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**Progressive Nitrous Mini-Controller
Gen-2**

INSTALLATION AND USER MANUAL

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1. Overview

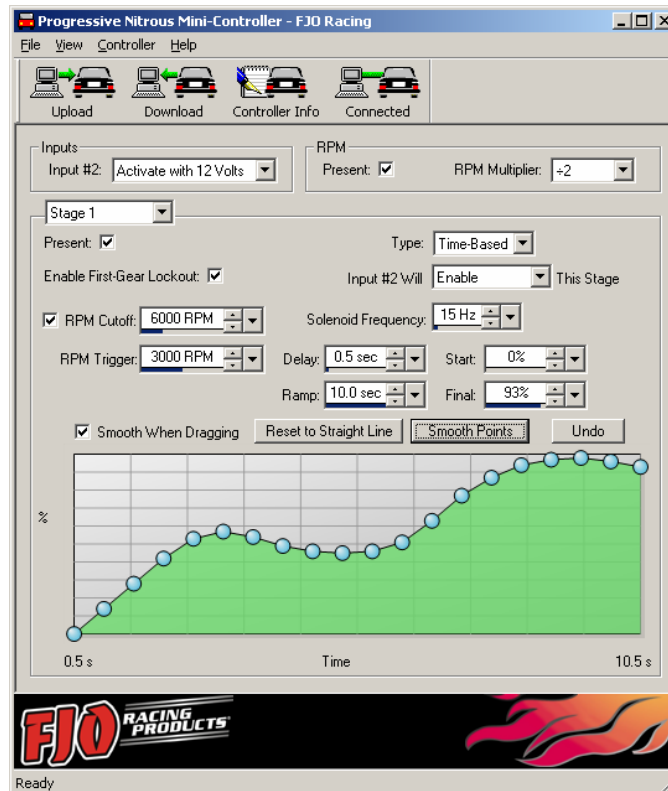
The PROGRESSIVE NITROUS MINI-CONTROLLER GEN-2 combines the functions of a throttle position switch, two RPM window switches and a 2 stage progressive driver all into a very compact module. It can progressively drive two channels, each with a 40 amp load capacity (continuous duty). The device also supports low-voltage OEM, V10 or 3 cylinder TACH signals without the need for additional adapters. It works with most OEM throttle position sensors including most drive-by-wire vehicles. This device also includes FJO's "real curve" ramp, which allows you to create a progressive curve instead of just a ramp. The ramp can be either time based or RPM based. All this and it's only the size of a spark plug box.

2. Software Installation

If you have the autorun feature enabled on your cdrom drive, wait for the navigation screen and follow the instructions to install the software. If the application does not auto-start, go to the cdrom directory and run "startpgm.exe"

3. Software

The following settings do not require that the controller be connected to the PC until you are ready to UPLOAD. All changes made to the set-up require that you UPLOAD to the. (See Upload/Download section).



3.1 Entering User Data

Drag & Slide – data fields that have this feature have a down arrow button to the right. Clicking and holding the button causes a slider bar to appear. Moving the mouse left or right while the slider is displayed will decrease or increase the value.

Increment/Decrement buttons - data fields that have this feature have up/down arrow buttons to the right. Click on either of these to increase or decrease the value accordingly.



Menu pull-down – data fields that have this feature have a down arrow button to the right. Clicking on the button will cause a pull-down menu to appear. To select, click on one of the displayed options.

Typing – clicking on the data field will highlight the value. You can then use the keyboard to enter the value.

DO NOT connect the controller to your PC until you have installed the software.

3.2 Input #2

Input #2 tells the controller if this input is seen as active when it is connected to 12 volts or ground. This input is used by both channels.

3.3 RPM Set-up

RPM Multiplier selects the correct pulse count for the RPM counter. Use the following as a guide to determine the correct setting:

- a) **Using a TACH signal** - TACH signals will typically have 1 pulse per cylinder during 2 revolutions of the crankshaft (1 full cycle) and therefore the correct setting would be $\div(\frac{1}{2} \text{ the number of cylinders})$

Example: When using a TACH signal

- 4 cylinder setting would be $\div 2$
- 6 cylinder setting would be $\div 3$
- 8 cylinder setting would be $\div 4$

Note: for LSx tach signals set the multiplier to $\div 2$

- b) **Using a trigger signal from a coil** - first determine how often it fires per revolution of the crankshaft. The correct setting would be:
- **x1** for a waste-spark since it fires each revolution of the crankshaft
 - **x2** for a full-sequential since it fires every other revolution.

This setting must be verified prior to operation. Verifying this setting will require the unit to be installed on the vehicle – see installation instructions later in the manual.

3.4 Stage Set-up

The following applies to both Stage 1 and Stage 2.

Present allows you to permanently turn off a stage. A check mark tells the controller to activate the stage as per the configuration. No check mark means this stage is always OFF.

Input #2 will determines what effect this input will have on the applicable stage. *Enable* allows the stage to function normally while *Disable* turns the stage off. If you are not using this input set it to *be ignored by*.

Enable First-Gear Lockout disables the stage until the RPM has exceeded the RPM Cutoff at least once since it was armed.

RPM Cutoff allows you to set the upper RPM threshold above which the nitrous will be turned off. (useful with locked torque converters)

RPM Trigger allows you to set the minimum RPM required before the Nitrous can be triggered.

3.4.1 Progressive Mode Options

FJO's "**Real Curve**" technology allows you to drag and drop any dot on the ramp between 0-100%. The controller will extrapolate between the dots thus creating a nitrous curve instead of the traditional ramp. We have provided some additional tools to help smooth the overall curve, which we discuss in the following sections.

Reset to Straight Line allows you to set the curve to a straight line between the Start and Final targets. (to simulate a simple ramp)

Smooth When Dragging when checked will drag multiple dots along with the selected one. It will attempt to soften rapid transitions from one step to the next in an effort to create a curve

Smooth Points will apply a smoothing algorithm to your curve. This button can be pressed multiple times until the desired curve is achieved

Undo is an undo button. If you applied the smooth points feature or dragged a dot, this feature will undo the change. It has multiple levels so you can undo several changes

Solenoid Frequency is the rate at which the controller cycles the solenoids. This number is determined by the solenoid manufacturer. [14 will work with all solenoids but may not be the optimum frequency]

Start sets the start percentage of the stage

3.4.2.1 Time-Based Curve

Final sets the final percentage of the stage. The ramp will maintain this level until the RPM cut-off is reached or the stage is deactivated by the TPS or RPM window.

Delay sets the time that the controller will delay starting the ramp once a stage has been activated

RAMP sets the build time for the ramp

3.4.2.2 RPM-Based Curve

Final sets the percentage of the stage at the *RPM End* target.

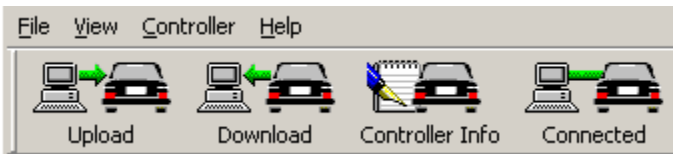
RPM End sets the upper RPM limit of the curve. Above this RPM, the controller will maintain the final percentage until the *RPM Cut-off* threshold is reached.

3.5 Upload / Download Configuration

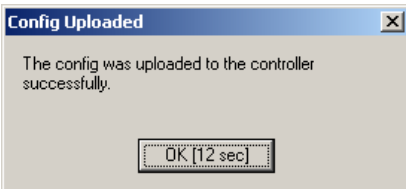
DO NOT connect the controller to your PC until you have installed the software.

To connect the controller to your PC, use the USB cable supplied with the kit. Plug the USB cable into an available port on your PC.

Note: The controller must be connected to a 12-volt power source to be programmed.



Once the software has identified the FJO MINI-CONTROLLER, the buttons will become fully visible and the connected ICON will be green.



Clicking on the UPLOAD button will store your settings in the controller. The “Config Uploaded” window will appear following a successful upload.

You are now ready to install your controller on the vehicle.

4. Installation

The Progressive Nitrous Mini-Controller is designed to be installed almost anywhere on the vehicle. Select a location that is away from heat sources that can damage the wires. Before permanently installing the device, we recommend that you complete the installation procedure below, as you will need access the push button and have a clear view of the LEDs for the final steps. Using the wiring diagram applicable to your application, connect the harness as illustrated.

Power Input should be connected to the arming switch and fused for 5 amps

Controller Ground should be connected to chassis ground as close as possible to the battery and preferably not to the same location that the DRIVER GROUND wire is connected to.

Driver Ground (12 AWG black wire) must be connected to a good ground location that can handle 80 AMPS.

DO NOT connect “Driver Ground” to the ECU ground connection. While pulsing the solenoids, this will generate large amounts of electrical noise that can interfere with the controller or your ECU.

USB Connector should always be sealed with the dust cap when the extension cable is not connected. If you want to leave the extension cable connected permanently, seal the connection to prevent water and dirt from getting into the contacts.

TACH input is designed to work with most Tachometer signals (down to 3 Volts), without the need for a separate adapter. It can be connected to a tach signal, coil trigger signal, or fuel injector. DO NOT connect it to a high voltage wire.

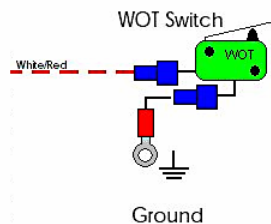
Input #1 is designed to work with most *throttle-position-sensors* (TPS) and *wide-open-throttle* (WOT) switches. Connect it directly to the signal wire from your TPS.



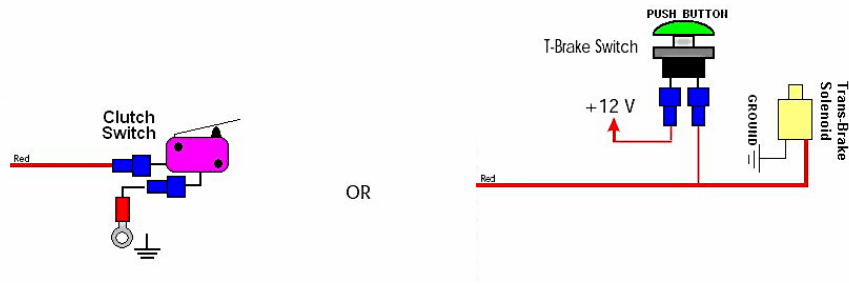
Note: For drive-by-wire it is recommended that you use the falling TPS signal.

For use with a **WOT switch** we recommend it be connected as shown in the diagram below:

Note: DO NOT connect other devices such as relays to the WOT switch.



Input #2 can be used with either a 12-volt or ground signal to activate it. (see Input #2 in the software section) Example: use this input as a secondary arm switch for applications that use a trans-brake or clutch switch.



FJO HIGH CURRENT SOLENOID DRIVER OUTPUT is designed to handle a maximum load of 40 amps per stage (continuous duty)

4.1 Wide-Open-Throttle Setup

The mini-controller will not turn on until the following steps are completed successfully:

- 1) Disconnect the solenoids from the relays to prevent them from firing.
- 2) Arm the Progressive Nitrous Mini-Controller.
- 3) With the throttle in the idle position, press and hold the TPS learn button until the RED, YELLOW and GREEN LEDs begin to flash. DO NOT change the throttle position until the GREEN LED stops flashing and goes out. If the GREEN LED begins to flash quickly, you have a bad TPS signal.

NOTE: The green LED on a new controller will flash when powered up. This indicates that the TPS is not programmed.

- 4) Once the GREEN LED is out, open the throttle all the way by pressing the gas pedal to the floor and then release it. Repeat this step twice.
- 5) Now verify that the GREEN LED goes off at IDLE and on at WOT.

4.1.1 Wide-Open-Throttle Setup (Drive-by-wire)

Note: It is recommended that you perform this on a test track or dynamometer

- 1) Disconnect the solenoids from the relays to prevent them from firing.
- 2) Start the car and arm the Progressive Nitrous Mini-Controller.
- 3) With the engine idling, press and hold the TPS learn button until the RED, YELLOW and GREEN LEDs begin to flash. DO NOT change the throttle position until the GREEN LED stops flashing and goes out. If the GREEN LED begins to flash quickly, you have a bad TPS signal.

Note: For drive-by-wire it is recommended that you use the falling TPS signal

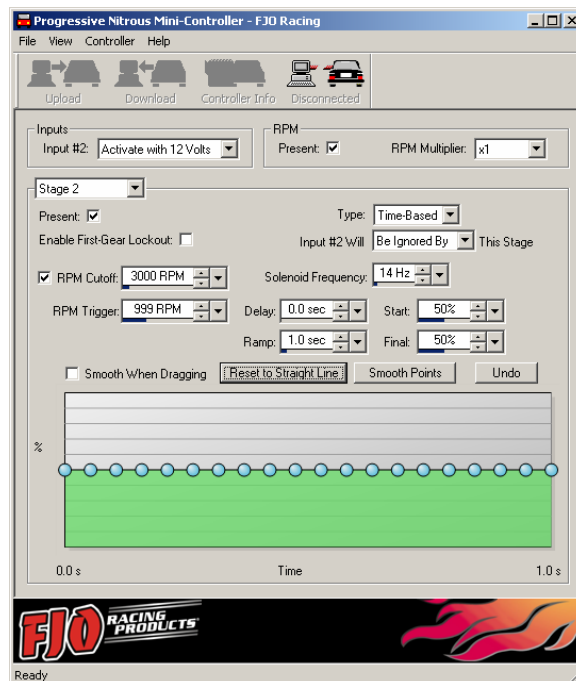
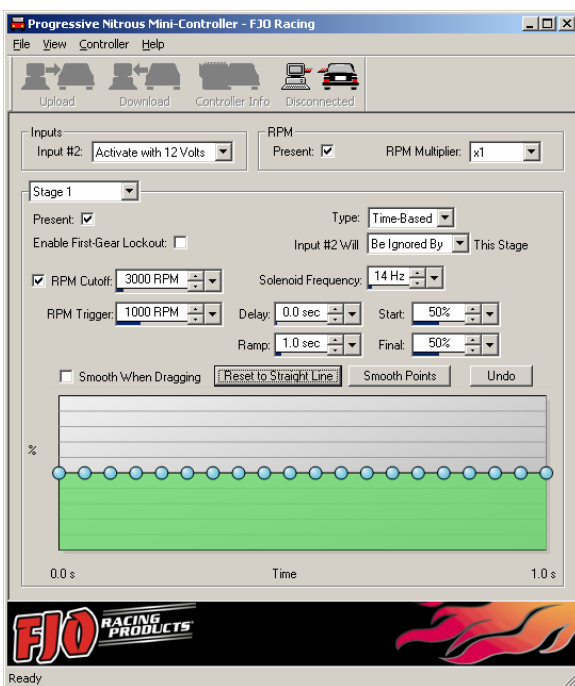
- 4) Once the GREEN LED is out, open the throttle all the way while driving the car and then release it. Repeat this step twice. If the GREEN LED is flashing quickly after this procedure the controller did not learn the TPS correctly. Power off the controller and start again.
- 5) If step 4 completed successfully, verify that the GREEN LED goes off at IDLE and on at WOT.

4.2 Verifying your Installation

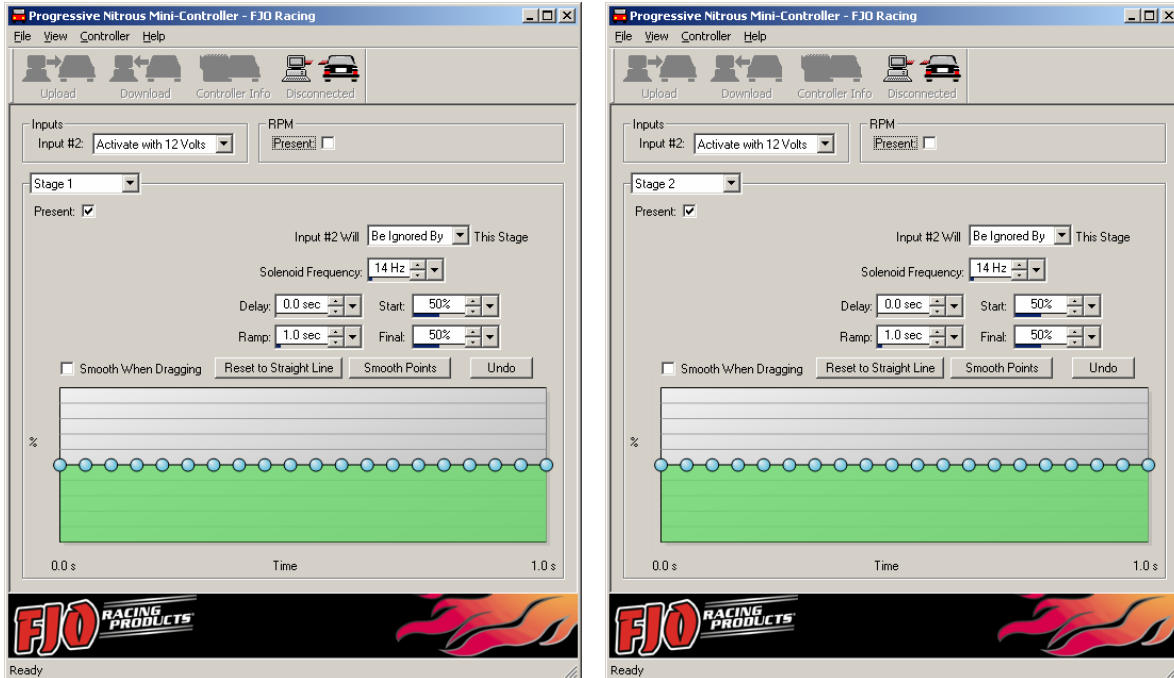
Follow these steps exactly and in the order they are listed. If you do not get the required result, STOP and correct the problem before proceeding.

Note: The settings in the verification steps are for testing only. You must UPLOAD a valid configuration before using the system or damage to the engine will occur.

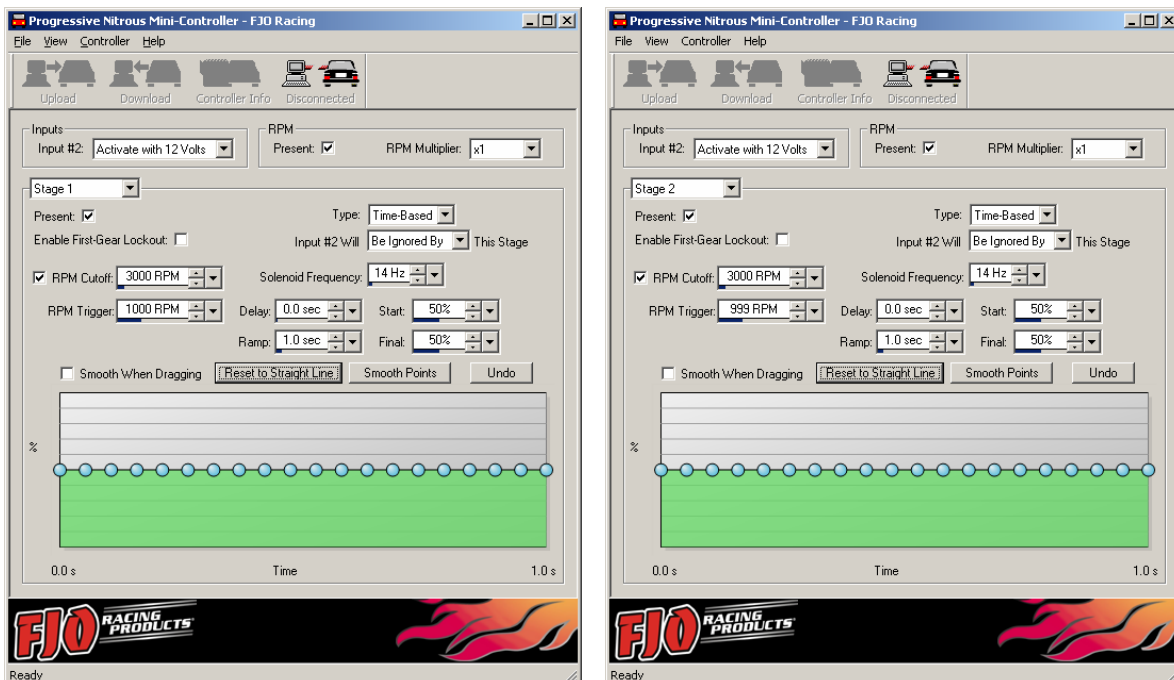
- 1) Turn on the ignition power but DO NOT start the engine.
- 2) Arm the Progressive Nitrous Mini-Controller.
- 3) Verify that the RED / YELLOW / GREEN LEDs are off with the throttle in the idle position.
- 4) If the green LED is flashing – follow the instructions in **Wide-Open-Throttle Setup** before continuing.
- 5) Connect the PC; verify that the controller shows as connected.
- 6) Set the following parameters in your software but DO NOT UPLOAD



7) Now **UNCHECK RPM Present** and you should see



- 8) **UPLOAD** this config.
- 9) With the system **ARMED**, your ignition power on, engine **NOT** running, nitrous bottle closed and any fuel pressure safety switches by-passed, press the accelerator pedal to the floor. The **GREEN LED** should come on and the solenoids will pulse. **DO NOT CONTINUE** if this step fails.
- 10) Set the following parameters in your software to test the RPM function.



- 11) Change the RPM Multiplier to your value as specified by the RPM Set-up section
- 12) Now **UPLOAD** this config
- 13) With the system **ARMED**, nitrous bottle closed and any fuel pressure safety switch by-passed wires removed, start the engine.

- 14) Check the LEDs on the controller. They should all be off.
- 15) Now slowly increase the throttle until you reach 1000 RPM. Watch the YELLOW & RED LEDs. If you set the correct RPM multiplier they will come on just as you reach 1000 RPM.
- 16) Now increase the throttle and verify that both LEDs go out as you pass 3000 RPM.
- 17) If the LEDs come on at the right RPM, then you selected the correct multiplier. If the LEDs come on too late then the RPM multiplier is **too high** and you need to set the multiplier to $\frac{1}{2}$ the previous setting and repeat the RPM set-up verification. If the LEDs come on too soon then the RPM multiplier is **too low** and you need to set the multiplier to **2x** the previous setting and repeat the RPM set-up verification.

Note: DO NOT use the half-step multipliers unless this is a 3 or 10 cylinder application.

If all steps passed, your installation is complete and you can now proceed to configure your nitrous system to your requirements.

5. Software and Firmware Updates

Free updates are available for the Progressive Nitrous Mini-Controller and related software at www.fjoracing.com

6. LED Indicators and Operation

The LED's, GREEN, YELLOW, RED are used to display the status of your PROGRESSIVE NITROUS MINI-CONTROLLER and are very useful in diagnosing problems.

GREEN:

FLASHING – indicates that the TPS WOT has not been programmed. In this case the unit will not fire any of the channels. Refer to the WOT set-up section for details on how to configure the box.

ON – indicates that the controller thinks it is at WOT. In this case the unit is ready but may still not fire due to RPM status, Trigger Input #2, or first gear lockout.

OFF – indicates that the controller does not see WOT. In this case the unit will not fire any of the channels.

YELLOW:

ON – indicates that channel 1 [**BLUE** wire] is inside the RPM window or RPM has been disabled.

FLASHING – indicates that the unit is getting a noisy tach signal. This condition will prevent the unit from firing.

OFF - indicates that stage 1 is outside of the RPM window. In this case the unit will not fire channel 1.

RED:

ON – indicates that channel 2 [**RED** wire] is inside the RPM window or RPM has been disabled.

FLASHING – indicates that the unit is getting a noisy tach signal. This condition will prevent the unit from firing.

OFF - indicates that stage 2 is outside of the RPM window. In this case the unit will not fire channel 2.

6.1 Normal Operation

PROGRESSIVE NITROUS MINI-CONTROLLER requires the following conditions to be satisfied before it will fire the solenoids:

WOT – green LED must be on, not flashing

RPM WINDOW – for channel 1, the yellow LED must be on, not flashing; for channel 2 the red LED must be on, not flashing. If you disable the RPM function these LED's are automatically turned on.

TRIGGER INPUT #2 – conditions must be met as you configured them.[see section 3]

FIRST GEAR LOCKOUT - disables the stage until the RPM has exceeded the RPM Cutoff at least once since it was armed.

7. Disclaimer

FJO Racing Products shall not be held responsible for any damages, howsoever caused, to any persons or equipment during the installation or operation of its products. FJO products are meant for off-road use only, and make no claims as to the unit's ability to meet local safety or emissions laws.

7. Warranty

FJO Enterprises Inc. (FJO) warrants this product to be free of defects in material and workmanship for a period of 180 days from the date of manufacture.

If the product exhibits such a defect, FJO will at its option, repair or replace it without cost for parts and labor. The product must be shipped, prepaid and insured (recommended) to FJO's repair facility. Prior to returning a product, the customer must contact FJO's service department to receive a WARRANTY CLAIM NUMBER and return instructions. Units returned without this number will be refused. Proof of date of original purchase is required.

The cost to ship the product to FJO's repair facility is the responsibility of the customer, the cost to return the product to the customer is the responsibility of FJO.

This warranty does not cover finishes, normal wear and tear, nor does it cover damage resulting from accident, misuse, tampering, unreasonable use, service attempted or performed by unauthorized service agencies, failure to provide reasonable maintenance, or FJO products that have been modified or used for commercial reasons. Also not covered are consumable items such as oxygen sensors.

FJO specifically does not warrant equipment, parts or components purchased by FJO or the customer from any third party manufacturers or suppliers. Rather, for any defect in respect of equipment, parts and components purchased from third party manufacturers and suppliers, the customer shall have recourse only to the terms of the warranty of that particular manufacturer or supplier. Any recommendations made by the third party manufacturer or suppliers concerning the use or application of their products are those of the manufacturer or supplier, and FJO extends no warranty with respect to the results obtained for their use. FJO does not warranty those products in any way beyond the term of the warranty extended by the manufacturer or supplier.

The warranty provided above, FJO's obligations and liabilities hereafter, and the rights and remedies of the customer are exclusive and in substitution for, and the customer waives all other warranties, guarantees, obligations, liabilities, rights and remedies, expressed or implied, arising by law or otherwise, including (without limitation) the implied warranties of merchantability or fitness of purpose, and any obligations or liability of FJO arising from tort, or loss of use, revenue or profit, or for incidental or consequential damage.

8. Wiring Diagram: Progressive Nitrous Mini-Controller

