

Fig.3

Fuselage:

In the first step, the two longitudinal of the fuselage are glued together at the interlocking are glued together. As in the next steps, the parts should be the next steps, the parts should lie on an absolutely flat surface, otherwise warping will occur. distortion. First, place the strips 700x3x6 on top and 716x3x6 on the bottom are glued to the edge of the into the recess.

Fig.4

Now the two strips 322x5x5 at the tail and the and the 560x5x5 on the nose, on one side only. one side at first. The position can be be taken from figures 4 and 5. Now the fixings for the wing spars, see Fig.2, should be marked. should be marked. This can best be done now that the longitudinal is still flat on the table, this is best can be done best. Now the bulkhead can be turned over and glue the battens on the other side on the other side.

Fig.5

Now comes the horizontal nose bulkhead. This is glued into the vertical longitudinal bulkhead from the front and then pressed down at the front until it rests flush on the wooden battens (Fig.6). With it must now be carefully glued to these. The parts should be aligned at right at right angles.

Fig.6

The next step is to assemble the frames. The half formers 2,3 and 6 are glued twice glued twice next to each other. For this purpose they can also be glued to each other before glued congruently with each other before before gluing. The two half frames No.4 must NOT be NOT be glued together! See

Fig.7. The fuselage will later be separated between them to have access to the engine. The half frames are glued on both sides symmetrically at right angles to the to the longitudinal bulkhead.

Fig.7

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After the frames have dried, the four wooden strips strips 730x5x3 are pressed into the grooves of the frames. of the frames. The battens must be flush with frame 2 (see Fig. 8). 7(see Fig. 8).

Fig.8

Now carefully align the fuselage along the hull and straighten the fuselage.

This must not be crooked or twisted. W7777777777777777when everything is aligned straight, the strips to the frames with thin super glue. the frames with thin super glue. At frame no.4 only the front (nose side) frame is glued carefully.

Fig.9

If the F-104 is to be equipped with a pendulum tailplane tailplane, the vertical stabilizer can be can already be prepared for this. See the the chapter "Pendulum Tail".

Fig.10

In the nose area, the horizontal bulkhead will protrude slightly protrude beyond frames 1 and 2. This should be sanded down flush to the formers with an 80 grit flush down to the formers. down to the formers.

Fig.11

High-launch hook:

From the remnants of the 6x3mm wood strips, saw off three pieces of 100mm and four of 30mm. The the three 100mm strips on the 6mm wide side on top of each other so that a 100x6x9mm strip. Behind the 2nd bulkhead cut out a strip of 9x100mm directly on the directly on the wooden strip.

Fig.12

Push the strip block into the slot and glue it with and glue it with thin super glue to the wooden strip of the fuselage bulkhead. Use the the four 30mm long wooden strips to to the 560x5x5mm strips below the horizontal nose horizontal nose bulkhead.

Fig.13

This creates a stable, lightweight mount for a 2.5-3mm thick carbon or steel pin. For this purpose a hole should be made at an angle of about 60 degree in the direction of the stern, with a distance of 80mm from the 2nd bulkhead. Do not glue the pin but do not glue it in yet. This is done after planking, otherwise it will be in the way.
way.

Fig.14

Flow channel 1 (parts cut):

From the two wedge-shaped PET parts at the front the bottom at the front and the edge of the flush at the back. Place the part with the leading edge flush with the front edge on the 3rd bulkhead and attach it to the 5x3mm wooden strips at the top and bottom. at the top and bottom.

Fig.15

From this line, draw a line to the to the rear flat corner and cut along (see Fig.16 and Fig.20).

Fig.16

Then draw a wedge (green line) of approx. 5x30mm with a distance of 12mm to the front edge. edge (see Fig.17 and Fig.20). and Fig.20).

Fig.17

Position the ledges for the spars as shown in Fig.2 and Fig.3 on the longitudinal bulkhead (blue lines). (blue lines). Then transfer these to the and cut out (see Fig.18 and Fig.20). Fig.18 and Fig.20).

Fig.18

Now place the fuselage skin for the corresponding side so that it rests on the top and bottom of the longitudinal on the top and bottom of the longitudinal bulkhead. Before doing this, the cut at the rear end of the cutout can be can be fixed with adhesive tape, this will reduce the Danger that the part breaks when bending. The fuselage skin must lie so that it is flush with the with the rear bulkhead. Now mark the mark the cutout on the PET with a on the PET. This mark will serve later as an aid when gluing on the other flow channel part.

Fig.19

The prepared PET part (see Fig.20) can now be removed and (see Fig.20) can be removed and the other side can be the other side in the same way.

Fig.20

The outer flow channel part is cut as shown. At the front, the cut off the semicircle diagonally along the along the line. ATTENTION! There must be one parts at the line "L" and one at the line "R". must be cut out. This creates a right and a left part. At the edge some 5-7mm of material should remain at the edge. These serve as gluing surface. The prepared PET parts can now be put aside for the time being, because now the spars have to be be built.

Fig.21

Preparing the tie bars:

For the spars use 4 pcs. Carbon rod 0,5x3mm in a length of 700mm. Also 4 pieces of the 3x10mm wood strip in a length of 350mm. length.

Mark the center of the carbon rods mark. Use a soldering iron to heat the center with a soldering iron. Now the rod can be easily bent at this bend easily at this point without destroying the are destroyed. The wooden strips at one end lightly on one end (about 5 degrees). See also Fig.24. Fig.22

Place one of the bent carbon strips and two wooden on the template and align it with the template. align them. Now fix in the middle with a drop of with a drop of superglue. Align again and place the second carbon strip on the wooden wooden strips. Fix again with a drop of superglue. Use activator spray to be used. If everything fits, the carbon strips can now be glued to the wooden strip glued to the wooden strip over the entire length. Be sure to work carefully! When the spar is glued cleanly, this sandwich construction can absorb enormous forces.

Fig.23

Repeat the same procedure with the remaining parts and build a second spar. At the template can be split in the middle (see red (see red line in Fig.24). The two parts created in this way are then used for aligning them

on the fuselage.

Fig.24

Cut out the points already marked for the spars on the longitudinal bulkhead (see Fig.3) and push the spars through the holes. Temporarily attach the two depron rectangles

Attach the tie bars (see Fig. 26). They facilitate the angular alignment of the tie bars. Use the templates that have just been divided to align the angle with the longitudinal bulkhead.

Fig.25

Now the 150mm long 5x3mm strips above and below the spars can be glued flat to the longitudinal bulkhead. After check the angles again, the spars can be fixed to these with superglue and activator spray. If you want to be on the safe side can reinforce these junctions with 2 epoxy glue. Now remove the depron rectangles.

Fig.26

Flow channel 2:

After the adhesive has dried, first the inner flow channel parts with the flush with the leading edge of the 3rd bulkhead. The rear end is glued flat to the longitudinal bulkhead. and, if necessary, additionally fixed with fiberglass tape if necessary.

Fig.27

Then glue the outer flow channel parts are glued to the inner parts activator to the inner parts. For the previously drawn marking (Fig. 19). mark (Fig.19) is used for exact positioning. It shows where the cutout for the air intake in the fuselage skin.

Fig.28

Proceed with the other side in mirror image.

Fig.29

The shorter side of the airflow channel (seen from the side) must be at the bottom. The front edge should be congruent with the previously made mark.

Fig.30

Wiring:

Before the fuselage can be planked, the cabling must be the wiring must be done. Nothing should be forgotten, because cables can only be laid with difficulty. difficult to do.

Fig.31

Cables to be routed are:+ Servo cables for elevator and rudder to the separation point at the tail.+ Speed controller with power cables to the front into the cockpit.+ Servo cables from the speed controller.+ Two servo cables for the ailerons

To avoid disturbances I lay the power cables on top and the signal cables in the fuselage. When extending the power cables to the controller, buffer capacitors should be planned. Fig.32The servo cables for the ailerons extend from the cockpit to the rear spars. (see

Fig.33. There you can fix the sockets temporarily. They will be used later when servo cables the aileron servos are connected either pushed back into the fuselage or recessed in the wings.

Fig.33

The motor cables from the speed controller should through the front 4th bulkhead.

Now the point has come where the tail section can be cut off. To do this simply use a sharp cutter to cut between the two frames No. 4 and cut through the longitudinal bulkhead at the top and bottom. The tail section is now single. The connection of hull and tail section is done according to your wishes. Here is from connectors over bayonet lock or simply fiberglass tape. everything is possible.

Fig.34

Planking:

Before the planking parts can be glued in place they must be pre-bent slightly.

To do this, carefully roll the parts lengthwise a tube, e.g. a vacuum cleaner tube. The better the parts are pre-bent, the easier it will be they can be glued later. For the fuselage shell parts before rolling, be sure to the slot at the back with adhesive before rolling.

Fig.35

The center fuselage section is first. Thread a over the spars and glue the formers and and the ribs with depron glue. glue. Allow the glue to flash off well and then start on the underside in the middle of the longitudinal longitudinal bulkhead. The alignment of the the sheathing is correct when it is flush with the 4th bulkhead and at the front of the 2nd bulkhead 3mm of glue remains free. This is later for the nose. Do the same with the other side with the other side.

Fig.36

After the fuselage skin come the air intakes. Using the template on the following page cut the holes for the spars in the parts. Pre-round the part thoroughly. The two The two notches can be cut about 2 cm further in the shape of a wedge. This This facilitates joining and fixing, On the inside in the rear part (from the notches) the depron (from the notches), sand the depron at an angle of about at an angle of about 45 degrees with sandpaper with sandpaper at an angle of about 45 degrees, so that the part can be glued on better.

Fig.37

To glue the parts in place, carefully coat the edge with with depron glue and allow to flash off well. well. Slide the parts over the spars. In the the front part, glue the air intake IN the the cutout, from the notches on the OUTSIDE onto the edge of the cutout. The edges can be filled with light filler and sanded.

Fig.38

229,5mm 132,5mm

72mm

Air intake, reduced view

Dimensions of the cutouts 3x10mm Notches recut template for aileron linkage M1:1

Template for nose from 0,3mm PET M1:1

Dimensions for the nozzle

Cut out of 0.3mm PET material and roll up.

176mm (+5mm glue margin)

320mm

226mm (+5mm glue margin)

Glue margin

d e c l e p t i o n !

Planking of the nose:

Join the lower nose sections 1 and 2 to form a large to form a large truncated cone. To do this edges with one piece and reinforce from the inside with reinforce from the inside with fiberglass tape. Carefully preround. Now mark the center of the part and glue the part to the bottom center of the longitudinal bulkhead. Then glue it to the 2nd former flush with the fuselag skin. Glue it flush to the fuselage skin. Now with the 1st bulkhead and fix it with tape if necessary. tape if necessary. Next, glue the two the two connecting wedges from the inside and finally Finally, put on the upper part of the nose.

Fig.39

The front tip is covered by a PET cone. cone. To do this, cut a "pie slice" from the 0.3 mm PET sheet using the template. using the template and carefully bend it until it is and carefully bend it until it is cone-shaped. cone-shaped. Then slide the piece onto the the tip of the fuselage with an overlap of 5mm and and glue. Tip: If you do not want a butt edge you can glue a 1cm wide strip from inside the nose and glue the and glue the opposite side flush flush, without overlap.

See Fig.40

Do not glue the nose to the fuselage until to the fuselage!

Fig.40

Cockpit molding:Slightly bend the cockpit nose and sandpaper the the inside at a flat angle with sandpaper. with sandpaper. See Fig.41.

Fig.41

Then bend the cockpit anvil 30mm behind the leading edge of the fuselage shell so that it has a height of 10mm in the center. 10mm in the center. The butt edge can then be filled and sanded.

Fig.42

Planking the stern:

Thoroughly pre-bend the jacket parts of the rear thoroughly pre-bend. Now on one side glue the and wooden strips on one side with glue. glue on one side. The top of the mantlet should be flush with the (on the SLW) and flush with the bulkhead at the front. with the former. Now glue the front part up to the middle of the three bulkheads and press and press it into place.

Fig.43

The part may protrude slightly in the middle. Cut this away in the middle of the longitudinal former before gluing on the other half. Now glue the sheathing to the rearmost bulkhead. to the rearmost bulkhead.

Fig.44

A bump is formed here. At the center bulkhead make a 4-5 cm incision in the middle bulkhead, congruent with the bulkhead...

Fig.45

...and cut away the resulting overlap. cut away. Do the same with the other side. with the other side. Attention! When gluing on the the front and rear spars, be especially careful not to be especially careful not to bend the bend. This can easily happen and leads the tail no longer fits flat against the fuselage. the fuselage.

Fig.46

Wings:

The wings consist of two layers of 10mmdepron. The 3mm layer is on top and is slightly smaller. Glue the parts on top of each other as glue. The rear spar is flush with the aileron cutout. with the aileron cutout, therefore glue the the larger part with 10mm distance to the aileron cutout. At the front the upper part is a little bit smaller so that you have to sand less later. later.

Fig.47

If you want to sink the spars completely into the the wings, the lower wing section must be wing section must be sanded out a little. To do this, mark the position of the spars as as shown. Use a leftover piece of 3x10mm wooden strip which you have glued with sandpaper sandpaper, you can work in the recesses in 10 and 3 mm width!

Fig.48

After this step fix the ailerons with masking tape to the wings. Only on the the underside, since the upper side must be sanded. must be sanded. The leading edge can be sanded down to a material thickness of 1mm, the the end strip to 2mm. On the a 230mm long piece of 0.5x3mm carbon strip is now piece of 0.5x3mm carbon strip is glued flat to the leading edge. This serves to reinforce the sharp wing edge.Now the front spars must be glued to a Longer by 60mm, measured from the air intake, must be shortened.

Fig.49

After the aileron servos have been installed, the the wings can now be glued to the spars from below. from below. The transitions can again be with light putty.

Before coating, the back bead must be bead must be made from two strips measuring strips measuring 15x690mm and glued on. glued on.

Fig.50

The glass fiber coating:

As mentioned at the beginning, the coating with is highly recommended for the durability and stability of the model. model is highly recommended. The fuselage should best to coat the fuselage in two coating. First the underside, then the top side. The tail section is processed separately.For the underside (as well as for the top side) first cut a 70x50cm piece of the glass fabric glass fabric (approx.50g/m²) and drape it roughly on the fuselage. roughly draped on the fuselage. Now the can be cut off with an addition of about 2cm using with a pair of glass fiber scissors.

Fig.51

Then weigh the epoxy resin (about 50g) in a plastic cup and in a plastic cup and stir thoroughly. stir thoroughly. The easiest way to to impregnate this thin fabric is to a little resin to the highest point (center of

the fuselage) and spread it with a plastic spatula with very light pressure. The spatula can be cut out of a PET scrap. Now you squeegee the resin little by little from the center to the outside. It is important that you the beads first (edge of the fuselage/ wing) before you fuselage/ wing) before applying the resin to the next surface the next surface (wing). Otherwise the silk will be hollow there.

Fig.52

When the laminate has hardened somewhat, you can the protruding edges can be cut off with a sharp cutter. Then proceed in exactly the same way the top side in exactly the same way. Here especially in the area of the back bead a bit of dexterity is needed to get the edges the edges nicely. The The rear segment is coated in the same way with a 70x40cm piece. Here you can, if you start on the underside the fuselage shell and then the two both side parts in one pass.
in one pass.

Fig.53

The small parts, such as ailerons and rudder parts are best coated best if they are placed on a piece of toothpicks on a depron remnant. See Fig.54. The complete coating of the aircraft with 55g/m² glass silk and epoxy resin L (both R&G) weighs less than less than 200g.

Fig.54

Details:

What follows is the making of some details and a some final work.

The cockpit canopy has to be cut out as shown and a cut out as shown and a fastening e.g. with velcro or magnets.

Fig.55

The machine gun can be cut out and and inserted as shown. To do this a small recess in the fuselage with a Dremel or similar tool. the fuselage with a Dremel or similar tool.

Fig.56

The linkage of the rudders must be be created. I use as rudder horns parts which

I cut from the PET remnants. See Fig.57 and templates. The tank half shells can be glued can be glued on.

Fig.57 The thermoformed nozzle can be cut out as shown, cut out and glued on. It is helpful if a small glue flange of approx. side of the nozzle, leaving a small glue flange of approx. 2 - 3 mm width.

The nozzle for the impeller can be cut out of the 0,3mm PET sheet. It should

fit over the impeller at the front (approx. 72mm diameter) and have a diameter of 56mm at the diameter of 56mm at the outlet. See also "Template for nozzle".

Fig.58

Structure of pendulum guide unit (optional)

CFRP flat bar 0.5x3mm

CFK round bar 2mm

CFK square tube 3mm x 50mm (2 pcs.)

CFRP square tube 6mm x 160mm

CFRP square tube outside 4mm/inside 2,6mm x 100mm (2 pcs.)

CFK round bar 2,5mm x 200mm

Bowden cable tube

Wooden strip 5x5mm x 322mm

Cut away material

1 2 pcs. CFK flat bar 0,5x3x52mm

2 2 pcs. CFK flat bar 0,5x3x161mm

3 3 pcs. CFRP flat bar 0,5x3x333mm

DS DS

1550 90

Scale 1:3

The Starfighter can optionally be equipped with a pendulum tail unit as found on the original.can be fitted.

The construction effort is a bit higher, but you get a model that is more true to the original. model. For the construction CFRP profiles are needed which are not included in the delivery. These can be ordered separately from R&G Faserverbundwerkstoffe, for example.

Pendulum control gear:

The construction of the pendulum tail unit is optional. It a conventional tailplane can also be can be built. The construction of the pendulum tailplane is more complex, but it increases the scale factor of the model the "scale factor" of the model enormously.

First cut the carbon profiles as shown in the previous listing.

Cut the two depron parts as shown in the previous illustration. Then cut all 0.5x3mm carbon profiles with the depron parts. glue them together.

The "T" made of the 6mm square profile and the 2,5mm carbon rod can be glued with 2K-epoxy glue or with super glue. glued.

The 3mm and 4mm square tubes must not yet be not be glued in yet. They will be glued at the very end of the build. If you complete the the tailplane now, you will have problems later problems with the coating of the rudder.

The tailplane can now be covered from both sides with a layer of glass silk on both sides (see chapter "Laminating"). This gives it most of its stability.

Thin tailplane for the tiptanks (optional) Cut 20mm

Cut line for depron part.

5mm deep cut in 30mm cut M1:1 of the center serves to stabilize lization of the vertical tailplane 1,5mm Airex hard foam or similar.

The thin tailplane consists of a sandwich of 0.3mm PET/1.5mm Airex hard foam rigid foam/0.3mm PET. After the parts are glued together with super glue.

The finished tanks with thin but still profiled tail surfaces!

Weighing and adjusting:

The finished model should weigh about 1600g ready to fly. The center of gravity should be adjusted by The center of gravity should be easy to reach by moving the battery in the cockpit area. It is 13mm behind the the leading edge of the fuselage.

The rudder deflections should be selected for the first flight as follows:

HR: +19mm / -16mm measured in the center.

QR: +12mm / -9mm measured at the inside of the aileron with 30-40% expo

SR: 15mm measured at the bottom corner

EWD: 1 degree (best to check/adjust with freeware "EWD calculator" or similar 13mm behind the leading edge

Maiden flight:

After the completion of the aircraft, the day of truth comes at some point - the maiden flight is coming!

For this I would like to give a few pieces of advice along the way. Because of the small the F-104 is extremely roly. The aileron should be used with care.

be used carefully. Curves should be actively controlled. A gyro can be helpful in windy conditions. The small wings provide a relatively high wing loading, so a certain minimum speed is necessary. minimum speed is necessary. The lower limit should be approached carefully. approach the lower limit. In order to reach the necessary speed quickly during takeoff, it is best to use a bungee with release.

best to use a bungee with release pedal (e.g. WeMoTec 1.8kg) and a launch pad. As a sensible for the rubber is about 7G (about 11kg, check with a suitcase scale!). turned out to be. With this, safe takeoff is possible, and the glider reacts immediately to the rudders. rudders. Be sure to fix the battery sufficiently so that it does not slip. A special feature of the F-104 is the attitude recognition. It is very difficult at a difficult at longer distances or with backlight. Caution is required here. I recommend a paint, where upper and lower side can be distinguished well from each other. If you follow this advice, nothing will stand in the way of a successful first flight. The great flight picture by the absolutely scale silhouette and the hissing impeller sound fascinate pilot and spectator alike.

Attention! Flying with this F-104G is addictive!

Have fun building and flying your Hundred Four.