

**Instructions for the Digitrip RMS 310 3-Pole and 4-Pole Trip Unit Installation and Operation with L-Frame and MDL-Frame Series C Circuit Breakers**

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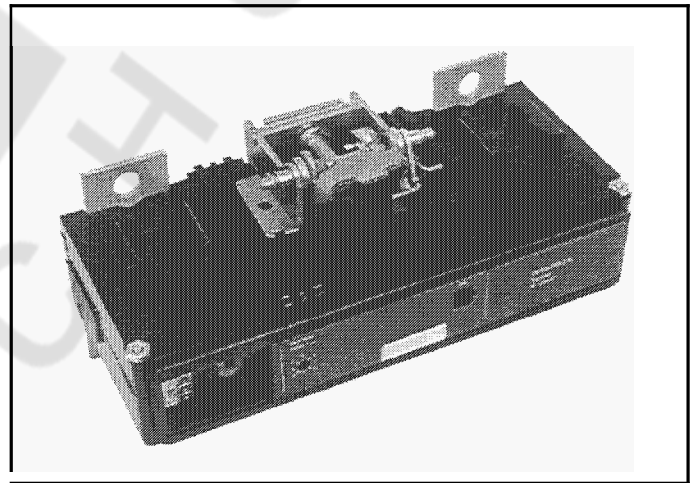
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**PRESENT BEFORE PROCEEDING WITH THE TASK, AND ALWAYS FOLLOW GENERALLY ACCEPTED SAFETY PROCEDURES.**

**CUTLER-HAMMER IS NOT LIABLE FOR THE MISAPPLICATION OR MISINSTALLATION OF ITS PRODUCTS.**

The user is cautioned to observe all recommendations, warnings, and cautions relating to the safety of personnel and equipment as well as all general and local health and safety laws, codes, and procedures.

The recommendations and information contained herein are based on Cutler-Hammer experience and judgement, but should not be considered to be all-inclusive or covering every application or circumstance which may arise. If any questions arise, contact Cutler-Hammer for further information or instructions.



*Fig. 1 Digitrip RMS 310 Trip Unit for 3-Pole L-Frame & MDL Frame Series C Circuit Breaker*

**1.0 GENERAL INFORMATION**

**1.1 Protection**

The Digitrip RMS 310, illustrated in Figure 1, is an electronic trip unit that incorporates a microprocessor-based custom application specific integrated circuit design for use with Series C L-Frame and MDL Frame Molded Case Circuit Breakers.

The Digitrip RMS 310 provides true RMS current sensing for proper correlation with thermal characteristics of conductors and equipment. Interchangeable rating plugs



**WARNING**

**DEATH, SEVERE PERSONAL INJURY, OR SUBSTANTIAL PROPERTY DAMAGE CAN RESULT FROM CONTACT WITH ENERGIZED EQUIPMENT. DO NOT ATTEMPT INSTALL OR PERFORM MAINTENANCE ON EQUIPMENT WHILE IT IS ENERGIZED. ALWAYS VERIFY THAT NO VOLTAGE IS**

are provided to establish the continuous current rating of each circuit breaker.

The Digitrip RMS 310 Trip Unit is completely self-contained and when the circuit breaker is closed, requires no external power to operate its protection systems. It operates from current signal levels and control power derived through current sensors integrally mounted in the trip unit.

Digitrip RMS 310 Trip Units are suitable for 50/60 Hz AC applications only. For DC applications, a thermal-magnetic trip unit should be used.

The Digitrip RMS 310 Trip Unit is available in 4 different types, (see Table 1-1). Each trip unit contains a fixed long delay time function (adjusted by changing the rating plug), and may be equipped with a maximum of two phase and two ground (time-current) adjustments to meet specific application requirements. The types of adjustments available for each model include the following:

Adjustment	Type
1) Short Delay Pick-up	LESxxxLS,-LSE,-LSP or MESxxxLS
2) Short Delay Pick-up/Short Delay Time	LESxxxLSI,-LSIE,-LSIP or MESxxxLSI
3) Short Delay Pick-up/Ground Fault Pick-up/Ground Fault Time	LESxxxLSG, or MESxxxLSG
4) Short Delay Pick-up/Short Delay Time Ground Fault Pick-up/Ground Fault Time	LESxxxLSIG or MESxxxLSIG

**2.0 UL LISTED DEVICES**

The Digitrip RMS 310 Trip Unit is listed in accordance with Underwriters Laboratories, Inc. Standard UL489, under File E7819 and satisfies the applicable requirements of the International Electrotechnical Commission (IEC) recommendations for molded case circuit breakers.

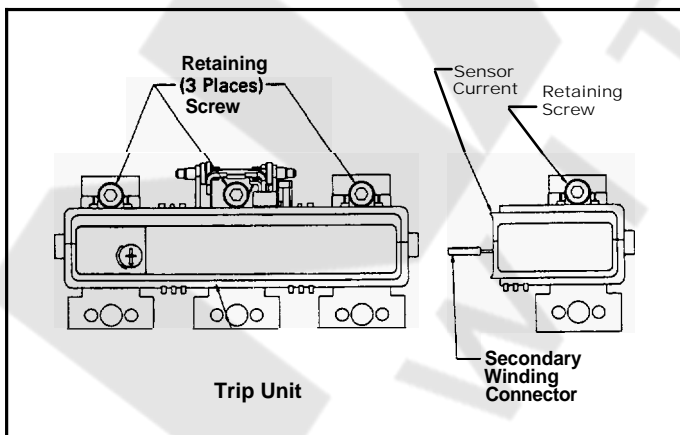


Fig.2 Preliminary Alignment of Trip Unit and Current Sensor

**3.0 INSTALLATION**

**3.1 Preparation (All Trip Units)**

The installation procedure consists of inspecting and installing the trip unit and rating plug. To install the trip unit, perform the following steps.

**Note: If required, internal accessory installation should be done before the circuit breaker is mounted and connected. Refer to individual accessory instruction leaflets.**

Make sure that the trip unit is suitable for the intended installation by comparing nameplate data with any existing equipment and system requirements. Inspect the trip unit for completeness, and check for damage before installing it in the circuit breaker frame.

**Note: Trip unit center retaining screw is captive in the trip unit conductor; the remaining retaining screws (2 for a 3-pole trip unit, 3 for a 4-pole trip unit) are supplied with the frame.**

Remove circuit breaker pan-head cover screws, and cover. To continue installation, proceed to the section applicable to the trip unit being installed:

Trip Unit Type	Section
4-pole Type Trip Unit	3.2
3-pole Ground Fault Trip Unit	3.3
3-pole Non-Ground Fault Trip Unit	3.4

**3.2 4-Pole Trip Unit Installation**

Remove the three screws for the left- and right-pole and fourth pole contact bases (Fig. 3) from the hardware bag.

Place the trip unit and fourth pole current sensor side by side on a flat surface. (See Fig. 2)

Remove the CAUTION tag from the current sensor secondary winding leads.

**Note: Secondary winding connector is not polarized.**

Plug the current sensor secondary winding connector into the receptacle in the side of the trip unit. Either polarity is acceptable.

**Note: The two trip unit outer retaining screws and fourth pole sensor retaining screw may be placed in the trip unit conductor holes at this time. If preferred, the 5/16 inch hexagonal-head wrench may be used to position the screws when the trip unit is in the base.**

Position trip unit and fourth pole current sensor in base. Make sure latch bracket pin is properly seated in slots in side plates (see Fig. 4). If necessary, push circuit breaker handle towards the closed position to help seat trip unit.

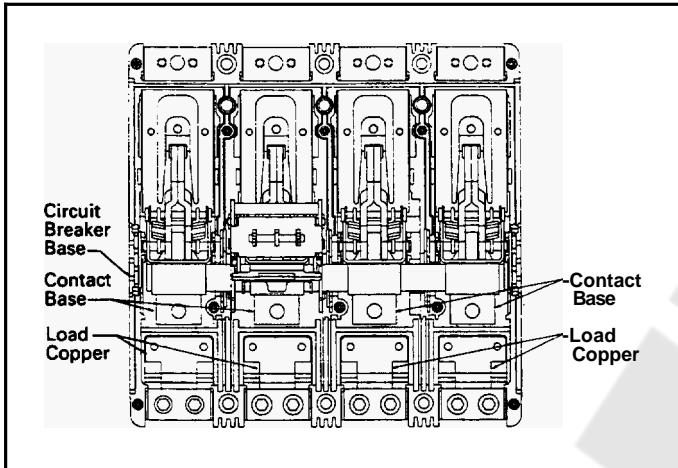


Fig. 3 Contact Bases and Load Copper

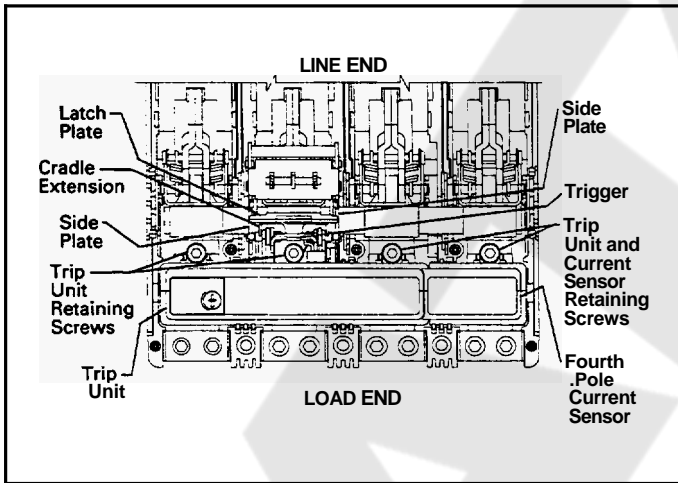


Fig. 4 Trip Unit Installed in Circuit Breaker



**CAUTION**

**DO NOT EXCEED A TORQUE OF 12 LB-FT (16.27 N.M). EXCESSIVE TORQUING WILL SHEAR SCREWS.**

**FAILURE TO APPLY THE REQUIRED TORQUE MAY LEAD TO EXCESSIVE HEATING AND CAUSE NUISANCE TRIPPING OF THE CIRCUIT BREAKER.**

Screw in and tighten three trip unit retaining screws (center first) and the screw for the fourth pole current sensor. Torque to 12 lb-ft (16.27 N.m) (see Fig. 4).

Finish installation of the 4-pole Trip Unit by following the instructions in Section 3.5.

**3.3 Ground Fault Trip Unit Installation**

**3.3.1 General**

Ground fault trip units are supplied from the factory with a wire harness with pigtail lead connections for a neutral current sensor (white and grey wires) and a ground fault alarm relay (yellow and green wires). A neutral current sensor is provided with each trip unit, and the ground fault alarm relay is ordered and shipped separately if required. If the alarm relay is not required, the green and yellow leads should be cut off before the trip unit is installed in the breaker.

Digitrip RMS 310 Ground Fault Trip Units detect ground fault currents through Residual Sensing. They are not designed to use source ground or zero sequence ground fault sensing methods. If the system neutral is grounded, but no phase to neutral loads are used, the neutral current sensor is not necessary. In that case, the white and grey leads on the trip unit should be cut off before installation.

If the system neutral is grounded and phase to neutral loads are used, then the neutral current sensor (see Fig. 5) must be used. It should be connected to the breaker according to the diagram in Fig. 6. It has the same turns ratio as the phase current sensors in the trip unit.

**Note: The polarity of the sensor connections is critical. Always observe the polarity markings on the installation drawings. The polarity markings are identified as white dots on the transformer. To insure correct ground fault equipment performance, conduct field tests to comply with National Electric Code requirements under article 230-95(C). See Section 6.2 for testing instructions.**

The optional "Internal Accessories" listed in Section 8.2 are available for installation in a Digitrip RMS 310 Ground Fault Trip Unit. These items, if required, must be ordered separately.

**3.3.2 Installation**

Plug the wire harness supplied for the neutral current sensor and ground fault alarm relay (white, grey, yellow and green wires) into the connector located in the right pole of the trip unit. With the correct polarity the harness should snap into place. Do not force the harness into the connector with the wrong polarity.

Remove trip unit outer pole screws and red plastic washers from the breaker frame. Discard red plastic washers (fig. 7). For the MDL-frame, also remove the load end trip unit mounting screws from the frame (fig. 7a).

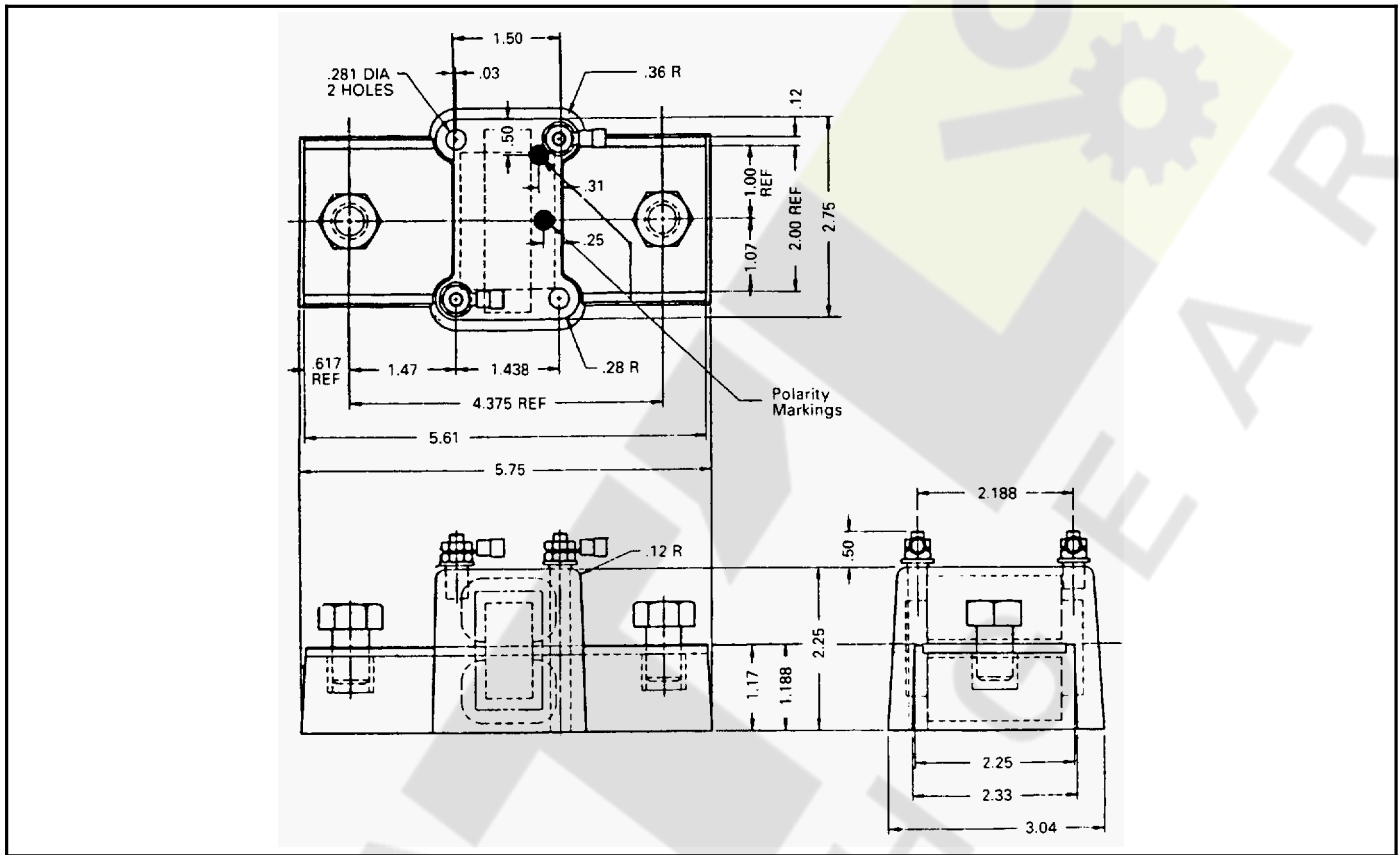


Fig. 5

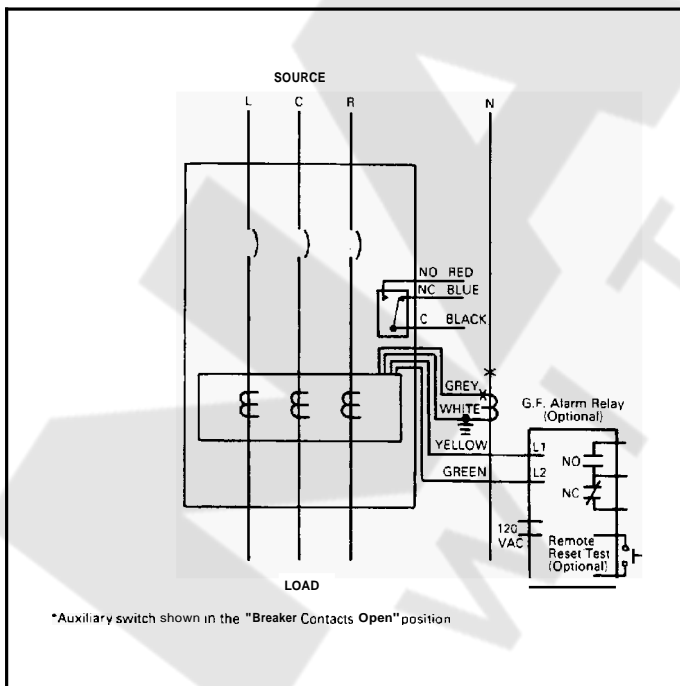


Fig. 6

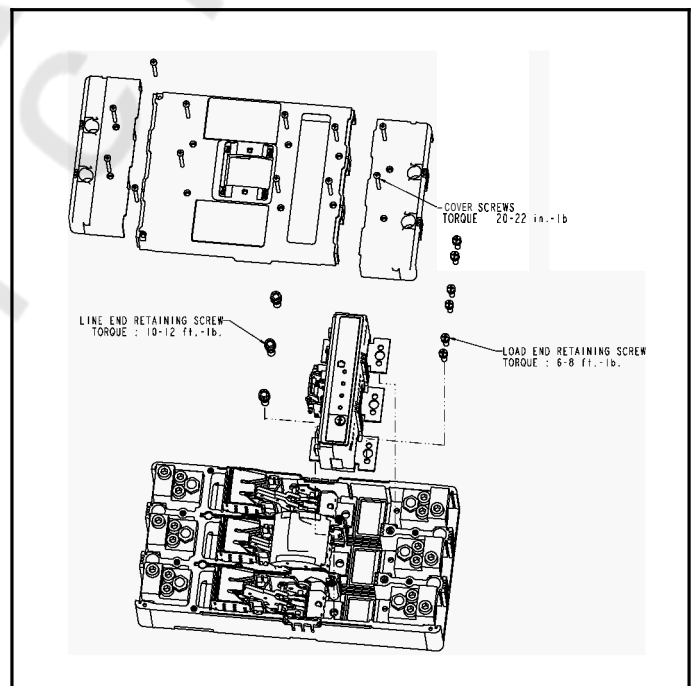


Fig. 7a MDL Trip Unit Installation



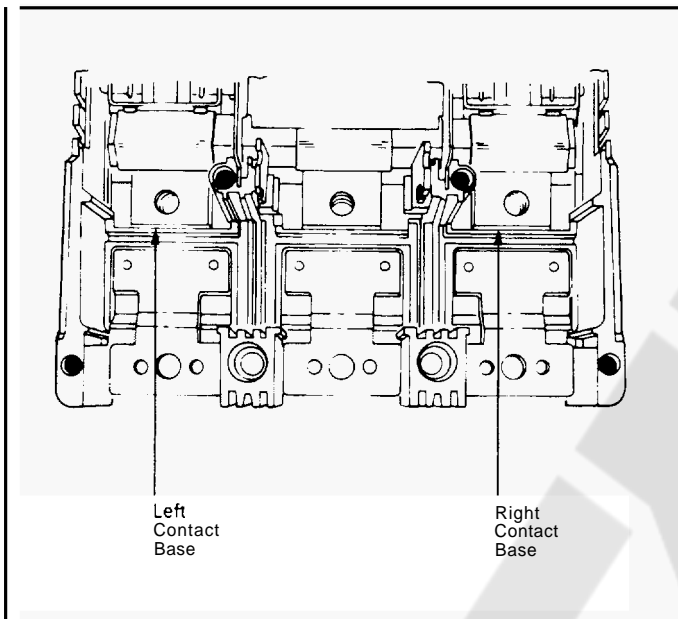


Fig. 7 Left- and Right-Pole Contact Bases

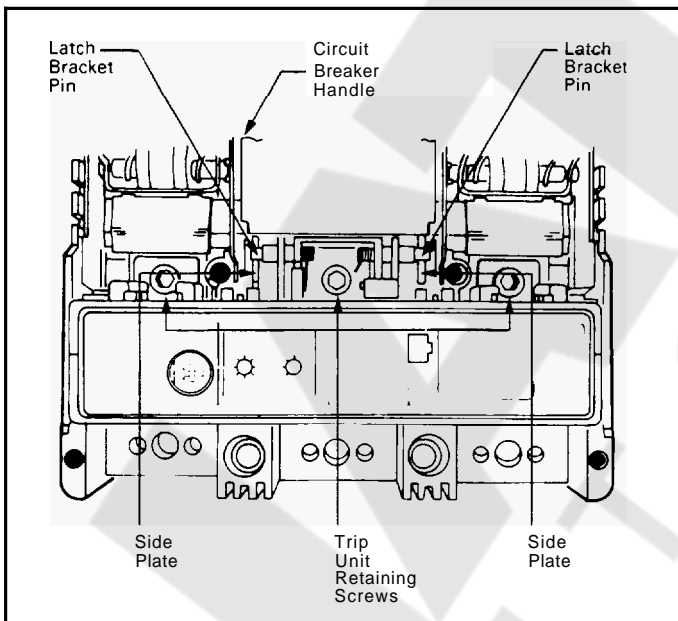


Fig. 8 Trip Unit Installed in Circuit Breaker

Note: The two trip unit outer retaining screws may be placed in the trip unit conductor holes at this time. If preferred, the 5/16 inch hexagonal-head wrench may be used to position the screws when the trip unit is in the base.

Position trip unit in base. Make sure latch bracket pin is properly seated in slots in side plates (see Fig. 8). If necessary, move latch toward load end of circuit breaker to seat trip unit.

Screw in and tighten three trip unit retaining screws (center first). Torque to 12 lb-ft (16.27 N.m) (see Fig. 8).



**CAUTION**

**DO NOT EXCEED A TORQUE OF 12 LB-FT (16.27 N.m). EXCESSIVE TORQUING WILL SHEAR SCREWS.**

**FAILURE TO APPLY THE REQUIRED TORQUE MAY LEAD TO EXCESSIVE HEATING AND CAUSE NUISANCE TRIPPING OF THE CIRCUIT BREAKER.**

For an MDL-frame, also screw in and torque the load end screws to 6-8 lb-ft. (8.14-10.85 N.m.).

3.4 3-Pole (Non-Ground Fault) Trip Unit Installation

Remove trip unit outer pole screws and red plastic washers from the breaker frame. Discard red plastic washers (fig. 7). For the MDL-frame, also remove the load end trip unit mounting screws from the frame (fig. 7a).

Note: The two trip unit outer retaining screws may be placed in the trip unit conductor holes at this time. If preferred, the 5/16 inch hexagonal-head wrench may be used to position the screws when the trip unit is in the base.

Position trip unit in base. Make sure latch bracket pin is properly seated in slots in side plates (see Fig. 8). If necessary, move latch toward load end of circuit breaker to seat trip unit.

Screw in and tighten three trip unit retaining screws (center first). Torque to 12 lb-ft (16.27 N.m) (see Fig. 8).



**CAUTION**

**DO NOT EXCEED A TORQUE OF 12 LB-FT (16.27 n.M). EXCESSIVE TORQUING WILL SHEAR SCREWS.**

**FAILURE TO APPLY THE REQUIRED TORQUE MAY LEAD TO EXCESSIVE HEATING AND CAUSE NUISANCE TRIPPING OF THE CIRCUIT BREAKER.**

For an MDL-frame, also screw in and torque the load end screws to 6-8 lb-ft. (8.14-10.85 N.m.)

### 3.5 Final Installation Instructions (All Trip Units)

Install accessory(ies), if required, using the appropriate instruction leaflet listed in Section 8.2. Where accessories are not required, install protective barriers supplied with the trip unit in accessory retaining slots in left- and right-hand poles of trip unit and in fourth pole current sensor if applicable.

Make sure interphase barriers and sliding handle barrier are in place.

Install circuit breaker covers and pan-head screws as shown in Fig. 9.



## CAUTION

**THE RATING PLUG MECHANICALLY INTERLOCKS WITH THE TRIP UNIT. IF THE RATING PLUG IS NOT CORRECTLY INSTALLED, THE CIRCUIT BREAKER CANNOT BE RESET OR PLACED IN THE "ON" POSITION.**

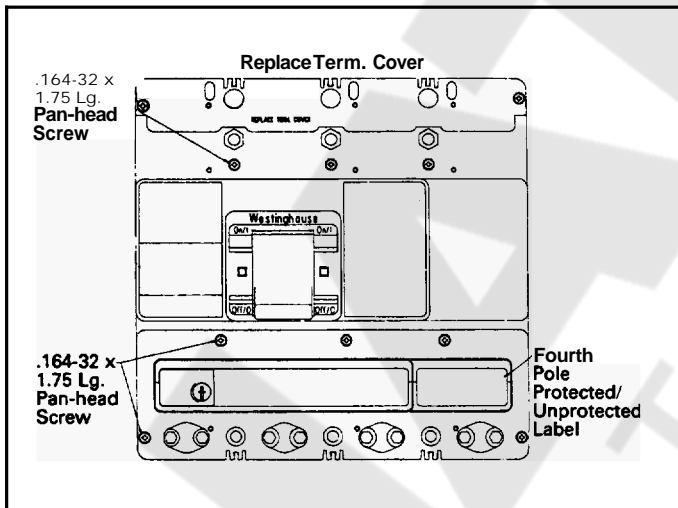


Fig. 9 Cover Screw Installation Positions

Note: Before attempting to install the rating plug, the arrow in the Push-to-Trip button portion of the plug must be pointing toward the REMOVE position. This can be done with a small screwdriver.

Install rating plug. Position the rating plug as shown in Fig. 10. Insert the rating plug in the trip unit. The pins and plunger must align correctly with the matching receptacles and slot in the trip unit. After the rating plug is pressed into position, depress the Push-to-Trip button with a small screwdriver and turn it clockwise one quarter of a turn

until the arrow points to ENGAGED. If an adjustable rating plug is used, four continuous current settings are possible. Set the switch marked A, B, C, D to the current rating desired.

Note: The reverse procedure is used to remove the rating plug. Turn the Push-to-Trip button to the remove position. This action will cause the circuit breaker to trip. Then grasp the lip of the Push-to-Trip button and gently pull. A small screwdriver placed under the left edge of the rating plug will assist in removal.

Reset circuit breaker by moving handle to the reset position. Move handle to the ON position. Circuit breaker handle should remain at the ON position.

Press Push-to-Trip button (in rating plug) to check manual tripping of the circuit breaker.

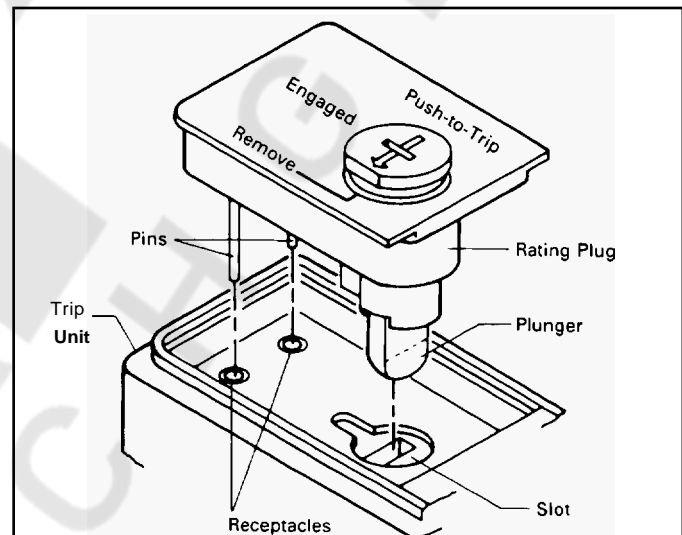


Fig. 10 Installing Rating Plug

## 4.0 PRINCIPLE OF OPERATION

In open air at 40°C, an L-Frame circuit breaker or an M-Frame circuit breaker with a Digitrip RMS 310 Trip Unit installed will carry continuously up to 600 amperes or 800 amperes respectively without exceeding a 50°C rise at properly sized and installed terminations. The calibration of the trip unit is insensitive to ambient temperatures over a range of -20° to +55°C. However, the trip unit contains thermal temperature protective circuitry that initiates a trip operation for self-protection if the internal ambient temperature at the printed circuit board (PCB) reaches approximately 100°C. This may occur for open air temperatures above 40°C with circuit breaker currents near full load.

For ambient conditions above 40°C and where the maximum ampere rating plug has been installed, derating of the circuit breaker frame should be considered to avoid exceeding a safe terminal temperature operating range. Consult Cutler-Hammer for recommendations.

#### 4.1 General

The Digitrip RMS 310 Trip Unit provides a tripping signal to the flux transfer shunt trip when current and time delay settings are exceeded. This is accomplished by employing the Cutler-Hammer custom designed integrated circuit Sure™ chip, which includes a microcomputer to perform its numeric and logic functions.

In the Digitrip RMS 310 Trip Unit, all required sensing and tripping power to operate its protection function is derived from the current sensors in the circuit breaker. The secondary currents from these sensors provide the correct input information for the protection functions, as well as tripping power, whenever the circuit breaker is carrying current. These current signals develop analog voltages across the appropriate calibrating resistors.

The microcomputer, in cyclic fashion, repeatedly scans the voltage values across each calibrating resistor and enters these values into memory. These data are used to calculate true RMS current values, which are then repeatedly compared with the protection function settings and other operating data stored in the memory. The software program then determines whether to initiate protection functions, including tripping the breaker through the flux transfer shunt trip device in the circuit breaker.

**4.2 Overload Trip:** In accordance with standards requirements, the trip unit initiates a trip of the circuit breaker within two hours for an overload of 135 percent, and will trip in less time for higher overload currents.

A "Thermal Memory" effect prevents the breaker from being re-energized immediately after an overload. A "cooling off" period of up to 5 minutes is required, which allows time for cabling to cool off.

**4.3 Short Delay Instantaneous Trip:** For short circuit conditions that exceed the short delay pick-up settings, the trip unit initiates a trip after a delay prescribed by the I<sup>2</sup>t ramp function for trip units with catalog number suffixes LS, LSE, LSP, and LSG. A flat response time delay action is provided by trip units with catalog number suffixes LSI, LSIE, LSIP, and LSIG unless the instantaneous (I) setting is selected.

**4.4 Ground Fault Protection:** When selected, ground fault pick-up and time delay settings shown in Table 1-2 allow selective ground fault coordination with other circuit protection devices.

## 5.0 PROTECTION SETTINGS

### 5.1 General

Prior to placing any circuit breaker in operation, each trip unit protection setting must be set to the values specified by the engineer responsible for the installation. The available settings along with the effect of changing the settings are illustrated in Figures 12-1 to 12-3. The installed rating plug establishes the maximum continuous current rating (I<sub>c</sub>) of the circuit breaker. Short delay current settings are defined in multiples of I<sub>c</sub>. One to four time and pick-up adjustment settings are available depending on the particular trip unit purchased. A rotary switch is provided for each setting. The rotary switch is adjusted using a small flatblade screwdriver (Figure 11).

**A green status light on the face of the trip unit indicates the operational status of the trip unit. If the load current through the circuit breaker exceeds approximately 20% of the maximum current rating of the trip unit, the status light will blink on and off once each second. A blinking status light is an indication of a properly functioning trip unit. If the status light is not blinking, the current through the breakers may be less than 20% of the maximum. If the current exceeds 20% and the status light is not blinking, use the STK2 test kit to investigate (see section 6.1).**



## CAUTION

**LACK OF ILLUMINATION OF THE STATUS LIGHT DOES NOT INDICATE THE TERMINALS OF THE BREAKER ARE DEENERGIZED.**

### 5.2 Short Delay Pick-Up Setting

Seven settings are available that range from 2 to 8 (I<sub>c</sub>) as shown in Figure 12-1. This feature is included on all Digitrip RMS 310 Trip Units.

### 5.3 Short Delay Time Settings

For catalog number LESxxxLS, -LSG, -LSP, -LSE, MESxxxLS and -LSG the short time delay is an I<sup>2</sup>t ramp configuration with the actual time delay a function of the trip current involved.

For catalog number LESxxxLSI, -LSIG, LSIP, -LSIE, MESxxxLSI, and -LSIG, the short time delay is a flat response. Four settings (I, .1, .2, .3 second) are available (see Figure 12-2). The "I" setting gives a trip response with no intentional delay (Instantaneous).

### 5.4 Instantaneous Pickup Setting

For catalog number LESxxxLSI, -LSIG, -LSIP, -LSIE, MESxxxLSI, and -LSIG, Instantaneous Pickup is achieved

by setting Short Delay Time to "I" (Instantaneous.) Short Delay Pickup (see paragraph 5.2) then becomes Instantaneous Pickup.

**5.5 Ground Fault Pick-Up Setting**

Five settings ranging from 1 through 5 (xIG) are available (see Figure 12-3) and correspond to the fixed ampere values listed on the trip unit nameplate and in Table 1.2.

**Note: These ampere values are always the same no matter what rating plug is installed in the circuit breaker.**

Available on Catalog Nos. LES3xxxLSG,-LSIG, MES3xxxLSG, and -LSIG.

**5.6 Ground Fault Time Settings**

The ground fault time delay is a flat response with four settings (I, .15, .3, .5 second) available (Figure 12-3). The

I setting gives a trip response with no intentional delay (Instantaneous). This option is available on Catalog Nos. LES3xxxLSG, -LSIG, MES3xxxLSG, and -LSIG

**6.0 TESTING**

**6.1 Functional Field Testing**

A test receptacle is built into each trip unit to allow use of the STK2 Test Kit. The Test Kit performs a test of the Long Delay, Short Delay and Ground Fault functions.

**6.2 Performance Testing for Ground Fault Trip Units**

**6.2.1 Code Requirements**

The National Electrical Code under Article 230-95-C requires that any ground-fault protection system be performance tested when first installed. The test shall be conducted in accordance with approved instructions

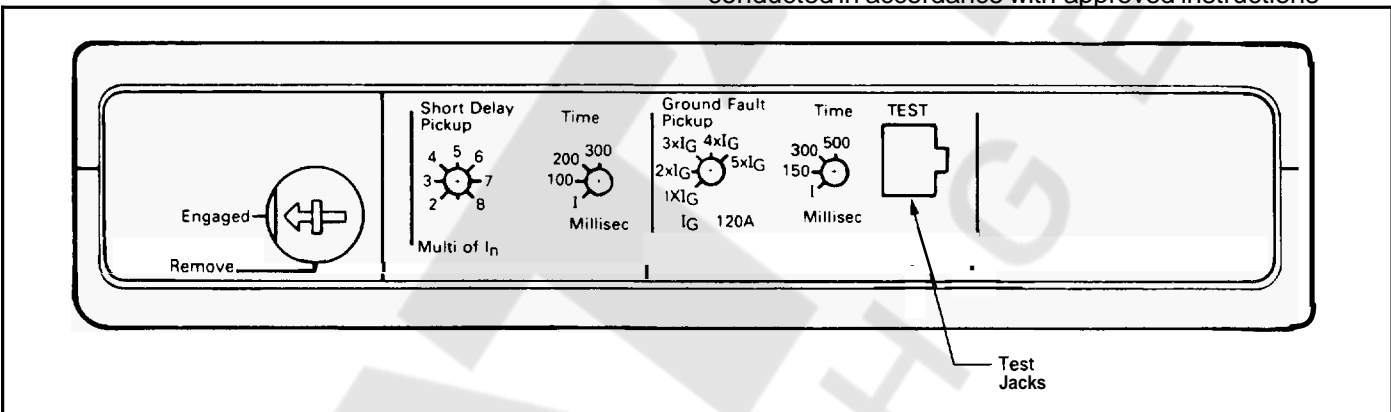


Fig. 11 Adjustment Switches and Test Points

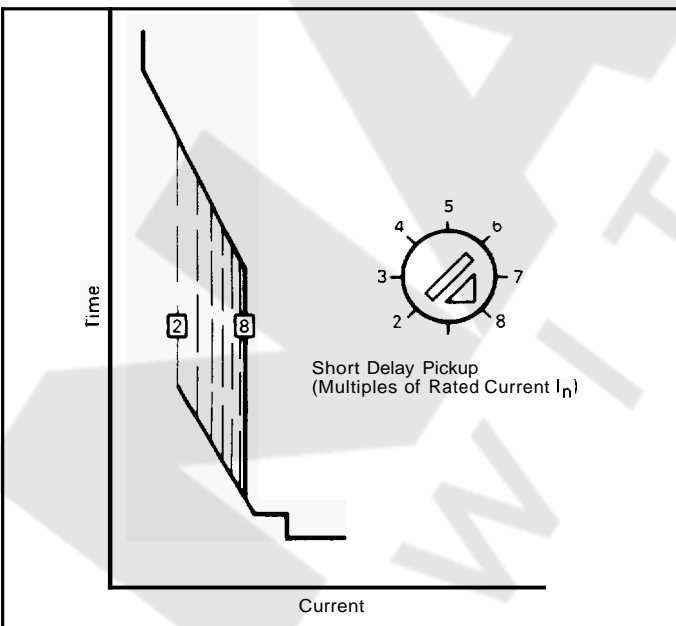


Fig. 12-1 Short Delay Trip Current Adjustment and Curve Details

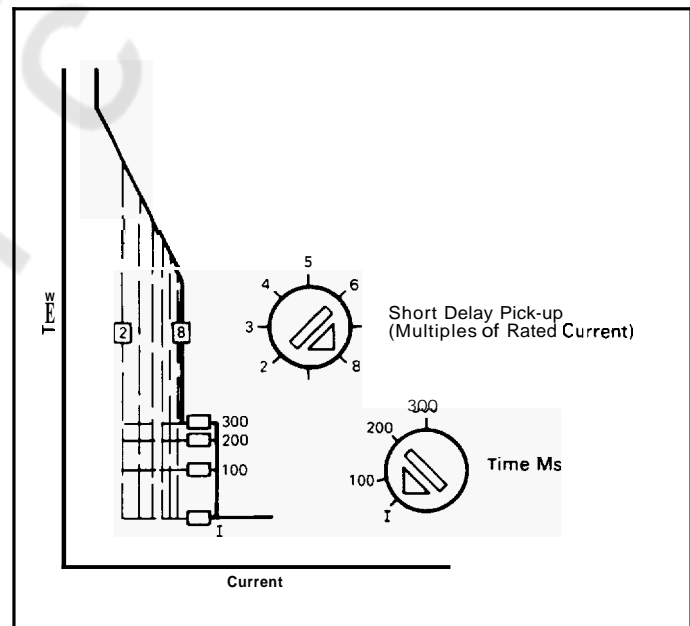


Fig. 12-2 Short Delay Trip Current and Short Delay Trip Time Adjustment and Curve Details



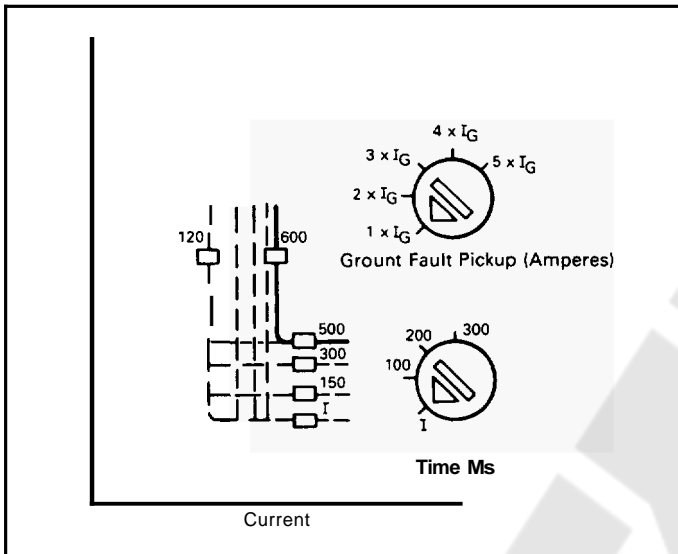


Fig. 12-3 Ground Fault Trip Current, and Ground Fault Trip Time Adjustments and Curve Details

provided with the equipment. A written record of this test shall be made and shall be available to the authority having inspection jurisdiction.

**6.2.2 Standards Requirements**

As a follow-up to the basic performance requirements stipulated by the N.E.C. as stated above, UL Standard No. 1053 requires that certain minimum instructions must accompany each ground fault protection system. These following statements plus a copy of the test record form illustrated in Fig. 16 are shipped with each Digitrip RMS 310 Trip Unit.

**6.2.3 General Test Instructions**

The interconnected system shall be evaluated in accordance with the equipment assembler's detailed instructions by qualified personnel.

The polarity of the neutral sensor connections (if used) must agree with equipment assembler's detailed instructions to avoid improper operations following apparently correct simulated test operations. Where a question exists, consult the specifying engineer and/or equipment assembler.

The grounding points of the system shall be verified to determine that ground paths do not exist that would bypass the sensors. The use of high-voltage testers and resistance bridges may be used.

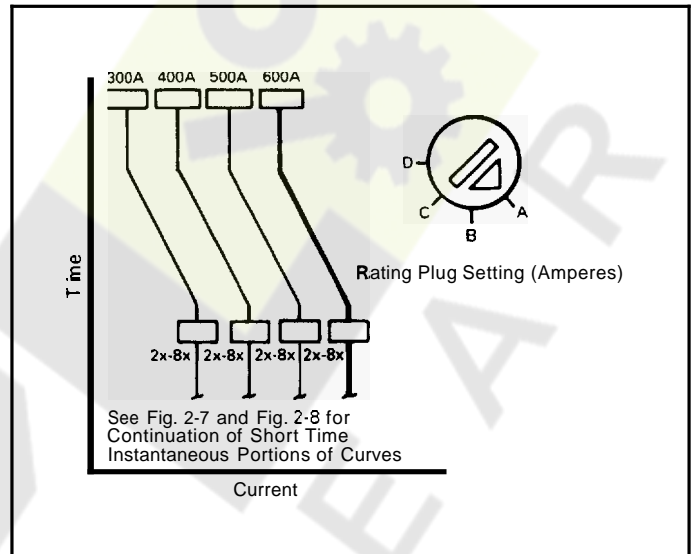


Fig. 13 Optional Adjustable Ampere Setting Rating Plug Used in LES Trip Unit



**WARNING**

**THERE IS A HAZARD OF ELECTRICAL SHOCK OR BURN WHENEVER WORKING IN OR AROUND ELECTRICAL EQUIPMENT. ALWAYS TURN OFF POWER SUPPLYING BREAKER BEFORE CONDUCTING TESTS.**

**Note: Since the Digitrip RMS 310 Trip Units derive their operating power from the phase currents, and not from the neutral current, passing current through the neutral sensor only will not properly test the ground fault feature.**

Using a low voltage (0–24 volt), high current, AC source, apply a test current of 125% of the Digitrip RMS 310 Ground Fault Trip Unit pick-up setting through one phase of the circuit breaker, as shown in Fig. 14-1. This should cause the breaker to trip in less than 1 second, and if an alarm indicator is supplied, it should operate. Reset the breaker and the alarm indicator. Repeat the test on the other two phases.

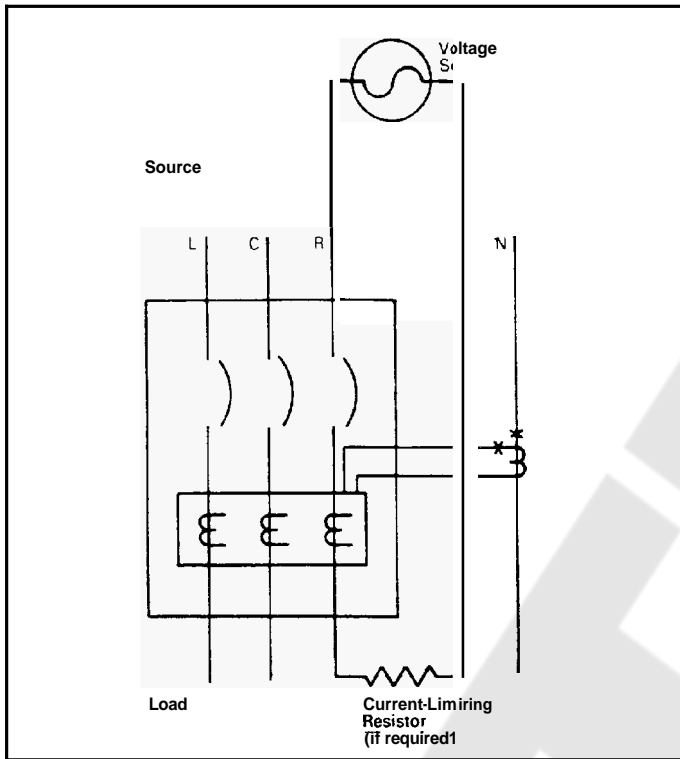


Fig. 14-1 Connections for Ground Fault Trip Test

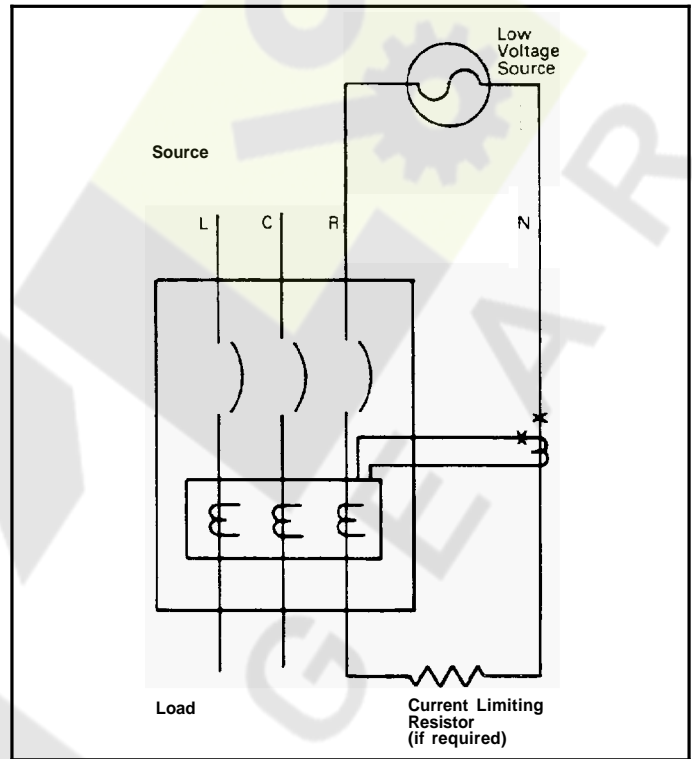


Fig. 14-2 Connections for Ground Fault No-Trip Test, with a Four-Wire System

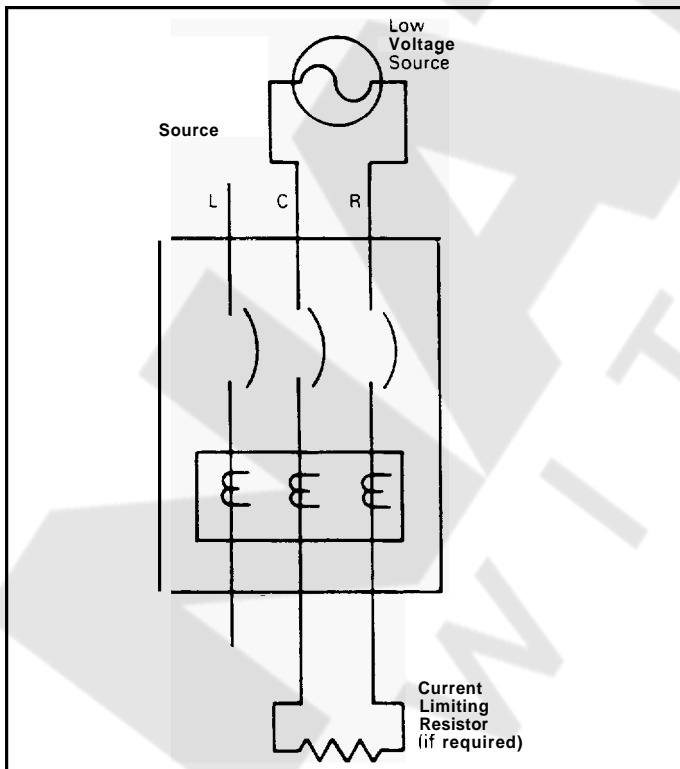


Fig. 14-3 Connections for Ground Fault No-Trip Test, with a Three-Wire System

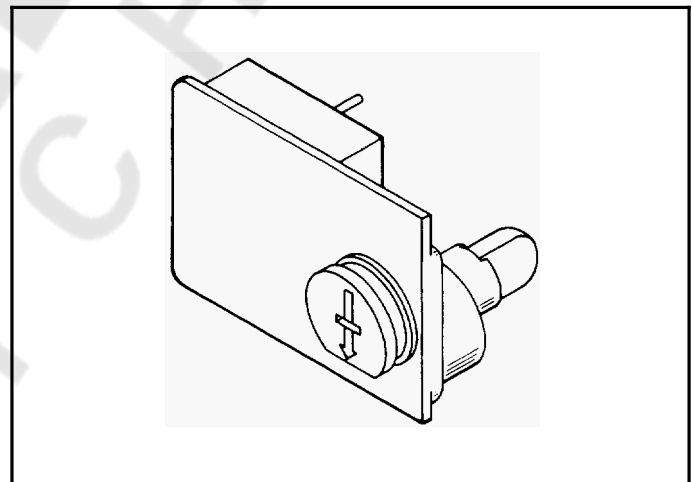


Fig. 15 Typical Rating Plug

**GROUND FAULT TEST RECORD FORM**

Ground Fault Test Record should be Retained by Those in Charge of the Building's Electrical Installation in order to be available to the Authority having Jurisdiction.

Test Date	Circuit Breaker Number	Results	Tested By:

Fig. 16 Typical Performance Test Record Form

If the system is a 4-wire system with a neutral current sensor, apply the same current as described above through one phase of the breaker, returning through the neutral sensor, as shown in Fig. 14-2. The breaker should not trip, and the alarm indicator, if supplied, should not operate. Repeat the test on the other two phases.

If the system is a 3-wire system with no neutral current sensor, apply the same current as described above through any two phases of the breaker, with the connections exactly as shown in Fig. 14-3. The breaker should not trip, and the alarm indicator, if supplied, should not operate. Repeat the test using the other two combinations of breaker phases.



## CAUTION

**FIELD TESTING SHOULD BE USED FOR FUNCTIONAL TESTING AND NOT FIELD CALIBRATION OF THE DIGITRIP RMS 310 GROUND FAULT TRIP UNIT.**

**ANY TEMPORARY CONNECTION MADE FOR THE PURPOSE OF CONDUCTING TESTS SHOULD BE RESTORED TO PROPER OPERATING CONDITIONS BEFORE RETURNING THE BREAKER TO SERVICE.**

The results of the test are to be recorded on the test form provided with the equipment.

### 7.0 RATING PLUG

The rating plug, as illustrated in Figure 15, is used to establish the continuous ampere rating of the related circuit breaker.

For adjustable rating plugs (Table 1-2), the primary current carrying conductors used with the breaker must be sized to correspond with the maximum setting of the rating plug, in accordance with National Electric Code requirements.

The Long Delay protection function of the trip unit is set at the rating plug value ( $I_n$ ). The Short Delay and Instantaneous protection functions are set as a multiple of  $I_n$ . The Ground Fault protection function is independent of  $I_n$ .

Different rating plugs are available (Table 1-2) to match the desired current rating and type of circuit breaker into which the trip unit is to be installed.

Complete catalog descriptions of all available rating plugs are given in the applicable circuit breaker supplementary instruction leaflets (see Section 8.0).

## 8.0 REFERENCES

### 8.1 Series C L-Frame Molded Case Circuit Breakers

29C105	Frame Instruction Leaflet
AD 29-167L	Typical Time-Current Characteristic curves for L Frame Breakers

**8.2 Internal Accessories:** The following types of internal accessories, which mount on the trip unit, are available for use. The number of the instruction leaflet covering the installation of each accessory is shown.

■ Alarm (Signal)/Lockout (ASL) Switch .....	I.L. 29C183
■ Auxiliary Switch .....	I.L. 29C123
■ Shunt Trip .....	I.L. 29C146
■ Low Energy Shunt Trip .....	I.L. 29C147
• Undervoltage Release Mechanism (Handle Reset) .....	I.L. 29C170



Table 1-1. Digitrip RMS Trip Unit Types

Trip Unit Functions		Digitrip RMS 310 Trip Unit Type Catalog Numbers									
		31					41				
		e	e	e	e	e	e	e	e	e	e
		LES3600LS LES3630LS MES3800LS	LES3600LSI LES3630LSI MES3800LSI	LES3600LSG MES3800LSG	LES3600LSIG MES3800LSIG	LES4600LSP LES4630LSP	LES4600LSIP LES4630LSIP	LES4630LSE LES4630LSIE	LES4600LS LES4630LS LES4800LS	LES4600LSI LES4630LSI	
Long Delay	Fixed Ampere Rating <sup>①</sup> with Fixed Long Delay	■	■	■	■	■	■	■	■	■	
	Adjustable Ampere Setting with Fixed Long Delay <sup>②</sup>	■	■	■	■	■	■	■	■	■	
Short Delay	Adjustable Short Delay Pick-up with Short Delay Time I <sup>2</sup> t Ramp	●		●		●		●	●	●	
	Adjustable Short Delay Time <sup>③</sup> with Adjustable Short Delay Pick-up, or Adjustable Instantaneous Pick-up <sup>④</sup>		■		●		●		●	●	
Instant	Fixed Instantaneous (Override) <sup>④</sup>	●	■	●	●	●	●	●	●	●	
Ground Fault	Adjustable Ground Fault Pick-up with Adjustable Ground Fault Time			●	●						
Fourth Pole Protection	100% rating for fourth pole					■	■				
	60% rating for fourth pole							■	■		
	Fourth pole unprotected								■	■	

① Fixed rating plugs available, see Table 1-2  
 ② Optional four-setting adjustable rating plugs available, see Table 1-2  
 ③ Using trip unit with adjustable short delay time (LSI, LSIG, LSIP and LSIE), instantaneous pick-up is achieved when the lowest time delay setting (I) is selected  
 ④ A non-adjustable override setting is set at the frame withstand rating

Table 1-2. Digitrip RMS Trip Unit Function and Rating Settings

Trip Function	Rating/Setting Description	
Ampere Rating Fixed at 100%	Fixed rating plugs available	
	Trip Unit Ampere Rating	Fixed Rating Plugs
	600A 630A 800A	300A, 350A, 400A, 500A, 600A (I) 300A, 315A <sup>①</sup> , 350A, 400A, 500A, 600A, 630A <sup>①</sup> (I) 400A, 500A, 600A, 700A, 800A (I,.)
Adjustable Long Delay Pick-up	Trip Unit Ampere Rating	Adjustable Rating Plugs
	600A 630A 800A	300A-400A-500A-600A (I) 315A-400A-500A-630A (I,.) <sup>①</sup> 400A-500A-630A-800A (I I) or 400A-500A-600A-800A (I I)
	In multiples of installed rating plug amperes (I) with marks at 2-3-4-5-6-7-8x	
Short Delay Pick-up (Adjustable)	I <sup>2</sup> t ramp configuration	
Short Delay Time (Fixed)	Flat response with time delay settings at 100 ms 200 ms and 300 ms	
Short Delay Time (Adjustable)		
Instantaneous Pick-up <sup>②</sup>		
Ground Fault Pick-up (Adjustable)	Trip Unit Ampere Rating	Settings
	600A 800A	120A, 240A, 360A, 480A, and 600A 160A, 320A, 480A, 640A, and 800A
	Settings at instantaneous (I), 150ms, 300ms, and 500ms	
Ground Fault Time Delay		

① Not UL Listed

② Occurs with short delay time adjustment set at I

**Cutler-Hammer**

Pittsburgh, Pennsylvania USA

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