DRAG-PRO N2O

FOR

NX NITROUS EXPRESS

MAXIMIZER 3

ELECTRONIC TRACTION CONTROL USER MANUAL

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US PATENT 6,577,944

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Introduction

We would first like to thank you for your purchase of our system. We believe it is the best system available to you on the market today. This system balances effectiveness with ease of installation, broad field of uses, and cost.

As with all technical devices such as engines, shocks, carburetors, clutches etc., the product's performance is based largely on your ability to use it properly. Testing in controlled circumstances will help you determine the proper settings for your application and your situation. Testing is very important since it will help you utilize this product to its full potential.

Please read all of the instructions and information thoroughly before attempting to install or use this product.

How Does It Work?

This system differs from other systems that you may be familiar with because it does not use any external wheel or ground speed sensors. Instead it uses a patented method that simply monitors engine speed or driveline speed to determine when wheel spin occurs. This process is a very simple way to effectively detect wheel slippage and evoke a means of correcting the slippage. In this case reducing the Nitrous Injected degrades the engine performance. When the Nitrous is reduced the loss of power is instant and generally sufficient to stop or greatly reduce the wheel spin.

However, there are limits to the unit. It is not a “Fix-All.” It will not fix a bad tune up or poor driving. It will however help a good driver in a good car get the power to the ground better and make more full passes. This allows the user to collect data to use to determine how to make adjustment to the car to get a better setup. A full pass, even if it is a few hundredths slow is very valuable compared to blowing the tires off 100 feet out.

For example, if your racecar experiences a loss of traction around 300’ the system will detect this and send a signal to the nitrous controller to reduce nitrous. This will reduce the amount of torque delivered to the drive wheels and help to regain grip much faster than the driver can “pedal” the throttle.

With a little practice the system is easy to configure and use. Typically after only a few test runs the proper settings can be reached. Most drivers adapt quickly to a car that does a little of the driving for

them. The driver simply has to accept the fact that the microprocessor in the system is much faster than his/her reflexes. In fact the system detect wheel spin in 1/100th of a second, and the microprocessors used can process 5 million commands a second!!

This system is not simply a few lines of code added to an existing fuel injection or ignition system, and called traction control. This system utilizes a patented method and multiple high speed processors to very accurately and effectively monitor rates of acceleration to determine wheel speed, and tire slip. In fact, Davis Technologies' systems are at least 20 times faster than other systems which are integrated into the fuel injection system.

Our systems only job is Traction Control !

Installation

Installation of the system is very simple. It is very important to *make all connections correctly*. Improper installation could result in poor system performance or damage to the unit.

Keep all wires away from any spark plug wires and coils or other sources of electrical noise and heat.

The unit should be mounted away from any sources of electrical noise or high heat. It can be easily mounted using the mounting flanges on each side.

Make the connections as follows:

2 Pin Connector (power in)

1. Connect pin “A” (RED wire) to 12v positive.

2. Connect pin “B” (BLACK wire) to ground.

3 Pin Connector (Sensor)

1. Connect the pin marked “A” (RED wire) to the red wire on the sensor (12v positive)

2. Connect the pin marked “B” (BLACK wire) to the black wire on the sensor (ground).

3. Connect the pin marked “C” (WHITE wire) to the white wire on the sensor. This wiring is for sensors supplied by Davis Technologies.

If another type of sensor is used, check with the manufacturer to determine connections. (IMPORTANT--The sensor must be capable of 15Khz resolution!!)

3 Pin Connector (Input/Output)

1. Connect the pin marked "A" (BLUE wire) to the Trans Brake wire. (Coming from the trans brake switch)

2. Connect the pin marked "B" (YELLOW wire) to the Nitrous Controller "Input 2" (RED wire).

3. Connect the pin marked "C" (PINK wire) to the data system or a LED to indicate when the system is making corrections. (12v+ output through a 1K resistor)

This unit is designed specifically to work with the Nitrous Express Maximizer 3

Testing

After installation it is recommended that you test the system. To do so please follow these instructions step by step. (Temporarily set the "% Cut" dial to 100 and "Ramp In" dial to 9 for testing)

Sensor test:

This test is useful for setting up the trigger ring and sensor if used.

1. Set the "M" dial to "0"

2. Rotate the RPM trigger-

The LED will flash each time a trigger is sensed. The unit is not active in any other way and no corrections will be made. The LED will appear to glow if triggered quickly. (The data output will also trigger)

RPM Window Test:

This mode is useful to check that the system is reading the RPM signal correctly. (To prevent the progressive controller from unintentionally activating, the traction control's Yellow wire should be disconnected from the progressive controller).

1. Set the "M" dial to "9"

2. Start the engine and accelerate the driveline.

3. When the driveline RPM is within the window of 1000 to 3000 rpm the LED will glow solid and the unit will make a large correction.

Forced Activation Test:

This test is useful to check both stages of cut. The progressive controller must be configured prior to executing this test. (Activate the "Traction Control" option in the progressive controller's software, and set the ramp to 100%, and uncheck the "RPM Connected" box for this test).

This is also useful to test the connections to a data system if used.

1. **Set the dial to any setting between 1 to 8.**

2. **Turn "on" the power to the unit, the LED should begin to flash.**

3. **Arm the nitrous system, with the Fuel and Nitrous systems de-pressurized ! (Close the bottle valve, disconnect the fuel pump power, and purge both systems).**

4. **With the engine off; activate the full throttle switch and trans brake, if used, to start the progressive controller's cycle. Quickly press the Test button on the unit until the LED glows solid. The first stage of cut will activate for 4 seconds, then the second stage for the next 4 seconds. (You will hear the solenoids change sound as the ramp is cut).**

   The data output wire (pink) will also be on for the 8 seconds of the test.

Note: After the test is complete, the LED will blink to

show the firmware version.

Note: Be sure to restore settings that were changed in the controller software to race settings after test is complete!

If unit does not pass all test, recheck all connections and test again.

Tuning

Traction Control Parameters:

Different tracks, cars, conditions, etc. may require different settings for the system to function effectively. The dials on the unit is used for this setting. The values are referred to as Threshold "T", and Mode "M".

The TM-4000-Drag Pro incorporates two different methods to control wheel spin.

Davis Technologies' patented systems have the ability to learn the amount of acceleration that the vehicle is achieving on average and activate the outputs if this *learned average* is exceeded.

The primary system is our patented "Self Learning" method. This is the method preferred by most users.

The second patented method is a simpler process where the users sets a threshold of acceleration that if exceeded will cause the outputs to be triggered.

The *Self Learning* system is activated when the "T" dial is set to zero. The Mode "M" dial is then used to tune the sensitivity of the system. The Mode controls the allowable percentage of acceleration change. The higher the number the more sensitive the system is. A good starting point is 4. Valid settings for Mode are 1-8. (0 turns unit off, except for sensor test / 9 activates window RPM test).

The second- *Non-Self Learning* system is activated when the "T" dial is set to anything other

than zero. This method simply looks for a threshold of acceleration change to be exceeded and the outputs will be triggered. The higher the number the more sensitive the system is. A good starting point is 4. Valid settings for threshold are 1-9. (When using this method the Mode setting has no effect on the system, with the exception of Mode 0, or Mode 9).

Starting RPM **is a user adjustable setting that allows the racer to set the point at which the unit begins making corrections. If the Starting RPM is set to 1800 RPM, then the unit is active and monitoring the driveline, but not making any corrections until the Starting RPM is reached. This may be useful to prevent the Traction Control from interfering with an already established launch setup.**

Ending RPM **is a user adjustable setting that allows the racer to set the point at which the unit Stops making corrections. If the Ending RPM is set to 5800 RPM, then the unit is active and monitoring the driveline, but not making any corrections after the Ending RPM is reached. This may be useful to prevent the Traction Control from making corrections *Down Track* if desired.** (This may be useful on tracks w/ bumps or conditions that may cause tire slip, but a loss of HP may be undesirable)

The *Null Zone* is a feature that allows the user to modify how the Traction Control reacts at certain RPM's. The user can set an RPM zone in which the Traction Control will make no corrections, or level 1 (small) corrections only. There are three components to this feature. The Null Mode sets the unit to either react as normal or to limit the type of

correction made.

***Null Mode 0*- Traction Control makes corrections in the normal manor.**

***Null Mode 1*- Traction Control only makes Step 1 (small) corrections within the set RPM range.**

***Null Mode 2*- Traction Control will not make any corrections within the set RPM range.**

The *Buffer* setting is another feature that can be used to fine tune the system. The buffer sets the number of consecutive errors required to cause a correction. Buffer 0 will react to each error in acceleration. Buffer 1 will require at least 2 consecutive slip conditions to cause a correction. This is useful to filter out small tire slips that may occur quickly, but have no ill effect on the car. (Buffer 1 is the default for most applications, but some experimenting with this setting may be useful to see what works best for you).

The *Sample Rate* of the unit can also be changed by the user, however this should only be done after consulting w/ tech support. The lower the number the faster the Sample Rate, which makes the unit less sensitive, but faster to react. The higher the number the slower the Sample Rate, which makes the unit more sensitive, but slower to react. Valid settings are 1-5. (Default=3)

Nitrous Control Parameters:

The *% CUT* is the setting that controls the amount of the Nitrous Oxide that will be cut. This is the percent of N_20 on the stage that the progressive controller is connected to only. The percent that the stage is cut can be adjusted from 10% to 100%, in 10% increments. Once the slip condition is corrected, the N_20 is ramped back in until the original progressive ramp is re-established.

The *RAMP IN* is used to control how quickly the N_20 is ramped back in after the slip condition is corrected. The time is adjustable from 0/10th to 3/10th seconds in 10 steps. (3=1/10th second)

If the amount of power reduced during a slip condition is too great, then a smaller % CUT may be required. If the tires recover from a slip condition and immediately slip again, then a longer RAMP IN may be desired.

The light on the system is useful in determining the settings. (A data acquisition system is preferred). Once the driveline has crossed the Starting RPM (default=1500 rpm) for the first time the light will flash when the system is making a correction.

With testing and good record keeping, you should be able to easily predict the necessary settings for current conditions. The settings will not vary much once you determine what works best for your setup.

Configuring

Trigger Count: *(default= 8)*

The unit must be configured for the number of counts it will receive per revolution of the driveline. Once set the value will remain until changed by the user. To change the value, follow these steps.

1. Set the "Mode" dial to "4"

2. Hold down the "Test" button

3. Turn the power On

4. While holding the "Test" button down, move the dial to the desired number of triggers divided by two. (example- 8 triggers/2=4)

5. Release the "Test" button.

The LED will flash to show the number of triggers the unit is now set to. (The Trigger Count must be set correctly for the accurate RPM calculations)

Starting RPM: *(default (15) 1500 Rpm)*

The driveline RPM at which the unit *Starts* to make corrections can be set by the user. Once set the value will remain until changed by the user. The RPM is set in 100 rpm increments, (example 1500 rpm, divided by 100 = 15). To change the Starting RPM value, follow these steps.

1. Set the "Mode" dial to "3"

2. Hold down the "Test" button

3. Turn the power On

4. While holding the "Test" button down, move the "Mode" dial to the first digit of the desired Starting RPM.

(example- 1500rpm - first digit=1 / 3000rpm - first digit =3)

5. Release the "Test" button,

The led will flash to show the value has been accepted.

6. Now move the "Mode" dial to the second digit of the desired Starting RPM, then press and release the "Test" button. (example- 1500rpm - sec. digit=5 / 3000rpm - sec. digit =0)

The led will flash to show the value has been accepted.

After about 1 second the LED will Blink to show the value that the Starting RPM is set to. The first digit is output followed by a short pause, then the second digit is output. (1500 RPM = 1,5 Blinks) (zeros are indicated by shorter blinks)

Ending RPM: *(default (99) 9900 Rpm)*

The driveline RPM at which the unit ***Stops*** to make corrections can be set by the user. Some users may want the unit to stop at a certain RPM while others may want the unit to be able to make corrections for the entire run. Once set the value will remain until

changed by the user. The RPM is set in 100 rpm increments, (example 9900 rpm, divided by 100= 99). To change the Ending RPM value, follow these steps.

1. Set the "Mode" dial to "9"

2. Hold down the "Test" button

3. Turn the power On

4. While holding the "Test" button down, move the "Mode" dial to the first digit of the desired Ending RPM.

(example- 9900rpm - first digit=9 / 8500rpm - first digit =8)

5. Release the "Test" button,

The led will flash to show the value has been accepted.

6. Now move the "Mode" dial to the second digit of the desired Ending RPM, then press and release the "Test" button. (example- 9900rpm - sec. digit=9 / 8500rpm - sec. digit =5)

The led will flash to show the value has been accepted.

After about 1 second the LED will Blink to show the value that the Ending RPM is set to. The first digit is output followed by a short pause, then the second digit is output. (9900 RPM = 9,9 Blinks) (zeros are indicated by shorter blinks)

Null Mode: *(default= 0)*

The Null Mode sets how the Traction Control will make corrections in the Null Zone. To set the Null Mode, follow these steps.

1. Set the "Mode" dial to "6"

2. Hold down the "Test" button

3. Turn the power On

4. While holding the "Test" button down, move the "Mode" dial to the desired Null Mode value.

5. Release the "Test" button,

The led will flash to show the value that the Null Mode is now set to. Valid settings are 0-2.

***(Null Mode 0*- Traction Control makes corrections in the normal manor.**

***Null Mode 1*- Traction Control only makes Step 1(small) corrections.**

***Null Mode 2*- T/C will not make any corrections within the set range.)**

Null Low RPM: *(default (40) 4000 Rpm)*

The low RPM of the zone at which the unit *Begins* to make corrections. Once set the value will remain until changed by the user. The RPM is set in 100 rpm increments, (example 4000 rpm, divided by 100= 40). To change the Null Low RPM value, follow these steps.

1. Set the "Mode" dial to "7"

2. Hold down the "Test" button

3. Turn the power On

4. While holding the "Test" button down, move the "Mode" dial to the first digit of the desired Null Low RPM.

(example- 4000rpm - first digit=4 / 3500rpm - first digit =3)

5. Release the "Test" button,

The led will flash to show the value has been accepted.

6. Now move the "Mode" dial to the second digit of the desired Null Low RPM, then press and release the "Test" button. (example- 4000rpm - sec. digit=0 / 3500rpm - sec. digit =5)

The led will flash to show the value has been accepted.

After about 1 second the LED will Blink to show the value that the Null Low RPM is set to. The first digit is output followed by a short pause, then the second digit is output. (4000 RPM = 4,0 Blinks) (zeros are indicated by shorter blinks)

Null High RPM: *(default (60) 6000 Rpm)*

The high RPM of the zone at which the unit *Stops making* corrections. Once set the value will remain until changed by the user. The RPM is set in 100 rpm increments, (example 6000 rpm, divided by 100= 60). To change the Null High RPM value, follow these steps.

1. Set the "Mode" dial to "8"

2. Hold down the "Test" button

3. Turn the power On

4. While holding the "Test" button down, move the "Mode" dial to the first digit of the desired Null High RPM.

(example- 6000rpm - first digit=6 / 7200rpm - first digit =7)

5. Release the "Test" button,

The led will flash to show the value has been accepted.

6. Now move the "Mode" dial to the second digit of the desired Null High RPM, then press and release the "Test" button. **(example- 6000rpm - sec. digit=0 / 7200rpm - sec. digit =2)**

The led will flash to show the value has been accepted.

After about 1 second the LED will Blink to show the value that the Null High RPM is set to. The first digit is output followed by a short pause, then the second digit is output. **(6000 RPM = 6,0 Blinks) (zeros are indicated by shorter blinks)**

BUFFER: *(DEFAULT= 0)*

A buffer can be set to lower the sensitivity of the unit if desired. To change the value, follow these steps.

1. Set the "Mode" dial to "1"

2. Hold down the "Test" button

3. Turn the power On

4. While holding the "Test" button down, move the dial to the desired buffer value.

5. Release the "Test" button,

The led will flash to show the value that the buffer is now set to. Valid settings are 0-3. (Buffer 2= 2 blinks) (zeros are indicated by shorter blinks)

Sample Rate: *(default= 3)*

The Sample Rate can be set to change the sensitivity of the unit. This should only be changed under the advice of tech support. Valid settings are 1-5. To change the value, follow these steps.

1. Set the "Mode" dial to "2"

2. Hold down the "Test" button

3. Turn the power On

4. While holding the "Test" button down, move the dial to the desired Sample Rate value.

5. Release the "Test" button,

The LED will flash to show the value that the Sample Rate is now set to. Valid settings are 1-5.

(Most users never need to adjust the Sample Rate)

Checking Settings:

The current setting for the different adjustments can be verified at any time using the Test button and the LED. This process is divided into 3 sections. *Standard*, *Advanced* and *Null Zone*. The different sections are chosen by the position by the dial when the verification is started.

The *Standard* values can be verified at any time by following these steps.

1. **Turn the power "On"**

2. **Set "Mode" dial any position from 1-7.**

3. **Press the "Test" button and HOLD DOWN.**

4. **The LED will glow solid for 8 seconds (as in the Forced Activation Test), then blink to show the firmware version.**

5. **Next the LED will flash the value for the *Buffer*. (A setting of zero is indicated by a short blip of the LED).**

6. **After a short pause, the Led will flash for the value of *Sample Rate*, followed by a pause.**

8. **Lastly, the LED will Flash the current *Self Learning* status value. (for tech support purposes only).**

The *Advanced* values can be verified at any time by following these steps.

1. **Turn the power "On"**

2. **Set "Mode" dial to "OFF".**

3. **Press the "Test" button and HOLD DOWN.**

4. **First, the value of the *Starting RPM* is shown. The LED will blink for the first digit followed by a short pause, then the LED will blink for the second digit.(1500 RPM = 1,5 Blinks) (zeros are indicated by shorter blinks).**

5. **After a pause, The value for the *Ending RPM* is shown. The LED will blink for the first digit followed by a short pause, then the LED will blink for the second digit.(8500 RPM = 8,5 Blinks) (zeros are indicated by shorter blinks).**

6. **After a short pause, the LED will flash for the value of *Trigger Count*. (8 Triggers=8 Blinks).**

The *Null Zone* values can be verified at any time by following these steps.

1. **Turn the power "On"**

2. **Set "Mode" dial to "9".**

3. **Press the "Test" button and HOLD DOWN.**

4. **The LED will Flash the current *Null Mode* setting, followed by a pause.**

***(Null Mode 0*- Traction Control makes corrections in the normal manor.**

***Null Mode 1*- Traction Control only makes Step 1(small) corrections.**

***Null Mode 2*- T/C will not make any corrections within the set range).**

4. **Next, the value for the *Null Low RPM* is shown. The LED will blink for the first digit followed by a short pause, then the LED will blink for the second digit.(2500 RPM = 2,5 Blinks)(zeros are indicated by shorter blinks).**

5. **After a pause, the value for the *Null High RPM* is shown. The LED will blink for the first digit followed by a short pause, then the LED will blink for the second digit. (4500 RPM= 4,5 Blinks) (zeros are indicated by shorter blinks).**

Factory Reset

All settings can be restored to *Factory Defaults* at any time by following these steps.

1. Set the "Mode" dial to "5"

2. Hold down the "Test" button

3. Turn the power On

4. While holding the "Test" button down, move the "Mode" dial to the "Off" position.

5. Release the "Test" button,

The LED will flash rapidly to indicate the Factory Settings have been restored.

Appendix A

Another advantage of these systems is that they are actually able to detect wheel slip better than most wheel speed sensor based systems. The reason for this is that our systems monitor the rotation of the driveline. With 8 triggers on the driveline you can measure slip within 1/8 of a rotation. Now factor in a 5:1 final drive *(rear end)* ratio and tire rotation can be measured within 1/40 of a turn (that is about 2-3 inches on most tires). The fact that the driveline is turning much faster than the wheels, amplifies the slip at the driveline, making these systems much more sensitive than the typical wheel speed systems. Put simply, if the tires slip the driveline revs. The only reason for the sudden increases in revs in the driveline is wheel spin.

Sensor based systems usually measure tire rotation about every 1/4 of a turn. The front and rear are compared to each other to check for slip. With a margin of error of 1/4 of a turn at each wheel, it may take as much as 1/2 of a turn of tire slip for the system to react. If a tire is allowed to slip a half a turn before a correction is made, it is very hard to stop the slip.

A system that uses a preset percentage of slip, between the rear wheel speed to front wheel (or ground) speed, cannot compensate for these changing conditions that are inherent in all types of racing.

<u>RING & SENSOR</u>

If using a Davis Technologies Ring & Sensor, use the following installation guidelines.

<u>Sensor set to .065” gap on centerline</u>