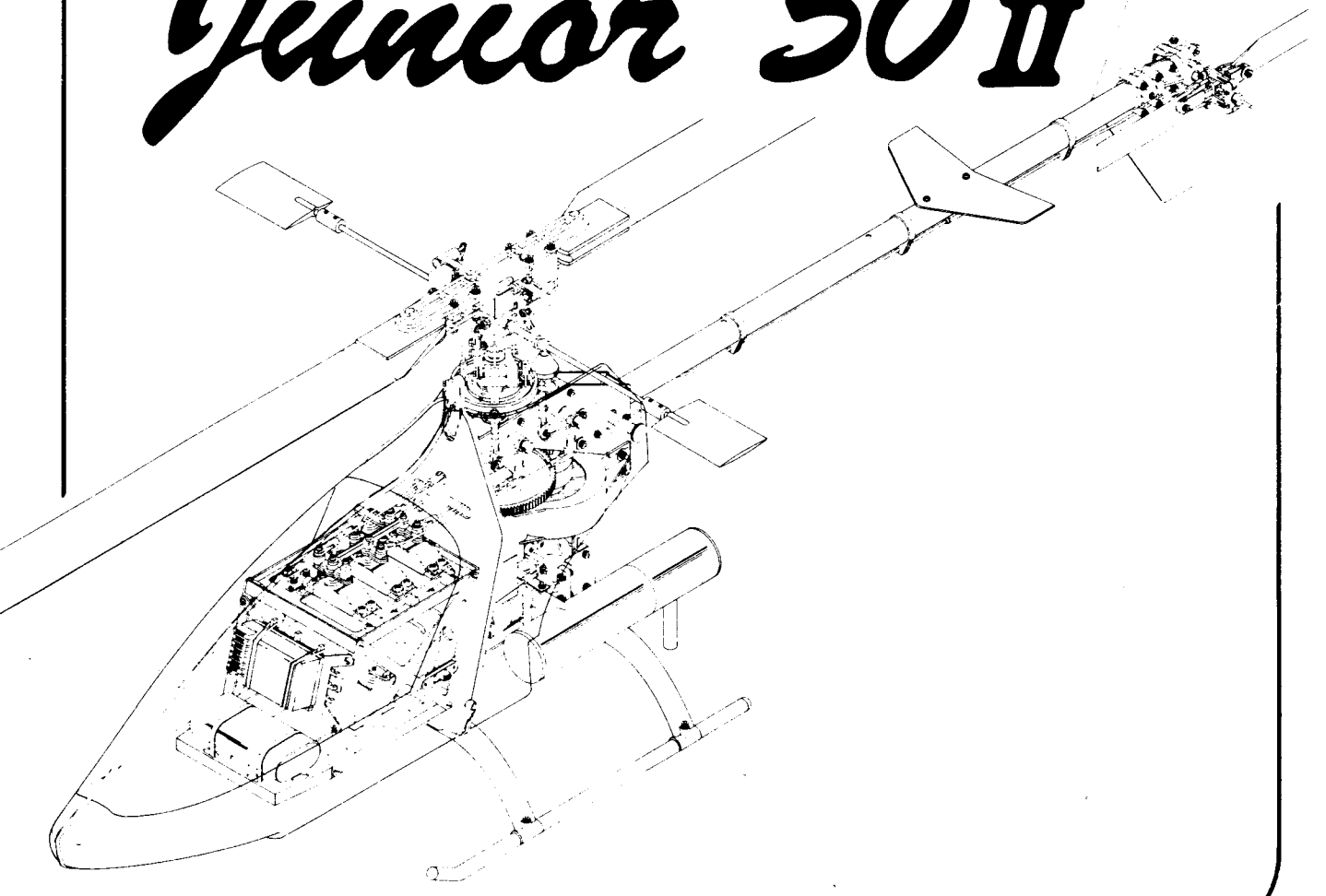
SERVICE-Nr.

Junior 50 II



robbe GmbH Modellsport

Werk Schlüter · Dieselstraße 5 · 6052 Mühlheim am Main · Germany

Telefon-Sammel-Nr. (0 61 08) 62 38 / Telefax: (0 61 08) 7 18 43

Made in Germany

Importé d'Allemagne

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 apply does not include a radio control system, motor or silencer system.

We recommend the silencer, Order No. S0922. To connect it to your motor you will also need an adapter, which should be ordered separately. The Schlueter helicopter catalogue shows the full range available.

The helicopter catalogue also includes a list of matching accessories.

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. Bag 17 contains a selection of spare screws and nuts which are often required.

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.

Stage 1 (Bag 1) - the side panels

Referring to detail 1 on plan 1, first fix the bolts (S3111) and (S3134) to the side panels (S3140) together with the spacers (S3126) and the M3 self-locking nuts (S0012), to form the pivots for the bellcranks which are installed later. Fix the side panels (S3140) to the channel section strips (S3141) using the M3 x 8 socket-head screws (S0030) and self-locking nuts (S0012). Place both side panels on a flat surface before tightening the screws.

Stage 2 (bag 2) - the skid landing gear

The skid landing gear is assembled as shown in detail 2 on plan 1.

First plug the skid bars (S3143) onto the skid tubes (S3144). Press one M3 self-locking nut (S0012) into each skid connector (S3145), with the plastic insert facing out. To aid assembly, press a long 2mm pushrod into the channel in the skid connector, and use it to push the connector along the skid tube until the threads are visible in the hole in the skid bar. Screw in the M3 x 16 socket-head screws (S0031). De-burr the inside of the skid tubes slightly, so that the end plugs fit more easily. Press the end plugs (S3146) into the skid

tubes.

Now fix the complete skid landing gear to the underside of the channel-section strips (S3141), using the M3 x 16 socket-head screws (S0031), washers (S0007) and M3 self-locking nuts (S0012).

Stage 3 (bag 3) - the main rotor shaft assembly

Referring to detail 3a on plan 1, place the ballraces (S1277) in the bearing shells (S3427) and fit the second shell on top to complete the units. Push the threaded sleeves (S3133) into the assembled bearing shells. Fit the completed bearing shells between the side panels (S3140) and secure them with the M3 x 10 socket-head screws (S0039). See overall views A and B. Referring to detail 3b, fix the freewheel (S3455) to the underside of the main gear (S3149) using eight M3 x 10 socket-head screws (S0039) and M3 self-locking nuts. Note that the gear lugs are not equi-distant from the outside edges: the deeper side must face upward.

Working from the top, pass the main rotor shaft (S3454) through the ballrace which is already in place in the chassis. The machined surfaces of the shaft must be at the bottom. Fit the collet (S1275), the shim washer (S1227), the assembled freewheel and the collet (S1275) on the bottom end, and clamp the parts in place using the M3 x 3 socket-head grubscrews (S0041). Note that the grubscrews must engage on the machined surfaces of the main rotor shaft. Fit the collet (S1275) on the top, and secure it in the same way using the M3 x 3 socket-head grubscrews (S0041), checking that the main rotor shaft exhibits no axial play between the ballraces. Once again, check that the grubscrews are located on the machined flats on the main rotor shaft.

Axial play in the freewheel should be about 0.2 mm. Undo the bottom collet (S1275) and re-position it slightly if this is not the case.

Stage 4 (bag 4) - the clutch assembly

Referring to detail 4a on plan 1, place the ballraces (S3315) in the bearing shells (S3132) and fit the second shell on top to complete the units. Push the threaded sleeves (S3133) into the assembled bearing shells. Fit the completed bearing shells between the side panels (S3140) and secure them with the M3 x 10 socket-head screws (S0039). See overall views A and B.
The next stage is to continue with the clutch assembly, as shown in detail 4b on plan 1. Grease the guide sleeve (S3157) for the pre-assembled clutch bell, and fit it onto the starter shaft of the centrifugal clutch (S3156). Working from the underside, push this assembly through the ballraces in the bearing shells, which are already in place, and fit the spacer sleeve (S0185) and the starter cone (S0186) on the top end of the starter shaft. Clamp the starter cone (S0186) in place using the M3 x 5 socket-head grubscrews (S0046). The position of the cone also determines the axial play of the clutch bell. This should be about 0.2 mm, and must be checked when you tighten the grubscrews.

Stage 5 (bag 5) - the fan

The fan (S3178) is fixed on the motor as shown in detail 5a on plan 1. It may be necessary to fit the spacer washer (S0150) supplied (not shown on the plan), depending on the make of motor and carburettor.

Caution: do not forget the washer (S0005). Tighten the crankshaft nut very firmly, using the special spanner (S1344).

Important: the fan (S3178) is bored 6.35 mm diameter, and fits most of today's standard 6.5 - 8 cc model motors. If your motor's shaft diameter is different, you will need to bore out the fan to suit. In the case of many motors, the manufacturing tolerances applied to the nose and threaded section of the crankshaft are not particularly close. As a result you may find that the fan does not run exactly true, and causes vibration. Other airframe components may amplify the effects, and the vibration may be quite serious. For this reason it is essential to check that the fan runs true, and adjust it if necessary.

Checking true running

The easiest method of checking true running is to use a dial gauge. Maximum tolerance should be 5/100 mm at the point marked XI on the plan. To check this, grip the motor lightly in a vice and remove the glowplug. See detail 5c on plan 1.

If you have no dial gauge, you can use the length of wire supplied in the kit. Carefully position the wire at the point to be measured, leaving a gap about 0.2 mm wide. Rotate the fan and check the width of the gap. The fan is running true when you can detect no visible difference in the gap as the fan is rotated.

Correcting out-of-true running

Loosen the crankshaft nut, rotate the fan to a new position, re-tighten the nut, and repeat the check. Mark the crankshaft (hub) and the fan, so that you can try a series of different positions. If this is not sufficient, you will need to drill out the fan about 0.2 to 0.3 mm larger than the crankshaft diameter. Tighten the crankshaft nut lightly, and offset the fan by shifting it slightly to one side or the other.

Tighten the nut further, then measure again. Once you have found the correct position, tighten the nut fully. If you are unlucky this task may take some while, but it is absolutely essential that the fan runs dead true.

Referring to detail 5b on plan 1, screw the motor brackets (S0187), the supports (S0188) and the channel-section strip (S3142) (see detail 1) to both side panels, using four M3 x 16 socket-head screws (S0031) and M3 self-locking nuts (S0012). Do not tighten the screws fully. Fit the guide sleeves (S0204) on the pins of the fan (S3147), and secure the motor to the motor brackets (S0187) using four M3 x 10 socket-head screws (S0039) and M3 self-locking nuts (S0012). Slide the whole motor assembly upward until the guide sleeves engage in the holes in the centrifugal clutch. It is essential to ensure that the starter shaft and the centrifugal clutch are exactly in line on one side, and the flywheel is exactly in line with the motor on the other. Take care not to slide the motor so far upward that the axial play in the starter shaft is lost. Tighten the screws in the motor brackets. If the installation is correct, the clutch bell should rotate freely when you turn the main gear by hand.

Stage 6 (bag 6) - the tail rotor drive system

Referring to detail 6 on plan 1, fit the crown gear (S0191) onto the tail rotor shaft (S0346), and screw in the M3 x 5 socket-head grubscrew (S0046) to the point where it projects slightly into the transverse hole in the tail rotor shaft (S0346). Place the two ballraces (S3315) in one bearing shell (S3316), fit the spacer ring (S0184) on the tail rotor shaft with the crown gear, and pass this assembly through the ballraces. Apply a drop of LOCTITE in the gap between ballrace and tail rotor shaft, to avoid the inner ring of the race rotating on the shaft. Take care not to let any LOCTITE run into the ballrace itself. Place the second bearing shell over the ballraces and push the threaded sleeves (S3133) through the hole in the bearing shells. Fit this assembly between the side panels from the rear, and secure it with four M3 x 10 socket-head screws (S0039) and washers (S0007). Take care here to set the correct clearance between the crown gear (S0191) and the gear on the clutch bell. Gear clearance should be about 0.1 mm. The crown gear must be exactly at right-

angles to the clutch bell gear, and must rotate freely. If you have to adjust gear clearance, it is essential to ensure that you move the whole bracket, and not just the crown gear and tail rotor shaft.

Stage 7 (bag 7) - the fan housing

Referring to detail 7 on plan 2, drill 3.5 mm holes at the outer marked points in the fan housing (S0296). Cut away the housing slightly to provide clearance for the carburettor. Cut the fan housing extension (S3151) to suit your motor, and glue it to the right-hand (wider) half of the fan housing (as seen from the rear, looking forward), using instant glue. Do not glue the left-hand part of the fan housing to the extension.

Note: because of the varying dimensions of different motors the fan housing extension (S3151) must be cut to length individually. Leave about 5 mm clearance between the motor and the extension. Cut the opening for the glowplug, with sufficient clearance for the glowplug clip. The material supplied is sufficient for two extensions.

Stage 8 (bag 8) - the tail boom

The tail boom assembly is shown in detail 8a on plan 1. Fit the tail boom (S3340) between the side panels (S3140), and slide it forward until it ends about 1 mm forward of the bracket (S3316). Fit the clamps (S0389) and the M3 x 30 socket-head screws (S0038), and secure them with the M3 self-locking nuts (S0012).

As shown in the drawing, insert the M3 x 45 studding (S3210) into the upper front hole, and screw the spacers (S1238) to it. The spacers are used to retain the canopy fixing screws.

Fit the driver shaft (S3341) through the guide sleeves (S0343) which are already in place in the tail boom, and pass it forward through the tail rotor shaft (S0346) until it is flush with the crown gear. Now apply a drop of LOCTITE to the M3 x 5 socket-head grubscrew (S0046) which was fitted in Stage 6, and tighten it so that it presses on the machined flat on the driver shaft (S3341).

The horizontal stabiliser (S0287) is fitted as shown in detail 8b on plan 2. Drill the 3.5 mm holes at the marked points beforehand. The stabiliser is fixed in place with the 2.2 x 6.5 self-tapping screws (S0042) and 2 mm washers (S0000).

Stage 9 (bag 9) - the tail rotor gearbox

The tail rotor gearbox housing is assembled next, as shown in detail 9a on plan 2.

Caution: when assembling the tail rotor gearbox it is essential to note that the small bevel gear with 17 teeth (S0347) must be fitted on the shaft which projects forward (S0346). The M3 x 5 socket-head grubscrew (S0046) projects into the transverse hole in the shaft (S0346), and later clamps the driver shaft (S3341). The larger bevel gear with 22 teeth (S0348) is fitted on the hollow shaft (S3319) which faces to one side. If you mix up the bevel gears the result will be extremely high tail rotor speed, and the gearbox will be wrecked. Grease the ballrace cage before fitting the ballraces.

The first step is to fit the small bevel gear with 17 teeth (S0347) onto the tail rotor shaft (S0346), and screw the M3 x 5 socket-head grubscrew (S0046) into the bevel gear (S0347) to the point where it does not quite project into the 2 mm hole in the shaft (S0346). Slip the unshielded ballrace (S3317) and then the single-seal ballrace (S3320) onto the tail rotor shaft, with the seal on the outside. Fit this assembly into the left-hand gearbox housing shell, and push it forward until the bevel gear (S0347) rests against the ballrace (S3317).

Slip the spacer sleeve (S3321), the large bevel gear (S0348) and the single-seal ballrace (S3320) onto the hollow shaft (S3319), with the seal on the outside. Slide this assembly (three parts) back along the hollow shaft (S3313) until the ballrace is flush with the right-hand end of the shaft. The bevel gear (S0348) can now be secured by tightening the M3 x 5 socket-head grubscrew (S0041). Push the ballrace (S3320) along the hollow shaft against the bevel gear (S0348). The ballrace seal must again be on the outside. Apply a drop of LOCTITE in the gap between the ballrace and tail rotor shaft, to prevent the inner ring of the race rotating on the shaft. Take care that no LOCTITE runs into the bearing itself. Now place this assembly in the right-hand gearbox housing shell, join the two shells and screw them together using two M3 x 16 socket-head screws (S0031), M3 self-locking nuts (S0012), two M2 x 8 machine screws (S0029) and two M2 self-locking nuts (S0090).

Seal the gearbox housing at the bottom with two M3.5 x 3 grubscrews (S0017). Do not screw them in too far, otherwise you risk obstructing the gears.

Referring to detail 9b, screw the bolt (S0228) into the attachment lug on the right-hand gearbox housing shell from the underside, and secure it with an M3 self-locking nut (S0012). Lightly oil the pushrod (S0349) and fit it into the hollow shaft. Connect the bellcrank (S0348) to the short end of the pushrod, fit it onto the bolt (S0228), and secure it with the collet (S0057) and M3 x 3 socket-head grubscrew (S0041).

Referring to detail 9c, fix the vertical stabiliser (S3342) to the assembled gearbox housing, using four M3 x 30 socket-head screws (S0028) and M3 self-locking nuts (S0012). Do not over-tighten the screws.

The gearbox housing can now be fitted onto the rear end of the tail boom. Note that the driver shaft (S3341) must fit inside the tail rotor shaft (S80346). Please ensure that the socket-head grubscrew (S0048) is not screwed too far into the tail rotor shaft (S0345). Tighten the M3 x 30 socket-head screws (S0038) to secure the vertical stabiliser and the tail rotor gearbox, checking that the tail rotor is horizontal and the vertical stabiliser is really vertical. Do not over-tighten the socket-head screws, otherwise there is a danger of forcing the gearbox out of shape.

Caution: tighten the socket-head grubscrew (S0046) which secures the driver shaft (S3314) securely, and lock it with LOCTITE. Check carefully that the screw engages on the machined surface of the driver shaft. To check this, rotate the tail rotor slowly, with the clamp screw not quite tight. Slowly tighten the screw, and you will feel when the screw meets the machined flat, as it will be possible to screw it in further by about one complete turn.

Pack both gearbox housing halves with plenty of grease, to ensure adequate lubrication for the bevel gears.

To prevent the tail boom and the tail rotor gearbox housing rotating, fit 2.2 x 6.5 self-tapping screws (S0042) and shakeproof washers (S0091) in the tail rotor gearbox housing and the front tail boom attachment (see details 8a and 10b). Drill 1.5 mm pilot holes beforehand. Do not over-tighten the screws.

Stage 10 (bag 10) - the tail rotor control system

The tail rotor hub and tail rotor blade holders (S0317) are assembled as shown in detail 10a on plan 2.

I = fix the ballrace (S0316) and circlip (S0369) to the tail rotor hub (S0277), using LOCTITE. The machined flange of the circlip (S0369) must face the ballrace, otherwise the ballrace will jam.
II = install the tail rotor blade holders (S0317), using LOCTITE on the screws. Fix the tail rotor blades (S3330) in place using the M3 x 16 socket-head screws (S0031) and M3 self-locking nuts (S0012).

Note: we recommend that you balance the tail rotor in its present state, with the tail rotor blades fitted, using the tail rotor balance shaft, Order No. S1346. Fit the tail rotor on the hollow shaft of the tail rotor gearbox when you are satisfied that balance is absolutely correct.

Assemble the components of the blade pitch control system as shown in details 10a and 10b, and fix the assembly to the pushrod (S0348) using the collets (S0292). The exact position of the components is determined later during the basic setting-up procedure.

Stage 11 (bag 11) - the swashplate / collective pitch compensator

Referring to detail 11a on plan 2, screw the brass balls (S3150) to the bellcranks (S3127), after fitting the bushes (S3532). The balls

are fixed with M2 x 10 (S0020) machine screws and M2 hexagon nuts (S0010). Lock the nuts with LOCTITE. Now fit the bellcranks onto the bolts which are already in place on the chassis, and secure them with the collet (S0057) and socket-head grubscrew (S0041). Check that there is minimal lost motion, and that the bellcranks rotate freely.

Referring to detail 11b on plan 2, fix the brass balls (S3150) to the outer ring of the factory-assembled swashplate, using the M2 x 8 machine screws (S0029), the M2 x 14 socket-head screw (S0074) and M2 hexagon nuts (S0010). Lock the nuts with LOCTITE.

Fix the brass balls (S3150) to the inner ring of the swashplate, using the M2 x 10 machine screws (S0020) and M2 hexagon nuts (S0010). Lock the nuts with LOCTITE.

Lightly grease the swashplate ball (S3453), and place it in the swashplate inner ring (S3435). Add the steel sliding ring (S3441) and tighten the three 2.2 x 8 self-tapping screws (S0099) to the point where it moves freely but with minimum slop.

The collective pitch compensator is assembled as shown in detail 11c on plan 2.

Fix the brass balls (S3150) to the collective pitch compensator arms (S3423), using the M2 x 8 machine screws (S0029) and M2 hexagon nuts (S0010). Lock the nuts with LOCTITE. Fit the bushes into the compensator arms. Screw the prepared collective pitch compensator arms (S3423) to the collective pitch compensator hub (S3460), using the special M3 screws (S3529). Fix the swashplate driver to the collective pitch compensator arms, also using the screws (S3529).

Caution: take great care not to fit the screws (S3529) at an angle. When they are straight, the screws should go in readily and be easy to tighten.

Slip the prepared swashplate and the collective pitch compensator assembly onto the main rotor shaft. Now make up the pushrod connection between the bellcranks and the swashplate (see detail 11a). You can obtain equal pushrod lengths by fitting the spacer sleeves (S3442) as shown. Press the swashplate driver (S3426) onto the brass balls on the swashplate inner ring. Push the threaded sleeve (S3133) into the hole in the swashplate holder (S3428), and fix it in place using the M3 x 10 socket-head screws (S0039) between the side panels (S3140) (see views A/B on plan 1).

Stage 12 (bag 12) - the main rotor head

Referring to detail 12a on plan 3, fit the blade pivot shaft (S3522) through the prepared main rotor hub, and press the O-rings into their seat in the main rotor hub. Fit two shim washers (S1688), two ballraces (S1553) and the buffer washer (S3525) on both ends of the blade pivot shaft (S3523), and temporarily fit the M5 x 16 socket-head screws (S0081) (no LOCTITE), leaving a gap of about 2 mm, but do not tighten them yet.

Referring to detail 12b, fit the blade pivot shells (S3527) onto the pivot assembly, and place the threaded plates (S3526) inside them. Close the units with the second blade holder shells, and secure them with the M3 x 25 socket-head screws (S0037) and the M3 self-locking nuts (S0012). Do not tighten them yet.

Important: check the axial play in the blade pivot units, and if necessary reduce excessive play by fitting 0.1 mm thick shim washers on both ends.

When both blade holders are in place, loosen the socket-head screws (S0081), apply LOCTITE, and tighten them fully.

Fix the blade pitch levers (S3628) loosely to the blade holders, as shown in detail 12c, using the M3 x 10 socket-head screws (S0039) and a little LOCTITE. Pull the blade holders (S3527) outward to help the bearings seat correctly, and immediately tighten the socket-head screws (S0037) in the blade holders and the socket-head screws (S0039) in the blade pitch levers.

Fix the brass balls (S3150) to the mixer arms (S3062), using the M2 x 10 machine screws (S0020) and M2 hexagon nuts (S0010), and also the ball-end bolts (S0434). Lock the nuts with LOCTITE. Mount the prepared mixer levers and bushes (S3532) on the blade pitch levers (S3528), using the screws (S3529) and 3 mm washers (S0007).

Caution: take great care not to fit the screws (S3529) at an angle. When they are straight, the screws should go in readily and be easy to tighten.

Grease the transverse shaft (S1576) which is already in place in the main rotor hub, and push the stabiliser bar (S0545) through. Press the ball-link (S3538) onto the brass ball (S3536), as shown in detail 12c. Fit the washer (S0066), the control arm (S3533), the sleeve (S3534) and the ball (S3535) onto either end of the stabiliser bar. Set the stabiliser bar approximately central, and temporarily fix these parts in place using the collets (S0559) and the M3 x 3 socket-head grubscrews (S0041). Only tighten the screws lightly at this stage.

Screw the M3 x 3 socket-head grubscrews (S0041) into the stabiliser weights (S1587), and slip them onto the stabiliser bar. Screw the control paddles (S3538) on the stabiliser bar. The paddles (S3538) must be set exactly parallel to each other. Check that they face the right way with reference to the direction of rotor rotation. Loosen the collet (S0559), and balance the stabiliser bar accurately by sliding it one way or the other. Tighten the socket-head grubscrews (S0041) in the collets (S0559), and align the control arms

(S3533) exactly parallel to the paddles (S3538). Tighten the M3 x 3 socket-head grubscrews (S0041). Any fine correction required for final balancing can be carried out by sliding the stabiliser weights (S1587).

Note: the requirements in terms of a model helicopter's control response vary widely from pilot to pilot. For this reason the stabiliser weights (S1587) can be moved, and extra stabiliser weights can be added, to alter the response of the rotor head.

By adding extra inertia weights, Order No. S0755, (not included in the kit) the model's inherent stability can be increased further. They are recommended for beginners and for pilots who prefer very smooth, relaxed flying.

Whenever you make any change to the inertia weights it is essential to re-balance the stabiliser bar again.

Referring to detail 12c, fit the driver (S3424) on the assembled main rotor hub (S3520). Press the spacer rings (S1572) into the holes in the driver. The driver is fixed in place using the M3 x 23 screw (S3522), but not until the rotor head is installed on the model.

Stage 13 (fueltank) - the fueltank

The fueltank is assembled as shown in detail 13 and view C on plan 3. Note that the clunk weight should not rest against the rear rounded part of the tank, as it could block the flow of fuel under certain circumstances. The fueltank is not installed in the model until the front structure has been completed.

Stage 14 (bag 14) - the front cabin structure

The next step is to assemble the front cabin structure, as shown in detail 15 and view F on plan 3. To do this, screw the fueltank holder (S3197) to the bottom servo plate, using the 2.9 x 9.5 self-tapping screw (S0044) (see detail 15). Press the angled side parts (S3138) (right and left) into the depressions in the top and bottom servo carriers, and secure them with the 2.9 x 9.5 pan-head screws (S0051).

Carefully round off the edges of the pre-cut cabin bulkhead (S3094 - 2 mm plywood). Apply several coats of fuel-proof paint to the bulkhead.

Fix the prepared cabin bulkhead to the rear of the plastic front structure, using the 3 mm washer (S0007) and the 2.9 x 9.5 self-tapping screw (S0044).

Place the assembled fueltank (detail 13, plan 3) between the side panels (S3140).

Fit the complete front cabin structure between the side panels (S3140) and fix it in place with the M3 x 35 socket-head screw (S0035), the M3 x 30 socket-head screw (S0038) and the M3 self-locking nut (S0012). At the bottom attachment point fit the spacer (S0297) between the side panels.

Stage 15 (bag 15) - the mixer

As shown in detail 14a on plan 4, screw the servo holder underneath the servo mounts for servos 1, 2 and 3. Drill the holes in the servo holders to suit the servo mounting method. For „Robbe RS 700" servos drill 1.8 mm holes and fit the servo mounting screws.

Check carefully that it is impossible for the servos to slide up and out of their rubber grommets, as this would render the model completely uncontrollable (see plan 4). Use the washers supplied (S0065) if in doubt.

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 (S3446) 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) must be 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 spacer tube (S3428) and the pushrod guide (S1243), which is fixed in place using an M2 x 18 machine screw (S0098) and M2 hexagon nut (S0010). Lock the nuts with LOCTITE. The support is supplemented by the three guides (S1241), which are fixed to the tail boom (S3313) as shown in the same drawing, using M2 x 10 machine screws (S0020) and M2 hexagon nuts (S0010). Lock these nuts with LOCTITE.

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.

Stage 16 (bag 16) - completing the main rotor blades

Sand the main rotor blades (S3810) and trim back the doublers slightly if necessary. It is important that the blades are 14 mm thick at the doublers, and that the doubler faces are exactly parallel to each other. Paint both ends of the rotor blades to prevent damp and oil penetration. Cover the main rotor blades with the film supplied, as shown in detail 16 on plan 3.

The rotor blades must be balanced carefully; use the pieces of film supplied. Apply red film to one blade tip and black film to the other, to aid blade identification during subsequent tracking checks.

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

Cut out the two canopy halves, leaving a flange about 5 mm wide on one, and about 10 mm wide on the other. Fit the canopy halves together, fix them with clothes pegs or clamps, then apply instant glue (cyano) to the stepped flange. The glue will run automatically into the joint between the two canopy halves. This is a fast, neat method of joining the canopy.

If you have no cyano-acrylate to hand, you can use PVC adhesive to join the canopy halves.

Now trim back the two canopy halves to the same width of flange, and try the cabin for fit on the model. Glue a strip of cabin material over the seam at the top as a reinforcement. Cut a finger opening for the RC system switch and the gyro switch. As indicated on plan 4, slit the canopy at the bottom (the projecting part), to allow the canopy to be spread apart and fit onto the rear cabin wall.

With the canopy in place on the model, mark the position of the spacers (S1238), and drill them 4 mm diameter. Glue the 2 mm plywood doublers on the inside, and continue the 4 mm holes through them.

The canopy can now be painted in the colour scheme of your choice. Rub down areas to be painted with fine abrasive paper 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 in 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 bulkhead, 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 after 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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Schlüter

Parts list
Junior 50 II

Order No.
S2876

Item No.	Description	No. off
S0000	Washer, 2 mm	8
S0002	Washer, 4.3 mm	2
S0007	Washer, 3.2 mm	24
S0010	Hexagon nut, M2	48
S0011	Hexagon nut, M3	1
S0012	Self-locking nut, M3	37
S0015	Self-locking nut, M4	2
S0017	Grubscrew, 3.5 x 6	8
S0019	Machine screw, M3 x 5	2
S0020	Machine screw, M2 x 10	24
S0029	Machine screw, M2 x 8	12
S0030	Socket-head screw, M3 x 8	11
S0031	Socket-head screw, M3 x 16	15
S0035	Socket-head screw, M3 x 36	6
S0037	Socket-head screw, M3 x 25	9
S0038	Socket-head screw, M3 x 30	9
S0039	Socket-head screw, M3 x 10	40
S0041	Socket-head grubscrew, M3 x 3	26
S0042	Self-tapping screw, 2.2 x 6.5	19
S0044	Self-tapping screw, 2.9 x 9.5	8
S0046	Socket-head grubscrew	7
S0050	Ball-link and ball	1
S0051	Self-tapping screw, 2.2 x 9.5	8
S0057	Collet, 3 mm	5
S0058	Ball-link, without ball	18
S0059	Clevis, M2	7
S0060	Allen key, 1.5 mm	1
S0061	Allen key, 2.5 mm	1
S0064	Allen key, 4 mm	1
S0065	Washer, 2 mm	12
S0068	Machine screw, M2 x 16	4
S0074	Socket-head screw, M2 x 14	1
S0075	Self-tapping screw, 2.2 x 9.5	2
S0079	Socket-head screw, M3 x 5	1
S0081	Socket-head screw, M5 x 16	2
S0090	Self-locking nut, M2	2
S0091	Shake-proof washer, 2.5	2
S0098	Machine screw, M2 x 18	3
S0099	Self-tapping screw, 2.2 x 6	3
S0150	Spacer washer	1
S0181	Spur gear, 12-tooth	1
S0184	Spacer ring	1
S0185	Spacer sleeve	1
S0186	Starter cone	1
S0187	Motor bracket	2
S0188	Motor support	2
S0191	Crown gear	1
S0197	Transverse pin, 2 x 11.8	6
S0204	Guide sleeve	2
S0228	Pivot pin	1
S0277	Tail rotor hub	1
S0283	Tail rotor control bar	2
S0284	Ball-link with bush	2
S0285	Transverse pin, 2 x 7.6	2
S0287	Horizontal stabiliser	1
S0292	Collet, 2 mm, M3 thread	2
S0296	Fan housing	1
S0297	Spacer tube, 20 long	5
S0316	Ballrace, 3 x 10	2
S0317	Tail rotor blade holder	4
S0348	Tail rotor shaft	2
S0347	Bevel gear, 17-tooth	1
S0348	Bevel gear, 22-tooth	1
S0349	Pushrod	1
S0364	Ballrace, 8 x 10 ZZ	2
S0369	Circlip	2
S0375	Pushrod, 590 long	1
S0384	Bellcrank	1
S0389	Tail rotor clamp	4
S0391	Bush, 2 mm	2
S0395	Washer, 2.5 mm	2
S0434	Ball-end bolt, 6 mm	3
S0542	Transverse support	1
S0545	Stabiliser bar	1
S0559	Collet, 4.1 mm, steel	2
S0573	Pushrod, 80 long	1
S1227	Shim washer	1
S1238	Spacer	2
S1241	Tail rotor clip	3
S1242	Pushrod connector	1
S1243	Pushrod guide	2
S1275	Collet, 10 mm	3
S1277	Ballrace, 10 x 19 ZZ	2
S1293	Ball-link, short	4
S1302	Key, 11 x 30	1
S1314	Heavy-duty grease	1
S1344	Key	1
S1552	Ballrace, 8 x 16 ZZ	4
S1556	Rotor blade sleeve	2
S1572	Spacer ring	3
S1576	Transverse shaft	1
S1586	Washer, 8 x 13 x 0.5	4
S1587	Stabiliser weight	2
S3082	Mixer lever	2
S3094	Cabin bulkhead	1
S3095	Ball-joint	2
S3111	Studding	2
S3126	Spacer	2
S3127	Bellcrank	4
S3132	Bearing shell	4
S3133	Threaded sleeve	11
S3134	Studding	2
S3135	Bottom servo plate	1
S3136	Top servo plate	1
S3138	Cross	1
S3140	Side panel	2
S3141	Channel-section strip, 25 mm, eloxided	2
S3142	Channel-section strip, 39 mm, eloxided	1
S3143	Skid bar	2
S3144	Skid tube	2
S3145	Skid connector	4
S3146	End plug	4
S3148	Fueltank	1
S3149	Main gear, 90-tooth	1

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Parts list
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Order No.
S2876

Item No.	Description	No. off
S3150	Ball	28
S3151	Fan housing extension	1
S3156	Centrifugal clutch	1
S3157	Clutch guide	1
S3158	Clutch bell	1
S3159	Clutch lining	1
S3178	Flywheel	1
S3196	Side panel, L.H. & R.H.	1
S3197	Fueltank holder	1
S3210	Studding, M3 x 46	1
S3211	Knurled screw, M4 x 10	2
S3315	Ballrace, 5 x 19 ZZ	4
S3316	Double bearing shell	2
S3317	Ballrace, 5 x 13	1
S3318	Tail rotor gearbox housing, L.H. & R.H.	1
S3319	Hollow shaft	1
S3320	Ballrace, 5 x 13 ZZ	3
S3321	Spacer tube, 6 x 0.45	1
S3330	Tail rotor blade	2
S3340	Tail boom	1
S3341	Driver shaft	1
S3342	Vertical stabiliser	1
S3412	Pushrod, 120 long	1
S3414	Swashplate ballrace	1
S3423	Collective pitch compensation lever	2
S3424	Compensator driver	1
S3425	Pin, 2 x 32	2
S3426	Swashplate driver	2
S3427	Bearing shell	4
S3428	Plastic spacer tube, 8 mm	1
S3429	Swashplate holder	1
S3434	Swashplate outer ring	1
S3435	Swashplate inner ring	1
S3438	Tube, 40 x 1 x 6	1
S3439	Spacer tube	1
S3440	Mixer, 16-part	1
S3441	Steel sliding ring	1
S3442	Plastic spacer tube, 5 mm	6
S3443	Pushrod, M2 x 25	5
S3446	Pushrod, 2 x M2 x 8 x 105	1
S3449	Pushrod, 2 x M2 x 8 x 130	1
S3451	Pushrod, 2 x M2 x 8 x 165	1
S3452	Pushrod, 2 x 6 x 10 x 200	1
S3450	Swashplate ball	1
S3454	Main rotor shaft	1
S3455	Freewheel hub	1
S3456	Freewheel	2
S3457	Brass bush	2
S3460	Compensator hub and sleeve	1
S3478	Pushrod, 2 x M2 x 10 x 170	1
S3507	Shim washer, 8 x 13 x 0.1	4
S3510	Pushrod, M2 x 10	2
S3520	Main rotor hub, steel	1
S3522	Special screw, M3 x 23	1
S3523	Blade pivot shaft	1
S3525	Buffer washer	2
S3526	Threaded plate, M3	4
S3527	Blade holder shell	4
S3528	Blade pitch arm	2
S3529	Special screw, M3 x 27.5	6
S3530	Set screw, 37 long	2
S3532	Bush	22
S3533	Control arm and ball	2
S3534	Sleeve	2
S3535	Ball, 8 mm	2
S3536	Ball-link	2
S3537	Special socket-head screw, M3 x 25	1
S3538	Control paddle, 70 long	2
S3539	O-ring	2
S3540	Pushrod, M2 x 5 / M2 x 10 x 75	2
S3541	Control paddle	2
S3542	Main rotor hub, plastic	1
S3810	Rotor blade set	1
S3823	Canopy	1
S3824	Plan and building instructions	1