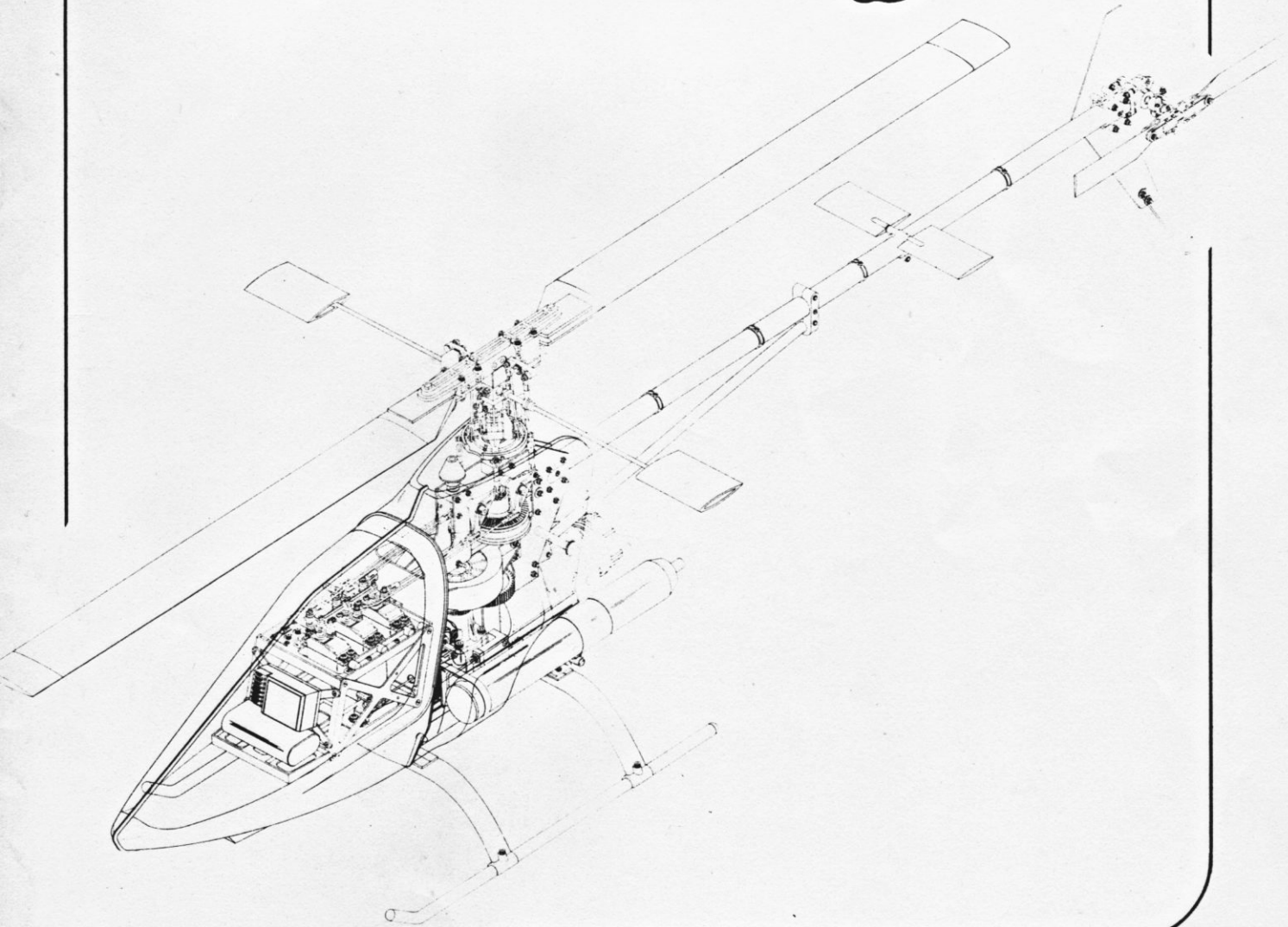




SERVICE - Nr. 81200

# *Magic*



robbe Modellsport GmbH

Werk

**Schlüter**

MODELLBAU

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Made in West-Germany

Importé d'Allemagne

Dear customer,

Your new MAGIC helicopter is fitted with the "Schlueter System '88" rotor head.

This type of rotor head differs from all previous designs in the method of controlling the main rotor. Collective pitch control is achieved by raising and lowering the swashplate, and the cyclic pitch control system is offset by 45 degrees. To complement the new control system, we have also developed a matching two-blade main rotor with flybar and 45 degree offset linkages, incorporating collective pitch compensation and a Bell / Hiller mixer.

Cyclic pitch control of the main rotor and flybar paddles is normally (and necessarily) offset by 90 degrees in the direction of flight. In the new rotor head, however, all the control linkage elements are shifted through 45 degrees for transmission via the swashplate. Assuming a right-hand rotation main rotor, the swashplate is normally inclined forward for forward flight, but in the new design it is inclined 45 degrees left and forward. Rolling the machine to the right normally involves a swashplate inclination of 90 degrees to the right, but in the new design the angle is 45 degrees right and forward. To sum up, all the control transmission elements are shifted forward by 45 degrees, in opposition to the direction of rotor rotation.

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

We recommend purpose-designed helicopter motors, which are fitted with an extended crankshaft with a plain ground surface. The crankshaft diameter should be either 9.5mm or 8mm. The kit contains spacer rings and split taper collets for shafts of these sizes.

As silencer we recommend our item Order No. S0924. You will also need an adaptor matched to your particular motor, which is ordered separately.

The Schlüter catalogue shows many useful tools and jigs which are designed specially for helicopter builders. A complete tool case, Order No. S 1370, is also available. We particularly recommend the rotor blade scales, Order No. S1367. You will need the following items in any case:

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

If you are new to helicopters, we recommend as a basic text the book "Hubschrauber ferngesteuert" ("Radio Controlled Helicopter Manual" in English), written by Ing. Dieter Schlüter. It contains all you need to know on the subject of model helicopters, and should be considered as essential reading by every pilot. The book is available in German under Order No. S9954, and in English under Order No. S9956.

### Replacement parts:

When you need to fit spares, it is essential that you use original replacement parts exclusively. The replacement part numbers are printed on the plan next to each component. When ordering spares, please prefix the stated number with the letter "S". The prefix is not shown on the plan, in the interests of clarity.

Bag 19 in this kit contains a number of replacement screws and nuts which are often needed.

The building instructions often refer to "Loctite" and "instant glue". The abbreviation (L) on the plan indicates where Loctite is to be used. Loctite is the liquid supplied in the kit, which is used to lock screws and nuts, and to locate ballraces on shafts. Instant glue is a cyano-acrylate adhesive which is available from many sources. This glue reacts very quickly, is highly versatile, and produces joints of very high strength.

### Stage 1 (bag 1) Assembling the side panels

As shown in detail 1a on plan 1, the first step is to mount the bolts (S3111) and (S3134) and the spacers (S3126) on the side panels (S3160), to act as pivot for the bellcranks, which are fitted later. Use the M3 locknuts (S0012).

The side panels (S3160) are fixed to the chassis floor (S3104) using the M3 x 8 socket cap screws (S0030) and M3 locknuts (S0012). Place the side panels on a flat surface before tightening the screws.

Press the tail boom sockets (SS3352) into the side panels (S3160). As shown in details 1b and 1c on the same plan, fix the bearing strip (S3162), the spacer sleeve (S3164) and the bearing strip (S3163) in place loosely, using the M4 x 16 countersunk socket head screws (S0032) and M4 locknuts (S0015). Place this assembly on a flat surface, on its side, check alignment carefully, and tighten the screws.

The assembly can now be pushed between the side panels (S3160) and screwed in place using the M3 x 30 socket cap screws (S0038) and M3 locknuts (S0012), as shown in views A + B. The central screw in the bottom bearing strip (S1363) should only be placed in position; it is tightened later.

Fit the rubber sleeve (S3116) in the hole in the fueltank holder (S3161), as shown in view C.

The parts remaining in this bag - the skid bases (S3179), socket cap screws, washers and locknuts, are used for mounting the side panels and the fueltank holder on the skid landing gear. This is done when the skid landing gear has been assembled.

### **Stage 2 (bag 2) Installing the skid landing gear**

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

Drill two extra 3mm holes outboard in the rear skid bar (S3121), using the fueltank holder (S3161) as a template.

First plug the skid bars (S3121) onto the skid tubes (S3124). Press an M3 locknut (S0012) into each of the skid connectors (S3122), with the plastic nut insert facing outward. To install the skid connectors, you may find it useful to press a length of 2mm wire into the groove in the skid connector, and push the connector into the skid tube with the wire, until you see the threads in the skid bar hole. Screw in the M3 x 18 socket cap screws (S0088). De-burr the inside of the skid tubes lightly, to ease the fitting of the sealing plugs. Press the plugs (S3123) into the skid tubes.

Place the skid base (S3179) in the front of the chassis floor (S3104) and fix the complete skid landing gear under the chassis floor, using the M4 x 16 socket cap screw (S0034) and 4mm washer (S0066). Use Loctite on the screw. Slide the fueltank retainer plate (S3161) between the chassis floor (S3104) and the skid bar (S3121) at the rear, place the skid base (S3179) in the chassis floor, and fix it in place with the M4 x 16 socket cap screw (S0034) and the 4mm washer (S0066), again locking the screw with Loctite. The fueltank retainer plate (S3161) is fixed to the outside of the skid bar (S3121) using the M3 x 16 socket cap screws (S0031), the 3mm washers (S0007) and the M3 locknuts (S0012), as shown in detail 1a.

### **Stage 3 (bag 3) Installing the starter shaft and the first gear stage**

As shown in detail 3a on plan 1, pass the toothed shaft (S3171) through the second ballrace in the bearing strip (S3162) from above, press the 52-tooth gear (S3170) on the toothed shaft, as shown, and pass the toothed shaft through the ballrace in the bottom bearing strip (S3163). Fit the M3 x 3 socket head grub screw (S0041) into the 8mm collet (S3187), slip it onto the toothed shaft (S3171) from underneath, and tighten the screw. There should be no free play here. Fix the 52-tooth gear (S3170) on the toothed shaft (S3171) using the M3 x 20 socket cap screw (S0036) and the M3 locknut (S0012).

The starter shaft (S3182) is supplied factory-assembled. Guide it into the plain bearing in the bearing strip (S3162) from the underside, as shown in detail 3b. Fit the 6mm washer (SS0005), the compression spring (S3185) and the 6mm collet (S3186) onto the starter shaft from the top. Now push the pre-assembled bearing bracket (S3165) onto the starter shaft, with the flange of the plain bush facing upward, and fix it to the side panels using the M3 x 30 socket cap screws (S0038) and M3 locknuts (S0012), as shown in view A. Fit the two M3 x 3 socket head grub screws (S0041) into the starter cone (S3106) and fit the cone on the starter shaft. When tightening the first socket head grub screw, you will feel it engage on the machined flat on the starter shaft (S3182) (approximately 10mm gap between starter cone and plain bush flange). Tighten both screws firmly.

It is the pre-set tension in the compression spring (S3185) which causes the starter shaft to disengage after the motor has started. The spring tension must be set so that disengagement is completely reliable. To do this, fit the M3 x 3 socket head grub screw (S0041) into the 6mm collet (S3186), which is already in place, set the tension on the spring, and tighten the grub screw firmly.

Fix the fueltank retainer plate (S3161) to the bearing strip (S3163), using the M3 x 5 socket cap screw (S0079), as shown in B.

### **Stage 4 (bag 4) Installing the main rotor train**

As shown in detail 4 on plan 1, fit the spacer washer (S3169), the 60-tooth plate gear (S3168) and the ring nut (S3475) on the longer side of the factory-assembled freewheel hub (S3472). Fit the bell with the internal gearing (S3167) on the opposite side, apply Loctite to the M3 x 12 countersunk socket head screws (S0071), pass the screws through the full-depth holes in the freewheel hub, and screw all the parts together.

This assembly should now be swung into the chassis from the side, and the shim washer (S1585) fitted between the bearing strip (S3162) and the freewheel hub. Fit the M3 x 3 socket head grub screws (S0041) into the collet (1275), and fit the collet on the freewheel hub. Insert the main rotor shaft (S3470), with the step first, through the collet (S1275), the freewheel hub (S3472) and the shim washer (S1585) and into the ballrace (S1552) from above. Press the main rotor shaft firmly into the bottom ballrace. Locate the machined flat on the main rotor shaft by gently tightening the socket head grub screw in the collet, then tighten both M3 x 3 grub screws (S0041) firmly.

Push the spacer sleeve (S3474) and the pre-assembled bearing bracket (S3471) onto the main rotor shaft from the top, with the ballrace facing downward. Press the bearing bracket (S3471) downward, and fix it to the side panels using two M3 x 30 socket cap screws (S0038) and two M3 locknuts (S0012), as shown in view A. This assembly should rotate freely and without lost motion.

### Stage 5 (bag 5) Installing the tail rotor drive system

The next stage is to install the tail rotor drive system, as shown in detail 5 on plan 1. Pass the tail rotor driven shaft (S3357) through the ballrace (S3320) in the pre-assembled bearing bracket (S3358). Fit the M3 x 3 socket head grubscrew (S0041) into the bevel gear (S3356), then fit the bevel gear onto the tail rotor driven shaft (S3357). Press the bevel gear against the ballrace to eliminate free play, and tighten the socket head grubscrew firmly.

This assembly is now fitted between the side panels, and fixed to them using the two M3 x 30 socket cap screws (S0038), four 3mm washers (S0007) and two M3 locknuts (S0012). See view C here.

**Caution:** The tail rotor drive shaft (S3357) and with it the bevel gear (S3356) must be set exactly at 90 degrees to the main rotor shaft. The two bevel gears should mesh fully, with no slop, but must rotate easily.

Screw the M3 x 3 socket-head grubscrew (S0041) into the tail rotor driven shaft (S3357), but do not tighten it yet. It is used later to secure the tail rotor driving shaft.

### Stage 6 (bag 6) Installing the fan hub

As already mentioned in these instructions, we recommend the use of the purpose-designed helicopter motors for this model; they are fitted with a long, ground crankshaft nose, with crankshaft diameter of 8 or 9.5mm. The kit is supplied with spacer sleeves and split taper collets of 8 and 9.5mm diameter.

Press the spacer sleeves corresponding to the diameter of your motor's crankshaft (S3192 = 8mm, with step facing inward; S3191 = 9.5mm) into the ballraces on both sides of the factory-assembled clutch bell.

Fit one or two shim washers (S1585) or one spacer washer (S3195) (depending on crankshaft diameter) and the prepared clutch bell onto the crankshaft.

**Caution:** It is essential that there is a 0.5mm gap between the motor casing and the gear on the clutch bell.

After checking this spacing, fit the appropriate split taper collet (S3176) or (S3193), push the centrifugal clutch (S3175) onto the collet, and slide the fan (S3177) onto the crankshaft. Please take particular care to ensure that the driver pin (S3194) engages in the hole in the centrifugal clutch. Add the 6mm washer (S0005) and the motor's propeller retainer nut, and tighten it firmly, using the correct size of socket spanner.

After tightening the propeller nut, check once more that the clutch bell can be rotated without rubbing on the motor casing.

### Stage 7 (bag 7) Installing the motor train

As shown in detail 7 on plan 1, fit the intermediate bracket (S3189) between the side panels, and fix the motor mount (S3188) to the intermediate bracket, using the M4 x 20 socket cap screws (S0049), which should be locked with Loctite. Now install the motor assembly in the chassis, apply Loctite to the M4 x 16 socket cap screws (S0034), fit the 4mm washers (S0002) and screw it to the motor mount (S3188).

The whole assembly should now be checked for alignment: it must be parallel to the side panels, and the drive gear on the clutch bell must mesh fully with the 52-tooth gear (S3170). There should be no slop, but it must still rotate freely. Check that the drive pin on the starter shaft (S3182) engages fully in the fan (S3177). When you are satisfied, tighten all the screws firmly.

**CAUTION:** Check carefully that the motor assembly is installed in a perfectly straight line.

The chassis must not be under tension. Check gear meshing after tightening all the screws. The gears must still turn freely, without lost motion.

### Stage 8 (bag 8) Installing the tail boom

The tail boom is fitted as shown in detail 8 on plan 1. Fit the tail boom (S3360) between the tail boom sockets (S3352), with the

cut-out facing upward, to the point where the end of the tail boom is flush with the sockets. The M3 x 30 socket cap screws, which are already in place, can now be tightened fully.

As shown in detail 8a on plan 2, insert the tail boom strut (S3354) into the clamp (S3353), and insert the M3 x 12 socket cap screws (S0073) and the M3 locknuts (S0012), but do not tighten them yet. These parts are now fixed between the side panels (S3160), using the M3 x 30 socket cap screw (S0038) and M3 locknut (S0012). Do not tighten the screws at this point.

The next step, as shown in detail 8b, is to install the support clamps (S3355) with the M3 x 20 (S0036) and M3 x 16 (S0031) socket cap screws, and the M3 locknuts (S0012). Set the support clamps exactly vertical before you tighten the screws. Tighten the screws in the clamp (S3353).

To prevent the support clamps (S3355) rotating, fit a 2.2 x 8 self-tapping screw (S0099) and 2.5mm shakeproof washer (S0091) through one side. Drill a 1.5mm diameter pilot hole in the tail boom before inserting the screw.

Screw the horizontal stabiliser (S3538) to the stabiliser holder (S3373), using the studding (S3335) and a 4mm shakeproof washer (S3339) fitted on one side. Slide the assembled horizontal stabiliser holder onto the tail boom. The horizontal spacing between the end of the side panel and the stabiliser holder should be 470mm. Set the stabiliser exactly horizontal, and fix the holder in place using the M3 x 20 socket cap screw (S0036) and M3 locknut (S0012).

### Stage 9 (bag 9) Installing the tail rotor gearbox

As shown in detail 9a on plan 2, complete the partially assembled sliding sleeve (S3323) by fitting parts (S3329), (S0285), (S0283), and (S3150). Slide this assembly onto the tail rotor shaft (S3322).

The next step is to assemble the tail rotor gearbox housing.

**CAUTION:** When assembling the tail rotor gearbox, please note that the small 17-tooth bevel gear (S0347) must be fitted on the tail rotor shaft which extends from the front (S3363). The M3 x 5 socket head grub screw (S0046) projects into the cross-hole in the tail rotor shaft (S3363) and later clamps the drive shaft (S3362). The larger 22-tooth bevel gear (S0348) is fitted onto the tail rotor shaft which comes out of the side (S3322). If the bevel gears are mixed up, the tail rotor speed will be extremely high, and the result will be the eventual destruction of the gearbox.

As shown in detail 9b, slip the single-shield ballrace (S3320), the plain ballrace (S3317) and the small 17-tooth bevel gear (S0347) (with M3 x 3 socket head grub screw (S0041) fitted) onto the tail rotor shaft (S3363). Lay this assembly in the right-hand gearbox housing shell, press the bevel gear and the tail rotor shaft (S3363) against the ballrace, and tighten the socket head grub screw to secure the tail rotor shaft between the ballraces. It should rotate freely, but with no lost motion. Insert the tail rotor shaft (S3322) with the sliding sleeve already in place through the hole in the left-hand gearbox housing shell.

Push the single-shield ballrace (S3320) (sealed side out), the 22-tooth bevel gear (S0348) (with M3 x 3 socket head grub screw (S0041) fitted), the spacer sleeve (S3321) and the ballrace (S3320) (sealed side out) onto the tail rotor shaft (S3322). Slide these four parts back along the tail rotor shaft (S3322) until the ballrace is located flush with the shaft on the right-hand side. Tighten the socket head grub screw (S0041) in the bevel gear (S0348).

Apply a little Loctite in the gap between the ballrace and the tail rotor shafts, to prevent the inner ring rotating on the tail rotor shaft. Take care that no Loctite gets inside the ballrace.

Now place this assembly in the left-hand gearbox housing shell, join the two shells, and fix them together using two M2 x 8 machine screws (S0029), two M2 x 10 machine screws (S0020) and four M2 locknuts (S0090).

Seal the completed gearbox housing with two M3 x 3 socket head grub screws (S0041), fitted one underneath, one on the side. Do not drive in the sealing screws too far, otherwise you may obstruct the gears. Half-fill the gearbox housing with grease. It does no harm to over-fill, as the excess grease will simply escape from the top hole.

Fit the axial bearing (S3364), the spacer sleeve (S3368) and the ballrace (S3367) onto the pre-assembled blade pivot shaft (S3365), as shown in detail 9c.

**CAUTION:** The axial bearing ring which is larger in both internal and external diameter must be fitted on the blade pivot shaft first, otherwise there is a danger that the blade holders will jam under load.

Fit a 2.7mm washer (S0065) onto the M2.5 x 8 socket cap screw (S3370), apply Loctite to the screw and tighten the screws against each other.

Fit the tail rotor blade connectors (S0280) on the ballraces and secure them with the corresponding screws and nuts, using Loctite to bond them.

As shown in detail 9d, screw the studding (S0229) into the fixing tongue of the left-hand gearbox housing shell from underneath, and secure it with an M3 locknut (S0012). Fit the bushes (S3532) in the bellcrank (S3331), fit the crank onto the studding (S0229), and secure it with a collet (S0057) and M3 x 3 socket head grubscrew (S0041).

Fix the tail rotor blades (S0394) to the tail rotor blade connectors, using the M3 x 16 socket cap screw (S0031) and M3 locknut (S0012). The tail rotor blades must swivel freely, so that they can align themselves automatically when the model is in flight.

### Stage 10 (bag 10) Installing the vertical stabiliser

As shown in detail 10a on plan 2, screw the tailskid (S3333) to the vertical stabiliser (S3371), using the M3 x 8 socket cap screws (S0030), the 3mm washers (S0007) and the M3 locknuts (S0012). The prepared stabiliser can then be screwed to the two tail rotor flanges (S3351), using the four M3 x 35 socket cap screws (S0035) and M3 locknuts (S0012). Do not tighten the screws yet.

Set the vertical stabiliser exactly vertical, hold the tail rotor flange (S3351) flush with the tail boom, and tighten the M3 x 35 socket cap screws firmly.

Slip the driving shaft (S3362) into the tail rotor shaft (S3363) of the already assembled tail rotor gearbox (it should project 807mm out of the tail rotor shaft), and secure it firmly with the M3 x 5 socket head grubscrew (S0046).

**CAUTION:** Please check carefully that this screw engages squarely on the machined flat on the drive shaft. To locate the flat, rotate the tail slowly, with the clamping screw slightly loosened. Tighten the screw slowly, and you will feel when the screw meets the flat. You will be able to screw it in approximately one full turn further.

Apply plenty of grease to the driving shaft (S3362) and slide it into the guide tube (S3361) from the rear. At the same time slide the gearbox housing into the tail boom (S3360). Please be sure to check that the driving shaft engages in the tail rotor driven shaft (S3357).

Fix the gearbox housing to the tail rotor flange (S3351) with the four M3 x 10 socket cap screws (S0039) and the M3 locknuts (S0012), as shown in detail 10b.

Screw the front end of the driving shaft (S3362) to the tail rotor driven shaft (S3357) using the M3 x 3 socket head grubscrew (S0041), which is already in place. Once again, check that the screw engages squarely on the machined flat on the drive shaft.

In order to prevent the tail boom and the tail rotor gearbox housing rotating, screw two 2.2 x 6.5 self-tapping screws (S0042) and two 2.5mm shakeproof washers (S0091) into the tail rotor gearbox housing on one side, and to the front tail boom attachment. See detail 8 and view D. You will need to drill 1.5mm pilot holes in the tail boom at these points. Do not over-tighten the screws.

As shown in detail 10c, screw the four pushrod guides (S1241) to the tail boom, using the M2 x 10 machine screws (S0020) and M2 hexagon nuts (S0010), but do not tighten them at this stage. The 2.2 x 6.5 self-tapping screws (S0042) supplied are not needed until later, when the pushrod guides are tightened.

As shown in detail 10d, align the front pushrod guide (S1243) and the spacer (S3428) perpendicular to the right-hand side panel, and fix them in place with the M2 x 18 machine screw (S0098) and the M2 hexagon nut (S0010). Use Loctite on the screw.

### Stage 11 (bag 11) Installing the swashplate / collective pitch compensator

As shown in detail 11a on plan 2, fit the bushes (S3532) to the bellcranks (S3127), and screw the brass balls (S3150) to them, using the M2 x 10 machine screws (S0020) and M2 hexagon nuts (S0010). Lock the nuts with Loctite. Now fit the bellcranks onto the studding, already in place on the chassis, and secure them with a collet (S0057) and socket-head grubscrew (S0041), as shown in the drawing. Check that the bellcranks can rotate freely, but without lost motion.

As shown in detail 11b on plan 2, screw the brass balls (S3150) and the spacer sleeve (S3439) to the outer ring of the swashplate, which is already in place, using the M2 x 8 machine screws (S0029), the M2 x 14 socket cap screw (S0074) and the M2 hexagon nuts (S0010). Lock all 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. Apply a little grease to the swashplate ball (S3453) and place it in the swashplate inner ring (S3435). Add the steel slide ring (S3441) and tighten the three 2.2 x 8 self-tapping screws (S0099), leaving the assembly free-moving but devoid of slop.

The next step is to install the collective pitch compensator, as shown in detail 11c on plan 2.

Fit the bushes (S3532) on the collective pitch compensator levers (S3423), and fix the brass balls (S3150) to the levers using the

M2 x 8 machine screws (S0029) and M2 hexagon nuts (S0010). Lock the nuts with Loctite. Screw the prepared collective pitch compensator levers (S3423) to the pre-assembled collective pitch compensator hub (S3460) with the screws (S3529). Fix the washplate drivers to the collective pitch compensator levers, using the screws (S3529).

**CAUTION:** Please take great care to check that the screws (S3529) are screwed into the components as stated above. When tightening the screws, check freedom of movement and lost motion.

The prepared swashplate and the collective pitch compensator assembly are now slipped onto the main rotor shaft. Make up the pushrod connection between the bellcranks and the swashplate (see detail 11a). If you fit the spacer sleeves (S3428), you will automatically obtain identical pushrod lengths. Press the swashplate drivers (S3426) onto the brass balls, which are already fixed to the swashplate inner ring.

Slide the threaded sleeve (S3133) into the hole in the swashplate holder (S3429) and fix it between the side panels (S3120) using the M3 x 10 socket cap screws (S0039). See detail 11d on plan 2.

### Stage 12 (fueltank) Installing the fueltank

Detail 12 on plan 2 shows how the fueltank (S1119) is assembled and installed.

First place the edge guard rail (S3113) on the inside of the fueltank holder, mark the exact length, cut it to size, and install it.

Fix the retaining bracket (S3181) to the side panel, using the centre screw on the short bearing strip. Insert the rubber sleeve (S3116). Push the fueltank into the holder to the point where there is a gap about 3mm wide between the front of the tank and the side panels (S3160). As shown on the plan, mark the position of the holes for the fueltank connections and the fixing hole for the retaining bracket (S3181). Withdraw the fueltank from the holder again, and drill the holes where marked. The hole diameter for the tank connections is 5mm, for the fixing screw in the retaining bracket 3mm.

Fit the fueltank in the tank holder again and press the M3 x 12 socket cap screw (S0073) and 3mm washer (S0007) through from the inside of the tank. Fit the 3mm washer (S0007) and the M3 locknut (S0012) on the outside, and tighten the nut. Leave the attachment slightly flexible. To achieve this, tighten the M3 locknut (S0012) until it is flush with the end of the socket cap screw.

Fit an O-ring onto each tank connection, fit them through the hole from the inside, and secure them with washers and nuts. Cut the silicone fuel tubing to length and fit the clunk weight on the end.

**CAUTION:** Check that the clunk weight does not rest against the rear curvature of the fueltank, as it may become jammed there.

Carefully clean out the fueltank and fit the end cap to seal it.

### Stage 13, (bag 13) Glowplug connection

Bag 13 contains all the parts required to make up the remote glowplug connection. The system is shown in detail 13 on plan 2.

Start by passing the socket with the lead soldered to it through the right-hand hole in the fueltank holder (S3161), fit the eye tag on the earth lead (already soldered in place), and screw the socket in place with the nuts supplied. We recommend that the earth lead should be trapped under one of the motor fixing screws, passing the screw through the hole in the tag. Alternatively it could be connected to one of the motor's crankcase screws. For technical reasons it is not possible to supply the crocodile clip soldered to the lead, so the next step is to solder the clip to the remaining lead and clamp the strain relief to it. Fit the crocodile clip to the groove in the glowplug.

The plug supplied can easily be used to make up a suitable connection to the glowplug battery.

### Stage 14 (bag 14) Installing the fan housing

As shown in detail 14a on plan 2, the canopy holder (S1238) is now screwed to the side panels.

To do this, apply Loctite to the studding (S3210) and screw the cabin holder (S1238) onto one end. Hold the spacer sleeve (S0297) between the side panels, push the studding (S3210) through the side panels and the spacer (S0297), apply Loctite again, and screw the second cabin holder to it. Tighten the two cabin holders against each other.

The plastic knurled screws (S3211) are used later to fix the canopy in place.

As is clear from detail 14b, drill the 3.5mm holes in the fan housing (S0296) at the inside marked points, and cut it down by 9mm at the front. Cut back the housing in the carburettor area to provide slight clearance.

Fix the fan housing to the side panels at the rear, using the M3 x 35 socket cap screws (S0035), the 3mm washers (S0007) on both sides, and the M3 locknuts (S0012).

As shown in view E, fix the front end of the fan housing in place with the M3 x 35 socket cap screw (S0035), the two 3mm washers (S0007), the M3 locknut (S0012) and the spacer (S3190), passed through the bottom hole.

The remaining M3 x 35 socket cap screws, washers, locknuts and spacer (S3190) are used to secure the servo structure, which is attached later.

The fan housing extension (S3180) should be cut to suit your motor.

**Note:** Because of the varying dimensions of motors, the fan housing extension (S3180) needs to be trimmed individually to match each power plant. It should be left about 3mm short of the motor itself. Cut the opening for the glowplug, and provide clearance for the glowplug clip.

After trimming the extension, place the unit on one side. It is glued to both sides of the fan housing using instant glue, but not until the servo structure has been installed.

### Stage 15 (bag 15) Assembling the main rotor head

Please refer to detail 15a on plan 3. Pass the blade pivot shaft (S3523) through the pre-assembled main rotor hub, and push the O-rings (S3506) into their seating in the main rotor hub.

Fit the shim washers (S1585), the ballraces (S1552), the axial bearings (S1551), the spacer rings (S3524), the ballraces (S1552) and the washer (S3525) onto both ends of the blade pivot shaft (S3523). Screw the M5 x 16 socket cap screws (S0081) temporarily (i.e. without Loctite) into the blade pivot shaft, leaving about 2mm clearance, but do not tighten them yet.

**CAUTION:** The axial bearing which is larger in both internal and external diameters must be fitted on the blade pivot shaft first, otherwise the blade holder may jam under load.

As shown in detail 15b, fit the blade holder half-shells (S3527) onto the bearing assembly, and place the threaded plates (S3526) inside them. Seal the unit with the second half-shell, and secure the assembly with the M3 x 25 socket cap screws (S0037) and the M3 locknuts (S0012).

**IMPORTANT:** Please check the axial play of the blade bearing housings. If there is obvious play, fit the 0.1mm thick shim washers on both sides to eliminate it.

Once both blade holders are in place, unscrew the two socket cap screws (S0081), apply Loctite to them, and then refit and tighten them firmly. As shown in detail 15c, fix the blade control levers (S3528) to the blade holders, using the M3 x 10 socket cap screws (S0039) and a little Loctite, then pull the blade holders (S3527) outward, so that the bearings can seat correctly. Immediately tighten the socket cap screws (S0037) in the blade holders and the socket cap screws (S0039) in the blade control levers.

Fix the brass balls (S3150) to the mixer levers (S3531), using the M2 x 12 machine screws (S0028) and the M2 hexagon nuts (S0010). Secure the nuts with Loctite. The prepared mixer levers, together with the bushes (S3529), can now be mounted on the blade control levers (S3528), using the screws (S3529) and 3mm washers (S0007).

The transverse shaft (S1576) is already in place in the main rotor hub. Grease the shaft and slide the flybar (S1570) through it. Press the ball-link (S3536) onto the brass ball (S3535), as shown in detail 15c. Fit the washer (S0002), the control arm (S3533), the sleeve (S3534) and the ball (S3535) onto both ends of the flybar, set the bar roughly central, and temporarily fix the aforementioned parts in place using the collets (S0559) with the M3 x 3 socket head grub screws (S0041) fitted.

The control response required of a model helicopter varies very widely from pilot to pilot. For this reason the kit is supplied with two different sets of control paddles. Which of the two sets is used, and whether you fly the model with or without stabiliser weights, is a matter for each individual to decide. The following text describes in detail the installation of the thin control paddles (S1588). The thicker paddles (S3541) have a better profile, and their weight is matched accurately to their profile. The result is outstanding stability coupled with excellent controllability.

Fit the M3 x 3 socket head grub screws (S0041) into the stabiliser weights (S1587), and slide them onto the flybar. Screw the control paddles (S1588) to the flybar. The paddles (S1588) must be exactly parallel to each other. They must also face the right way round, with reference to the direction of rotor rotation. Undo the collet (S0559) and balance the flybar precisely by sliding it one way or the other. Tighten the socket head grub screws (S0041) in the collets (S0559), align the control levers (S3533) exactly parallel to the control paddles (S1588), and tighten the M3 x 3 socket head grub screws (S0041). If you need to make further fine corrections, you can do this by shifting the stabiliser weights.

**Note:** In order to cater for variations in required control response from model helicopter pilots, it is possible to alter the response



of the rotor head in two ways: by shifting the stabiliser weights (S1587), or by reducing the size of the control paddles (S1588). The effects are as follows:

1. With original size control paddles (S1588) and the weights (S1587) right outboard, control response is very good, inherent stability is relatively high and aerobatic qualities optimum. Recommended for experienced and practised pilots.
2. With original size control paddles (S1588) and the weights (S1587) moved further inboard (towards the rotor hub), the model becomes extremely sensitive. Stability is greatly reduced and the model's flying characteristics are unbalanced. This set-up is only recommended for extreme applications. The model may exhibit a tendency to balloon up at high forward speed.
3. Shortening the control paddles (S1588) by about 20mm, all other adjustments as in 1. above: control response is slightly softer, but there is no tendency to balloon up at high speed. Recommended for slightly more docile flying.
4. If extra weights, Order No. S0755, are fitted (not included in the kit), inherent stability is improved further. This is recommended for beginners and very calm pilots.

Whenever any alterations are made to the weights, it is essential to re-balance the flybar.

As shown in detail 15c, set the driver (S3424) on the pre-assembled main rotor hub (S3520), and press the spacer rings (S1572) into the corresponding holes in the driver. These parts are secured permanently using the M3 x 23 screw (S3522) when the head is installed.

### **Stage 16 (bag 16) Front cabin structure**

Please refer here to view G and detail 16 on plan 3 for details of assembling the front cabin structure. Press the inclined side panels (S3137) (R.H. and L.H.) into the recesses in the top and bottom servo bearers, and secure them with the 2.9 x 9.5 raised countersunk head screws (S0051). Screw the cross (S3138) to the front of the front structure using the 2.9 x 9.5 self-tapping screws (S0044).

Cut out and trim the die-stamped cabin former (S3139) (2mm plywood), and round off all the edges carefully. Drill the 3.5mm fixing holes. Apply fuel-proof paint to the cabin former.

The treated cabin former can now be screwed to the plastic front structure, which is already in place, using the 3mm washer (S0007) and 2.9 x 9.5 self-tapping screw (S0044), fitted from the rear.

Slide the completed front cabin structure between the side panels (S3160), and secure it with the M3 x 35 socket cap screws (S0035) and M3 locknuts (S0012). At the lower attachment point the spacer (S3190) has to be fitted between the side panels.

### **Stage 17 (bag 17) Installing the mixer**

As shown in detail 17a on plan 4, screw the servo holders under the servo mounts for servos 1, 2 and 3. Drill fixing holes in the servo holders to match the servo mount. For the "Robbe RS 700" servo: drill 1.8mm pilot holes, and secure with the servo fixing screws.

Please take particular care to ensure that the servos cannot be pulled up out of the rubber grommets, as this would cause the model to become uncontrollable. See detail 17c on plan 4 here. If necessary, use the washers (S0065) supplied.

Fix the output lever reinforcements with the short extensions and the balls (S3150) to the output levers of servos 2 and 3, as shown in detail 17b on plan 4, using the M2 x 16 machine screws (S0068). Use Loctite on the screws. For "Robbe RS 700" servos, dimension Y is 27mm.

Fix the output lever reinforcements with the longer extensions and the balls (S3150) to the output lever of the collective pitch servo 1, using the M2 x 18 machine screws (S0098). Use Loctite on the screws. For "Robbe RS 700" servos dimension Y is 32mm.

If you are using servos of a different make, dimensions Y will differ from the values stated above, depending on the position of the linkage holes in the servo output arms. It will also vary depending on the angular movement of the servos, the control movements in general, and the desired model response.

The output lever reinforcements are slotted, to allow you to vary the Y dimension. The important point is that the reinforcements are mounted symmetrically on the servo output levers, and that the central ball is exactly above the axis of the servo's output shaft. Secure the ball with the M2 x 8 machine screw (S0029), and lock the screw with Loctite.

Drill the 2.5mm holes in the longitudinal bearers at the points shown in detail 17a. Fit the servos and the longitudinal bearers together, and place the assembly on the front servo structure. Set the longitudinal bearers at the raised points on the front servo

structure, and set the servo rotational points exactly on the model's centreline. Drill 1.8mm holes in the front servo structure, drilling through the existing 2.5mm holes in the longitudinal bearers. Fix the longitudinal bearers to the front servo structure, using the 2.2 x 6.5 self-tapping screws (S0042).

The pushrod connections are shown in detail 17d on plan 4, and view H on plan 4. Please note the following points:

1. Connect servos 1, 2 and 3 to the radio control system receiver. (Do not install the rest of the receiving system yet, as the optimum position can only be established when the model is being balanced. See "Centre of Gravity".)
2. Set all transmitter sticks and trim levers to centre.
3. With the transmitter and receiver switched on, all servo output arms should now be parallel to the longitudinal centreline of the servo. For servo 1 this applies when the collective pitch stick is at centre.
4. Adjust the 165mm long pushrod (S3541) until all three servos are exactly vertical.

When adjusting the linkages, please check that all the servos are upright.

In order to set up servos 2 and 3 accurately, first set the adjustment jig (channel section rail) between the top edge of the side panels and the bottom edge of the swashplate. See plan 4, overall view I.

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

**Note:** Do not bend the threaded sections of the pushrods, as they may fracture at that point.

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

**The following general points apply:**

- A. Servos 1, 2 and 3 vertical
- B. Bellcranks vertical / horizontal
- C. Spacing between swashplate and side panels 16mm (using the adjustment jig)
- D. Collective pitch compensator horizontal (offset 45 degrees in direction of rotation)
- E. Mixer lever horizontal at blade control arm
- F. Flybar horizontal

With these basic settings, the blade control arms should now be raised slightly, and should show a pitch angle of +2.5 degrees at the forks of the blade holders.

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

The tail rotor control system consists of the pushrod (S0356) and the pushrod (S3305). The pushrod (S0356) is supported on the right-hand side panel. See detail 10D on plan 2; the parts are already assembled. The four pushrod guides (S1241), which are also already in place (see detail 10C) provide further support. Apply Loctite to the M2 hexagon nuts (S0010), align the pushrod guides carefully, and tighten the machine screws permanently. To avoid the pushrod guides (S1241) rotating, they are each secured with one 2.2 x 6.5 self-tapping screw (S0042) each. Pilot-drill the tail boom using a 1.5mm drill at the appropriate points before fitting the screws.

When linking the two tail rotor pushrods, it is essential to check that the 6mm long threaded ends are screwed entirely into the pushrod connector (S1242).

When setting up the tail rotor linkage, please check that the control arm (S3331) is at right-angles to the tail boom when the servo is at centre. Connect the clevis (S0059) on the pushrod to the centre hole in the servo output lever.

Adjust the tail rotor pitch range from the transmitter, aiming to achieve the following settings relative to the main rotor:

Main rotor 0 degrees = Tail rotor 0 degrees \*  
Main rotor 2.5 degrees = Tail rotor + 5 degrees  
Main rotor 6.5 degrees = Tail rotor +10 degrees

\* Figures apply to Eppler section tail rotor blades (Order No. S0394), measured with the adjustment jig, Order No. S1366, relative to the tail boom centreline.

These settings should only be considered as a starting point. They will inevitably vary according to motor power and revolutions.

**Stage 18 (bag 18) Completing the main rotor blades**

Sand the main rotor blades (S3820) smooth, and trim the root doublers slightly if necessary. It is important that the total thickness over the doublers should be 14mm, and that the faces should be parallel. Paint both ends of the rotor blades to prevent the absorption of damp and oil. Cover the main rotor blades with the film supplied, as shown in detail 18 on plan 3.

The rotor blades must be balanced using the extra pieces of film supplied. Apply red film to one blade tip, black film to the other, to aid blade tracking adjustments.

We recommend the rotor blade scales, Order No. S1367, for balancing the rotor blades.

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

Mount the rotor blades, tighten the set screws (S3530) slightly more firmly than normal, set the blades in an exactly straight line, and align them with the rotor head. Turn the entire rotor head over, to the "inverted flight" position. Now support the flybar. The main rotor blades will then hang freely below the flybar. Apply film to the lighter blade, until the rotor head remains exactly horizontal.

**Canopy**

Cut out the two canopy halves as shown in the drawing, leaving a 5mm wide flange on the one, and a 10mm wide flange on the other. Hold the two halves against each other, align them carefully, and clamp them together. Now run instant glue along the stepped joint formed by the two flanges. The glue will run by itself along the joint line. This is a fast and neat method of joining the canopy halves.

If you have no instant glue to hand, the canopy halves can be joined with a suitable PVC adhesive.

Sand back the flange of the two canopy halves to an even and equal width, and trim the canopy to fit snugly on the model.

Glue a piece of the canopy material to the inside of the topseam, as shown by the dotted line on plan 4. Cut a finger hole for operating the RC system switch and the gyro switch (if fitted). As indicated on plan 4, cut the canopy at the bottom (where it projects forward), in order to allow the canopy to be spread apart and fitted over the rear cabin wall. Place the canopy on the cabin former, and mark the position of the two holes for the rear canopy attachment (S1238) on the outside of the moulding. Two die-stamped cabin reinforcements are supplied on the die-cut plywood sheet. Saw them out and sand the edges smooth. The reinforcements can now be glued to the rear edge of the canopy from the inside, as shown on plan 4. Now drill the holes where just marked right through the canopy material and the reinforcement.

Rub down the canopy where it is to be painted, using 600 grit abrasive paper, and paint it to taste.

**Centre of Gravity**

Raise the model by the flybar, with the fuel tank about half-full, and the model completely equipped. The helicopter should now balance with the nose inclined slightly downward (about 2 or 3 degrees).

The position of the battery influences the balance point, and it can be shifted to correct any discrepancy. The remaining receiving equipment components are fitted where there is space on the bottom servo plate. Make sure that the battery is well secured with rubber bands, and seat it on a thin base of foam rubber. The receiver should be given as much soft padding as possible. Check that no leads are dangling loose. Run the receiver aerial directly down and back, out of the cabin former, and tension it to the skid and the horizontal stabiliser with a thin rubber band. The tail rotor gyro is mounted on the surface of the bottom bearer, following the manufacturer's instructions.

**Maintenance**

After every two or three hours' running, grease or oil all the following points on the model:

Swashplate, main rotor shaft in the area of the collective pitch compensator hub, the tail rotor hub flapping hinges, and the tail rotor shaft where the tail rotor slider is located.

After every five to eight hours' running, grease or oil the bellcranks, the levers at the collective pitch compensator hub and the rotor head mixer levers.

We reserve the right to alter technical specifications

| Order No. | Description                          | No. off<br>in the<br>kit | No. off<br>(Spare<br>parts) | Order No. | Description                        | No. off<br>in the<br>kit | No. off<br>(Spare<br>parts) |
|-----------|--------------------------------------|--------------------------|-----------------------------|-----------|------------------------------------|--------------------------|-----------------------------|
| S0000     | Washer, 2mm                          | 6                        | 20                          | S0356     | Pushrod, 760mm long                | 1                        | 1                           |
| S0002     | Washer, 4mm                          | 6                        | 20                          | S0364     | Ballrace, 3 x 10 ZZ                | 2                        | 1                           |
| S0005     | Washer, 6mm                          | 2                        | 10                          | S0394     | Tail rotor blade                   | 2                        | 2                           |
| S0007     | Washer, 3mm, large                   | 33                       | 20                          | S0434     | Ball-link, 6mm                     | 1                        | 2                           |
| S0010     | Hexagon nut, M2                      | 48                       | 20                          | S0542     | Transverse bearing                 | 1                        | 1                           |
| S0011     | Hexagon nut, M3                      | 1                        | 10                          | S0559     | Collet, 4.1mm, steel               | 2                        | 5                           |
| S0012     | Locknut, M3                          | 73                       | 10                          | S1119     | Fuel tank, 500cc                   | 1                        | 1                           |
| S0015     | Locknut, M4                          | 7                        | 5                           | S1238     | Canopy holder                      | 2                        | 2                           |
| S0019     | Machine screw, M3 x 5                | 2                        | 10                          | S1241     | Tail rotor pushrod guide           | 4                        | 2                           |
| S0020     | Machine screw, M2 x 10               | 27                       | 10                          | S1242     | Pushrod connector                  | 1                        | 1                           |
| S0028     | Machine screw, M2 x 12               | 12                       | 10                          | S1243     | Pushrod guide                      | 2                        | 2                           |
| S0029     | Machine screw, M2 x 8                | 12                       | 10                          | S1275     | Collet, 10mm                       | 1                        | 1                           |
| S0030     | Socket cap screw, M3 x 8             | 11                       | 2                           | S1277     | Ballrace, 10 x 19 ZZ               | 5                        | 1                           |
| S0031     | Socket cap screw, M3 x 15            | 5                        | 10                          | S1293     | Ball-link, short                   | 6                        | 1                           |
| S0032     | Socket cap screw, M4 x 15            | 4                        | 4                           | S1302     | Socket spanner, 11mm               | 1                        | 1                           |
| S0034     | Socket cap screw, M4 x 16            | 6                        | 2                           | S1314     | High-performance grease            | 1                        | 1                           |
| S0035     | Socket cap screw, M3 x 35            | 10                       | 4                           | S1551     | Thrust bearing                     | 2                        | 1                           |
| S0036     | Socket cap screw, M3 x 20            | 3                        | 4                           | S1552     | Ballrace, 8 x 16 ZZ                | 7                        | 1                           |
| S0037     | Socket cap screw, M3 x 25            | 10                       | 4                           | S1556     | Sleeve for rotor blade             | 2                        | 2                           |
| S0038     | Socket cap screw, M3 x 30            | 20                       | 4                           | S1570     | Stabiliser bar (flybar)            | 1                        | 1                           |
| S0039     | Socket cap screw, M3 x 10            | 12                       | 4                           | S1572     | Spacer ring                        | 3                        | 1                           |
| S0041     | Socket head grub screw, M3 x 3       | 29                       | 10                          | S1576     | Transverse shaft                   | 1                        | 1                           |
| S0042     | Self-tapping screw, 2.2 x 6.5        | 20                       | 5                           | S1585     | Washer, 13 x 0.5                   | 5                        | 2                           |
| S0044     | Self-tapping screw, 2.9 x 9.5        | 8                        | 5                           | S1587     | Stabiliser weight                  | 2                        | 2                           |
| S0046     | Socket head grub screw, 3 x 5        | 1                        | 10                          | S1588     | Control paddle, 100mm long         | 2                        | 2                           |
| S0049     | Socket cap screw, M4 x 20            | 4                        | 2                           | S2838     | Remote glowplug connector          | 1                        | 1                           |
| S0050     | Ball-link with ball                  | 1                        | 2                           | S3104     | Chassis floor                      | 1                        | 1                           |
| S0051     | Self-tapping screw, 2.9 x 9.5        | 8                        | 5                           | S3106     | Starter cone                       | 1                        | 1                           |
| S0057     | Collet, 3 mm                         | 5                        | 1                           | S3111     | Bolt                               | 2                        | 1                           |
| S0058     | Ball-link without ball               | 18                       | 2                           | S3113     | Profiled edge guard strip          | 1                        | 1                           |
| S0059     | Clevis, M2                           | 7                        | 2                           | S3116     | Rubber sleeve                      | 2                        | 1                           |
| S0060     | Allen key, 1.5mm                     | 1                        | 1                           | S3121     | Skid bar                           | 2                        | 2                           |
| S0061     | Allen key, 2.5mm                     | 1                        | 1                           | S3122     | Skid connector                     | 4                        | 4                           |
| S0062     | Allen key, 3.0mm                     | 1                        | 1                           | S3123     | End plug                           | 4                        | 4                           |
| S0064     | Allen key, 4.0mm                     | 1                        | 1                           | S3124     | Skid tubing                        | 2                        | 2                           |
| S0065     | Washer, 2.7mm, large                 | 16                       | 10                          | S3126     | Spacer                             | 2                        | 1                           |
| S0066     | Washer, 4.3mm, large                 | 2                        | 10                          | S3127     | Bellcrank                          | 4                        | 1                           |
| S0068     | Machine screw, M2 x 16               | 4                        | 10                          | S3133     | Threaded sleeve                    | 1                        | 2                           |
| S0071     | Countersunk socket head screw, M3x12 | 4                        | 4                           | S3134     | Bolt                               | 2                        | 1                           |
| S0073     | Socket cap screw, M3 x 12            | 3                        | 2                           | S3135     | Bottom servo plate                 | 1                        | 1                           |
| S0074     | Socket cap screw, M2 x 14            | 1                        | 2                           | S3136     | Top servo plate                    | 1                        | 1                           |
| S0079     | Socket cap screw, M3 x 5             | 2                        | 2                           | S3137     | Side panel, 15 degree, L.H. & R.H. | 1                        | 1                           |
| S0081     | Socket cap screw, M5 x 16            | 2                        | 2                           | S3138     | Cross                              | 1                        | 1                           |
| S0088     | Socket cap screw, M3 x 18            | 4                        | 4                           | S3150     | Brass ball                         | 29                       | 10                          |
| S0090     | Locknut, M2                          | 4                        | 5                           | S3139     | Cabin former                       | 1                        | 1                           |
| S0091     | Shakeproof washer, 2.5mm             | 3                        | 10                          | S3160     | Side panel                         | 2                        | 1                           |
| S0097     | Machine screw, M2 x 6                | 1                        | 10                          | S3161     | Fuel tank holder                   | 1                        | 1                           |
| S0098     | Machine screw, M2 x 18               | 3                        | 10                          | S3162     | Bearing strip, long                | 1                        | 1                           |
| S0099     | Self-tapping screw, 2.2 x 8          | 4                        | 5                           | S3163     | Bearing strip, short               | 1                        | 1                           |
| S0197     | Transverse pin, 2 x 11.8             | 6                        | 1                           | S3164     | Spacer                             | 1                        | 1                           |
| S0218     | Clutch lining                        | 1                        | 1                           | S3165     | Bearing bracket                    | 1                        | 1                           |
| S0229     | Bolt                                 | 1                        | 1                           | S3166     | Glycodur bearing                   | 2                        | 1                           |
| S0280     | Tail rotor blade connector           | 4                        | 4                           | S3167     | Internal tooth gear, 50-tooth      | 1                        | 1                           |
| S0283     | Tail rotor control bar               | 2                        | 2                           | S3168     | Plate gear, 60-tooth               | 1                        | 1                           |
| S0285     | Transverse pin, 2 x 7.8              | 2                        | 2                           | S3169     | Spacer washer                      | 1                        | 1                           |
| S0296     | Fan housing                          | 1                        | 1                           | S3170     | Gear, 52-tooth                     | 1                        | 1                           |
| S0297     | Spacer sleeve, 20 long               | 1                        | 2                           | S3171     | Toothed shaft, 10-tooth            | 1                        | 1                           |
| S0347     | Bevel gear, 17-tooth                 | 1                        | 1                           | S3172     | Clutch bell                        | 1                        | 1                           |
| S0348     | Bevel gear, 22-tooth                 | 1                        | 1                           | S3173     | Gear, 26-tooth                     | 1                        | 1                           |
|           |                                      |                          |                             | S3174     | Spacer ring                        | 1                        | 1                           |

| Order No. | Description                              | No. off    | No. off       | Order No. | Description                         | No. off    | No. off       |
|-----------|--|------------|---------------|-----------|-------------------------------------|------------|---------------|
|           |  | In the kit | (Spare parts) |           |                                     | In the kit | (Spare parts) |
| S3175     | Centrifugal clutch                       | 1          | 1             | S3373     | Horizontal stabiliser holder        | 1          | 1             |
| S3176     | Split taper collet, 8mm                  | 1          | 1             | S3414     | Swashplate ballrace                 | 1          | 1             |
| S3177     | Fan                                      | 1          | 1             | S3415     | Pushrod, M2, 100mm long             | 1          | 2             |
| S3179     | Nut for channel section                  | 2          | 2             | S3423     | Collective pitch compensation lever | 2          | 1             |
| S3180     | Fan extension                            | 1          | 1             | S3424     | Compensation lever driver           | 1          | 1             |
| S3181     | Fuel tank retainer bracket               | 1          | 1             | S3425     | Pin, 2 x 32mm                       | 2          | 2             |
| S3182     | Starter shaft with guide ring and pin    | 1          | 1             | S3426     | Swashplate driver                   | 2          | 1             |
| S3185     | Compression spring                       | 1          | 1             | S3428     | Spacer sleeve, 8mm long             | 5          | 2             |
| S3186     | Collet, 6mm                              | 1          | 1             | S3429     | Swashplate holder                   | 1          | 1             |
| S3187     | Collet, 8mm                              | 1          | 1             | S3434     | Swashplate outer ring               | 1          | 1             |
| S3188     | Motor mount                              | 2          | 1             | S3435     | Swashplate inner ring               | 1          | 1             |
| S3189     | Intermediate motor bracket               | 1          | 1             | S3438     | Tube, 40 x 1 x 6                    | 1          | 1             |
| S3190     | Spacer                                   | 2          | 1             | S3439     | Stand-off tube                      | 1          | 1             |
| S3191     | Intermediate ring, 9.5mm                 | 2          | 2             | S3440     | Mixer, 18-part                      | 1          | 1             |
| S3192     | Intermediate ring, 8mm                   | 2          | 2             | S3441     | Sliding ring, steel                 | 1          | 1             |
| S3193     | Split taper collet, 9.5mm                | 1          | 1             | S3442     | Spacer sleeve, 5mm long             | 2          | 2             |
| S3195     | Spacer washer                            | 1          | 1             | S3443     | Pushrod, M2, 25mm long              | 6          | 2             |
| S3210     | Studding, M3 x 45mm                      | 1          | 1             | S3444     | Pushrod, M2, 138mm long             | 1          | 1             |
| S3211     | Knurled screw, M4 x 10                   | 2          | 2             | S3445     | Pushrod, M2, 145mm long             | 1          | 1             |
| S3305     | Pushrod, M2, 300 long                    | 1          | 1             | S3446     | Pushrod, M2, 105mm long             | 1          | 1             |
| S3317     | Ballrace, 5 x 13                         | 1          | 1             | S3447     | Pushrod, M2, 185mm long             | 1          | 1             |
| S3320     | Ballrace, 5 x 13 Z                       | 5          | 1             | S3451     | Pushrod, M2, 165mm long             | 1          | 1             |
| S3321     | Spacer sleeve                            | 1          | 1             | S3453     | Joint ball                          | 1          | 1             |
| S3322     | Tail rotor shaft                         | 1          | 1             | S3456     | Freewheel                           | 2          | 1             |
| S3323     | Sliding sleeve                           | 1          | 1             | S3460     | Compensator hub and sleeve          | 1          | 1             |
| S3324     | Control sleeve                           | 1          | 1             | S3470     | Main rotor shaft                    | 1          | 1             |
| S3325     | Ballrace, 6 x 10 ZZ                      | 2          | 1             | S3471     | Bearing bracket                     | 1          | 1             |
| S3326     | Spacer ring                              | 1          | 1             | S3472     | Freewheel hub                       | 1          | 1             |
| S3327     | Transverse pin, grooved                  | 1          | 1             | S3474     | Spacer sleeve                       | 1          | 1             |
| S3328     | Circlip                                  | 1          | 1             | S3475     | Ring nut                            | 1          | 1             |
| S3329     | Ball link with bearing                   | 2          | 2             | S3506     | O-ring, 7 x 3                       | 2          | 1             |
| S3331     | Bellcrank                                | 1          | 1             | S3507     | Shim washer, 13 x 0.1               | 4          | 2             |
| S3333     | Tailskid wire                            | 1          | 1             | S3510     | Pushrod, M2 x 10mm                  | 2          | 2             |
| S3335     | Studding, M4 x 50mm                      | 1          | 1             | S3520     | Main rotor hub, steel               | 1          | 1             |
| S3339     | Shakeproof washer, 4.3mm                 | 1          | 5             | S3522     | Special screw, M3 x 23              | 1          | 1             |
| S3350     | Tail rotor gearbox housing.<br>R:H:&L.H. | 1          | 1             | S3523     | Blade pivot shaft                   | 1          | 1             |
| S3351     | Tail rotor flange                        | 2          | 2             | S3524     | Spacer ring                         | 2          | 1             |
| S3352     | Tail boom socket                         | 2          | 2             | S3525     | Washer                              | 2          | 2             |
| S3353     | Clamp                                    | 1          | 1             | S3526     | Threaded plate, M3                  | 4          | 2             |
| S3354     | Tail boom strut                          | 1          | 1             | S3527     | Blade holder half-shell             | 4          | 2             |
| S3355     | Support clamps                           | 2          | 2             | S3528     | Blade control lever                 | 2          | 1             |
| S3356     | Bevel gear, 15-tooth                     | 1          | 1             | S3529     | Special screw, M3 x 27.5            | 6          | 1             |
| S3357     | Tail rotor driven shaft                  | 1          | 1             | S3530     | Set screw, 37 long                  | 2          | 2             |
| S3358     | Bearing bracket, eloxided                | 1          | 1             | S3531     | Mixer lever                         | 2          | 1             |
| S3359     | Guide sleeve, 3mm                        | 5          | 2             | S3532     | Bush                                | 22         | 2             |
| S3360     | Tail boom                                | 1          | 1             | S3533     | Control arm with ball               | 2          | 1             |
| S3361     | Guide tube, 750mm long                   | 1          | 1             | S3534     | Sleeve                              | 2          | 1             |
| S3362     | Tail rotor driving shaft,<br>625 mm long | 1          | 1             | S3535     | Ball, 8mm                           | 2          | 1             |
| S3363     | Tail rotor shaft                         | 1          | 1             | S3536     | Ball link for 8mm                   | 2          | 2             |
| S3364     | Axial bearing, 4mm                       | 2          | 1             | S3537     | Special screw, M3 x 26              | 1          | 1             |
| S3365     | Tail rotor blade pivot shaft             | 1          | 1             | S3538     | Control paddle, 70 long             | 2          | 2             |
| S3366     | Circlip                                  | 2          | 2             | S3540     | Pushrod, M2, 75 long                | 2          | 1             |
| S3367     | Ballrace, 4 x 10 ZZ                      | 2          | 1             | S3541     | Control paddle                      | 2          | 2             |
| S3368     | Spacer sleeve                            | 2          | 2             | S3542     | Main rotor hub, plastic             | 1          | 1             |
| S3370     | Socket cap screw, M2.5 x 8               | 2          | 2             | S3817     | Plan and instructions               | 1          | 1             |
| S3371     | Vertical stabiliser                      | 1          | 1             | S3819     | Trim film                           | 1          | 1             |
|           |  |            |               | S3820     | Main rotor blade                    | 2          | 2             |
|           |  |            |               | S3821     | Canopy                              | 1          | 1             |

**robbe**

**Model Sport, Inc.**

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FAX (201) 359-1415



**Schluter**  
**RC-Helicopter**

RECOMMENDED TOOLS AND ACCESSORIES

|            |  |          |
|------------|--|----------|
| S1366      | Schluter Pitch Gauge .....   | \$24.95  |
|            | Sets the pitch in main rotor, tail rotor and paddles accurately.     |          |
| S1345      | Fly-Bar Lock.....  | \$ 8.95  |
|            | Locks the fly-bar to enable an accurate setting of main rotor pitch. |          |
| S4191      | Super Starter 120 - Electric Starter.....                            | \$99.95  |
|            | Produces a high torque starting action.                              |          |
| S4190      | Super Starter 60 - Electric Starter.....                             | \$79.95  |
|            | Electric starter for all Schluter mechanics.                         |          |
| S4190/1000 | Starter Extention.....   | \$11.95  |
|            | Extends the starter cone in order to clear the rotor head.           |          |
| S0747      | Starter Extension.....   | \$ 9.95  |
|            | Fits into existing starter cone.                                     |          |
| S1341      | Blue Loctite.....  | \$ 7.95  |
|            | Locks and seals all nuts, bolts, screws and fittings.                |          |
| S1360      | Ball Link Pliers.....  | \$ 7.50  |
|            | Removes the plastic ball with no damage to links or ball.            |          |
| S1346      | Tail Rotor Balancer.....   | \$ 7.95  |
|            | Balances tail rotor assemblies.                                      |          |
| S1347      | Assembly Tray.....   | \$12.95  |
|            | The tray will stop unwanted loss of small parts when building.       |          |
| S1370      | Schluter Tool Kit.....   | \$129.95 |
|            | Contains all tools and gauges for building and maintenance.          |          |
| S1368      | Fly-bar Paddle Guage.....  | \$22.95  |
|            | For easy alignment of fly-bar paddles.                               |          |
| S1367      | Rotor Elade Balancer.....  | \$54.95  |
|            | This is a simple way of balancing main rotor blades one by one.      |          |

TRAINING AIDS

|       |  |         |
|-------|--|---------|
| S0779 | Float Set 60 size.....   | \$39.95 |
|       | Softens hard landings and enables flights off of water.            |         |
| S0780 | Float Set 50 size.....   | \$39.95 |
|       | Same as S0779 except for 50 size helicopters.                      |         |
| S2708 | Heli-Trainer Training Table.....                                   | \$89.50 |
|       | Allows all movements of helicopter while harnessed to stand.       |         |
| S0755 | Universal Adjustable Flybar Weights.....                           | \$19.90 |
|       | Increases stability by dampening cyclic inputs.                    |         |
| S9900 | Mike Mas Mini Ecy Tape.....  | \$29.99 |
|       | Explains the set up and building of the Mini Boy.                  |         |
| S9956 | Schluter Helicopter Manual by Dieter Schluter.....                 | \$22.95 |
|       | Leads you through starting to build and fly model helicopters.     |         |
| S9960 | Mike Mas Champion/Scout Tape.....                                  | \$29.99 |
|       | Learning all about helicopters. About set up, flying and building. |         |
| S9970 | Mike Mas "Magnificent Men".....                                    | \$21.99 |
|       | A funny look at flying and crashing model helicopters.             |         |
| S9089 | Schluter Cup Hat.....  | \$ 2.99 |
|       | A black hat with the yellow Schluter logo.                         |         |

# ← robbe Information

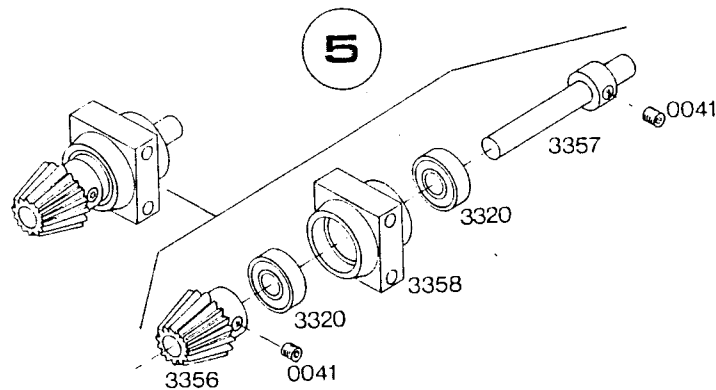
## ATTENTION

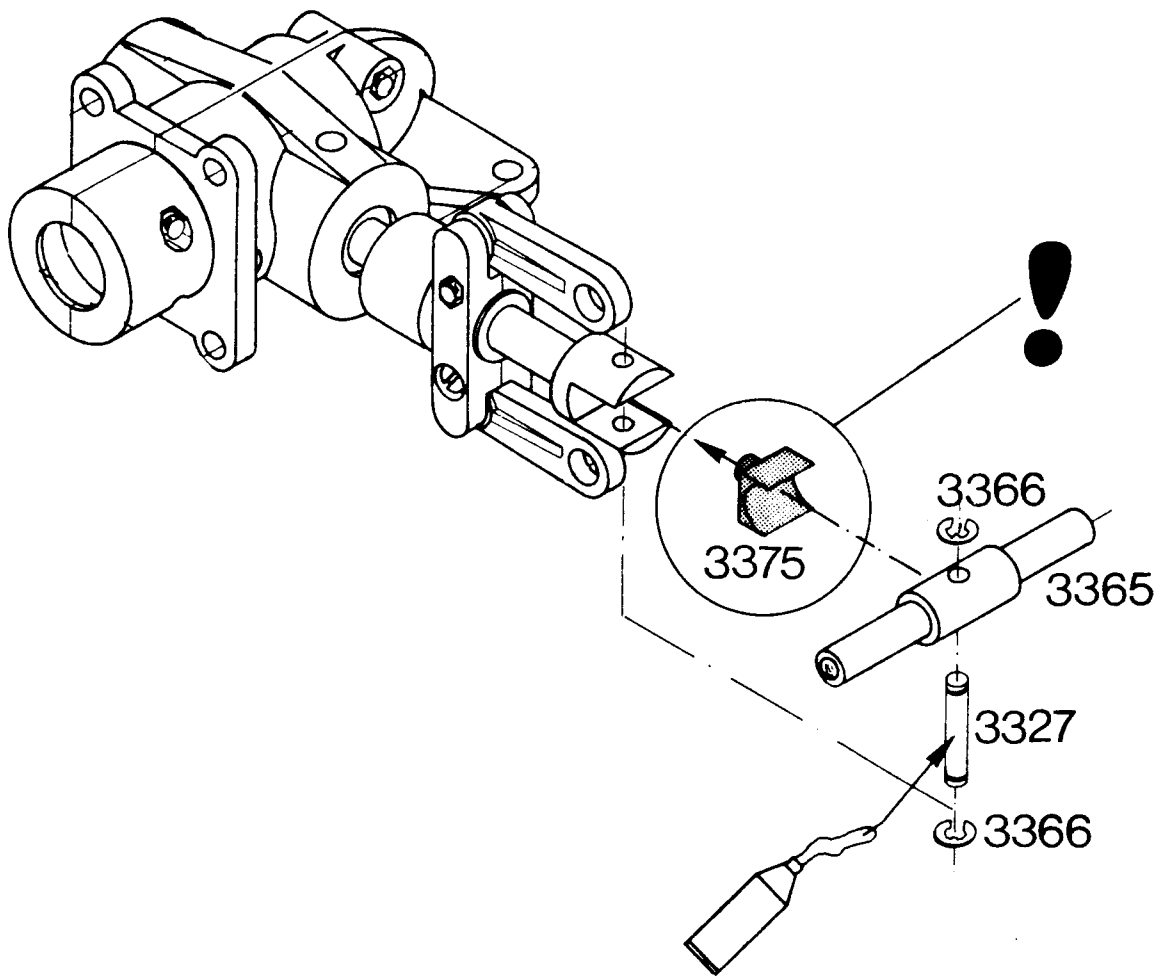
THE BEARINGS (S3320) IN THE BEARING BLOCK (S3358) IN STEP #5 HAVE NOT BEEN LUBRICATED AT THE FACTORY. IT IS VERY IMPORTANT TO LUBRICATE BEFORE INSERTING SHAFT (S3357) OR FAILURE OF THE BEARING WILL OCCUR. BE SURE TO LOCTITE THE THE SHAFT (S3357) TO THE BEARINGS (S3320). IT IS ALSO IMPORTANT TO REMOVE THE ANODIZED COATING FROM THE SIDES OF THIS BEARING BLOCK WITH A MEDIUM GRIT SANDPAPER.

### RECOMMENDED LUBRICATION:

S1314- BOSCH BEARING GREASE

R5532- TEFLON IMPREGNATED GREASE





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robbe Modellsport GmbH

---

Werk \_\_\_\_\_

**Schlüter**

MODELLBAU

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