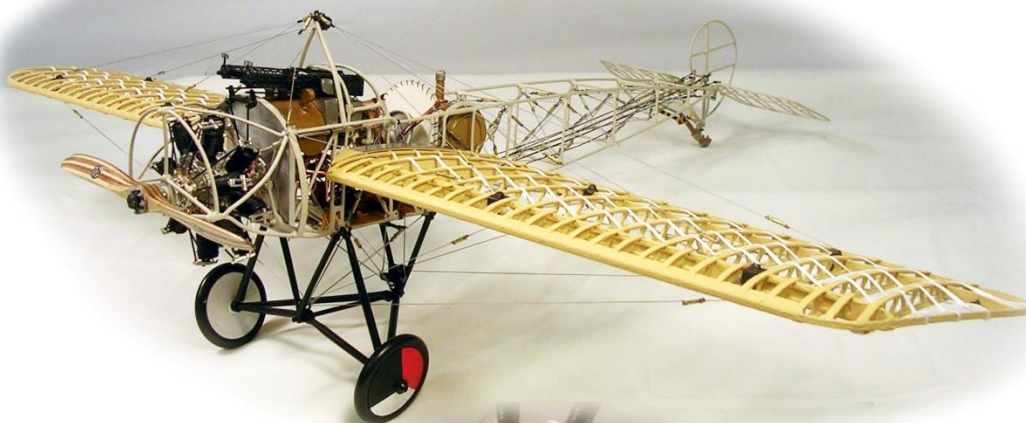


# Instruction Manual



## Modeling the **Fokker Eindecker** **E-IV** 1915



Instructions and model  
prototype prepared by

**Ken Foran**

Kit No. MA1050

Scale: 1:16

Length: 20"

Height: 7 1/4"

Wingspan: 25"

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## Before You Begin to Build

At 1:16 scale, it is easy to build this Fokker Eindecker E-IV model and obtain precise detail. Laser cut parts offer a simple building method. Britannia (white metal) parts eliminate creating metal parts from scratch. However; some metal fittings will need to be formed using brass tube for authentic detailing.

Before starting to assemble the model, carefully examine the kit and study the **Plan Sheets** and the **Assembly Instruction Manual**. First, determine if all the listed kit parts are present using the **Plan Parts Layout Sheet; Materials List** and **Assembly Instructions**. Handling the parts will provide a better understanding of the kit's building requirements. Try to visualize how every part will look on the completed model. Also, try to follow the building sequence and what must be completed first, or ahead of time and what can be done simultaneously if you wish. For example, you may want to skip to the **Propeller** as you are working on the **Fuselage** waiting for glued assemblies to set or paint to dry.

**The Plans:** Four (4) **Plan Sheets** are provided for reference and part identification and may not be exactly true to scale due to the reproduction process. These drawings show elevation views, a parts layout with color guide and laser cut layout sheets. Review and study the plans and assembly instructions prior to starting the build to better understand how the parts will come together and the proper build sequence.

**Make Allowances:** Try to be exact when following the instructions, but use common sense. Adjustments may be necessary to compensate for small differences in how your model is shaping up and how the parts are relating to each other. An old saying in the model building craft is that "if it looks right, it is right." Also check the instruction photographs for various details before working on them.

**Kit Lumber:** Laser cut Plywood and Basswood parts are supplied in the kit. A word about laser cutting: a common misconception is that the parts should punch out of the carrier sheet. This is not so. Laser cut parts are retained in the carrier sheet by small bridges of uncut wood called tabs. Tabs can be oriented parallel to the wood grain or perpendicular to the wood grain. It is always better to cut through these tabs rather than try to punch out the parts by breaking the tabs. You may have to cut through not only the tabs but portions of the part outline that did not cut completely through the sheet. Turn the carrier sheet over and cut from the backside to release the part without damage. Care must be taken when cutting out parts due to the thickness of plywood which in some cases is very thin to maintain proper scale.

**Laser cut parts:** There are plywood laser cut parts and laser cutting burns through the plywood leaving charred surfaces. The charred surface sometimes does not make good strong glue joints. It is recommended to sand or scrape away the loose char before gluing. It is not necessary to remove all the char, unless a finished wood surface is required. In some cases simply scraping with the back edge of a # 11 blade is sufficient. The use of a small sanding drum in a rotary tool with a light touch would work best on the thicker plywood edges.

**Britannia Metal Parts:** There are many Britannia (white metal) parts in this kit. First, remove any mold joint flash with a #11 hobby blade using the back edge as a scraper, then file or sand with fine sanding stick or sandpaper. **Important: Always dry fit parts together first to determine if holes need to be drilled further or if mating surfaces are flat to each other.** Once parts have been dry fitted wash

parts in dishwashing liquid and warm water to remove traces of mold release agent and body oils your fingers may deposit. Allow the parts to dry thoroughly before applying primer and painting. Try to avoid painting, whenever possible, surfaces to be glued together, or locating pins that insert into holes. Due to the metal casting process used and shipping; some deformed parts may be received, or filled in holes that will have to be drilled. Parts can be straightened by **gently and slowly** reforming with your fingers. Check with the plans and photographs to verify the reforming of the part(s); every effort was made to reproduce the parts accurately but some deforming may occur during de-molding or shipping due to the weight of the parts themselves.

**Photo Etched Parts:** An etched aluminum sheet of parts is included in the kit. Care must be used to cut these parts from the carrier sheet using the tip of a hobby knife blade on a hard surface like steel or use small scissors/snips. Cut tabs will need to be filed smooth using a fine needle file. The “Eindecker E-IV” on the aluminum sheet can be used to make a nameplate if desired.

**Glues:** Super glues, such as Jet, Flash, or Zap, produce quick adhesion. For most applications, the medium viscosity, gap-filling variety is best allowing a little time for final positioning. The thin type is recommended for filling a narrow crack, wicking into laminated tight joints and seizing thread ends to make “needle” points. These instructions will refer to super glues as CA (cyanoacrylate). For Basswood and Plywood it is best to use Yellow Wood glue like Titebond which is easier to sand than CA which hardens the plywood. Epoxy glue is highly recommended for gluing metal cast engine parts some of which are heavy. The five minute setting type is sufficient for this build. Scoring mating metal joint surfaces with the tip of a hobby knife in a cross hatch pattern will increase the strength of the glue joints. Excess glue can be cleaned carefully with acetone on a Q-tip, but take care not to loosen the glued joint.

### **Building Tips and Suggestions before Starting to Build**

Read assembly instructions, study the pictures and review the plans to understand and familiarize yourself with various parts and components and how they relate to each other.

Check parts list to make sure you have all the kit parts listed.

Verify that you have all the tools and materials needed to start the build. See the materials list and suggested tool list on the next page. A variety of rubber bands is essential to assemble the fuselage.

Try to follow the suggested build sequence outlined in the assembly instructions.

Pay attention to steps that are **BOLD** face type or underlined. These are critical actions to avoid problems with assembly or when extra care is needed. Parts are **Capitalized** and **Boldface** on purpose for emphasis and identification when reading and easy reference. Cast white metal parts in some cases are delicate due to replicating in scale. Extra care and caution is required when cleaning, filing parting lines and adjusting to dry fit.

Prime, paint and dry fit all cast parts prior to assembling. Keep primer and paint to a minimum to retain fine details. When dry fitting parts if excess paint is an issue scrap off paint as needed for a good fit. Keep in mind it is better to have two or three light coats rather than one thick coat of paint. Fill casting voids with putty if required and then sand and prime before painting.

Take your time, learn and enjoy the build process as much as the finished model.

**Building Strategy:** Due to the number of laser cut parts in the kit for the wings; it is recommended to clean, file, dry fit then paint the wood once the wings are assembled.

The following instructions will address some sub-assemblies of components to be worked on and then set aside for later assembly.

Paint all the cast metal parts first before starting to assemble. Paint brass components once assembled to painted parts to match during the build process.

### **Additional materials that will be needed:**

Medium CA –Small Bottle	1 Bottle MS 4802 Gun Carriage Red
Thin CA – Small Bottle	1 Bottle MS 4830 Hull Spar Black
1 small bottle of Yellow Glue.	1 Bottle MS 4975 English Oak
1 small bottle of White Glue.	1 Bottle MS 4961 Brass
Fine sand paper or sanding sticks.	1 Bottle MS 4972 Clear Satin
1 Bottle MS 4821 Deck House Light	#2 and #7 Round paint brushes.
1 Bottle MS4962 Aluminum	10/0 spotter paint brush for touch up.
1 Bottle MS 4970 Copper	1/2" Flat brush (for cleaning and dusting)
1 Bottle MS 4839 Primer	Small can of Acetone–clean/ debond glue.
1 Bottle MS4973 Pre-stain Wood Conditioner	Small pins/ T-pins
1 Bottle MS 4823 Pearl Gray	A variety of flat rubber bands.

### **Suggested tool list:**

Hobby knife blade holder.	Round flat drift punch.
#11 blades - 12- 18 as needed. 1 chisel blade.	Wax paper.
Hobby Knife Saw Blade	Masking tape- automotive low tack
Small needle nose pliers.	Drill Bits 1/32"; 3/64"; 1/16"; 1/4:"
Small end cutters.	Pin vise for drill bits.
Tweezers – straight and bent.	X –Y table for drill press.
Medium size Mill Bastard file.	Mechanical Pencil .05 lead sizes.
Needle files. Flat , Half Round, and Square	Small 4" bar clamps – 2 to 4
ScotchBrite pad- Fine and Medium.	Metal spring clamps - 10 to 12
Sanding paper/stick – 80,100,120,220 grits.	Small Plastic clamps – 10 to 12
Set of small reams to clean holes.	Small package of Clothes pins.
Small Square.	1 Stainless steel pick – bent ends.
Several round toothpicks.	

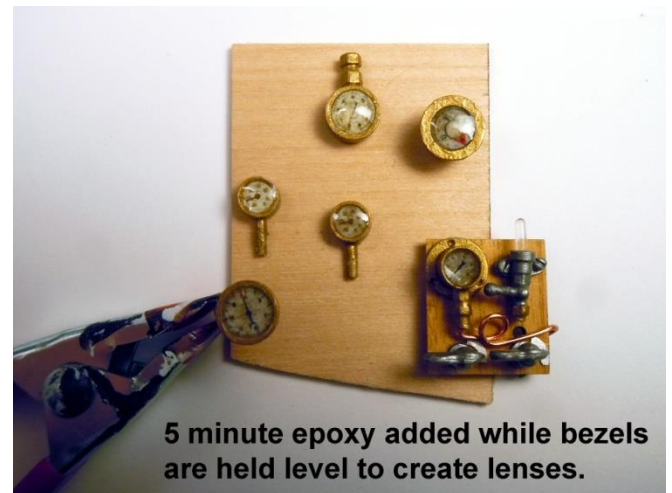
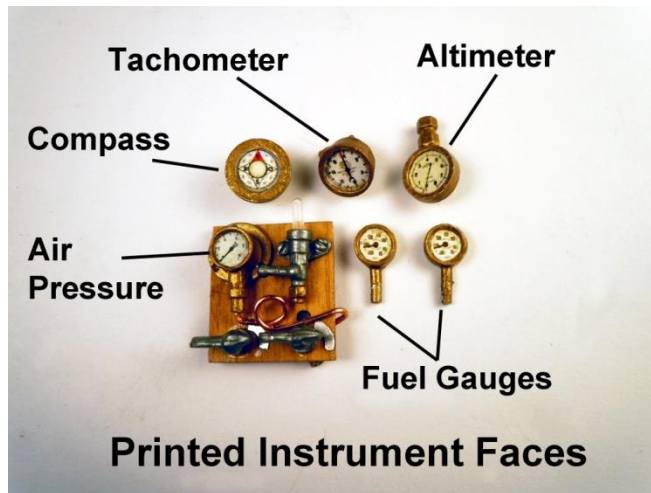
The **Materials List** identifying the parts supplied in the kit is a separate document to this manual. Use plan sheet "**Parts Layout and Color Guide**" to check for parts as well as the colors to paint them.

**Parts:** The very first step is to paint all the cast metal parts their respective colors using the **Color Guide Plan Sheet**. This will help to better understand the parts and how they relate to each other; do

any adjustments that are needed and remember to bend **very slowly** to relieve any stress in the parts and avoid breaking the part. It will also enable an inventory to make sure that there are no missing parts. For this instruction manual all parts were painted using Model Expo paints and brush painted. Some builders may prefer other brands and spraying with airbrush rather than by hand.

### Instruments:

Carefully cut out the printed instrument faces and glue them in place to the correct painted cast metal instrument bezels. Note that the two "Axial" labels will go on the propeller once it is carved. **Extra detail:** Mix some 5 epoxy and add to the instrument face while level, this must be done quickly before the epoxy starts to set. Better to do in two groups of bezels and this will form lenses for the instruments. There is a detailed explanation further on in these instructions to do the **Instrument Lenses** read ahead to locate. Building all the **Instruments** ahead of time is recommended and will assure ample drying time for the epoxy lenses to set before handling. See the pictures below.

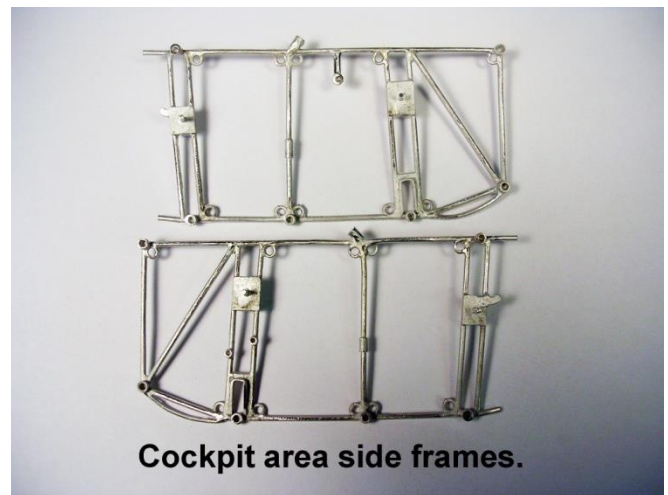
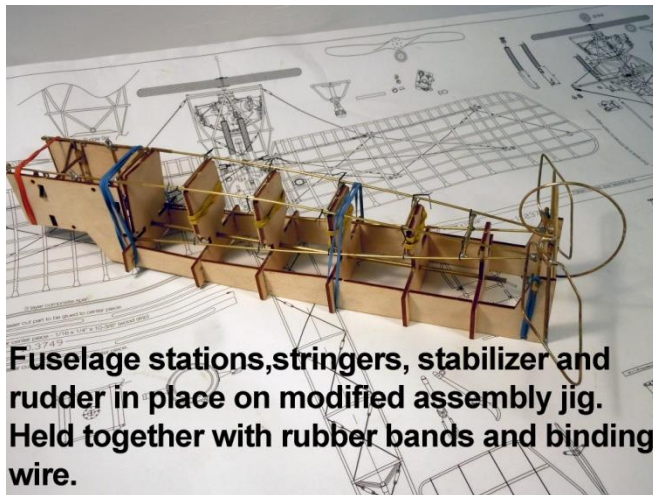


### Fuselage Building Fixture:

Remove the 1/8" plywood parts required to assemble the **Fuselage Building Fixture**; laser cut parts sheets "H" and "I" and clean the char from all the edges. A suggestion is to paint the edges with Wood Conditioner to stabilize the char from transfer while handling the fixture during the build assembly.

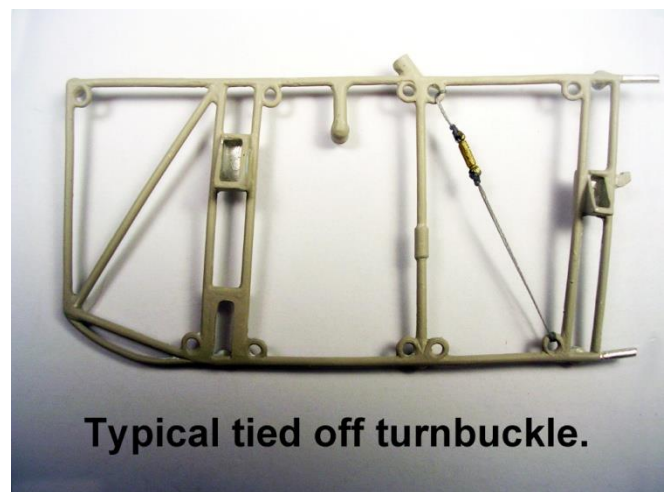
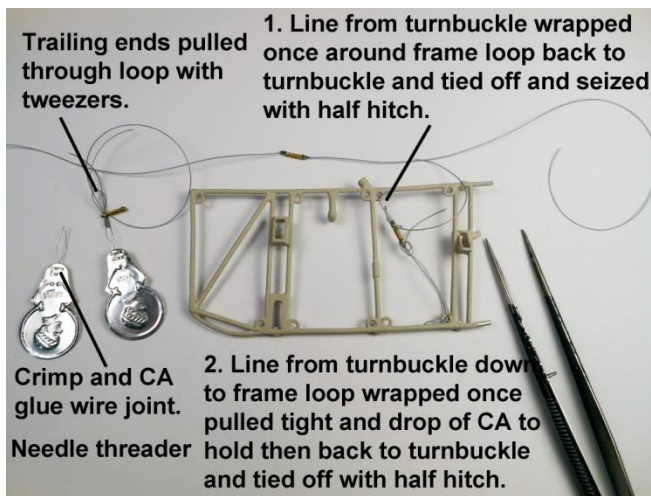
Next using the 1/16" x 3/16" x 5" wood strip cut five (5) spacers 3/4" long and glue them to the **Stations** in places marked "Spacer" making sure the top edges of the spacers align with the top of the laser cut lines on the **Stations**. This alignment of the spacers is critical.

Once the **Stations** are ready, assemble the **Building Fixture** indexing the **Stations** in proper marked sequence to each other. Note **do not glue** the **Station** parts 2 to 7 in place and note that the **Building Fixture** does taper narrowing from rear to front. See picture on the next page to the left with assembled parts. With the **Stations** in place, insert the 1/8" diameter x 11" **Brass Tube** down the center through the holes in the **Stations** to stabilize the **Building Fixture**. This will help greatly when handling during assembly.



### Turnbuckles:

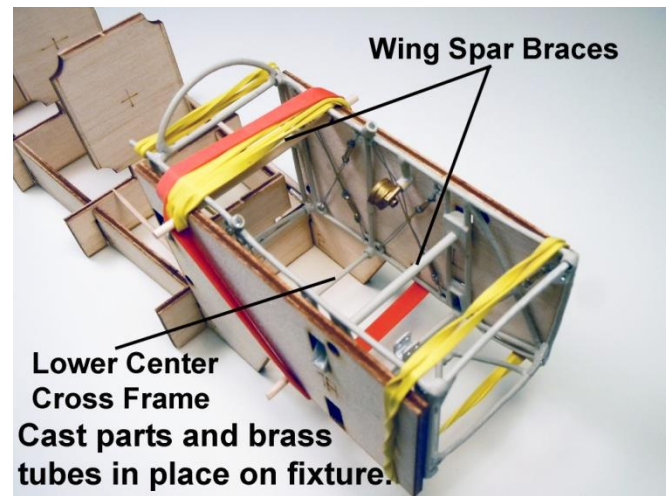
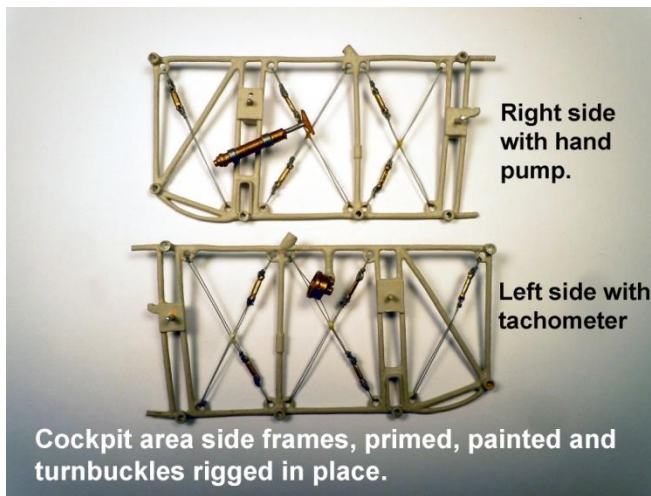
There are many **Turnbuckles** to be used for this build. Each **Turnbuckle** should be cleaned; holes drilled with 1/32" (#67) drill bit if necessary then primed and painted Brass. Using a needle threader insert it into a **Turnbuckle** hole then index a thread loop into the threader and pull the loop back through the **Turnbuckle** hole just to clear the hole. Now with tweezers inserted through the loop pull the two ends of the thread back through the loop and seize the **Turnbuckle** pulling the ends to tighten; once tight on the **Turnbuckle** tie a half hitch and add a drop of thin CA on the short thread end and pull the long thread to have the glue set straight. When the glue has set cut off the short end at the knot. Repeat the process on the other end of the **Turnbuckle**. Tie enough **Turnbuckles** for each section of the build as needed. **Tip:** On the needle threader crimp tighter the junction of the wire with the aluminum handle using pliers to help eliminate the wire being pulled out of the handle.



### Fuselage:

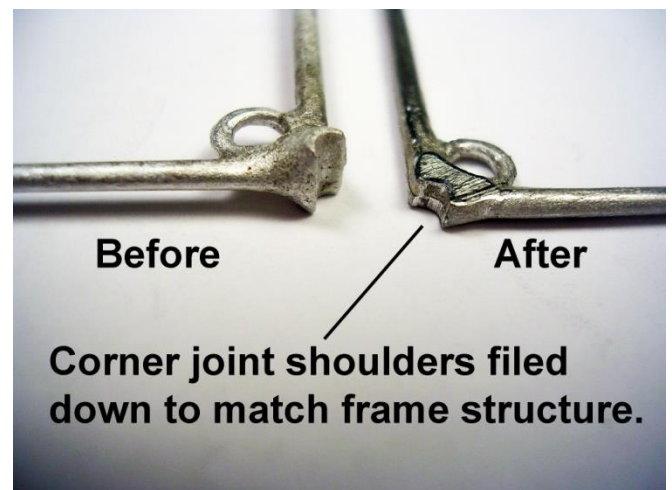
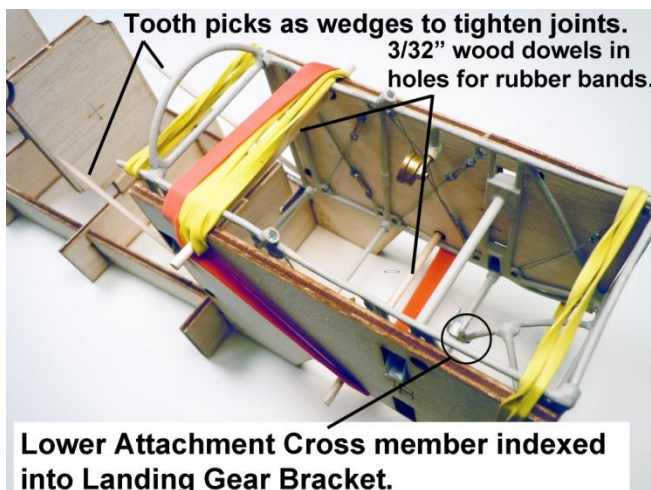
Now locate the nine (9) cast parts and three (3) brass tubes needed to assemble the cockpit area of the **Fuselage**. The cast parts are the **Cockpit Area Side Frames** (2 - Left and right); upper rear **Seat Cross Frame**; **Landing Gear Bracket**; lower **Rear Pivot Brace**; forward upper and lower **Fuselage Attachment Cross Members** (2); **Tachometer**; **Hand Pump**. The following Brass tubes: **Wing Spar Braces** (2) 3/32" x 1- 9/16"; **Lower Center Cross Frame** (1) 1/16" x 1- 21/32".

Tie the ten (10) **Turnbuckles** to the **Side Frames** as seen in the picture below. Note that all **Turnbuckles** are in the upper and lower corners towards the front of the plane. This will also apply to all the fuselage stations as well. Now glue the painted **Hand Pump** to the right **Side Frame** at the two (2) location holes for the pins on the **Hand Pump**. The **Tachometer** can also be glued in place on the left **Side Frame** in the location hole with a slight angle up.



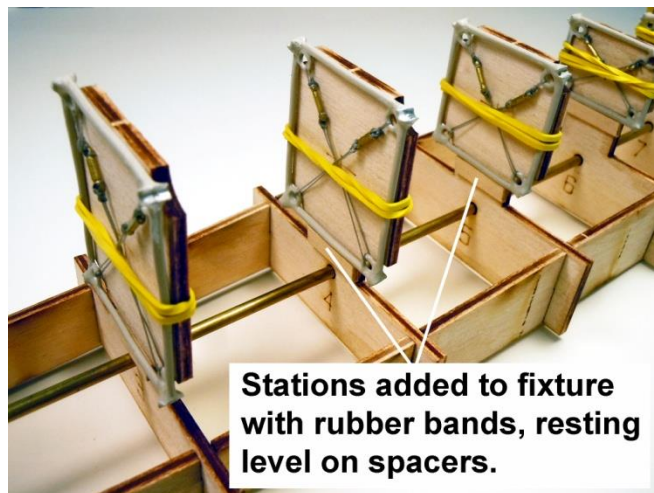
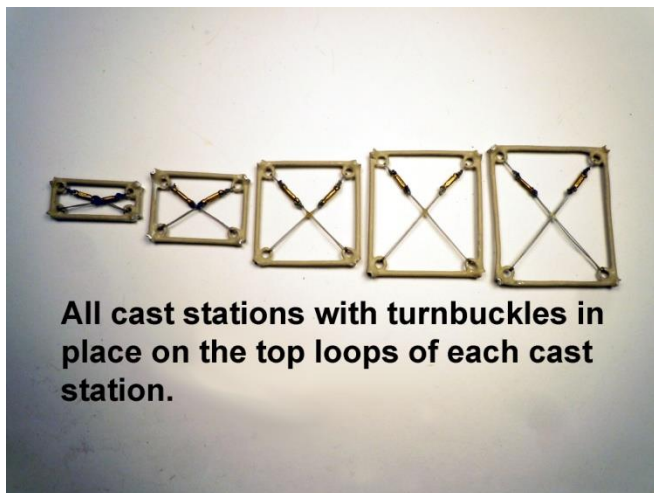
**TIP:** Locate the painted Black **Joystick Control Rod** and **Rear Pivot Brace** and test fit the **Rod** shaft into the center hole in the **Brace**; the **Rod** shaft must be able to move freely through the hole when painted. If it does not ream/enlarge the hole until it does; this is much easier to do now than later.

Add the two painted (2) **Wing Spar Braces** to the pins on the inside of the **Wing Spar Boxes**. Dry fit the **Braces** first with the **Side Frames** on a flat surface and square to the **Side Frames**. Now carefully insert the assembly into the **Building Fixture** and hold together with rubber bands as seen in the picture above. Now dry fit the following parts by carefully indexing them into their locations working from the center out. First the **Lower Center Frame**; **Landing Gear Bracket**; **Seat Cross Frame**; **Rear Pivot Brace**; upper **Attachment Cross Member** and finally the lower **Attachment Cross Member** which indexes into the **Landing Gear Bracket** as seen in the picture below. Note that some parts may need adjustment or straightening to fit properly. Once all parts are dry fitted and held in place with rubber bands; then square up the assembly and glue all connections using ample thin CA and allow the assembly glue joints to set, about an hour or longer should work. Start with gluing the **Wing Braces** first to set the assembly square; then the rest of the joints.



While waiting for the assembly glue to set; file the corner shoulders of the five (5) fuselage **Stations (3 to 7)** flush to the frame structures on both sides for a more authentic detail. See picture on the previous page. Due to metal casting limitations it was necessary to add the shoulders to assure proper filling of the corners. Once filed smooth to match the frame, touch up the paint.

Now rig the five (5) **Fuselage Stations** with **Turnbuckles** and try to equalize the **Turnbuckles** from the two corners as seen in the picture below.



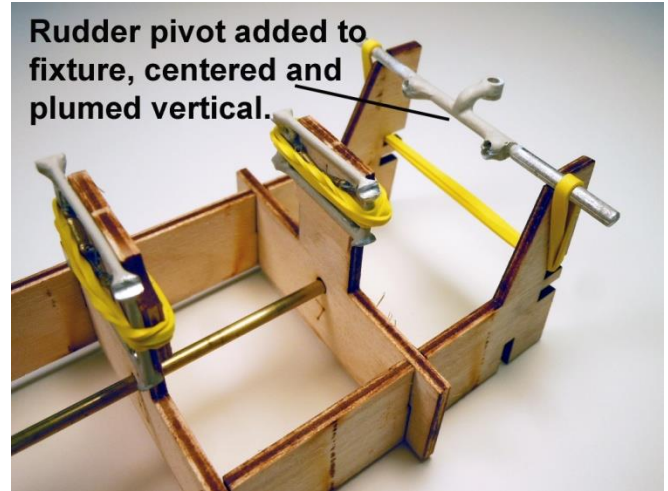
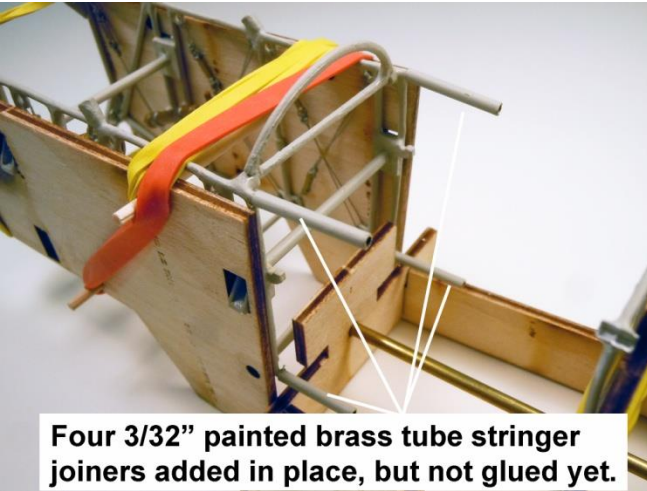
Using rubber bands add the five (5) **Stations (3 to 7)** to the front side of the **Building Fixture** locations making sure the **Stations** are centered and resting level on the **Spacers**. The rubber bands **must** hold the **Stations** tightly in place. See the picture above.

Now glue in place the four (4) 3/32" x 3/4" brass tube **Fuselage Joiners** to the rear ends of the **Side Frames** making sure they are completely seated against the **Side Frames**. These joints are per the original design.

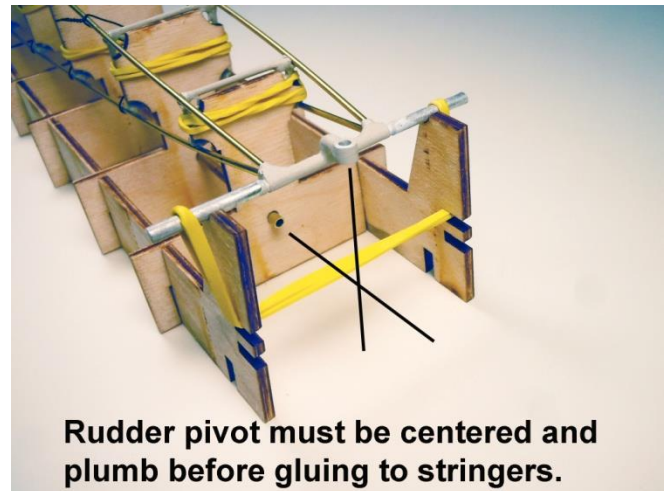
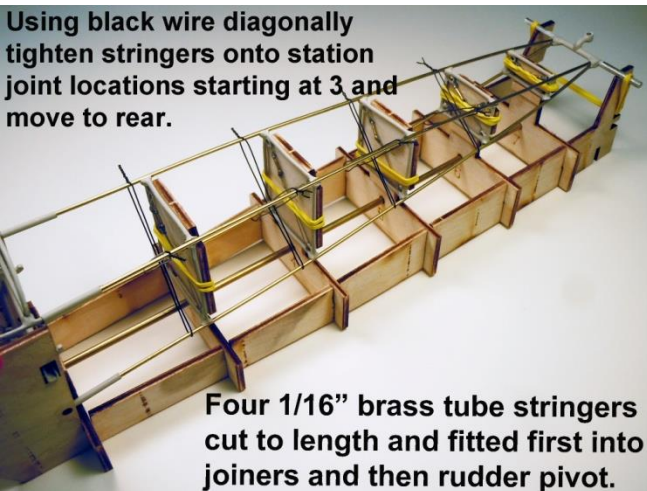
Add the **Rudder Pivot** cast metal part to the rear end of the **Building Fixture** indexing it onto the quarter rounds and hold it in place using a rubber band as seen in the picture on the next page. The **Rudder Pivot** must be centered and plumb vertically. The **Rudder** will index through the hole so it can be inserted to check.

Next, dry fit the four (4) brass tube **Fuselage Stringers** 1/16" x 10- 3/4" inserting them one at a time starting with the bottom two (2) and then the top two (2) into the **Fuselage Joiners**, onto all the **Station** corners and finally the **Rudder Pivot**. Carefully bend the **Fuselage Stringers** to relieve any stress and ideally the **Fuselage Stringers** should be able to rest in place between the **Fuselage Joiners** and the **Rudder Pivot**. See the pictures on the next page.

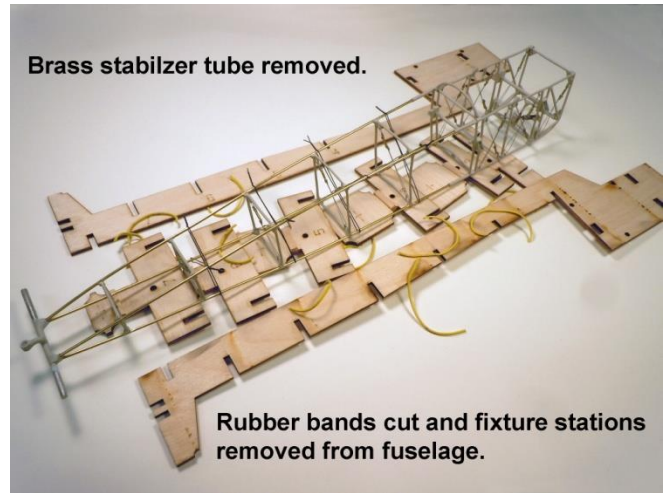
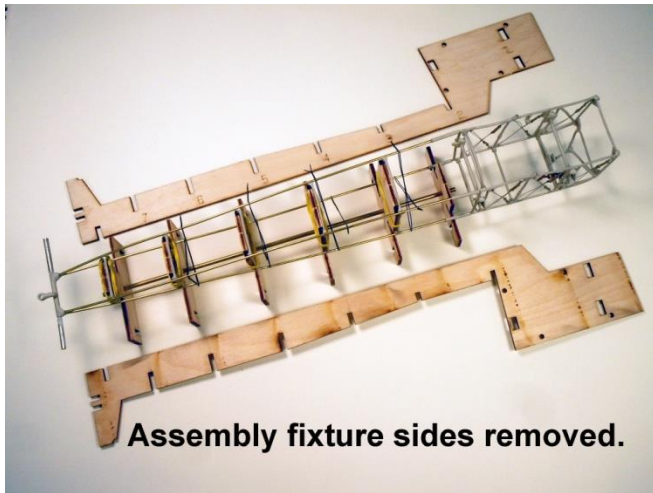




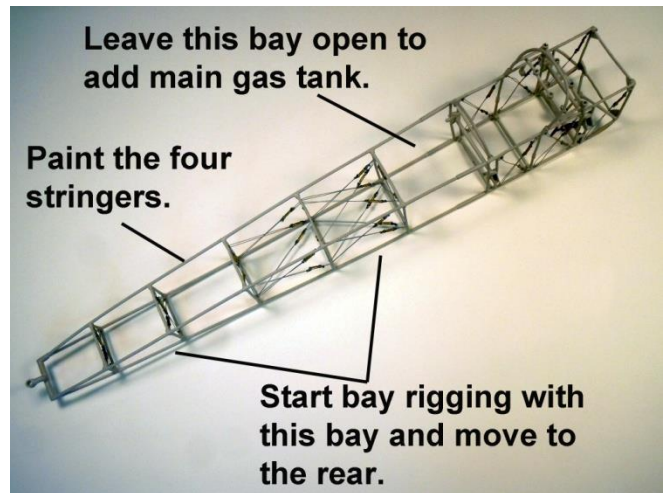
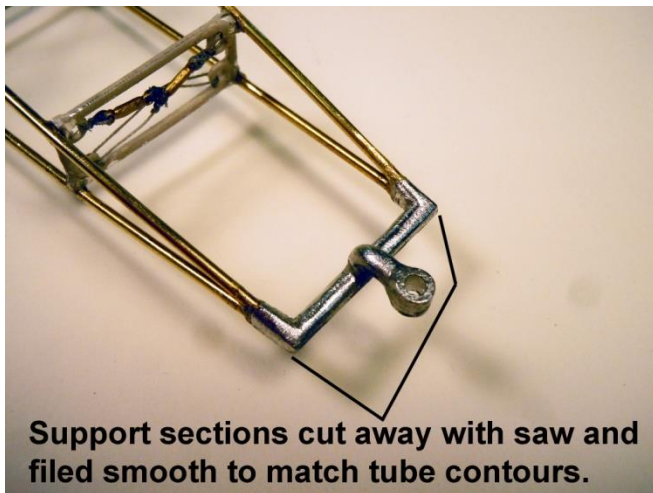
Next using binding wire, seize the **Fuselage Stringers** in place in front of each **Station** diagonally twisting the wire to tighten in place on the **Station** corners. Start at the rear and move forward as seen in the picture below. Once all the **Fuselage Stringers** are seized and adjusted check the **Rudder Pivot** to be on center and vertically plumb then glue all the joints and allow the glue to set completely. See picture below.



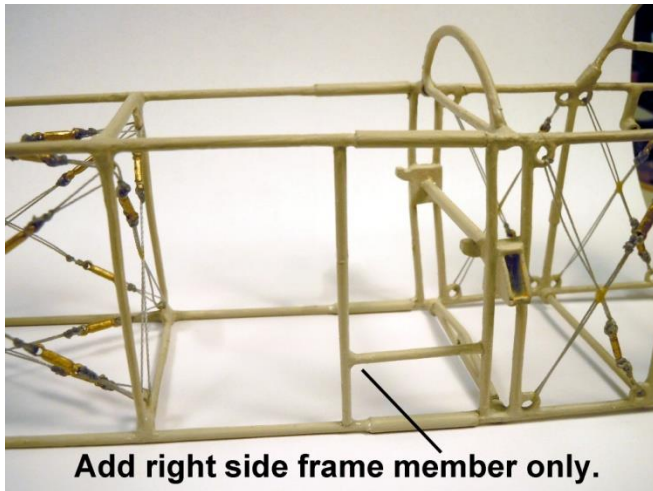
Once the glue has set completely on all the stringer joints slowly remove the 1/8" brass tube **Stabilizer** from the **Stations** and then the two (2) sides of the **Building Fixture** down from the wood **Stations**. See the picture on the next page. Next cut all the **Station** rubber bands and carefully remove the **Stations** by turning them diagonally and down leaving only the **Fuselage** with the binding wires still in place for now. Check all joints to make sure they are tight and still glued securely. If in doubt glue the joints again.



Now with the binding wires still in place cut away the extended support from the **Rudder Pivot** using a jeweler's saw and file and sand smooth the saw cuts to match the contour of the **Fuselage** frame structure as seen in the picture below. These extensions were cast in place to facilitate correct alignment of the **Fuselage** when building.

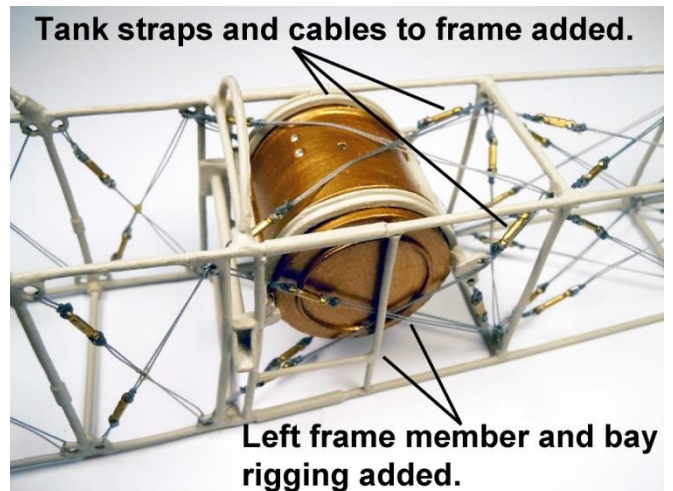
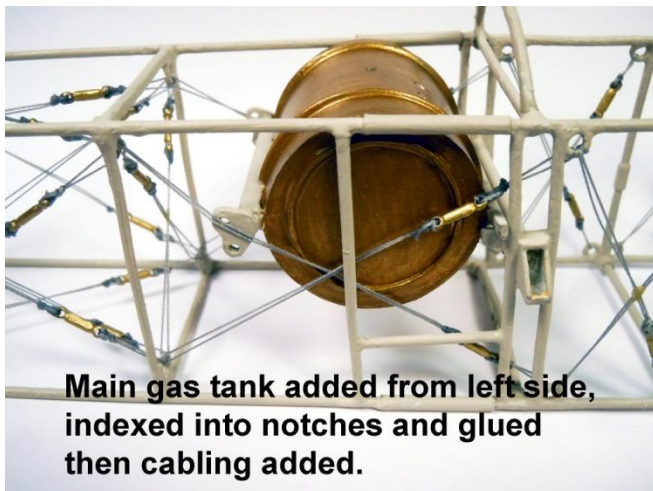


Now cut away and remove the binding wires with small snips taking care not to snag the **Stringers**. Add the rigged turnbuckles to all the **Fuselage** sides, tops and bottoms starting at the rear and up to **Station 3**. The bay between 3 and 2 must be left open to add the **Main Gas Tank**. See picture above and on the next page

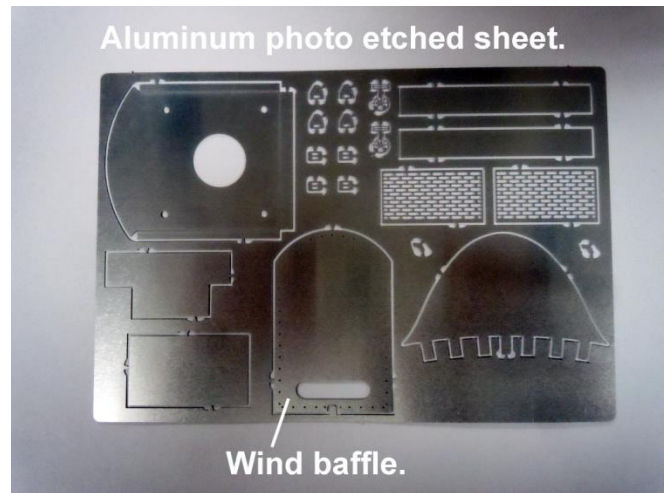
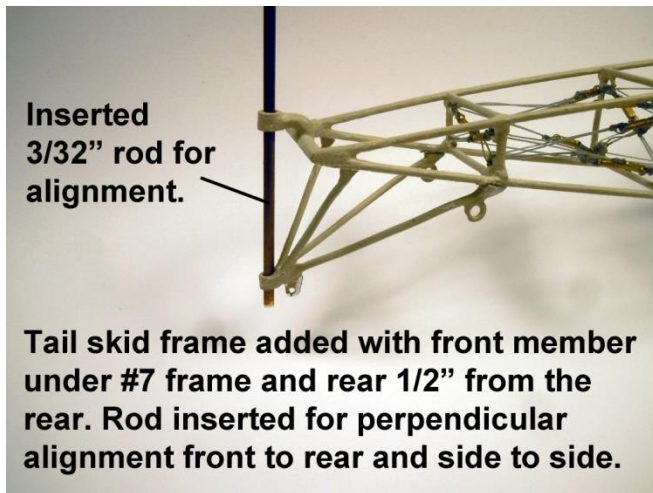


Glue the right side **Frame Member** in place with the three joints being tight. The ends of the **Frame Member** can be filed half round with a small round file to match the **Stringers**.

Assemble the **Main Gas Tank** and paint it Brass if not already done, or touch up when assembled. The two (2) halves of the **Main gas Tank** index to each other, medium CA can be added to the mating surfaces and the Medium CA allows a few seconds for part alignment before setting. Once the **Main Gas Tank** is ready to install insert it into the bay from the left side and index the front support into the notches in the **Frames (left and right)** and glue in place holding horizontal with the top aligned with the top of the **Stringers** until the glue sets.

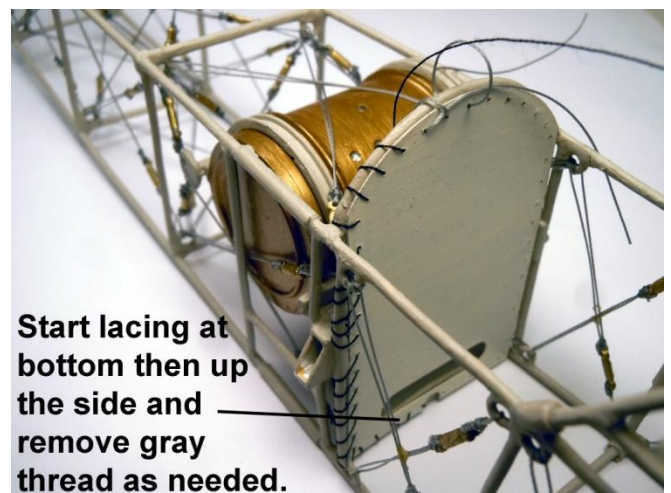
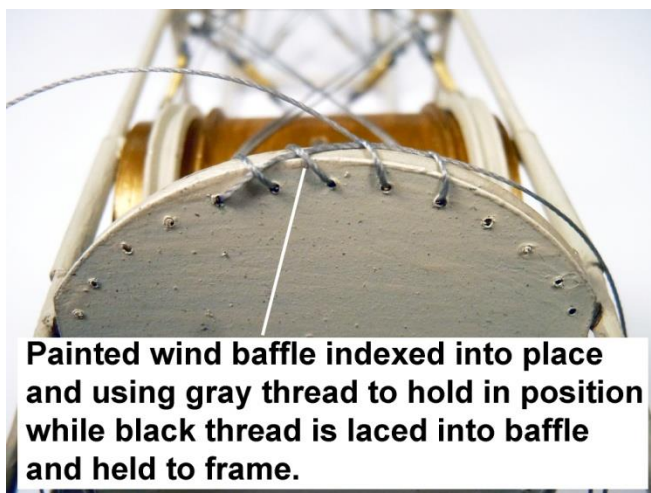


Add the **Cables** with **Turnbuckles** from the **Main Gas tank** to the four (4) frame loops in the upper and lower corners of the bay as seen in the picture above. Now glue in place the two (2) cast metal **Upper Tank Straps** and **Lower Tank Straps** between the outer edges and the ring in the **Tank**. Now add the left side **Frame Member** in place just like the right side. Finally, rig the cables with **Turnbuckles** to all sides of the bay of the **Fuselage**. See the picture above. **NOTE:** Other **Main Tank** details can be added later once the **Landing Gear** is in place.



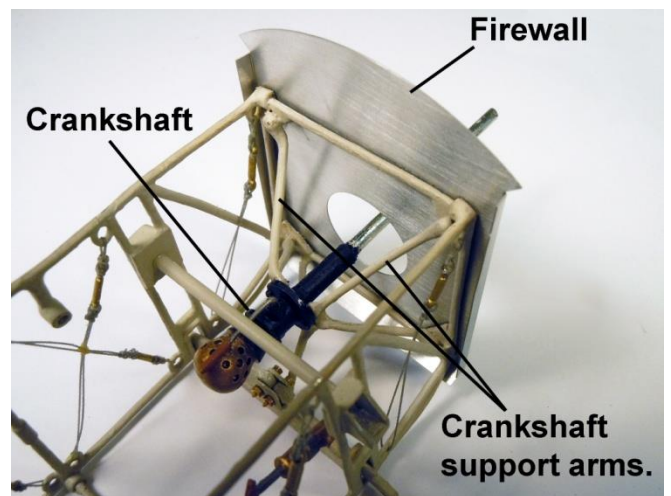
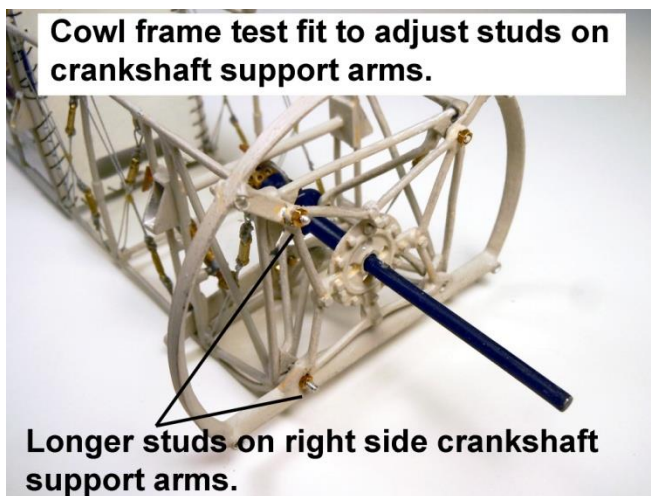
Dry fit and adjust as necessary the **Tail Skid Frame** to the **Fuselage** with the front leg of the **Tail Skid Frame** indexed on the **Stringer** joint at **Station #7** and the front edge of the rear leg of the **Tail Skid Frame** 1/2" from the end of the **Fuselage**. Check the plans to verify the location. Use a 3/32" x 2-7/8" brass rod (for landing gear) to align the **Tail Skid Frame** on center and plumb vertically. This alignment is important so that the **Rudder** will be vertical and centered. Once satisfied with adjustment and fit glue the **Tail Skid Frame** in place with the 3/32" x 2-7/8" brass rod in place to check for alignment needed. See the picture above.

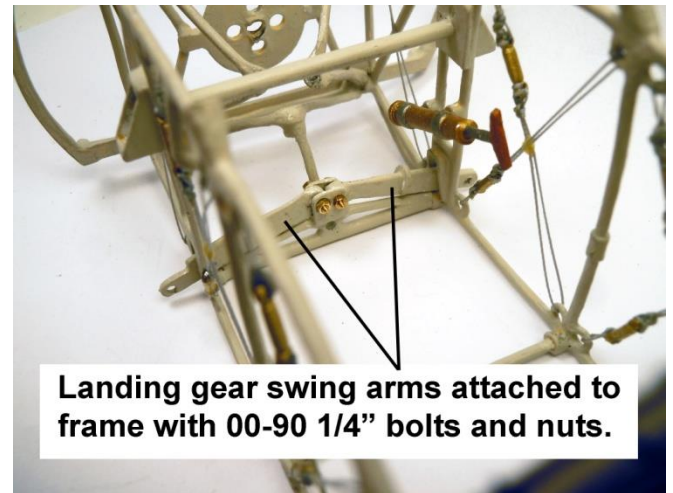
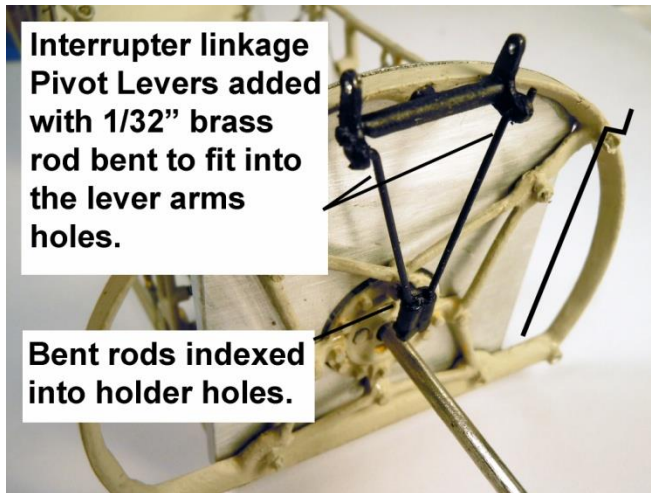
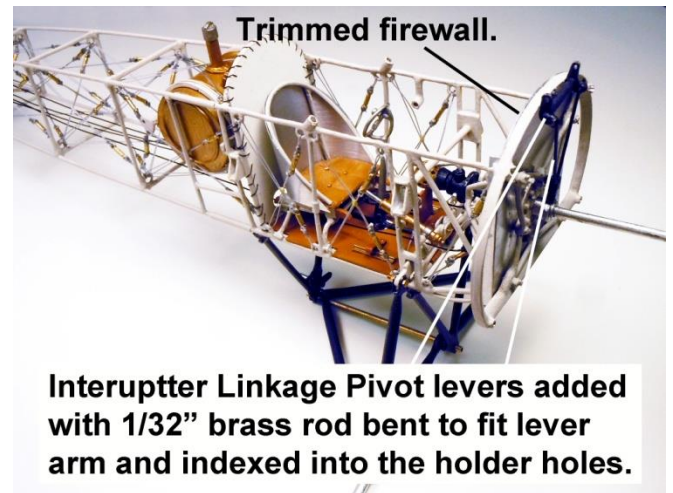
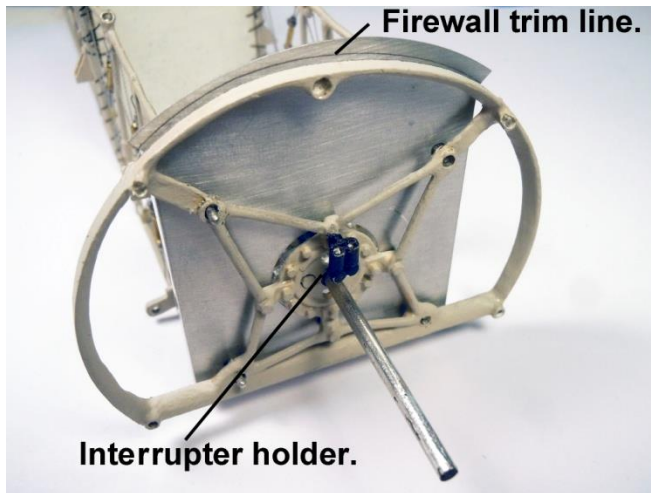
Locate the **Photo Etched Sheet** of parts and carefully remove the **Wind Baffle** part by cutting the connecting tabs. Mix the white primer with a touch of **English Oak** to have an off White color replicating the look of canvas. The primer mix will result in a matte finish. Paint both sides of the **Wind Baffle** thinning the primer mix with water for a smooth finish as seen in the pictures below. If the perimeter holes are filled with paint use a pin to open the hole. Once dry, insert the **Wind Baffle** into the **Fuselage** at station #2 forward of the **Main Gas Tank**. Use the gray thread to align and hold the top center in place against the curved frame member using the top five (5) holes. See picture below. Now using the Black thread lash the **Wind Baffle** in place and starting at the right side center bottom lash around the **Frames** holding the **Wind Baffle** in place to the **Frames**. Add thin CA to the end of the Black thread and cut at an angle to form a needle like end; this will help in threading through the holes. When completely around to the bottom left center then seize the end of the thread with glue and trim off the excess.



Locate the following parts: **Cowl Frame**, **Left and Right Crankshaft Support Arms**, **Crankshaft**, **Carburator Adjustment Handle** and four (4) **0-80 Nuts**. These parts may need significant adjusting to fit each other so adjust any bending very slowly. The **Right Crankshaft Support Arm** has the longer bolt studs than the left one when fitting them into the four holes at the end of the **Fuselage Frame**. Using a 1/32" drill bit ream/drill out the top and bottom holes on the **Crankshaft** adjacent to the locator pins and on center left and right sides. See engine detail on plan sheet for hole locations. Glue the **Carburator Adjustment Handle** into the top hole. Carefully thread loosely the four 0-80 nuts onto the bolt studs enough for a snug fit but still slightly loose. This will allow for moving. Now, from within the cockpit add the **Crankshaft** indexing the two pins on the **Crankshaft** into the holes on the **Crankshaft Support Arms** and through the center hole in the **Cowl Frame** with the **Carburator Adjustment Handle** up as seen on the plan sheet. Bending and fitting the **Crankshaft Support Arms** may be required and the **Crankshaft** needs to be centered left to right and up and down best as possible. This is critical for the proper alignment of the **Engine**. Once the proper fit is attained tighten the four (4) **0-80 Nuts** for a snug fit. **DO NOT OVER TIGHTEN** this will break off the bolt stud. If broken save broken stud with nut to be glued later.

Now remove the **Firewall** from the **Photo Etched Sheet** and brush both sides horizontally with a Scotchbrite pad or fine sandpaper for a natural brushed aluminum finish. Next bend the two sides 90 degrees on the half etched lines and the bottom about 20 degrees from centerline to match the lower **Fuselage Frame**. Remove the four 0-80 nuts and the **Cowl Frame** and fit the **Firewall** on bolt studs, now replace the **Cowl Frame** in place and with a pencil, mark a cut line on the **Firewall** with the top edge of the **Cowl Frame** as a guide. See picture on the next page. Then remove both and cut along the trim line on the **Firewall** and carefully lightly sand the cut edge smooth. Now replace both back in place and add the four **0-80 Nuts** for a snug fit. **DO NOT OVER TIGHTEN!** Note the large center hole in the **Firewall** should index around the center **Crankshaft** support on the **Cowl Frame** as seen in the picture on the next page.



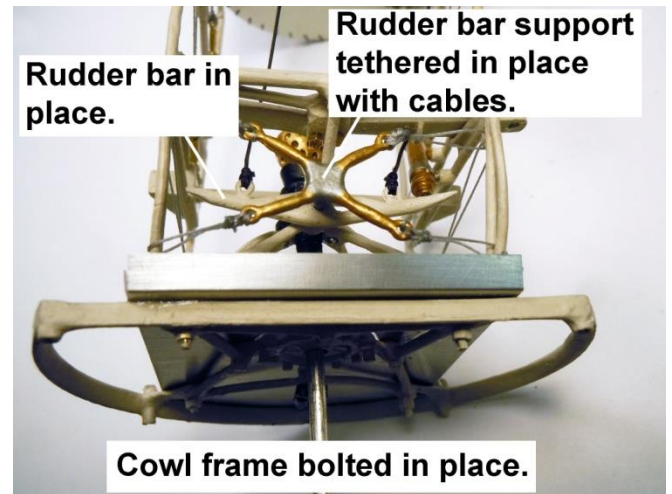
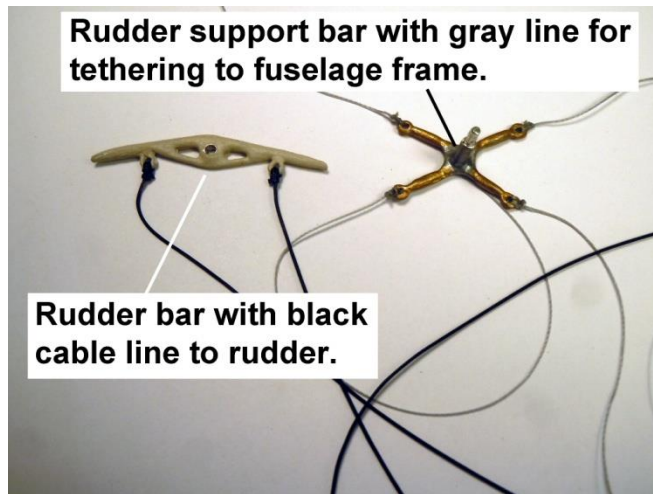


Insert the **Interrupter Holder** into the hole just above the **Crankshaft** hole as seen in the picture above. Then the **Interrupter Linkage Pivot** into the location hole at the top of the **Cowl Frame**. Cut and bend two (2) 1/32" brass rods indexed into **Pivot Levers** and **Interrupter Holder** holes and linkage. The two linkage rods are painted Black

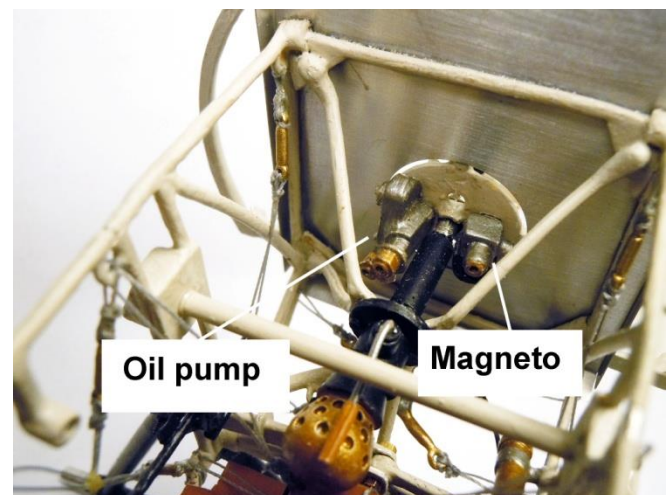
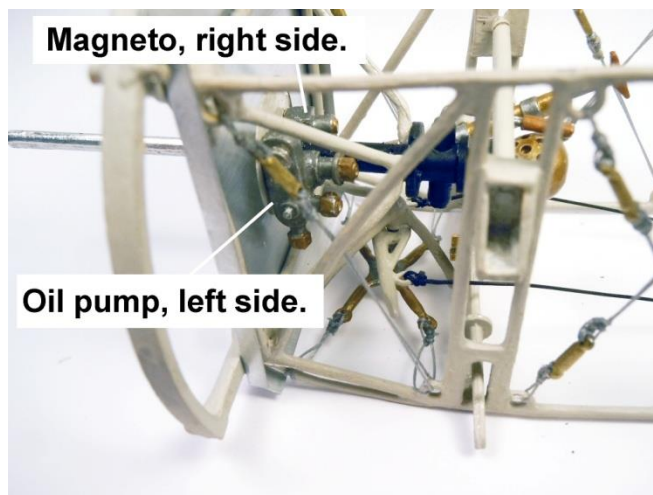
Locate the two (2) **Landing Gear Swing Arms**, two (2) 00-90 x 1/4" **Bolts** and two 00-90 **Nuts**. The **Swing Arms** on one end have an extended portion with a hole for a mounting bolt; this portion should be in the down position as seen in the picture above. Insert the extended portion into the rectangular openings formed by the two **Frame** members below the forward **Wing Socket**. Index the other end into the hole located in the **Frame Center Brace** aligning the holes; then insert a 00-90 x 1/4" **Bolt** from the rear side into the aligned holes and then add the **Nut** and tighten enough to allow the arm to move up and down. Repeat the procedure for the other arm and both arms should be able to move up and down within the rectangular openings. If a nut driver or wrench is not available drill a hole sized just enough to press fit a bolt head into the end of a 1/8" dowel long enough to fit through the **Fuselage** to turn the bolt while holding the nut with needle nose pliers.

Locate the **Rudder Bar** and **Rudder Support Bar**. With two 18" lengths of **Black Line** tie one end of the lines to the holes in the **Rudder Bar** and set aside. Now tie four (4) six inch lengths of gray line to the four (4) holes on the **Rudder Support Bar** as seen in the picture on the next page. With the **Fuselage** upside down place the **Rudder Bar** down on the shaft of the **Rudder Support Bar** and add a drop of medium **CA** glue on to the top of the shaft and then insert the assembly of **Rudder Bar** and

**Rudder Support Bar** into the location hole in the **Fuselage Brace** with care that the **Rudder Bar** will turn freely on the shaft once the glue has set. Next gather the two (2) Black **Rudder Bar** lines straight back into the cockpit area for now. Tie off the gray lines to the **Fuselage Frame Loops** for the rear lines and the forward lines to the forward **Fuselage** joints. See picture below.



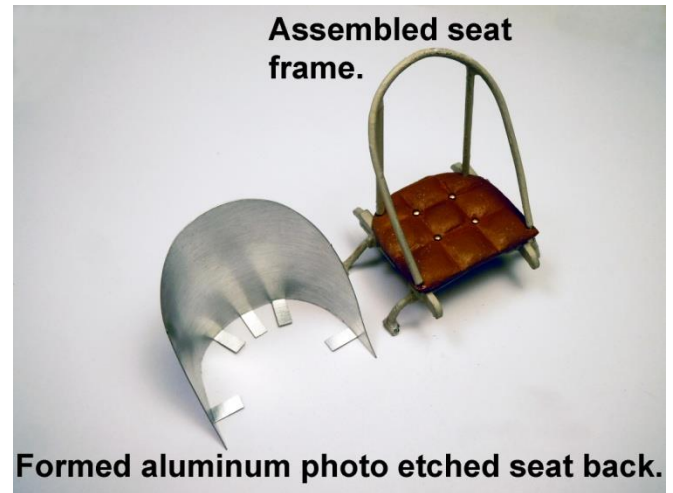
Glue the **Magneto** and **Oil Pump** to the rear side of the **Cowl Frame Camshaft Support** location holes with the **Magneto** on the right side and the **Oil Pump** on the left side as seen in the picture below. Make sure they are arranged on a vertical orientation as seen in the picture below on the right.



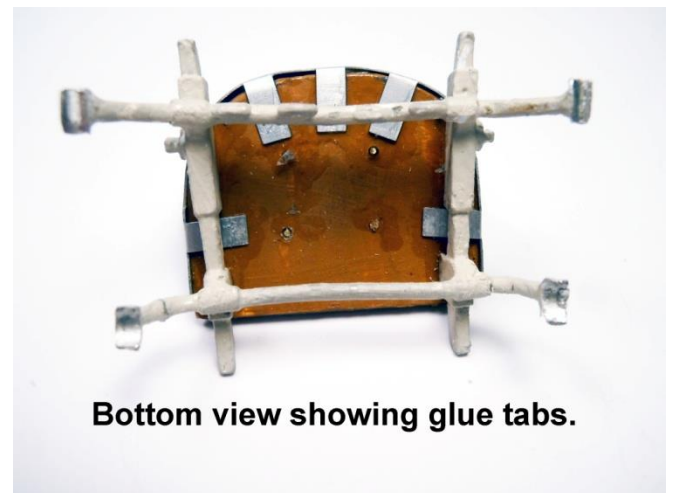
Tie four (4) gray lines on the four (4) corners of the **Leather Pad** then tether the **Pad** positioned just below the air filter attaching to the loops on the **Fuselage Frame** as seen in the picture on the next page with the view looking up through the bottom of the **Fuselage**.

Locate the seat assembly parts: the photo etched **Seat Back**, cast metal **Seat Cushion**, **Seat Frame**, **Seat Base** and four (4) **Pins**. First, brush the aluminum **Seat Back** horizontally on both sides to simulate brushed aluminum taking care not to bend or distort the tabs. Next adjust and form the **Seat Back Frame** and glue to the **Seat Cushion** indexing the locating pins on the **Frame** into the locating holes on the **Cushion**. Now glue the four (4) **Pins** in place by inserting the **Pins** into the holes in the **Seat Cushion** and add the glue to the **Pins** on the bottom side of the **Seat Cushion**. Once the glue sets completely cut off the excess **Pin** shafts and add a drop of glue onto the cut off **Pins**. See pictures on the next page. Glue the **Seat Base** to the **Seat Cushion** indexing the locating pins on the **Base**

**Frame** into the locating holes on the **Seat Cushion**. Test fit and adjust as needed the **Seat Base Frame** to fit onto the **Fuselage Stringers** setting centered and square to the **Fuselage Frame** in the cockpit. File with a round needle file the contact surfaces for a strong joint.



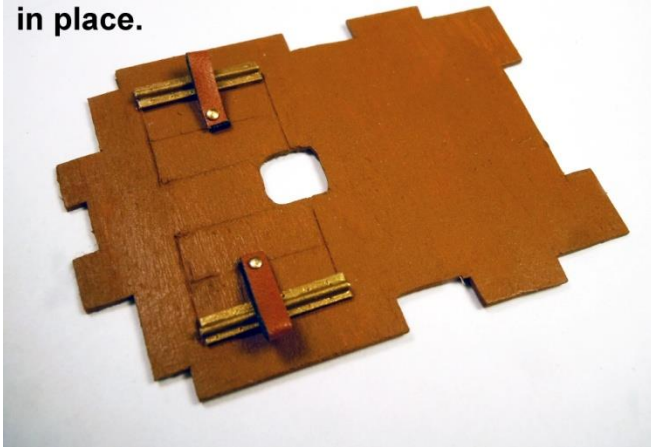
When satisfied with the **Seat** test fit bend and form the **Seat Back** into a half round shape to fit the **Seat Frame**, bending over a round mandrel such as a tool handle will help. Ideally, the aluminum surface should contact the **Seat Frame** surfaces completely. Then bend the tabs 90 degrees and score with hobby knife cuts the tabs for a stronger grip when glued. Glue the **Seat Back** to the **Seat Frame** and clamp to hold in place until glue sets. If necessary add glue along the top edge joint. Set the seat aside for now and allow the glue to completely set.



Remove the plywood laser cut **Floorboard** and sand all the edges to reduce the char. The **Floorboard** has panel lines etched into the upper surface; these lines represent two **Viewing Panels** that the pilot could open using the leather straps to be able to see below the plane. This was an advantage for pilots flying at altitude to see what was happening below since the wings blocked most of the downward view. Just the upper surface **Hinges** are supplied with the kit.



Plywood floor with hinges and pull straps in place.



Cockpit floor added diagonally up through the bottom of the fuselage frame.

Mix Oak Stain using the **English Oak** paint and really dilute with water and apply the stain to both sides of the **Floorboard** and allow drying. Locate the following parts: **Hinges** two (2); **Pins** two (2); **Leather Strip**, 2 inches skived and cut in half. Skiving is the removal of the excess leather from the unfinished side. Use a sharp hobby knife blade at an angle with a slicing action remove as much as possible of the excess leather without cutting through the finished surface. This can be a very tricky process. Once the **Floorboard** has dried glue the **Hinges** in place aligned with the outboard laser cut **Viewing Panels** and the center of the **Hinge**. Fold the 1 inch **Leather Strips** in half and pierce the ends with **Pins** and glue the strap **Pins** to the **Floorboard**. Cut off the excess **Pin** shafts and add a drop of glue to the cut ends of the **Pins**. See the picture above. Add the **Floorboard** to the **Fuselage** by inserting it at a diagonal angle from the bottom of the **Fuselage** and then index the tabs into the **Center Brace** that supports the **Swing Arms**. **DO NOT GLUE** the floorboard until the Seat Assembly is added later.



Joystick must be able to pivot back and forth.

Upper bellcrank must be able to slide on shaft even when painted.

Carefully thread 00-90 x 1/4" bolt through joystick and control rod and add nut for snug fit.



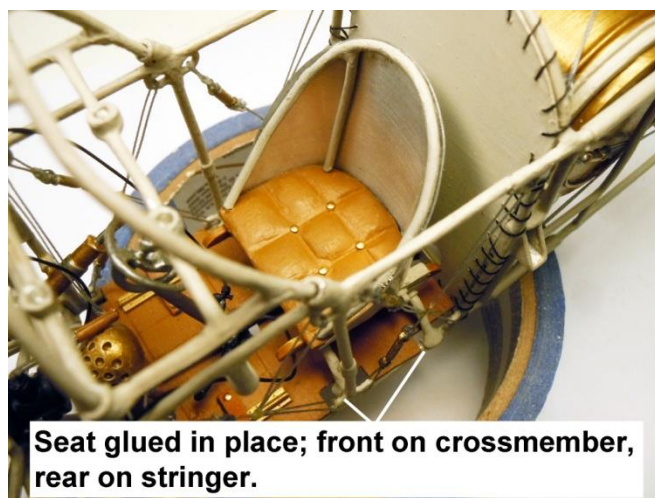
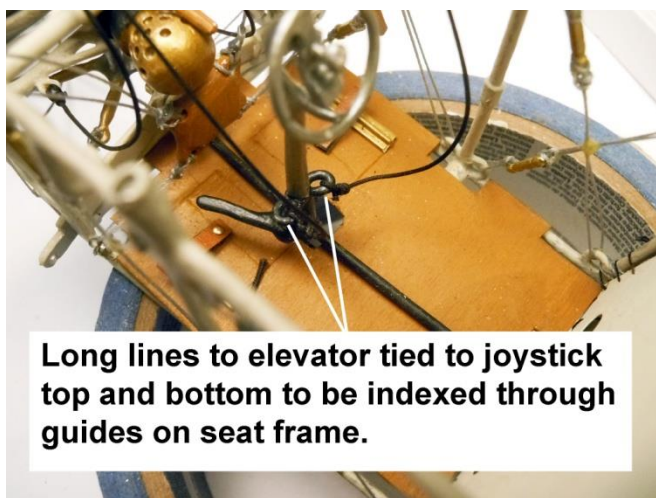
Index shaft into rear hole location and then index into front hole location, then with joystick vertical glue bellcrank on shaft parallel to ground against baffle.

Locate the following parts: the **Joystick**; **Control Rod**; **Upper Bellcrank**; **00-90 x 1/4" Bolt** and **Nut** (1); **Cast Nut** and six (6) laser cut **Wood Handles**. Remove and glue together with Yellow Glue the layers of the laser cut **Wood Handles** left and right. The Wood Handle with the laser cut guidelines should be the bottom layer and once all layers are glue together carve out using the guidelines to fit the round Joystick Handle. Basswood is very easy to sand so be careful and sand to final shape. Once satisfied with fit, shape and finish stain with diluted **English Oak**. See reference picture on page 32 and plan sheet. Note: extra parts are provided just in case they may be needed.

Insert the **Control Rod** into the **Joystick** short end to the front and align the holes. Very carefully thread the 00-90 x 1/4" **Bolt** until the **Bolt** head just seats against the side of the **Joystick** and then add the **Nut** to the other side of the **Bolt** and tighten the **Nut** to just touch the side of the **Joystick**. The **Joystick** must be free to move back and forth. See the picture above; the parts are unpainted for clarity. Note the orientation of the **Upper Bellcrank** and slip it onto the end of the **Control Rod**. **DO NOT GLUE** the **Bellcrank** on the **Control Rod** for now. **TIP:** An advanced or skilled builder may want to make a **Control Rod** using a 1/16" x 2 -3/4" brass rod as seen on **Build Patterns Plan Sheet**.

Add the **Joystick assembly** to the **Fuselage** by inserting the rear end of the **Joystick Control Rod** into the hole in the **Rear Pivot Brace** just below the **Wind Baffle** being very careful not to bend the **Rod** and insert just enough to allow the front end of the **Joystick Control Rod** to insert into the hole in the **Landing Gear Bracket**. A frame member will prevent the front end from going through and making sure the **Joystick** is positioned in the **Floorboard** hole as well as the **Upper Bellcrank** lies in the hole at the rear of the **Floorboard** with a **Cast Nut** added on the end of the **Joystick Control Rod**. See the picture on the previous page. Center the **Joystick** vertically centered between the cockpit **Stringers** and slide the **Upper Bellcrank** against the **Wind Baffle** and glue it horizontally in place. Be very careful not to glue the **Upper Bellcrank** to the **Rear Pivot Brace**; the **Joystick** should move freely side to side and the **Joystick Control Rod** should now be trapped in place front to rear with the **Upper Bellcrank** and **Cast Nut** holding the **Joystick Control Rod** in place and free to move side to side.

Tie two (2) 16" lengths of **Black Line** to the rings on either side of the **Joystick** just above the locking lever at the bottom of the **Joystick** with a double half hitch knot. With knots facing to the rear glue with a touch of CA and cut off excess at the knot leaving the two long lines that will attach to the lower holes on the left and right **Elevator Control Horns**. Set the lines off to the sides of the cockpit for now with the **Joystick** in the forward position. See the picture below. Add a single Black line about 36" long and seize the center of the line in the loop at the bottom of the **Joystick** and lash at the loop with thin black thread. Feed the lines up and back through the **Fuselage** without interfering with existing turn buckled lines. These lines will attach into the upper holes of the end of the left and right elevator **Control Horns**. See the plan sheet for clarification if needed.

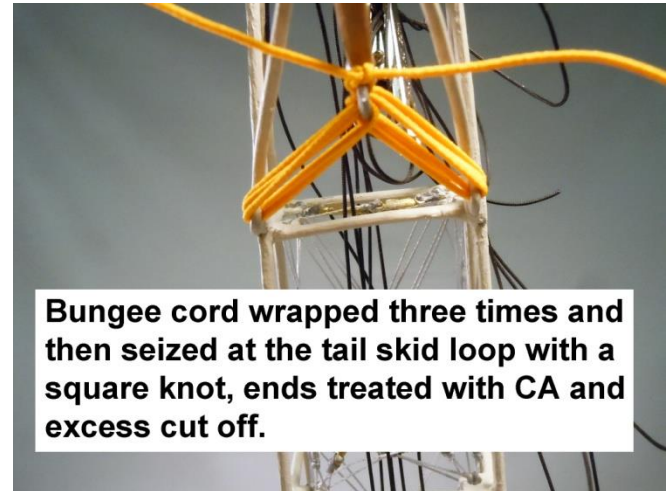
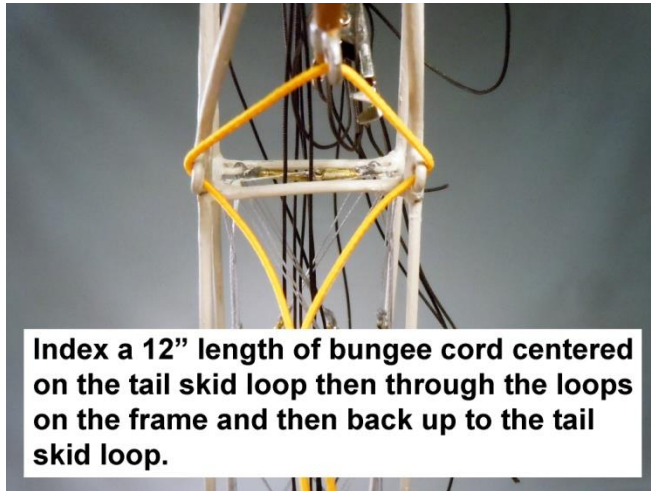


Carefully position the seat in place indexing the **Seat Base** onto the fuselage **Stringers** and **Center Brace** within the openings in the **Floorboard**. Once positioned in place glue the **Seat Base** first and then glue the **Floorboard** in place from the bottom side so as not to mar the top surface. Allow the glue to set. Index the upper Black lines from the **Joystick** into the two (2) center ring guides on the underside of the **Seat** down through the **Fuselage** and avoiding tangling with **Turnbuckle** lines. Do the

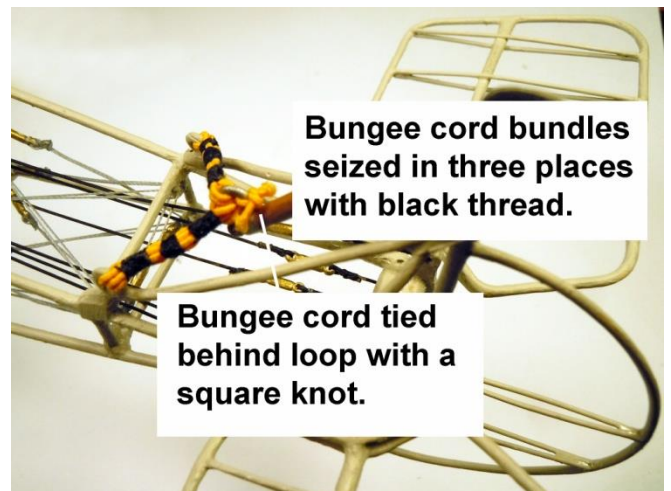
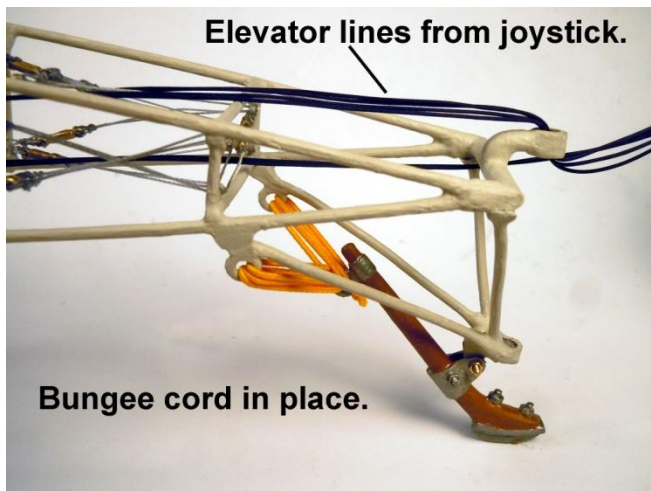
same with the two (2) Black lines from the **Rudder Bar**. These lines can be sorted out later when being attached to the **Rudder** and **Elevator**.

### Tail Skid:

Add the **Tail Skid** by inserting and aligning the holes in the **Tail Skid Frame** and secure in place with a 1/4" 00-90 **Bolt** and **Nut**. Snug fit the **Nut** so that the **Tail Skid** can move. See the picture on the next page as well as the plan sheet.



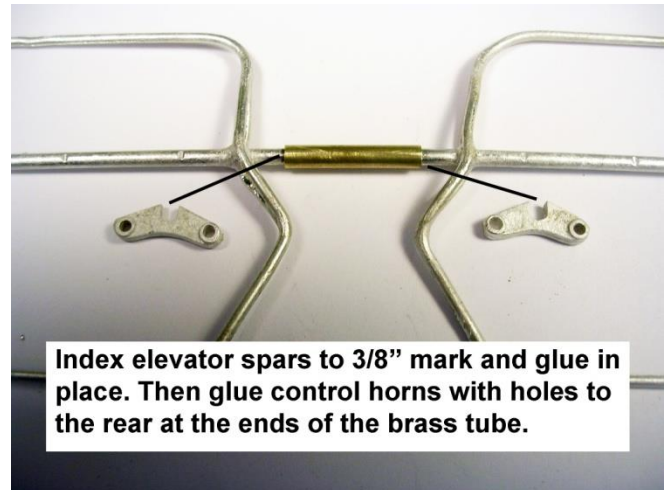
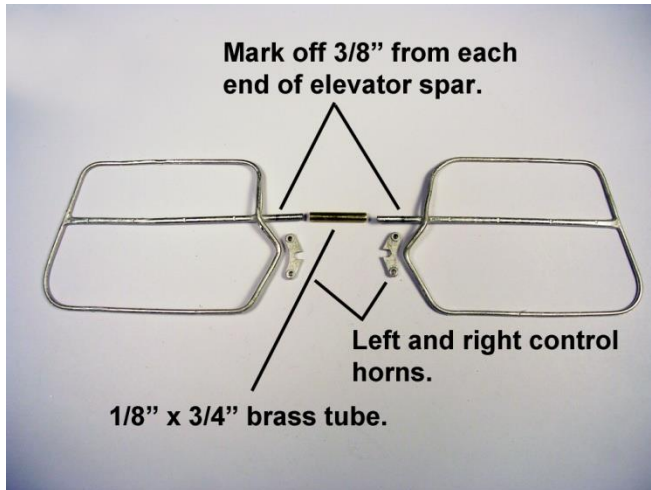
Center a 12" length of **Bungee Cord** on the loop on the **Tail Skid** and then feed the ends through the **Frame** loops for three times and then seize at the **Tail Skid** loop with a square knot. Treat the knot lines with CA to cut of the excess to prevent fraying and cut off the excess cord with a sharp blade or scissors close to the knot. See the picture above. Using Black thread seize the two (2) Bungee Cord bundles in three (3) places, center and top and bottom for added detail. See the picture below



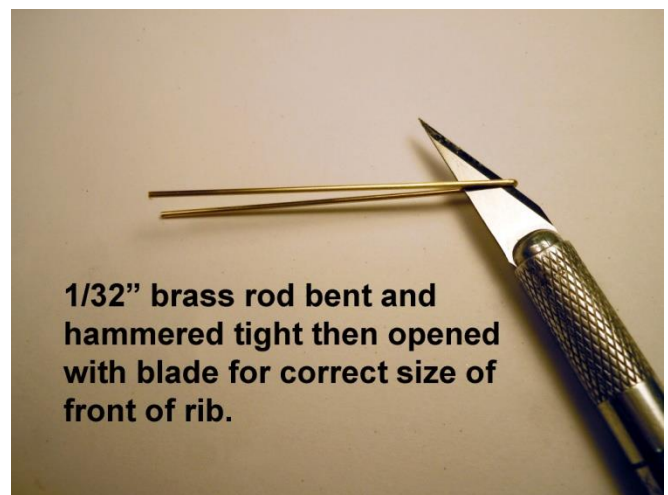
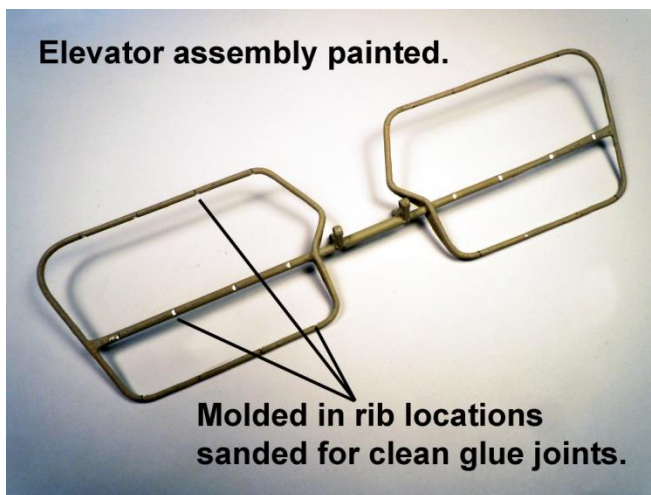
### Elevator:

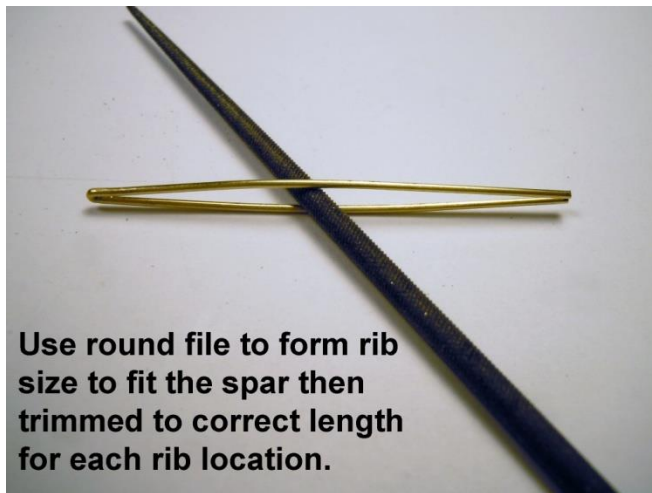
Gather the left and right cast metal **Elevator** halves; the cast metal **Control Horns** (2); 1/8" x 3/4" **Brass Tube**. Adjust and straighten the two **Elevator** halves to match the plans if not already done. Mark the two spars 3/8" from each end. See picture on the next page. Apply medium CA to one spar end surfaces and slip into the **Connector Tube** up to the 3/8" mark; repeat gluing for the other side while on a flat surface for a matching flat **Elevator**. Once the glue has set, glue the two control horns in

place with the holes facing to the rear on to the spar at the ends of the brass **Connector Tube**. See the pictures on the next page as well as the plan sheet.



With a small round needle file clean the cast in location notches for the **Ribs** as seen in the picture below. Note that there are notches on both sides of the **Spars**. Using 1/32" rod measure the length of the **Ribs** front to rear starting at the out board side of the **Elevator** and add 1/8". Mark the center of the cut 1/32" **Rod** for the **Rib** and fold completely back on itself, then with a hammer gently hammer the **Rod** together. Using a hobby knife blade slowly bend open the center area of the **Rib** as seen in the picture below. Now at the location of where the spar will be on the **Rib** using a small round file carefully form the curved bend of the **Rib** and over bend to allow spring back for the ends to touch. Test fit the **Rib** into the front and **Spar** notches, then mark the end to cut the ends to fit into the rear notches. When satisfied with the dry fit glue the **Rib** in place in the notches as seen on the next page. Continue adding the rest of the **Rids** repeating the process.





Use round file to form rib size to fit the spar then trimmed to correct length for each rib location.

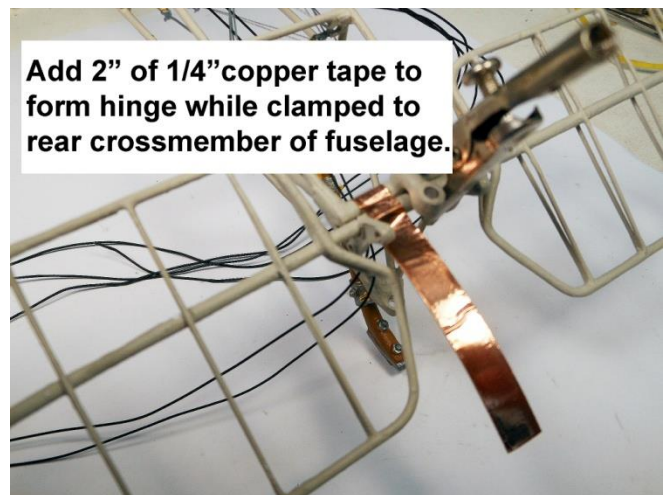


Formed ribs glued in each rib location.

Once all the ribs are in place as seen below with tight glue joints and the glue has set paint all the Ribs Pearl Gray.



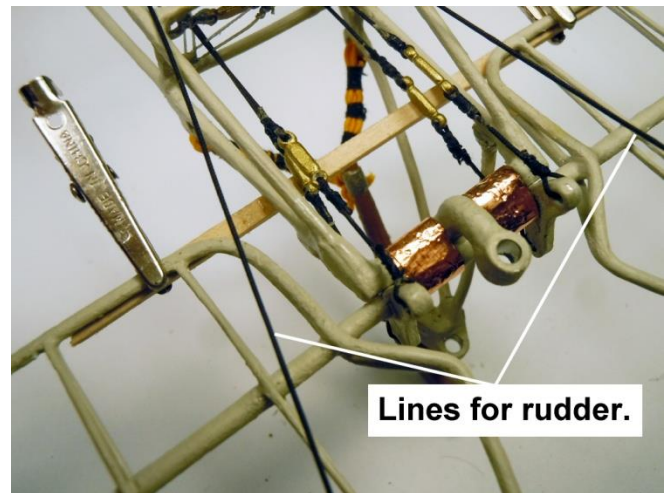
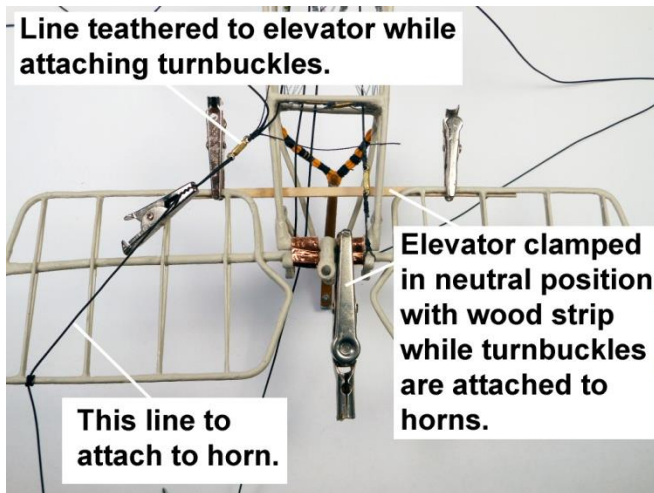
Ribs installed ready for paint.



Add 2" of 1/4" copper tape to form hinge while clamped to rear crossmember of fuselage.

With an alligator clip or small clamp, clamp the **Elevator** to the **Rudder Pivot** of the **Fuselage** and centered on the **Fuselage Stringers** and level with the **Rudder Pivot**. Now carefully apply by wrapping the 1/4" x 2" **Copper Tape** tightly around both the **Elevator** and the **Rudder Pivot** to the right side and then the left side to form hinges. Next, remove the laser cut **Elevator Shim** and glue it onto the underside of the **Rudder Pivot** only; the **Elevator** must be free to turn. This shim is intended to keep the **Elevator** from sagging down out of position over time.

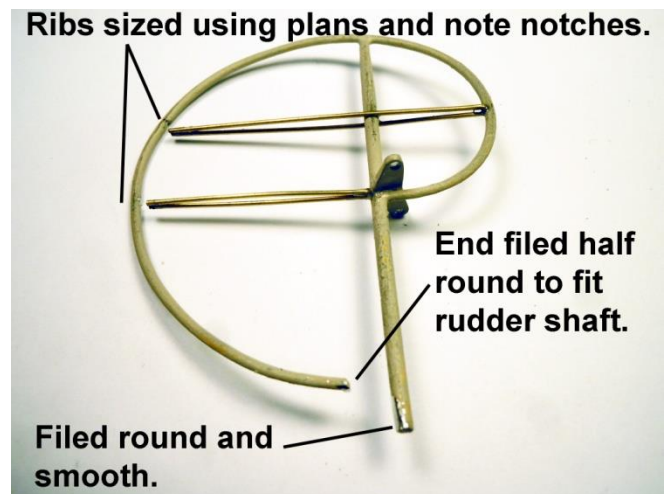
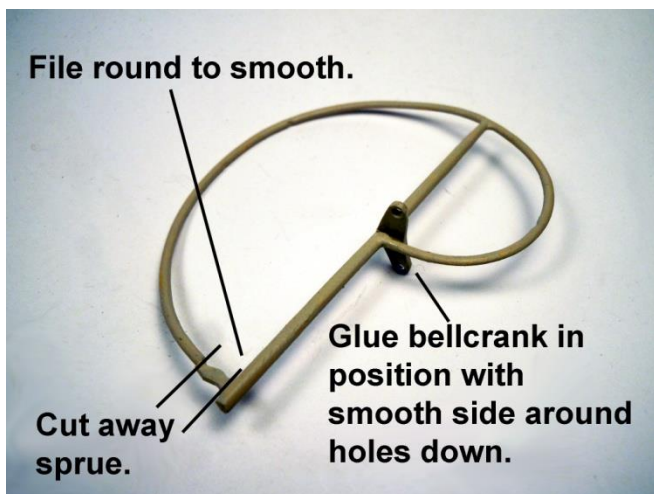
Gather the four (4) Black lines from the **Joystick** and sort the two from the bottom of the **Joystick** from the two from the rings above the **Floorboard**. With a wood strip clamp the **Elevator** in the neutral position as seen in the picture above.



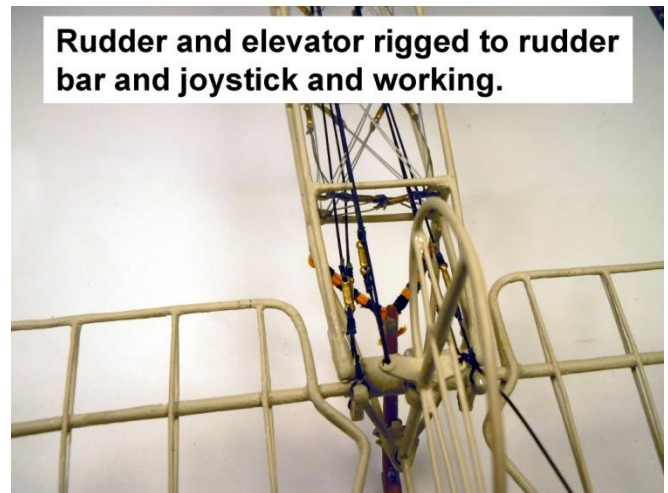
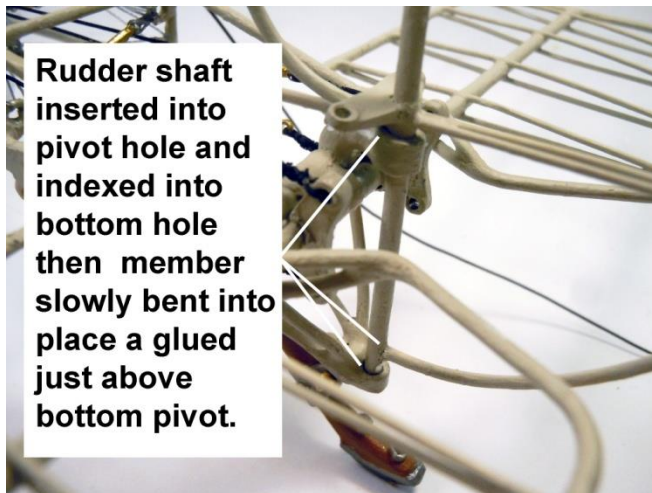
The weight of the aft portion will hold the wood strip against the **Fuselage Stringers**. Start with the two lines from the bottom of the **Joystick** which will attach to the top holes in the **Control Horns** and seize a **Turnbuckle** on each line just even with the wood strip. Small alligator clips will hold the ends of the lines passed through the holes in the **Turnbuckles** until lashed with thin Black thread. It can help tethering the second short Black line from the **Turnbuckle** to the rear section of the **Elevator** to hold in place while lashing the **Turnbuckles**. See the left picture above. When the **Turnbuckles** are seized to the lines attach them to the top holes in the **Control Horns** making sure the **Elevator** is in the neutral position. All the control lines should be as taut as possible without pulling the Elevator out of the Neutral position. Turn the **Fuselage** upside down and repeat the process attaching the two lines from the rings on the **Joystick**, however attach the left ring line to the left **Control Horn** and the right line to the right **Control Horn lower holes**. Remove the wood strip and clamps then prime and paint the **Copper Tape** and **Elevator Shim**.

### Rudder:

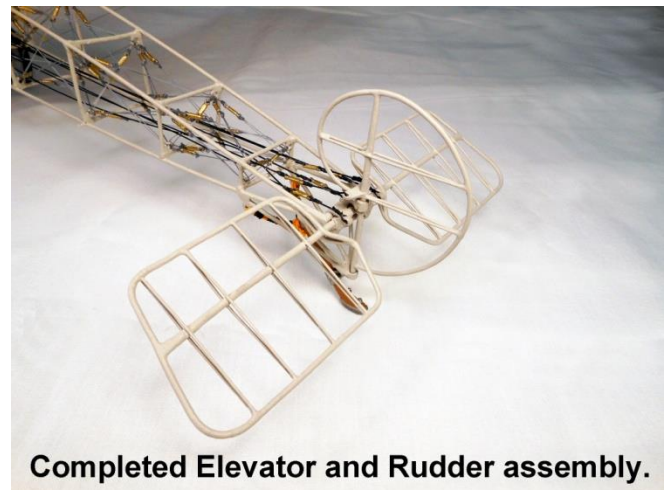
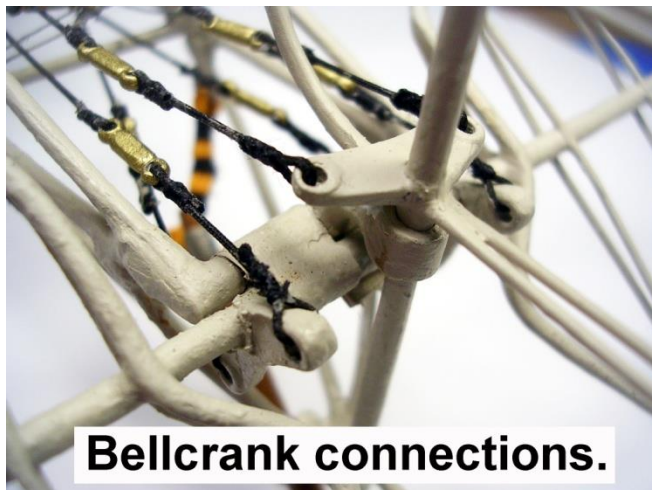
The **Rudder** is a cast metal part that has a connecting sprue at the bottom that will have to be cut away to be able to slip onto the pivot hole locations. The two (2) **Ribs** will be 1/32" brass rod just like those of the **Elevator** and a **Rudder Bellcrank** with the smooth surface around the holes facing down. Look at the part to see the difference.



Glue the **Rudder Bellcrank** in place on the **Rudder** shaft touching the perimeter rod with the smooth side facing down. File clean the notch locations for the **Ribs** for strong glue joints. Cut away the sprue at the bottom of the **Rudder** as seen in the picture on the previous page. This sprue was needed for casting purposes for a quality part. Clean and file round and smooth the shaft where it was cut and the perimeter rod half round using a small round needle file to match the shaft. Using the 1/32" **Rod** form the two **Ribs** using the plans for sizing and glue them in place in the location notches as seen in the picture on the previous page. Now carefully insert the **Rudder** shaft into the top pivot hole down to the bottom hole seating on the perimeter rod. The **Rudder** should turn freely in the holes. If tight remove and open up the holes with a ream or needle file, paint in the hole could be the issue as well. Slowly bend the perimeter rod to touch the ends of the ribs and glue them in place and then continue to slowly and carefully bend to touch the **Rudder Shaft** above the bottom hole and glue in place. Make sure not to glue the **Rudder** to the shaft hole. Once the glue has set adjust the **Rudder** if necessary to be perpendicular to the **Elevator**. Touch up the glued joints with paint to match. See picture below.

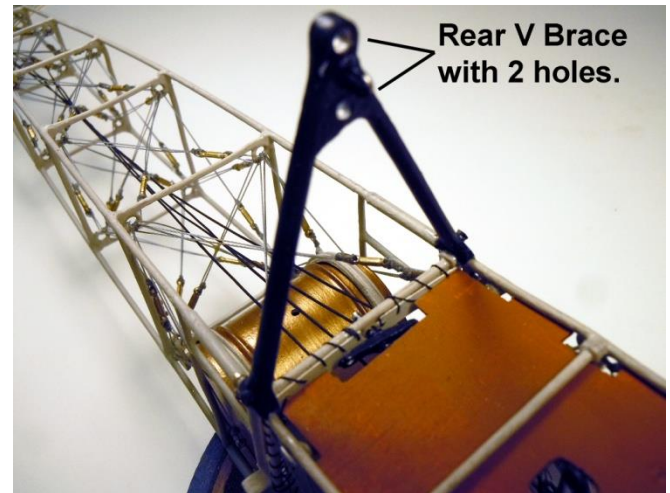
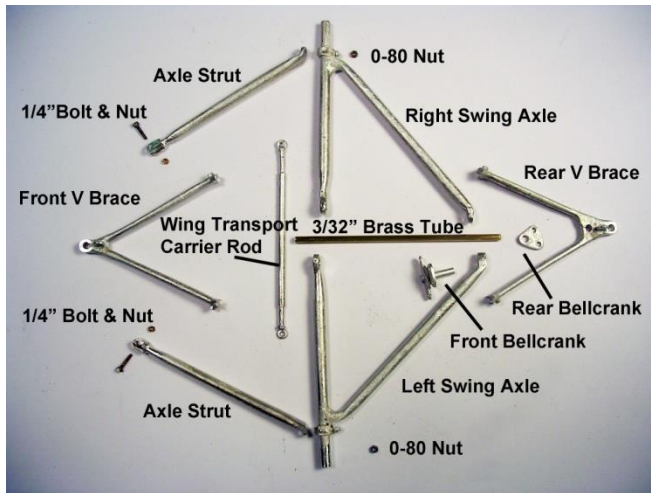


Now bring the two (2) **Rudder Bar** Black lines to the **Rudder Bellcrank**; check for any interference from the guidelines under the **Seat** with any of the existing lines and adjust as needed the left and right lines to the left and right holes in the **Bellcrank**. Once the lines are sorted out add two **Turnbuckles** in the same area as the **Elevator Turnbuckles** add the second lines attached to the **Turnbuckles** to the **Rudder Bellcrank** making sure that the **Rudder** is in the neutral position. See the picture above. Slowly test the movement of the control surfaces using the **Joystick** back and forth for the **Elevator** and **Rudder Bar** back and forth for the **Rudder**.

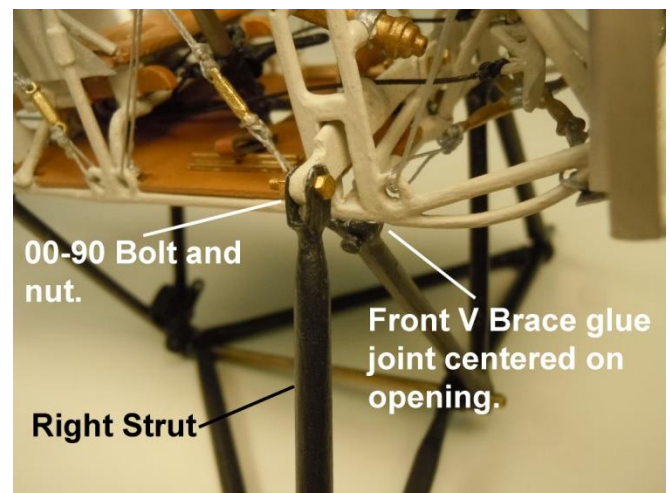
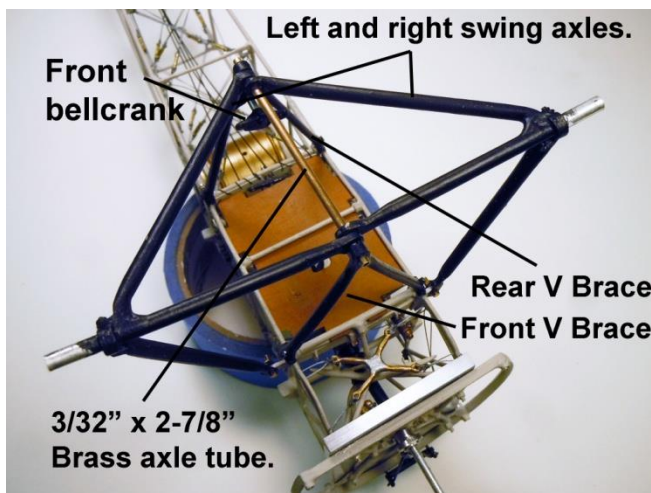


## Main Landing Gear:

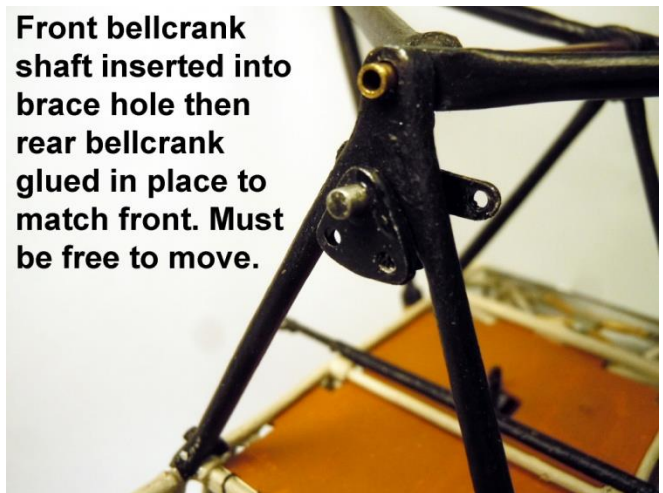
Gather the following parts for the Main Landing Gear; **Front V Brace**; **Rear V Brace**; **Left Swing Axle**; **Right Swing Axle**; **Axle Struts (2)**; **Wing Transport Carrier Rod**; **Front Bellcrank**; **Rear Bellcrank**; **3/32" x 2-7/8" Brass Tube**; **0-80 Nuts (2)**; **00-90 x 1/4" Bolt and Nut (2)**. See picture below.



Glue the **Front and Rear V Braces** in place on the **Fuselage Stringers** at the junction of the **Cross Braces** perpendicular to the **Fuselage**. It may be necessary to file with a small round needle file to have a tight fit on the **Stringers**. Check the clearance of the **3/32"** holes in the **Left and Right Swing Axles** and the **Front and Rear V Braces** and check for alignment with the **3/32" x 2- 7/8" Brass Tube**. Note that the **Right Swing Axle** fits within the **Left** when matching the holes to each other. Carefully index the **3/32" Brass Tube** through the **V Braces** and the **Swing Axles** as seen in the picture below with the **Tube** ends spaced equally out the **V Braces**. Now carefully index the bent end of the **Axle Strut** with the single hole onto the **Post** at the end of the **Swing Axle**; add the **00-90 x1/4" Bolt** while aligning the other end of the **Strut** with the two flanges onto the **Swing Arm at the Fuselage**; once the **Bolt** is in place then add the **00-90 Nut**. See the picture below. Now glue the bent end of the **Strut** to the small **Post** and then add the **0-80 Nut** onto the small post. Repeat the process to the other side. Both axle assemblies should be free to move up and down.

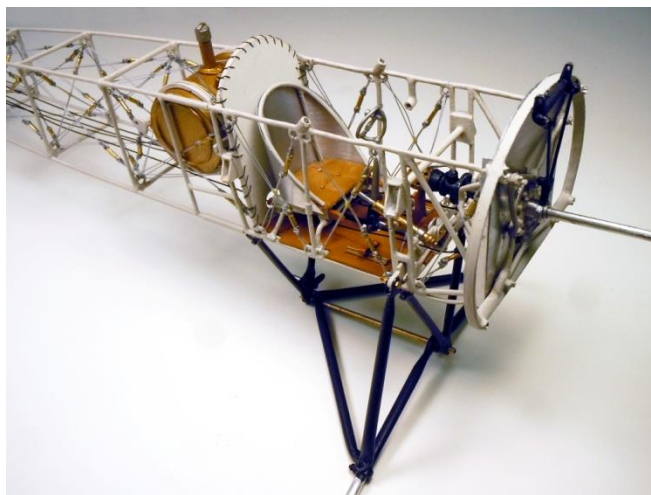






Insert the **Front Bellcrank** shaft into the hole at the bottom of the **Rear V Brace** and then add the **Rear Bellcrank** to the shaft and glue in place aligning the cable holes front and rear in both **Bellcranks**. Make sure the **Bellcranks** are free to rotate. Now with the **Control Stick** in the neutral position and the **Lower Bellcrank Arm** parallel to the **Upper Bellcrank** on the **Control Rod** tie two (2) equal cables from the **Upper** to the **Lower Bellcrank** with no slack. Ideally, they would have equal tension.

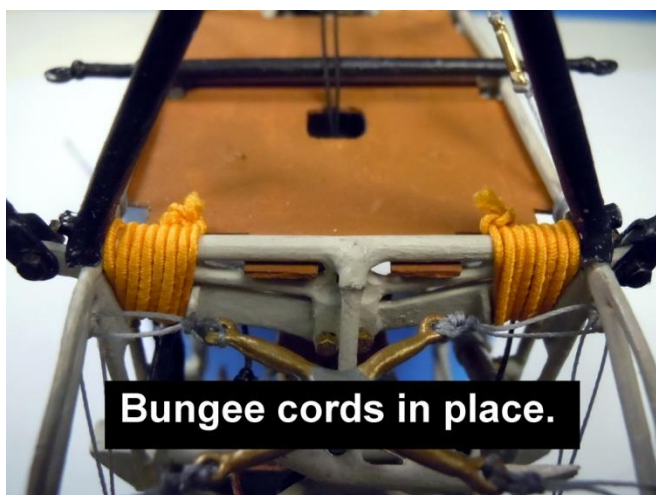
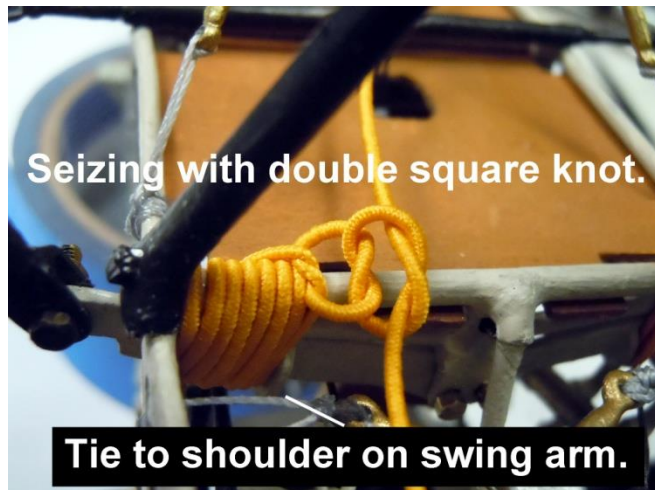
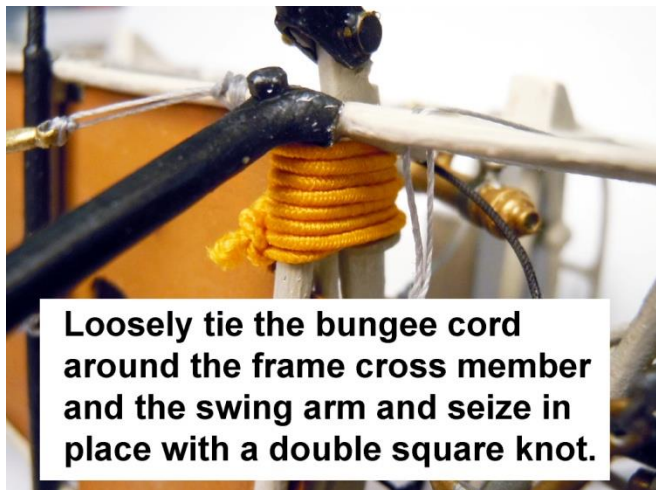
Add the four (4) **Cables** from the loops on the **V Braces** to opposite corners on the **Fuselage** with **Turnbuckles** as seen in the picture below or on the **Plan Sheet “Build Patterns and Details”** for rigging landing gear drawing. With the landing gear in place there is now a more stable platform to finish the rest of the model build as seen in the picture below.



Invert the fuselage so that the **Landing Gear** is facing up if not already and with a length of **Bungee Cord** wrap loosely around the **Frame Cross Member** and the **Swing Arm** from the outboard side up to the shoulder on the **Swing Arm**. Then seize with a double square knot; add a drop of CA to the **Bungee Cord** to be cut off at the knot to prevent fraying and once the glue has set then cut off the excess **Cord**. Repeat the process for the other side **Landing Gear**. The tying of the **Bungee Cord** functions like a shock absorber when the plane lands and will cause the **Wheels** to angle in once added later on. See the pictures on the next page.

With the **Landing Gear** in place the **Lifting Handles** can be glued in place on the **Fuselage** lower stringers just aft of the **Main Tank**. The **Drain Line** can now be added to the underside of the **Main**

**Tank** and the **Filler Neck** to the top. The two **Line Connectors** can also be added to the **Main Tank**. See the **Plan Sheet** for exact locations of these components.

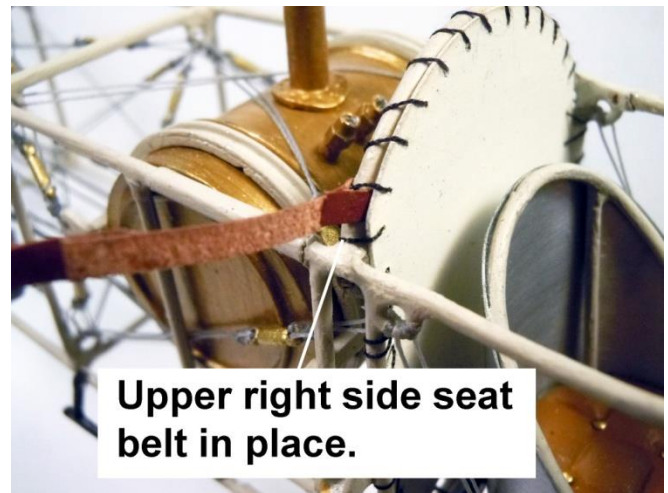
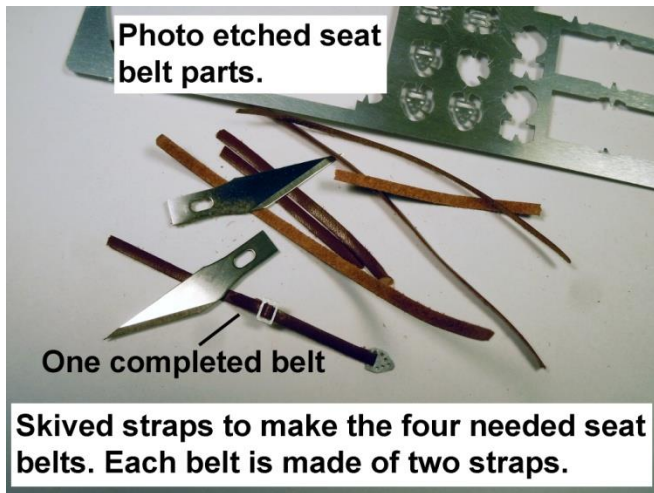


### Seat Belts:

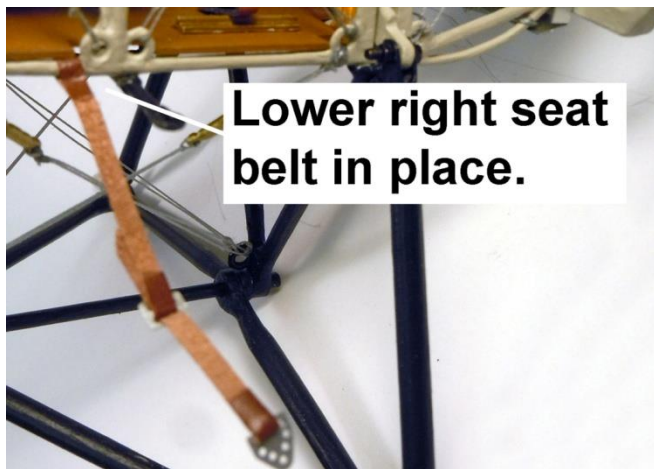
There are four (4) **Seat belts** – 2 **Upper**; 2 **Lower** and each belt are comprised of two (2) **Straps**. The supplied leather strip is too thick to work in scale and must first be skived to work in scale. Skiving is the removal of the underside leather from the finished surface and this is done very carefully with a very sharp blade and a slicing action and be careful not to cut through the finished surface. Doing this can be a bit of a challenge but keep in mind only about 2 inch straps are needed, not one continuous piece.

Eight (8) 2 inch straps in total will be needed.

The seat belt hardware Slides (4) and Fasteners (4) are Aluminum photoetched parts. Great care must be taken when removing from the carrier sheet and working with them.



Once eight (8) **Straps** are cut, sanded smooth with medium sandpaper and ends cut square attach one end to the center strip of the adjusting photoetched **Slide** part and one **Fastener** end using medium CA to glue the folded **Strap** to hold the parts. See the picture above. Repeat the process to make four (4) **Seat Belt Straps**. Now position one of the upper **Seat Belts** in place indexed between the **Wind Baffle** and rounded **Cross Member** at the junction of the **Stringer** and cut away the excess for the proper length with the **Fastener** setting in the middle of the **Seat**. Now match the second **Upper Seat Belt** and cut to length. Glue both **Upper Seat Belts** in place using medium CA with the **Belt** glue joint pointing down toward the **Seat**. When the CA has set, wet the underside of the **Belt** with water on a Q-tip and form the wet **Belt** to conform around the **Seat** back. Repeat the process for the **Lower Seat Belts** indexing between the **Floorboard** and the **Stringer** up against the **Loop**. See the pictures below as well as the drawing detail on the plan sheet.



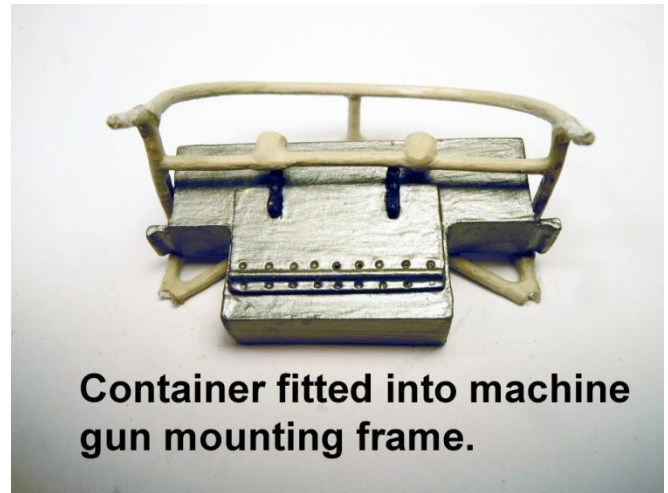
### Machine Gun Mounting Frame:

Adjust and test fit the **Machine Gun Mounting Frame** to the **Fuselage** angled location sockets on the **Stringers**. The rear curved member fits into the sockets on the **Stringers** and follows the same angle as the sockets while the front **Frame** member is perpendicular to the **Stringers**. Drill the sockets open if necessary for a good fit when the ends are inserted into them. Test fit, and file the inside of the **Frame** members as necessary to fit the assembled **Spent Ammo Can**. See the picture on the next page. These two parts **MUST** be added together at the same time for a proper build. Once the assembled **Can** is fitted, glue the **Mounting Frame and Can** in place on the **Fuselage**. Note that the hinge on the **Can** faces to the rear into the cockpit.

## Machine Gun Mounting Frame



File these surfaces and inside corners for tight fit of spent round shell container.



Container fitted into machine gun mounting frame.

Assemble the two (2) **Ammo Cans** gluing the P.E. parts to the cast **Ammo Can** parts and file the edges to match. See the **Spent Ammo Can** above. Set the **Front Ammo Can** aside for now.

Below is a picture of the rear view of the fitted **Spent Ammo Can** in the **Machine Gun Mounting Frame**. Once glued in place, carefully drill out or clean the four (4) locating sockets for the machine guns.

Machine Gun Frame and spent ammo can must be installed as a unit.



Wing warping mast assembly in place.

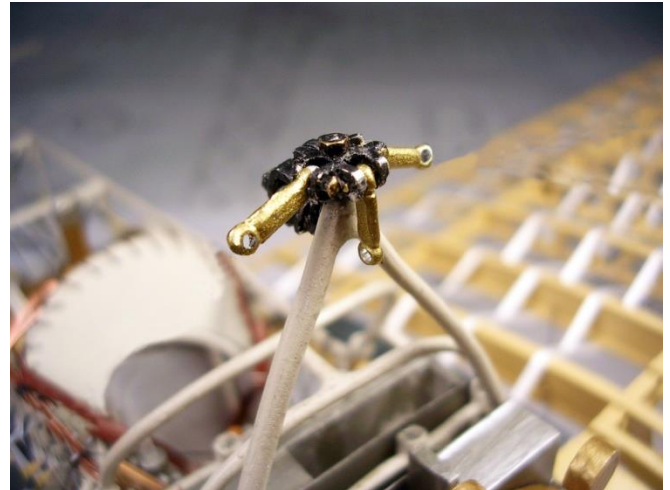
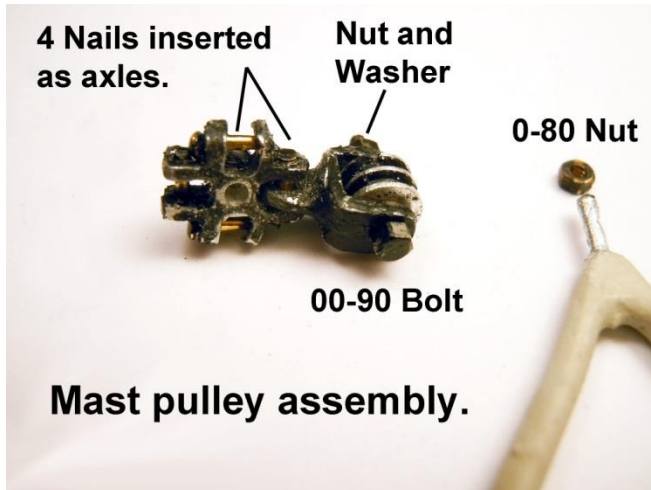


Machine gun mounting frame in place.

**Wing Warping Mast:** Wing warping was an early concept for lateral (roll) control. The concept, used and patented by the Wright brothers, comprised of a system of cables and pulleys to bend (warp) the trailing edges of the wings in opposite directions. The Eindecker used a mast as a basis for effective mechanical advantage in warping using the **Joystick**.

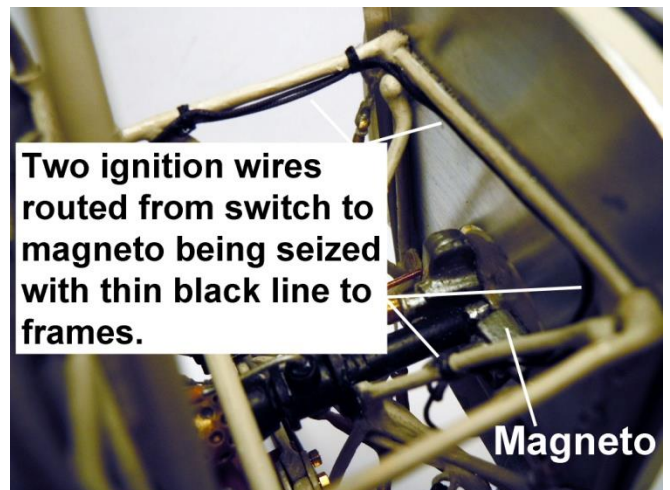
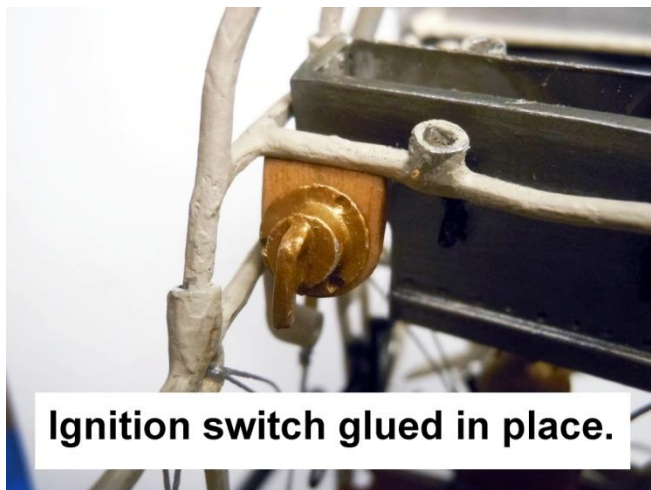
Gather the **Mast** components as follows: **Mast**; **Mast Cap**; **Pulley**, **Pulley Carrier**; **0-80 Nut (1)**; **00-90 x 3/8" Bolt, Nut and Washer (1 each)**; **Nails .027 x 5/16" (4)**. Add the **Pulley Carrier** to the **Mast Cap** aligning the holes and use a **5/16" Nail** as an axle and trim off the excess shaft of the **Nail**. The **Carrier** must be free to move. Add the **Pulley** to the **Pulley Carrier** using the **00-90 x 5/16" Bolt, Nut and Washer** making sure the **Pulley** is free to rotate. Test fit the three (3) **Nails** to the three (3) holes in the **Mast Cap**, then add three (3) **Turnbuckles** with the three **Nails**. Trim off the excess **Nail** shafts. Make sure the **Turnbuckles** are free to move. See the picture on the next page. Glue the **Mast Cap** assembly to the top of the **Mast** with the **Pulley** facing to the rear keeping in mind the bent arm of the **Mast** is on the left side of the Fuselage and that the **00-90 Nut** is down. Glue the **0-80 Nut** on top of

the **Mast Cap** on the **Mast Shaft**. Glue the assembled **Mast** to the **Fuselage** stringers butted against the **Machine Gun Mount Frame** perpendicular to the **Fuselage** as seen in the picture above.



**Wiring & Lines:** Adding the **Wiring** and especially the **Copper Lines** to various parts will be the most challenging part of this kit build requiring a degree of patience. However, these lines will add a degree of realism to the build. Check and study and refer to the **Build Patterns and Details Plan Sheet** for the drawing showing all the connection points.

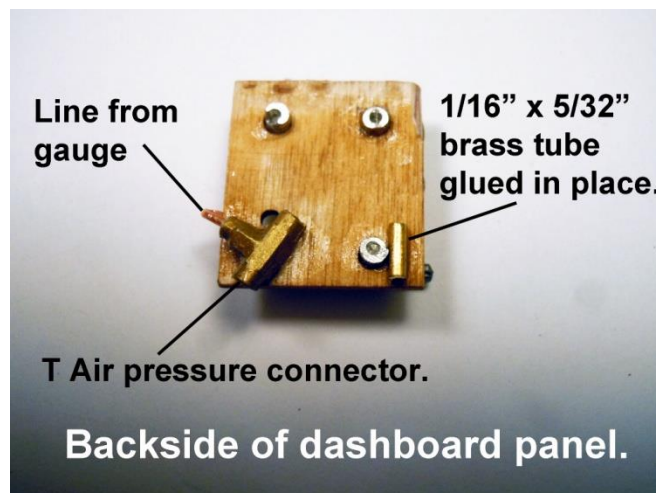
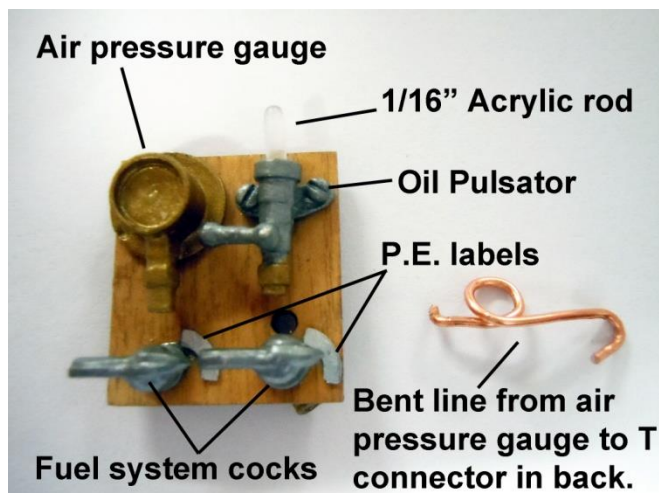
Locate the laser cut **Ignition Switch Holder** and the cast metal **Ignition Switch** and glue the **Ignition Switch** into the **Holder** with the switch handle end pointing down. Glue two (2) six inch lengths of the heavy Black Line into the location holes in the back of the **Switch**. Now glue the **Switch Holder** assembly straight edge to the left side of the **Machine Gun Mounting Frame**. See the picture below. Feed the **Ignition Switch** black lines along the left side of the **Fuselage Stringer** to the forward **Cross Member** and seize to the **Stringer** with thin black thread and then across the forward member on the underside and down the angled frame to the **Magneto** and glue the lines into the two holes on the **Magneto**. See the picture below.



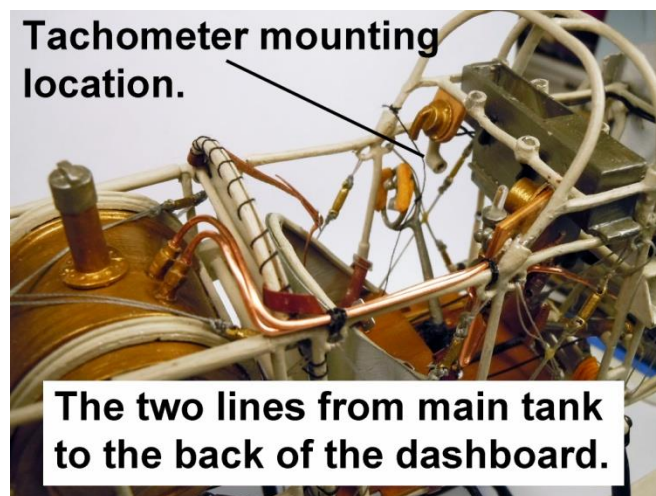
#### Instruments:

Gather the cast metal **Air Pressure Gauge**; **Oil Pulsator**, **Fuel System Cocks (2)**; **T Connection**; **1/16" Acrylic Rod**; **Photo Etched Labels** and **Copper Wire**. Glue the **Air Pressure Gauge**; **Oil Pulsator** and **Fuel System Cocks** in their proper locations as seen in the picture on the next page.

Then add the **P.E. Labels** to the right of the **Fuel System Cocks**. File sand smooth and polish half round the end of the **Acrylic Rod** and cut to a 1/4" length and glue into the **Oil Pulsator**. Form a short length of **Copper Wire** into the configuration seen in the picture below. One end inserts into the **Air Pressure Gauge** then a loop and around the edge of the **Dashboard** into the **T connection** on the back as seen in the picture below.



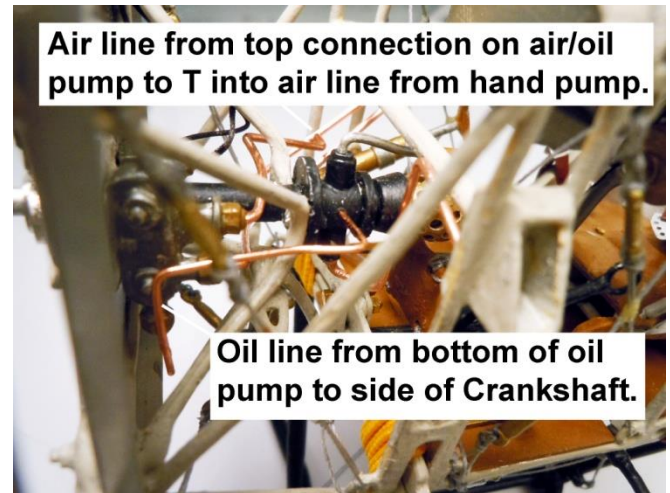
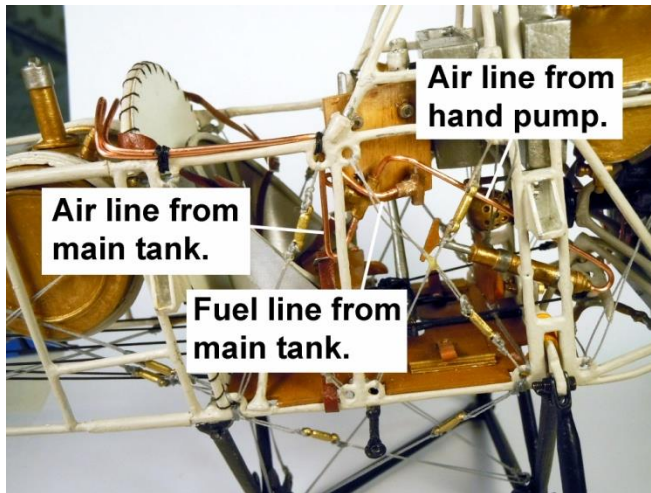
Once the glue has set on the front **Dashboard** components drill clean the holes on the back for **Copper Wire Connections**. Add the **T connection** to the right **Fuel System Cock** inserting it into the location hole and end of formed **Copper Line** and a 1/16" x 5/16" **Brass Tube** to the left **Fuel System Cock** making sure all connection holes are clean or drilled 1/32". Note the slight angle of the **T Connection**.



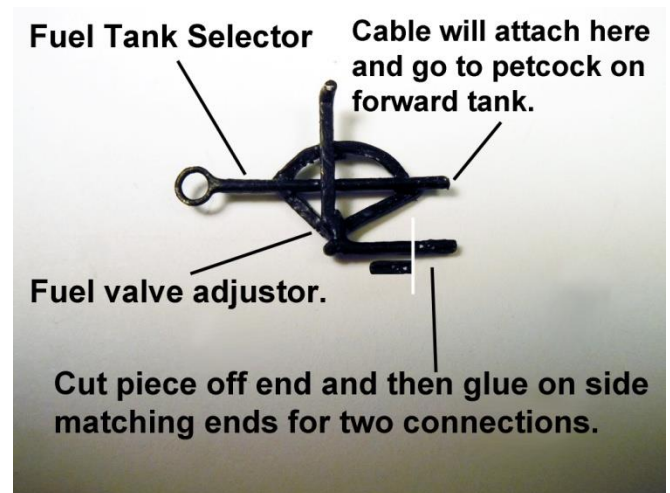
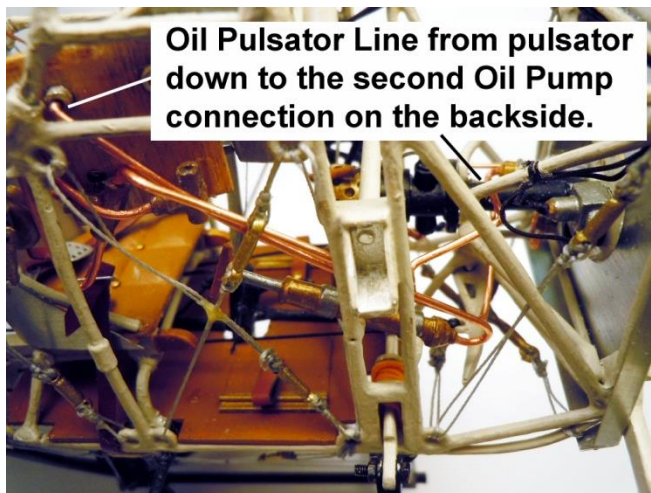
Glue the **Dashboard** in place. The **Dashboard** is located in the upper right of the cockpit area with the upper left corner glued to the **Spent Ammo Can** and the right upper corner to the angle socket on the **Fuselage** stringer as seen the picture above.

Now glue the two (2) cast metal **Connectors** to the **Main Tank** and allow the glue to set. See the picture above and the plan sheet. Form the two **Copper Lines** from the **Main Tank** to the **Dashboard**. One **Line** is an **Air Line** and the other a **Fuel Line** form them starting at the **Connections** on the **Main Tank** and bent towards the **Fuselage Stringer** to the **Dashboard**; the **Air Line** will bend down and back up to connect into the lower connection on the **T Connector**. The **Fuel Line** will continue past behind the **Dashboard** and bend down and up to connect into the center of the **Left Fuel System**

**Cock.** Once the two (2) **Lines** are formed carefully glue them into their connection points and with thin black thread seize them to the **Stringer** at the **Loops** in the **Fuselage** as seen in the pictures above and below.



Bend a **Copper Line** from the end of the **Air Hand Pump** back up to the upper connection on the **T Connection**. Now form a **Copper Line** from the top connection on the **Air/Oil Pump** to the **Air Line** from the **Hand Pump** for a **T connection** and glue to the line. For this connection of copper to copper, use epoxy if available. Form an **Oil Line** from the bottom connection on the **Oil Pump** back up and then parallel to the **Crankshaft** to the connection hole on the left side of the **Crankshaft** just below the **Carburetor Handle**. See picture above.

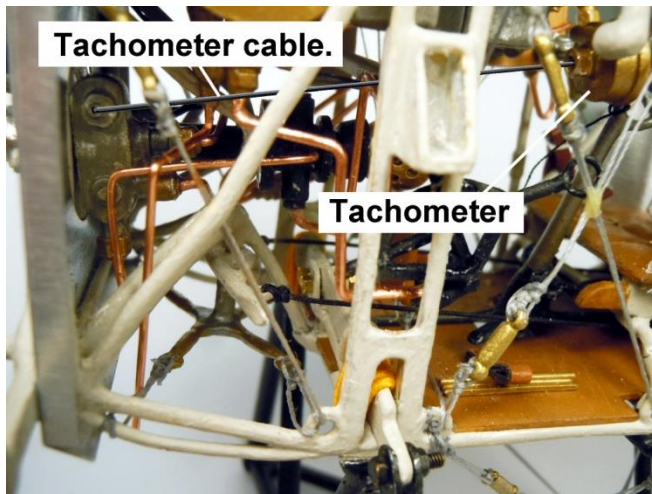


Locate the **Fuel Tank Selector** and cut 1/8" off the lower extension and glue the cut off piece to the side of the extension matching the ends for two connections. Glue the **Fuel Tank Selector** to the left side of the **Fuselage** just below the **Wing Socket** as seen in the picture on the next page. Form a **Copper Fuel Line** from the inboard side of the two connections on the **Fuel Tank Selector** to the hole on the underside of the **Crankshaft** below the **Carburetor Handle**. Bend immediately up from the connection to avoid interference with the **Rudder Bar** then bend across and back down to the **Crankshaft** and back up to the hole.

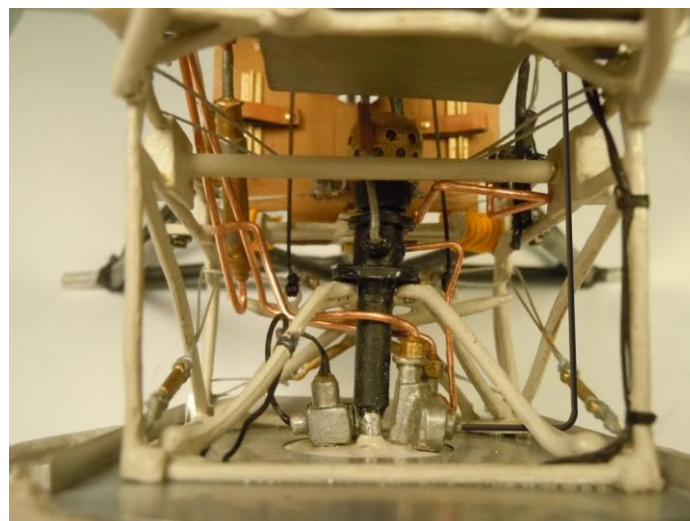
While on the left side of the **Fuselage** add the **Tachometer Cable** (copper line painted black) from the back of the **Tachometer** to the connection on the **Top Left** side of the **Air/Oil Pump**. See the pictures

below. From the **Tachometer** go forward at a slight downward angle along the **Fuselage** side and form a 90 degree bend toward the upper left side connection point on the **Air/Oil Pump**.

Add the **Altimeter** to the underneath right side of the **Fuselage Stringer** as seen in the picture below. The **Altimeter** was not fitted on all aircraft and was a pilot's choice to add.



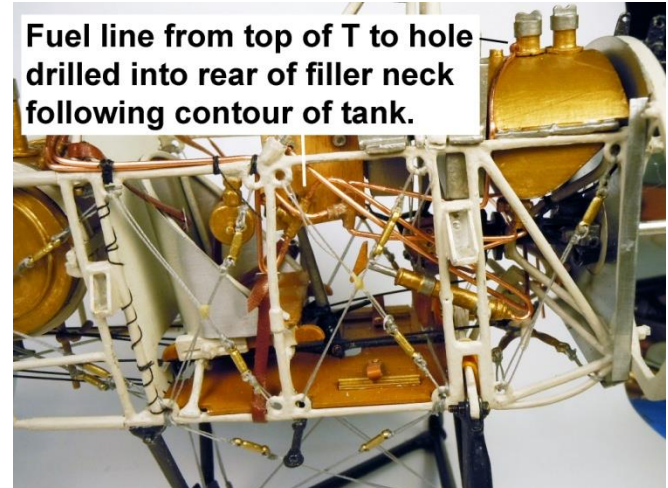
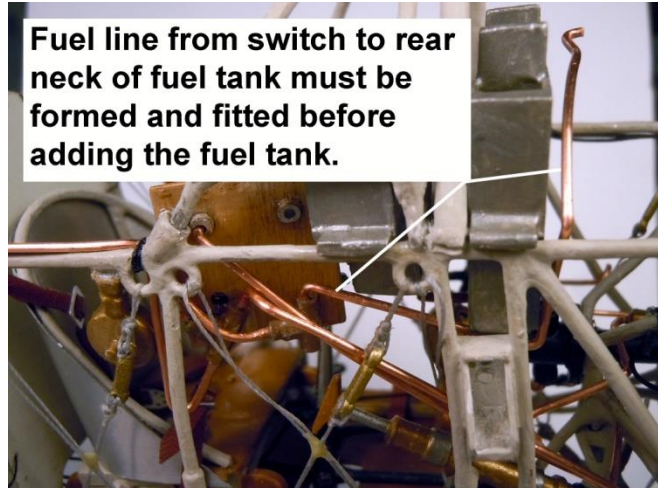
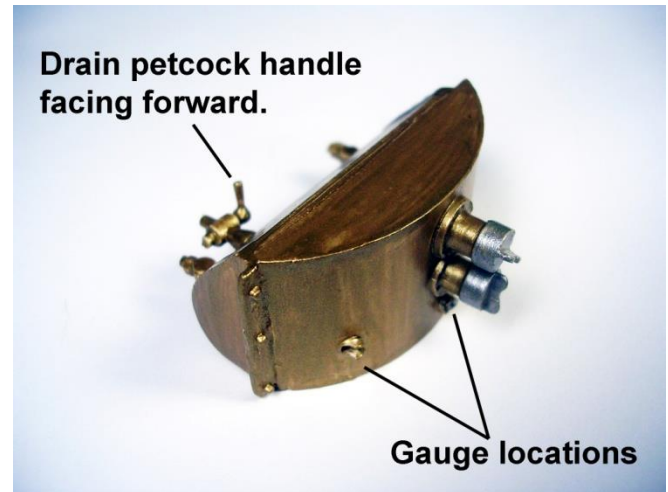
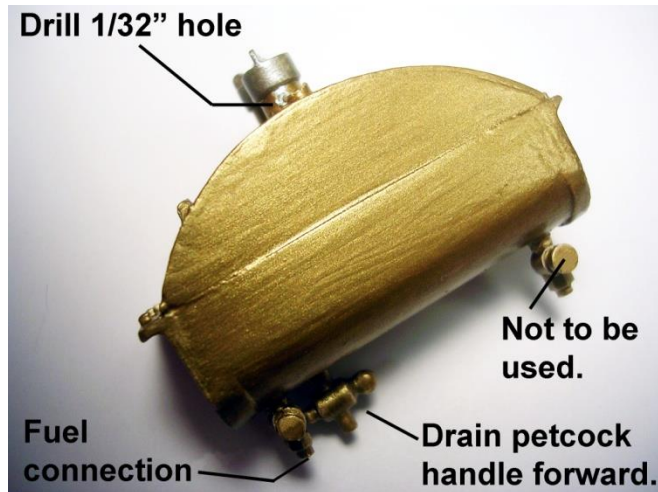
Below is a top view of lines.





## Forward Fuel/Oil Tank:

The **Forward Tank** is divided between fuel and oil, assemble, prime and paint the two (2) halves of the **Forward Tank**, if not done already. Glue the three (3) fittings the two outer are **Fuel Line Connections**, however only the one next to the **Fuel Tank Drain Valve** will be connected. **Note the orientation** of the **Fuel Line Connections** with the horizontal connections pointing to the **Rear** vertical wall. Glue the **Fuel Tank Drain Valve** into the recess in the tank wall. On the top of the **Fuel Tank** glue in place the two (2) **Filler Necks** with **Caps** and paint the **Filler Necks** to match tank and the **Caps** Aluminum. See the picture below. Drill a 1/32" hole centered between the cap and base of the rear **Filler Neck** to receive a copper line. The **Fuel Gauges** will be added after the **Machine Guns** are in place.

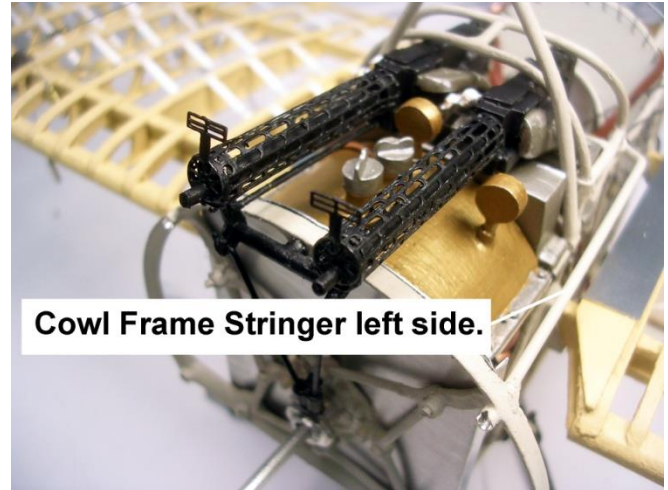
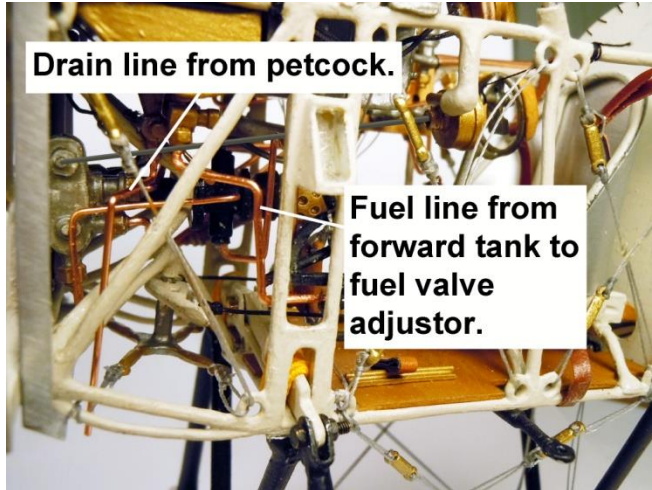


Form a **Copper Fuel Line** from the top connection on the **Switch** and bend down past the **Ammo Can** and back up in the corner; then position the **Forward Tank** in place and form the wire following the contour of the **Tank** to the hole in the rear **Filler Neck**. Forming this line may require **Tank** removal to form for a tight fit. Make sure the **Fuel Gauge** clearance is available. Once satisfied with line fit glue the **Line** to the **Filler Neck Hole** only. Do not glue the **Forward Tank** to the **Stringers** yet. See the pictures above.

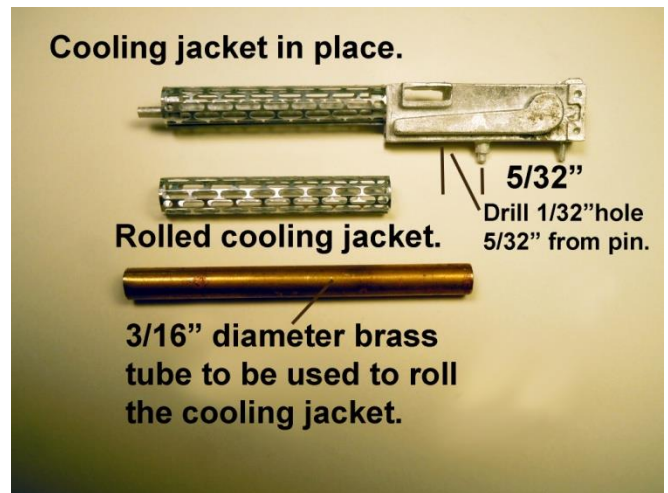
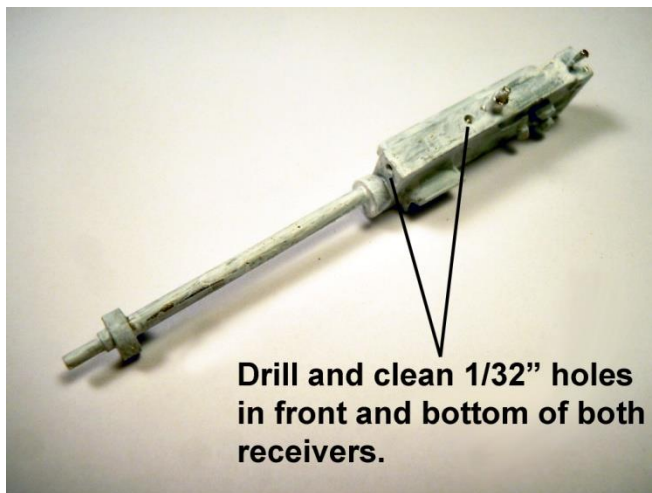
With the **Forward Tank** in place form a line from the **Fuel Connection** on the bottom of the **Tank** to the second connection on the **Fuel Valve Adjustor**. Make sure these connections are glued tight since

Tank adjustment may be necessary later. Form a **Copper Drain Line** from the **Petcock** forward from the **Petcock** to the corner of the **Fuselage** and down. See the picture below. Also check the **Build Patterns and Details Plan Sheet** for drawing of all connection points.

Form the left and right **Cowl Frame Stringers** using 1/16" x 2-3/4" Brass Rod using the pattern on the **Build Patterns Plan Sheet**. Glue them indexing into sockets on the **Cowl Frame** and at an angle glue to **Fuselage Stringer** just aft of the **Machine Gun Mount Frame** sockets. See picture below.



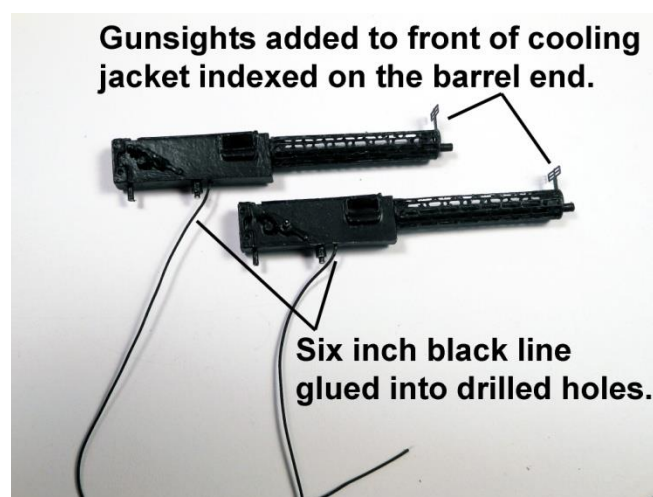
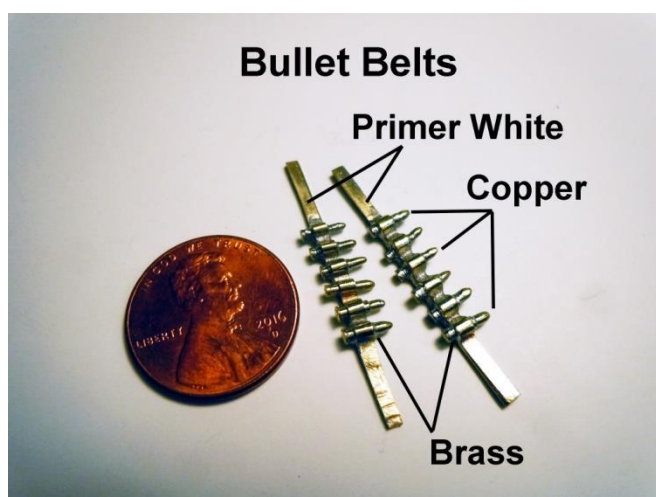
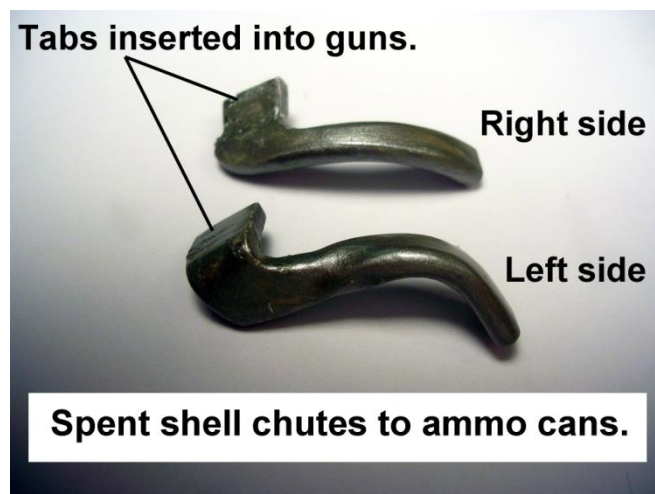
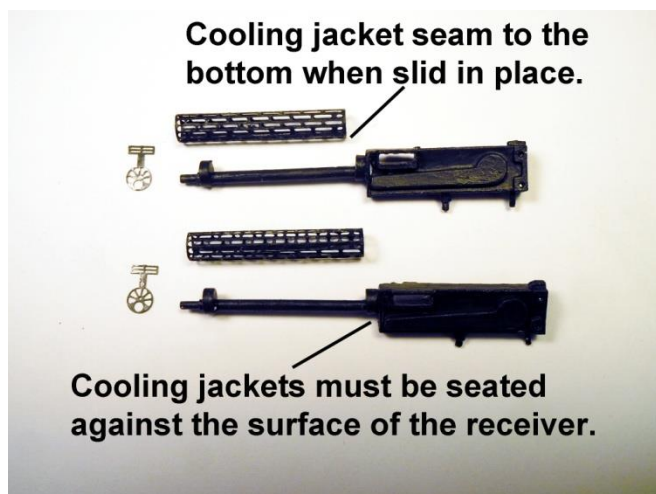
#### Machine Guns:



Drill two (2) 1/32" holes 5/32" on center from the locating **Pins** on the bottom of the **Machine Gun Receivers**. See pictures above. These holes will be for the cables to the trigger.

Using the 3/16" x 2" **Tube** roll form the two (2) photo etched **Cooling Jackets** carefully cut from the **P.E. Sheet**. Once formed paint them Hull Spar Black inside and out without filling the oval holes. When paint is dry very carefully index the formed **Cooling Jackets** onto the round boss on the end of the **Barrel** and slide down with the overlapping seam at the bottom to seat on the round boss at the end of the **Receiver**. Adjust the fit as necessary and add a drop of thin CA at the base of the **Receiver** and **Cooling Jacket** and at the boss at the end of the **Barrel** to hold the **Cooling Jacket** in place. See picture on the next page. Touch up any paint as necessary on the two machine guns.

Prime paint the two (2) **Ammo Can Chutes**; left and right a **Steel Color**. Paint the **Bullet Belts** the colors as seen below. Glue a six (6) inch length of **Black Line** into each of the drilled holes in the bottom of the **Receivers**. See the picture below.



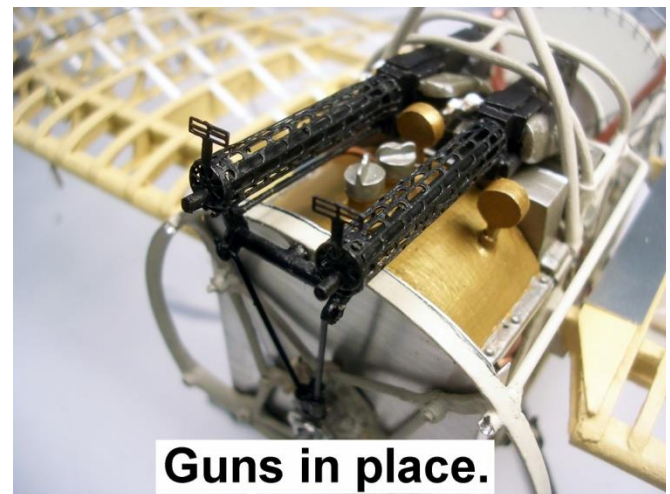
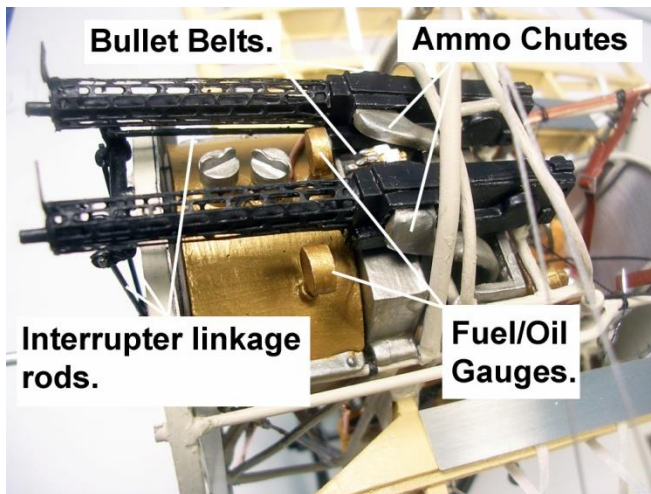
Now to install the **Machine Guns** and due to tight fits the best sequence for installation is to install the left gun first down the center and rolling into the location holes on the **Machine Gun Mount** while also inserting the **Black Line** down between the **Ammo Cans** to be later attached to the **Joystick**. **DO NOT GLUE** the gun into the location holes yet. Carefully fit the left **Ammo Chute** down in place into the rear **Spent Ammo Can** between the **Mast** and insert the tab into the open slot in the side of the **Machine Gun** and add a drop of thin CA to the tab only. Next very slowly bend and form one **Bullet Belt** to fit the left gun indexed into the open slot on the right side of the **Receiver** trimming off the white gun belt to have one bullet into the **Receiver**. **Note: the gun belt extensions are for easier molding and bending and be cut off after forming.** This **Bullet Belt** could interfere with the right **Ammo Chute** if the bend is not tight enough. Set the formed **Bullet Belt** aside for now, the space is needed to get the right **Machine Gun** in place. Fit the right **Machine Gun**, while also inserting the **Black Line** down between the **Ammo Cans** to be later attached to the **Joystick** then in place by carefully fitting onto the location holes in the **Machine Gun Mount**. Fit and glue in place the **Right Ammo Chute** per the left side. Slowly bend and form the **Bullet Belt** to fit the right gun indexed into the open slot on the right side of the **Receiver**. With the right **Ammo Chute** in place and both guns setting in their location holes, now form and cut to length needed the two (2) **Interrupter Linkage Rods** from the levers to the hole in front of the **Receiver**. Index the bent ends into the **Lever** holes and then back to the **Receiver** holes and

they will be trapped when the guns are glued in place. Check the alignment of the **Machine Guns** with the **Cooling Jackets** being parallel looking down and side to side and adjust as needed. The guns should have a slight angle up. Once guns are aligned as best as possible, all parts are glued in place and **Interrupter Rods** in the **Receiver** holes add glue to the gun location pins and holes at the rear of the guns sufficient enough to hold in place. See the pictures below. Glue the left **Bullet Belt** in place and adjust if needed due to the right **Ammo Chute** now being in place. **Note of caution:** moving forward take care not to break if the gun sights which are very fragile details.

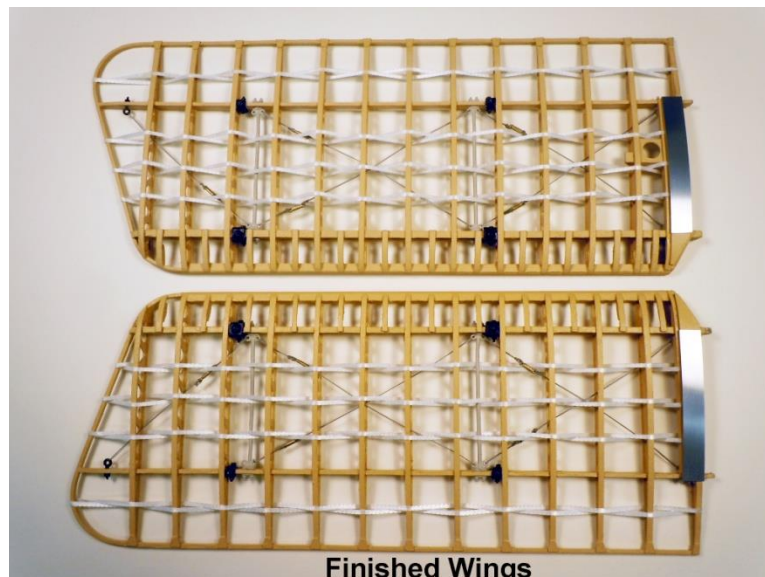
With the **Machine Guns** in place now glue the two (2) **Fuel/Oil Gauges** carefully in place. The center one, make sure it is fully seated adjacent to the **Fuel Line** in the back of the **Filler Neck**. The second one is straight forward on the left side but make sure both face squarely to the rear and are plumb vertically as much as possible.

Feed the two (2) **Machine Gun Black Lines** keeping them separate and parallel back to the **Joystick** and glue to the sides of the little square in the center of the **Joystick** leaving enough slack for the **Joystick** to have enough movement and still centered.

**Note:** now would be a good time to center the Joystick, if not already done sooner, with a thread line left to right to aid when it comes to attaching the wing warping cables.

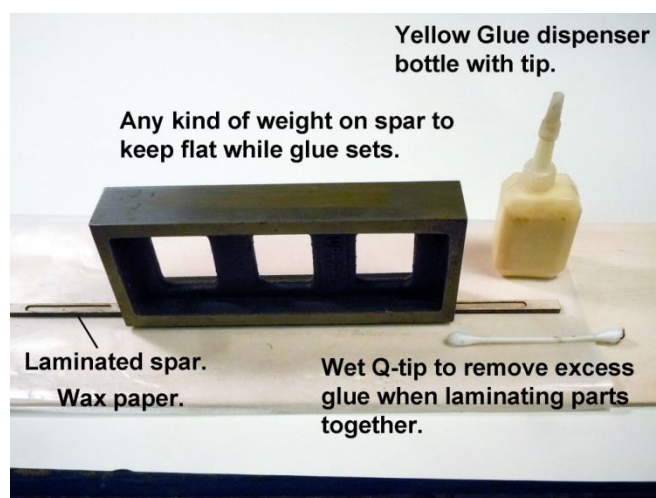


**Wings:**



The Eindecker wings are symmetrically mirrored left to right with the right wing having the **Bracket** to hold the **Compass** as seen in the picture above. The laser cutting technology enables the delicate **Wing Ribs** to be replicated as close as possible to the original wing construction. Care must be especially taken when working with the **Wing Ribs**. Due to the number of parts it is recommended to build one **Wing** at a time. From the plan sheet "Build Patterns and Details" cut out the building pattern for the left wing and tape it to a building board capable of receiving **T-pins**. A building board can be fabricated by gluing three layers of cardboard (10" x 14") together. See picture below. Then tape a piece of wax paper over the pattern to eliminate glue adhering to them. Remove the laser cut **Wing Rib** parts required for the left wing **WR1; WR1a; WR2; WR3(2); WR4 (9); WR5; WR5a (12); WR6(12); WR6a** and **WR7**. The three **Forward Spar** parts **WSL**; rear **Spar** wood strip 1/16" x 3/16" x 11-1/4"; laser cut **Wing Tip Former**; and **Wing Tip** wood strip 1/16" x 3/32" x 8". Wood Strips 1/32" x 3/32" x 12" as supplied for **Rib Caps**. The **Leading Edge** wood strip 3/16" x 3/16" x 9" and **Trailing Edge** 1/16" x 1/16" x 10-1/16".

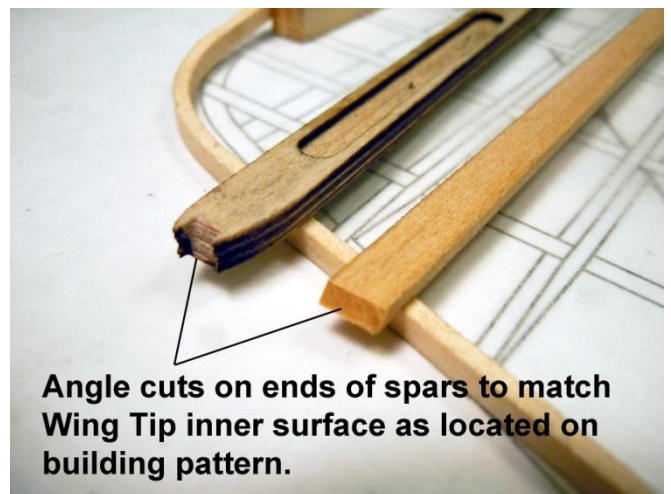
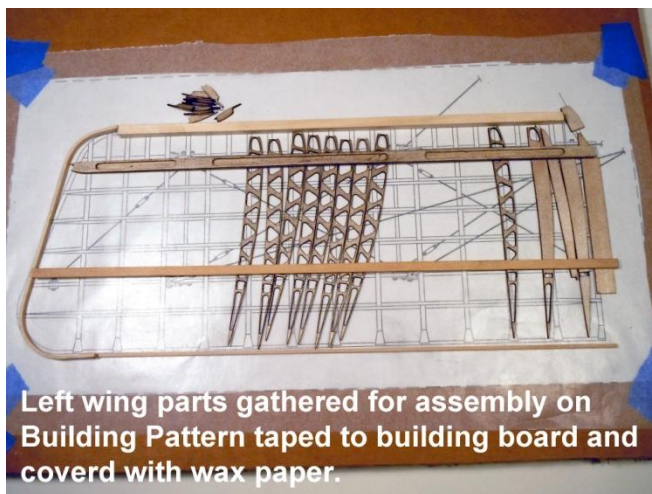
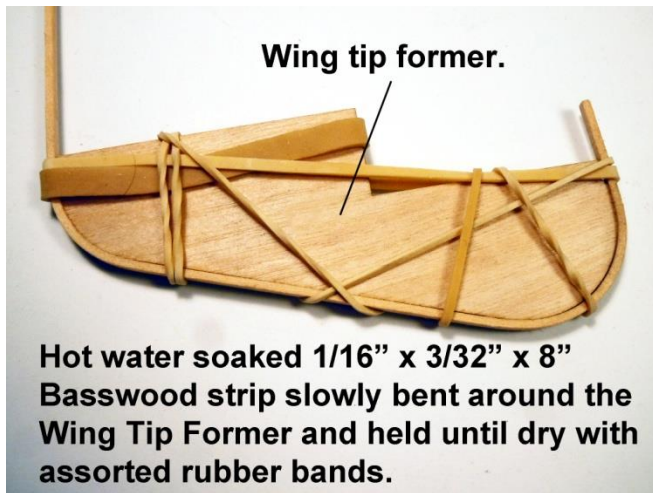
**Note:** Cast metal parts to be added after the assembled wood wing is painted Deck House Light.



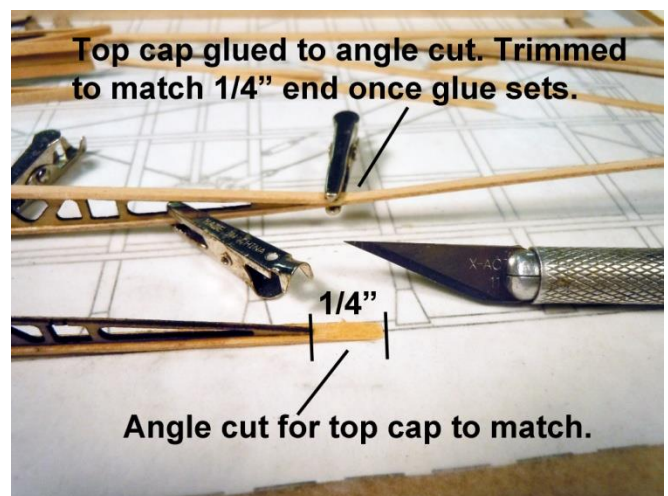
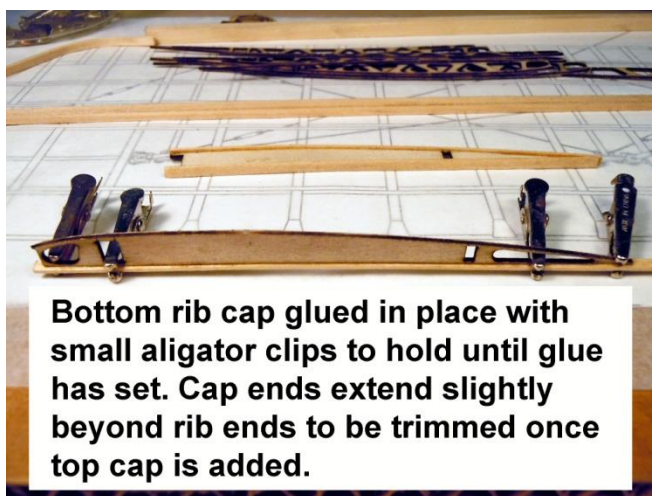
**SPAR:** Glue two (2) sets of the three **Spar** parts together using Yellow Glue making sure the two with holes cut out are outboard of the center part with no holes. Make sure the perimeter edges all match then set on a flat surface using wax paper and weigh down for glue to set over night. This will eliminate the potential for the **Spar** to warp or twist. See picture above.

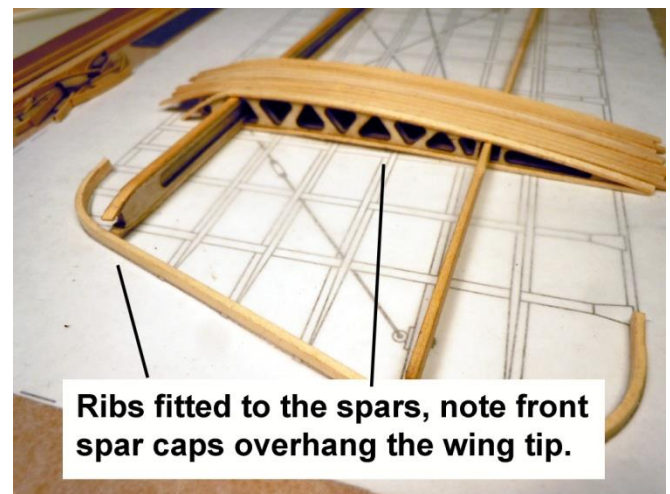
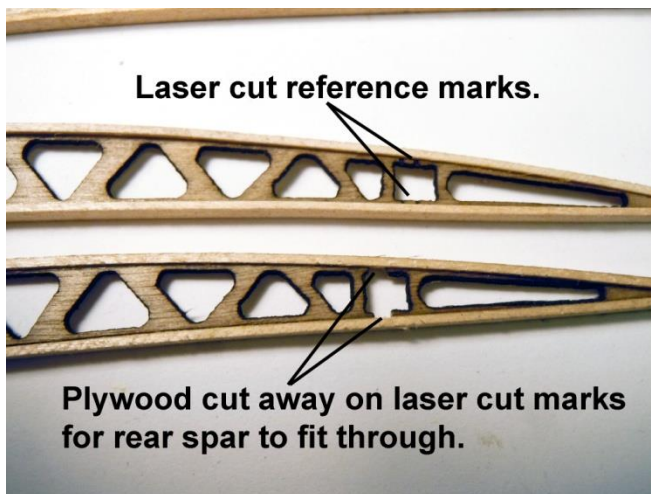
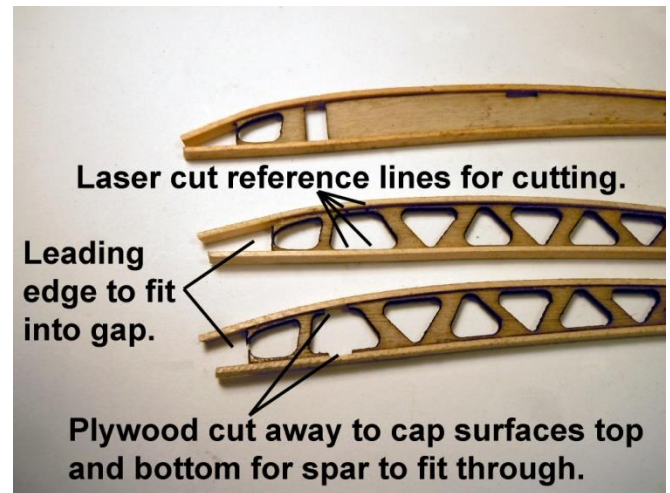
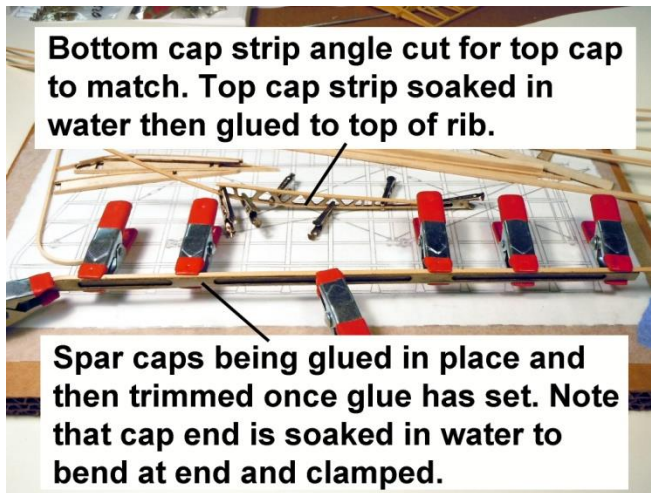
Add 1/32" x 3/32" x 12" **Cap Strips** to the top and bottom surfaces of the laminated Spars and cut off excess once glue has set off the inboard ends while the outboard ends extends 1/4" beyond the end of the Spars. The **Wing Tips** will index into the extensions. When glue has set then sand the cap strips flush if necessary to remove any excess glue. Set the two (2) **Spars** aside for now.

**WING TIPS:** Set the **wood strip 1/16" x 3/32" x 8"** in a dish of hot water for about 15 minutes to make the wood pliable. Remove the strip from the water and slowly and carefully form around the perimeter of the **Wing Tip Former** and use various rubber bands to hold the shape of the strip as seen in the picture on the next page. Allow the formed **Wing Tip** to set over night on the **Former** with rubber bands in place. Once dry and set remove the rubber bands and set aside. Repeat steps for a second **Wing Tip**. Cut the formed **Wing Tips** using the Plan Sheet Build Patterns and Details as a guide using the reference lines for the **Wing Tip** joints for cutting.



**RIBS:** Once all the various Rib parts are removed from the carrier sheets; very carefully sand using a flat sanding board all the perimeters to remove any tab connections and some of the laser cutting char. Start with Rib WR1 and work through to WR5 adding the Rib Caps (1/32" x 3/32" x 12") starting first with the bottom edge of the ribs and glue the Cap Strips in place centered on the Rib and hold in place using small alligator clips with 1/4" of the Cap Strip extending beyond the rear of the Ribs as seen in the pictures below.





For the top **Rib Caps** soak the ends of the wood strips in hot water as before and once pliable pre-form the top curve carefully with fingers then glue in place with Yellow glue. See the pictures above. Once all the **Ribs** with **Caps** in place are set; with a sharp hobby knife blade using the laser reference lines cut away the web of plywood to the **Caps** being very careful not to cut through the **Caps** themselves. Magnification would be very helpful in doing this. These are the locations for the **Spars** front and rear on each **Rib**. Once each web is cut away test fit the opening with the appropriate **Spar**. Once all are **Ribs** are trimmed, index them onto the two **Spars** together and lightly sand to match if necessary. Also test fit the **Wing Tip** to the extensions on the front and rear **Spars**. See the pictures above.

**Leading Edge Stiffeners:** Now add caps to the twelve (12) **Leading Edge Stiffeners (5a)** with ample overhang at the front edge and cut the trailing edge flush with the end of the **Stiffeners**. See the picture on the next page. Also add caps, top and bottom to **WR1a** at this time.

Now position each **Rib** roughly in their proper position on the plans along with the other parts to make sure all are accounted for and ready to assemble. Using **T-pins** index and align the two (2) **Spars** in place on the plans by first inserting a **T-pin** on the fuselage end of the **Spars** and then work down the length of each **Spar** positioning the **T-pins** to hold each in place firmly to the building board. Insert several T-pins across the top to press the **Spars** down against the building board. Now adjust each **Rib** into its final position on the building pattern and glue in place with a drop of **CA medium viscosity** at each joint and allow the CA to set. **NOTE:** **WR2** is not a full rib but is a support rib for the **Step Platform WR7**. Use **WR7** to space **WR2** from the last **Rib WR1**. Allow time for the CA to set firmly then



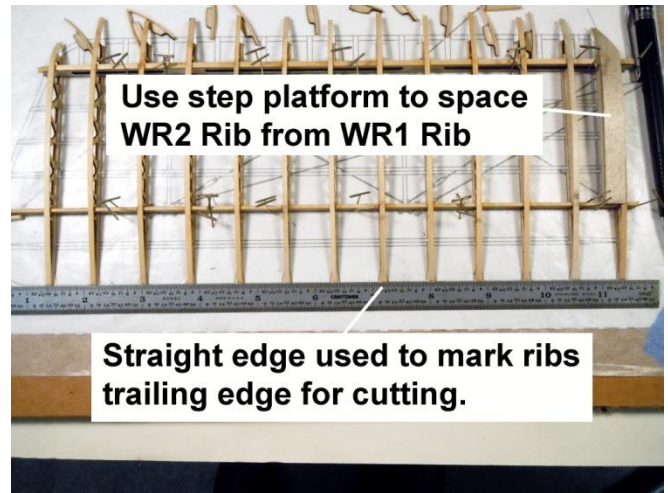
1/4" overhang on front edge and trimmed flush at rear edge.  
**Leading Edge Stiffener**



**All wood parts accounted for and positioned roughly in place.**



**Spars pinned in place and then ribs glued in place and glue allowed to set.**



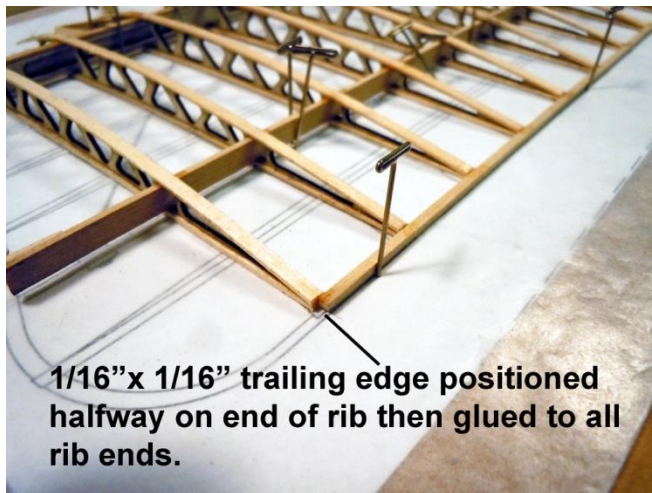
**Use step platform to space WR2 Rib from WR1 Rib**

**Straight edge used to mark ribs trailing edge for cutting.**

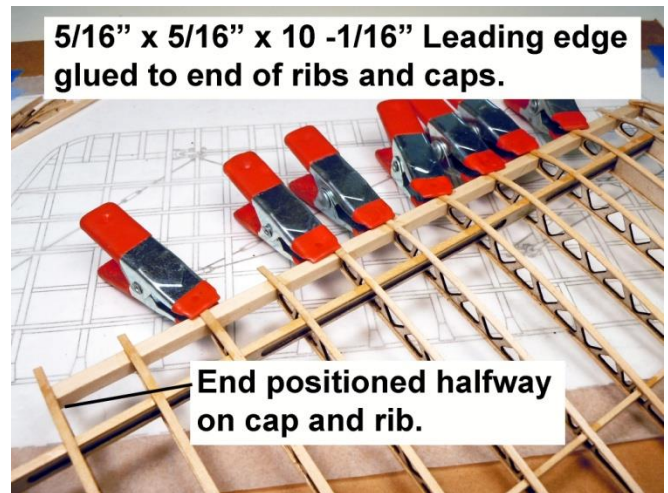
with a straight edge set on the inner line of the trailing edge of the building pattern mark with a pencil a cut line. Then with a scrap piece of 1/64" plywood from the carrier sheet slip under the ribs and cut off the end of the **Ribs** for the **Trailing Edge**. See pictures above. Once all **Rib** ends are cut, position the 1/16" x 1/16" x 10-1/16" **Trailing Edge** starting at **Rib WR5**, position the end of the **Trailing Edge** halfway on the end of **WR5**, the **Wing Tip** will butt joint against the end of the **Trailing Edge** here. Glue the **Trailing edge** in place.

Locate and cut the **Leading Edge** 3/16" x 3/16" x 10 -1/16". Mark a pencil line 1/16" down from one edge and then cut an angle from the back top edge down to the marked pencil line. Sand the cut surface smooth. Index and clamp the leading edge against the front edges of the **Ribs** and tight against the extending **Rib Caps** with the **Wing Tip** end fit halfway on the **Rib** end of the last **WR4 Rib** and glue in place with CA both on the **Rib** edges and extended **Rib Caps**. After the **Leading Edge** glue joints have set fit **WR1a** in place between the **Leading Edge** and **Rib WR1**. Cut the upper and lower extended **Rib Caps** to butt joint as seen in the pictures. Cutting the existing **Caps** in place will be required for tight joints. See the pictures on the next page.





**1/16" x 1/16" trailing edge positioned halfway on end of rib then glued to all rib ends.**

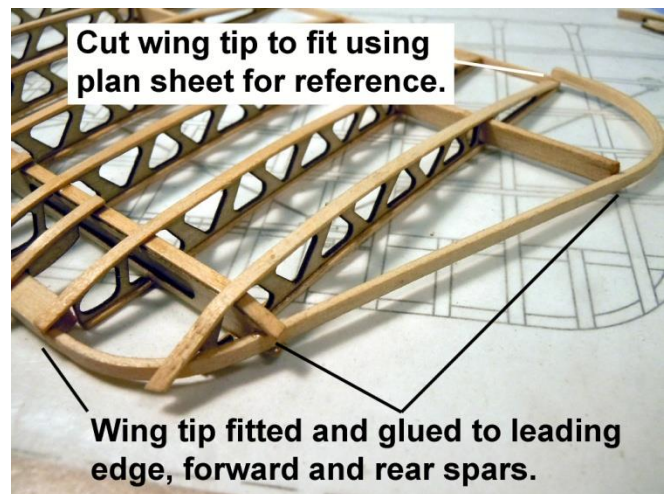


**5/16" x 5/16" x 10 -1/16" Leading edge glued to end of ribs and caps.**

**End positioned halfway on cap and rib.**



**WR1a caps cut and fitted to WR1 and leading edge. Here can also be seen the angle cut on the leading edge.**



**Cut wing tip to fit using plan sheet for reference.**

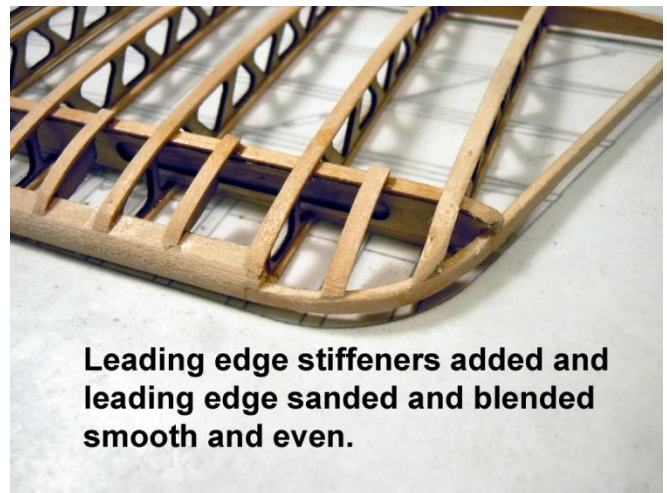
**Wing tip fitted and glued to leading edge, forward and rear spars.**

Fit the formed **Wing Tip** in place at the end of the forward **Spar** and the **Rib WR5** and if the fit is good, or adjust if needed then glue the forward end of the **Wing Tip** to the end of the **Leading Edge** flush to the bottom edge. Next glue the **Rib WR5**, the **Spar** end and the **Rear Spar** that was angle cut to fit flush. Allow the glue to set and now with the **Wing** on the **Building Pattern** for reference cut and fit the rear end of the **Wing Tip** to the **Trailing Edge**. With a sharp blade taper cut the **Rear Spar** to blend from **Rib WR5** to the **Wing Tip** then sand to blend and smooth the **Ribs** to the **Trailing Edge**.

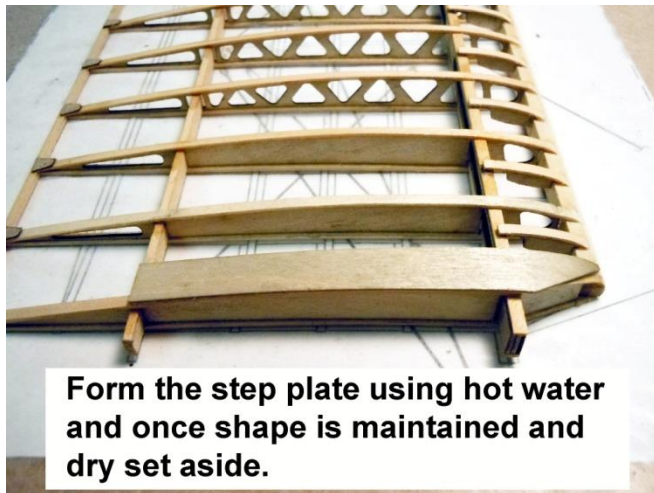
Add the twelve (12) **Leading Edge Stiffeners** centered between the wing **Ribs** with the back edge of the **Rib Caps** aligned with the back edge of the **Forward Spar** as seen in the pictures on the next page. Cut the front extensions off flush with the front edge of the **Leading Edge**. Cut an angled chamfer on each of the **Stiffeners** front edge. (On the underside of the wing add **Rib Cap** extensions from the edge to the **Ribs** to the front edge of the **Leading Edge** and cut flush. **This is only if necessary if extensions were cut inadvertently**). Once the glue has set sand the **Cap** joints smooth to each other, then starting with the lower edge of the **Leading Edge** sand using a flat sanding board a small radius the length of the **Leading Edge** blending to the **Wing Tip**. On the top of the **Leading Edge** sand a much larger radius blending the **Rib Caps** into the rounded **Leading Edge**. **NOTE: Take care not to sand through the Rib Caps**. Now do a final smooth sanding of the entire top surface of the **Wing**. Sanding diagonally across the ribs will provide a better result of wing curvature.



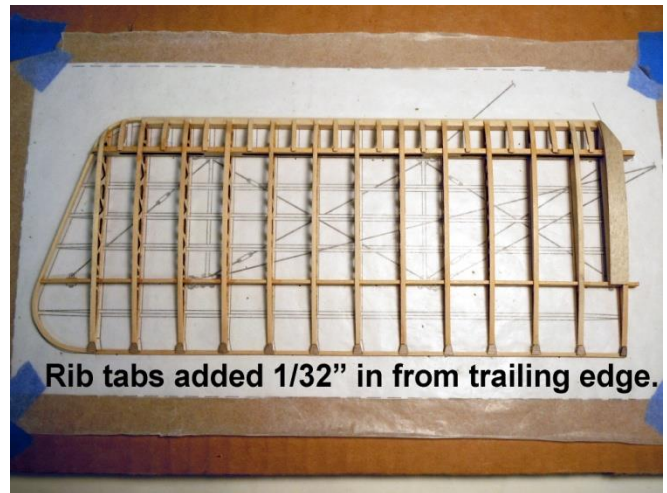
Cap fillers added, sanded to blend and leading edge corner sanded.



Leading edge stiffeners added and leading edge sanded and blended smooth and even.



Form the step plate using hot water and once shape is maintained and dry set aside.



Rib tabs added 1/32" in from trailing edge.

Form the two (2) **Plywood Step Plates** using hot water soaking and slowly form with fingers to match to rib locations onto **Rib WR1** and **WR2** and once the shape is maintained dry then set aside to be glued in place later. Add the twelve (12) **Rib Tabs WR6** and **WR6a** (1) making sure that they are spaced about 1/32" from the outer edge of the **Trailing Edge** as seen on the **Building Pattern**. Apply Wood Conditioner to the entire wing to stabilize the laser cut char prior to painting. Allow the **Wood Conditioner** to dry completely before painting with **Deck House Light (MS4821)**.

**Right Wing Difference:** The only difference the right has is the addition of the **Compass**. Once the right wing is assembled and sanded place on the building pattern mark the location of the **Compass** on the edge of the **Caps** and glue in place the **Compass Holder** with the circle cut out to the underside of the **Caps** between the **Ribs**. On the forward edge glue the vertical **Brace**. See the picture on the next page. Then glue the two (2) **Triangular Braces** to the top surface and then glue them to the underside of the **Cap** against the **Rib** wall aligning it with the front edge of the **Compass Holder**. Now apply Wood Conditioner and paint **Deck House Light (MS4821)** per the left wing. Once the right wing is dry; glue the **Compass** in place in the **Compass Holder**. The compass label and lense should be done prior to gluing in place.

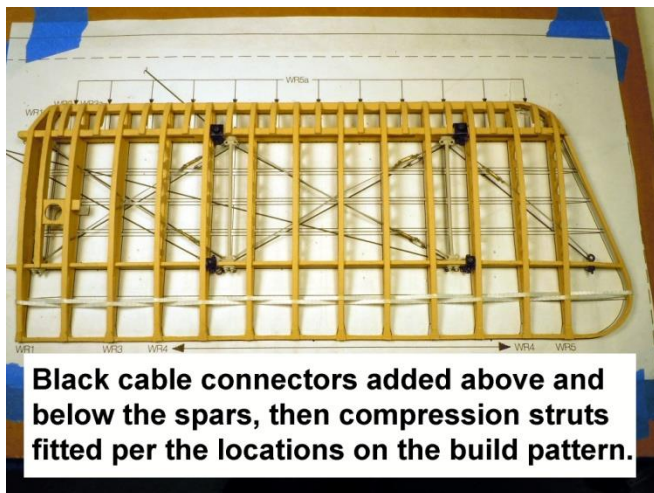


**Compass support bracket.**

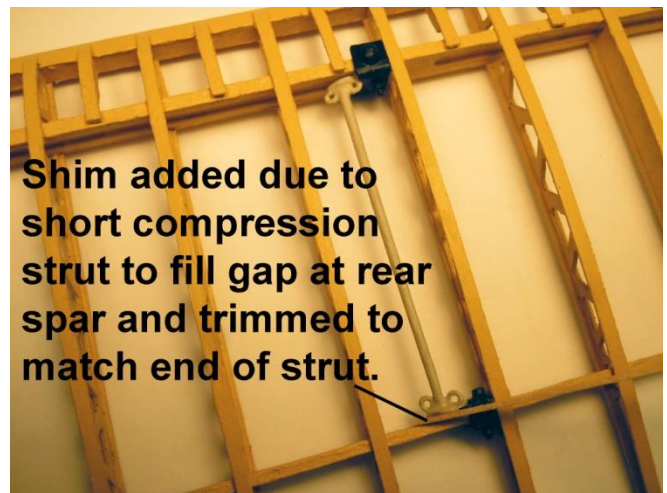


**Compass support in place on right wing.**

**Wing Hardware:** Gather the following painted cast metal parts for the wings: Four (4) Sets of **Forward Spar Cable Anchor Points** (upper and lower); four (4) Sets of **Rear Spar Cable Anchor Points** (upper and lower); two (2) **Rear Spar Eye Bolts**; two (2) **0-80 Washers**; two (2) **0-80 Nuts**; six **Compression Struts**; twelve (12) **Compression Strut Bolt Sets**; two (2) **Aluminum Step Plates** (Photo etched); ten (10) **Turnbuckles** (holes drilled 1/32").



**Black cable connectors added above and below the spars, then compression struts fitted per the locations on the build pattern.**

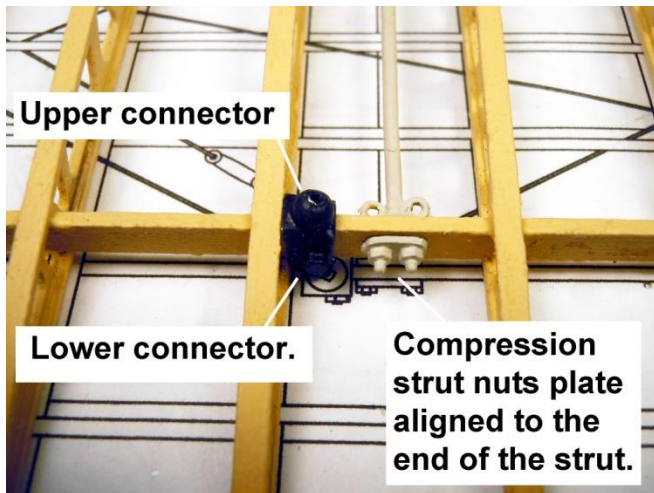


**Shim added due to short compression strut to fill gap at rear spar and trimmed to match end of strut.**

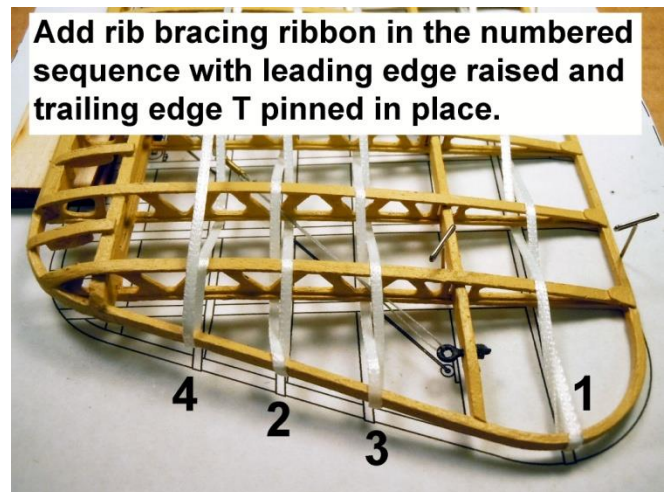
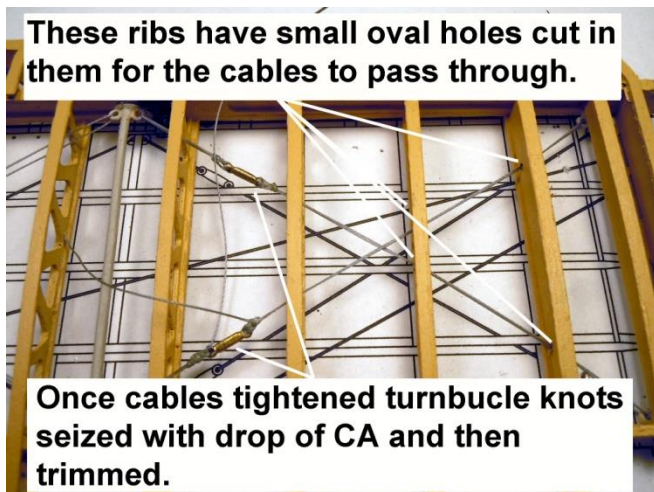
Place the **Left and Right Wings** on their building patterns. Locate and glue the three (3) **Compression Struts** in place and shims may be needed to compensate for the **Strut** fit due to variations in building. If shims are needed, add them at the **Rear Spar** end of the **Strut**. Once all the **Compression Struts** are in place glue the **Nut Sets** on the other side of the spars as seen in the picture on the next page.

Using the building board as reference, glue in place the **Cable Anchor Points** by adding the lower part first and then the upper noting the orientation towards the **Fuselage** as seen on the **Assembled Views and Details Plan Sheet**. Then drill 1/32" holes in the locations for the **Eye Bolts** on the **Rear Spar**. Insert the **Eye Bolts** into the holes with the eye facing forward then add **0-80 Washers** first then **0-80 Nuts** onto the **Eyebolt Shafts** and glue in place.

Once all the **Cable Anchor Points** glue has set then drill the holes in them to make sure they are clean to receive the **Cable Lines** both top and bottom.



**Bracing Cables:** Cables and compression struts were used in combination to strengthen the wings. The first thing is to seize the gray thread as used in the **Fuselage to Turnbuckles** using the **Needle Threader** to pull the thread through the **Turnbuckle** holes. See Picture above. Seizing a thread to the **Turnbuckle** starts by inserting the **Needle Threader** into the hole in the **Turnbuckle** then inserting a loop of thread into the **Needle Threader** and pulling the loop back through the hole enough to be able to pull the other ends of the thread through the loop after releasing the **Needle Threader** and pull the ends to cinch up on the **Turnbuckle**. Then with one thread lead seize a half hitch on the other to a knot. Add a drop of thin CA to the thread lead to be cut off. Now repeat the process to the other end. One lead can be longer than the other. Study the plans and pictures to see how the cables will be tied off on the loops of the **Compression Struts**. The cables passing through the inboard **Ribs** have small ovals cut in them for the **Cables** to pass through. See the picture below.

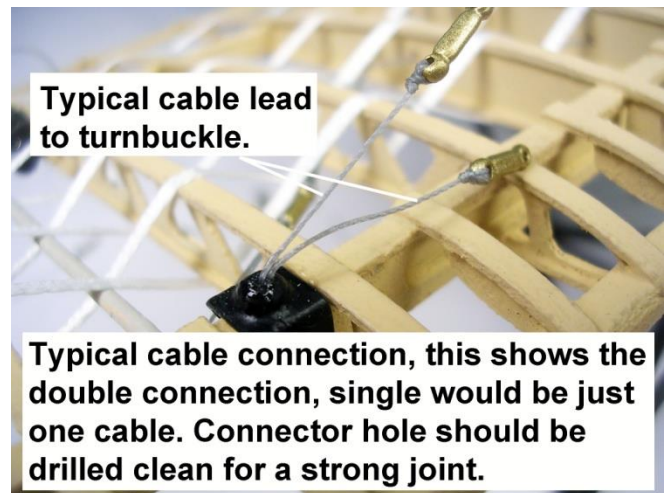
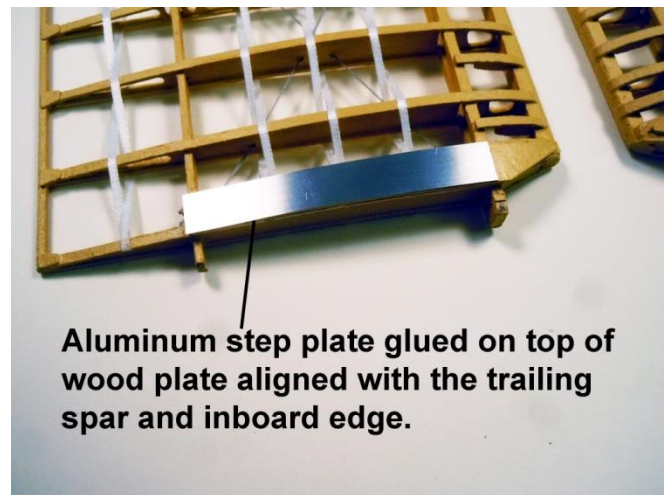
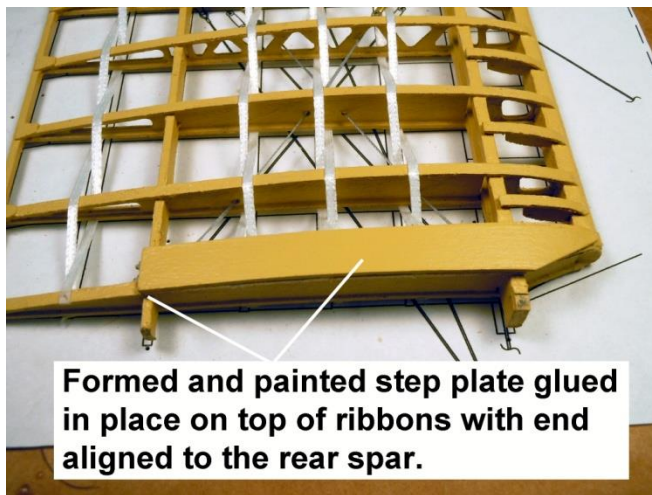


All the **Wing Cables** are roughly the same size with a short lead (2") and long lead (6") and can be tied as you build or tied all at once, builder's choice. Start with the **Eye Bolt** and work inboard to get use to the process and work over the **Building Pattern** to make sure the **Cables** are indexing between the proper **Rib Webs** and keeping them as straight as possible to the next strut loop. The inboard ones will pass through small ovals laser cut in the **Rib** walls.

**Rib Bracing** will be done using the 1/16" wide white ribbon. Cut four (4) 24" strips of the ribbon. Study the **Building Pattern** drawing closely for the interweaving pattern between the **Ribs**. See the application sequence numbered in the picture above with 1 being centered on the space between the

rear **Spar** and the **Trailing Edge. 2** being centered in the space between the forward and rear **Spars**; **3** the space between **2** and the rear **Spar** and **4** between **2** and forward **Spar**. Typical for each application is to center the ribbon on the **Wing Tip** and glue to the **Wing Tip** then interweave per the **Building Pattern** and not interfere with **Bracing Cables**, pull taut to keep the ribbon even and then glue one of the ribbons on the inboard **Rib**, let the glue set then check the tautness of the second and glue in place. Then add a drop of thin CA to each ribbon contact point on each **Rib**. See the pictures on the previous page and below. Repeat for each ribbon following the sequence and make sure not to pull the ribbons too tight and warp the **Wing**.

Glue each formed **Step Plate**, aligning the rear edge of the **Step Plate** with the edge of the **Rear Spar** and the inboard edge of the **Rib**. Then paint the **Step Plates**. Remove the two (2) **Aluminum Step Plates** and with Scotchbrite pad or fine sandpaper scrub lengthways to simulate brushed Aluminum. Score the underside of the **Aluminum Step Plate** with the tip of a hobby blade diagonally to aid in the glue adhesion. Use medium CA and carefully glue them in place aligning the rear edge of the plywood **Step Plate** as seen in the picture below.



**Wing Rigging:** The wing rigging is fairly straight forward and rigging cables are above and below the **Wing** surfaces. The **Forward Spar Cables** are **Wing Bracing Cables** while the **Rear Spar Cables** are the warping **Cables**. Study the plan sheets to fully understand the **Cables** relationship to the **Wings**. Note that the front spar inboard anchor point has two (2) **Cables** attached at it as seen in the picture above.

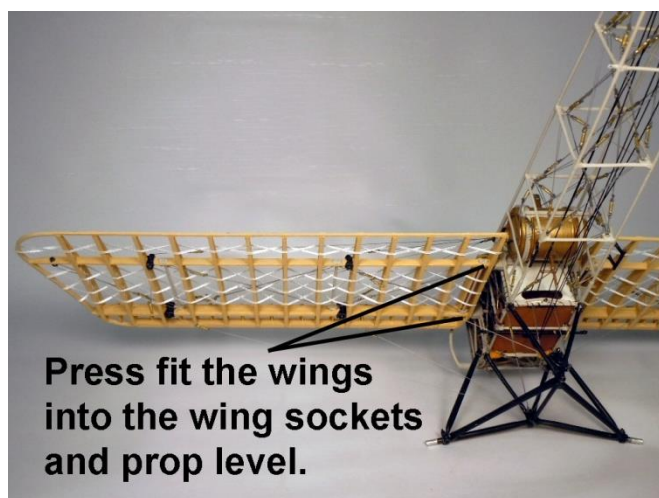
**Cable Leads:** Seize eighteen (18) **Cable Leads**; one end of a **Turnbuckle** with 7/8" thread from the **Turnbuckle** attachment hole. Glue two (2) **Cable Leads** into the **Front Spar** inboard anchor point as seen in the picture on the previous page and on the Plan Sheets for each **Wing** (Left and Right). Then glue the remaining fourteen (14) **Cable Leads** into each anchor point above and below the **Wings**. Make sure that each **Cable Lead** is glued securely in each anchor point, the last thing is to have is a lead come loose while rigging with the **Wings** in place on the **Fuselage**.

Now carefully align each **Wing** with the **Wing Sockets** and press fit them into the **Wing Sockets**. Ideally, a tight press fit is desirable to hold the **Wings** level to the ground in the **Wing Sockets** which will make the **Wing Rigging** easier. If too loose in the sockets try pieces of paper or even paint to build up the difference. Should trimming be needed to fit, trim slowly and carefully to attain the tight fit. See the picture on the next page.

The **Turnbuckles** on the **Mast Assembly** should be in place, however if not add them as seen in the picture on the next page. Now using the plans as reference cut a **Cable Line** long enough to go from the forward **Spar** inboard anchor point up to the mast head and back to the outboard anchor point and add about six to eight inches long enough to tie knots. Tie the **Cable Line** to the inboard **Turnbuckle Lead** then through the hole of the mast head **Turnbuckle** then back to the outboard **Cable Lead** and seize the **Cable Line** on that **Turnbuckle** with enough tension to keep the line straight, but not raise the **Wing** but to keep the **Wing** level. Now seize the **Cable Line** with small black thread as seen in the picture below. Now repeat the process for the other **Wing**.

**Warping Cables:** Now it would be wise to seize the **Joystick** in the center neutral position with a thread line from the **Joystick** to both sides of the **Fuselage Stringers** if not done already.

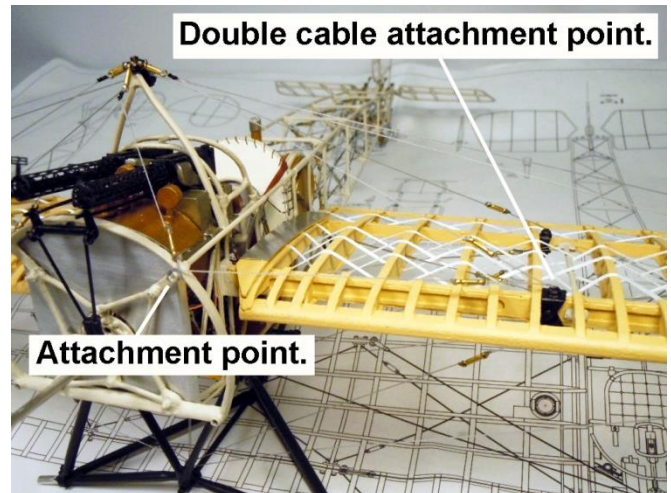
Now cut a **Cable Line** the length needed to go from the **Rear Spar** inboard anchor **Cable Lead** on one **Wing** to the **Mast Head** pulley and back down to the inboard **Cable Lead** on the other **Wing** and add six inches or so for knot tying. Seize the **Cable Line** at the **Left Wing** inboard **Cable Lead Turnbuckle** and then up through the **Upper Pulley** then back down to the **Right Wing** inboard **Cable Attachment point** with just enough tension to keep the line taut without bending the **Wing**. Now repeat the process for the outboard **Cable Leads** through the **Lower Pulley**. Make sure the **Cable Line** is taut again without raising the **Wing** and keep them level.



Once the **Upper Rigging** cables are in place now the same process will be repeated below the **Wings**. The forward **Spar Bracing Cables** are seized at the loop at the bottom of the forward **V Strut** again

just taut enough to hold the **Wings** and keep the **Cable Lines** straight. **DO NOT GLUE** the knots seizing the lower **Bracing Cables** at the **Turnbuckles**; this will allow for adjusting if necessary later.

The rear **Spar** inboard **Warping Cables** are seized on the **Front Bellcrank** at the bottom of the **Rear V Strut** just behind the **Lower Bellcrank**. Next seize the outboard **Warping Cables** to the **Rear Bellcrank** at the bottom of the rear **V Strut** again taut enough to hold the **Wing Level** and the **Cables Lines** straight. Check all knots on **Turnbuckles** to make sure they are seized and taut enough to hold the **Wing Level**. Once satisfied release the **Joystick** and move left and right and the **Wings** should now warp. See pictures below. If the **Wings** are still level seize the knots at the **Turnbuckle**, or adjust the lower **Bracing Cables** as needed to get the wings to be level and then glue.



With the **Fuselage** sitting level now seize the second **Bracing Cable Lines** to the **Turnbuckles** on the **Cable Leads** in place in the forward **Spar** inboard anchor points. With lines attached to the **Turnbuckles** now seize them at the junction of the **Fuselage Stringers** and the **Cowl Frame**. See the picture above.

Seize the center of an 8" **Cable Bracing Line** to the forward facing **Turnbuckle** at the **Mast Pulley Assembly** and attach the two (2) **Cable Lines** to the same junctions as the **Wing Bracing Cables** at the **Cowl Frame**. **TAKE CARE** while rigging these two **Cable Lines** around the gun sights. Using thin black thread whip the two lines at the **Turnbuckle** as done on the others. See the pictures above and on the previous page. Set the **Fuselage** aside and admire while building the **Engine**.

### Engine:

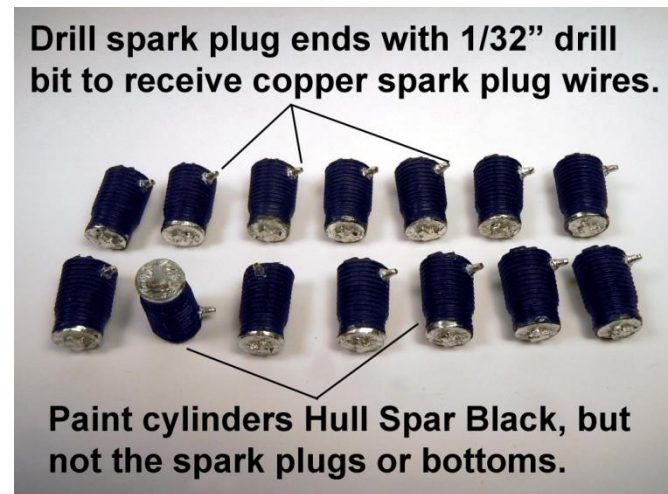
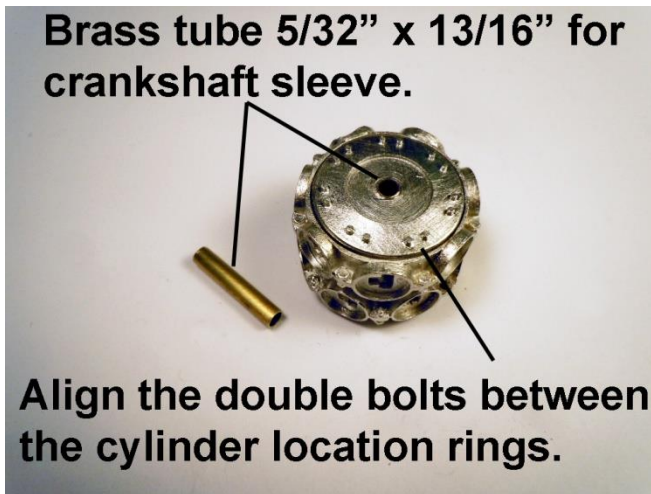
To assemble the **Engine** gather the following parts: **Crankcase** (1); **Front Cover** (1); **Rear Cover** (1); **Cam Cover** (1); **Igniter** (1); **Interrupter Cam** (1); **Cylinders** (14); **Cylinder Tops** (14); **Rocker Arms** (14); **5/32" x 13/16" Brass Tube**; **1/32" Brass Rod** (for Pushrods); **.020" Copper Wire** (spark plug wire); **0-80 Nuts** (14).

Decide if certain **Engine** parts are to be painted or wire brushed polished for a metal finish. The following parts need to be either painted aluminum or wire brushed: **Crankcase**; front and rear **Covers**; **Cam Cover**; **Igniter**; **Rocker Arms**; **Interrupter Cam** (Cam only - optional Black, builder's choice).

All parts need to be cleaned especially surfaces to be glued together to remove any residue from casting process which can weaken glue joints.

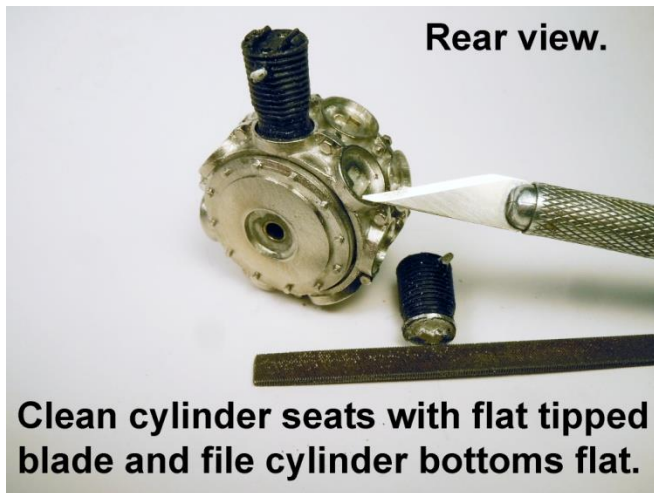


Dry fit the **Front** and **Rear Covers** to the **Crankcase**. **Attention:** There is a correct and wrong way to assemble them. The **Crankcase** cylinder locations have a recessed “T” in them, if holding the **Crankcase** in your left hand vertically the leg of the T should point away from you. See picture below. The **Front Cover** has double sets of 14 bolt heads, while the **Rear Cover** has 12 single spaced bolt heads. The **Front Cover** double bolt heads should be spaced between the cylinder location rings. See picture below. Now dry fit the **5/32” x 13/16” Brass Tube** into the holes in both **Covers** and file or ream the holes to fit if necessary. Once all parts are dry fitted and orientated correctly glue them together. Medium CA applied to the recesses in the **Crankcase** will allow a little time to adjust. Acetone can clean excess CA or release a glue joint when liberally applied and allowed to work in the joint.



File any parting lines and clean the fourteen (14) **Cylinders**. Drill 1/32” or slightly smaller holes in the ends of the spark plugs to receive the **Copper Ignition Wires**. Magnification will help and use a scribe to press a starting point for the drill bit on the end of the **Spark Plug**. Paint the **Cylinders Hull Spar Black** except for the surfaces to be glued. Then paint White the tapered part only of the spark plugs and do not paint shut the drilled holes for the ignition wires.





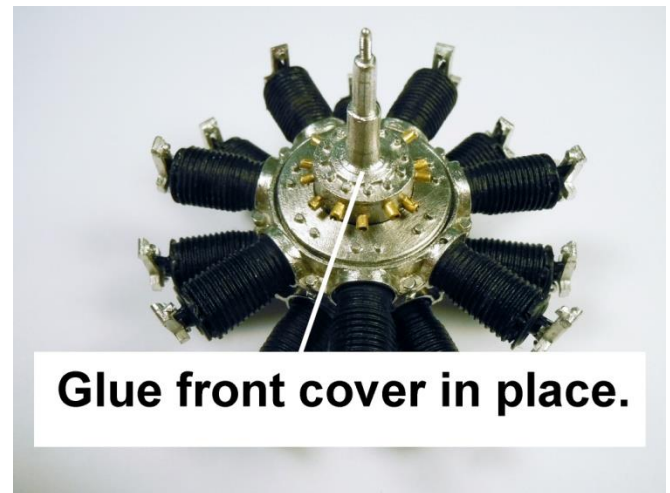
Dry fit the **Cylinders** and clean the **Cylinder** seats of any burrs and check the bottom of the **Cylinders** and if necessary file to flat to fit. The **Cylinders** must fit flat and straight up with the spark plugs pointing to the rear. See pictures above. Once fitted, glue **Cylinders** in place and allow the glue to set.



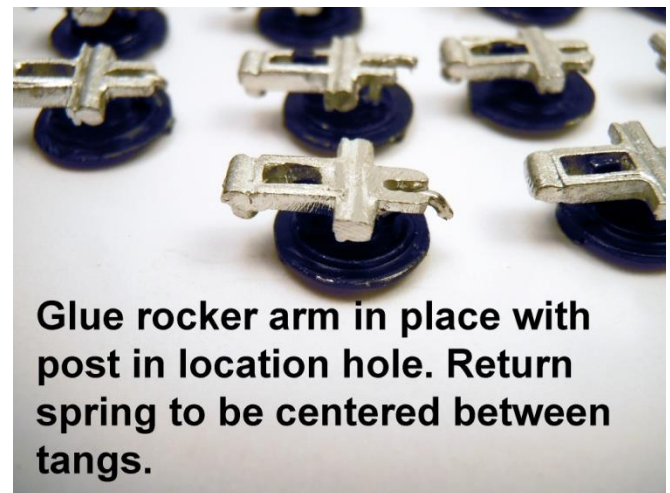
Drill 1/32" holes in all the posts on both the **Cam Cover** and the **Igniter**. The **Cam Cover** posts will receive the 1/32" **Pushrods** and the **Igniter** .020" **Copper Wire**. See the picture above.

Paint the **Cam Cover** posts Brass and the **Igniter** posts Copper and do not paint shut the holes and allow to dry.

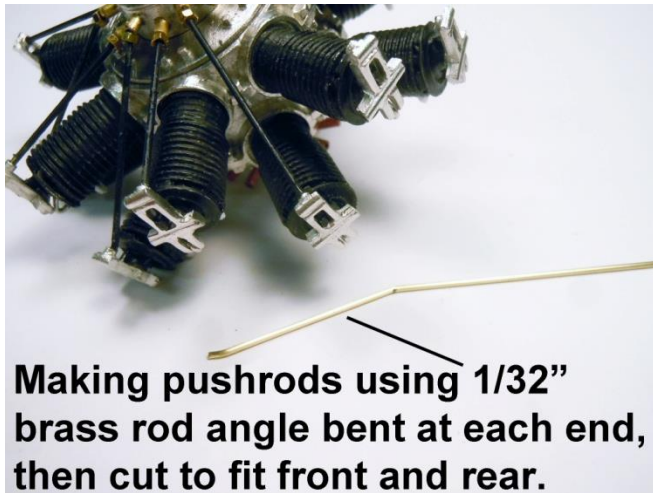
Once the paint is dry on the **Cam Cover posts** glue it in place in the recess on the **Front Cover**. Insert a 1/8" drill bit to align the **Cam Cover** with the 5/32" **Brass Sleeve** in the **Crankcase**. Align the rearward posts with the centerline of forward **Cylinders**; this is necessary for the correct positioning of the **Pushrods**. See the pictures on the next page.



Now drill clean the **Rocker Arms** indexing holes for the **Pushrods** using a 1/32" drill bit. On the **Cylinder Tops** very carefully align vertically the Valve Spring. Paint the **Cylinder Tops** Hull Spar Black except for the Valve Spring and under surface that will be glued. Glue the **Rocker Arms** to the **Cylinder Tops** indexing the Valve Spring between the tangs on the **Rocker Arms**. See the pictures below.



Using 1/32" **Brass Rod** form **Pushrods**; bend one end of the **Brass Rod** and index it into a **Cam Cover** post and dry fit a **Rocker Arm** assembly (with cylinder top) on top of a **Cylinder** and cut the **Brass Rod** to length necessary with a slight bend to fit when cut into the hole in the **Rocker Arm**. Some trimming may be necessary for flat fit on top of the **Cylinder** to trap the **Pushrod**. Cut seven (7) pushrods 1 -1/8" and seven (7) 1" to start with to bend and cut to length as needed.



**Making pushrods using 1/32" brass rod angle bent at each end, then cut to fit front and rear.**



**Pushrods cut and fitted to each cylinder then 0-80 nut added at bottom then rocker arm fitted to trap pushrod in place and then painted black.**

Once satisfied with the fit of the **Rocker Arm** assembly, add a **0-80 Nut** to the bottom of the **Pushrod** to rest on the post of the **Cam Cover** and glue the **Rocker Arm Assembly** in place trapping the **Pushrod**. Repeat the process for the balance of the **Cylinders** noting that there are two different lengths as mentioned earlier needed for the front and rear rows of **Cylinders**. See the pictures above.



**Pushrods in place.**

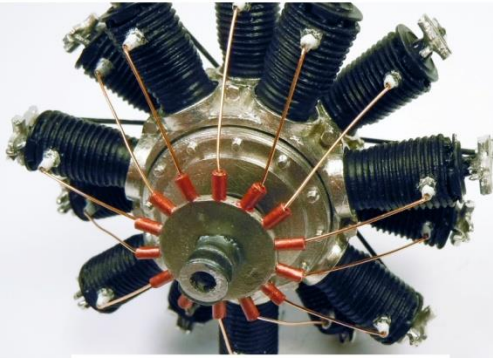


**Igniter ring.**  
**Interrupter cam.**

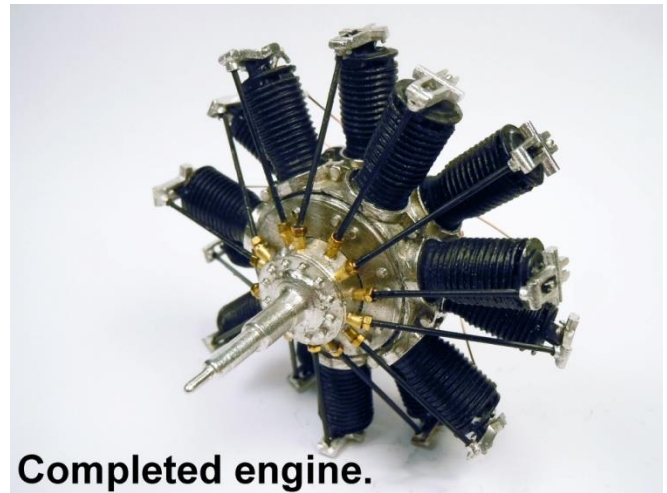
Align the **Igniter Ring posts** with **Spark Plugs** and glue in place. Insert a 1/8" drill bit to align the **Igniter** with the **5/32" Brass Sleeve** in the **Crankcase**. Take a length of the thin **Copper Wire** and stretch it slightly holding each end with pliers to straighten and harden the wire. Now insert one bent end of the **Copper Wire** into the hole on the **Spark Plug** and down to the post on the **Igniter** and cut to length with a slight bend to fit into the post on the **Igniter**. To glue the wire in place first insert it into the post on the **Igniter** and bend forward straight into the hole on the spark plug. This will avoid having to bend and distort the wire trying it the other way. Repeat the process for the balance of the **Cylinders**. See the pictures above and on the next page.

Now using a 1/8" drill bit inserted through the **Interrupter Cam** and into the **Engine** align the **Cam** and carefully glue in place without gluing it to the drill bit. Let the glue tack off remove the drill bit and test fit onto the **Crankshaft** coming out of the **Fuselage** to check for any interference. The **Engine** should be free to rotate on the **5/32" Brass Sleeve** in the **Crankcase**.

Add thin copper wire with bent ends to igniter ring and spark plugs.



Paint spark plugs white.



Completed engine.

### Propeller:

The **Propeller** will be a typical design used for the Eindexer comprising of nine (9) laminations of laser cut woods alternating with **Basswood** (light); **Cherry** (medium); and **Walnut** (dark)

Locate clean and paint Steel, if not done already the two (2) **Propeller Hub Plates** with bolt heads (rear) and nuts (front) cast in place. Set aside for now for the paint to dry. See picture below.

Gather the nine (9) laser cut wood **Propeller Blanks** and sand smooth the edges where the connecting tabs are located. Once sanded glue them together in the sequence suggested below and on the plans. **Yellow Glue** would be the best to use for the ongoing carving that will happen. Use a 1/8" drill bit to center and align the **Blanks** as they are being glued together making sure the edges line up and match each other. Clamp together and let the glue to completely set before carving. Overnight if possible.

### Propeller Hubs



Rear Front

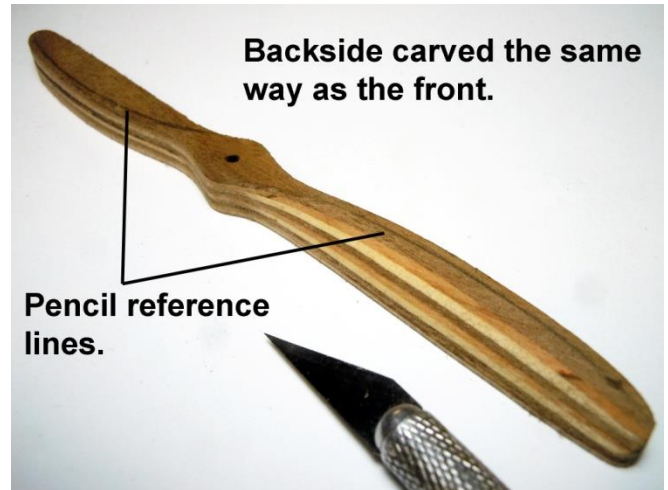
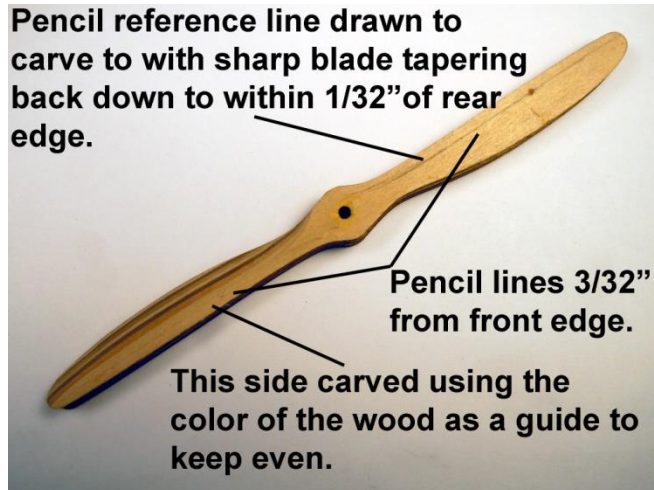
### Propeller wood layers.



Light Basswood  
Medium Cherry  
Dark Walnut

Mark with a pencil a reference line 3/32" from the edge down the straight side of the **Propeller Blades** from the center to the tip of the blade. See the picture on the next page. With a sharp hobby blade and short slicing strokes carefully carve away 1/32" from the curved trailing edge up to the pencil line. Develop slowly the curved surface of the blade using the different colors of the wood to keep the carving even and tapered when getting to the center hub. Some may wish to use the **Propeller Hubs Plates** to draw lines around the hole as reference lines to carve to as well. **Carving Tips:** Now and then run the blade through a candle, the wax will lubricate the blade for easier carving. The upper half

of the blade from the center to the tip will do most of the carving. Use short slicing action cuts removing just small amounts of wood at a time being sensitive to the wood grain direction.



When close to the finished surfaces carving with the blade, switch to a half round needle file and file smooth and blend the surfaces and use the curved side of the file near the center for the blending. Check for balance using a small drill bit and remove wood from the heavy side. See the picture below. Finally, using fine sandpaper sand all the carved surfaces and round the leading and trailing edges maintaining the laser cut profile. Once satisfied with the **Propeller** shape and finish apply **Clear Satin** to the blade and let dry completely. If necessary sand any imperfections with fine sandpaper (#320) to (#400) and reapply **Clear Satin**. Now apply the two (2) **Arial Labels** to the **Propeller Blades** 1-1/4" from the tip of the **Blades**. **Note** the orientation of the **Blade** and apply the **Labels** to the **Front** surface of the **Blades**. (Basswood to the front) Apply a final coat of **Clear Satin** over the blades covering the **Arial Labels**.

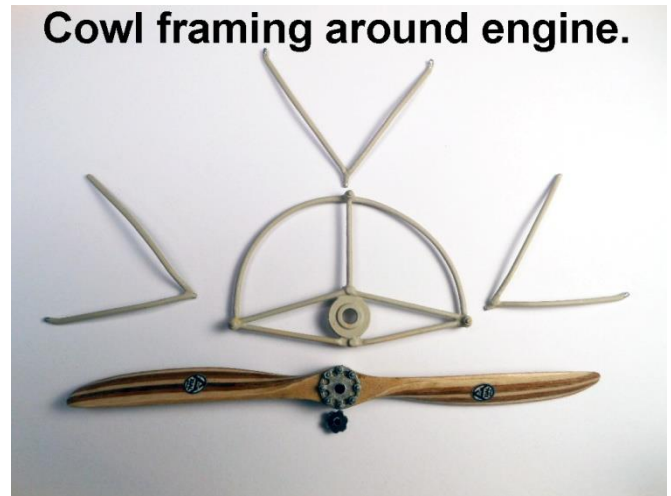


Glue the **Front Propeller Hub Plate** to the **Propeller** using a 1/8" drill bit for alignment. The **Front Plate** has the **Nuts** cast in place. The **Rear Plate** has the **Bolt Heads** cast in place on it and has a larger center hole that should slip onto the shaft of the **Cam Cover**. Check by fitting the **Rear Plate** to the **Cam Cover Shaft** and adjust if needed to fit. The wood of the **Propeller** must seat against the shoulder of the shaft on the **Cam Cover** for the **Propeller Nut** to fit properly. Tack the **Rear Hub Plate** to the **Propeller**, centered on the hole in the **Propeller** and quickly place on the **Cam Cover Shaft** and make sure the wood seats against the shoulder as described earlier. Adjust if necessary. Now apply

glue to the joint for a strong joint. Set the **Propeller** with **Hub Plates** in place onto the **Cam Cover Shaft** and tack the **Propeller Nut** in place to the **Front Plate** using the shaft to locate the **Nut** as seen in the picture below. Then remove the **Propeller** from the shaft and glue the **Nut** in place permanently. **DO NOT GLUE** the **Propeller** to the **Cam Cover Shaft** yet. Index the assembled **Engine** onto the **Crankshaft** without the **Propeller** if not done already.



**Propeller nut glued to hub.**

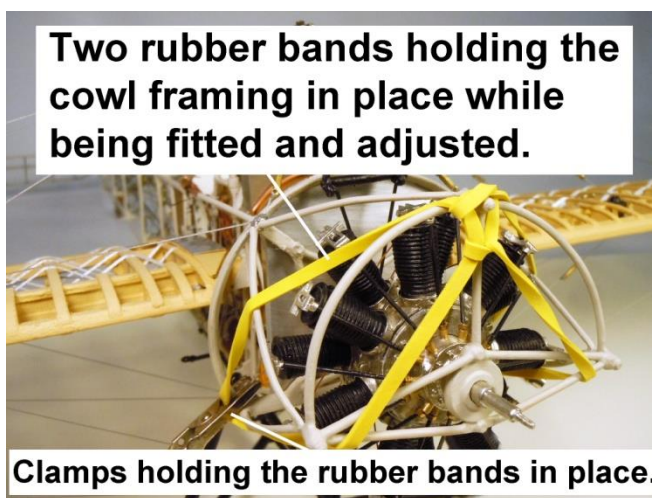


**Cowl framing around engine.**

**Cowl Framing:**

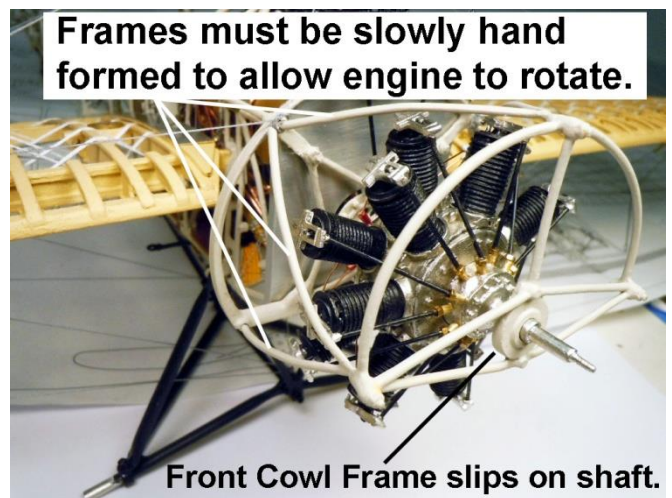
Gather the following **Cowl Framing** parts: **Front Cowl Frame** (1); **Left Side Frame** (1); **Right Side Frame** (1); **Top Frame**. See the picture above. Carefully and slowly bend and form the **Cowl Frame Parts**; **Top Cowl** and two (2) **Side Frames** such that the **Engine** will rotate freely. This adjusting and forming will require several trial attempts to finally get a correct fit.

Position the **Front Frame** in place indexed on the **Cam Cover Shaft**, and hold parallel to the **Fuselage Cowl Frame**. Index the **Top Frame** into the three location sockets; two on the **Fuselage Cowl Frame** and one in the **Front Cowl Frame**, now fit both **Cowl Frame Sides (left and right)** and hold in place using two rubber bands linked together so as not to exert too much pressure on the **Frames** and allow for removal to adjust. See the picture below.



**Two rubber bands holding the cowl framing in place while being fitted and adjusted.**

**Clamps holding the rubber bands in place.**

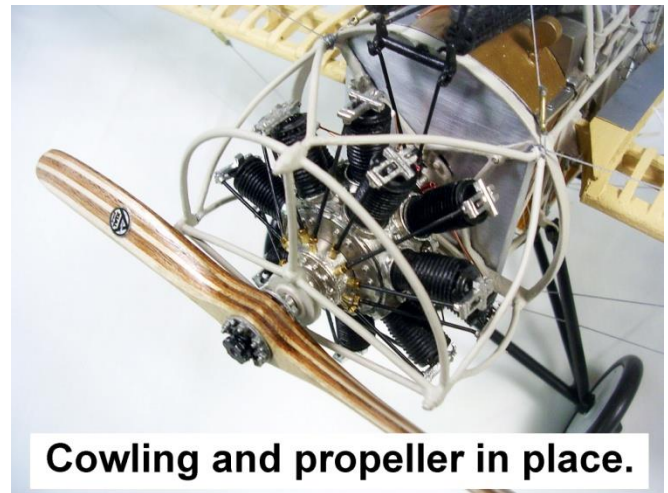
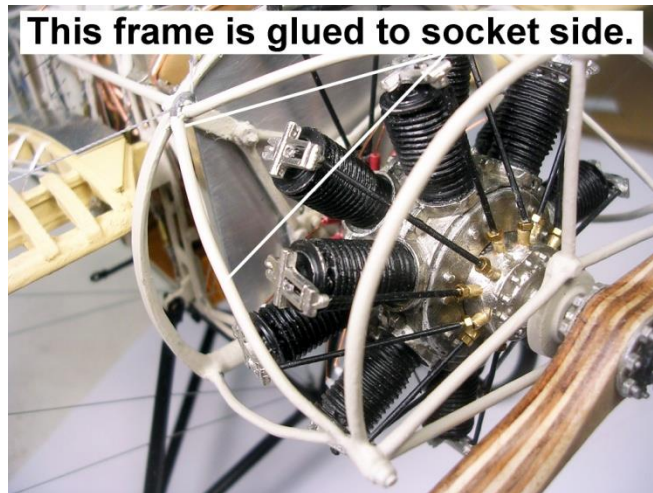


**Frames must be slowly hand formed to allow engine to rotate.**

**Front Cowl Frame slips on shaft.**

Adjust the three **Cowl Frames** until the **Engine** can rotate freely then glue the **Top Frame** in place first and allow the glue to set. Next, adjust the two lower **Frame Members** on the two **Side Frames** with their ends in sockets and glue in place making sure the diagonal **Frame Member** is close to the joint of

the **Top Frame**. Finally, glue the curved diagonal **Frame Member** to the side of the socket that the **Top Frame** is glued into. See the picture below. Test the **Engine** to make sure it rotates freely without hitting any of the **Frames** and adjust **Frames** as needed.

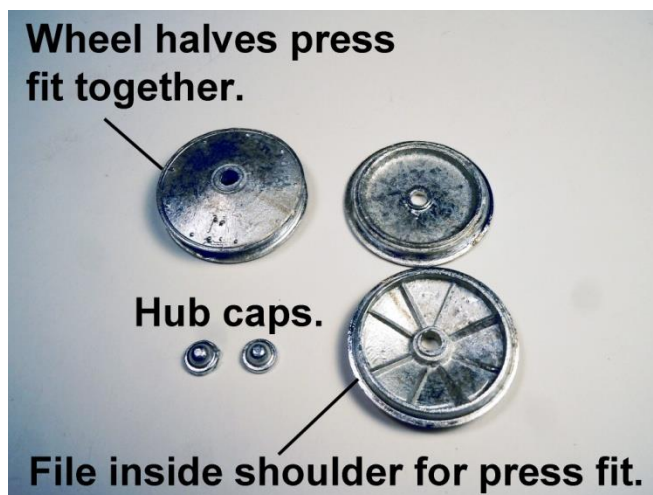


Add a drop of medium CA to the side of the **Cam Cover** shaft and slip the **Propeller** in place on the shaft making sure that the **Propeller** is completely seated against the shoulder of the shaft.

#### Wheels:

To assemble the **Wheels** gather the cast metal parts: **Inner Wheel Half** (2); **Outer Wheel Half** (2); **Hub Caps** (2). Test fit the **Inner** and **Outer Halves** for a press fit. Check the center line to make sure both parts are fully seated together. If not file the shoulder of the **Outer Half** until parts fit. While press fit together, use a small round file to file the **Tire** seat for any burrs or mismatch.

Prime and paint the **Wheel Halves** and **Hub Caps** colors of the builder's choice. The **Parts Layout Color Guide Plan Sheet** shows several authentic color schemes for the **Wheels**. When the **Wheel** paint is dry, press fit, and glue the **Halves** together with the **Tire** in between and trapping the **Tire**. Now index the **Wheels** onto the axle shafts and then very carefully glue the **Hub Caps** onto the ends of the axle shafts to retain the **Wheels** to the axles. The **Wheels** should be free to rotate on the axles. See the picture below.



The Eindecker IV model should now be completed and time to enjoy the result of your building efforts.

