The MECCANO® Model Library

The Meccano Model Library: Fokker DVII

Chris Bourne

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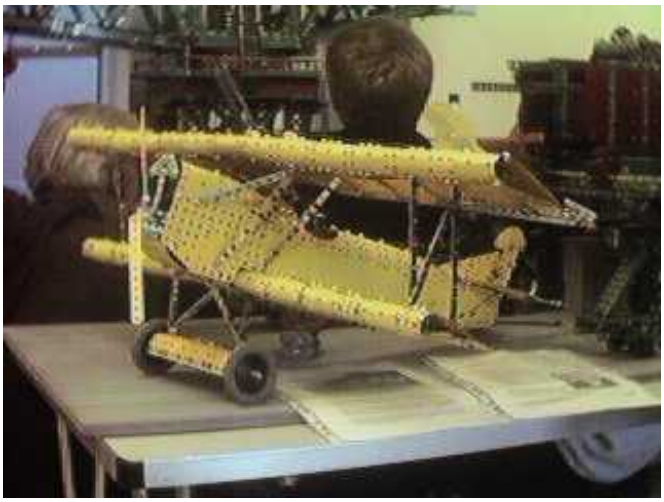
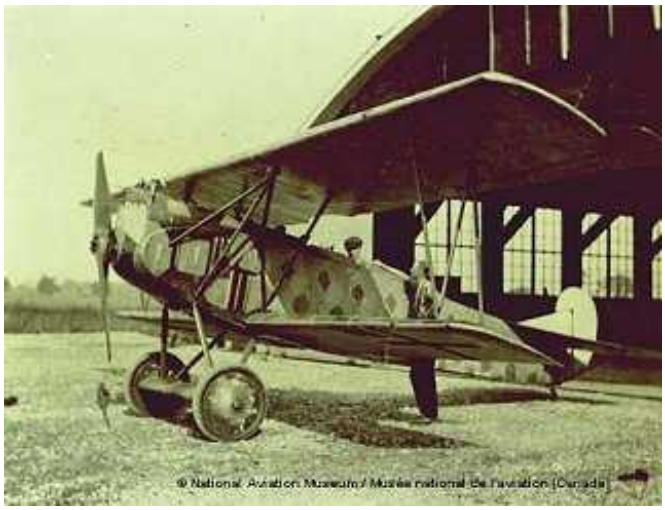
Fokker DVII

by Chris Bourne



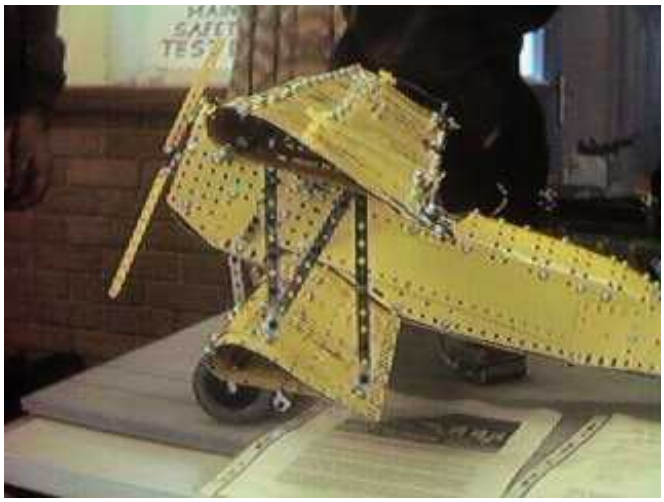


INTRODUCTION

The Fokker D.VII is generally regarded as the best fighter of the Great War on either side. It used the powerful straight six Mercedes D.III engine, which generated 180hp for a top speed of 118mph. The first models had unstable wings, but when these were brought closer together and the fuselage lengthened an exceptionally reliable and speedy aircraft resulted.

Over 2,500 were produced between April and December of 1918, by Fokker and Albatros, but the German economy was exhausted and its war machine unable to contain the Allies.

The D.VII remained a popular aircraft and saw service in Holland, Russia, and the USA. The Swiss fliegertruppe built eight D.VIIs as late as 1929 and the Belgium air force was still using them in 1931. A condition of the armistice was the surrender of all D.VIIs.



The model is built to a scale of 1:10, which allowed the use of conical discs for the wheel covers and sleeve pieces for the engine cylinders. Elastic cord suspension − bungee rope − is reproduced in the undercarriage.

Ailerons, elevators, and the rudder are all controlled from the cockpit joystick. The aileron controls follow the prototype quite closely, with the V−shaped bell crank on the shaft from the base of the joystick.

The distinctive interplanar N−struts, and the three unusual front fuselage struts, give considerable rigidity over standard parallel struts, even when built up from relatively weak narrow strips. The armaments, two Spandau machine guns, were synchronised with the airscrew. In the model, I have included the two channels on either side of the engine cylinders which were supposed to catch stray bullets and protect the engine block. By such crude devices were pilots' lives guarded in these early years of aviation.

PARTS LIST

The model stays mostly within the parts selection of a Number Ten Set with additions − mainly narrow strips and brackets. Most of the additional parts are inexpensive ones.

Spare parts can be obtained from a variety of sources. In the UK, the club scene is frequented by second−hand dealers selling parts at very reasonable prices. Look at http://www.dircon.co.uk/meccano/ for details of a club in your area. New parts can also be obtained from MW Models, at http://www.btinternet.com/~mwmodels.meccano/index.htm.

This list is an accurate account of the parts used in the model pictured. You might find more washers useful, especially if you wish to follow good practice and use washers on both sides of all bolts. I only used washers on painted parts, and even then, not on all painted parts. I have increased the number of nuts and bolts on the basis that I never yet built a model which didn't seem to need more nuts and bolts than the parts list stated.

Part	Q'ty	Part	Q'ty	Part	Q'ty	Part	Q'ty	Part	Q'ty
1	8	**17**	1	**53a**	3	**126a**	2	**201**	4
1a	6	**18a**	2	**59**	7	**128**	1	**212**	2
1b	7	**18c**	1	**62b**	2	**133**	2	**214**	5
2	18	**20a**	2	**63**	6	**133b**	4	**221**	4
2a	3	**22a**	2	**70**	2	**133c**	2	**223**	4
3	8	**23a**	1	**73**	2	**136**	1	**224**	3
4	2	**23b**	2	**74**	1	**142a**	2	**225**	2
5	9	**23c**	6	**77**	2	**147d**	1	**226**	2
6	3	**37a**	680	**89**	2	**147f**	4	**235**	13
7	2	**37b**	500	**89b**	2	**163**	6	**235a**	19
8	2	**37h**	8	**90**	4	**186**	1	**235b**	16
9	3	**38**	370	**90a**	1	**186a**	2	**235d**	14
9a	2	**38a**	5	**102**	1	**187a**	2	**235g**	6
9b	2	**38b**	1	**103d**	2	**188**	13	**235h**	12
9e	2	**38d**	1	**103h**	6	**189**	18	**518**	1
10	4	**43**	1	**111**	6	**190**	8	**700**	1
11	2	**45**	1	**111a**	43	**191**	16	**720**	1
12	26	**46**	1	**111c**	27	**192**	24	**806b**	6
12b	12	**46a**	1	**111d**	2	**194**	10	**811a**	2
12c	3	**47**	1	**111e**	3	**196**	2	**812b**	9
12d	1	**48**	5	**114**	7	**197**	2	**812d**	18
16a	1	**48a**	10	**116a**	1	**199**	21	**825a**	2
16b	3	**51**	2	**125**	2	**200**	5		

Many of the parts above can be substituted. In particular, the narrow strips used reflect those which were to hand when the model was built. Had more of the longer strips been available, they would have been used in the model.

In building the model, the general sequence of these instructions should be followed.

Note: The photographs referred to in the text are mostly clear enough when printed as black and white hard copy. Some detail may be lost, however, so if you will not have access to a computer when you build the model, it might be wise to make notes about any important information which is not clear in your printout while you can still see the original image! Long bolts and washers for spacing are not mentioned in all occasions. It should be obvious when building when these are required, but not mentioned. Many long bolts were used where they were not strictly necessary, but because they are sometimes easier to use when bolting several parts together in hard to reach places.

CONSTRUCTION

1. The Upper Wing

The upper and lower wings are constructed on similar lines, but the upper wing is complicated by the aileron mechanism. I describe the construction of the wing first in terms of the general structure, and then discuss the details later on. Builders may wish to add the details as they go, to save having to disassemble parts of the wing later − as always, read the whole of the section carefully before beginning construction in order to see where these extra details occur. But it is quite possible to build the basic wing first and then add the details later, which is how the original model was built.

Two 24 1/2" girders 1 and 2 are bolted together to form a single strong U−girder. Bolt the holes of the upper girder 1 to the holes of lower girder 2, so that the plates which form the surface of the upper wing can be bolted to the slots of upper girder 1. This will allow them to be adjusted slightly as the wing is built up. The centre of the U faces forward, towards the leading edge of the wing. In the model, the centre of the U carried three bolts spaced out to hold girders 1 and 2 together before the plates were bolted to them.

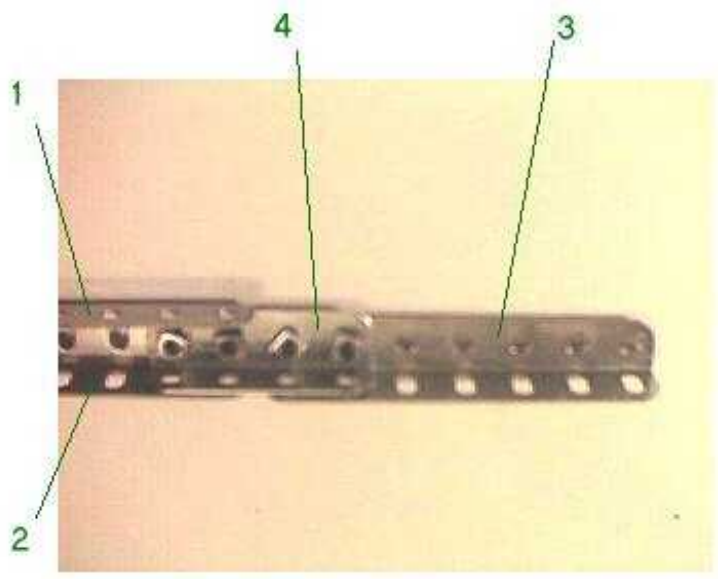


Figure 1

Figure 1 shows the end of the left U girder. A 3 1/2" girder 3 is butted onto the U girder using a 2" girder 4 to straddle the join. A similar girder is bolted to the right side of the U girder, giving a 31 1/2" compound girder overall. This is 1" short on either side of the full wingspan, which is therefore 33 1/2" overall.
Twenty−four 5 1/2" x 2 1/2" flexible plates are used to cover the wing − twelve on each side, six on top and six on the bottom. On the top, the outer three are bolted to the compound girder on their fifth holes, while the inner three plates are bolted to the compound girder by their fourth holes. The corresponding lower plates are still staggered in the same way, but they are bolted to the upper plates at the rear, and to the curved plates at the leading edge. This results in a half−inch space at the back of the wing for the aileron.

Figure 2 shows the outer part of the wing with the aileron in place. The leading edge of the wing is formed by thirteen 2 1/2" x 2 1/2" curved plates (part 199) and two 2 1/2" x 1 1/2" plates curved to a similar angle. These two smaller plates were positioned next to the end curved plate, and overlapped the next curved plate by one hole. By part numbers, from left to right, therefore, the leading edge goes: 1x199, 1x188 (1h overlap), 11 x 199 (1h overlap) 1x 188, 1x199. The U−bend of part 199 is close to that required for the leading edge but will need to be squashed a little more. Of course it is possible to use ordinary 2 1/2" square plates and bend them, or indeed curved plate part 200, and bend that, but using part 199 will cause the minimum amount of distortion to the plates.

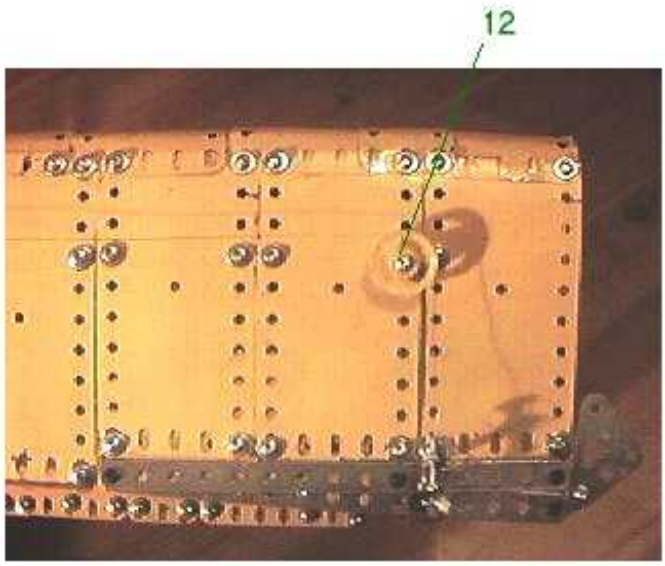


Figure 2

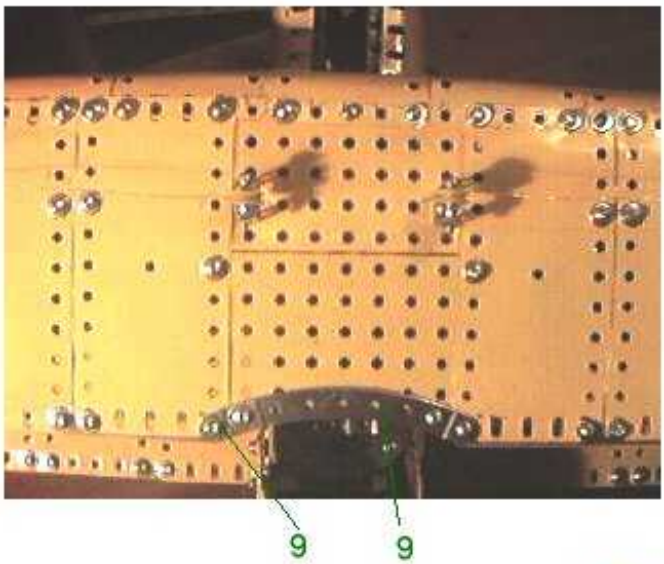


Figure 3

It is probably easiest to bolt the plates in place working from the centre outwards. Start by leaving 3 1/2" − 7 holes − clear in the centre of the compound girder. ***Figure 3*** shows how the centre will eventually be filled in with 4 1/2" x 2 1/2" flat plates, but they should be left out to start with and filled in later.

At the rear, the inner plates have a 7 1/2" perforated strip between upper and lower plates to stiffen the rear edge of the wing. The outer plates are joined together using 1/2" narrow strips (part 806b). Fishplates can be used instead but the narrow strips are easier to keep completely out of the aileron as it moves.

At the front, on the leading edge, leave a 2 1/2" gap in the centre where the last 2 1/2" curved flexible plate will be bolted when everything else is finished. The flexible and curved plates are bolted to perforated strips on the inside of the top and bottom of the wing. In the model a 25 1/2" strip was used in the middle with two 19 1/2" strips, one on each side of the wing, with the arrangement repeated on both top and bottom of the wing. ***Figure 4*** shows the inner side of part of the wing where a 25 1/2" strip 5 butts against a 19 1/2" strip 6.
In ***Figure 4*** you can also see the edges of 4 1/2" x 2 1/2" flat plates 7 and 8. These will be bolted in the centre of the wing, later, the edges pushed under the inmost flexible plates. They do not overlap each other, and in the Figure 4 it can be seen that they are at an angle to each other. The front plate is more or less horizontal, while the rear plate is angled downwards, to emulate the curve of the wing, which is smoother elsewhere with the flexible plates. A third 4 1/2" x 2 1/2" flat plate is bolted at the front of the wing on the underside, opposite plate 8. But no plate is used to correspond to plate 7 at the back of the wing, in order to allow a small bit of space for fingers when completing the final model.

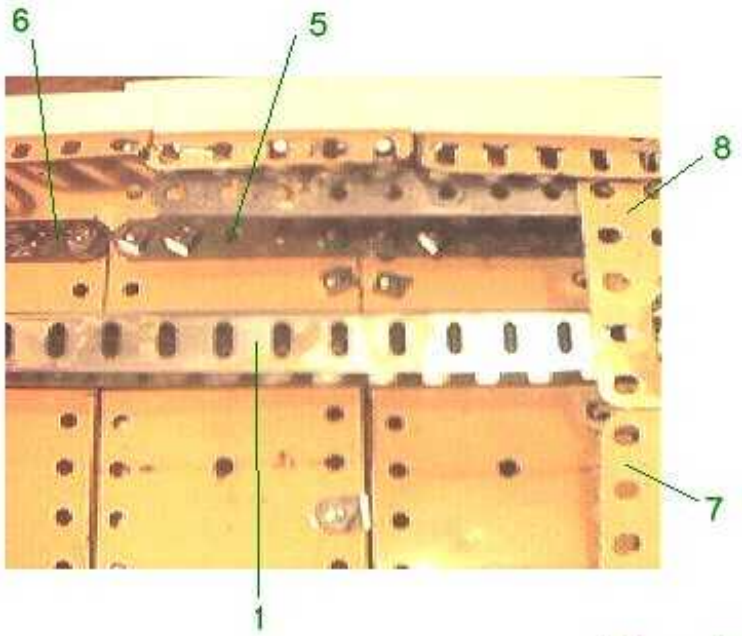


Figure 4

Figure 3 shows the completed centre of the wing with two 4" curved strips 9 overlapped by one hole only which are bolted to the 5 1/2" x 2 1/2" plates on either side. The central 2 1/2" x 2 1/2" curved plate can be bolted on the top side, curved down and slid between perforated strip and flat plate on the bottom side. It can then be bolted in place through the centre hole at the front edge using a 1 1/4" long bolt passing all the way through.

In ***Figure 5*** you can see assembly 10 carrying the aileron wires.

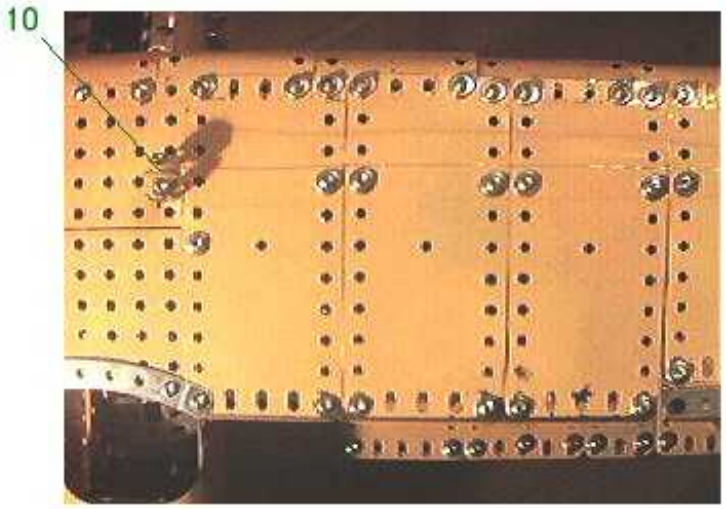


Figure 5

Assembly 10 is shown in more detail in ***Figure 6***. A 1" x 1/2" narrow double angle bracket (part 811a) carries a 1/2" bossless pulley on a pivot bolt. The wire will come up from the fuselage through flat plate 8 (and it's opposite number below), through hole 11. The wire then continues to assembly 12 in ***Figure 2***.

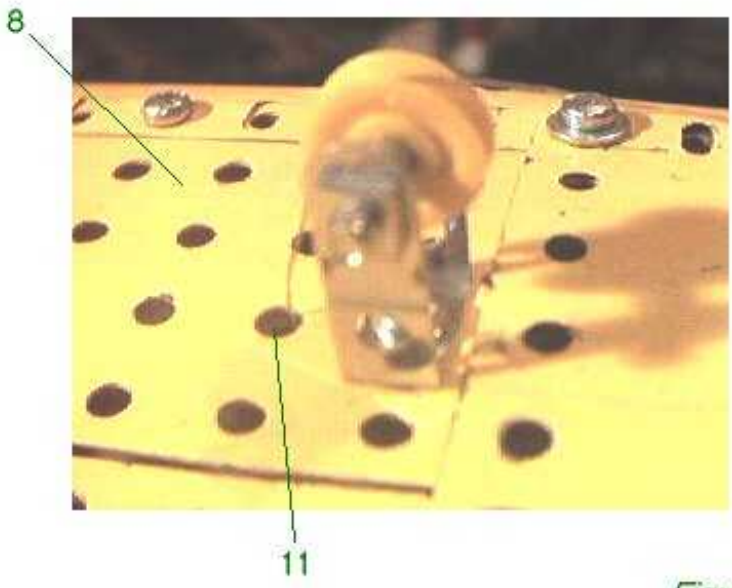


Figure 6

Figure 7

Figure 7 shows assembly 12 in more detail. It is a 1" bossless pulley held by a pivot bolt. The pivot bolt passes through the pulley and a plastic spacer (part 38a) before entering the wing but a collar could be used instead. In the model I used yellow pulleys and spacers to have them blend in with the surface of the wing, so they are less obtrusive.

The wire continues around the pulley to the aileron. ***Figure 8*** shows an aileron, in fact the left aileron, from above. Two 7 1/2" perforated strips 13 and 14 are bolted together at one end and to a hinge 15. Strips 13 and 14 are bolted to a 1" triangular plate at the other end and a 1 1/2" x 1 1/2" triangular plate 16 is bolted to the third hole of the 1" triangular plate.

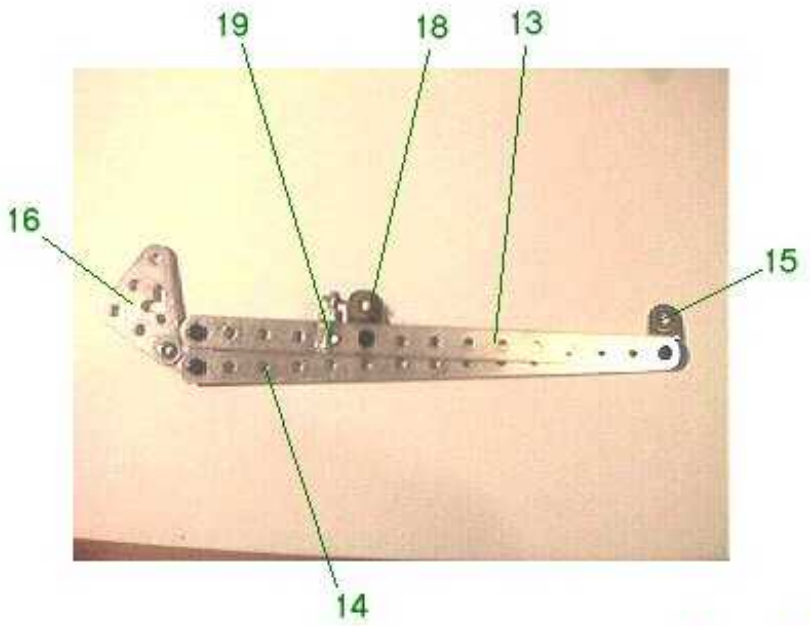


Figure 8

Figure 9 shows the underside of an aileron in detail, showing 1" triangular plate 17.

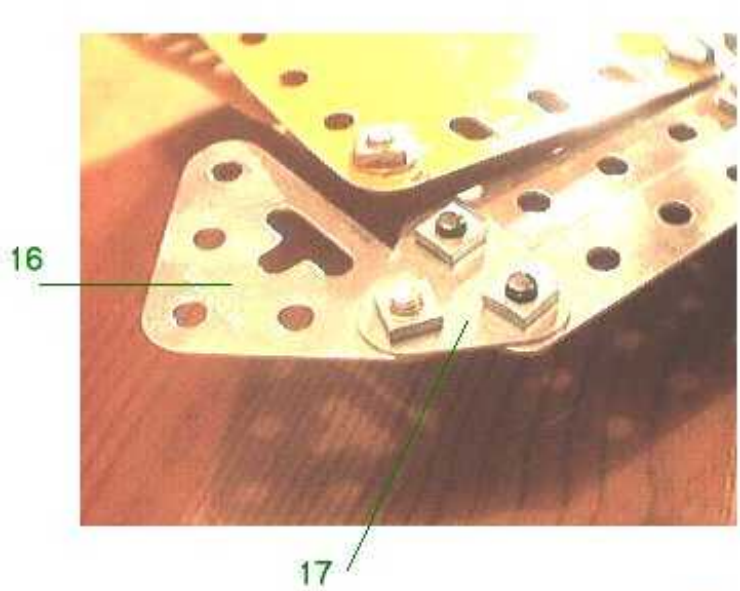


Figure 9

A second hinge 18 is bolted to strip 13. A 1" x 1/2" narrow angle bracket (part 812b) 19 is bolted next to hinge 18 and carries a 3/4" long bolt in the top hole, attached by a retaining nut on each side. This is shown in detail in ***Figure 10***. The aileron wire can be wedged with a nut to the tip of the 3/4" bolt and the bolt can be finely adjusted on bracket 19 by moving the retaining nuts.

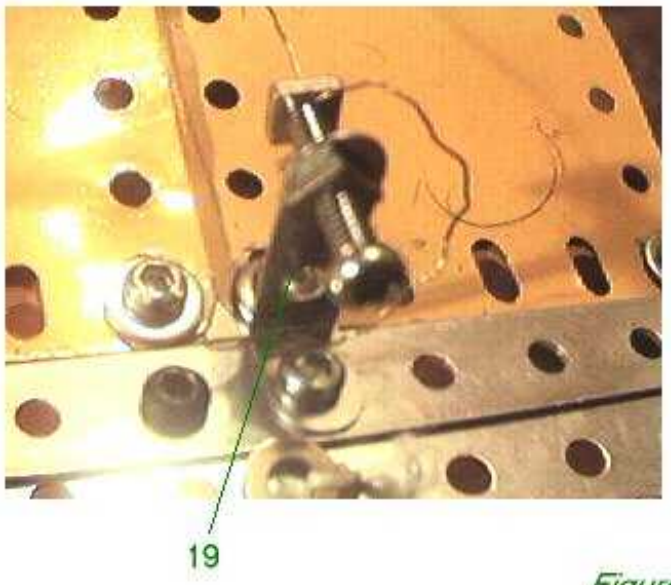


Figure 10

Figure 11

A small length of elastic is attached to a small washer or nut and fed through strip 14 opposite the bracket. It is passed through a suitable hole in the underside of the wing and tied off to a washer on the other side, so that it tends to pull the aileron down. This is shown in detail in ***Figure 11***.

Figure 12 shows the underside of the top wing − this is the right wing, and the leading edge is to the top of the picture. Two angle brackets 20 are bolted to flexible plate 21. I used new French angle brackets as this allow me to push the hole of the bracket under the edge of the plate. I have found that old Binns Road brackets seem to be slightly shorter in this regard and the hole can't be pushed under an edge. It is useful to have the slot sticking out as it makes attaching the wing struts much easier, but the bracket can be bolted in place with the slot under the plate if necessary.

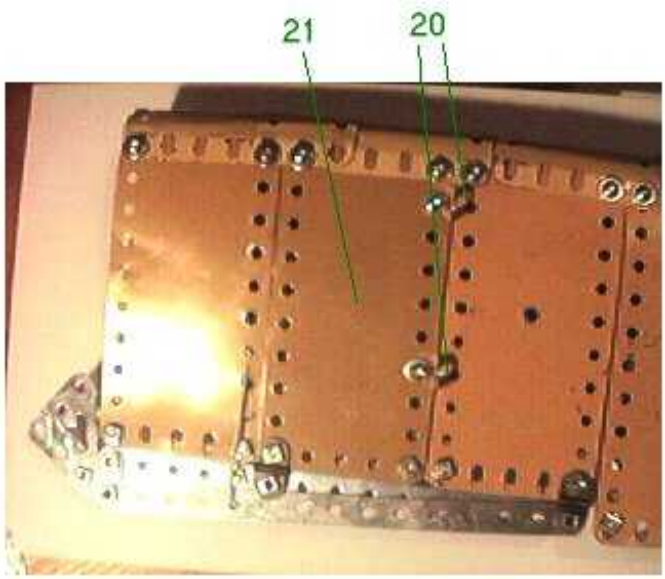


Figure 12

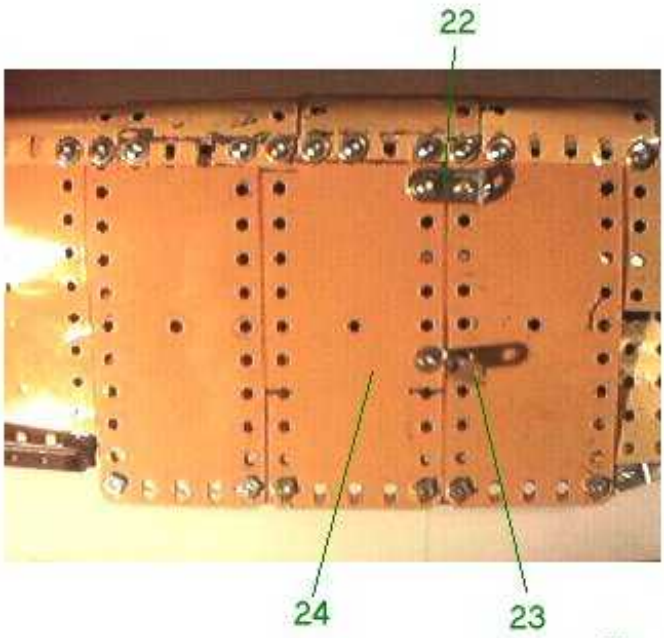


Figure 13

Figure 13 shows the underside of the top wing, closer to the centre. 1" x 1/2" angle bracket 22 is bolted in place as shown just behind the leading edge, and obtuse 1"x1/2" obtuse narrow angle bracket 23 (part 812c) is bolted with the short arm under the edge of flexible plate 24, and the long arm inclining inwards towards the fuselage. The bracket is hard to see but the shadow is very visible. These brackets also carry struts. The strong 1" x 1/2" angle bracket is going to provide a home for three separate struts in one; hence the abandonment of concealment in favour of a robust fixing.
The wedging of the aileron wire is crude but it works well. A more elegant solution was suggested by Roland Jaggard, who suggests drilling a hole all the way along the centre of the bolt's shaft so the wire can be passed right through the shaft of the bolt. He suggests attaching the wire to a split washer at the bolt head. The bolt can then be adjusted on the bracket as before. This provides great control over the fine tuning of the aileron and also looks much neater, but of course it does involve a certain amount of worskhop activity and the mutilation of the part.
Of course the wire cannot be properly adjusted until the model has been completely assembled. It is worth noting however that the bolts securing the hinges may have to be kept quite loose for the aileron to operate successfully, and care must be taken to ensure that the aileron moves freely and does not catch against any part of the wing.

2. Undercarriage

The undercarriage has a frame of perforated and double angle strips, covered over with rows of curved 2 1/2" x 1 1/2" flexible plates. In the model, yellow plastic plates where used, as the plastic is well suited to the curve required. But there is no reason why metal flexible plates cannot be used.

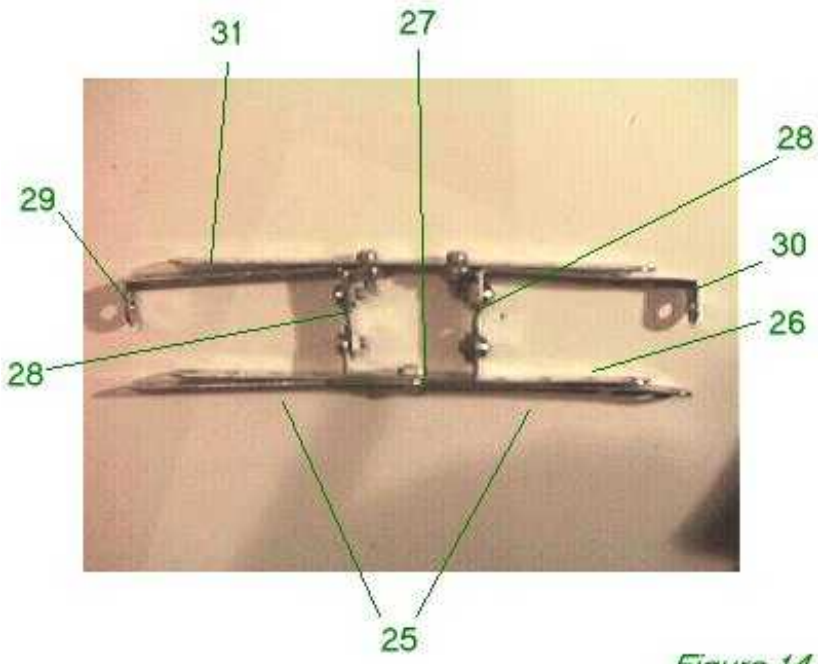


Figure 14

Bolt two 3 1/2" perforated strips 25 and a 5 1/2" perforated strip 26 to a 1 1/2" x 1/2" double angle strip 27, as shown in ***Figure 14***, to make an assembly 13 holes wide. Bolt two 1" x 1/2" angle brackets 28 to the arms of double angle strip 27, with the brackets turned inwards. Bolt two 2 1/2" x 1/2" double angle strips 29 and 30 to brackets 28. Bolt a 5 1/2" perforated strip 31 across the top of double angle strips 30 and brackets 28, using spacing washers when bolting to the brackets, which are most likely on a slightly lower level. These last bolts will carry four plates each and another washer when the undercarriage is finally finished, and in the model long 3/8" bolts were used. The picture shows the strips and brackets loosely bolted, so that they can be seen more easily, but in the model they must be bolted together very tightly.

Figure 15 shows an end−on view of the framework including the covering plates. Two 2 1/2" curved strips 32 are bolted to a 1 1/2" flat girder 33. Curved strips 32 only overlap by one hole, so as to form a 3" curve. A reverse double angle bracket 34 is bolted to the centre hole of flat girder 33 on the inner side, the other end of which will form a strong bracket for the undercarriage struts, but it will probably be easiest to bolt this in place at the end, even if it means some slight disassembly to do it.

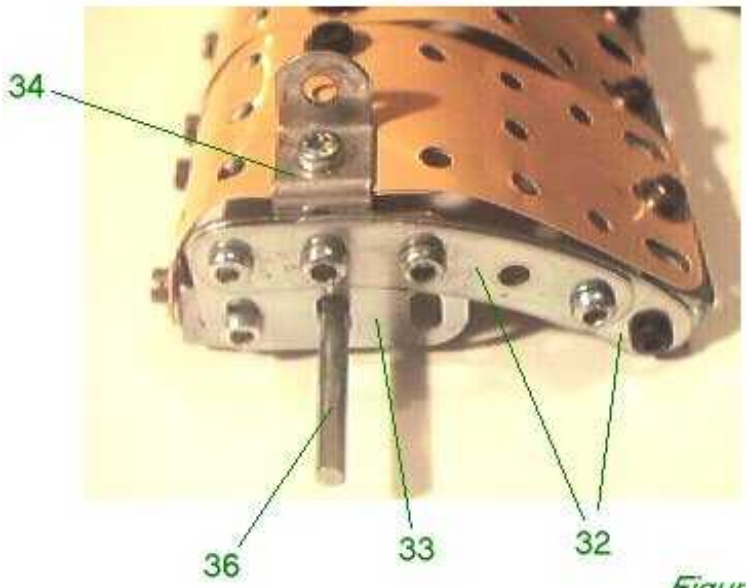


Figure 15

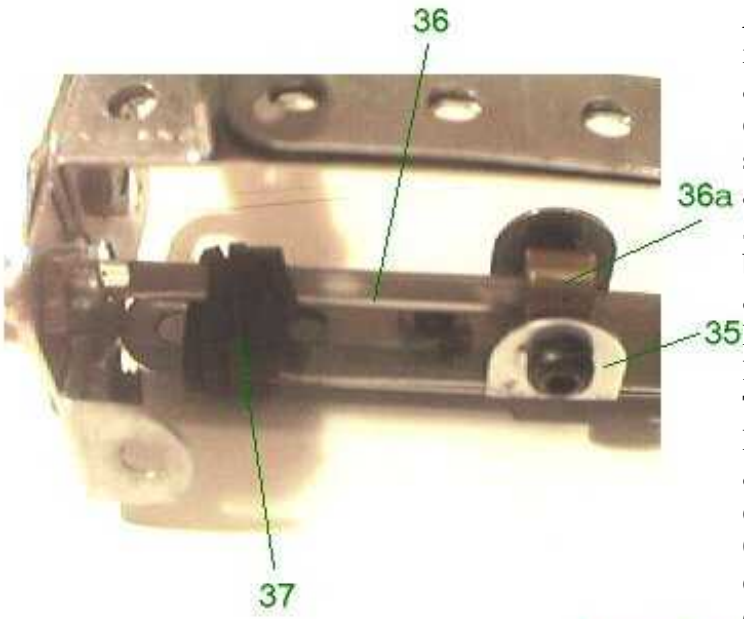


Figure 16

Figure 16 shows the inside of the construction in detail on the right hand side. Slide a double angle bracket 35 between strips 25 and 27. Set a collar 36 between the jaws of bracket 35 using a standard bolt on each side to hold it. Slide a 3" axle rod 36 through the centre slot of flat girder 33, and then through the loop of a 6" driving band 37. Wrap driving band 37 around strips 25 and 27 twice, and then secure by pushing the loop once again over the end of axle rod 36. Push the axle rod into collar 36 and secure it. The axle rod will now move up and down a little in the slot, while the looped driving band acts as 'bungee rope' suspension, as in the original aircraft.
On the outer side, axle rod 36 carries a loose collar, a 2" pulley with tyre (part 142a), a conical disc to act as the wheel cover, a washer, and finally a second collar is secured to the end of the rod to hold it all in place.

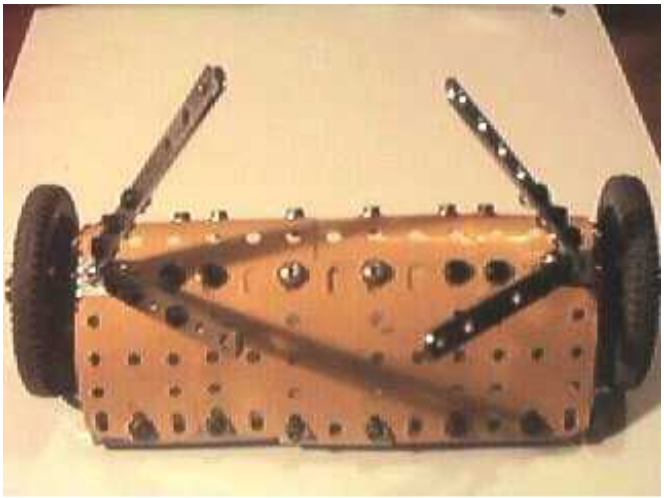


Figure 17

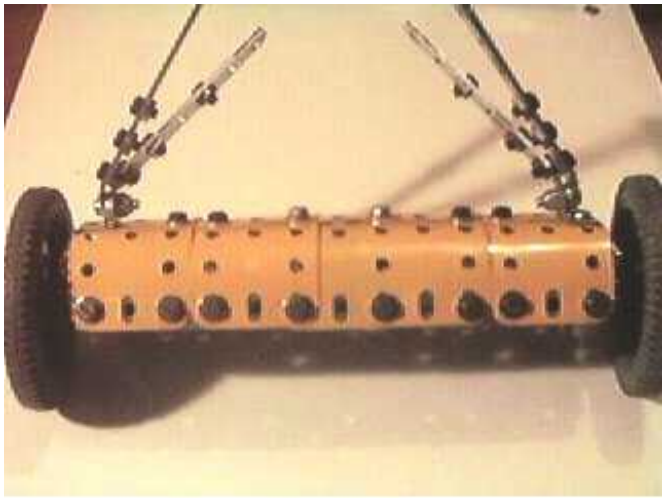


Figure 18

The construction can now be covered over with the flexible plates. The front set of five are bolted to strip 31 by their fourth holes, and the rear set also to strip 31, over the front set, by their first holes. Bolt two angle brackets to the front slots of flat girders 33 and join them with two 2 1/2" strips and a 4 1/2" strip, overlapping to make a thirteen−hole compound strip. At the rear the model uses two 2 1/2" x 1/2" double angle strips and one 1 1/2" x 1/2" double angle strip bolted together and to the end holes of curved strips 32 to achieve the same effect. The flexible plates are then curved and bolted firmly down on the front and rear bars. With thirteen holes to span, the simplest arrangement is to have one central flexible plate in each group of five overlapped on either side: ***Figures 17 and 18*** show the complete undercarriage unit from front and back.

Narrow strips are used for the undercarriage struts, built up with several thicknesses for strength. ***Figure 19*** shows the struts disassembled. The rear left and right struts are six holes long and consists of two 3" narrow strips with a 1 1/2" narrow strip and a 1" x 1/2" obtuse narrow angle bracket (part 812c) sandwiched between them. The front strut is almost identical, except it is 3 1/2" long, and therefore uses two 3 1/2" narrow strips with a 2" narrow strip and 1" x 1/2" obtuse narrow angle bracket (part 812c) sandwiched between them. This leaves a one hole slot in the top of each strip to carry the end of the bracket in the fuselage to which they will later be attached.

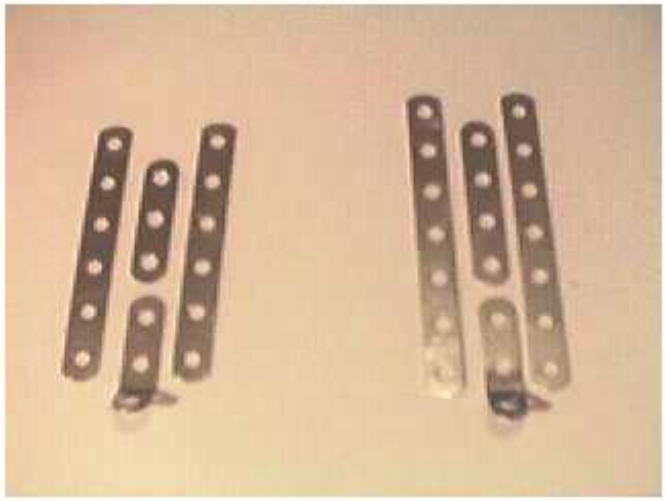


Figure 19

Figure 20

The ends of the narrow obtuse angle brackets are attached to the end of the reverse double angle bracket 34 by means of a 3/8" long bolt and locknut (part 37h). As always, two ordinary nuts can be locknutted together to make a similarly strong joint, although the modern French locknuts are easier to use. The front strut is on the outside, and spaced from the rear strut by two washers, which leaves room for them to splay out without interfering with each other. ***Figure 20*** shows the struts bolted in place, in close detail.

3. Fuselage Framework

The fuselage is a frame of perforated strips covered over with flexible plates. The plates should be bolted onto the framework later, after the lower wings, cockpit controls, engine and airscrew are completed. Naturally all the bolts in the framework will have to be undone and bolted up again with the plates in place later. In the model, many of these are long bolts to aid construction when passing the bolt through several parts at once, or because spacing is used between elements of the framework as the fuselage becomes wider towards the cockpit. Because the fuselage is completely symmetrical, details are given for one side only.

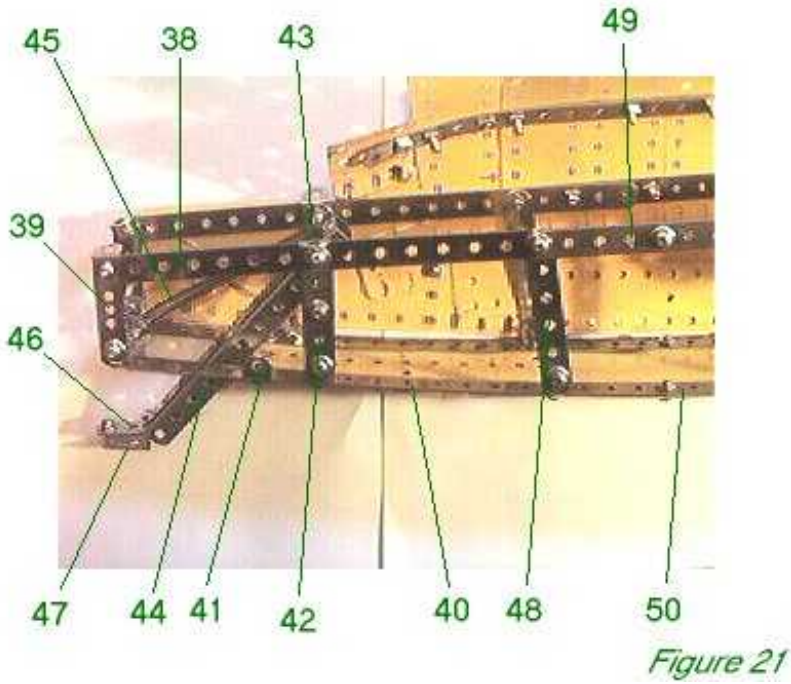


Figure 21

Figure 21 shows the rear end of the framework with the tailskid in place. A 9 1/2" perforated strip 38 is bolted to a 2" perforated strip 39 and to a 1/2" angle bracket with the slot facing inwards. The slot provides a fixture for the tailplane assembly later.
A similar 1/2" x 1/2" bracket is bolted to the bottom hole of strip 39, which carries a 2" perforated strip (the modern 5−hole variety) flat across the width of the base of the fuselage and a 12 1/2" perforated strip 40 flat along the length of the base of the fuselage. Thus at the rear of the fuselage, it will be four holes wide. A 1/2" x 1/2" bracket 41 will carry a flexible plate later. A 2 1/2" perforated strip 42 is bolted to the slot of a 1/2" x 1/2" bracket at the base, and to strip 38 and the hole of a 1/2" x 1/2" bracket 43 at the top − using modern angle brackets will enable bracket 43 to be placed behind the strips. Note that the slot sticks out from the fuselage, providing another fixture for the tailplane. A double armed crank is bolted behind strip 42 by the top and centre hole of the strip, on each side of the fuselage. The crank bosses form journals for a 2" axle rod, on which the tail−skid is mounted. The tail−skid consists of two 5 1/2" girders 44 bolted together to form a compound U−girder. Bolt them together by the slotted holes, and mount them on the axle rod through the last but one hole. The last hole carries a tension spring 45 which runs back down to the centre hole of the 5−hole 2" perforated strip across the rear of the base of the fuselage. Long 3/8" bolts are used to secure the tension springs − one nut secures the bolt to the strip or girder, and a second nut secures the spring on top.
At the bottom of the tail skid a 1/2" x 1" obtuse angle bracket 46 is bolted to girders 44. A single bent strip 47 is bolted beneath bracket 46.
The tailskid arrangement works but might be improved with extra tension springs to provide a stiffer suspension. In the original aircraft, elastic 'bungee' rope was used, stretching backwards like the spring in the model.
A 3" perforated strip 48 is bolted to the slot of a 1/2" x 1/2" angle bracket at the base and to strip 38 and to a new 12 1/2" perforated strip 49 at the top. Note that there are six clear holes between strips 42 and 48 at the top, but seven clear holes between the two at the base, so the strip is inclined backwards somewhat. At the base, 12 1/2" strip 40 is bolted to a fresh 12 1/2" strip 50, overlapping it by six holes. These base strips will carry something of a curve from rear to nose which provides an effective profile for the aircraft, reasonably to scale within the limitations of Meccano spacing.

Figure 22 shows the mid−section of the fuselage framework. At the top, a 3 1/.2" perforated strip 51 is bolted to strip 49 and to a 2 1/2" x 1/2" double angle strip. This double angle strip is separated from strip 51 by two washers; in the model, 1/2" long bolts were used here as three flexible plates and a third washer will be added to the outside later. A 2 1/2" x 2 1/2" curved flexible plate 52 (part 200) is bolted to the double angle strip and hangs down to form the pilot's seat.

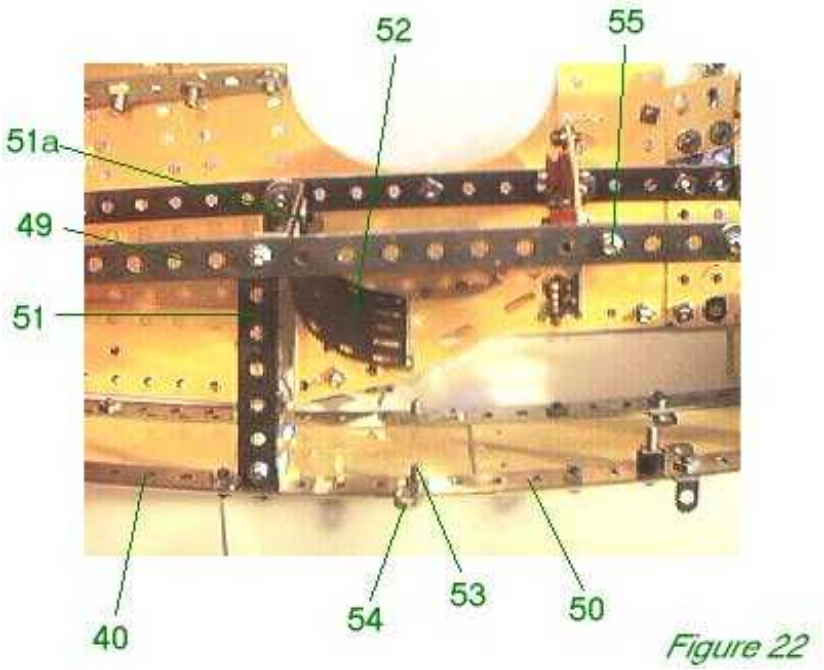


Figure 22

At the base, strip 51 is secured to a further 2 1/2" x 1/2" double angle strip, which in turn is bolted to strip 50 just in front of the end of strip 40. Note that there are ten holes between strip 48 and strip 51 at the top, but only nine holes between strips 48 and 51 at the base, thus strip 51 inclines forwards somewhat.

A 3/8" long bolt 53 carries a 1" narrow perforated strip 54 (part 810 − a fishplate could be used instead). Strip 54 is hard to see in the picture. It is angled backwards slightly and will be fixed to the inner trailing edge corner of the lower wing. Refer to figure 26 to see exactly where this and other fixture bolts are placed on the underside of the fuselage.

A 2 1./2" x 1/2" double angle strip is bolted to strip 49 at bolt 55, again with two washers spacing it from strip 49, which will carry the cockpit instrument panel.

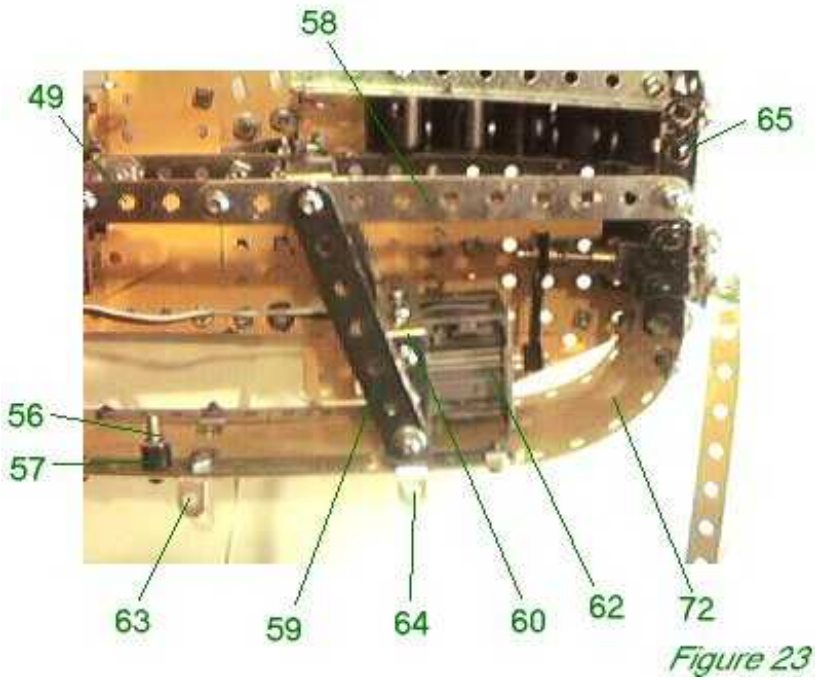


Figure 23

Figure 23 shows the front section of the fuselage framework.

3/4" long bolt 56 has been left in place and will carry the central girder of the lower wing, with plastic collar 57 to space the lower wing from the base of the fuselage. A brass collar could be used instead.

A 5 1/2" perforated strip 58 overlaps strip 49 by three holes. A 3 1/2" perforated strip 59 is bolted in place with a 2 1/2" x 1/2" double angle strip on the inside at the top, spaced from strip 58 by two washers. At the base, strip 59 is bolted to a 2 1/2" x 1 1/2" double angle strip 60, again, separated from it by two washers. A 2 1/2" x 1" double angle strip 61 is bolted over the top of double angle strip 60 and will in turn carry the motor 62. Both of the arm holes of double angle strip 61 are bolted to double angle strip 60, the spacing washers allowing tight room for a bolt head underneath strip 59.

Figure 24 shows the motor assembly in isolation.
A 5 1/2" perforated strip 58 overlaps strip 49 by three holes. A 3 1/2" perforated strip 59 is bolted in place with a 2 1/2" x 1/2" double angle strip on the inside at the top, spaced from strip 58 by two washers. At the base, strip 59 is bolted to a 2 1/2" x 1 1/2" double angle strip 60, again, separated from it by two washers. A 2 1/2" x 1" double angle strip 61 is bolted over the top of double angle strip 60 and will in turn carry the motor 62. Both of the arm holes of double angle strip 61 are bolted to double angle strip 60, the spacing washers allowing tight room for a bolt head underneath strip 59. Figure 24 shows the motor assembly in isolation.
The undercarriage struts will be carried on 1" x 1./2" narrow angle brackets 63 and 64 (part 812b), the long arm of which is bolted between the flexible plates on the base of the fuselage and strip 50. The front bracket, 64, is also bolted to the underside of the motor assembly through the third hole from the end of strip 50. These brackets are opened out slightly with pliers to carry the struts: this is best done after they are in place and the correct angle can accurately be judged.

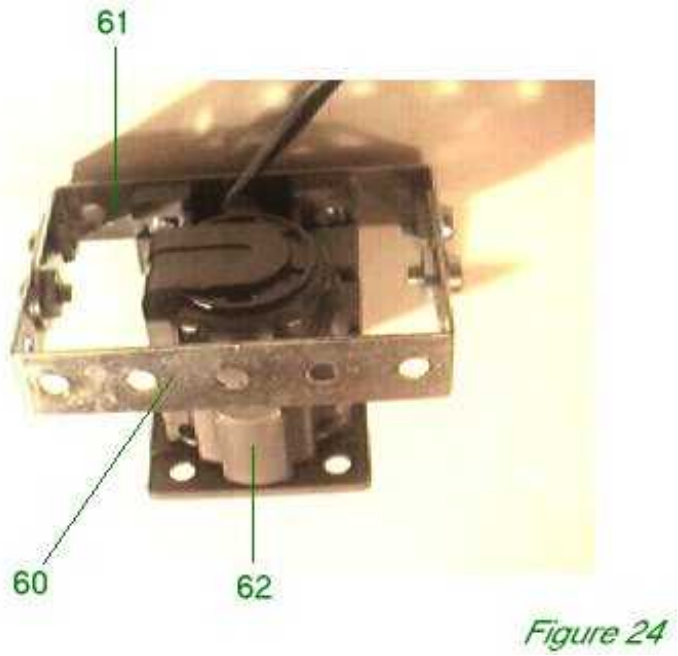


Figure 24

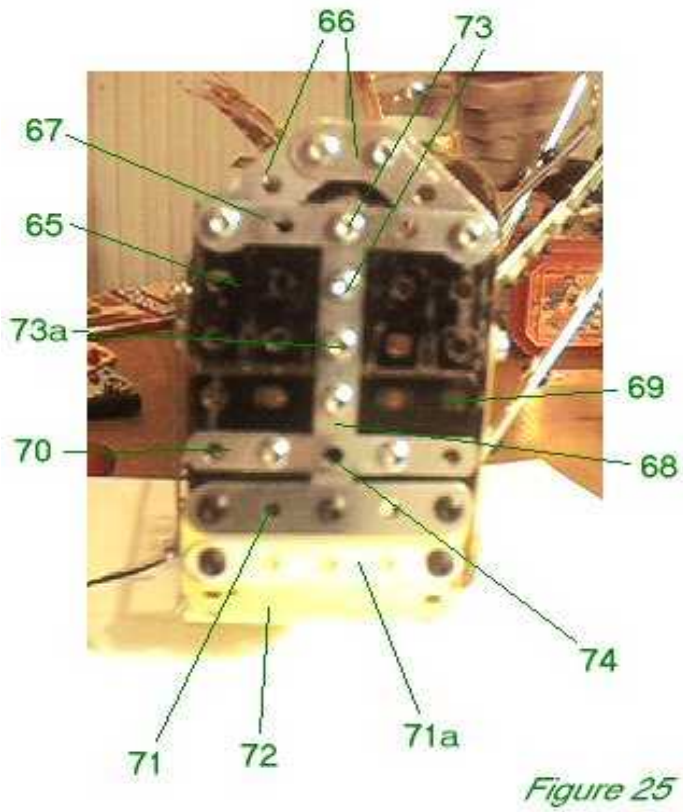


Figure 25

At the nose, 2 1/2" x 1 1/2" flanged plate 65 is bolted to the end of strip 58. ***Figure 25*** shows the radiator from the front, with the airscrew removed. At the top, two obtuse corner brackets 66 (part 133c) are bolted together, and then to flanged plate 65 together with a 2 1./2" narrow perforated strip 67. A 3" narrow perforated strip 68 is bolted vertically and carries a second 2 1/2" x 1 1/2" flanged plate 69. A 2 1/2" narrow perforated strip 70 is bolted across the centre of flanged plate 69. The bolts also hold a double bent strip on the inside of flanged plate 69, to form a journal for the airscrew. A 2 1/2" perforated strip 71 is bolted over a 9 1/2" strip plate 72 and also to flanged plate 69 and strip 70. A second 2 1/2" perforatred strip 79 is also bolted over strip plate 72.
Note that bolts 73 are 1/2" bolts which pass through small rubber pulleys (part 23c) on the inside, and then secure the front cylinder of the engine block, compressing the rubber pulleys somewhere between cylinder and flanged plate. Bolt 73a passes through the hole of a 1/2" x 1/2" angle bracket on the inside of flanged plate 65, the slot of the bracket forming a mounting for the engine block.
Note also that hole 74 will carry the airscrew shaft.
With the motor assembly in place, strip plate 72 is curved back and bolted to strip 50. The seventh hole of plate 72 is bolted to the first hole of strip 50. The various bolts in strip 50 holding fixtures can be removed and replaced with strip plate 72 in position.

Figure 26 shows strip plate 72 from below, and the bolts previously mentioned. A 9 1/2" strip plate 73 overlaps strip plate 72 by three holes.

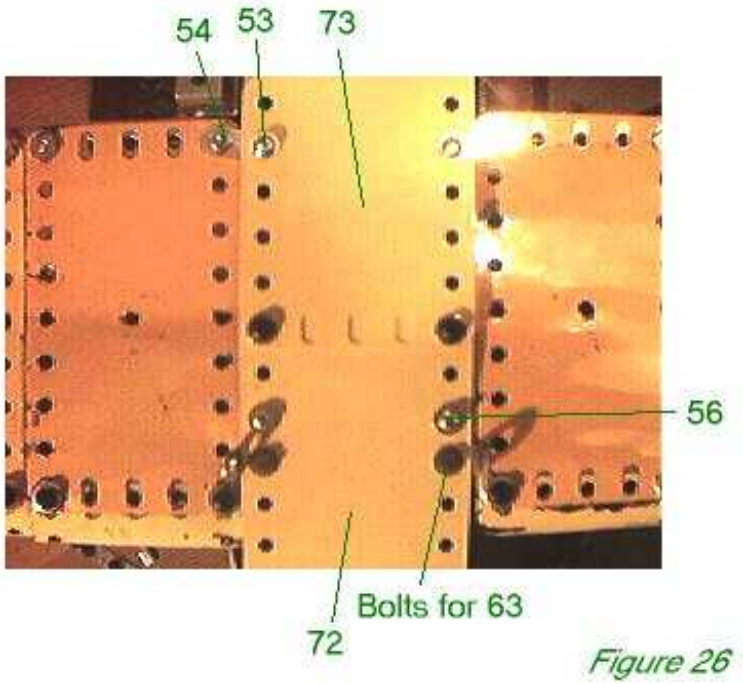


Figure 26

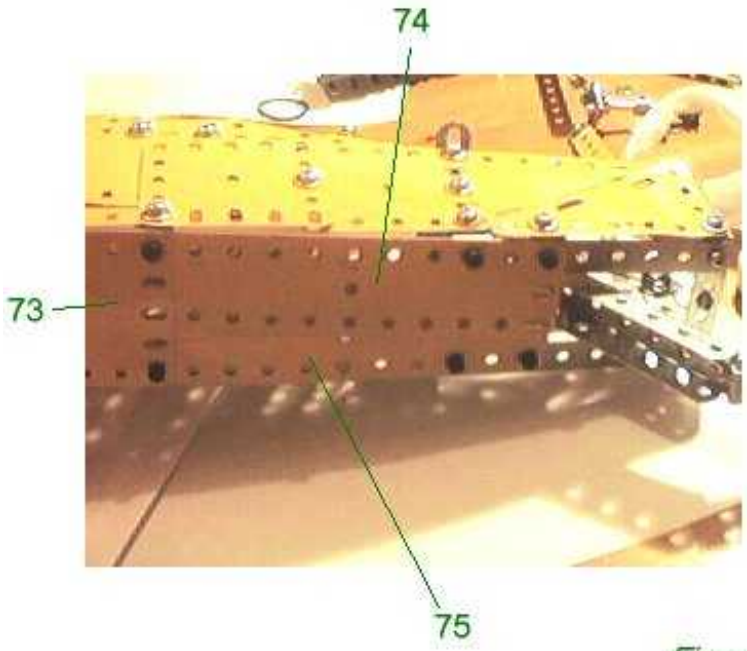


Figure 27

Figure 27 shows the rear of the base of the fuselage with the plates in place. Two 5 1/2" x 1 1/2" flexible plates 74 and 75 are inclined towards each other, overlapping, towards the rear of the fuselage. A gap is left right at the back for the tailskid.

4. Airscrew and Engine Block

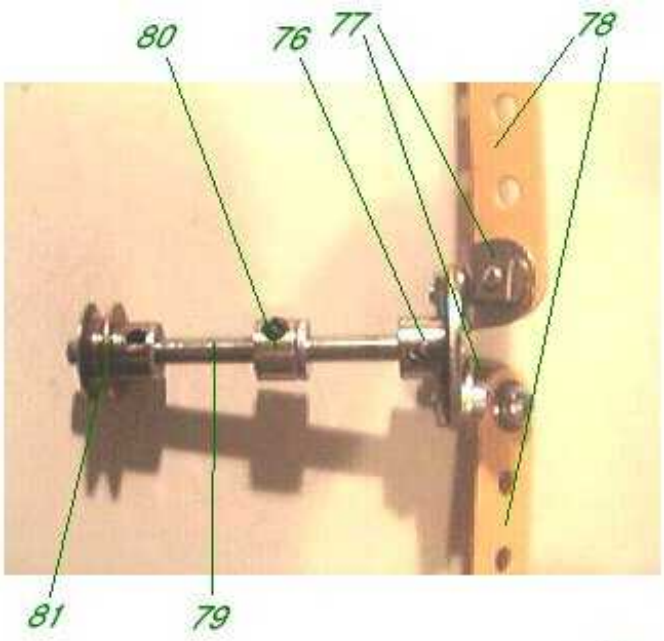


Figure 28

Figure 28 shows the airscrew in isolation. A 1" bush wheel 76 (Electrikit part 518 − a very useful part, well worth buying) carries two obtuse angle brackets 77. A washer is placed between bracket and bush wheel to prevent the bracket being fouled by the peening of the boss. Two 5 1/2" perforated strips 78 are bolted to brackets 77 for the blades of the propeller. Bush wheel 76 is fixed to a 2 1/2" axle rod 79. This will be journalled in the flanged plate and double bent strip previously mentioned and secured in place by a collar 80. A 1/2" pulley 81 is secured to axle rod 79. A small rubber pulley (part 23c) on the motor shaft carries the drive to pulley 81 using a 2 1/2" driving band.

Figure 29 shows the engine block. This simple construction has six 1 1/2" sleeve pieces bolted together at the bases in a line, through the lowest of the three holes in each sleeve piece, with a washer between each sleeve piece, using a screwdriver narrow enough to pass through the opposite hole before it too is secured − or, of course, an Allen key and Allen bolts, as in the model.
The sleeve pieces must be arranged so that some have the open side facing right, and some have the open side facing left. Furthermore, they must be arranged so that a 4 1/2" girder 82 can be bolted to the upper of the two holes on the closed side on at least one sleeve piece on each side. In the model the left girder is bolted to the third cylinder from the front, while the right girder is bolted to the first and fifth cylinders.

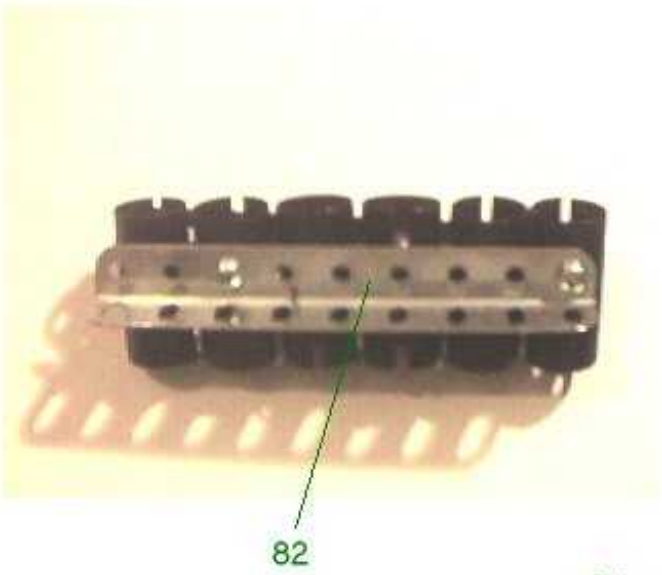


Figure 29

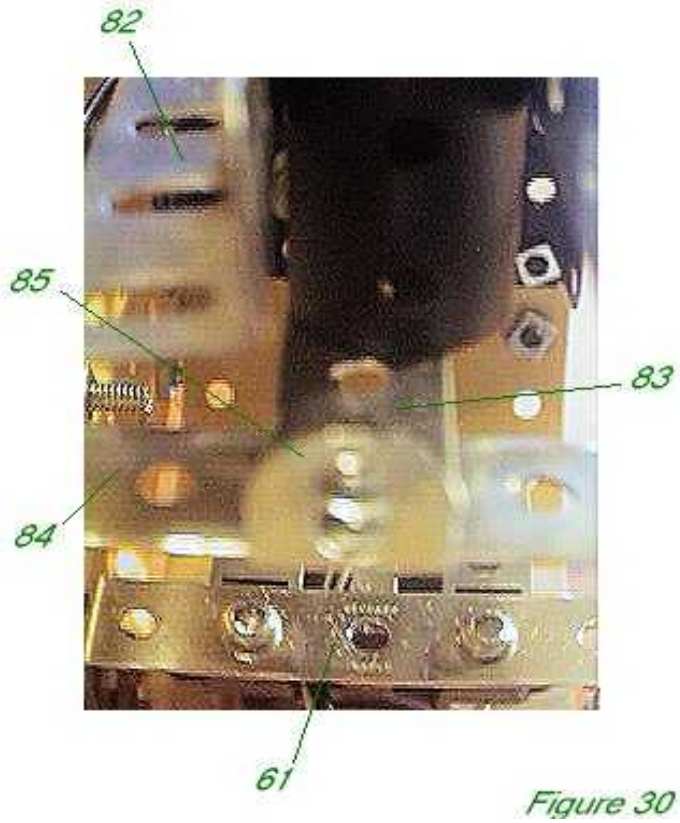


Figure 30

A 4 1/2" perforated strip 83 connects the angle bracket in flanged plate 65 to the double angle strip 84 nine holes back. This strip acts as a base for the engine block. A second 1/2" x 1/2" angle bracket 85 is attached to the centre of double angle strip 84. ***Figure 30*** shows the engine block in place with the final sleeve piece removed for clarity. The final sleeve piece is bolted to the preceding sleeve piece, and to the slot of angle bracket 85 using a 1/2" long bolt, with a rubber pulley between bolt and sleeve piece as a tight cushion.

Girders 82, besides helping to hold the sleeve pieces in place, also model two steel channels which were supposed to protect the engine block from stray bullets, in the original aircraft.

The engine block is bolted in place at the front using 1/2" long bolts and rubber pulleys as cushions, according to the instructions in the previous "Fuselage Framework" section. Tighten the lower bolt first, of course, and then the upper bolt.

5. Cockpit and Joystick

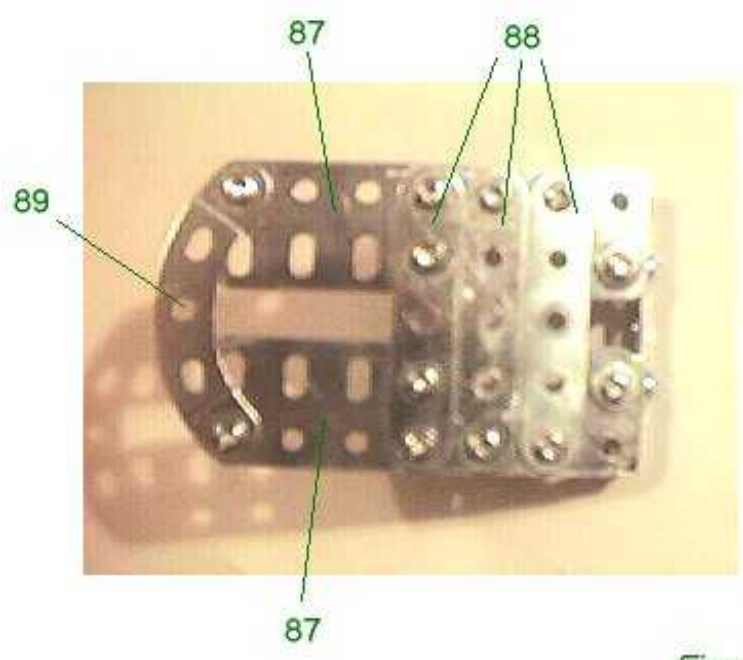


Figure 31

Figure 31 shows the floor of the cockpit. Two 3 1/2" flat girders 87 are joined by three 2 1/2" perforated strips 88, and a 2 1/2" stepped curved perforated strip 89 at the rear of the floor.

Figure 32 shows the underside of the cockpit floor with the joystick control mechanism in place. Four 1/2" x 1/2" angle brackets 90 are bolted to the floor and carry two 2 1/2" x 1/2" double angle strips 91 into which the aileron control shaft is journalled. Two 1 1/2" x 1/2" double angle strips 92 are also bolted to the cockpit floor and will be bolted in turn to the base of the fuselage as previously described in the Fuselage Framework section.

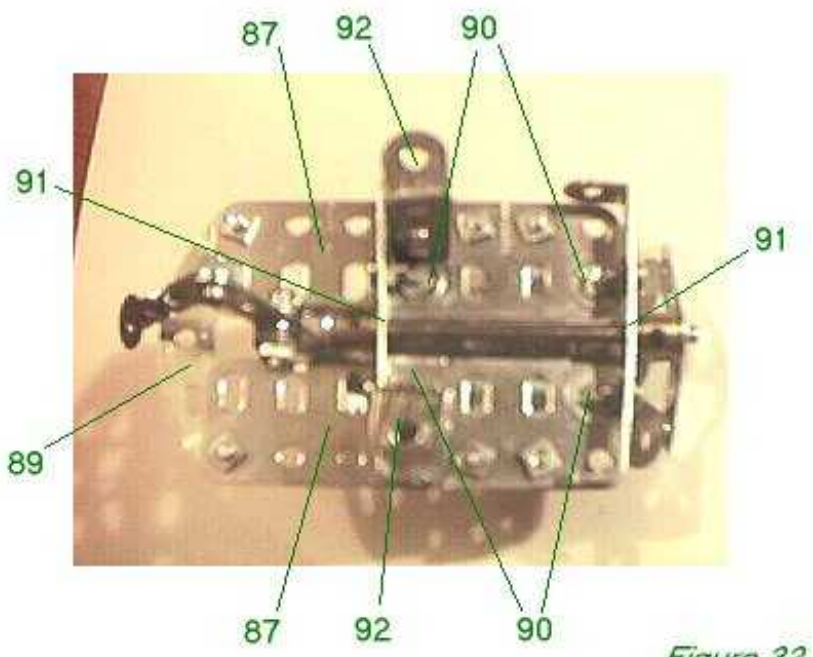


Figure 32

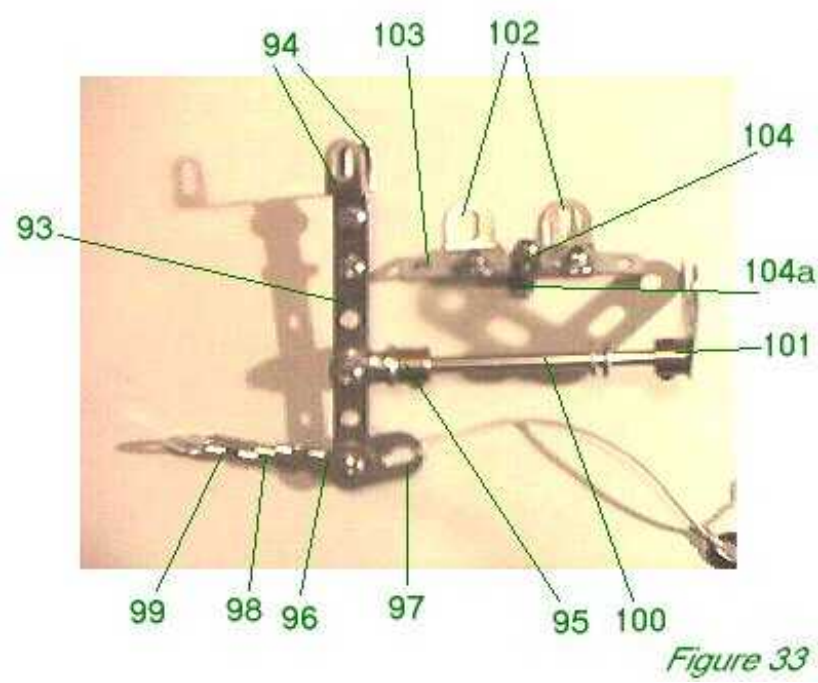


Figure 33

Figure 33 shows the joystick control mechanism in isolation, and the rudder control mechanism beside it.
Two 3" narrow perforated strips 93 are bolted together side by side for strength, and two narrow reverse angle brackets 94 (part 825) are bolted to the top to form the hand grips. A small fork piece 95 is bolted to strips 93 with a 5/8" Allen pivot bolt (a standard pivot bolt will do fine), and three washers on either side of the strips to hold it centrally, but free to move forwards and backwards. A rod and strip connector 96 is bolted to the end hole of strips 93 pointing back towards the tail, along with a fishplate 97 pointing towards the nose. A 3/8" long bolt with a locknut − or two nuts lock−nutted − should be used to allow both the rod and strip connector 96 and fishplate 97 to move freely. Rod and strip connector 96 carries a 1 1/4" axle rod 98 (part 18c) with a second rod and strip connector 99 on the other end. It is not necessary to use this length of axle rod − a 1" or 1 1/2" axle rod would do just as well.

A wire will be passed through the hole of rod and strip connector 99 and both ends drawn through the rear fuselage until they emerge to be connected to the elevator horns in the tail plane so that when the joystick is moved forwards and back, the elevator flaps rise and fall in unison. A length of elastic is tied to fishplate 97. The other end is tied to a second fishplate and this is bolted to a suitable hole in the front fuselage − one of the flat plates is ideal. The elastic tends to pull on the joystick against the weight of the elevator flaps, and thus prevents the elevator flaps from always falling down and dragging the joystick forward as a result.

Fork piece 95 is secured to a 3" axle rod 100 which will be journalled through double angle strips 91. Axle rod 100 carries a bossed bell crank 101. This is secured so that the when the joystick is upright, the arms of the bell crank are spread equally, at 45 degrees to the vertical. A wire will be passed through the two end holes of the bell crank arm and both ends of the wire passed up through the top of the fuselage, through the top wing, and around the pulleys on the top wing until they are attached to the aileron horns as described in the instructions for the Upper Wing. As the joystick is moved from side to side, so the wire will pull one aileron up and, aided by the elastic on the underside of the ailerons, cause the other aileron to droop. The movement is not great, and would not have been in the prototype, but if the wires are taut, it is sufficiently pronounced to demonstrate the control of the ailerons from the joystick.

The rudder control bar is very simple. Two obtuse angle brackets 102 are bolted to a 2 1/2" narrow perforated strip 103 which is secured to the centre hole of the forward−most perforated strip 88 by a 1/2" bolt using a plastic mini spacer 104a (part 38b) and a locknut 104 so the control bar is free to pivot. A wire will be run between the slots of angle brackets 102 and the two ends drawn back through the fuselage to be attached to the rudder.

Figure 34 shows the cockpit floor from above with the joystick and rudder mechanisms in place. The picture shows the rudder bar wrongly rotated sideways. The control wires should be placed sooner rather than later − I left them later and cursed greatly as I tried to poke them through inaccessible parts of the fuselage. Make sure you leave plenty of extra wire which can be trimmed later. In particular, when attaching the aileron wire, remember that both ends must pass upwards about eight inches as well as outwards along the wing − an extra foot and a half altogether, almost, on top of the outward span.

Figure 34

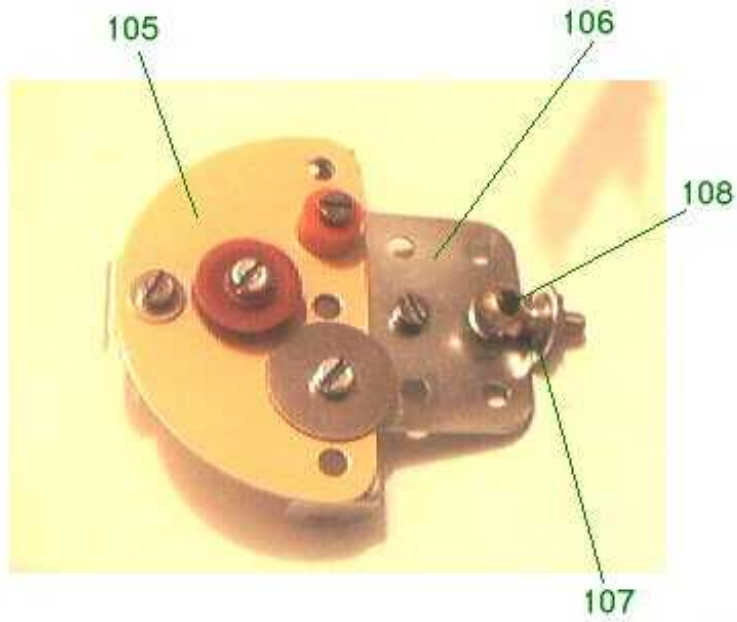


Figure 35

Figure 35 shows the instrument panel. A semi−circular plate 105 is bolted over the 2 1/2" x 1/2" double angle strip previously mentioned and also to a 1 1/2" x 1 !/2" flat plate 106 hanging down below. A 1" x 1/2" angle bracket 107 is bolted to flat plate 106 and carries a handrail support 108 − this represents the compass in its gimbals. A 1/2" plastic pulley, orange plastic spacer, and a large washer are used to represent instrument panels, more or less where larger instrumentation occurred in the original. There is scope for improvement if modelers have photographs of an original Fokker DVII cockpit.

In the model, a further 1" x 1/2" angle bracket was fixed to the top two holes in the centre of plate 105. It was the intention to bolt this, with appropriate spacers, to the fuselage cover, but in fact this was never done. The bracket remains in the parts list, but the bolt and spacers for the connection do not.

6. Lower Wings

The lower wings are built in a very similar style to the upper wings, but as they carry no ailerons, and are in two distinct halves, they are even simpler.

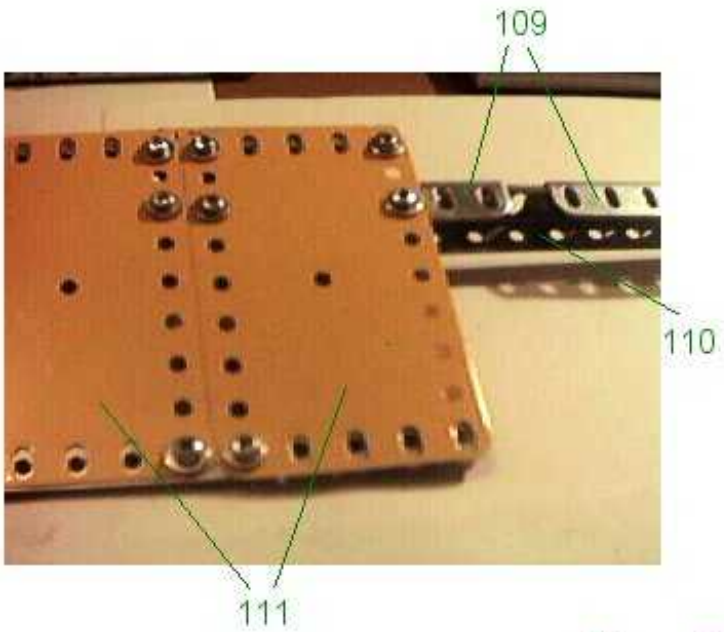


Figure 36

The central girder is slightly different. ***Figure 36*** shows the central area. Two 12 1/2" angle girders 109 are bolted to a central 5 1/2" angle girder 110, overlapping by five holes on either side. The base of girder 110 is bolted very tightly to the fuselage using long bolts 56, spaced from the fuselage base by plastic spacers or collars as described in the Fuselage Framework section.
It is important to bolt the girders in place at this stage as will not be possible to pass the wings through the fuselage when they are fully built−up.

Working from the inside out, ***Figure 36*** shows the inner part of the wing and ***Figure 37*** shows the outer part of the wing. Construction is almost identical to the upper wing, except that eight 4 1/2" x 2 1/2" flexible plates 111 are used on each wing, four on the upper surface and four on the underside. Four 5 1/2" x 1 1/2" flexible plates 112 are also used on each wing, two on the upper surface and two on the underside: the plate at the wingtip overlaps the next plate by one hole.
Four 2 1/2" x 2 1/2" curved flexible plates 113 (part 199) are used for the leading edge on each side, but flexible plates 112 are long enough to be curved right round the leading edge and bolted together at their ends.

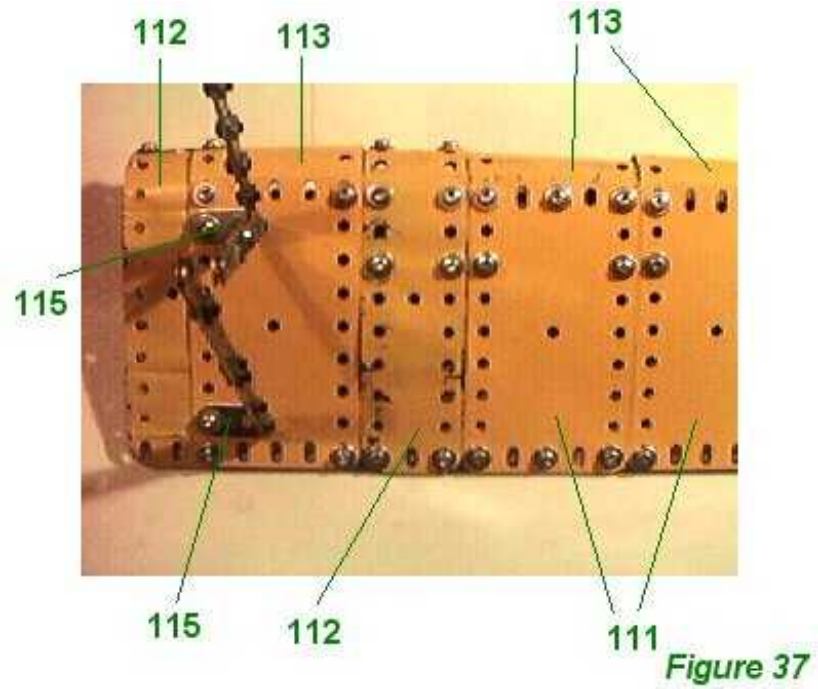


Figure 37

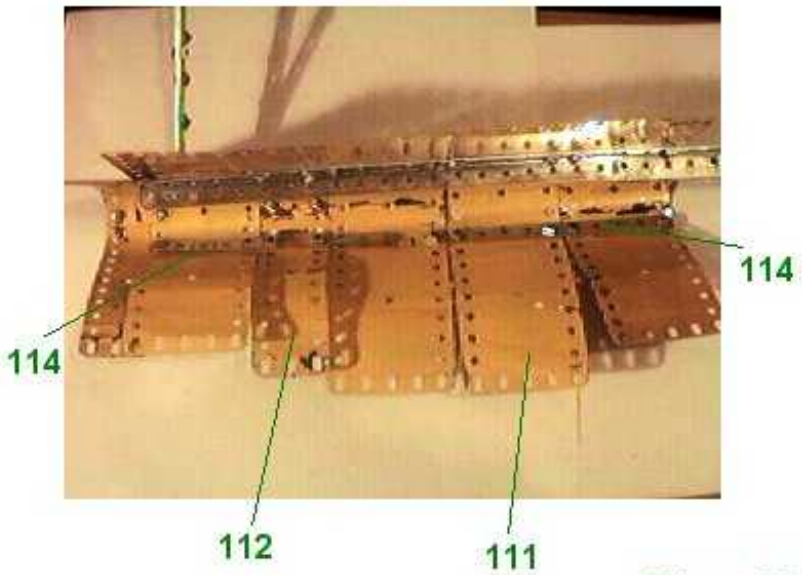


Figure 38

On the upper side the flexible plates are bolted to girder 109, but also connected at leading and trailing edges by 5 1/2" perforated strips 114. Two are used to bolt the trailing edges together, and four are used at the leading edge − two for the upper side and two for the underside.
Figure 38 shows the plates of a lower wing opened out to show the strips and the leading edge.

In ***Figure 37*** the wing struts have been left in place to show how they are attached. They are bolted to the lower wing by means of two 1" x 1/2" angle brackets 115. In the model locknuts were used on the bolts to make as strong and tight a fixture as possible.
Figure 39 shows a side view of the lower wing.

Figure 39

7. Fuselage Covering and Wing Struts

The fuselage is covered over with plates. There are many different combinations of platework which are possible, but the model uses plates which were to hand at the time. The pictures show the side plates and the top plates which have been opened out. Refer also to ***Figures 21−25*** for the underlying framework on which the plates are to be bolted.

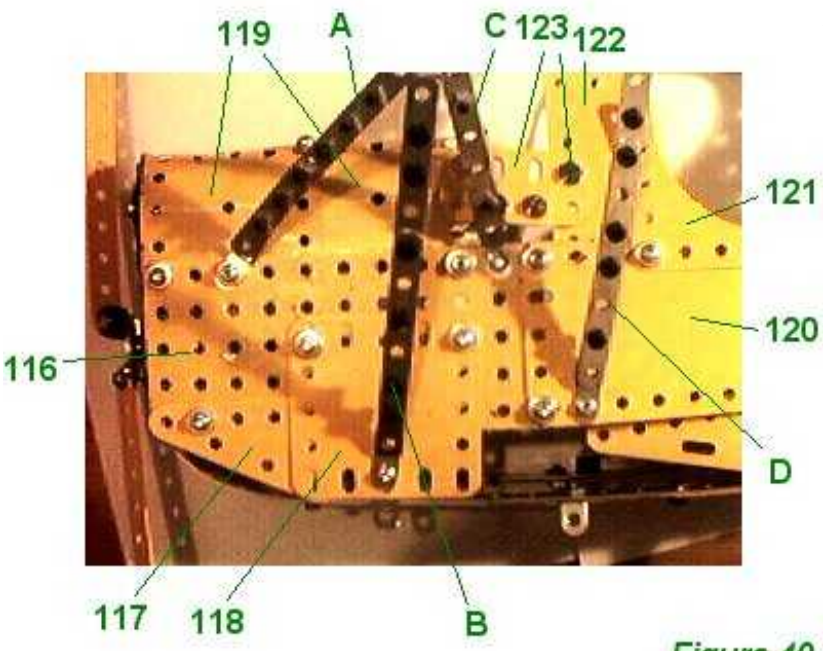


Figure 40

Figure 40 shows the front of the aircraft. A 5 1/2" x 2 1/2" flat plate 116 is bolted over strip 58. 2 1/2" x 1 1/2" triangular plate 117 and 2 1/2" x 2 1/2" flexible plate 118 are bolted to plate 116 as shown. 2 1/2" x 2 1/2" curved flexible plates 119, overlapping each other by one hole, are bolted to plate 116 along the upper edge. These are curved inwards until they almost touch the sleeve pieces in the engine block.

Figure 41 shows an overhead view. However, plates 116, 118 and 119 also carry the forward fuselage wing struts shown as A, B and C. The construction of the struts is discussed at the end of this section.
A 12 1/2" strip plate 120 is bolted to the end holes of plate 116. Strut D is attached to the lower edge of pate 120. A flexible gusset plate 121 is bolted to a 5 1/2" x 1 1/2" flexible plate 122 and to strip plate 120. Plate 121 and 122 will be curved around the top of the fuselage. In the model two 1 1/2" x 1" flat girders 123 are bolted together, overlapping by two holes to form a 2" compound flat girder, are bolted to plate 122. This was an ugly arrangement. The reason for not using a single 2" flat girder was because such girders are not available in light yellow. It is probably much more desirable to use another 5 1/2" x 1 1/2" flexible plate curved around the top of the fuselage. However in the model I decided to leave an opening here so as to be able to adjust the aileron control wired more easily and generally maintain some access to the inner fixtures. Modelers are encouraged to consider improving the construction of this part of the fuselage for themselves.

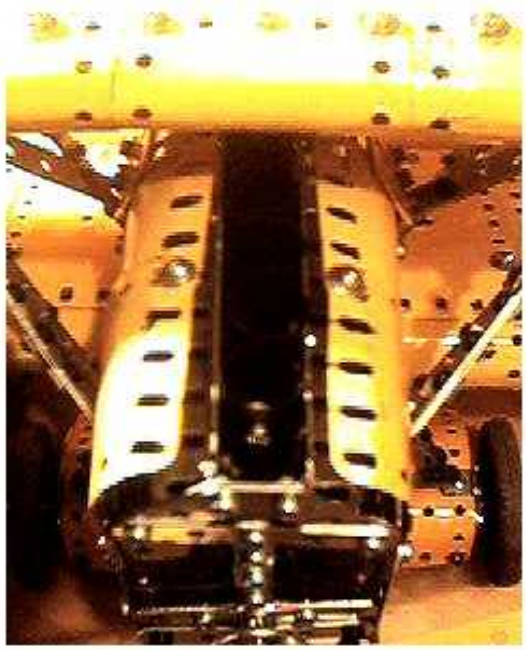


Figure 41

Figure 42 shows the mid−section of the fuselage around the cockpit area. Flexible gusset plate 124 is bolted to gusset plate 121 and strip plate 120 as shown, and, at the rear, to 5 1/2" x 1 1/2" flexible plate 125. Plate 125 is the first of five such plates leading edge to edge back along the fuselage; all these plates are bolted to strip plate 120 (and the corresponding strip plate on the other side) by the second hole from each end. Perforated strips are bolted underneath the central holes of these plates leading backwards, as a connecting spine. In the model, a 4 1/2" perforated strip and 7 1/2" perforated strip were used, overlapping by seven holes, but other combinations are possible.

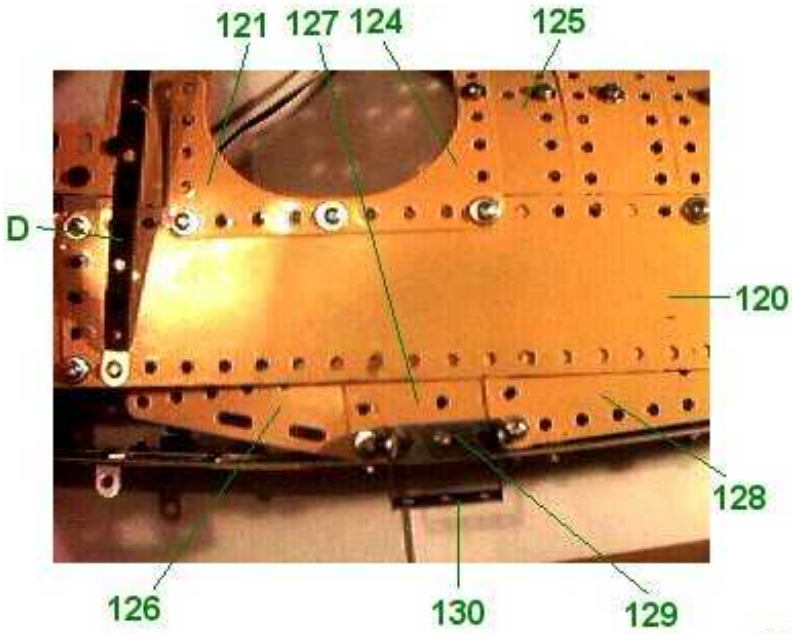


Figure 42

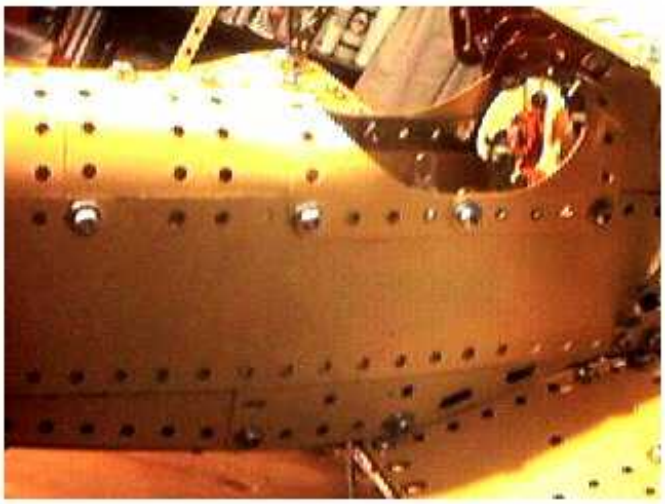


Figure 43

Figure 43 shows a different view of this area, in the finished model. Note that the gusset plates bolt together at the rear of the cockpit, whereas at the front there is a full space between them, as the front of the cockpit is higher than the rear.
A 3 1/2" x 1 1/2" triangular flexible plate 126 is bolted to a 2 1/2" x 1 1/2" flexible plate 127 which in turn is bolted to a 5 1/2" x 1 1/2" flexible plate 128. These plates are arranged so that plate 126 is close to the curve of the lower wing. On the left hand side (as in ***Figure 42***) of the aircraft a 1 1/2" x 1/2" double angle strip 129 is bolted to plate 127. A 1 1/2" x 1" double angle strip 130 is bolted to double angle strip 129 to form a step for the pilot. This structure is not repeated on the right hand side.

Figure 44 shows the five plates 125 to advantage. 2 1/2" x 2 1/2" flexible plates 131 and 132 are bolted in place as shown − a single 4 1/2" x 2 1/2" flexible plate could be used but it is easy to secure the smaller plates as the space for fingers dwindles.
The hindmost plate 125 marked A in ***Figure 44*** is angled down towards the tail somewhat, and the strip serving as the spine below it must of course also be curved downwards to match. Bolt 133 carries the lower left corner slot of 2 1/2" x 1 1/2" flexible plate 134, to which in turn is bolted 2 1/2" x 1/2" flexible plate 135, curving over the rear of the fuselage.

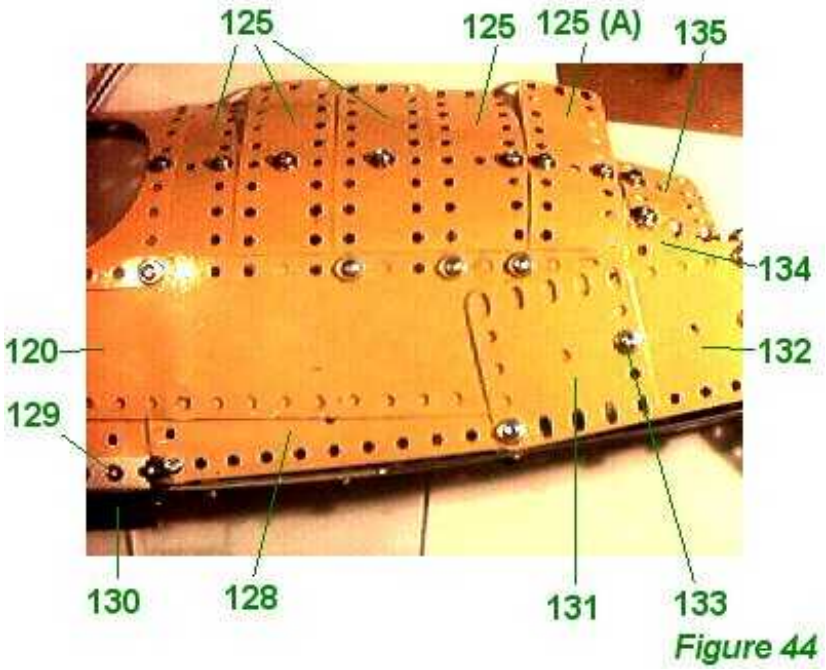


Figure 44

Figure 48 shows an overhead view of the rear of the model with the tail in place. The view also shows how the plates bend down towards the tail.

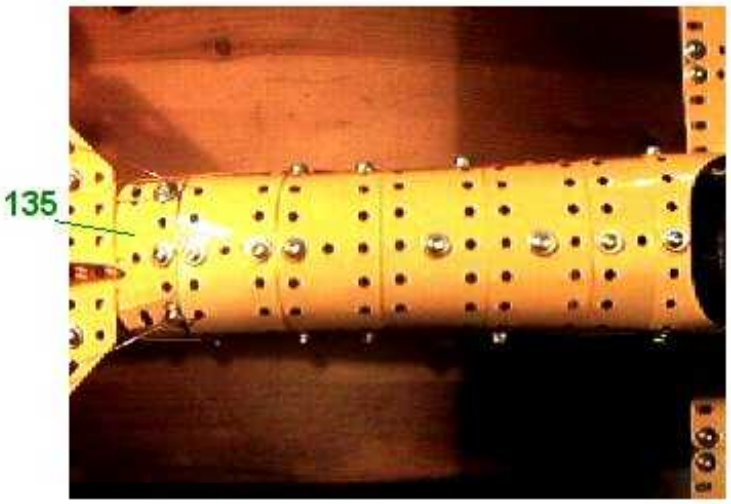


Figure 48

Figure 45 shows the rear of the model from the side, again with the tail in place. Bolts 136a are 1/2" long bolts which pass through strip 42 and the double arm crank carrying the tailskid axle rod, as well as 3 1/2" x 2 1/2" flexible triangular plate 136. 3 1/2" x 2" flexible triangular plate 137 is bolted into the remaining space. Note that plate 137 just rests over bolt 138 right at the back.

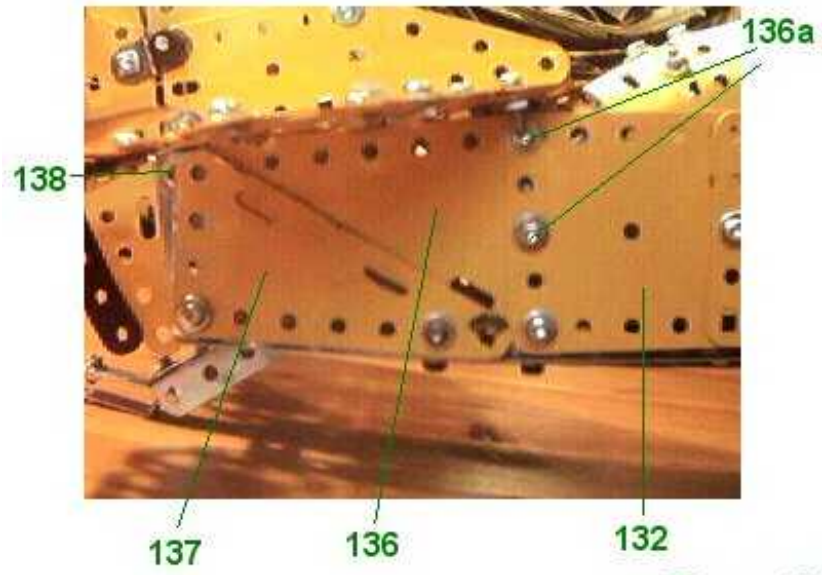


Figure 45

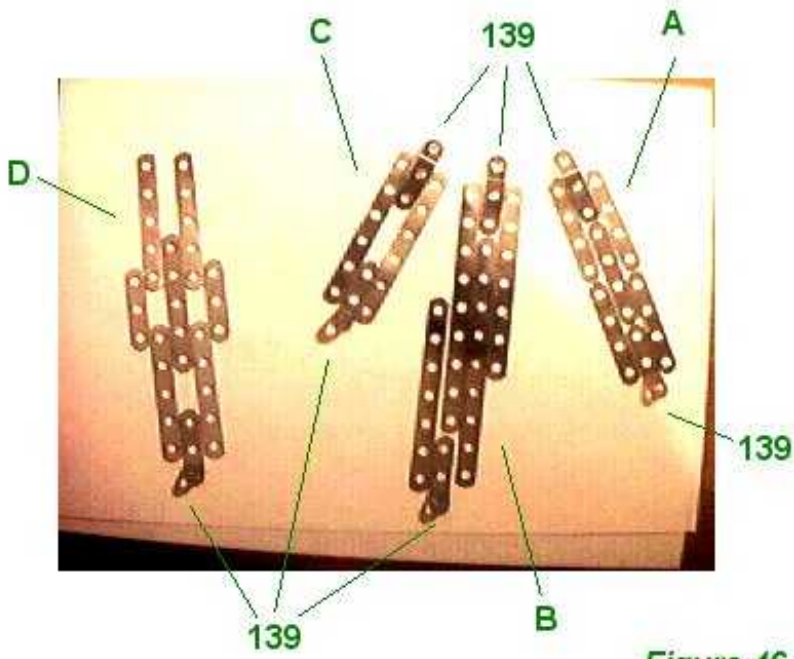


Figure 46

Figure 46 shows wing struts A, B, C, and D − all attached to the fuselage as described above − in a disassembled state. Narrow strips are used to build these strips up with obtuse narrow angle brackets 139 to attach them at appropriate angles to fuselage and upper wing.
The exact choice of narrow strips used is irrelevant as long as a strong strut is formed. The choice of narrow strips used in the model reflects what was available to me when the model was built, and is recorded in the list of parts, but can be improved upon. Whichever strips are chosen, however, it is useful to alternate shorter strips with long ones to leave slots in the end for the angle brackets and to interleave the strips from different struts, where two struts meet, in order to create stronger joints.
Struts A, B and C all meet at the top and are bolted using a long 1/2" bolt to the 1" x 1/2" angle bracket in the upper wing.

Figure 47 shows the three outer wing struts disassembled as before and Figure 49 shows a side view of them attached between the upper and lower wings.

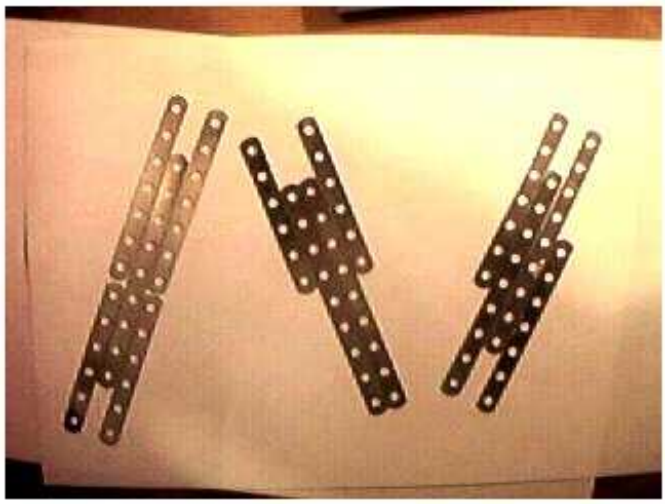


Figure 47

Figure 49 shows a side view of them attached between the upper and lower wings.
At long last the undercarriage and the upper wing may now be bolted to the fuselage and wing struts, and the aileron wires pushed through the centre flat plates of the upper wing, over their pulleys and adjusted on the aileron horns.

Figure 49

8. Guns and Tailplane

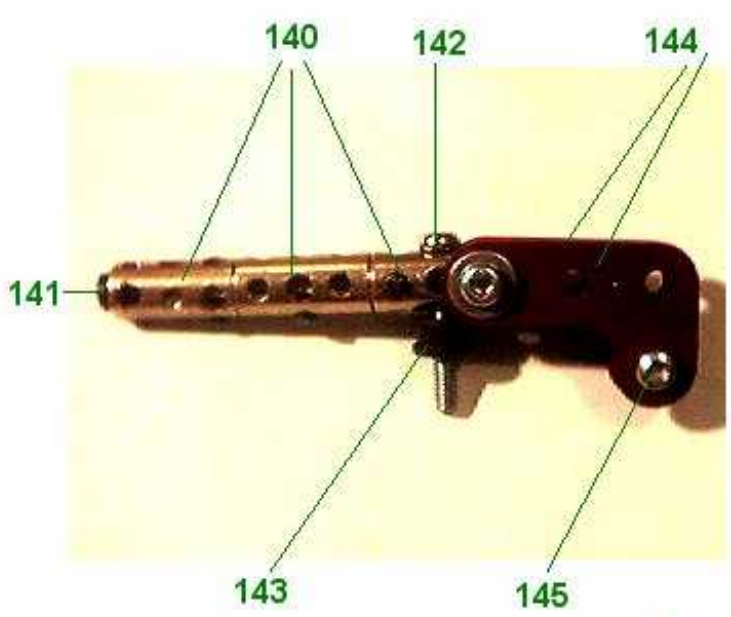


Figure 50

The two Spandau machine guns may now be constructed. ***Figure 50*** shows a gun in isolation. A 1 1/2" axle rod is used to join three couplings 140. The foremost coupling has a black allen bolt 141 fixed in the end, to represent the gun muzzle. The centre bore of the rear coupling has a 1" long bolt 142 screwed through it, with a small rubber pulley143 on the underside, which will be compressed somewhat against the fuselage when the gun is fixed to the front cockpit rim. A 3/4" long bolt passed through the end bore of the coupling holds two 1 1/2" x 1/2" corner brackets 144 (part 133b). Brackets 144 are bolted together at the 'trigger' end using a 1/2" long bolt 145.

Bolt 142 is used to fix the guns to the front of the cockpit rim. ***Figure 51*** shows the guns in place, bolted to the cockpit rim. The spacing of the gusset plates at the front can also be seen.

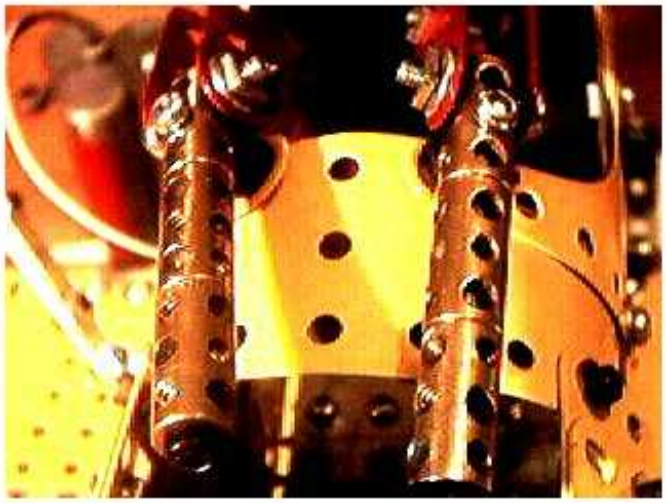


Figure 51

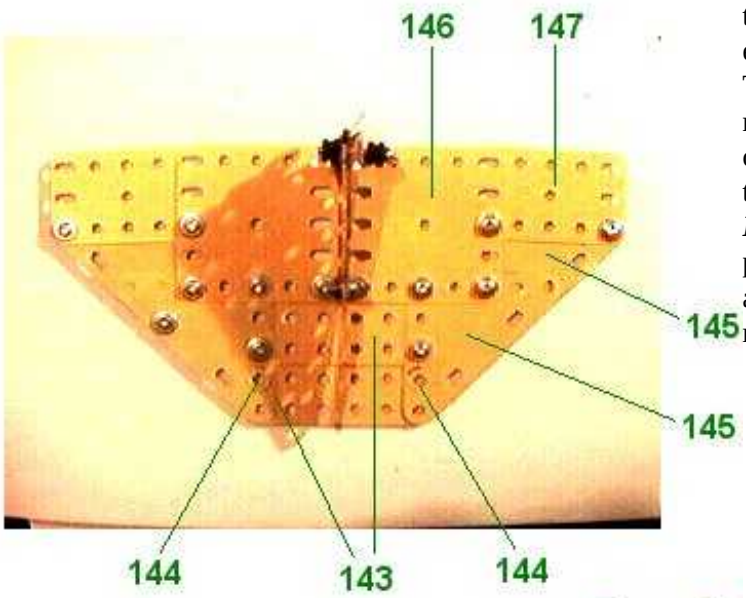


Figure 52

Figure 52 shows the tailplane from above with the tail in place, but without the rudder and elevator flaps.
Two 3" x 1 1/2" flat plates 143 overlap by one row of holes to form a rigid base in the center of the tail. They will be bolted to brackets 43 in the fuselage framework at holes 144 (see ***Figure 21***). Two 2 1/2" x 2 1/2" triangular plates 145, a 2/12" x 2 1/2" flexible plate 146 and a 2 1/2" x 1 1/2" flexible plate 147 form the rest of the sailplane, on each side.

Figure 53 shows the underside of the tailplane. 1" x 1./2" angle brackets 148 carry the tail and are bolted to the hindmost brackets in the fuselage framework.

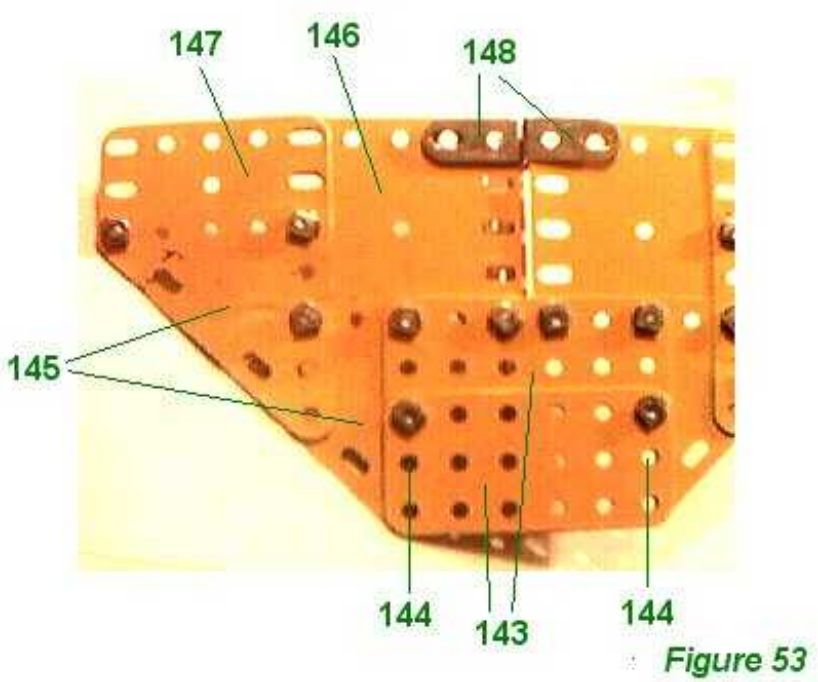


Figure 53

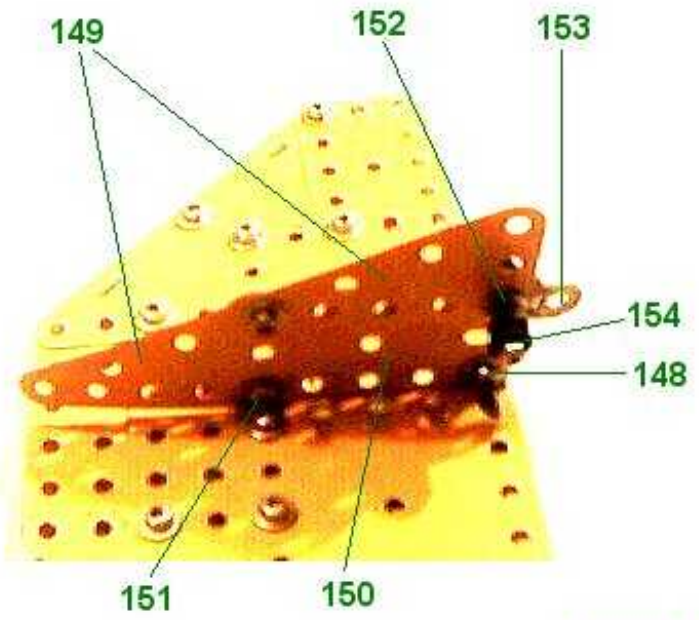


Figure 54

Figure 54 shows the tail. This consists of two 2 1/2" x 1 1/2" triangular plates 149 bolted to a 2 1/2" x 1 1/2" flexible plate `150. 1/2" x 1/2" angle bracket 151 holds the tail to the tailplane, one on each side, and bracket 148 can also be seen. A long 1" bolt 152 carries a hinge 153 which will be fixed to the rudder. Bolt 152 also has a small rubber pulley 154 on each side of the tail; these pulleys act as a guide for the rudder wires. They are somewhat obtrusive and modelers are encouraged to improve upon the design.

Figure 55 shows the rudder. Two semi−circular plates 155 sandwich a 2 1/2" x 1 1/2" flexible plate 156. Two 5 12" curved perforated strips 156 are also bolted to plates 155 and plate 156, one strip on each side. The slots of plate 156 are used to angle plates 155 downwards somewhat. A 3 1/2" x 1 1/2" triangular flexible plate 157 is bolted to plate 156 so that the longest side forms a straight line with the edge of plate 156. Bolt 158 is a 1" long bolt nutted to plate 156 so it sticks out equally on each side − this bolt carries the two ends of the rudder wire from the rudder control bar in the cockpit. Bolt 159 will also be attached to hinge 153 on the tail.

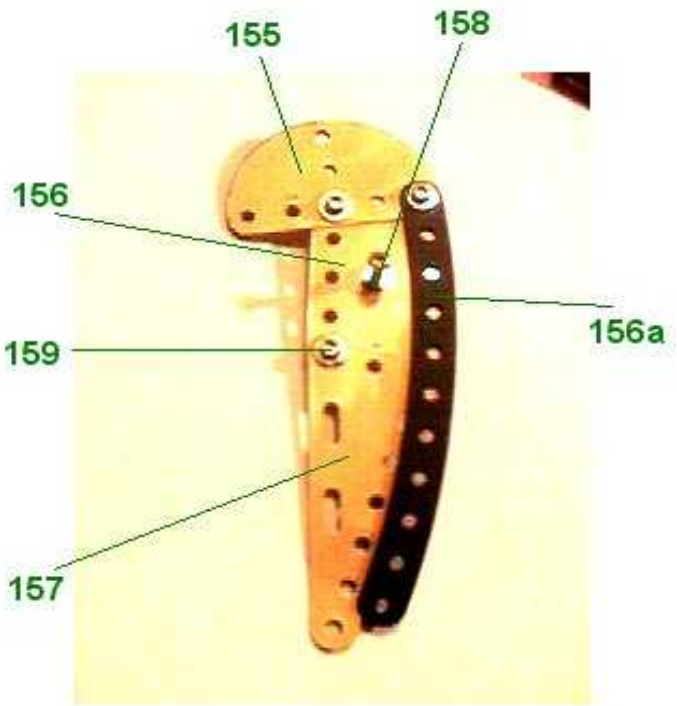


Figure 55

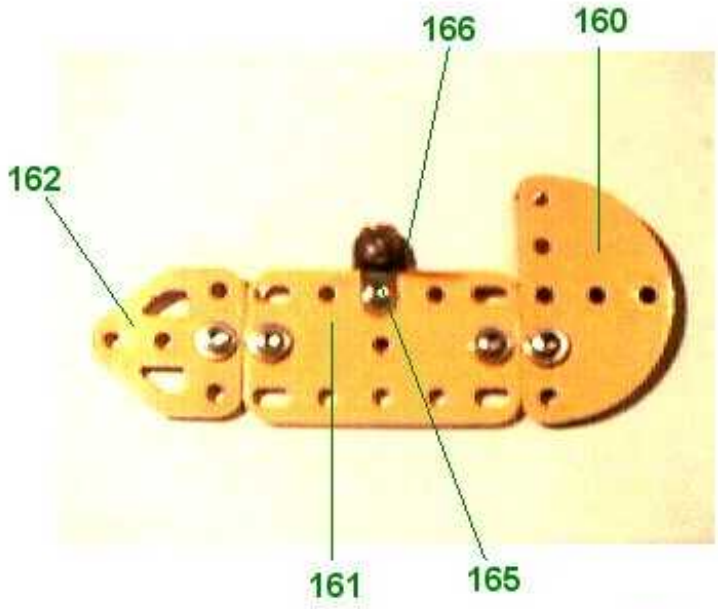


Figure 56

Figure 56 shows the upper side of a tail elevator. A semi−circular plate 160, a 2 1/2" x 1 1/2" flexible plate 161 and a flat trunnion 162 are connected by a 3 1/2" perforated strip 163 on the underside. A 1" x 1/2" narrow angle bracket 165 (part 812b) provides the elevator horn to which one elevator control wire is attached. The same bolt also carries hinge 166.

Figure 57 shows the underside of the tail elevator.

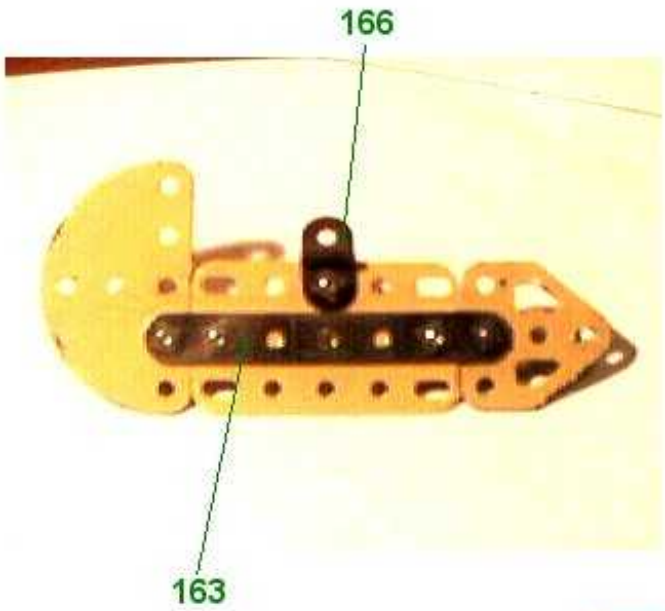


Figure 57

POSSIBLE IMPROVEMENTS

1. Aileron control wires

In the model, the wires pass through the top of the wing and over pulleys placed on the upper surface. In the prototype, these wires passed through the inside of the wing, and it should be possible to arrange the pulleys so they carry the wires inside the wing rather than outside.

I left the wires on the outside because it is easier to rig them and adjust them after the model is built. Clearly if the wires are to be passed through the wing some thought must be given to ensuring access to the two pulleys when the wing is built up and in place.

I used an inexpensive modelling wire for the control wires but am advised that a good fishing line, which does not stretch, would be better. My thanks to Howard Somerville for this suggestion. One might also consider incorporating tension springs in the wires to maintain tension.

2. Front fuselage cover

The model has a large gap in the front fuselage cover which provided finger access for the wires as they come up from the bell crank, and also allowed some access to other fixtures such as the motor. However this would probably be improved greatly if it was covered over so that it sloped down towards the level of the curved plates around the engine block.

3. Elevators

The elevator controls are much more responsive than the aileron controls, not surprisingly, given the longer distance of travel for the joystick and the lack of pulleys to traverse. Some form of reduction gearing could be used to compensate for this. However the diagrams I have seen of the original controls show no such system.

4. Colour Schemes

The original 'works' colour scheme for the Fokker DVII was a garish array of multi−coloured lozenges, as seen in the picture on the front page of this plan. However, the German air force allowed pilots great latitude in the decoration of their machines − a useful practise for identifying other pilots in a dogfight − and so virtually any colour scheme is possible, including the canary yellow suggested by the model.

Given a suitable supply of black parts, it should be possible to recreate the black crosses on the wings and fuselage. More adventurous modellers might investigate some of the actual markings used by German aces.

I'd be very grateful to hear from any modeller who solves these or any other problems with the Fokker DVII, or who has any problems constructing the model, and will try and include the solutions and corrections, in future updates of these instructions.

Chris Bourne

London, February 2000

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