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# 1. Introduction

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Welcome to the family of Europa builders. The purpose of this manual is to simplify construction by giving a step-by-step explanation of every procedure. Building and flying an aircraft that you have built yourself is likely to be the most satisfying experience you will have in aviation.

Many builders would agree that the knowledge and satisfaction gained in just *building* an aircraft is worth the total cost of the entire project.

Building your 'Europa' wants to be an enjoyable experience so take a little time in creating a pleasant working environment. Your *workshop* is an important part of the project, you will be spending many hundreds of hours in it. Make sure that it is warm, light and comfortable. Paint the floor if it is concrete to stop dust, paint walls a light colour to reflect the light, add a few creature comforts like a radio and pin ups on the walls (aircraft of course).

Remember that on a cold, dark winter's evening when you are sat in your favourite chair in front of a warm fire watching T.V., the thought of going out to your workshop must be able to compete with this and win. I have known builders who have done no more than put a bench over the lawn mower and wire in a 60 watt bulb. The chances of them ever completing their project is immediately reduced by a factor of 10. Every hour spent in preparing your workshop will more than repay you in the months ahead.

There are two very distinct approaches that builders take towards a project such as this. The first approach is to hurry and rush the project along, constantly anticipating the actual enjoyment of flying the aeroplane. Builders who fall into this category typically start off with a big burst of energy and progress, but get easily discouraged because they keep looking too far ahead rather than taking it slowly and carefully concentrating on one step at a time. The quality of workmanship in this category will suffer unless the builder has a lot of previous experience. There is a definite 'frustration factor' which is normal here also. We typically find that the frustrated builders are the ones who really don't find any enjoyment in the building, but just want to hurry through the construction so they can finally have fun in their aeroplane. Although finishing the aircraft is certainly everyone's goal, and is ultimately the catalyst which keeps the project progressing, the *building* of the Europa kit can be just as rewarding as flying it, if the right attitude is present from the start.

The second approach (and the one which we promote) is for each builder to have the *desire* to learn as much as they possibly can about the airframe, power plant, and all the relating systems which make up the aircraft. If this desire is not there at the start, develop the desire as the project advances. The project should be something each builder wants to do in order to develop a solid sense of confidence in the airframe, and to develop more confidence in his or her abilities. If craftsmanship was never a strong point, then make it a goal to attain during the project. The important point to remember is: make the construction phase of the Europa project something you want to do and find some relaxation, reward, and enjoyment in doing. In the end, you will be an improved person for it and have a much better aircraft to enjoy.



Try to work on your project *every day* even if it is only reading a part of the plans or sweeping up your workshop, that way you will see that you are making progress week on week and you will maintain a momentum. Do try and contact other builders in your area, it is surprising how much help and support you can give each other.

Your Europa kit has been designed for the first time builder with no special skills being required. All parts that require machining or welding have been pre-fabricated. *Always study the instruction manual carefully* and do your very best work. Remember, the day will arrive when you are sat at the end of the runway ready for first flight and that is not the time to start having doubts about the quality of your workmanship.

Think of this manual as a staircase, that will take you by the hand in little baby steps up a mountain, the top of which is inhabited by a small band of people who have actually built and flown their own aircraft. See you at the top.

## Your workshop and tools

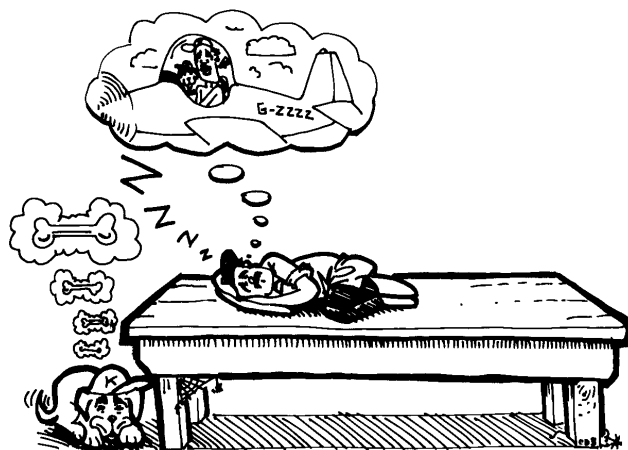
Europa can be built in a single car garage, you will ideally need a flat (not twisted) work bench 8' x 2'6" set at a suitable working height in the centre of your shop which you can walk around. This will be used for jiggging and laying up your fin, rudder, tailplanes, ailerons and flaps. It can then be moved to the side of your shop whilst you build your wings. Once these are completed you can suspend them from the ceiling or walls and store fin and rudder etc. under your bed, or hang them up in the house as a talking point for visitors. This will then leave your workshop clear for building the complete fuselage.

You will also require another small table or shelf to mix resin, hardener, flox, micro etc. etc. and a clean area for cutting lengths of glass cloth.

Have a thermometer and hygrometer located near to where you are doing your layups.

The workshop temperature should be no less than 20°C and, ideally, around 25°C.

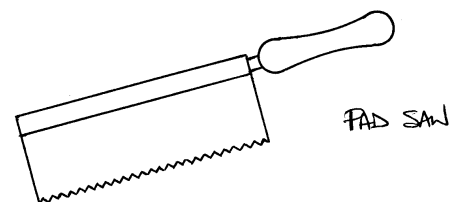
Humidity levels are also important; the relative humidity should be maintained below 70% maximum and below 60% for best results. These conditions should be maintained throughout the time it takes for a layup to cure.



A workbench 8' x 2' 6"

## List of tools required

- ☐ Tape measure - metric or imperial (dual scale is better)
- ☐ Pencils and marker pens
- ☐ Ruler and straight edge
- ☐ Saws - hacksaw, coping saw and pad saw
- ☐ Sharp knife and spare blades
- ☐ Level - minimum 24" long (a digital level is useful but not essential)
- ☐ Electric hand drill with 1/16", 1/8", 3/16", 1/4", 3.3mm, 4.2mm, 4.8mm, 10.2mm, 12mm bits
- ☐ 19mm (3/4") spade cutter
- ☐ Inspection lamp
- ☐ A.F. spanners 1/4" through to 3/4"
- ☐ 1/4" drive socket set
- ☐ Assorted screwdrivers
- ☐ Builder's line
- ☐ Assorted files
- ☐ Sanding splines - 6" and 18" long - make from wood
- ☐ 1 gallon or 5 litre steel container with a lid, for cleaning used brushes, squeegees etc.
- ☐ Home made or electronic scales - electronic scales should have a resolution of 0.5 grams, and a capacity of 500 grams. A resin mixing pump is very handy - remember that it should be set to measure by volume, not weight
- ☐ 20 1/8" Clecos (supplied)
- ☐ Hole saws dia. 10mm (3/8"), 19mm (3/4"), 44mm (1 3/4"), 54mm (2 1/8"),
- ☐ Rivet gun
- ☐ Several cheap 1/8" pop rivets (keep them separate)





- ☐ Inclinometer (home-made will do)
- ☐ Number 2 Swage-it tool or Nicopress swaging pliers
- ☐ 12mm x 1.75mm and 5mm x 0.8mm pitch taps with tap wrench
- ☐ Engineers square

## Some useful dimensions

### Spacers and Bushes

Part No.	O.D. (In)	I.D. (In)	Length (In)	Material
FL9	0.375	0.25	0.125	Phosphor Bronze
FL10	0.25	0.1875	0.28	Stainless Steel
FL12	0.25	0.1875	1.435	Stainless Steel
FL13	0.3125	0.25	0.56	Aluminium Alloy
FL14	0.3125	0.25	0.25	Aluminium Alloy
FL23	0.25	0.193	0.385	Stainless Steel
OR8	0.25	0.1875	0.5	Aluminium Alloy
OR9	0.25	0.1875	0.2	Stainless Steel
OR10	0.25	0.1875	0.7	Stainless Steel
W14	0.3125	0.25	0.725	Aluminium Alloy
W15	0.25	0.1875	1.35	Aluminium Alloy

### AN Bolts (UNF threads)

Dash No	Length (+1/32" -1/64")	
	AN3 and AN4	AN5
3	15/32	N/A
4	17/32	19/32
5	21/32	23/32
6	25/32	27/32
7	29/32	31/32
10	1-1/32	1-3/32
11	1-5/32	1-7/32
12	1-9/32	1-11/32
13	1-13/32	1-15/32
14	1-17/32	1-19/32
15	1-21/32	1-23/32
16	1-25/32	1-27/32
17	1-29/32	1-31/32
20	2-1/32	2-3/32
21	2-5/32	2-7/32

# Europa Technical College

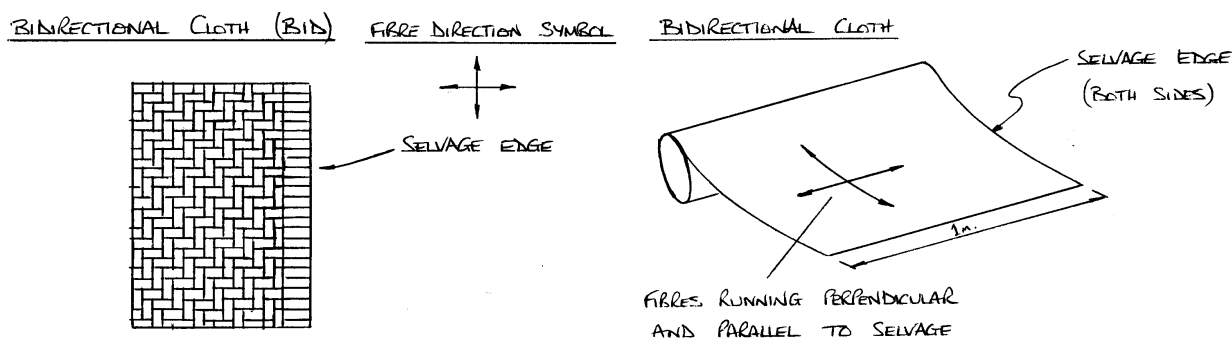
Throughout the building of your 'Europa' you will learn a great deal about aircraft construction and composites. Let us start off by looking at some of the materials that you will be using.

## Glasscloth

Glasscloth is simply a cloth woven from strands of glassfibre yarn. There are many different types of weave and weights of cloth. You will be using two different types.

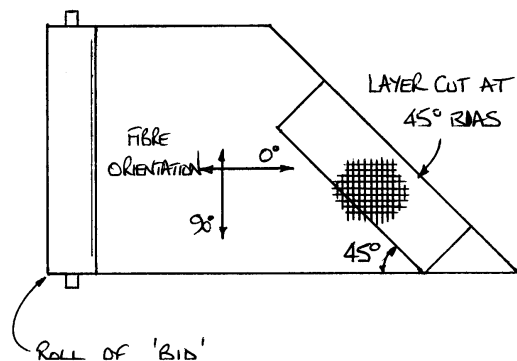
### 1. Bi-directional cloth or 'bid'

'Bid' is woven in a special way using a 2 x 2 twill weave which gives a herring-bone pattern to the finished cloth, the advantage of this weave is that it has good 'drapeability'. If you make a fist and drape the cloth over it you will see that it can alter its shape.



Because of these qualities we use 'bid' to get around those awkward shapes - ribs etc.

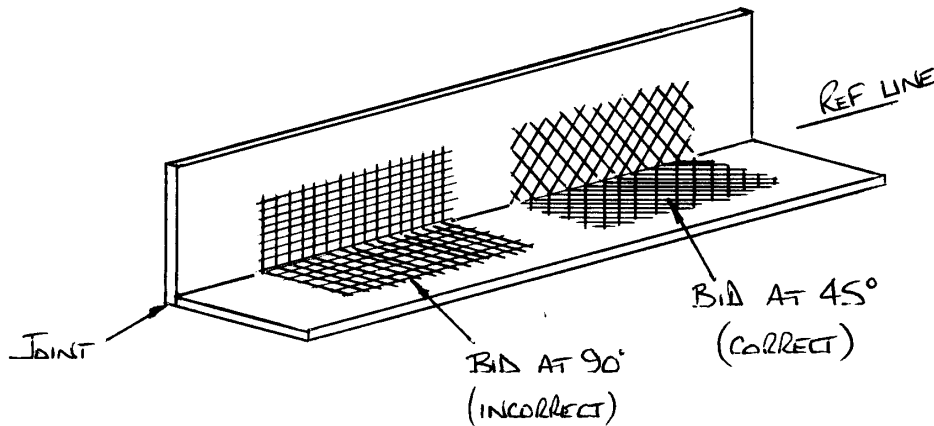
The plans often call out bid at  $\pm 45^\circ$ , this means that the cloth is cut and laid up on a 'bias'. The tailors or dressmakers amongst you will know all about this. For the rest of you it simply means that the individual strands of the cloth are laid up in such a manner that they lie at  $45^\circ$  to a reference line.





The advantages of laying bid at 45° are twofold:

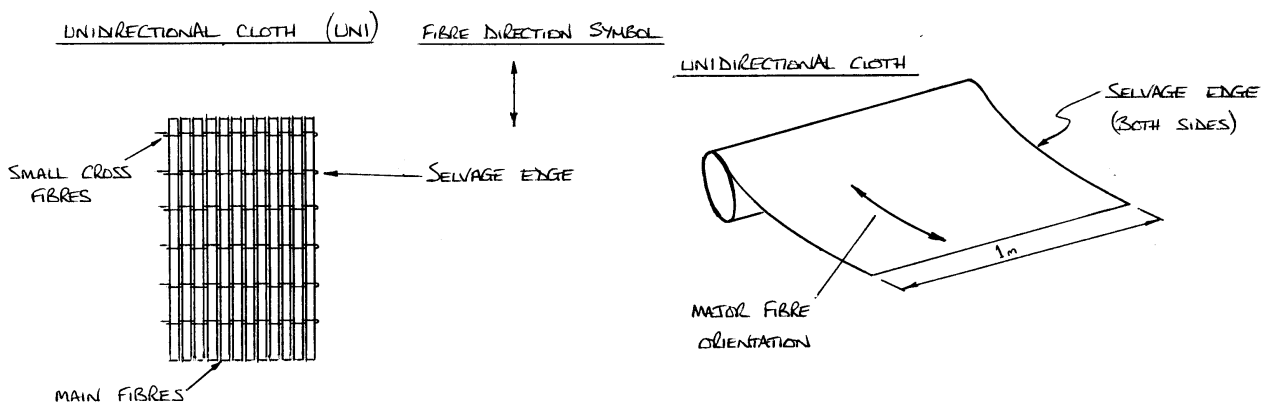
1. The fibres will go into a tight corner
2. All the fibres pass from one part to the other giving greater strength.



Cut a small piece of bid at 45°, 9" x 9" and see how easy it is to alter its length etc. and drape over a three dimensional object like a tennis ball.

## 2. Uni-directional cloth or 'Uni'

This cloth, as its name suggests, has 95% of its fibres orientated one way. One of the advantages of composite materials is that the designer can have the strength of a laminate in the direction desired. By inspecting a sample of 'Uni' cloth you can see that most of its strength is in one direction and this we use to our advantage when laying up wing spars and skins. You will also see that it does not have the same drapeability as 'bid' so would not be good for laying up intricate shapes.





Always store glass cloth in a clean, dry place.

## Epoxy Resins

There are many different resin systems each with their own advantages and disadvantages. There are several different systems used in the construction of your Europa. The complete footwell/forward bulkhead in the fuselage for instance uses fire proof phenolic resin, whilst a different system is used in the wing main spars. Epoxy, as called out in the plans, is made up from a mixture of resin plus hardener.

Resin + Hardener = Epoxy

The resin and hardeners use a mixing ratio, we recommend mixing by weight, and a sketch to help you make a simple balance is included on page 1-8.

Often a resin can be used with different hardeners - fast, slow, etc. - this refers to the curing or working time.

**Important:** *Think of your epoxy resin system as the resin being the bolts and the hardener being the nuts. Mixing to the correct ratio gives you exactly one nut for each bolt. Too much or too little hardener will make the epoxy weak and could seriously affect the strength of your aircraft. Take care when mixing epoxy, your life depends on it. A tolerance of  $\pm 1\%$  resin and  $\pm 2\%$  hardener is allowed.*

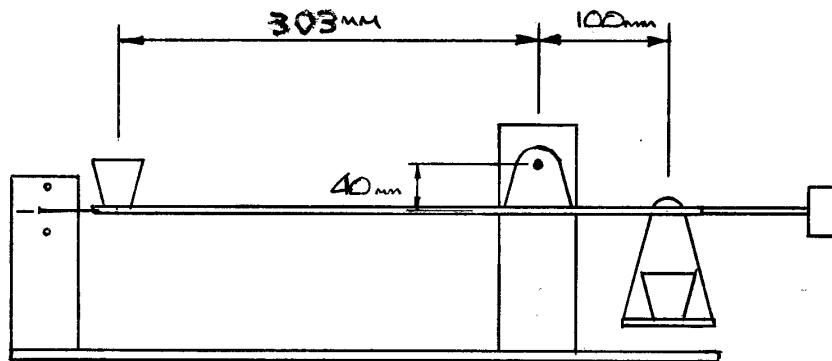
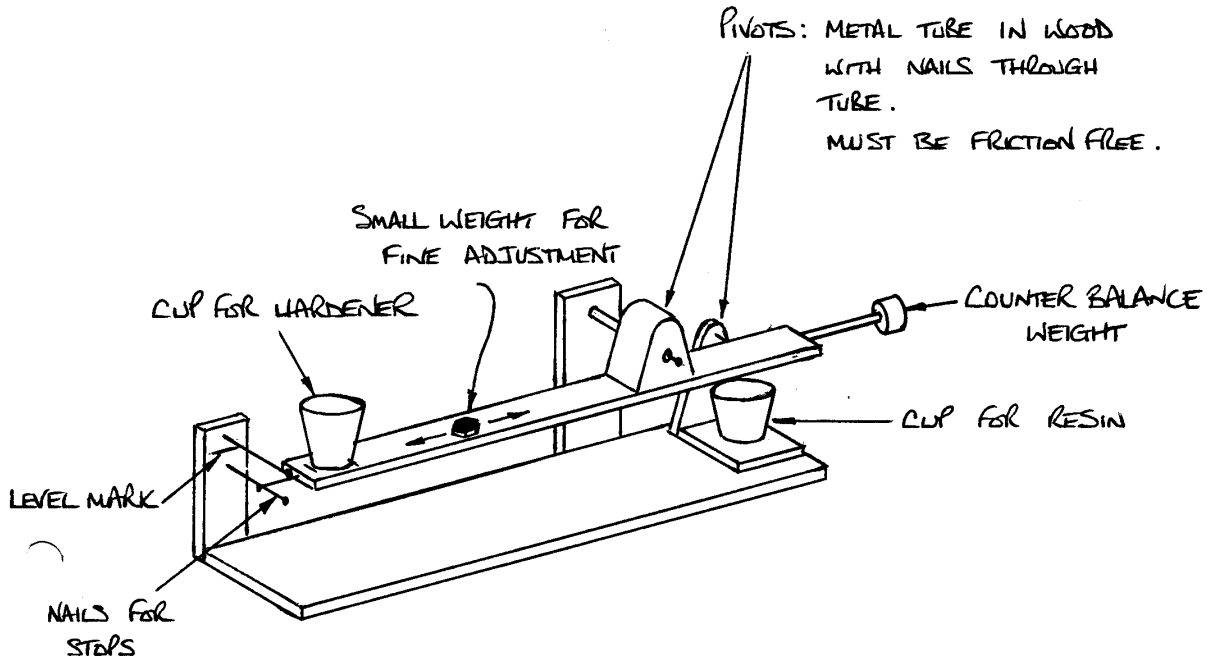
Your kit includes the SP Systems Ampreg 21 resin with standard and slow hardeners. It is important to use the correct mixing ratio which, by weight is:-

**100 parts resin to 33 parts hardener (100 parts resin to 38 parts hardener by volume).**

Use slow hardener for long lay-ups to ensure that the epoxy does not start to cure before you have finished work. When doing shorter lay-ups or micro-filling the skins during finishing use the standard hardener.

The balance simplifies weighing exact amounts. Always mix epoxy in small quantities e.g. 50-100 grams. The chemical reaction between the resin and hardener creates heat. If heat builds excessively then the epoxy will exotherm (the heat causing the epoxy to cure faster thus causing more heat etc.) and this is unacceptable. You can avoid this by (1) mixing resin in small quantities and (2) making sure that you use the correct hardener called out in the plans.

If the epoxy is spread thin as in a layup its curing heat will quickly dissipate and it will remain only a few degrees above room temperature. However, in a thick laminate or cup the low surface area to mass ratio will cause the epoxy to retain its heat, increasing its temperature. This results in a faster cure causing more heat.







Always mix your epoxy thoroughly and never use mixing cups that are coated with wax. You can re-use the mixing cups supplied after cracking out the epoxy after it has cured.

Your epoxy will work best if it is used at a temperature between 20 and 25°C. If left in a cold workshop it will become thick and not wet out the cloth easily. Remember that resin which has been cold soaked will take a lot of time to warm up again even if the air temperature in your workshop is up to the required level. For best results the epoxy, cloth and foam etc. should all be up to 20°C minimum, and this must be maintained throughout the curing time..

We have found that the best way to store your resin and hardener in Northern Europe is in a cupboard with an 8 or 10 watt electric bulb left permanently on, but check that the temperature of the resin is being kept at no more than 25°C. Check also that the shelf lives of both the resin and the hardener have not expired before you use them.

After thoroughly mixing a small cup of epoxy there are two other materials that you may add to this, these are:-

### **Flox**

This is flocked cotton and is used to add structural strength around metal or wood inserts and corners. Flox is added to the mixed epoxy until it is of the consistency of whipped cream, or it no longer runs or falls off the mixing stick. It should be neither runny nor dry in appearance.

When using flox to bond in a metal part, abrade the metal with 220 grit paper and paint with pure mixed epoxy (no flox) on the metal part first.

### **Micro - or microspheres**

This is a very light filler or thickening material used in a mixture with epoxy. 'Micro', as this *non-structural* mixture is called, can be mixed to form a 'slurry', about the same consistency as runny honey, or 'dry micro' to the consistency of double whipped cream - this will stand up on the end of your mixing stick and will not run or sink.

'Slurry' is used as a thin primer coat on the foam before laying up glass cloth and 'dry micro' is used as a light weight filler for dings or holes in the foam and to finish the wings etc. prior to painting.

There are two types of filler used in the Europa:-

1. Q-Cel. This filler is white and very powdery, (not fibrous as is the flox), and should be used for all filling operations where 'micro' is called for in the instructions, e.g. micro-slurrying the foam, and "dry" micro-filling dents and dings before lay-up. Q-Cel could be used for the final finishing process, but it is hard to sand.
2. Expancel. This product is not powdery as is Q-Cell but is possible to be squeezed into a ball as you would with snow or dough. Expancel is for use as an external surface filler for the final finishing process. It has properties generally similar to 'micro', but is much easier to sand.



## **Araldite 420 (previously known as Redux 420)**

This is a two component epoxy adhesive which is used for bonding various parts of the structure. The two parts are a yellow paste (Araldite 420A) and a blue liquid (Araldite 420B). These are mixed in the ratio by weight of 100 parts of Araldite 420A to 40 parts Araldite 420B. When mixed they form a dark green paste. More details concerning this product are given at the end of the Manual in Appendix B.

## **Rapid Epoxy**

This refers to the Araldite 2012 rapid epoxy system. You will be using it in small quantities throughout the construction of your Europa.

## **Bondo**

This is a term that we use for ordinary car body filler such as Isopon. It is a polyester filler that is usually grey in colour. We use it only for holding jig blocks in place and temporary fastening jobs. It has the advantage of curing very quickly. Bondo is not used in the structure of your Europa. It can be purchased from any car body repair shop. Unlike epoxy resin the curing time of polyester resin can be accelerated by adding more hardener.

## **Peel Ply**

Peel ply is used to smooth the transition from one 'layup' to another. A 'layup' is the term we use when glasscloth is laid up and wetted out with epoxy. The edges of a cured layup can be very sharp with small needles of cloth, these are very painful if you catch your fingers on them. To cure this problem we use 'peel ply'. Peel ply does not become part of the structure. It is laid up over the edges of a layup as the last ply. Once the layup has cured the peel ply is ripped off leaving a smooth transition. The peel ply in your Europa kit is coloured so that you do not forget to remove it.

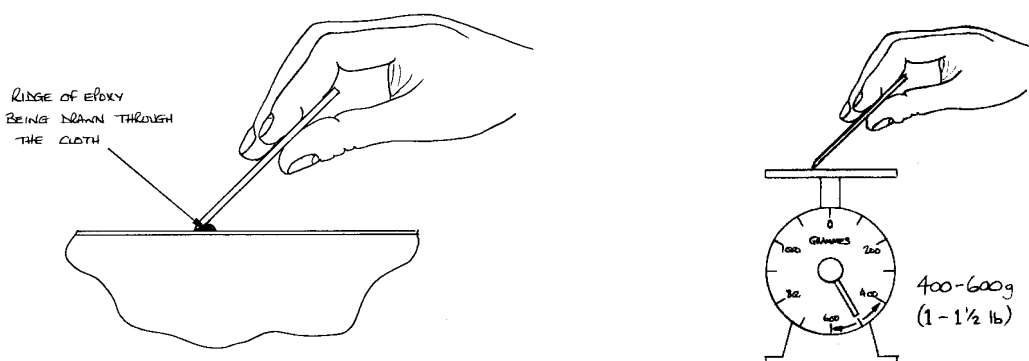
When using peel ply it is best to use it in 20-25cm (8"-10") lengths, overlapping each piece to ease their removal.



Peel ply, once removed, leaves a fine pattern on the cured laminate but it is still advisable to abrade the surface prior to bonding anything to it afterwards. Bonding to a cured layup requires the surface to be clean and free of grease, be it from your hands or elsewhere. Silicone based products are probably the worst for contamination as they are difficult, if not impossible to get rid of once present.

## **Squeegee**

A squeegee is simply a piece of plastic or rubber like a credit card that is used to apply and spread resin or micro. They are supplied in your 'Europa' kit. Your squeegee is a really handy and important tool. By proper use you can get the glass to resin ratio in a finished laminate just right. It can pull epoxy around and move it from wet or rich areas to dry areas.



Draw your squeegee over a layup at approximately 45° whilst applying a downward force of between 400 - 600 grams (1 - 1 ½ lb).

**Note:** Before using your squeegee on the aircraft get a feel for the correct force by practicing on your kitchen scales.

## Safety

Some of the chemicals that you will be using during your “Europa” project can be damaging to your health if not handled properly. Always use safe working practices:

- ❑ When sanding or laminating try to ventilate your workshop.
- ❑ Always wear protective goggles when using epoxy, sanding, drilling or riveting.
- ❑ Epoxy resin system can cause dermatitis if allowed to come into contact with your skin. We have found that the best protection when using epoxy is to wear rubber kitchen gloves with a pair of thin cotton gloves underneath. These can be bought from most large chemist shops. The cotton gloves stop your hands from sweating. Wash gloves with hot soapy water before removal.
- ❑ Do not use the very thin medical type gloves, these are porous to epoxy.
- ❑ You will need to purchase and store a small amount of either M.E.K. or acetone for cleaning out brushes and squeegees. This material is highly inflammable and should be stored in sealed metal containers. Do not allow M.E.K. or acetone to come into contact with blue foam or your skin. Acetone or M.E.K. can be purchased from any chemical manufacturers or suppliers. Look in the phone book for your nearest supplier.
- ❑ Equip your workshop with a small first aid kit.
- ❑ Read and obey the safety instructions given by the epoxy and adhesive manufacturers.
- ❑ Always wear a dust mask when sanding.



## Measurement definition

**Chordwise** = measurement from leading edge (L.E.) to trailing edge (T.E.) of wing, fin, etc.

**Spanwise** = measurement from wing tip to wing root, or tailplane tip to root.

When defining an exact point on an aircraft structure we use 'Water Lines' (W.L.), 'Fuselage Stations' (F.S.) and 'Butt Lines' (B.L.).

**Water Lines**, as their name suggests, are the level or horizontal lines through an airframe. W.L. 0. on your Europa runs through the centre of the propeller flange. Water Lines lower than this are negative and above this are positive. The leading edge of your tailplane is at W.L. + 4.6". That is 4.6" above our zero datum

**Fuselage Stations** are simply positions forward or aft of a datum point. The datum point on your Europa is 74.3cm (29.25") forward of the rear edge of the cowling/fuselage joggle, so the leading edge of the tailplane, for example, is at F.S. 159, that is 159" aft of the datum.

**Butt lines** are measured from the aircraft's centre line, so can be left or right. The tip of your port tailplane is at B.L.48L.

Refer to the general arrangement (G.A.) drawing for further clarification

**Note:** 1" = 25.4mm

## Educational layup

If you have never used composite materials before you are probably feeling a little apprehensive about starting the actual aircraft without first having a practice; well this is exactly what you are going to do next.

The 'Euro' wheel chock, described later in this chapter, has been designed to give you practice in:-

- ☐ Reading and understanding instructions.
- ☐ Cutting and shaping blue foam
- ☐ Mixing epoxy
- ☐ Using micro and flox
- ☐ Orientating and laying up 'bid' and 'uni' cloth
- ☐ Making flox corners
- ☐ Scissor trimming



- ☐ Using peel ply
- ☐ Final trimming

The wheel chock is more difficult to make than anything on the entire 'Europa' so once you have completed it you can begin your building with confidence.

Always make sure, before putting on your gloves to start mixing epoxy for a layup, that you have:

- ☐ cleaned the entire work area and the part to be laid up - an old vacuum cleaner is best for this.
- ☐ cut the cloth and have it neatly to hand.
- ☐ mixing cups, sticks, brushes and squeegees to hand.
- ☐ resin and hardener from the storage cupboard.
- ☐ peel ply cut into 20 - 25cm (8" - 10") lengths.
- ☐ acetone or M.E.K. bath to hand to put tools in once finished with.
- ☐ a cloth or kitchen roll to wipe up drips or spills.
- ☐ scissors - you need 2 pairs - one pair that is kept clean for cutting cloth in preparation for a layup and another pair that you trim the cloth on the job with whilst laying up.

Think of all layups as a medical operation, plan and think the entire job through before commencing, have everything to hand. If you find that you are having to find things half way through a layup, contaminating cupboard handles etc. with epoxy then you need to plan more thoroughly.

Place both flox and micro into handy containers (biscuit tins?) with a large spoon or measure in each. After each layup replace the lids to keep materials dry and clean.

When you have everything ready, including having the instructions opened at the page you are working on, then you are ready to put on your gloves and start mixing.

Take your time, do your best work and enjoy yourself.



## Main steps when completing a layup

### 1. Core preparation.

Make sure that the foam cores are smooth, there are no high spots, and remove any nibs from leading edges by carefully sanding with your 80 - 120 grit sanding block.

Make sure that any crumbs of foam are removed after sanding, a vacuum cleaner is the best for this.

### 2. Microing.

Firstly, fill any ding' holes in the foam core with 'dry micro'.

Mix epoxy and add micro to form a slurry (runny honey), pour the slurry onto the foam to be laid up and spread using your squeegee.

**Note:** *You cannot take too much micro from the foam, it is simply a covering to fill the pores of the foam.*

### 3. Applying epoxy.

Immediately after applying the slurry, brush on a generous coating of pure epoxy.

### 4. Laying on cloth.

Check ply orientation and place the cloth neatly onto the foam. If using 'uni' cloth, make sure that the main fibres are straight (not wriggling about like snakes). To straighten the fibres pull from both ends. *You will notice that the cloth starts to 'wet out'.*

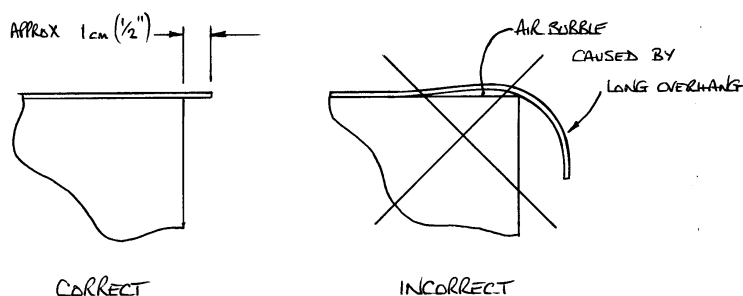
### 5. Wetting out.

Using your squeegee make several light passes to bring the epoxy up through the cloth. Use a 1" brush to add more epoxy where required and to get into any awkward corners.

**Note:** *When using 'uni' cloth always go with the main plies, not across them.*

## 6. Scissor trimming.

Trim the cloth with your dirty scissors to about 1cm ( $\frac{1}{2}$ " ) overhang of the foam edges. If you allow the cloth to overhang the foam by more than about 1cm, it will hang down and form a bubble near the edge of the foam.

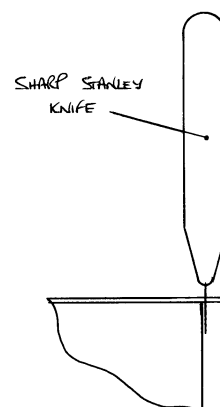


## 7. Peel plying.

Cover any transition areas with peel ply, making sure that you have a loose end or overhang to the peel ply so that you can rip it off when the layup has cured. Wipe off any runs or drips.

## 8. Knife trim stage.

When the layup has partially cured it becomes like stiff leather and this is the best time to trim the layup flush with the foam by using a knife. If you catch it at the right time it is as easy as cutting butter. You'll have a chance to experiment with the wheel chock you'll be making next to assess the best time to trim.



### One final note

Before leaving a layup, check the areas that are:-

too dry = white flecks or  
too wet = runny or glossy.

Any surplus epoxy is better in the waste bin than flying around as dead weight in your Europa for the next 20 years or more.

A layup that is just right should have a satin type of appearance.

Check the plans to make sure that you have completed all the layups, inserts etc. and ply orientation.

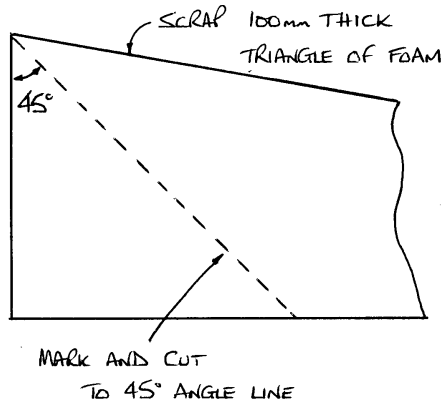
Now, without further delay, let's get on with the job in hand - the Euro Chock.



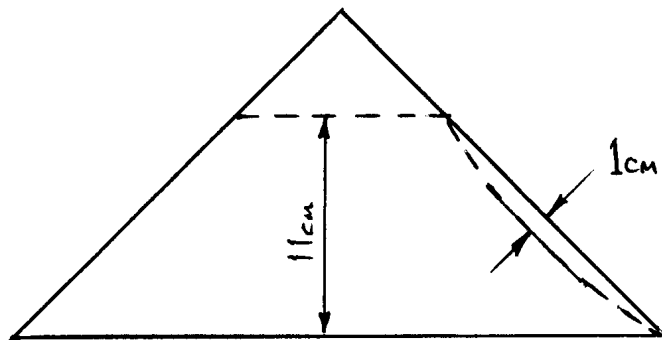
## THE EURO CHOCK

### Step 1

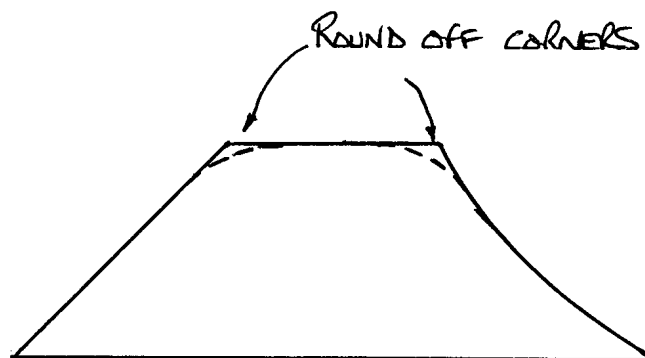
Find the triangle of scrap foam from the trailing edge of the rudder and using a felt pen, rule and straight edge mark the foam as below.



Using your pad saw, cut off the foam piece, then mark thus:-



Use a bandsaw or hacksaw blade and cut to shape.



### Step 2

Sand all edges *except* the base to a radius of approximately 3cm (1") using a small surform or 40-80 grit paper then clean off all loose chippings of foam.



### Step 3

To make life easier when laying up the chock it's best mounted clear of the bench. Hammer 3 or 4 long nails through a piece of wood, about 1cm (1/2") thick by about 15 x 10cm (6" x 4") (these sizes are not critical), place it on your bench with the nails sticking up then simply stab your foam chock onto them so that its base is a few centimetres clear of your work bench.

Cut 3 plies of 'bid' at 45°. Each piece needs to be large enough to drape over the entire chock. Plus 4 small patches 8cm x 8cm (3" x 3") at 90°.

### Step 4

Mix up a small quantity of epoxy and then add micro to make a slurry. Brush micro onto all sides of foam core and use your squeegee to scrape off any surplus from flat sides. You will notice that you cannot use your squeegee on compound curves. Next brush over the micro with a coat of epoxy.

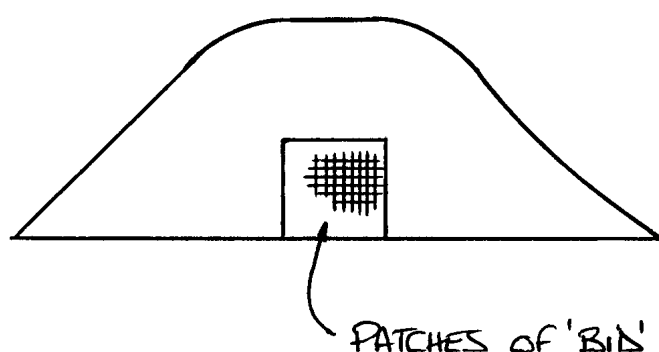
Take your first ply of cloth and drape it over the entire foam core so that the fibres are at +/-45° to its length.

*Take a **careful** look at the fibre orientation and don't be fooled by the way the light can make it appear to be at 45° from its true direction.*

Brush epoxy onto the cloth where required to wet it out. Trim the cloth all around the base to 1cm (1/2"), when this is completed lay up ply number 2, followed by ply number 3.

**Note:** Use pressure on your brush to bring any surplus epoxy up through the layup from previous plies before adding further epoxy.

Next add the small patches, 2 per side, in the area shown. You'll see how 'bid' cut this way falls apart easily if not handled carefully.



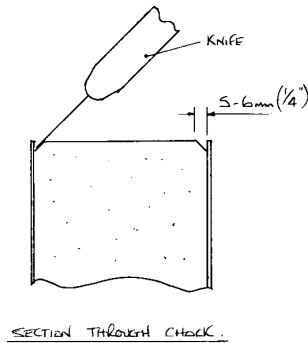
Once these are wetted out lay up short pieces of peel ply (coloured) over the joints to give a smooth transition - make these pieces long enough so that you have a loose end to peel them off after cure. After inspection for dry areas and ply number and orientation, allow a few hours for the layup to reach the 'knife trim stage' (layup becomes leathery), knife trim flush with foam around bottom edges and allow to cure fully overnight.



## Step 5

Remove the peel ply and, with your sanding block, sand the bottom edges flush with the foam.

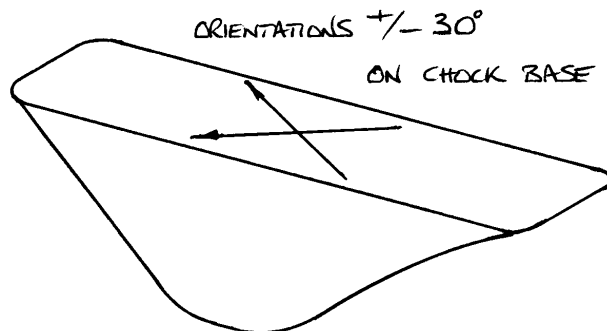
Take a razor sharp knife and cut out a 5mm (1/4") triangle of foam from all around the base. Don't cut into the skin though.



Cut 4 plies of 'uni' cloth to cover the base.

## Step 6

Mix up a small batch of flox (make this on the wet side) and fill up the triangular cut out in the foam, after this micro slurry the remaining area of the foam and then brush pure epoxy over the entire base. Lay up your 4 plies of 'uni' orientated  $-30^{\circ} +30^{\circ} +30^{\circ} -30^{\circ}$  to the length.



Scissor trim the edges to 1 cm (1/2") of the chock's sides, knife trim at the appropriate time and allow to fully cure before sanding them flush.

You are now the proud owner of a Euro chock.