## *Table of Content*



The following attachments have to be considered integral part of the current Manual:

Jig construction: Fuselage – Wing – Flap – Aileron – Stabilizer, Elevator- Fin- Rudder:

Production cycle: Fuselage Structure, Overturned Fuselage;
Half-wing- Small spar wing;
Tank;
Flap;
Aileron;
Stabilizer;
Elevator;
Fin;
Rudder-Counterbalance(same applies to the elevator);
Complete wing.

QBK assemblage

Flight Manual: This one will be provided as a draft and its final version including the chapter referring to the centering, are full responsibility of the amateur build, as its correct completion is the result of the selected engine, instruments and system which are going to be installed.

## *INTRODUCTION*

The approach of homebuilt aircraft or "Experimental "allows everybody to fly recreational or if required educational aircraft. This of course does not mean that the construction of the aircraft does not need to follow strict security standards, one of these (assuming that the aircraft was built correctly)is the correct maintenance of the vehicle during its operational life.

Aviation authorities allow homebuilt aircraft and expect that 51% of it is manufactured by the amateur build/pilot so that he is capable in the future to guarantee a correct maintenance and the authorities are sure that it was performed correctly.

The project you are about to start is going to be at the end a series of results that you will achieve. Sometimes it will make you angry, happy, hyper-excited or frustrated. You will plan scheduled that you might not be able to keep, but

at the end you will be satisfied and rewarded of what you were able to realize.

If you decide to go for a homebuilt aircraft we assume that you already know the basics of how to work some materials like aluminum or fiberglass. Therefore these instructions will help you during the assemblage and the construction of your aircraft to reduce the building time which depends also on the individual construction skills.

Our manual provides basic instructions on how to perform some works on the aluminum, like cutting, bending or riveting and about the tools required, but caution that these information cannot be taken as exhaustive on this subject therefore we invite the builder to stop at any doubt and to carry on only when he is sure to have obtained the necessary information (you can also benefit of Flying Legend videos and pictures).

## *Manual Overview*

Flying Legend strongly suggests to follow the instructions of this manual as any dissimilarity or private initiative taken unilaterally can compromise or alterate the original project and cause security issues on the aircraft.

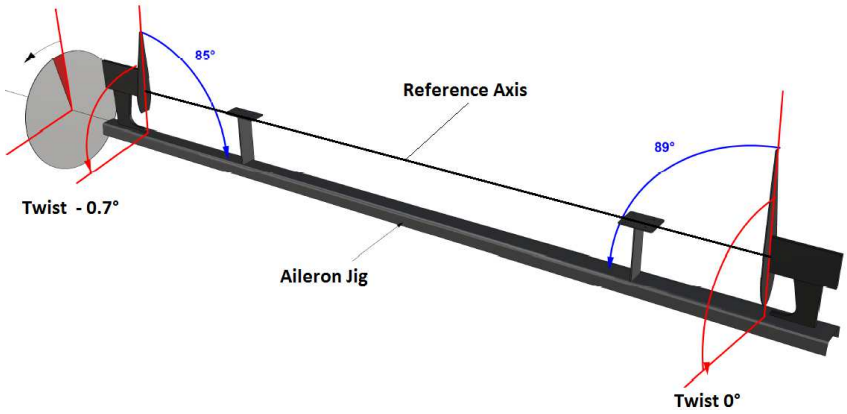
The amateur build is the solely responsible of unilateral actions not noted on our manual and not authorized in writing by our technical team.

A technical background is not necessary to be able to understand the drawings as the manual is completed with graphic representations and pictures and every single item has its own code making it easy to be identified by the final user.

Our Manuals are mainly divided in three groups:

1st group: Jigs realization

The production cycles of every single item being part of our aircraft have been realized by hypothesize each of them (like flap, aileron, and also wing and fuselage) on an imaginary level, and therefore we have taken as a construction reference some axes which mainly correspond to the spars and to the rib swhich are at the far end of each item like:




Within this Manual we will also supply the jigs drawings including pictures of our jigs which have been realized in our plan… of course our jigs have been realized in steel which is the material that we usually manage, however you can easily realize yours in wood material as long as the reference axes and distances comply with the ones provided.

2nd group: Realization basic and advanced KIT;

It includes a general description of the necessary operations to be able to perform them correctly on the aluminum and on the single items of the kit like fuselage, empennage, wings and so on. In this way they are ready to be painted. The chapters are unconnected and they do not follow a layout to be attached to this introduction.

3rd group: Realization QBK (quick build kit)

This manual refers to the final assemblage of the aircraft and also includes the basic hydraulic, fuelling, electric systems for a correct installation of a Rotax engine.

The builder will stay in touch with FL through the whole assemblage process and inform FL about the type of engine and the instruments which have been installed/or the ones that he wishes to install on the kit, and especially he will SEND the aircraft weights once it is finished and before, of course, the first flight.

In case Flying Legend is aware of serious modification on any item of the kit that may cause doubt on the airworthiness of the aircraft, it will communicate them immediately through Service Bulletin (SB) to its customers.

## *Required Tools*

Our kits have been realized and structured to reduce to a minimum the expenses required to purchase the essential tools to be able to assembly the aircraft. Therefore little and simple tools are required like hand battery drills, screwer, cutter, electric or air rivet gun, little air compressor, bench grinder - (required to reduce the amount of work)etc. etc.

Also, in order to help the builder during the assemblage phase, we opted for blind rivets and not solid rivets (however if the builder wishes to use solid rivets for example during the skin application, it is feasible but of course it has to be discussed before with the technical dpt. which will instructthe builder about the blind rivets which can be replaced with solid rivets).

Below a list of equipments:

- Air compressor 100 lt (20 gallons)
- Air drill/Battery drillwith accessories:







- Belt sander:


- Cleco pliers and accessories:



- Spring clamps and C-clampsof various dimensions




And other tools like heavy soft faced hammer, masking tape, metal sheet cutter and scissor, belts, hole finder, etc. etc.

Several order tool houses offer already tool kits to construct and assembly “experimental” aircraft.

These pictures are pure indication, more details can be required directly from the suppliers.

## SUGGESTED TOOL QUANTITY

### Various

| | | |
|---|---|---|
| 1 | Hemostats | |
| 1 | locking pliers and pliers set (duck bill - alligator - 45° - 90° - etc.) | |
| 4 | locking Clamp 6” | |
| 1 | machinist squares | |
| 1 | Aviation snip | |
| 1 | pencil deburring tool | |
| 1 | Needle file set | |
| 1 | leverage diagonal cutter | |
| 1 | point socket set | |
| 1 | safety –wire pliersand safety-wire | |
| 1 | calipter | |
| 1 | locking hand seamer | |
| 2 | wrenche set (mimimum 2 for 3/8 and 2 for 7/16) | |
| 1 | hex key set | |
| 1 | screwdrivers set | |
| 1 | small Mallet set (nylon and metal) | |

### Clecos

| | | |
|---|---|---|
| 400 | Clecos 3/32" | |
| 300 | Clecos 1/8" | |
| 100 | Clecos 5/32" | |
| 20 | Clecos 3/16" | |
| 20 | Cleco Clamps -1" | |
| 2 | Cleco -Pliers | |

### Palm drill and accessories

| | | |
|---|---|---|
| 2 | Palm Drill | |
| 1 | Angle drill (45°/90°) | |
| 1 | kit cobalt jobber bits | (minimum 5 for 3/32” - 5 for 1/8” – 3 for 5/32” – 2 for 3/16” –3 for ¼”) |
| 2 | chucking reamers | (1 for 3/16”and 1 for ¼”) |
| 1 | punches kit | |
| 1 | rivet removal tool | |
| 1 | cone drill bit | |
| 1 | cylindrical rotary files (1/4”) | |
| 1 | hole finder set | (minimum 1 for 3/32” – 1 for 1/8”) |
| 1 | counterskins kit | (minimum 1 for 3/32” – 1 for 1/8”) |
| 1 | drill stops sets | |

### Dimpling/Riveting

| | |
|---|---|
| 1 | Hand squeezes with 3” |
| 1 | dimple die set (3/32” and 1/8”) |
| 1 | bench-top riveters(optional) |
| 1 | Hand rivet gun |
| 1 | pneumatic pop rivet gun |

## *GENERAL INFORMATION ABOUT CONSTRUCTION*

The information provided with your kit are indications about the correct building procedures, however the correct execution of work is the result of the skills and experience of the user, therefore if you are unsure in how to complete a specific work, look for help from knowledgeable people until you are confident to be able to complete the job in a safe manner.

***Aluminum protection through Primer***

The material used to build the items of our aircraft are from different types:

Aluminum 6061-T6 used for the ribs/bulkheads, Aluminum 2024-T3 for the Skins and the load bearing structure, Steel cr/mo 4130 for the welded parts.

All materials will corrode with the time especially if they are kept in a salt –air environment, therefore protect them is a must through the use of adequate primers which can be supplied as an optional either liquid which has to be sprayed with a gun (suggested if you need to protect large batches of parts) or as aerosol primers they are used on small items. A brief description on how to apply it will follow below:


or similar

Push roads have to be protected internally as well. The easiest way is to clean the internal part with some schotch brite and then pour some catalyst liquid primer, and leave it to dry as suggested on the product instruction.

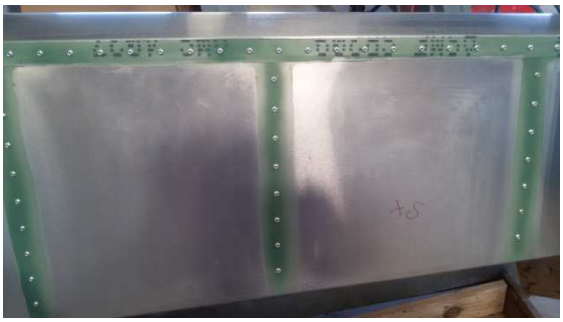
Of course fuel and brake lines do not have to be protected with primer otherwise they won't work correctly and can be very dangerous.

All the parts assembled by Flying Legend are already coated in our plants. The remaining parts which instead are managed by the builder, it is suggested to treat them with a thin layer of primer especially on the surface of two different materials (like rib/skin) or close to the holes which have to be riveted:

Clean carefully every item which will be treated with primer by using some schotch brite and subsequently some neutral thinner, dry them, if necessary use some paper. Check that no felt tip pen or pencil marks remain and then apply the primer in a well ventilated area and in a free dust environment and leave them to dry.

NB. We suggest to mark with extra fine point pen and not pencil as the lead can cause corrosion on the aluminum even if accurately cleaned with thinner or schotch brite.

Threaded parts, bearings and road end bearings have to be treated to avoid that they do not work correctly.

CAUTION: ANY PRIMER WORK HAS TO BE PERFORMED IN A WELL VENTILATED AEREA AND WITH THE ADEQUATE TOOLS (like approved respirator suitable for painting). CHECK CAREFULLY THE EXACT PRECAUTIONS AS LISTED ON THE PRODUCT.

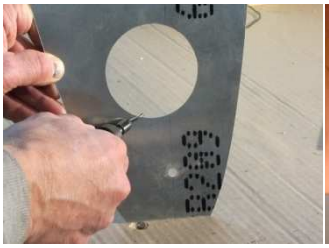
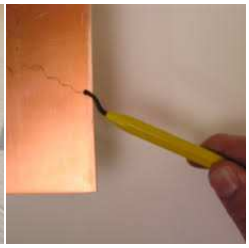
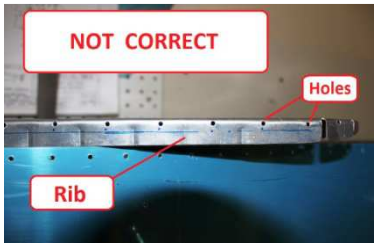
***Sanding metal sheet body (edge finishing and scratch removal)***

The fundamental nature of the aluminum 2024 T3 is its hardness and its fragility, therefore it has to be worked carefully especially during bending, cutting and finishing operation:

If the bending is performed with a radius not adequate to the thickness (which has to be three times the thickness of the aluminum) a scratch may occur. They can so tiny, almost impossible to see, but very dangerous with the time.

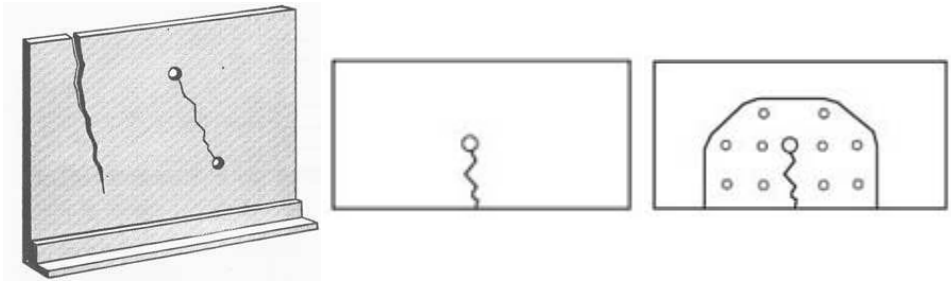
The same applies to any shearing and edge finishing which may present little burrs (like a hacksaw blade). The best way to check if the edge is smooth enough is to run a finger on it by being very careful as the blade can be very sharp.

Holes should never be too close to the edge or to any aluminum fold (the minimum distance between edge/fold has to be three times the diameter of the hole). Every surface sheared, drilled or scratched has to be sanded (rounded off or smoothed) in order to avoid any further dangerous scratches.

It is always suggested a last finishing procedure with some schotch brite or very thin sandpaper.

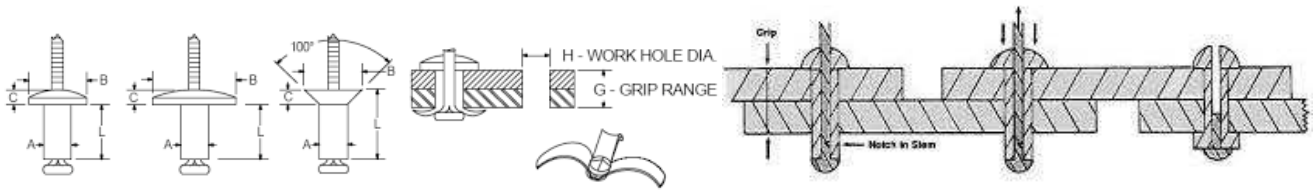
In the unlucky case that a scrach occurs on the aluminum, it is possible to stop it by performing a little hole by using a drill bit of 0.039”(#61).



***Riveting***

Kit structural parts where solid rivet have to be applied are already assembled by Flying Legend, therefore the builder has to apply only blind rivets or Pop rivet as they are commonly known. These rivets, with different materials and length, are applied by using a pneumatic/hand operating puller which expands the blind ends of the rivet and snaps off the mandrel.

This system reduce assembly time compared to the use of solid rivet.



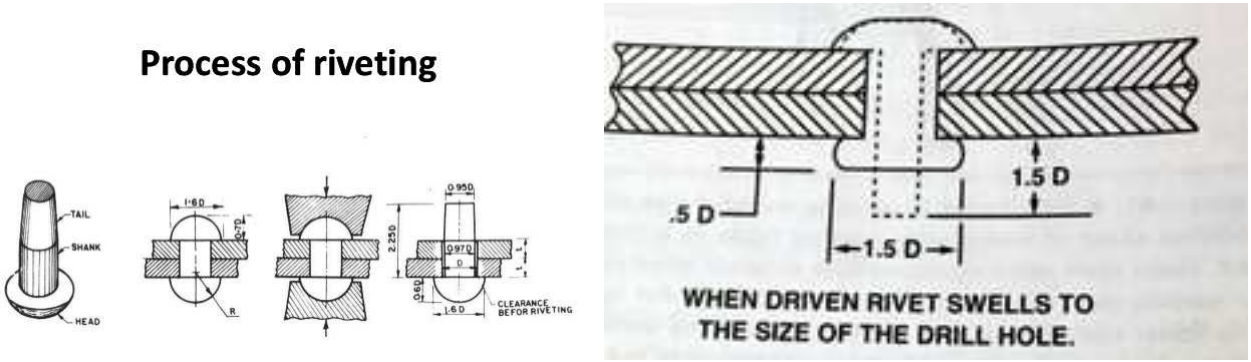

While assembling your kit you need to follow the building/assembly checklists which specify the type of rivet to be used. It is also important to check always the rivet box stating the rivet diameter and the GRIP.

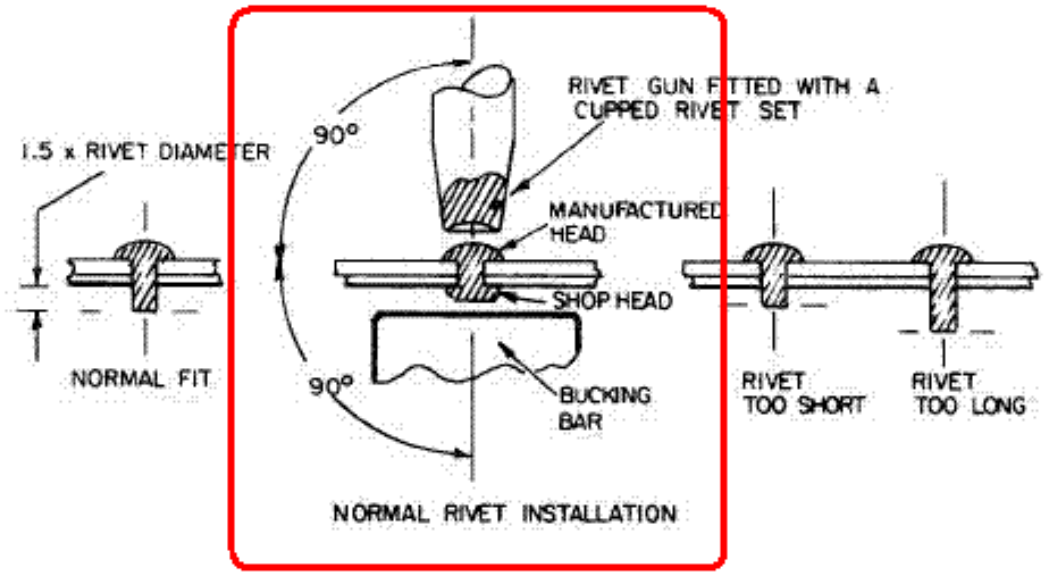
In case you would like to replace the blind rivets with solid ones, please contact Flying Legend who will authorize you in writing and indicate you which type of AN to be used.

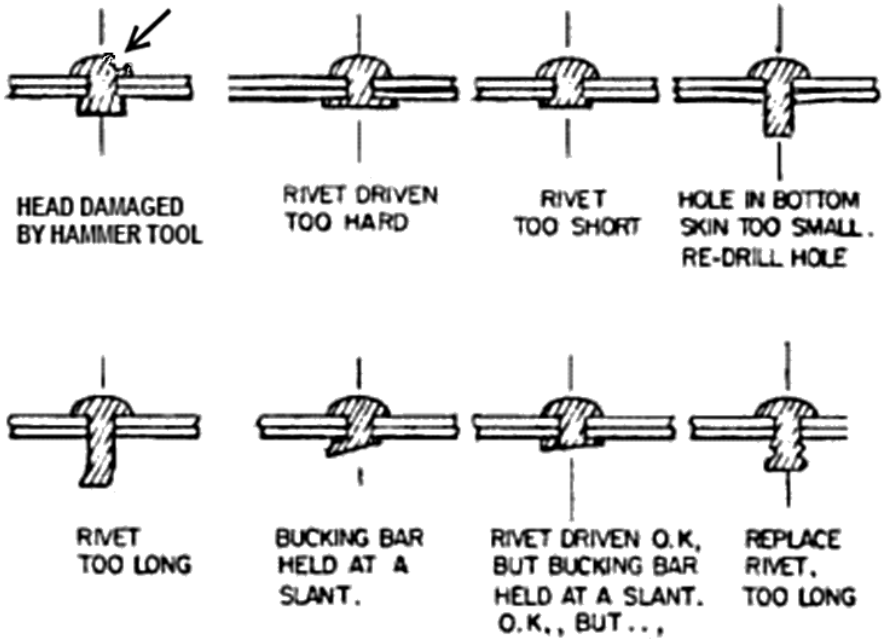
Solid rivets are applied with high setting pressure, requiring a heavy duty rivet gun against a bucking bar.


Solid rivet have to be applied properly, many aluminium manuals provide a complete education on this subject

We would like to suggest: "A&P TECHNICIAN AIRFRAME TEXT BOOK of Jeppesen" or similars.



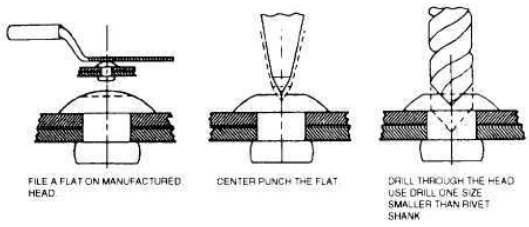



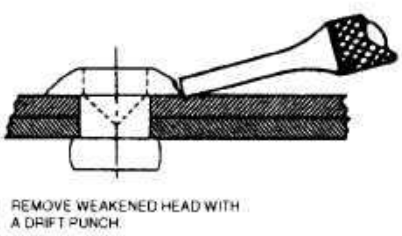


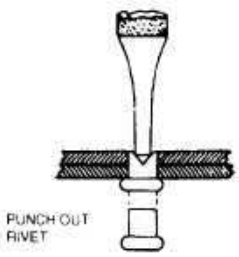

***Removing Rivets***

If pop rivets or solid rivets are not applied correctly, please do not panic as they can be se safely removed without damaging the aluminium body.

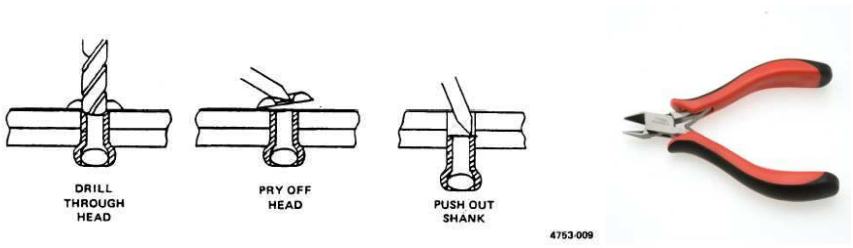
If the rivet has to be removed from thinner material, please be extra careful in order to avoid to ruin it. The suggested manual(to be bought - A&P TECHNICIAN AIRFRAME TEXT BOOK of Jeppesen)guides you in a simple but efficient manner to remove the not correct assembled rivets.



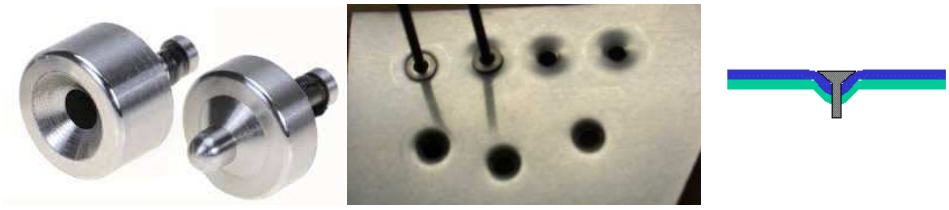
The same procedure can be used on the pop rivets, the shop head can be then pried off with the help of a leverage diagonal cutter by rotating the head from one side to the other.



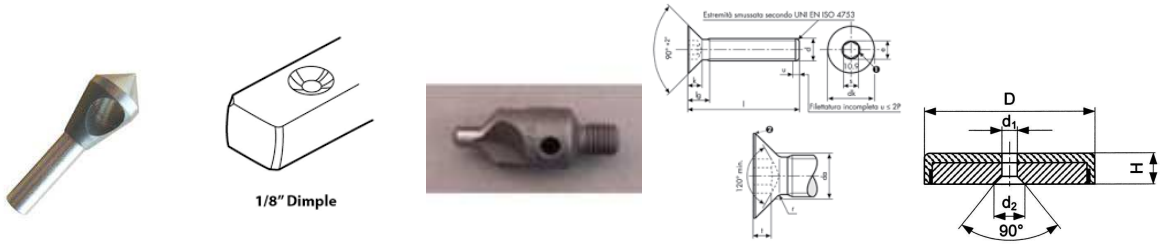

***Dimpling - Countersinking***

Another important work is countersinking and dimpling, which allows bolts and rivets to be aligned with the the top sheet.

Before starting wheterver to countersing or dimple, it is very important to check the tickness of the material to be joint. If we would like to countersing the wing skin, this has a tickness of 0.5 mm (.019) and therefore cannot be dimpled, as no material can be removed as it will weaken the local structure, therefore it has to be countersunk together with the rib, which also can be damaged if material were removed being its tickness 0.6mm (.024). The The tools used to countersink vary according to the hole diameter (our aircraft use mainly 0.32 mmand some 2.4mm) as they are depicted:



The dimple procedure removes burr and can be applied on ticker material. However attention is required about the inclination angle of the bolt or rivet head.



## *FINAL CONCLUSION*

Our are general indications and therefore we suggest the final user to gaher all the necessary information to be able to perform the job correctly.

In our production schedulde we will always specify when it is necessary to drill, to shear, to countersink and so on and also which type of rivet, bolts, bearing has to be applied and how to apply them.


It is also important to garantee the maximum adherence between the skin and the ribs during the riveting procedures to avoid waves. We usually suggest (as written in our production schedulde) to cleco the whole item, ispect the skin extension, and then start rivetting. If deformation may occur, metal strip are applied between skins and ribs to level off.

While applying rivets along the edge of sheared metal sheet, some deformation may occur on the external edge. Therefore we suggest to do a little fold on the edge which can be done by using specific tools or with a little cut on a piece of wood where the metal sheet will be positioned.Then with a little pressure we wil pass it through the edge itself in order to garantee homogeneity and a better aesthetics.



The production schedulde will follow as:

| | |
|---|---|
| Wing | spar – undercarriage dpt – flap – ailerons |
| Fuselage | spar – central box – structural fuselage – fusoliera capovolta – luggage dpt – parachute dpt (optional) |
| Empennage | fin – rudder – stabilizer – half elevetor– trim |
| Flight control | elevator controls–flap controls – caileron controls– rudder controls |
| Fuel Tank | assemblage of aluminum tanks – bladder tanks |
| Canopy | glue or riveting |

And to assemble the single parts our QBK manual

***We can just wish you to have a lot of patience and determination… Enjoy.***