



Marvelous »Ready for Takeoff« helicopter aptly named »Shuttle« talks things over with little buddy, GMP Cricket. These machines share the distinction of being unique in their respective class, namely in innovative construction and unequalled flight performance in small helicopters.

## SHUTTLE:

### Ready for takeoff

A Veterans Viewpoint  
by Dick Tristao

Some of you may be asking if Colin has gone bananas by having another look at the Hirobo Shuttle in this issue. Maybe bananas is too tame a word for what runs around in his head, but there is a method to the apparent madness. The previous article dealt with the Shuttle from a beginners standpoint and no doubt offers the plus and minus comments that are often generated by inexperience with model helicopters. The Hirobo Shuttle can only benefit from such a review since a lack of familiarity by any newcomer will emphatically point out the strengths and perceived weaknesses.

My look at the little machine will be from the more experienced angle. While I am not a championship calibre helicopter flyer, I do a pretty good job of precision tooting around the sky, from sport aerobatics to smooth scale. My current stable of steeds numbers eight machines, ranging in production models from 1971 to 1985.

Hirobo's Shuttle is obviously a pioneer aircraft, much in the vein of the original Schluter and Kavan designs, and later unique pioneer; Heli-boy. The fact that in the short fifteen year life span of model helicopters we have seen machines go from lumbering self destructing clunkers, meticulously assembled by dedicated modelers, to sleek ready to fly out of the box helicopters.

Almost ready to fly best describes the Shuttle as the little beast is fully assembled into three major parts groups: Main chassis, Rotor blades, and landing gear. As supplied to me in the United States by Hirobo's authorized distributor, Gorham Model

Products in Calabasas, California, the Shuttle was the kit version offered without engine. An O.S. .28 FSR-H was provided separately by GMP for the review. Actually I was glad to have the kit in this way since it gave me the opportunity to closely look at some of the parts that are inaccessible in the fully assembled version.

Throughout the years we 'old timers' have seen kits that ran the range from pure junk to engineering masterpieces. The Hirobo Shuttle fits the last category with no argument. Space age materials are used throughout, namely carbon fiber filled plastic that is beautifully moulded into numerous parts. The fit and finish is truly remarkable and attests to the craftsmanship spent on the engineering and tool/die making. Overall, I am impressed with the entire helicopter. Areas that may appeal to experienced modelers will now be highlighted.

Hirobo's DDF style rotor head was shrunk and moulded in a smaller size for Shuttle yet retains the all ball bearing assembly of the larger one. Individual blade dampening is handled by rubber 'O' rings that resemble chubby doughnuts. Though the dampening felt rather soft, it proved to be perfect for general sport flying. The balance of the main rotor control components, linkages, swashplate, etc were also beautifully moulded, including integral ball joints. Many of these components are the right size to be used on larger machines and will probably begin showing up on later versions.

At first glance the main rotor blades appear to be moulded items also, but



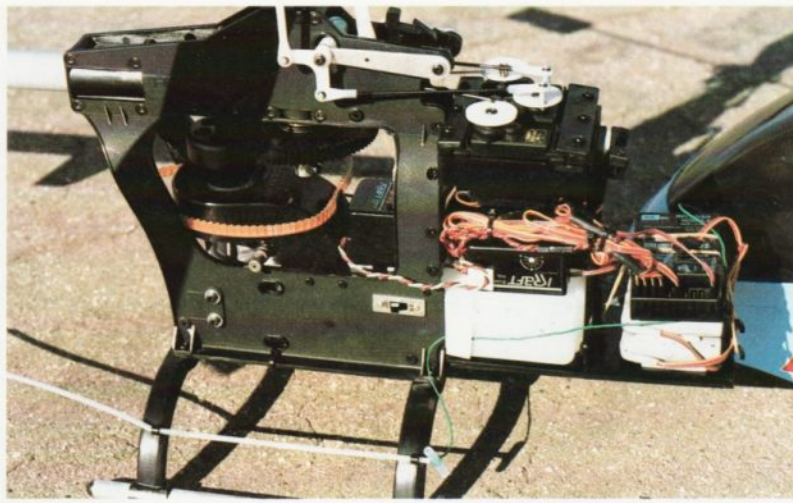
closer inspection reveals them to be finely finished and beautifully painted wood. Blade root doublers are already mounted in place making the matched pair ready to mount. A quick check on the Hi-point balancer proved both blades to be exact in weight.

The bottom side of the main shaft found the typical drive arrangement, a large plastic gear, fitted with autorotation. Differing from other Hirobo designs, the tail rotor is not driven off this gear but takes off slightly farther aft. The output end of the clutch shaft sports a toothed pulley which transfers tail rotor power down the tail tube via a reinforced cog belt. At the tail rotor end, a larger, fully enclosed pulley accepts and transfers power to the output shaft. Hub and blade holder assemblies are standard Hirobo fitted with new symmetrical plastic blades.

Now, before some of you go off ranting about how past helicopter designs of this type continually split their belts, let me caution you to not let your mouth run ahead of your brain. I doubt the belt used in the Shuttle could be broken by a Sumo wrestler, and it isn't going to come off on its own. The pulleys have large edge flanges that just barely clear the side frames and the tail rotor housing enclosures. The thing just isn't going to fly off nor snap in two. Turning the assembly slowly by hand, obvious notching can be felt. However, after a few tanks of fuel, the system turns smoothly and with as little effort as a shaft/gear system, quite possibly less.

Helicopter engines have proven themselves popular and powerful within recent years and the O.S. 28-H follows the same pattern. Shuttle was designed around this very engine so machined mount and everything related to the powerplant matches up just fine. By the time you read this, a joint effort by GMP and K & B Manufacturing in the United States will make available a potent new .28 engine for helicopters. Bolt patterns for mounting lugs and muffler, plus general dimensions will correspond with the O.S. thus making this new powerhouse easily interchangeable. A half aluminium, half carbon fiber muffler is provided for direct bolt attachment to the engine.

The cooling fan/flywheel assembly is straightforward Hirobo with a new design clutch mounting with a key/slot index and two long screws. The clutch itself is of the same moulded glass material with a return spring fitting around the two shoes. This assembly centers automatically on a stub shaft within the clutch bell which slips into a ball bearing pressed into



*Main pre-assembled core of Shuttle is made mostly of carbon fiber injected parts. Radio compartment accepts virtually any size system with a little room to spare. Unique gyro shelf sits just ahead of the engine. Switch location another neat premoulded idea.*

*Standard production Hirobo tail rotor parts. Moulded tail tube and houses bearing supported output shaft and cog pulley. Large diameter tail tube needed to enclose cog belt.*



the clutch end. No clutch lining is used which immediately raised my eyebrows! Later test flying proved the whole mechanism works well so my fuzzy brows returned to normal. Hirobo's own design tank is already plumbed and mounted just ahead and below the cooling shroud and contains the largest capacity for a .28 size helicopter on the market. Belt start is standard.

All of these finely crafted components are held precisely in alignment by the neatest pair of side frames I have ever seen. Again, carbon fiber materials are moulded to shape, including integral bearing blocks for clutch and main shaft. All pieces are keyed together while some appear to interlock. Tied to the front of this assembly is a moulded servo tray that accepts nearly any size servo currently being used. My JR 401's

worked perfectly, taking all of 15 minutes to mount with the unique sandwich mounting plate method designed into the Shuttle. A platform is provided for placement of the battery pack and receiver, including the rubber band for final securing. Another first is designed into this little machine: a gyro tray. Yup, just ahead of the cooling shroud is a platform that places the gyro almost directly under the main rotor shaft, considered the best place on any helicopter.

The two final goodies that complete the Shuttle are the miniature flexible landing gear with integral receiver antenna tube, and the slide on cabin with locking latch at the top. With addition of trim decals from the provided sheet, the total elapsed time from box opening to finished Shuttle: three hours! Amazing when you consider





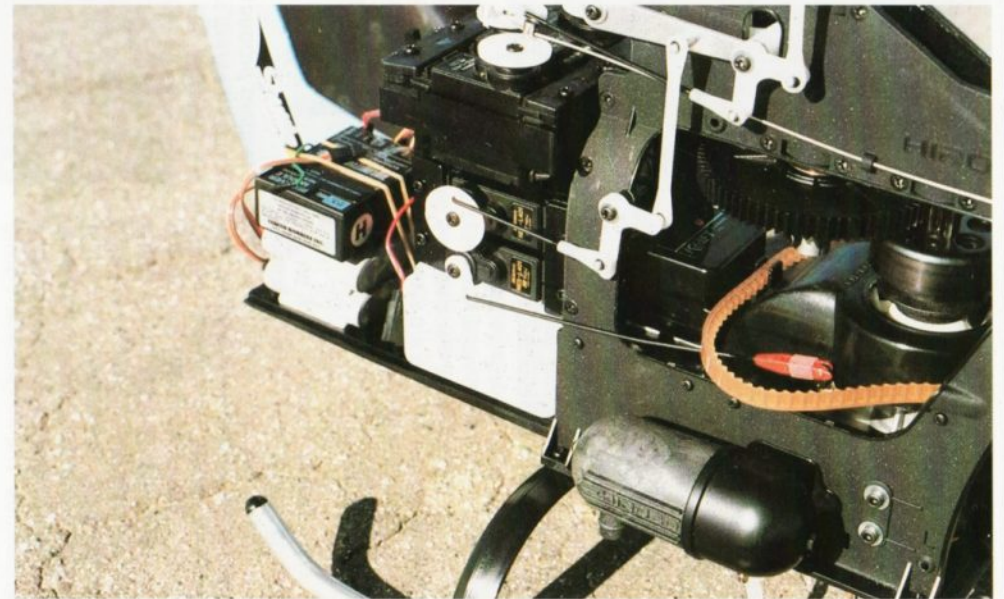
*First flights found my »not paying attention to instructions« to be a handful. A throttle/collective relationship change (per instructions) solved all strangeness of flight performance.*

*All the components of the DDF style head reduced in size for this .28 powered machine. Moulded parts are lightweight yet share or exceed strength of aluminum and steel counterparts.*



*Fast forward flight keeps you on your toes as speed is quite high. Response to all commands is smooth and firm. Shuttle follows your lead with little effort and plenty of control reserve.*

*Supplied muffler is two part assembly of aluminum and moulded glass. Servo linkages and rods are preassembled and were a near perfect fit for my radio.*







*Stable hover is Shuttle's trademark. Cyclic response is soft yet positive due to very easy head dampening.*

*Hirobo has designed and produced a «New era» model helicopter. Not only is it impressive in flight performance, it sets new engineering standards, advanced materials usage and new, ready for the customer, packaging. All photos by Dick Tristao*





most kits today need 20 to 40+ hours to complete.

Instructions provided in the kit are very thorough, profusely illustrated and include exploded parts views and a flight training section for the novice. I found little to challenge in the instruction book, either in procedure or set up.

Following the radio installation instructions had servos with proper rotation locked into proper slots for a given control function. Hirobo designers probably use JR radios as the preassembled pushrods fit with only a half turn here and there to correctly position all control surfaces and collective/throttle throw relationships. Three areas that can prove troublesome if not adjusted right are collective, throttle and tail rotor. I know, because I breezed through the set up instructions in those areas, thinking I could rough it then dial in with transmitter curve and trim adjustments. A tank of fuel and a lot of transmitter twiddling quickly convinced my 'set up from experience' was totally out to lunch.

Follow the instruction book carefully when mounting servo arms to achieve differential throw as illustrated. Set collective travel mechanically to get the -1 1/2 to +7 degrees called for. Second, servo throw for throttle must match the carburetor travel exactly, including trim, from full open to full closed on the transmitter stick. Third, turn the ATS off, center the tail rotor servo; center the rear tail rotor collective bellcrank in its slot and tighten the pushrod wire. Turn the ATS on and set the dial to mid position. With this set up and the engine just breaking into two cycle at liftoff, the Shuttle will hover steadily trimmed at transmitter half stick with a main rotor speed of 1450 to 1500 rpm.

It took me several tanks of fuel to match eyeball-brain-fingertip coordination to the Shuttle. The previously mentioned soft feeling dampening was raising havoc with me as I am used to lightening quick response to tiny stick inputs. Shuttle's cyclic response is very positive but requires more stick movement than I am accustomed to. Because of this, I found myself overcontrolling the helicopter.

Actually, if I left the sticks alone, the Shuttle actually hovered better! As I became more acquainted with the response and overall feel of the model, I found it easy to handle and very predictable.

Tail rotor response is Shuttle's best feature, or worst if you are frightened of that end of a model helicopter. An

approximated ratio of 1 to 1:8, driven directly off the engine, finds the tail feathers really singing. At the main rotor speed (1500) that my Shuttle seemed happiest, the tail was turning approximately 7500 rpm. Talk about response, the Shuttle can be easily yawed 90, 100 or 360 degrees while in fast forward flight! Switching to low rate, about 60%, allowed me to tame the tail to a feel I am used to. Also with the greater response, and because of its ideal location, the gyro sensitivity was turned down to 25-30%, otherwise the tail danced from side to side. Since the tail rotor is driven directly off the engine, inconsistent running of the engine is immediately transmitted to the tail. Mine twitched and yawed as much as 30 degrees until the needle valve was fine tuned. As soon as the engine smoothed out, the tail became a pussycat.

Vertical response is as quick as any collective machine in today's marketplace. Punching the collective really makes you forget this model is powered by a .28. The collective/throttle relationship as set per the instructions operates as though Idle up is on. Rotor speed remained constant in all flight modes (checked with a visual tachometer) and even during fast descents. I did activate idle up later to try some aerobatic maneuvers.

Once I became accustomed to hovering and nap of the earth maneuvering, time came to turn Shuttle loose. »Ready for Takeoff« is too tame a phrase for what Shuttle does when you launch into forward flight. This little rocket accelerates unbelievably fast and maintains a high rate of speed with just a little more stick position past hover. The second surprise followed immediately in the form of firmer control response. Wide and tight figure eights, straight flight and a few stall turns were thrown in to develop more feel for the Shuttle's flight characteristics. I almost had to shout »Whoa« to get the Shuttle to slow down for an approach, which it did descending with grace and ease. Back into a solid hover, Shuttle settled into being a docile machine again.

The next squirt into the wild blue was for loops and rolls. Shuttle's fast forward speed capability lends itself well to aerobatics but the super soft head dampening does not. Loops from level flight were graceful and quite large, requiring about half cyclic during entry and roughly three quarters upon recovery. Any attempt to smoothly tighten the loop at entry or at the vertical produced an immediate reduction in forward speed with the resultant near stop on top and sloppy figure nine down the

backside. Rolls were breathtaking in that you weren't sure the model will complete it. Smooth, consistent feeding of the stick produced the best rolls, although they took most of the fields length and went around slowly. Idle-up and a lot of negative collective were needed to complete the maneuver. As an experienced flyer, I had little trouble performing these maneuvers, but the intermediate guy may scare himself good on his first aerobatic tries. My advice is to let altitude and speed be your friend until comfortable with the Shuttle. My personal guess to this type of performance lies within the rotor head. The soft dampening absorbs a large percentage of cyclic input thus diminishing control effectiveness needed when moved quickly and to the extreme. As already mentioned, cyclic input done slowly and steadily produced large positive maneuvers while quick or too much input slowed everything down. At no time did Shuttle go out of control nor get squirrily in any way.

When we look at Shuttle's market place the soft head dampening makes a lot of sense. Designed primarily for the beginner and sportsman flyer, soft head dampening provides better reaction time plus absorption of the neophyte's overcontrolling actions. Hirobo's Shuttle excels in the easy to hover category, and shines in the high/low speed circuits. Advanced flyers who want more aerobatic capability in this little machine will probably modify or change the rubber doughnuts to some thing stiffer, which I am sure will speed cyclic response and produce the desired result.

Autorotations are strictly Hirobo ease, performing with little difference from the .40 and .60 big brothers. Actually the sportsman flyer will have little trouble learning autorotations with Shuttle due to its predictable nature.

In summary, Hirobo's Shuttle is indeed ready for takeoff. Preassembly of this machine is nearly total, requiring finishing that any reasonable human being should be able to accomplish. Craftsmanship and quality of workmanship take second place to no one, and the model helicopter industry is seeing a unique trend setter, one that is sure to be imitated. Flying characteristics are superb and properly engineered for the intended market place. High performance flyers will have to be content with the fact this model was not designed for their specific needs. It can be modified to suit them I'm sure, but if they will take a few flights to become accustomed to Shuttle's smooth and predictable behavior, they will find it can do anything asked of it, and darned well too!