Instructions for the JUNIOR 50 II, almost-ready-to-fly.

Dear customer,

The **JUNIOR 50 II** which you have just purchased differs from all previous designs in the method of controlling the main rotor. The control system is based on a rise-and-fall swashplate for collective pitch control, combined with a 45-degree offset cyclic pitch control arrangement. The new system is used in conjunction with an accurately matched two-bladed main rotor with stabiliser bar, and 45-degree offset control system incorporating collective pitch compensation and a Bell/Hiller mixer.

As is generally understood, for technical reasons the cyclic pitch of the main rotor blades and stabiliser bar paddles is not varied in the direction of flight, but offset by 90 degrees. However, in this new system cyclic control commands are transmitted via the swashplate with all transmission elements offset by 45 degrees. We will assume that the main rotor spins in the clockwise direction. For forward flight the swashplate is now tilted at an angle 45 degrees left of forward, instead of directly forward. A roll to the right is initiated by tilting the swashplate 45 degrees right of forward, instead of 90 degrees to the right. All control movements are offset through 45 degrees, in the direction opposite to rotor rotation.

If you own a computer radio control system you must use the standard H1 program (mechanical mixing of swashplate with one servo for collective pitch control).

The kit to which these instructions applies does not include a radio control system.

A list of matching accessories can be found in the Helicopter Catalogue.

The catalogue includes many useful tools which are specific to helicopters, available individually or as a complete tool set (Order No. S1370). The rotor blade balance, Order No. S1367, is highly recommended as an aid to initial setting up. The following aids should be considered as basic essentials:

Angle jig	Order No. S1366
Main rotor adjustment jig	Order No. S1345
Tail rotor balance shaft	Order No. S1346
Ball-link pliers	Order No. S1360
Control paddle adjustment jig	Order No. S1368

If you are new to model helicopters, we strongly recommend that you read Dieter Schlueter's „Radio Control Helicopter Manual". It contains everything you need to know on the subject of radio-controlled helicopters, and should be considered essential reading for any model chopper pilot. The book is available in German under Order No. S9954 and in English under Order No. S9956

Replacement parts:

It is vital that you use original spare parts exclusively. The replacement part number is printed next to each component on the plan. When ordering spares, be sure to add the prefix „S" to the part number. The prefixes are omitted from the plan to avoid confusion.

The building instructions often refer to „LOCTITE" and „instant" glue. Wherever you see the letter „L" on the plan, you should apply „LOCTITE" to the joint. Loctite is a thread-locking fluid which prevents screws and nuts working loose. It is also used to fix ballraces in position on shafts. Instant glue, or „cyano", is a modern cyano-acrylate adhesive which is available from many manufacturers. This type of glue sets very quickly, produces high-strength joints, and adheres to most materials.

The ARTF kit is supplied with the full plans of the JUNIOR 50 II, as included with the standard kit. The plans show every detail of the model's construction. These building instructions refer constantly to plan numbers and detail sketches on the drawings.

The plans include a number of drawings which show the radio control system installation and the final adjustment procedure.

Stage 1 Skid landing gear

The skid landing gear is screwed to the underside of the channel-

section strips (S3141), using the M3 x 16 socket-head screws (S0031), M3 washers (S0007) and M3 self-locking nuts (S0012).

Stage 2 Installing the tail boom, tail rotor and tail surfaces

Fit the tail boom (S3140) between the side panels (S3140). It should project about 1 mm forward of the tail drive bracket (S3316). Check that the driver shaft (S3341) engages in the tail rotor shaft (S0346). Install the clamps (S0389) and the M3 x 30 socket-head screws (S0038). Align the tail surfaces with the mechanics, and secure them with the M3 self-locking nuts (S0012).

Apply LOCTITE to the M3 x 5 socket-head screw (S0046), which is already in place in the crown gear, and tighten it to the point where it engages on the machined flat in the driver shaft (S3341). To prevent the tail boom rotating, drill a 1.5 mm pilot hole in the tail boom, and screw a 2.2 x 6.5 self-tapping screw (S0042) and shakeproof washer (S0091) into the tail rotor mount (see plan). Take care not to over-tighten the screw.

Installing the radio control system, adjustment procedure, installing the main rotor

Assembling the mixer

Referring to detail 14a on plan 4, screw the servo holders to the underside of the servo mounts for the servos 1, 2 and 3. Drill fixing holes in the mounts to suit your servos. If you are using „**Robbe RS 700**" servos, drill 1.8 mm holes and screw in the fixing screws.

It is essential to ensure that the servos cannot slide up and out of their rubber grommets, as this would render the model completely uncontrollable (see plan 4). If necessary, use the washers (S0065) supplied.

Drill 2.5 mm holes in the longitudinal members at the positions shown in detail 14a. Fix the three servos to the longitudinal members and place the assembly on the front structure. Position the longitudinal members at the raised points in the front structure, and check that the axis of the servo output arms coincides exactly with the centreline of the model. Drill 1.8 mm holes in the front structure through the 2.5 mm holes in the longitudinal members. Fix the longitudinal members to the front structure using the 2.2 x 6.5 self-tapping screws (S0042).

Referring to detail 14c on the plan, fix the balls (S3150) and the reinforcements with the short extensions on the output arms of servos 2 and 3, using the M2 x 16 machine screws (S0068). For „**Robbe RS 700**" servos dimension Y is 27 mm.

Fix the balls (S3150) and the reinforcements with the long extensions on the output arms of servos 2 and 3, using the M2 x 18 machine screws (S0098). For „**Robbe RS 700**" servos dimension Y is 32 mm.

If you are using servos of a different make, the spacing of the holes in the servo output arms may differ, which means that dimensions Y may not be as stated above. The dimensions will also vary according to the angular travel of the servos, servo throws in general, and the level of control response you require of the model.

The output arm reinforcements are slotted, to allow you to vary the Y dimensions. It is important that the arm reinforcements are mounted symmetrically on the servo arms, and that the central ball is exactly above the output axis of the servo. Secure the ball with an M2 x 8 machine screw (S0029).

The pushrod linkages are shown in detail 11a on plan 2 and the overall view D on plan 4. Please note the following points:

1. Connect servos 1, 2 and 3 to the receiver. Do not install the receiving system permanently, as its final position can only be ascertained after the model has been balanced. See „Centre of Gravity".
2. Set all the sticks and trim sliders on the transmitter to neutral (centre).

3. With the transmitter and receiver switched on, all the servo output arms should be parallel with the long sides of the servos. In the case of servo 1 this only applies when the collective pitch stick is in the centre position.

Adjust the 105 mm long pushrod (S3466) until all three servos are exactly vertical.

Do not make any adjustments to the mechanical linkages until the servos are exactly vertical.

Follow this procedure for making final adjustments to the linkages to servos 2 and 3: first fit the adjustment jig (channel section) between the top edge of the side panels and the bottom edge of the swashplate, as shown in the overall view C on plan 4.

Press the swashplate onto the adjustment jig. The correct length for the threaded pushrods to the roll servo 2 and the pitch-axis servo 3 is now obvious.

Note: do not attempt to bend the threaded section of the pushrods, as the bent part will then fracture easily.

Fix the main rotor head securely on the main rotor shaft, using the M3 x 23 socket-head screw (S3522) and M3 self-locking nut (S0012). Check that the driver pin on the collective pitch compensator engages in the driver (S3424). Make up the mechanical linkages between the swashplate and the rotor head, and between the collective pitch compensator and the rotor head, as shown in the drawings. The correct basic setting is shown in the overall drawing E on plan 4.

The following general points apply:

A. Servos 1, 2 and 3 vertical
B. Bellcranks vertical / horizontal
C. Swashplate to side panel clearance 15 mm (adjustment jig)
D. Collective pitch compensator horizontal (45 degree offset in direction of rotation)
E. Mixer arm on blade control arm horizontal
F. Stabiliser bar horizontal

The blade control arms should now be inclined slightly upward, and should produce an angle of incidence at the forks of + 2.5 degrees.

The collective pitch range should now be - 4 to + 9 degrees.

The tail rotor control system consists of the two pushrods (S0375) and (S3452). The pushrod (S0375) is supported on the right-hand side panel as shown in detail drawing 11b on plan 2, and the overall view D on plan 4. The support system is based on the pushrod guide (S1243), which is already installed, supplemented by the three guides (S1241). They are fixed to the tail boom (S3313) as shown in the same drawing.

To prevent the guides rotating, each should be secured with one 2.2 x 6.5 self-tapping screw (S0042). Drill a 1.5 mm pilot hole at each screw position before fitting the screws.

When connecting the two tail rotor pushrods it is vital to ensure that the 6 mm long threaded end is screwed completely into the threaded connector (S1242).

When adjusting the tail rotor pushrod note that the control arm (S0384) should be at right-angles to the tail boom when the servo is at centre.

The pitch angle of the tail rotor blades is adjusted by moving the collets (S0292). The total pitch range should be about - 10 degrees to + 25 degrees, from one end-point of the tail rotor servo to the other.

The basic correlation between tail rotor and main rotor pitch is as follows:

Main rotor - 4 degrees = tail rotor 0 degrees
Main rotor 2.5 degrees = tail rotor + 4.5 degrees
Main rotor 7.0 degrees = tail rotor + 9.0 degrees

These figures apply for the Eppler-section tail rotor blades, Order No. S3330, measured using the adjustment jig, Order No. S1366, set parallel to the tail boom.

Completing the main rotor blades

The rotor blades must be finished off by balancing them using the pieces of film supplied. Apply red film to one blade tip and black film to the other, to help you check blade tracking later.

By far the best way of balancing rotor blades accurately is to use the rotor blade balance, Order No. S1367.

If you have to balance the blades without this aid, follow this procedure:

Install the rotor blades, tighten the set screws (S3530) slightly tighter than usual, and set the blades exactly in a straight line and correctly aligned with the rotor head. Turn the complete rotor head over, to the „inverted flight" position, and support the stabiliser bar. The main rotor blades will now hang freely below the stabiliser bar. Apply a piece of film to the lighter blade until the rotor head balances exactly horizontal.

Canopy

With the canopy in place on the model, mark the position of the holesin the spacers (S2138) which are already installed, and drill them 4 mm diameter.
Glue the 2 mm plywood reinforcements over the holes on the inside, and continue the 4 mm holes through them.

Cut a finger hole to provide access to the RC system and the gyro switch. Paint the canopy in the scheme of your choice. Rub down areas to be painted using very fine abrasive paper (1200 grit) beforehand.

Centre of Gravity

Assemble the model completely, place the RC system components in their intended positions, and half-fill the fueltank. When the model is raised by the stabiliser bar, it should hang with the nose inclined slightly forward (nose down by about 2 - 3 degrees).

The RC system is installed on the vacant space on the bottom servo plate. Lay the battery on a thin foam cushion and fix it securely with rubber bands. The receiver should be wrapped in soft foam rubber packing. Secure all leads and wires - don't leave anything dangling. Pass the receiver aerial downward and out to the rear, through the cabin former, and tension it to the skid or the horizontal stabiliser with a thin rubber band. The tail rotor gyro is fixed on the bottom servo plate in front of the fueltank, using double-sided foam tape (servo tape).

Maintenance

The following points on the helicopter should be oiled every 2 or 3 hours of flying time:

1. Swashplate ball on the main rotor shaft
2. Sliding sleeve of the collective pitch compensator hub
3. Tail rotor drive shaft in the tail boom guide sleeves 4. Control rod in the hollow shaft of the tail rotor gearbox housing

We reserve the right to alter technical specifications.

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