

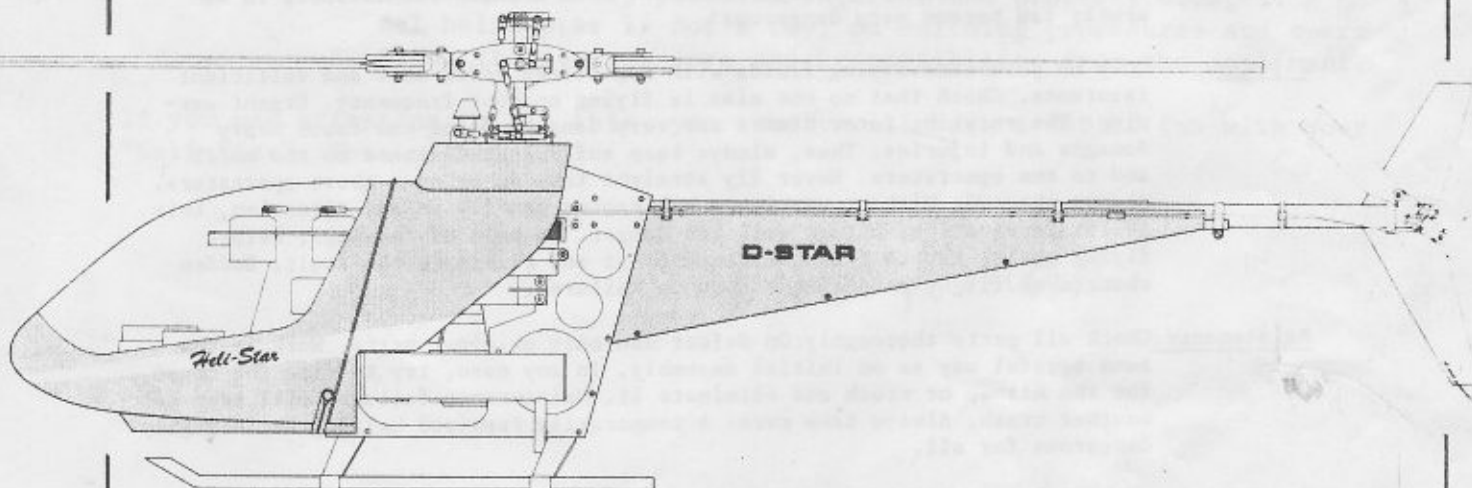


SERVICE - NO. 47214

Building-instructions

Heli-Star

ORDER NO. 2850



Building-instructions and plan order -No.1297

HUBSCHRAUBER

Schlüter

MODELLBAU

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Safety of Modelhelicopters

A remote controlled model helicopter is something fascinating, but in no case an easy-to-handle toy.

A remote controlled helicopter is a technically and from the point of flying a very fastidious aircraft and for this reason, should only be assembled and operated by cautious, responsible and possibly experienced model builders.

Helicopter experience will be gained on studying special literature and reading the concerning articles in model magazines. Helicopter manufacturers as well offer efficient literature and the corresponding building instructions in the kits. Furthermore, there are training seminars and all sort of meetings of helicopter friends and naturally various competitions on schedule. For more details about these events refer to your local model magazine or the next R/C helicopter club. It's advantageous to attend these events, to get advice and watch how other modelers cope with their craft. At this stage a warning: take care of advice from model fliers, who principally boost around to know more about the model than the manufacturer and scatter the recommendation that only by this or other "improvements" one gets the model really flying. On the whole, those alterations do not prove advantageous. But in any case, modifications result in a falsification of the features intended by the designer and manufacturer, thus single information, technical data, setting rates etc. of the building instructions will be of no use. Certainly, you do not intend this, therefore, please observe the following instructions:

Assembly: Adhere to all details of the building instructions. Assemble carefully and deliberately, use only original parts, execute no alterations. This also applies for single screws. Secure all attachments against loosening. Install the R/C unit carefully, mount servos in a soft suspended way, so they do not touch any surroundings. Execute balancing procedures carefully to avoid vibration. Always remember: even a small carelessness in assembly can become very dangerous!

Flying: Only on permitted flying fields with registered radio unit and sufficient insurance. Check that no one else is flying on your frequency. Urgent warning: The rotating rotor blades are very dangerous and can cause heavy damages and injuries. Thus, always keep sufficient distance to the model and to the spectators. Never fly straight towards or even above spectators. Always observe: Without warning a helicopter can fly in any direction, this is its fascination, but as well its danger. In case of mishaps, before flying again, try to find the cause of it and eliminate the fault. Sudden changes of flight performance show up failures.

Maintenance: Check all parts thoroughly. On defect use only original parts. Work in the same careful way as on initial assembly. In any case, try to find the cause for the mishap or crash and eliminate it. Maintenance failures will lead to another crash. Always take care: A temporarily repaired helicopter is highly dangerous for all.

Responsible adherence to this information will assure you safe operation of your helicopter.

W A R N I N G

A radio controlled Helicopter is not a toy, but a highly complex machine that must be assembled and operated by an experienced radio control modeler.

Failure and carelessness in assembly or installation of accessories may result in the model becoming unreasonably dangerous to fly or operate. The rotating rotorblades are a permanent danger and can cause heavy injuries to the operator, spectators and onlookers. Property damage of all kind may incur.

Since the manufacturer and seller has no influence on the proper assembly and operation of his products, he expressively mentions the above dangers and assumes no liability or responsibility for the use of these products.

Dear customer!

With the purchase of the "Heli-Star", you have obtained a model, which is based on the evaluation of 16 years of helicopter practice. The "Heli-Star" meets the high stand of helicopter technique, nowadays required and thus has been designed as a complete unit. All components and building sets are constructed and prepared to coincide perfectly. It will always prove disadvantageous to destroy this combination by detail alterations.

Please remember this on assembly!

Proceede according to the single building steps.
Observe the hints, advice and recommendations.
Use only original parts.
Avoid any alterations from your part.^x

Another advice: Work thoroughly and carefully.

Remember, a faulty assembled helicopter becomes uncontrollable and causes heavy personal injuries and property damages. A model helicopter is not a toy, on building procedures and operation, it requires care and responsibility from the applicant.

If you pay attention to all this, you surely will have a lot of fun with your "Heli-Star". This wishes you

Walter Helber

x Please return the enclosed Service card, provided with all necessary data and your complete address. Service number is marked on upper right side of your building instruction. On occasional questions and additional orders, always use this number.

Building-advice

Sequence of the various building steps will be according to the resulting, subsequent step. All components are packed in corresponding units. Marked numbers on the bag correspond with building step. Open only the packet you presently work on, thus avoiding mixups.

The mounting instructions show no photos, instead they are provided with perspective detail-drawings, all components with the appropriate screws etc. can be seen in their correct building position.

For identification of the screw-assortment and the various sizes, please refer to the screw-list. Adhere to this list and strictly use only the recommended screws, since they are provided in a variety of material strength.

One additional bag contains an assortment of replacement-screws, just in case you lose some.

On preparing the building instructions, purposely the explanation for each single building step has been omitted, since it can easily be seen on the detail-drawings. As far as certain building steps have to be observed, it will be shown in the drawing or is stated in the building instructions. On assembly you should always keep an eye on the drawings. Certain points have been marked with special hints, like this:



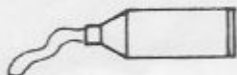
= this screw must be inserted with Loctite-Screw-Securer



= special advice in the building-instructions have to be adhered



= grease and oil parts before assembly



= apply with grease or fill with grease



= cut

As standard installation, a 10 ccm one-cylinder glow engine is recommended. Engine parts are according to the requested common, presently known engines. The fly-wheel, which has to be fitted directly onto the engine, is designed for a crankshaft diameter of $1/4"=6,35$ mm. For larger shafts, wheel must be bored by an expert on a lathe, for a wider diameter. It is of utmost importance that the mounting parts to the engine (fan wheel and clutch) are running absolutely circular, otherwise, heavy vibrations might occur, which will cause considerable damages and high wear. Thus, pay attention to the information at step 4.

The recommended radio control unit should have 5 servos, two servos should take the pitch and engine throttle on one function. In addition, there should be a mixing possibility for the tailrotor compensation.

Building-Sequence "Heli-Star"

- ✓ 1. Provide lever (445/446), according to detail-drawing D1 a. D2 with ball head (434).
 - ✓ Observe: Do not overturn the threads of the ball heads in the plastic levers.
Now screw together the completed levers, according to detail-drawing D1 a. D2, with the chassis-side-parts.
 - ✓ Observe: Tighten fastening screws and lock nuts M 3 slowly until the bearing sleeves (151) have been inserted into the plastic washer (1280) and the levers are playfree, but move smoothly.
 - ✓ Mount the complete landing skid and screw on the bottom profile (135). Distance between rear skid clamp and end of skid bar is approximately 90 mm. Screw side parts (147) loosely to bottom profile (135).
- ✓ 2. Assemble main rotor parts according to detail-drawing E from the partly pre-mounted components to a complete unit, outside the chassis.
 - ✓ Observe: Keep the exact sequence of all components. Apply some grease to pitch linkage. Slide on hub (1289) of follower in a way that threaded boring shows to the outside and screw (041) is accessible.
 - ✓ Screw the complete unit, with the two bearing blocks (152) between chassis-side-parts (147). Now screw side part to bottom profile.
 - ✓ Important: Chassis has to be aligned absolutely straight, avoiding distortion.
- ✓ 3. Mount bevel gear drive for the tail rotor, according to detail-drawing F and screw between chassis. Mount tail tube (390), support (388) and stabilizer (287).
 - ✓ Important: Align bevel gear without play, but smoothly running, towards large gear. Tail tube must be routed straight to the rear. Tighten screws (038) for the tail rotor attachment only slightly, thus plastic halves (389) clamp the tube, but do not get jammed.
 - ✓ Tip: Oil screw section of the clamp (354), eases tightening.
- ✓ 4. Screw fan wheel (1239) onto the engine. Refer to detail-drawing G and H.
 - ✓ Important: Do not forget washer (005). If fan wheel runs too tight to carburetor, apply washer (150), (distance at least 5 mm). Crankshaft nut of engine has to be tightened very well. Use holder (wrench) (1344).
 - ✓ Take care: The fan wheel (1239) has been provided with a center bore of 1/4"= 6,35 mm dia. and fits onto most common 10 ccm-model engines. For engines with other shaft diameters, wheel must be bored by an expert on a lathe. Many engines have considerable tolerances at the connecting pin and in the thread of the crankshaft. Occasionally, the fan wheel may not rotate correctly, which might even be increased by the connected parts, which will lead to considerable vibrations. On mounting procedure, fan wheel must be checked of true circular running and adjusted accordingly!

✓ Checking of true rotation: If available, use a gauge. Tolerance maximum up to 5/100 mm, measured on the points marked with X1. (drawing H). Clamp engine into vise. Remove glow plug.

Without a gauge, you may use a wire, as shown in detail-drawing H. Bend wire close to the measuring point, leaving a small slot of approxm. 0,2 mm. If the slot does not change recognizably on turning of the drive (viewed with naked eye) the required true rotation has been achieved.

✓ Correction of true rotation: By loosening the crankshaft nut, tentatively turning of the wheel and re-tightening of the nut. Mark crank shaft (hub) and fan wheel, to enable checking of new positions. If this should not be sufficient, bore fan wheel. (approxm. 0,2 to 0,3 mm larger than crank shaft diameter). Tighten crank shaft nut only slightly and align fan wheel for true rotation. (move). Tighten nut a little more, measure again, correct if required and then tighten nut finally. This work is sometimes very time consuming, but absolutely necessary.

Only when the fan wheel rotates completely true, clutch (154) may be mounted and checked at point X2 for true rotation. If no difference occurs, turn clutch for 180°. The measuring position X3 is relatively not critical and may be corrected by slight lateral pressure on the starter shaft.

✓ 5. Fit parts of clutch bell and bearing onto starter shaft, according to detail-drawing G - without starter cone (149).

Important: Do not forget the washer (269)

Screw engine block (143), still movable, onto the engine.

Install entire unit with block (142) and align that it is positioned straight in the chassis and the drive gear runs playfree but smoothly in the large gear. Now tighten all screws carefully. Do not forget the attachment plates (263).

✓ Important: Observe the exact aligned installation of the drive unit. Do not distort chassis. Engaging of the gear must be correct after tightening of all screws: Playfree, but smoothly running. Tighten clamping screws (041) for the starter cone (149) thoroughly. Do not forget washer (005).

✓ Tip: Engine will not slip downward, when starter cone is fastened temporarily on mounting.

Straight installation of the drive unit can be checked, by comparing the partly recognizable slots in the chassis for the engine block.

✓ 6. Install toggle lever (466), according to detail drawing D1 into the chassis and complete. Apply eye bolt (447) into the lower pitchlinkage (478).

✓ Important: Connection of eye bolt (447) to pitch linkage (478) will only run true after mounting of the rotor head, thus cannot be judged at this assembly stage. Do not forget to oil parts. Drill fan housing (296) at inner marked positions for 3,5 mm dia., at front, cut off 9 mm. Occasionally, opening at the carburetor area has to be enlarged a little. Cut out fan housing extension (298) according to engine type used and screw together with the right half of the fan housing (housing removed). Left fan housing will not be screw to extension. Mount fan loosely. Do not fasten at the front.

✓ Remark: Fan housing extension has to be cut individually according to engine type used. It should be routed up to a distance of 5 mm to the engine,

i.e. laterally and at the head to the cylinder center. Provide an opening for the glow plug and a space for the glow clamp, which has to be fixed from underneath. (Provided material is sufficient for two extensions.)

- ✓7. Glue together middle part from the provided wooden parts, according to L1. (Cabin fire wall, servo plates and switch board will be glued on at a later stage, as shown at figure L2). Insert middle part into the front of the chassis, observe measurements at L3, drill 4 holes of 3,1 mm dia. and screw on wooden parts and fan.

Important: Do not tighten screws of fan housing and wooden tray too much, avoiding jamming of the wood and spacer bushing.

- ✓8. Assemble tail rotor gear with tail fin (after painting it) according to detail-drawing J.

✓ Important: Small bevel gear with 17 teeth (347) has to be mounted onto the shaft (346) routed from the front. Screw (ø46) protrudes in the cross boring of the shaft (346) and will clamp shaft (351). The larger bevel gear with 22 teeth (348) will be fitted onto the lateral routed shaft (380). A (possible) mix-up of the bevel gears will lead to an extreme high rotation of the tail rotor and will damage it. Do not overtighten the screws in the plastic parts.

✓ Observe: Fill gear box half with grease, overfilling will cause no harm, grease will leak out of upper borings.

✓ Push tail drive shaft (351) into the tail gear, in the shaft (346) 30 mm deep, (measured from the housing). Loosen clamping screw (ø46) far enough. Then tighten tail drive shaft. Feed drive shaft from the rear into tail tube and push into shaft (346) to the front. Clamp tail rotor gear with clamping piece (392).

✓ Important: Tighten clamping screws for the tail drive shaft at rear and front thoroughly. Take care, they press noticeable onto surface of the drive shaft!

✓ Tip: Turn tail rotor slowly with slightly loosened clamping screw. Tighten screw carefully by feeling the surface, allow screw approx. one turn when surface has been touched.

✓ Remark: After a short operation time, bevel gears might run too tight in the tail gear. (a clicking noise from tooth to tooth). In this case, loosen forward clamping screw of tail drive shaft and retighten again. Always take care that clamping screw presses on the surface.

- ✓9. Mount tail rotor hub with blade holders and control parts according to detail-drawing K.

Important: Keep the building sequence according to detail-drawing:

I. = Screw ball bearing (316) with securing washer (369) on hub (277)
II = Then mount blade holder (317).

Screws (ø30) for the ball bearings (316) must be inserted with Loctite/Lop. As well all hexagon nuts (ø10).

Recommended: Mount the completed tail rotor, including rotor blades, then balance with the "tail-rotor-balance-axis", Order No. 1346, available as additional accessory, only then mount tail rotor onto axle of tail rotor gear. (Refer to detail-drawing O).

- ✓10. Complete tank, according to detail-drawing I and install. Insert the threaded part (ø16) with pointed pliers into tank. Size X will be according to the distance of the silencer, applied at the left side of tank. On application of the original silencer, Order No. 925, size X will be = 38 mm. In case of uncertainty determine tank position after exhaust installation. Distance tank to silencer = 10 mm.

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- ✓7. Glue together middle part from the provided wooden parts, according to L1. (Cabin fire wall, servo plates and switch board will be glued on at a later stage, as shown at figure L2). Insert middle part into the front of the chassis, observe measurements at L3, drill 4 holes of 3,1 mm dia. and screw on wooden parts and fan.

Important: Do not tighten screws of fan housing and wooden tray too much, avoiding jamming of the wood and spacer bushing.

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11. Main rotor assembly according to detail-drawing P

- ✓ a) Screw lever (1557) with socket head screw (o3o) - M 3 x 8 - and Loctite/Lop L into the slot of the blade bearing shaft (155o).
- ✓ b. Assemble shock absorber (567), as shown in the detail-drawing, with rubbers (1574) and spacer bushings (568).

✓ Remark: The size of the "thick" rubber determines the stiffness of the main rotor and can be chosen from the model builder to his own thinking. A good middle value is an approxim. 1o mm long "thick" rubber with an approxm. 5 mm long "thin" rubber on each side. Enlarging of the "thick" rubber results to a stiffer rotor. Cut rubbers accordingly. You achieve an even stiffer rotor, when applying the flexible washers (1584) on the later mounting of the rotorhub onto the shaft. (Only suitable on constant rotation or previously chosen rotation).

- ✓ c) Insert collar bearings (563) into rotor hub (1559) with the long collar. Grease pin which protrudes to the outside! Assemble sideplates (1558) with the completed blade bearings, the rotor hub and the shock absorber. Refer to detail drawing A.

✓ Important: Align bearing block by applying the strip or similar underneath.

✓ Observe: Apply washers (1573) under the screws (o3o). Observe mounting direction of the screws (o38) for the shock absorber. Tighten all screws thoroughly.

✓ Advice: Collar bearings between rotor hub and side plates have to be regreased from time to time.

- ✓ d) Complete mixing lever (1577), insert with collar bolt (1567) into the arms (1557) and tighten with set screw (o41) - M 3 x 3.

✓ Observe: Apply securing ring (1571). Do not forget to oil.

- ✓ e) Mount stabilizer bar (157o). Fasten set collar (559) and control arm (562) temporarily in the center. Slide on balancing weights. (Refer to remark). Screw control paddles (1588) onto the stabilizer bar, tighten slightly, but do not strip.

✓ Observe: Rotation direction of the control paddles (1588) must be according to drawing! Align control paddles (1588) and control arm (562) exactly parallel to each other. (horizontal). Balance carefully. (See advice.)

Remark: The demands for control response and maneuverability of a helicopter model differ from pilot to pilot. Thus the control system of the Heli Star has been designed in a way, that it will suit all wishes known up to now. This will be executed by different application and setting of the so called "Balancing weights"(shown in the building plan with a question mark).
The provided control paddles (1588) feature, on application without balancing weights, an outstanding fast and very strong reaction of the main rotor. The model is in this configuration extreme flexible and demands a very precise and careful control of the pilot.

The "Balancing weights" dampen the extreme control response. If you fit the weights at the outside, you will achieve a high damping. The further you position the weights to the rotor hub, the more damping will decrease. At the inside, damping will be nearly zero. At the start, we recommend to position the weights to the outside. They may be balanced to the pilots own feelings, occasionally, they must be adapted to weather conditions. Important is the renewed balancing. For this procedure, all ball bearings have to be removed, avoiding that stabilizer bar sways. On the flying field, consider the possible effect of the wind on the control paddles. Balancing procedure might be executed in the car.

M) Provide U-lever (1561) with ball heads. The two lateral ball heads (434) can be applied in different positions, according to the required collective pitch: (Refer to detail drawing A).

Pitch-reactions: Inner position A= normal for simple aerobatic flight
 Middle position B= increased support for autorotation
 Outer position C= extreme for inverted flight

Preferable is the middle position B.

Installation of the various control rods will be according to detail drawing C. Setting procedures are considerably eased by using the fly-bar lock, Order No. 1345 (refer to N). Final settings can only be executed, when servo tray with servos and the radio unit has been mounted.

12. Rotor blades (1240) are intended for a rotor diameter of 1.320 mm. Sand blades, apply foil and mark with different colored adhesive tape at the ends. Reinforcements at inner blade connections, occasionally, have to be slightly re-worked, provide with sleeve (1556) and insert into fork part (1581).

Observe direction of rotor-rotation: viewed from above, clockwise, to the right. Tighten screws (1555) only so far that rotor blade pivots with medium effort.. In no case allow the blade to be so loose that it can pivot away on its own weight. On blade mounting, use only original screws (1555)!

Balancing of the rotor blades: We take it for granted that the basic technique of the balancing procedure is known. For this rotor type, a bar of 2 mm dia. will be inserted through the hub, instead of the screw for the rotor attachment on the rotor shaft, positioned sideways, used as center point for the balancing. Rotor hub must be located vertically. Refer to detail-drawing B! (Simplified layout). For compensation, apply white foil to the lighter blade, next to the colored markings, to the outside.

13. Assemble wooden tray according to detail-plan and drawing L1 and L2. Prior to this, cut out the positions for the servos. Take care that the cut outs are large enough, so servo will not touch the wood later on, and vibrations are transmitted. As well do not tighten servo attachment screws too much, enabling an elastic suspension of the servos. If necessary, provide space for the gyro. Slide on fire wall then glue together servo boards.

Advice: Switch for the RC-unit, if required, switch for the gyro and charging socket have to be mounted laterally, to the right, at the switch board activated through a finger hole, provided in the cabin.

Cut out canopy at marked positions and glue the two halves with a fast setting glue.

Tip: Fasten the canopy halves with clamps, then pour glue into the gap. Adjust canopy. As reinforcement, apply remaining pieces of cabin material at the points marked with M (to the inside). Canopy may be painted to pilot's own taste.

14. Installation of the various control rods can be seen on the detail drawings and will be according to the servos employed and their position. Taken for granted, is the application of 5 servos. Direction of travel during operation and control routing are stated.

Length of rods:	20 mm = Order No. 433	150 mm = Order No. 494
	36 mm = Order No. 497	180 mm = Order No. 408
	40 mm = Order No. 436	220 mm = Order No. 409
	75 mm = Order No. 590	270 mm = Order No. 429
	120 mm = Order No. 407	760 mm = Order No. 356

Fasten control wire for the tail rotor with the special form pieces at the tail rotor. After final alignment, secure against distortion with a drop of fast setting glue.

Installation of the radio unit will be according to the space on lower servo-tray. Position of accumulator influences the center of gravity. Fasten accumulator sufficiently with rubber band and foam layer. Receiver should be installed in a soft way. Take care that no cables are hanging about. Route antenna straight to lower rear (through cabin former) and fix with a thin rubber band to strut and stabilizer.

Center of gravity:

If you lift up the model on the stabilizer bar, with an approxim. half filled up. tank and complete equipment, your helicopter should slightly tilt to the front. (approxm. $2-3^{\circ}$).

Setting values:

Maximum tilt of the swash plate = $+ 15^{\circ}$. Corresponds $+ 8$ mm travel of the rods leading to the swash plate. Corresponds $+ 12$ mm travel of the rods to the servos.

Values for the collective pitch will be according to positions of figure 11/f for the ball heads (434), A, B or C. Furthermore, the setting depends on the engine performance and has to be determined by the model builder himself. As an aid serves the setting of the main rotor blades for hovering flight of approxm. 4° on full engine speed.

Tail rotor setting for the hovering flight with a middle value of approx. 5° . This as well, depends on the engine, its performance, setting of the main rotor and if a stabilizing gyro is employed. Entire range of setting of the tail rotor from approx. $+ 12^{\circ}$ to approx. $- 3^{\circ}$.

Final adjustments:

We strongly recommend the silencer, Order No. 925. This silencer has been specially designed for the "Heli-Star"-dimensions.

The silencer adapter has to be ordered separately, Order No. 933/... adding the identification letter for the corresponding engine employed. For closer description refer to Schlüter Main Catalog.

In this catalog you find also some very useful accessories, single or the complete helicopter-tool-set in a case, Order No. 137o.

Your minimum equipment should be:

Schlüter Universal Pitch-Gauge	Order No. 1366
Fly-Bar-Lock	Order No. 1345
Tail-Rotor-Balance-Axle	Order No. 1346

Spareparts

It is of utmost importance to use only original spare parts. In the building plan each single part is shown with its sparepart-number.

Flying-in

There is a lot to say about this subject and the experiences in the modeler circles are very different. To draw a clarifying line towards the building instructions, we recommend Eng. Dieter Schlüter's book

"Radio Controlled Helicopter Manual"

This book can be obtained in the following languages:

German	Order No. 9954
English	Order No. 9956
French	Order No. 996o

HELI-STAR Set up Instructions

Legend

- (A,etc) refers to Kit building plan
- (433,etc) refers to plan part number
- (Dia.) refers to drawings in this instruction set

Flying with today's Helicopter radios allows many adjustments to be made at the transmitter. However, the helicopter must be properly set mechanically before using the radio functions. The radio cannot compensate for a poor set up. It may seem to do so, but is only overworking itself. Therefore the first step to success is digging out the radio manual that is buried somewhere in your workshop. Got it? Let's get started.

✓ STEP ONE:

Refer to the Radio Manual for position of all switches and knobs for neutral set up. Turn functions off you will not be using. This set up does not cover inverted flying so disable that switch also. Certain steps will instruct you to turn specific functions off momentarily, then back on. Pay attention so they are not missed.

✓ STEP TWO; RADIO

Set all transmitter AND STICKS trims to mid position, including pitch and hovering throttle. ATS dials to mid position also.

✓ TURN ATS AND GYRO OFF.

Turn system on to neutralize servos. Attach all output arms or wheels 90° to servo centerline. Operate transmitter sticks to insure servos travel equally in both directions. Return sticks to center positions, then TURN SYSTEM OFF.

✓ STEP THREE; SWASHPLATE

Attach servo pushrods to swashplate bellcranks. Adjust clevis' until swashplate is level from all angles. TURN ON Operate cyclic stick. Forward cyclic produces a dip on front of swashplate. Right cyclic produces dip on right side of swashplate (use transmitter reversing switches now if necessary). Reference swashplate direction viewing helicopter from rear.

✓ SET RATE SWITCHES TO HIGH. Full stick deflection needs to produce full swashplate travel. Move clevis in or out on serve arm to achieve without binding.

✓ SET RATE SWITCHES TO LOW. Adjust rate trimmers for approximately 1/2 previous travel. Finally, adjust to your preference while flying.

✓ Insure all transmitter sticks are back to center, TURN SYSTEM OFF

✓ STEP FOUR; TAIL ROTOR

Attach pushrod to servo and tail rotor transmission bellcrank. Adjust clevis' until front edge of transmission bellcrank is parallel to back edge of transmission case. Move collars to set tail rotor pitch at approx. 5 to 6°, (Dia.1)

TURN ON, move rudder stick to full left. Tail blades should move to 2-3° negative pitch. If not, two things must be done. First reverse direction switch in transmitter. Right stick movement should produce an increase in pitch. Second, move clevis in or out on servo arm until full left stick produces negative 2-3° pitch.

✓ Next, TURN ATS ON to (R) RIGHT rotation. Move throttle stick from low to high, tail pitch MUST increase. If it does not, move ATS switch to left (L) Rotation. These directions for flying the nose.

Return transmitter sticks to center, then TURN OFF.

✓ STEP FIVE; CONING ANGLE, MAIN ROTOR

Attach Flybar Lock (1345) or level and lock the flybar (fig. N). Use a coning angle tool (1060) or measure distance from top of tail boom to underside of blade near mount doubler. Move out to blade tip. Loosen side plate bolts, set top to same dimension as root near doubler. Tighten all bolts firmly. Rotate head 180° and repeat.

✓ STEP SIX; COLLECTIVE PITCH

Attach pushrod from collective servo to large collective crank on main frame (466)(N). Adjust clevis' so top edge of crank angles down from horizontal approx. 15 to 20°. TURN ON. Move throttle stick from full low to full high. Move clevis in or out on servo arm to achieve maximum crank travel WITHOUT touching top of fan housing or bottom of main gear. Adjust length of pushrod to clear once travel is obtained. RETURN throttle stick to center, TURN OFF.

✓ Getting tedious, huh?

Move up to rotor head while referring to drawing (C). Adjust ball link on collective rod until collective yoke (1561) is level. Remove flybar lock to do this easily, then replace. Next adjust rods (436) and (433) rods (436) appear parallel. Rods (436) should match in length while (433) will be slightly unequal.

✓ SETTING BLADE PITCH.

Heli-Star's unique individual blade dampening head design will give different pitch settings from the static to flying positions. We must take this into account during initial set up.

With all head parts level per drawing (C) and flybar locked, we can begin our "back and forth" adjustments. Start by setting 2° positive on the Pitch Gauge (1366) and attaching it to one blade near the center. Adjust rod 433 to coarse, 436 for fine. Move back and forth with these rods to get 2° while maintaining level bell mixer. Move pitch gauge to other blade and repeat. Remember to keep the 436 rods the same length.

While sighting from blade end, loosen thumbwheels on pitch gauge and lift blade top approx. $\frac{1}{4}$ to $\frac{1}{2}$ inch. Hold tip in this position and read pitch angle. It should be 3 to 3½°. Adjust rods if necessary to put pitch in that range. Repeat on other blade. This represents approximate pitch during hover.

✓ TURN ON. Move throttle stick to low position. Read pitch with blades in relaxed position. Low end pitch should be -2½ to -3½°. Move stick to full throttle position, pitch should be +6½ to 7½°. Move clevis in or out at servo arm to achieve this total pitch range. Return stick to center, assure pitch returns to +2 to +2½°. Adjust as necessary. Leaving stick at center, TURN OFF.

✓ STEP SEVEN; THROTTLE

Attach pushrod to servo arm and carburetor arm. Adjust length so carb arm is open approx. 60% or just past half. This position is based on the carb arm being -45° at closed and +45° at full open.

TURN ON. Move stick low to high several times. Move clevis in or out on servo arm to achieve full throw without binding or stalling. For proper throttle/collective operation, it is IMPORTANT the servo moves throttle the proper full range, no more, no less. Do it until it is right.

STEP EIGHT; GYRO

TURN ON radio system, then Gyro. Proper directional operation of the gyro is critical. Move throttle stick to center position. Twist gyro box to left, tail rotor servo should move to ADD PITCH to tail blades. Check this step carefully or you are going to break your pride and joy.

If gyro does not respond as directed, it must be reversed. With Kraft or JR gyro, the Gyro unit must be remounted upside down, not sideways nor turned 180°. Futaba gyros have a reversing switch at the control box.

STEP NINE; REVIEW

Go back through the complete set up and double check each step. It is easy to overlook a step. Operate all functions. Check for smooth operation, no binding nor stalling of servos. CORRECT ANYTHING THAT DOESN'T CONFORM TO INSTRUCTIONS.

STEP TEN; THE MOMENT OF TRUTH

If you are new to model helicopters, please try to find an experienced flyer to perform a check out and first flights. If you can or cannot, at least follow the guidelines given. Use CAUTION as an out of control helicopter can be a dangerous and unruly beast. Refer to the Trouble Shooting Chart when trouble persists or the critter continues to show a mind of it's own. For the beginner, we suggest Flight instruction cassette #S1040.

STARTING:

Start engine and adjust idle speed. A reliable idle should be obtained at low stick, $\frac{1}{2}$ to full idle trim. Full low trim MUST kill the engine. Adjust clevis at servo arm or at carb. to achieve. If you need more than two or three turns, go back to STEP SEVEN.

ENGINE ADJUSTMENT:

TURN GYRO OFF. Place helicopter into wind and slowly advance throttle to approx. $\frac{1}{3}$ stick. Engine should reach fast four cycle. Adjust main needle if needed.

Advance throttle to $\frac{1}{2}$ stick, helicopter should lift off with engine breaking into two cycle. For those who have a tachometer, we need 1600 to 1650 rpm main rotor speed at hover.

If engine seems to be overspeeding or, conversely, lugging, land immediately. Refer to Trouble Shooting Chart. Do not proceed until this important lift-off stick position-main rotor speed relationship is correct. Adjust and repeat as necessary.

TAIL ROTOR TRIM:

Lift off to hover. Note any tendency for the nose to swing. Trim left or right on transmitter, as needed, to keep the nose in place. If unable to correct swing with trim lever, refer to Trouble Shooting Guide. Repeat until you've got it.

ANOTHER MOMENT OF TRUTH:

TURN GYRO ON. If you did the gyro installation correctly, lift off will produce a rock steady tail. If not, you'll be calling us to order parts.

The compensation knobs can now be adjusted. If lift off produces no swing of the nose, all is okay. A slight swing of the nose to the left means more compensation is needed; dial toward the higher numbers. The opposite if the nose goes right. Refer to the Trouble Shooting Guide if

CYCLIC TRIM:

Once rotor speed, stick hover point and tail rotor are trimmed, cyclic is next. Correct any for/aft or side/side drift with transmitter stick trims. Running out of trim means you have to go back to Swashplate set up.

FLIGHT SUMMARY:

Following the preceeding bench and preliminary flight set ups should have your Heli-Star properly hovering within one or two tank fulls.

The correct set up will see the Heli-Star reach constant rotor speed just prior to $\frac{1}{2}$ stick lift off. Accurately trimmed, the lift off will be smooth and stright up.

Climb out and acceleration into forward flight should be fast with NO engine sag or rotor speed loss. If this occurs, you have too much maximum pitch for the engine being used and pitch curving must be adjusted. Refer to the Trouble Shooting Guide and the Radio Manual, if you can find it again.

Fast flight will be smooth and VERY responsive, even with the flybar weights all the way out to the paddles. If the helicopter is too responsive or jerky, switch to low rate and adjust to suit your likes. Control response can also be altered by trimming $\frac{1}{4}$ -inch increments from the paddle ends to a minimum dimension of 2 $\frac{5}{8}$ inch.

Throttling back for descent should produce a slight reduction of engine and rotor speed. Those of you who don't like any loss of engine/rotor speed during rapid descents should use the radio's Hi-Idle function rather than mechanical overrides.

AUTOROTATION:

The mere mention of this maneuver raises the pucker factor by twenty notches. Actually the Heli-Star autorotates easily. Practice by climbing to 100 or so feet, turning into the wind. Reduce throttle stick to full low position (check first to insure idle is reliable). Keep nose of helicopter level while descending nearly vertically with slight forward speed. At 15 to 20 feet, flare as though landing, add throttle/pitch and go around for another try. When you get the hang of it, set throttle hold at a reliable idle, flare at 3 to 4 feet and feed in collective as needed to land. Some radios allow additional pitch at the top end while in throttle hold. It sounds easier than it is, but practice will take the fear out of it and it may save your Heli-Star from a severe crash if a real engine out occurs.

CONCLUSION:

We have tried to make these instructions easy to follow and as through as possible. Being prepared on a word processor allows easy changes and revisions. Your feedback will be appreciated and included where applicable.

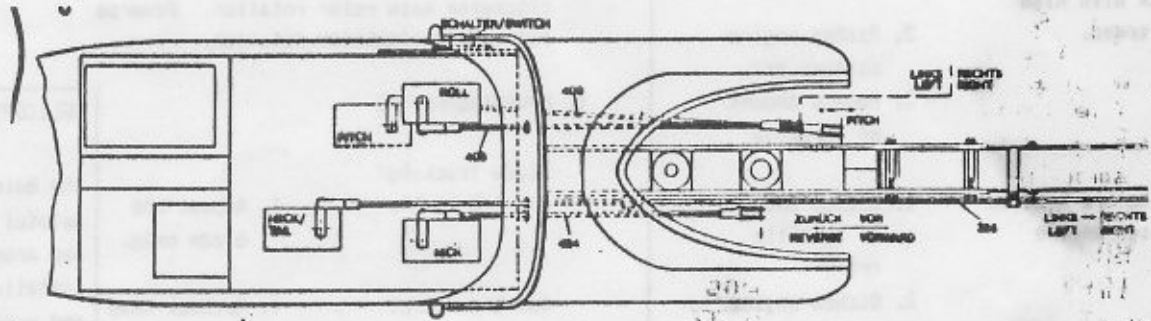
Meanwhile, enjoy flying your Schluter Heli-Star.

Prepared 1/12/85

Copyright 1/85

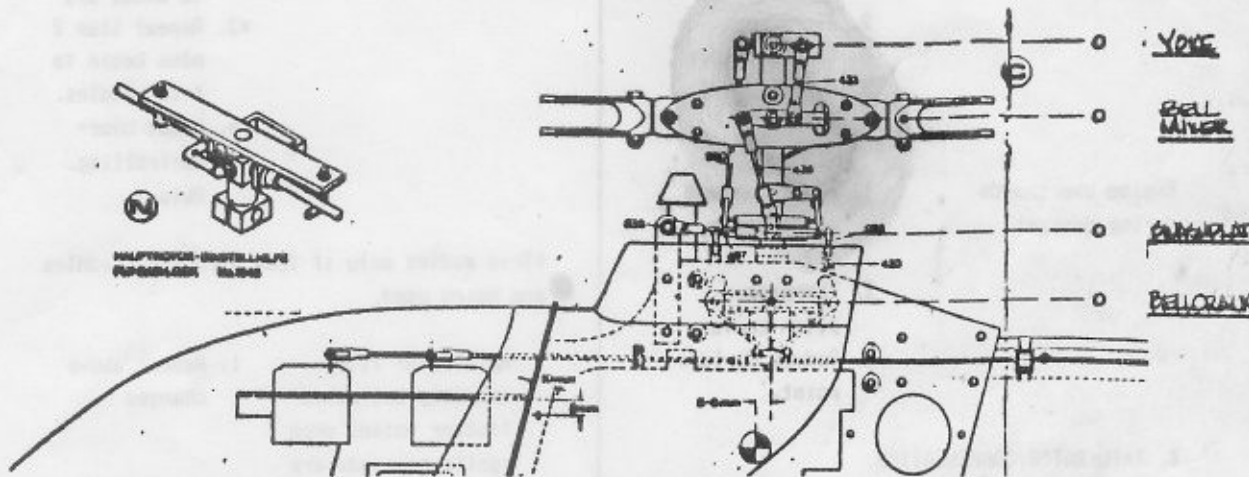
Written by Dick Tristao

SKETCHES



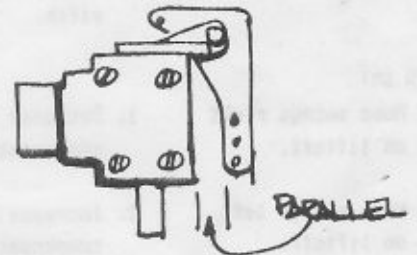
ALL SET UP IS PERFORMED WITH SERVO'S IN NEUTRAL OR CENTER POSITION AS SHOWN.

FIGURES 'N' and 'C'



WITH ALL SERVO'S CENTERED, ADJUST ALL RODS SO ZERO POINTS CONFORM TO THE ABOVE DRAWING. THIS IS AT TRANSMITTER ONE HALF STICK POSITION, EQUAL TO HOME POSITION.

Do 1.



TAIL ROTOR CONTROL BELLOWS POSITION AT 1/2 STICK POSITION.

A. THROTTLE/ROTOR SPEED

- Hover occurs before 1/2 stick with low rotor speed.
1. Reduce pitch or;
 2. Lean mixture
- Hover occurs after 1/2 stick with high rotor speed.
1. Add pitch or;
 2. Richen engine mixture or;
 3. Reduce amount of throttle
- Hover before 1/2 stick with high engine speed.
1. Reduce amount of throttle or;
 2. Richen engine.
- Hover at past 1/2 stick with low speed
1. Increase throttle, or;
 2. lean engine.
- Engine sags during climbout.
1. Richen engine mixture, or;
 2. Increase throttle, or;
 3. Reduce pitch curve.
- Engine overspeeds during descent.
1. Reduce amount of throttle, or;
 2. Increase pitch curve
 3. Reduce Hi-Idle point.

B. TAIL ROTOR/COMPENSATION

At hover, Gyro on:

ATS off:

- Nose swings right.
1. Decrease T/R pitch.
- Nose swings left
2. Increase T/R pitch.

ATS on:

- Nose swings right on liftoff.
1. Decrease T/R compensation.
- Nose swings left on liftoff.
2. Increase T/R compensation.

With ATS and Gyro on:

- Tail swings 360° violently.
1. Reverse gyro direction.
 2. Turn gyro over.

- Tail swings side to side 2-4°.
1. Decrease gyro sensitivity.

Tail drifts.

1. Recheck trim, or;
2. Increase gyro sensitivity.

NOTE: Tail rotor set up based on clockwise main rotor rotation. Reverse for counterclockwise rotation.

C. HOVERING/FLYING

Blade Tracking:

- Out 1/8 to 1/4°.
1. Adjust one blade only.
- Out 1/2 or more.
1. Recheck head set up and cone angle.

Control response too fast or jerky.

1. Switch to low rate, or;
2. Move flybar weights out to ends, or;
- *3. Repeat step 2 plus begin to trim paddles.
4. Pilot over-controlling. Relax!

*Trim padles only if long aerobatic paddles are being used.

Helicopter flies smoothly but makes flutter noises when cyclic commands are given.

1. Repeat above changes

D. CONCLUSION:

Have done everything, the helicopter does not perform satisfactorily

1. Call us right away.

The Helicopter flies GREAT!

1. Don't change a thing. Let us know if a change needs to be made in instructions or trouble guide.

Let us hear about your experiences with Schluter helicopters, good or bad.

Let's go flying.

HELICOPTER TROUBLE SHOOTING GUIDE

The Guidelines given here will be helpful only if the helicopter had proper construction, radio installation and set up per the and supplemental instructions.

Copyright 12/84-1 by Dick Tristao for:

Miniature Aircraft Supply
2594 N. ...
...om Trail

Part-list





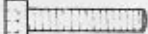





Heli-Star

Art. No.	Description	pcs.	pcs.	Description	pcs.
o5o	Ball link with ball	3	347	Bevel gear 17 teeth	1
o57	Set collar 3 mm	1	348	Bevel gear 22 teeth	1
o58	Ball link without ball	16	349	Control rod	1
o59	Snap link M 2	1o	351	Drive shaft 2 mm dia.	1
124	Skid	2	352	Ball bearing 5x16, open	4
131	Bearing block	1	354	Clamp 2o dia.	1
135	Lower U-Profile	1	355	Clamping ring 2 mm	1
141	U-Profile, 1o mm long	1	356	Rods 2x M2x15x76o	1
142	Intermediate block	1	363	Ball bearing 5x16, shielded	2
143	Engine block, bent	2	369	Securing washer	2
147	Side plate	2	379	Guide sleeve	1
149	Hub	1	38o	Hollow shaft 44 mm long	1
15o	Spacer washer	1	384	Angled lever f. tail	1
151	Bushing	2	385	Bearing block halves	2
152	Bearing block	2	386	Spacer bushing f. No. 385	2
154	Clutch with drive shaft	1	387	Body-fit-washer 5xlox1	2
162	Fan wheel	1	388	Tail strut	1
217	Ball bearing 6 x 19 open	2	389	Clamping part, tail tube	4
218	Clutch lining	1	39o	Tail tube	1
219	Securing ring f. autorot. clutch	1	391	Plastic Bearing 2 mm	2
228	Bearing bolt	1	392	Clamping device f. tail fin	1
241	Inner sleeve autorot. clutch	1	393	Covering plate tail boom	1
242	Outer ring f. autorot. clutch	1	394	Tail rotor blade	2
243	Cap ring f. autorot. clutch	1	395	Washer	2
244	Spacer ring lox16x3	2	4o7	Rod M2xlo/2x3ox12o	1
245	Ball bearing 15x24x5 sealed	2	4o8	Rod M2xlo/2x3ox18o	1
246	Pin f. autorot. clutch 3x9,8	2	4o9	Rod M2xlo/2x3ox22o	1
247	Spring f. autorot. clutch	2	412	Ball bearing 17x35, open.	1
249	Holding pin f. autorot. clutch	1	429	Rod M2xlo/2x3ox27o	1
252	Square-washer f. struts	2	433	Rod M2x2o	5
262	Bevel gear 15 teeth	1	434	Ball head	16
263	Holder for swash plate	1	436	Control rod 4o long	2
267	Clutch bell, aluminum	1	445	T-lever	1
268	Spur gear lo teeth	1	446	Roll lever	1
269	Body-fit-washer 6 x o,2	1	447	Eye bolt	1
27o	Ball bearing 6x19x6, sealed	1	45o	Main rotor shaft	1
276	Tail fin, aluminum	1	453	Swash plate, outer ring	1
277	Tail rotor hub	1	454	Swash plate, inner ring	1
278	Spacer bushing	1	456	Ball bearing lox19, open	3
283	Control strut (tail)	2	466	Toggle lever	1
284	Ball link with counter bearg.	2	472	Toggle joint, outer part	1
285	Cross pin f. 284	2	478	Pitch linkage	1
286	Tail Skid	1	494	Rod M2x8/2x4ox15o	1
287	Stabilizer	1	497	Rod M2xlox36	1
288	Clamp without thread	2	498	Swashplate ball	1
289	Clamp with thread	2	499	O-Ring f. swash plate	1
292	Set collar 2mm, thread M3	2	535	Steal bearing	4
293	Clamp	4	542	Cross bearing	1
294	Landing struts	2	559	Set collar 4 dia.	1
296	Fan housing	1	562	Control lever	1
297	Spacer, 2o mm long	3	563	Collar bearing, long	2
298	Fan extension	1	567	Shock absorber	1
316	Ball bearing 3xlo, open	5	568	Spacer bushing	2
317	Tailrotor-blade mount	4	59o	Rod 2xM2x8x75	1
34o	Tailrotor-gear-box	1	1119	Tank 5oo ccm	1
341	Bearing block	1	1237	Wooden tray	1

Art. No.	Description	pcs.	Art. No.	Description	pcs.
343	Sleeve	2	1239	Fly wheel with fan	1
346	Tail rotor shaft	2	1559	Main rotor hub	1
1241	Clamp f. tail tube	4	1561	Pitch lever	1
1242	Rod connection	1	1562	Glycodur bearing	2
1243	Rod guide	2	1567	Bearing shaft f. mix.lever	2
1267	Gear 80 teeth	1	1570	Stabilizer bar	1
1280	Plastic washer	4	1571	Securing ring	3
1289	Hub f. follower	1	1572	Spacer-ring 5/3x2.2	1
1290	Side plate f. follower	2	1573	Washer 3x8x1	4
1291	Spacer bushing f. follower	1	1574	Rubber shock absorber	
1292	Follower shaft	1	1576	Cross shaft	1
1293	Ball link f. follower	1	1577	Mixing lever	2
1297	Building plan a. instructions	1	1578	Spacer	2
1298	Bearing block	1	1579	Blade shaft holder	2
1299	Canopy	1	1581	Blade holder	2
1302	Head wrench	1	1582	Plastic bearing 3,175 mm	6
1344	Wrench	1	1583	Washer	2
1550	Blade bearing shaft	2	1584	Flexible washer	2
1551	Thrust bearing	2	1585	Washer 8x14xo,5	2
1552	Ball bearing 8x16, sealed	2	1586	O-Ring	2
1555	Body-fit-washer M 4	4	1588	Control paddles	2
1556	Sleeve f. rotor blades	2	1937	Deco foil	1
1557	Blade pitch lever	2		Balancing weights	2
1558	Side plate f. main rotor	2			

SCREW-LIST *Heli-Star*





Imbusschrauben / socket screws

080		M 2 x 10
079		M 3 x 5
030		3 x 8
039		3 x 10
031		3 x 15
078		3 x 16
036		3 x 20
038		3 x 30
035		3 x 35
034		M 4 x 15






Sechskantschraube / hexagon screw

009		M 3 x 20
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

Eisenschrauben / iron screws

020		M 2 x 10
019		M 3 x 5
021		3 x 8
026		3 x 25







Stiftschrauben / set screws

041		M 3 x 3
046		M 3 x 5
072		M 3 x 8
017		M 3,5 x 3
077		M 4 x 5

Blechschauben / self tap screws





042		2,2 \varnothing x 6,5
075		2,2 \varnothing x 9,5

Unterlegscheiben / washers

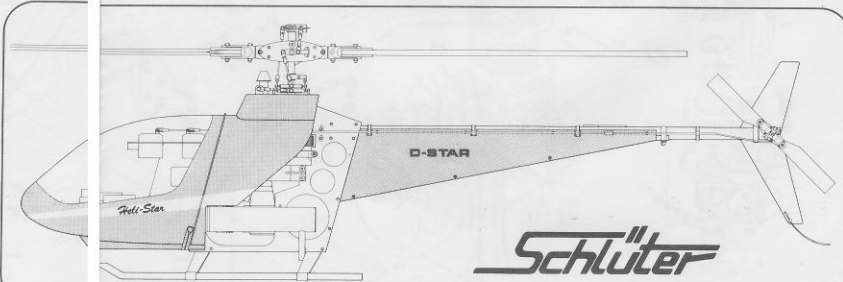
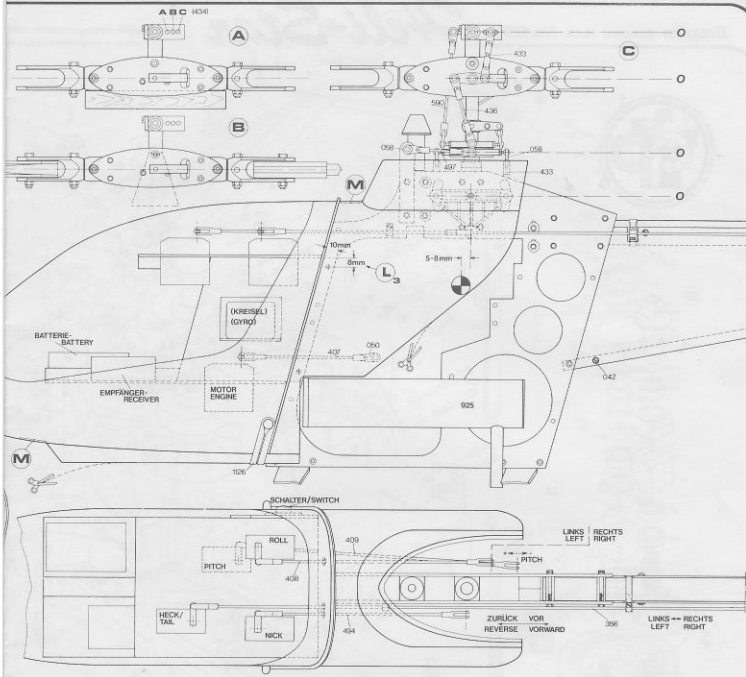
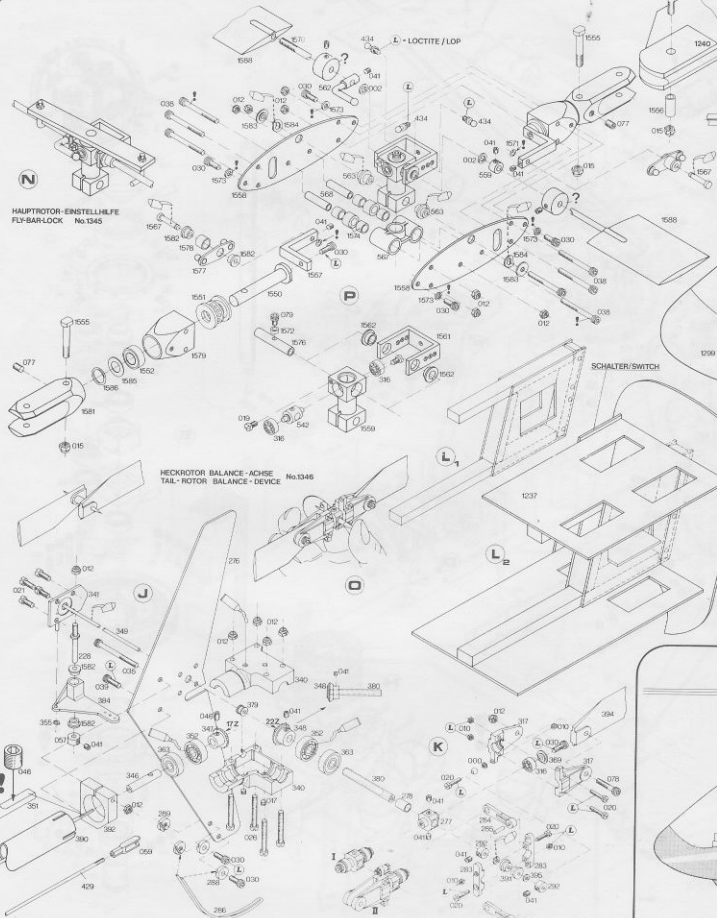
000		2,2/5 \varnothing x 0,4
007		3,2/9 \varnothing x 0,8
1573		3,2/8 \varnothing x 1
1280		3,1/10 \varnothing x 1
002		4,3/9 \varnothing x 0,8
005		6,4/25 \varnothing x 1,5

M 1:1

Sechskantmuttern / hexagon nuts

010		M 2
011		M 3
012		M 3 Stop
015		M 4 Stop

Heli-Star



Schlüter

