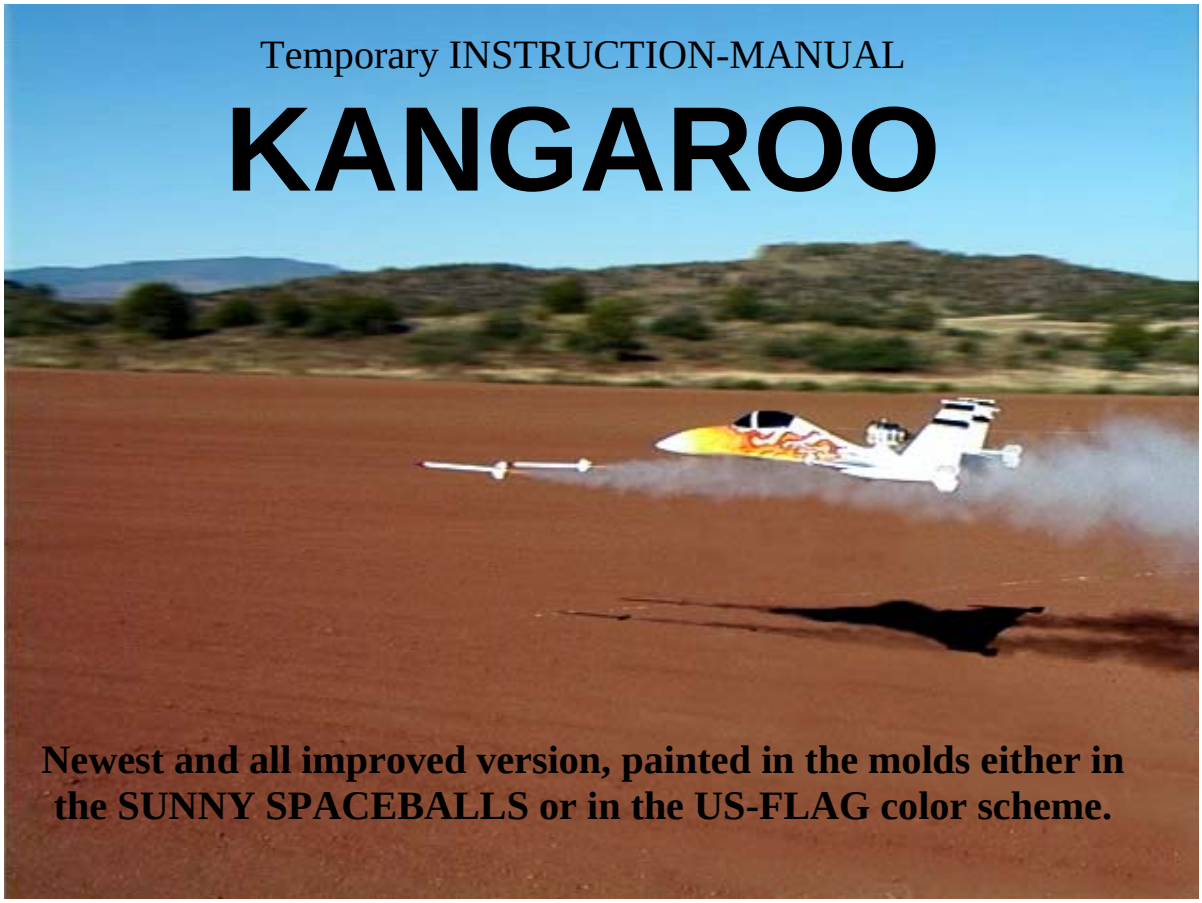
Temporary INSTRUCTION-MANUAL

KANGAROO



Newest and all improved version, painted in the molds either in the SUNNY SPACEBALLS or in the US-FLAG color scheme.

It is essential to read right through the safety notes and building instructions. Study them with the greatest care, and do not proceed unless you understand them completely!

Important: the construction of this model requires a high level of technical knowledge, manual skill and piloting experience. Operating a model with a jet engine requires a highly circumspect approach and specialised technical expertise. Please read and observe the safety notes in the building instructions. The turbine operating instructions are comprehensive and must be observed.

This instruction manual is only temporary, until the all new release is finished. Composite-ARF offers the free download from composite-arf.com of the new realease!!!

Warning
Safety notes and warnings concerning jet-powered models

Welcome to the jet age for model aircraft!

Before you attempt to fly the model for the first time it is absolutely essential that you read right through the operating and building instructions, and understand every part of the text. These notes are an integral part of the operating instructions and should be stored away carefully together with the instructions. If you ever dispose of the model, be sure to pass these documents on to the new owner.

Please note that operating the **KANGAROO** is potentially extremely hazardous. When powered by the **JetCat P 80 / P 120** jet engine the model is capable of airspeeds of up to 400 km/hr (250 mph). The case temperature of the **JetCat P 80 / P 120** can be up to 500°C (Celsius), and the exhaust gas may even reach 720°C. These engines are genuine turbines, and it is essential to study the instructions and warning notes supplied with your engine before you even attempt to run it.

The standard wing joiner for the KANGAROO is a 16 mm O.D. aluminium tube. This joiner tube is designed for normal flying in conjunction with a JetCat P 80, or other make of turbine rated at no more than 8 kg thrust. For an extra margin of safety it is possible to fit a length of 12 mm Ø beech dowel in the 16 mm Ø joiner tube. The dowel should be the same length as the aluminium tube, and glued in place using UHU plus endfest 300 (24-hour epoxy), or - better - thickened epoxy laminating resin.

If you decide to use a jet engine rated at more than 8 kg thrust, such as the JetCat P 120, it is essential to fit the beech dowel as described above in order to ensure adequate airframe strength. Of course, there is no reason why the supplementary beech dowel should not be used if you are using an 8 kg turbine or one of lower power. In the interests of safety we can also supply a CFRP joiner rod of appropriate size, which can easily absorb any load placed on it by the airframe. This part is available under Order No. 6264.220, and can, of course, be used even if you are fitting a turbine of around 8 kg thrust.
Contact PLANES PLUS (630) 904-9983

In the interests of your own safety and that of others, the model must only be operated by experienced, disciplined modellers with sufficient specialised expertise, and it must be serviced and maintained regularly and competently. If you have no experience in building and operating models of this type, it is vital that you enlist the help and advice of an experienced jet modeller if you are to avoid potentially catastrophic errors; this applies in particular to the jet engine itself, which should only be run when an experienced operator is present. If you have a model flying group or club in your area where training and support are available, we strongly recommend that you join that group. With this model any defect or deficiency in its construction or operation can result in serious personal injury or even death.

CAUTION!
Before you operate this model aircraft, you must determine the local by-laws and regulations which apply to you. In legal terms our models are classed as aircraft, and as such are subject to legal regulations and restrictions which must be observed. Contact Planes Plus regarding the AMA Regulations for turbine powered aircraft.

WARNING!
It is your responsibility to protect others from possible injury. Keep a safe distance from residential areas in order to protect people, animals and buildings: at least 1.5 km “as the crow flies”.
Keep well clear of high-tension overhead cables. Don’t fly the model in **poor weather**, especially when there is **low cloud cover** or **fog**. Don’t fly the model directly **into the sun**, as you could easily lose visual contact with the model. To avoid collisions, always keep well clear of full-size aircraft, whether manned or unmanned. It is your responsibility to land immediately if a real aircraft approaches.

When operating the **JetCat P80 / P120** jet engine you must keep people and animals a safe distance from it. This means:

In front of the turbine	4.5 m
To the side of the turbine	7.5 m
Behind the turbine	4.5 m

WARNING!
The operator of the model must be in full possession of his or her bodily and mental faculties. Operating a model aircraft under the influence of alcohol or drugs is not permissible under any circumstances. This applies both to the operator and to his or her assistants.

WARNING!
Radio-controlled model aircraft may only be used for the purpose intended by the manufacturer. They must never be used as machines for carrying people or goods, nor for any other purpose except as model aircraft. Misuse of this model may result in serious personal injury or even death.

WARNING!
It is important not to make any modifications of any kind to the model. If you deviate from the instructions, perhaps by using different components or materials, or by making changes to the structural design, you may seriously affect the ability of the model aircraft to function correctly. Please resist the temptation, and build the model exactly as directed.

WARNING!
Before you fly the model it is essential to check the Centre of Gravity and the control surface travels, as stated in these instructions. These settings are very important, and our recommended values must be observed. Before you fly the model, carry out a careful check of all the working functions and all the control surfaces. Check the range of the radio control system with the transmitter aerial collapsed. If the check is satisfactory, repeat it with the engine running, with an assistant holding the model securely. Read the instructions supplied with your radio control system, and make sure that you observe the manufacturer's recommendations.

LIABILITY EXCLUSION AND DAMAGES
You have acquired a kit which can be assembled into a fully working RC model when fitted out with suitable accessories, as described in the building instructions in the kit. However, as manufacturers, we at FiberClassics are not in a position to influence the way you build and operate your model, and we have no control over the methods you use to install, operate and maintain the radio control system components. For this reason we are obliged to deny all liability for loss, damage or costs which are incurred due to the incompetent or incorrect application and operation of our products, or which are connected with such operation in any way. Unless otherwise prescribed by binding law, the obligation of the FiberClassics company to pay compensation is excluded, regardless of the legal argument employed. This applies to personal injury, death, damage to buildings, loss of turnover and business, interruption of business or other direct and indirect consequent damages. In all circumstances our total liability is limited to the amount which you actually paid for this model.

BY OPERATING THIS MODEL YOU ASSUME FULL RESPONSIBILITY FOR YOUR ACTIONS.

It is important to understand that FiberClassics is unable to monitor whether you keep to the instructions contained in this operating manual regarding the construction, operation and maintenance of the aircraft, nor whether you install and use the radio control system correctly. For this reason we at FiberClassics are unable to guarantee or provide a contractual agreement with any individual or company that the model you have made will function correctly and safely. You, as operator of the model, must rely upon your own expertise and judgement in acquiring and operating this model.

SUPPLEMENTARY SAFETY NOTES
Pre-flight checking
Before every session check that all the model's working systems function correctly, and be sure to carry out a range check. This is the procedure: switch on the transmitter, followed by the receiver. Leave the transmitter aerial collapsed and walk away from the model. At the appropriate range check that all the control surfaces work perfectly when you move the sticks.
Repeat the procedure with the engine running, while an assistant holds the model securely.
The first time you fly any new model aircraft we strongly recommend that you enlist the help of an experienced modeller to help you check the model and offer advice while you are flying. He should be capable of detecting potential weak points and errors.

Be certain to keep to the recommended CG position and control surface travels; if adjustments are required, carry them out.

Don’t ignore our warnings or those provided by other manufacturers. They refer to things and processes which, if ignored, can result in fatal injury or permanent damage.

You alone are responsible for the safe operation of your radio-controlled model and its jet engine.

- Turbines may damage your hearing; always wear ear protectors when operating these engines.

- Never run a jet engine in an enclosed space such as a workshop, garage, hall etc. Turbines develop very high exhaust gas temperatures of +500°C and more, and therefore represent a serious fire hazard.

- **This model must only be operated outdoors.**

- Persons not required directly to operate the model and turbine must be kept well clear of the model. When the jet engine is running, never look, reach or walk into the area of the hot exhaust gas flow.

- When the turbine is running keep your hands at least 15 cm away from the area of the intake funnel. Keep all unnecessary objects - clothing, animals, children etc. - well clear. The engine develops a very powerful suction force in this area, which is perfectly capable of sucking a hand, finger or other object into the spinning compressor in an instant. Keep this potential hazard in mind at all times!

- Before you run the engine, remove all loose objects from the area of the intake duct. This applies to cleaning cloths, screws, nuts, cables and any other miscellaneous objects. Check in particular that you have not left any small loose items in the inlet duct, such as waste materials from building the model, odd screws or even sanding dust. Loose parts can very quickly enter the turbine and cause serious damage or personal injury.

- When running the jet engine always ensure that no persons, animals or movable objects are in the plane of rotation of the engine (hazard zone!).

- Propellers and other rotating parts which are powered by a motor represent a constant hazard and present a real risk of injury. Don’t touch them with any part of your body. For example, a propeller spinning at high speed can easily slice off a finger.

- At low ambient temperatures the plug-in connections for the starting gas / fuel system may freeze or bind; the starter mechanism may also tend to freeze up. Free the parts carefully - on no account use excessive force.

- All model flyers should behave in such a way that the danger to people, other creatures and property is minimised. Never act in any way which will disturb other modellers and prevent safe, orderly flying at the site.

- Turbine fuel is toxic! Avoid skin contact at all times! Fuel must always be stored in clearly marked containers, and kept out of the reach of children.

- Jet-powered models are capable of extremely high airspeeds, and for this reason they must only be flown where there is plenty of open airspace, and where unrestricted vision is guaranteed. Do not fly the model when there is low cloud cover, and never fly directly into the sun in bright conditions. Since the model is so fast, within a few seconds it can fly completely out of sight of the pilot. Always give way to full-size aircraft of any kind well before there is the remotest chance of collision. To avoid all risks, stop the turbine and land the model as quickly as possible. Manned aircraft and human life have top priority.

- Do not fly the model unless you are in the best of health, and are able to concentrate fully on the activity.

- Turbine fuel is volatile and highly inflammable, and must be kept well away from open flames, excessive heat and possible sources of sparks. Do not smoke anywhere near the area where fuel, fuel vapours or gas may be expected.

Whenever you are operating a jet engine it is essential to keep a fully charged, correctly maintained **C02 fire extinguisher - not a powder-based type** - to hand at all times, together with a **fire blanket**. Flammable and volatile objects and materials, such as fuel containers and gas bottles, must be kept well out of the range of the turbine’s hot exhaust area. Jet engines represent a serious fire hazard, especially in dry Summer conditions (dry grass, stubble etc.).

- Jet engines develop great heat and run at very high temperatures; even when stopped and left to cool down for a considerable period, some parts can still be hotter than 80°C. If you are unsure, you can avoid painful burns simply by not touching the engine.

- Never touch any part of the turbine when it is running. Keep well clear of the area around the intake and the exhaust.

- At the end of each session remove all traces of fuel remaining in the engine and tank, and allow residual gas to dissipate before placing the model in your car. Note that escaping compressed gas is extremely cold and can produce freeze burns, so avoid skin contact. At all times keep well clear of open flames (cigarette lighters, matches etc.); when filling or draining fuel tanks, as gas or liquid fuel may escape and cause a fire hazard.

- Every time you intend to operate your model check carefully that it and everything attached to it is in good condition and undamaged. Do not fly the model unless you are confident that every part of it is in perfect condition. Don't be tempted to compromise your safety standards. If you detect visible damage, or hear any abnormal system noises which might indicate bearing wear or some other problem, cease operations immediately and eradicate the fault.

  Never attempt to dismantle or repair the turbine yourself. All work on model turbines requires specialist knowledge and special tools; don't try it yourself.Any attempt to interfere with the engine invalidates the guarantee, and the manufacturer will refuse any claim under warranty and any claim for damages in that case.

- Be sure to keep an adequate supply of fuel in the tank. Don't continue to fly the model until the tank is drained dry - it never happens.

- Never fly directly over people or other creatures.

- Never fly directly towards people.

- Keep a safe distance from residential areas: at least 1.5 km "as the crow flies". The best solution is to join a model flying club and use the approved flying site. Always keep well clear of high-voltage overhead cables.

- Take-off and landing strips should be kept free of people, animals and movable obstacles, particularly when a model is using the strip.

- Don't operate your model from residential areas, public roads, squares, school playgrounds, public parks or sports grounds etc., and ensure that you always have the model under control.

Building and operating the Kangaroo calls for a high level of technical skill and knowledge, and the model should only be flown by an extremely competent model pilot. The model is highly pre-fabricated, but the work which you have to carry out is crucial, and must be completed with the greatest care. The model will only be strong and fly well if you complete your tasks competently - so please work slowly and accurately.

Essential accessories (not included in the kit):
Radio control system: you will need at least a 7-channel RC system, i.e. 7 separate functions.

Foam rubber for packing and protecting various internal components.

Adhesives, thread-lock fluid,
Thread-lock fluid is used on screwed joints to prevent them shaking loose, and should be applied to all screw-fitting linkage components. Don't use it where screws are fitted into plastic parts, e.g. control surface horns. You will also need epoxy laminating resin, 5-minute epoxy and CA glue (thick and thin) together with CA activator spray.

Before you start building the model:
If you are buying a radio control system for this model, check that the transmitter and receiver are suitable for **model aircraft** and bear the standard type-approval sticker.
The frequency bands used for radio control systems are shared by other radio equipment and radio-frequency apparatus, so we cannot guarantee that you will not suffer interference when using your system.

During construction
Adhesives and paints contain solvents which may be hazardous to health under certain circumstances. Read and observe the notes and warnings supplied by the manufacturer of these materials. Take waste glue and paint back to the model shop for disposal, or to your local toxic waste collection centre.
Take care to keep tools, adhesives and paints out of the reach of children.
A large, unobstructed working surface is a great advantage for all types of model-making.

Essential tools for building the KANGAROO:
This high-quality model is of all-glass construction, so completing it is really just a matter of assembly work. The model is designed as standard to accept a retractable undercarriage, and mounts for standard commercial retract units are already bonded in place. However, you will soon see that the underside of the fuselage is not cut away for the retracts; you will only find guide lines scored in the moulding, and these apply only to our recommended retract units. There are good reasons for this: if a customer already owns a suitable set of retracts, then factory-cut openings would not necessary fit, and the same applies if you prefer to fit a make of retracts other than those we recommend. That is why we only provide approximate guide lines. Cutting the openings and installing the retract units is not necessarily a straightforward task, and calls for careful thought and accurate working to avoid mistakes. In fact, installing the retracts is the most complex and difficult part of construction. However, the type of modeller for whom the Kangaroo is intended will not find this difficult.
A well-equipped model workshop with all the usual machines and tools is a fundamental requirement for anyone wishing to become a jet pilot. However, that does not mean that a milling machine, lathe and other engineering tools and facilities are inevitably required.

Gluing different materials
The table below shows the correct glue to use for various typical joints in the model. It is just a guideline, and is not intended to be comprehensive.
All glued joints must be carried out with great care, and this applies in particular to gluing the control surface horns in place, and fixing the plates which support the RC system and turbine components, together with the formers, mounting plates and rails associated with them. For these important joints we recommend epoxy laminating resin and a suitable thickening agent such as chopped cotton, 5-minute epoxy, or thin / thick cyano used with activator spray. Provided that the GRP surfaces of the KANGAROO's components are roughened thoroughly, it is possible to make such joints safely using thick CA and accellerator spray. CA does not attack the material used as the filler in the GRP sandwich, and is also safe with the foam used for the formers (Herex); it produces really strong joints with these materials. These joints are usually stronger than the Herex / sandwich material itself. However, it is important that all formers and other internal parts which are glued in place with CA should be a really accurate fit. Bear in mind that it is not possible to adjust their position once the glue has been applied, as is possible when using epoxy resin or 5-minute epoxy. The net result is this: if you are a very confident builder, use CA. If you are less experienced or "not so quick", use epoxy laminating resin or 5-minute epoxy to be on the safe side.
Please note: you must not use CA for the control surface linkage joints - gluing the GRP or phenolic horns in the machined slots in the wing and stabiliser control surfaces.

The horns must be bonded to the control surfaces of the wings and fins using epoxy laminating resin or 30 Minute Epoxy.

If you glue the horns to the control surfaces using CA of any type, you cannot be completely confident that the joints will not fail in flight. **It is essential to use epoxy laminating resin or 30 min epoxy for gluing the horns in place!**

If you are using 30 Minute Epoxy or epoxy laminating resin, be sure to use an adequate quantity of the adhesive of your choice. In the case of the horn joints, this means completely filling the machined slots into which the horns fit with resin!

Note:
Areas of the fuselage which are to be glued should be rubbed down with medium-grit abrasive paper to remove any lingering traces of mould release agent. Aim at reducing the glossy surface to a **FLAT** finish, otherwise there is little chance of a durable glued joint between the fuselage and other parts.

Caution:
Use only the adhesives which we expressly recommend.

Tips on assembling the model
The plywood parts for the KANGAROO are machine-cut to shape, but they may need fine trimming to obtain a perfect fit. When gluing parts together ensure that the joint surfaces are dry and free of grease and dust. Be sure to use the recommended adhesives.

Since so many parts of this model are of moulded construction, it is quite likely that some of the plywood parts will not fit exactly. Be prepared to carry out minor trimming, but this only takes a little while.

Building instructions

Please be aware, that these instructions are only temporary, as we took the former FiberClassics instructions and just copied and modified them slightly. As Composite-ARF feels strongly in charge of improving the Kangaroo instructions to the level of other Composite-ARF instructions, we will keep you updated on our homepage, when the new instruction book will be finished. But you should not worry, building the Kangaroo is so easy, that even with the instructions in front of you you will be able to complete the task with no major problems. If you experience any problems, please contact your Rep, he will happy to help you out. Please email us at feedback@composite-arf.com when you face any problems, which should be adressed in the new instructions with priority.

As already described in the Introduction, you will find that the kit contains very highly pre-fabricated airframe components of excellent quality moulded in GRP, some of them with sandwich reinforcement, with a virtually faultless white/red pigmented surface. The wings are ready-made at the factory, leaving only the installation of the servo mounts (included in the kit), and the elevon linkages to be completed. The same also applies to the rudder linkages. The model can be completed, ready to fly, in a very short time - typically 25 to 40 hours - although this does depend on your experience and technical expertise. The fact that the model is supplied in a two-colour finish and features virtually spotless surfaces means that the time-consuming tasks of painting and other surface treatment are eliminated. Your own markings can be applied (self-adhesive film or painted) to give your model an impressive and unique appearance.

The most difficult process in building the model is the installation of the retract units. The model features marked guide lines which are designed for the pneumatically operated and braked retract units, Graupner Order No. 175, which we recommend for this model, but the wells are not pre-cut.

It would certainly be possible for the factory to prepare pre-cut wells for the retract units, but there are drawbacks to this: there are countless different types of retract unit on the market, and many modellers are strict adherents to one or other make; in some cases the builder will have a set of retracts on the workshop shelf which are to be used, and for all these reasons we decided to leave it up to the builder to cut out and trim the retract unit openings to suit the undercarriage you intend to install, even if you do settle on the recommended units (Order No. 175). The undercarriage mounts are pre-installed and bonded into the airframe at the factory, and the mounts are designed to suit the retract units, Order No. 175, as we have already mentioned. Slight trimming and adjustment may well be required for these mounts due to manufacturing tolerances, even if you use the retract units we recommend.

If you decide to install our suggested retract units, you can follow the dimensions stated in the stage photos and the building instructions when cutting the openings for the wheels and mechanical units. These dimensions **may** also be used as the starting point for other makes of retract unit, **but - as already stated - even the dimensions in these instructions are only approximate values; they were measured from our existing prototype models**. The basic aim should be to keep the openings as small as possible, i.e. only as large as necessary, but large enough to allow the retracts to function correctly even if the wheel legs are slightly bent.
If you decide to install the airbrake / speed brake as suggested, we recommend that you mark and cut out the opening at the same time as you cut the openings for the retract units, so that the experience you gain initially can be exploited for the remaining work.

When you are marking out the position of the speed brake take care to locate it centrally and symmetrically, and cut it to the exact size stated. When cutting out the speed brake be aware that the brake flap you cut out is the brake flap you will use; the kit does not include a replacement panel or separate flap! With this in mind, aim at the narrowest possible gap when cutting, i.e. the tool which you use to separate the flap should be around the width of a balsa knife blade or a miniature sawblade. Cut very carefully!

Although the surface of the fuselage is hard GRP, in practice we find that it is best to use a reasonably rigid balsa knife or craft knife to cut the openings in the fuselage.

For accurate straight cuts use a steel straight edge or ruler. Curves can be cut free-hand, or - better - using a template which you prepare yourself.

The first step in cutting out the retract unit wells is to mark the dimensions on the fuselage (1) as shown in Figs. 1, 2 and 3 (note: dimensions are approximate). Next you have to check whether the marked lines coincide reasonably well with the factory-installed retract unit mounts. This is done by holding the fuselage against a very bright light: the bonded-in mounts will show up as shadows, and you can check their position with fair accuracy

against the marked lines. Start by cutting the wells for the mechanical part of the main retract units, as shown in Figs. 1; use the retract unit itself as a template for cutting the opening. Fit the retract unit in the well, then disengage the retracting leg and fold it down against the underside of the fuselage. Using a permanent felt-tip pen, carefully mark the wheel axis, i.e. the point which will be the centre of the circle for the wheel well. If you are using our retract units, Graupner Order No. 175, we recommend that you mark a circle of 43 mm radius. Cut out the wheel well, then disengage the undercarriage leg and lay it on the fuselage again. You can now easily mark the outline of the channel in which the undercarriage leg will lie when the undercarriage is retracted. Mark out the channel with a little excess width, and cut it out using a sharp knife and a steel ruler as a guide.

Install both main retract units, and check by hand that neither the undercarriage leg nor the wheel touches or rubs at any point on the well and channel when retracted. The main retract units can now be fixed to the mounts using the type of screw recommended. Fixing screws are supplied with our retract units, Order No. 175. These are self-tapping screws, and it is important to drill 2.5 mm Ø pilot-holes before fitting them, otherwise there is a danger of damaging the undercarriage mounts. To be precise, if you fit the retract unit screws without drilling pilot-holes, the screws may split and destroy the plywood plates into which the screws are driven. The recommended retract units include pneumatic brakes, and if your undercarriage also has this feature, this is the time to cut the hole for the pressure hose (see Fig. 4).

Mark the outline of the well for the retractable nosewheel unit based on the dimensions in Fig. 2. Disengage the noseleg and fit it through the cabin opening on the top of the fuselage and into the retract unit mount designed for it. Mark round the outline of the retract unit on the inside, as shown in Fig. 2.

The next step is to check that the marked outline on the outside of the fuselage coincides with that on the inside of the moulding, and this is again done by holding the fuselage against a bright light, so that you can check alignment. An alternative method of checking the well location is to push stout pins through the GRP laminate at corner positions. The retract unit well can now be cut out. Work slowly and patiently, with the aim of keeping the outline as accurate as possible, with just a slight gap all round. When you have established the correct position and cut out the well as neatly as possible, screw the noseleg retract unit in place as described for the main retract units (i.e. drill pilot-holes for the screws).

The retract units can now be installed permanently, but before you do this remember to connect the pressure hoses which control the retracting mechanism and the brakes, because they are much more difficult to fit once the retracts are installed.

The opening for the airbrake / speed brake, which you have already marked out, can now be cut out (dimensions in Fig. 3). Check your marked outline by holding the fuselage against a bright light once more - it is important that the marked flap should not overlap the former which is already installed in the fuselage. There should be at least 10 mm between the rear edge of the former (Herex foam) and the leading edge of the airbrake flap. When you are confident about the flap location, start by drilling the holes for the pin hinges; this is much easier to do before you start cutting. The position of the holes is shown in Fig. 5, but please note that a twist drill does not work well on the hard surface: instead pierce the GRP skin and the sandwich material with a sharp instrument, then file out the holes to final size using a suitable round file. The airbrake / speed brake has rounded corners, as can be seen in Fig. 5. The radius should be approximately that of a small coin. We found it useful to stick four coins (same value!) in the corners using double-sided adhesive tape, to ensure absolutely constant radii. The coins themselves then serve as cutting templates. Start by cutting the long straight lines, holding a steel straight edge against the coins, and finish off by cutting the corner curves. Don't attempt to penetrate the GRP outer skin in one cut; it is much better to make repeated light cuts, as this prevents the outer skin and/or the sandwich material being crushed or distorted. Carefully sand the flap and the opening in the fuselage using coarse glasspaper on a sanding block, then glue the pin hinges (19) in place using a length of 0.8 mm Ø steel wire (20) to aid alignment. Note that the pin hinges (19) must be shortened as shown in Fig. 5 before they are glued in place. Fix the flap in the opening by applying clear Tesa tape on the outside, and check that there is an even gap all round. Now thread the steel wire (20) through the hinges as shown in Fig. 5, and tape the steel wire to the outside of the fuselage, applying the tape outside the outline of the flap. This technique ensures that you install the airbrake hinges with their pivot axes exactly in line, and outside the line of the fuselage, which in turn allows the airbrake / speed brake to deflect through 90º or more without fouling its surround. The hinges can now be glued in place using thickened 5-minute epoxy as shown in Fig. 6. Allow the epoxy to cure completely, then remove the strips of tape. If the flap should foul its surround at any point, sand it back using coarse abrasive paper. When you are satisfied with the fit, glue the airbrake stop strip (14) (plywood, 350 x 20 x 0.8 mm) to the fuselage using thick cyano, leaving a support ledge for the airbrake about 5 mm wide.

Now screw the RC components for the steerable nosewheel and the speed brake in the pre-cut openings in the

RC installation plate (8). At the same time install the RC system switch (in our case the Power switch harness. The servo which operates the speed brake has to be installed inverted as shown. In the example in the pictures we are using two electronic control valves, Order, to operate the pneumatically operated and braked retractable undercarriage. If you prefer to use mechanically operated pneumatic valves to control the undercarriage functions, there is plenty of space on the RC installation plate (8) for the servos and associated components. The installation plate (8) is designed to be removable, to make it easier to install the various components. Fix the RC installation plate (8) to the machined plywood front support (9) and the two 35 x 19 x 9 mm plywood support blocks (10) using the 2.9 x 13 mm self-tapping screws (24). The position and layout are shown in Fig. 7. As with the retract unit mounts, don't forget to drill 1.5 mm Ø pilot-holes for the fixing screws, otherwise the plywood may split. Now place the RC installation plate assembly (complete with RC components) in the fuselage, and position it with the centreline of the nosewheel steering servo central in the fuselage. Assemble the linkage to operate the speed brake and connect it to the inverted servo. This pushrod is made up from a length of M3 studding (threaded rod) (21), an M3 clevis (22) and an M3 nut (23). Cut an opening in the factory-fitted Herex foam former large enough to clear the airbrake / speed brake pushrod; this is shown in Fig. 7. Now slide the RC installation plate, complete with all its fittings, into final position and glue the plywood support components (9) and (10) to the Herex foam former and the fuselage floor using 5-minute epoxy. Take care not to glue the plate itself in place. At this stage the Novotex horn (17) for the airbrake / speed brake can be placed in position (Fig. 6) and tacked in place using thick cyano. When the glue has hardened, reinforce the joint with a generous fillet of thickened 5-minute epoxy as shown. Now cut the airbrake / speed brake pushrod to length and adjust it carefully: when the servo is moved from end-point to end-point, the flap should close completely without stalling the servo, and then extend to max. 90°. Pushrod parts: M3 studding (21), M3 clevis (22), M3 nut (23).

Cut part (12) (turbine electronics support plate) to length, so that it fits exactly between the two factory-fitted Herex foam formers. Measure the actual dimensions from your fuselage, as manufacturing tolerances may cause slight differences (Fig. 8).

Now glue two plywood blocks (13) in place in such a way that the plywood plate (12) (on which the turbine electronics components will be installed) fits snugly between them: glue one part (13) to the bottom of the fuselage using thick cyano or 5-minute epoxy, and the other to the rear Herex former, parallel to the first and 3 mm above it (to allow for the thickness of the support plate (12)); use thick CA for this joint. Please note that the position of the fueltank (2-litre disposable Pepsi bottle) is fixed by the manufacturer; check that it still fits when parts (12) and (13) are installed.

Now fit the trimmed support plate (12) between the two plywood blocks (13) to establish the position of the third block (13), to which the plywood plate for the turbine electronics is screwed. Screw part (13) to the plate (12) using two 2.9 x 13 mm self-tapping screws (24), then glue part 13 to the former securely using 5-minute epoxy. When the epoxy has set hard, unscrew the two self-tapping screws (24), and it should be possible to lift out the support plate (12) (Fig. 8). The third part (13), to which the plate (12) is screwed, should now be attached securely to the front Herex former and the fuselage floor.

Epoxy the retaining plate (16) to the fuselage at the rear end of the canopy opening (Fig. 8).

Now tape the canopy (2) to the fuselage, taking care to position it accurately. You will find marked lines on both sides of the canopy, indicating the correct position of the canopy latches. Extend these lines onto the fuselage. Locate the marked point in the rear end of the canopy and drill a 6 mm Ø hole in that position, drilling right through the plywood plate (16) which you have just fitted to the fuselage. Enlarge the hole in the GRP canopy moulding to accept the head of the M6 x 20 socket-head cap screw (25); the screw head should pass through it without binding.

Remove the tape holding the canopy to the fuselage, taking care not to wipe off the marked points for the canopy attachment, then cut out the openings in the GRP fuselage and canopy as shown in Fig. 9; study the picture carefully! Installing the retainer lugs as shown in the picture may look difficult and excessively complicated, but the system works well and the canopy does not fall off!

On our model we use two retainer lugs (7), but you may wish to install up to four of them for extra security. This does involve extra work, and if you find our suggested latch system too complex you are welcome to invent your own alternative system. Just remember that it must be strong enough to ensure that the canopy cannot possibly come loose in flight!

The method of canopy retention described in these instructions may appear difficult and excessive, but in practice it is a simple, reliable system which has already proved its worth in the large number of "conventional" KANGAROOs of the same design which have already been produced and sold.

When you have completed the canopy latch system, and your canopy fits snugly on the fuselage without any ugly gaps, check that the hole you originally drilled at the rear end of the canopy still lines up correctly with the hole in the plate (16) which is glued in the fuselage. Adjust the hole in the plate if necessary, then drill it out to 7.3 mm Ø and glue the M6 captive nut (26) in place; we recommend 5-minute epoxy for this.

The next step is to assemble the plywood servo mounts for the four wing-mounted servos and the two rudder servos. The plywood parts (27) comprise machine-cut components to make a total of six servo mounts. Assemble the servo mounts and glue the joints with thick cyano. Fix the servos in the mounts, and glue the mounts in place using cyano (see Fig. 10). Check that each servo is positioned correctly on the base plates / hatch covers.

Before gluing the servo mounts permanently, be sure to check that the servos are aligned correctly, i.e. that the pushrods will exit the wings and run straight to the control surface horns. In our case the pushrod slots are in the top surface of the wing. Check in the same way that the rudder linkages are exactly correct (Figs. 10/11).

Fit extension cables to the servo leads as required, then fix the prepared servo mounts (complete with servos with output arms fitted) in the appropriate wells in the wings and fuselage using the self-tapping screws (28).

If you use standard servo extension leads, i.e. with plugs and sockets, then secure each connection individually with heat-shrink sleeving or tape!

The Phenolic (Novotex) horns (17) can now be glued in the pre-cut slots in the ailerons using UHU plus endfest 300 or epoxy laminating resin. Use the template supplied in the kit to set all the horns at the correct angle. Note that the horns must rest against the front edge of their slots, i.e. as far forward as possible relative to the hinge line gap.

General tip: before you make up any of the control surface linkages, check carefully that the servos are at neutral / centre, and that the servo output arms are correctly positioned. The output arm retaining screws must be properly fitted and adequately tightened. If the pushrods are straight, and perfectly aligned with the servos and the control surfaces, you will find it straightforward to program the radio control system satisfactorily.

At this point the pushrods for the four elevons can be made up and installed. Cut suitable lengths of the M3 studding (21), and complete them with the M3 clevises (22) locked in place with M3 nuts (23). Ensure that each elevon is accurately at neutral and in line with its paired elevon when the servos are at centre. The M3 nuts are used as locknuts to secure the clevises; alternatively you may prefer to solder the clevises to the rods (Fig. 11).

Fit the two 6.4 mm Ø brass tubes (29) and the wing joiner tube (5) through the pre-cut holes in the fuselage, slip the fins and the wing panels onto the tubes as shown in Fig. 12, and glue the brass tubes (29) in the holes **in the wings only** using 30 Minute Epoxy. This technique ensures that the wing incidence pegs (brass tubes) line up correctly with each other. When the epoxy has cured, cut off the brass tubes, leaving them projecting from the root ribs by about 25 - 30 mm.

- You may find that some slight adjustment of the hole diameter in the fins is necessary; at the factory we aim at a close fit, but manufacturing tolerances combined with material shrinkage may cause the fits to become slightly too close.

Locate the marked point on the fins (3) and push a round file through the moulding at that point to clear the wing retainer screw (30) (M6 x 30 socket-head cap screw). The hole should be just slightly larger than the screw diameter.

The next step is to fix the captive nut (26) in the fuselage, but first check that the factory-cut holes in the wing panels and fuselage line up correctly, and also line up with the hole in the fins which you have just made. Carry out any minor trimming required.

The M6 x 30 socket-head cap screws (30) would fall out of the root ribs if not secured, so cut pieces of silicone hose (31) about 8 mm long and push them onto the screws (Fig. 13). Install the captive nuts (26) in the fuselage and secure them with 5-minute epoxy. When the epoxy has cured you can screw the wings and fins to the fuselage using a ball-end allen key applied through the slot which is factory-machined in the underside of the wing.

When securing the wings, tighten the socket-head screws (30) no more than moderately. With the wings in place, check the alignment of the wing panels, fins and fuselage along the top surface of the wing root. If there is an unacceptable “black gap” at the wing / fin junction, sand the mating surfaces carefully to eliminate it (Fig. 14).

At this stage the GRP horns (18) can be glued in the rudders using 30 Minute Epoxy, again using the template to set the correct angle. Check carefully that the linkage geometry is identical on both sides (Figs. 15). It is also important that the pushrod from the horn should run in a straight line to the servo output arm (Figs. 15), and more or less parallel to the servo output arm slot.

Once you are sure that the rudder servo arms are correctly aligned and the servos are at true centre, the rudder pushrods can be assembled and the joints soldered. The parts required are the M2.5 studding (32), M2.5 locknuts (33), M3 clevises (22) and aluminium ball-links (34). The M3 clevises are soldered to the M2.5 threaded rods after the pushrods has been assembled and adjusted.

Press the linkage balls out of the aluminium ball-links (34), and attach them to the horns using the M2 x 15 cheesehead screws (35) and M2 self-locking nuts (36), as shown in Fig. 15.

Once you have completed all these stages of construction, the turbine can be installed together with the associated electronics, the fueltank system and the RC components. Carry out the set-up process for the equipment.

In our example we installed the JetCat electronics on the support plate (12) which is designed for this task. The gas and kerosene valves are fixed to the plate using self-tapping screws, the electronics and fuel pump using cable ties (Fig. 16). The self-tapping screws and cable ties are included in the kit.

To secure the turbine in the KANGAROO you will need the turbine clamp, which is designed specifically for the JetCat P 80 / P 120. Fixings for the clamp and turbine are included in the set.

Position the turbine clamp as shown in Fig. 17, mark the position of the fixing holes using the clamp itself as a template, and fit the four self-tapping screws to secure it. Here again, we recommend that you pilot-drill the holes, as described for the retract units, to avoid splitting the plywood reinforcements. Fit and tighten the screws to secure the turbine clamp. As you can see in Fig. 18, we packed up the rear of the turbine clamp with four 5.3 x 10 mm washers (37) on each side. This modifies the thrust angle of the turbine, and the revised setting has proved ideal for the beginner to model jet aircraft. Packing up the turbine clamp has the effect of altering the thrust axis of the turbine compared with the nominal setting. As your flying skills improve and you become more familiar with the KANGAROO, you will find it worthwhile to reduce the turbine thrust angle by steadily removing the packing washers. However, whether you are a beginner or an advanced pilot, we still recommend fitting the four washers (37) on each side initially. Once you have installed the turbine you can cut a hole in the rear of the fuselage for the cables and hoses as shown in Fig. 19. Now you can connect the turbine electronics to the turbine. Assemble the fueltank from a 2-litre disposable drinks bottle - this is a Pepsi bottle on our KANGAROO - following the instructions in the turbine manual, and install it in the model.

These 2-litre disposable bottles are not exactly precision items, and manufacturing tolerances may make it necessary to trim the former which supports the bottle. Check that the tank bottle fits in the fuselage (Fig. 20), then glue the machine-cut plywood fueltank support (11) to the front Herex former using 5-minute epoxy, resting against the RC installation plate (8). Caution: do not glue it to the RC installation plate, otherwise the plate will no longer be removable. Fit the two ring-screws (38) in the RC installation plate (8) so that the fueltank bottle can be secured using rubber bands or cable ties (Fig. 20).

The rear part of the fuselage features factory-prepared wells on both sides to house the batteries. Install the batteries after fitting extension leads as required: the battery leads must be long enough A) to reach as far as the switch / turbine electronics and B) to be deployed neatly inside the fuselage. If you use a genuine JetCat turbine battery, you will find that the cables are long enough as standard. You may have to cut holes in the battery wells for the cables; this can be done using a long drill bit, or a metal rod or tube heated with a gas torch. Make the holes just large enough to suit the connector which has to be passed through them.

By this time you should have installed the electronics for the turbine and the radio control system, together with the pneumatic, fuel and air lines, and connected all the equipment. You just might have noticed by now that there is a substantial quantity of cable, hose and general technology inside the model. The more neatly you deploy all this, the easier it will be to ensure that everything works correctly. As far as possible, group the cable runs together in a clear, logical way, and arrange and secure them in an orderly fashion. We recommend that you

separate the various cables associated with the turbine and the turbine electronics from the cables associated with the receiving system, i.e. servo extension leads and the like. The cable looms can be secured in the model using self-adhesive cable tie fixing pads.

In our models we linked the two rudder servos to a single receiver output by means of a Y-lead. The nosewheel steering servo is also linked to the same output using a second Y-lead.

When you are setting up the retract units and the steerable nosewheel please note that A) the nosewheel must be exactly "dead-ahead" at the centre position, and B) the steering cables must not get tangled when the gear is retracted (Fig. 21). The parts required to steer the nosewheel are not included in the kit.

The pressure tank for the pneumatic retractable undercarriage, and the turbine gas tank, are installed forward of the nosewheel former (plenty of foam padding is sufficient). As can be seen in Fig. 21, we fitted the turbine gas tank standing upright, secured to the noseleg former with a cable tie. For this arrangement you will have to drill your own holes.

If you have built the model exactly as we have described, and installed the recommended airborne RC components and turbine system (JetCat P 80 / P 120), then the Centre of Gravity should be more or less correct without requiring much ballast. Check the CG with the tank empty and the canopy in place.

The Centre of Gravity of the model should be located about 95 - 100 mm forward of the front edge of the wing joiner tube.

The next step is to program the radio control system; we recommend the following control surface travels as a starting point:

Elevator travel	+/- 25 mm	)	
Aileron travel	+/- 20 mm	)	20% Exponential
Rudder travel	+/- 8 - 10 mm	)	

Both control surfaces on each wing panel should deflect by exactly the same amount up and down.

The two surfaces on each wing panel work in parallel, operating as mixed elevators and ailerons (elevons).

A typical programming procedure for the mc-24 radio control system is included in the building instructions.

When programming the system and setting up the control surfaces it is important to ensure that the travels are completely symmetrical and synchronous, i.e. if you apply up- or down-elevator, all four elevons should move an equal distance up or down. This ensures that the model will actually climb straight ahead when you apply up-elevator, rather than flying a roll!

Calibrating the elevon travels is very important to the model's control response and general flying characteristics, and we strongly recommend that you measure the deflections carefully using geometry measuring instruments (setsquare etc.) while you are in the peace and quiet of your workshop - not at the flying field.

The model's appearance is improved considerably by picking out the canopy in a contrasting colour, masking it out along the moulded-in lines. Apply the decals supplied in the kit to finish the model off nicely.

Before you test-fly the model, check that all control surface linkages are really slop-free, and secure all locknuts with a drop of Thread-locker fluid. Check that the retract system works with 100% reliability, that all three legs lock when extended, and that the turbine and its associated system components are in order.

Check that you have programmed all the control surfaces to deflect in the correct "sense" (direction), and that the travels are as stated.

Carry out a comprehensive range check with the turbine running.

Are all the installed components properly mounted and adequately secured? Could they tear loose,

bearing in mind the high rates of acceleration which they will undergo?

Is the Centre of Gravity of your model actually at the manufacturer's stated position, i.e. 95 - 100 mm forward of the front edge of the wing joiner tube?

Are the batteries for the receiving system and turbine electronics well maintained and properly charged?

If you can answer yes to all these questions, then you and your model are ready for the first flight.

Have you read the safety notes and building instructions carefully and understood them completely?

The construction of this model requires a high level of technical knowledge, manual skill and piloting experience. Operating a model with a jet engine requires a highly circumspect approach and specialised technical expertise. Please read and observe the safety notes in the building instructions, and the information in the instructions supplied with all the auxiliary equipment.

Before you fly the model for the first time, and indeed before you attempt to run the engine, read as much as you can on the matter of model jet turbines, and make yourself thoroughly conversant with the subject. Don't run your turbine until you are confident that you understand how the system works, and that you are capable of operating the engine safely. There is plenty of information in the public domain concerning these potentially hazardous power plants, and for safety's sake it is your responsibility to find out all you can. If you know a modeller in your locality who has experience with jet models, don't be too proud to ask his advice. Nearly all modellers are generous with their help and suggestions, so make use of all the help you can get!

We hope you have many hours of pleasure building and flying your KANGAROO

Again we appologize, that these instructions are only temporary, as we took the former FiberClassics instructions and just copied and modified them slightly. As Composite-ARF feels strongly in charge of improving the Kangaroo instructions to the level of other Composite-ARF instructions, we will keep you updated on our homepage, when the new instruction book will be finished. But you should not worry, building the Kangaroo is so easy, that even with the instructions in front of you you will be able to complete the task with no major problems. If you experience any problems, please contact your Rep, he will happy to help you out. Please email us to feedback@composite-arf.com when you face any problems, which should be adressed in the new instructions with priority.

Please contact your Rep regarding any existing AMA Regulations for operation of Turbine Powered Aircraft. It might be important even for the fuel cell installation already.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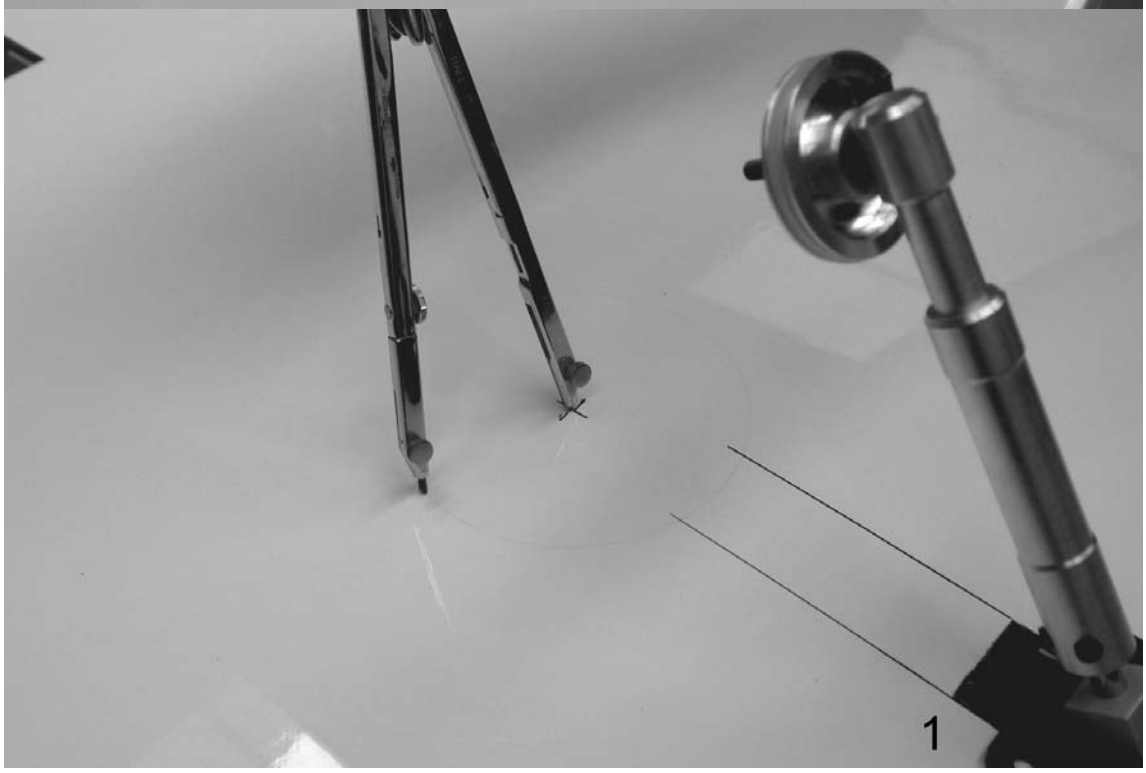
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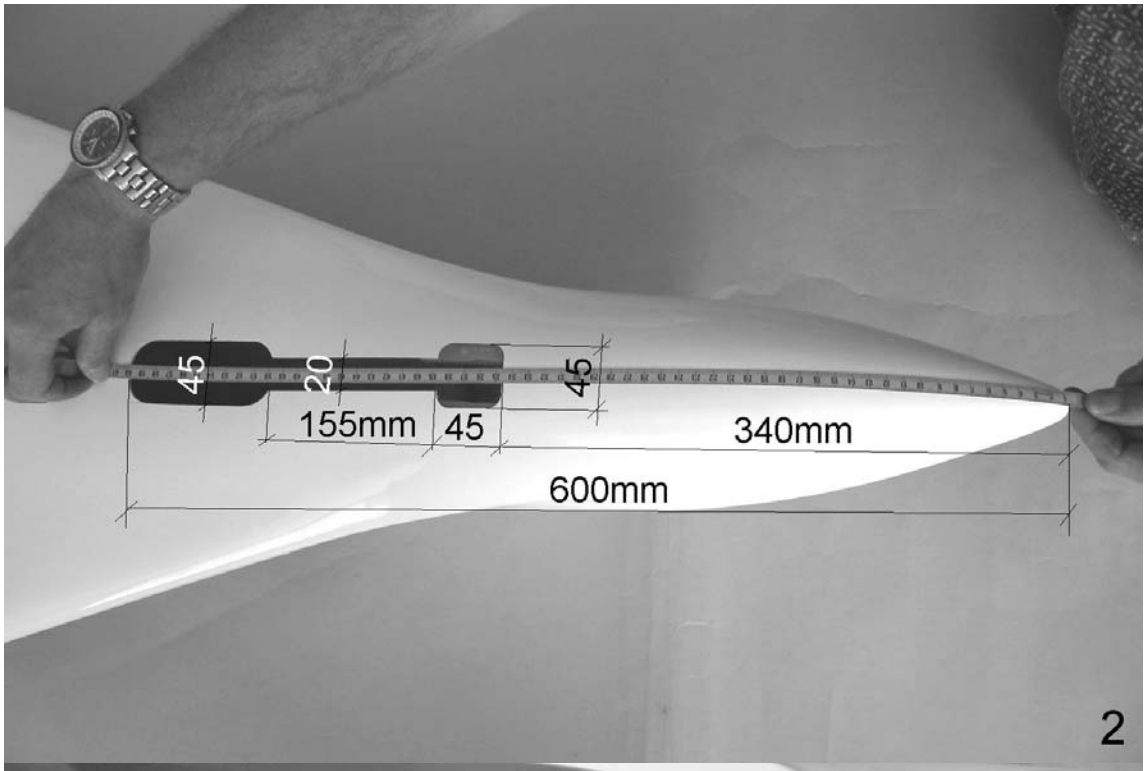

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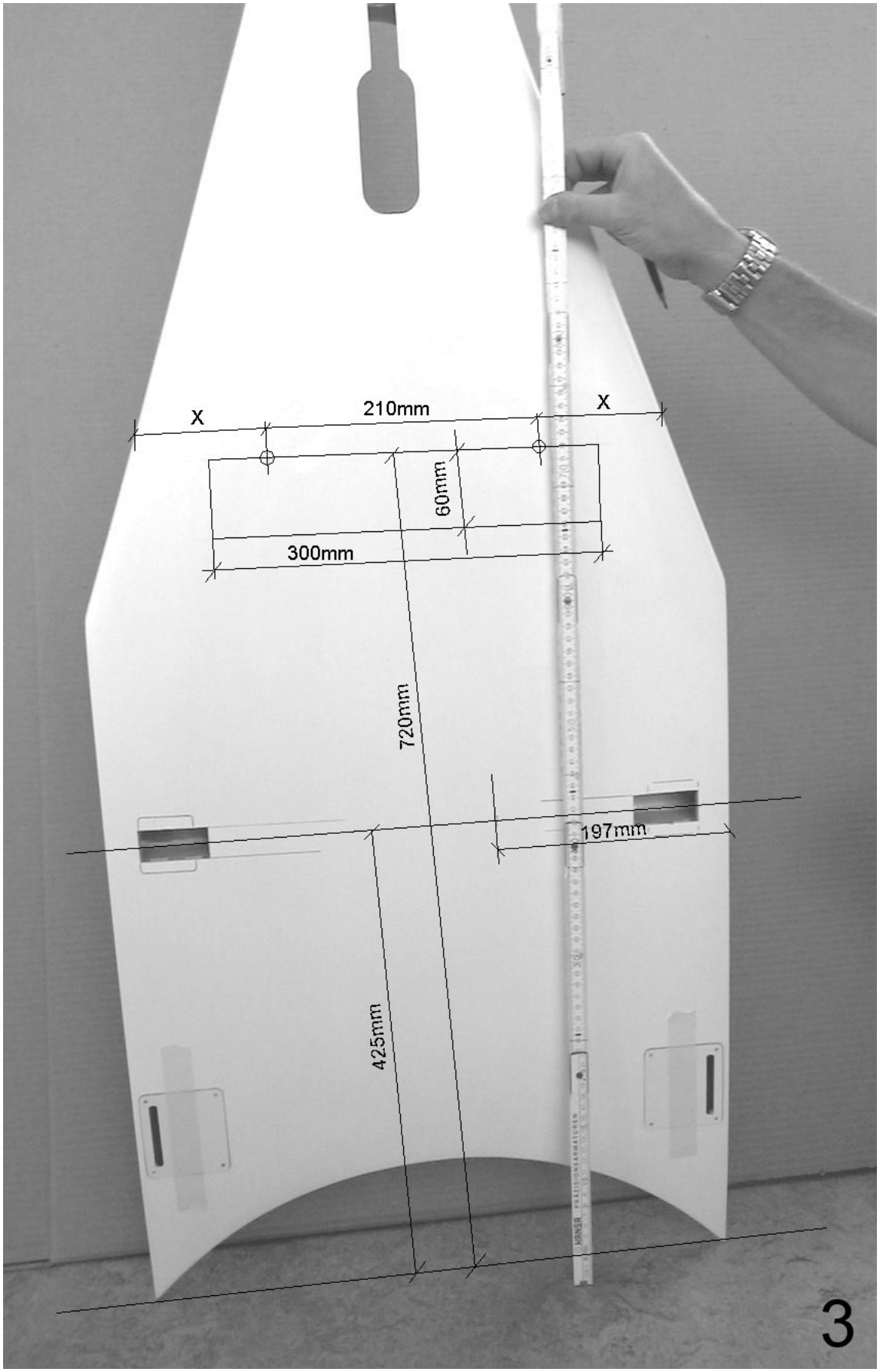
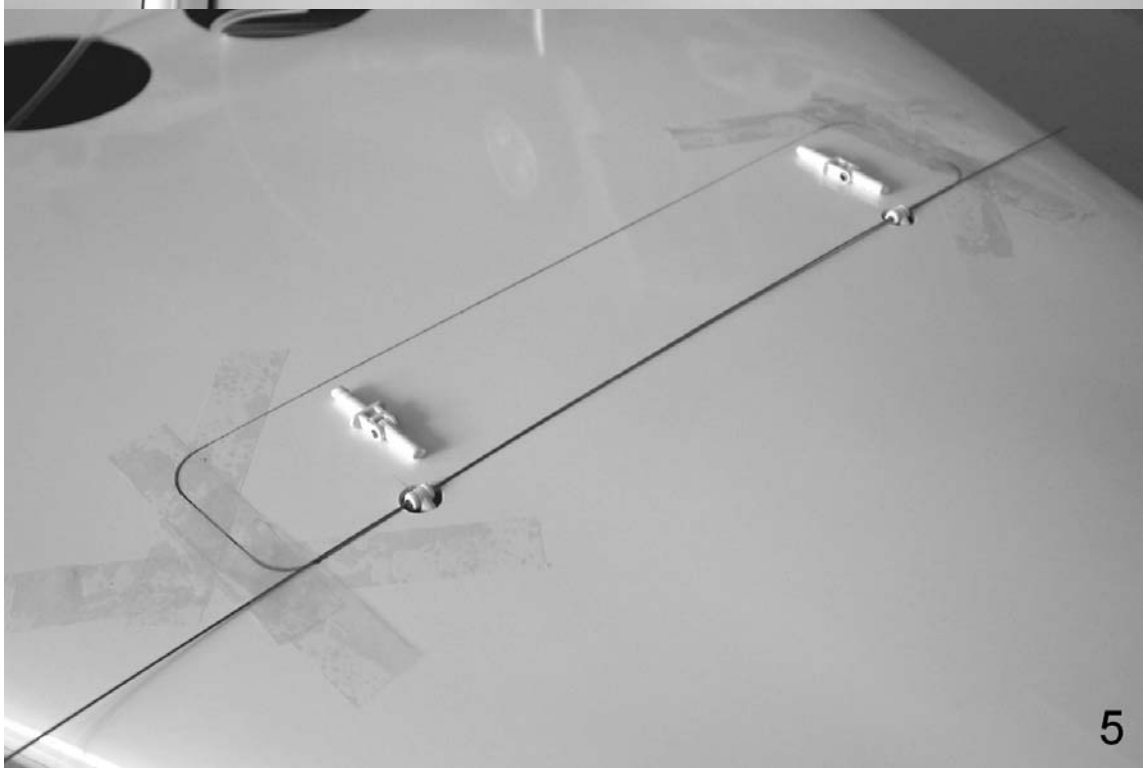

X
210mm
X
60mm
300mm
720mm
197mm
425mm

4



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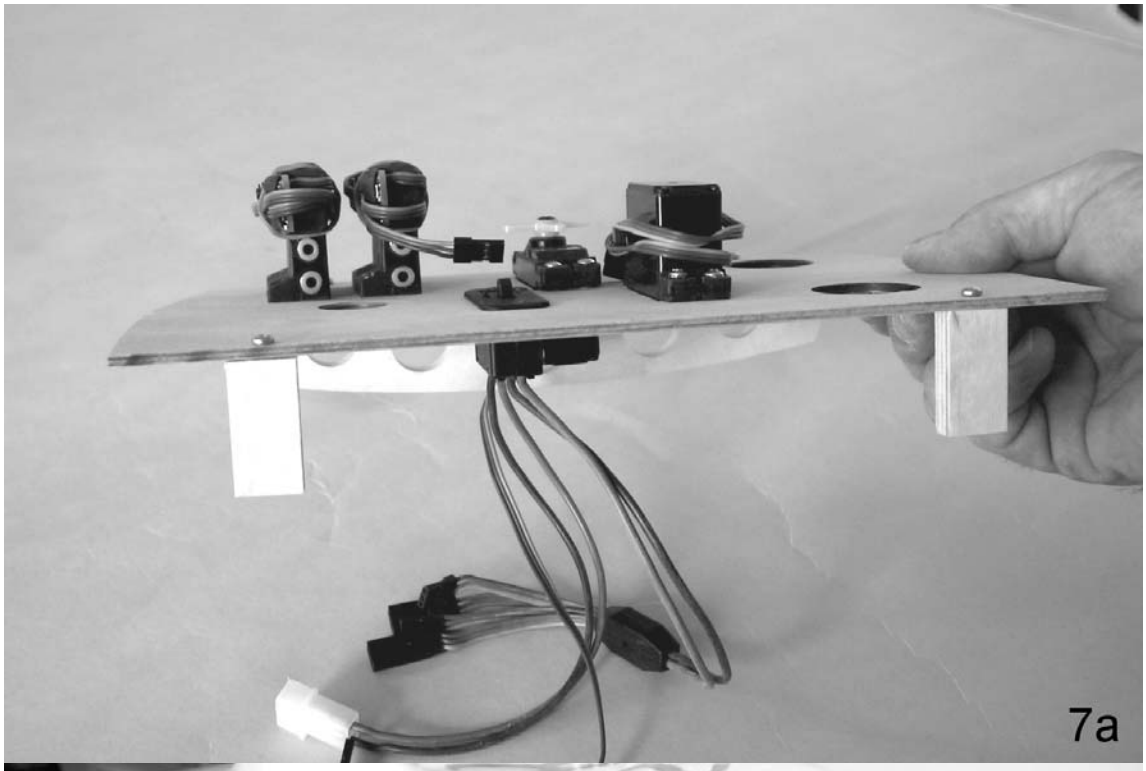

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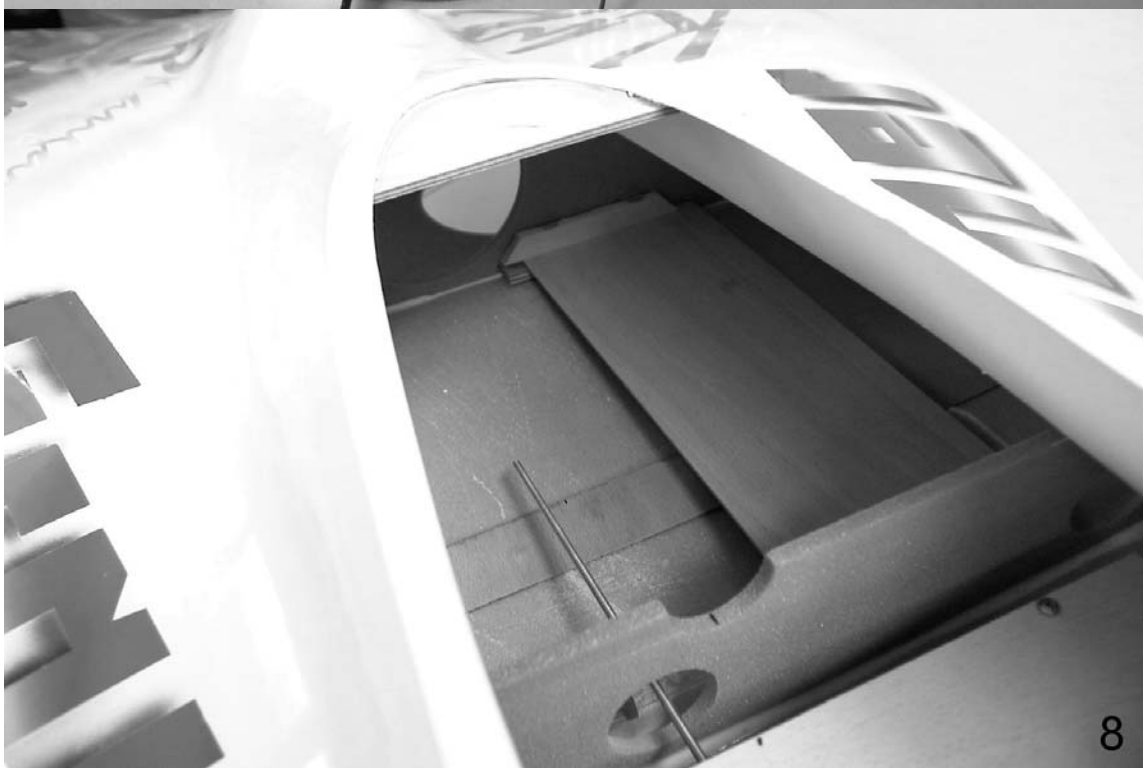

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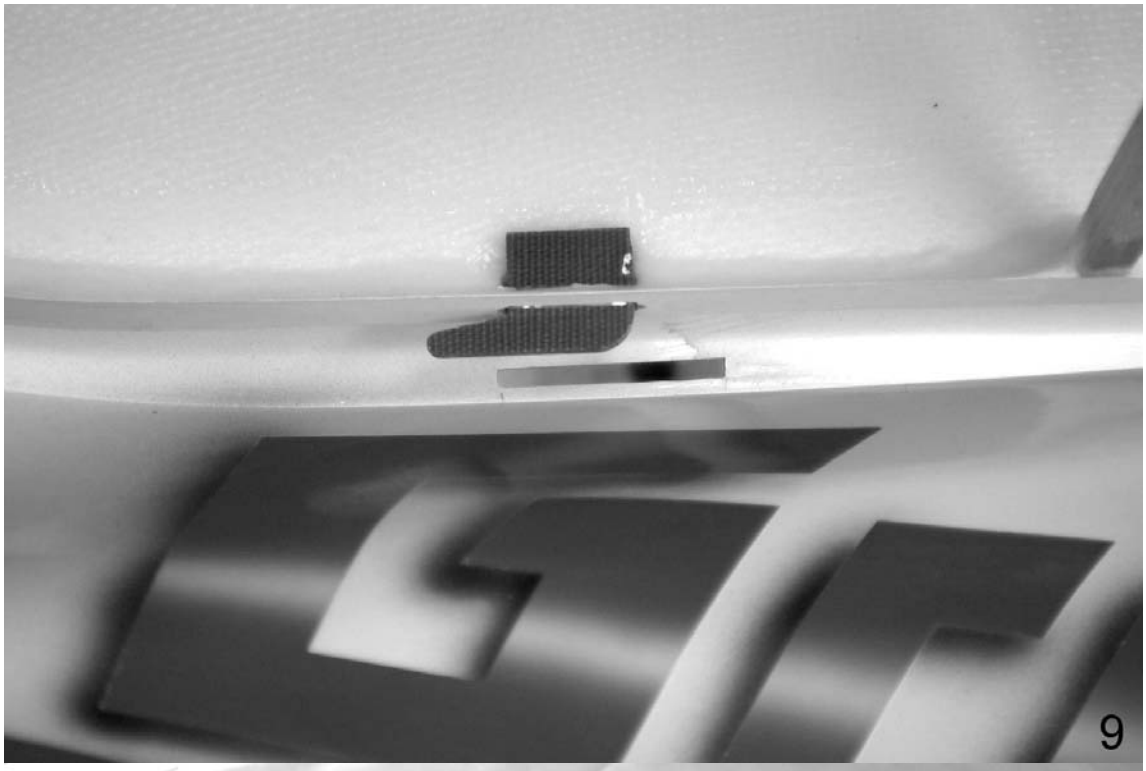

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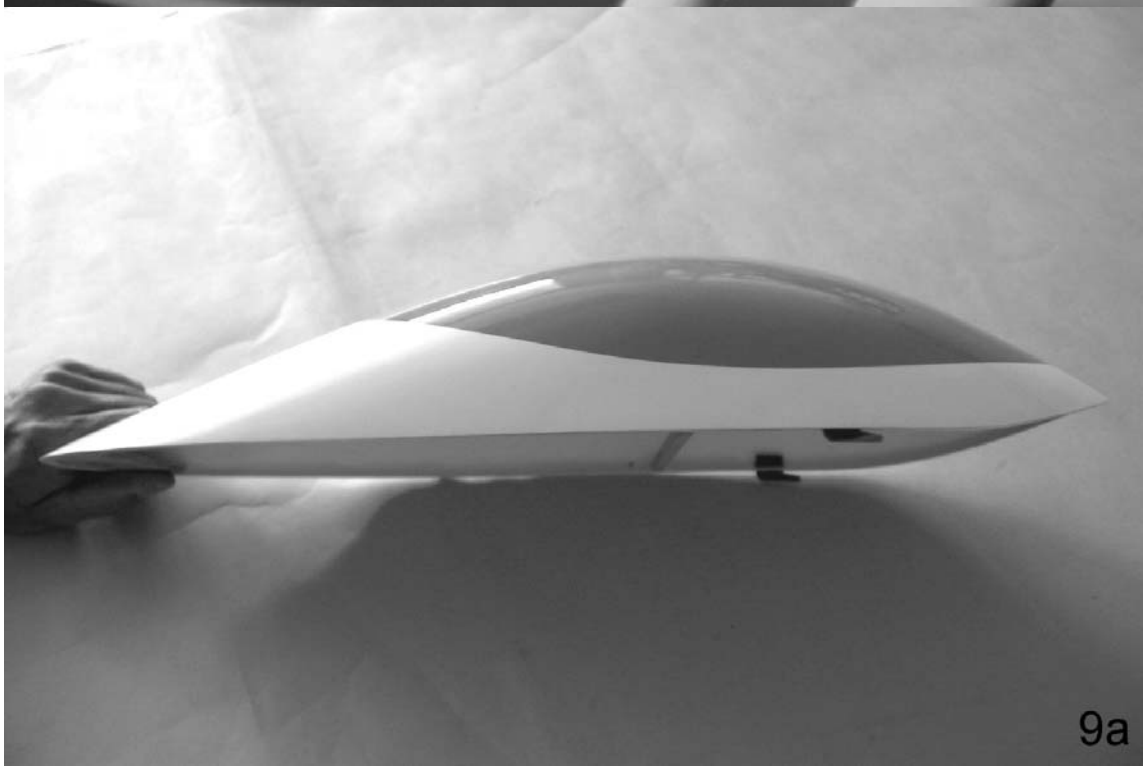

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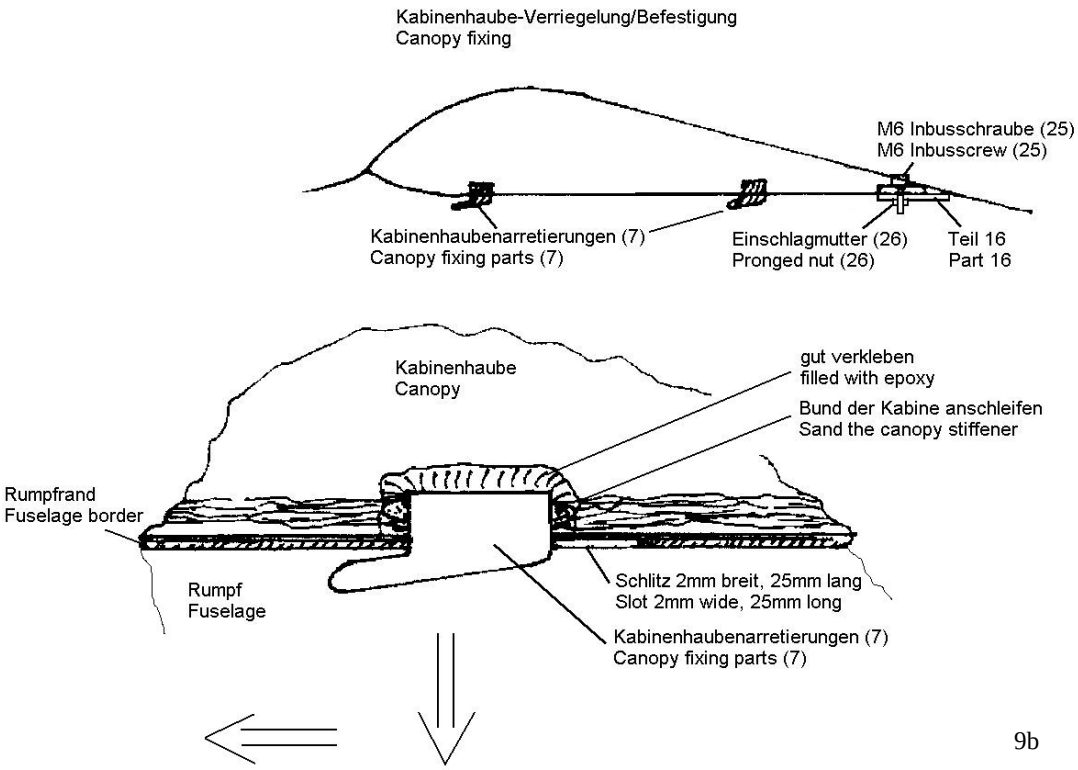
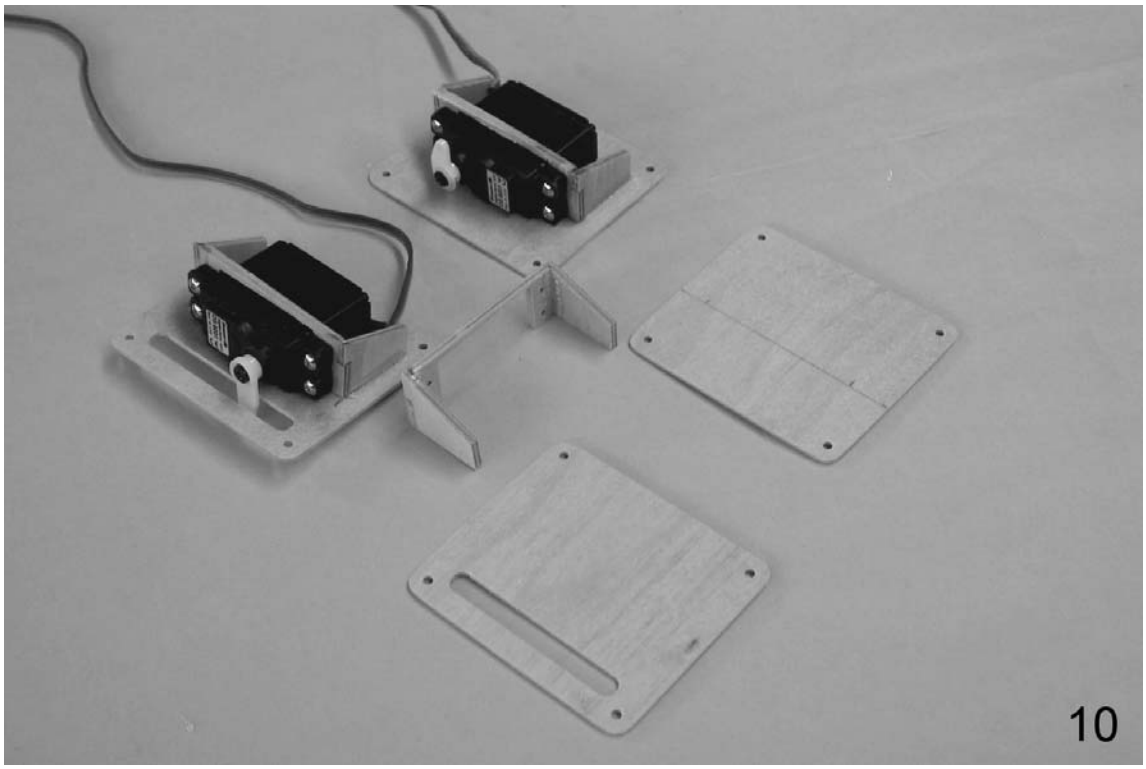

Kabinenhaube-Verriegelung/Befestigung
Canopy fixing
M6 Inbusschraube (25)
M6 Inbusscrew (25)
Kabinenhaubenarretierungen (7)
Canopy fixing parts (7)
Einschlagmutter (26)
Pronged nut (26)
Teil 16
Part 16
Kabinenhaube
Canopy
gut verkleben
filled with epoxy
Bund der Kabine anschleifen
Sand the canopy stiffener
Rumpfrand
Fuselage border
Rumpf
Fuselage
Schlitz 2mm breit, 25mm lang
Slot 2mm wide, 25mm long
Kabinenhaubenarretierungen (7)
Canopy fixing parts (7)

9b



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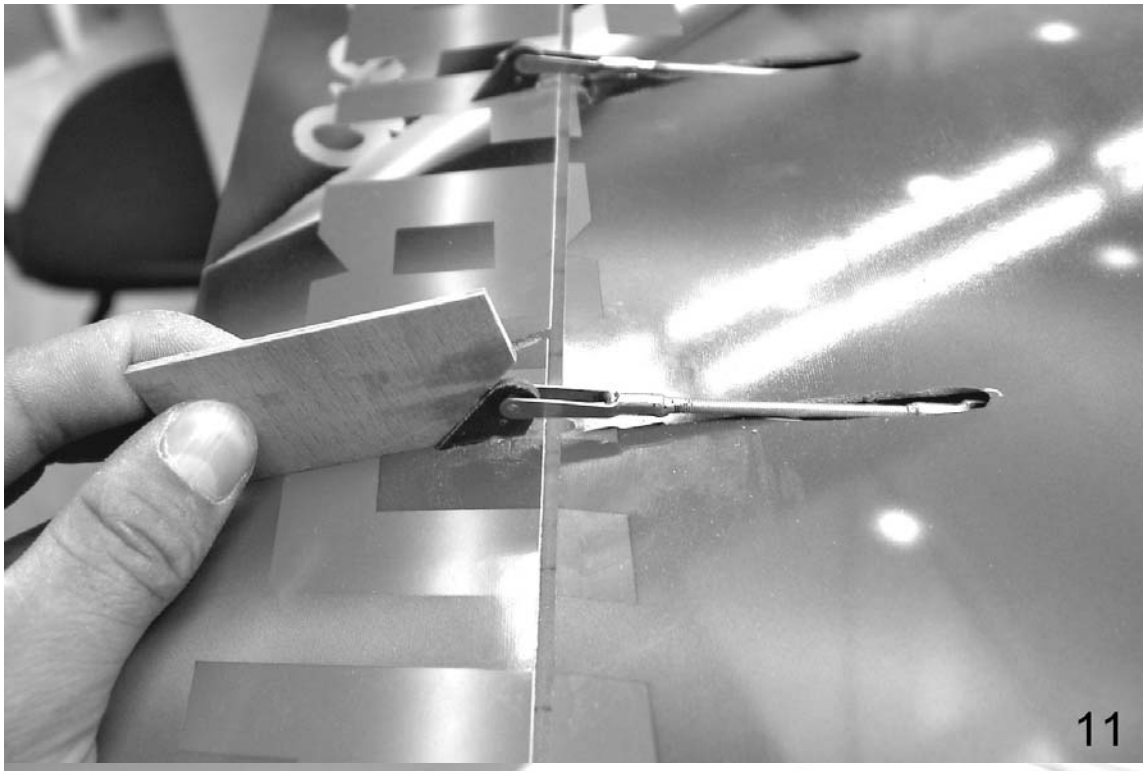

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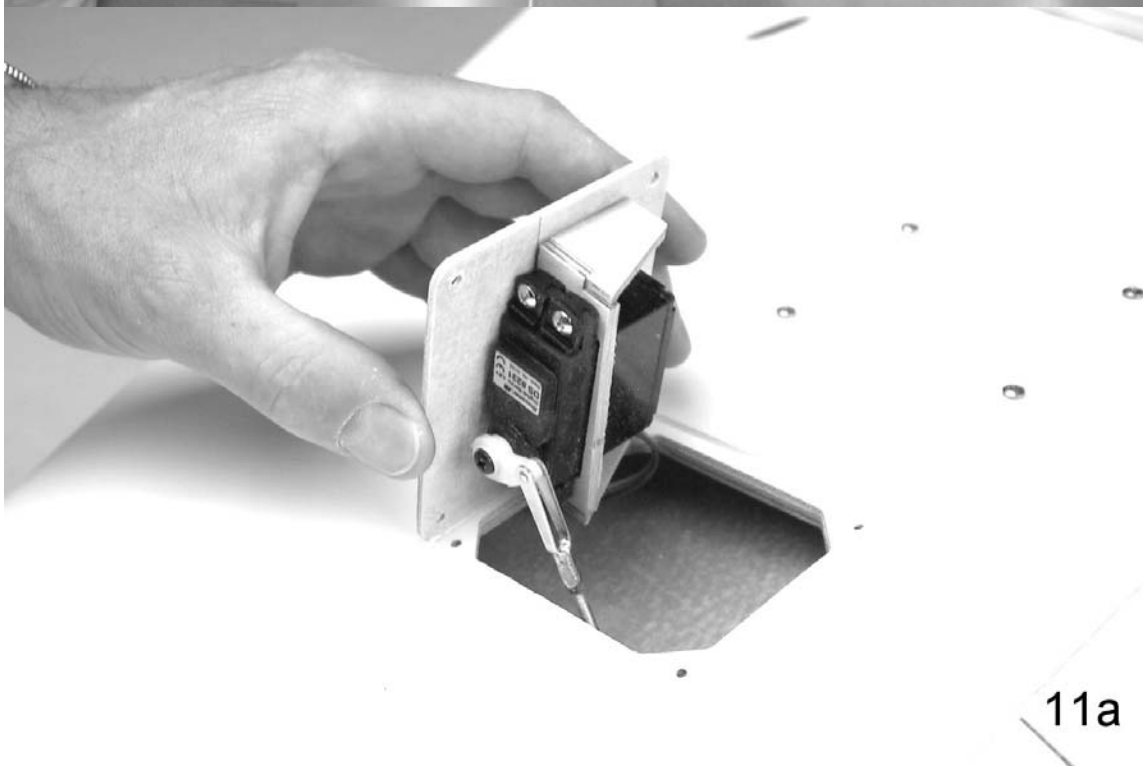

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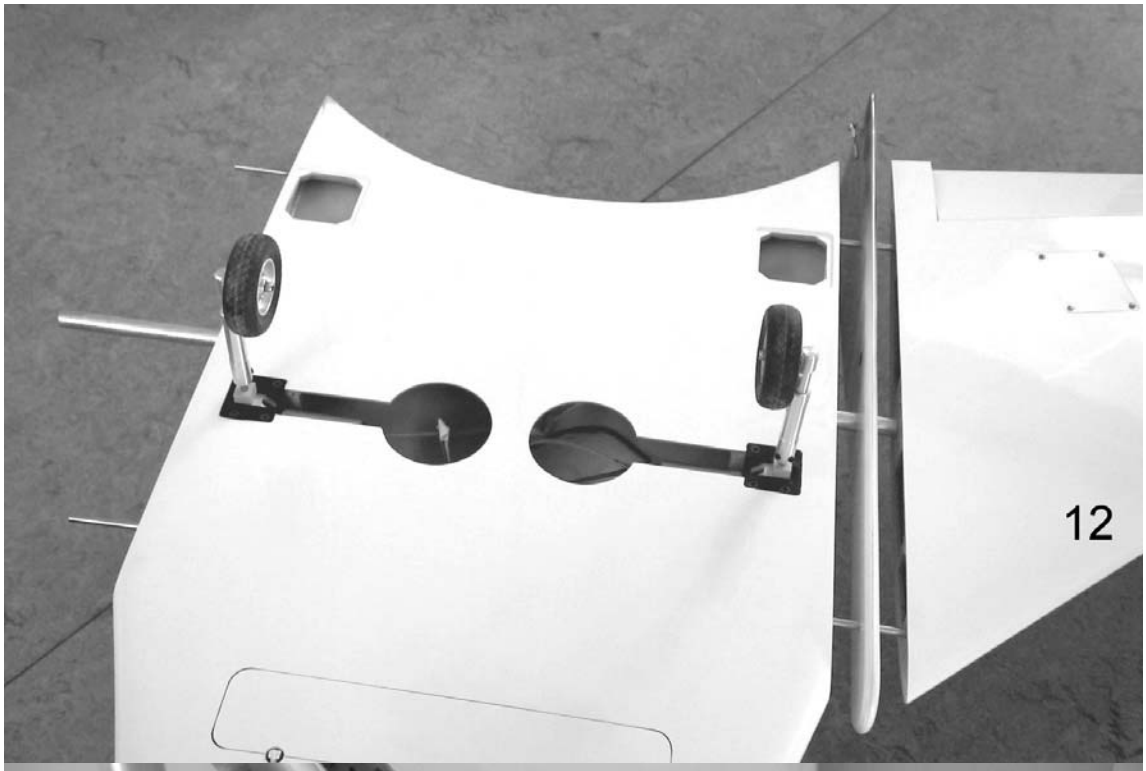

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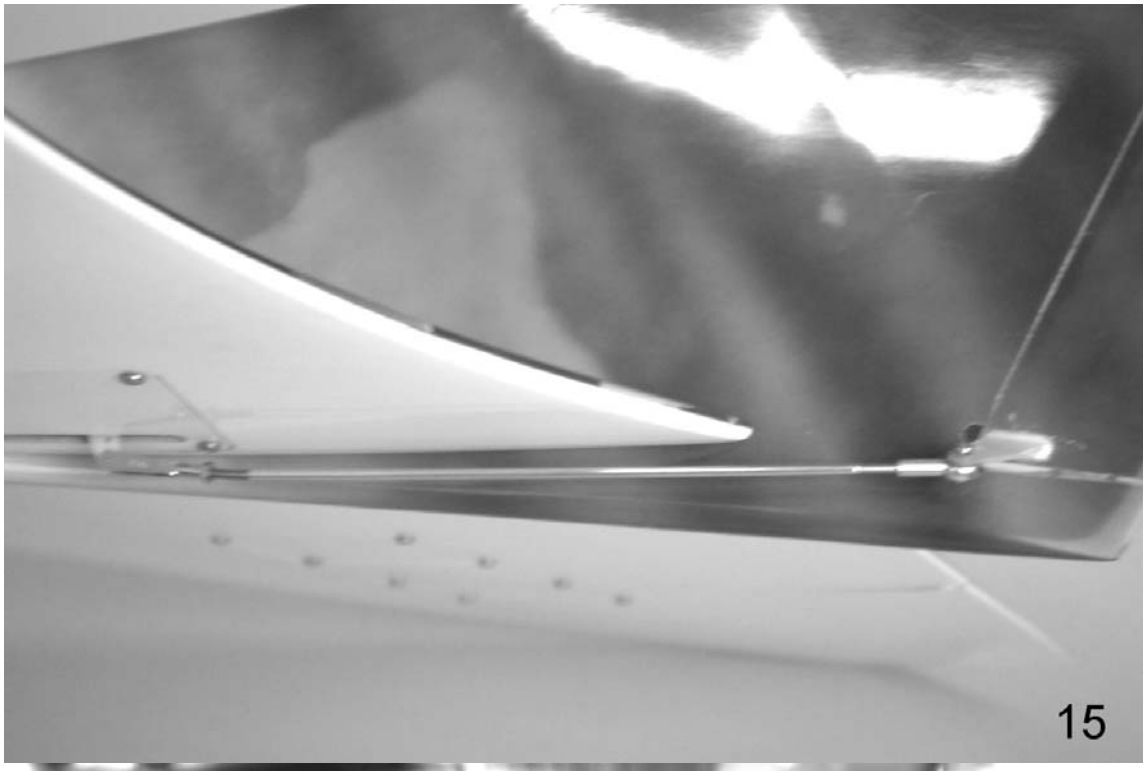

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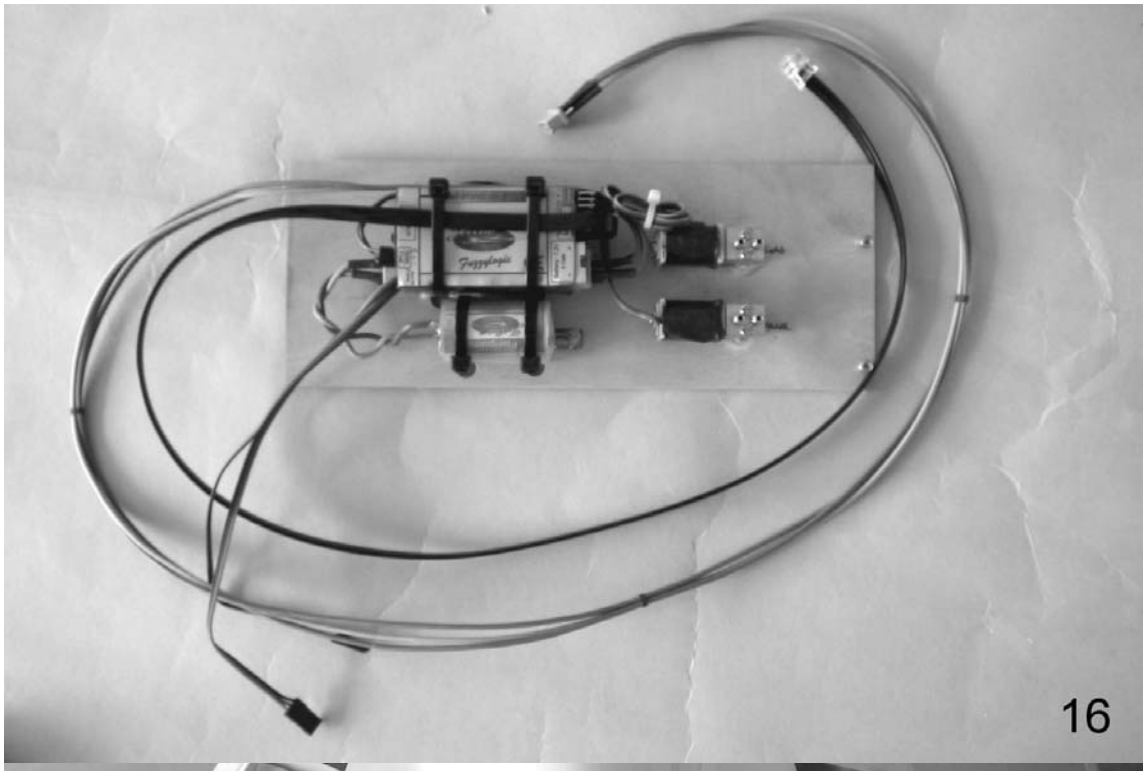

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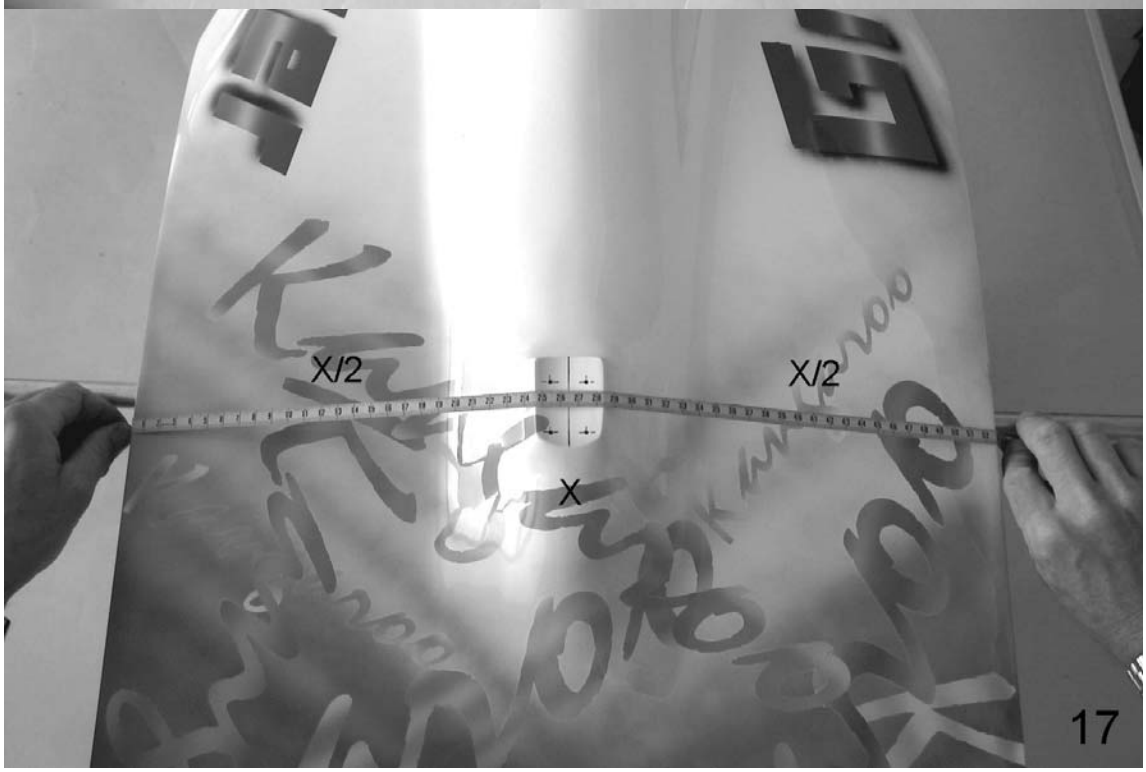

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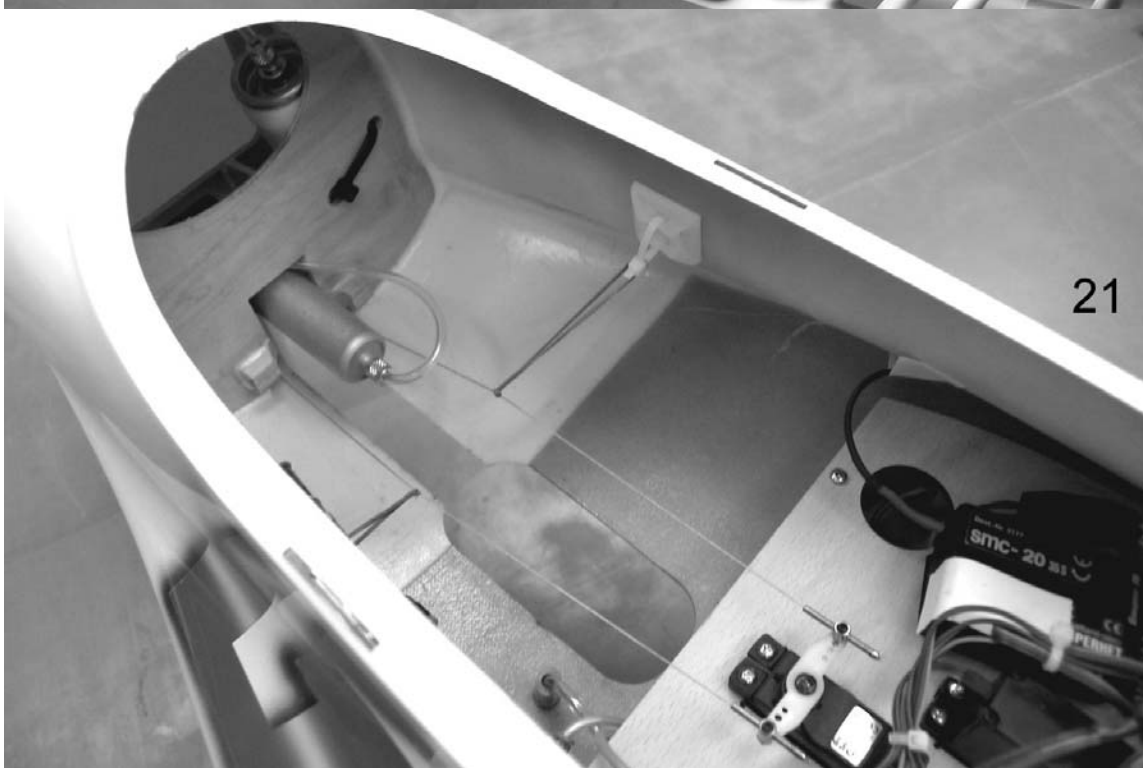

21

Complete Packing List Kangaroo

Anzahl	Bezeichnung Deutsch	Description English
1	Rumpf GFK	Fuselage
1	Tragflächen rechts GFK	right wing
1	Tragflächen links GFK	left wing
1	Seitenleitwerk rechts GFK	right rudder fin
1	Seitenleitwerk links GFK	left rudder fin
1	Klarsichthaube	clear canopy
1	Kabinenhaubenrahmen GFK	fibre glass canopy frame
1	Alu Flächenrohr 16x 1,5 x 820 mm	Aluminum wing tube 16 x 2 x 820 mm
1	Kleinteilebeutel (standard)	hardware bag (Standard)
1	Fräs/ Saägeteilebeutel	milled wood and phenolic parts bag
1	Bauanleitung Deutsch o. Englisch	instruction book english

	nicht zum Kit gehoerendes Zubehoer:	not included in the kit:
1	Kohlestab 16 x 820 mm	carbon rod 16 x 820 mm
1	Tiptanks (2 Stück)	Tip tanks (pair)
1	Turbinenhalter Aluminium	aluminum turbine mount
1	FC Fahrwerk Dreibein	Composite ARF fixed gear
1	Robart Fahrwerk Dreibein	Robart retracts
1	Springair Fahrwerk Dreibein	Spring Air Retracts
1	Air-Control-kitt # 188	Air control kit
1	Raeder- und Bremsensatz	Wheels and Brakes set

Packing List Hardware Bag

Anzahl	Bezeichnung Deutsch	Description English
2	Bolzen 6x40 mm Buche, Tankbefestigung vorne	Beech dowel 6 x 40 mm, front fuel tank mount
4	Messingrohr, aussen 6,4 - 40mm	Brass tube 6.4 outside dia., 40 mm
2	Robartschaniere 5mm	Robart hinges 5 mm
2	Gewindestab M 3x200 mm Seitenruder	all thread M3 x 200 mm, for rudder
4	Gewindestab M 3x100 mm Flächen	all thread M3 x 200 mm, for flaps
1	Kabinenhaubenschraube Kunststoff M 6x20 mm	plastic screw M6 x 20 mm, for canopy mount
2	Flügelbefestigungsschrauben Inbus M 6x30 mm	allen screw M6 x 30 mm, for wing mount
3	Einschlagmuttern M 6	blind nuts M6
12	Metallgabelkopf 3 mm	metal clevis M3
12	Muttern M 3	steel nuts M3
24	Blechschrauben 2,9 - 13 mm Servodeckelbefestigung	sheet metal screws 2,8 x 13 mm, servo hatch mount
2	Senkkopfschrauben M5 x 20 für Motoraufsatz	counter sunk screws M5 x 20

Packing List Milled Wood and Phenolic Parts

Anzahl	Bezeichnung Deutsch	Description english
2	Kabinenhaubenhaken Novotex 2 mm	Canopy hooks, Novotex 2 mm
5	Ruderhörner Novotex 2 mm	Control horns large, Novotex 2 mm
2	Ruderhörner GFK klein	Control horns small, Novotex 1,5 mm
6	Frästeile für Servoeinbau	milled plywood parts 3mm for Servo mounts
1	Frästeil Bugfahrwerksspant Aufdopplung (für Springair oder WABO) 3mm Sperrholz	Milled plywood former for vertical nose gear mount (optionally used)
2	Spanten halbrund für Kabinenhaube 3mm Sperrholz	Milled 3 mm plywood former for canopy mount,
1	Servo/Pneumatik/Elektronik-Einbauspant (Birke 3mm)	Milled 3 mm plywood former for accessory mount
1	Stützspant (Pappel 6mm)	Milled 6 mm support former
2	Einbaulehren für Ruderhörner, 3mm Birke	Milled 3 mm plywood templates for control horns.
2	Motoraufsatz Seitenteil 3 mm Sperrholz	side part for glow engine mount, 3mm ply
1	Motoraufsatz Heckspant 3 mm Sperrholz	rear part for glow engine mount, 3mm ply
1	Motoraufsatz Oberteil 3 mm Sperrholz	top part for glow engine mount, 3mm ply
1	Motoraufsatz Verstärkung 3 mm Sperrholz	doubler for glow engine mount, 3mm ply
1	Sperrholzbrett Pappel 3mm, 255 x 90 mm	Plywood 255 x 90 x 3 mm
1	Sperrholzleiste 0,8 mm, 350 x 20 mm	Plywood 350 x 29 x 0,8 mm
2	Sperrholzklotz 35 x 19 x 6 mm (Pappel)	Plywood 35 x 19 x 6 mm
3	Sperrholzklotz 90 x 10 x 6 mm (Pappel)	Plywood 90 x 10 x 6 mm