

etc-12 G Series
Direct Programmer Replacement for
GE MicroVersaTrip units.
Section 1 Installation Manual



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Introduction:

The Satin American *etc-12 G series* can be used to replace various OEM trip units while utilizing current sensors and flux trip devices that are already on the circuit breaker. The *G-series* trip unit contains the same hardware and operates using the same curves as the *etc-12* trip unit but is packaged in an enclosure that makes it plug-in compatible with several original *General Electric* trip units.

This manual provides instructions for individuals with circuit breaker maintenance experience to use the *etc-12* to replace *General Electric MicroVersaTrip*, *MicroVersaTrip RMS-9 MicroVersaTrip Epic*, *MicroVersaTrip Plus* and *MicroVersaTrip PM**

The *etc-12* trip unit is supplied with all protective functions. Unneeded protection bands can be shut off. The unit is adaptable to all frame sizes without the need for ratings

plugs. The *etc-12* is compatible with residual-sensing ground fault for 3 and 4 wire applications.

In the special instance when ground fault protection is being added on a 4-wire system, an additional neutral sensor, copper details and secondary disconnects may be required. Contact the factory before beginning a conversion of such a system

Installation requires familiarity with circuit breaker operation and maintenance, careful workmanship and compliance with instructions. Conversion requires removal of the original trip unit, installation of the new trip device and minor rewiring. In the event that any of the original components are found to be defective, Satin American can provide compatible replacements. Qualified individuals can usually accomplish the upgrade in less than an hour.

IMPORTANT!!

RETROFITTED BREAKERS MUST BE PERFORMANCE TESTED BEFORE BEING RETURNED TO SERVICE. PRIMARY INJECTION TESTING IS STRONGLY RECOMMENDED. REFER TO THE *TESTING* SECTION IN THE *SECTION II* MANUAL FOR DETAILED INSTRUCTIONS.

WARNING!!

TO PREVENT ELECTRICAL SHOCK AND INJURY, DISCONNECT THE BREAKER FROM ALL PRIMARY AND SECONDARY POWER SOURCES AND CONFIRM THAT THE BREAKER IS OPEN AND CHARGING SPRINGS ARE DISCHARGED BEFORE BEGINNING WORK.

REFER TO NFPA-70E FOR COMPREHENSIVE ELECTRICAL SAFETY GUIDELINES

* The *etc-12 / etd G series* is compatible with current transformers and flux trip device on breakers retrofitted with *MicroVersaTrip PM* but advanced features such as voltage / power monitoring and plug-in compatible communications are not available.

1.0 Required Tools:

1.1. Installation of this trip unit does not require tools but since minor repairs and adjustments are generally made at the same time as the trip unit is upgraded, it is recommended that a full set of basic hand tools be available. When upgrading the trip unit on breakers above 2000A, an included jumper must be added to the existing wiring harness. If this modification is required, it is recommended that the pin extraction tool listed in table 1 be available. This is because it is not possible to remove and reposition the jumper without the tool if it inserted incorrectly in error. The table lists several commercial sources of this tool. It can also be obtained through *Satin American*.

Table 1
Sources for TYCO/AMP pin extraction tool #455822-2

Source	Phone / URL	Stock Number
Allied Electronics	(866) 433-5722 http://www.alliedelec.com/	527-0181
Digi-Key Corporation	(800) 344-4539 http://www.digikey.com/	A9954-ND
Mouser Electronics	(800) 346-6873 http://www.mouser.com/	571-4558222

2.0 Reference Material:

2.1. Manufacturers Circuit Breaker Maintenance Manual.

3.0 Manual and time-current curves for original trip unit.

3.1. *etc-12* Section II Programmer Instruction Manual

IMPORTANT!!

BEFORE PROCEEDING, VERIFY THAT THE BREAKER IS OPEN AND CHARGING SPRINGS ARE DISCHARGED

4.0 Installation:

4.1. Verify that the proper kit was supplied and thoroughly inspect it for damage or missing components.

4.2. Read and understand these instructions before beginning the retrofit.

4.3. Place the breaker on a solid bench in a clean work area where there is sufficient access to all sides of the breaker.

4.4. Perform a detailed mechanical inspection of the breaker. At a minimum, verify that the breaker opens and closes properly. Any mechanical problems should be fixed prior to beginning the retrofit. Normal maintenance can be performed prior to or during kit installation.

4.5. Remove and existing solid state tripping device by sliding the *RELEASE* lever on the existing programmer mount. See figure 1. Before discarding original trip unit, be sure to make note of settings.

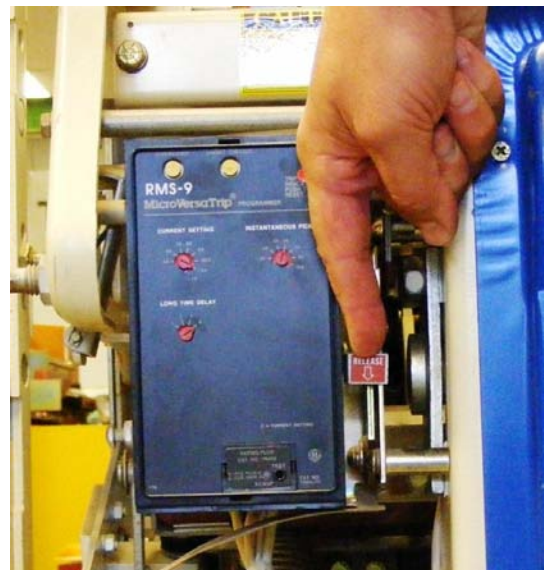
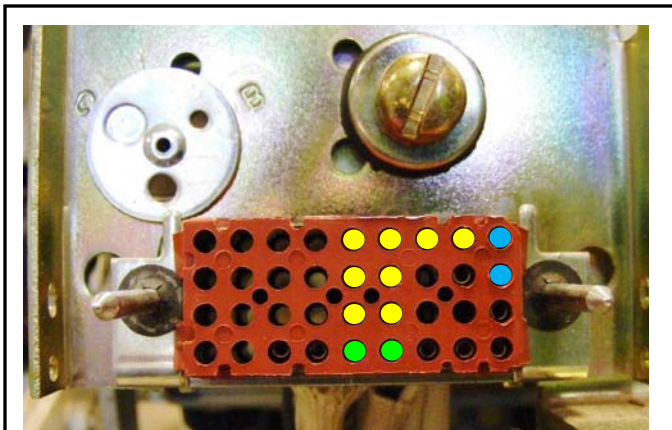


FIGURE 1, REMOVING EXISTING TRIP UNIT

4.6. Inspect existing wiring harness. The etc-12 only requires wires connected to 10 locations on the harness connector. There may be additional wires routed to this connector. These additional wires should be removed before installing the new trip unit. Figure 2 indicates which positions in the existing harness should be populated.



**FIGURE 2,
PIN CONNECTIONS ON EXISTING HARNESS**

- LOCATIONS INDICATED YELLOW ARE NECESSARY FOR PROPER OPERATION
- LOCATIONS INDICATED IN GREEN ARE REQUIRED ONLY IF A NEUTRAL CT IS UTILIZED
- A JUMPER MUST BE PLACED IN THIS LOCATION IF THE BREAKER IS LARGER THAN 2000A FRAME.

4.7. To remove a contact from the connector, place the extraction tool into the cavity from the front of the connector as shown in figure 3. Press extraction tool firmly into the connector then depress the plunger. Note that if the tool is not pressed firmly into the connector before the plunger is depressed, the contacts being extracted will be damaged.

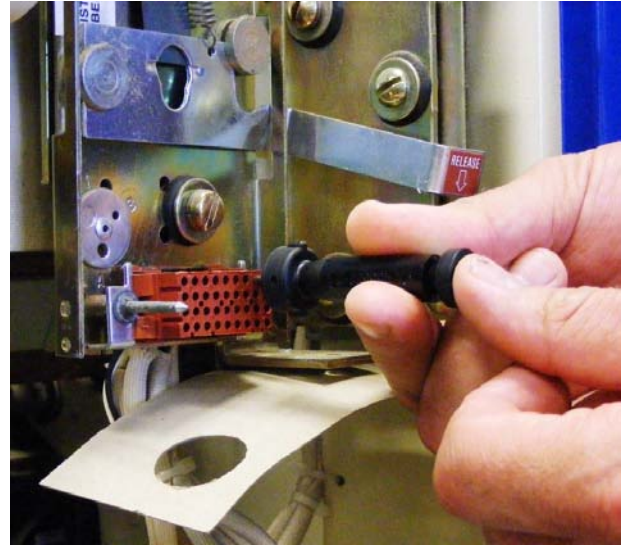


FIGURE 3, REMOVING UNNEEDED WIRES FROM CONNECTOR

IMPORTANT!!

IF THE BREAKER FRAME SIZE IS ABOVE (BUT NOT INCLUDING) 2000A, AN ADDITIONAL WIRING JUMPER MUST BE ADDED AS DETAILED IN STEPS 4.8 AND 4.9. FAILURE TO INSTALL THIS JUMPER CAN RESULT IN NUISANCE TRIPPING

4.8. The jumper required for breaker frames above but not including 2000A is inserted in locations 35 and 36 of the harness connector. These locations are indicated in blue in figure 2. Location numbers of each cavity are molded into the rear of the connector but it is often possible to install this jumper without removing the programmer mount.

4.9. Figure 4 shows a rear view of the existing mounting bracket with the supplied jumper inserted. It is critically important that the jumper snaps into place so that it cannot be pulled out. When properly installed, the contacts of the jumper should be flush with the contacts already on the connector. Figure 5 shows this connector not inserted fully. Failure to fully jumper contacts can result in nuisance trips.

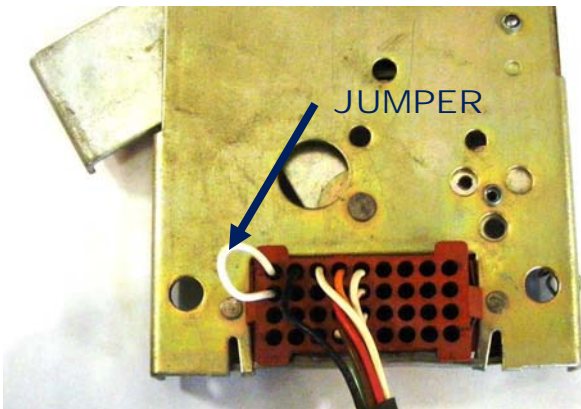


FIGURE 4, REAR VIEW OF EXISTING BRACKET SHOWING INSERTION OF JUMPER FOR FRAMES GREATER THAN 2000A

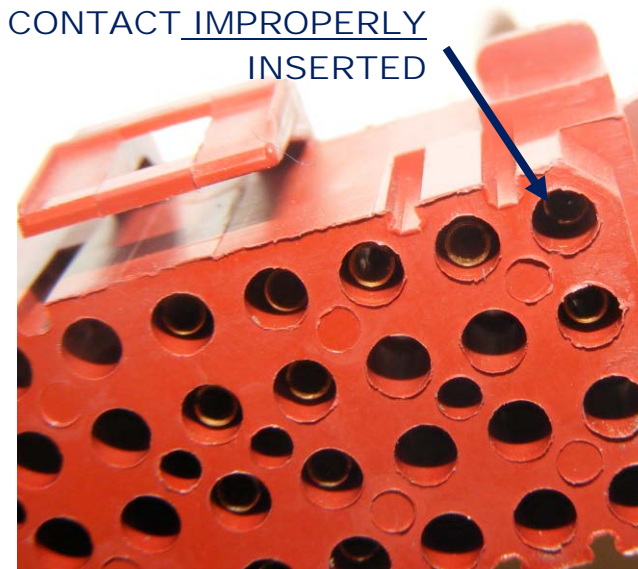


FIGURE 5, CLOSE-UP VIEW OF CONNECTOR SHOWING CONTACT NOT FULLY INSERTED

4.10. Install the *etc-12 G Series* trip unit by pulling down the *RELEASE* lever on the box mount and inserting the brass retention pin into the mating slot on the existing boxmount. Pressing the retention pin against the flat spring will cause the *RELEASE* lever to move into the locked position. Refer to figures 6 and 7.

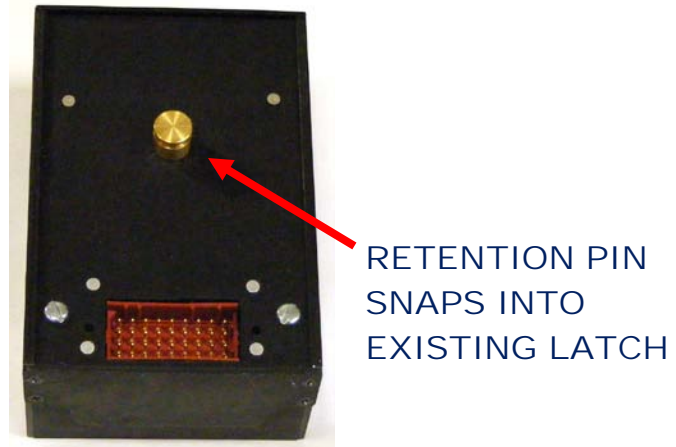


FIGURE 6, REAR VIEW SHOWING RETENTION PIN

4.11. Make certain that the new trip unit is securely latched into place and its connector is properly mated with the connector on the box mount



FIGURE 7, NEW UNIT INSTALLED ON BREAKER

5.0 Installing on a PowerBreak

5.1. Remove trip unit bezel assembly by removing the 4 screws indicated in figure 8.



FIGURE 9, REMOVE INDICATED SCREWS

5.2. Remove front cover by removing the 4 screws indicated in figures 9 and 10.

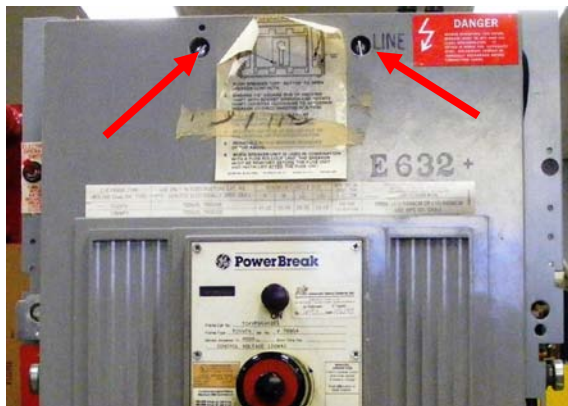


FIGURE 10, REMOVE INDICATED SCREWS



FIGURE 11, REMOVE INDICATED SCREWS

5.3. Remove the existing solid state trip unit by pulling the release lever as indicated in figure 12.

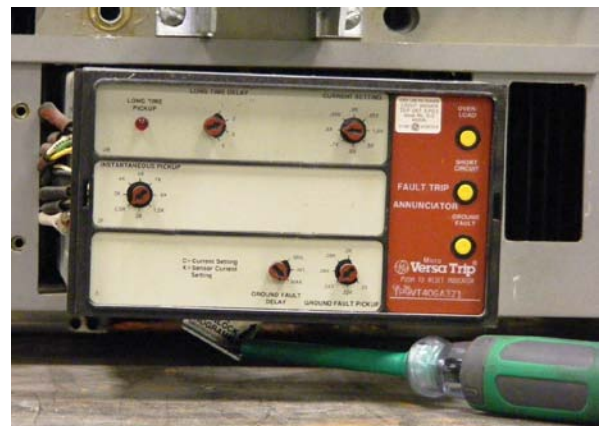


FIGURE 12, Pull Lever to Release Existing Unit

5.4. Inspect the wire harness and add jumper if the breaker is above 2000A frame. Refer to step 4.6.

5.5. Examine the back of the trip unit. If the connector extends above the back plane of the trip unit as shown in figure 13, the mating connector must be repositioned as detailed in steps 5.6 to 5.12. If the connector is flush, proceed directly to step 5.13



FIGURE 13, ORIGINAL TRIP UNIT WITH CONNECTOR EXTENDING BEYOND THE BACK PLANE OF THE UNIT

5.6. Remove the plastic connector housing from the trip unit mounting bracket as shown in figure 14. If necessary the metal tabs retaining the plastic housing can be bent slightly to allow the housing to be removed.

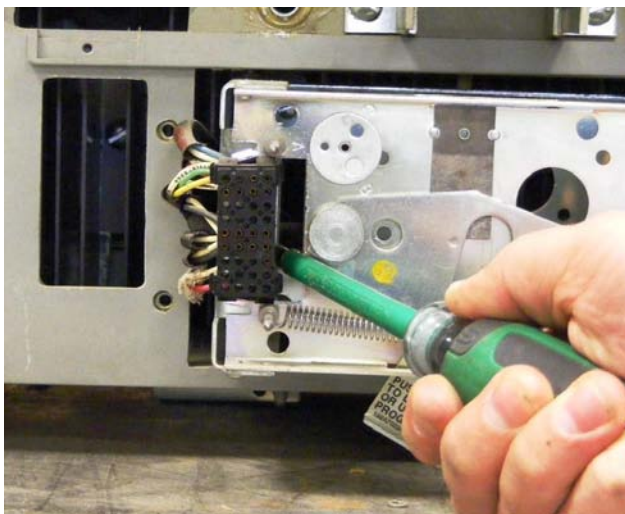


FIGURE 14, REMOVING THE CONNECTOR HOUSING

5.7. Slide the supplied “horseshoe” adapter bracket over the plastic housing. The notches in the plug body should fit through the notches of the “horseshoe”. Refer to figure 15.

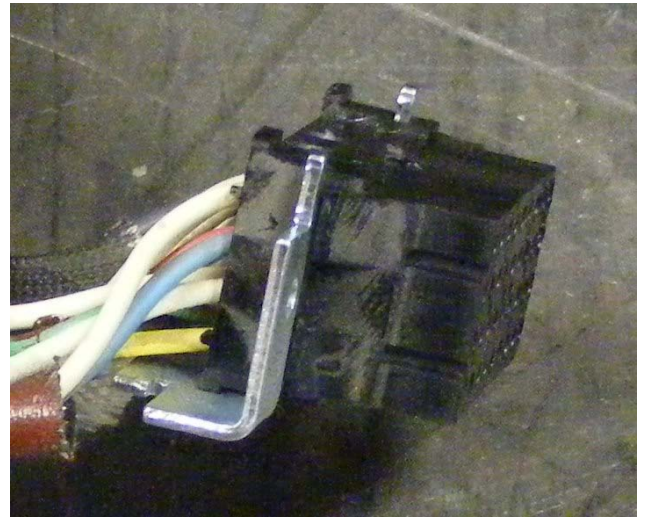


FIGURE 15, HORSESHOE BRACKET INSTALLED ON PLASTIC HOUSING

5.8. After the plastic housing is properly nested, the tabs on the *horseshoe* bracket should be bent slightly as so to lock the housing in place.

5.9. Slide the *horseshoe* bracket over the positioning pins on the existing programmer mounting bracket. Take care not to pinch wires during this process. Secure *horseshoe* in place with supplied push-nuts. See figure 16. *Note: There may not be enough slack left on the wiring harnesses on some breakers. If this is the case, the programmer mount must be removed as detailed in steps 5.10 through 5.12.*

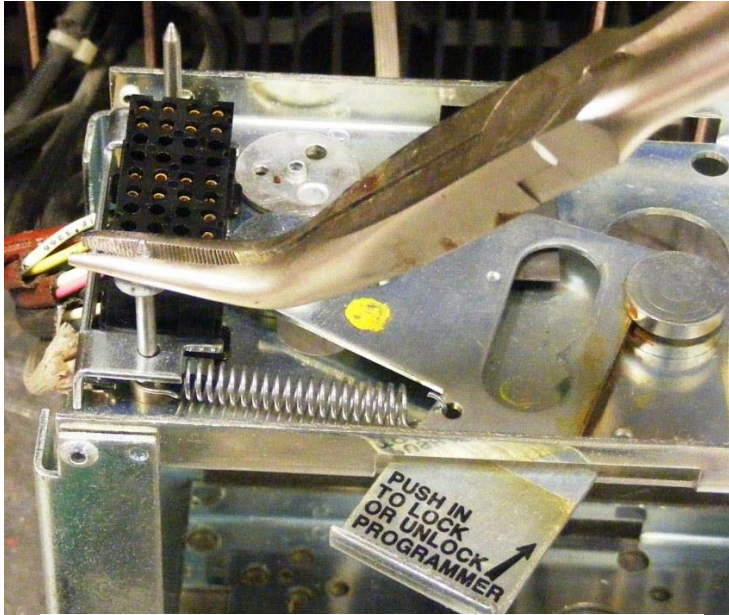


FIGURE 16, SECURING HORSESHOE WITH PUSH NUTS

5.10. If there is not enough slack in the wire harness, the existing programmer mount may need to be removed in order for the *horseshoe* bracket to be slid over the positioning pins on the mounting bracket. To remove the programmer mount, the front mechanism of the breaker must be removed. This is accomplished by loosening the screw indicated in figure 17.

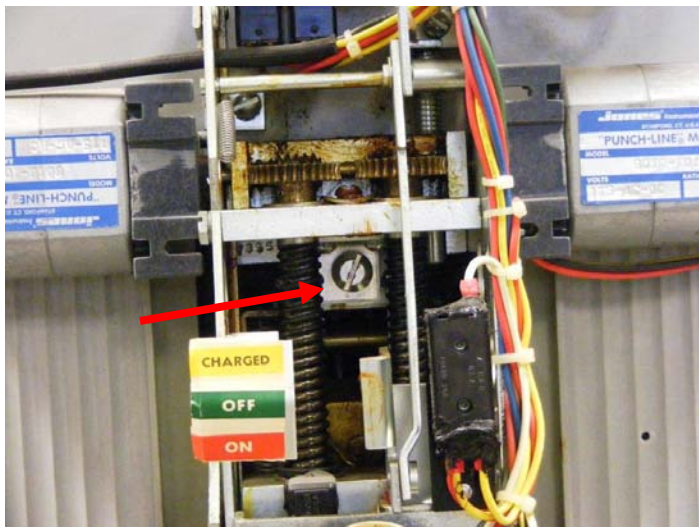


FIGURE 17, LOOSEN INDICATED SCREW TO REMOVE FRONT MECHANISM

5.11. Carefully remove the front mechanism from the breaker. When doing so, be prepared to support both halves of the breaker. Remove the existing box mount by removing the 4 screws indicated in figure 18.

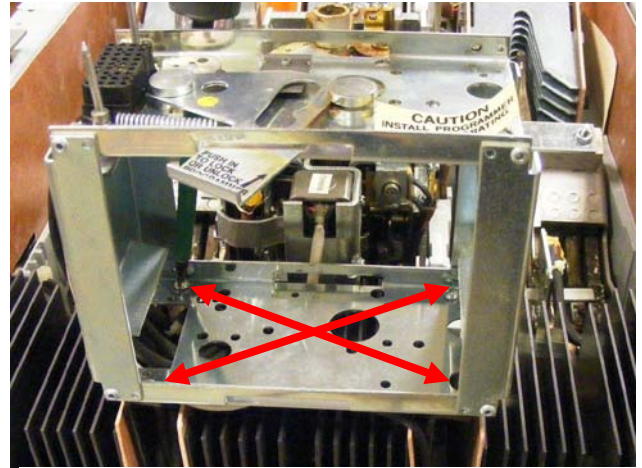


FIGURE 18, REMOVE INDICATED SCREWS

5.12. After the programmer mount is removed, there should be enough slack in the cable to slide the *horseshoe* over the guide pins as described in step 5.9. Once the *horseshoe* is secured in place, remount the programmer mount and front mechanism.

5.13. Mount the *etc-12* onto the existing bracket by pulling the *release* lever and sliding the guide pins into the holes in the back of the trip unit. The brass retention pin will mate with the existing mechanism on the mounting bracket and lock into place. Make certain that the connector on the programmer is properly seated onto the mating connector on the bracket. See figure 19.



FIGURE 19, etc-12 INSTALLED ON BRACKET

5.14. Install the new escutcheon plate on the trip unit bezel using the supplied 6-32 x 1/2 " long flat head screw. See figure 20.



FIGURE 20, ESCUTCHEON PLATE

5.15. Replace the front cover of the breaker, the trip unit bezel and install the Plexiglas cover on the escutcheon.

6.0 Settings

Warning!

This retrofit kit was not designed to increase the current rating of the circuit breaker. Do not operate the breaker above the manufacturer's maximum ampere rating. Failure to adhere to this warning will result in damage to, failure of, or shortened circuit breaker life expectancy.

6.1. Trip settings must be determined by a qualified engineer who has performed a comprehensive study on the distribution system where the breaker is to be used. The *etc-12 Section II* manual provides detailed instructions entering these settings into the *etc-12*.

6.2. Table 2 lists the current sensor secondary current rating for the current sensors originally supplied with various original trip units. In order to ensure proper protection and prevent nuisance tripping, it is important that this information be properly entered into the *etc-12* during set-up. Note that the screens for selecting the 400 and 500mA will not be available unless the trip unit is connected to the harness and the jumper is installed per 4.8. The unit must be completely powered down at the time it is plugged into the jumpered harness or a self-calibration error will occur. If the trip unit is inadvertently plugged into the harness when it is operating under battery power, it will erroneously report phase currents when it is not connected to a current source. This problem can be remedied by powering down the unit then re-powering it when it is already connected to the jumper.

Original Trip Unit	Breaker Frame Size	CT Secondary Rating
<i>RMS-9, RMS-9 Epic, MicroVersaTrip, MicroVersaTrip Plus, MicroVersaTrip PM</i>	2000A and below	200mA
<i>RMS-9, RMS-9 Epic, MicroVersaTrip, MicroVersaTrip Plus, MicroVersaTrip PM</i>	Above but not including 2000A	400mA

6.3. Table 3 provides a cross-reference of the long-time delay bands on original *GE MicroVersaTrip* units to the delays that are available on the *etc-12*.

<i>MicroVersaTrip</i> delay	Closest available <i>etc-12</i> delay
1	Custom, 3.5 sec @ 6L
2	Custom, 7 sec @ 6L
3	INT
4	MAX

6.4. Table 4 provides a cross-reference of the short time delay bands on original *GE MicroVersaTrip* units to the delays that are available on the *etc-12*.

<i>MicroVersaTrip</i> delay	Closest available <i>etc-12</i> delay
MIN	.150 seconds
INT	.300 seconds
MAX	.400 seconds

6.5. Table 5 provides a cross-reference of the ground fault delay bands on original *GE MicroVersaTrip* units to the delays that are available on the *etc-12*.

Table 5, Ground-Fault Delay Cross-Reference	
<i>MicroVersaTrip</i> delay	Closest available <i>etc-12</i> delay
MIN	.150 seconds
INT	.300 seconds
MAX	.400 seconds

7.0 Testing

7.1. Conduct a full performance test of the trip unit and breaker. Primary injection is strongly recommended for newly retrofitted breakers. Refer to the *etc-12 Section II* manual for detailed test procedures and specifications.

NOTE: *MicroVersaTrip, MicroVersaTrip Epic, MicroVersaTrip RMS-9, MicroVersaTrip Plus* and *MicroVersaTrip PM* are products of General Electric.

