MAG-BOOSTA
Magnetic Fuel Conditioners

Made in South Africa

Thank you for purchasing a Mag-Boosta fuel conditioner.

The model you have purchased is the **Mag-Boosta MB-1014**. The model number defines the range of the *outside diameter* (in millimetres) of the flexible fuel hoses for which it is suited – i.e. 10mm through to 14mm. (3/8" to 9/16"). Mag-Boosta fuel conditioners are manufactured in Durban, KwaZulu Natal, South Africa. Mag-Boosta fuel conditioners are supplied with a 12 month warranty against failure of function of the magnets.

The purpose of the Mag-Boosta fuel conditioner is to help reverse the rapid quality degradation that occurs in modern fuels. **Your purchase and installation of a Mag-Boosta will not void a new vehicle warranty, as it does not in any way affect the fuel flow rate, nor the fuel pressure.**

DIESEL

- A significant proportion of diesel used in South Africa is imported from overseas refineries (more than 6 Billion litres/annum), whilst some is produced in our own ageing refineries which urgently require upgrading to current technologies.
- Modern diesel is either (i) a blend of thermally distilled fuel and catalytically cracked fuel or increasingly (ii) is 100% catalytically cracked.
- The cracked fuel is produced from both raw crude oil and the heavy tars left over from the primary thermal distillation process. (In the years up until the early 1970's and the Arab Oil Embargo of the Western aligned nations following the Yom Kippur war between Israel and the Arab nations, these tars were sold as a low profit by-product into the paint, cement and asphalt/tarring industries.)
- The different grades of diesel are made up of hydrocarbon polymer chains ranging from C9 to C23. (This is the number of carbon atoms on the chain.) Essentially, the crude oil or heavy tars are made up of longer chains that do not combust well, due to their size and structure.
- In the fluid catalytic cracking process the longer oil/tar chains are broken or "cracked" into shorter chains, many of which range from C9 to C23, which of course is diesel.
- Unfortunately for the end user/engine owner, the cracked hydrocarbon chain structure includes "active ends" or charged ions, which have a low-level electrical attraction for each other. Both positive and negative ions are present on the cracked chains. In comparison to thermally distilled fuel which in it's pure form (e.g. NATO military spec. naval fuel) has an exceptionally long shelf life of tens of years, *cracked diesel can quite literally be termed "unstable" in a matter of days.*
- The cracked HC chains begin to ***rapidly*** cluster together and form microscopic bundles in the fuel after refining, due to the covalent bond between the charged ions.
- This 'bundling' process starts within hours of the fuel leaving the refinery and basically doesn't ever stop. The process is accelerated by oxidation (exposure to air in storage tanks), heat (outdoor tanks and hot engines) and high pressure (transfer pumps and vehicle fuel injector pumps).
- These fuel bundles or clusters are often several hundred times bigger than the maximum desired fuel particle one would want to see and designed for by your vehicle's manufacturer. (In diesel we regularly receive fuel sample reports showing high levels of particulates that are 30 micron or more, instead of the ideal size of 30 angstrom. ***That's 1000 times over the ideal particle size !***
- These microscopic bundles or "lumps" of fuel pack up on your fuel filter, scratch their way through the close tolerance passageways in pumps & injectors (4 – 6 microns) and enter the cylinder as a coarse spray instead of the finely atomised mist that one generally hopes for.
- The detrimental effects of the off-spec diesel on the fuel system & engine include most, if not all, of the following :-
    - Sludge formation in the fuel tank. Often called "algae", this is actually tar.
    - Sludge deposits on the fuel filter, resulting in reduced filter life & effectivity. This often leads to reducing the fuel filter life by 80% or more.
    - Abrasive scoring damage & subsequent early failure of pump & injectors. Hydrocarbon molecules are very hard and incredibly sharp. Imagine a 10 micron diamond being pushed through your 4 micron passageway with 30000 PSI pressure behind it. The metal doesn't stand a chance.
    - A varnish-like lacquer forming on any hot metal fuel system component. This can reduce clearances/tolerances.
    - Incomplete combustion of the coarse fuel droplets during the power stroke.
    - Uneven deposits of partially combusted fuel particles as tar & carbon on cylinder heads and piston crowns. (Carbonyls & carboxyls.) These disrupt proper gas flow within the chamber.
    - Glazing on the cylinder bore, covering over the critically important hatch work of honing marks, which are the "ladder" onto which the lubricating oil clings. The oil runs off more easily, resulting in reduced lubrication and subsequently, heat damage.

- Gummy waxes and tars in piston rings and ring grooves. These slow or prevent correct expansion of the rings which again, leads to a slight loss of pressure during the power stroke.
- An increase in the amount of carbon in the lubricating oil. This essentially forms a fine, damaging grinding paste.
- Deposits of very small carbon particles on the exhaust valve seat, which prevents proper sealing of the valve when it closes. This can result in a very slight loss of pressure during the power stroke, which again leads to a small loss of power transferred to the crank shaft.
- Heavy deposits of carbon and tar on the exhaust valve stem. We've seen many stems that are double or triple the original size due to these deposits. This effectively chokes the exhaust stream a bit, which effects power and performance of the turbocharger.
- Higher-than-design exhaust gas temperatures due to some of the coarse fuel particles still burning when the exhaust valve opens.
- Deposits of extremely hot tar & carbon particles on the turbocharger hot wheel. These can quite easily become entrained in the gas stream at the edge of the fan and can result in damage to both fan and housing.
- Heat transfer from the hot wheel to the turbo fan. This causes the air drawn into the fan to be heated above ambient temperature in milliseconds and as a result, the incoming air expands and results in a slight reduction of oxygen entering the air intake of the engine. Less oxygen means a reduced rate of combustion.
- Once past the hot wheel, the obvious symptom is black smoke being emitted from the exhaust. (Incompletely combusted fuel.)
- Increased levels of CO2, unburnt Hydrocarbons, Carbon Monoxide and Nitrous Oxide (the really bad gas.)
- Less than optimum power output.
- Fuel consumption that is well over manufacturers specifications.
- Difficult starting.
- A noisier, rougher engine and a turbocharger that won't "sing".
- Sluggish accelerator response.

PETROL

Whilst petrol does not experience the severe forms of degradation that diesel does, it still shows some quality reduction due to several mechanisms: Evaporation of light fractions, oxidation, absorption of water vapor, separation of alcohol from other ingredients, re-polymerisation (formation of hydrocarbon clusters) due to the catalytic cracking process, etc. Which one is dominant depends on the fuel source and circumstances. Fitting the Mag-Boosta will give the vehicle a new snappiness and better performance, whilst protecting the entire fuel injection system, combustion chambers and exhaust system. Our clients often tell us their engine is running "smoother" and quieter.
Providing the vehicle has an excess fuel return pipe to the fuel tank, fitting a Mag-Boosta will also eliminate any of the tank organisms (bacteria, fungi, yeasts and moulds) that are commonly found in tanks that have previously had, or currently have, ethanol fuel introduced. As long as the Mag-Boosta is on the fuel line, the bacteria will die & never reappear. These bacteria are extremely harmful as they release acidic enzymes which can rapidly corrode the fuel injection and internal components of the engine.

How the Mag-Boosta fuel conditioner unit works in both diesel and petrol engines.

The internal magnets in the MAG-BOOSTA cause the "active ends" of the cracked fuel chains to repel each other, thus reducing the size and mass of the fuel clusters. Our technology is called Magnetic Toroidal Field technology (MTF) and is the ongoing result of years of R & D on hundreds of engines.
As a modern engine's fuel pump generally circulates about 2 to 5 times the amount of fuel than that which is required for combustion, the continual circulation of the additional fuel through the unit results in the fuel clusters (or lumps) being progressively reduced in size. *Smaller fuel particles mean better combustion*. It's as simple as that.
Installation of the MAG-BOOSTA unit between the fuel tank and the engine will start to reverse all of the issues listed above. You should also feel a new "snappiness" in the throttle response. Remember, with the Mag-Boosta unit, you can have either the manufacturer's designed fuel consumption or, improved performance. You seldom see both, unfortunately.

TANK ORGANISMS. Another significant feature is the total elimination of hydrocarbon utilising microbes, or "humbugs" in fuel tanks. These organisms will establish themselves in the interface zone between any water on the bottom of the tank (a common problem caused by use of biofuels, condensation or a dodgy fuel supply and it need only be a millimetre deep) and the fuel. They secrete an acidic enzyme to "eat" the fuel chemicals. This is very similar to sulphuric acid. Just what you don't want in your pump, injectors and cylinders, as it causes corrosion and micro pitting. Having the Mag-Boosta on the fuel line will kill the organisms and prevent them from re-establishing. The London Force of the magnets causes the organism's cell wall to open, flooding the interior with fuel chemicals, which kills the individual cell, then the next, etc, etc, etc.

VERY IMPORTANT ! *INSTALLATION INSTRUCTIONS TO BE READ BEFORE OPENING PACKAGING*

Failure to install your Mag-Boosta correctly will void the warranty !

Installation of your Mag-Boosta magnetic fuel conditioner.

PLEASE READ THIS SECTION BEFORE UNPACKING AND INSTALLING THE UNIT.

Location on a diesel engine. On the last piece of rubber hose between the fuel tank and the primary fuel filter.
Location on a petrol engine: On the last piece of rubber hose before the steel fuel injector rail/pipe, after the fuel pump.

1. It is very important that your workbench is ***completely*** free of steel swarf or filings when you remove the Mag-Boosta unit from the packaging. Also little screws, nuts, bolts etc. Magnets have a real affinity for tiny bits of steel.
2. Find a suitable place on the rubber or plastic fuel hose in the engine bay of the vehicle or boat. This should have a straight section of at least 50mm where you can mount your Mag-Boosta.
3. Take a flat screwdriver and whilst gently holding the two halves of the Mag-Boosta together, remove each of the four M3 steel screws.
4. ***PLEASE DO NOT ALLOW THE MAG-BOOSTA TO SPRING APART !*** Please do not drop it and damage the vehicle or the unit itself.
5. Remove the screws from the brass support tubes. ***In the packet is a small tube of thread lock paste. Open the tube and very carefully, apply a small dot of paste to the last 5 or so threads at the end of the screw.***
6. Now take the two halves of the Mag-Boosta and place them around the chosen section of the rubber or plastic fuel hose, so that they line up. Keep the two black dots (on one end of each Mag-Boosta body half) on the same end.
7. If the Mag-Boosta is too loose on the fuel hose, take a piece of the supplied plastic tube and slip this around the fuel hose. Fit the Mag-Boosta around the plastic tube and test for snugness. If still loose, fit the second piece of plastic tube over the first. There are three different size combinations possible, being 10mm OD, 12mm OD and 14mm OD. (Some vehicles have fuel hoses that are only 8mm in diameter. You might need to wrap some duct tape or insulation tape around the fuel hose to build an 8mm pipe up to 10mm.)
8. Once the two halves are snugly in position around the hose, align the four holes on the Mag-Boosta halves and introduce :-
    a. The four brass tubes into the screw holes. ***It is very important to fit these, as they provide support between the brass insert nut and the flat washer under the screw head.***
    b. The slotted screws into the tubes in the Mag-Boosta and gently tighten up all four of the screws in a crosswise pattern. Do not over-tighten, they need only be firm. The thread lock paste will set in 10 minutes and within 24 hours, will be fully cured.
9. Congratulations ! You have successfully fitted your Mag-Boosta magnetic fuel conditioner.

Maintenance

Whenever the engine is inspected for water/oil/battery, etc. please inspect the Mag-Boosta unit. If any of the screws look like they might be loose (unlikely), remove the loose screws, clean with a wire brush and re-apply thread lock paste. Introduce the screws again and then use a screwdriver to re-tighten them. Otherwise, there is no need to do anything else.

Initial results after installation

With both diesel and petrol engines, you might notice an *increase* in exhaust smoke for the first few tanks of fuel, after fitting the Mag-Boosta unit. It is not anything to be alarmed about. It is the existing carbon & tar gradually burning off from the cylinder head & piston crowns inside your engine. It will soon reduce. On older vehicles with diesel engines, it is advisable to get yourself a spare fuel filter element for both your primary and secondary fuel filters. Our customers report that their tanks start cleaning up quite rapidly & when the filter is drained, the fuel is dark brown from the fuel sludge released from the fuel tank. Keep the spare filters handy, just in case, or stay in touch with your mechanic. Vehicles with a dash display showing fuel usage/consumption might see an increase in the displayed consumption rate. This is a result of the computer becoming “confused” due to the improved fuel combustion. Disconnecting the vehicle’s battery for 2 minutes normally resets the onboard computer. Reset the clock once done.

Installing a Mag-Boosta fuel conditioner will protect your fuel system components & engine internals, reduce your maintenance costs, extend the life of your engine and reduce emissions. Please note that contrary to what our customers call the Mag-Boosta, it is not a fuel saving device. It is a very cost-effective engine protection device.

We hope you enjoy your Mag-Boosta. Please drop us an email and let us know how it has worked for you.

Thanks again

The Mag-Boosta team.

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