



## Arctic Cat Exhaust Valve-Based Fuel Adjustments

### Introduction

Arctic Cat BoonDocker Control Boxes with newer “Synergy” programming have the capability to use the nitrous settings to control fuel based on Exhaust Valve position and RPMs. Currently this feature is not compatible with nitrous use or TPS use. The Control Box must be TPS capable and a TPS wire must be installed on the Control Box Nitrous harness plug-in.

Note 1: *It is recommended you have the latest programming before using this feature.*

Note 2: *Early boxes sold during the 04/05 season are not TPS capable.*

### Background

Due to EPA and fuel mileage requirements, Arctic Cats are programmed to run lean in the mid-range just before the exhaust valve opens. Once the exhaust valve opens, the factory fuel mapping then goes rich to supply adequate fuel for maximum power. On early Arctic Cats, the exhaust valve opening occurred at a specific rpm. However, on later models (after '04), the exhaust valve opening is dependent on throttle position and rpms (valve opens earlier at full throttle vs later at part throttle), as well as other factors such as altitude (valves open later at higher elevations). This presents tuning problems for engines that have mods which make them sensitive to this lean condition. Because this condition varies according to exhaust valve opening, simple rpm-based adjustments do not work for all conditions. By monitoring the exhaust valve position and using the rpm window feature, fuel can be added to this lean area just before the exhaust valve opens.

### Installation

A wire must be installed from the Control Box to the Exhaust Valve motor position wire, which is available from BoonDocker. The wire from the Control Box is normally used as a TPS input for Nitrous activation, but can be used instead as an exhaust valve position input.

1. Make sure that when the Exhaust Valve Position wire is plugged into the N2O connector, it mates with a white wire on the Control Box side.
2. Splice this wire from the Control Box into the **Yellow** wire on the Exhaust Valve Servo Motor. The best way to do this is with the supplied Blue Splice Connector as follows:
  - a. Cut the Yellow wire on the Servo Motor.
  - b. Strip 5/16” insulation off both ends of this wire.
  - c. Install the Splice Connector on one end of this Yellow wire using proper crimp pliers (for insulated terminals).
  - d. Strip 5/16” wire off the Control box wire.
  - e. Insert both the remaining Yellow Servo position wire and the Control Box wire into the other end of the Splice Connector and crimp.
  - f. Heat both ends of the Splice Connector until they are sealed to the wires.

### Menu Setup

#### A. Set Box to N2O:FIX

The Control Box must be set so the Nitrous Mode is FIXed. The Nitrous Mode is displayed in the lower right of the Startup Screen as shown below.

```
Arctic Cat 6-900  
xxxxxxxx N2O:FIX
```

This mode can be changed by going to the Setup Menu (Main → Map → Setup) and changing N2O Regulator Mode to FIX (not ADJ or NON).

## B. Set Fuel Adjustment

From **Main Menu**, move the cursor-arrow to **N2O** and press SEL, the following screen will be displayed:

```
Fuel N2O RPM Btn
->050 OFF OFF N2O
```

Press either the SEL, UP/DOWN arrow buttons and the following Fuel Menu will be displayed:

```
N2OFuel F-Delay
->007 000
```

The number under “Fuel” is the fuel that will be added (or subtracted if value is negative) when the other settings in this menu have been satisfied. This is the fuel amount that will be added before the exhaust valve opens.

The F-Delay setting can be kept at zero (this is the delay in engine cycles before fuel is added).

Suggested starting Fuel amount is between 4 and 10.

**(Leave TPS OFF for now! Otherwise if TPS is ON and RPM is OFF, fuel adjustment will take immediate effect!)**

## C. Set RPM Adjustment

From the **N2O** menu, move the cursor over to **RPM** and press either the SEL, UP/DOWN arrow buttons and the following RPM Menu will be displayed:

```
RPM Min Max
ON← 5560 8000
```

Set RPM to “ON” and the Min/Max Values to those shown:

**RPM ON** Shows **RPM** mode is **ON**. Press Up or Down Arrow Buttons to toggle ON/OFF.

**5560** Min RPM threshold. This is when the fuel adjustment will start taking effect.

Suggested Min RPM is between 5000 and 6000.

**8000** Max RPM threshold. This is when the fuel adjustment will stop taking effect. Set this value to a RPM **higher** than when the Exhaust Valve is guaranteed to be open. If Max RPM is high enough, then the TPS setting (exhaust valve input) will shut the fuel off **before** the Max RPM setting shuts fuel off.

Suggested Max RPM is between 7200 to 8000.

## D. Set TPS Adjustment

From the **N2O** menu, move the cursor over to **TPS** and press either the SEL, UP/DOWN arrow buttons and the following TPS Menu will be displayed:

```
N2O Fuel on if
->ON TPS > 140
```

**N2O ON** Shows **TPS** mode is **ON**. Press Up or Down Arrow Buttons to toggle ON/OFF. When OFF, no fuel will be added based on the (TPS) Exhaust valve input. When ON, Fuel will be added according to the Exhaust Valve input and Threshold level (see below).

Note: Be sure to set RPM to ON **before** setting TPS to ON, otherwise fuel will be added **immediately** at idle!

**140** Exhaust Valve Threshold value. When the Exhaust valve is **closed**, the input value will be high (around 165). When the Exhaust Valve is **open**, the value will be low (less than 100). The above Fuel amount will be added when the Exhaust valve value is **greater** than this value.

Suggested value is 140.

## Stats Screen

When the exhaust-valve fuel is being added, the Stats Screen will display an “N” and the solid block above it as shown:

```
Run 35/40 F 10 ■
5500 MD■■■■ N
```

Note: If the special LED feature is used (found in advanced mode) and LED is set to N2O, the LED will turn on when exhaust valve fuel is being added which can be used as a visual reference when tuning.