Sherwood KUB
Single Seat Aircraft

Pilots Operating Manual

Revision 3
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Operators Manual

This manual applies to aircraft

Registration............................. **Serial No: ....**

Manufacturer

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This manual is a legal document that is approved for use with the ***Sherwood*** KUB microlight aircraft, issued with a United Kingdom Homebuilt Permit to Fly. It must remain with the aircraft, and not be amended or altered.

All pilots should read this manual before flying as pilot in command of the aircraft to which it refers.

Approved for issue:-

Paul Hendry-Smith - Managing Director

Date

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TABLE OF AMENDMENTS

Amendment No.	Details	Date of change	Signed
Issue 2	Re-written for Wankel engine version	01.10.2012	
Issue 3	Re-written for Polini THOR 250 and Hirth L23 engine version	01.10.2016	

1 Introduction

1.1 The ***Sherwood KUB*** is a conventional 3-axis controlled microlight aeroplane. The basic design was originally created and tested in accordance with the requirements of British Civil Airworthiness Requirements (BCAR) Section S issue 5; which at the time of writing is arguably the highest airworthiness standard in the world that is applied to microlight aircraft.

1.2 This manual is not intended to teach you to fly the aircraft, or to build it. A separate build manual exists to instruct you in building a ***Sherwood KUB*** from a kit.

1.3

1.4 What this manual will do is provide the information that a qualified pilot requires to fly this aircraft safely (although a conversion by a Flying Instructor familiar with the type is recommended), and to carry out routine maintenance and minor repairs. All modifications to a British ***Sherwood KUB*** should be approved The Light Aircraft Company Ltd.

1.5 Licensing, you should ensure that your licence coverage permits you to fly this aircraft in accordance with your countries aviation regulations. The licenses that would be required to fly this aircraft are a UK PPL (Aeroplanes)-Microlights, with or without operating restrictions, a UK or EASA PPL (Aeroplanes), a LAPL (Aeroplanes), a CPL (Aeroplanes),an ATPL (Aeroplanes) or an NPPL with microlight endorsement. Pilots used to larger types are particularly recommended to obtain conversion to microlight aircraft since microlight aircraft can have different flying characteristics.

1.6 Pilots should also be aware that the tail wheel configuration of the ***Sherwood KUB*** requires slightly different handling during taxiing, take-off and landing to a nose wheel-configured aeroplane. It is therefore equally important that any pilot unfamiliar with tail wheel aircraft obtains instruction in the correct handling techniques, from a qualified instructor.

2 This aircraft must be operated using either, two separate logbooks, one for the airframe and one for the engine (CAP 389 & 399) or equivalent documents. All entries must be made in the logbook in ink and within 7 days of a flight.

3 Description of the Aircraft

3.1 Ancestry. The ***Sherwood KUB*** was developed to meet the niche in the UK aviation market for a microlight that looked and handled like a conventional aircraft, but which conformed to the lower weight and license requirements of microlights and was easily towable and stowable.

3.2 Construction. The ***Sherwood KUB*** fuselage is a powder coated tubular steel construction, covered with, as standard, Oratex, a self coloured heat shrink fabric or optionally with heat shrink polyester fabric finished with a proprietary coating such as the Poly-fiber system. The wings consist of parallel tubular spars with wooden ribs bonded to them and aluminium trailing edges. The wings also support both flaps and ailerons. All surfaces are covered in the same fabric and finished as per the fuselage. The tail surfaces are also made of tubular steel construction, and are wire and tubing braced. The surfaces are finished as per the rest of the aircraft. The windscreen, windows, and optionally doors are made from clear or tinted polycarbonate sheet.

3.3 Flying Controls.

3.3.1 Pitch control is through a conventional elevator controlled by a single control column in the cockpit. The linkage between them consists of a series of levers and push rods.

3.3.2 Pitch trimming is through a trim tab fitted to the right side of the elevator. This is controlled in the standard configuration by a piano wire cable and manual lever.

3.3.3 Roll control is through conventional ailerons, controlled by a single control column in the cockpit. The stick is linked to the ailerons by a series of levers, cables and pulleys.

3.3.4 Yaw control is through a conventional rudder, controlled by a set of rudder pedals in front of the pilot's seat. Connection is by a series of levers and cables. The rudder self centres, aerodynamically for large deflections, and for small deflections using bungees attached to the firewall.

3.3.5 Braking, disc brakes on the main wheels effect braking. These brakes are operated by hand controls, one for each side, attached to the control stick, this provides both stopping and differential steering.

3.3.6 The tail wheel is steerable and connected to the rudder via a spring system, it steers in the same sense (push right, yaw right, turn right) but due to the springs it is not direct and there can be a delay in steering response.

3.3.7 Operational flaps are be fitted to the aircraft and are operated by a lever on the seat back to the left of the pilot's seat. Connection to the flaps is via cables. The flaps are not mechanically interconnected so that in the event of a cable failure a different flap setting on each wing can occur, however flight-testing has shown this not to cause severe handling difficulties and is easily controlled by use of the rudder.

4 Limitations

4.1 Introduction. This section includes the basic operating limitations for the ***Sherwood KUB***

4.2 Units. When noting limitations, it is important to ensure that the limitations that you are using use the same units and calibrations as the instruments in the cockpit. The limitations below show knots CAS (Calibrated Airspeed) but your aircraft may have an instrument in mph, and in any case will read IAS (Indicated Airspeed). The difference between IAS and CAS is basically the accuracy of your pitot-static system. The IAS limits for your aircraft should be determined when it is first test flown and should be placarded in the cockpit, however space is allowed below for you to insert the IAS limitations and calibration details for your aircraft.

4.3 Operational Limitations

4.3.1 The ***Sherwood KUB*** must only be flown in day VMC conditions, within sight of the surface.

4.3.2 The ***Sherwood KUB*** is not certified to any airworthiness standard, this prohibits it use for aerial work.

4.3.3 This aircraft is classed in the UK as an SSDR (Single Seat De Regulated), in all other countries please refer to the relevant sporting organisation or Airworthiness Authority.

4.3.4 For flight the following instruments must be fitted and serviceable: ASI, Altimeter, Engine RPM a Compass. and slip-ball are recommended but not essential.

4.3.5 It is recommended that the ***Sherwood KUB*** is not flown where a crosswind component above 8 knts (9 mph)

4.3.6 Do not fly above 10,000ft standard pressure altitude without the use of personal oxygen.

4.4 Flight Limitations

4.4.1 Never exceed speed Vne is 86 kn (99 mph) CAS [IAS]

4.4.2 Flap Limiting Speed Vf is 58 kn (67 mph) CAS [IAS]

4.4.3 Manoeuvring Speed Va is 62kn (71 mph) CAS [IAS]

4.4.4 Maximum Bank angles are 60° either way.

4.4.5 Maximum Pitch attitudes are 30° nose-up, 30° nose-down.

4.4.6 Normal acceleration limits are +4 / -2g.

4.4.7 At least 55kg (121 lb / 8 stone 9lb) must be in the cockpit for flight, pilot weight is limited to a maximum of 120kg (264 lb / 18 stone 10lb).

4.4.8 Maximum Take-off weight is 300kg.

4.4.9 Aerobatics and deliberate spinning are prohibited.

4.4.10 No more than 5kg is to be carried in the baggage sack.

4.5 Engine Limitations

4.5.1 The limitations for the engine are contained in Annex B; they are also placarded in the cockpit.

IAS Calibration Card for **Sherwood KUB** Call Sign..........................

Kn CAS (calibrated)	26 kn 29 mph (V_{S0})	29 kn 33 mph (V_{S1})	40 kn 46 mph (Vx) (Best angle)	45 kn 52 mph (Best glide)	45 kn 52 mph (Vy) (Best climb)	58 kn 67 mph (V_F) (Flap limit)
IAS (Indicated)						
Stall speeds are MTOW; less at lower weights.						
Kn CAS (calibrated)	62 kn 71 mph (V_A)	70 kn 80 mph	86 kn 92 mph (V_{NE})			
IAS (Indicated)						

Unless all errors are 2knots (2.3 mph) or less, a copy of the relevant calibration card must be displayed in the cockpit near to the ASI

5 Flying the ***Sherwood KUB***

6

6.1 General

The ***Sherwood KUB*** can have its wings folded to enable transportation on a trailer and/or storage in a smaller space, and to this end it is important that the procedures for this operation are followed precisely.

4.1.1. Folding the wings

- If a radio aerial is fitted on the turtledeck then undo the cable connector, if the antenna is mounted on the airframe just aft of the turtle deck then remove the antenna.

- Undo the two screws (or camloc type fasteners if fitted) holding the turtledeck in place and remove the turtledeck completely.

- For the wings to safely overlap in the flap area it is necessary to release the flap actuating cable on the Starboard wing, it is located just behind the seat and is released by lifting the cable and adjuster out of its bush and the cable slide out of the slot in the bush.

- Remove the safety clip from one of the forward spar-securing pins.

- Fold the Port wing first

- Holding onto the wing jury strut (to stop the wing swinging uncontrollably) push out the securing pin; the wing can then be folded back. Be aware that the tension will have been removed from the aileron cables, so they will drop as you move the wing back. A tip is to use a piece of pipe lagging foam on the trailing edge: if placed across the aileron and flap this will keep the aileron level and will also act as a cushion between the aileron and fin. The wing is held in this position by attaching the transport jury struts between the lifting handle on the fuselage and the lift strut attach point on the wing.

- With the Port wing folded back and secured with the transport strut enter the cockpit and raise the flap lever to the second position, no more.

- Repeat the same procedure for the Starboard wing. Be aware that the flap on the Port wing has been lowered to go under the other wing's flap; again the foam lagging can be used to stop friction between the two flap surfaces. Secure the wing as above and ensure that all nuts on the transport jury strut are tight.

- If you intend to trailer the aircraft, be aware that the propeller may need to be secured otherwise wind action could turn the prop and it may hit parts of the trailer. Aircraft should be secured by both the main gear and tail wheel when being transported on a trailer. Do not secure using the main gear V brace or bungee (non-bungee) legs.

4.1.2. Unfolding the wings.

- Start with the Starboard wing

- Undo the transport jury strut nuts and remove the bolt from the lift strut swing wing forward (use the wing jury strut) and carefully feed the spar end onto the headrack attachment point. Pull on the wing to align the pin hole, insert the pin and then the safety clip.

- Enter the cockpit and replace the Starboard wing flap cable into its bush with the adjuster, ensure they are correctly seated. Take off the flap setting from the Port wing.

- Repeat the procedure for the other wing. Ensure that the transport jury struts are completely removed from the aircraft.

- Fit the turtledeck into position and secure with the two screws; camloc type fasteners if substituted must be secured.

- If a radio aerial is fitted on the turtledeck then reconnect the cable connector, if the antenna is connected to the airframe re connect.

- Ensure that any packaging/transportation material is removed from the aircraft.

6.2 Pre-Flight Inspection

6.2.1 Engine. Carry out an engine pre-flight inspection following the instructions contained in the Engine Manual.

6.2.2 Aircraft. The following is a brief summary of the minimum pre-flight inspection; if you are unsure, it does no harm to increase the number of items on your inspection.

Inside the Cockpit - Check

- Ignition switch (es) OFF
- Chocks in position if required
- Condition of throttle controls and throttle cable
- Condition of choke and choke cable
- Condition and security of all flying controls
- Condition of all instruments
- Harnesses are properly fitted and not frayed
- Seat cushions are secure
- Sufficient fuel for the planned flight
- Fuel hoses and fuel filter.
- Baggage sack and contents are secure

Underside

- If the aircraft has not flown within 24 hrs, drain a small amount of fuel from the drain valve and check for water.
- If fitted verify security of any radio/transponder aerials
- If fitted verify security of beacon/strobe.
- Condition of fabric.

Starting from the port side, inspect:

- Condition of door, window, hinges and catches (if fitted)
- Condition of the tyre, undercarriage leg, bungee cord, brake lines, actuators, brake pads, brake discs and security of wheel and attachments.
- Forward spar/ headrack clevis pins and safety clip/ring
- The fuel tank outlet connections (if second tank fitted)
- Lift strut attachment to fuselage
- Fuel filler cap in position and secure. Vent clear and facing forward
- The wing struts and fastenings
- The jury struts and fastenings
- Ensure that transportation jury strut bolt has been removed from top of lift strut
- The port wing leading edge
- The port strobe/navigation light (if fitted).

Walk around to the port wing trailing edge, inspect:

- The port aileron and its hinges, fixings and cable attachments
- Move the aileron, confirm there is no free play between it and the aileron on the other wing
- The port flap and its hinges, fixings, return spring and cable attachments
- Look over the upper and lower wing surfaces for any distortion or damage
- Fastening of the trailing edge spar to the headrack
- The aileron cable its pulley and cable keeper

- The flap Bowden cable condition
- Turtledeck condition and security
- Fixing and security of GPS aerial (if fitted).
- Fixing and security of Radio aerial (if fitted).

Walking back to the tail, check:

- Tension on the fuselage and fin fabric
- Ensure that transportation jury struts and bolts have been removed from the spine lift handle.
- Condition of stabiliser wire fastenings and cable condition (carefully, a broken strand can be very sharp!)
- Stabiliser attachment fittings
- Stabiliser struts and fittings
- Elevator and rudder hinges, clevis pins and split pins
- Tension and condition of the tail plane fabric
- Tail wheel condition, connections, springs and security
- Rudder cables and attachments
- Look forward from behind the tail: any airframe distortion should be visible as an asymmetry.

Walk to the starboard side and check:

- Starboard elevator hinges, clevis pins and split pins
- Condition of stabiliser wire fastenings and cable condition (carefully, a broken strand can be very sharp!)
- Stabiliser attachment fittings
- Stabiliser struts and fittings
- Elevator and rudder hinges, clevis pins and split pins
- Elevator trim tab, hinge and connections attachment and condition
- Tension and condition of the tail plane fabric
- Elevator linkage and the pushrod.

Moving forward along the fuselage inspect:

- Tension on the fuselage fabric
- The flap Bowden cable condition
- The aileron cable its pulley and cable keeper
- Fastening of the trailing edge spar to the Headrack
- The fuel tank outlet connections
- Look over the upper and lower starboard wing surfaces for any distortion or damage

Moving along rear edge of wing, inspect:

- The starboard flap and its hinges, fixings, return spring and cable attachments
- The starboard aileron and its hinges, fixings and cable attachments
- Move the aileron, confirm there is no free play between it and the aileron on the other wing
- The starboard strobe/navigation light (if fitted)

Walk around to the front of the wing, inspect:

- The starboard wing leading edge
- The wing struts and fastenings
- Ensure that transportation jury strut bolt has been removed from top of lift strut

- Check security and fitting of Pitot and Static vents and that they are not obstructed
- The jury struts and fastenings
- Fuel filler cap in position and secure. Vent tube present, clear and facing forward
- Condition of the tyre, undercarriage leg, bungee cord, brake lines, actuators, brake pads, brake discs and security of wheel and attachments.
- Pitot and static tubing condition and connections
- Forward spar/ headrack clevis pins and safety clip/ring
- Lift strut attachment to fuselage
- Condition of door, window, hinges and catches (if fitted)
- Condition and security of exhaust system and attachments
- Condition, cleanliness and security of the windscreen
- Condition and security of cowlings
- Water Radiator if fitted is clean, secure and has unobstructed air flow
- Condition and security of propeller
- Condition and security of spinner (if fitted)
- Remove top cowling
- Check engine installation, fluids, ancillaries for security and signs of leaks
- Check electrical wiring for wear and breaks
- Condition and security of air filter (wire-locking)

6.3 Starting. The standard manual pre-start checks [**STAIP**] are recommended. The STAIP checks are:

6.3.1 Aircraft, Crew, Equipment, **Secure**
6.3.2 **Throttle** full and free
6.3.3 If engine cold, **choke** ON and **Throttle** CLOSED
If re-starting, **choke** OFF and **Throttle** open 1/8"
6.3.4 **Area** around and behind aircraft clear
6.3.5 **Ignition** switch ON.
6.3.6 Pull/Push - start the engine.
n.b refer to engine operating manual for specific instructions

6.4 Taxying. The aircraft will taxi on whatever course you wish without difficulty using a combination of throttle, brakes and tail wheel steering. In strong winds, keep the stick fully longitudinally with the wind, and laterally into wind (e.g. if the wind is coming from the half past one position, the stick should be at the half past four position). It is easiest to turn using the tail wheel steering (rudder pedals), but this can be supplemented for a very tight turn by using the brake on the side to which you are turning. The turning circle is normally around 10ft in diameter (at the aircraft centreline), which can be greatly improved by use of differential braking.

6.5 Prior to take-off. It is recommended that standard pre-take-off checks [**CHIFTWAP,** see below] be used. The pilot must ensure that the engine has been run successfully at take-off power prior to take-off (and has in any case run for several minutes) and that the choke is off.

6.5.1 **Controls** full and free, **Choke** off
6.5.2 **Harnesses, Hatches (doors/windows)** and **Helmets** (if worn), secure
6.5.3 **Instruments** all serviceable, reading correctly.
6.5.4 **Fuel** on, sufficient for the flight, filter clear of debris
6.5.5 **Flaps** full and free and set for take-off (normal operation would be 0°)
6.5.6 **Trim** set to take-off position
6.5.7 **Wind** speed and direction checked, and suitable for safe take-off on selected runway
6.5.8 **Approach** to the selected runway clear of aircraft
6.5.9 **Power** checked, and the pilot is satisfied that the aircraft can sustain take-off power.

6.6 Take-off. The take-off distance clean or with flap is very similar and therefore it is recommended that no flap be used, although flap can remain down for a touch and go/roller. Take-off is conventional for a tailwheel aircraft. As full power is applied, the stick is held fully forward, until the tail rises when the stick is moved aft to the neutral position and checked until sufficient flying speed has been obtained. During the take off roll the aircraft is kept straight by using the rudder pedals. Rotate at **35 kn** ***(40 mph)*** **CAS** [IAS] and the aircraft should fly-off at around **40 kn** ***(46 mph)*** **CAS [IAS]**. It is not advisable to allow the speed to fall below the best angle of climb speed of **40 kn** ***(46 mph)*** **CAS** [IAS] during the climb-out and **45-50 kn** ***(52-58 mph)*** **CAS** should be used once clear of obstacles. In crosswinds, the aircraft will weather-cock into wind immediately it is airborne. Flaps if set can be retracted once 300ft has safely been achieved.

6.7 Landing. Flap for landing should be set at 15° (1st notch) on base leg with 28° (2nd notch) being selected on finals. If a short landing is required then the final stage of flap 40° can be deployed on late finals. Be aware that pitch changes will occur with the use of flap and additional power will be required to maintain approach speed. Generally the ***Sherwood KUB*** should be landed from an approach speed of about **45 kn** ***(52 mph)*****CAS** [IAS], with the pitch trimmer set nose up, although in turbulent conditions, handling can be improved by increasing this by **5-10 kn** ***(6-12 mph)***. Roundout should be initiated at around 8-10 ft and hold-off 1-2ft above the runway. The aircraft should be kept straight, using the rudder. Until the pilot has gained more detailed operating experience on the aircraft, the pitch trimmer should be set in the neutral position during the pre-landing checks. Approach and landing speeds may be reduced (at low weight) once pilot experience has been gained. It is further recommended that the inexperienced pilot uses grass before hard runways where more careful handling is required. The landing distance is 275m from 15m/50 ft with full flap applied.

6.8 Landing in a Crosswind. Landing with even a small crosswind component can create a significant amount of drift on approach. However by using the **into wind wing down approach** technique, with an approach speed of around **50 kn** ***(58 mph)*****CAS** [IAS], crosswind components of up to **8 kn** ***(9 mph)*** may be handled without significant difficulty, although the pilot should expect to have to apply considerable concentration, a single wheel landing is inevitable on the into wind wheel. Crosswind components above this limits should not be attempted other than by experienced pilots fully familiar with the type.

6.9 Cruise. If set up correctly, it should be possible to trim the ***Sherwood KUB*** to within **2 kn** ***(2.3 mph)***, by use of the pitch trimmer, with power set as required. Pilots used to open-cockpit microlights are reminded that the doors and windows if removed or not fitted may reduce the aircraft's directional stability and therefore occasional checks of the slip-ball are worthwhile for efficient flight.

6.10 Turning. Turning is conventional for this class of aircraft, with a moderate amount of rudder co-ordination required. The maximum permitted bank angle is 60°, which result in quite high back-stick forces, and a corresponding increase in power to maintain a balanced turn. As with any other aircraft, the stall speed will increase with bank angle. However, the nearly full back stick required to stall the ***Sherwood KUB*** gives a good warning of the impending stall.

6.11 Flight in Turbulence. The ***Sherwood KUB*** has a higher wing loading than most microlights and hence flies well in turbulence. In turbulence it is best to maintain a reasonably fast cruising speed, which will reduce the effects of gusts and crosswind components; however, do not fly above the manoeuvre speed of **62 kn** ***(71 mph)*** CAS
[IAS] in turbulence. Below this speed, the worst thing a gust can do to you is stall the wing or one of the control surfaces. Above this speed, it is possible for strong gusts to overstress the aircraft.

6.12 Stalling.

6.12.1 The table below shows the aircraft stalling speed at standard conditions (wings level, idle power) at various flap settings. However, note that this is in knots CAS. Stalling speed may reduce slightly with aft CG.

6.12.2 Stall Speeds

Stall Speeds				
Config	Clean	1 st Stage	2 nd stage	Full Flap
CAS kts	29 kn 33 mph	29 kn 33 mph	28 kn 32 mph	26 kn 29 mph

6.12.3 Wings Level, Power Off. The aircraft can safely be stalled at a deceleration rate of up to 5 Kts/sec**.** The ***Sherwood KUB*** exhibits benign, traditional stall characteristics. There is subtle aerodynamic warning (buffet) of the approach to the stall; however, adequate warning is provided by the high pitch attitude and low IAS. The stall is instantly recognizable, either by nose drop or height loss and frequently results in full back stick; there is no tendency for the aircraft to drop a wing at the stall. Recovery is immediate upon centralising the stick and applying power and results in a height loss between stall and recovery, of approximately 100 ft if power is used, and 200 ft to establish a steady glide if power is not used.

6.12.4 Wings Level, Power On. With power applied the stall is similar to the idle case; however, stall speeds are reduced by 2 Kts CAS and much higher nose attitudes (approximately 25°nose up pitch) are experienced. Once again there is no tendency for a wing drop.

6.12.5 In Turning Flight. The ***Sherwood KUB*** is extremely resistant to stall in the turn. At 30° AoB the full back stick mechanical stop is reached before the onset of the stall; therefore, the aircraft is extremely safe, in that the stall cannot be demonstrated in the turn.

6.12.6 Aerobatics. Aerobatics are not permitted in this aircraft.

6.12.7 Departures from Controlled Flight.

The Spin. Deliberate spinning of the ***Sherwood KUB*** is prohibited. It is however possible, through mishandling of the aircraft, inadvertently to enter a spin, either through stalling the aircraft in a turn or by failing to keep the rudder pedals straight at the point of stall. Should this happen, the spin will be seen by a steep nose-down attitude and the aircraft will be rotating rapidly. The standard spin recovery should be:

Close the throttle
Determine the spin direction by looking through the propeller arc or at a slip ball
Apply full opposite rudder to oppose the spin (This will probably be sufficient to stop the spin)
If the spin does not stop within 1 second move the stick centrally forward until the spin stops (It is likely that up to 5 cm of forward stick movement will be sufficient).
Recover from the resulting dive

Note: There is no need to raise any stages of flap until spin recovery is complete as it is very unlikely that the flap limiting speed will be reached.

Other Departures. Other departures from controlled flight are likely either to be due to damage to the aircraft, or hazardous flying conditions. In either case, land as soon as possible and examine the aircraft, particularly the flying controls, for any damage.

7 Performance.

5.1 The following data was obtained using the UK prototype, Data and performance figures for alternative engines and propellers will be in an attached supplement, when available. When using the data for planning purposes, apply sensible safety factors such as are contained in CAA Safety Sense leaflet 7B (Aircraft performance), part of which is reproduced here by kind permission of the CAA.

5.2 The best climb speed is **45 kn CAS** ***(51 mph)*** [IAS] which should give 350-400 ft/min at MAUW/Sea Level ISA. When selecting a climb speed, always remember that should anything go wrong, more speed gives you more time to sort your problems out. Although climb performance may change between aircraft, the best climb speed should not. Specific performance figures for your aircraft may be in the relevant supplement.

5.3 The best glide speed is **45 kn** ***(51 mph)*** [IAS], at which a rate of decent of 430 ft/min may be expected.

5.4 Because microlight aircraft are very strongly affected by weight, engine condition, propeller matching, wind and air temperature, it is very hard to give any reliable information concerning the cruise performance of the ***Sherwood KUB***. The captain is encouraged to plan very conservatively until sufficient experience is gained of the fuel consumption and cruising speeds at the conditions in which s/he normally flies the aircraft.

5.5 Scheduled (factored) take-off performance for short dry grass Sea Level airfield on an ISA day to climb to a screen height of 15m/50 ft agl is 330m. Test data was gathered in temperatures up to 28°C and a mean take-off distance of 255m was achieved.

5.6 Using the figures above, the following additional safety factors should be applied to the distance to clear a 15metre obstacle (taken from CAA GA Safety Sense leaflet 7B). If unsure, always use these factors to ensure you have sufficient take-off distance available.

10% increase in weight	Multiply take-off distance by 1.2
Per 1000 ft runway height above Sea Level	Multiply take-off distance by 1.1
Per 10°C increase in temperature above 15°C	Multiply take-off distance by 1.1
Wet grass	Multiply take-off distance by 1.1
Dry Tarmac or concrete	Divide take-off distance by 1.1
Per 2% uphill slope	Multiply take-off distance by 1.1
Per 5knot tailwind component	Multiply take-off distance by 1.2
Soft ground or snow	Multiply take-off distance by 1.25

Landing distances for short dry grass from a screen height of 15m/50 ft are 275m with full flap. Landings with less than full flap can be achieved in 320m.

Using the figures above, the following additional safety factors should be applied to the distance to clear a 15metre obstacle on the approach (taken from CAA GA Safety Sense leaflet 7B). If unsure, always use these factors to ensure you have sufficient runway to avoid using the considerately provided hedge at the far end of the runway.

10% increase in weight	Multiply landing distance by 1.1
Per 1000 ft runway height above Sea Level	Multiply landing distance by 1.05
Per 10°C increase in temperature above 15°C	Multiply landing distance by 1.05
Wet grass	Multiply landing distance by 1.1
Dry Tarmac or concrete	**Divide** landing distance by 1.1
Per 2% downhill slope	Multiply landing distance by 1.1
Per 5knot tailwind component	Multiply landing distance by 1.2
Soft ground or snow	Multiply landing distance by 1.25

6 Emergencies

6.1 Engine Failure Before Take-Off. Close throttle, apply brakes (if fitted), switch off.

6.2 Engine Failure After Take-Off (EFATO). Lower nose to establish an approach speed of at least 45kn CAS [IAS], land straight ahead or near to straight ahead
DO NOT ATTEMPT TO TURN BACK from below 500ft.

6.3 Engine Failure In Flight. Lower nose, maintain best glide speed, select a landing site, make emergency radio call if time permits, as time permits check for possible reasons for engine failure and attempt re-start (e.g. ignition switch, fuel cock), if field is flat land into wind, otherwise uphill. Apply braking only if it is essential to stop within the distance available, and never before all 3 wheels are on the ground.

6.4 Engine Fire in Flight. Close fuel cock, open throttle fully, make emergency call if time permits, treat as engine failure in flight. Vacate aircraft as soon as possible after landing.

6.5 Fire in the cockpit. Close all ventilation, switch off all electrical devices (not the ignition unless there is an engine fire also), land immediately and vacate the aircraft.

6.6 Emergency Landing on Water. Try to land into wind with as high a nose-up attitude as possible. Before impact, pilot must be prepared to release harness, it may also be beneficial to release the doors before impact. If wearing a lifejacket, do not inflate them until outside the aircraft. Note that it is very hard to judge height above water.

6.7 Emergency Landing in Trees. Ensure harness is tight, try for low bushy trees as far as possible. Try to impact with as steep a nose-up attitude as possible.

6.8 Inadvertent Flight in Hail or heavy rain. Turn carburettor heat on (if fitted), reduce power to avoid propeller damage, fly out of the weather as soon as possible.

6.9 Hot Engine Bearing Temperature. If the bearing temperature reaches 120°C in flight reduce power to below 5000 rpm and monitor. If the temperature exceeds 150°C, land as soon as possible.

6.10 Control/Airframe Vibration During testing it was noted that free play in the elevator trim cable allowed the trim tab to “flutter” which gave noticeable stick shake and airframe vibration. If such vibration is experienced fly at **40-50 kts** ***(46-58 mph)***to the nearest suitable landing site. And land normally.

7 Weight and Balance.

7.1 So long as it is kept within the placarded operating limits, and no unapproved modifications have been made since construction (including the alteration of ballast), the ***Sherwood KUB*** can be flown with any permitted fuel, pilot and passenger weights without falling outside of its permitted CG limits. However, pilots should be aware that stick forces and displacements will become lighter with aft CG (typically a lightweight pilot, and full fuel) and heavier with forward CG (typically low fuel, and light weight pilot). Flying outside of the permitted CG limits at either extreme is potentially dangerous.

7.2 The ***Sherwood KUB*** CG datum is at the leading edge of the wing. Measurements are in inches and kg.

7.3 The moment arms of the seats, fuel tank(s) and other items are shown in the Weight and CG report at Annex C.

7.4 The ***Sherwood KUB*** will have been weighed when first built, and should be re-weighed typically every 5 years or when it is modified or repaired.

8 Routine Maintenance.

8.1 Below are the service intervals to be followed for the airframe. For engine maintenance see Annex B.

8.2 It is also permitted for the pilot to make small aileron adjustments at the aileron cable turnbuckles if the aircraft has a natural turn.

8.3 Who May Certify Maintenance?

8.3.1 In the UK PPL holders who are owners or part owners of the aircraft being maintained, in other countries please check with your controlling authority and/or sporting organisation as to the regulations controlling maintenance on aircraft of this type.

Record of Maintenance

8.3.2 The ***Sherwood KUB*** must possess either two separate logbooks for the airframe and engine (e.g. CAP 398 and CAP 399) or the BMAA combined logbook BMAA/AW/036. Other combined logbooks can be used subject to local approvals. All entries must carry a signature, date and PPL number.

8.3.3 Check A (daily) need not be recorded in the aircraft logbooks unless a defect is found.

8.3.4 Check B (25 hrs / 3 months), and Check C (50hrs / 6 months) and the annual inspection must always be recorded in the appropriate logbooks. A list of all parts replaced must always be given and the invoices or certificates of conformity for these parts must be retained, along with all other aircraft maintenance records, until at least two years after destruction or permanent withdrawal from use of the aircraft.

8.3.5 If the aircraft is run on unleaded fuel, an entry stating that this is the case must be in both logbooks, at the date on which unleaded fuel was first used.

8.4 Preparing the Aircraft for Inspection

8.4.1 Carry out a visual inspection before cleaning the aircraft. Any fretting damage may be visible from powdery deposits around a bolt hole. Leaks or fatigue cracks may sometimes be detected by visible deposits in surface dust or dirt.

8.4.2 The aircraft may then be cleaned if required using a weak solution of mild detergent in water. Take care not to get water into electrical devices, venturis, pitot heads or static ports. Ensure that the aircraft is then dried thoroughly.

8.4.3 If the aircraft has been stored outside, all frost, snow or excessive dew or rain must also be carefully removed.

8.4.4 Inspection must be carried out in a clean environment, with good light. A torch, small mirror are often also useful.

8.5 When to Carry out Maintenance

Check A
- Before the first flight of the day.
- Before any further flight if the aircraft has been left unattended on an airfield for any period of time.

Check B
- At 25hr or 3 month intervals, except when a Check C or annual inspection is carried out instead.
- If necessary, Check B interval may be extended by up to 2½hrs or 9 days, but the next check time must still be taken from the due date of the previous inspection.

Check C
- At 50hr or 6 month intervals, except when an annual inspection is carried out instead.
- If necessary, Check C interval may be extended by up to 5hrs or 18 days, but the next check time must still be taken from the due date of the previous inspection.

Annual
- Once per year, or at 150 hr intervals (extendable by up to 15 hrs if required).
- This may not be extended in time, however if the aircraft is "rested" for some time, the intervals for all other checks may be reset by carrying out an annual inspection.

Note: Airframe and Engine Hours
Inevitably, airframe and engine hours rarely, if ever, match up. Whilst it is permissible to separate airframe and engine maintenance intervals, this becomes very complicated. It is recommended that whichever has the highest hours (usually the engine) is used as the basis for inspection and maintenance intervals.

8.5.1 Check A - the Daily Inspection (DI)

Paperwork
- Check permit to fly (if required) is valid
- Confirm no B, C or Annual checks are due.
- Check that all defects entered into the logbooks are acceptable, or have been rectified.

Aircraft
- See section 4.2 Pre-Flight inspection

8.5.2 Checks B, C and Annual

	Check B (25hrs / 3 months)	Check C (50 hrs / 6 months)	Annual (or 150 hrs)
Fuselage			
Check all pressure instruments for cracks, leaks and stiction			✓
Check all airframe members for cracks, dents, corrosion or deformation		✓	✓
Check all fasteners for security, condition or fretting		✓	✓
Check all rig / derig connections, rings & clips	✓	✓	✓
Check all bracing cables for tension, corrosion or kinks.	✓	✓	✓
Check doors/windows (if fitted) for security and cracks		✓	✓
Check seats for fraying, cracks, security		✓	✓

	Check B (25hrs / 3 months)	Check C (50 hrs / 6 months)	Annual (or 150 hrs)
Check harnesses and belts		✓	✓
Check flying control runs for condition and lubrication	✓	✓	✓
Check operation of all controls	✓	✓	✓
Undercarriage			
Check structure for damage or deformation	✓	✓	✓
Check tyre pressures (12psi)	✓	✓	✓
Check freedom & play in bearings		✓	✓
Check brakes for wear or damage		✓	✓
Check brake discs for security and wear	✓	✓	✓
Lubricate all joints and bearings		✓	✓
Check steering mechanisms for wear and lubrication.		✓	✓
Unlace cover and check condition and security of elastics.	✓	✓	✓
Brakes			
Check operation, adjust and check fluid levels.		✓	✓
Propeller			
Inspect blades for nicks and splits	✓	✓	✓
Inspect hub and blades for security and condition		✓	✓
Check for vibration on run-up	✓	✓	✓
Inspect leading edge protection (if fitted) for security	✓	✓	✓
Check blade pitch (if ground adjustable)			✓
Fuel System			
Inspect tank(s) for cracks, leaks, abrasion	✓	✓	✓
Drain or flush tank			✓
Inspect tank mount for security or chafing		✓	✓
Inspect all fuel pipes and hose for cracks or perishing. Always replace if unsure.			✓
Inspect system for leaks		✓	✓
Inspect and clean or replace fuel filter.			✓
Disconnect hose at pulse pump and confirm fuel flows from tank(s).		✓	✓
Check operation of fuel tap.		✓	✓
Inspect primer bulb (if fitted) for perishing.			✓
Electrical			
Check electrolyte level of unsealed batteries.	✓		✓
Check security of battery mounting, leaks, connection security.		✓	✓
Check all wiring for condition and security.		✓	✓
Check condition of all switches			✓
Wing			
Check rib or batten profiles match pattern.		✓	✓
Check all members for cracks, dents, deformation, corrosion or fretting.		✓	✓
Check all cables and thimbles for tension, corrosion, fraying, kinking or fretting.	✓	✓	✓
Check all fasteners for security (nylon-insert self locking nuts are to be replaced with new items if removed for inspection).	✓	✓	✓
Check critical structural fasteners for corrosion and deformation.		✓	✓
Check condition and abrasion of stitching and gluing of fabric.			✓
Check mainspar join for wear or deformation.	✓	✓	✓
Inspect all rig & derig points for condition and operation.	✓	✓	✓

	Check B (25hrs / 3 months)	Check C (50 hrs / 6 months)	Annual (or 150 hrs)
Ailerons			
Check for full and free movement.	✓	✓	✓
Check for any excessive freeplay between ailerons, and between aileron and control column.		✓	✓
Check control deflections are correct.			✓
Inspect all hinges, brackets, push-pull rods, bellcranks, control horns, cables, pulleys		✓	✓
Check control cables and stops have correct tension and friction.			✓
Rudder			
Check for full and free movement.	✓	✓	✓
Check connections to tail wheel steering		✓	✓
Check for any excessive freeplay between rudder and pedals.		✓	✓
Check control deflections are correct.			✓
Inspect all hinges, brackets, push-pull rods, bellcranks, control horns, cables, pulleys		✓	✓
Check control cables and stops have correct tension and friction.			✓
Elevator			
Check for full and free movement.	✓	✓	✓
Check for any excessive freeplay between ailerons, and between aileron and control column.		✓	✓
Check control deflections are correct.			✓
Inspect all hinges, brackets, push-pull rods, bellcranks, control horns, cables, pulleys		✓	✓
Check condition and operation of pitch trimmer.		✓	✓
Check all control cables and stops have correct tension and friction.			✓
Doors/Windows			
Check condition of doors and windows, hinges, and latches.		✓	✓
Rear Fuselage			
Inspect all rear fuselage structure through access points.			✓

9 Repairs

9.1 General.

Repairs should either be carried out as described below, or to a scheme approved by Light Aircraft Company Ltd. After making any repairs, you should always obtain a "second inspection" from a qualified pilot or inspector, who should sign in the logbook that they have inspected the repair and consider it safe.

9.2 Repairs to bolted tubular structure, springs, pulleys, cables, bolts, nuts, etc. Any damage to such parts must not be repaired and the aircraft must not be flown once the damage has been identified. Identical replacement parts must be fitted before any further flight, If it is not possible to obtain replacement parts, consult Light Aircraft Company Ltd for advice.

9.3 Repairs to the Engine. These should be carried out in accordance with the maintenance manual for the engine fitted.

9.4 Repairs to Instruments. Microlight aircraft instruments are not usually repairable and should be replaced.

9.5 Repairs to Fuel Hose. Any fuel hose that found to be cracked, damaged or has hardened with age, must not be replaced. For hose forward of the firewall replacement must be least fire-retardant, (preferably aircraft or boat use) re-enforced rubber fuel hose. Rear of the firewall transparent polyurethane fuel hose may be is used, Note : PVC hose must not be used with fuel under any circumstances. Take care not to over-tighten cable ties used to secure hose, since this can cause a flow restriction.

9.6 Damaged Wiring. Replace with fireproof or fire resistant wiring of the same or higher current rating, secured in the original manner.

9.7 Repairs to Batteries (if fitted). A damaged battery must be replaced and all surrounding structure thoroughly inspected for acid damage.

9.8 Repairs to Tyres. An inner tube puncture may be repaired. If there is damage to the tyres that shows the inner canvas, replace the tyre in question.

9.9 Damage to a Fuel Tank. The fuel tank should be drained and removed from the aircraft. It is possible that the tank will be repairable. If it becomes impossible to see the fuel level in the tank sight gauge, then replace the tubing.

9.10 Damage to the Fabric. Do not attempt to fly if there is damage to the wing or fuselage covering fabric. Repairs should be carried out in accordance with FAA Airworthiness Circular AC43.13-1B chapter 2 section 4, taking care to ensure that the same materials are used as at original build, or - if the aircraft has subsequently been re-covered - the last re-covering, if in doubt please contact The Light Aircraft Company Ltd.

9.11 Damage to The Welded Steel Frame. If there is damage, either corrosion or bends to parts of the welded steel frame, do not attempt to straighten any damage, and do not attempt to overpaint or repair corrosion. Any repair must be approved by The Light Aircraft Company Ltd and is likely to require cutting out the damaged section, welding in a replacement, painting the repair, and then externally sleeving the repair. Guidance notes on such repairs are to be found in FAA Airworthiness Circular AC 43.13-1B chapter 4 section 5.

10 Vital Statistics

Weight values for this ***Sherwood KUB*** are at Annex C and a description of the aircraft is at Section 2. The following describes the basic dimensions of the aircraft:

	SI	**Imperial**
Length	5.00m	16ft 5”
Length wings folded	5.64m	18ft 6”
Length wings folded with tips	6.10m	20ft 0”
Height	1.58m	5ft 2”
Span	7.98	26ft 2"
Span with tips	8.90	29ft 2"
Mean chord	1.14m	43”
Wing area	9.10m²	98 ft²
Wing area with tips and fairings	11.5m²	124 ft²
Dihedral angle	1.3°	
Sweepback angle	0 °	
Washout	1.04°	
Fin area	0.530m²	5.40 ft²
Rudder area	0.507m²	5.45 ft²
Horizontal tailplane area	0.863m²	9.29 ft²
Elevator area	0.630m²	6.78 ft²
Undercarriage track width outside	1.42m	4ft 8in
Undercarriage wheelbase	3.68m	12ft 3/4in
Fuel capacity	25 litres	5.5 galls
Tyre Pressure	83 kPa	12 psi
Datum Point		Leading edge of wing
Datum Main wheels	.197m	-7.75”
Datum Tail wheel	3.48	+137”
Datum Pilot	.254	+10”
Datum Fuel	.381	+15”
Datum Baggage	.965	+38”
Baggage Maximum load		5kgs

Notes:

Take Off Distance

To 15m/50ft agl at 252 Kg, ISA Sea Level = 330m (factored from test data of 252m)

Landing Distance

With Full Flap and approach **45 KIAS** ***(51 mph)*** = 275m

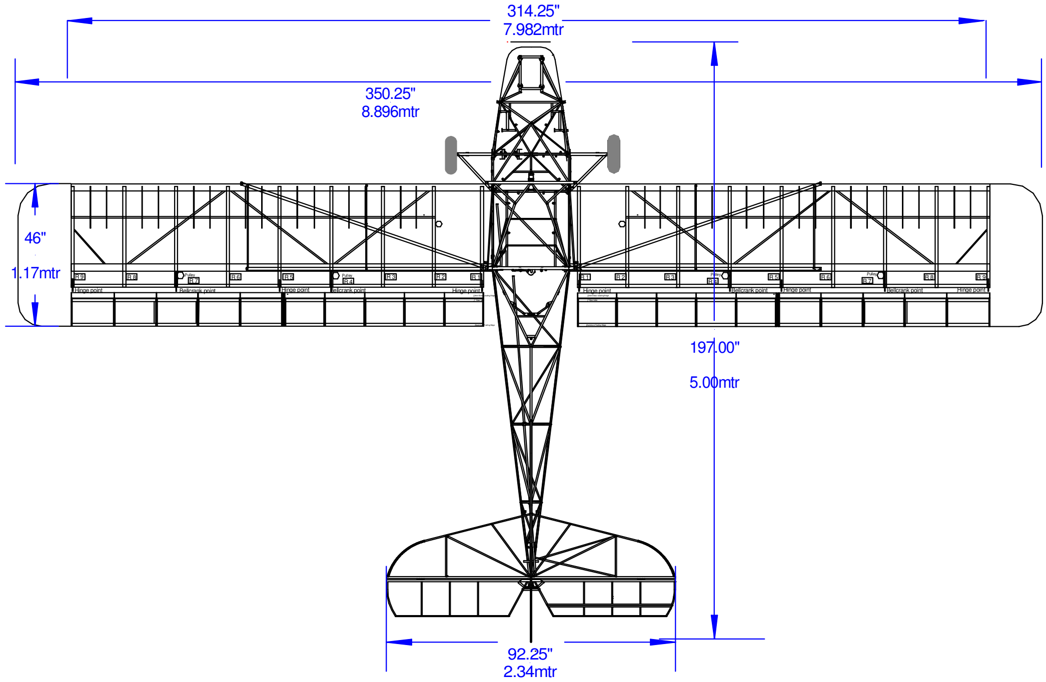
Best Rate of Climb 45-50 KIAS *(51 - 58 mph)*

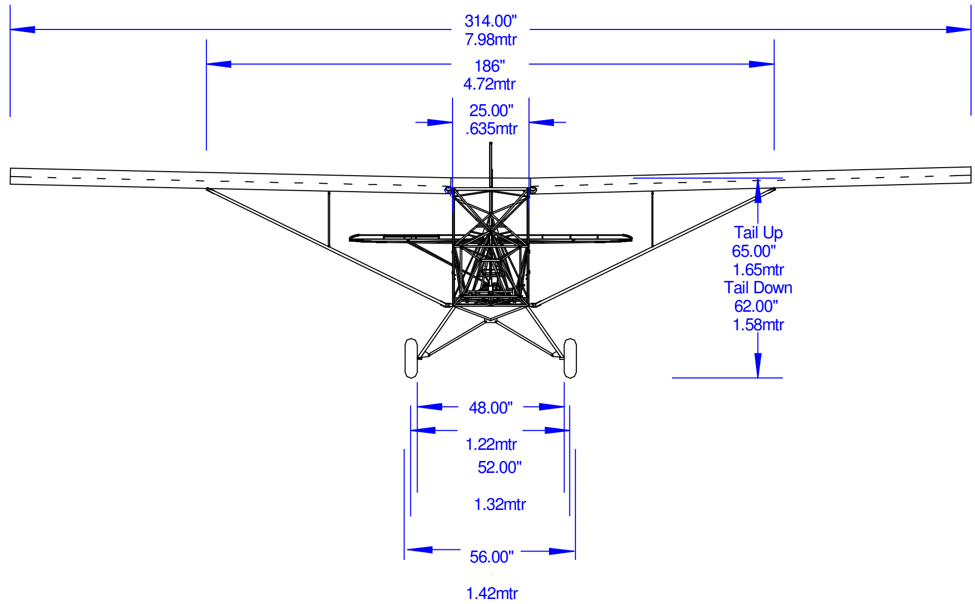
350-400 ft/min

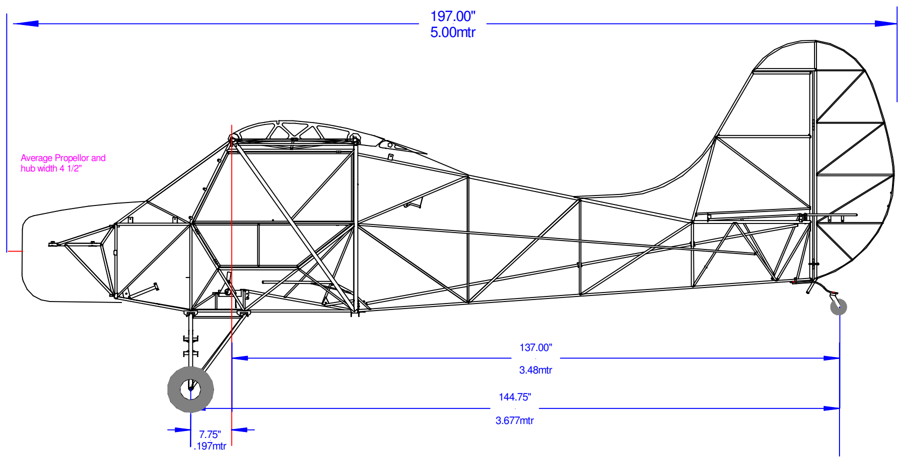
Gliding at 45 KIAS *(51 mph)*

430 ft.min

ANNEX A -Aircraft Data Sheet







ANNEX B

ENGINE MANUAL

There are 2 engine options available at this time, please refer to the manufacturers handbook for all information regarding the operation and maintenance:-

Polini THOR 250 twin spark

Hirth 50hp L23

ANNEX C

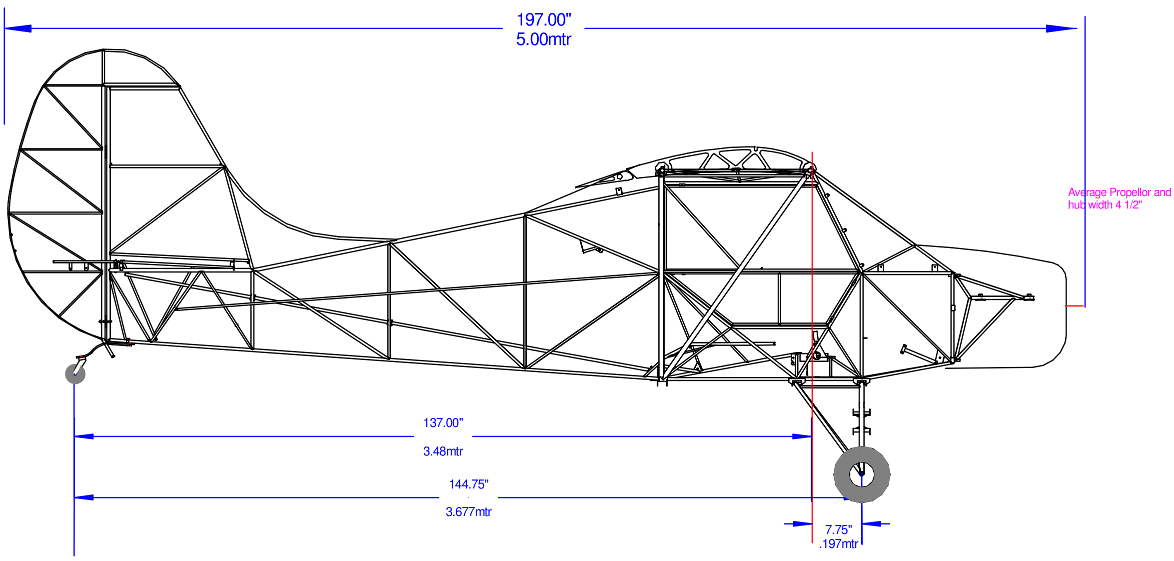
WEIGHT AND BALANCE REPORT

Weight and Balance must be done with the headrack level (i.e. in flying attitude)

Datum for all measurements is the leading edge of the wing.

C of G range is from 9” to 15.5” Aft of Datum

Datum measurements	
	Tail wheel
Main wheels	-7.75
Tail wheel	137”
Pilot	10”
Fuel	15”
Baggage	38”



ANNEX D

MINOR MODIFICATIONS FITTED TO THIS AIRCRAFT SINCE INITIAL BUILD

Minor modification approval sheets are to follow this page

Minmod No.	Description	Sign and date incorporated

ANNEX E

MAJOR MODIFICATIONS FITTED TO THIS AIRCRAFT SINCE INITIAL BUILD

MAAN / AAN No.	Issue	Description	Sign and date incorporated

ANNEX F

INSTRUCTIONS AND MANUALS FOR OTHER DEVICES FITTED TO THIS AIRCRAFT

No.	Description	Issue or date	Approval Mod No, or original equipment
F1			
F2			
F3			
F4			
F5			
F6			
F7			
F8			
F9			
F10			
F11			
F12			
F13			
F14			
F15			
F16			
F17			

SUPPLEMENT