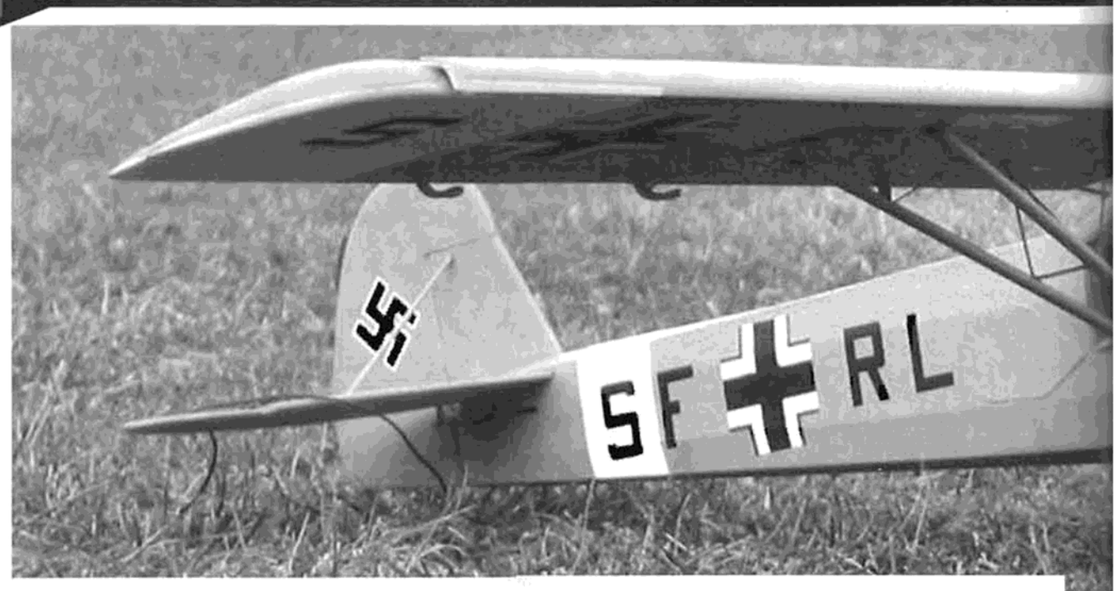
# FIESELER Fi-156C STORCH

## Sport Scale WWII S.T.O.L. Liaison Plane For .15 Glow Or Speed 480 Electric

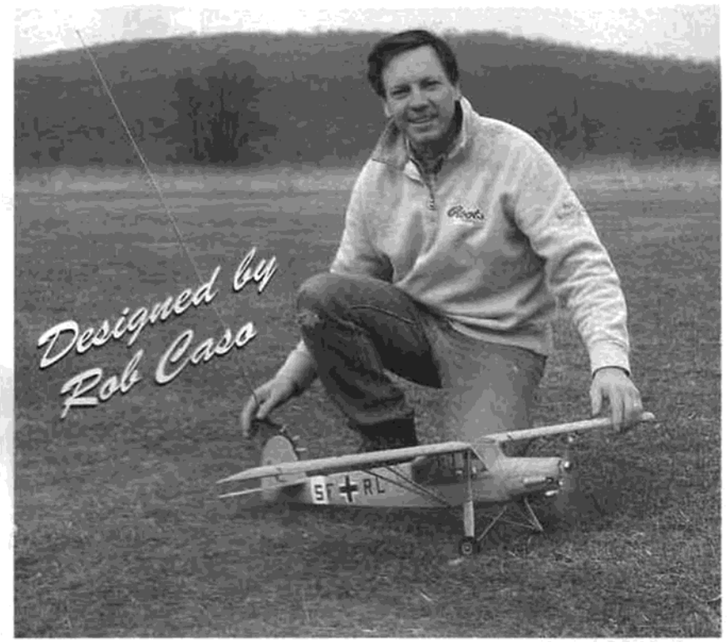


*Construction photos by Rob Caso, flight photos by Bill Sunick, electric model photos by Ron Call.*



**History:**

Designed in mid-1930's, the Storch was the first operational STOL (short take-off and landing) aircraft. With its ability to take off in 50 yards and land in 30, the Storch was used by the Luftwaffe during WWII in much the same way helicopters are used today. Its primary roles were spotting, liaison, rescue and ambulance, and it saw action in all theaters, side by side with the more famous Focke-Wulf and Messerschmitt aircraft. Although lightly loaded and having a high lift, high aspect ratio wing, the full scale Storch was a somewhat unforgiving plane to fly and more than a few careless "hot shot" Luftwaffe pilots gained newfound respect for the plane after a hair-raising joyride.




**Model:**

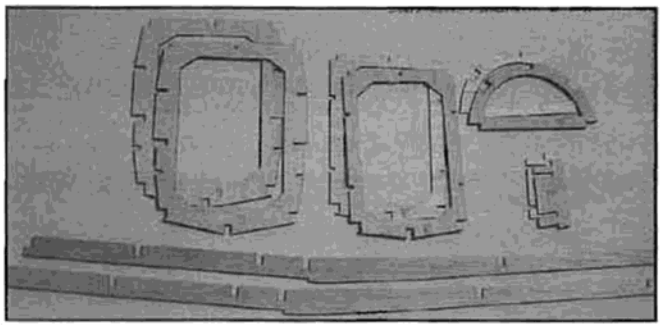
This model employs interlocking components to ensure speed and accuracy of construction as well as a rigid but light airframe. Use medium CA throughout and contest grade balsa for sheeting. Study the plans carefully before beginning assembly. A vacuformed canopy and laser-cut short kit are available from:

**www.TurnKeyRC.com**

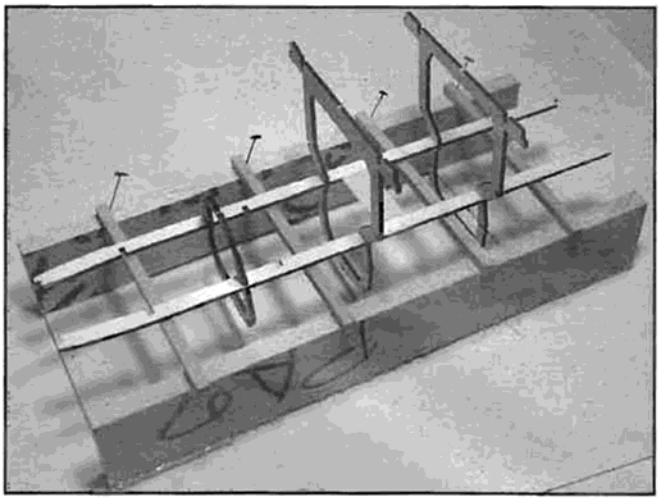
**Fuselage:**

The Storch's fuselage is constructed more like a boat than an airplane; it is not built side to side. Instead, fore and aft sections are constructed, the ventral spine (F6) providing the primary link for the two. Note that some components require laminatiing two 1/16" parts (noted as "2X" on the plans).

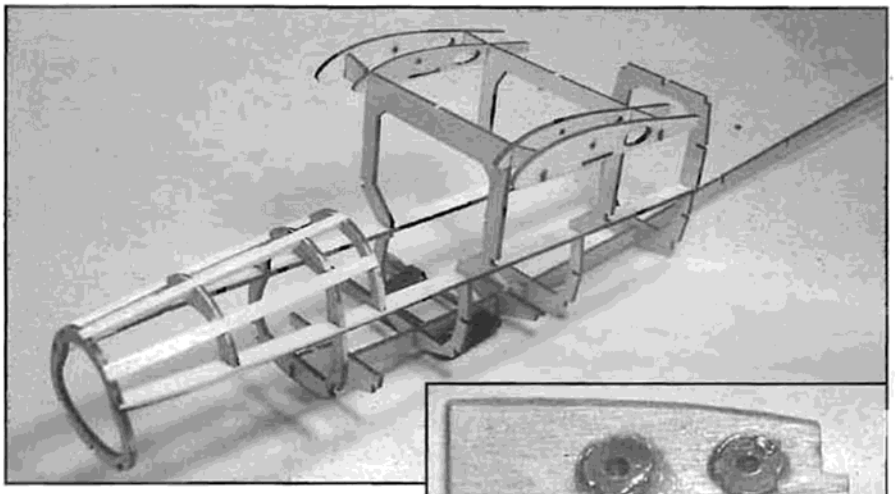
Build a 6" x 2" x 12" channel shaped box to support the fore section during construction. Start by resting each F1 on quarter square supports placed across the box. Dry fit bulkheads #1, 2, 3, 4, 6, 8 and 9, to F1, ensuring that each F1 is aligned square when viewed from above. Run a piece of tape across the F1's between bulkheads #6 and 8 to hold everything together. Holding each bulkhead vertically with a square, glue up the assembly. Affix ribs #1 and 2 and add the ply wing mounts. Affix the ventral spine, F6, ensuring that it is completely seated on each bulkhead.



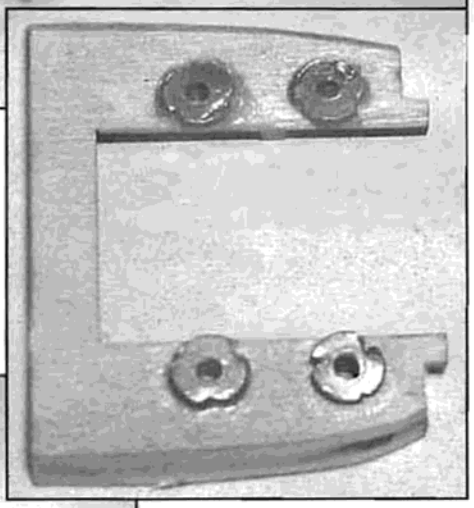
*ABOVE: Some parts are comprised of two cross grain laminations of 1/16" balsa for strength.*



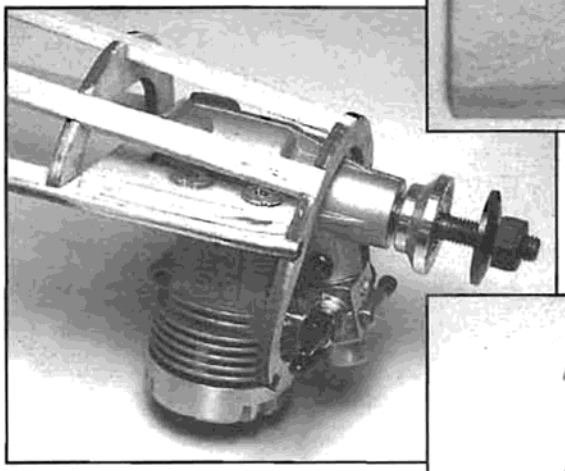
*RIGHT: Fuselage construction begins by first making a jig on which to assemble the forward fuselage. The fuselage is not built in a conventional side to side manner — fore and aft sections are built separately and then joined.*



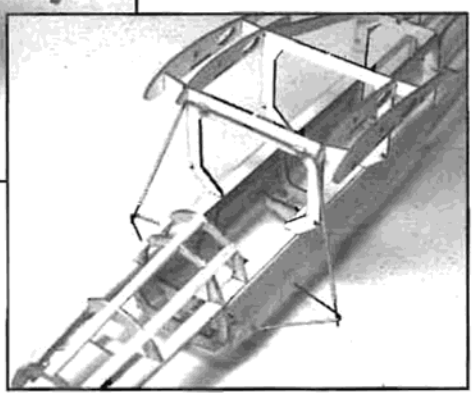
*ABOVE: The completed forward fuselage framework. The ventral spine provides mounting points for the aft section assembly. Make sure that the spine is seated completely on all bulkheads.*



*RIGHT: 4-40 blind nuts are pressed into the 1/8" lite-ply engine mount and are secured with CA.*



*LEFT: The engine mount for the glow version is epoxied atop F1. Inverted O.S. Max .15 shown.*



*RIGHT: The main landing gear struts are made from 1/16" wire. The lower "V" supports are epoxied into previously installed brass tubes in the fuselage after the side sheeting is applied.*

Construct the aft section on a flat surface, upside down. Join each laminated half of F4 and pin this down. Attach the bulkheads vertically to F4. With the fore section pinned to the channel box, dry fit the aft section again, making sure that each bulkhead is properly seated on F6. Sight down from the nose and make sure the assembly is straight, then glue in the aft section. Add the dorsal spine, F3, the tail post, the stabilizer support, F5, and the rear cabin framing, F7. Add bulkheads #5 and #7, and the wing srut attachment plate F8 (with 2-56 blind nuts) and run 3/16" square stringers from #5 to the tail post. Install the 3/16" x 1/16" and the 1/4" x 1/8" stringers as shown. Sand the side and corner stringers flush with the bulkheads back to #9. Add the side sheeting, noting that the lower fuselage and nose sheeting are added after the LG and the wing strut supports are installed. Apply thin CA on the vertical wing supports of bulkheads #6 and #8. Note that bulkheads #1A, #2A and #3A and F2 are used to form a removable cowl to provide engine access for the glow powered model.

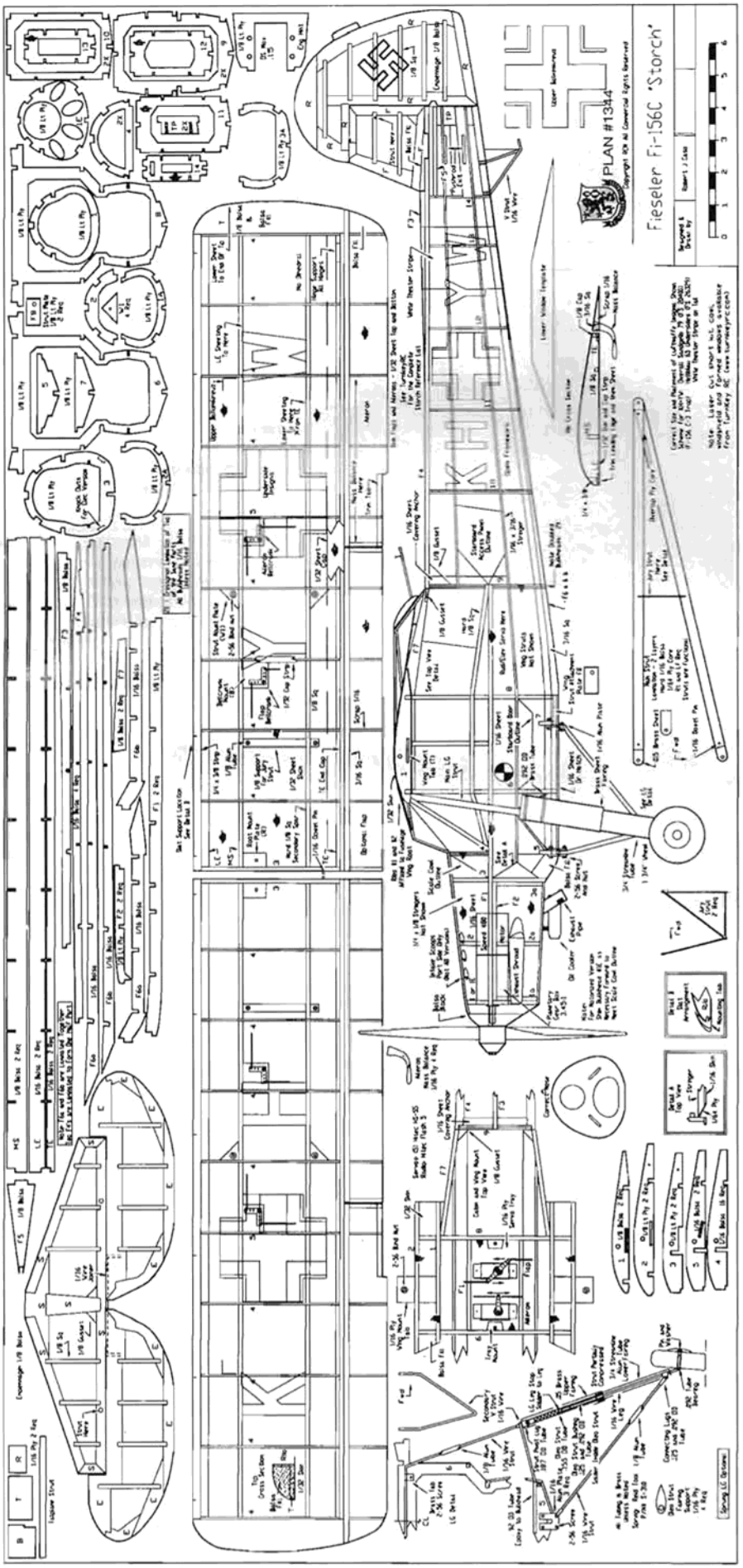
Affix 4-40 blind nuts to the engine mount and, after test fitting the engine, install the mount with slow set epoxy. Fuelproof the engine compartment.

**Electric Version Fuselage:**

Bulkhead #1E is used for electric power and bulkheads #1A and #3A are omitted for the electric version. Extra slots are provided in #3 for nose stringers used in the electric model.

**Wing:**

The wing is a standard "D" tube. Lay out the wing by dry fitting a few ribs onto the main spar "MS". Pin down LE, position the secondary spar on the plans and then position the rib/spar assembly. Line everything up with the plans and



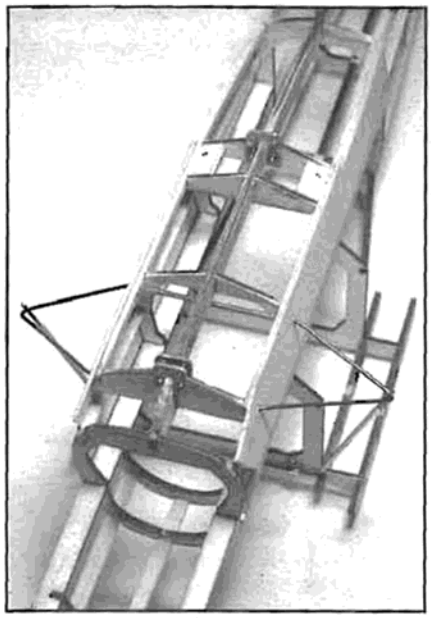

## FIESELER FI-156C STORCH

**Designed by:**
Robert J. Caso
**TYPE AIRCRAFT**
Sport Scale
**WINGSPAN**
46 Inches
**WING CHORD**
6 Inches
**TOTAL WING AREA**
276 Sq. In.
**WING LOCATION**
High Wing
**AIRFOIL**
Clark Y
**WING PLANFORM**
Constant Chord
**DIHEDRAL, EACH TIP**
Slight (see text)
**OVERALL FUSELAGE LENGTH**
31.5 Inches
**RADIO COMPARTMENT SIZE**
8" (L) x 2-1/8" (W) x 4-3/4" (H)
**STABILIZER SPAN**
10-3/8 Inches
**STABILIZER CHORD (inc. elev.)**
4-7/8 Inches (Avg.)
**STABILIZER AREA**
18-1/4 Sq. In.
**STAB AIRFOIL SECTION**
Flat
**STABILIZER LOCATION**
Top of Fuselage
**VERTICAL FIN HEIGHT**
2-5/16 Inches
**VERTICAL FIN WIDTH (inc. rud.)**
5-1/2 Inches
**REC. POWERPLANT**
Elect. Version: Speed 480, geared 3.45:1
Glow Version: O.S. Max .15
**REC. BATTERY (Electric)**
3-Cell LiPo, 1300 mAh
**LANDING GEAR**
Conventional
**REC. NO. OF CHANNELS**
4 or 5
**CONTROL FUNCTIONS**
Rud., Elev., Throt., Ail., optional Flap
**C.G. (from L.E.)**
1-1/2 Inches
**ELEVATOR THROWS**
3/8" Up — 3/8" Down
**AILERON THROWS**
3/8" Up — 3/8" Down
**RUDDER THROWS**
3/4" Left — 3/4" Right
**FLAP THROW**
3/4" Down
**SIDE THRUST**
—
**DOWNTHRUST/UPTHRUST**
—

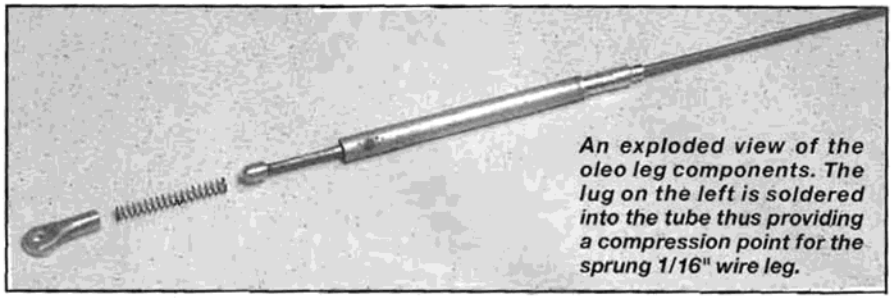
**BASIC MATERIALS USED IN CONSTRUCTION**

Fuselage ..... Balsa & Lite Ply
Wing ..... Balsa & Lite Ply
Empennage ..... Balsa
**Wt. Ready To Fly** ..... 32 Oz. (2 Lbs.)
**Wing Loading** ..... 16.7 Oz./Sq. Ft.

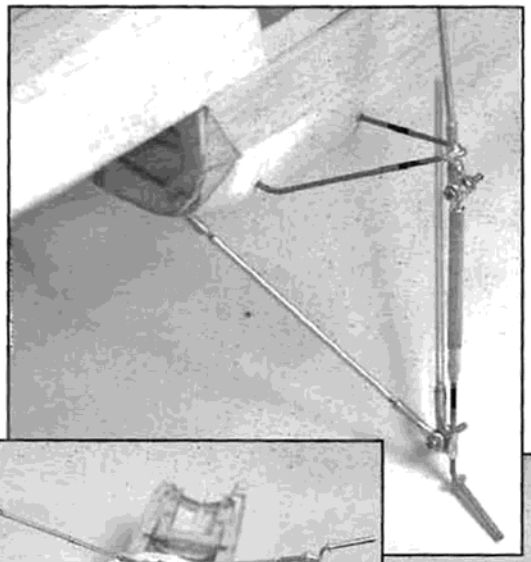
PLAN #1344 Full-Size Plans Available See Page 125



*The lower "V" strut aluminum plates are mounted to bulkheads #5 and #7 with 2-56 screws. Three are required, two of which go on bulkhead #5. The blind nut plates for the wing struts are added before the underside is sheeted.*

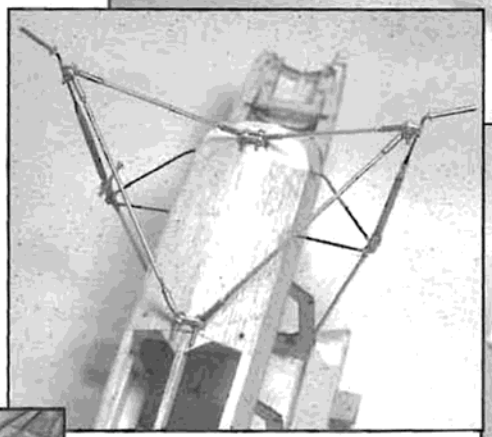


*An exploded view of the oleo leg components. The lug on the left is soldered into the tube thus providing a compression point for the sprung 1/16" wire leg.*



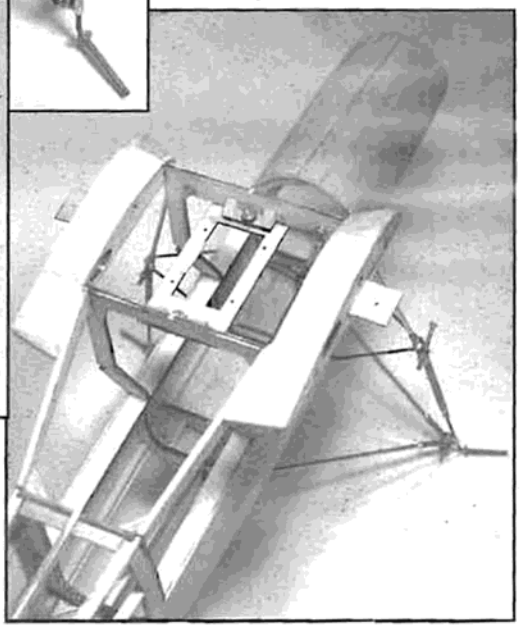
*LEFT: A shot of the assembled telescopic landing gear. The top of the sprung oleo leg is screwed to a lug soldered to the fixed upper main strut just below where the "V" support strut intersects the main strut that goes up and over the fuselage. All screw joints must be just loose enough to allow the gear to move freely.*

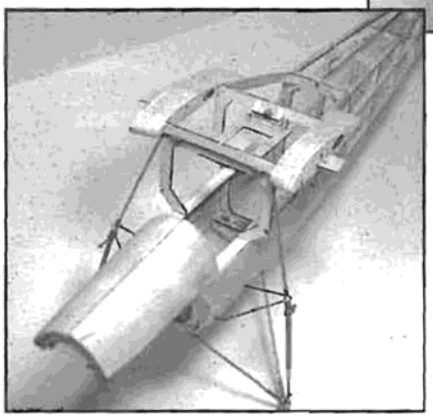
*BELOW: Fully framed forward fuselage shown here complete with landing gear and aileron/flap servo tray. Note the 1/16" covering anchors just aft of the cabin.*



*RIGHT: An underside shot of the landing gear. The long "V" struts keep each wheel aimed in the right direction and also prevents fore and aft movement of the oleo leg. This set-up is very similar to landing gear on the actual aircraft. Note also the engine mount.*

*BELOW: Front view of the framed fuselage showing the landing gear installation.*



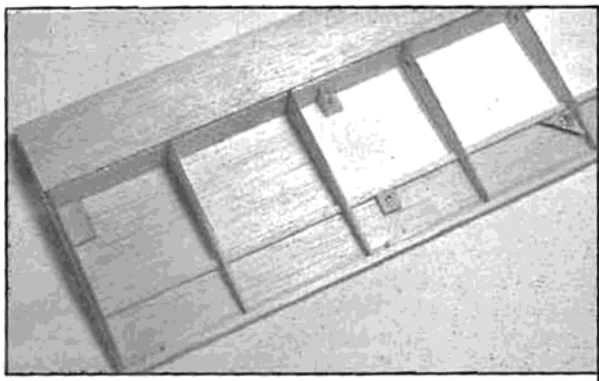


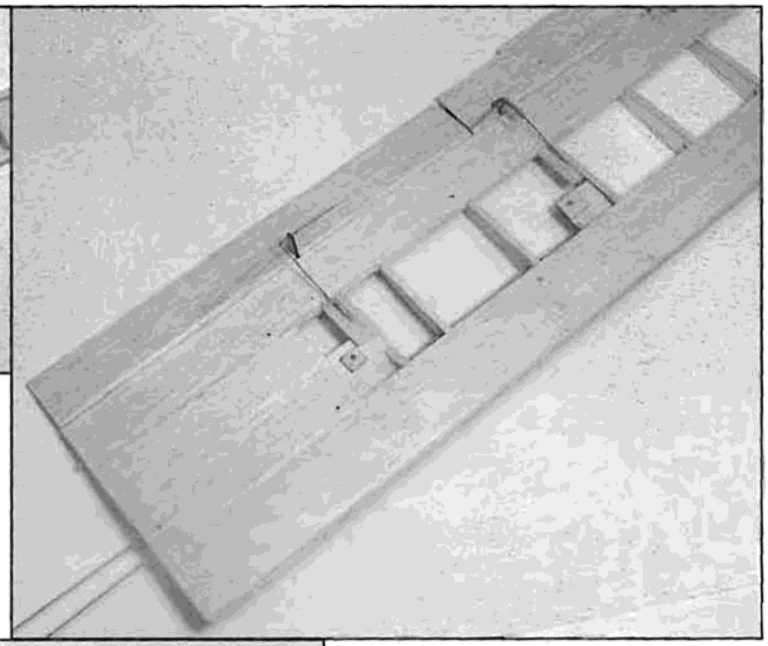
pin the assembly down. Add TE, the balance of the ribs and the tip. Go over the joints with CA and affix the leading and trailing edge sheeting. Pull up the assembly and lay down the lower sheeting, extending the sheet to the tip, then reposition and pin down the framework and affix it to the sheeting. Cut the lower sheet wide enough to accommodate the flap and aileron and build these with the wing. Build up the surfaces, drill holes for the pin hinges and separate the sections. Sand the leading and trailing edges so that they flow nicely off each rib. Apply scrap balsa for the aileron and flap hinge supports and install the bellcranks, W1 and the 2-56 blind nuts for the struts. Punch holes at the blind nuts through the bottom of the wing so that you can locate them later. Install the plates for the jury struts and the 1/16" dia. dowel pin to the root rib. Test fit the wing to the fuselage, sliding the wing onto the locating tongue at the root. Drill through the tongue and the wing, remove the wing and install a blind nut on the fuselage tongue. Alternatively, a box can be constructed in the wing to house the blind nut or the wing can simply be glued to the fuselage at final assembly. The functional "V" struts attach to the wing and fuselage with 2-56 screws.

Check the wing contour at the leading and trailing edges and along the main spar to ascertain that the framework is smooth. With the wing pinned down, apply the upper sheeting and capstrips. Fill in the tip with soft 1/4" sheet and finish-sand the tip and the leading edge.

**Leading Edge Slats:**

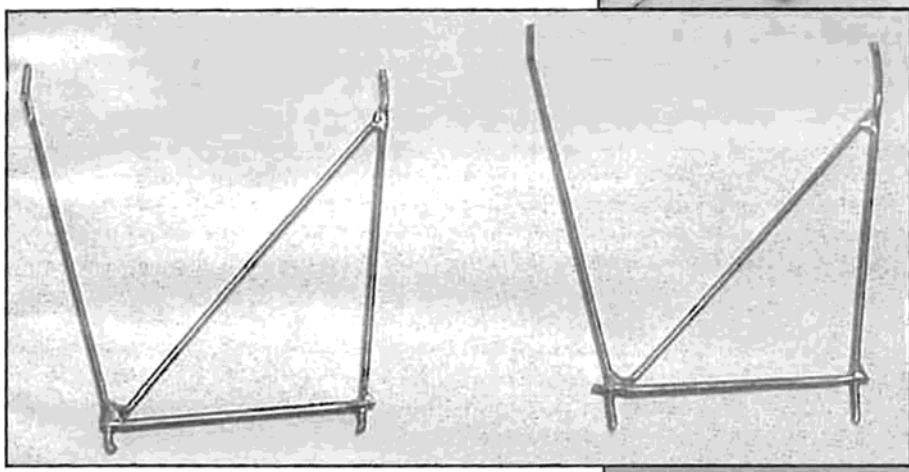
The leading edge slats are made by forming a lamination of two 1" x 24" x 1/32" balsa strips over a piece of large leading edge stock using slow set epoxy. Since the LE stock is not truly airfoil shaped, affix a piece of 1" x 24" x 3/32" and sand to an airfoil contour. Apply packaging tape to prevent the slat from adhering to the LE stock. Wet the slats with ammonia-based window cleaner,





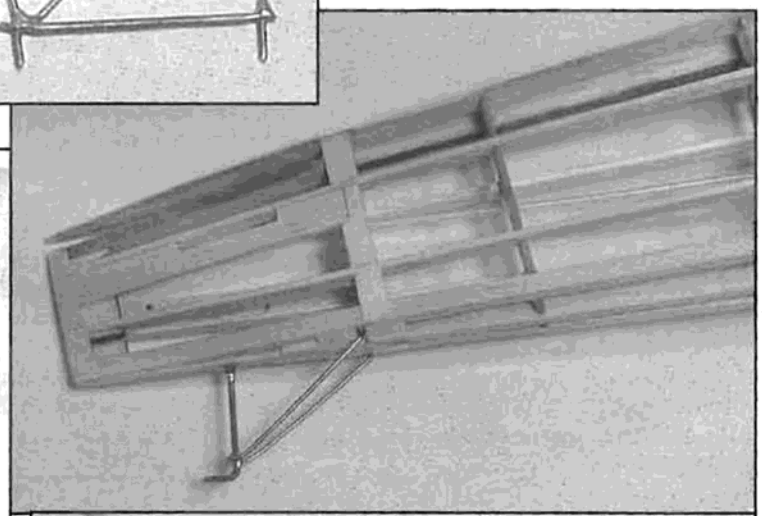
*ABOVE: The wing is a conventional flat bottom "D" box sheeted and capstripped with 1/32" balsa. It is extremely strong and warp resistant — use an ultra flat building board. Note the wing tab mount at the root, the main and jury strut plates and the back fill for the hinges. Aft and root sheeting is next.*

*RIGHT: The underside of the wing showing the flap and aileron linkage installation.*



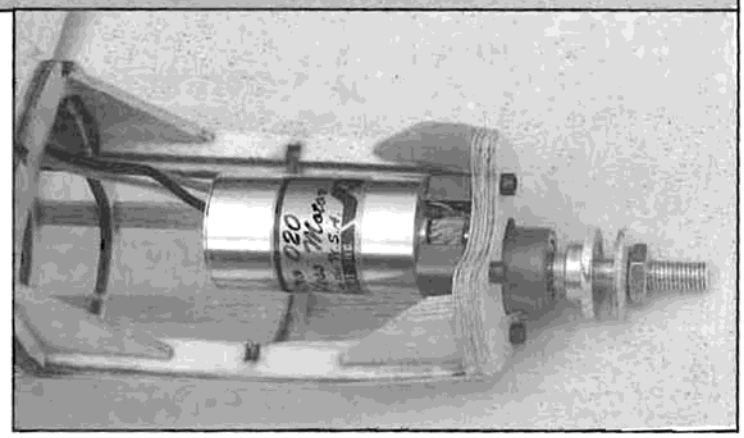
*LEFT: The jury struts are 1/16" brass wire and keep the main struts from flexing upon landing. Epoxy these to holes in the main struts so that they are vertical to the wing when everything is assembled.*

*BELOW: The tailskid is simply 1/16" music wire soldered to brass wire braces. I let in small pieces of aluminum tube in the fuselage framework to accept the skid which was epoxied in.*




*ABOVE: A 3:1 geared Astro Flight 020 brushless motor/gearbox combination was used in the latest E-powered model.*

*RIGHT: A look inside the nose at the motor installation. Motor is mounted to a hard ply plate and in such a way as to allow enough clearance for the cowl. Ply triangles are used to brace the nose against the weight of the motor/gearbox. Battery is accessed through open former aft of motor.*



# Materials

(1) TurnKeyRC Fi-156 Storch short kit
*or substitute the following four items:*
(2) 1/8" x 4" x 48" balsa
(2) 1/16" x 4" x 48" balsa
(1) 6" x 6" x 1/16" ply
(1) 6" x 24" x 1/8" lite ply

(1) O.S. Max .15 2-stroke/3.5:1 Speed 480
(1) 5-channel radio with lightweight servos
(1) 7 cells 1200 mAh battery and speed control
(1) 4 oz. fuel tank
(1) 4" x 36" 1/16" sheet
(5) 4" x 36" 1/32" sheet
(2) 3/16" sq. x 36"
(2) 1/8" x 3/16" x 36"
(4) 1/8" sq. x 36"
(1) 1/4" x 1/8" x 36"
(1) 1/4" x 5/16" x 36"
(4) 3/16" x 1/16" x 36"
(1) 12" x 3" x 1/4" soft balsa
(1) 4" 1/16" dowel
(1) 1" x 36" x 1/64" ply
(2) 1-3/4" light wheels
(2) Pkg. Robart pin hinges
(1) Pkg Du-Bro microconnectors #845
(4) Du-Bro pushrod #847
(4) Du-Bro bellcrank #851
(8) 2-56 blind nut and screw
(4) 4-40 blind nut and screw
(2) Rolls covering
Short kits, cowls, windshield, and rear windows are available from: TurnKeyRC, 128 Grandview Rd., Boyertown, PA 19512, (610) 564-9529.
**sales@turnkeyrc.com**

apply the epoxy and laminate the pieces together. While still wet, evenly place this over the LE form and wrap tape around everything. Put some pin holes in the tape to allow to dry 24 hours. Since the slats have an airfoil cross section, apply a strip of 3/32" to their leading edge and sand in, using the form for support. The slats must be installed symmetrically on each wing so that the air inlet is greater than the exit. Functionally, at increased angles of attack, the slat "opens" aerodynamically, forcing high velocity air over the wing, thus creating lift — like the "blowing on the paper" demonstration we have all seen.

**Wing Struts:**

The functional main wing struts are fabricated from a lamination of two layers of hard 1/16" balsa and a 1/64" plywood core with thin brass plates slid in the ends of the lamination and pinned. Note that the Storch's struts were a flat oval in cross section, not streamlined. The jury "N" struts are made from 1/16" wire and slide into holes in the bottom of the wing. A very slight amount of dihedral may be built in to avoid the "drooping wings" look; however, the full scale Storch had no dihedral.

**Landing Gear:**

A scale telescoping LG is shown on the plans but it is not really necessary for such a small model. The scale LG is not difficult to make but it is more work. When soldering, use heat sinks (wet tissues) to avoid unsoldering previous work. The landing gear must not be permanently attached to the fuselage until the windshield is in place.

The LG should be viewed as two sections, an upper and lower. The upper section provides the primary support, so it must be sturdy. 1/16" wire forms the upper main strut ("US"), which is bolted to #6 using brass tabs. I also added 1/16" I.D. aluminum tube to increase the cross section of US for scale. Secondary "V" struts emanate from the fuselage sides, supported by 1/16" I.D. tubes that run along bulkheads #5 and #6. The fuselage sides should already be sheeted; however, the bottom of the fuselage should be left open to allow installation of the tubes and the aluminum plates. Install 1/8" triangles inside the fuselage where the brass tubes exit. Install the tubes with epoxy and then bend the "V" struts so that they slide in the tubes (secure with thin CA) with the point of the "V" intersecting US and allowing 1/4" of US to extend below. Fabricate and install with 2-56 screws the three "U"-shaped 1/16" aluminum LG mounting plates as shown on the plans.

For the strut pivot lug, I simply soldered together two layers of tube, and drilled one end to accept 2-56 screws. Small washers were also soldered on for strength. The lug is then slotted to accept the oleo leg and provides a mounting junction for US and the "V" struts. Slide the lug onto US under the "V" strut and then wire and solder everything together.

The lower LG is made from brass tube and 1/16" wire. The lower section provides only a cushion — no structural support. The oleo (shock absorbing) strut consists of a bushed tube inside of which slides a sprung piece of 1/16" wire that is bent to form the LG leg and axle. To hold the sprung internals in place, a flattened lug is soldered to the top of the oleo. There must be some overlapping support for the sliding LG leg inside the oleo. Do this by soldering a long bushing inside the oleo tube. Also solder a bushing to the top of the sliding LG leg to prevent the leg from exiting the oleo and to provide a

pressure point for the spring. Each oleo pivot lug consists of two tubes, one inside the other, half flattened and drilled to accept 2-56 screws. The lug is soldered inside the top of the oleo after the (unbent) leg and spring are fed through. This oleo lug mates in the slotted pivot lug already soldered on US. There must be a minimum of play here — solder on washers to fill in the slack. This lug must also be long enough to eliminate any play in the spring.

Each lower "V" strut is comprised of two struts, the ends of each having a crushed tube to provide mounting points. These move with the action of the gear and provide lateral and fore and aft support to the LG leg. A drilled tab is soldered on the lower LG leg to provide a mount for the lower "V" struts. I dressed up the "V" struts with 1/16" aluminum tube. Note that the attachment points of the working sections of the LG must be allowed to move freely, but have a minimum amount of play.

The working telescopic strut fairings are made from .005" brass sheet for the upper and 3/4" wide streamlined aluminum tube for the lower telescoping slider. Cut the brass sheet 2.5" long x 1-7/8" wide and anneal it with a torch to make it more pliable. Make sure that you de-burr any cuts. Pre-bend the sheet into a shallow curve and form the leading edge at the center over a piece of 3/16" steel rod set in a vise. Work into a streamlined shape by making further curvatures over a dowel. Brass does not have much memory and we need a way to keep the pointed trailing edge together. We don't want to edge solder the TE since any globs of solder collecting inside the tube could interfere with the action of the lower telescoping fairing. Cut a 1/2" x 2.5" strip of brass and bend this into a "V" lengthwise, being careful not to induce ripples. Squeeze the trailing edge of the fairing together and slip on the "V" strip. It will want to pop off so use some stainless or aluminum wire twisted around everything to keep it together for soldering. All this is easier done than said! When you solder, use only enough to do the job. Now make another one!

The lower telescopic slider is easy. Cut a piece of 3/4" streamlined aluminum tube 2-3/8" and make a 1/4" long slot at one end about 3/16" from the leading edge on one side of the tube. This slot will fit over the lug on the LG leg that mates with the long "V" struts emanating from the center of the fuselage. Note that you must make a right and a left slider. The tube is fed on the oleo strut and is then captured on the lug by affixing a small slotted piece of aluminum sheet slid onto the lug from the other end. Test fit the two fairings to see that the slider will slide easily through the upper fairing. It's okay if the slider floats around or wobbles a little on the LG — the upper fairing will keep it in line when everything is assembled.

Almost there. The upper fairings are mounted to the oleo leg with 1/16" plywood supports cut in a streamlined shape and having a 3/16" hole for them to slide over the fixed part of the oleo. Prepare two for each leg; one should be epoxied at the top of the oleo and the second about 1/2" lower. Slide on the upper fairing (after the lower is in place) and epoxy it to the upper support. There is no need to glue the fairing to the lower support; its purpose is only to keep the fairing in alignment with the oleo leg during compression of the strut.

Storches were equipped with either a tail wheel or skid. Aluminum tube CA'd in the fuselage structure provides the mounting points.

**Empennage:**

Nothing exciting here. Piece the outlines together over the plans and add the 1/8" square ribs. Round out the empennage. Remove any covering from where the empennage is to be attached to the fuselage. Hinge the empennage with thinned down 1/8" pin hinges.

*The following parts are available from:*

***www.TurnKeyRc.com***

*or you can vacuum-form your own.*

***Rear Cabin Glazing:*** The rear cabin glazing is vacuformed from .030 PET-G plastic. The rear cabin glazing should be made to be removable to allow for equipment access and adjustment. Trim the rear cabin glazing around its perimeter, leaving at least 1/4" of the vertical sides. The vertical side of the forward portion should be trimmed away so that the glazing sits flush atop bulkhead #6, under the rear portion of the windshield. Both are held in place with small sheet metal screws. The sides of the glazing should be notched to fit over bulkhead #8. Add a piece of hard 1/16" balsa to the aft vertical side and drill to accept a 1/16" dowel in the center. A corresponding hole is drilled in bulkhead #9.

***Windshield:*** The windshield is vacuformed from .030 PET-G plastic. The side cabin glazing should be installed before installing the windshield and both should be installed before the landing gear. First trim off the bottom portion, up to the lower glazing line. Trim the curved section to about 1/4" from the demarcation line to provide a gluing surface and to allow for equipment. The rear portion of the windshield is made a bit longer to allow for attaching to bulkhead #6. Trim the rear so that the windshield overlaps bulkhead #6. Make 3/8" vertical and 1/4" horizontal cuts on the rearward sides of the windshield toward the top to allow for the landing gear and test fit the gear to check clearance. Scrap 1/16" ply should be applied to the top front of bulkhead #6 to provide a mounting point for the top of the windshield. A proper fit is achieved when the windshield rests flush with the top and sides of bulkhead #6 and is seated against bulkhead #4. Glue the windshield to the sides of bulkhead #6 and to bulkhead #4, leaving it loose on the top of bulkhead #6. The rear cabin glazing also rests on the top of bulkhead #6, however its front edge is positioned atop the windshield. Both are held in place with small sheet metal screws. Use Formula 560 glue, and tape the windshield in place while the glue sets.

***Cowling:*** The vacuformed (.030 high impact polystyrene) cowling must be joined at the center with a strip of polystyrene. ABS pipe glue may be used to secure the joint. Trim the cowl to the outline shown on the plans and open a hole for the propeller shaft, the cooling air intake (see the plans) and in the front and rear of the exhaust cooling shrouds on the side of the cowl. Support the mounting points with 1/64" ply. The upper and nose sections may be permanently affixed to the model and a removable bottom portion provides access to the engine.

The procedure is similar for the fiberglass (fiberglass and epoxy) cowling, however, it is provided in one piece. The glass cowl must be washed in warm water to remove the mold release. Prime the cowl with auto body primer and fill any holes or imperfections with auto body filler and wet sand with 400 grit paper.

**Finishing:**

The Storch displayed a number of interesting paint schemes, depending upon the theater and role in which it was deployed. Aside from the standard RLM black green/green camouflage used in

Russia and mainland Europe, there were also a number of tropical and winter schemes. The winter camouflage was a water-based wash applied to the upper surfaces and sides and around the call letters and the national and unit markings, allowing some of the base camouflage to show through. The Storch also sported various national insignia other than German including Swedish, French, Italian and Spanish and some wore the insignia of capturing British and U.S. forces.

**Equipment:**

Place the battery as far forward as possible and use other equipment to balance out the model so that it is slightly nose heavy. On the gas model, place the servo battery behind the 4 oz. fuel tank and use the receiver to balance things out. On the prototype, the Hitec Hs55 rudder, elevator and throttle servos were placed in the rear of the cockpit cabin.

**Flying:**

Aileron and elevator throws should be about 3/8" each direction. If you have a computer radio, it's helpful to mix a little rudder with the ailerons to coordinate turns. The flaps are quite effective and enable very slow flying. A full flap, full power take-off in a slight breeze will get the Storch airborne in 8 feet or less and it will land in just about its own length. The first flight of the .15 gas powered Storch took place on a day with a little more wind than I would have liked, but it seemed to fly very easily and handling was not adversely affected. It will stay in the air easily on less than half throttle, but crank in a little more for turns where the bank is more than 15-20 degrees. The ailerons are very effective and with little or no dihedral, the plane will not tend to automatically right itself — you must fly it through the turns. The Storch will do all the prototype's maneuvers including STOL, tight turns and figure "8's" and at low throttle with flap and a breeze it will actually hover. I also did some loops and rolls, but don't let anybody see you doing these! The rudder is very effective; if you want to be a good STOL pilot, learn to use the rudder for slipping and for keeping the aircraft pointed into the wind. The sprung landing gear really soaks up the bumps on a grass field and even with the small wheels the Storch had no trouble flying off rough surfaces. It's a great everyday flier that looks very realistic in the air.

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