

# **XIC** *MODEL 1000*

## **XTRA INJECTOR CONTROL**



Thank you for purchasing the XIC model 1000!

The XIC is intended to function as a supplementary injector controller to provide fuel required for engines fitted with aftermarket turbo or supercharger upgrade kits. The XIC reads engine vacuum and boost using an internal, or optional external map sensor, and will control the pulse time of custom mounted additional injectors. The XIC will increase pulse time above a set vacuum/boost threshold. Additional fuel can be adjusted with one "Main Fuel" number to quickly make an overall change in fuel mixture entering the engine.

Also, there are 38 RPM fuel trim locations where finer adjustments can be made in each RPM range. Each RPM trim location can also display captured O2/wideband data from a prior acceleration run of the engine.

The XIC is designed to control only high impedance injectors at the present time. Do not use with low impedance injectors or the XIC will be damaged.

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Made in Canada

# Installation Section

## Hose:

Install the vacuum hose into the hole in the front of the XIC by twisting and pushing at the same time. The hose must be pushed in 0.5 inches for proper retention onto the sensor. Connect the vacuum hose to the intake manifold of the engine, so the XIC will sense both vacuum and boost pressure on the engine. If no connections are available on the intake, look for the fuel pressure regulator, and "T" the hose into the vacuum line that goes to the regulator.

Avoid connecting the hose to the throttle body, this location may not see engine vacuum. Don't "T" this hose with wastegate hoses since these may have airflow through them.

## **Wiring harness:**

**Black:** Connect black to a known good ground, typically bare metal on the vehicle chassis is best.

**Red:** Connect the red wire to a fused key switched +12 volt supply. XIC current draw is less than 1 amp.

**Green:** Connect to tach signal, typically the ignition coil minus terminal. See the section in following pages.

**White:** Can be connected to a wideband mixture meter such as PLX, AEM, Innovate units, or this wire can connect to a standard heated or unheated O2 sensor in the exhaust. It is not essential to connect this wire, but additional features can be used with O2 feedback.

**Yellow:** Hookup of yellow is optional. Used to cutoff fuel at low throttle. Turn vehicle ignition to the Run position. Use a voltmeter set on volts, ground the black test lead, probe all TPS wires and move the throttle when probing each TPS wire, the wire that shows voltage change as throttle moves is the wire that needs to connect to the XIC. Voltage should not exceed 5 volts to the XIC or damage will result. Do Not connect if voltage is over 5 volts!

## **Injector wiring:**

The single common wire coming out of the injector harness needs to connect to fused key switched +12 volts, current draw will be 1 amp per injector at 100% duty cycle.

The long white(or black on some models) injector wires will need to be installed into the proper positions. Route the wires from the injectors through firewall or looming back to the XIC.

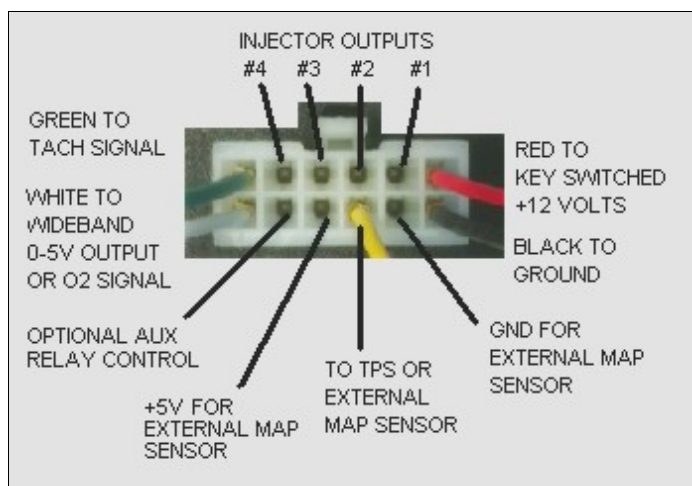
If you are running a single injector then insert the wire into the #1 injector output position.

If you are running 2 injectors then insert the wires into the #1 and #2 output positions.

If you are running 3 injectors then insert the wires into the #1,#2, and #3 output positions.

If you are running 4 injectors then insert the wires into the #1,#2,#3 and #4 output positions.

There is a spare terminal included for the AUX output. Hookup is not required. Aux output is designed to switch a relay on and off to control a secondary fuel pump, or wastegate boost control or other possible future uses. More later in the manual.



## Green wire connection, Tach signal information

### **The XIC needs a tach signal typically found in the engine's ignition system.**

Take care routing the green wire, if it shorts to ground it could damage the ignition coil. One defense against this would be to put a 1 to 3 amp fuse inline with the green wire near the coil pack, then if any short occurs the fuse will blow protecting the coil.

### **Aftermarket Ignitions with Multi Spark or CDI ignition boxes:**

If the vehicle has an aftermarket multi-spark type ignition box then the XIC green wire should be connected to the spark box's tach output terminal instead of the coil.

### **Stock ignitions:**

**Engines with one ignition coil:** Connect the green wire to ignition coil minus terminal.

### **Engines using coil packs(one coil for every two cylinders):**

Look for a tach signal using wiring diagrams. Alldatadiy.com is a good place to get wiring information at a reasonable cost. Look for a wire going from the stock tachometer to either the ecu or the ignition module. If this cannot be located then connect the green wire to the minus terminal of one ignition coil.

Disconnect the ignition coil from the stock wiring, with ignition key in On position, probe the harness, as one wire will be have +12 key switched and the other wires will be the minus terminals of the coils, connect the green wire to one of the minus terminals.

### **Coil-on-plug ignitions(one coil for each cylinder):**

For 6 and 8 cylinder engines obtain an aftermarket 9117 tach adapter available from popular aftermarket gauge manufacturers when a typical tach signal wire cannot be found.

For 4 cylinder or less than 4 cylinder engines, you can connect the green wire to one of the coil's minus terminal.

If the above cannot be done then another source for a tach signal is to connect to the minus side of a fuel injector. This may or may not work well as some EFI systems create extra injection events during throttle movement so this can trick the XIC into making some extra injections as well as triggering the XIC at lower than normal rpm's. XIC tach filtering software may eliminate some but not all of the extra events. If the green wire is connected to an injector, then the pulseperrev setting should be the same as for a coil-on-plug connection. More information later in the manual.

Modern cars in general newer than MY2000 may have tach's using databus rather than a conventional pulse signal. The XIC cannot work with databus connections presently.

CDI(capacitive discharge) ignitions, can be found on some engines, in these cases one of the coil wires will be grounded permanently, and the other wire will have a positive pulse, which can feed a tach signal to the green wire. Yamaha snowmobiles with coil on plug are this type.

## Setup of the XiC

Each adjustable parameter is accessible using the left and right arrow keys, but:

### **Hidden Settings**

**Note: Some important parameters are hidden, and to access them you must hold down the left arrow button while you power up the XIC. Then press the left arrow button to see several hidden parameters.**

The main reason for making some adjustments hidden is they are only changed at installation time, and should not need adjustment after that. And this avoids accidental changes to some very important parameters. When in the hidden parameters, if you keep pressing the right arrow key you will scroll into the normally accessed parameters. If you need to get back to the hidden parameters again, you must power off the XIC, hold down the left arrow, and power up the XIC again.

Each parameter's setting is changed using the plus and minus keys on the XIC.

Now we will cover each adjustable parameter in order of importance rather than order of appearance.

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# Hidden Parameter descriptions

## Tach Pulse Per Rev (note, hidden setting see above)



### **ABSOLUTELY THE most important parameter in the XIC. Period!**

This refers to the number of tach pulses per crankshaft revolution.

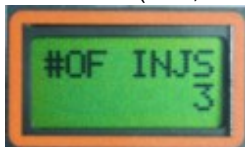
This parameter determines the RPM reading in Gauge mode, and also the frequency of the injectors it controls, and this is very important for the most even fuel distribution across all cylinders of the engine.

XIC software version 2.3 has eleven different settings available to cover most tach signals and number of cylinder configurations. Make note of where you connected the green tach wire and use the chart below to look up the best setting.

Engine/ignition type	Tacpulse/rev setting
1cyl 4 stroke single ignition coil	1/2
1cyl 2 stroke single ignition coil, green wire to 1 coil	1 or 1/2*
2cyl 2 stroke two ignition coils, green wire to 1 coil	1 or 1/2*
3cyl 4 stroke with single ignition coil	1.5
3cyl 4 stroke, 1 coil for each cylinder(coil-on-plug)	1/3
4cyl 4 stroke single coil ignition with distributor	2
4cyl 4 stroke waste spark coil pack, green wire to 1 coil	1/2
4cyl 4 stroke 1 coil for each cylinder(coil-on-plug)	1/4
5cyl 4 stroke single ignition coil	2.5
6cyl 4 stroke single ignition coil with distributor	3
6cyl 4 stroke coil-on-plug with 9117 tach adapter	3
8cyl 4 stroke single ignition coil	4
8cyl coil-on-plug with 9117 tach adapter	4
12 cyl 4 stroke	6
4cyl special application/future use/factory testing	Y6P

\*Note, try the 1/2 setting in place of 1 for possible better fuel distribution.

## # of INJS (note, hidden setting see Page 4)



The second most important parameter. This is the number of injectors connected to the XIC. Minimum is 1, maximum is 4. It is wise to check and make sure this setting is correct to match the number of injectors you are installing on the engine.

## MAP TYPE (note, hidden setting see Page 4)

Version 2.3+ has eight different settings.

INT22PSI, this is the built in map sensor.

INT30PSI, this is an alternate internal sensor which may be used if above is obsoleted.

GENERIC, for unmapped external 0 to 5 volts sensor. Readout will be numbers from 1 to 64 since actual data is unknown.

EXT15PSI External GM type 2bar (15psi boost)

EXT30PSI external GM type 3bar (30psi boost)

EXT36PSI external screw in type from AEM or SSI 36 psi boost.

EXT61PSI external screw in type from AEM or SSI 61 psi boost.

EXT44PSI external 44psi sensor.

**FUEL MULT**(note, hidden setting see Page 4)

X1, is the default and normal setting.

X2, can be used if the Main Fuel number is near or at the maximum of 255. If you change to X2 then you need to reduce the Main fuel number by half. The XIC can produce longer injector pulse times with this setting at X2.

**INJ LAG**(note, hidden setting see Page 4)

Injector lag provides a way to give some additional time to the injector pulse width when the map sensor reaches the Threshold setting, and compensate for injector opening time which usually around 1 millisecond for most injectors. Default value is 7 which is approximately 1millisecond.

**MIN RPM**(note, hidden setting see Page 4)

The value is not actual rpm. Determines the minimum RPM at which the XIC will inject fuel.

**See Appendix of manual for lookup chart.** Default value will be 125 which equates to around 1800 rpm on a 4 cylinder engine with typical 2 pulse per rev tach signal.

**AUX output**(note, hidden setting see Page 4)

Two uses:

1. Auxiliary fuel pump relay control.
2. Wastegate boost control solenoid.

**Important:** If you purchased the optional boost solenoid, make sure this is set to "BOOSTCTL" before running the engine.

**ERR MASK**(note, hidden setting see Page 4) Reserved for future use.

**#RPM ERR**(note, hidden setting see Page 4)Reserved for future use.

**#OF CYLS**(note, hidden setting see Page 4)

Number of cylinders is currently not used, but may be used in future software versions, so it would be best to keep this number set to match the engine.

**LOCKCODE** (note, hidden setting see Page 4)

This is a 4 digit code for enabling an optional Boost control solenoid to operate. An upgrade solenoid can be purchased along with the code to enter, then the XiC can control turbo boost. If you purchased the boost solenoid option along with a new XiC, then do not press the plus or minus buttons. Changing the code will disable wastegate control. Write down the code for future reference in case it gets changed accidentally. If the boost solenoid is purchased separately, you must enter your lock code. Use the arrow keys to access each digit and plus and minus keys to enter your lock code.

**AFR CAL (V3.2+)** Used to calibrate the O2 input for proper reading. If an air to fuel ratio gauge is connected, then this value can be changed to make the XiC reading match your air fuel gauge. Factory default value is 246. Numbers in the 240 to 255 range are actually negative values. 246 is equal to -10.

**BARO CAL (V3.2+)** Used to calibrate the barometric pressure sensor. Similar to afr cal. Typically this value is a zero.

**Baro, CH6. (V3.2+)** Typically "NO", but "YES" if an external barometric pressure sensor is connected externally to older XiC's. New XiC's mid 2013+ will all ship with internal barometric pressure sensors.

**AIRT SEL (V3.4+)**

Used to enable use of an air temperature sensor. Setting should be NONE when there is no air temp sensor connected. +1 will change to various types of sensors that can be used. If a sensor is enabled, then the TP reading in Gauge Diagnostic will be replace with the current air temperature reading.

# Tuning Parameter descriptions

Threshold and Main Fuel are the two most important tuning parameters.

## Threshold



**Very important setting.** This determines at what vacuum or boost level the XiC will begin to operate the injectors. For a turbo or supercharger kit upgrade you would want to have a threshold setting usually in the -5 to +1 area. If in doubt, lower the setting and this will make the XiC operate with less throttle, so worst case the engine might be too rich, and

you can always raise the threshold up later.



XiC units with version 3.1 or higher software, will all come with a barometric pressure sensor, which can be used as the threshold point where the XiC begins to inject fuel. Factory engines that use Throttle position for load sensing and or MAP or Barometric pressure sensors that remain vented to

the atmosphere after adding turbo or superchargers, may benefit by using this setting as opposed to a fixed threshold point shown in the photo above (+0.5). If the stock map sensor is seeing boost pressure then you are better off using a fixed threshold point rather than "Barop". To select "Barop", press the minus button on the keypad many times, "Barop" is the lowest position.



**New to software V3.1,** we have added more Barometric Threshold settings you can use. These allow the XiC to begin adding fuel at various pressures lower than the measured Barometric pressure, which can help in some cases to correct mixtures even before the engine sees

pressure above atmospheric. Settings are: Baro-10", Baro-8", Baro-6", Baro-4", Baro-2". The Inches refers to inches mercury, a commonly used scale for reading engine vacuum. **NOTE:** It may be very important to set **MIN RPM** if a Baro-xx" setting is used so the XiC does not add fuel at really low rpm's or during cranking, idle or light throttle conditions. Baro-10" is the most aggressive setting which will add more fuel at lighter engine load than Baro-2", which is least aggressive.

## Main Fuel



This is the number to change if the engine is too lean once it sees more than a few pounds of boost pressure. If in doubt go higher with this number to make the fuel mixture richer as boost goes higher. If the engine gets too rich as boost goes up then this number needs to be lowered. Maximum value is 191, and if maximum is reached you can get more

fuel by increasing RPM Trim numbers, or an alternative method is to change the FUEL MULT to X2, but also the extra injectors may need to be changed to higher flow rate, or you there could be a fuel pressure/delivery problem(pump inadequate). The stock fuel pump's flow will decrease with higher engine boost pressure.

## Fuel cut/TPS



This setting is optional. It's use is for allowing the XiC to quickly cutoff fueling to the extra injectors when throttle is closed rapidly. This may be required on engines with little or no vacuum such as 2 stroke engines and high power

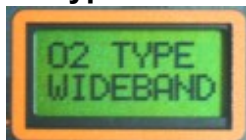
race engines. On mild or stock 4 stroke engines, hookup is likely not required, since the Threshold parameter will provide effective fuel cutoff.

**Important, if not hooked up to the TPS, then this setting should be adjusted to a value of 1. If an external map sensor is used, then this function becomes unavailable and setting should also be at 1.**

Adjusting: The value is adjustable from 1 to 64, 1 being closed throttle, 64 wide open. On the XIC, scroll through gauge mode screens and you will see TP xx, showing the actual value, and as throttle is moved the value should change. On most TPS's you will not get full range from 1 to 64, but this is normal, as long as you see a reasonable amount such as 10 to 45 lets say, this will be fine.

Best to begin with a value of 1 this allows the XIC to inject fuel at any throttle position. If the engine tends to go too rich when the throttle is closed rapidly, then the value can be increased and experimented with. Too high a setting will not allow fuel so be careful and observe the air/fuel ratio.

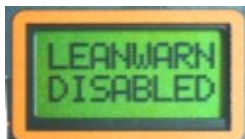
## O2 Type



Select the type of O2 sensor connected.

Four selections, NONE, NARROW, AEM(OLD), AEM(NEW). The AEM old measures down to 10 to 1, the AEM new measures down to 7.5 to, so these have different output voltages vs a/f ratio, so select carefully.

## Lean Warning



This feature can turn on the Status LED if the engine runs lean for more than 2 seconds. Three settings here, disabled, enabled and enabled+fuel. Enabled turns on the LED only. Enabled+fuel turns on the LED and adds 25% to the injector pulse width to richen the fuel mixture and help prevent engine damage. If a Lean Warning occurs then the

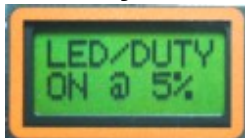
Main Fuel number may need to be higher or there could be a loss of fuel pressure. You must have a wideband meter or O2 sensor connected for this to work.

## Values Lock



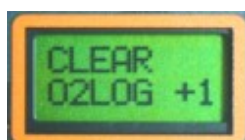
Press + to change Values Lock to ON, which prevents all other parameters from being changed. Turn OFF to allow programming again. Used to block accidental changes. Disables the plus and minus keys.

## Led/Duty



You can program the LED to come on at various injector duty percentages. Selections are 1,5,10,50,80,90,100% duty cycle. Low settings like 1,5 and 10 are useful to indicate when the XIC begins injections. High settings warn against maximum injector capacity being reached.

## Clear O2Log



Press the plus key to clear O2 Logging data captured in each RPM Trim window.



## RPM Trim parameters and O2Logging

**There are 38 of these windows**, every 250 rpm from 3000 up to 12,250 RPM.



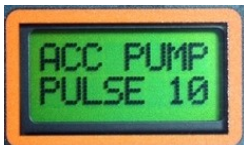
These windows allow you to add or subtract an amount from the Main Fuel number in a specific RPM range. This is useful to tune the air/fuel ratio at different RPM's. The number shown here on the bottom left is the Fuel trim amount for the 4000RPM range. The trim number is zero, in this photo. The fuel trim can be adjusted from -63 to +64.

There may not be a need to use fuel trim but the ability is here in case there are problem RPM zones that need more or less fuel delivery to correct the air/fuel ratio. On the 2<sup>nd</sup> line, lower right, is captured O2 data from an acceleration run through this rpm range(4000). As you scroll using the arrow keys you can access each RPM range and see the air/fuel ratio that was captured the last time the engine passed through each RPM range. Each RPM range covers 125 below and 125 above the displayed rpm. So for example the 4000 range covers 3875 to 4125 rpms.

### Tips for O2Logging:

1. O2 logging begins when the XIC map sensor pressure is above the Threshold setting. O2 logging stops when XIC map sensor pressure is below the Threshold setting. So basically you can start and stop O2logging with the throttle.
2. Try to keep the throttle steady. Throttle movement can activate extra enrichment in stock EFI / Carburetors and will make logging inconsistent.
3. Use a higher gear, forget 1<sup>st</sup> and 2<sup>nd</sup> gear. Use 3<sup>rd</sup> 4<sup>th</sup> or 5<sup>th</sup> or a drive uphill. Rapid acceleration will result in some rpm ranges not capturing data.
4. For best O2 logging results, a wideband O2 meter should be used, and its analog output connected to the white O2 input wire on the XIC harness. A traditional 1,3 or 4 wire O2 sensor can be used but logged data will be voltage readings instead of air/fuel ratio. With traditional O2 you want to see voltages above 0.65 volts, anything less, then either increase the RPM Trim numbers or the Main Fuel number.
5. Scroll to the Clear O2Log screen and press the plus key to clear old data before you do another acceleration run.
6. If you find all RPM ranges are O2logging lean readings then its a lot easier to increase the Main Fuel number, than to change all of the RPM trim numbers.
7. Just because there are trim numbers doesn't mean they all need to be adjusted, especially if O2 readings stay in the 12's through the whole RPM operating range.

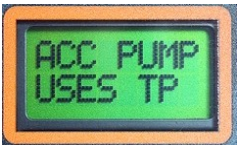
## Accelerator Pump Pulse



This number allows the XiC to add extra fuel when either throttle or manifold pressure increase rapidly, which may help throttle response. Minimum value recommended is 7. Anything less than 7 is likely to have no affect. This value should be set after the XiC is working well in steady state conditions. If throttle is opened quickly, then try higher

numbers in here to help reduce hesitation. A value of 7=1millisecond, most injectors will not respond below this. If this feature is not needed, set this value to 1 to disable. Too high a number will make the mixture too rich and will make response worse. Acc pump is only active when Manifold pressure is above the Threshold setting.

## Accelerator Pump Uses(TP or Map)



TP or MAP can be selected. TP is highly recommended, but requires the yellow wire to be connected to the throttle position sensor signal wire. If there is no TP sensor, then set this setting to "USES MAP" by pressing +1. On some engines, Map may false trigger the ACC PUMP feature due

to fluctuating map sensor signals, and this will cause inconsistent rich mixtures. If Map is used, be sure to have a restrictor orifice in the map sensor hose. If mixtures seem rich and inconsistent, then it is best to disable ACC pump by setting ACC PUMP PULSE to 1.

## Accelerator Pump Max TP



This simply cuts off ACC Pump at high throttle. A value of 40 is approximately 2/3 throttle on most engines, but this should be checked. See Gauge modes to for TP(throttle position). The XiC measures throttle position with numbers from 1 to 64. Most sensors wont use the entire 1 to 64 range and this is okay but you should see a change of 35 or more from

closed to wide open throttle.

## Gauge Modes

Gauge modes are used to monitor inputs to the XiC and help with troubleshooting purposes. Just like a set of gauges in a car. Three different screens with combinations of RPM, manifold pressure, Duty cycle and O2 readings, plus a 4<sup>th</sup> diagnostic gauge mode.

Gauge1 Displays manifold pressure(MP) and RPM. Vacuum is in inches HG, boost in PSI. Use MP to make sure you have a vacuum and boost signal into the hose. RPM can be used to make sure you have a proper tach signal to the green tach wire. RPM reads in 250 rpm increments, only above 3000. Below 3000, RPM reads <3000, meaning RPM is less than 3000. You wont know if your tach signal works until you rev



up the engine.

Gauge2 Manifold pressure, same as Gauge1. Duty is injector duty cycle percentage of the XiC injectors. Monitor duty to make sure XiC injectors don't go more than 100%. The engine can go lean if Duty passes 100%. Duty will actually read beyond 100% so you know just how high its going. If duty is going past 100% then larger injectors may be needed or there is a fuel pressure problem.



Gauge3 RPM and O2. O2 is either wideband air to fuel ratio or if a standard traditional O2 sensor is connected, this will be a voltage reading. With a standard O2 you would want to see voltages of 0.65 or higher when at mid to full throttle. With a wideband reading, anything higher than 13.2 is getting too lean, so the best target would be in the 12's.



Gauge4, Manifold pressure and O2 display. (No photo)



Gauge5, Boost duty final result after Boostdty HiAlt is factored in. Second line is Altitude reading in 130ft increments from the internal Barometric sensor. Altitude can also read in Absolute Inches Mercury by pressing the +1 button.

**Gauge Diagnostic.** Allows checking of three inputs. Helpful with testing and troubleshooting. If the yellow wire is connected to a throttle position sensor signal, TP can be viewed and checked for proper operation. This input number should change when the throttle is moved. TA is tach input which allows testing of the green tach wire input. TA0 with no voltage on the green wire. To test touch the green wire to +12 volts and the TA will show TA1, meaning the input is working normally. O2 is displays voltage.



## Altitude Fuel Trim



Value add or subtract from the Main Fuel number in 8 different altitude ranges, from 1000 to 8000+ft. Allows trimming of the air fuel ratio if needed at several altitudes, if it is determined that the air fuel ratio is not as desired at these altitudes.

## Other Windows

Software version, Burn # and Serial # are used to reference the factory database. We may ask for these if you phone or email for help.

## Status L.E.D.

The Status LED is a visual alarm for several conditions occurring:

The LED will light for approximately 2 second at powerup, or if the unit resets from short power interruptions due to poor power connections, or noisy power sources.

The LED will light at various amounts of injector duty cycle as determined by the "LED/DUTY" setting.

The LED will light using the Lean Warning feature(if enabled) in combination with a wideband O2 meter or a standard traditional O2 sensor.

## Running the Engine for the first time

Get the engine running and scroll the XIC to Gauge1 mode. Watch the RPM reading and rev the engine to around 4000RPM. The RPM reading should show 4000. If not, this means either the Tachpulse per rev setting is wrong, or the green wire is not getting a tach signal.

Most likely if the RPM reads wrong, error will be half or double, so the Pulse Per Rev setting will need to be changed. If the XIC does not pick up a tach signal the RPM reading in gauge modes will keep reading <3000 when the engine is revved.

Set Threshold to -6 approximately, set the LED DUTY to 1%. Give the engine a short burst of full throttle. The status LED should light briefly, then you can begin running the engine and tuning with the XIC. If you cannot get the LED to light see Troubleshooting.

## Tuning

Threshold and Main Fuel settings are major adjustments to make the XIC correct the air/fuel ratio on the engine. For turbo and supercharger kits, Threshold should be set most likely between -5 and +1. And Baro setting can be tried also if the engine will see a wide range of altitude changes.

If the stock engine/EFI system uses a mass airflow meter, it may compensate somewhat for boost pressure since it sees higher airflow, so in these cases Threshold might need to be set higher than +1.

If the engine uses a MAP sensor type EFI system then a good Threshold setting should be around -5 to +1. If in doubt lower is better, lower is richer, and the XIC will begin injecting fuel at lower throttle.

If the engine approaches or comes onto boost and goes lean, then you should lower the Threshold setting, and possibly increase the Main Fuel number too.

Main Fuel is difficult to determine in theory due to many variables, but it may be best to begin with a higher number in 150 to 200 area. Run the engine on low boost pressure and note the air/fuel ratio or O2 voltage, as well as horsepower feel. If too rich, lower the Main fuel number by 10 and run again. Repeat until air/fuel is in the 12's or O2 volts are .65 or higher. Changing the Main Fuel number by one won't make much difference, make changes by 5 or 10 instead.

Good Info: As boost gets up above the Threshold setting by say 5 PSI, then you want to monitor a/f, and if a/f is going too lean, then you need to increase the Main Fuel number. If a/f is going too rich, then you need to decrease the Main Fuel number.

Tip: For the first runs of the engine you should maybe go about half way to redline. Worry about upper RPM ranges after the lower ranges are working well.

Run the engine to higher rpms and use O2logging and RPM Trim numbers to fix any problem RPM ranges. If a/f stays in the 12's there may be no need to bother changing RPM Trim numbers

Tip: You cannot tune the XIC just by revving in neutral, the engine needs to be under load either driving or on a dyno.

Tip: Do Acc pump settings last. These can tend to cover up incorrect Threshold setting too so be careful by keeping Acc pump numbers low when tuning for the first time. Or plan to revisit ACC PUMP numbers if Threshold gets changed later.

## Aux output options

This output has one of two options. Auxiliary fuel pump relay control or Wastegate boost solenoid control. Future software may include other uses for this output.

Aux fuel pump relay control is an optional extra feature which can be used to control a secondary fuel pump that could be needed if the factory pump does not maintain fuel pressure. Use a typical cube style automotive relay. Relay control allows the pump to run only when needed by the XIC. The XIC will switch on the relay at a lower manifold pressure than the Threshold setting, allowing a bit of a head start for the pump to build pressure. The pump should have a check valve in it to maintain pressure and the additional injectors should not leak for this to be successful.

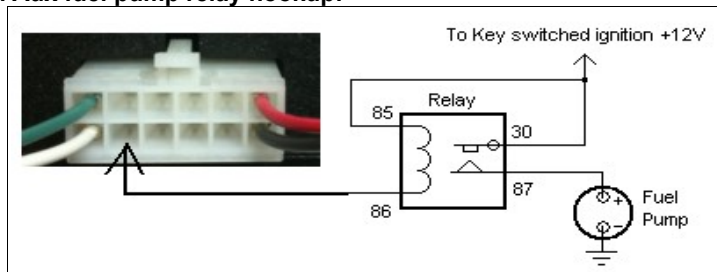
XIC software will turn off the relay after a delay period of 5 seconds after manifold pressure/vacuum drops below the Threshold. Also the relay will switch off at low rpms, below where the XIC operates the injectors. Delay allows the pump to keep operating during gear changes or a quick lift of the throttle. There are no programmable adjustments for aux relay control.

For Aux fuel pump relay, find one connector terminal included and solder a 20 gauge wire(not included) into the terminal and insert terminal into the position shown below.

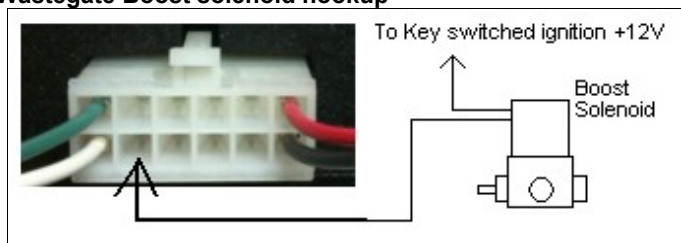
Inserting the wire terminal: Crimp folds of terminal should be upward with terminal 2 lock tabs on either side, and push it in until tabs click.

For the Boost solenoid, unwind the wire from the solenoid and insert the wire into the white connector as shown below.

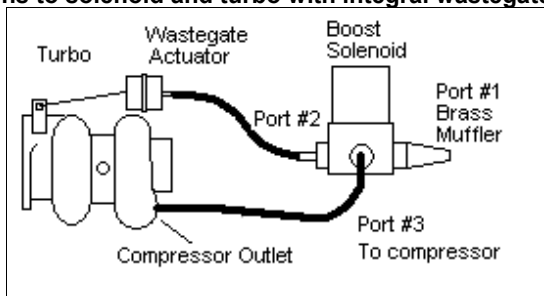
#### Optional Aux fuel pump relay hookup:



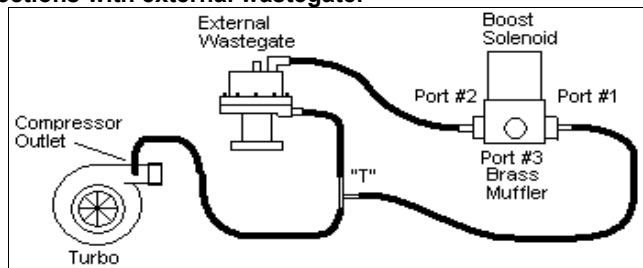
#### Optional Wastegate Boost solenoid hookup



#### Hose connections to solenoid and turbo with integral wastegate.



#### Hose connections with external wastegate.



## Boost Duty (sets your boost pressure). Optional.



Adjusting this number determines the duty cycle percentage of the Boost solenoid valve. Best to begin with this set at 0%. Note minimum boost will be determined by the wastegate spring. The XiC can only increase boost pressure. A setting of 50% should increase boost by about double the wastegate spring pressure, so if, say, you have a 7psi spring, then with 50% your boost should be around 14psi. Higher number equals higher boost. Avoid really high numbers above 85% as the wastegate may not open at all. Below 20% and above 80% there may not be any noticeable change, this due to really short on or off times and the valves minimum response time. See Gauge5 and see Boost duty hi altitude.



## Boost Duty High Altitude

This number controls boost duty cycle increase with altitude. Resulting Duty % can be seen in the gauge5 screen. As Turbo engines run uphill to higher altitudes, if you want to maintain Absolute boost pressure, then have a value in here of between 10 and 25, and Boost solenoid duty % will increase with altitude. Having a value of 1 means that the Boost duty would not increase with altitude so the Absolute manifold pressure in the engine would decrease as altitude gets higher. If boost goes too high and your highest altitude, then lower this number. If boost is too low at highest altitude, then raise this number by 1 or 2 and observe results.

## Boost Trim (no photo)

Allows fuel trim at several ranges in boost to achieve best air/fuel ratio

## Troubleshooting

Status LED stays lit when the engine is first started up:

If you start the engine, and the LED stays on longer than 2 seconds there could be a power source problem such as noise or pulsating power (small engines without a battery). The XiC may be continually resetting from this. The XiC may need a battery to smooth out DC voltage and/or a 12V power filter like what is used in the car audio industry. The XiC draws fractions of an amp so a low power filter is fine.

If the XiC does not pick up a tach signal the RPM reading in gauge modes will keep reading <3000 when the engine is revved. With a proper tach signal and Tach Pulse per Rev setting, the RPM reading will increase once the engine is revved above 3000.

XiC works good to xxxxRPM's then quits:

Likely a tach signal problem or fuel delivery. Rev the engine in neutral and watch the RPM reading in gauge mode to see if it freezes at a certain maximum reading. Sometimes as the tach signal frequency increases with RPM's, the XiC could filter the signal too much and absorb really short tach pulses. Try to find another source for a tach signal. Monitor fuel pressure with a gauge.

XiC works good with Low boost but when boost is higher then engine loses power:

This could be many things. Fuel delivery, spark retard if the engine has a knock sensing ignition system. Monitor fuel pressure. Try higher octane gas. Don't exceed the MAP sensor limit of 22PSI. Higher pressure sensors can be connected for above 22PSI. Main Fuel number can be increased or decreased, watch air/fuel readings, if you don't have a gauge, try a higher value for main fuel first, if that does not work try lower. Really over-rich mixtures, when misfiring, can show up as lean on the a/f gauge, so this can trick you into thinking its lean, you add more fuel and running gets worse.

Air/fuel is inconsistent when the XIC is operating:

Placing an orifice or restrictor in the map sensor hose can be done to smooth out the map sensor readings and this will help. Watch the MP reading in Gauge modes.

I cannot get the Status LED to light or

I cannot get a tach signal anywhere!:

Hopefully this does not happen, but as a last resort, in some cases, a hall sensor and magnets might be able to be mounted. This is rather difficult however. Contact us for help. Try the other wire going into the ignition coil. Try lower settings for TacPulse Per Rev, such as the 1/2, 1/3, or 1/4 settings and recheck RPM in gauge mode for a reading.

XIC puts out no fuel: See "I cannot get a tach signal. Also check the Fuel cut/TPS setting, and make this setting a 1, and try again. Check 12 volts to injector harness.

Watch DUTY % reading in gauge mode while revving the engine and set Threshld setting to -15" or greater vacuum, try revving the engine again.

Mixture good at high boost but lean at low boost: Lower the Threshold setting, and this will richen the mixture at low boost. If Threshold is lowered then Main Fuel number may need to be lowered slightly also. Also the INJ LAG number can be increased to help also, but best try a lower Threshold setting first.

Mixture good at low boost but lean at high boost: Just increase the Main Fuel number. Or also use the RPM trim numbers at various RPMs that are lean. If mixture is lean at all RPM's then it easiest to just increase the Main Fuel number first then use RPM trim to fine tune each RPM range.

Uneven Fuel distribution across cylinders or some cylinders are leaner than others:

First double check tach wire, RPM reading in Gauge mode, and Tacpulse per rev setting, contact us for help if in doubt. Rpm in gauge should agree with the engines tach, if you have half the RPM reading then this can cause uneven fuel distribution.

Could also be how or where the additional injectors are mounted.

**Warranty** 1 year from date of purchase. Warranty does not cover damage related to running low impedance injectors or water flooding of the XIC enclosure. Freight charges are covered only one way by warranty. For repairs out of warranty, the end user must pay all freight both ways.

**Returns** If sending for repair or warranty, please write "Made in Canada" on waybill and shipping box, and this may save extra duty & tax charges by the courier. Air shipping often is best, ground carriers charge more duty and brokerage when the package crosses the border ultimately costing as much or more than air shipping.

Contact us via email for return address and instructions.

## **Tech help Contact information:**

snowmobiles: neil@boost-it.ca

car engines: xichelp@nucleus.com

It would be best to write down the Software version, Burn# and Serial number and include this with email or give us this over the phone if you need help. Also include your settings, which you can write down below, injector type, engine type.

## **Repairs and Upgrades**

Your dealer or email: [xichelp@nucleus.com](mailto:xichelp@nucleus.com)

Phone Barry at 403-453-7687. Please leave a clear message if no answer.

## **Write down your settings here:**

Serial # \_\_\_\_\_ Burn# \_\_\_\_\_ SW Versn \_\_\_\_\_  
 TacPulse/Rev \_\_\_\_\_ # of INJS \_\_\_\_\_ # of CYL \_\_\_\_\_  
 Threshold \_\_\_\_\_ Main Fuel # \_\_\_\_\_ Fuelcut/TP \_\_\_\_\_  
 AccPumpPulse \_\_\_\_\_ AccPumpUses \_\_\_\_\_ AccpumpmaxTP \_\_\_\_\_  
 AccPumpMaxTP \_\_\_\_\_ BoostDuty \_\_\_\_\_ BoostdtyHialt \_\_\_\_\_  
 O2Type \_\_\_\_\_  
 RPM trim \_\_\_\_\_  
 RPM trim \_\_\_\_\_  
 Hi Alt trim \_\_\_\_\_

## Appendix, MIN RPM Chart

Look up your Pulse Per Rev(PPR) setting, and the minimum RPM you want the XiC to inject fuel. Example: Say you want the XiC to only inject fuel above 4125 rpm and your PPR setting is 2, then you would enter 57 in MIN RPM.

		NUMBER TO ENTER FOR MIN RPM							
		1 PPR	1.5 PPR	2 PPR	3 PPR	4 PPR	1/4 PPR	1/2 PPR	1/3 PPR
MIN RPM	9125	51	34	26	17	13	26	26	34
	8875	53	35	26	18	13	26	26	35
	8625	54	36	27	18	14	27	27	36
	8375	56	37	28	19	14	28	28	37
	8125	58	38	29	19	14	29	29	38
	7875	60	40	30	20	15	30	30	40
	7625	61	41	31	20	15	31	31	41
	7375	64	42	32	21	16	32	32	42
	7125	66	44	33	22	16	33	33	44
	6875	68	45	34	23	17	34	34	45
	6625	71	47	35	24	18	35	35	47
	6375	74	49	37	25	18	37	37	49
	6125	77	51	38	26	19	38	38	51
	5875	80	53	40	27	20	40	40	53
	5625	83	56	42	28	21	42	42	56
	5375	87	58	44	29	22	44	44	58
	5125	91	61	46	30	23	46	46	61
	4875	96	64	48	32	24	48	48	64
	4625	101	68	51	34	25	51	51	68
	4375	107	71	54	36	27	54	54	71
	4125	114	76	57	38	28	57	57	76
	3875	121	81	60	40	30	60	60	81
	3625	129	86	65	43	32	65	65	86
	3375	139	93	69	46	35	69	69	93
	3125	150	100	75	50	38	75	75	100

Stay Tuned!  
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