

Rescue boat propelled by a pop-pop engine

Philippe, a friend of mine, is a volunteer at SNSM (Société Nationale de Sauvetage en Mer=French company for rescue at sea). As I'm fond of pop-pop engines he suggested me to build a rescue boat model propelled by a pop-pop engine. This idea took place end of 2010 but I had many other projects which were more serious. Time was passing...

In March 2011, Daryl, another friend of mine, suggested me to participate at the *2011 World Wide Pop Pop Boat Build* competition. From then, building the rescue boat model took place among my most urgent projects.

Hull :

After hesitating between several boats of the 50s such as this one



I decided to stick (more or less) to the following one which was built in 1961.



The original boat was made of wood. The deck of the model is also made of wood, but I used polyester resin and fibreglass for the hull. Here is the result.



The colors are the most common ones for this type of boat (as on the above drawing): green hull and orange deck.

Remote control :

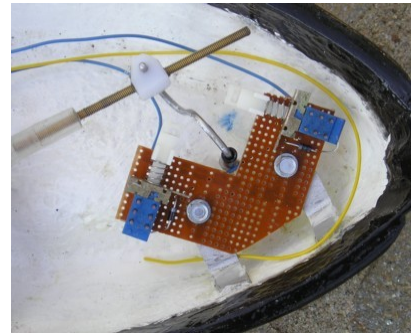
This is something I'm not fan of for so simple pop-pop boats. However, on forums I read many messages of people who would like to RC pop-pop boats. To work in that direction I decided to add a rudder control. A cheap one. I bought for 10€ a RC car (made in China).



I took off the wheels, the body...and kept only what is on the right of the photo.

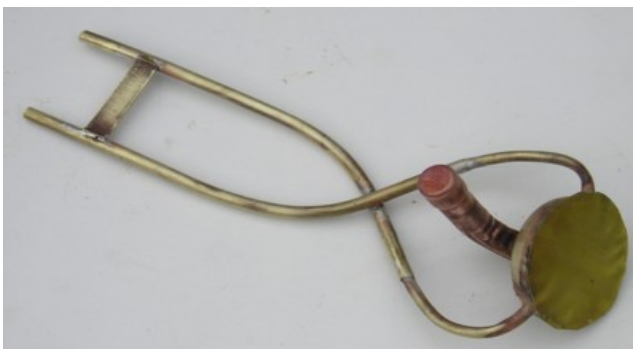
The stroke and force of the steering motor was not enough to control the boat rudder. Therefore, I used the main motor, but it was too fast and its torque was not sufficient. I just added a screw and a nut to get an appropriate speed and a higher torque. And to avoid mechanical seizing I added 2 limit switches recovered from an old tape recorder and 2 diodes.

The rudder can take any position between 45° port and 45° starboard. The remote control is possible up to 40 meters, which is much more than needed for a pop-pop boat because to avoid damages the burner is to be shut down immediately in case of engine burn-out.



Engine.

Where both shafts are located on the real boat I inserted two brass pipes when building the hull. Inner diameter 5mm. And once the rudder RC components were located I built an engine which had to comply with remaining room. It would have been easy to use a coil engine but I wanted a diaphragm one; a noisy one, and a slow speed one. Here it is.



For the chamber I used the cover of an old switch. Diaphragm diameter 54mm.

In order not to heat too much the thin diaphragm and its soft metal welding I prolonged the switch cover by a copper tube (silver brazed before putting the diaphragm). It is this copper tube which is heated by the burner.

To match this rather big engine and the relatively short hull I crossed the pipes to add some length. First I tested the engine alone and it worked at the first attempt. And on the same day I fitted the engine aboard and tested the whole boat. But before that, in order not to set the thin plywood deck on fire, I had to add a thermal screen. I glued a thin aluminum film under the deck and inside the hull in the vicinity of the boiler. And I built a big chimney which exhausts between the 2 fore cabins.

“Sea” trials :

The first tests took place in a small children pool but, working for years in a shipyard, for fun I use the words “sea trials” as for big ships.

The first burner was simply a plate warmer candle. As its power was not enough I just put two wicks instead of one.

After approx 10 minutes warming up, the engine ran without any trouble during 21 minutes. It could have been longer, but at that time the candle wax was liquid and one wick sank.

Sound is loud. Frequency: 3Hz.

**Additional photos :**Inside, under the deck :

From fore to aft one can see the motor with its diaphragm, the chimney, the control unit (square black box), the (black) steering motor and the (blue) limit switches.

Rear underwater shape :

It can be seen that each nozzle is located in a semi tunnel (as the propellers of the real boat were).

Fore deck :Rear pole and flag (and cleat)