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**Strain Relief and Battery Cable Support for Alternator Installation**January 2019

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**Introduction**

Proper installation of your Balmar alternator will ensure the best performance and trouble-free use. One important aspect of a good installation that is often overlooked is the proper installation of heavy battery cables. On many installations the combination of long cable runs to batteries and higher output alternators necessitates the use of heavy battery cables. The use of 1/0, 2/0, 3/0 or even 4/0 cables are not uncommon.

**Instructions**

Proper strain relief is mentioned in Balmar's alternator installation manual. What is strain relief? In this context strain relief is taking the weight of the heavy copper cable and properly supporting it so that the weight is not being carried by the positive or negative stud on the alternator. We often see battery cables hanging off of the stud on the back of the alternator, putting undue torque and strain on the stud. Over time engine vibration combined with the weight of the cable flexes the stud and/or the rectifier plate to which the stud attaches until the constant vibration fatigues the metal and it snaps, thus causing an alternator failure.

There are a few simple rules that should be followed when making connections.

1. Cables should be strain relieved to the engine or an engine component no more than 12 inches from the alternator connection.
2. Cables should NOT be run to a mounting point that is not ultimately supported by the engine mounts, regardless of how close that mounting point is to the alternator.
3. Whenever possible, avoid using more than one heavy cable on each alternator post. In other words, the alternator stud should not be used as a buss bar. If more than one cable is needed, then use a buss bar or post remotely, and run the cables to it from the alternator.
4. Additional chafe protection should be used wherever the cable touches or may come in contact with a source of vibration.

<p><b>Balmar Technical Support is available from 8:30 am – 7:30 pm EST Monday through Friday. Please call on us at +1-360-435-6100 x3 should you have any questions about Balmar products.</b></p>
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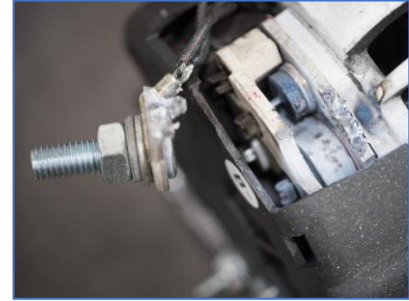
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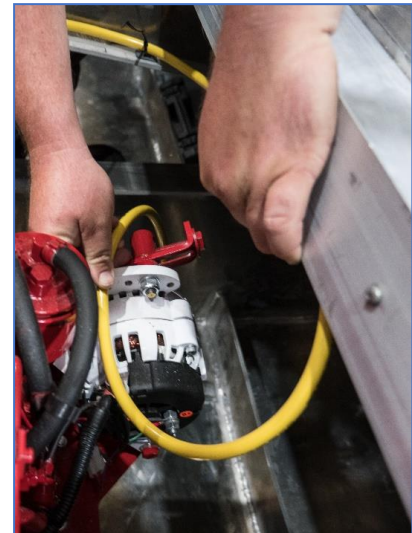
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**Case Study**

A Balmar customer builds aluminum water taxi vessels used to ferry passengers in a protected port. The boats operate over 12 hours a day, involving many starts, shifts, and acceleration cycles. Their vessels were repeatedly experiencing a failure of the B- stud on the back of the alternator. The vessels have two engines, but the stud failure was only happening on the starboard engine.



Upon inspection, it was learned that the battery cables were being run alongside the engine compartment hatch framing, then looped gently to the alternator - but only on the starboard side. The cable being held by the installer (shown to the right) illustrates where the cables were installed on several vessels.



There are two problems with this installation. First, the length of the unsupported cable is over 12 inches. Second, by attaching the cable to the frame, the support scheme is allowing the cable to vibrate at both a different frequency and amplitude than the alternator. Over time, the alternator mounting post or its connection plate work-hardened, fatigued, and ultimately failed. On a pleasure boat this may take some time, but on this high use commercial application the failure was after only a few months of service.

The photograph to the right represents a good installation of the battery negative cable. The cable is run with chafe protection and is secured to the engine with a cable tie (see the yellow circle) a short distance from the alternator.

