CHASSIS DYNAMOMETER PROCEDURE

THE FOLLOWING PROCEDURE DESCRIBES THE PROCESS FOR HP VERIFICATION ON SUPERCHARGED VEHICLES.

NOTE: All vehicles should be inspected and deemed free of all faults including but not limited to: check engine lights, misfires, hesitations, low boost, and detonation.

The Chassis Dynamometer procedure for Supercharged Vehicles is designed to recreate typical conditions that your vehicle would see during on-road conditions. One of the major differences between typical driving conditions and the chassis dynamometer environment is the presence of fresh cool air. For this reason, it is imperative that the procedure be run outdoors or in an extremely ventilated environment. Previous testing has shown a loss of over 75 hp solely from the ambient recirculation of exhaust gases into the intake. If one can see or smell exhaust or if the environment does not allow for isolated fresh air intake and exhaust, measured power will be significantly lower than expected.

Another concern with static air is the reduction of flow over the vehicle's intercooler. Most Supercharged cars use a two stage intercooler system. There is a heat exchanger in the front air dam, an intercooler in the intake manifold, a high flow water pump, and a recovery tank for the water supply. This system provides consistent cooling for the engine in all driving conditions. The difficulty in chassis dynamometer testing supercharged cars comes from trying to simulate on road driving conditions. You need to supply enough airflow to the heat exchanger and intercooler to replicate how the car performs on the street. We use an Intake Air Temperature (IAT) Sensor in the intake manifold as a detonation control to reduce spark advance at elevated IAT's. For example if you're running your car in hot ambient temperature without adequate air flowing through the intercoolers, air charge temperature will exceed 150 degrees, and you will not see max horsepower.

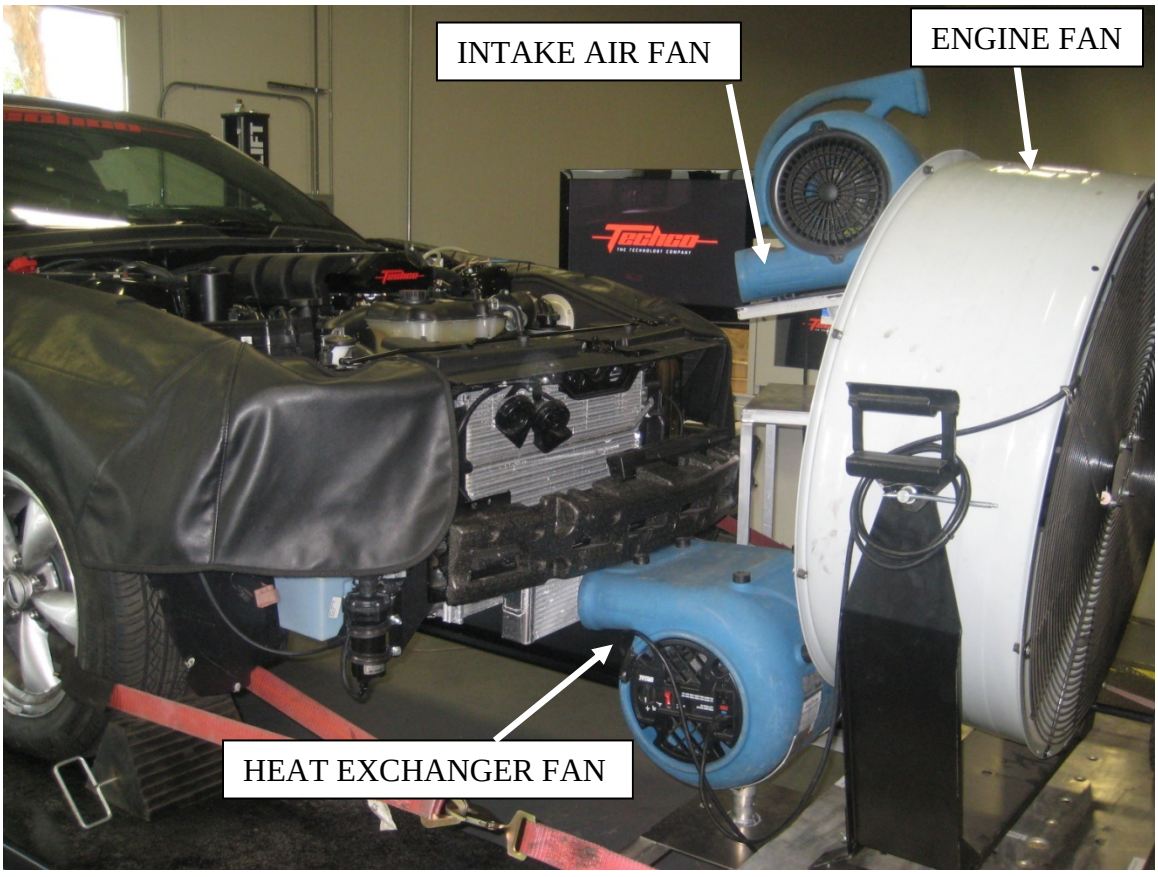
Since most Chassis Dynamometers cannot recreate the load associated with wind resistance and vehicle acceleration, the run must be made in 4^{th} gear (3^{rd} gear for some automatics) to achieve accurate results. Overdrive should be turned off to inhibit upshifting while cruising up to speed. Dynamometer runs in lower gears will shorten the length of the pull thus under-loading the engine and placing the truck in conditions it would never see on the street.

Here are some tips on how to successfully Chassis Dynamometer test a supercharged vehicle:

1. ENGINE COOLANT AIR FLOW: Leave the hood open and use a large fan to ensure air is flowing into the engine bay to keep the engine radiator cool. Never dyno a hot car, Allow the car to cool down before performing any dyno runs.

2. INTAKE AIR FLOW: Ensure that there is a steady flow of fresh cool air into the intake of the vehicle. If possible use a separate fan to direct air flow to the air filter box. It is often helpful to open garage bay doors to the atmosphere and turn on multiple large capacity fans to direct fresh air to the intake.

3. HEAT EXCHANGER AIR FLOW: If possible use a separate fan to direct air flow to the Heat Exchanger in the front air dam. (Note: the intake manifold and intercoolers are made of aluminum and will heat soak from the engine heat.) Never perform back-to-back runs without cool downs. The intercooler temps will only continue to increase and the performance will go down. To aid in the cool down of the intercooler, use a small fan on top of the blower in between runs, and/or ice if necessary.



4. EXHAUST VENTILATION: Make sure that the exhaust has been completely isolated from the intake air. It is important to verify that there is no backpressure being supplied by the dynamometers exhaust system. Backpressure makes the engine work extra hard, and thus the dynamometer will measure less power.

5. DISABLE TRACTION/STABILITY CONTROL: If the vehicle is equipped with Electronic Traction Control or Electronic Stability Control you will need to disable it in order for the rear wheels to spin independently of the front without triggering Engine Limiting.

6. DATA LOGGING: For Mass Air Flow (MAF) based systems, record Actual Air-Fuel Ratio with a Lambda Meter, RPM, Load, Mass Air Flow (MAF) (lbs/min), Spark, Fuel Pressure (psi), Engine Coolant Temperature (ECT), Intake Air Temperature (IAT), Throttle Position, Knock, Knock Sensor Volts, Boost Pressure (psi). For Speed Density based instead of measuring MAF data record Manifold Absolute Pressure (MAP), Volumetric Efficiency, Pressure Ratio (MAP/Baro).

7. ENTRY CONDITIONS: Start every dyno run at or below 90^{o} Intake Air Temperature (IAT) and at or above 160^{o} Engine Coolant Temperature (ECT). These numbers can be easily read on any CAN bus OBDII scan tool. Starting Dyno runs outside of these conditions will give inaccurate, inconsistent runs.

8. DYNO PULLS: Perform the Dyno runs in 4rd gear, which is typically a 1:1 gear ratio and will allow for a long pull for the supercharger to build to peak boost output. Begin the WOT portion of the run from roughly 3000 rpm to Redline. (For Automatics without manual gear selection, the run should be started in Drive (D) at the minimum speed possible before a downshift into 3rd gear. For automatics with manual 3rd gear selection, such as Dodge Charger/Challenger/Chrysler 300, the run should be performed in 3rd gear. Overdrive should also be turned off.)

9. CALCULATING FLYWHEEL HP: To calculate engine flywheel power take the rear wheel number and divide by .85 for manual transmissions (for a 15% drivetrain loss), and .79 for automatic transmissions (for a 21% drivetrain loss). This takes into account internal drive train loss since the chassis numbers represent only a portion of the actual flywheel power.