

Fuse Those Batteries

By Ken Larson, KJ6RZ

The deep cycle batteries used to power our radio equipment in portable and mobile installations can be very dangerous. The problem is not electrocution. The 12 volt voltage of the batteries that we utilize is too low for that to be a concern. The problem is the very high current that batteries, particularly deep cycle storage batteries, are capable of delivering. Short circuiting a storage battery can destroy the battery and could cause a fire from over heated radio power wiring, in addition to causing serious personal injury.

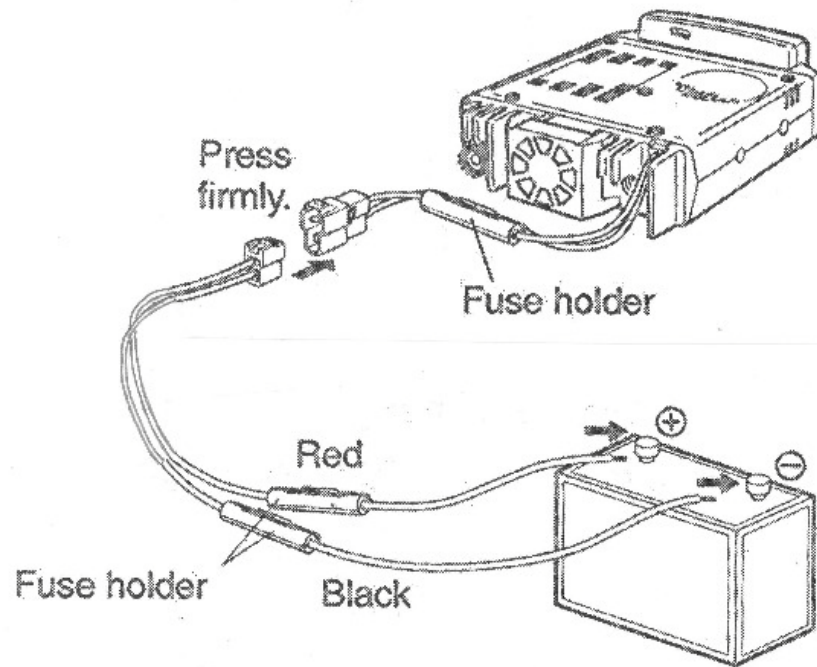
For example, a short circuit in the radio power wiring of a mobile radio installation could ignite a fire in the vehicle's engine compartment, ultimately destroying the vehicle. This could happen in the middle of the night when the vehicle is parked "safely" in the owner's driveway.

I once had the painful experience of inadvertently touching my hand, in particular my wedding ring, against the positive terminal of a rather large deep cycle battery. That in itself would not have been a problem had not the wrench that I was using to tighten the battery's negative terminal cable clamp also been resting against my wedding ring. The short circuit from the negative terminal through the wrench and my wedding ring to the battery's positive terminal melted my wedding ring. Fortunately, when the accident occurred, I jumped breaking the connection between my wedding ring and the positive terminal of the battery. Had the short circuit lasted a instant longer, my ring could have become welded to the battery terminal causing very serious injury, probably the loss of a finger. Even though it could have been worse, I was taken to the hospital emergency room where my ring was cut off and the burned skin on my finger, where the ring had been, was treated.

How can you prevent such tragic accidents from occurring?

Amateur radio equipment manufacturers recommend that two sets of fuses be installed in battery powered mobile and portable radio installations. They recommend that two fuses be placed on the battery end of the power cable, as close to the battery as possible, with a third fuse on the radio side of the power cable connector. The recommended approach is shown in the figure below. The two fuses close to the battery protect the battery from a short circuit, minimizing the chance of a fire or personal injury. The fuse on the radio end of the cable protects the radio. Note, some manufactures fuse both power leads at the rear of the radio.

Hugh Bosma, AE6YC, recommends that the battery fuses be rated at twice the current that you expect to draw from the battery. A 50 watt mobile radio typically draws 10 to 15 amps of power, so 30 amp fuses are a good choice for protecting the vehicle battery, or a deep cycle battery in a portable application. 10 amp fuses will do a good job protecting a 5 to 7 ah battery if you are running a low power radio. The fuse on the radio side of the power cable connector will usually be specified by the radio manufacturer. Mobile radios typically use a 15 amp fuse.



Proper fusing prevents fires, protects your radio, the power leads, minimizes voltage drops, and assures proper radio operation. Fuses are resistive elements and contribute to voltage drop – a good rule of thumb for sizing the short circuit fuses at the battery is to double the manufactures radio fuse specification. For mobile installations remember to use additional protection over the power leads to prevent shorts where the leads pass through the fire wall. For runs up to 20 feet Hugh recommends 10 gauge wire, remote trunk radios may require 8 gauge to limit power lead voltage drop.