

## Battery Cable Information

### Introduction

Battery cables provide the vital link between the battery, load and charging system. Faulty connections can lead to poor system performance, affect battery life, or damage battery components. This white paper identifies the main causes of faulty connections and recommends practices that will aide in minimizing problems that may occur.

### Loose Connection

The table below shows torque values that should be used when attaching cables to the battery terminals.

Terminal Type	Torque (in-lb)
AP	50 - 70
LT	100 - 120
LPT, HPT, WNT, DWNT, UT	95 - 105
ST	120 - 180
* For DT (Automotive Post & Stud) refer to AP or ST type	

Do not over-torque. Doing so can result in terminal post breakage, terminal post meltdown or a fire.

Clean the cable connectors and the battery terminal posts with a small stainless steel wire brush before connecting them together.

Use two half-thickness lock nuts instead of the standard hex-nut for added security in applications where high shock or vibration may be encountered. Do not use a washer or anything that may interfere with the metal-to-metal contact between the battery terminal post and the cable connector.

Check all connections periodically to make certain that they are and remain tight. Re-torque if necessary.

### Corroded Terminals

If corrosion is found on the terminal posts, remove the cables from the battery and clean all mating surfaces. Use a terminal post cleaning brush or a small wire brush. Neutralize the surfaces of the cable connector and terminal post with a solution of baking soda and water and dry thoroughly.

To prevent corrosion, apply a thin coat of petroleum jelly or corrosion inhibitor to the connections after reattaching the cables. Keep the top of the battery clean and dry.

Remove dirt from the top of the battery with a cloth or a brush and a solution of baking soda and water. Do not remove the vent caps during cleaning to prevent any cleaning solution or foreign matter from entering the battery. Finish off by wiping the top with a wet cloth. Dry the top of the battery thoroughly.

### Undersized Cable

Battery cable should be sized to properly handle the expected load. Undersized cables can lead to an unacceptable voltage drop and/or increased cable temperature. Refer to the table on the following page for the suggested maximum ampacity for copper wire. Ampacity is the ultimate safe current carrying capacity of the wire before damage occurs to the insulation.

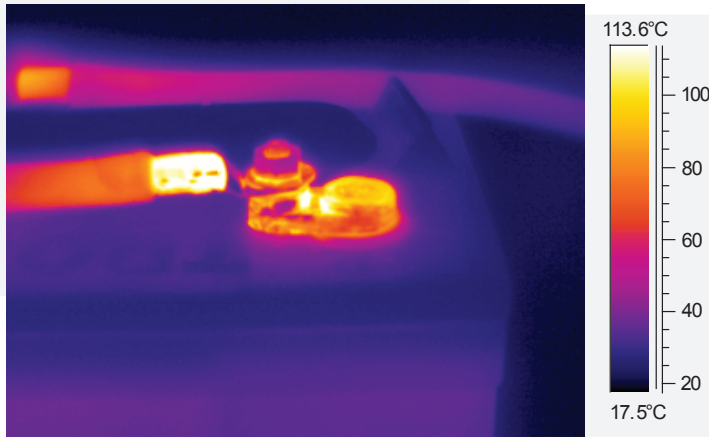
Table values are from NEC Table 310.15(B)16 for copper cables rated at 167°F (75°C), operating at an ambient temperature of no more than 86°F (30°C).

Wire Gauge Size (AWG)	Ampacity (Amps)
14 (2.08)	20
12 (3.31)	25
10 (5.26)	35
8 (8.36)	50
6 (13.3)	65
4 (21.1)	85
2 (33.6)	115
1 (42.4)	130
1/0 (53.5)	150
2/0 (67.4)	175
4/0 (107)	230

## Improper Connector Assembly

Connectors that are mechanically crimped to the cable's end will create a high resistance area. At high discharge rates, this resistance can create enough heat to melt the terminal post on the battery and/or melt the adjacent insulation on the cable.

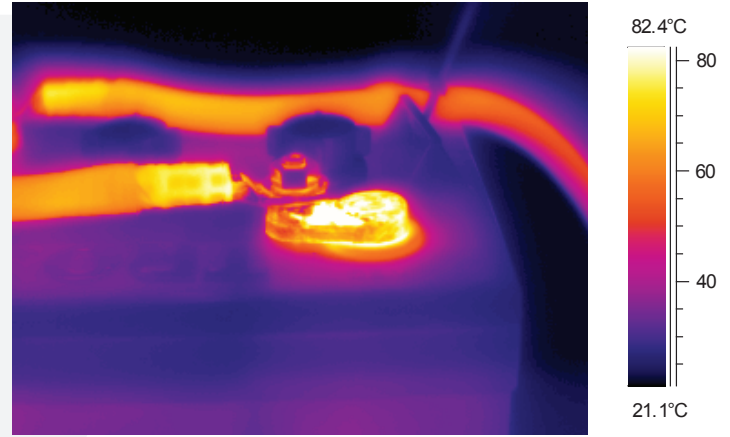
The infrared picture below shows a cable with a crimped connector under a high-rate discharge. Note that the crimped area is considerably hotter than the rest of the terminal post and the cabling. If allowed to continue the high temperature will be transferred to the terminal post through the connector and eventually a melting down of the terminal will occur.



The infrared picture below shows a cable with crimped and soldered connector under a high-rate discharge. Note that the high temperature area is no longer near the connecting junction but evenly distributed along the cable and battery terminal.

## Conclusion

Faulty connection can negatively affect the performance of a battery system and is the leading cause of most battery terminal post meltdowns. By sizing the correct cable, using properly assembled cable connectors, and practicing good maintenance habits, the potential for a problem to occur can be greatly minimized.



It is therefore highly recommended that connectors not only be mechanically crimped but also soldered to the cable's end. A properly crimped and soldered connector will provide a low resistance connection and reduce the amount of heat buildup at the connecting junction.

## Terminal Configurations





### TECHNICAL SUPPORT

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