Xair (UK) Construction Manual

The current copy of the British Microlight Aircraft Association (BMAA) Homebuilt Aircraft Data Sheet for the Xair HM1, is available to the builder.
This can be obtained from the BMAA at: The Bullring, Deddington, Banbury, Oxford. OX15 0TT Tel No 01869 338888

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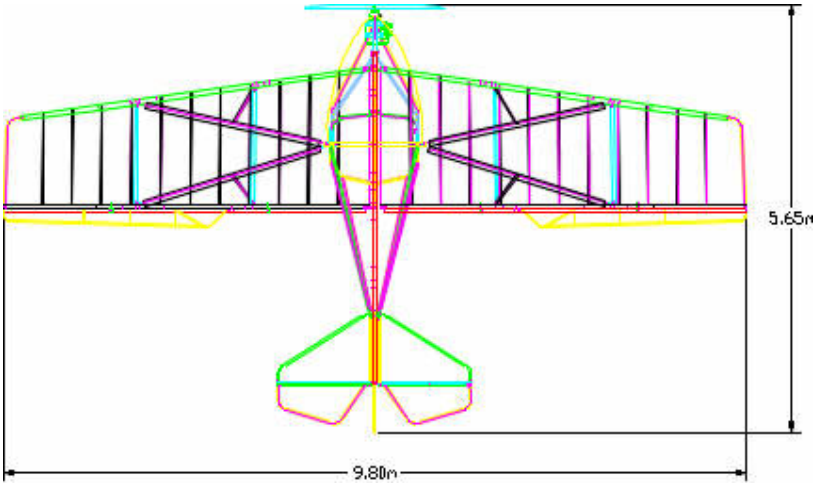
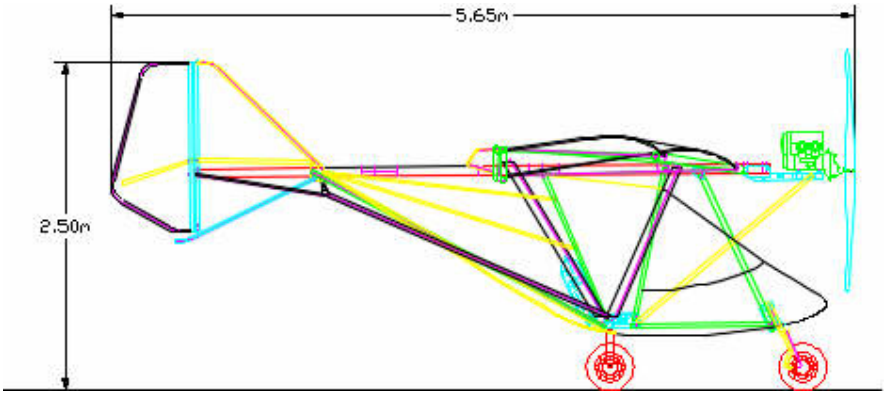
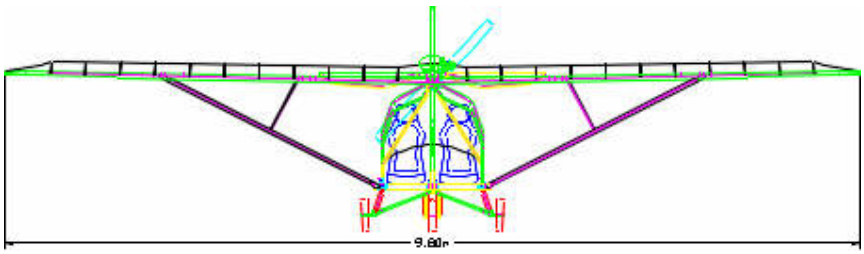
Aircraft 3 views







INTRODUCTION

This manual has been written from knowlage gained from constructing numerous aircraft and feedback from other constructors so is updated regular.

VERY IMPORTANT NOTE

Construction sequences in this manual may vary from what is shown in the illustration diagrams.
This Manual is to be followed at all times and is considered as being the correct method as the UK version has modifications applicable to it.

The manual has been used to guide the construction an aircraft, and is therefore offered in the confidence that it will supplement the set of diagrams from Rand Karl.
It is recognised that the skill and experience levels of builders will vary from those who have never built before to those who have constructed other aircraft. It is not possible to write a manual to suit all requirements, but it is hoped that the content level will be sufficient for the novice, and act as guidance for, the experienced builders

Purpose
This manual is provided, together with the diagrams produced by Rand Karl, for the purpose of providing guidance and information to the Kit Builder. This Text Manual is to be interpreted as correct and supersedes any other text shown elsewhere.

Scope

The Kit.
The scope of this manual is limited to the assembly of the kit purchased from The Wessex Light Aeroplane Company.

Amendments
Constructive comments to improve the manual are always welcomed The manual will be amended to incorporate improvements and other changes, such as new modifications. These amendments will only be incorporated in manuals issued to builders who buy kits after the amendments have been incorporated. It is not the intention to provide a service to maintain manuals for completed kits. These will be regarded as having served their purpose.

UK Modifications

The manual includes annexes that list both mandatory and optional modifications. The manual will suggest an appropriate point at which the builder should consider incorporating a UK Modification. The manual will not contain instructions on incorporating the modifications. These are contained in a supplementary book issued by The Wessex Light Aeroplane Company.

Section 1
UK Modifications

Notes.

1. Refer to BMAA HADS HM1 annexes A & B for the official list of mandatory and optional modifications.
2. The points at which UK modifications can be most conveniently incorporated are identified in the text at the appropriate stage

Paperwork Requirements

Upon receiving your Xair kit, various forms must be completed to register the kit.

1. Obtain form BMAA/AW/022 issue 3 from the BMAA. This is to register your kit as a homebuilt and get it's build No. The fee for registering is £30.00. You will then have to contact your local Senior inspector, as he has to sign this form to say that he is prepared to do the stage inspections for you.

2. Obtain form CA 1 050399 from the CAA registration office, this is to get it's registration letters i.e. G-XAIR (unfortunately it's on an airliner). The fee for an in-sequence registration is £45.00 out of sequence is £300.
   CAA Registration's Dept. Tel. 0171 - 8326044.

3. Upon completion of the project you will need a permit to fly which is available again from the BMAA. Fee £95.00

Note fees are a guideline only at time of print.

Section 2
Preparation & Inspection Stages

1 The first stage of inspection by the BMAA Inspector will include, amongst other things, an examination of the area prepared for the build process.

2 Before the kit arrives it will be necessary to prepare the construction area. This will include:

a) Ensuring that there is sufficient space for the fuselage and wings
b) Lighting levels are adequate
c) The area is clean and dry with protective packaging available on the floor, as items are unpacked.
d) The required tools are available

XAIR INSPECT10N STAGES

Stage	Description	Inspector's Signature	Date
1	Check kit paperwork including construction manual and current TADS. Confirm that no assembly has started and owner has checked all kit contents for condition and against the packing list. Confirm that workshop facilities are fit for purpose.		
2	Inspect assembled framework, undercarriage, floor cable runs and controls. Inspect Empenage, seats. fuel tanks and elevator torque tube		
3a	Inspect completed Fuselage, Wings, Tailplane (including all fabric), and Control runs		
3b	Inspect assembled and fitted engine, gearbox and propeller, Inspect all wiring and fuel line system		
4	Final inspection before flight including Range of movements, Engine installation checklist. Weight & balance report completed.		
5	All aircraft documentation (manual, logbooks, engine manual, other manuals and instructions) complete.		

Section 3
Unpacking

Notes:

1. It is suggested to put down some form of floor covering to provide protection to the tubing etc.
2. All items should be stored in their original packaging until required for use.
3. The use of a battery powered screwdriver is recommended to remove the screws which secure the lid on the wooden crates.

Unpacking

a) Position the long container in the construction area and remove the packaging list from the plastic pocket.
b) Carefully unpack the kit, noting and checking the contents against the inventory on the packing list.
c) Stow all items in a safe location where they will be protected from any damage during the construction process.
d) Note any discrepancies.
e) Move the empty container outside to ensure sufficient working space.
f) Position the remaining container in the construction area and remove the packaging list from the plastic pocket.
g) Repeat Stage b) and replace items in the container, or completely unpack as required.

Contact BMAA Inspector to perform Stage Inspection Number 1 and sign off

Section 4
Tools and consumables

Tools

You will need the following tools:

- Nylon or Rubber tipped hammer
- 7, 10, 13, 14, 17, 19mm sockets or ring spanners
- Pop rivet gun
- Drill and 4,5,6 and 8-mm HSS drill bits
- Screwdrivers, crosspoint and plain
- Various metric Allen keys

Consumables

- Loctite or similar thread locking compound.
- Nylon Lubricant (halfords)
- Silicone Spray

Some of the Additional Items you will need to purchase

- 1/8 inch or 3mm pop rivets. Qty 50 approximately
- UK Optional Modification Kit if required
- Battery Box (or make) Battery & Cables if required
- Black Armaflex Pipe Insulation 28 x 9mm (2 lengths)
- PVC or similar tubing for the Pitot / Static head (2 x 5m)
- Fuel Pipe (4m) and clips
- Fuel filter
- Fuel Cock
- Primer Bulb

Section 5
Airframe Assembly

We have found from Experience that the following sequence of assembly is easier and more streight forward, than shown in the picture manual, follow this text only.

Preparation. Identify the following items and remove their packaging. Carefully examine each item.
NOTE: If fitting an engine other than a Rotax 582 follow these instructions until this manual states otherwise.

Items	Part Number	Qty
Door Thresholds	111142C	2
Main Axle Assembly with fasteners	111	1
Engine supporting tubes with plug (drg n°10001)	138	2
Front roll bars with plug (drg n°10003)	139	2
Rear roll bar with plug and fasteners left and right	140	2
Tail Support Tubes	141	2
Floor tubes (drg n°10006) with plugs	142	2

a) Set these items to one side to prevent any damage.
b) Place the Main Axle Assembly (111) on a prepared surface oriented in the direction chosen for the build process.
c) Refer to diagram A1A. Install the two Door Thresholds onto the main axle, note you will notice the inboard holes on the threshold when installed do not line up with any hole on the axle, this is normal as they are a universal fit for both sides.

Fitting the Floor Tubes (142).

a) Refering to A1. After noting the positions of the bolts in the forward tube receptacles, remove the nuts, withdraw the bolts, and set them aside.
b) Position one of the Floor tubes (142) with the end fitted with a plastic blanking plug to the front. Insert the other unblanked end into starboard forward tube receptacle. Turn the Floor tube until the pre-drilled holes are aligned and insert a bolt ensuring that the threaded portion is inboard. Fit the nut finger tight.
c) Repeat this operation to install the Floor tube on the port side. Do not tighten the nuts at this stage.

Fitting the Engine supporting tubes (138).

Note. These tubes will need to be supported at the approximate angle they will assume when completely installed and supporting the engine. Be prepared to have some temporary support available to prevent the lower ends being damaged by the tube swiveling down. The potential problem will become obvious once the tube is fitted. It is suggested that a very small amount of material is filed out to prevent any obstruction to the tube rotating in the bracket. **N.B. On later kits this might not be needed**.

a) After noting the positions of the bolts (above and adjacent to Floor tube fitting 142), remove the nuts, withdraw the bolts, and set them aside.
b) Hold the first Engine supporting tube (138) so that the plugged end is uppermost and engage the lower end into the bracket. Refit the bolt and finger tighten the nut. **N.B.** It is suggested to put a washer each side of the tube. To prevent bending brackets.
c) Repeat for the other engine support tube.

Fitting the Front Roll Bars (139)

a) After noting the positions of the bolts in the forward tube receptacles, remove the nuts, withdraw the bolts, and set them aside.
b) Hold a Front Roll Bar (139) so that the plugged end is uppermost and engage the lower end into the bracket. Turn the Roll Bar until the pre-drilled holes are aligned. Insert the bolt ensuring that the threaded portion is inboard. Refit the nut finger tight.
c) Fit the second Front Roll Bar on the other support bracket. Insert the bolt ensuring that the threaded portion is inboard. Refit the nut finger tight. **N.B. This is the best time to fit the Armaflex Insulation to these tubes.**

Fitting the Rear Roll Bars (140)

a) After noting the positions of the bolts in the rear tube receptacles, remove the nuts, withdraw the bolts, and set them aside.
b) Hold a Rear Roll Bar so that the plugged end is uppermost and engage the lower end into the bracket. Turn the Bar until the pre-drilled holes are aligned. Carefully ensuring that the tube is aligned, drill the 6-mm hole out to 8-mm to accommodate the fixing bolt. Insert the bolt ensuring that the threaded portion is inboard. Refit the nut finger tight.
c) Fit the second Rear Roll Bar on the other support bracket. Insert the bolt ensuring that the threaded portion is inboard.
d) Fit the seat belts before fitting nuts.

Fitting the Tail Supporting Tubes (141)

a) Refer to A3 & A3B Remove the nut, washer and bolt from the mounting bracket at the rear of the Main Axle Assembly. Engage the lower end of the Tail Supporting Tube (plugged end goes to tail) in the bracket and refit the bolt and we suggest adding an additional washer each side of the tube to tale up the gap. Hand tighten the nut. Ensure that you have fitted the bolt with the nut on the inside.

Assembly of Keel Forward and Aft Sections 101 and 102

Preparation. Identify the following items and remove their packaging. Carefully examine each item. Refer to diagram A2-1.

Items	Part Number	Qty
Keel front part Assembly with fasteners	101	1
Keel rear part Assembly with fasteners	102	1

Note. The forward and aft sections are marked at the factory with alignment markings. Identify these now. Ensure that you fit these two assemblies so that these marks align exactly.

Caution. The aft Keel Section is long and relatively heavy. It is recommended that you have the assistance of a helper to prevent damage in moving and positioning this item. If the build facility has overhead joists of sufficient strength, it might be helpful if the unit is suspended to assist with the process.

a) Identify the long bolt immediately behind the alignment mark on the forward Keel section. Note the position of the nuts and spacers and set these aside.
b) Examine both Keel sections and ensure that all and any swarth or other loose material is removed + de-burr the holes. Carefully assemble this section to the aft section, observing the alignment marks.
c) Re-fit the long bolt, spacers, and engage the nuts finger tight.
d) Fit and secure a 5mm pop rivet into the pre drilled hole in the top of the Keel rear part Assembly.

Caution – Safety Note You are now to fit the whole Keel Assembly to items 138, 139, 140 and 141. If mishandled, there is a risk of injury or damage. It is strongly recommended that you have assistance for this stage of the process.

Fitting the Keel Tube Assembly to the Supporting Struts.

a) Refer to diagram A2-2 and then study the illustrations A2A, A2B, A2C and A3A Note the Assembly details.
b) Refer again to diagram A2B. Identify and remove the nuts, saddle washers and bolts. Set these aside.
c) With the whole Keel Assembly either suspended, or with a helper taking the weight, fit the bolt through the top holes in one of the front cabin tubes (139). Re-fit a saddle washer. Pass the bolt through the Keel and fit the saddle washer on the other side. In turn, pass the bolt through the other tube and fit the washer and hand tighten the nut.
d) Carefully maintaining the Keel Assembly in this position, resting the tail end on the ground. Refer to diagram A3A. Identify and remove the nuts, washers leave saddle washers in place.
e) Lift the keel at the rear and fit each tail support tube (141). Refit washer/nuts
f) Refer to diagram A2C. Identify and remove the nuts, washers and bolts from the fittings on both sides of the Keel Assembly. Set these aside.

g) Position the top of a Rear Roll Bar (140) adjacent to the fitting point. Connect the bar to the Keel using the bolts provided, ensuring that the bolt head face to the front. Hand tighten the nuts.
h) Fit the Rear Roll Bar on the other side.
i) Finally Refering to A2A fit the engine support tubes (138) in a similar way.

Fitting the Front Fork Assembly

Preparation. Identify the following assemblies and remove the packaging. Carefully examine each item. Refer to and study diagrams A6, A6A & A6B

Items	**Part Number**	**Qty**
Nose wheel tube assembly with fasteners	108	1
Fork Steering Bellcrank with fastener	109	1
Front fork assembly with fasteners and spacers	110	1

Note. The shaft of Front Fork assembly will have to rotate with rudder movement within the bearing of the Fork Steering Bellcrank 109 and the Nose wheel tube assembly 108. It is essential for both smooth rudder operation and long life that the shaft is as smooth as it can be. No corrosion is allowed. It is suggested that any shaft surface corrosion be removed by polishing with wet and dry paper. Fine wire wool, or pot scourers could be used to obtain a bright and smooth surface finish. When the shaft is fitted in to the Fork Steering Bellcrank 109 and the Nose wheel tube assembly, lubricate with a suitable nylon lubricate **not** oil.

a) Position the Nose wheel tube assembly to prepare for connection with the lower front fork mounting holes.
b) Align the top of the Nose wheel tube with the mounting bolts on the Keel tube A6B and re-fit the bolts. Finger tighten the nuts.
c) Remove the long bolt. Align the Nose wheel tube fitting holes and insert the bolt, ensuring that the spacers are fitted correctly. Finger tighten the nut. A6A

N.B. If you are working on your own, you may find that it is difficult to line up the holes with the bolt. One method used, was to fit a **X** shaped car wheel brace, into the place where the front forks go and use a twisting action on the nose wheel tube, to help line up the bolt with the hole.

d) Ensure that there is sufficient space between the bottom of the Nose wheel tube assembly and the working surface area.
e) Slide the (lubricated) shaft of Front Fork and Fork Steering Bellcrank into the Nose wheel tube assembly. Ensure that the stops are pointing aft and the bolts are uppermost. Ensure that the Front Fork assembly is free to rotate within its limits.

Fitting Tension Leg Assemblies 113

Preparation. Identify the following assemblies and remove the packaging. Carefully examine each item. Refer to diagrams A7, A7A, A10, A10A & A10B

Items	Part Number	Qty
Tension leg assemblies left and right (Wheel axles)	113	2
Compression legs with fasteners left and right	114	2
Rear shock absorbers	148	2
Front floor support tube / with Rudder Pedals	158	1

Note. If the Airframe Assembly is suspended, as mentioned earlier, the next steps in the build will be much easier. Otherwise it will now be necessary to raise the assembly by inserting supports under the main axle to obtain about 400-mm ground clearance. **Ensure, for safety, that the assembly is secure and cannot topple or fall.**

a) Fit the Tension leg assemblies to the Main axle using the bolts supplied, Finger tighten the nuts. **N.B.** It is suggested to fit additional washers between the bracket & tube to take up any gap.
b) Fit the Rear shock absorbers to the Tension legs.
c) Lift and bolt into place on the Main axle.
d) Tighten the nuts just fitted.
e) Separate the rudder pedals from the front floor support tube, and temporarily fit this tube in place through the holes in 142 A7A
f) Position the Compression Tubes 114 with the pin and ring ends pointing forward and temporarily attach at the front A10A. Connect the other ends, with the nuts & bolts, to the Main Axle. These Compression Tubes will have to be removed later to fit the Pod. A10B

Installing the Main Wheels

Preparation. Identify the following assemblies and remove the packaging. Carefully examine each item. Refer to diagrams A11 and A11A.

Items	Part Number	Qty
Front wheel with tyres, tubes and bearings	129	1
Rear wheels with tyres, tubes and bearings	130	2

a) Carefully remove the brake drum back plate, from the wheel and note the orientation of the long spacer tube. It has a locating ring at one end.
b) Refer to diagram A11A. Slide the back plate onto the wheel axle, noting it has a location hole for the prong protruding from part 113. The back plate must be fully pushed home.
c) Slide on the drum to wheel spacer tube, (ring goes towards back plate).
d) Slide on the wheels and fit the retaining bolt & washer.
e) Check the free movement of the wheels, and the operation of the brake levers.
f) Fit front wheel 129 into the fork, with a spacer on each side of its axle.
g) The fuselage structure can now be lowered onto its wheels.

Steering Bellcrank Alignment

a) First align the Fork Steering Bellcrank part 109 to the Front Fork assembly by sighting down from above the Nose wheel tube and rotating the Fork Steering Bellcrank until it looks in line.

b) Lower the Airframe to rest the shaft of Front Fork assembly on the ground. This will ensure that the shaft is positioned fully home in the Nose wheel tube. Add weight to keep nose down.

c) Now carefully rotate the Nose wheel tube assembly to align with the Front Fork assembly. Check again that all assemblies are aligned.

d) Draw lines, using a permanent marker pen, across the interfaces of all assemblies. (These lines will enable any movement out of alignment to be detected during the subsequent drilling process.) Centre mark and drill an 8 mm hole through the nylon bearing at each side, carefully monitoring the alignment marks. This process should mark the shaft of the Front Fork assembly.

e) Remove the Front Fork assembly, and carefully complete drilling the 8 mm hole. Remove all swarth and file smooth any rough edges.

f) Temporarily re-fit the Front Fork assembly (it will have to be removed again to fit the Pod). Fit the 8-mm bolt, finger tighten the nut.

Airframe Alignment

Fitting the Vertical Fin Tube (119) to the Keel Tube Assembly

N.B. The next stage of work is very important. It will determine the vertical alignment of the Tailplane to the Aircraft. Ensure that you take the greatest care with this part of the assembly process.

Preparation. Identify the following assembly and remove the packaging. Carefully examine the whole assembly. Refer to diagram A4 and study diagrams A5 & A5A

Item	Part Number	Qty
Vertical Fin Tube trailing edge with fasteners	119	1

a) Remove the lower fittings from the tube and after removing the bolt from the Keel rear tube, carefully slide the Fin tube down through the rear hole in the Keel tube.

b) It will be necessary to ensure that the Fin Tube is at a right angle to the Axle assembly and in line with the nose wheel tube 108. You can do this by either standing behind the tail or sighting it with your eye if you feel competent or by placing a spirit level on the Axle assembly and ensure that the Axle is level. Then, again using a spirit level, check the Fin tube for vertical alignment. Apply a gentle twist to the Fin tube and note the way in which plate 102130 shown on A5, and the adjacent supporting tubes move. This demonstrates the way in which the plate aligns the structure when the Fin tube is at the correct right angle to the Axle.

c) Clamp the plate (102130) to the adjacent supporting tubes.

d) Carefully drill (6mm bit) through the tube and mark the plate. Similarly drill and mark the other side. Place a piece of masking tape, or mark the plate on one side, so as not to lose the correct orientation, and temporarily remove the plate.

e) Complete the drilling of the two holes in the plate, taking care to remove any burrs or rough edges.

f) Re-fit the plate (look at your marks to preserve the same orientation) and all fastenings. Leave nuts finger tight. *Check again for vertical alignment.*

g) Fit the seat tube safety cables as shown in diagram A5.

Note. At this stage, you can now install alternative engine mountings, following the relevent instructions. e.g. “Fitting the verner mount”.
You can then fasten all nuts & bolts previously installed and finger tight, except anything marked temporarily above. i.e. front fork 110 & compression tubes 114. These are to be removed again to allow fitting of the Pod at a later stage.

Fitting the Floor Assembly 150

Note. *Ensure that you review the UK Modifications list and incorporate any relevant modifications at this time.*

Preparation. Identify the following assemblies and remove the packaging. Carefully examine each item. Refer to and study diagrams A7A, to A8B.

Items	Part Number	Qty
Floor fitted with rudder bars	150	1
Control columns	159	2
Control columns Floor mounting assembly	159	2
Tube front Underseat with U brackets	143	1
Throttle assembly	160	1

Note. The following instructions require the airframe to either suspended or raised up sufficiently to allow access underneath.
Caution. Ensure that the airframe is securely supported before working underneath**.**

a) You will need to remove the bolts temporarily holding the floor front support tube 158187 be careful that you keep this support in place. Position the wooden floor on the airframe floor tubes.

b) Fit the rudder pedal assembly in place as shown in A8A. (make sure brake pedals are on the left side). locating the long bolts through the rudder blocks, floor and support tube.

c) Temporarily fit the nylon spacers and nut to the bolts.

d) Position the front Under-seat Tube 143 (with U brackets) to align the mounting bolt holes with the corresponding holes in the floor.

e) Insert a mounting bolt through the floor, as shown in diagram A8B, passing through one side of the U bracket, through the floor tube and the other part of the U bracket. You may find this difficult to line up, if so you can use a ratchet strap to pull the floor tubes together.

f) Secure the floor to tubes 142 and 143 with cable ties. Loosely fit large cable ties to attach floor (aft end) to the Main Axle Assembly.

g) You are about to fit the control column base assembly 159. The bolts in this must be fitted with the nuts at the bottom, not as shown in A7B. The two 8mm bolts must also be drilled for a split pin. Before taking the assembly apart, make a careful note of it's construction, particularly in regard to the location of the spacing pieces and the pulleys red spot. (facing down).
Note. We have found that it is a good idea to strip the control column 159148 completely and reassemble ensuring bind free operation.

h) Carefully separate the control column base assembly 159, to fit the two mounting plates above and below the wooden floor. The fitting location is identified by the position of the holes in the floor. With the assistance of a helper, carefully fit the securing bolts, distance pieces and pulleys in place. Locate, but do not tighten the nuts. It will later be necessary, when fitting the aileron cables, to partially remove the pulleys so that the cables are located within the pulley groove. See diagram A8D.

i) Do not fit sticks at this time.

j) Temporarily fit the throttle levers. (you will have to drill the tube for the right hand lever) slide on the right hand lever, and mark with a pencil its position on the tube, so that there is no sideways movement. See diagram A7C. Remove the assembly from the floor. And remove the existing bolt in the left hand lever.

k) Lay the throttle levers flat on the wooden floor (or similar flat surface) and slide on the tube, lining up the original hole with the left hand lever. Adjust the right hand lever position so that it lines up with the pencil mark. (you should now have two throttle levers that are parallel to each other, with the correct spacing in between for the mounting blocks).

l) Mark the position on the tube, through the hole in the left hand lever, remove the tube and drill a 6mm hole.

m) Re-assemble the throttle assembly in it's position on the floor. Do not tighten nuts as they will be used for throttle stops later.

IncorporateUK modification no.8 throttle stops, at this time.

Fitting the Aileron and Rudder Control cables.

Preparation. Identify the following assemblies and remove the packaging. Carefully examine each item. Refer to and study diagrams A8C, D, E and F.

Items	**Part Number**	**Qty**
Set of control cables	134	1

Note. The aileron cables are the ones fitted with turnbuckles.

a) After inspecting the cables, lay them out to position the rudder cables so that the shackle is at the aft end. Similarly the aileron cables have the turnbuckle at the aft end.

Notes.

1 You are about to thread the cables through the pulleys shown in diagram A8C.Examine and note the position of the red spot on each pulley wheel. *All pulleys must be refitted in the same way to preserve this orientation.*

2 To thread the control cables through the gap between the pulley and the main axle, you may have to partially remove the pulleys to open a gap at one side. (one method is to insert a screwdriver, as you withdraw the bolt. This will allow you to tilt the pulley assembly enough to slide the cables down the gap.) Take great care not to lose any spacing washers nor change the orientation of the pulleys. There is a possibility that when the bolt is withdrawn, the installation sequence of pulleys and spacer washers may be lost. This will certainly be the case if you drop them! If this does happen, the installation sequence is:

3 Bolt and large thick washer, through seat belt anchor and bracket, two washers, pulley with rudder cable, three washers, elevator rod bracket, three washers, pulley with aileron cable, eight washers, pulley with aileron a

cable, three washers, elevator rod bracket, three washers, pulley with rudder cable, two washers, through bracket and seat belt anchor, large washer and nut on other side. Tighten bolts just enough to allow the elevator rod bracket to move freely.

a) Thread the cables past and on to the pulley wheels and re-secure the pulleys.

b) Tighten the 8mm bolt, just enough to allow elevator rod bracket to move freely.

c) Identify the pulleys, aileron and rudder, left and right, with temporary labelling (masking tape) to minimise the risk of incorrect installation.

d) Temporarily loosen the aileron pulleys shown in diagram A8D. Thread the aileron cables forward over tube 143, under the floor, around the pulleys, and through the guides.

e) Pass the aileron cables aft to the pulley assembly on the Keel tube as shown on diagram A8E. Ensure that you **do not cross** the aileron cables.

f) Temporarily connect rudder cables to rudder pedals.

g) The aileron return cable is already fitted to the keel. The pulley assembly needs to be removed, so that **UK mod no. 23** can be completed, also drilling of the 6mm bolt for a split pin.

Note. It will be necessary, as before, to temporarily remove the pulley wheels and washers. Take great care not to lose any washers and ensure that the pulley wheels have the red dot facing out.

h) Pass the aileron cables underneath the inside pulley wheel around, up and back over the top and lead forward. Temporarily secure the turnbuckles with tape.

i) Pass the rudder cables aft and **ensure that they are crossed**. See diagram A8F. Feed the rudder cables over the outside pulley on the Keel tube and lead them aft. Temporarily secure with tape.

j) Connect the forward ends of the rudder cables to the top bolts on the rudder bars. See diagram A9

k) Tighten all the nuts necessary to secure the rudder and control column assemblies to the floor.

Connecting the Brake Cables

Preparation. Identify the following items and remove the packaging. Carefully examine each item. Refer to and study diagram A9

Items	Part Number	Qty
Brake cables	128	2

a) If you wish to lubricate the inner cables before installation, do this now.
b) Withdraw inner cables from outer sheaths and thread through rudder pedals and cable guides. Refit outer sheaths and route under the floor, exiting through the top of the shock mounting.
c) Thread through brake adjuster on brake drum, wrap around lever and tighten the bolt.
d) Ensure that cables are routed to maintain a large radius curve where they leave the brake pedals. Attach cables using cable ties, to convenient points beneath the floor.
e) Adjust cables so that the slack is just taken up. Check brakes operation and trim inner cables to length. Solder the newly cut ends to prevent splaying of the strands.

Installing the Elevator Tube Assemblies

Preparation. Identify the following assemblies and remove the packaging. Carefully examine each item. Refer to diagrams A12 and A11A, A11B and A11C.

Items	Part Number	Qty
Elevator control tube assembly with fasteners	107	1
Elevator tube front part assembly with fasteners	117	1

UK modification number 1. This modification affects several of the nuts and bolts used to secure the elevator tubes 107 and 117. Study this modification now and incorporate the split pins as shown. Note that the Elevator control tube rear bolts have to be removed at a later stage of the build. Do not incorporate the modification until final assembly of these bolts.

a) Position the Elevator tube front part assembly 117 as shown in diagram A12A Ensure that the pulley wheel is on the port side.
b) Fit and tighten the front bolt to allow free movement of the elevator control fore and aft.
c) Connect the rear of the tube as shown in diagram A12B. Fit and tighten the rear bolt to allow free movement of the elevator control fore and aft
d) Position the Elevator control tube assembly 107 as shown in diagram A12C. Fit the bolt but do not tighten.
e) Connect the front of the Elevator control tube to the fitting between the rudder cables, which cross above it. Fit and tighten the front bolt to allow free movement of the elevator control fore and aft diagram A12B.

Installing the Seat Tube 112

Preparation. Identify the following item and remove the packaging. Carefully examine. Refer to diagram A13

Items	Part Number	Qty
Seat back tube with fasteners	112	1

a) Position the Seat back tube 112 as shown in diagram A13 and fit bolts through the side brackets, do not tighten the nuts.
b) Connect the two cables from the upper plates and tighten the nuts.
c) Press down on the Seat back tube to evenly tighten the straps and ensure that the side brackets are properly located to maintain that position.
d) Fit the tube fitting bolts and finger tighten the nuts. These nuts will have to be removed again to enable the fuel tank securing straps to be fitted
e) Attach elevator-limiting cable to centre bolt on tube 112. Do not tighten the nut.

Fitting the Fuel Tanks.

Preparation. Identify the following items and remove the packaging. Carefully examine. Refer to diagrams A15, A, B and C.

Items	Part Number	Qty
Fuel Tank assembly	124	2
Set of webbing	133	1
Set of hoses	135	1

Incorporate UK Modification N^{o} 13, fitting the fuel tank drain taps, at this time.

a) Open packet 133 and identify the four tank securing webbing straps. Set these aside.
b) Study diagram A15 and note the positions of the fuel tanks.
c) Refer to diagram A15A. Remove the washer and bolt shown, fit the securing cable and refit the washer and nut.
d) Refer to diagram A15B. Remove the washer and bolt shown, fit the securing cables of both tanks and refit the washers and nuts.
e) Study the webbing strap buckle and ensure that you understand how fit the strap so that it can be tensioned and remain locked by the buckle.
f) Fit the four straps over the axle and beneath the floor. Do not tighten the straps at this time.
g) The tanks should now be hanging in position.

Note. The Set of hoses 135, as supplied, are to be discarded when fitting UK Modification N^{o} 15

Note. If desired, the fuel pipe run may be installed at this point in the construction. This is suggested because at this time, the access is easier than later in the construction. Final installation may be completed later when the engine is fitted.

Fitting the Seats

Preparation. Identify the following items and remove the packaging. Carefully examine. Refer to diagram A14

Items	Part Number	Qty
Seats	151	2

Notes:
Incorporate UK Modification number 9 now before fitting the seats. This modification requires that larger cable ties be fitted. Read this modification instruction now and enlarge the holes in the seat backs as instructed.

a) Position the first seat
b) Release all the Velcro strips and move seat cover and foam rubber aside to give access to the bolt holes.
c) Fit four bolts (it is advisable to fit "penny" washers, under the bolt heads and nuts to prevent crushing) through the seat base and push these through the pre-drilled holes in the floor.
d) Fit the corresponding penny washers and nuts from below the floor. Do not tighten the nuts yet.
e) Fit two large cable ties from the mod kit, through the seat back holes and around the seat tube and secure these.
f) Check that the seat is correctly positioned and tighten the seat bolt nuts. To prevent damaging the fibreglass seat shell do not over tighten these nuts
g) It is suggested that four strips of polyethylene foam be glued to the tanks to prevent rubbing and friction with the tank. The size of these strips can be determined by examination. If you are going to install this extra protection, prepare and glue these strips now.
h) Refit the seat cover and secure the Velcro strips.
i) Repeat steps a) to f) to fit the other seat
j) Tighten tanks securing straps to position tanks snug against the seat backs.
k) Tighten rear floor securing cable ties (which were previously loosely fitted.)

Fitting the Vertical fin cover

Preparation. Identify the following items and remove the packaging. Carefully examine. Refer to diagrams B1,B1A,B1B & B1C

Items	Part Number	Qty
Vertical fin cover	136229	1
Top fin leading edge tube	144	1
Fin lower tube	145	1

Notes:

1 *UK modification number 2 should be incorporated at this point*

2 The Vertical fin cover is enclosed with the wing and fuselage cover. Note that it made of two triangle shapes. It will be fitted with the larger triangle at the top. See diagram B1. If you have dual coloured sailcloth, the coloured leading edge will be on the larger triangle shape.

3 When fitted, the Fin Cover should be drum tight. Fitting this requires a technique, and this is explained below.

4 The Fin trailing edge with fasteners 119, previously temporarily fitted, will have to be removed for this process. It will be necessary to remove all the assemblies on the lower half of this assembly. Make a sketch of these before removal to facilitate correct refitting later.

a) Examine the Fin Cover and note the correct orientation for fitting. Refer to diagram B1 and slide it forwards over the fuselage tube.

b) Refit the fin trailing edge 119 inside the fabric from the top, locate it's bolt in the keel.

c) Refer to diagram B1B. Temporarily remove the bolts and plastic spacers.

d) Examine the top fin leading edge tube 144, note which end has the threaded insert fitted and slide this end up through the fin cover from the front.

e) Refering to B1A Insert the bolt through the top of 119, just finger tight into tube 144 just to catch a few threads (take care not to cross the thread) but loose enough to allow free movement.

Note make sure the fin fabric is hooked over the end of the keel.

f) Position the forward end of this tube in the space between the brackets from which the fitting bolts have just been removed.

g) Fit the bolts and saddle washers, if needed use a screwdriver, or similar metal rod, align the tube between the brackets.

h) Fully secure the bolt at the top end of the tube.

i) Insert the lower tube forward from the aft end. First having sprayed the tube with silicone or similar to help the fabric slide on the tube.

Note. To engage the forward bolt, it will be necessary to raise the tube up as far as the fin cover fabric will allow. Doing this will reduce the angle at which the front end of the tube approaches the bracket and will permit easier engagement. It will, therefore, be necessary to push the fin cover material upward to allow this.

j) Fit the forward bolt and finger tighten the nut.

Note. It will now be necessary to fit a temporary supporting block underneath keel tube at the rear. This block will be needed to prevent the tube moving when a downward force is applied to the lower strut. Assistance with this operation is desirable.

k) With the supporting block in place, force the aft end of the lower fin 145 tube down until it can be moved across into alignment with the bottom of the fin tube 119. This operation will tension the lower fin cover material.

l) The lower fittings previously removed may now be replaced.

<u>Fitting the Tailplane, Elevators & Rudder</u>

Preparation. Identify the following items and remove the packaging. Carefully examine. Refer to diagrams B2, B2A, B3, B3A B3B, B3C & B3D

Items	Part Number	Qty
Rudder	132	1
Stabilisers (tailplanes)	152	2
Struts	121	2
Trim cables	126	1 set
Elevators	131	2
Elevator fork	118	1

Notes.

1. You are about to fit the stabilisers to the fuselage tube. The length and position of the Struts 121 will set the symmetry of these to the vertical fin. Expect to have some dihedral angle between the stabilisers and the vertical fin. The dihedral must be the same on both sides. You will need to add ballast to the front of the airframe to counterbalance the increased weight of the tail assembly. If you have an engine, this could be lifted into position now.

a) Fit stabilisers (tailplanes) 152 between brackets, and temporarily fit the struts 121, to provide support. (you might find that you have to file away a piece of the attachment tube, where it comes in contact with the tailplane tube).
b) Measure the distance, on both sides, between the centre of the bolt at the lower end of the struts, and the bolt securing the short tube fitting to the stabilisers. Adjust the total lengths of the support (strut + short tube fitting) until they are equal. View the tailplane from the rear to check on overall symmetry. When this is all correct, mark and drill a 6-mm hole through the existing hole at the top of strut 121 through the short tube fitting.
c) Fit elevators to tailplanes, and install elevator fork 118. *Ensure that UK Mod 2 is completed*
d) Refer to diagram B6C
e) Install trim cables. *Incorporate UK modification number 5 at this stage.*
f) Leave trim cables unattached at rear, until after fitting of fuselage covering.
g) Fit the Rudder and connect the rudder cables.

Contact BMAA Inspector to perform Stage Inspection Number 2 and sign off

Section 6
Pod, windscreen and instrument Panel

Before fitting the Pod perform the following adjustment to the steering link rods:

Adjusting the Rudder Bellcranks (Steering link rods)

a) Examine the Steering link rods and Note that they are unequal in length The lengths of the tubes are 245 and 260mm.
b) Refer to diagram A9 and fit the Steering link rods as shown.
c) Temporarily fit the rudder
d) Connect rudder cables to align the rudder pedals so that the bolts to which the cables are connected are in line as viewed from the side. The rudder should be aligned to the axis of the aircraft. Adjust the steering link rods so that the nose wheel is pointing straight ahead. Pushing the aircraft and noting the line of travel can test this.

Fitting Pod, Windscreen & Instrument Panel

Preparation. Identify the following items and remove the packaging. Carefully examine. Refer to diagrams C2, C3, C3a, C3b, C4, C5, C5A, C6, C7, C8, C9, C9A, & C10

Items	**Part Number**	**Qty**
Pod	149	1
Windscreen,	153	2
Instrument Panel Top	155	1
Instrument Panel front,	156	1
Windscreen fixings,	157	
Medium Cable Ties.		

Notes.
1. It will be a lot easier if you have help to fit the Pod.
2. Take great care to position the Pod centrally before drilling holes. If this work is correctly performed, the final shape will be satisfactory. Constant checks will be required throughout the process to ensure that the Pod is centrally aligned.
3. Remember that the compression struts 114, are left and right handed

a) Position the airframe to rest the fuselage on it's tail.
b) Insert supports under the main axle, at the strut attachments, so that the wheels are off the ground. It is suggested that this should be done by placing 25ltr plastic drums (Qty 4) or similar, to the front & rear of the wheels, with a piece of timber across the top of them, so that the axle is resting on the middle of this timber.
c) Remove the nose wheel assembly and the compression struts 114.
d) Remove nuts & washers from underneath the pod, that secure the rudder pedal assembly to the floor.
e) Remove the small bolt from the lug on the front fork support tube.
f) Lift Pod into position and temporarily support in place, using more drums and timbers.
g) Manoeuvre Pod from underneath until the holes in the bottom of the Pod, line up with bolts from the rudder pedal assembly. Temporarily fit washers & nuts to

hold in place. If no additional help is available fit a strap around rear to hold the Pod in place. (you can also temp. cable tie the rear of the pod to the axle 111.

h) Adjust the position of the Pod at rear so that both sides are equal and look the same.

i) Check and ensure that centre hole in the Pod is aligned with nose wheel tube, i.e. the centre axis of the aircraft.

j) Drill 5mm holes in the Pod, on each side of the engine support tubes, just at the point where the tube is curved. Secure with medium cable ties. See diagram C3A. Temporarily fit spare cable ties, through holes in rear of pod and around axle 111, to help hold in place.

k) Drill a hole in the Pod aligned with the lug on the front fork tube and fit the bolt.

l) See Drawing C10. Remove nuts from rudder assembly bolts, and add, from the inside, between the tube and the Pod, the thick nylon spacer washer to the bolt.

m) Fit the other (thinner) nylon washer to the underside of the Pod.

n) Repeat this operation to fit the other spacer washers & nuts.

o) Refit nosewheel assembly and tighten the fixing bolt this time

p) Refit Compression struts 114 in their proper left and right hand locations.

Note. It is recommend to both fit a washer, (to take up the gap), between slots in end of the compression tubes and the plates. And to replace the clevis bolt, with a nut & bolt. (6 x 30mm).

Windscreen and Dash

See Diagram C4. Perform a trial fit of the two sections of the Instrument panel.

Note. It is suggested that, to facilitate possible maintenance access and removal of the instrument panel, 4mm captive anchor nuts be fitted.
It is recommended to drill 4.5mm holes for all 4mm bolts to allow some clearance.

a) When you are satisfied with the alignment, drill and fit the seven 4mm bolts to join both pieces of the instrument panel together.

b) Slide the dash assembly into place. *Note this unit will determine the shape & rigidity of the Pod & windscreen.* Line up, and in the top instrument panel; drill the two furthest forward 4mm holes in the front corresponding to the two holes in the Pod. *Shown in C4 as bolts 1 & 2 not the centre one which is not shown.* Temporarily fit two 12 x 4mm bolts.

c) Proceed around the dash top alternating side to side as shown in C6 3 & 4. You can tighten them as you go, however they will need to be removed again later.

d) When all the bolts are fitted to the dash top remove them again on one side only. Fit trim to pod edge on this side.

e) Add trim to the windscreen holes, which allow cabin tubes to pass through.

f) Temporarily detach the engine support tube at the engine mount, and pass through the hole in the windscreen.

Notes.

1. You may have to use adhesive to secure the trim to the windscreen holes.
2. Before positioning the windscreen in place, if not previously fitted consider fitting Armaflex, (28 x 9mm) black foam pipe insulation to Roll bars 239 at this stage whilst the top fixing bolt can be temporarily removed to allow the foam pipe to be slid

down the tube. This will enhance appearance and provide a better support between the windscreen & tubes. It is also required for the fitting of the optional door kit.

g) Insert the windscreen half between the Pod & dash top panel, on the side you have removed the bolts. Temp fit a bolt to the lower front hole on the windscreen to the centre one on the Pod. See C9.
h) Temporarily fit cable ties to windscreen around cabin tubes to hold in place, making sure there is enough material to fit bolts along the side of the pod.
i) Starting from the centre, with a combination of lifting the pod in place and pushing the dash top forward and out, drill through the windscreen, lining up with the pre-drilled holes. Proceed to where you stopped earlier.
j) Remove bolts on other side and copy what was just done with the first half. Joining windscreen only at the moment with the bottom bolt hole and not up the centre of the screen. **Note** Windscreen halves overlap.
k) When finished fit remaining bolts that join the pod to the windscreen on both sides.
l) Join windscreen halves together up the middle.
m) Finally fix all the remaining plastic ties, to cabin tubes, and particularly those on the level of the engine support tubes, which prevent windscreen collapsing under pressure from wind of the propeller. See C9A
n) The Dash front can now be removed again for the fitting of the instruments and wiring.

Notes.

1. Refer to TADS BM063; paragraph 8 for the type acceptance instrument fit. It is suggested that if all the aircraft instruments are available they be fitted now. Plan the layout of the instruments carefully, taking into consideration future requirements of possible Radio and GPS fit. It is suggested that the airspeed indicator, compass and altimeter be directly in the pilots' line of view.
2. The Instrument front panel will have to be removed for this work.
3. The Wiring loom components may also be fitted at this time.
4. Holesaws can be used for drilling out the hole shapes for the various instrument gauges. The sizes required are: 42, 52, 57 and 78mm.

Fit UK Mod no. 14 at this time.

Section 7
Fitting Rear Framework & Fuselage Covering

Rear Framework

Preparation. Identify the following items and remove the packaging. Carefully examine. Refer to diagrams D1, D1A, D1B, D2, & D3

Items	Part Number	Qty
Fuselage Ribs,	123	
Rivets	1/8 inch or 3mm	Approx. 50
Framework tips & brackets.	147	10 + 8

Note. All the stiffeners are put into position, without forcing or bending, the ribs or tube 141.

a) Refer to diagrams D1 to D3B. Start by identifying each rib. The long ones with the bend are for the bottom, the two longest straight ribs, attach from above the seat back tube to the tail, and the other two ribs, attach from just where the same cabin tube bends, and then also back to the tail.

b) Fit a straight tip No. 2, into both ends of the bottom ribs, also into one end only of each of the four remaining side ribs. *Do not rivet at this stage.*

c) Place one washer on each side of the bolt at the tail. Locate the end of the middle ribs (with tip No. 2) onto the bolt, and fit a tip N^{o}. 5 onto the other end of the ribs, and put rib into place on tube 140 (approx. above seat tube) adjust ribs on tips. Drill & pop rivet, ribs to tips, tips to tubes.

d) Place six washers on each side of the bolt at the tail. Locate the bent end of the lower ribs into the slot on the Pod. Slide other end of the ribs onto bolts. Adjust lengths of tips at each end, and when they are ok, remove ribs from fuselage, and drill & pop into place as above. Re-fit ribs, fitting bolts at Pod .

e) Place a further three washers onto each bolt, and fit two remaining top ribs onto bolts, fit tips No. 4 onto the other ends, and place into position just at the top bend, adjust ribs on tips, and drill & pop rivet into place as above.

f) See diagrams a D4, D4a & D4c Fit tip into upper brace stiffeners, the longer part goes at the top with No. 1 tip, with No. 3 tip at the bottom. Put into place on bolt on Keel and rest the other end on tubes 141, approx. 1300mm from the bottom. This is not critical, however it should not be putting any pressure on tubes 141. Stand back and look at both stiffeners to see if they are in line, then pop rivet into place as before.

g) See diagrams D5 & D5a Fit tips N^{o}. 3 into lower stiffener rib, and put into position below above, and resting on the lower ribs. Again no pressure should be put on tubes 141. Pop rivet into place.

h) See diagram D5b Add last straight rib across lower ribs, approx. 400mm from the Pod end. Bolt or pop rivet into place.

i) See diagrams D4b & D5a. We recommend the fitting of additional gussets, (**not supplied in kit**) where ribs & stiffeners cross each other. Make them out of light aluminium sheet, approximately 50mm square or round. Pop rivet them to the ribs & stiffeners.

Aft Fuselage Covering

Preparation. Identify the following items and remove the packaging. Carefully examine.

Items	Part Number	Qty
Fuselage sailcloth	136	1
Elevator compensator bungee, large jubilee clip	Bag 135	
String		

a) Verify that control cables are correct, rudder cables go either side of control tube 107 then cross before going over pulleys on top. Aileron cables go around pulleys from below, and exit towards the front again. Check that the trim cables are ok. Check fuel tanks and the fuel lines to ensure that there are no leaks.

b) See diagram D6. Disconnect elevator tube 107 at rear, and thread through covering, along with the trim cables. Re-fit into place again. Fit elevator compensator bungee, around hinge tube at rear, (D6) back over the top of the saddle washers, tie knots in the ends of the bungee and attach to elevator tube 107, with a jubilee/hose clip. Adjust tension in the elastic, so that the elevator just stays up, on it's own. This should be checked every 25hrs as the rubber ages and losses its elasticity.

c) Wrap fuselage covering around framework, and starting at rear overlap Velcro strip.

d) Stretch the fabric forward by wrapping it around tube 140 with one hand, and hold in place with cable ties.

e) Attach lacing string to the top of one side and lace the string through all the eyelet's to the bottom.

f) Repeat this for the other side, also to the bottom of the fabric, through the holes in the Pod

g) Pull and tension the string on each side and bottom in rotation until you are satisfied with the fit and location of the fabric on the tube. Tie and secure all the strings.

h) Check and ensure that the aileron and rudder cables are in the correct place. (top Aileron cables are on the outside of the fabric)

i) Carefully examine and ensure that all other components inside the fuselage frame are fitted and secure as required.

j) Fit fabric cover behind the seats, and small fabric side pieces.

k) Attach trim cables to trim tab and secure along fork with cable ties. Ensure trim lever is working in the correct way which is - trim tab deflected down when trim lever is pulled back.

Note. If fitting optional door kit, this is best done now.

Section 8
Assembling the wings

Assembling the wings

Preparation. Identify the following items and remove the packaging. Carefully examine. Refer to diagram E1

Items	Part Number	Qty
Sailcloth for Wing left/right	136	1
Wing tip tubes left/right	137	2
Wing spar tube leading edge left/right	103	2
Wing spar tube trailing edge left/right	104	2

a) Prepare a clean surface and place the wing sleeve flat onto it with the lower surface uppermost. To avoid marking or damaging the wing fabric during this assembly, take great care that the surface is kept clean. Do not step onto, or walk on, the wing material. **N.B.** Wing spars are left and right.

Note. You are about to insert the foam stiffener material into the leading edge pocket. The foam is narrower at one end, this goes to the tip. Insert your arm into the pocket at the wing tip end. Progressively push your arm into the pocket, pulling the sailcloth up your arm, do this until your fingers can touch and pull the foam material out to the wing tip. (it might be helpful if somebody else could feed it in from the other end).
Be careful. It is possible to rip the foam. Ensure, by feeling all along the leading edge, that the foam is correctly and evenly positioned with no folds or tucks.

b) See diagram E1. Insert the wing leading edge foam stiffener into the pocket on the leading edge referring to above.
c) See diagram E2. Align and assemble the two parts of the trailing edge, fit a pop rivet into the hole adjacent to the join, and unroll the cable. Temporarily remove the small triangular plate from the outer end of the trailing edge to enable the trailing edge to be inserted into the wing pocket
d) Align and assemble the two parts of the leading edge, fit a pop rivet into the hole adjacent to the join, and unroll the cable.
e) See diagram E2B. Install the short compression tube 103015 to the mounting bracket on the leading edge.
f) See diagrams E5A and E5B. Before inserting the wing tip tube 137016 in the wing sleeve, check to ensure that it fits nicely into the mounting holes in both the leading and trailing edges.
g) See diagram E3. Insert the wing tip tube 137016 into the outer end of the wing sleeve, then insert the trailing edge tube 104 (making sure the cable, is exiting the wing at the leading edge root). Then, finally, insert the leading edge tube 103. As you do this, ensure that you pass the long compression tube out through the corresponding hole in the wing fabric, and also the cable out through the hole in the wing, to the trailing edge root. (See diagram E4).

Note. Do not engage the tip tube at this point. The long compression tube will be seen on the lower outside, short will be on the inside of the wing fabric.

h) See diagram E5C. Insert the short compression tube into the corresponding mounting bracket on the trailing edge. (the nut's should be facing up as this is the bottom of the wing.

i) See diagram E5D Attach the free end of the long compression tube to the mounting bracket on the trailing edge.

j) See diagram E5A & E5B. fit the tip tube into the leading edge then the trailing edge. Make sure the tip tube is fully pushed home.

k) Refer to diagrams E5E and E5F and attach the cables to the root of the leading and trailing edges. Refit triangular plate to trailing edge tip.

Note. If the lengths don't match, check that the wing tip tube is positioned correctly, and that the cables are not caught around anything. Ensure that strut attachments are facing up (lower surface up).

l) Repeat this procedure, paragraphs (a) to (l), to assemble the other wing.

Section 9
Attaching the Wings to the Aircraft

Attaching the Wings to the Aircraft.

Preparation. Identify the following items and remove the packaging. Carefully examine. Refer to diagrams E6A to E

Items	Part Number	Qty
Wing strut assembly with fasteners front	105	2
Wing strut assembly with fasteners rear	106	2
Stabilisers strut assembly with fasteners left and right	121	2
Jury struts		4

Note. You will need assistance with this task

a) See diagram E6A. Attach the struts to the airframe at the axle
b) Position the first wing near to its position on the airframe
c) See diagram E6C Insert the leading edge tube into its hole and attach with its clevis bolt.
d) See diagram E6B Fit trailing edge into position and fit bolts.
e) See diagram E6D Attach the forward strut to the leading edge attachment bracket
f) See diagram E6E Attach the aft strut to the trailing edge attachment bracket
g) Repeat the work of paragraphs (a) to (f) for the other wing.
h) Caution! Right and left parts are different. Identify them by offering them up to the structure and noting the correct fit.
i) See diagram E7. Install the jury struts.
j) See diagram E8. Insert the 4 larger streight battens into the root of the wing.

Note. Do not attempt to fit remaining battens until the wing tension process is completed.

k) See diagram E8a. Tension the wing panels by pulling them together using webbing straps 133235 (spend time working out how the straps loop around rings so that you can pull the panels together). proceed gradually, tensioning each strap in several stages. Five straps join the upper battens, and three join the lower ones.
l) Lay out the wing ribs, noting numbers, starting inboard from the wing root, progressively insert the upper battens then the two wing underside straight battens, (a rib is fitted inside inspection flap at rear strut mounting).

Note. The wing tensioning process will have to be repeated after the first flight.

Assembling the Ailerons to the wings

Preparation. Identify the following items and remove the packaging. Carefully examine the Aileron assemblies. Refer to diagrams F1 A to B

Items	Part Number	Qty
Aileron assembly + Extension tube	122	2

a) Assemble the two parts of the ailerons
b) See diagram F1a. Ensure that the hinge point is securely attached and properly installed.
c) Attach the aileron to the wing trailing edge.
d) Connect both aileron control cables to the aileron horn
e) Adjust the turnbuckles.
f) Repeat stages (a) to (e) for the other aileron.
g) See diagram E9. Fit top and bottom fabric pieces to close the gaps between the wing panels.

Incorporate UK modification number 22, Velcro tails/eyelets, at this time

Note. Do not wirelock the turnbuckles at this stage. Refer to section 11 for fine tuning & setting of all of the controls.

Warning. The nylon bushes holding the ailerons must not be lubricated with oil or grease only use a nylon spray lubricant.

Contact BMAA Inspector to perform Stage Inspection Number 3a and sign off

Section 10
Installing the Engine

Follow instructions given by the engine manufacture and additional information that may have been supplied with this kit.

Install Rotax 582 engine in accordance with Rotax Service Information Manual, reference 9 UL 91-E (part number 897 701) **"Installation Instruction for Rotax Ultralight Engines"**

Install Verner 133M by following Verner Motor 133M installation, operation and maintenace manual.
Also
Follow "Fitting the Verner engine & mount" instructions supplied with engine/mount.

Others follow manufacturers guidlines

Contact BMAA Inspector to perform Stage Inspection Number 3b and sign off

Section 11
Fine Tuning of the Controls and Control Surfaces

1. Control Surface Deflections

Shall be set to the limits and settings given in the HADS No HM1 current and latest issue.

2. Placards.

Placards shall be fitted and contain the information given in the HADS No HM1 current and latest issue.

3. Elevator.

Ensure that the pivot bolts are not tight. Also the hinge bolts should be easily rotated with your fingers. The elevator control should operate smoothly through the whole range of movement.

4. Elevator Compensator

This shock cord is to compensate for the weight of the elevator. Check that it is tensioned just enough so that the stick does not fall forward or that the elevator, does not drop when released. This should be regularly checked, say every 25 hours as the rubber ages. It is inexpensive and should be changed every 100 hours.

5. Elevator trim tab.

Check and ensure that it moves in the right direction. Push the trim lever forward, the tab should move up (so as to push the elevator down, for a nose down response). Adjust the cables so that the trim tab is in line with the elevator when the lever is vertical. The trim cables must be tight, but not excessively so. Do not apply any lubricant to the pulley wheel. You may also need to tighten the screw to prevent slipping.

6. Ailerons

a) Set the aileron's by adjusting the aileron return cable turnbuckle in the full way so that there is about one thread showing above the nuts.
b) Adjust the two top turnbuckles so that the cables are not tight and not slack making sure also, the control columns should be in the vertical position.
c) Check to make sure the aileron bolt at the wing tip is not tight and can move easily.
d) Wirelock this bolt along with the turnbuckles.

7. The Rudder.

First check that the rudder cables are crossed. The cables will under slight tension when the rudder is centred: slack in all other positions is normal. To eliminate any possibility of the cables jamming over the bolt that ties the two rear support tubes, next to the stainless plate, it is a good idea to make the two simple guide leads using plastic ties and pieces of fuel hose, tied to the leading edge of the stabiliser. When the pedals are lined up, the rudder should be in line with the longitudinal axis of the aircraft; the easiest way to get this is to clamp the rudder between two cleats and set the adjustable links so that:

- The nose wheel is in line with the longitudinal axis
- The pedals are lined up
- The cables are slightly taut

9. Pulleys.

Check the fitting and operation of the pulleys. The pulleys at the aft end of the fuselage Keel must be installed so that they cannot move off their bearing. The red mark must be visible for the outside. Only in this way will the bearing keep the pulley in place.

10. Lubrication.

The ideal lubricant is a silicone spray (do not use WD-40, as it will stain the sailcloth if any comes in contact with it) Apply to all points likely to create unwanted friction: control tubes washers and pivots, elevator and rudder hinges, aileron and pedal bearing, all pivot bolts of sticks as well as the fork main axle. Any nylon components can be sprayed with a suitable nylon lube.

In summary, to obtain smooth, precise controls, you need: barely taut cables, barely tight bolts and regular lubrication

11. Pre-flight checks:

When you have completed the above checks, sit in the cockpit and ensure that the control to control surfaces system works perfectly, and give the right responses. This is vital common sense.

Carry out a complete and detailed pre-flight check, as detailed in the Xair flight manual. **Note, it is a good idea to get somebody else to check this for you.**

Ensure that all control surface deflections are set in accordance with HADS No. HM1

Contact BMAA Inspector to perform Stage Inspection Numbers 4 and 5 and sign off

Annex A
Xair parts listing sorted alphabetically by item name

Leading Edge Foam	154	2
Main Axle Assembly	111	1
Nose wheel Tube assembly	108	1
Pod	149	1
Pop Rivets Set & cable ties	147	1
Rear Wheel Assembly	130	2
Roll Bar Front	139	2
Roll Bar Rear	140	2
Rudder Assembly	132	1
Rudder Pedals LHS & RHS	158	2
Rudder Tab	146	1
Seat assembly	151	2
Shock Absorbers Rear	148	2
Stabiliser assembly	152	2
Stabiliser Strut Assembly	121	2
Tension Legs Assembly	113	1
Throttle & Choke Assembly	127	1
Throttle Assembly	160	1
Tip Tube	137	2
Trailing Edge Assembly Wing	104	2
Trim Cable Set	126	1
Tube Engine Supporting	138	2
Tube Floor	142	2
Tube Tail Supporting	141	2
Tube Under seat Front	143	1
Webbing Set	133	1
Wind Screen	154	2
Wing Strut Assembly Front	105	2
Wing Strut Assembly Rear	106	2

Annex B

Xair parts listing sorted alphabetically by item part number

130	Rear Wheel Assembly	2
131	Elevator Assembly	2
132	Rudder Assembly	1
133	Webbing Set	1
134	Cables Set	1
135	Hoses Set	1
136	Covers Wing, Fin & Fuselage	1
137	Tip Tube	2
138	Tube Engine Supporting	2
139	Roll Bar Front	2
140	Roll Bar Rear	2
141	Tube Tail Supporting	2
142	Tube Floor	2
143	Tube Under seat Front	1
144	Fin Top Leading Edge	1
145	Fin Lower Leading Edge	1
146	Rudder Tab	1
147	Pop Rivets Set & cable ties	1
148	Shock Absorbers Rear	2
149	Pod	1
150	Floor assembly	1
151	Seat assembly	2
152	Stabiliser assembly	2
154	Leading Edge Foam	2
154	Wind Screen	2
155	Dash Board Top	1
156	Dash Board Front	1
157	Fasteners package	1
158	Rudder Pedals LHS & RHS	2
159	Control Stick Assembly	1
160	Throttle Assembly	1