Surge arrester interchangeable fuse cutout combination installation instructions

Powering Business Worldwide

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Contents

Safety for life

Eaton meets or exceeds all applicable industry standards relating to product safety in its Cooper Power™ series products. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Eaton employees involved in product design, manufacture, marketing, and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high voltage lines and equipment, and support our "Safety For Life" mission.

Safety information

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians who are familiar with this equipment should install, operate, and service it.

A competent technician has these qualifications:

- Is thoroughly familiar with these instructions.
- Is trained in industry-accepted high and low-voltage safe operating practices and procedures.
- Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.
- Is trained in the care and use of protective equipment such as arc flash clothing, safety glasses, face shield, hard hat, rubber gloves, clampstick, hotstick, etc.

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This manual may contain four types of hazard statements:

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in equipment damage only.

Safety instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

DANGER

Hazardous voltage. Contact with hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment. G103.3

WARNING

Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage. G101.0

WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury and equipment damage. G102.1

WARNING

Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage. G122.3

Product information

Introduction

Eaton's Cooper Power™ series surge arrester interchangeable fuse cutout combination provides overvoltage and overcurrent protection to distribution systems.

Read this manual first

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before installing or operating this equipment.

Additional information

These instructions cannot cover all details or variations in the equipment, procedures, or process described nor provide directions for meeting every possible contingency during installation, operation, or maintenance. For additional information, contact your Eaton representative.

Acceptance and initial inspection

Each fuse cutout combination is in good condition when accepted by the carrier for shipment. Upon receipt, inspect the shipping container for signs of damage. Unpack the fuse cutout combination and inspect it thoroughly for damage incurred during shipment. If damage is discovered, file a claim with the carrier immediately.

Handling and storage

Be careful during handling and storage of the fuse cutout combination to minimize the possibility of damage. If the fuse cutout combination is to be stored for any length of time prior to installation, provide a clean, dry storage area.

Standards

ISO 9001 Certified Quality Management System

⚠ CAUTION

Make all electrical connections — ground and line — so that no mechanical stress is applied to the surge arrester. Mechanical stress may damage the arrester in such a manner that its service life is shortened significantly.

⚠ WARNING

Always consider an arrester to be energized until both the line and the ground leads have been disconnected from the circuit.

Field testing

All UltraSIL™ polymer-housed silicone rubber and porcelain-housed distribution-class arresters have passed a complete series of production tests prior to shipment; therefore, no field testing of new units is required.

⚠ CAUTION

Before performing any test on an arrester, contact your Eaton sales engineer. Some test procedures may damage the arrester externally and/or internally, making it incapable of protecting the apparatus or the circuit on which it is installed or shortening its service life significantly.

Removing an arrester from a circuit

1. De-energize the electrical system.
2. Disconnect the arrester line lead(s) from the circuit.
3. Discharge the arrester by attaching the line terminal to a temporary ground.
4. Mark the temporary ground to make sure it is removed before the arrester is reinstalled.
5. Disconnect the arrester ground lead(s) from the circuit.
6. Disconnect the arrester from the mounting bracket.

Installation procedure

The surge arrester fuse cutout combination must be properly selected for each installation with consideration to recovery voltage, continuous current, basic impulse insulation level (BIL), and fault interrupting rating.

Mounting the cutout

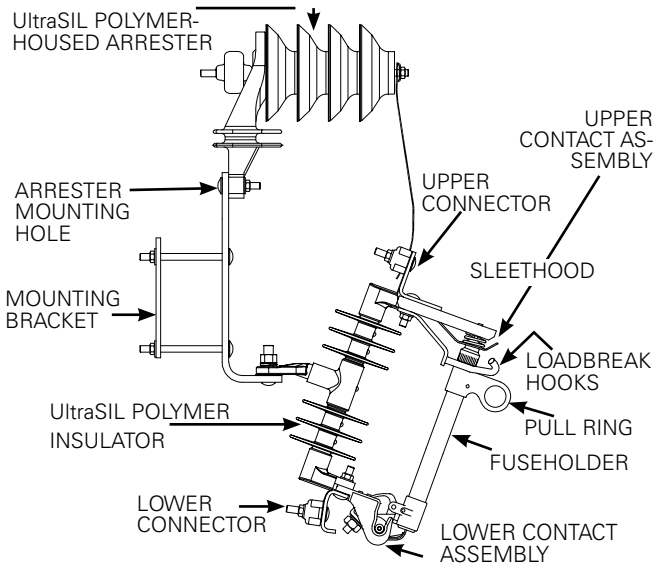

Figure 1. UltraSIL polymer-housed surge arrester fuse cutout assembly.

1. De-energize the electrical system.
2. Securely attach the mounting bracket, if supplied with the cutout, to the crossarm or pole per standard procedure.

⚠ WARNING

Do not mount this cutout in vaults or other enclosed areas because of the expulsion emitted during fault interruption when using a fuseholder.

3. Mount the cutout on the mounting bracket making sure the external-tooth lockwasher is placed between the mounting bracket and the cutout bushing support pin (refer to Figure 2). Tighten the nut by hand.
4. Rotate the cutout and the mounting bracket to provide maximum clearance for the operator and maximum ease of operation.
5. Securely tighten the carriage bolt nut with a wrench.

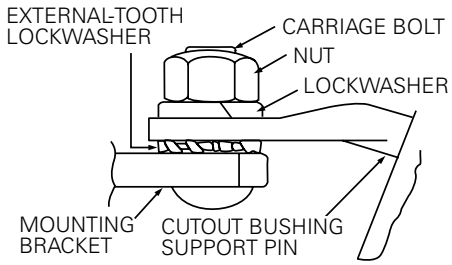

Figure 2. Mounting the cutout to the mounting bracket.

Mounting the surge arrester

1. Mount the arrester on the arrester mounting hole and tighten the nut between 20 and 25 ft-lbs (refer to Figure 1).

Connecting electrical leads

1. Loosen upper and lower connectors on both the cutout and arrester.
2. Connect the line lead between the arrester's top terminal stud and the top connector of the fuse cutout. Torque both to 20 ft-lbs maximum.
3. When using aluminum conductors, wire brush conductors and apply a coating of oxidation inhibitor before inserting conductor into connector.

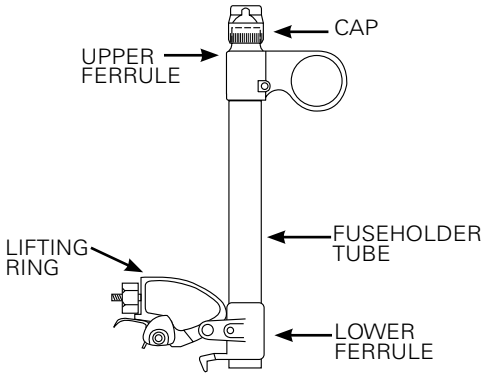

Figure 3. Fuseholder.

4. Connect the ground terminal of the arrester to ground. Torque to 20 ft-lbs maximum.

Note: Make the arrester ground connection as short and direct as possible to a solid, effective, permanent, low-resistance ground. If the arrester has a ground lead disconnector, the ground lead must be flexible enough to allow the disconnector to operate properly.

5. Connect the lower connector of the fuse cutout to the equipment. Torque to 20 ft-lbs maximum.
6. Connect the line lead to the arrester line terminal stud. Torque to 20 ft-lbs maximum.

Note: The standard arrester terminals accommodate conductor sizes from AWG No. 6 solid through AWG 2/0 stranded.

Installing an expulsion fuse link in fuseholder

1. Remove the cap from the upper ferrule of the fuse-holder assembly (See Figure 3).
2. If there is a removable button head on the fuse link, make sure the button is tight. Then, insert the fuse link, cable end first, into the top of the fuseholder and pull out at the lower end or in accordance with the fuse link manufacturer's instructions.

⚠ CAUTION

Do not remove or damage the small tube of the fuse link. It is an integral part of the fuse link and removal or damage may result in the cutout's failure to interrupt.

3. Replace the cap on the upper fuseholder ferrule and tighten with a wrench.
4. Holding the lower end of the fuseholder, rotate the flipper fully about its pivot until it reaches its stop. Hold the flipper in this position and feed the fuse link cable through the flipper channel and feed the cable around the fuse link clamping bolt in a clockwise direction. Make only one turn with the cable. DO NOT OVERLAP. This will prevent strand breakage when the clamping nut is tightened (See Figure 4).
5. While maintaining tension of the fuse link cable, tighten the fuse link clamping bolt head with a wrench.
6. Cut excess fuse link cable to within 1/2" (13 mm) of the clamping bolt head and discard.

⚠ CAUTION

Never insert the excess leader into the cutout fuseholder tube. Doing so may cause improper operation of the fused cutout. This can result in failure of the cutout and damage property in the vicinity of the installation.

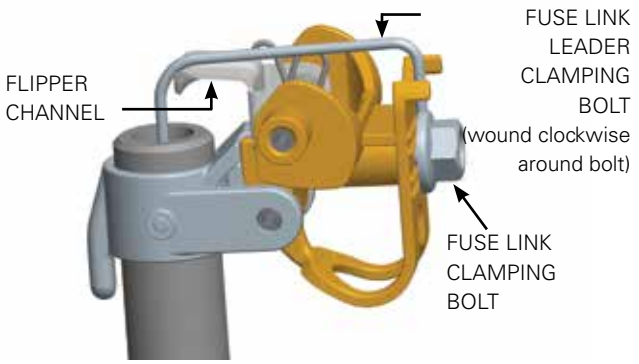

Figure 4. Installation of a fuse link into a fuseholder.

⚠ CAUTION

Do not use 100 A or smaller fuse links in 200 A fuseholders by using washers or other means. This could result in failure to interrupt.

Note: Cutouts using an arc shortening rod require the use of removable buttonhead fuse links. To attach the fuse link to the arc shortening rod:

A. Remove the screw-type buttonhead (and washer if equipped) from the fuse link.
B. Screw the arc shortening rod (attached to cap) onto the fuse link and tighten firmly (See Figure 5).
C. Follow the same procedure as outlined in steps 2 through 6 under "Installing an Expulsion Fuse Link in Fuseholder".

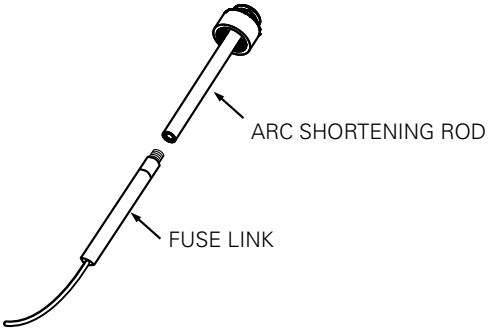

Figure 5. Installation of fuse link with an arc shortening rod.

Installing a fuseholder in cutout

Once the fuse link has been installed in the fuseholder:

1. Insert the hook stick into the fuseholder's lifting ring.
2. Place the fuseholder into the hinge of the cutout (See Figure 6).

⚠ WARNING

When closing a fuseholder in the cutout, hot gasses and high velocity particles can be expelled from the bottom of the fuseholder if a fault is present. This expulsion could cause serious injury.

3. Remove the hook stick.
4. After positioning himself/herself well clear of the vented end and exhaust path of the cutout, the operator should place the hook stick in the pull ring on the upper ferrule of the fuseholder.
5. Rotate the fuseholder to an intermediate position as in Figure 7.
6. While looking away from the cutout, quickly and firmly drive the fuseholder into the closed position.

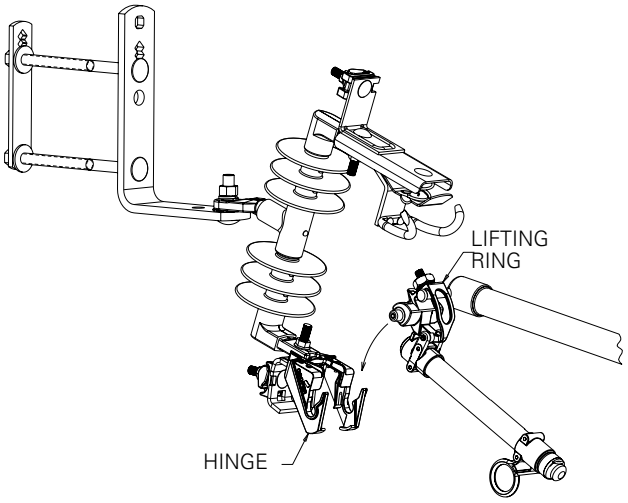

Figure 6. Inserting the fuseholder into the UltraSIL polymer-insulated or porcelain Type L cutout.

7. Remove the hook stick from the pull ring carefully to avoid opening the fuseholder.

⚠ WARNING

Do not attempt to interrupt load current by pulling on the fuseholder pull ring to open the cutout. An arc started by opening a cutout under load in this manner could cause injury or damage to equipment.

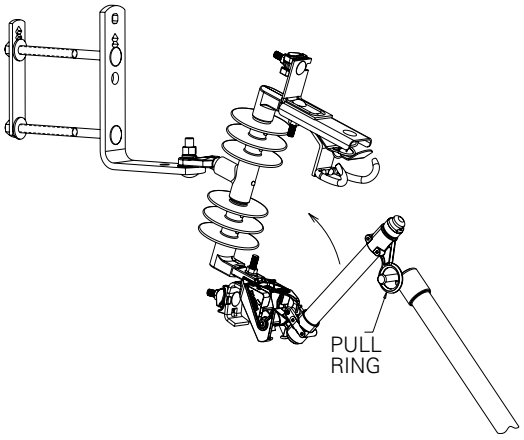

Figure 7. Closing the fuseholder into the UltraSIL polymer-insulated or porcelain Type L cutout.

Note: The Type L cutouts are equipped with hooks for use with a loadbreak tool. To open the fuseholder from the cutout, use ONLY an approved loadbreak tool designed for use with cutouts and follow the instructions provided with such tool.

Installing an ELF™ or Tandem ELF fuse in cutout

The ELF™ full-range fuse is shipped fully assembled and ready to be installed in an UltraSIL™ polymer-insulated or porcelain Type L cutout. The Tandem ELF fuse is shipped only with the current-limiting fuse installed. The fuse link must be removed (if supplied and of proper rating) from the package and then follow the instructions described under "Installing a Fuse Link in Fuseholder" on page 4 of this instruction sheet. The Tandem ELF is ready to be installed in an UltraSIL polymer-insulated or porcelain Type L cutout once the fuse link is properly installed in the fuseholder. If the fuse link is not supplied, select the correct fuse link ampere size based on the application section in catalog section 240-67. The current rating for the fuse link selected should not exceed the fuse-rating values shown in Table 2 of catalog section 240-64 for the Companion™ II backup fuse.

1. Insert the hook stick into the lifting eye of the ELF or Tandem ELF fuse. Make sure the fuse link has been installed in the fuse link holder of the Tandem ELF fuse.
2. Place the ELF or Tandem ELF fuse into the hinge of the cutout.
3. Remove the hook stick from the ELF or Tandem ELF fuse. If installing a Tandem ELF fuse, take a position well clear of the venting end and exhaust path of the cutout in the closed position.
4. Place the hook stick into the pull ring of the ELF or Tandem ELF fuse and move to an intermediate position. Refer to Figure 8 for an intermediate position of the ELF fuse. The Tandem ELF is installed in a same manner.

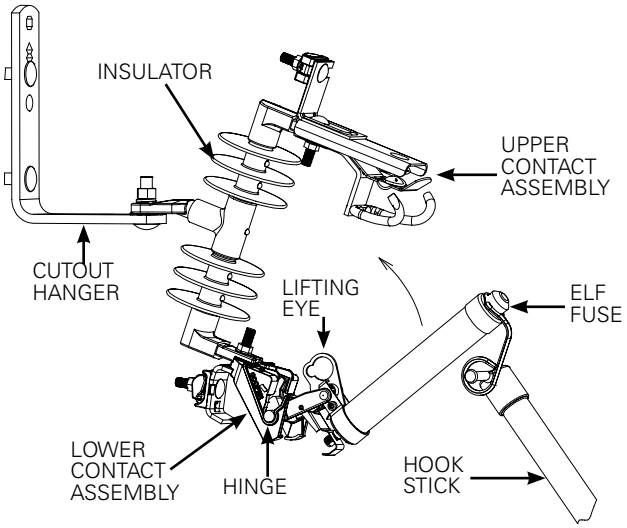

Figure 8. Intermediate position for the installation of ELF fuse into the interchangeable cutout.

5. Quickly and firmly (with minimal side thrust) drive the ELF or Tandem ELF fuse into the upper contact of the interchangeable cutout. When installing the Tandem ELF be sure to look away from the cutout before closing into the upper contact.

⚠ CAUTION

The ELF or Tandem ELF fuse should not be installed if it has any visual signs of operation and/or damage.

⚠ WARNING

Do not attempt to interrupt load current by pulling on the ELF or Tandem ELF fuse's pull ring to open the cutout. An arc started by opening a cutout under load in this manner could cause injury or damage to equipment.

6. Remove the hook stick from the pull ring carefully avoiding opening the ELF or Tandem ELF fuse from the cutout.

Note: The cutouts are equipped with hooks for use with a loadbreak tool. To open the ELF or Tandem ELF fuse from the cutout, use ONLY an approved loadbreak tool designed for use with cutouts and follow the instructions provided with such tool.

Operation

⚠ CAUTION

Only qualified personnel should operate a cutout. Such personnel should always wear appropriate protective equipment such as rubber gloves, hard hats, safety glasses, etc., in accordance with established utility and safety practices.

When the fuseholder, ELF or Tandem ELF fuse (refer to Figure 9) clears a fault, the dropout mechanism will allow it to drop open in the cutout.

Removal of a fuseholder

1. Insert a hook stick into the lifting ring of the ELF or Tandem ELF fuse.
2. After verifying proper voltage and current ratings for the application, follow the preceding steps under "Procedure for Installing ELF or Tandem ELF in Cutout".

Removal of an ELF or Tandem ELF fuse

CAUTION

An ELF with the dropout actuator operated and dropped open from the cutout or Tandem ELF dropped open from the cutout indicates a blown fuse due to an overload or fault condition. Faults and/or visibly failed equipment should be located and repaired before re-installing a replacement ELF or Tandem ELF fuse.

1. Insert the hook stick into the lifting eye of the ELF or Tandem ELF fuse.

CAUTION

If the Tandem ELF fuse operates for a high-current fault, the backup current-limiting fuse may be hot enough to cause burns. Wear gloves and handle the Tandem ELF fuse by the fuse link holder to avoid burns.

2. After verifying proper voltage and current ratings for the application, follow the preceding steps under "Procedure for Installing ELF or Tandem ELF in Cutout".

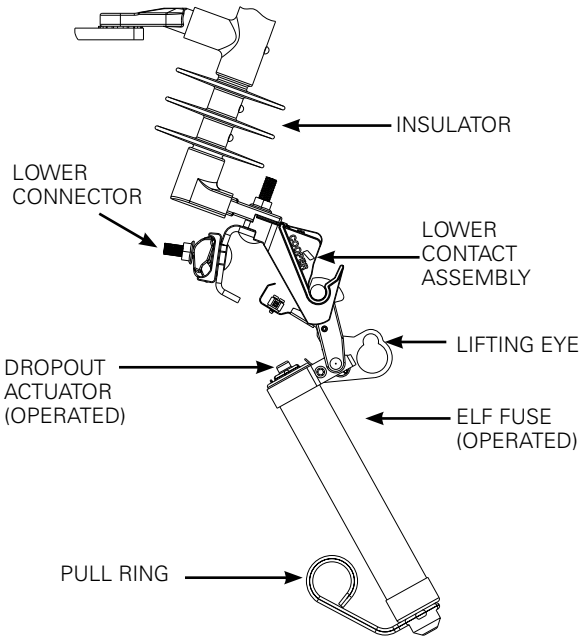

Figure 9. ELF fuse in cutout after dropping open due to operation of dropout actuator. The Tandem ELF (not shown) will drop open in a similar manner after the expulsion link operates.

If the fault has been cleared, the ELF fuse will remain intact in the upper contact of the cutout.

CAUTION

If a fault is present when installing an ELF fuse, the dropout actuator will operate. When the hook stick is removed, the ELF fuse will drop open. The operator will be unable to permanently close the operated ELF fuse into the upper contact of the cutout.

CAUTION

If a fault is present during installing of a Tandem ELF fuse, both the backup current-limiting fuse and expulsion fuse will operate to clear the fault. During the operation of the expulsion fuse, hot gases and high velocity particles will be expelled from the fuseholder during interruption. The backup current-limiting fuse may be damaged if a low-current fault is present during installation. When the hook stick is removed, the Tandem ELF fuse will drop open. The operator will be unable to permanently close the operated ELF fuse into the upper contact of the cutout.

Testing

Testing an ELF fuse

1. A continuity test in the field can determine if the fuse element is open. This can be accomplished by using an ohmmeter or self-powered continuity tester as shown in Figure 10 for the backup current-limiting fuse used with the Tandem ELF fuse.
2. To confirm the integrity of the current-limiting section, additional shop testing using a micro-ohm-meter to verify the nominal resistance is recommended.

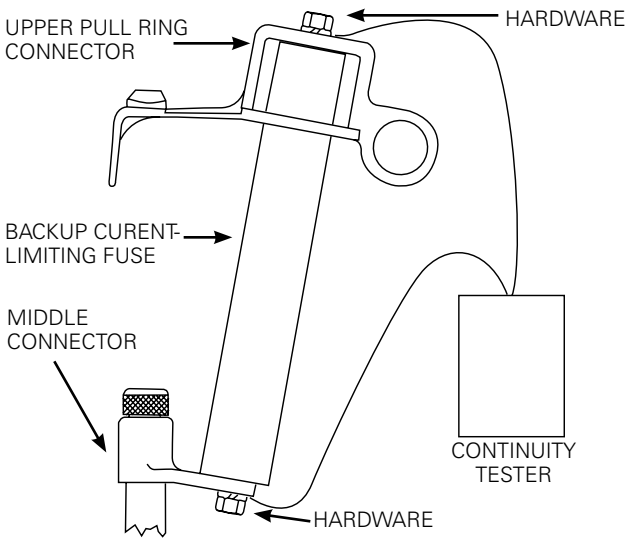

Figure 10. Testing and refusing the backup current-limiting fuse.

Testing a Tandem ELF fuse

1. Perform a continuity check on the backup current-limiting fuse as shown in Figure 10.

⚠ CAUTION

Failure to check the Tandem ELF's backup current-limiting fuse may result in placing an operated/damaged fuse back in service. This could result in personal injury, fire, or equipment damage.

2. If the backup current-limiting fuse does not have continuity, change out the fuses as described in "Refusing the Backup Current-Limiting Fuse" and depicted in Figure 11.

Refusing the backup current-limiting fuse

1. Remove the backup current-limiting fuse by unbolting it from the middle connector.
2. Unbolt the upper pull ring connector from the backup current-limiting fuse and replace with new backup current-limiting fuse. Bolt the reused upper pull ring connector to the new backup current-limiting fuse noting proper engagement of the alignment key. (Refer to Figure 11.)
3. Bolt the backup current-limiting fuse to the middle connector noting proper engagement of the alignment key as shown in Figure 11.

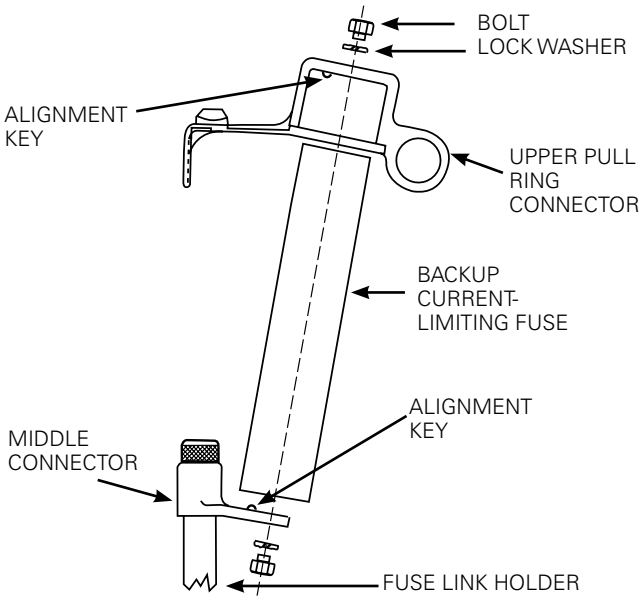

Figure 11. Refusing the backup current-limiting fuse.

Refusing the fuse link in fuseholder

1. Remove the fuse cap and then the operated fuse link from the fuseholder of the Tandem ELF fuse.
2. Visually inspect the fuseholder bore and remove debris.
3. Continue with the steps outlined in "Installing a Fuse Link in Fuseholder" on page 4.

Maintenance

Refer to the latest revision of IEEE Std C37.48™ standard "Guide for the Application, Operation, and Coordination of High-Voltage (>1000 V) Current-Limiting Fuses" as a general guide for maintenance of the cutout.

1. Periodically inspect the fuse link at the lower open end of the fuseholder for evidence of corrosion.
2. Replace fuse links which show signs of deterioration (broken strands, heavy corrosion, etc).
3. Replace broken or cracked porcelain and clean or replace if heavily contaminated.
4. Inspect contacts for excessive pitting or burning and replace as necessary.
5. Check the fuseholder polymer liner for cracking or excessive erosion. If cracked or if the I.D. is larger than .650" and .860" on the 100 A and 200 A fuseholders respectively, then replace the fuseholders.
6. f the fuseholder shows any signs of electrical tracking it should be replaced.

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