BUILDING THE TSK BLACKSTAR GS-2

By SILAS KWOK

Have you noticed the price for a gallon of R/C fuel lately? If you are one of us that use 30% nitro fuel, it comes to approximately $2.50 per tank for 10 minutes of flying. How does 25 cents per tank for 40 minutes of flying sound to you? If that sounds good to you, a gasoline powered helicopter is what you need.

Over the years, I prefer to fly an all metal and precision CNC machined part helicopter. There are only a few manufactures that currently fit this category. But with the gasoline powered, there are only three. The TSK BlackStar GS 2, Kalt's Gas Alpha and the Yamaha R50. The Yamaha is not currently imported to the US, but at a rumored price tag of over $50K, it is too much for my pocket book.

The TSK comes with a 32 cc TSK/TAS motor and is bigger and more powerful than the 25 cc Kalt. It also comes with push pull control for the cyclic system. The

This kit comes in a 13.5" X 11" X 38" brown paper box. Just as well, the brown paper box disguises it from my wife. Upon opening the box, I can see why the price tag is high. All major components; the H-1000 main rotor head, engine/lower frame, tail rotor gear box come preassemble. The fiberglass canopy is white gel-coated and ready to paint. The quality of the parts in this kit is excellent. Ball bearings are used at every moving points. On a scale of zero to ten, it is a twenty!

The GS 2 is based on the top-of-the-line BlackStar DL helicopter. The difference between the regualr BlackStar and the BlackStar DL is in the upper frame unit and the servo frame. The DL offers push pull control for the cyclic control, dual swashplate anti-rotation unit and short couple collective control system. The English instruction comes with the kit are related only to the BlackStar DL helicopter, I will point out the portion just related to the GS-2.

BUILDING:

Our first step is to locate the landing gear assembly. Drill two holes 107 mm apart, center from mid point on the plastic skid brace. Install the skid pipes into the skid brace but don't tighten the set screw at this time. Mount the landing gear assembly to the engine/lower frame assembly with M3-30 socket head bolt and lock nut. Use the 12mm aluminum spacer provided between the lower frame and the landing gear.

Locate and mount the pull starter. Locate the muffler and discard the gasket between the two muffler halves. Instead use Permatex 101 Ultra-Copper high-temp silicon RTV gasket material available from your local automotive store. Mount the muffler with the gasket provided between the muffler assembly and the engine.

Now set the engine assembly on the skid and install the front brace with M3-8 on the right side. Mount the throttle transfer L lever bracket with M3-10 on the left side. Mount the throttle transfer L lever to the bracket. Be sure to use the m3-0.4 washer in between the bolt, L lever and bracket.

Mount and dial indicate the in-line clutch shaft. Since the engine/lower frame assembly is almost inches wide, you might have problem securing it on your vise. An alternative is to clamp the dial indicator to the lower frame itself to check for run out. Less than 0.002" run-out must be obtain to reduce vibration.

The TSK clutch can be install with either leading or trailing clutch engagement. I prefer the later for a smooth operation. Assemble the two clutch shoes and confirm the leaf spring is firmly interlock the shoes. Install the clutch shoes on to the pivot shaft. Complete the assembly by installing the clutch bell.

Now we can refer to the English instruction for the remaining assembly. The instruction is in isometric format and very easy to follow, however I like to point out some tips.

TIPS:

During the construction of the upper frame unit, do not tighten all the nuts and bolts until all the parts are placed at their location. I found none of the holes need to be modified and once the bolts are tighten, all gear meshes are properly set.

From experience, using 72 MHz on a TSK helicopter will require the tail drive shaft to be isolated from the mechanics to obtain an interference-free reception. With the .60 size TSK, we can use carbon drive shaft as an insulator. However the GS 2 tail boom is over 900 mm long and drives shaft at that length is difficult to obtain. The solution is to make use of the noiseless coupler part number D9905 from TSK. Currently TSK is considering including this part in the kit.

The recommended main rotor blade is the Hi-Product B-1800 FRP blade. This is a scale up version of their SC-60 popular among the F3C pilots around the world. I choose to use the Hi-Product CT-28 tail rotor blades. Neither main or tail rotor blades are included in the kit. With an almost 6 feet main-rotor diameter, a minimum height requirement of the pilot is 6 feet to ensure a safe rotor braking.

ADJUSTMENT:

This is an area we need to accustom to a gasoline type helicopter. This engine does not spin up as fast as the .60 size helicopter. The recommended maximum rotor speed is 1400 RPM while hovering at 1100 RPM. For normal flying, the maximum pitch setting is 9 degree and hovering at 5 degree. For acrobatic flight, lower the top end pitch to 7.5 degree but not to exceed the maximum rotor speed. Any over rev-ing will resulted in unexpected auto rotation.

Top end pitch for auto rotation can be set at 12 to 13 degree and bottom end at minus 3 degree. I found the best way to adjust the engine is to firmly bolt the helicopter to a test stand and adjust the high speed needle valve for maximum RPM. Make sure to wear proper ear, eye and head protection. The needle valve is very sensitive, 1/16 turn can affect change.

The best fuel mixture is 20 to 1 of high quality 2 cycle oil and 92 octane fuel. TSK includes a 600 cc size mixing bottle with the kit. That is enough fuel for a fully charged radio system for a day of flying.

SPECIFICATIONS:

Main Rotor Diameter	71.5" (1816 mm)
Tail Rotor Diameter	11" (279.4 mm)