A Tale of Two Mercedes

Several years ago J. B. wanted us to build two high performance engines for his Mercedes. The first was a 1970 250 Sedan, the second was a 1973 450 SLC. Both cars he had purchased and began driving since new. The 250 had a 280 engine previously installed after the original engine wore out. Now, the 280 engine was tired, after many years and well over a hundred thousand miles of service.

My first suggestion to J.B. was that he go look at some three to five year old Mercedes instead of rebuilding his current ones.

Being a very intelligent and analytical kind of guy as well as a pilot and owner of a turbo charged twin engine airplane J.B. promptly said I don't want any of that computerized stuff in a car that I own and drive every day.

His goal was to have us build two high performance engines for the Mercedes using only factory Mercedes parts.

I first contacted Renntech who have on staff a Mercedes engineer who worked for Mercedes when these vehicles were new.

Did I mention that J.B. did not want any form of forced aspiration (super charging or turbo charging) as dealing with it on his airplane was enough for him.

My first thought was to significantly increase the displacement of both engines. The Mercedes engineer I spoke with researched the idea and called me back several days later and said the architecture of both engine blocks did not allow for the use of later (larger displacement) crankshafts. Retrofitting later engine blocks would have been a heroic task in terms of time and dollars. We needed another approach.

First the 280 engine; We balanced all the reciprocating and rotating components we checked all the clearances and internal engine volumes and corrected any that were improper. These techniques are commonly known as balancing and blueprinting. We selected the highest lift camshaft Mercedes made for the six cylinder single overhead cam known as 114 and the 130 engines in Mercedes speak. We installed European specification high compression pistons. That completed the cylinder block for the 250.

On to the cylinder head. The cylinder head was gas flowed. A process that when done properly, increases the volumetric efficiency of the engine. Basically, anything that you can do to increase the volume of air pumped through an engine will make more power. A device used to measure volume of air through a cylinder head called a flow bench is used to evaluate the before and after flow volumes when a cylinder head is gas flowed or ported.

We were able to achieve about a 28% increase in air flow through the cylinder head. J.B. had previously installed exhaust manifolds and the exhaust system from the 280 SE (fuel injected) engine as it is significantly more free flowing. Prior to the engine project we had installed a Weber conversion kit (from J.A.M. engineering) so the external induction and exhaust systems on the engine were attended to.

We sent the intake and exhaust manifolds to extrude hone. Extrude honing is a process where a gritty rope is pushed through either a cylinder head or manifold to port something that is either impossible or too difficult to access by hand. The last item to attend to on the 280 was the ignition system. We located a Bosch distributor with an aggressive advance curve, had a custom fitted pertronix electronic ignition system installed and used that to trigger a Jacobs computerized (don't tell J.B.) ignition system which can be switched off so the car has redundant ignition systems just like an airplane. The engine was installed, test run, the timing set to 12 degrees initial and 38 degrees at 4000 RPM. The carburetors were synchronized and the idle speed set. Next with the engine cold we retorqued the cylinder head and readjusted the valves.

Then the car was turned over to J.B. for break-in and final carburetor jetting. J.B. has a portable carbon monoxide meter based on a wheatstone bridge that he used for finalizing the carburetor jetting.

J.B. ending up plugging the high speed enrichment circuits in both carbs to get the desired 12 to 1 fuel to air ratio mixture for max power under full throttle.

J.B. has a measured distanced near his aircraft hanger where he does time speed distance calculations to evaluate performance.

We improved the acceleration by over 20%, a more than satisfactory result using only Mercedes parts and some inventive tuning tricks!

On to the 450 engine. The engine was bored to the second oversize. The highest compression ratio factory Mercedes pistons were sourced. US spec engines had an 8 to 1 compression ratio, European engines were 8.8 to 1. The block was decked and milled (a process to straighten and flatten the top surface) to raise the compression ratio to just over 9 to 1 to help compensate for over 6000 foot elevation. Again all reciprocating and rotating components (pistons, connecting rods, crankshafts, flywheel and front crankshaft pulley) were balanced. All clearances were set to the middle of factory tolerances ("blueprinting").

The intake manifold and exhaust manifolds were shipped to extrude hone to be gas flowed.

The intake system was topped off by sending the throttle body to a machine shop to be bored oversize.

Again we selected the highest lift camshafts available form Mercedes. For those into Mercedes jargon, they

were known as #56 and #57. They had about 1.5mm more lift and about 7 degrees more duration allowing the valves to stay open longer and lift higher which causes more efficient cylinder filing and evacuating (read more air pumped which = more power because of improved volumetric efficiency. The camshafts were carefully dialed in using factory Mercedes offset keyways, a dial indicator and a degree wheel. This is a time consuming exercise but can make or break the whole project in terms of power output and drivability.

Again we fitted a Pertronix electronic ignition (a favorite of mine.) This time used to trigger a MSD ignition system. We set the distributor up for 12-14 degrees of advance at idle and 38-40 degrees of maximum advance at 4000 RPM. We installed the engine following J.B.'s directive to check everything that moves or has fluid going through it. After rejuvenating anything that required it we fired up the engine. We set the fuel pressure to 30 PSI Bosch thoughtfully provided an adjustable fuel pressure regulator on the D-jet fuel injection system as original equipment.

Did I mention J.B. crafted a cold air induction system for both cars? This was long before kits were sold. After the engine was run the cylinder heads were retorqued, the valves adjusted, the ignition timing set as was the fuel mixture. Along the way, we discovered the vacuum pipe which goes to the transmission modulator which controls the shift timing and quality had been previously repaired and was leaking causing lean running and poor shift quality. We resectioned the steel pipe, adjusted the fuel mixture properly and turned the car over to J.B. for break in.

After the engine was broken in, it was back to the oak tree for acceleration testing.

J.B. reports that the acceleration improvement again was over 20%. Again a resounding success!

J.B. has been enjoying both these cars for many years. He uses the red car, the 250 Sedan equipped with 4 Michelin snow tires, for winter use and the silver car, the 450 SLC coupe, for summertime motoring.

Did I mention that both cars have flames on them?

Respectfully Submitted,
Mark R. Weiner