

Real Performance Product By GIZZMO

MS-2 Boost Controller

GIZZMO ELECTRONICS

Thank you for purchasing the Gizzmo
MS-2 Boost Controller.

This manual contains operating instructions
and installation procedures that are needed
for the fitting and operation of this product



取扱説明書

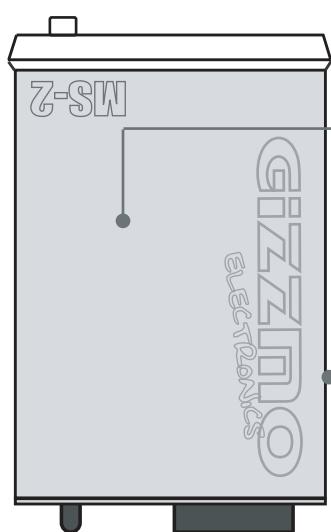
Instruction Manual

GIZZMO
ELECTRONICS

www.gizzmoelectronics.com

GIZZMO
MS-2 Boost Controller

Gizzmo's MS2 shares and builds on the proven tried and true boost strategy of the MSIBC whilst also sporting a fully configurable turbo timer. Our reasoning behind the addition of the turbo timer is that the cool off period of a turbo is directly proportional to the heat of the turbo which is generated by the amount of work that your turbo does. The MS2 knows exactly how much work your turbo has been doing so it seems ideal that it too would be in control of the cool off period. The MS2 also has a boost solenoid supervisor so if for any reason your boost control solenoid malfunctions the MS2 will warn you of this immediately. Additionally, the MS2 also has an integrated boost cut remover (Note 1) to help you bypass the factory boost cut. Driving all these features is the MS2's processor which is capable of computing almost one billion calculations per minute so that you can rest easy knowing that the Gizzmo MS2 really is the complete turbo management solution.

Technical Diagram**Processing Power**

Gizzmo's MS-2 is over engineered with a 64mhz RISC Processor capable of processing almost one billion instructions per min.

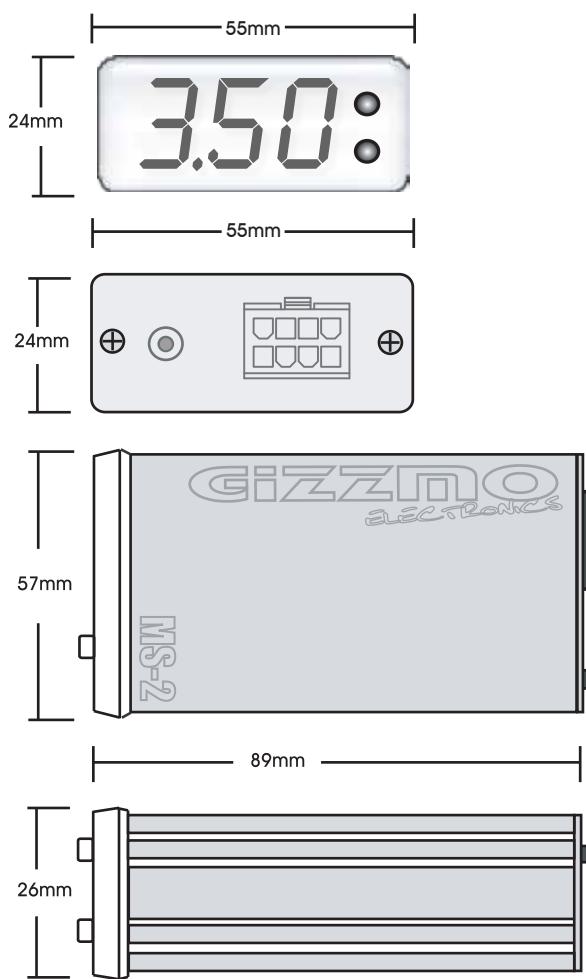
Extruded Aluminium Case

By utilising a rugged Extruded Aluminium case you can be assured that your MS-2 will keep its look for years to come. Because the MS-2 is so deceptively small, you can mount it virtually anywhere.

Functions/Specifications

- Fully configurable turbo timer
- Active over boost control
- Boost Cut Romver (FCD)
- Real time boost gauge
- Adjustable up to 50psi (3.5bar)
- 64mhz RISC Processor Technology
- Open or Closed loop boost control
- Suits Internal and External Wastegates
- Real-time boost gauge
- Comes with all Installation accessories

MS-2 Specifications

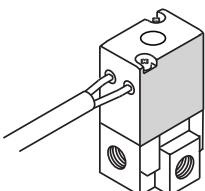


Number of boost memories	6 with individual gain settings
Maximum boost	50psi (3.5bar)
Scramble time	1 to 100 seconds
Scramble duty	0% to 50%
Boost Control	Open or Closed loop
Turbo Timer Time	0 to 5min
Boost Cut Range	2 to 6.5V
Over boost range	5psi to 50psi
Processing Power	64mhz RISC
MS-2 size	117mm * 57mm * 26mm
Operating Voltage (v)	11.8V - 21V
Operating Current	Less than 0.5A
Reverse Battery Protection	Yes
Overcharging Protection	Yes
Case Material	Anodised Extruded Aluminium
Display	3 * 7seg White LED display
Pressure display options	KPA, LB or BAR
Wastegate Compatibility	Internal and External
Solenoid	High Performance Single

MS-2 Parts List



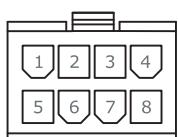
MS-2 Module
x1



Solenoid Valve
x1



Instruction Manual
x1



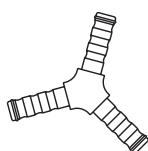
MS-2 Harness x1



1mx5mm Nitrile
Tubing x1



1.2mx2.8mm
Vacuum Tubing x1



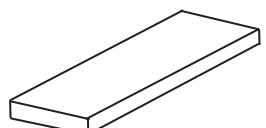
5mm 'Y' Piece
Connector x1



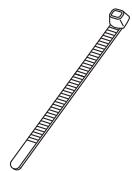
3mm 'Y' Piece
Connector x1



Tail 5mm
x2



Double sided Tape
Pad For Mounting
MS-2 x1



Cable Tie
x8



3mm Flat
Washer x2



3mm Nut
x2

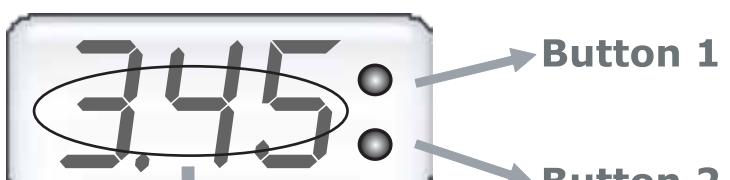


3mm Bolt
x2

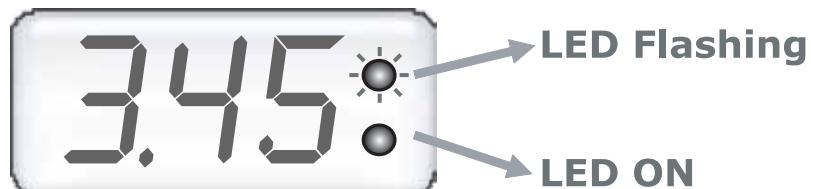
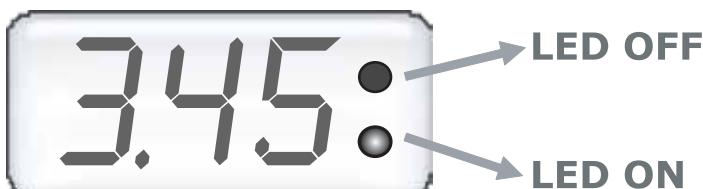
Warning/Caution

Always connect the wiring exactly as described in the instruction manual.
Disconnect the negative terminal of the battery before proceeding with installation.
Do not drop or expose this unit to excessive shock.
Installation should only be performed by an experienced automotive electrician.
Keep this unit away from moisture.
Never disassemble, modify, or tamper with this unit.
Never operate this unit while driving.
Securely mount this unit away from any area that may effect driving.
This unit is only designed for 12V DC type vehicles with a negative ground supply.

Operating Instructions



White 7 Segment
LED Display Area



Notes:

By pressing both buttons at the same time you can toggle between bright and dim display settings.

Glossary of terms:

Hold: Push Button down for over 1 sec.

Activate: Push Button down for less than 0.5 sec.

Units of Pressure

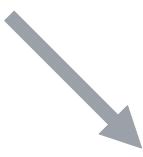
e.g:

BAR Display

1.00:

LB Display

145:



KPA Display

100:



Caution:

All readings in this Manual are in BAR unless otherwise stated.

Start Up Sequence

Every time the ignition is turned on the Solenoid will click briefly and Display Area will:

1. Display the memory option that was last in use.

2. Display the boost pressure for the memory option.

Then will go to the real time boost display. (Running Mode)

e.g:

Memory Option

1.00:



Boost Pressure

1.00:

Running Mode

0.00:



To Change Boost Memories

The screen will display ' **:1:**' which stands for Memory1 Option and then it will display the boost pressure for that memory option e.g: ' **1.20:**'

Running Mode



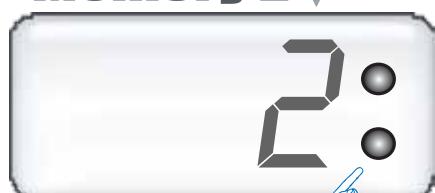
【Activate
Button2】

Memory 1



【Activate
Button2】

Memory 2



【Activate
Button2】

Memory 3



【Activate
Button2】

Memory 4



【Activate
Button2】

Memory 5



【Activate
Button2】

Memory 6



【Activate
Button2】

Adjusting the Duty Cycle Setting

Running Mode

0.00°

[Hold down Button2 for two seconds]

CLO:

[Hold down Button2 for two seconds]

Control Menu

CLO:

[Activate Both Button1 And Button2]

The display will scrolling "CLOSE" which stand for the Closed Loop Setting

duty cycle menu

[Activate Both Button1 And Button2]

Use Button1/Button2 to set the Duty Cycle Percentage. The Setting Range is from 10%~90% in 1% increments.

Duty Cycle Menu

duty cycle menu

[Activate Both Button1 And Button2]

The display will toggle between scrolling "duty" which stand for duty cycle and the present duty cycle setting.
e.g: "duty" <> "duty"

Gain Menu

gain:

[Activate Both Button1 And Button2]

Use Button1/Button2 to set the Gain Percentage. The Setting Range is from 0%~100% in 1% increments.

Gain Menu

gain:

[Activate Both Button1 And Button2]

The display will toggle between scrolling "gain" and the present gain setting.
e.g: "gain" <> "gain"

Open/Closed

The display will scrolling "OPEN" which stand for the Open Loop Setting

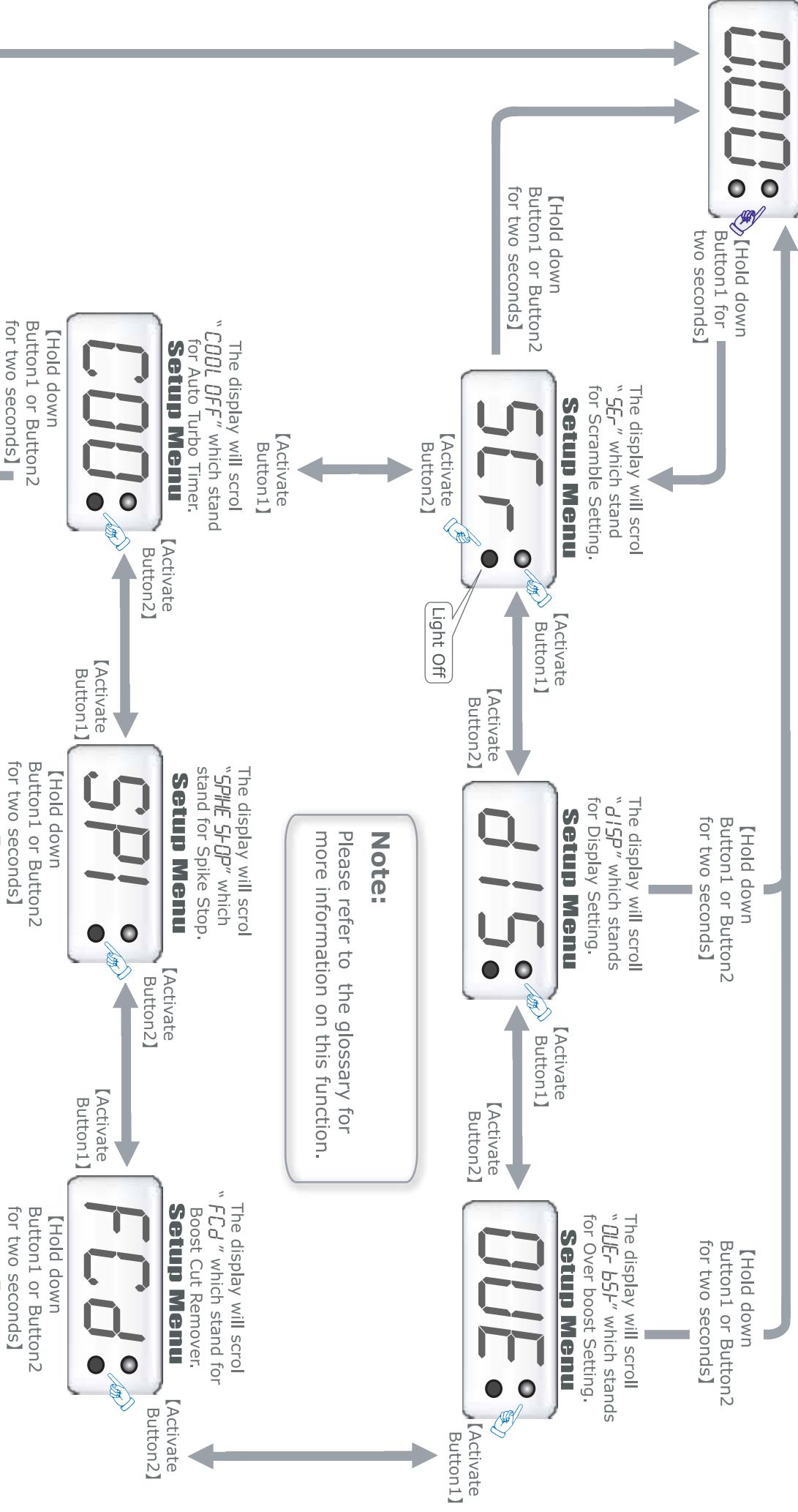
This refers to the type of control the MS-2 will apply to your waste-gate.
If you select 'open' the MS-2 will NOT attempt to correct any fluctuations or boost creep/drop off. If you select 'closed' the MS-2 will continually monitor and make minor offsets to the duty cycle in an attempt to stabilise the boost.
(refer to the glossary for more information on these 2 functions).

Adjusting the Duty Cycle Setting

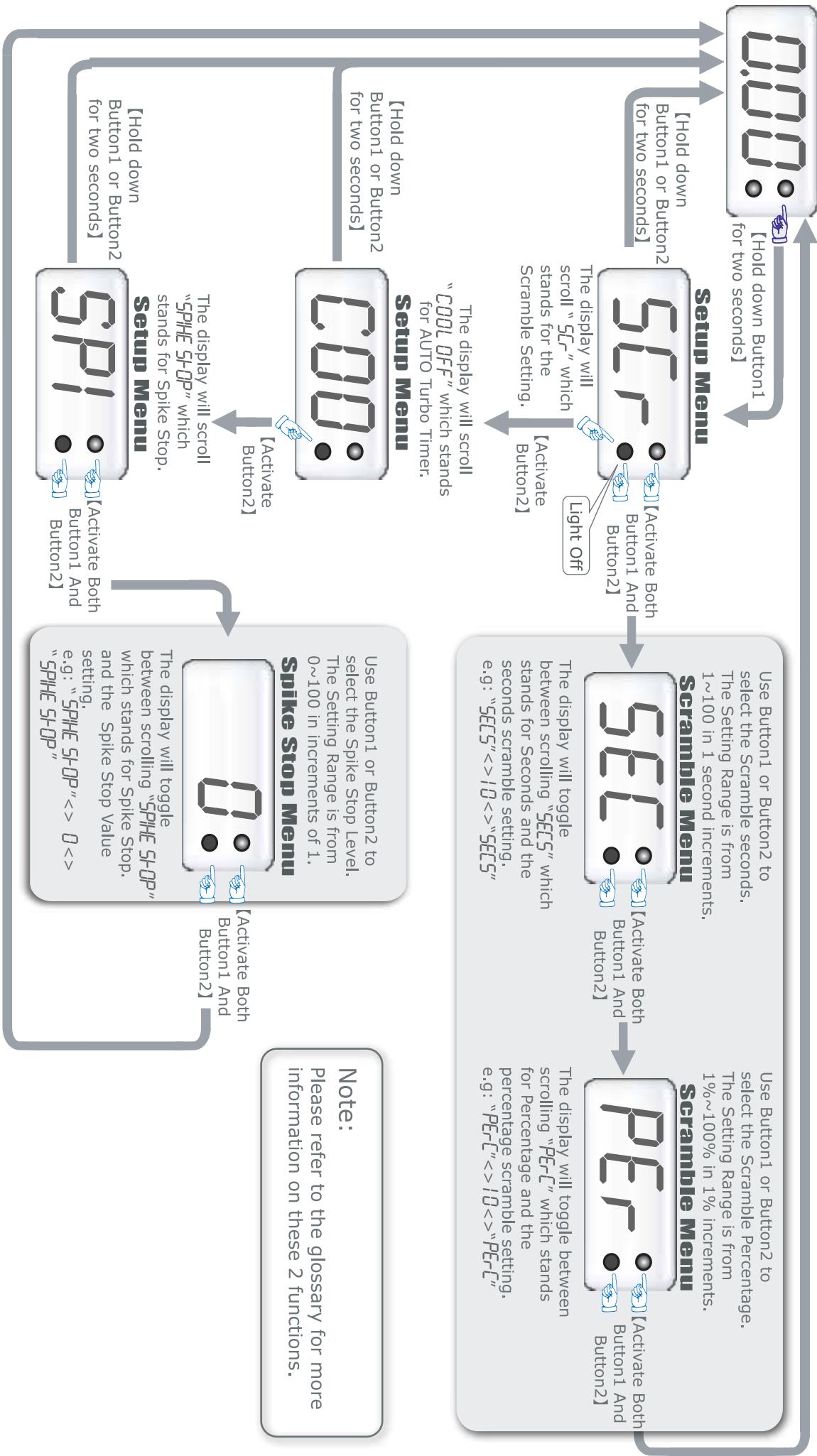
Hold down the bottom button2 until the screen displays 'CLOSE' and then release the button.

At this point the display will scroll 'CLOSE' which represents the option of closed loop boost control; at this point you can push either button to toggle to open loop should you desire (refer to the glossary for more information on these 2 functions). Upon the display showing your desired setting, you must push both buttons to go through to the 'Duty' setting screen.

Boost Cut Remover (FCD) SetUp



Scramble & Spike Stop Setup



Pressure Display Setup

Running Mode

0.00:

[Hold down
Button1 for
two seconds]

Scr.

[Activate
Button1]

[Hold down
Button1 or Button2
for two seconds]

The display will scroll
“Scr” which stands for
Scramble Setting.

Setup Menu

Ove.

[Activate Both
Button1 And
Button2]

The display will scroll
“Ove b5F” which stands
for Over boost Setting.

Setup Menu

Off.

[Activate Both
Button1 And
Button2]

Use Button1 or Button2 to
select the over Boost Level.
The Setting Range is from
0~3.5 Bar .

Warning Menu

d!5.

[Activate
Button1]

[Hold down
Button1 or Button2
for two seconds]

The display will scroll
“d!5P” which stands
for Display Setting.

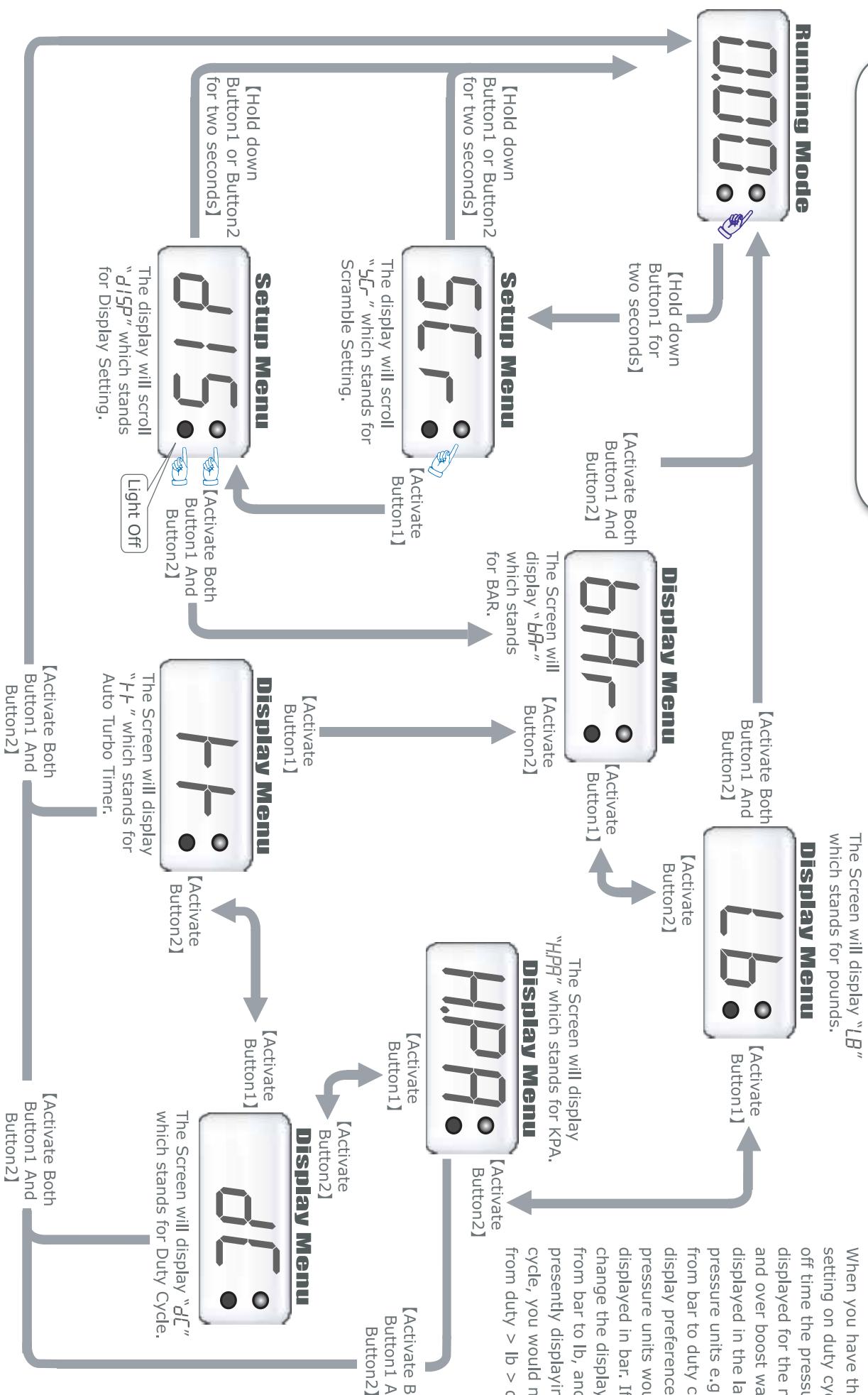
Setup Menu

Caution:

The over boost pressure will
be display in the same format
as the display pressure, and if
the overboost limit is
exceeded the MS-2 will attempt
to reduce the boost level.

Note:
Please refer to the glossary for more
information on the functions on this page.

Display Setup



The Screen will display "LB" which stands for pounds.

Note: When you have the display setting on duty cycle or cool off time the pressures displayed for the memories and over boost warning will be displayed in the last used pressure units e.g. if you went from bar to duty cycle for your display preference, all display pressure units would still be displayed in bar. If you wish to change the displayed units from bar to lb, and you were presently displaying duty cycle, you would need to go from duty > lb > duty.

Note: Please refer to the glossary for more information on the functions on this page.

Operating MultiScramble

Running Mode



[Activate Button1 or Remote Button]

Scramble 1



[After One Second]

[Activate
Button1
Before
timed out]

Realtime Boost



[Both LEDs
FLASHING]

[After Preset Scramble Timeframe]

Scramble 2



[After One Second]

[Activate
Button1
Before
timed out]

Realtime Boost



[Both LEDs
FLASHING]

[After Preset Scramble Timeframe]

Scramble 3



[After One Second]

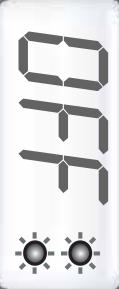
[Activate
Button1
Before
timed out]

Realtime Boost



[Both LEDs
FLASHING]

[After Preset Scramble Timeframe]



[After One Second]

CAUTION:
Never use the scramble feature unless you are on full boost at full throttle prior to triggering the scramble feature. Not observing this precaution can lead to an over-boosting scenario

Note:
During the Scramble Mode the Boost Pressure will increase by the Preset Percentage in the Preset Timeframe (Please refer to Scramble setup Page for more information on how to set the Timeframe and Percentage)

Auto Turbo Timer Setup I

Note:
To cancel the turbo timers countdown period simply hold down either of the MS2s buttons during the countdown period

Running Mode

0.00 :

[Hold down
Button1 or Button2
for two seconds]

[Hold down Button1
for two seconds]

Setup Menu

Scr :

The display will
scroll "Scr" which
stands for the
Scramble Setting.

[Activate
Button2]

C00 :

[Activate Both
Button1 And
Button2]

"C00L OFF" which stands
for Auto Turbo Timer.

Setup Menu

991 :

[Activate Both
Button1 And
Button2]

The display will toggle
between scrolling "991" and
the present gain setting.
e.g: "991" <> 10 <> "991"

Timer Menu

L00 :

[Activate Both
Button1 And
Button2]

The display will toggle
between scrolling
"L00" <> E51" which stands
for Shorest, and the present
gain Shorest timer setting.
e.g: "L00" <> 003 > "L00"

Timer Menu

Sh0 :

[Activate Both
Button1 And
Button2]

Use Button1/Button2 to
set the Shortest auto
turbo timer time. The
Setting Range is from
1~10 in 1 increments.

Timer Menu

Fall :

[Activate Both
Button1 And
Button2]

Use Button1/Button2 to
set the Fall level. The
Setting Range is from
1~10 in 1 increments.

Timer Menu

0.00 :

[Activate Both
Button1 And
Button2]

Please refer to the next page or
glossary for more information on
this function.

Note:

Auto Turbo Timer Setup II

How to use the MS-2's Auto Turbo Timer in Manual Mode

If you wish to use the MSII as a manual Turbo Timer, e.g. have a fixed cool off time simply set the gain and fall to zero and set the 'shortest' setting to the cool off time you require. Obviously you will have to have the 'longest' setting at a time greater than that of the 'shortest' setting.

Definition of the MS-2's Configurable Turbo Timer settings

Gain

This setting determines the rate at which the cool off time will increase. The cool off time only increases only whilst the engine is on boost e.g. above 1lb of boost. The cool off time is displayed as a factor of time display in seconds with the relationship of seconds to increment per second of boost. An example of this would be that if the gain is set to 4 then for every second the engine ON boost the cool off time will INCREASE by 4 seconds.

Fall

This is the opposite of the gain outlined above so as an example, if the fall is set to 7, for every second the engine is OFF boost, the cool off time will DECREASE by 7 seconds.

Shortest

This setting determines the minimum time for the cool off period and is displayed in time. An example would be that if this were set to 1.12 (one minute and twelve seconds), irrespective of how the car is driven the vehicle will always cool off for at least one minute and twelve seconds.

Longest

This is the opposite end of the scale from Shortest (above). This setting determines the maximum time for the cool off period and is displayed in time. An example would be that if this were set to 4.07 (four minutes and seven seconds), irrespective of how the car is driven the vehicle will always cool off no more than four minutes and seven seconds.

To cancel the countdown period

If during the turbo timer countdown period you wish to switch the engine off immediately simply press and hold either of the MS2's buttons and the countdown period will be immediately aborted.

Boost Cut Remover (FCD) SetUp

Running Mode

0.00:

[Hold down
Button1 for
two seconds]

The display will scroll
“**SCR**” which stand
for Scramble Setting.

Setup Menu

SCR:

[Activate
Button2]

Light Off

The display will scroll
“**FCD**” which stand for
Boost Cut Remover.

Setup Menu

FCD:

[Activate Both
Button1 And
Button2]

The display will scroll
“**COLD OFF**” which stand
for Auto Turbo Timer.

Setup Menu

COLD OFF:

[Activate
Button2]

[Hold down
Button1 or Button2
for two seconds]

SPI:

[Activate
Button2]

The display will scroll
“**SPIKE STOP**” which stand for Spike Stop.

Setup Menu

[Hold down
Button1 or Button2
for two seconds]

[Activate Both
Button1 And
Button2]

0.00:

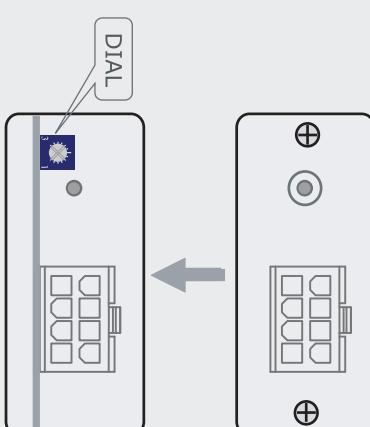
[Hold down
Button1 for
two seconds]

[Hold down
Button1 or Button2
for two seconds]

Note:

Please refer to next page
or the glossary for more
information on this
function.

Remove the 2 case screws from
the back of the MS2 case and take
the back plate off.



use screw driver to adjust the
blue dial to set the voltage as
high as possible but just low
enough to remove the boost cut.

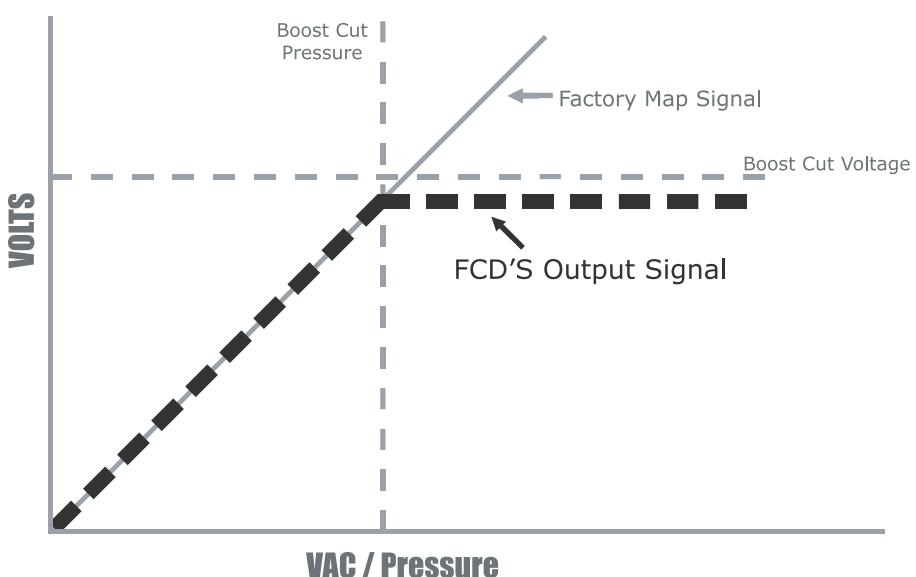
Boost Cut Remover (FCD) SetUp II

CAUTION!!!

- The MS2, by removing the over boost protection from your factory ECU allows you to run boost well in excess of what your vehicle was designed for. Please consult your performance technician regarding what boost pressures are safe for your mechanical combination. Running boost in excess of what your mechanical combination is designed for can cost you a new motor so if in doubt it is recommended that you run a lower boost setting.
- We recommend for your boost cut remover and boost be set on a dyno as this allows accurate setting and monitoring of your air fuel ratios and detonation.

THE FCD OPERATING PRINCIPAL

An FCD is essentially a voltage clamp e.g. a module that allows voltage to go in and out of it freely until a preset voltage level is reached (in this case the FCD voltage level that you set) at which time it will not allow the output voltage to go above preset level but instead will hold the output there until the input has again gone below the preset level.

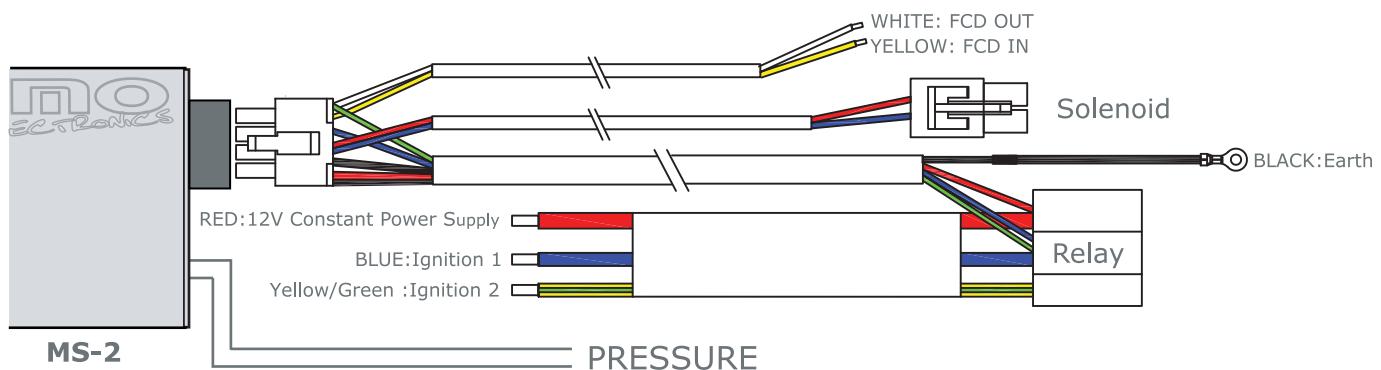


SETTING PROCEDURE

It is recommended that after entering into the FCD screen in the main menu you start with the FCD voltage setting as high as possible and progressively work your way down until the boost cut has been eliminated. The objective is to set the voltage as high as possible but just low enough to remove the cut. We have included a small listing of expected cut voltages on our website www.gizzmoelectronics.com to help you set the FCD as fast as possible but please use these as a guideline only as the rule is always to set the voltage as high as possible but just low enough to remove the cut.

Wiring Diagram

Disconnect the negative terminal of the battery
BEFORE proceeding with the installation.



Yellow: FCD IN, wires to the SENSOR SIDE of the vehicles load sensor for determining boost cut.
(normally a MAP sensor)

White: FCD OUT, wires to ECU SIDE of the vehicles load sensor for determining boost cut.
(normally a MAP sensor)

Black: Earth, Clean chassis earth

Red: 12V Constant Power Supply

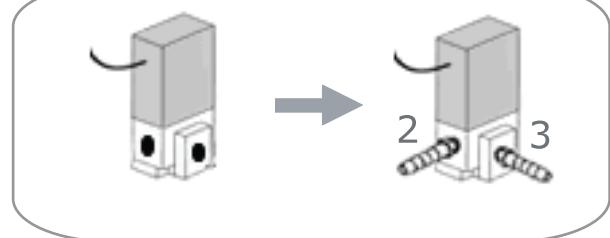
Blue: Ignition 1, This Ignition supply MUST stay on when on the starting position.

Yellow/Green: Ignition 2

1. The Pressure port is to be connected to a direct pressure source at an inlet manifold e.g. Fuel Press Regulator. Do not connect this to any other device such as a solenoid valve or blow off valve. A 3mm Y connector is provided to assist plumbing.
2. Mount the solenoid with the un-used port facing downwards. Connect the hoses as per the correct application (actuator or external wastegate).
3. Connect the Red wire to a good fused power source.
4. Connected the Black wire to a good clean chassis earth.

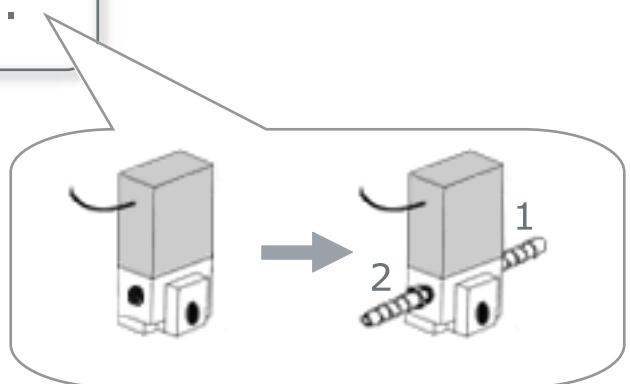
Installation for an Internal Wastegate

Connect the tails to Port 2 and Port 3 of the Solenoid Valve.



Installation for an External Wastegate

Connect the tails to Port 1 and Port 2 of the Solenoid Valve.



Glossary

Closed/Open

Refer to Open/Closed in this glossary

Display Settings

The MS2 can display boost in Pounds, Bar or Kpa OR can display the live turbo timer countdown time OR can display the real time boost controller solenoid duty cycle. All this can be set in the display menu. 1bar equals 14.5lb which equals 100kpa.

Duty

There are 2 different duty settings on the MSIBC...

Boost Duty: This duty cycle, also referred to as the 'Base duty' can be adjusted from 10% to 90% to adjust the boost level. Every vehicle has a different response to duty cycle and essentially the only way to work out your duty cycle vs boost relationship is via trial and error starting from a low duty cycle. A lower duty cycle equals lower boost and typically your boost won't start to rise till at least 20%.

Scramble Duty: This duty cycle is the additional duty that will be added to the Boost Duty (as explained above) every time the Scramble is energised for example...

Boost Duty = 25% and the Scramble duty = 3%. When the vehicle is first Scrambled the duty total duty cycle will be 28% as if you had set your memory setting to 28%. So, if you scrambled a second time the duty would be 31% (25% base setting + 3% first scramble + 3% second scramble), again resulting in the same boost as if you had set your boost memory to 31%.

Glossary II

Boost Cut Remover (FCD)

Boost cut Remover (FCD)

In order to eliminate boost cuts from factory ECU's it is necessary to limit the amount of boost that the factory ECU can see. The factory ECU more often than not sees boost as a voltage which is proportional to the pressure seen by a pressure sensor which is plumbed to the intake manifold. In order to limit this signal we must limit the maximum voltage that the ECU can see as a higher voltage signifies a higher pressure. This is done by wiring the MS2 in series (e.g. cutting the factory wire so that the signal can go in and out of the MS2) in between the pressure sensor and ECU. The maximum voltage the ECU can see on this wire is displayed on the MS2's FCD screen.

Gain

Gain effects how quickly the turbo comes on boost. Ideally this would be set as high as possible; however, if this is set too high overshooting and boost instability can occur so there will be an ideal setting for this that will be different from vehicle to vehicle.

Memories

The MS-2 has 6 memories in total and can fast switch between these. This means that when you select the next memory the boost will change immediately which is an advantage when changing memories whilst racing. Each memory has its own gain setting (refer to 'gain' in this glossary) and control strategy setting (refer to Open/Closed in this glossary).

Glossary III

Multi-Scramble™

This is Gizzmo's variation of the traditional scramble feature outlined above. Having activated the scramble feature via the MS-2's top button, it is possible to activate the scramble up to two more times to increase the boost again. In order to do this you must energise the scramble again before the scramble time has run out e.g. If you have set the scramble for a 3% increase in duty cycle for 5 seconds and you have just initiated your first scramble, in order to scramble again (add another 3% duty cycle hence a total increase of 6% to your Base duty cycle) you must again press the scramble before the 5 second scramble completes.

Open/Closed

This refers to the type of control strategy that the MS-2 will have on your waste-gate.

If you select 'open' the MS-2 will not attempt to correct any fluctuations or boost creep/drop off. This may be your preferred method in a turbo/waste-gate/manifold combination where any change in the boost controller's solenoid duty may have an undesirable effect re boost stability.

If you select 'closed' the MS-2 will continually monitor and make minor offsets to the duty cycle in an attempt to stabilise the boost. This setting is recommended for vehicles with boost control issues such as boost creep/drop off and vehicles with boost harmonics due to turbo/waste-gate/manifold design or tune.

Glossary IV

Over Boost warning

Via the menus, you can set an over boost pressure to flash the display and attempt to drop the boost should your vehicle exceed this set pressure limit.

Scramble Seconds

This refers to one of the two Scramble parameters that require setting for the Scramble to operate. Seconds refers to the amount of time that the 'Scramble Duty' (refer glossary under 'Duty') will be added to the base duty cycle for.

Spike Stop

A unique feature of the MS-2 is 'Spike stop'.

As with everything, wastegates take time to open and in a situation where they are required to react quickly (flat shifting gears at high revs, off/on throttle quickly whilst on boost at high rpm) this sometimes results in a boost spike. Spike stop largely eliminates this and can be adjusted from 0 to 100 with 100 being suitable for vehicles with a large amount of boost spiking and 0 suiting cars with no spiking issues. Ideally you want to keep this setting as low as possible because the higher this is, the longer it will take to return to your desired boost setting.

Solenoid Supervisor

The MS2 constantly monitors the boost controller solenoid output channel to ensure that there are no malfunctions and should anything go wrong the MS2 IMMEDIATELY displays 'SOL' to warn you of a fault with your solenoid, solenoid loom or output driver

Features

Multi-Scramble™

A 'scramble' feature of a boost controller increases the boost period of time e.g. an additional 3lb for 5 seconds before returning to the previous boost setting. This can be beneficial when you need a slight edge towards the end of a close race or if you are racing and wish to run higher boost in your later gears.

Multi-Scramble...

Traction is often a real issue for at least the first 1/8 mile due to many cars power vs traction ratio; this is often evident with front wheel drive turbocharged vehicles. The MS-2 offers two possible solutions to this. Solution one is to use the MS-2's fast toggle memories to start on a low setting e.g. 8lb in memory number 1 when taking off from the line and work your way through the memories as you go through the gears. Using this method gives you the advantage of tailoring different boost steps throughout the race e.g. 8lb in 1st, 12lb in 2nd, 20lb in 3rd etc. Solution two would be to use multi-scramble. With multi scramble you could start the race on a low boost setting and once, having gained reasonable traction, can start progressively increasing the boost with the multi-scramble. If you again start to lose traction, you can cancel the scramble and again start scrambling the boost once you have regained traction.

Features II

Auto Turbo Timer

The MS2 has a fully configurable turbo timer so that the MS2 can constantly adjust the countdown time in accordance with your settings. In addition to this you have the option to display your countdown time live on the display.

Display

The MS2 can display boost in Pounds, Bar or Kpa OR can display the live turbo timer countdown time OR can display the real time boost controller solenoid duty cycle.

Over Boost warning

Via the menus, you can set an over boost pressure to flash the display and attempt to reduce your boost should your vehicle exceed this set pressure limit.

Solenoid Supervisor

The MS2 constantly monitors the boost controller solenoid output channel to ensure that there are no malfunctions and should anything go wrong the MS2 IMMEDIATELY displays 'SOL' to warn you of a fault with your solenoid, solenoid loom or output driver.

About The Warranty

Gizzmo Electronics Limited
Limited Warranties Statement
Effective 1 January 2003

All Products manufactured or distributed by Gizzmo Electronics are subject to the following Limited Express Warranties, and no others:

For a period of one year from and after the date of purchase of a new Gizzmo Electronics product, Gizzmo Electronics warranties and guarantees only to the original purchase/user that such a product will be free from defects of material and workmanship in the manufacturing process. Gizzmo Electronics, at its sole option, shall replace the defective product. This express warranty shall be inapplicable to any product not properly installed and properly used by the purchaser/user or to any product damaged or impaired by external forces. This is the extent of Warranties available on this product. Gizzmo Electronics shall have no liability whatsoever for consequential damages following from the use of any defective product or by reason the failure of any product. Gizzmo Electronics specifically disclaims and disavows all other warranties, express or implied including, without limitation, all Warranties of fitness for a particular propose, Warranties of Description, Warranties of Merchantability, Trade Usage or Warranties of Trade Usage, The above warranty is valid in New Zealand, Australia and the America's only as Gizzmo Electronics does not offer an international warranty outside of these regions.