ALL CAPACITORS ARE NOT CREATED EQUAL!

As the originator of multi-farad power capacitors for car audio, Alumapro is often asked to compare our products to newer competitive designs. With over 6 years experience, and more than 10,000 The C.AP. devices in daily use, Alumapro certainly has the largest working knowledge of audio power capacitors.

To understand the differences in capacitor technologies, it is worthwhile to first look at the history of The C.A.P.--"Carbon Alloy Power". Before The C.A.P., electrolytic capacitors were used for power leveling or "stiffening". At that time, the largest commercially available capacitor was about 1 F (or Farad). Though it was not designed specifically for this application, it improved voltage stability on the lower powered audio systems of that era. In order to get a significant improvement on larger systems up to 1000 watts, it was common to parallel multiple electrolytic cans together with bus bars or other additional interconnects. While this certainly appears to be a good idea, in practice the added connections worked against it. The practical limit was found to be about 3 of these cans, after which the response of the device was too slow to function to expectations. In fact, a popular Richard Clark/David Navone seminar back then demonstrated this phenomenon.

The problem is the increase in impedance. Impedance is the complex sum of the AC and DC resistances in a capacitor and its connections. While a single 1F capacitor had an acceptable impedance for low powered systems, the additional interconnects increased the inductance (reactance) and therefore the AC impedance. There was no net gain in performance by adding more electrolytic cans. And 3F of capacitance was inadequate for higher-powered systems.

And it is easy to see why multi-farad capacitors were desirable. The purpose of a power reservoir is to maintain the system voltage at some value to avoid amplifier shutdown or instability. Furthermore, with amplifiers employing unregulated power supplies there can be dramatic increases in power when the system voltage is maintained at a higher level. So how much charge is available in a 1F capacitor? If we assume a maximum voltage off the alternator of 14.4 volts, and a minimum voltage of 10.5 volts before amplifier shutdown, then (14.4-10.5) x 1 F = 3.9 Coulombs. While a 1F capacitor has a total charge of 14.4 Coulombs (at 14.4 volts), it has an effective charge of only 3.9 Coulombs since the rest of the charge is not usable below amplifier shutdown.