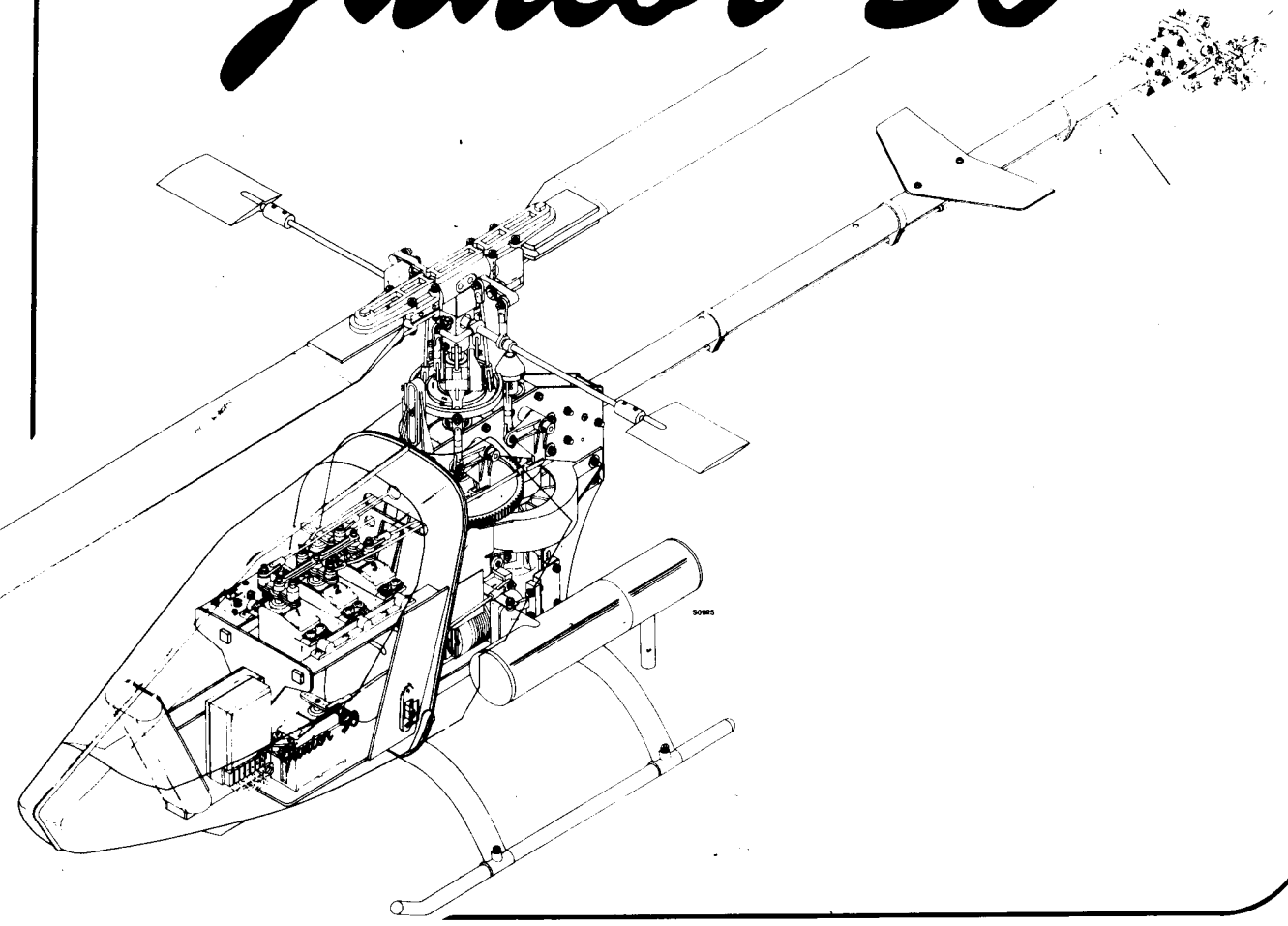
SERVICE-Nr. 72580

Junior 50



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Made in West-Germany

Importé d'Allemagne

Dear customer,

The "Junior 50" is a member of the newly deveLoctiteed "Schlueter System '88". Compared with earlier designs, this system offers one completely new feature: the main rotor control system. Collective pitch control is achieved by raising and lowering the swashplate, while cyclic pitch is controlled by a system of links offset by 45 degrees. The control system is complemented by a newly deveLoctiteed two-bladed main rotor with stabiliser bar (fly bar), itself actuated by a system of links offset by 45 degrees, with pitch compensation and Bell/Hiller mixers.

Cyclic pitch variation of the main rotor blades and stabiliser bar paddles must occur at 90 degrees to the direction of flight, for technical reasons. In this case, however, these control movements are transferred via the swashplate with all the transmission elements offset by 45 degrees. If the main rotor rotates to the right, forward flight is no longer achieved by tilting the swashplate forward, but by 45 degrees to the left and forward. A roll to the right is not achieved by tilting the swashplate to the right by 90 degrees, but by 45 degrees to the right and forward. All control movements are thus shifted forward by 45 degrees in opposition to the direction of rotor rotation.

This kit does not include radio control system, motor and silencer. Please refer to the Schlueter catalogue for recommended radio equipment and motors. We recommend the silencer Order No. S0922 for this model. You will also need a separate adaptor to match the motor you intend using. The Schlueter catalogue includes tables of matching accessories, plus useful helicopter tools, which are available individually and as a complete set in a tool case (Order No. S1370). The rotor blade balance, Order No. S1367, is highly recommended. The following items should be considered essential:

Helicopter adjustment gauge	Order No. S1366
Main rotor adjustment jig	Order No. S1345
Tail rotor balance shaft	Order No. S1346
Ball-link pliers	Order No. S1360

An ideal introduction to the world of model helicopters is "Schlueter's radio-controlled helicopter manual" (Argus Books), written by Ing. Dieter Schlueter. It contains everything worth knowing about model helicopters, and should be considered essential reading by every would-be 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 replacement parts exclusively. The part numbers are printed next to the illustration of the part on the plan. When ordering spare parts, this number must be preceded with an "S"; the prefix is not shown on the plan to avoid confusion.

Bag 17 includes a number of useful replacement screws and nuts.

The building instructions often refer to "LOCTITE" and "instant glue". The symbol "**L** " on the plan indicates where "LOCTITE" is to be used. "LOCTITE" is the fluid supplied in the kit for locking screws and nuts, and also for fixing ballraces on shafts. "Instant glue" is the generic term for the cyano-acrylate adhesives which are produced by many manufacturers. This material sets very quickly, is very versatile, and offers very high strength. **Thread-lock fluid and grease must be used where stated**; they are available under Order Numbers S1341 and S1314.

Stage 1 (bag 1) Assembling the side panels

As shown in detail 1 on plan 1, the first step is to screw the threaded bolts (S3111) and (S3134) and the spacers (S3126) to the side panels (S3140) to form the pivot for the bellcranks, which are installed later. Use the M3 locknuts (S0012).

Join the side panels (S3140) to the channel-section pieces (S3141), using the M3 x 8 socket cap screws (S0030) and M3 locknuts (S0012). Align the side panels on a flat surface before tightening the screws.

Stage 2 (bag 2) Assembling the skid landing gear

The undercarriage is assembled as shown in detail 2 on plan 1.
First plug the skid legs (S3143) into the skid tubes (S3144). Press an M3 locknut (S0012) into each skid connector (S3145) (plastic nut insert on the outside). As an aid to assembly, press a long 2 mm pushrod into the groove in the skid connector, and with its help push the skid connector into the skid tube, until the threads in the hole in the skid leg are visible. Screw in the M3 x 16 socket cap screws (S0031). De-burr the inside of the skid tubes slightly, to make it easier to fit the end plugs. Press the end pads (S3146) into the skid tubes.
Now screw the complete skid landing gear to the underside of the channel-section pieces (S3141) using the M3 x 16 socket cap screws (S0031), the washers (S0007) and the M3 locknuts (S0012).

Stage 3 (bag 3) The main rotor shaft assembly

Please refer to detail 3a on plan 1. Place one ballrace (S1277) in each bearing shell (S3427), and add the second shells. Fit the threaded sleeves (S3133) into the assembled bearing shells. Slide the bearing shells between the side panels (S3140) and fix them in place with the M3 x 10 socket cap screws (S0039). See overall views A and B.

Referring to detail 3b, screw the freewheel (S3455) to the main gear (S3149), using eight M3 x 10 socket cap screws (S0039) and M3 locknuts (S0012). Please note that the screwing flanges of the gear are not the same distance from the outside edges. The deeper side must face up.

The main rotor shaft (S3454) can now be pushed from the top into the ballrace already fitted in the chassis, with the machined flats at the bottom. Fit the collet (S1275), the spacer washer (S1227), the pre-assembled freewheel and the collet (S1275) on the shaft from the bottom, and tighten the M3 x 3 socket-head grubscrews (S0041) to secure them. Check that the grubscrews in the collets engage on the machined flats on the main rotor shaft. Slide the collet (S1275) on the top and tighten the M3 x 3 socket-head grubscrews (S0041) to secure. There must be no axial play between the ballraces on the main rotor shaft. Once again, check that the grubscrews engage on the flats on the main rotor shaft.

The bottom collet (S1275) determines the axial play of the freewheel. It may be necessary to undo and retighten its screws to set the axial play to about 0.2 mm.

Stage 4 (bag 4) Assembling the clutch system

Please refer to detail 4a on plan 1 here. Place the ballraces (S3315) in the bearing shells (S3132) and fit the second shells. Push the threaded sleeves (S3133) into the assembled shells. Fit the completed bearing shells between the side panels (S3140) and secure them with the M3 x 10 socket cap screws (S0039). See overall views A and B. The next step - shown in detail 4b - is to assemble the clutch system. Be sure to grease the roller bearing beforehand, as it is difficult to grease it afterwards. Fit the spacer sleeve (S0184), the shim washer (S0199), the greased roller bearing (S0198), the pre-assembled clutch bell (S0180), the shim washer (S0199) and the spacer sleeve (S0185) on the starter shaft of the centrifugal clutch (S0207). This assembly is then slid into the ballraces of the previously installed bearing shells from the underside, and the spacer sleeve (S0185) and starter cone (S0186) fitted on the starter shaft from the top. The starter cone (S0186) is secured with the M3 x 5 socket-head grubscrews (S0046), and its position determines the play of the clutch bell. The play should be about 0.2 mm, and must be checked when the socket-head grubscrews are tightened.

The clutch bell gear and main gear (S3149) must rotate freely, but without excessive play. It may be necessary to loosen the bearing shells again in order to adjust the amount of play.

Stage 5 (bag 5) Installing the cooling fan

The cooling fan (S3147) is screwed to the motor, as shown in detail 5a on plan 1. Depending on the motor and carburettor in use, it may be necessary to fit the spacer washer (S0150) supplied.

Caution: Do not forget the washer (S0005). Tighten the motor crankshaft nut very securely, using the retaining spanner (S1344).

Important: The fan (S3147) is bored 6.35 mm diameter, and fits most 6.5 - 8 cc model motors in current use. For motors with different shaft diameters the fan will need to be drilled out. Many motors have considerable tolerances in the crankshaft nose and threaded section, and you may find that the fan does not run true. Other rotating parts will amplify the problem leading to serious vibration. For this reason it is essential to check that the fan runs true at this early stage, and adjust it if necessary.

Checking true running: The easiest method of checking is to use a dial gauge. The maximum permissible tolerance is 5/100 mm at the point marked X1. Clamp the motor lightly in a vice and remove the glowplug. See detail 5c on plan 1.

If you do not have access to a dial gauge, true running can be checked using the rod supplied. Set the rod close to the point to be measured, and adjust it until you see a gap about 0.2 mm wide. Rotate the fan and watch the gap; if it does not alter visibly, the fan is running sufficiently true.

Correcting out of true running: Undo the crankshaft nut on the fan, rotate the fan to a new position and tighten the nut again. Mark the crankshaft (hub) and fan, so that you can try a series of positions. If that is not sufficient, the fan will have to be bored out (about 0.2 to 0.3 mm larger than the crankshaft diameter). Tighten the crankshaft nut only lightly, push the fan to one side, and check true running again. Keep shifting the fan until correct running is achieved. Tighten the nut with greater force, check that the setting is still correct, then tighten the nut fully. If you are unlucky, this may be a frustrating task, but it is absolutely essential.

(S3317) onto the tail rotor shaft, followed by the single-shield ballrace (S3320), shield on the outside. This assembly is now placed in the left-hand gearbox shell. Push it forward until the bevel gear (S0347) butts up against the ballrace (S3317).

Fit the spacer tube (S3321), the large bevel gear (S0348) and the single-shield ballrace (S3320) (shield outside) onto the tubular shaft (S3319). The assembly of these three parts is now pushed back on the tubular shaft (S3319) until the ballrace is flush with the shaft on the right-hand side. Tighten the M3 x 3 socket-head grubscrew (S0041) to secure the bevel gear (S0348). Push the ballrace (S3320), shield outside, against the bevel gear (S0348) on the tubular shaft. Apply a little LOCTITE in the gap between ballrace and tail rotor shafts, to avoid the inner ring rotating on the tail rotor shaft. Take care here; no LOCTITE must get into the ballrace. Now place the assembly in the right-hand gearbox housing shell, join the two gearbox shells and secure with two M3 x 16 socket cap screws (S0031), M3 locknuts (S0012), two M2 x 8 machine screws (S0029) and two M2 locknuts (S0090).

Seal the bottom of the assembled gearbox housing with two M3.5 x 3 grubscrews (S0017). Do not screw in the sealing screws too far, otherwise you may jam up the gears.

As shown in detail 9b, screw the threaded bolts (S0228) into the underside of the fixing tongue on the right-hand gearbox housing shell, and secure with an M3 locknut (S0012). Oil the pushrod (S0349) and slide it into the tubular shaft. Fit the bellcrank (S0384) on the short end of the pushrod and the threaded bolt (S0228), and secure it with the collet (S0057) and M3 x 3 socket-head grubscrew (S0041).

Referring to detail 9c, fix the fin (S3342) to the assembled gearbox housing with four M3 x 30 socket cap screws (S0038) and M3 locknuts (S0012). Do not tighten the screws yet.

The assembled gearbox housing can now be fitted onto the tail boom from the rear, at the same time fitting the drive shaft (S3341) into the tail rotor shaft (S0346). Please note that the socket-head grubscrew (S0046) should not be screwed too far into the tail rotor shaft (S0346).

Tighten the M3 x 30 socket cap screws (S0038) which secure the fin and the tail rotor gearbox, checking that the tail rotor is horizontal and the fin vertical. Do not tighten the socket cap screws too firmly, otherwise you may distort the gearbox.

Caution: The socket-head grubscrew (S0046) which secures the drive shaft (S3314) must be tightened firmly, and the screw must engage squarely on the machined flat on the drive shaft. To ensure that this is so, rotate the tail rotor slowly, with the clamping screw slightly loosened. Tighten the screw slowly, and you will feel when the screw meets the flat. At this point it should be possible to tighten the screw by about one further turn.

Fill the gearbox housing about half-full with grease. Over-filling does no harm, but the excess will ooze out of the upper hole.

To prevent the tail boom and tail rotor gearbox from rotating, two 2.2 x 6.5 self-tapping screws (S0042) and two shake-proof washers (S0091) are screwed into the tail rotor gearbox housing and the front tail boom fixing. See details 8a and 10b. Pilot-drill these points 1.5 mm diameter, and do not over-tighten the screws!

Stage 10 (bag 10) Assembling the tail rotor pitch control system

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

I = Screw the ballrace (S0316) and locking washer (S0369) to the tail rotor hub (S0277) (use LOCTITE). The free flange on the locking washer (S0369) must face the ballrace, otherwise the bearing will jam up.

II = Assemble the tail rotor blade holders (S0317). Lock the screws with LOCTITE. The tail rotor blades (S3330) are fixed using the M3 x 16 socket cap screws (S0031) and M3 locknuts (S0012).

Recommendation: We strongly advise balancing the tail rotor / tail rotor blades assembly at this stage, using the tail rotor balance shaft (Order No. S1346). Do not mount the tail rotor on the tail rotor gearbox tubular shaft until it is balanced.

Assemble the parts of the tail rotor pitch control system as shown in details 10a and 10b, and fix the assembly to the pushrod (S0349) using the collets (S0292). The exact position of these parts is determined later during the basic setting-up operation.

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

Referring to detail 11a on plan 2, equip the bellcranks (S3127) with the sleeves (S3532), and screw the brass balls (S3150) to the cranks, using the M2 x 10 machine screws (S0020) and M2 hexagon nuts (S0010). Lock the nuts with LOCTITE. The bellcranks are now mounted on the threaded bolts which are already in place on the chassis, as shown, and secured with the collet (S0057) and socket-head grubscrew (S0041). Check that each bellcrank rotates freely, but without Loctite.

Referring to detail 11b on plan 2, screw the brass balls (S3150) and the spacer tube (S3439) to the outer ring of the already assembled swashplate, using the M2 x 8 machine screws (S0029), the M2 x 14 socket-head screws (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 the M2 hexagon nuts (S0010). Lock the nuts with LOCTITE.

Apply a little grease to the swashplate ball (S3453) and place it in the swashplate inner ring. Place the slide ring made of steel (S3441) on top and tighten the three 2.2 x 8 self-tapping screws (S0099) to the point where it is free-moving but devoid of Loctite.

The collective pitch compensator is now built; see detail 11c on plan 2.Fit the sleeves (S3532) to the collective pitch compensator levers (S3423), using the M2 x 8 machine screws (S0029) and M2 hexagon nuts (S0010). Secure the nuts with LOCTITE. The prepared compensator levers are now screwed to the pre-assembled collective pitch compensator hub (S3460), using the screws (S3529). Fix the swashplate drivers to the compensator levers using the screws (S3529).

CAUTION: Take particular care that the screws (S3529) are driven in straight. Check that the parts remain free to move, but when you tighten the screws.

The prepared swashplate and collective pitch compensator assembly are now slid onto the main rotor shaft. The next step is to make up the pushrod connections beween the bellcranks and the swashplate, as shown in detail 11a. To ensure equal pushrod lengths, fit the spacer sleeves (S3442) between the links. Press the swashplate drivers (S3426) on the brass balls already mounted on the swashplate inner ring. Push the threaded sleeve (S3133) into the hole in the swashplate holder (S3429), and fix it between the side panels (S3140) using the M3 x 10 socket cap screws (S0039). See views A and B on plan 1.

Stage 12 (bag 12) Assembling the main rotor head

As can be seen from detail 12a on plan 3, the blade support shaft (S3523) is passed through the pre-assembled main rotor hub, and the O-rings (S3539) pushed into their recesses in the main rotor hub.

Fit the spacer washer (S1585), ballrace (S1552) and thrust washer (S3525) onto both sides of the blade support shaft (S3523) and screw the M5 x 16 socket cap screws (S0081) temporarily (no LOCTITE at this stage) into the blade support shaft, leaving a gap of 2 mm. Do not apply LOCTITE at this stage, and do not tighten the screws.

As shown in detail 12b, fit the blade holder shells (S3527) onto the bearing assembly and place the threaded plates (S3526) in them. Fit the second blade holder shell to seal the unit, and secure with the M3 x 25 socket cap screws (S0037) and M3 locknuts (S0012).

Important: check the axial play of the blade bearing unit, and if necessary fit a 0.1 mm thick shim washer on both sides to reduce it.

When both blade holders are complete, remove the two socket cap screws (S0081), apply LOCTITE, and tighten them firmly.

Referring to detail 12c, apply a little LOCTITE to the M3 x 10 socket cap screws (S0039), and screw the blade pitch levers (S3528) loosely to the blade holders. Pull the blade holders (S3527) outward, so that the bearings seat correctly, then tighten the blade holder socket cap screws (S0037) and at the same time the blade pitch lever socket cap screws (S0039).

Fix the brass balls (S3150) to the mixer levers (S3531) using the M2 x 12 machine screws (S0028) and M2 hexagon nuts (S0010). Secure the nuts with LOCTITE. Mount the prepared mixer levers and bushes (S3532) on the blade pitch levers (S3528) using the screws (S3529) and the 3 mm washers (S0007).

CAUTION: Take particular care that the screws (S3529) are driven in straight. Check that the parts remain free to move when you tighten the screws.

The transverse shaft (S1576) is already in place in the main rotor hub. Grease the shaft and slide the stabiliser bar (S0545) through. Press the ball link (S3536) onto the brass ball (S3535), as shown in detail 12c. Slide the washer (S0066), the control arm (S3533), the sleeve (S3534) and the ball (S3535) onto both sides of the stabiliser bar. Set the stabiliser bar roughly central and secure the aforementioned parts using the collets (S0559) and the M3 x 3 socket-head grubscrews (S0041), tightening the screws only lightly.

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) to the stabiliser bar. The paddles (S3538) must be set exactly parallel to each other. Check that the paddles are the correct way round relative to the direction of rotor rotation. Undo the collet (S0559), and balance the stabiliser bar precisely by sliding it one way or the other. Tighten the socket-head grubscrews (S0041) in the collets (S0559), align the control arms (S3533) exactly parallel to the control paddles (S3538), and tighten the M3 x 3 socket-head grubscrews (S0041). Any fine correction of balance can be achieved by moving the stabiliser weights (S1587).

Note: No two pilots agree on the "correct" control response in a model helicopter. To allow for variations, the rotor head can be modified by shifting the stabiliser weights (S1587) or by fitting additional weights.

Fitting an extra set of inertia weights, Order No. S0755, (not included in the kit) increases the model's inherent stability further. Recommended for beginners and very calm pilots.

Whenever you make a change to the inertia weights, it is absolutely essential to re-balance the stabiliser bar.

Referring to detail 12c, place the driver (S3424) on the assembled main rotor hub (S3520). Press the spacer washers (S1572) into the corresponding holes in the driver. The driver is secured permanently with the M3 x 23 screw (S3522) when the head is assembled.

Stage 13 (fueltank) Installing the fueltank

Assemble the fueltank as shown in detail 13 on plan 3. It is installed in the model after the front structure has been completed.

Stage 14 (bag 14) Assembling the front cabin structure

Please see detail 15a on plan 3 for details of assembling the central section of the front servo structure. Sand the edges of the wooden parts, and carefully round off the edges of the cabin bulkhead. Use instant glue for all joints, and drill 3 mm diameter holes where marked. When the structure is complete, screw the central section temporarily between the chassis side panels at the front, and check correct alignment.

The longitudinal beams which take the servo mount are glued in place next, but before this the holes for the beams must be sawn out in the cabin rear wall and in the front bulkhead. Before cutting the holes, check the spacing between the beams, which will vary according to the servos you intend using, as shown in detail 15b on plan 3: the dimension is marked X.

Please note:

The **centrepoint** of the output shafts of the servos 1, 2 and 3 must be exactly on the **centreline** of the model, as shown in overall view D on plan 4. As the servo output shafts are usually to one end of the case, the servos must be installed offset to one side. This is the reason for the differences in dimensions A and B, as stated also in the detail drawing 14b.

A full-size drawing is supplied for **"Robbe RS 700"** servos, which shows the correct beam hole spacing, the position for servos 1, 2 and 3, and the apertures and positions of the tail rotor and throttle servos. All you need to do is transfer the dimensions to the wood parts.

If you are using other types of servo, you will need to mark out the beam spacings A and B and the other servo apertures yourself. The crucial point is that the **servo output shaft centres** must be located where shown. If in doubt, you can make up the servo assembly described in Stage 15 beforehand.

As shown in detail 15 on plan 3, slide the rear cabin wall onto the central section (mounted on the chassis) until it rests against the chassis side panels. Fit the 8 x 8 mm servo beams, add the front bulkhead and join the wooden parts using instant glue. In the same way glue in place the base plate (with aperture for throttle servo), the top plates (with aperture for tail rotor servo and optional gyro switch), the right-hand switch plate (with aperture for RC system switch) and the gyro mounting plate.

Apply a fillet of Stabilit Express along all the glued joints for extra rigidity.

Remove the completed front structure and fuel-proof it thoroughly. The assembly can now be fixed permanently between the side panels using the M3 x 30 socket cap screws. Secure the fan housing using the M3 x 35 socket cap screws, but do not overtighten them, as this would damage the wooden parts.

Stage 15 (bag 15) Assembling the mixer

Referring to detail 14a on plan 4, screw the servo holder under the mounts for servos 1, 2 and 3. Drill the holes to match the spacing of the servo mounts. If you are using **"Robbe RS 700"** servos, pilot drill the holes 1.8 mm diameter and secure with self-tapping screws.

It is essential to ensure that the servos cannot spring out of the rubber grommets, as the model would be completely uncontrollable in this state (see plan 4). Use the washers supplied (S0065) if necessary.

Drill the beams 2.5 mm diameter. Fix the servos on the beams, and screw the beams to the front structure using the 2.2 x 9.5 self-tapping screws (S0075). Please observe the 19 mm dimension as shown in overall drawing B, and the position of the servo output shafts.

Screw the reinforcements with the short extension and the balls (S3150) to the output levers of servos 2 and 3, as shown in detail 14c on plan 4, using the M2 x 16 machine screws (S0068). For **Robbe RS 700** servos dimension "Y" should be 27 mm.

Screw the reinforcements with the longer extension and the balls (S3150) to the output arm of the collective pitch servo 1, using the M2 x 18 machine screws (S0098). Dimension "Y" should be 32 mm for **Robbe RS 700** servos.

If you are using servos of a different type, dimensions "Y" may not be as stated above. The dimensions will vary according to the position of the holes in the servo output arms, the servo output arc and the control throws in general (corresponding to the control response you require).

The lever reinforcements are slotted, to allow for differences in the "Y" dimension. The important point is that the reinforcements must be mounted symmetrically on the servo output arms, and the central ball must be exactly above the servo output shaft centrepoint. The ball is fixed using the M2 x 8 machine screw (S0029).

The pushrod connections are shown in detail 11a on plan 2, and the overall drawing D on plan 4. Please follow this procedure:

1. Connect servos 1, 2 and 3 to the receiver. (Do not install the RC system yet, as the correct position can only be determined later when balancing the model. See "Centre of Gravity".)

2. Set all transmitter sticks and trims to neutral.

3. With the transmitter and receiver switched on, all the servo output arms should now be positioned parallel to the long axis of the servos. For servo 1 this applies when the collective pitch stick is central.

4. Adjust the 105 mm pushrod (S3446) until all three servos are exactly vertical.

All the stated pushrod settings should be measured with the servos vertical.

To set up the pushrods for servos 2 and 3 accurately, first slide the channel section jig between the top edge of the side panels and the bottom edge of the swashplate, as shown in overall drawing C on plan 4.

Press the swashplate onto the jig, and the correct thread lengths for the roll servo 2 and pitch-axis servo 3 will be obvious.

Note: Do not bend the threaded section of the pushrods, or they may break.

Secure the main rotor head to the main rotor shaft using the M3 x 23 socket cap screw (S3522) and the M3 locknut (S0012). Make up the pushrod connections from the swashplate to the rotor head and between collective pitch compensator and rotor head as shown. The exact basic adjustment is shown in the overall drawing E on plan 4.

The following general rules should be observed:

A. Servos 1, 2 and 3 vertical
B. Bellcranks vertical/horizontal
C. Swashplate to side panel dimension 16 mm (jig)
D. Collective pitch compensator horizontal (offset in direction of rotation by 45 degrees)
E. Mixer lever on blade pitch lever horizontal
F. Stabiliser bar horizontal

The blade pitch levers should now be angled upward slightly, and the forks of the blade holders should be at an angle of + 2.5 degrees. The collective pitch range is now - 4 to + 9 degrees.

The tail rotor control system comprises the pushrods (S0375) and (S3452). The pushrod (S0375) must be fitted with an extra bush on the right-hand side panel, as shown in the detail drawing on plan 2 and the overall view D on plan 4. This bush consists of a spacer tube (S3428) and pushrod guide (S1243), which is fixed in place with an M2 x 18 machine screw (S0098) and an M2 hexagon nut (S0010). Lock the nut with LOCTITE. The four guides (S1241) serve as further bushes. They are fixed to the tail boom (S3340) with the M2 x 10 machine screws (S0020) and M2 hexagon nuts (S0010), as shown at the same point. Lock these screws also with LOCTITE.

To avoid the guides rotating, fit one 2.2 x 6.5 self-tapping screw (S0042)into each one. You will need to drill a 1.5 mm pilot hole in the tail boom for each screw.

It is vital that the 6 mm long threaded portions of the two tail pushrods are screwed completely into the pushrod connector (S1242).

When setting up the tail rotor pushrods, please check that the control arm (S0384) is at right-angles to the tail boom when the servo is at neutral (centre).

The pitch angle of the tail rotor blades is adjusted by shifting the collets (S0292). The overall range is between about - 10 and + 25 degrees, from one end-point of the tail rotor servo to the other.

You should aim to achieve the following movements, in relation to the main rotor:

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

* If you are using the Eppler section tail rotor blades Order No. S3330, measure with the helicopter adjustment gauge (Order No. S1366) parallel to the tail boom.

Stage 16 (bag 16) Completing the main rotor blades

Rub down the main rotor blades (S3810) and trim the doublers if necessary. It is important that the total thickness of the blades including doublers is 14 mm, and that the doubler faces are parallel. Seal both ends of the rotor blades with paint, to protect against damp and oil absorption. Cover the main rotor blades with the film supplied, as shown in detail 16 on plan 3.

Balance the rotor blades using the pieces of film supplied, and mark one tip red, one tip black, using the film supplied, to aid blade tracking adjustments.

We strongly recommend using the rotor blade balance, Order No. S1367. If you have to balance the blades without the blade balance, please follow this procedure:

Mount the rotor blades on the rotor head, tighten the setscrews (S3530) somewhat tighter than normal, and set the blades exactly in line with each other and the rotor head. Turn the assembly over, i.e. in the "inverted flight" position, and support the stabiliser bar. The main rotor blades will now hang below the stabiliser bar. Add film to the lighter blade until the rotor head balances absolutely horizontal.

Cabin moulding

Cut out the cabin mouldings leaving a 5 mm wide flange, on one side, and a 10 mm on the other as shown in the drawing.Clamp the two mouldings together with clothes pegs and apply instant glue to the projecting ledge thus formed. The instant glue will automatically run right into the joint. This is a quick, reliable method of joining the cabin.
If you do not have any instant glue, use PVC adhesive in the normal way.
Cut down the central flange of the two cabin mouldings to an even thickness, and trim the cabin to fit snugly on the model. Glue a strip of the cabin material over the upper joint area on the inside to reinforce the seam. Cut an access opening for the RC system and the gyro switch (if fitted). The RC system and/or gyro switch are mounted on the left-hand side of the switch plate. As indicated on plan 4, slit the cabin at the bottom (the projecting part). This allows you to spread the moulding apart, and fit it over the rear cabin wall.

Paint the cabin in the scheme of your choice, after rubbing down with fine glass paper.

Centre of Gravity

With the complete radio system installed, half-fill the fueltank and raise the model by the stabiliser bar. The helicopter should balance with the nose inclined down by about 2 - 3 degrees.

The position of the battery has a considerable influence on the Centre of Gravity, and moving it is the main means of correcting the balance point. The rest of the radio control system is installed in the remaining space on the lower servo plate. Wrap the battery in a thin layer of foam, and secure it with strong rubber bands. The receiver must be wrapped in vibration-absorbing material. Make sure that no leads are dangling loose. Route the aerial as directly as possible down and out through the cabin bulkhead, and tension it lightly to the skid and the horizontal stabiliser with thin rubber bands. The tail rotor gyro is mounted in an aperture in the central

front structure, following the manufacturer's recommendations.

Maintenance

After every two or three hours' operation, the following points on the helicopter should be lubricated:

1. Swashplate ball on the main rotor shaft
2. Sliding sleeve on the collective pitch compensator hub
3. Tail rotor drive shaft in the tail boom bushes
4. Pushrod in the tubular shaft of the tail rotor gearbox housing

We reserve the right to amend technical specifications.
robbe-Form 70-2377