



Skyranger Nynja 912UL / ULS Operators and Maintenance Manual



Issue 2(E)

Manufacturer

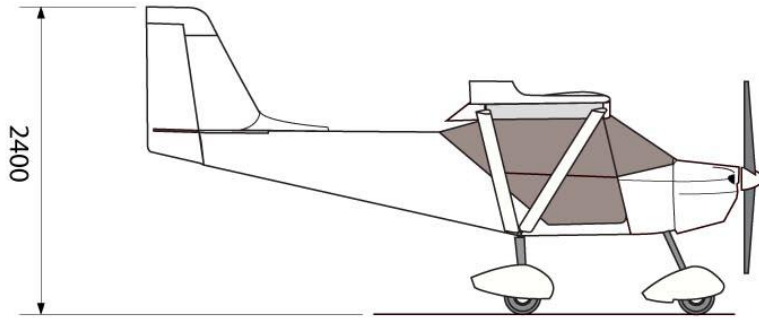
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This manual refers To Skyranger Nynja:

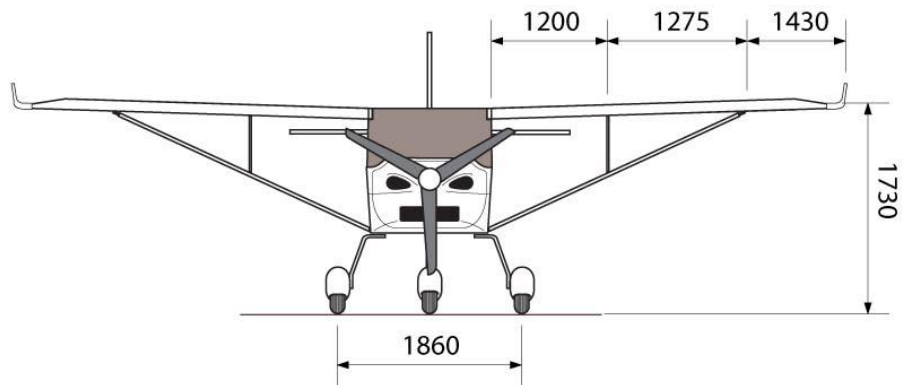
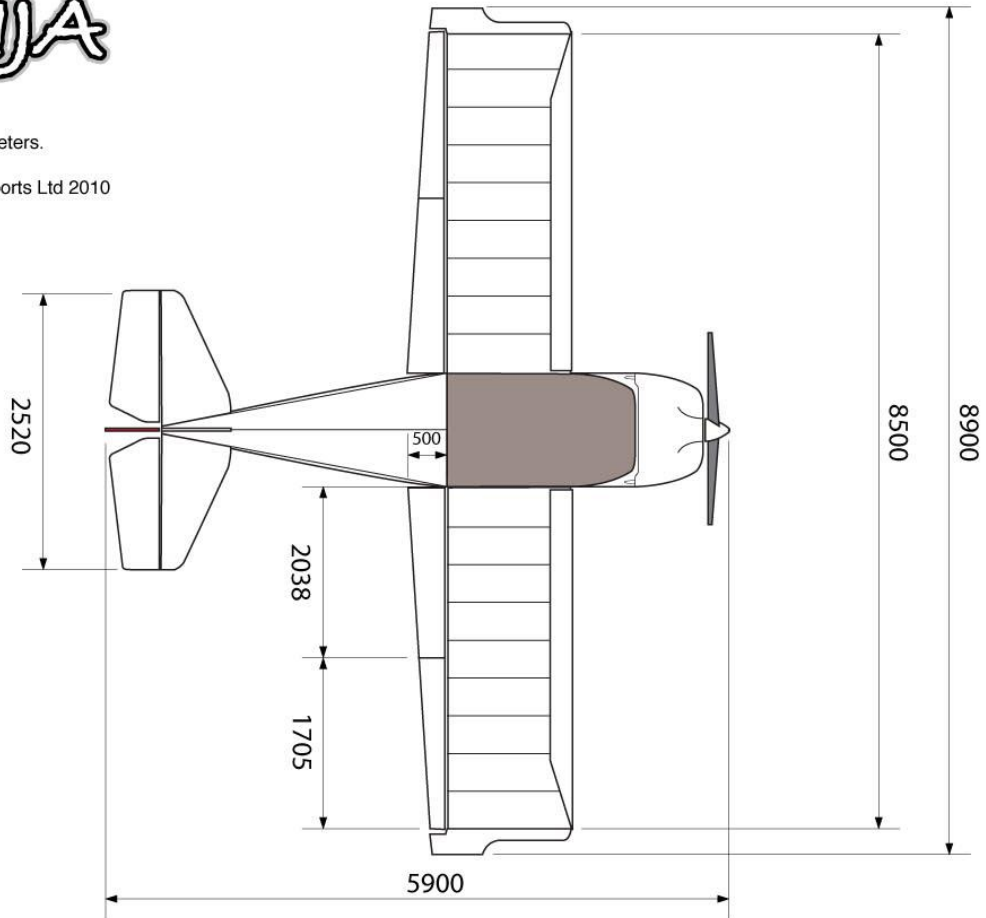
Serial Number.....

National Registration:.....

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



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1. Introduction

- 1.1 The Nynja is a three-axis microlight aeroplane.
- 1.2 This manual is not intended to teach you to fly the aircraft, or to build it. Learning to fly should be accomplished under the supervision of a flying instructor experienced on the type. A separate build manual exists to instruct you in building the Nynja from a kit.
- 1.3 What this manual will do, is provide the information which a qualified pilot requires to safely fly this aircraft (although a conversion by an instructor, familiar with the type is strongly recommended), and to carry out routine maintenance and minor repairs. Any modifications to this must be approved by the relevant national authority or its delegated body for the purpose.
- 1.4 The licenses which would be required to fly this aircraft are subject to individual national regulation. Pilots with microlight ratings trained for Flexwing aircraft should carry out differences training for 3 Axis control systems before attempting to fly this aircraft. Pilots with licenses and experience confined to heavier non Microlight aircraft are strongly recommended to carry out differences training for microlight aircraft.
- 1.5 An aircraft / engine logbook should be kept for this aircraft. All flights, maintenance, repairs and modifications should be recorded in order to have a structured care and maintenance plan. Please check national regulations for any specific national requirements.

2. Description of the Aircraft

Wing Area: 12.8m²

Wing Span: 8.9m (with winglet type wing tips)

Wing Standard Mean Chord: 1.5m

Manufacturer's Standard Empty Weight: 256 (912UL) – 271 Kg (912ULSP)

Max. Take-Off Weight: 450kg / 472.5KG if fitted with an Airframe

Mounted Total Recovery Parachute System

Wing Loading (Max. Weight / Wing Area): 36.91 kg/m²

Standard fuel capacity: 60litres / optional 70litres

Engine description / Limitations

	Rotax 912UL	Rotax 912ULS
Reduction gear type / ratio	Gearbox / 2.27:1	Gearbox / 2.43:1
Intake system	Air filters (K&N)	Air filters (K&N)
Exhaust system	CKT	CKT
Weight	80Kg installed approx	83Kg installed approx
Max power	59.6 KW at 5800 RPM	73.5 KW at 5800 RPM
Max. Static RPM	5500 (5000 with standard prop pitch)	5500 (4850 with standard prop pitch)
Max. Continuous Power	58 KW at 5500 RPM	69 KW at 5500 RPM
Power available at max permissible RPM	58 KW at 5500 RPM	69KW at 5500 RPM
Max. CHT	120C (wet sender type)	120C (wet sender type)
Fuel Specifications:	90 RON minimum unleaded, 100LL Avgas	95 RON minimum unleaded, 100LL Avgas
Engine Oil Specifications:	API SAE 10W40	API SAE 10W40
Gearbox Oil Specifications:	API SAE 10W40	API SAE 10W40
Fuel / Oil Mix	4 stroke only	4 stroke only
Max. Oil Press	5 Bar	5 Bar
Min. Oil Press	1.5 Bar	1.5 Bar
Max. Oil Temp	140C	130C
Propeller	Kievprop 273, 170cm diameter, 3 blade. Pitch 24deg@35cm rad, weight 3.6Kg	Kievprop 283, 180cm diameter, 3 blade. Pitch 35deg@33.5cm rad, weight 3.6Kg

2.1 Ancestry

The Skyranger was conceived by Philippe Prevot in 1991. The first 200 examples were manufactured under licence by Synairgie between 1994 and 1998. The manufacture of the Skyranger was moved to Aeros in the Ukraine in 1998, incorporating many developments in the design. An updated shorter wing model – The Skyranger Swift then followed. The Skyranger Nynja is a further development from the Skyranger design, featuring a redesigned fuselage with Fibreglass body fairings, and detail aerodynamic, improvements, along with a reworked interior.

2.2 Construction

The Nynja is predominately constructed of pin-jointed straight aluminium tubes with wings and tail covered with pre-sewn polyester or optional laminate fabric. The fuselage is covered in non structural glassfibre panels.

2.3 Flying Controls

- 2.3.1 Pitch control is by fore-aft movement of the control stick, with movement transmitted via cables to a conventional elevator.
- 2.3.2 Pitch trimming is by a hand-operated lever mounted in the central console between the seats, with movement transmitted through a cable to a trim-tab on the starboard elevator, reacted with springs.
- 2.3.3 Roll control is by sideward movement of the control stick, with movement transmitted through cables to part-span, differential-movement ailerons.
- 2.3.4 Yaw control is by dual-control foot pedals, with movement to the rudder transmitted through cables.
- 2.3.5 Braking is by hand-operated hydraulic disc brakes.
- 2.3.6 The undercarriage is of tricycle arrangement, with nose wheel steering by movement of the dual-control rudder pedals.
- 2.3.7 Flaps are lowered in two stages by lifting a hand-operated lever located between the seats whilst gripping an integral latching lever.

3. **Limitations**

3.1 **Introduction**

This section includes the basic operating limitations for the Nynja.

3.2 **Units**

When noting limitations, it is important to ensure that the limitations which you are using use the same units and calibrations as the instruments in the cockpit. The limitations shown below use knots CAS (Calibrated Airspeed); your aircraft may have an instrument in mph, or KPH and in any case will read IAS (Indicated Airspeed). The difference between IAS and CAS is basically the accuracy of your Pitot-static system. For a kitbuilt aircraft, if not a national requirement it is recommended to perform a calibration of the airspeed indicator system. A method for doing this can be found here https://www.bmaa.org/files/til_027_avionics.pdf

IAS Calibration Card for Nynja: _____.

Kn CAS (Calibrated)	33.5 V _{so}	36 V _{S1}	43 min sink	45 Best climb angle	52 Best glide angle	52 approach speed	58 best climb rate	70 V _{fe}	74 V _a	117 V _{ne}
IAS (Indicated)										

Unless all errors are less than 2 knots, a copy of this calibration card should be displayed in the cockpit near to the ASI.

3.3 **Operational Limitations**

3.3.1 The Nynja must only be flown in day VMC conditions, according to applicable national regulations.

3.3.4 The **minimum** instrumentation required is:

Airspeed Indicator, Altimeter, Slip, Compass, RPM Gauge, Oil temperature, Oil Pressure, Coolant temperature.

3.3.5 It is recommended that the Nynja is not flown where a crosswind component above 15 knots is predicted.

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

3.3.7 Do not fly if any ice is present on the airframe. Performance, stability and handling will all be degraded with dangerous consequences. Do not fly the aircraft into known icing conditions.

3.4 **Flight Limitations and key performance speeds**

3.4.1 Never exceed speed, Vne, is 117 kn CAS [IAS]

3.4.2 Manoeuvring speed, Va is 74 kn CAS [IAS]

3.4.3 Flap limiting speed, Vfe is 70 kn CAS [IAS]

3.4.4 Door open limit speed is 72 kn CAS [IAS]

3.4.5 Speed for best rate of climb 58kn CAS [IAS]

3.4.6 Speed for best climb angle 45kn CAS [IAS]

3.4.7 Maximum Bank angles are 60° either way.

3.4.8 Maximum Pitch attitudes are 45° nose up and down from the horizontal.

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

3.4.10 At least 55kg must be in the cockpit for flight, no more than 120kg may be carried in each seat.

3.4.11 Maximum Take-off weight is 450kg - or 472.5Kg if fitted with a ballistic recovery parachute system.

3.4.12 Aerobatics and deliberate spinning are prohibited.

4. *Flying the Nynja*

4.1 Pre-Flight Inspection

Pre flight inspection – Check A, is detailed in the maintenance section.

4.2 Starting

4.2.1 Before starting the engine ensure that the max takeoff weight will not be exceeded (from fuel/weight placard).

4.2.2 Pre start check:

Security Aircraft, Crew, Equipment, Secure, brakes ON.

Throttles Full and free, and closed, choke set as required.

Area All around and behind aircraft clear.

Ignition Ignition switches ON.

Prop Shout ‘clear prop’, pause then start the engine.

Once the engine is running set 2000RPM and slowly remove the choke.

For the first start of the day it is recommended to crank the engine with ignition OFF for around 5–10 seconds – until the first indication of oil pressure rising.

4.3 Taxying

4.3.1 Before Taxying ensure that the engine has run for at least 2 minutes from cold. Do not use high RPM until the engine has reached its minimum flight operating temps.

4.3.2 Taxi at no more than a brisk walking pace, somewhat less if the surface is rough. Steering is effected through the rudder pedals which are linked directly to the nosewheel. The turning circle normally is around 20 feet in diameter (at the aircraft centreline).

4.3.3 Microlight aircraft are easily blown over in winds over 25knots. It is imperative that when taxiing in strong winds the correct control placements are used. When the wind is from the forward quarters hold the stick into wind and the elevator neutral. When the wind is from the rear quarters the stick should be positioned away from the wind and the elevator held down.

4.3.4 Taxy checks

When taxying check:

- Brakes functioning
- Compass moving when aircraft turned
- Slip ball moving when aircraft turned
- Engine temps warming, no limits exceeded

4.4 Pre take-off checks (vital actions)

Prior to take-off, it is recommended that the following pre takeoff check is used. Position the aircraft into wind, brakes held on

C – Controls

- Check controls for full and free movement
- Check visually that the controls are moving in the correct sense

H – Harness and Hatches

- Check harnesses and hatches (doors) are secure, no loose objects

I – Instruments and engine

- Check flight instruments are set and serviceable
- Check engine instruments are serviceable, minimum operating temps
- Check choke is OFF
- Set 3000 RPM and check each ignition in turn – max RPM drop 150
- Check for smooth idle around 1500–1700 RPM
- Increase power to max brakes will hold for at least 10 seconds
- Check engine indications normal. Reset RPM to 2000

F – Fuel and Flaps

- Check fuel tap is ON
- Check contents sufficient for flight
- Cycle flaps and check symmetrical operation, detent operation
- Set flap as required

T – Trim

- Check trim set for takeoff (mid position)

W – Wind (and eventualities)

- Check wind speed and direction / crosswind component
- Consider emergency actions – abort point EFATO options etc

A – All clear

- Confirm all clear on approach
- R/T call if required and line up on runway

4.5 Normal takeoff

- 4.5.1 For a non performance takeoff, into wind, flaps can either be left in the fully up –CR (cruise) position, or with the first stage – TO (takeoff) position.
- 4.5.2 When lined up and rolling straight smoothly apply full power. Keep straight with rudder, ailerons neutral and with the elevator slightly up to reduce the weight on the nosewheel.
- 4.5.3 When the airspeed rises to 45 knots CAS [IAS] rotate and lift off and adopt a shallow climb attitude. Allow the airspeed to rise to 60 knots CAS [IAS] and adopt a climbing attitude to hold this airspeed.
- 4.5.4 When above 200 feet AGL the airspeed can be reduced to 58 knots CAS [IAS] if a greater climb rate is required, and the flaps selected to CR. The power can also be reduced a little for noise abatement if required. When the flaps are retracted there will be a slight tendency for the aircraft to pitch up, which will require a gentle push on the stick to maintain a constant airspeed. Therefore after the flap change re trimming may be required.
- 4.5.5 When in the climb, due to the excellent climb rate, the nose is high and may obscure forwards view. Therefore it is recommended to periodically weave or lower the nose to clear the blind spot. For prolonged ascents a cruise climb at reduced power setting and slightly higher airspeed is recommended and will increase forwards field of view.

4.6 Short takeoff

- 4.6.1 For a short takeoff select first stage, (TO), flap. Start from as close to the beginning of the field as possible. Hold on the brakes as power is increased to full. When power is full or if the aircraft starts to ‘creep’ forwards, release the brakes. Elevator position should be neutral (smooth surfaces only) or slightly up.
- 4.6.2 When the airspeed rises to 40 – 45 knots CAS [IAS] rotate and lift off. When airborne allow the aircraft to accelerate to 45 knots CAS [IAS] for best obstacle clearance. Be aware that at this speed prompt action will be needed to lower the nose and obtain glide speed in the event of power loss.

4.6.3 When clear of obstacles allow the aircraft to accelerate to 58 knots CAS [IAS], and at 200 feet AGL select CR flap.

4.6.4 It is important to always pick an abort point before attempting to take off from a short field. If the aircraft approaches the abort point before lifting, the takeoff should be aborted by fully closing the throttle and braking firmly.

4.7 **Soft field takeoff**

4.7.1 Select first stage (TO) flap. Avoid stopping the aircraft whilst entering the runway and roll into the takeoff run. Hold full up elevator until the nosewheel lifts and then try to balance the aircraft in the rotated attitude whilst speed is increased. This will help reduce rolling resistance and keep overall drag to a minimum.

4.7.2 Allow the aircraft to lift off at around 40 knots CAS[IAS] , and then carefully allow the aircraft to accelerate to 58 knots CAS [IAS] in ground effect before adopting the climbing attitude. At 200 feet AGL select CR flap.

4.7.2 It is important to always pick an abort point before attempting to take off from a soft field. If the aircraft approaches the abort point before lifting, the takeoff should be aborted by fully closing the throttle and braking firmly.

4.8 **Crosswind takeoff**

4.8.1 The maximum demonstrated takeoff crosswind of the Nynja is a component of 15knots. Pilots are advised to avoid crosswind components of greater than 10 knots until very experienced on type.

4.8.2 Select O (CR) flap. Start the takeoff roll with the stick held fully into wind and the elevator neutral. Pressure may be required on the rudder pedals to steer straight.

4.8.3 Allow the aircraft to accelerate. The amount of aileron can be reduced if there is a tendency to lift the downwind wheel. Keep the elevator neutral until the speed reaches 50–55knots CAS[IAS], then cleanly rotate and lift off.

4.8.4 As the aircraft lifts off, adopt a shallow climb attitude. Gently yaw the aircraft into wind to set up the required drift angle, and centralise the ailerons and balance ball.

4.9 Normal landing

- 4.9.1 Generally the Nynja should be landed from an approach speed of about 52 knots CAS [IAS], although in turbulent conditions handling can be improved by increasing this by 5–10 knots. Full flap (LD) position is the standard landing setting. As flap is selected a gentle pull on the stick will be required to maintain constant airspeed. Therefore re trimming will be required.
- 4.9.2 Maintain the approach speed until roundout, which should be initiated around 15–20 ft ,and then hold-off initially 2–3 ft above the runway and allow to settle gently when the speed decays. Aim to land on the main wheels with the nose wheel well off the ground.
- 4.9.3 Pilots transitioning from more traditional lower performance microlight aircraft should be aware that if the airspeed is allowed to increase on the approach then the aircraft may exhibit considerable float during the hold off period and this may cause a tendency to ‘balloon’ and will cause more runway than expected to be used.

4.10 Short field landing

- 4.10.1 Select full flap (LD) position, and set up a powered approach at around 45 – 50 knots CAS[IAS]. Use power adjustments to control the flight path and rate of descent whilst accurately maintaining airspeed with elevator. If tall obstacles are present on the approach, then transition into a glide approach once clear past them. Take care however to maintain airspeed during this phase. 50 knots CAS [IAS] is recommended as the minimum for a full glide approach at max takeoff weight and full flap.
- 4.10.2 When round out height is reached close the throttle fully and round out. Perform a brief hold off and land. Brakes can be used to shorten the landing roll if required. Take care not to brake too sharply on rough or soft surfaces. Braking efficiency is at its greatest if the elevator is applied fully up after touchdown once below flying speed.
- 4.10.3 Accurate airspeed control is the key to short field performance and pilots new to the Nynja must practice until this is achieved, to be able to land in the published distance.

4.11 Soft field landing

4.11.1 Fly the approach as in 4.11.1 above.

4.11.2 Fully hold off and try to touch down gently, and as slow as possible.

During the ground roll avoid braking and progressively apply full up elevator to keep the nose wheel up for as long as possible. Continue to hold up elevator when the nose wheel is on the ground.

4.12 Cross wind landing

4.12.1 The Nynja has a maximum demonstrated crosswind component of 15 knots. Cross wind components above 10 knots should not be attempted other than by experienced pilots fully familiar with the type.

4.12.2 Either O (CR) or first stage (TO) flap can be selected. Fly a powered approach at a little higher airspeed than normal – around 55 – 60 knots CAS[IAS]. Initially crab the approach to remain in balance and on centreline.

4.12.3 During the final stages of the approach lower the into wind wing a little and apply rudder pressure as required to align the fuselage with the runway. Round out and hold off like this, and touchdown into wind wheel first. Try to land after a short hold off without allowing the airspeed to decay too much. This will assist in maintaining good control response.

4.12.4 As with all crosswind landings the aircraft must still be accurately 'flown' whilst on the ground. Initially the aircraft will touchdown on the upwind main wheel first. Progressive aileron deflection should be applied into wind as the speed decays during the ground roll to keep the aircraft on one wheel and gently lower the downwind wheel as airspeed reduces and aileron authority diminishes. The aircraft will need to be accurately steered straight down the runway with rudder during this process. The nose gear should be held off initially and gently lowered before rudder authority reduces too far and aerodynamic directional control is lost. As the nose wheel touches down rudder will have to be straightened to avoid a steering snatch due to the rudder deflection applied against the crosswind.

4.12.5 When the nose wheel is down, aileron will still need to be applied against the crosswind and neutral or light forwards elevator pressure

should be applied to ensure adequate steering from the nose wheel and to avoid yawing into wind.

4.13 Cruise

The Nynja has a large range of cruise speed. At the higher values fuel consumption will be correspondingly higher. Cruise is set up in the normal way by selecting the required attitude and power and trimming off any residual pitch forces.

4.14 Turning

4.14.1 Turning the Nynja is accomplished in the standard manner. In common with most microlight aircraft the Nynja requires some rudder coordination to maintain balance when rolling into and out of a turn.

4.14.2 As with any other aircraft, the stall speed will increase with bank angle. The stalling speed at 60° bank with no flap will rise to 53 knots CAS [IAS], at 472.5Kg takeoff weight.

4.15 Flight in Turbulence

The Nynja has powerful controls and handles turbulence well. However, do not fly above the manoeuvre speed of 74 knots CAS [IAS] in strong turbulence. Below this speed the worst thing a gust can do to you is stall the wing or one of the control surfaces. Above that speed, it is possible for strong gusts to overstress the aircraft.

4.16 Stalling

During test flying of the prototype the following stalling speeds were recorded:

VS1 – Stalling speed at max takeoff weight, forward CG and flaps up: 36kn CAS.

VSO – Stalling speed at max takeoff weight, forward CG, full flap: 33.5kn CAS.

These speeds should represent the worse case in normal service. Lower takeoff weights and more rearward CG will lower the stalling speed – but not by much! Pilots should also remember that stalling speed increases during turns and manoeuvres. Any ice on the aircraft will also increase stalling speeds – **never takeoff with ice present on the aircraft.**

4.16.1 Slow flight characteristics

Slow flight indications include:

- Lightening of controls accompanied by reduced effectiveness
- Reduced airflow noise (most noticeable at low power settings)
- High nose attitude (most noticeable at high power settings)
- Rearwards position of control stick
- Strong pitch buffet as the incipient stall is entered
- A tendency to roll or wing rock accompanying the buffet

To recover normal operating airspeed at the slow flight stage, simply move the stick forwards and apply power.

4.16.2 Wings Level, Power Off

The aircraft can safely be stalled at a deceleration rate of up to 3kn/s. Max pitch attitude is 45°, and stall warning is given about 2 knots above the stall by buffet. Stall is normally marked by a mushing descent in heavy buffet or nose drop.

4.16.3 Recovery

Recovery is effected in the standard manner by moving the stick forwards to reduce angle of attack and simultaneously applying full power to aid acceleration and minimise height loss. The nose can then be raised as soon as the airspeed is building past 45 – 50 knots CAS [IAS]. Height loss between stall and recovery, if well executed, is around 50 – 80 feet if power is used, or around 100 – 150 feet to establish a steady glide if power is not used.

4.16.4 Wings Level, Power On

Characteristics are similar to the power off case. An additional warning of the approaching stall is the attitude of the aircraft. With full power set the aircraft stalls at a very high nose attitude.

Because of the increased slipstream and torque effect at high power settings considerable rudder deflection may be required to keep in balance as the stall is approached. Stalling out of balance can result in considerable wing drop.

4.16.5 Recovery

Recovery is simply effected by moving the stick forwards to reduce angle of attack. Any tendency to wing drop should be countered by application of opposite rudder sufficient to prevent further yaw towards the dropping wing. These two actions should be performed simultaneously.

4.16.6 In Turning Flight.

Stalling speeds are increased with bank angle, in the manner normally expected. The Nynja often has the characteristic of rolling towards wings level as the stall occurs. Recovery is standard. Move the stick forwards to reduce angle of attack and apply power. Simultaneous opposite rudder should be applied against any rolling tendency. Once the aircraft is safely above the stalling speed co-ordinated aileron and rudder can be used to level the wings.

4.17 Aerobatics

Aerobatics are not permitted in this aircraft.

4.18 Departures from Controlled Flight.

4.18.1 The Spin

Deliberate spinning of the Nynja is prohibited. However, it is possible through gross mishandling of the aircraft to inadvertently enter a spin. Should this happen, the spin can be seen by a steep nose-down pitch attitude (about 45° nose down) and the aircraft rapidly yawing in one direction. Some higher than normal 'g' forces may also be experienced. Should this occur, close the throttle and centralise the stick (elevator and aileron) and rudder pedals immediately. The aircraft should stop turning almost immediately and be established in a steep nose down attitude with the airspeed rising rapidly. At this point, retract flaps if extended, and gently ease out of the dive. Normal flight can then be resumed.

4.18.2 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.

4.19 Flight with doors open or removed

If fitted with the two-piece door option the Nynja may be flown with the top half of the door open. The maximum speed for flight with the doors open is 72kn CAS [IAS].

4.19.1 When the doors are opened in flight they must be latched on the wing mounted hooks. Failure to do this can result in the door unexpectedly slamming shut during flight out of balance (sideslips).

4.19.2 Pilots should be aware that as the doors are opened the aircraft will experience a tendency to pitch up slightly and re establish trim some 5kn or so slower.

4.19.3 The Nynja can also be flown with either the one or two-piece doors removed entirely.

4.19.4 The Nynja exhibits greater directional stability when flown with the doors open / removed. This then requires slightly more rudder input to maintain balance with the engine running at full power in the climb.

4.19.5 Climb and glide performance is slightly reduced when flying with the doors open / removed. Stall and spin characteristics remain unchanged.

5. Performance

5.1 Introduction

The following data was obtained in the original UK prototype. When using the data for planning purposes, apply conservative safety factors.

5.2 Climb

Speed for best rate of climb is 58kn CAS [IAS]. Best angle of climb speed (V_x) is 45kn CAS [IAS]. 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 speeds should not vary significantly.

5.3 Glide

Speed for best glide angle is 52kn CAS [IAS], at which a glide ratio of around 9 to 1 may be expected. Flying a little slower at 43kn CAS [IAS] will give the minimum descent rate (min sink) of around 550FPM.

5.4 Cruise

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 Nynja. The pilot is encouraged to plan conservatively until sufficient experience is gained of the fuel consumption and cruising speeds at the conditions in which the aircraft is normally flown.

5.5 Performance values

Table below represents typical performance at sea level

	912UL	912ULS
Best rate of climb	900FPM	1140FPM
Takeoff distance	353m at 472.5Kg 322m at 450Kg	308m at 472.5Kg 280m at 450Kg
Landing distance	296m at 472.5Kg 282m at 450Kg	296m at 472.5Kg 282m at 450Kg
Stall speed Vs0	33knots CAS	34knots CAS
Cruise speed Vc	93knots CAS	97 knots CAS
Never exceed speed Vne	117knots CAS	117 knots CAS

Takeoff distance: Using the above figures, the following additional safety factors should be applied to the distance to clear a 15metre obstacle. If unsure, always use these factors to ensure you have sufficient take-off distance available.

Per 1000 ft runway height above Sea Level	Multiply by 1.1
Per 10°C increase in temperature above 15°C	Multiply by 1.1
Per 2% uphill slope	Multiply by 1.1
Soft ground or snow or wet grass	Multiply by 1.25
If it is very soft (or wet), or the snow is more than 1"deep	Multiply by 1.6
If you have to take-off with a tailwind	Multiply by 1.2 for every 4 knots of wind
Now to be sure, multiply by 1.33, to take into account that you may not fly the aeroplane as well as the company test pilot did when he worked out the values in the manual.	

Landing performance: Using the figures above, the following additional safety factors should be applied to the distance to clear a 15metre obstacle on the approach. If unsure, always use these factors to ensure you have sufficient runway to avoid using the considerably provided hedge at the far end of the runway.

For every 1000ft you are above sea level	multiply by 1.05
For every 10°C above 15°C air temperature	multiply by 1.05
For every 2% of downslope	multiply by 1.1
If the runway is tarmac or concrete	multiply by 1.2
If the ground is soft, or there is snow or wet grass	multiply by 1.25
If the ground is very soft (or wet) or if the snow is more than 1" deep	multiply by 1.6
If you have to land with a tailwind	multiply by 1.2 for every 4 knots of wind
Now to be sure, multiply by 1.43, to take into account that you may not fly the aeroplane as well as the company test pilot did when he worked out the values in the manual.	

6. Emergencies

6.1 Engine Failure Before Take-Off (aborted takeoff)

Close throttle, apply brake, ignitions (mags) off.

6.2 Engine Failure After Take-Off (EFATO)

Lower nose, to establish an approach speed of at least 52 kn 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 43 kn CAS [IAS] the minimum sinking speed. If it is required to glide a distance to the nearest suitable field then 58 kn CAS [IAS] will give the best glide speed, fly a little faster in a head wind to maximise distance and a little slower with a tail wind. 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 switches, fuel cock, lack of fuel pressure), if field is flat land into wind, otherwise uphill. Use brakes as appropriate.

6.4 Engine Fire in Flight

Close fuel Tap, open throttle fully, make emergency call if time permits, when engine stops turn off mag switches and master, treat as engine failure in flight. Vacate aircraft as soon as possible after landing.

6.5 Fire in the cockpit

Switch off all electrical devices (not the ignition unless there is an engine fire also), close heater vent, open fresh air vents, land immediately and vacate the aircraft.

6.6 Emergency Landing on Water

Try to land into wind, touching down with as high a nose-up attitude as possible. Before impact, pilot and passenger must be prepared to release their harnesses, it may also be beneficial to release the doors before impact. If wearing lifejackets, 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(es) 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

Reduce power to avoid propeller damage, fly out of the weather as soon as possible.

6.9 Inadvertent Flight in Icing Conditions

Fly out of conditions as soon as possible, land as soon as possible.

6.10 Use of Airframe mounted total recovery parachute system (if fitted)

Tighten harnesses, fuel tap OFF, ignitions OFF, pull handle, make emergency radio call if radio carried. [Note, if an Airframe mounted total recover parachute system (AMTRPS) is fitted to this aircraft, the manual should be annexed to this manual.]

7. Rigging and De-rigging

7.1 To attach the wings to the Nynja:

- With the wing tip raised to approximately the rigged height, slide the wing root into place to engage in the root brackets
- Insert the wing root fixing bolts
- Attach the lift struts and jury struts
- Tighten all attachment bolts and insert safety rings
- Connect flap pushrod
- Connect Pitot line
- Connect aileron cables
- Ensure aileron cables are crossed as per placard in cockpit on central upright.
- Final inspection of all nuts and bolts, cable routing and attachments

7.2 To remove the wings from the Nynja:

- Disconnect aileron cables
- Disconnect pitot line
- Disconnect flap pushrods
- Remove safety rings from lift strut bolts (if fitted)
- Remove nuts from lift strut bolts and spar bolts
- Support wing tip
- Remove lift struts
- Remove spar bolts (wing root)
- Slide wing outwards until spar is clear of cabin.

7.3 Tail

The tail plane is not designed to be a regular de-rig item, however it may be removed for long distance trailering, as may the rudder. When re assembling these parts replace all Nyloc nuts that were removed for disassembly.

7.4 **Use of wing fold mechanism**

Use of the optional wing fold mechanism is detailed in the wing fold instructions document, and if fitted these instructions should be appended to this manual.

8. Weight and Balance

8.1 Introduction

A standard unmodified Nynja has a wide centre of gravity range which normally allows for most if not all combinations of fuel, crew and baggage within the loading limitations and within the maximum takeoff weight without exceeding the permitted CG limits.

However, pilots should be aware that stick forces and displacements will become lighter with aft CG (typically a heavy crew and full fuel / baggage) and heavier with forward CG (typically low fuel, light pilot only). Also at aft Cg, the hands off stability will be reduced. Flying outside of the permitted CG limits at either extreme is potentially extremely dangerous and should not be attempted in any circumstance.

8.2 CG Datum and weighing attitude

The Nynja CG datum is the main wheel axles. Positive values are forward of datum.

Weighing attitude: levelled so that the horizontal tailplane trailing edge tube (forward of the elevator) is to be 8mm below the horizontal tailplane leading edge tube.

8.3 CG moment arms and limits

Nosewheel:	+1.45M
Crew:	+0.15M
Fuel tanks:	- 0.29M
Baggage bag:	- 0.29M
Forward CG limit:	+ 0.38M
Aft Cg limit:	+ 0.21M

8.4 loading limitations:

Min pilot weight: 55kg

Max pilot weight: 120Kg per seat (within MTOW of 450/472,5Kg)

Max baggage: 10Kg in baggage bag

8.5 Weighing

The Nynja will have been weighed when first built, and must be re-weighed at intervals as laid down by local regulations, or when it is modified or repaired). Calibrated scales should be used. Details of the weighing must be entered in the aircraft logbook.

The results can then be tabulated and calculated to produce Total empty weight and total empty moment – see example below:

Example for imaginary Nynja ‘G-NYNJ’

Item	weight	arm	Moment (Weight x arm)
Nosewheel	75	+1.45	108.75
Main wheel left	95	0	0
Main wheel right	95	0	0
Total empty weight	265	Total moment	108.75

Example weights and worked calculations in red.

Once you have the empty weight and moment for your specific aircraft you can use this to calculate Centre of gravity position for a specific flight using a simple table. See example below for a 90Kg pilot flying with 30Kg of fuel and 10 kg of baggage:

Item	weight	arm	Moment (weight x arm)
Empty weight	265		108.75
Crew	90	+0.15	13.5
Fuel	30	-0.29	-8.7
baggage	10	-0.29	-2.9
Total weight	395	Total moment	110.65

CG position = Total moment / Total empty weight (110.65 / 395) =
Centre of Gravity position: + .28M (forward of datum)

A spreadsheet can be used to verify the range of loadings and cg positions obtainable. The BMAA have such a spreadsheet available on their website – form AW028 which we recommend for this purpose.

If additional items or modifications are fitted then the weight and balance report should be amended – either calculated, or by re weighing.

Weighing should be carried out with fuel tanks drained (but unusable fuel remaining).

To get the most accurate information for the pilot, weighing should be carried out with all normal equipment fitted (removable avionics, cushions, headsets etc)

9. Maintenance

9.1 Introduction

This manual details recommended maintenance. However maintenance requirements will depend upon conditions of storage and type of use.

Examples of harsh use may include:

Storage outside

Use near salt water

Regular use from unprepared rough fields

Regular transport by trailer

Learning to fly

In such cases more regular inspections and component replacement may be required in order to keep the aircraft in an airworthy condition.

Service bulletins may occur from time to time. Regular checks for new bulletins should be made to the www.skyranger.co.uk website

9.2 Who may carry out maintenance, and who's responsibility is it?

9.2.1 The Nynja has been designed and conceived to be maintained by a person without specific training in mechanics. However some mechanical experience is desirable and persons with limited mechanical capability should limit themselves to the simple maintenance actions and engage suitably skilled persons to undertake the more complex tasks. Check local regulations for who can carry out or certify maintenance.

9.2.2 The Owner is essentially the 'maintenance manager' and must assume responsibility for ensuring the maintenance actions are carried out as and when required in order that the aircraft may remain in an airworthy condition. As such the owner must be thoroughly familiar with this maintenance manual, and not hesitate to take advice from their local technical representative / inspector, professional maintainer, and / or the aircraft importer on any points that are not immediately clear.

9.3 Recording and certifying maintenance

9.3.1 All maintenance actions should be recorded in the aircraft airframe and engine log book(s). Separate worksheets and invoices for parts / work, should be kept in a file that can be referenced in conjunction with the logbook entries.

9.3.2 Each logbook entry detailing maintenance should be accompanied by a signature of the person or persons that have carried out the work.

Any work that is 'flight critical' should have a second signature (in addition to the person that has carried out the work) to certify that correct reassembly has been carried out. This must be done by a 'qualified person' – the definition of such a person will be defined by local regulations.

Examples of tasks that are considered 'flight critical' are:

Disassembly/ reassembly of primary structure (rigging / derigging as defined previously is excepted).

Maintenance by replacement of primary structure

Maintenance by replacement of control systems

9.4 Sourcing parts

9.4.1 Unique airframe parts must be purchased from the manufacturer and should not be made by a third party or 'home made'.

9.4.2 Non unique parts may be sourced from other suppliers. However they should be equivalent in terms of specification and dimension. If there is doubt, then there is no doubt – they should not be used.

9.5 Engine maintenance

This should be carried out in accordance with the engine manufacturer's specific maintenance schedule for the type and model of engine. Regular checks for engine service bulletins should be made.

9.6 Inspections and when to carry them out

9.6.1 There are four types of routine inspections:

1. Check A – this is a daily inspection. A sub version of this is a subsequent preflight inspection, which may be slightly less detailed.
2. Check B – 50 hour / 6 month inspection (whichever comes sooner). This inspection may be also be extended by 10% (5 hours).
3. Check C – Once per year timed to co-incide with the annual permit inspection or 100 hours (whichever comes sooner). This inspection may be also be extended by 10% (10 hours).

9.6.2 These hours are airframe hours – which are flight hours. If the aircraft is operated from a rough surface then it is recommended airframe hours are recorded from start of taxiing, to finishing taxiing at the end of the flight. For convenience owners may choose to base times on engine hours.

9.7 Check A

9.7.1 Engine – carry out an engine pre-flight inspection following the Instructions contained in the Rotax engine manual.

9.7.2 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:

- Ignition switches OFF
- Condition of choke and choke cable
- Condition and security of all flying controls
- Check condition of all instruments
- Check harnesses are properly fitted and not frayed.
- Check seats are secure.
- Check fuel filter is clean.
- Check sufficient fuel for the planned flight.
- Check wing leading and trailing edge bolts secure

Underside

- If the aircraft has not flown within 24 hrs, drain a small amount of fuel from the drain tap using a standard tool and check for water.

Engine bay

- Remove cowling
- Check all items as in engine manual at Annex B
- Check security of all electrical connections
- Check prop bolts protruding from securing nuts
- Generally look for any fluid leaks or loose fastenings
- Check condition of engine mounting rubbers and bolts
- Check firewall security – not chafing any structure, secure and sealed to cowlings.
- Replace the cowling and all securing screws

Starting from the nose, inspect

- Condition of the propeller: no nicks or cracks
- Condition and security of the spinner, if fitted
- Condition and inflation of the nose wheel tyre
- Condition of noseleg
- Security of the nose wheel spat and fairing
- Security of the engine cowling

Moving down the starboard side of the aircraft and along the starboard wing, inspect

- Static vent is clear of obstructions
- Condition of door, hinges and latches

- Starboard undercarriage leg undistorted
- Undercarriage drag strut and shoes secure
- Tyre condition and pressure
- Security of wheel spat
- Check for evidence of hydraulic leaks
- Security of wing strut lower attachment bolt
- Jury strut brackets
- Wing struts and jury struts straight
- Security of upper wing strut attachments
- Through the inspection panel in the lower surface, check the condition of the aileron pulleys and cables and internal wing structure.
- General condition of leading edge, wing tip area and covering
- Aileron movement and hinges, attachment of cables and control horn condition
- Flap, hinges, and security of actuating rod attachment
- Condition of wing covering and security of battens

Moving towards the tail, inspect

- Condition of covering on tail cone.
- Security of horizontal tail mounting bolts and covering lacing
- Elevator and hinges, horns and cables
- Trim-tab, horn and cables
- Rudder and hinges, horns and cables
- Condition of tail surface coverings
- General alignment of vertical and horizontal tail surfaces
- Condition of bracing wires and their terminations

Moving forwards to the port wing, inspect

- Port undercarriage leg undistorted
- Undercarriage drag strut and shoes secure
- Tyre condition and pressure
- Security of wheel spat
- Check for evidence of hydraulic leaks
- Security of wing strut lower attachment bolt
- Jury strut brackets
- Wing struts and jury struts straight
- Condition of wing covering and security of battens
- Flap, hinges, and security of actuating rod attachment
- Aileron movement and hinges, attachment of cables and control horn condition
- General condition of leading edge, wing tip area and covering
- Security of upper wing strut attachments
- Through the inspection panel in the lower surface, check condition of the aileron pulleys and cables and internal wing structure.
- Condition of door, hinges and latches
- Static vent is clear of obstructions
- Finally stand back and take an overall view looking for general symmetry.

9.8 Routine maintenance worksheet

Nynja Airframe check B/C worksheet		
Aircraft serial no / Reg:..... Airframe hours at check.....		
Fuselage	required	tick
Check all pressure instruments for cracks, leaks and stiction	50hrs	
Check all fuselage tubes for cracks, dents, corrosion or deformation	50hrs	
Check all fasteners for security, condition and fretting	50hrs	
Check all bracing cables, for tension, security, fretting, and corrosion.	50hrs	
Check all plastic saddle washers for cracking.	50hrs	
Check operation of flying controls – friction, control cable tension and condition.	50hrs	
Rotate control cable pulleys ¼ turn	50hrs	
Check harnesses for security, condition and operation of buckles	50hrs	
Check Seats, for security and condition, wear on support pegs.	50hrs	
Check fuselage fairings and cowlings for security and condition	50hrs	
Check doors for security and condition, cracks in lexan, operation of latches.	50hrs	
Check windscreen for security and condition – cracks in lexan.	50hrs	
Undercarriage	required	tick
Check main gear legs for distortion, security and condition.	50hrs	
Check noseleg for distortion security and condition, free rotation	50hrs	
Re-grease noseleg (undo top bolt, and steering bar and slide down to do this)	200hrs	
Check wheels for general condition, security of rims to hub, and rims for distortion.	50hrs	
Check Tyres for tread, cuts, scores, perishing, correct inflation (26PSI)	50hrs	
Spin wheels to check bearings	50hrs	
Check brake discs and callipers for security, pads for wear levels.	50hrs	
Check operation of brake system, fluid levels and leaks.	50hrs	
Check condition and security of wheel spats (if fitted)	50hrs	
Propeller	required	tick
Inspect blades for nicks and splits	50hrs	
Remove spinner and check hub and spacer for security and condition	50hrs	
Check securing bolts torque	50hrs	
Check blade pitch setting	50hrs	

Check spinner and back plate for security and condition	50hrs	
Fuel system	required	tick
Inspect inside tanks for dirt / contamination – clean if required	50hrs	
Check tanks for security and condition	50hrs	
Check fittings for perishing rubber bungs / leaks	50hrs	
Inspect all fuel pipes for perishing, abrasion and security of connections	50hrs	
Fuel filter – check for contamination and change if necessary	50hrs	
Inspect system for leaks	50hrs	
Check operation of fuel tap	50hrs	
Electrical	required	tick
Check electrolyte level of battery (if applicable)	50hrs	
Check security of battery mounting, leaks, connections security	50hrs	
Check all wiring for condition and security	50hrs	
Check condition of all switches	50hrs	
Wings	required	tick
Check spar tubes for straightness, dents, corrosion and fretting	50hrs	
Check all cables and thimbles for tension, corrosion, fretting, fraying, kinking.	50hrs	
Check all fasteners for condition and security	50hrs	
Check lift struts for straightness, dents, corrosion and fretting, security and condition of fasteners	50hrs	
Check jury struts for straightness, dents, corrosion and fretting, security and condition of fasteners	50hrs	
Check aileron structure, and condition and security of hinges, operation and control cable runs and pulleys.	50hrs	
Rotate aileron cable pulleys in wing ¼ turn	50hrs	
Check flap structure, and condition and security of hinges. Operation. Check the return spring on detent lever.	50hrs	
Lubricate aileron and flap hinges	50hrs	
Check coverings and stitching for condition, abrasion, damage	50hrs	
Tailplane and Elevators	required	tick
Check structure of tailplane and elevators, for straightness, dents, corrosion.	50hrs	
Check tailplane halves attached securely to fuselage – condition and securing of fasteners and mountings	50hrs	
Check elevator joiner for condition, and security/ integrity between elevator halves (grasp each elevator and apply some torque pressure in opposition – there should be no movement)	50hrs	
Check operation of elevator	50hrs	

Check hinges - condition and security	50hrs	
Lubricate hinges	50hrs	
Check fabric and stitching condition	50hrs	
Grease turnbuckles exterior for corrosion protection.	50hrs	
Check condition and tension of bracing cables.	50hrs	
Check condition and tension of Elevator cables	50hrs	
Check security and condition of trim tab	50hrs	
Check operation of trim tab and hinge, lever friction	50hrs	
Check trim tab springs for condition and security	50hrs	
Lubricate trim tab hinge	50hrs	
Check trim tab control cable for condition	50hrs	
Fin and Rudder	required	tick
Check structure of fin and rudder for straightness, dents, corrosion	50hrs	
Check forward attachment of fin - condition and security	50hrs	
Check condition and tension of rudder cables	50hrs	
Check condition and tension of centring bungee	50hrs	
Check condition of hinges	50hrs	
Lubricate hinges	50hrs	
Check rudder operation (push tail down to free nosewheel), no excessive friction, and centring on release	50hrs	
Check condition and security of fin extension	50hrs	
Check fabric and stitching condition	50hrs	
Engine bay	required	tick
Carry out maintenance actions as per Rotax manuals	50hrs	
Check fuel system - condition of fuel lines, security of connections. Carburettor rubbers for bulges or splits. Air filters - security and condition	50hrs	
Check oil system - condition of oil lines, security of oil cooler, Oil tank, oil filter, level and leaks	50hrs	
Check water system - condition of hard and flexible water hoses, water radiator, header tank, overflow bottle level and leaks, Water carb heat (if fitted)	50hrs	
Check exhaust system - security, springs, check for cracks, dents, blowing. Proximity to cowlings, fluid pipes.	50hrs	
Lubricate exhaust ball joints	100hrs	
Check heater components - security of heater wrap, ducting, valves and operation.	50hrs	
Check electrical system - engine connections, security and condition. Spark plug connections, CDI unit security.	50hrs	

Check engine mounting structure for condition and security.	50hrs	
Check engine mount rubbers for excessive movement (see specific check advice below)	50hrs	
Check engine mount bolts wire-locking.	50hrs	
Check engine cowlings for condition, security of mounting fasteners, check fire resistant paint isn't worn off areas.	50hrs	
General	required	tick
Clean all accessible aluminium structure and treat with ACF50 or equivalent	50hrs	
Symmetry check - stand 5M in front and view for general symmetry - fin and tailplane alignment with wing, wing twist etc.	50hrs	
<p>Work carried out by.....on.....Date</p> <p>Signed.....</p> <p>Comments:</p>		

9.9 **Component Life**

The following components have a calculated fatigue or wear life. They should be replaced at the following intervals:

Lower Lift strut Bolts	500
Upper Lift strut bolts	1000
Leading and Trailing edge to fuselage attachment bolts	1000
Wing fold spar attachment pins	500
Control stick pivot bolt	1000
Control stick torque tube forward hinge bolt	1000
All Control cables	2000

9.10 **Fabric**

9.10.1 The Nynja can be fitted with either Dacron or Xlam coverings. It should be noted that Dacron degrades more rapidly than Xlam when exposed to UV light, and therefore requires more care to ensure a long service life.

9.10.2 Prolonged outside uncovered storage is not recommended.

9.10.3 Covering fabric and its stitching can be tested with the BMAA approved 'Bettsometer'. This should be done annually. In addition it should also be done after each 100 hours of flight or after each 20 days of accumulated outside storage (such as resulting from touring use) – whichever accumulates the sooner.

9.10.4 The minimum Bettsometer test values for the Nynja are:

Dacron	1000g
Xlam	1360g
All stitching	1360g

9.11 **Damage to fabric**

9.11.1 Small tears in the fabric up to 30mm long, or abraded holes up to 15mm diameter, that are more than 50mm from a seam line, or can be repaired using a self adhesive patch, if possible to both sides of

the fabric – warmed gently with a hairdryer to fully activate the adhesive.

9.11.2 Single broken stitches can result in ‘running’, where a large area loses tension. Securing the broken end with a drop or two of glue will prevent this.

9.11.3 Any greater damage must be repaired using approved processes. Consult the manufacturer.

9.12 Cleaning lubricating and protecting the structure

9.12.1 Aluminium and steel airframe components and fasteners can corrode rapidly in certain adverse conditions. These include:

Operation in a ‘marine’ environment (near the coast where salt can be in the air).

Dust or dirt left on the structure for prolonged periods.

Dampness for prolonged periods – especially dampness coupled with dirt or dust.

9.12.2 Always keep the aircraft clean. It pays to clean the aircraft after use before storage. But avoid putting the aircraft away wet in a closed hangar with reduced ventilation.

9.12.3 Proprietary car ‘wash wax’ cleaning products are generally suitable for washing. Pay particular attention to rinsing to ensure all traces of detergent are removed.

9.12.4 Particular care should be exercised cleaning Dacron fabric. We recommend ‘Starbrite Sail and Canvas Cleaner’.

9.12.5 For corrosion protection we recommend ‘ACF50’ anti corrosion fluid be liberally applied periodically to the airframe components. This can be applied to a cloth and rubbed on – much like a polishing operation. Use the aerosol directly to get in tight areas and exposed tube ends. Wiping away and dribbles and excess.

9.12.6 Exposed steel parts like wing strut ends, tailplane turnbuckles etc are recommended to be coated with a thin layer of grease.

9.12.7 Control surface hinges should be regularly lubricated – either with grease or oil.

9.12.8 Glassfibre parts can be polished after washing with wax polishes.

9.12.9 Lexan glazing is sensitive to product in order to remain clear and streak free. Use a suitable cleaner / polish. Warning – Fuel spillage or contact with Loctite will cause almost instant cracking of Lexan.

9.13 **Engine mount rubbers**

9.13.1 Engine mount rubbers slowly wear out over time. They should be changed 'On Condition':

9.13.2 They should be changed if external signs of cracking / perishing are present.

9.13.3 They should be changed if excessive movement is present. Check this in the following way:

Remove the engine bonnet

Grasp the propeller near the hub

Lift up and down, side to side, and diagonally.

Observe the rubbers and movement relative to the mounting structure. Movement confined to rubber flexing is fine. Clear movement of the whole rubber parts relative to the hole in the mounting structure indicates that the rubber should be replaced.

9.14 **Fuel tanks**

9.14.1 Standard fuel tanks are clear polyethylene. Taking off the tank caps results in the ability to look directly inside. Any dirt / water or other contamination is easy to see. Using the drain valve will remove most of this, but inevitably some is left in the corners and over the front of the 'saddle' of the tanks.

9.14.2 A useful technique to clean these areas is to make up a siphon tube using a length of small diameter aluminium tube connected to a length of flexible pipe. This can be directed and used as a very effective 'Hoover' to clean all small remaining particles.

9.14.3 The polyethylene fuel tanks will yellow and harden over time. Rate of degradation will depend on fuel type used, UV and heat exposure. It is recommended to change them on condition or at a maximum of 10 years. Rubber parts of the tank fittings will also harden and degrade over time. It is recommended to change them on condition or at a maximum of 10 years.

9.15 Checks following a heavy landing

- 9.15.1 Main Undercarriage – The main gear legs will splay outwards if overloaded. Usually a heavy landing will be slightly wing down and one leg will distort more than the other. So initially observe from the front and check for symmetry. Check also the angle of the wheel to the vertical. When new the wheel angle when unloaded will be vertical or very slightly ‘towed in’ at the bottom. A wheel sitting splayed outwards at the bottom indicates the gear leg (or axle) has been bent, and is no longer serviceable. If landed heavily with brakes on, or on a rough surface, significant drag loads may be applied. Check for play in the connections of the steel drag brace to the main gear leg and where it attaches to SKR.15. Lock the brakes on and rock the aircraft backwards and forwards to assess this. Check also the main cross beam SKR.9 for straightness.
- 9.15.2 Nose landing gear – If the aircraft is heavily landed on the nose landing gear the leg itself may become bent. This may not be readily apparent from an external inspection. The weakest part is where the leg wastes down in size to accept the suspension rubbers. If it bends here it will usually result in increased friction in the rudder / ground steering circuit. Press down the tail to lift the nosewheel and push the rudder side to side. If increased friction is found, this indicates a bent noseleg. Removing the noseleg will confirm this. It may also be possible if overloaded to bend the large washer under the suspension rubbers, or even drive the rubbers over the washer.
- 9.15.3 Wheel rims – If the aircraft is heavy landed it is possible for the tyre to deflect to the point where the wheel rim comes in contact with the ground, and will dent / distort. Check this visually and by spinning the wheels. Underinflated tyres will cause this damage following slightly less firm arrivals
- 9.15.4 Tubes SKR.27 – These are the diagonal cabin brace tubes behind the pilot and passenger seats, extending to the top corners of the cabin. These brace the cabin and stop parallelograming of the structure sideways. If the aircraft is landed heavily on one wheel these can be damaged – the fittings become stretched in the tube ends and relative movement develops. This can be checked by:

Stand just outside the cockpit with doors open Hold the wing lift struts feel each end of the SKR.27's for movement – where the insert goes into the tube, and where the insert attaches to the airframe. If noticeable movement exists then there is damage, and the damaged part must be replaced.

The above points are the common areas where damage is first witnessed. However it is possible that other areas may damage first, or may also be damaged. Following any heavy landing a very thorough inspection of all the airframe should be made.

9.16 Major strip down

- 9.16.1 It is recommended that the Nynja receive a major strip down inspection after a substantial period of use / time. In average conditions this is recommended at 1000hours / 5 years. Aircraft stored/ used in particularly good conditions may not require this for 10 years, and those stored / used in poor conditions may require it sooner.
- 9.16.2 Essentially then it will be 'on condition', but don't extend this simply for financial reasons. Seek guidance from your local inspector / maintenance professional/ the importer.
- 9.16.3 Such a strip down will involve removal of fabric coverings and fuselage fairings. This permits full detailed inspection of airframe components and the opportunity to replace all fasteners showing signs of corrosion.
- 9.16.4 The simple design and construction of the Nynja permits such a detailed and comprehensive task to be relatively simply accomplished.

9.17 General maintenance tips

- 9.17.1 Use the Nynja build manual for reference to airframe assembly sequences and processes.
- 9.17.2 Nyloc nuts should only be used once – repeated use will reduce its locking ability. Also it is recommended that Loctite thread locker is used as standard practice on every fastener using a Nyloc nut. At least one thread must protrude.

9.17.3 Split pins should not be used more than once.

9.17.4 Unless otherwise specified airframe bolts should be tightened to remove free-play, without causing distortion of the parts/ ovalising of tubes.

10. Repairs

- 10.1 If the aircraft is damaged, it is imperative that the full extent of the damage is quantified by an appropriately qualified person, and in accordance with local regulations.
- 10.2 Damage can often extend well beyond the immediately obvious.
- 10.3 Careful strip inspection of components will often be prudent. Check for bent fasteners, distortion of tubes, elongated holes and stress marks in the anodizing of aluminium tubes.
- 10.4 Repair by replacement is the usual course of action, and as such requires no special additional approval. However repair of a particular part by rework/ reinforcement/ welding etc is classified as a repair and requires specific approval of the repair process. On a simple aircraft like the Nynja it is normally far simpler and cheaper to replace the damaged component.

10.5 Repairs to the Engine.

These should be carried out in accordance with specific Rotax instructions.

10.6 Repairs to Instruments.

Microlight aircraft instruments are not usually repairable and should be replaced.

10.7 Repairs to Fuel Hose.

Any fuel hose which is found to be cracked or damaged must not be repaired. Replace it with at least automotive quality (preferably aircraft or fire-retardant boat use) reinforced rubber fuel hose. 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.

10.8 Damaged Wiring.

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

10.9 Repairs to Batteries.

A damaged battery must be replaced and all surrounding structure thoroughly inspected for acid damage.

10.10 Repairs to Tyres.

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

10.11 Damage to the Fuel Tank.

The fuel tank should be drained and removed from the aircraft. The fuel tank should be replaced.

11. Control deflections

Elevator	Up: $25^{\circ} \pm 2^{\circ}$ Down: $25^{\circ} \pm 2^{\circ}$
Ailerons	Up: $25^{\circ} \pm 2^{\circ}$ Down: $20^{\circ} \pm 2^{\circ}$
Ailerons neutral is with aileron trailing edges level with flap trailing edges at zero° flap setting	
Rudder	Left: $25^{\circ} \pm 2^{\circ}$ Right: $25^{\circ} \pm 2^{\circ}$
Elevator trim tab	Up: $35^{\circ} \pm 2^{\circ}$ Down: $35^{\circ} \pm 2^{\circ}$
Flaps	$0^{\circ}, 8^{\circ}, 19^{\circ} \pm 15\text{mm}$ between sides
Flap Neutral setting is 125mm from nearest edge of fuselage fairing to centre of end of flap trailing edge tube. $\pm 15\text{mm}$ tolerance	

12. *Vital Statistics*

A description of the aircraft is at Section 2. See also the 3 view at the beginning of this handbook

The following describes the basic dimensions of the aircraft:-

Length	5.9m
Height	3.25m
Span	8.5m
Mean chord	1.5m
Wing area	12.8m ²
Dihedral angle	1.2°
Sweepback angle	0°
Washout	0 – 1°
Fin area	0.4m ²
Rudder area	0.46m ²
Horizontal tailplane area	1.08m ²
Elevator area	0.92m ²
Aspect ratio	5.7:1
Undercarriage track width	1.6m
Undercarriage wheelbase	1.4m
Fuel capacity	60l / optional 70l
Tyre Pressure	26psi

ANNEX A

ENGINE MANUAL

The operators and maintenance manual for the engine fitted to this aircraft is to follow this page.

ANNEX B

WEIGHT AND BALANCE REPORT

Aircraft serial number.....

Date of weighing.....

Carried out by.....

Results:

Item	weight	arm	Moment (Weight x arm)
Nosewheel		+1.45	
Main wheel left		0	
Main wheel right		0	
Total empty weight		Total moment	

Final operational weight and balance templates

Item	weight	arm	Moment (weight x arm)
Empty weight			
Crew		+0.15	
Fuel		-0.29	
baggage		-0.29	
Total weight		Total moment	

CG position = Total moment / Total empty weight = Centre of Gravity position:.....

Item	weight	arm	Moment (weight x arm)
Empty weight			
Crew		+0.15	
Fuel		-0.29	
baggage		-0.29	
Total weight		Total moment	

CG position = Total moment / Total empty weight = Centre of Gravity position:.....

Item	weight	arm	Moment (weight x arm)
Empty weight			
Crew		+0.15	
Fuel		-0.29	
baggage		-0.29	
Total weight		Total moment	

CG position = Total moment / Total empty weight = Centre of Gravity position:.....

