

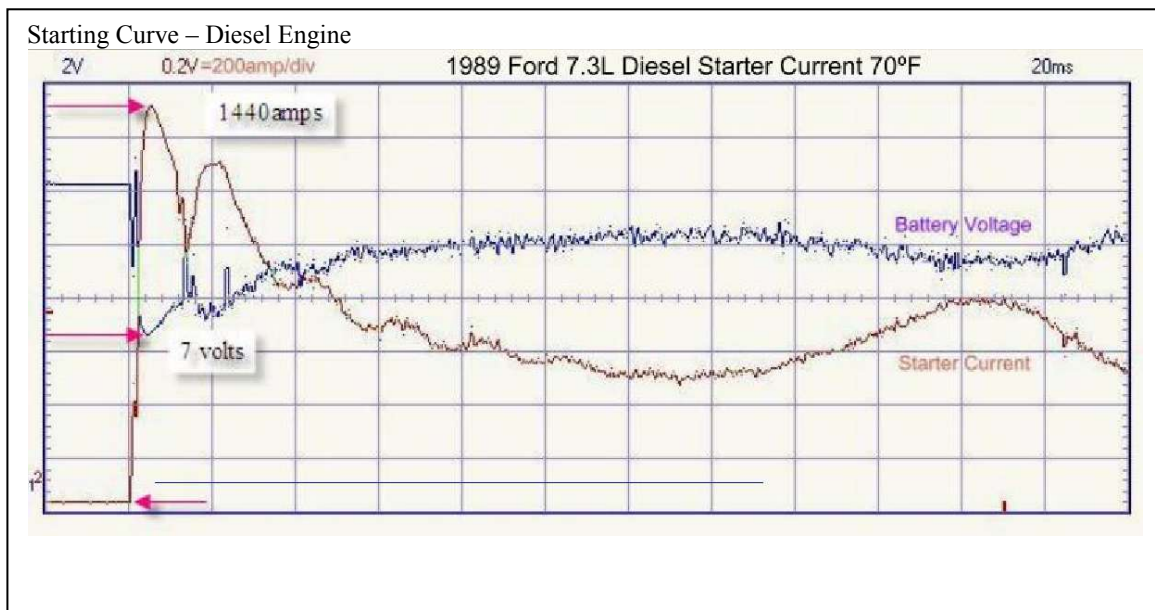


## Jump-starting your battery the safe way

### Surge and Spike Protection on Jump-N-Carry and Booster Pac Jump Starters

Some European competitors are claiming to have Surge and Spike protection for jump starting a car. Let's start with the basics of how a car starts.

- 1) The mass of the engine is still governed by Newton's Law: A body at rest will remain at rest until acted upon by some external force - that's called inertia. So the engine is stopped and the starter is engaged. The first few milliseconds are the most difficult and require the most power to start the engine mass moving and the flywheel rotating.



- 2) The curves above show that a professional using the jump starter to start a typical truck's diesel engine needs to deliver 1440 Amps in the first 10 milliseconds to start rotating the engine. The next peak in the curve, at about 20 milliseconds is the first compression cycle (approximately 1350 amps) while the engine is still ramping up its speed.
- 3) The complete starting cycle for a well maintained engine is between 1 and 2 seconds and the amount of energy required is very high. Anything that interferes with the delivery of the power required, will reduce the Jump Starter's ability to start the vehicle. The Jump-N-Carry product as well as its companion products, Booster Pac and Truck Pac all have batteries specifically designed to provide high peak currents, and sustained energy delivery to start vehicles others just simply can't. Once a battery has been designed properly, the rest of the system has to be designed in accordance with the amount of power you must deliver to start an engine. To accomplish this, our products are designed with the best power cable size and construction, specifically designed for minimal resistance (we deliver as much of the battery's power as possible to the engine).
- 4) Could fuses be used?
  - a. If a fuse were to be used, then the fuse would have to allow for over 1600 Peak Amps (3200 Peak Amps on the dual battery units) and therefore would not be useful in protecting anything under that much current.
  - b. If what's called a "Slow blow" fuse were used so that the peak current would not trip it, the protection would also be minimal.



## Jump-starting your battery the safe way

- 5) The key question is; what's the difference between a jump starter being connected to the car, and the connection of a new battery to the vehicle?
  - a. If you think about it, the jump starter connecting to a car's electrical system is no different than hooking up the car's original battery. The car's electrical system goes from a state of now power, to powered the same way when a Jump Starter is hooked up to the electrical system.
- 6) The key to using a professional grade jump starter is to ensure that professionals use it. That they follow good common sense processes that mechanics and road assist professionals have been using for decades:
  - a. Read and follow all User Manual Instructions
  - b. Make sure all the vehicle's systems are in the OFF position
    - i. Ignition Key,
    - ii. Lights,
    - iii. Radio,
    - iv. Heater fan's
    - v. Etc.
  - c. First connect the positive cable to the battery
  - d. Then connect the negative cable to the vehicles chassis or engine block (never connect to the fuel line)
  - e. Do Not hold the ignition key on the "start" position longer than 3 seconds
  - f. Allow sufficient time between start attempts for the battery too cool off (1 minute minimum)