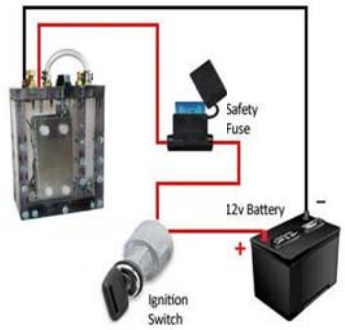
HHO Generator briefing V1.0 2011

Examiners may discover an unusual looking device connected to the air intake of the main engine on the boat they are examining. These devices are used to generate hydrogen gas and deliver the gas directly into the engines air intake. These generators are actually known as HHO Generators and for those of you wanting to understand a bit more about their operation, read on.

Here is a simplified explanation on how HHO Generators change plain old H_20 into Hydrogen and Oxygen. Let's start with the water - as a minimum, it should be at least filtered or distilled. Some form of vessel is required to contain the water along with sufficient headspace for the liberated gases. Next comes a pair of electrodes – anything will do – copper wire, stainless steel, even a pair of graphite pencil leads! On connecting a battery, the resulting current flow causes excitation in the water molecules and it divides into its primary elements of Hydrogen and Oxygen and the resulting gases are liberated from the water into the headspace of the vessel (see picture on the right). As you can probably imagine, such home-brewed, DIY set-ups can be fraught with danger. To see a DIY HHO generator in action, have a look at the following clip: http://www.youtube.com/watch?v=mWDZ0RGWBUg where you will appreciate the output of HHO from a multi-plate cell.

Turning now to the practical aspects of HHO generation. You can produce HHO with as little as 1.5 volts DC and one amp of current. The real key is how to configure the generator to deliver a useful output for minimal power input. In reality, once the HHO generator has been charged up, it actually performs like a wet cell battery. It holds a charge of 1.5 - 2.0 volts DC and can operate when charged with the power switch turned off until the remaining suspended HHO gas is pulled off. The power switch is primarily used to maintain the HHO generator's charge and .the gaseous material is drawn off by the vacuum created by the engine it is fuelling and this feeds the gas directly into the engine for combustion purposes. The system is an on-demand system, NOT a pressurized storage system - the HHO generator only produces what the vehicles' engine may call for, nothing more.



HHO – Electrical Circuit

To improve the efficiency of the gas transfer process in commercial operations, pure water is often substituted by an aqueous solution made from the chemical compound potassium hydroxide – KOH (sometimes known as caustic potash, potash lye or potassium hydrate). The process starts with water and typically a lye-based electrolyte. You add DC current; the H_20 breaks down into H_2 & O [called HHO for simplicity]. To put some numbers on the theory, the running current for a HHO Generator is in the region of 20 to 25 amps (at 12v) – hence the need for heavy power cables (and circuit protection).

The HHO is delivered to the engine using the engine's vacuum. The HHO combines with the petrol / diesel and air in the combustion chamber and is burnt. Once burnt, it converts back to H_20 and then absorbs the inner heat from the engine (at around 175 to 205°C) whereupon it turns into super-heated steam which is then pushed out during the exhaust stroke via the exhaust system. It then condenses back into to water vapour and eventually collects back into water. The process gives a really odorless exhaust with very low HC, CO and NO^2 emissions and only water vapor from the exhaust pipe. Why vapor instead of water - because the hydrocarbon fuel [petrol] produces enough heat during combustion to keep the burnt HHO in a water vapor state, leaving it to totally condense back into water outside of the exhaust system thereby eliminating internal corrosion !

HHO – Gas Circuit

So, what does a proprietary HHO Generator look like, some illustrations.

In HHO generator systems, the “header” tank in the RH picture is referred to as a “bubbler” – it is used to prevent the possibility of a spark migrating from the engine all the way to the HHO generator by passing (“bubbling”) the HHO gas through water.

You need to be aware that some DIY “kit” suppliers use components that you'll find at your local DIY store - some of them use glass jars and clear-acrylic water filter housings to house the cell. If a craft has a HHO Generator fitted, you should be aware that very few DIY components are designed to withstand the conditions of electro-chemical reaction of hydrogen/oxygen production.

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