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A REVIEW ON NITROUS OXIDE ON ENGINE

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ABSTRACT: Nitrous oxide is a cryogenic gas composed of 2 molecules of nitrogen and 1 molecule of oxygen. By weight it is 36% of oxygen. It is non-flammable by itself and it is stored as a compressed liquid. It is commonly known as laughing gas due to the exhilarating affects of inhaling it, and because it can cause spontaneous laughter in some users. It is used in surgery and dentistry for its anesthetic and analgesic effects. Nitrous oxide is present in the atmosphere where it acts as a powerful greenhouse gas. In modern automobiles, nitrous oxide (often just "nitrous" or "nitro" in this context) is sometimes injected into the intake manifold (or just prior to the intake manifold) to increase power: even though the gas itself is not flammable, it delivers more oxygen than atmospheric air by breaking down at elevated temperatures, thus allowing the engine to burn more fuel and air. Additionally, since nitrous oxide is stored as a liquid, the evaporation of liquid nitrous oxide in the intake manifold causes a large drop in intake charge temperature. Nitrous oxide also known as nitrogen oxide or nitrogen monoxide with chemical formulaN20.

INTRODUCTION

Nitrous oxide is a chemical compound with chemical formula N2O. Under room conditions it is a colourless non-flammable gas, with a pleasant slightly sweet odour. The aim of this paper is to utilize the engine performance through the nitrous oxide. Nitrous oxide can sometimes be utilized to increase the performance characteristics of any gasoline engine. The gas itself is highly misunderstood by the general public, and many people have even more questions about how to actually utilize it. Nitrous oxide is a cryogenic gas composed of 2 molecules of nitrogen and 1 molecule of oxygen. By weight it is 36% of oxygen. It is non-flammable by itself and it is stored as a compressed liquid. Nitrous oxide has another effect that improves performance even more when it vaporizes, nitrous oxide provides a significant cooling effect on the intake air, when you reduce the intake air tempt, you increase the air's density and this produces more oxygen inside the cylinder. Nitrogen acts to buffer or damage the increased cylinder pressure helping to control the combustion process. Nitrous also can reduce the intake charge tempt by 60 to 75 degree. F.

WORKING AND CHARACTER OF NITROUS OXIDE

Nitrous oxide is a cryogenic gas composed of 2 molecules of nitrogen and 1 molecule of oxygen. By weight it is 36% of oxygen. It is non-flammable by itself and it is stored as a compressed liquid. This would lower the engine's intake air temperature and produces a dense inlet charge. Also we know that air contains only about 23% oxygen by weight whereas nitrous contains about 36% oxygen by weight, if nitrous is added, it will increase the total mixture of oxygen of the inlet charge. This would result also in the increase in the rate at which combustion occurs in the engine's cylinders. During the combustion process in an engine, at about 572 degrees F, nitrous breaks down and releases oxygen. This extra oxygen creates additional power by allowing more fuel. to be burned so the injection of nitrous oxide into an engine means that more oxygen is available during combustion because you have more oxygen, you can also inject more fuel, allowing the same engine to produce more power. Nitrous oxide is one of the simplest ways to provide a significant horse power boost to any gasoline engine. Nitrous oxide has another effect that improves performance even more when it vaporizes, nitrous oxide provides a significant cooling effect on the intake air, when you reduce the intake air tempt, you increase the air's density and this produces more oxygen inside the cylinder. Nitrogen acts to buffer or damage the increased cylinder pressure helping to control the combustion process. Nitrous also can reduce the intake charge tempt by 60 to 75 degree. F.

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Nitrous oxide is best applied at wide open throttle (unless a progressive controlled is used). Nitrous can be safely applied above 2500 RPM under full throttle conditions one problem with nitrous oxide is that it is fairly bulky, and then engine requires a lot of it. A car normally carries only a few minutes of nitrous oxide, and the driver uses it very selectively by pushing a button.

SIDE EFFECT's OF NITROUS OXIDE

It is necessary to be careful while fixing or using nitrous oxide since mistakes could have serious consequences and could lead to damage to equipment and even death.

1. Engine could be damage if the fuel pressure as flow is not adequate.
2. Nitrous oxide should be used only at wide open throttle at the engine speed of 3000RPM and above and install proper engine to chassis ground otherwise there could be an explosive failure of the main nitrous supply line.
3. Nitrous oxide must not be injected as this could lead to death.
4. Nitrous oxide should not be allowed to come in contact with the skin as this could cause permanent frost bite damage to the skin

COMBUSTION PROCESS OF ENGINE WITH NO_2

Nitrous oxide by itself is not flammable but an oxidizer which provides more oxygen to allow the additional fuel to burn and therefore produces more power .The oxygen present in nitrous oxide cause combustion of fuel to take place more rapidly. Nitrous oxide is in the liquid form while in the cylinder and also held under high pressure. When it is released from the cylinder into the intake track its physical state changes from liquid to a gas. This transformation takes place as the nitrous is released from the area of extreme pressure into the vacuum of the intake manifold (boiling).This boiling effect reduces the temperature of the nitrous to about – 127 degree F. The cooling effect in turn significantly reduces intake charge tempt by approximately 60-75 F degree when the additional fuel required for nitrous is introduce in such a way that it is exposed to the full force of the expanding nitrous, it is completely atomized. This assists burning in the combustion chamber and a result power

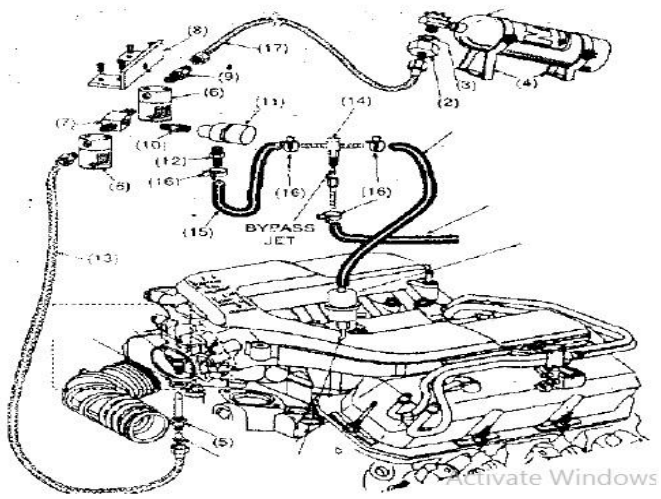

Figure1: System assembly drawing

EQUIPMENT'S OF SYSTEM ASSEMBLY

1. Nitrous bottle
2. adapter
3. washer
4. mounting bracket
5. fan spray nozzle
6. nitrous solenoid
7. solenoid TEE
8. Solenoid bracket
9. filter fitting
10. Nipple
11. pressure regulator
12. barb fitting
13. 3AN line male fitting
14. pressure TEE
15. Vacuum hose
16. Ratcheting hose clamp
17. nitrous supply line
18. 4 AN 90o Fitting
19. Flare jet

MOUNTING OF A NITROUS OXIDE SYSTEM

There is much misunderstanding about the gas itself, and this is why many people damage the internal components of their motors. If only nitrous is sprayed into the intake tract of the engine, then the engine will no undoubtedly run lean and hurt the internals of the engine. Usually, a piston will burn up and will have to be replaced. However, sometimes major engine damage can occur and render an entire motor totally useless if

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nitrous oxide is not utilized correctly. Setting up a nitrous oxide system can be relatively difficult or easy, depending on the complexity of the system and the desired operation of the system. Most nitrous oxide systems contain two solenoids: one for fuel and the other for nitrous. Lines that run from each solenoid then converge into the nozzle which is plumbed into the intake. At the nozzle and line meeting point, there are a set of jets (one for nitrous, one for fuel). The jets can be adjusted to increase the horsepower levels of the shot, as well as adjust the air fuel ratio accordingly. The fuel solenoid obtains its fuel from the automobile fuel system itself or a standalone fuel system dedicated to the nitrous oxide system itself. The nitrous solenoid is connected to a bottle containing nitrous oxide at high pressure (a pressure value exceeding 1000 psi is not uncommon). Some systems only require the use of a nitrous solenoid. This is called a dry system and is only used for fuel injected cars. The nitrous is sprayed efore theMAF and it adds the necessary fuel. Some dry systems for speed density cars use engine vacuum as a reference to add fuel to the engine. There are more complicated systems besides these simple single nozzle systems. Direct port systems offer superior nitrous distribution by having a nozzle for each individual intake runner. These systems can usually be jetted much higher than their single nozzle counterparts because there is less of a chance of one cylinder running lean due to unequal nitrous oxide distribution. As such, more nitrous can be used in order to create more power. Nitrous systems are sometimes set up on a dual or even triple stage (sometimes, in rare cases, more) configurations. These configurations either use separate solenoids and nozzles for each stage, or it uses a computer to control the voltage seen by the solenoid to adjust the amount it is open. This technique of using several nitrous stages has proven to be very useful for drag racers as they often are traction limited. Therefore, a drag racer can set up his system such that once the car has left the line and has full traction; a second stage can hit and produce more power. A third stage might be useful on the big end of the track as well.

There are many ways to activate the nitrous oxide system. One is by a simple button or switch, but others prefer a safer approach as nitrous oxide can backfire at low rpms and also cause severe engine damage if the engine is over revved. One way to activate the nitrous system is by using a wide open throttle switch in conjunction with a window switch. The wide open throttle switch makes a contact which powers the positive side of the electrical connection on each solenoid, both fuel and nitrous. However, the system is still not grounded and therefore is not activated. The window switch provides the ground with which the solenoids will receive a current and therefore open. However, the window switch only completes that ground when the engine is in a certain RPM window. The window switch reads RPM through the use of a crank trigger, distributor trigger, or another mechanism that can actually read the engine RPM. Most racers set their window switches high enough so as to not cause a backfires. Nitrous backfires have been known to blow the intake manifold completely off the car and sometimes cause fires that put the driver in danger. However, today's nitrous technology has allowed racers to make use of the power adder in a highly productive way.

Requirements for Nitrous Oxide system

a. Through much experimentation and many broken motors, there were several things learned about nitrous oxide itself:
b. Nitrous oxide runs best with elevated octane ratings as to prevent any form of detonation.
c. When run too lean, nitrous oxide can cause catastrophic engine damage.
d. Nitrous oxide, when used in heavy amounts, requires strong internal engine components.
e. Careful tuning is needed in setting up a nitrous oxide system. Care must be taken to not run lean.
f. Nitrous oxide performs best if the total timing in the engine is reduced.

PRECAUTIONS

a. Do not start the engine if the nitrous has been injected while the engine was not running. Disconnect the coil wire and turn the engine over with the throttle wide open for several revolutions before attempting to start the engine otherwise the engine would be damaged. (Crank the engine 10 to 15 sec. before starting
b. Do not allow readily combustible substances e.g. oil, grease etc. to come in contact with cylinders, valves,

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solenoids, hoses and fittings. They may combine with gases such as oxygen and nitrous oxide to produce a flammable make condition.

c. Do not drop or violently strike the bottle to avoid explosion.

d. Nitrous bottle should always be closed when the system is not being used.

e. Do not interchange nitrous and fuel solenoids. It could result to engine damage.

f. Do not attempt to remove the siphon tube without completely emptying the bottle of all nitrous and pressure.

g. To keep the engine healthy while using Nitrous oxide you must ensure it operates at the proper air /fuel ratio.

CONCLUSION

Nitrous oxide by itself does not make power. In order to make power, fuel must be burned in an efficient manner. As such, nitrous oxide supplies the extra oxygen needed to burn the extra fuel. Nitrous oxide will not burn on its own, it needs another chemical to actually become combustible. The general public is highly uninformed about this, and as such many think nitrous oxide is an explosive gas, which is untrueNitrous oxide if properly fitted and managed and all the necessary precautions taken is found to be very economical and so more industries should encourage the use of it in all vehicles by allowing constructors that would make the installations easy and safe.Nitrous oxide by itself is not flammable but an oxidizer which provides more oxygen to allow the additional fuel to burn and therefore produces more power .The oxygen present in nitrous oxide cause combustion of fuel to take place more rapidly.

REFERENCES

[1]. Dimitri N. Elgin. Camshaft theories. http://www.ls1tech.com/forums/showthread.php?t=101100p

[2]. Internal Combustion Engines. Harcourt Brace Jovanovich, Toronto, Canada, 1988.

[3]. Jeff Lucius. Turbocharger compressor flow maps for 3000gt and stealth owners.

[4]. http://www.stealth316.com/2-3s-compflowmaps.htm.

[5]. http\www_geocities_com-MotorCity-5335-graphics-fogger_gif.ht

[6]. K. Newton T.K. Garrett and W Steeds. The Motor Vehicle, 13th Edition. SAE International Warrendale, PA, 2001.

[7]. SAE Charles O. Probst. How to Understand, Service and Modify Bosch Fuel Injection Engine Management. Bentley Publishers, Cambridge, MA, 1989.

[8]. http\www.Nitrous oxide - Wikipedia, the free encyclopedia.htm

[9]. Holden LTD. Gen iii v8 engine management. GM Service Manual. Richard Stone. SAE International, Warrendale, PA, 1995.

[10]. Corky Bell. Supercharger!: Design, Testing and Installation of Supercharger Systems. Bentley Publishers, Cambridge, MA, 2001.

[11]. T.W. Asmus. Valve events and engine operation. Chrysler Corporation Article.

[12]. http\www.Car Craft Magazine Nitrous.htm

[13]. Factory fuel injection (Dry manifold system).