

Installation Instructions for X-1200 Battery Box

1.1 Overview

The battery box you are about to install is designed to provide many years of service. When wiring the battery box it is essential that the wiring be highly resistant to corrosion and vibration. We recommend, at a minimum, high quality terminals, corrosion preventative sealant on connections, and wire ties and cable clamps to secure wires in order to limit long term damage from vibration and corrosion.

If your application is considerably different than what is described here, feel free to contact technical support at Elston Manufacturing at 1-800-845-1385 for more information.

1.2 Unpacking the Battery Box and Gathering Supplies

The battery box should ship with all components listed in the parts list.

Additional parts required:

- 4 - 7/16" diameter grade 5 bolts 1 to 1 ½ inches longer than the thickness of the front wall of the trailer with 8 flat washers and 4 nylon lock nuts to match
- Corrosion preventive spray or compound designed for coating threads and mating surfaces (recommended)
- Corrosion preventive grease or sealant designed for electrical connections (recommended)
- Premium quality ring terminals for #10 and 1/4" studs, clips, and wire ties
- Set of battery terminals with 6 or 4 gauge cables to fit your battery
- Automotive grade wire (see installation to help determine what gauge you need)

1.3 Installation of the Battery Box

Warning: Always use washers on the mounting bolts on the back of the battery box. Failure to do so risks cracking or failure of the box.

The first step is to mount all the desired components to the battery box except the battery and cover. Refer to the parts list for the installation location of all parts and the recommended hardware. If desired, the position of the circuit breaker and the junction block may be switched.

Once all the components are mounted you are ready to mount the battery box to the wall of the trailer. Using the battery box as the pattern, mark the four mounting holes and drill with a 15/32" bit. As you secure it to the wall, apply corrosion preventative compound to the threads of the bolt and the flanges on back of the battery box where it clamps directly against the wall of the trailer. Depending on the construction of the inside wall of the trailer it may be necessary to use a fender washer or similar item to provide a larger bearing surface for the bolts.

Now that the battery box is mounted, it is time to install the battery and wire the unit. The recommended wiring diagram is shown in Illustration 1. The circuit you will use will be determined by the device the battery is designed to run. The circuit breaker should be sized by the accessory or item the battery box will be powering. For proper charging, the battery box

should receive power at least the entire time the ignition of the tractor is on (unless the battery is being charged from a source on the trailer).

The size the wire you need for your installation is determined by the acceptable voltage drop in the circuit. An acceptable voltage is required so the battery can be fully charged in a timely manner without exposing it to damaging levels of current that will shorten its life. As tractors and trailer wiring systems are generally designed to run lights and other components on the trailer that have less demanding voltage requirements than charging batteries, the voltage in the trailer circuit will often be less than ideal under load. In serious cases the battery will not charge more than half full and will experience capacity-reducing sulfation due to extended service on less than a full charge. Four features of your installation set the acceptable voltage drop:

- Battery type and size – with larger batteries requiring larger charge currents and less voltage drop
- Depth of discharge on battery – If the battery will rarely be discharged to more than a 90% charge such as when used as a buffer for a high current item or power for short times only, more voltage drop is acceptable than if the battery will often be run down to 60% of a full charge or less.
- Other accessories running on the charging circuit - If an accessory on the same circuit that the battery is powering requires significant current (>2A) and will be running when the vehicle is running, the increased voltage drop under load will slow the charging of the battery.
- Battery Isolator¹ – If a diode based battery isolator is used, the voltage drop in the isolator significantly limits the acceptable voltage drop in the circuit. Even with no voltage drop, battery charging will be slow with this set up.

The chart below lists the approximate desired voltage drops for use with typical low maintenance deep cell batteries. Numbers for other battery types such as AGM will be slightly different. Please contact your battery supplier or Elston manufacturing technical support for more information and help developing a more exact figure. If the voltage drop in the circuit is more than the target value, the battery will probably not be able to reach or maintain a full charge. Since lead acid batteries need to spend most of their time full charged for maximum life

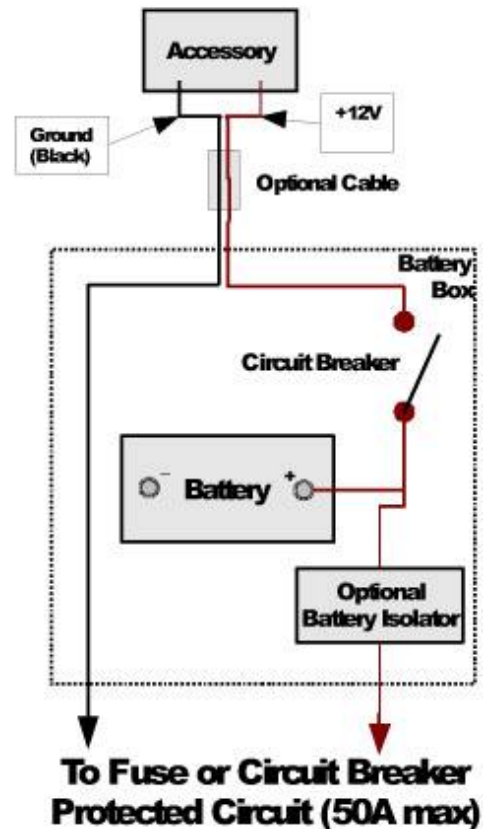


Illustration 1: Battery Box Wiring Diagram

¹ Generally battery isolators are recommended when batteries of different types and ages are used in the same circuit. When batteries are installed in more typically applications where battery to battery voltage drops under load are small this is unquestionable good advice. However, we, at Elston Manufacturing, believe that the normal voltage drops under load seen between the tractor and a battery box on the trailer result in isolators doing more harm than good.

you can also expect reduced battery life, possibly significantly reduced, if voltage drop is too large.

| Depth of Discharge of Battery | Other Accessories Running | Battery Isolator | Target Voltage Drop with 10A Total Load² |
|--------------------------------------|----------------------------------|-------------------------|--|
| Small | No | No | 3-6% |
| Large | No | No | 3-5% |
| Small | Yes ³ | No | 3-4% |
| Large | Yes ⁴ | No | 2-3% |
| - | - | Yes | As Low As Practical (<2%) |

Once you have determined the voltage drops in the existing wiring, including what is in a typical tractor in your fleet, size the new wiring to keep the total voltage drop within the target range. If the voltage drops in the existing wiring are already more than the target values, you'll need to determine how much reduced performance from the battery you are willing to accept to keep costs down and where it makes sense to improve the cables and tractor wiring to reduce voltage drop. A battery with reduced effective capacity from incomplete charging due to excessive voltage drop may very well be a cheaper alternate than getting the voltage drops within the target values above assuming a significant reduction in battery amp-hours are acceptable in your application and the costs from the accelerated battery replacement schedule are factored in.

Once you've sized the wiring, it is time to begin wiring the battery box. As mentioned above, it is essential that the wiring be highly resistant to corrosion and vibration for a trouble free service life. We recommend, at a minimum, high quality terminals corrosion preventative sealant on connections, and wire ties and cable clamps to secure wires to limit long term damage from vibration and corrosion. We also recommend using dual wall heat shrink tube for maximize encapsulation of the joints.

2 Total voltage drop measured from the battery terminal in the battery box and the battery terminal on the tractor with a 10A load across the battery box battery terminal and no other loads on that circuit.

3 The more power required by the accessory the lower the desired voltage drop. If the current is more than 12A or so, a voltage drop lower than what is listed is required.

4 See note 3