

Building Instructions for "Super-Heli-Baby"

The "Super-Heli-Baby" (order no. 706) differs from the "Heli-Baby" (order no. 705) only in regard to the main rotor head, rotor shaft and connection parts for the collective pitch control mechanism.

Please refer to the "Heli-Baby" building instructions for all details concerning the mechanical assembly, the cabin, engine installation etc. The instructions stated therein for the radio and servo installation are still valid, this applies also to the servo positions. Only the throttle linkage is to be altered due to the addition of the collective pitch control, but this will be described exactly later on in the building instructions.

A modern high torque engine such as the Webra-Speed 40 HC (order no. 951) which has been specially modified for installation in the "Heli-Baby" is recommended. This engine has sufficient reserve power to fully utilise the possibilities offered by the collective pitch control.

If an already assembled "Heli-Baby" is to be converted to a "Super-Heli-Baby" by means of the conversion kit (order no. 761), then only the main rotor shaft (no. 430) and the complete rotor head will have to be removed. The following instructions apply thus not only to the conversion kit but also to the "Super-Heli-Baby" kit (order no. 706).

1.) Installation of the Main Rotor Shaft

Slide the push-pull slider (440) on to the main rotor shaft (438) after having hooked the pitch linkage (439) by its angled end on to it from the inside beforehand. The pitch linkage must be completely received by the groove in the main rotor shaft (438) and the slider must be able to slide freely on the shaft. The Z-bent end of the pitch linkage (439) must be centred exactly to the centre line of the main rotor shaft (438).

Add the pickup (403), conical spring (431D), the completed swashplate (431) and the ball (431C) to the rotor shaft assembled so far, slide it from the top into the shaft bearings (131) and bolt the nylon toothwheel (134) to the lower end. Check that the pitch linkage still has free movement. An added drop of oil is recommendable! (In the kit, order no. 706, bag 4 contains the already assembled main rotor shaft).

Adjustment to the swashplate is carried out just as with the "Heli-Baby" and has nothing to do with the collective pitch control. Please refer to the "Heli-Baby" building instructions for the necessary details.

2.) Bellcrank Installation

Insert the ball link (443) with two bearings (556) and two bolts 3 x 5 mm (1/8" x 3/16") into the bellcrank (442). The ball link must rotate freely. (Lubricate).

Slide the bellcrank (442) with bearings (556) over the fuselage frames (120) (oblong holes) and fix it by means of the bolts 3 x 10 mm (1/8" x 3/8") and nuts with washers (557) added. Now adjust the bellcrank by sliding it

in the oblong holes in such a way that the ball link (443) is exactly centred below the shaft so that the Z-bent end of the pitch linkage (439) also runs centrally and can be fixed in the slider of the ball link (443) with a socket head screw 3 x 3 mm (1/8" x 1/8"). (See figs. 1 and 2).

Connect the long, lower part of the bellcrank to the throttle/pitch servo. During full travel of the throttle linkage from idle to full open (approx. 14 mm = 5/8" including throttle trim) the slider should move up and down about 6 mm (1/4"). In its lowest position (idle) its clearance to the pickup (403) should be 3 - 5 mm (1/8" - 3/16"). The correct tension of the swashplate's conical spring results then automatically from this.

When using the conversion kit (order no. 761) please note the following: In the first production series of 1975, the oblong holes in the sideplates (120) are not provided for. They will have to be drilled and filed by the modeller himself by referring to the diagrams included in the kit.

3.) Main Rotor Assembly

Attach the sideplates (551) to the sides of the rotor hub (550) with one each flanged washer (556) on the inner side and one bearing washer (557) on the outer side using a socket head screw 3 x 30 mm (1/8" x 1 1/4") and lock nut. (See figs. 3 and 4).

Bolt the pitch lever with axle (554) and bearing (555) between the sideplates (551) using 4 socket head screws 3 x 30 mm (1/8" x 1 1/4") and lock nuts having previously slid one pitch lever on either side through the slot in the sideplate. Before tightening the nuts, the tubes (552) have to be inserted using socket head screws 3 x 30 mm. Be sure that the screw heads are on the sides of the lever, otherwise they are bound to block the lever's free movement. Now screw one ball head screw (434) into the outer side of each pitch lever, the nut on the inner side. (See figs. 5 and 6).

Slide the stabilizer bar (545) into the cross tube (541) of the articulating rotor head. From one end slide the collar (506) and from the other end the control lever (546) in place. The ball end of the lever faces inwards. Slide one clamp piece (553) on either side of the bar, screw on the flyweights (547) tightly on the ends. They should be exactly parallel and face direction of rotation. The flyweights are secured only by being firmly tightened on the ends of the bar, lock screws are unnecessary.

Balance the thus far assembled unit according to the instructions for the "Heli-Baby". Tighten the clamps (553) at a distance of 28 mm (1 1/8") from the centre of the rotor hub in such a way that they face vertically downwards! Screw the ball heads (434) into them from the outside. (See figs. 8, 9, and 10).

Prepare the rotor blades in the normal manner and as further described in the "Heli-Baby" instructions and attach them to the rotor head using blade mounts (516) and socket head screws 3 x 15 mm (1/8" x 5/8"). For the time being set the flat lower blade surfaces parallel to the corresponding pitch levers.

With the blades in this position balance them following the "Heli-Baby" instructions. Unhook all links and connections beforehand to prevent anything getting caught up. Please note: at this stage the see-saw will

probably not move so freely in the rotor head, just add a drop of oil to the centre bearing and during balancing "vibrate" the blades slightly with light thrusts, they will then oscillate freely.

4.) Assembly of the Mixing Levers

Bolt the mixing levers (441) to the sides of the slider (440) from the outside with one flanged washer (556) and screw 3 x 3 mm each. Screw two ball heads (434) into each mixing lever and secure with nuts 3 mm so that the balls face the rotor shaft. Prepare two pushrods (430 and 436) by screwing on ball joints (050), prepare pushrod (437) in the same way. (See fig. 7).

5.) Basic Cyclic Rigging

Rigging of the cyclic pitch control (swashplate with stabilizer and flyweights) is accomplished following the "Heli-Baby" instructions, the only difference is that instead of rod 432, the longer rod (437) is used. The cyclic pitch control does not have any influence over the collective pitch control.

6.) Rigging of the Collective Pitch Control

A.) Basic Adjustment

Set the common throttle/pitch servo in centre position. Centre the transmitter trim lever, too. Adjust the pushrod so that it is in a vertical, exact downward position to the bellcrank. Adjust the pushrod connecting bellcrank and carburetor in such a way that the throttle is in a half open position. The servo should now be able to move the throttle from idle to open by full use of the trim range. During this operation the slider (440) should move up and down approx. 6 mm (1/4"). (See chapter 2 and photo 12).

B.) Adjustment of the Mixing Levers

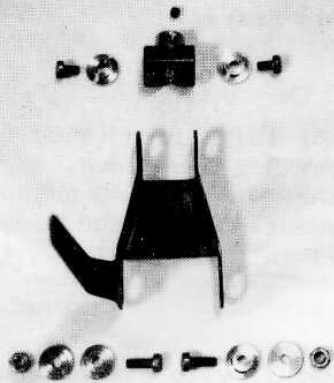
Centre the throttle/pitch servo as mentioned above (bellcrank vertical, throttle halfway open). With the stabilizer exactly horizontal(!), connect the pushrods (436) to the clamps (553) and the outer balls of the mixing levers (441) and adjust so that the mixing levers are exactly horizontal. The pushrods (436) must stand vertically. Any small variations can be corrected by resetting the clamps (553) on the stabilizer bar (545). This adjustment must assure continuous parallel movement of the mixing levers (441) to the stabilizer bar (see photo 8).

C.) Adjustment of the Rotor Blades

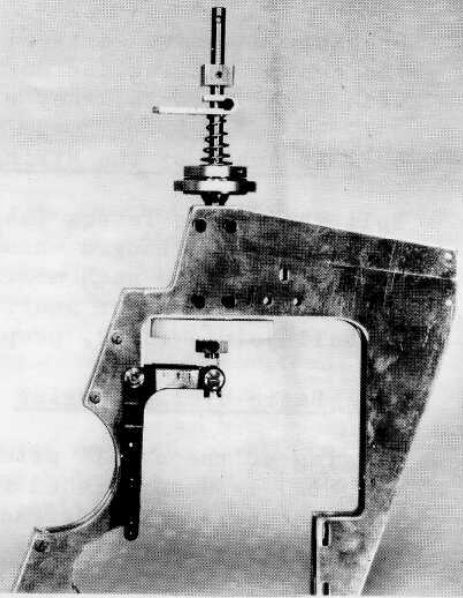
With the servo in centre position as described above, connect the pushrods (433) between the inner balls of the mixing levers (441) and the blade pitch levers so that the blade pitch levers are positioned exactly horizontal. Check that the pitch levers in the sideplate slots can move freely at all throttle positions, even with the seesaw tilted at maximum deflection. During all later adjustments, always follow this same sequence - basic adjustment, adjustment of the mixing levers, adjustment of the rotor blades, so that all pushrods run parallel and in the same ratio to each other.

D.) Adjustment of the Upper Limits (Static)

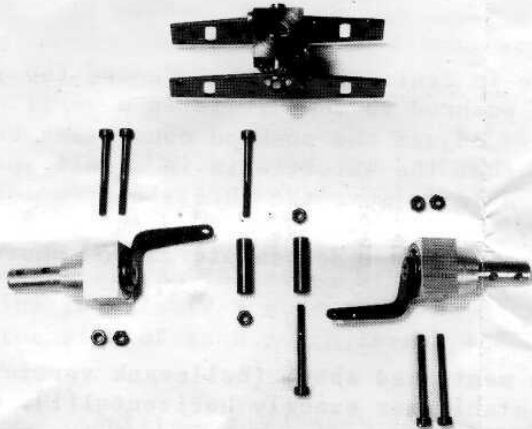
Set the common throttle/pitch servo including trim to full open. By rotating the blade mounts on the stud (554), set the blade's angle of incidence to + 2° in relation to the stabilizer bar. Use the plastic template provided by holding one of the longer edges against the blade's flat bottom and



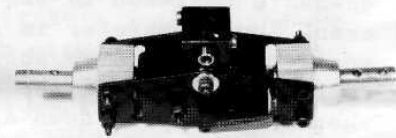
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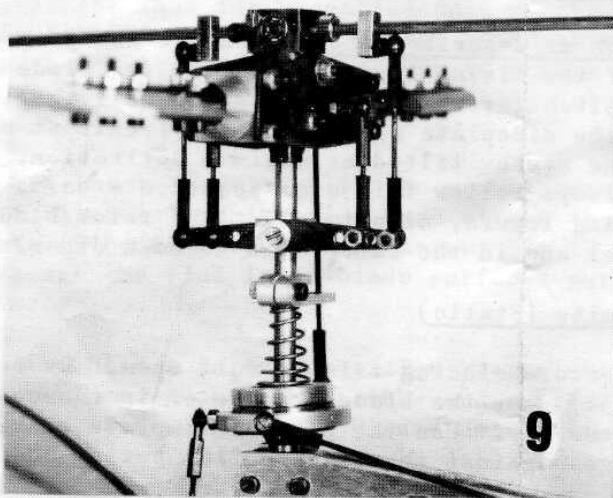


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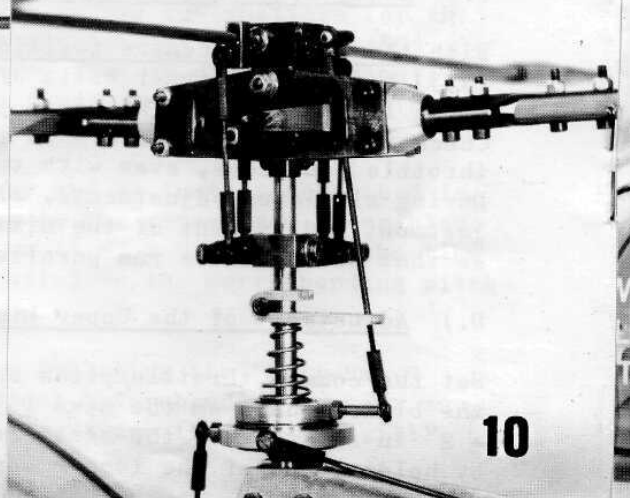


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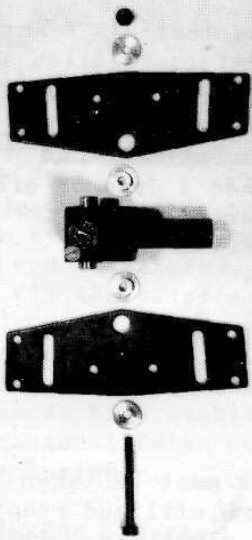


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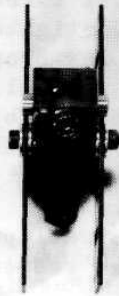


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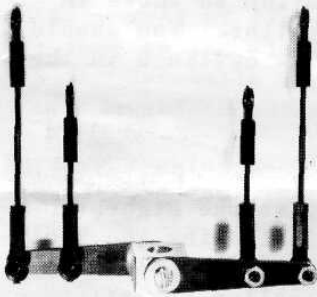
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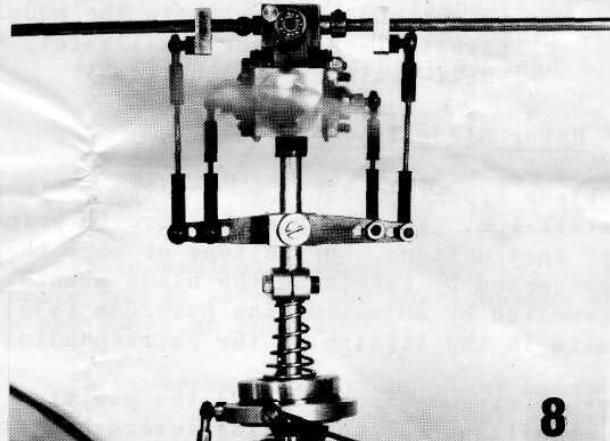
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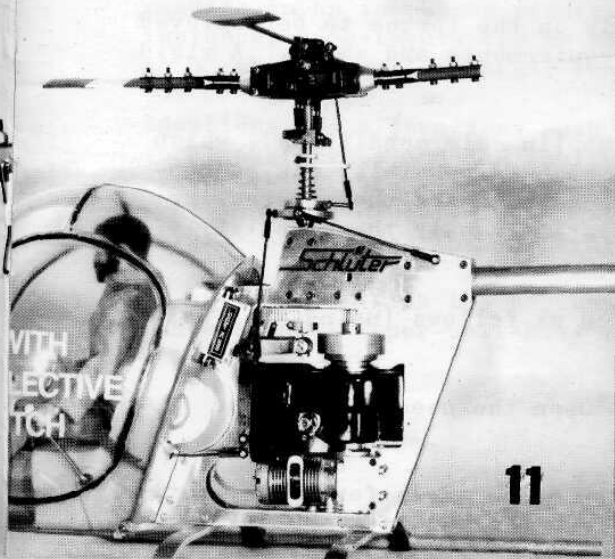
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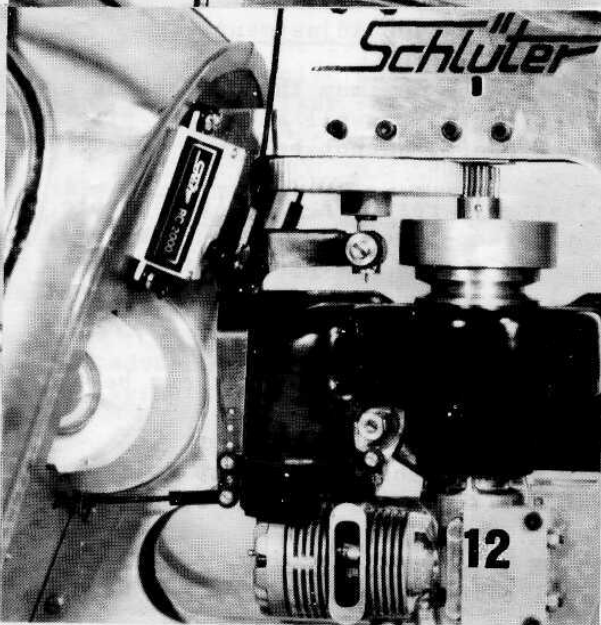
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comparing it to the stabilizer bar.

After this, tighten all screws and nuts on the rotor head and blade mounts, but do not overtighten! Disconnect all pushrods on the rotor head and check again for proper balance and make any corrections when necessary. If brand new ball links have been mounted, add a drop of oil to them all to prevent any binding and resultant high servo loadings. This applies also to the links on the swashplate, on removal of the plastic parts, and servos. (Special Oil order no. 838).

The final positions of all pushrods are illustrated in photos 8,9, and 10, they show also the respective centre positions.

7.) Flight Adjustments (Dynamic)

The foregoing description of the various adjustment work must be taken as the very basic of setting possibilities as each engine utilized reacts differently according to weather conditions, fuel, glow plugs etc. It is therefore in all cases necessary to make slight re-adjustments between rotor runs.

!!!! These adjustments can be substantially simplified by using the "Heli-Trainer" (order no. 707). All preflight adjustments can be accomplished under conditions quite similar to those in flight and at no risk to the model or the pilot. You should, nevertheless, observe all safety measures as outlined in the "Heli-Trainer" instructions!

A.) Rotor Blade Tracking

The blade tracking should be checked while operating at the highest possible rpm. You can proceed here in principle by following the "Heli-Baby" instructions. Deviations of more than 8 mm (5/16") should always be corrected by resetting the blade mounts (516). Smaller deviations can be remedied by adjusting the pushrods (433). (Lengthening the pushrod results in the lifting of the corresponding blade's track).

Under no circumstances should the position of the pushrods (436) between the stabilizer bar and mixing levers be altered!

B.) Maximum Power Adjustment

Adjustment for maximum thrust depends greatly on the torque to be achieved from the engine as well as on the pilot's requirements and skill. A rigid rule therefore, cannot be given here.

An adjustment resulting in a reasonable climb (in calm conditions), which is not rocket-like and with an rpm level as high as possible, can be considered as a good average. But here you should be aware that increasing rotor loads and decreasing rpm will unnecessarily impair the stability of the system.

This ideal average adjustment can be achieved as follows (using the "Heli-Trainer"):

Slowly advance the throttle to full power. Open the needle as far as possible without any audible rpm decrease.

Watching the blade tracking, adjust the rotor blade angle for a distinctive vertical climb without any decrease in rpm. On the "Heli-Trainer" this

means a distinct pull-out of the centre shaft. (Please note here that the helicopter, later on in flight, will climb considerably better without the ballast of the trainer's moving parts.

8.) Cyclic Control in Flight

Adjustment of the collective pitch control does not noticeably influence the cyclic pitch control. Due to the expanded adjustment possibilities it can be altered, as opposed to the standard rotor of the "Heli-Baby", to fit the pilot's personal requirements.

The adjustments as described in the foregoing chapters are based on the values of the successful and well known "Heli-Baby" and its proven qualities such as high stability and slow control response which can overcome an occasional false control input and which is therefore exactly suited for the beginner.

9.) For Experts

This slow control response is sometimes considered as being too sluggish for the experienced pilot. It can be improved to a certain extent by lightening the flyweights (paddles). This can be done by drilling as many holes as possible in the paddles and covering them with self-adhesive foil. In extreme cases (and only for really skilled pilots), the paddles can be made from wood or light plastic material. That means so light, that they react fast to the slightest control deflection and bestow the model with fantastic aerobatic capabilities. The ensuing high mechanical load must not be overlooked though!

A further special adaption of the "Super-Heli-Baby's" collective pitch rotor head to meet the pilot's particular requirements is achieved by re-positioning the clamps (553) in alternate positions on the stabilizer bar.

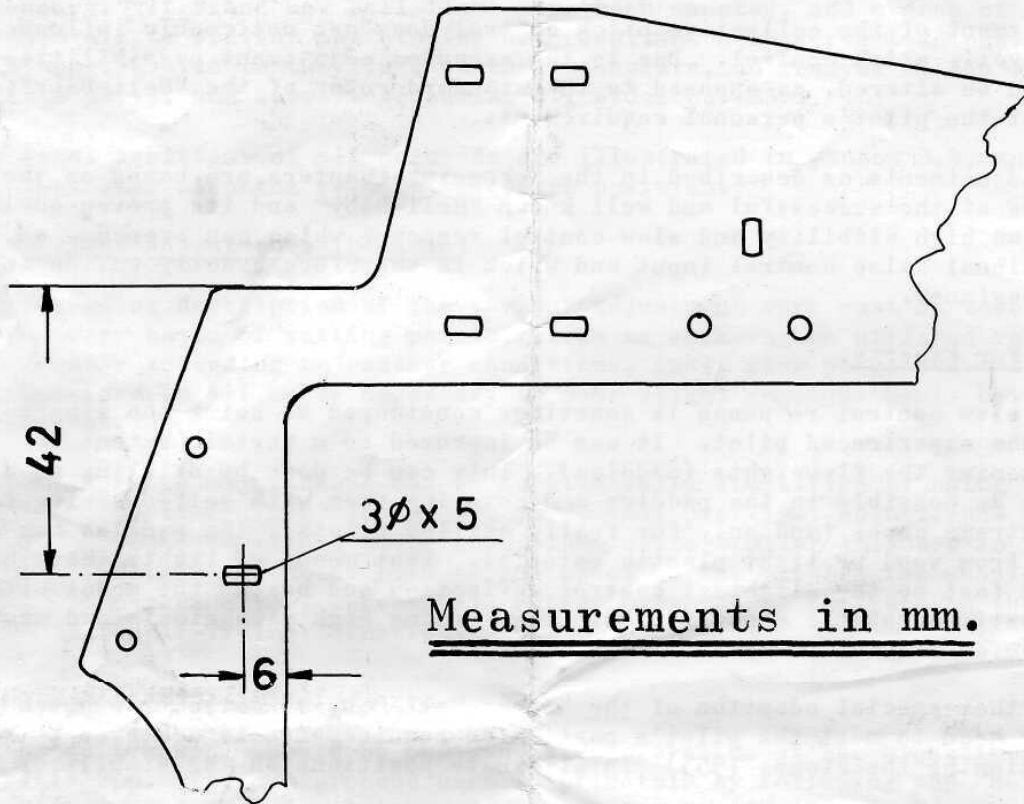
Thus the movement relation of the cyclic control between the stabilizer bar and effective blade pitch change can be altered for the adaption of these responses to other systems and makes of helicopters.

This applies above all to pilots with experience in flying other makes of helicopters, they can switch over to a "Super-Heli-Baby" without any re-taining at all.

In general, the clamps are repositioned towards the rotor hub. This results in an increased reduction ratio of the cyclic control. For instance, adjustments can be made that the stabilizer bar tilts as much as 5° while the blade angle change is only about 3° .

Adaptions and alterations such as these are, of course, a matter of personal preference and can really only be evaluated by those already possessing the necessary flying experience. It must be emphasized once again, that the less experienced modeller should follow the basic adjustments and values recommended in the foregoing chapters.

In any case, I wish the beginner, the advanced and expert flyer a lot of fun with his "Super-Heli-Baby", good flying and happy landings!



Measurements in mm.

HUBSCHRAUBER

Schlüter

MODELLBAU

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Made in West-Germany

Importé d'Allemagne