

## SST Eagle Freya Update

Issue 1, May, 2001

# *sst-eagle* **FREYA**

### Update News

This newsletter has been included in the kit to keep you informed about the new Hirobo SST Eagle Freya. Firstly, Altech Marketing would like to thank you for purchasing your Freya. We hope that when you've built and flown the Freya, you'll agree with our belief that this is one of the finest 60 size 3D or contest machines available. There are also several newsgroups where you can ask other

pilots of Hirobo products questions. You are always encouraged to give Altech Marketing or our field representatives a call if you require some assistance. Later in this newsletter we will show you how to contact the newsgroups and Altech Marketing. If you have something to contribute then feel free to contact us directly. Your input will join that accumulated from our test pilots, field representatives, and other pilots like you in a future Freya Update publication.

### Freya Best of Show

Did you know that the SST Eagle Freya won the prestigious title of "International Model of the Year?" Mr Keitaroh Matsusak, President of Hirobo Limited, received the award at the Nurnberg Toy Fair. This was the first time the award has gone to a helicopter.

### Freya Construction Tips

Prior to building your Freya, we urge you to take a look at these construction tips and advice.

When threading any metal part into plastic, use a small drop of thick cyanoacrylic (CA) glue as a thread-locking agent to keep the part securely fastened.

The Freya is supplied with 660mm, symmetrical main blades. The longest main blade you can use with the stock 95mm tail rotor blades is 680mm. We highly recommend V-Blades for the best 3D performance if you choose not to use the stock blades.

**Step 1, Elevator Lever Assembly.** Each elevator arm with ball end measures approximately 75mm in total length. Make sure both arms are the same length.

**Step 6, Main Frame Assembly.** You may want to glue 3mm

lock nuts for the boom strut mounting screws into position on the inside of the main frame. You may also wish to glue an extra two nuts into the alternate boom strut mounting position at the lower back ends of the main frame as well. This may prove useful at a later date if you decide to change the mounting location of the boom supports.

Glue the fuel tank rubbers to the fuel tank with CA or silicon RTV before tank installation. You never have to split the frames to install or remove the fuel tank if the isolation rubbers are attached to the fuel tank.

**Step 8, Main Gear Installation.** The Freya uses Eagle main gears. You can choose either the 93T main gear or the 95T main gear that is standard in the kit. Some YS-STII users are using the machine cut 93T main gear (0404-706). This gear is made of Delrin and is white in color.

**Step 9, Swashplate Assembly.** The two inside short pivot bolts (D) can be replaced with two long pivot bolts (E) to obtain more bell cyclic input for higher cyclic rates.

**Step 11, Yoke Assembly.** If the spindle holders (0414-103) do not slide into the yoke (0414-101) easily during trial fitting, file down the back edge of the spindle holder to remove any burrs left over from machining. The spindle holders should slide into place and be able to be removed before gluing with little effort. Thick CA (slow cure) or epoxy is OK to use for gluing the spindle holder to the yoke.

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**Step 14,** Stabilizer Control Arm assembly. When positioning the stabilizer bar through the control arm assembly, set the stabilizer bar's position so there is 216mm of material protruding from each outer tip of the the control arm halves.

File about a .25mm off each end of the "bird cage" steel rods (2511-018) to eliminate any slop in the seesaw assembly. The assembly should have a minimum of lateral play.

**Step 15,** Stabilizer Blade Assembly. Screw both paddles all the way onto the stabilizer bar. Ensure that they are parallel to one another. The paddles should each be the same distance from the control arm assembly as shown in the diagram.

Adjust to make make them equidistant (and in balance).

**Step 16,** Radius Block, Wash-out, and Swashplate Installation.

It is imperative that the radius block (0414-112) with guide pins is securely fastened to the main shaft and not allowed to rotate. After setting the phase adjustment, go back and make sure the two 2 x 8 mm cap screws and nuts are tightly fastened and thread-locked. During your pre-flight, check this component to be certain that it can not be rotated. If after installation and tightening it is found that this unit can still be rotated, STOP and contact Jeff Green at Altech for further instructions.

Rotor Head Installation: Install the two 4 x 10mm cap screws that secure the rotor head to the main shaft, with a liberal quantity of thread lock compound. The coarse threads of the 4mm bolts require plenty of compound to secure the bolt

**Step 17,** Collective Pitch Lever Installation. Add a thick washer under (0414-128) Collective Pitch Bolt, or remove 1mm from each end of the (0414-127) Collective Pitch Shaft to properly assemble the unit. The collective pitch bolts are not threaded all the way. The slight unthreaded shank prevents proper tightening of the assembly.

**Step 19,** X-type, Aileron, Elevator torque Lever Installation.

Note that the X-levers are not symmetrical. There is an upper and lower portion to each lever. You can tell by measuring the distance between the bosses through which the 2mm screw secures the ball. The upper part of the X-lever has a distance of approximately 9mm between the boss centers. The lower part has a distance of approximately 7.5mm between boss centers. Alternatively, when the molded on letter that indicates the mounting side (L=left, R=right) is upside down, then the X-lever is correctly positioned. There is a note and diagram

about this much later in the instructions: Page 36, Step 35.

Final preparation is complete when the bosses on the lower portion of each lever are sanded flush with the lever to allow clearance for the ball link. Be careful here as you only need to sand the outer forward boss and inner rear boss of each lever. No sanding is required on the upper bosses.

**Step 20,** Case Assembly. Included in the assembly package is a 5 x 7 x .1mm (2506-021) shim washer. The drawing doesn't detail this item or its purpose. Simply use this washer to remove any end-play in the tail rotor belt pulley shaft (0414-144) if required.

**Step 29,** Engine Installation. Use Vaseline to hold the engine mount/frame washers (2521-084) in place while installing the engine. If you are using a Yamada YS 61STII, you will need an extension for the throttle lever. One of the handiest adapters around is the Miniature Aircraft "non-threaded spacer" part number 106 78. Simply mount this to the barrel with a 3mm cap head screw of 25mm length.

**Step 30,** Servo Installation. Install battery switch before installing servos. On a JR type switch, you will find that one corner of the mounting plate will require filing to fit the contour of the frame. Alternatively, the switch can be attached to an Eagle switch plate (0404-633). The Eagle switch plate is then mounted on the front mechanical plate (0414-122) using the two holes located on the right-hand-side of the plate. Switch access is then made through the lower right cabin sponson. After installation of this switch, you will find it much easier to turn your receiver on and off. Due to the location of the switch plate, access to the plug is limited. It would be a time saver to fit a remote plug adapter at this point.



## **Freya Setup Tips**

Building the Freya has but one purpose, and that is to go flying. Some would say that building is a necessary evil while others enjoy the task. While construction time has been cut to a minimum on the Freya, it still doesn't ease the anxiousness and anticipation you feel before getting the ship in the air. All helicopter pilots want to know one thing: "What is everyone else doing?" This can be in regard to radio, engines, or gyros and servos. Plus, pilots all want to know what secret programming mix is being used to make the model fly truer. Well, here is little information about how we think the Freya flies and perhaps some of this will be useful to you.

### **Main Rotor Speed**

A variety of head speeds are appropriate on the Freya. For a more docile model suited for the novice or sports intermediate flyer, 1600 RPM makes for a stable and gentle handling. Of course, most will say that they are interested in 3D or freestyle flying which is why this model was developed. Experience has shown that a 1700-1750 RPM head speed is perfect for this type of flying. This RPM suits the OS engine with the 95T main gear, and also the YS using the 93T main gear. The YS will also run well on the 95T main gear but it seems that most YS users simply prefer the 93T gear.

### **Muffler**

Try to keep this simple. Whenever a helicopter engine appears to be having problems, the majority of the time it is caused by tuned pipes. The pipes are designed for resonance at a particular engine RPM that will then correspond to a set main rotor RPM. If you are not given this information when you purchase the pipe then expect a long period of time devoted to determining the critical pipe length. All of this cuts into the flying time! For great results on the Freya, we recommend the Hatori 666 two piece muffler. Altech are proud to now carry this line of Mr. Hatori's mufflers.

Other pilots are using the Hatori one piece mufflers with the Zimmerman stainless steel mufflers also drawing high praise. The premise here is to employ an exhaust system that is fit and forget with minimal installation and maintenance worries.

Incidentally, an OS 61 WC on 30% nitromethane and an Hatori 666 muffler is producing over 2.3 BHP!

### **Controls**

The ball link positions on the servo arms as denoted in the kit's instructions are fine. With the travel volume on the servos expanded from the normal 100% (JR radios) there is plenty of cyclic response for the hardest 3D flying. Be sure that they Bell/Hiller mixing ratio is set at the lowest amount of Hiller response by installing the mixing arms in hole #1 (Step 13, Seesaw Section Assembly). More than adequate cyclic rate is provided by removing one of the weights in the paddles, but to get really wild, remove both of them; however, the rock solid hovering characteristics seem to lessen with all weights out of the paddles.

For crisper handling, replace Pivot Bolts D with Pivot Bolts E (2530-005) on the upper swashplate ring. All four Pivot Bolts will be of the type E after modification.

If you find that your cyclic response varies depending on which direction you are maneuvering, for example, your roll rate is higher to the right than to the left, try these techniques to even the rates out.

- 1) Expand the travel volume (ATV) on the side that is slowest. This will increase the swashplate movement for that side increasing the input to the head.
- 2) Reduce any exponential on the slow side to increase the sensitivity more abruptly when moving away from center stick. This increases the initial input to the head as the stick is moved in the affected direction.

### **Blades**

Blades that are designed as FAI type usually have the following characteristics. They are heavier than a 3D type blade (190 gms and up), possibly of semisymmetrical airfoil section, and have an outboard center-of-gravity (CG). A 3D type blade is generally the opposite; being lighter, symmetrical, and with an inboard CG. In addition the rotor blades best suited for maneuvering will be of rigid construction. A flexible blade is ideally suited to hovering and less demanding aerobatic applications. With that in mind, MRC/Altech recommend the excellent V-Blades main blades for 3D. Specially marked Freya kits include a pair of V-Blades for just \$50 more. If your kit did

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not include V-Blades and you would like a pair at this promotional price, then please contact Jeff Green at Altech for details on how to obtain a set.

## **New Eagle Replacement Tube**

Some of you may have converted to the Freya shaft drive. The shaft, couplings, and bearings are common to the Eagle and Tsurugi helicopter lines, so if you have spares from these models they will fit perfectly. Hirobo have recently updated the specification of the tube and reduced its price. The new tube is fitted with solid aluminum end caps which are drilled to accept the roll pin that secures the female couplings. This system prevents the roll pins from wallowing out the tube and possibly loosening the coupling. Order part number 0404-797 to receive this updated specification tube.

## **Alternate Starter Adapters**

If you want to use a different starting adapter on your Freya, you will find this easy to do. The Freya utilizes a 6mm start shaft making it readily adaptable to a variety of options. In order to use the Pegae starting system, you must buy the necessary components separately. You must order the 6 1/2" flex shaft (Part Number 1034) in order to clear the head of the Freya. In addition, you need the start shaft coupling of which there is a long and short version. You will need the longer version (Part Number 1049).

Incidentally, you can not buy the Pegae starter system for the Sullivan preassembled with the 6 1/2" flex shaft; the items must be purchased individually.

## **New Engines**

You have probably already heard about the new Yamada YS 80 ST3 and OS 91 SX-H engines. Both are wonderful power plants for the Freya, but their installation is a little different. If you are using the YS 80, there is no need to alter the gearing in any way. You may run either the 92 or 95 tooth main gears with this engine. In addition, the engine will run well with the standard Hatori 666 muffler though best performance is reached with the new one piece Hatori specially designed for the engine.

The OS 91 requires the use of a larger clutch pinion. Now available is the 12 tooth pinion and clutch bell, 0414-187. The retail cost is \$53 but the street price will possibly be less. The OS 91 produces its best power under 15,000 rpm so the gearing change is necessary to run the engine at this speed. Right now, both K&S and Hatori have a suitable muffler available for the engine. There is also a special version of the Hatori engineered by Todd Bennett which incorporates a two piece design to relieve stress on the engine in the event of a crash.

## **Pinions Available**

You asked for it, and now they are available. Drive pinions without the expensive clutch bell are available in 10 tooth and 12 tooth varieties. An 11 tooth pinion is due shortly. Part numbers are: 0414-210 for the 10 tooth and 0410-211 for the 12 tooth. A part number for the 11 tooth pinion will be published when the gear is available.

## **E-Groups**

Got questions about the Freya or other Hirobo products? Want to find out what others are doing with their models? Connect online with other Hirobo pilots at E-Groups. Simply surf to <http://www.yahoo.com> and search for "Eagle" or "Hirobo" within Yahoo Groups. Sign up and receive e-mail in real time or opt for a daily digest. It is simple and fun.