

## WIRING

**Wiring is just as important as any other component in the starting and charging system. It must be capable of delivering the amount of current that the load is demanding.**

When electrical systems are designed, the wire size is calculated for the specific requirements of the electrical components being used. **When electrical components are added or upgraded, the wire size has to be upgraded also. For example, replacing a low torque starter with a high torque starter will normally require the battery cables and possibly the battery to be upgraded.**  
**WHEN IN DOUBT, ALWAYS USE A BIGGER WIRE.**

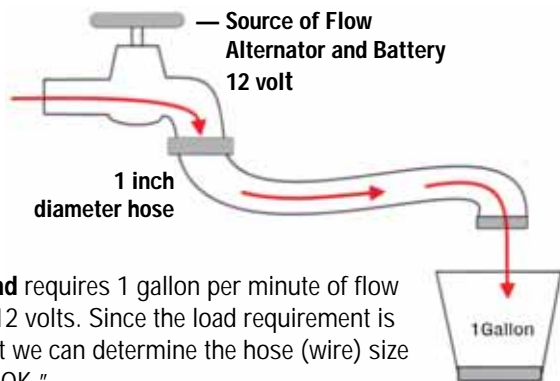
### A word about wire gauge

The size of a wire (gauge) is expressed in terms of a standard American Wire Gauge (AWG) measurement. **The higher the AWG number, the smaller the wire. For example, a 14 gauge wire is smaller than a 10 gauge wire.** The smaller the wire, the greater its resistance to the flow of electrons and the greater the heat generated when the wire is conducting electricity. The heat can destroy insulation and even kindle a fire. **THE LARGER THE AMPERAGE OF A CIRCUIT, THE LARGER THE WIRE THAT IS NEEDED.**

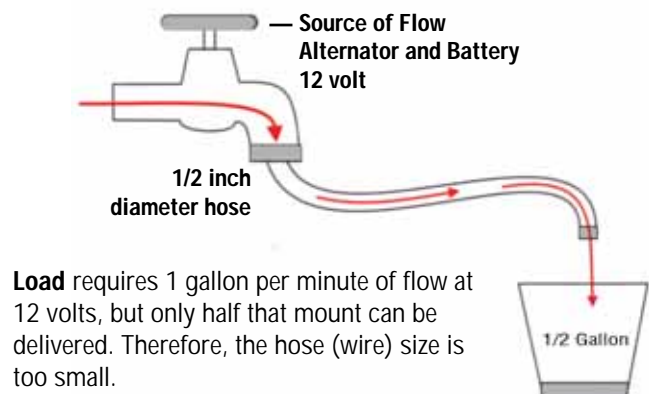
### Think of wiring as a water hose.

**The electrical current is like water flowing through the hose.** The source or supply of this water would be the battery and alternator. Look at the diagrams below. The first diagram shows a one inch diameter hose which allows one gallon per minute of flow. Since the load requires only a gallon per minute of flow, we can say that this hose (wire size) is of sufficient size to carry the supply of water (current) to the load. This all changes when we reduce the water hose (wire size) to one half inch as shown in the second diagram. The hose (wire) can only deliver half the current needed by the load— this hose (wire) is NOT of sufficient size to carry the needed supply of water (current) to the load.

### Adequate Wire Size (gauge)



### Inadequate Wire Size (gauge)



**BIGGER (LARGER) IS BETTER!**

**The higher the AWG Number, the smaller the wire.**

**The larger the amperage of a circuit, the larger the wire that is needed.**

## WIRING AND VOLTAGE

### VOLTAGE IS MUCH LIKE WATER PRESSURE.

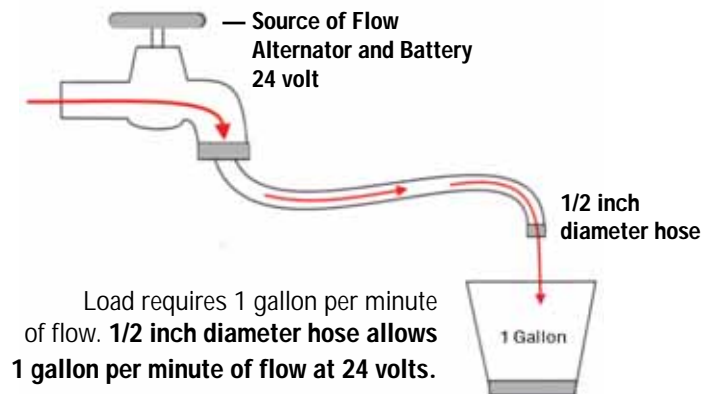
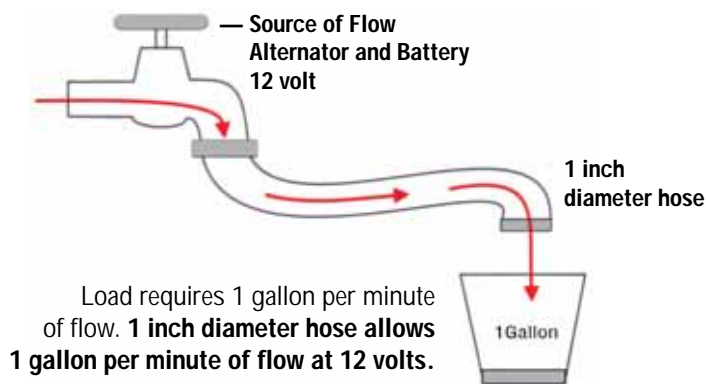
When calculating proper wire sizing, voltage plays a very important role.

Voltage is much like water pressure. The higher the voltage, the faster the current flows.

**A 24 volt system can move the same amount of current through a wire one half the size required for a 12 volt system.**

This is also shown in the charging cable size chart on the following page.

Notice that the 24 volt cable size requirements are much less than that of the 12 volt.



**The higher the voltage, the faster the current flows.**



## RECOMMENDED WIRE SIZES

Below you will find the recommended wire sizes for charging and starting systems. **IT IS VERY IMPORTANT TO INCLUDE THE GROUND CABLE WHEN CALCULATING THE TOTAL LENGTH OF THE SYSTEM.**

The ground cable must carry the same amount of current as the positive cable.

**WHEN IN DOUBT - - - BIGGER IS BETTER!**

### MINIMUM CHARGING CABLE GAUGE SIZE

TYPE OF SYSTEM	OUTPUT IN AMPERES	TOTAL LENGTH INCLUDING GROUND CABLE							
		UP TO 4 FT.	4 FT. TO 7 FT.	7 FT. TO 10 FT.	10 FT. TO 13 FT.	13 FT. TO 16 FT.	16 FT. TO 19 FT.	19 FT. TO 22 FT.	22 FT. TO 28 FT.
<b>12 VOLT</b>	0-20 AMPS	14 GA.	12 GA.	12 GA.	10 GA.	10 GA.	8 GA.	8 GA.	8 GA.
	20-35 AMPS	12 GA.	10 GA.	8 GA.	8 GA.	6 GA.	6 GA.	6 GA.	4 GA.
	35-50 AMPS	10 GA.	8 GA.	8 GA.	6 GA.	6 GA.	4 GA.	4 GA.	4 GA.
	50-65 AMPS	8 GA.	8 GA.	6 GA.	4 GA.	4 GA.	4 GA.	4 GA.	4 GA.
	65-85 AMPS	6 GA.	6 GA.	4 GA.	4 GA.	2 GA.	2 GA.	2 GA.	0 GA.
	85-105 AMPS	6 GA.	6 GA.	4 GA.	2 GA.	2 GA.	2 GA.	2 GA.	0 GA.
	105-125 AMPS	4 GA.	4 GA.	4 GA.	2 GA.	2 GA.	0 GA.	0 GA.	0 GA.
	125-150 AMPS	2 GA.	2 GA.	2 GA.	2 GA.	0 GA.	0 GA.	0 GA.	00 GA.
<b>24 VOLT</b>	0-20 AMPS	14 GA.	14 GA.	14 GA.	12 GA.	12 GA.	12 GA.	10 GA.	10 GA.
	20-35 AMPS	12 GA.	12 GA.	12 GA.	10 GA.	10 GA.	8 GA.	8 GA.	8 GA.
	35-50 AMPS	10 GA.	10 GA.	10 GA.	10 GA.	6 GA.	6 GA.	6 GA.	6 GA.
	50-65 AMPS	8 GA.	8 GA.	8 GA.	8 GA.	6 GA.	4 GA.	4 GA.	4 GA.
	65-85 AMPS	6 GA.	6 GA.	6 GA.	6 GA.	6 GA.	6 GA.	4 GA.	4 GA.
	85-105 AMPS	6 GA.	6 GA.	6 GA.	6 GA.	4 GA.	4 GA.	4 GA.	2 GA.
	105-125 AMPS	4 GA.	4 GA.	4 GA.	4 GA.	4 GA.	4 GA.	2 GA.	2 GA.
	125-150 AMPS	2 GA.	2 GA.	2 GA.	2 GA.	2 GA.	2 GA.	2 GA.	2 GA.

### MINIMUM STARTING CABLE GAUGE SIZE FOR MOST INBOARD GASOLINE ENGINE APPLICATIONS

#### 4 - 6 - 8 Cylinder Gasoline Engine

Total Cranking Circuit Length in Inches	UP TO 75"	75" - 125"	125"-175"	175"-225"	225"-275"	275"-325"	325"-425"
Minimum Battery Cable Size	4	2	1	0	2/0	3/0	4/0

