



Polaris RMK Pro Turbo Fuel 3D Control Box Instructions

Before you begin, please check kit contents and read all the instructions.

Control Box Kit Contents: Quality check by: _____

- | | |
|-----------------------------------------------|----------------------------------------|
| ___1 Fuel Control Box | ___1 Reusable Zip-Tie |
| ___1 EFI Harness | ___1 jumper/battery adapter (4A style) |
| ___1 Transducer Harness (if not in Turbo Kit) | ___1 Temp Sensor (if not in Turbo Kit) |
| ___1 Transducer (if not in Turbo Kit) | |

I. Theory of Operation:

The BoonDocker Control Box makes fuel adjustments to an Electronic Fuel Injected engine by connecting between the Engine Control Unit (ECU) and the fuel injectors. The Control Box makes modifications to the signals being sent to the fuel injectors to increase/decrease the amount of fuel being injected at certain RPM ranges and throttle positions. The Control Box only modifies the signals being sent from the ECU so the ECU's stock fuel maps that compensate for different operating parameters are still used as a baseline.

The Control Box has the ability to add or subtract fuel to achieve the proper air/fuel mixture, these settings are adjustable using the buttons and LCD display. It is possible to adjust the air/fuel mixture too rich or lean and too the point that engine damage can occur. To prevent incorrect tuning it is recommended to use an Air/Fuel gauge and that the user has experience tuning an engine. In addition to adjusting air/fuel mixture the Control Box has other features such as the ability to capture and display operational data, control fuel for a nitrous oxide system and save multiple fuel maps.

The BoonDocker Fuel Control Box has many other features, such as the ability to capture and display operational data, control a nitrous oxide system, and save multiple setups.

Note: Be sure you know how to properly tune an engine before you adjust the fuel settings! Use of an Air/Fuel Gauge and plug readings are highly recommended when tuning.

IMPORTANT NOTES – READ THIS!

Note 1: **Never unplug the Control Box when the engine is still running! Electrical damage may result which is not covered under warranty!**

Note 2: We recommend using **Dielectric Grease** on all connections to help prevent corrosion on the terminals.

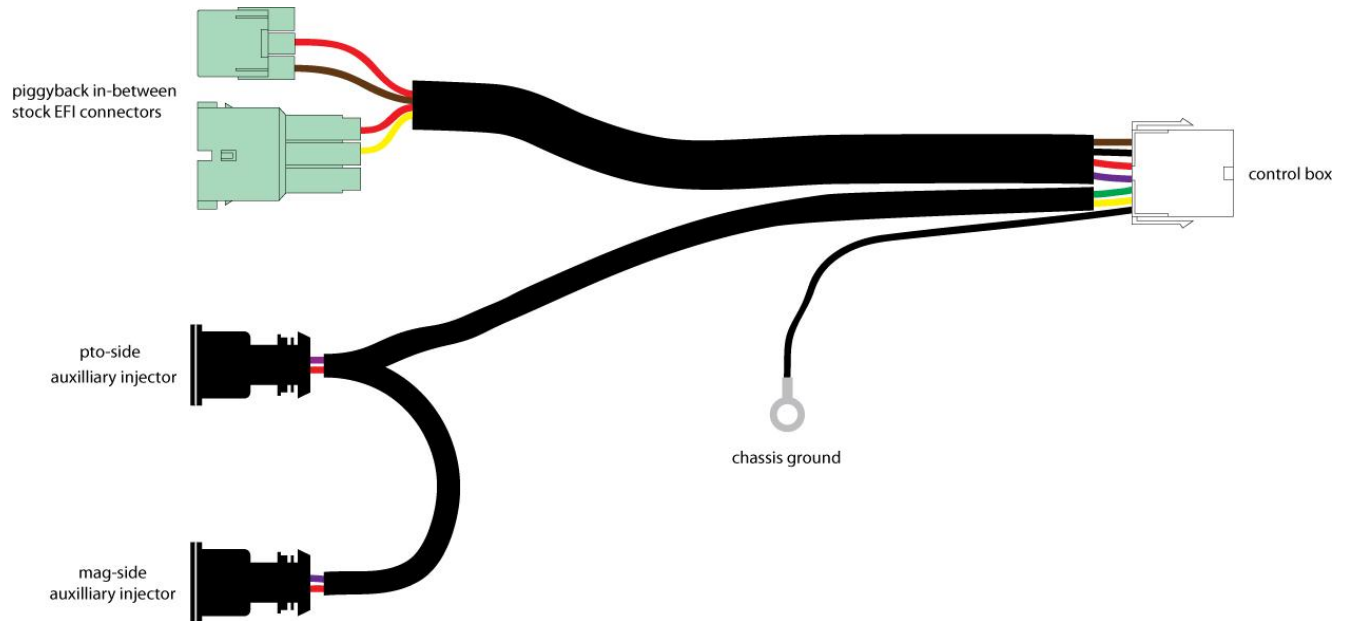
Note 3: Avoid exposing the Control Box to environments where **static charges** may exist. For example, quickly removing a sled cover from the sled in a dry environment can create a static spark that will damage the box (especially if the box is mounted up on the handlebars).

Note 4: The Control Box is sealed – do not take it apart or it will no longer be sealed. The Control Box is designed to be splash-proof. Do not submerge or subject the box to high-pressure spray. During long periods of non-use it is recommended that you do not leave the control box exposed to the elements.

Note 5: Always use Resistor Spark Plugs! Non-resistor plugs WILL cause electrical interference with the Control Box.

II. Installation of Fuel Injection Harness

There are two 10-pin connectors at the end of the black cable on the Control Box. One is for the EFI Harness and the other is for the Transducer Harness. These two connectors are keyed (male/female) so only the correct connectors will mate. However, you must be careful to not cross the 6-pin connectors for fuel injectors (EFI Harness) with the connectors for the Electronic Boost Controller (EBC), which is available separately. The EFI Harness is shown below.



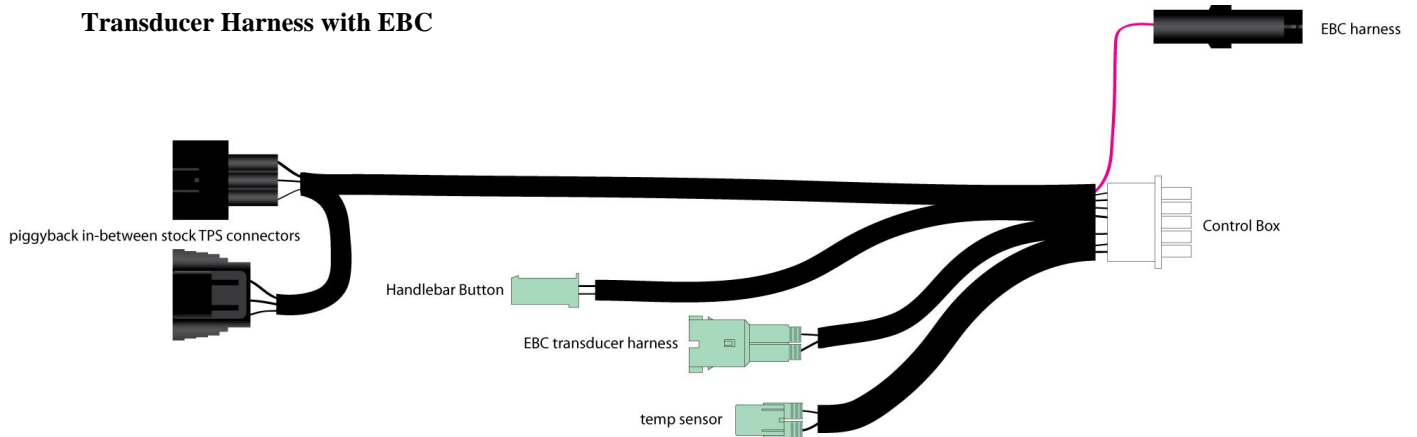
Install the EFI Harness as follows. **Note:** Use Dielectric Grease in all connectors to help prevent corrosion on the terminals.

1. Locate the six-pin connector behind the center of the engine cylinders and just above the throttle bodies. This is the sled's EFI harness. Lift the latch to disconnect it.
2. Connect the Boondocker EFI harness between these two connectors.
3. Route the Boondocker EFI harness from this location upward where the white 10-pin connector will later connect to the Fuel Control Box pigtail connector.
4. Route the cable with the remaining connector to the Auxiliary Injectors and plug it in.
5. Connect the ring terminal on the black wire to a solid chassis ground. It is very important to have good electrical contact. It must be attached in such a way that it cannot come loose.
6. Double check the routing of all wires to be sure they are away from hot areas and moving parts. Use zip ties to secure it.

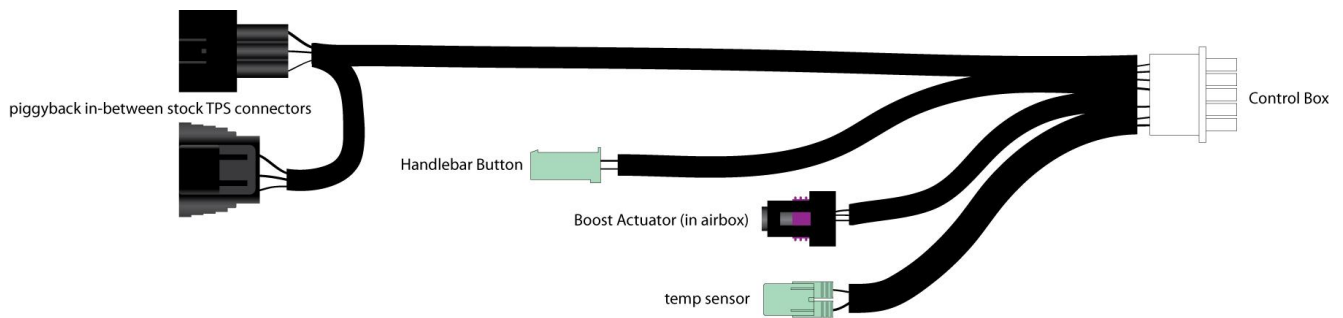
III. Installation of Transducer Harness

Two different transducer harnesses are available depending on if an EBC is being used. Both harnesses are shown below. Install the harness according to the diagram as shown below.

Transducer Harness with EBC



Transducer Harness without EBC



Install the Transducer Harness as follows. **Note:** Use Dielectric Grease in all connectors to help prevent corrosion on the terminals.

TPS

The stock throttle position sensor (TPS) is located on the PTO end of the throttle bodies. As show in the image on the right.



IIV. Control Box Mounting Locations

The Control Box can be mounted under the hood, on the console, or on the handlebar riser using the supplied Velcro strips. Before applying the adhesive strips, thoroughly clean each surface (rubbing alcohol works well). Be sure each surface is room temperature or higher.

If the box is mounted under the hood, keep the box away from excess heat (like the exhaust), and away from the ignition coils.

Note: The Control Box is designed to be splash proof. Do not submerge or subject the box to high-pressure spray.

IV. Battery / Jumper Connector

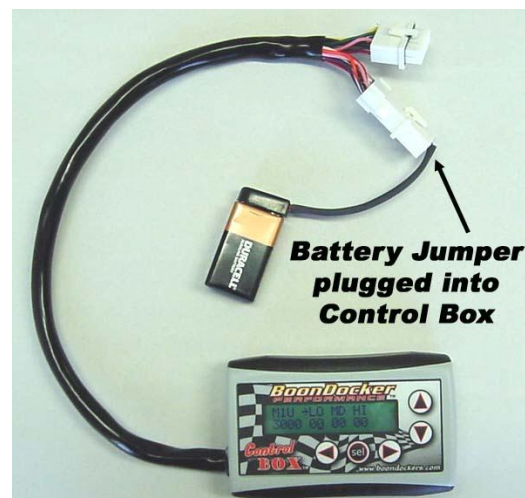
A jumper is supplied with the Control Box:

1. Battery Connector

The Fuel Control Box is designed to operate without a battery. It will be on whenever power is applied to the fuel injectors. However, by disconnecting the Control Box's turbo connector and plugging in the supplied **Battery Connector** with a 9-volt battery (not included), you can operate the Fuel Control Box without the sled running.

2. Jumper Connector

The jumper is used for troubleshooting only. If your sled will not run or will not idle correctly, disconnect the EFI harness from the Fuel Control Box and plug the Jumper into the Boondocker EFI harness to bypass the Fuel Control Box. The injectors are now connected directly to the sled's ECU through the Boondocker EFI harness. Caution: This is only to be used to test at an idle. Without the Fuel Control Box, no fuel can be added for boost pressure so engine damage can result. If your sled will not run with the Jumper, then unplug the Boondocker EFI harness at the injectors, and plug the stock connectors onto the injectors.



V. Control Box Operation

The control box is powered only when the injectors are on which occurs for a few seconds when the key is first turned on and when the engine is running. Up to 5 different maps can be stored in the box. The box will remember what map was last selected and what its settings are – you do not need to do anything to save a map.

1. Startup Screen

When the box is first turned on (by the engine or battery), the Startup screen is displayed. Press any key to go to the main menu. An example Startup screen display is shown below:

```
PolarisRMK Turbo  
5B2a8N2a N2O:FIX
```

In the example shown above, this screen displays the following information:

PolarisRMK Turbo

Sled model. This box is designed for the Polaris RMK with a turbo. Boxes for other sleds will have other lettering.

5B2a8N2a

This is the software version of the box. The box can be reprogrammed only by sending the box back to Boondocker. Have this number handy when you call Boondocker for technical support.

2. Main Menu

The Main Menu is shown below:

```
Main →Fuel Stats
Menu  N2O  Map1U
```

The current selection is shown by the **Right-Arrow** and the **cursor** (underscore below the “F”). Use the **arrow keys** to move the cursor. Move the cursor to the desired menu option and press the “SEL” key.

Fuel Go to the **Fuel** adjust menus.
Stats Display runtime data, captured data, and recorded maximum data.
N2O Go to setup menus for optional Boondocker Nitrous kit or to set up the tuning feature.
Map Go to the **Map** menu to store, lock, or change maps.

The current **Map** number is displayed as “**Map1U**”. This indicates that map number **1** is being used and it is **Unlocked**.

3. Boost Fuel Adjust Menus

This selection is used to make fuel adjustments. There are four **Fuel** adjust screens (examples shown below). Fuel screen 1 will be displayed after moving the cursor to the **Fuel** selection on the **Main Menu** and pressing the “SEL” button.

Go to the next screen by pressing the “SEL” button. After pressing the “SEL” on the last **Fuel** adjust screen, you will return to the **Main Menu**. Use the **Left/Right Arrow** keys to switch between settings. Use the **Up/Down Arrow** keys to change the setting values. Sample **Fuel** adjust screens are shown below (actual RPM settings and number of screens may be different for your model).

```
Fuel screen:  psi →LO MD HI
              4300 08 10 00
```

3.1 Fuel Screens (RPM Adjustments)

In the RPM screens (1 and 2), the Fuel Control Box allows fuel adjustments to be made according to the following two factors: RPM and Engine Load.

RPM Regions:

In the example above, the 3000 screen sets the fuel level for near 3000RPM down to idle. The 5000 screen sets the fuel level for RPMs near 5000. (Higher RPM fuel numbers are fixed internally, but will actually be dominated by boost fuel settings.) Between 3000 and 5000, the fuel adjustment will be proportioned between the two settings. For example, suppose the 3000RPM fuel setting is at “4” and the 5000RPM fuel setting is at “8”. If engine is at 4000RPM, the actual fuel adjustment made will be ½ of “4” and ½ of “8” which is “6”.

Throttle Position:

Each RPM Region is split into 3 throttle position ranges: closed throttle (idle) to 1/3 open, MD is 1/3 to 2/3 open, and HI is 2/3 to full open.

```
M1U →LO MD HI □□□
3000 00 00 00 □□□
```

Below is a description for each field show in the above sample screen:

3000 This is the **RPM Region** for the fuel adjustments on this screen. In this example, this screen's values will be used near 3000RPM down to an idle. The effect of the 3000RPM setting tapers off until 5000RPM, while the effect of the 5000RPM setting ramps up as RPMs go from 3000 toward 5000.

LO / MD / HI These are the throttle settings for each RPM region. Since engine load is directly related to throttle position, each load range is equivalent to the following approximate throttle positions:

LO = 0 up to 1/3 throttle

MD = 1/2 up to 2/3 throttle

HI = 2/3 up to full throttle

00 **Fuel adjustment value.** Each setting can go from 0 to 127. Refer to the EFI tuning section for general tuning guidelines. A value of 00 means no fuel adjustment will be made and the original injector signal will be passed through unmodified. Negative values will reduce the fuel. Positive values will increase the fuel.

Note 1: Each number is equal to about 1/2% of the stock-supplied fuel. The maximum available fuel will vary with each engine as well as with elevation and air temperature.

Note 2: It is possible to max the injector (duty cycle > 100%) before the adjustment setting is maxed! Pay careful attention to EGT's, O2 readings, and fuel pressure when running with engine mods that require a lot of additional fuel!

4. Map Menus

From the **Main Menu**, select **Map1U** to go to the **Map Menu** (shown below). This screen is used to **Load/Copy/Lock/Unlock** saved “maps” that contain fuel and N2O settings. Five maps are available.

```
Lock ULock StUp
→Load Copy Quit
```

4.1 Map: Load

When a new map is loaded, the current adjustment settings will be changed to the values from that map. To load a new **Map**, first move the cursor to select **Load** and press “**SEL**”. The following **Load/Lock Menu** appears:

```
Load 1 2 3 4 5→Q
Lock U U U U U Q
```

Load 1-5 Selects which map to load
Lock L = Locked, U = Unlocked, applied to the map number the **L** or **U** is under
Q Quits this menu

Use the **Up/Down** and **Left/Right Arrow** keys to move the cursor around. To load a new map, move the cursor to the desired map number and press “**SEL**.” The map will be loaded and the **Main Menu** will be displayed. When a map is loaded, **Mx** (*x* is the map number) is displayed in the Main and Fuel menus showing which map is loaded.

To quickly Lock or Unlock maps while in this screen, move the cursor down to the **Lock** row, place the cursor under the letter under the desired map number, and press “**SEL**” to change from **Locked** to **Unlocked** or vice versa.

Select **Q** to Quit and return to the Main Menu.

4.2 Map: Copy

To copy a map, first select **Copy** from the **Map Menu**. The following **Copy/Lock Menu** will be displayed:

```
Copy 1 2 3 4 5→Q
Lock U U U U U Q
```

Copy 1-5 Selects which map to copy the current map **TO**
Lock L = Locked, U = Unlocked
Q Quits this menu

This screen is used to save the CURRENT fuel adjustment map **TO** one of five available map locations. The map that is being copied **TO** must be Unlocked – otherwise a message will be displayed telling you that the map you selected cannot be overwritten.

Note: When a map is copied, the Control Box will load the map copied **TO** as the new current map.

Use the **Up/Down** and **Left/Right Arrow** keys to move the cursor to the map number you want to copy **TO** and press “**SEL**”. The following confirmation message will be displayed:

```
Overwrite Map A
With Map B? Y→N
```

“**A**” represents the map copied **TO** and “**B**” represents the current map (copied **FROM**). If this is exactly what you intend, use the Left Arrow to underscore “**Y**” and press “**SEL**”. Now the current map is loaded into the selected map number, the selected map number will become the current map, and the **Main Menu** will be displayed.

To quickly Lock or Unlock maps, move the cursor down to the **Lock** row, place the cursor under the **L** or **U** by the desired map number, and press “**SEL**” to change a **U** (Unlocked) to an **L** (Locked) or vice versa.

Select **Q** to Quit and return to the Main Menu.

4.3 Map – Lock and ULock

Either **Lock** or **ULock** (**UnLock**) can be selected from the **Map Menu** to quickly lock or unlock the CURRENT map. Move the cursor to the desired selection and press “**SEL**”. The box will return to the Main Menu and the current map will be locked or unlocked when **SEL** is pressed.

5. Stats Menus

This Control Box has a new feature that allows real-time data to be displayed and captured. This feature can be useful for tuning or for diagnostic purposes.

5.1 Stats: RUN/CAPTURE

Selecting **Stats** from the Main Menu will first display the following screen with real “Run-time” data (current conditions):

```
Run 35/40 10.2N
5500 MD 010
```

1st line

Run

“Run” indicates display is in Run mode, which displays current real-time data. If in capture mode, “Cap” will be displayed.

35

Input duty cycle in percent (stock value)

40

Output duty cycle in percent (after change by Fuel Control Box)

10.2

Current Boost Pressure in PSI

N

If “N” displayed, Nitrous is on

2nd line

5500

Engine RPM

MD

Engine Load. **LO**, **MD**, or **HI** will be displayed.

■■■■

These bars are a graphic display of **LO**, **MD**, or **HI** as shown below:

LO , **MD** ■■■■ , **HI** ■■■■■■

10

Current Fuel Adjustment

Run/Capture mode:

The Run/Capture mode will capture 9 frames of the realtime adjustments being made by the Control Box.

Left-Arrow button : Sets Capture Mode, “Cap” will be displayed and the current data will be frozen on the display. The capture occurs on the display when the button is **released** (data will continue to be captured if the button is held down). It will stay in capture mode (data will remain frozen) until the **Right-Arrow** is pressed to return to **Run** mode or until the Control Box is re-powered. If the Stats menu is re-entered before the engine is shut off and the box is in Capture mode, the last captured data will be displayed.

Right-Arrow button: Clears capture mode (captured data will be lost!) and sets Run mode. “Run” will be displayed and real-time data will be displayed. Note: The Handlebar Button Mode can also be configured to Capture the Status screen.

Press **SEL** to go to the next screen: **Stats: MAX-1**.

5.2 Stats: MAX-1

The first MAX screen displays max RPM, Duty Cycle In from the sled’s ECU, and Duty Cycle Out to the injectors.

```
MAX DCIn/Out Clr   MAX:   7600   Max RPM
7600 35/45  Y→N   DCIn    35    Max Duty Cycle Input from sled’s ECU.
                   DCOut   45    Max Duty Cycle Output to the injectors.
```

These max values will be saved when the box is shut off so they will remain the next time this screen is displayed even if the box is re-powered. Peak values or “spikes” are filtered by finding the average during a certain time-window. Therefore, a maximum must be held for at least 1 second to be recorded and displayed properly.

Use the arrow keys to move the cursor between Y and N. Pressing **SEL** when the cursor is on **Y** will clear the max values.

Pressing **SEL** when the cursor is on N takes you to the next screen: **Stats: MAX-2**.

5.3 Stats: Max-2

The second MAX screen displays max boost pressure and max boost air temperature.

```
MAX PSI Temp Clr    PSI    12.2    Maximum boost
 12.2 168 Y→N      Temp    168    Maximum boost air temperature.
```

These values are also average over a one second period and are saved when the box is shut off.

Use the arrow keys to move the cursor between Y and N. Pressing **SEL** when the cursor is on **Y** will clear the max values.

Pressing **SEL** when the cursor is on N takes you to the main screen.

6. Extra Menus

Boondocker's Synergy feature allows you to trigger nitrous several different ways, using combinations of RPM, throttle position, and the handlebar button. For example, the handlebar button can be used to arm nitrous, then throttle position determines when to turn it on. Activation can be further constrained to an RPM range, for best engine protection.

From the **Main Menu**, select the **EXTRA** option. Below is a description of this menu:

```
Fuel TPS RPM Btn
→050 OFF OFF N20
```

Fuel 050 Fuel setting during nitrous activation
TPS OFF Shows TPS mode is OFF or displays TPS trigger value if TPS is ON
RPM OFF Shows whether RPM mode is ON or OFF
Btn N20 Displays button mode (described in detail below)

Fuel: This is the amount of fuel that will be added when the button is activated for nitrous or tuning (see Btn settings).

TPS: To select throttle-position triggering, move the cursor until it is under **TPS** and press “**SEL**”, **Up** or **Down Arrow**. The following screen will appear:

```
TPS N2O on if
→OFF TPS > 140
```

TPS OFF Shows TPS mode is OFF.
140 TPS threshold value.

Under **TPS**, press the **Up** or **Down Arrow** to toggle the TPS mode **ON** or **OFF**.

Move the cursor right to the **140** position, then use the **Up and Down Arrows** to select the trigger level. You can adjust it from 50 to 248.

Press the “**SEL**” button to return to the **Main Menu**.

RPM: To select RPM Fuel Adjustment window, move the cursor right until it is under **RPM** and press “SEL”, **Up** or **Down Arrow**. The following screen will appear:

```
RPM  Min  Max
OFF← 5560 7550
```

RPM OFF Shows **RPM** mode is **OFF**.
5560 Min RPM threshold
7550 Max RPM threshold

Under **RPM**, press the up or down button to turn this mode **ON** or **OFF**.

Move the cursor right to adjust the **Minimum RPM** and the **Maximum RPM**. If **RPM** mode is **ON**, fuel adjustment will activate only when RPM is between these values.

Press the “SEL” button to return to the **Main Menu**.

BTN: To select the button mode, move the cursor right until it is under **Btn**. Press the up or down key to select between the following five possible modes. The screen will change to the following:

```
OFF: Description: Btn
      Button Off :→OFF
```

This mode disables the handlebar button. Nitrous can still be activated with TPS or TPS plus RPM.

```
N2O: Description: Btn
      N2O + Fuel :→N2O
```

This mode adds nitrous and fuel when the button is pressed. When the button is pressed, nitrous will be activated regardless of the TPS or RPM settings.

```
TUN: Description: Btn
      Fuel only :→TUN
```

When the handlebar button is pressed in **TUN** mode, only fuel is added. This is used to experiment with fuel addition and subtraction while riding. Press the button at a certain RPM or under a certain load to see whether your addition or subtraction is beneficial. This cannot be used in combination with N2O operation. Be sure **TPS** and **RPM** triggering are **OFF** when using this feature. Also, set the fuel number in the N2O menu to a low value such as two or minus two.

```
CAP: Description: Btn
      StatCapture:→CAP
```

In **CAP** mode, the handlebar button is used to capture current data. When pressed, the **Stats Capture** screen will be displayed, but the data will not be frozen until the button is released. After a capture, pressing the **Right-Arrow** button will erase the captured data and return to **Run Mode**.

```
ARM: Description: Btn
      On for N2O :→ARM
```

By using a pushbutton (momentary), toggle, rocker, or slide switch connected to the button input, the nitrous system can be armed or disarmed. When the switch is closed the system is armed and ready. Then, depending upon other configuration settings, either the **TPS** or **TPS with RPM** can activate the nitrous system. When the switch is open, the system is disarmed so neither **TPS** nor **RPM** will result in nitrous activation.

Nitrous activation idea: One way to use the button for nitrous activation and to have the RPM limiting feature (to prevent hitting the rev-limiter), set Btn to ARM, TPS to ON (with a low threshold), and RPM to ON (with desired Min/Max settings).

Press the **Left or Right Arrow** to return to the N2O menu or push the “SEL” button to return to the **Main Menu**.

VI. Turbo EFI Tuning

Fuel Requirements:

Race gas MUST be used, even for low boost! Detonation will quickly destroy your engine! (see topic in Tuning Tips)

SUNOCO 112 is recommended and has been determined to be adequate for boost levels up to 14psi. **VP fuel is not recommended - it has been found to have lower octane than other comparable fuels.** Other suggested brands include Unical, Rockett Brand, F&L Racing Fuel, and Trick racing gas. Always use fresh fuel from a sealed barrel.

Spark Plug Gap:

Use new spark plugs and reduce the gap to .018" - .020". Carry extra plugs – leaded fuel and boost are hard on spark plugs!

Recommended Control Box Settings:

Call Boondocker for suggested starting numbers.

Boost Controller:

It is recommended to start with your Electronic Boost Controller set below 4psi. If you are using a boost tee, set it to the **lowest boost setting**. To find this starting point, remove the boost tee, loosen the knob all the way, blow through it while tightening the knob until you start to feel resistance (the valve starts to close off). Make sure the engine is tuned properly before increasing the boost and watch closely for proper fuel mixture and detonation (see topic in Tuning Tips).

Tuning Instruments:

Air/Fuel gauge:

A good wideband O2 gauge is highly recommended as an effective tuning tool. The sensor will have a limited lifespan due to exposure to pre-mix oil and leaded racegas, but in many cases it can last for a season and it is a very valuable tuning tool. If desired, after initial tuning is completed the probe may be removed to prolong its life.

Be aware that too rich a mixture can cause the gauge to read lean due to unburned fuel not being read by the gauge (the oxygen will produce a lean reading). Whenever the engine is decelerating, your A/F numbers will be lean - these readings can be ignored. However, whenever the throttle is being applied, pay attention to the readings!

Higher numbers are leaner (less fuel), lower numbers are richer (more fuel). A 14.7:1 ratio means all the available oxygen has combined with all the available fuel. Numbers from 11:1 to 13:1 generally produce the best power (extra fuel helps cooling and can help prevent detonation). A lower A/F ratio (10.8 to 11.2:1) is considered safer on a turbo since the extra fuel prevents heat build-up and helps prevent detonation. We recommend you find the lowest ratio where the sled still runs without being too rich.

EGTs:

Exhaust Gas Temperature gauges can also be an effective tuning tool and are recommended, but they are not a substitute for reading spark plugs and piston wash and for a general feeling of how the engine runs. Use EGTs only as a backup to verify what you see. They can be misleading under certain conditions and safe readings can vary greatly from engine to engine depending on such things as probe placement, fuel, timing, pipe design, porting, etc. Typical EGT temps can be between 1250 – 1325degF after a long pull.

Plug and Pipe Color:

Color will develop inside the pipe and on the plug after running a while which can be used to determine fuel mixture. A tan/cardboard brown color is desired. Light-gray is too lean, and dark brown is rich.

Tuning tips:

Important: Find the settings where your motor runs rich **before** you decide to go lean!

1. Tune with the engine and pipe at operating temperature. The sled's ECU will make adjustments as the engine warms up – you might think the engine needs leaner settings then later realize you are too lean once the engine warms up.

Tuning tips (continued):

2. Use the **Load/Save Map** feature to quickly change and compare fuel settings when testing. This can also be useful for riding under different conditions. For example, changing elevations or temperatures may require different adjustments if the stock ECU does not compensate properly for your modifications. For drag racing, you might want to run richer settings for longer distances than you would for short distances.
3. One method for finding out where a fuel adjustment setting is effective, greatly increase only that setting. Run the engine to find out when it suddenly becomes too rich – this is where that setting is effective. Be careful – you can easily flood the motor, especially with low (LO) load or low RPM settings. If this happens, to restart the engine you may have to pull several times with the throttle held wide open.
4. The **Stats Capture** feature can be used to determine RPM and whether the load setting is LO, MD, or HI. The handlebar button can be configured to capture these stats (see nitrous configuration section). From the Main Menu, select **N2O**, set **Btn** to **CAP**. Whenever the button is pressed, the **Stats: Capture** screen will be displayed. The current stats will be captured when the button is released.

N2O Menu in “Capture” mode:

```
Fuel TPS RPM Btn
050 OFF OFF→CAP
```

5. The handlebar button can be used to add or subtract a preset amount of fuel for interactive tuning purposes (see nitrous configuration section below). From the Main Menu, select **N2O**, set **RPM** and **TPS** to **OFF**, set **Btn** to **TUN** and adjust the fuel number as desired for the test (see example menu screen below). When the nitrous button is pressed, this amount of fuel will be added or subtracted immediately from the current settings for all RPMs and all loads. Use small numbers for this test, either positive or negative.

N2O Menu in “TUNE” mode:

```
Fuel TPS RPM Btn
002 OFF OFF→TUN
```

Also consider the following:

- A/F Mixture Generally EGT’s get hotter as the motor gets lean, but too lean and the temps can actually drop! As oxygen is added, the flame gets hotter to a certain point, then too much air can gradually cool things off.
- Detonation** Detonation often requires an experienced tuner to detect – in most instances it cannot be heard or noticed. Careful examination of the piston and sparkplug are required. Watch for melted sparkplug electrodes, speckling on the sparkplug insulator, or shiny or gray flakes on the electrode which could be melted aluminum from the piston. If possible, watch the crown of the piston (near exhaust port) for a pitted or sand-blasted look. EGT’s can sometimes read low during detonation – heat is going into the cylinder and piston instead of out the pipe.
- Timing Timing can affect the pipe temperature. Generally if the ignition is retarded, more heat will build up in the pipe. Too much advance may drop EGT temps, but increase cylinder temps. Stock timing seems to work best for this turbo.
- Fuel Different fuels have different specific gravities (densities) and other characteristics which can affect your mixture requirements from one fuel to another – be aware of this if you change fuels. Oxygenated fuel will run leaner than non-oxygenated fuel and is not recommended.
- Lean spots Sometimes a motor runs hot at certain RPMs and throttle positions (usually in its mid-range) no matter what. The fuel adjustment settings can be used to richen this up, but the engine may quickly become too rich and run erratically. Under light load conditions you can sometimes get away with running hot for short periods of time. Under such conditions it is best to vary the throttle position often and not stay at one throttle setting for long durations.

VII. Troubleshooting

Stuck Button

When the Control Box is first turned on, all buttons are checked to verify that a button is not stuck on. If a button is on during power up, the button will be disabled and the following message will be displayed until a button is pressed:

Button is Stuck!

If this condition occurs, the Control Box will still function and adjust fuel properly. The Control Box can be sent back to Boondocker to be serviced.

Injector Fault

The Control Box monitors the signals from the sled's ECU. If it detects signals on one set of wires but not the other, it will detect a fault on that injector and display one of the following error messages.

Injector 1 Fault	No signal detected on the MAG side lower injector (yellow wire).
Injector 2 Fault	No signal detected on the PTO side lower injector (green wire).
Injector 3 Fault	No signal detected on the MAG side upper injector (yellow/white wire).
Injector 4 Fault	No signal detected on the PTO side upper injector (green/white wire).
Injector x Fault	An error occurred that did not get cleared (by pressing any button) before the engine was started again.

If any of these conditions occur, the Control Box will still try to function and adjust fuel properly. Contact Boondocker to determine if the Control Box and harness need to be sent back to be serviced.

Other Issues

Engine runs erratic:

1. Verify that the EFI Harness Ground Wire has a good connection.
2. Verify that all wiring is in good condition and that the wires have not pulled out of the terminals. To verify this, look inside each connector and verify that the terminal pins are all at the same height. If a terminal is starting to back out, it will appear to be lower in the connector.
3. Unplug the EFI harness and plug original harness back into the injectors and verify that the sled runs OK (test can only be done at low RPMs before boost comes on).
4. If problem only occurs with Control Box plugged in, change all fuel adjustment settings to 0 and see if problem persists.
5. Verify that the Control Box does not reset itself when the sled is running by doing the following:
 - a. When the sled is first powered up, change the menu screen on the Control Box to one of the fuel adjust screens.
 - b. Run the sled.
 - c. Before shutting off the sled, verify that the screen is still on the same menu selection.
 - d. If the startup screen is displayed (showing version number etc.), the box has reset itself. This is likely caused by bad voltage to the box due to an intermittent connection.

Rough Idle Idle adjustments are much more sensitive than other adjustments since the injectors are on for a very short duration. You may not be able to adjust your 3000 LO settings by very much.

LCD is dim If you are using a 9 volt battery to power the box when the sled is not running, your battery voltage is getting low – replace your battery. Extreme hot or cold temperatures may cause the LCD to not display properly.

LCD display is slow	Cold weather conditions can make the LCD respond very slowly. The Control Box will still function OK. You can locate the box under the hood in order to provide heat so the LCD will display quicker.
Moisture on LCD	Condensation is normal if the Control Box is quickly moved from a cold to a warm environment. In some cases, the Control Box enclosure may no longer be sealing properly. If such problems persist, contact Boondocker to determine if resealing the box is necessary.
Check Engine light	Make sure the wires in the EFI harness are correct and check for a bad connection in the wiring harness. Recheck all connectors and be sure each is completely latched. Also inspect each wire to make sure there are no frayed, broken, or melted wires.

VIII. Warranty, Terms & Conditions

Returned Goods – No merchandise will be accepted without prior approval. A RMA number (Return Merchandise Authorization) provided by Boondocker is required before a return will be accepted. A 20% handling and restocking charge will be applied to returned merchandise. No unauthorized returns will be accepted.

Limited Warranty – Boondocker warrants its product to the original purchaser against workmanship defects for a period of 90 days, commencing from the date of product delivery to the Consumer.

Maximum Liability – The maximum liability of Boondocker in connection with this warranty shall not under any circumstances exceed the price of the product claimed to be defective.