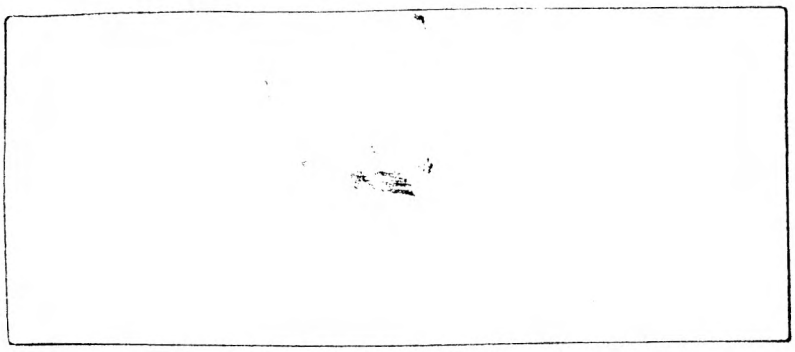
Building Instruction "SX 81"

Complete Kit, Order No 27o6

This kit consists of a box with all mechanical parts, including accessories and hardware, and a second box with PVC parts for the cabin and fuselage.



INSIDE OF RIGHT

General information

The Schlueter "System 8o" consists of combination possibilities of various helicopter drives, fuselage designs, extension stages, and rotor heads which has been proved for many years. This system provides the possibility to meet special requirements for an optimal helicopter. The beginner as well as the demonstration or competition flier will find a model within the Schlueter "System 8o", suitable for their individual skill. To emphasize is the possibility to change to another extension stage by omission or additional purchase of single parts. This economizes the basic purchase and the stocking of spares to full satisfaction. Once having made a decision for the Schlueter "System 8o" the modeler is fully equipped with various possibilities for many years to come, since all present and future designs are, or will be integrated into this system.

Now to the present kit

The model described in this kit, also fits into the Schlueter "System 8o" and, as concerns rotor head, control unit, tail rotor and essential drive parts, is built of parts which have proven their reliability thousands of times. With a newly designed flat drive unit and a new positioning of the center of gravity towards the rotor, thus providing the building of flatter models. By the variety of the retained mechanical components the experiences of many years are evaluated and will be passed on. This enables, even with a relative small selection of parts, a modification of "old" Schlueter "System 8o" models to the flat version.

A special statement and a corresponding list show you which similar modules should be employed within the different models and kits. At one glance you will know which part you need for your "changing" to another model or another rotorsystem. The contents of the modification sets depend on this.

To simplify construction, all building components are packed in bags numbered in a sequence corresponding to their appropriate assembly stage. These bags contain all small hardware parts, bolts, washers, nuts etc., which are required for that particular building stage. It is therefore recommended that you keep to the number sequence given in instruction stage and on corresponding bag. Open only the bag required for a particular stage on which you are presently working. Some parts groups have already been pre-assembled. Only "normal" tools are required for assembly: screwdrivers, pliers and similar items. Special socket head screw wrenches 1.5, 2.5 and 3 mm, as well as socket wrenches 5.5., and a tube of heavy duty grease are also provided in the kit. All of these accessories are packed in a separate bag.

Special devices or a building board are not required for assembly, but it must be recognized that we are handling very high quality and precise mechanics and assembly should therefore be done in dustfree surroundings. Also please note that all bearings should be greased before assembly since it will not be possible to add grease later. This is a very important point, since it will ensure sufficient lubrication from the very beginning. Later oiling of bearings from the outside will not be so satisfactory.

Stage 1, basic frame (bag 1)

Both side plates (165) and the bottom support (174) are screwed together with a total amount of 6 steel screws M 3 x 8 and hexagon nuts. Bottom support projects forward of the side plates. Rear drillings of the side plates remain open for later mounting of tail support. Important, nuts of bottom support have to be mounted to the inside and aligned parallel, tighten screws immediately. It is advisable to secure the nuts by a drop of "Loctite", Order No 1341.

For the mounting of the skid struts insert two socket screws M 3 x 15 from above into the bottom sopport (174) and secure with hexagon nut from underneath. Use "Loctite". Slide on re-inforcements (168) (over nuts and skid struts (123) and secure with lock nuts M 3. At a later stage bottom board will be positioned between bottom support (174)and re-inforcements (168).

Now fasten skid rods (124) with clamps (125) to the struts (123) using 8 M 3 x 1o bolts and hexagon nuts. Nuts fitted downwards. Skid struts should project 1o cm at the rear end.

Stage 2, T- and Roll-lever, (bag 2)

Fasten three steel ball fittings (434) in the raised bosses of the pitch lever (445), T-lever) and roll lever (44) (Angled lever). Do not tighten too much. As shown in fig. 2 the pitch lever (445) is on the left side and the roll lever (446) is on the right side of the side plates. Assembly order from the outside in is: Steel screwM 3 x 15, washer, bushing (151), T-lever (445) and roll lever (446), side plate (165), lock nut M 3 from the inside. When assembling moving parts, use the grease provided. They should move easily, but without play.

Stage 3, Clutch and Cooling fan, (bag 3)

Fasten gear (17o) onto clutch and allow centering to engage. Lead socket head screws M 4 x 15 from the clutch into the gear and press into gear with special nut (171) (with edge). Tighten well, but not too much. Slide onto (upper) part of the drive shaft (169) one or two washers 6 dia. and push on clutch bell (144). Bell must run close to the gear, but not touching it, however.
Slide onto drive shaft 2 washers and bearing block (131) bearing downward towards clutch. Slide on from underneath bearing block (131) with bearing upward. Fit between side plates from the front.
Slide onto drive shaft cooling fan wheel (177) from underneath. Closed side of fan wheel shows upward in direction of clutch.

Insert this assembly between sideplates, upper bearing block (131) with open bearing and all three bearing blocks have to be fastened using 6 socket head screws M 3 x 3o with lock nuts.
Put on top starter cone (149) and tighten well with 2 socket head screws M 3 x 3.

Tighten fan wheel with socket head screw M3 x 5 and position in center of opening. This has to be corrected eventually at a later stage when adapting the cooling fan housing.

Stage 4, Main Rotor Shaft, (bag 4)

In this stage the main rotor shaft with swash plate, bearing and drive wheel are assembled.

For the two bladed aerobatic rotor, a collective pitch linkage (448) is fitted into the slot of the main rotor shaft (45o). Use grease! The short angled end of the linkage faces downwards. The bottom end of the main rotor shaft has the hole nearer to the end.

Now slide on to the main rotor shaft, from the bottom end, with the collective pitch linkage in place:

1. Carrier (444) wide edge downward (moves heavily by intention)
2. Swash plate (412, 453, and 454 (assembled) inner ring upward
3. Swash plate ball (452), ball upward.
4. Spacer (475)
5. Bearing block (152) with ball bearing (456) upward
6. Bearing block (152) with ball bearing downward.

Next slide the main rotor shaft and bearing blocks between the side plates. Fasten bearing blocks with four M 3 x 3o socket head screws and M 3 lock nuts. Make sure that the support plate (449) is fitted under on upper left side. Slide gear (148) onto main rotor shaft from below and fasten with the special M 3 x 23 screw and M 3 lock nut. Slide up shaft and adjust axial play from above with swashplate ball and 2 set screws M 3 x 3. These screws should be tightened well on the ball, so shaft is fixed exactly axial. In order to eliminate a possible downward movement of shaft during a very hard landing, an additional support bearing is installed.

Fasten the ball bearing (316) to the support bearing block (163) in the following order: Socket head screw M 3 x 15, ball bearing (316), washer 3 mm dia., bearing support block (163), self lock nut M 3.

The complete sub-assembly is now fastened underneath the main drive gear (148) with socket head screw M 3 x 35 and self lock nut, between side plates. The ball bearing should almost touch bottom edge of gear (148) with no more than 1/1o mm space between them.

Insert three steel ball fittings (434) in the bottom ring of the swashplate. Three control rods (433) are fitted with two ball joints without ball (o58) each. Ball joints should be screwed on until they touch each other. Now connect these three assemblies between the three swash plate balls and the three balls of the T-lever and roll levers. Carrier pin (455) is inserted into fourth hole on swash plate outer ring. This pin moves in the slot of the supporting plate (449). Screw one ball (434) into upper ring of swash plate.

Stage 5, Toggle lever (bag 5)

Toggle joint (443), ball bearing (316), two bushings (535), and 2 steel screws M 3 x 5 are inserted into fork end of collective toggle (476). Bushings are fitted from the outside of the toggle. Parts must move easily (grease well).

Eye bolt (447) is fitted through the ball bearing (316) and retained with a self lock nut M 3. Slide toggle lever (476) with two bushings (from inside) onto the side plates. The lower right angled end of the collective pitch linkage which protrudes below the main rotor shaft, is inserted into the eye bolt and then toggle with bushing washers are fastened from outside of the main frame with the M 3 x 35 screw which also holds the support bearing block between the frames. The toggle lever must also move easily.

Stage 6, Tail rotor Drive (bag 6)

Slide spur gear (146) 15 teeth, onto tail drive shaft (362). Insert loosely set screw M 3 x 5 through the gear hub into tail rotor shaft hole. Two ball bearings (352) are slid onto drive shaft and tail rotor shaft, as shown and placed in the bearing blocks (339). This unit is now inserted in frame be-

washer and lock nuts on both sides. Do not tighten yet.

Now move bearing blocks (339) with gear (146), so that gear (146) engages fully into upper teeth of large gear without free play. Tighten carefully, otherwise PVC casing of the blocks gets jammed and distorted. Best result is achieved by tightening the cross screws until gear moves very heavy. Then loosen screws until gear moves smoothly. Screw socket head screws M 3 x 3o with lock nuts temporarily into frame.

Stage 7, Drive Unit (bag 7)

For this stage the engine to be used must be available. Basically, almost every modern 1o ccm engine with a crankshaft ending of 1/4 dia. (6.35 mm) may be used.
Please note, on many engines this part of crankshaft does not always run true. For this reason special attention should be paid to the adjustment of the gear (173), described as follows:

Put the gear (173) - 5o teeth - together with the ball bearings (456) and bearing-block (172) onto the free ending of crankshaft. Gear must be placed onto forward (mostly ribbed) surface of the engine hub. Slide on steel washer 6,4 mm and tighten well with the original crankshaft nut. When tightening, hold gear with full hand round, using a rag.
Check centrisity of the gear. Remove glow plug from the engine and rotate the crankshaft. One uncentrical stroke of up to 1/1o mm is permissible. Noncircularity beyond 1/1o mm can be recognized by sight, if stroke is too large, loosen crankshaft, rotate wheel slightly, retighten nut and check again.

Now insert engine with bearing blocks from the front into the frame and fasten bearing block with socket screws M 3 x 3o, using washers and M 3 lock nuts, screws must be left loose.

Almost every type of engine has a different flange. Holes in motor support (143) correspond to an average design, which may have to be corrected in some cases by slight filing. It is important that engine mounts are not distorted when fastening the engine to the frames. In the case of an engine with much wider hole spacing, additional holes may be drilled in the engine mounting flanges.
Both engine mounts (143) are fastened to the slots in the side plates with M 3 x 35 socket screws, using washers on both sides and M 3 lock nuts. In doing so, also insert the aluminum block (175) with long end upward, between the side frames. Eventually screws for bearing blocks of the clutch shaft have to be loosened again. Fasten engine with four socket screws M 3 x 15 and lock nuts M 3, onto engine mounts. Do not tighten screw yet.

Now adjust play between the steel gear and the large gear by moving the entire drive unit. The teeth of small gear, must engage fully but level and straight into upper teeth of large gear, with practically no play. All nuts of the engine mount and the ball bearing blocks can now be evenly tightened. Do not distort adjustment of the drive elements when tightening. These steps are very important to ensure easy movement of drive unit, and for durability of gears.

Stage 8, Fan Housing (bag 8)
screws are contained in bag 7

Cut out both halves of fan housing (PVC extruded part) along dotted line and drill holes at the marked points, 3,5 mm dia. The fan housing may be cut out with a jigsaw or similar. If cut along dotted line, the tip round openings are automatically also cut out.
Also cut out gear covers to protect gear and fix together with fan mounting screws.

Adjust the two halves of fan housing to the side plates. Cooling duct is led up to the cylinder. Right side of cooling duct (in flight direction) should be shorter than left side, so warm air can be deviated to the left. On adjustment provide vents for the neeedle valve, carburetor lever etc. To avoid loss of cooling air, keep vents as small as possible.

Glue the two halves of the fan housing on forward, outer edge together. Looking in flight direction, left fan housing half should be bent to the outside, push fan housing from the front onto fan wheel fasten on both sides with 4 steel screws M 3 - 8 with large washers into the tapped holes of the side parts. At the same time screw on the gear cover. Eventually now the position of the fan wheel has to be corrected and adjusted to centricity of fan housing.
The cooling air deviator is fitted into the fuselage at a later stage, now it is just cut out.

Stage 9, tail rotor gearbox, (bag 9)

Push bevel (348, 22 teeth) onto tail rotor shaft (333)so that the rotor shaft projects about 14 mm on the gear side. Fasten with socket head screw M 3 x 3. Slide one open ball bearing (352) and one shielded ball bearing (363) onto the shaft with the shielded bearing on the outside.
Bevel gear (347, 17 teeth) is fastened with socket screw M 3 x 5 onto tail rotor shaft (363), do not tighten screw yet, so that the drive shaft may also be pushed in later. Ball bearing (352, open) and (363, shielded) are slid onto shaft with the shielded bearing outside. Fit both gear assemblies into tail rotor gearbox (34o). (Long shaft 333 in square part, short shaft 346 into round part).

Grease gears well and fill gear box with
grease before assembly.

The two holes on the gearbox, beneath the bevel gears, are each closed with screws M 3,5 x 5, so that warm and liquid grease cannot leak out.
The tail rotor gearbox is now assembled with screws M 3 x 25 and lock nuts, nuts upward.
Pre-assembled bearing block (341) with control lever (342) and control rod (349) is fed into rotor shaft (333), use grease, and secured with 4 M 3 x 1o screws. Control lever (342) positioned below.

Stage 1o, Tail Rotor, (bag 1o)

The brass spacer tube (359) and tail rotor hub (327) are pushed onto tail rotor hollow shaft (333) and fastened with one socket screw M 3 x 3 (use wrench 1,5 mm) fitted through the lateral tapped holes. Tighten well. Place two ball bearings (316) in the plastic halves of blade mounts (317). Fit the blade mounts together and secure with M 2 x 1o screws and nuts. Fasten to each arm of blade mount (317) on the outside a ball joint and secure with M 2 x 1o screws and hexagon nuts. Put a 2 mm washer between the ball and arm. Screw on to the tail rotor hub the assembled blade holders and fasten with M 3 x 8 socket head screws. Use 2.5. mm wrench. Secure tightly!

Push on to protruding control rod wire:

1 Collar (314)

2 Washer 2 mm (important)

3 Control plate (315)

4 Washer 2 mm (important)

5 Collar (314)

Fasten collars temporarily with 2.6 x 4 mm set screws. Fasten two ball joints to control plate (315) with two M 2 x 1o screws. Note: Looking from the left, the tail rotor rotates to the right. The control arms with ball joints are positioned in front of the blade mounts.
Fasten M 3 x 15 screws and M 3 lock nuts to the blade holders temporarily. (The tail rotor blades will be installed later).

Stage 11, Main Rotor I, (bag 11)

As shown, the already assembled blade shaft holders (555) are loosely fastened between the side plates (551) with two M 3 x 3o socket screws and lock nuts. The control arms are inserted in the slots of the side plates (551).
Feed into shock absorber (567)two rubber shock absorbers (569) and two spacer sleeves (568). Shock absorber with rubbers and spacer sleeves are screwed loosely betweenthe two side plates, using two socket head screws M 3 x 27 (shortened screws) and two lock nuts.
Fit the black steel bearing (563), longer end first, into the center top hole of the pre-assembled rotor hub. Spread the loosely pre-assembled side plates slightly and fit onto the steel bearings (563), tighten all six screws of the side plates well.

Rotor blades must have the same V-form or the same coning angle. Eventually the clamping screws for the bearing blocks of the pitch lever of main rotor have to be loosened and V-form corrected. Not the size of the V-form is important, but that both blades are equal. It is recommended to measure the distance between the blade tips and the tail rotor, rotate the rotor by 180° and measure the distance of the second blade.
Two steel ball fittings (434) are fitted into the control arms and secured with M 3 nuts.

The aluminum adapter (575) is fitted onto the blade shaft (572) and fastened on the inside hole with a M 3 x 15 socket screw and a M 3 lock nut. These screws have to be tightened well to avoid later slipping of the adapter (575) on the shafts (572). If the true tracking decreases on flying, in most cases it depends on this screw. The flat blade holders (574) are fastened onto the outer hole with M 4 x 2o socket screws and lock nuts. The blade holders and with these, the rotor blades, can now pivot readily.

Stage 12, Main Rotor II, (bag 12)

As shown, screw into mixing lever (561) three stell ball fittings (434) with hexagon nuts M 3. Slide onto transverse shaft (558) from the side one bushing each, spread mixing lever (561) slightly and allow to snap onto shaft. Stabilizer bar (564) is inserted through this shaft, grease. Fit washer on both sides and steel collar (559) on one side. On other side, fit control lever (562), ball joint with the brass ball facing inward.

Thread the plastic control paddles (749) onto ends of stabilizer bar and fix with glue. Line them up in an exactly parallel position. The thread will cut itself into the paddles. Take caution not to overtighten paddles. The stabilizer bar is now moved back and forth until it is balanced exactly. This procedure is important and must be executed with great care. Later, controling and smooth rotating of the rotor depends on this. After the center position has beeen fixed, collar (559) and control lever (562) are secured to the stabilizer bar with socket head screws M 3 x 3. Stabilizer bar should still have a small axial play and move smoothly in the rotor hub. On tightening the control lever (562) note: lever should be positioned exactly paralell with control paddles. On mounting the control paddles, take care that the rotor rotates to the right (viewed from above) and the small side of the paddles looks to the front (viewed in rotation direction)

To increase stability of the stabilizer bar, you can add balancing weights (order No 755). This has the advantage that weights can be added or taken off on flying field without having to change any other adjustments. Maximal two weights are permitted.

Slide on this pre-assembled unit with the rotor hub onto the main rotor shaft. Insert socket head screw M 3 x 3o, with black steel bearing washers (57o), through the steel bearings (563) and through center hole of main rotor shaft and tighten with lock nuts M 3.

Screw onto the protruding pitch linkage one ball joint without ball and press onto middle ball head of mixing lever. Adjust ball joint so that mixing lever is absolutely horizontal when arm of toggle lever (476) faces exactly vertically downward. (Both levers in middle position). Provide control rod (573) (8o mm long) with two ball joints and press onto ball head of upper swash plate ring, respectively on ball of control lever (562). Control rod (573) has a shorter thread on one end, screw into ball joint, which shows downward.

The length of the rod should be adjusted so that in a middle position stabilizer bar and control lever (562) are exactly horizontal. Control rod (573) is routed on lower part through the fork of carrier (444). Push carrier upward so that the pitch linkage, which is threaded through the slot of the rotor shaft, does not touch in its lowest position. Tighten carrier with two socket head screws M 3 x 3.

Control rod (573) routed upward, exactly in the middle of the two side plates. Do not overtighten clamping screws of carrier.

For later blade mounting, screw into the blade mounts the remaining 6 socket head screws M 3 x 15 and lock nuts temporarily. Adjustment and rotorblade mounting will be executed at a later stage.

Screw together each, two ball joints without ball and control rod (433) 2o mm long, leaving 4 mm rod uncovered between the ball joints. Connect with these rods ball heads of mixing lever above, with ball heads on the blade pitch levers.

Note, both blade pitch levers must have the same distance to the rotor head.

Stage 13, aerobatic extension (bag 13)

For improved control, the extension set for aerobatic flight can be installed. This can be achieved by direct control of the main rotor blade through the swash plate. This results in mixing of direct control through the swash plate and indirect control and stabilizing by the stabilizer bar. The appropriate order can be seen on the picture.

Dismantle the two ball heads of the blade pitch levers and screw tightly into the threaded holes of upper swash plate ring. The two small mixing levers (566) with the ball heads to the outside, are screwed with one each steel bearing (535) and a steel bearing washer (557) onto the outside of the blade pitch levers. (sequence from the out- to the inside as follows:
Socket head screw M 3 x 8, steel bearing washer (557), mixing lever (566), steel bearing (535), pitch lever and hexagon nut M 3.

On assembly of these parts, take care that the mixing levers (566) move absolutely smooth, but also without play. (grease).

Now the ball joints, originally fixed to the ball heads of the pitch levers, are led downward and pressed onto the riveted ball heads at short arms of the small mixing levers.(as shown). Two rods (436) 4o mm long, are provided with two ball joints each, without ball. With these a connection between the ball heads in the upper ring of the swash plate and the long arms of the small mixing levers (566) is executed. (The two rods are routed to the same side upward).

Basic adjustment: In middle position of the pitchlinkage (mixing lever on the stabilizer bar horizontal) and a middle position of the swash plate (exact horizontal position), the small mixing levers on the pitch levers must also be exactly horizontal.

Stage 14, Rotor blades (bag 14)

Both main rotor blades (881) are already shaped and provided with holes for the blade mounts. Before covering the rotor blades with self-adhesive foil, it is advisable to sand the trailing edge lightly. Paint tips and the area around the mounting screws. Cover the rotor blades with self-adhesive foil wich has already been cut to size. Do not cover area at the blade connections!

If you intend to fly the aerobatic version (extension by direct control of the main rotor blades), the ends of the blades must be re-inforced with fiberglass cloth and resin. This is a must for aerobatic flying!

Procedure for Covering

Remove pre-cut foil from backing paper and place foil on a smooth and even surface, with self-adhesive side up. Place the rotor blade with top surface up on top of foil, foil must overlap the trailing blade edge by about 1 cm. Press blade on foil in this position and take care that the trailing edge is lined up straight with cut foil. Put the foil carefully around leading edge and press down thoroughly throughout. Try to avoid air bubbles forming under the foil. Fold overlapping foil edge around trailing edge of the blades with as sharp a crease as possible. Now fold the broader part of the foil clean and without air bubbles around the leading edge,press onto second side of rotor blade. At the trailing edge, the foil will overlap the already covered side by about 1 cm.

Press foil end down thoroughly to prevent its peeling off during later use. Fasten main rotor blades to blade mounts with 3 each M 3 x 15 screws (looking down from above, rotor rotates to the right). Rotor blades have to be in a straight line with blade mounts, blade pitch lever at zero position has to coincide with zero line of the fully symmetrical rotor blade profile.

Balancing of the main rotor, resp. of the main rotor blades

Instead of using a screw for rotor head fastening, a 2 mm steel wire is used and the entire rotor head (as shown) similar to a see-saw, is suspended between two blocks. For the following adjustments, it is important that main rotor hub stands up vertically from the side plates on rotor head. Even a small inclination of the rotor hub will influence the adjustments.

More weight has to be applied to the lighter weight blade (shown by an upward motion) by adding additional self-adhesive foil along the blade length until counterbalance is achieved, starting on the blade tip. This step is important for a smooth running rotor system and should be done very carefully.

All further questions regarding the balancing of the blades, determination of the center of gravity of rotor blades etc. are answeredin my book "Schlueter's Radio Controlled Helicopter Manual" - english - order No 9956, obtainable at your dealer or with a direct order from my firm.

The plastic tail rotor blades (748) are installed without covering.

Install the tail rotor blades in the blade holders with the screws provided. Tighten screws so that the blades are just held in their position, but can pivot away when touching an obstacle. When installing blades,note that tail rotor rotates clockwise when viewed from the left side of the helicopter.

Stage 15, Tail boom and Tank, (bag 15)

Tail boom (366) has already been furnished with a guide tube for the flexible shaft and has to be fed with the un-sloted long end into the side plates at the rear 2 mm up to the bearing block for the tailrotor drive. Align tube, so that bent end shows vertically upward. Tighten the 4 M 3 x 3o screws only slightly in order that tube is hold in place but not jammed.

Cut out horizontal stabilizer of plywood, glue together, lack and screw with two countersunk screws M 3x1o with large washers and nuts underneath the U-rail of the tail support (367). Screw tail support onto the side plates using two steel screws M 3 x 8 and hexagon nuts underneath and fasten at the rear end with clamp (354) onto tail rotor.

Feed into the hollow shaft of the already mounted tail rotor gear, the complete flexible shaft (365), retract for approx. 1 mm and tighten with socket set screw M 3 x 5, using socket wrench 1,5 mm, through the drilling of housing.

Important: The clamping screw must press through the cross drilling of the hollow shaft onto the flexible shaft, otherwise the hollow shaft gets only jammed and the flexible shaft slips away.

The same applies to the forward end of the flexible shaft.

Now grease flexible shaft thoroughly over whole length, fasten clamp (354) on tail tube,feed shaft into the guide tube of tail boom.and allow insertion into hollow shaft of tail drive. Feed into tail tube the tail rotor gear and align to the left. Tighten clamp over slottedend of tube.

Rotate tail rotor and main rotor several times in order that tail shaft engages. Tighten clamping screw M 3 x 5 of flexible shaft.

Provide tank with fittings, according to picture, and fasten with the two clamps (836) to tail support. (Use M 3 x 3o screws with nuts and washers)

Stage 16, Servo mount, (parts contained in bag 15)

According to drawing cut out servo mount of 2 mm plywood, determining servo position and providing the corresponding openings and drillings for later servo-installation.
Pay attention that the servos have to be mounted partly from the left and partly from the right side, whereas the opposit side has to be kept free.

A favorable servo sequence can be viewed on the building instruction. These servo positions are well proved and therefore recommended. Length of linkage depends on this position.

Accumulater and receiver are located in front of the servos in the corresponding openings. Recommended is anopening for the accumulator in the left plate of the servo mount, in which the accumulator may be inserted. Receiver will be fastened with a rubber band and foam underneath onto the outer right side plate, using self-bent wire-hooks, inserted through the plates.

The on-and off-switch shouldbe screwedon the upper servo mount and should be operated through a large enough hole in the canopy. This assembly is well proven it provides the installationof the entire control unit onto the servo mount.and if required,the removal of the complete unit.

After completion of all openings the two plywood side plates are glued together to a closed box, using two pinewood strips. Align box carefully and screw together.

Caution has to be taken to leave enough space for the access of the glow plug, when using glow plug wrench. (Refer to building instruction). Pinewood stripes must be kept short enough and servos positoned accordingly.

Provide bearing block (14o) with mixing lever (344) with steel screw M 3 x 2o, washer 3 dia. from above and hexagon nut from underneath. Tighten screw that lever is without play but easy to move.

Screw bearing block (14o) tightly with 2 steel screws M 3 x 1o, four washers and locknuts between plywood boards.

Screw U-rail (176) with socket head screw M 4 x 15 on upper part of engine block (175), looking to the front. Push servo mount onto U-rail and secure with 4 steel screws M 3 x 3o with 8 washers and 4 nuts. Now again align the complete servo mount.

Duct for the cooling air (to the right) will be adjusted above the engine, using 2 steel screws M 3 x 1o with large washers 3 dia. and screwed under the U-rail (176). Now you may lac or paint the servo mount for isolation.

For the removal of the servo mount take off one socket head screw of the upper and two steel screws of the under U-rail. Detach control rods and retract the complete mount incl.Alu-rail and duct to the front.

Stage 17, Casings
(small parts are contained in bag 15)

Cut out neatly the cabin, leaving an edge of 5 mm (view building instruction)
Hold cabin halves in place with pins and glue (PVC glue).
Procede in the same way with tail casing and jets, cut vents for the tank fitting leaving below an opening for the fuel tubing. Glue only upper tail casing and put open side over tail tube and tank.
Screw onto chassis with the rear, upper screw of the tail tube mount, Use three self tapping screws each, 2,2 dia. x 6,5 mm and screw onto the side of the tail support (367).
Cut out openings at the right side of cabin front part for the cooling air exit and for the silencer unit. On high position of silencer, cut directly from the starter cone opening to the cooling air exit.

Canopy installation:

For the installation of the canopy,socket head screws M 4 x 2o are inserted into moulds of tank casing. Re-inforce inner and outer side of canopy at installation points with plywood pieces. (for details refer to drawing).
Now put canopy from the front over servo mount and mechanics, secure with nuts M 4 at the rear of tank.
To avoid slipping of the canopy at the front, glue remaining pieces of pinewood stripes 1ox 2o mm on upper and under inside of canopy. Stripes will slide between plywood plates of servo mount.

To prevent the fan from sucking dust on low flights, cut out plywood piece 2 mm (according to drawing) and screw between chassis carrier and skid strut, enabling the intake of cooling air from the side. Use fuel proof lacquer to seal plywood piece.

Painting procedures of canopy and rear fuselage are left to the pilots own personal requirements. Use resin lac, no Nitro lac!
On painting, take care to leave on both sides of tank area a"window", in order to check your fuel. Window-size should correspond with enclosed adhesive foil for tank contents scale. Glue scale underneath tank fittings.

Stage 18, Servo installation and control rods
(bag 16)
For sequence of the different control rods view drawings.
The routing of the control rods are illustrated clearly. The size and type of servos employed may cause some variation in positions of the various rods. The following swashplate movement should occur for full servo travel:

Swashplate to front	1o degrees
" to right	1o degrees
" lateral to left	1o degrees
" lateral to right	1o degrees

These swashplate movements can be retained when using additional controls for aerobatic flying. The model will react much faster, but still remain very stable.

Pitch angle of main rotor

Main Rotor	Tail Rotor Compensation	Throttle Pos. Idle
0 degrees	0 degrees	idle
+2 degrees	+2 degrees	2o%
+3 degrees	+4 degrees	4o%
+4 degrees	+6 degrees	6o%
+5 degrees	+8 degrees	8o%
+6 degrees	+1odegrees	1oo%

The amount of tail rotor compensation is changed by moving the trim lever into the slot of the mixing lever.

Less tail rotor compensation: Move lower rod, leading to the tail rotor more to turning point center.

More tail rotor compensation: Move upper servo rod downward, to turning point center. A good average value is achieved by moving the rods to the outer end of the mixing lever, according to drawing.

The final adjustment - mainly with the aerobatic version - is highly dependent on opinion, control habits and requirements of the individual pilot.

Tail rotor control:

Bowden cable is routed through tail casing and fastened with adhesive band at the tail tube. This must be executed very carefully otherwise adhesive band may loosen (warmth) and bowden cable slips out of place, resulting to different tail rotor adjustments. For this reason the cable is routed through a bent alu-tube and this as well is fastened with adhesive band.

There should be a tail rotor movement of 1o degrees to each side in addition to the compensation value.

When adding the extra parts for the aerobatic version (mixed direct control to the main rotor-blades) the control movements of swash plate (cyclic control for change of flight direction) are retained. Please note that the helicopter will react faster and more directly in this case, as compared to standard versions.

The collective pitch range, however, is reduced by the added aerobatic mixing levers. Accordingly, the control rod from the front mixing lever to the collective pitch lever must be attached in a higher hole. It may also be required to attach this rod farther outwards on the front mixing lever, so that a larger collective control movement is obtained. Note that it will now also be necessary to re-adjust the mixing lever for the tail rotor.

Main rotor blades must have an identical coning angle when in a stationary condition. If necessary, loosen the screws which retain the baring clocks to the blade axles a little and raise or lower one of the blades. The coning angle is not quite as important as the fact that both blades should have the same size. It may be advisable to measure the distance from one blade tip to tail boom.

For further information regarding flight training, maintenanceand accessories please refer to my book "Schlueter`s Radio Controlled Helicopter Manual", Order No 9956.

As silencer (muffler) we recommend the special silencer for the "SX 81", Order No 99o. Muffler will be supported by an additional fastening, fixed to the damper with a clamp and screwed onto the chassis at the right drilling, infront of the angled lever of the swashplate. An additional adapter for the silencer has to be ordered, No 933 for the corresponding engine. Please quote the corresponding figure, as listed in our catalogue.