

## Large Diameter (+50mm) Waste Gate Control with CARVtech Auxiliary Boost Controller.

It seems like everyone wants to go big. Big turbo, big Waste Gate, big Exhaust etc. Fact is that how big is a function of how much flow is required through the various parts of the system to support the power goal.

With the Waste Gate, most often it seems trendy that if you are going for "big power" then you must have a 60mm Gate, or at the very least a 50mm. In some instances two 60mm Gates. While there is a very simple set of sums that can help you calculate "how big?", it seems again that people just want a big one.

So the next step is controlling this large diameter valve. Specifically trying to keep it closed on the seat and preventing pre-mature "creep" and loss of exhaust gas mass flow across the exhaust turbine of the turbocharger.

The reason the larger gates are harder to control is simple: The bigger the valve the more effective force is required to keep it on the seat against exhaust pressure. Compounding this is the fact that as the valve diameter goes up the relative increase in the diaphragm diameter lags behind, and so the total effective differential force (springs and pressure on the diaphragm) decreases.

What is most often done after trying to tune the Boost Controller and failing to gain any acceptable level of control is to increase the valve / seat force by ramming and cramming extra springs into the diaphragm cap assembly.

What most mechanics and tuners end up with is a Waste Gate that is mechanically locked closed under excessive spring force and it cannot modulate at all. So the next step now becomes tuning the springs to drop the pressure back to what was required. Or they get fancy and drill a hole that they then tap and place an adjuster bolt so that they can vary the spring loading.

Alternately some tuners install a Co2 Bottle with a regulator in order to "lock down" the diaphragm with a controlled (regulated) load from above the "open" chamber on the Gate. Both methods will achieve one thing after lots of time and trial and error.....they will open the Gate and then slam them shut, just at, and right after the set pressure. There is no modulation and no ability to hold a stable open / close cycle. As the system mass flow changes and the rate of change varies these system cannot adapt. If it is tuned with the Nitrous Oxide system off then it will have to be tuned again with the system on. Additionally for a street or street / strip vehicle the opportunity for High and Low Boost is gone with the "spring" method, and becomes another tuning session with the "Co2" method.

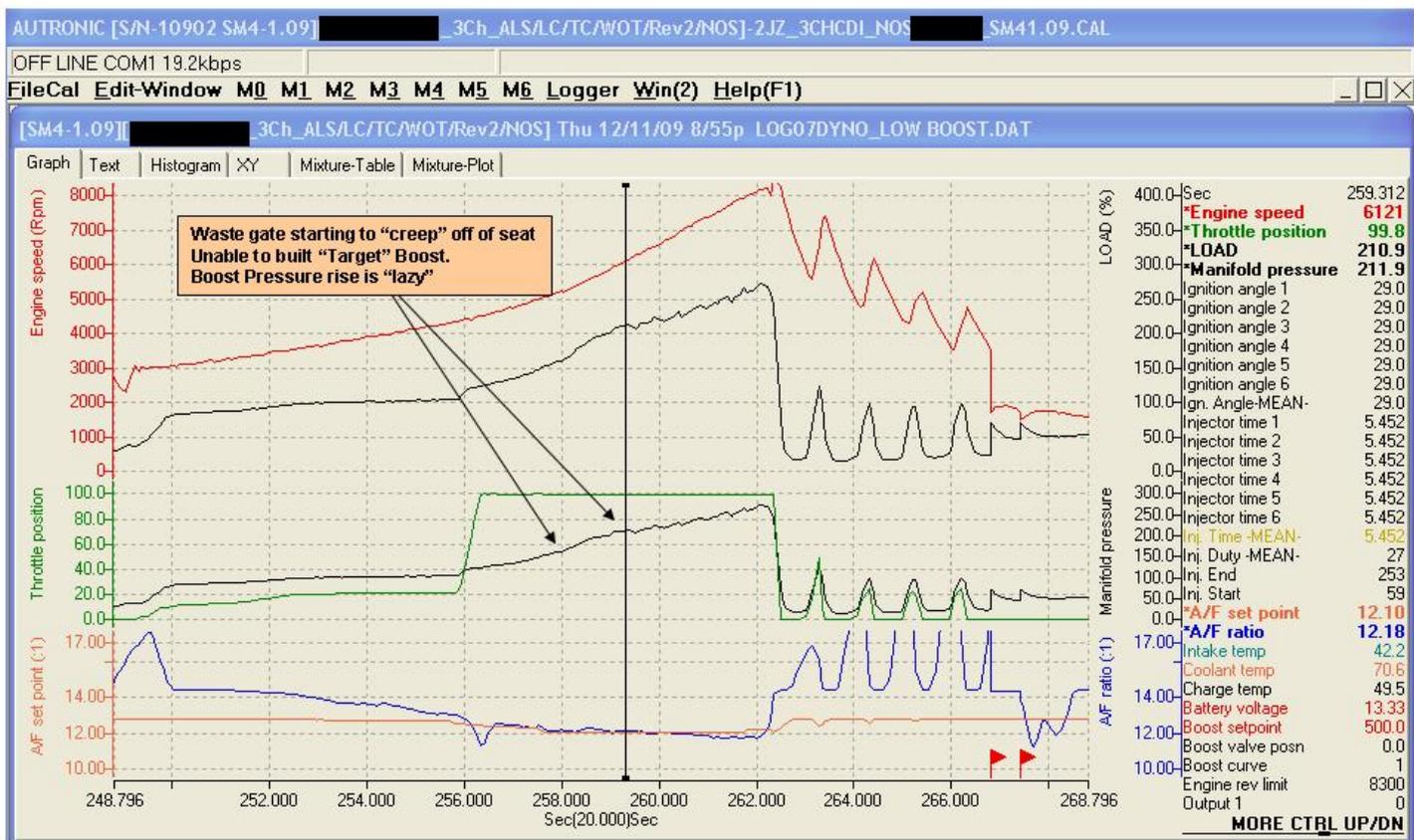
While the concept of pressure times area equals force is by no means new, so too there are methods of managing this in a more dynamic manner within the application of a Waste Gate. CARVtech PC has developed an Auxiliary Boost Control Valve that works in tandem with the systems existing Boost Controller. There are two models available that have been tried and proven. Both models require the use of a high quality electronic PWM Boost Control Solenoid as the base system (ie. The existing system that cannot cope).

1. "piggy-back" to the existing stand alone Boost Controller with either electro-mechanical or "following" PWM Control.
2. Independent 3D Mapped PWM Control via an Autronic ECU.

**The benefits** of the CARVtech Auxiliary Boost Controller are numerous and shown with three actual Dynamometer tuning session log files:

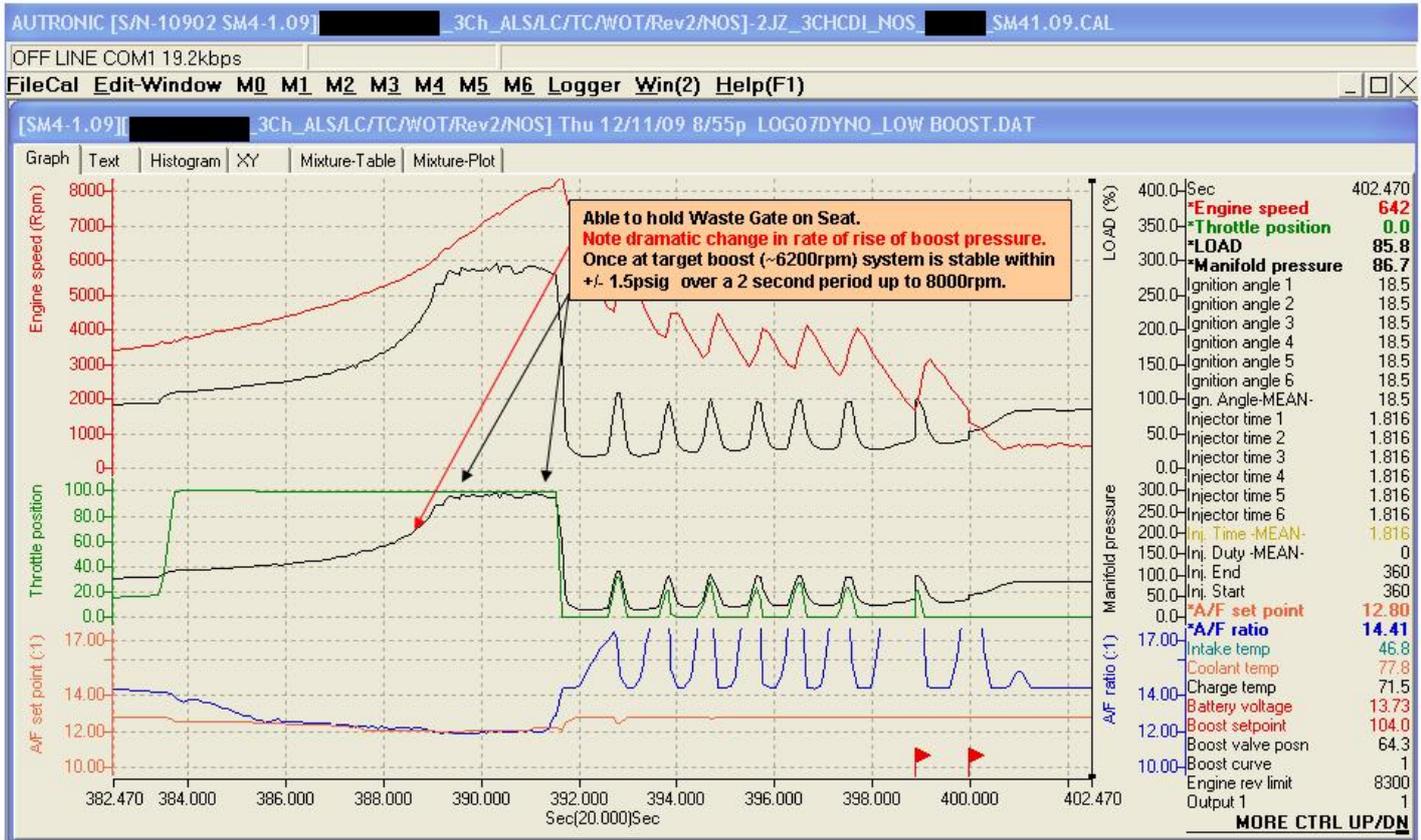
1. Allows for modulated control of the mass flow across the Waste Gate Valve.
2. Eliminates "set point" overshoot as a result of "popping" off the seat.
3. Eliminates "creep" and allows a progressive increase in Boost Pressure.
4. Maintains "set point" within 0.5psi or better.
5. Increases the area under the power curve by optimizing the flow through the exhaust gas turbine housing without uncontrolled venting or leakage.
6. The system fully integrates with no major modifications.
7. Used in combination with the Autronic SM4 ECU this system can provide a "fail safe to low boost" option that is configurable to multiple parameters.
8. System allows the user to truly switch between high, intermediate or low boost levels.

### Base Line Run: 60mm Greddy Waste Gate



Waste Gate with upper boost reference line only

# Autronic SM4 and Autronic Boost Control Valve - on: 60mm Greddy Waste Gate

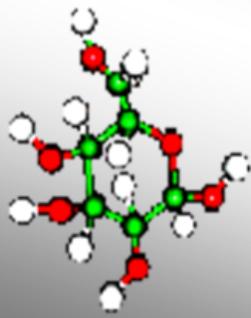


794bhp and 566lb-ft @ 28psi and hunting

# CARVtech Auxiliary Controller + Autronic SM4 and Boost Control Valve - on: 60mm Greddy Waste Gate



806bhp and 587lb-ft @ 28psi holding



# CARVtech PC. Ltd

**UPSTREAM PETROLEUM CONSULTING SERVICES**  
&  
**PERFORMANCE AUTOMOTIVE ENGINEERING SOLUTIONS**

*"Leading from the wellbore..... to the finish line!"*

Marque Carvalho  
CARVtech PC Ltd.

Web: <http://www.carvtechpc.com>.

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