.50-13 Hex Hd Nut Stl	
8	-.50 Lock Washer Stl	
8	-.50 Flat Washer Stl	
4	-.25-20 x .5 Pan Hd Sems Scr Stl	
3	-.164-32 x .5 Mach Scr Stl	
3	-.164-32 Nut Stl	
3	-.164 Lock Washer Stl	
3	-.164 Flat Washer Stl	
1	-.190-32 x .75 Fil Hd Scr Stl	
1	-.190-32 Nut Stl	
1	-.190 Lock Washer Stl	
1	-.190 Flat Washer Stl	
2	-.138-32 Nut Brass	
2	-.138 Lock Washer Brass	
2	-.138 Flat Washer	
1	S#3554A32H01 Bracket	
3	S#70801CB33B Nylon Wire Clamp	
1	S#282498 Grommet	
1	S#1440164 Grommet	
1	S#8184A37H01 Spacer - Cross Bar.	

*NOTE: Kit may contain more hardware than required due to multi-purpose use.

PLACEMENT OF ACTUATOR

- Using the existing .25-20 tapped hole in the breaker platform (Fig. 7) and .25-20 x .5 sems screw secure the actuator to the breaker with the right edge of the actuator base parallel to the side of the breaker platform, Fig. 10.
- Using a 9 to 12 volt battery and after having closed the breaker manually, check tripping and reset functions of actuator, repeat numerous times to verify proper functioning. It may be necessary to bend reset arm for positive resetting of actuator.
- Using the actuator as a template, drill and tap a .190-32 hole in breaker platform and secure actuator to platform with "L" bracket in place using .190-32 x .75 screw, nut and washers, Fig. 13.
- Remove the Tru-arc retaining ring from the right end of the main contact cross bar. Slide 1 (one) cross bar spacer over the bar against the insulator and replace the Tru-arc ring.

CAUTION

When retrofitting DBL-25, make sure there is no interference between actuator tripping linkage and breaker limiter tripping screw.

PLACEMENT OF AMPTECTOR

- The amptector mounting details consist of two "T" shaped brackets, one right and one left hand which are secured to the rear frame. Remove the existing bolts at top, place bracket over the lift bracket and secure with .5-13 x 1.5 bolts, now using existing hole and .375-16 x 1.5 bolt, secure to bottom end of breaker, Fig. 11.
- Once the brackets are secure the amptector can now be mounted between the brackets using .25-20 x .5 fil. hd. screw and washers and the .25-20 threaded hole in the bracket, Fig. 12.

6476C59

6478C49G01 - 15/25

WIRING HARNESS AND SENSORS

1. Dependent upon which amptector was supplied, acquaint yourself with the appropriate wiring scheme, see Fig. 7. If the ground element is not utilized, remove the associated wiring from the harness.
2. Check each lug on the harness to ensure they are properly secured to the wires.
3. Connect the colored wires to the amptector per the wiring diagram and slide the rubber grommet over the end and insert grommet into the split hole on the left front side of the amptector. Attach the harness to front of the amptector using the nylon clamps and .164-32 x .50 mach. screw, nuts and washers, Fig. 10.
4. Connect the black wires to the actuator using the .138-32 nut, lock and flat washer, Fig. 11, being careful to observe polarity marks on one wire.
5. Connect the green wire at the end of the right amptector support bracket using .164-32 x 5 hardware. This now grounds the sensor star point, see Fig. 13.
6. Install grommet in lower slot on right side of breaker rear frame. Thread the sensor end of the harness through this grommet, Fig. 20.
7. Remove the finger clusters from the lower studs, wire the harness leads to the sensors, (Fig. 20). Attaching the wires can be accomplished easily by having the terminals of the sensor facing upwards. Once the leads are secured the sensors can be flipped 180° and placed on the lower studs, (Fig. 21), now reinstall the finger clusters. Secure the wiring harness to the right hand amptector mounting bracket using nylon clamp and .164 hardware.

TEST

Using the amptector test kit or a power supply.

1. Check operation of the amptector/actuator system sufficient number of times to insure proper operation.
2. Set the amptector dials to the required settings, and verify that the amptector is in calibration.
3. Record the settings to the side of the amptector for a permanent record.

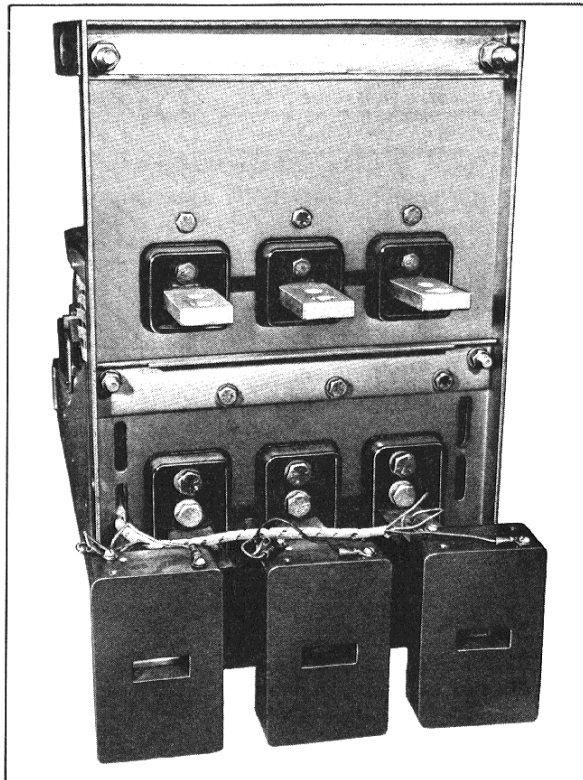


Fig. 20 Attaching Wiring Harness to Sensors DB-25 and DB-50

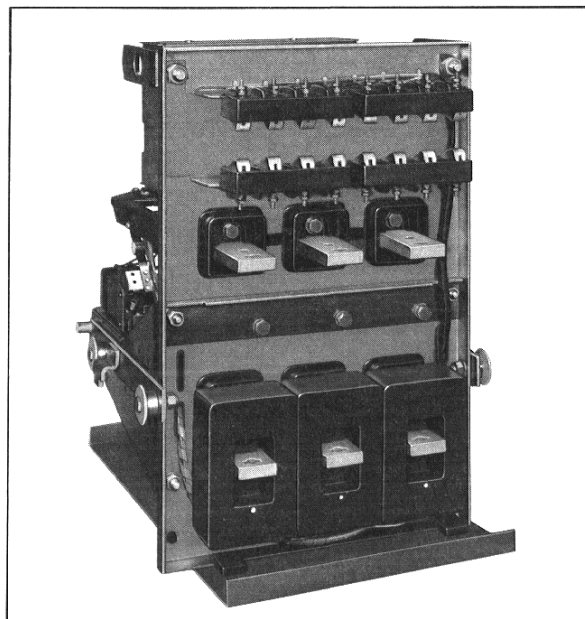


Fig. 21 DB-25 Sensors Properly Installed on Breaker Studs

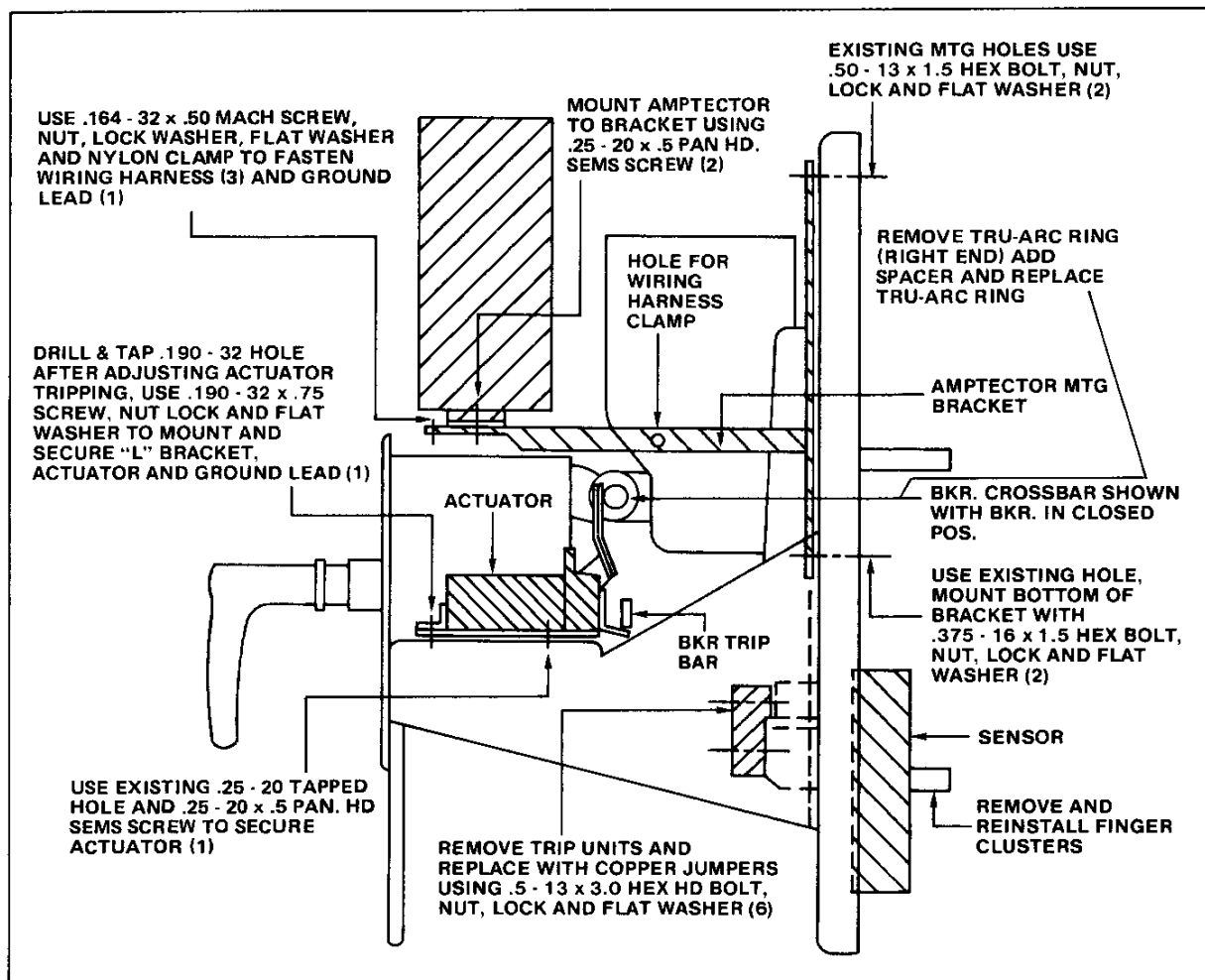


Fig. 22 Right Side View of DB-25

Type DB-25 Breaker Available Currents

Desired Current	Sensor Style Number	Correct and Connections Are Taps
100 Amperes	8184A41H01	X1* - X2
200 Amperes	8184A39H01	X1* - X2
300 Amperes	8184A39H01	X2* - X3
400 Amperes	8184A39H01	X2* - X4
500 Amperes	8184A39H01	X1* - X3
600 Amperes	8184A39H01	X1* - X4

* = This terminal has polarity

SECTION 4 – INSTALLATION INSTRUCTIONS FOR DB-50 BREAKER

REMOVAL OF ELECTRO-MECHANICAL TRIPS

- A. Remove items from box and check against the Bill of Material for appropriate parts of style numbered kit as ordered.

DB-50 RETROFIT KIT BILL OF MATERIAL

Quantity per Breaker	Description	Style Number
1	Amptector IIA	6997D20G00
	Amptector IA	6998D02G00
1	Actuator	591C326G02
3	Sensor	8184A40H01
	Sensor (200 Amps thru 1600 Amps) See Fig. 23	8184A38H01
1	Set of Amptector Mounting Details	8271A10G03 or 3500D39G03 (Two Brackets and Cross Brace)
1	Wiring Harness	6489C99G06
6	Copper Jumpers	809A436H01
1	Hardware Kit Consisting of:	
4	-.50-13 x 1.5 Hex Hd Bolt Stl	
12	-.50-13 x 3.0 Hex Hd Bolt Stl	
16	-.50-13 Hex Hd Nut Stl	
16	-.50 Lock Washer Stl	
16	-.50 Flat Washer Stl	
3	-.25-20 x .5 Hex Hd Bolt Stl	
3	-.25 Lock Washer Stl	
3	-.25 Flat Washer Stl	
3	-.164-32 x .5 Mach Scr Stl	
3	-.164-32 Nut Stl	
3	-.164 Lock Washer Stl	
3	-.164 Flat Washer Stl	
1	-.190-32 x .75 Fil Hd Scr Stl	
1	-.190-32 Nut Stl	
1	-.190 Lock Washer	
1	-.190 Flat Washer	
2	-.138 Nut Brass	
2	-.138 Lock Washer Brass	
2	-.138 Flat Washer Brass	
1	S#3554A32H01 Bracket	
3	S#70801CB33B Nylon Wire Clamp	
1	S#282498 Grommet	
1	S#1528855 Grommet	
1	-.312-18 x .5 Fil Hd Scr Stl	
1	-.312 Lock Washer Stl	
1	-.312 Flat Washer Stl	

- B. Familiarize yourself with the right hand side view of breaker, Fig. 23.

- C. Remove the three electro-mechanical trip units and replace with six copper jumpers, 2 per phase using .5-13 x 3.0 bolts, (12) required, similar to what is shown for DB-15 in Fig. 6.

PLACEMENT OF ACTUATOR

1. Scribe a line on the right side of breaker platform, parallel to front, and 3" from existing .313-18 tapped hole.
2. Using the .312-18 tapped hole secure actuator to breaker platform with .312-18 x .5 sems screw, base of actuator should be parallel with side of platform, Figs. 9 and 10.
3. Close the breaker manually and with a 9 to 12 volt battery check tripping and reset functions of actuator, repeat several times to verify proper functioning. It may be necessary to bend reset arm for positive resetting of actuator.
4. Using the actuator as a template, drill and tap a .190-32 hole on the scribed line and temporarily secure front of actuator to platform with "L" bracket in place using .190-32 x .75 screw nut and washer, similar to that shown for DB-25, Fig. 13.

PLACEMENT OF AMPTECTOR

1. The "Amptector" mounting details consist of two (2) "T" shaped mounting arms, one left and one right and a 4" x 19" x 1/8" cross plate. Remove the existing bolts at the top of the breaker rear frame, place the mounting arm over the lift bracket and secure with .5-13 x 1.5 bolt. Now using the existing hole and .5-13 x 1.5 bolt secure bottom end of arm, Fig. 9.
2. Mount the cross plate with the two .203 holes next to the breaker arc chutes on the left hand arm using the .25-20 tapped hole, and .25-20 x .5 bolt and washers. Now mount the right hand side of the amptector to the cross plate and right hand arm with .25-20 x .5 bolt and washers, then secure left hand side of amptector to the cross plate with another .25-20 x .5 bolt and washers, Fig. 24.

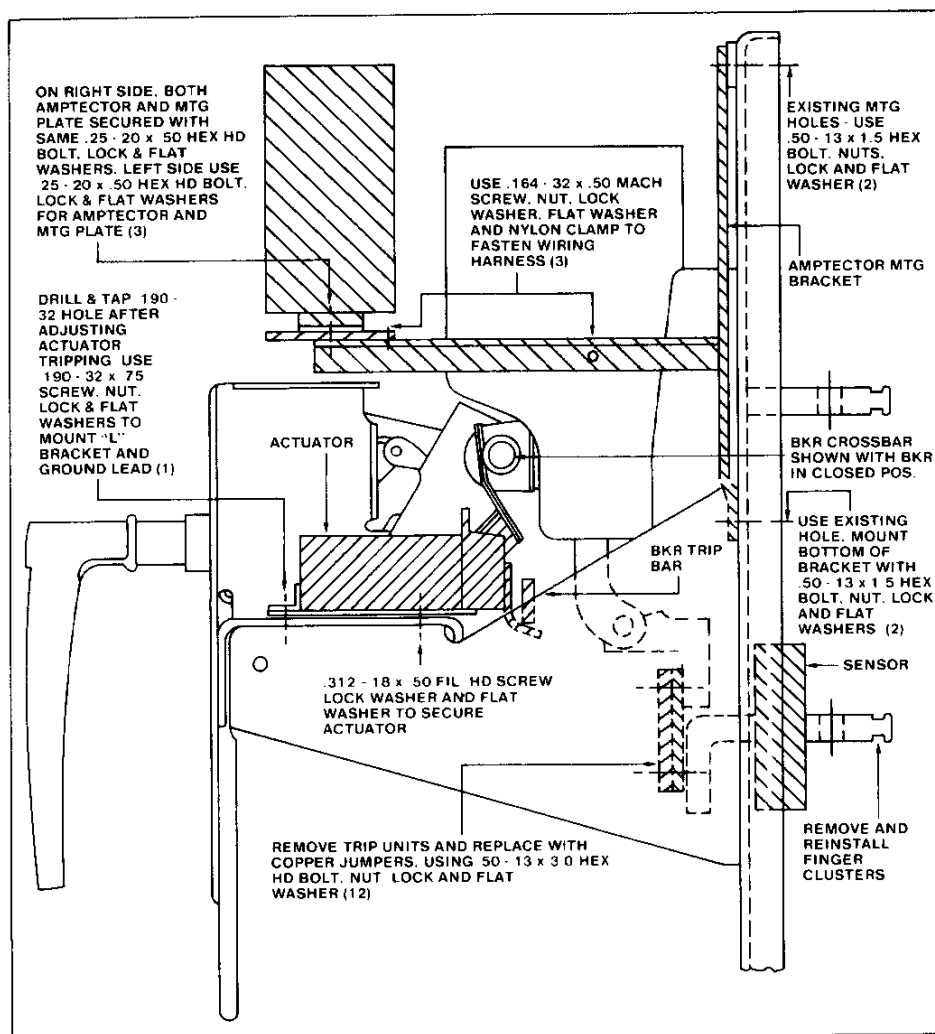


Fig. 23 Right Side View of DB-50

Type DB-50 Breaker Available Currents

Desired Current (Amperes)	Choose Sensor Style Number	and Correct Connections Are Taps
200	8184A45H01	X1* - X2
400	8184A38H01	X1* - X2
600	8184A38H01	X1* - X3
800	8184A38H01	X1* - X4
1000	8184A38H01	X3* - X5
1200	8184A38H01	X2* - X5
1600	8184A38H01	X1* - X5

* = This terminal has polarity

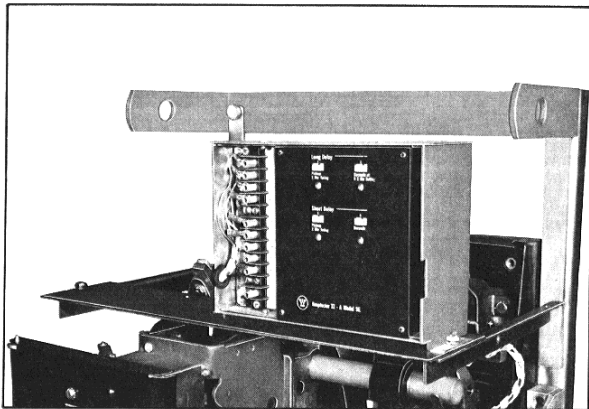


Fig. 24 Amptector Mounted on Cross Plate DB-50

WIRING HARNESS AND SENSORS

1. Dependent upon which amptector was supplied, acquaint yourself with the appropriate wiring scheme, see Fig. 7. If the ground element is not utilized, remove the associated wiring from the harness.
2. Check each lug on the harness to ensure they are properly secured to the wires.
3. Connect the colored wires to the amptector per the wiring diagram, and slide the rubber grommet over the end and insert grommet into the split hole on the left front side of amptector. Attach the harness to the back side of the cross plate using the two .203 dia. holes and .164-32 x .5 screw nut, washers and nylon clamps.
4. Connect the black wires to the actuator using .138-32 nut, lock and flat washers, Fig. 13 being certain to observe polarity as marked on the wires.
5. Connect the white wire to the .190-32 x .75 screw on the actuator and firmly secure the actuator to the platform. This now grounds the sensor star point, Fig. 11.
6. Install grommet in lower slot on right side of breaker rear frame. Thread the sensor end of the harness through this lower slot in the right hand side of the breaker rear frame viewing breaker from the front.
7. Remove the finger clusters from the lower studs, and wire the harness leads to the sensors. Attaching the wires can be accomplished easily by having the terminals of the sensors facing upwards. Once the leads are secured the sensors can be flipped 180° and placed on the lower studs, (similar to Fig. 20). Now reinstall the finger clusters. Secure the wiring harness to the right hand arm which has an existing hole using the .164 hardware and nylon clamp.

TEST

Using the amptector test kit or a power supply.

1. Check operation of the Amptector/Actuator system sufficient number of times to insure proper operation.
2. Set the Amptector dials to the required settings and verify that the Amptector is in calibration.
3. Record the settings to the side of the Amptector for a permanent record.

SECTION 5 – INSTALLATION INSTRUCTIONS FOR DB-75 AND DB-100 BREAKERS

DB-75 AND DB-100 RETROFIT KIT BILL OF MATERIAL

Quantity per Breaker	Description	Style Number	
		DB-75	DB-100
1	Amptector IA	6998D02G00	
	Amptector IIA	6997D20G00	
1	Actuator	591C326G03	
3	Sensors (See Fig. 25)	8184A43H01	8184A44H01
1	Set of Amptector Mounting Details	2817C67G03	
1	Sensor Mounting Details	2817C67G04	
1	Wiring Harness	6489C99G08	6489C99G10
1	Hardware Kit Consisting of:		
6	-.25-20 x .50 Hex Hd Bolt Stl		
2	-.25-20 Hex Nut Stl		
6	-.25 Lock Washer Stl		
6	-.25 Flat Washer Stl		
6	-.50-13 x 2.25 Hex Hd Bolt Stl		
6	-.50 Lock Washer Stl		
6	-.50 Flat Washer Stl		
3	-.25-20 x .50 Pan Head Screw Stl		
1	-.312-18 x 1.0 Fil Hd Mach Scr Stl		
1	-.312-18 Nut Stl		
1	-.312 Lock Washer Stl		
1	-.312 Flat Washer Stl		
1	-.190-32 x .75 Fil Hd Stl Scr Stl		
1	-.190-32 Nut Stl		
1	-.190 Lock Washer Stl		
1	-.190 Flat Washer Stl		
2	-.164-32 x .5 Mach Scr Stl		
2	-.164-32 Nut Stl		
2	-.164 Lock Washer		
2	-.164 Flat Washer		
2	-.138-32 Nut Brass		
2	-.138 Lock Washer Brass		
2	-.138 Flat Washer Brass		
1	-.25-20 x .75 Carriage Bolt		
1	-.25-20 Elastic Stop Nut		
1	S#32B7802H19 Trip Bar Finger		
1	S#3554A32H01 Bracket		
2	S#120A842H04 Nylon Wire Clamp		
1	S#282498 Grommet for Amptector		
1	S#440298 Grommet for Platform		

REMOVAL OF ELECTRO-MECHANICAL TRIPS

- Remove items from box and check against Bill of Material for the appropriate parts or style numbered kit as ordered.
- Familiarize yourself with the right hand side view of the breaker, Fig. 25.
- Remove the three electro-mechanical trip units, no copper jumpers required, Fig. 6.

PLACEMENT OF ACTUATOR

- Position and assemble trip paddle on breaker trip bar using .25-20 x .75 carriage bolt, trip bar finger and elastic nut. Left edge of paddle should be 3.12" from side of platform, Figs. 26 and 27.

NOTE: Trip paddle should not set snug against the actuator, should be about a 1/8" gap.

- Drill a .343 hole in platform base after you have properly positioned the actuator on the platform per Figs. 24 and 26. Hole is approximately 5.18" from the front of the platform and 1.03 from the side of the platform. Secure the actuator with a .312-18 x 1.0 screw, nut and washers.
- With a 9 to 12 volt battery, close breaker, check tripping and reset functions of actuator, repeat several times to verify proper functioning.
- Drill and tap .190-32 hole in breaker platform 2.18 from front and 2.38 from right side of platform, Fig. 27 and temporarily secure actuator parallel to the platform with "L" bracket in place using .190-32 x .75 screw, nut and washers, similar to Fig. 13.

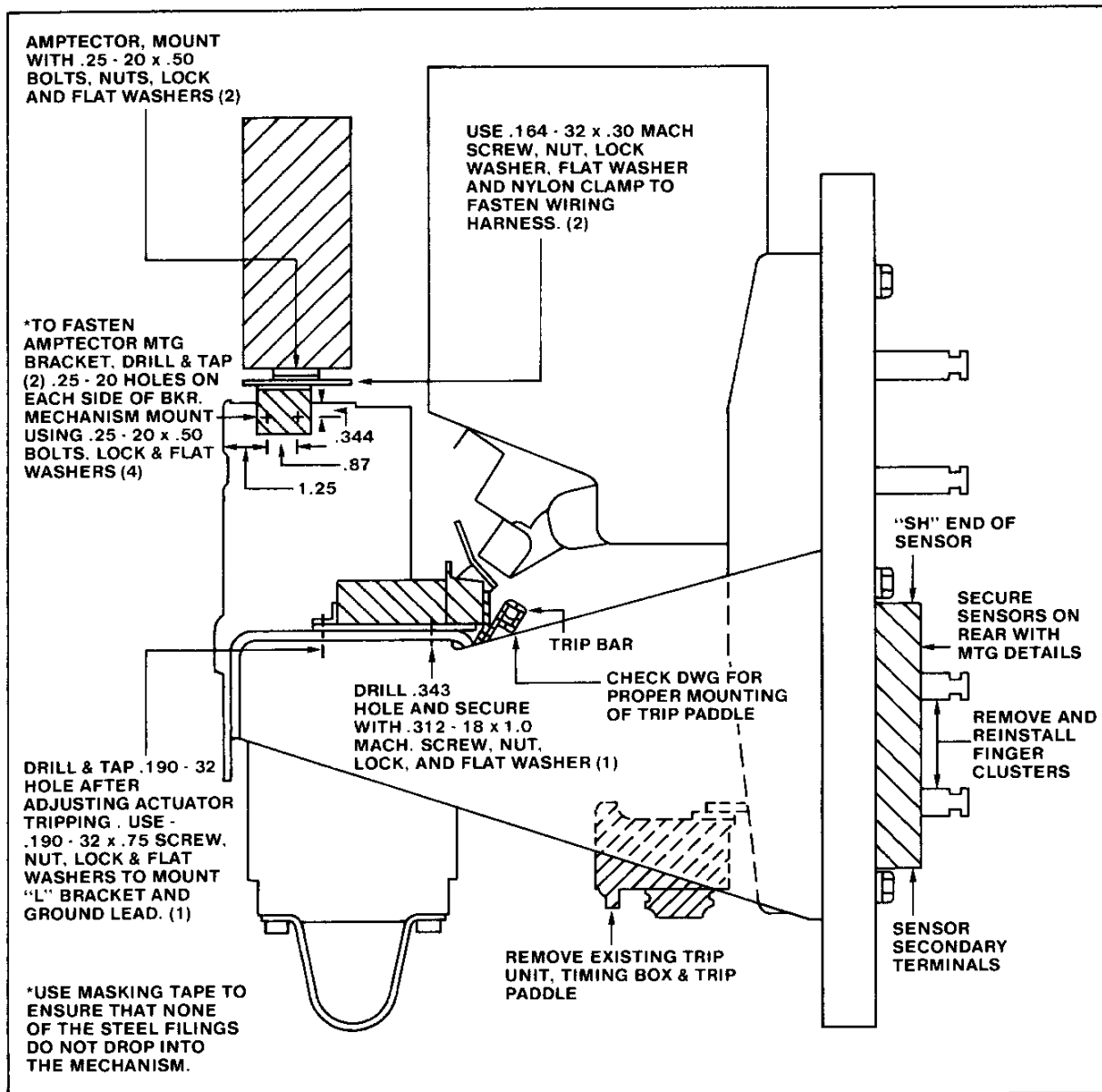


Fig. 25 Right Side View of DB-75 and DB-100

Type DB-75 and DB-100 Breakers, Available Current

Breaker Type	Desired Current (Amperes)	Choose Sensor Style Number	and	Correct Corrections Are Taps
DB-75	2000	8184A43H01		X1* - X2
DB-75	2500	8184A43H01		X1* - X3
DB-75	3000	8184A43H01		X1* - X4
DB-100	4000	8184A44H01		X1* - X2

* = This terminal has polarity

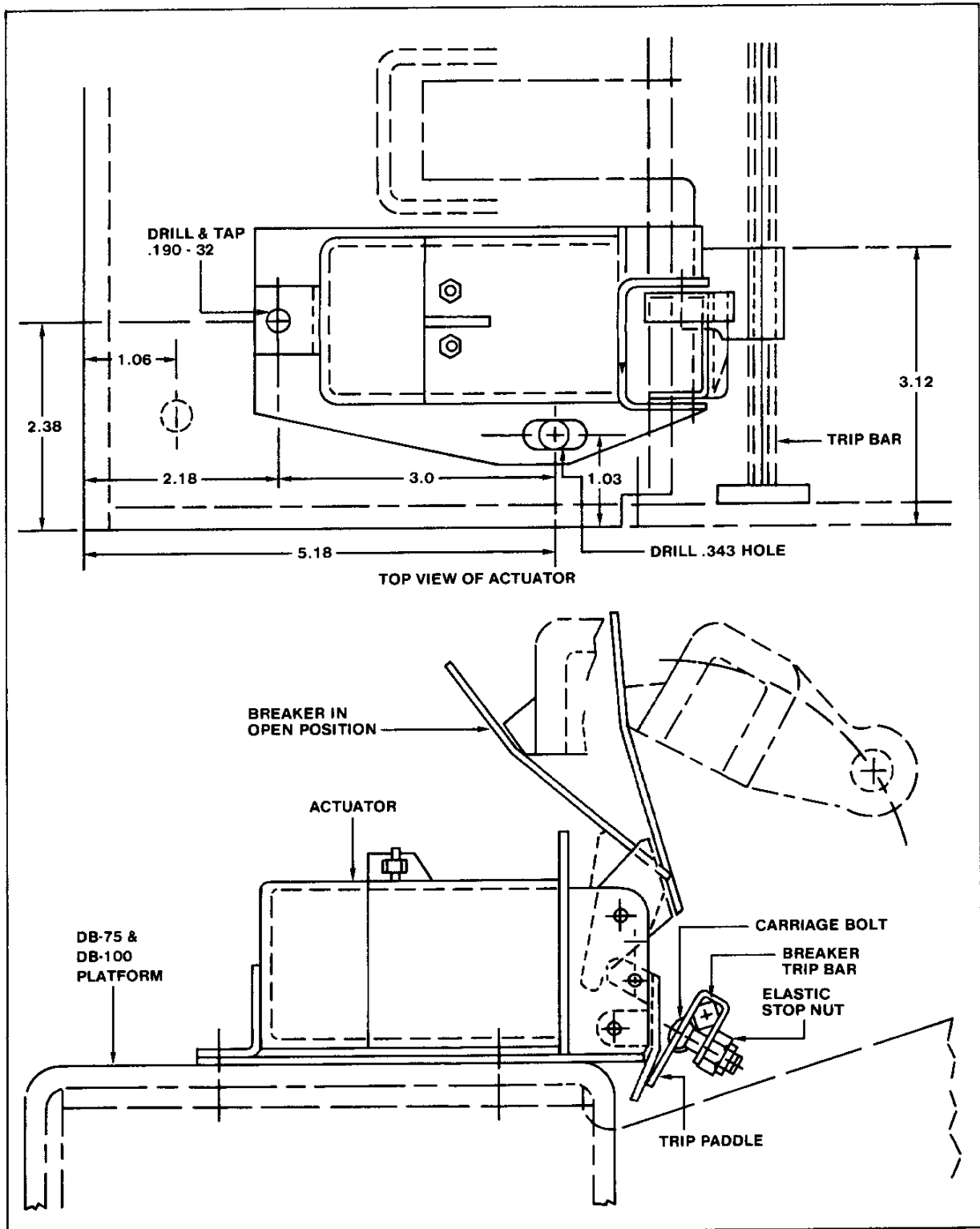


Fig. 26 Positioning of Actuator Relative to Trip Bar DB-75/100

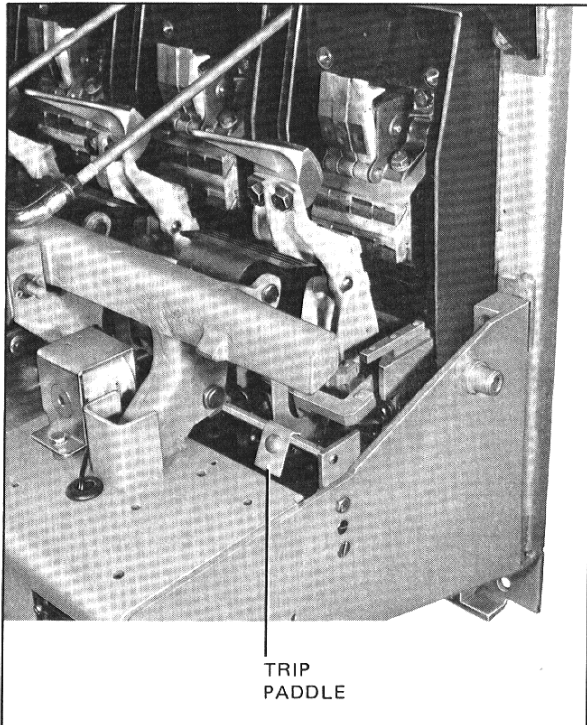


Fig. 27 Positioning of Actuator Trip Paddle DB-75/100

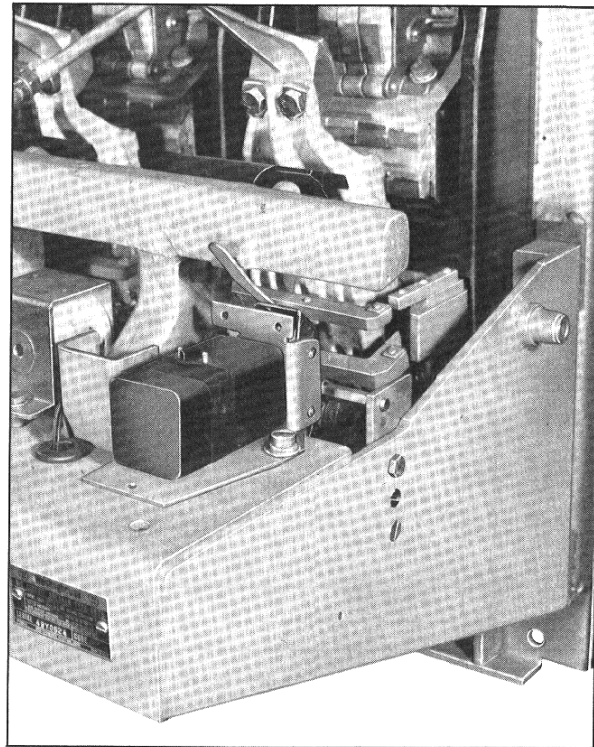


Fig. 29 Actuator in Place and Readied for Drilling .190-32 Hole

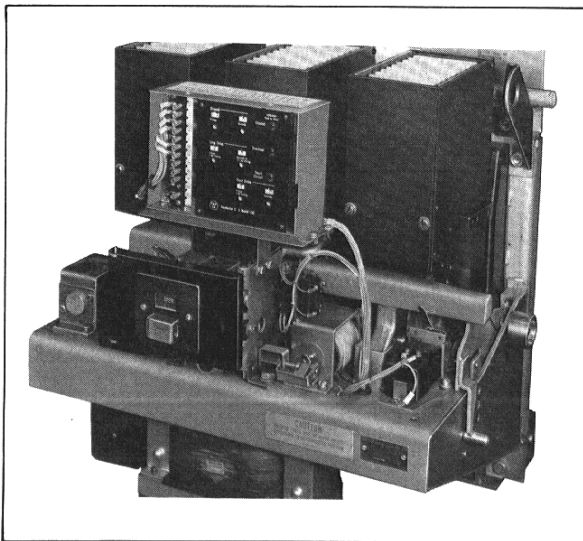


Fig. 28 Amptector and Actuator Mounting DB-75/100

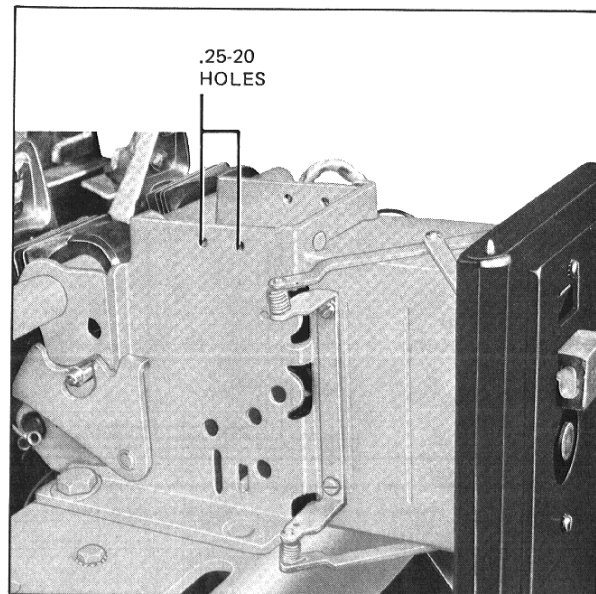


Fig. 30 Location of Holes for Amptector Bracket

PLACEMENT OF AMPTECTOR

1. Remove breaker mechanism top cover, and place masking tape on the inside of the mechanism to catch any metal chips which may fall during the drilling and tapping process.
2. Drill and tap four (4) .25-20 holes, two (2) on each side .87" between centers, 1.25" from the front, and .344 from top of breaker mechanism side frame, see Figs. 25 and 30. It is recommended that .125 dia. holes be drilled first.
3. Clean burred edges and remove masking tape making sure that none of the metal chips have dropped into the mechanism.
4. Reinstall the mechanism top cover.
5. The amptector "mounting assembly" consists of a steel plate with two (2) .203 dia. holes, and two (2) 25-20 tapped holes, and two (2) "L" brackets welded to it and 4" apart. Each "L" bracket has two .281 dia. holes, which line up with the newly .25-20 tapped holes when the assembly is fitted onto the breaker, Fig. 31, secure the assembly to the breaker mechanism, with the .203 dia. holes in plate towards the arc chutes, use .25-20 x .50 bolts, lock and flat washers. **Do not use longer bolts, as they will interfere with the mechanism linkages.**
6. Mount Amptector on the steel plate with .25-20 x .50 bolts, nuts and washers, Fig. 32.

WIRING HARNESS AND SENSORS

1. Dependent upon which amptector was supplied, acquaint yourself with the appropriate wiring scheme, see Fig. 7. If the ground element is not utilized, remove the associated wiring from the harness.
2. Check each lug on the harness to ensure they are properly secured to the wires.
3. Place rubber grommet in .781 dia. hole in breaker platform, hole is located to the left of the actuator.
4. Feed the amptector end of the wiring harness through the grommet from the under side of the breaker, wire should be behind the amptector, Fig. 33.
5. Place grommet onto the wiring harness and connect the leads to the amptector per wiring diagram, attach grommet to the split hole on the left front side of amptector, Fig. 10.
6. Connect the black wires to the actuator using .138-32 nut, lock and flat washers, Fig. 13 being certain to observe polarity marked on wires.
7. Connect the white wire to the .190-32 x .75 screw on the actuator and firmly secure the actuator to the platform. This now grounds the sensor star point, Fig. 13.
8. Remove the finger clusters from the three lower studs, remove the two (2) .50-13 x 1.25 bolts located directly in the middle of the studs. Place the sensor mounting bracket with the nipples facing the two holes from where the bolts were removed and secure with two (2) .50-13 x 2.25 bolts and washers, (Fig. 34). Slide the sensors onto the studs, do not force the sensors on, due to close tolerances the sensor may be inched from side to side to get them properly mounted. Once the sensor is up against the back plate secure it with the mounting bracket using the .25-20 x .50 panhead screw, (Fig. 35). The sensor must be mounted with the end marked with the letters "SH" on top. These sensors have a special shield to minimize the effect of stray flux.

NOTE: The sensors fit both the cast aluminum panels and formed panels without any modification.

9. Wire the leads to the sensors and secure the wiring harness to the amptector mounting plate using the .203 dia. holes and .164-32 x .5 screw, nut, washers and nylon clamps, Fig. 25.

TEST

Using the amptector test kit or a power supply.

1. Check operation of the amptector/actuator system sufficient number of times to insure proper operation.
2. Set the amptector dials to the required settings and verify that the amptector is in calibration.
3. Record the settings on the side of the amptector for a permanent record.

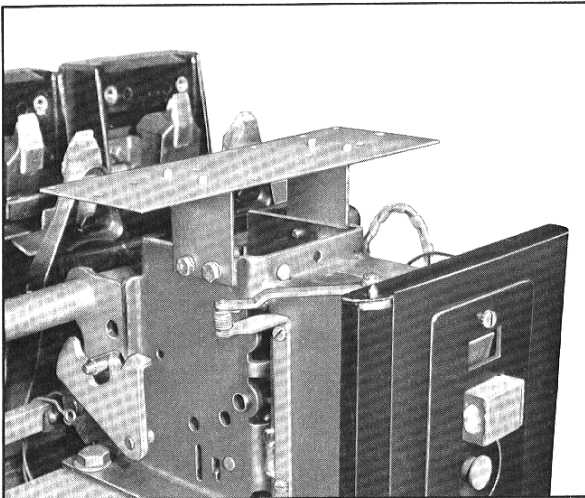


Fig. 31 Amptector Mounting Bracket

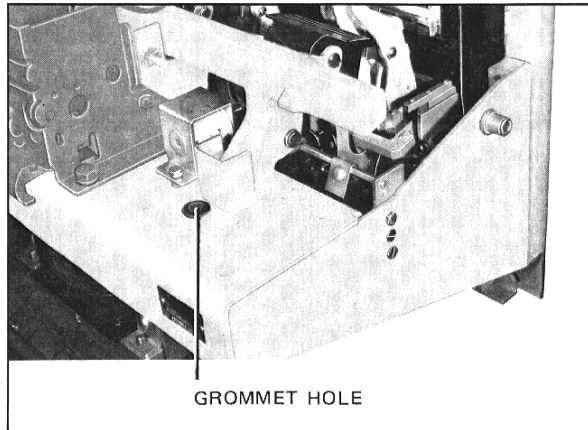


Fig. 33 Location of Grommet for Harness DB-75/100

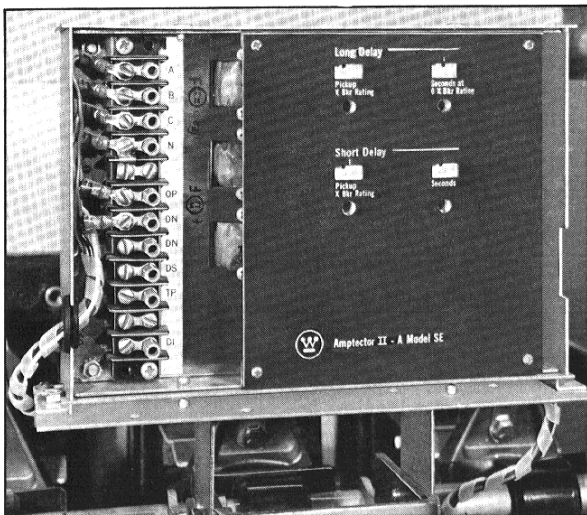


Fig. 32 Amptector Mounted on Bracket DB-75/100

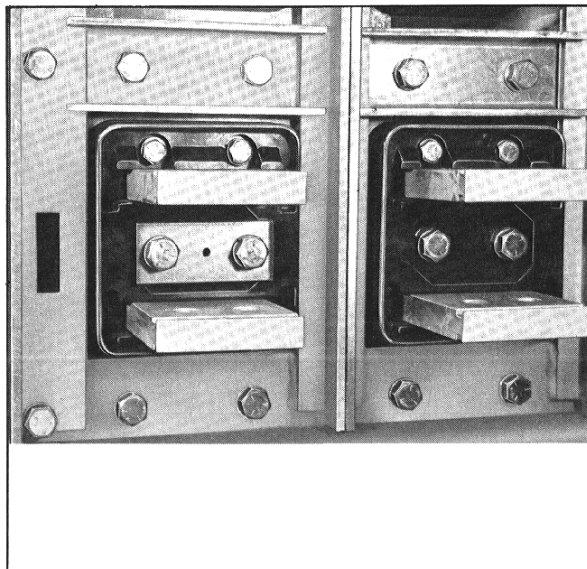


Fig. 34 Sensor Mounting Detail DB-75/100

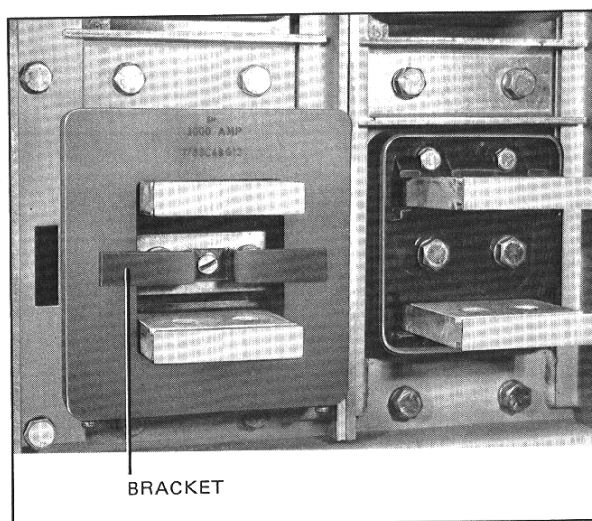


Fig. 35 *Sensor Mounted in Place with Bracket*

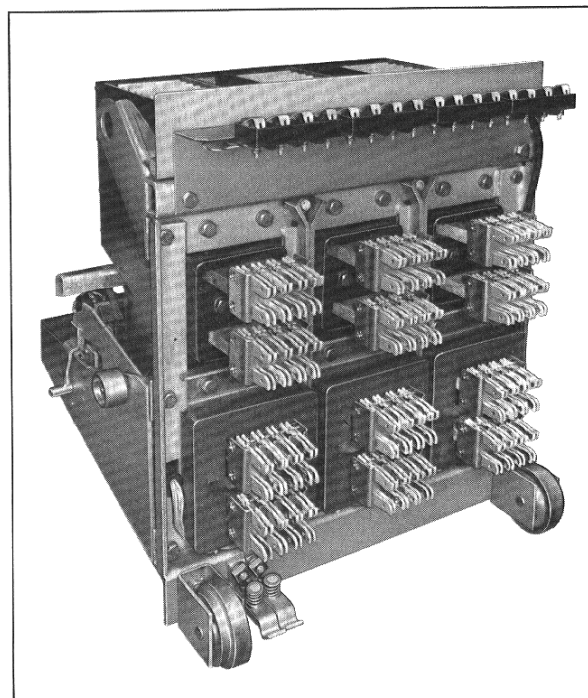


Fig. 36 *Sensors Mounted and Wired*