

Aeromotive, Inc. Technical Bulletin #802

From: Aeromotive Technical Department

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Re: Fuel Tanks and Cells: Sumps vs. Pick-up Tubes and EFI

EFI and modern engine technology have combined to create the ultimate street driven racecar. With ordinary combinations producing from 300 HP to as much as 500 HP, the stock EFI fuel system has proven flexible. Hard core engine combinations exceed this mark with the exotic making 1000+ HP, on “the street”. Applications above 500 HP universally require a complete fuel system makeover, from fuel rails to fuel pump. A key part of any fuel system upgrade is the fuel container itself. The debate is whether to modify the stock tank or install a racing fuel cell.

There are several benefits for retaining the stock fuel tank in a high horsepower streetcar. It has a larger capacity than most fuel cells, already has a mounting location and hardware, has provisions for filling from outside the vehicle, has a cap that both vents and seals and is already on/in the vehicle.

The drawbacks to stock fuel tank retention are more numerous but less obvious. The stock pick-up/pump assembly is restrictive, requiring complete replacement with a fabricated assembly. When using a stock tank with fabricated pickup, unless the fuel level in the tank is $\frac{3}{4}$ full or higher, the internal well, which the stock pump draws from, is far too small and poorly supplied with fuel from the rest of the tank. Faced with the demand of a large pump, drawing through a fabricated pickup, it has no chance of refilling fast enough to support WOT full engine load. Under low demand, cruise type conditions, the large volume of fuel delivered to the rails is unused and returned. The same fuel, picking up heat from the pump and the rails, is constantly recycled to and from this well, rapidly increasing fuel temperature. Common problems associated with stock fuel tanks and fabricated pickups are pump cavitation, vapor lock, varying fuel pressure, exaggerated pump wear and lean conditions during both low and high loads. ***Note: Unlike a carbureted engine, any loss of fuel supply at the in-tank- pickup will immediately result in a loss of fuel volume and pressure at the EFI injector resulting in lean conditions and engine damage.***

For those who prefer a stock style fuel tank, Aeromotive has performed extensive research into what would make an acceptable compromise. The findings above clearly ruled out the use of any kind of fabricated pickup. Instead, the company designed a fuel sump and baffle assembly, professionally installing it on various stock style tanks. The primary problem of heat soak is minimized, as is the restriction of fuel flow through the sump box and to the actual pick-up point. However, this is still a compromise at best, requiring fuel levels be maintained above $\frac{1}{4}$ for normal low load driving, above $\frac{1}{2}$ to $\frac{3}{4}$ for drag racing and above $\frac{3}{4}$ for road racing. In all serious racing applications the correct fuel cell is highly recommended. All Aeromotive fuel systems are available with or without the modified stock tank, allowing the best choice of fuel container without compromising on the rest of the system. There is a better way to feed the beast and Aeromotive has the modern fuel system components to do it now!

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