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Issue 1.

Date : 10/10/89

SOLAR WINGS Ltd.

OPERATORS HANDBOOK

PEGASUS QUASAR

ROTAX 503 ENGINE

SOLAR WINGS LIMITED

56 GEORGE LANE

MARLBOROUGH

WILTSHIRE

SN8 4BY

SOLAR WINGS Ltd.

PEGASUS QUASAR OPERATORS HANDBOOK.

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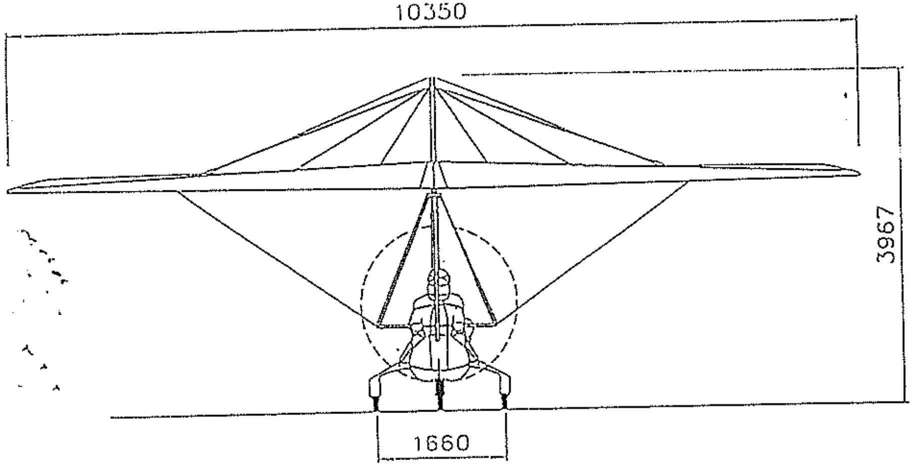
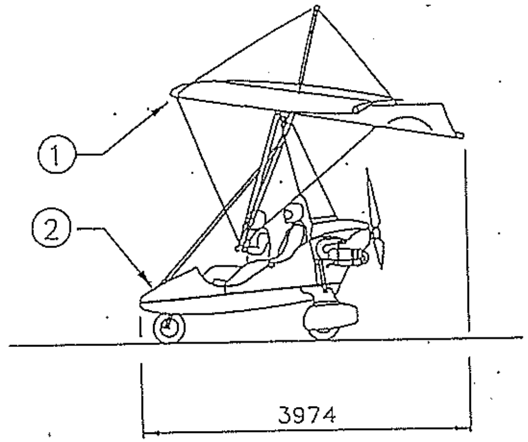
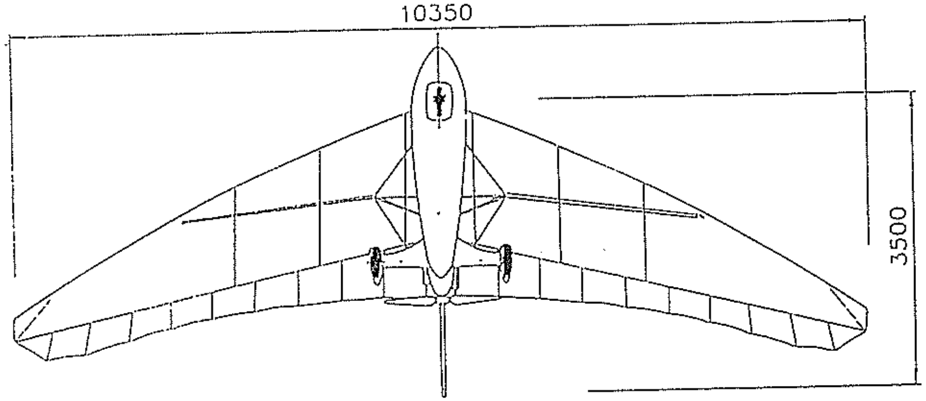
SECTION.

MASTER IN YELLOW

Drawing No. SW-89200







Number	Description	Quantity	DRAWING NO	PART NO
2	TRIKE SUB ASSEMBLY	1	SW-89201	TQU-001
1	WING SUB ASSEMBLY	1	SW-89207	YQW-002

PEGASUS QUASAR
GENERAL ARRANGEMENT

Iss.	Description of revision	Date	Approved
B	ADDITIONAL VIEWS	270390	DSR
A	INITIAL	10.2.90	

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	Date	Name
Drawn	10.2.90	W. BROOKS
Approved	28/3/90	DSR
Checked	28/3/90	

Scale NTS

Jig No.

Drawing No. SW-89200

Substituted for

Replaced by

DIMS IN MM

GEN TOL+-20mm UNLESS OTHERWISE SPECIFIED

SOLAR WINGS LTD.

OPERATORS HANDBOOK

PEGASUS QUASAR

ROTAX 503 AIR COOLED ENGINE

1.0. GENERAL: The Pegasus Quasar is an advanced weight shift controlled, aircraft. It may be flown solo or dual. Its rugged construction is complemented by a short take off and landing run and excellent rate of climb, allowing pilots to carry out a wide variety of operations from airfields quite often inaccessible to conventional aircraft. Using more appropriate airfields the Pegasus Quasar can also be used as a safe and reliable training machine.

1.1. PRIMARY STRUCTURES AND SYSTEMS - THE WING:

1.1.1. THE SAIL: The Quasar is the product of one the most experienced flex-wing design teams in the world today. The sail fabric is cut with exacting accuracy from a stabilised polyester using a tight, virtually non-porous and tear-resistant weave construction. Double-stitched seams using a compatible thread ensure complete panel join integrity. Sail reinforcement is achieved by including extra material at high stress points. The aerofoil section is defined by preformed aluminium and preformed aluminium composite ribs, with chordwise tension being maintained by attachment to the trailing edge. The predictable low speed stall exhibited by the Quasar, is achieved mainly by the clean lines of the aerofoil's leading edge radius and owes as much to the design and production teams expertise as it does to the insertion of a full length Mylar insert.

1.1.2. THE AIRFRAME: All the main tubing used in the airframe is HT 30 TF aluminium alloy supplied by British Aluminium from aircraft quality billets using a special process of mandrel extrusion followed by being drawn to agreed industry specifications. All external tubing and main inserts are anodised to give maximum protection against corrosion. There are no welded components in the frame, and sheet fittings are plated, anodised or stainless steel. All bolts are of high tensile steel. Rigging wires are PVC covered where necessary to afford protection to the occupants and to also serve as an anti-kink measure.

1.2 PRIMARY STRUCTURES AND SYSTEMS - THE TRIKE:

1.2.1. THE POWER UNIT: The engine is a Rotax air cooled twin-cylinder two-stroke of 496.7cc rated at 43 bhp at 6350 rpm. (6500 RPM continuous,7000 rpm max.) The drive utilises a purpose built gear box with a 2.58: 1 reduction and a choice of either two bladed or three bladed propeller. Forced vibrations from the power unit are isolated from the main frame by :

a) Mounting the engine on anti-vibration rubber bushes.
b) An integral torsional vibration absorber built into the gearbox.

1.2.2. THE ROLLING CHASSIS: The main structure of the trike is of square section high strength aluminium alloy tube(HE30TF). A rigid GRP tandem seat is fitted which locates onto the folding tubular seat frame. The seat incorporates a foldable backrest for the front pilot.

The rear undercarriage comprises an advanced composite flexible beam with integral spats which carry the braked mainwheels. The outer sections of the spats are removable for cleaning and inspection.

The nose undercarriage is steerable and incorporates footrests and throttle/brake controls. A trailing link elastomer suspension system is fitted.

1.2.3. THE FUEL TANK AND SYSTEM: Fuel is fed from a single 44 litre fuel tank mounted beneath the seats. The fuel system has a fuel cock and external filter backed up by an internal strainer fitted to the end of the fuel tank pick-up pipe. External fuel pipes are fire-resistant.

1.3 SECONDARY STRUCTURES AND SYSTEMS:

1.3.1. ENGINE CONTROLS: The primary throttle control is foot-operated (forward for full power and rearward for power off) and complemented by the friction-damped hand throttle (forward on and rearward off) on the port side of the seat frame.

The mixture control is a pull and twist type in the port side cowl intake area. Twisting the knob clockwise will lock it at any setting and twisting anti-clockwise will free it. In the freed state pull the knob out(towards the front of the aircraft) to enrich and push it in to weaken. Normal running is in the fully weakened condition.

An ignition-kill switch (up for on/down for off) is fitted on the starboard side of the seat frame.

The engine start system is a pull-start running from a pulley half way up the main pylon.

1.3.2. BRAKING SYSTEM: The drum brakes are mounted in the rear wheels and are operated by a foot pedal on the left side of the front fork steering bar. A brake locking device is provided for parking and engine run-up purposes. To lock, press the brake pedal and, with the left hand, lift the adjacent locking lever and engage one of its slots with the hoop on the side of the steering assembly. Release occurs automatically the next time the brake pedal is pressed.

1.3.3. FUEL: 97 Octane, 4 star petrol mixed at a ratio of 50:1 with a non detergent good quality 2 stroke oil is the recommended fuel/mixture for the Rotax 503 engine.

****IMPORTANT****

FILTERED FUEL ONLY SHOULD BE ADDED TO THE FUEL TANK.

1.3.4. SEAT BELTS: Lap straps are provided for both occupants. In addition, a single diagonal shoulder restraint is provided for the front seat and twin shoulder restraints for the rear.

1.3.5. COCKPIT AND FAIRING: All fairings are made of light weight GRP and serve the dual functions of giving the pilot a degree of weather protection as well as improving the aerodynamics of the aircraft. The engine is also fully cowled.

1.3.6. ELECTRICAL SYSTEM : The Pegasus Quasar is fitted with two standard wiring systems; one for transmission of electrical power derived from the engine alternator and the other for sensor signals to be used in instrumentation.

Power is derived from the engine alternator which has two separate power output windings. The two windings may be connected in parallel if desired(see wiring diagrams in sec.2). The power available is a function of engine revs and the electrical load. With the two windings connected in parallel full power is nominally specified at 140 watts but can be as high as 250 watts dependent on revs and load.

Connection to the cables is via crimp connections in rubber connector housings and, in the case of the power cable, also via a two part plug and socket screw terminal block.

2.0. GENERAL INFORMATION:

2.1. AIRCRAFT:

Empty Weight CG. Position: 150.6 cms rearward from front wheel axle.

Useful Load :

1. Max pilot weight	198 lbs	90 kg
2. Max passenger weight	198 lbs	90 kg
3. Max weight of fuel(42litres)	65.9 lbs	29.9 kg
4. Max baggage	2.2 lbs	1 kg
Total	464.9 lbs	210.9 kg

Max All Up Weight	841.3 lbs	381.6 kg
Min All Up Weight	490.5 lbs	222.4 kg

2.2. WING:

Wing Span:	33.95 ft.	10.35 m.
Sail Area:	164.3 sq ft.	15.264 sq. m.
Aspect Ratio:	7.0	

2.3. TRIKE:

Length (erect):	111 ins	282 cm	
Length (fold down):	114 ins	289 cm	
Width:	72 ins	183 cm	
Track:	65 ins	165 cm	
Height (erect):	98 ins	249 cm	
Height (fold down):	61 ins	155 cm	
Minimum payload:	156 lbs	55 kg	
Fuel Tank Capacity.		44 Litres.	9.7 Imp. Gals.
Useable Fuel.		42 Litres.	9.2 Imp. Gals.
Unuseable Fuel.		2 Litres.	0.44 Imp. Gals.
Fuel.		97 Octane. 4 star petrol.	
Fuel Petrol/Oil Mix Ratio.		50:1	
Gearbox Oil		EP90 Hypoid.	

FILTERED FUEL ONLY TO BE ADDED TO THE FUEL TANK.

2.4. ENGINE:

Model.	Rotax 503
Capacity	496.7cc
Max Rpm.	7000 Rpm.
Max Continuous Rpm	6500 Rpm.
Max Cylinder head Temp.	250^{o}C 480^{o}F.
Propeller Pitch Setting	14^{o} at 53.5cm from hub centre.

NOTE:
For all other engine data refer to the engine manufacturers handbook supplied as a supplement to the Aircraft Operators Handbook.

2.5. AIRCRAFT WEIGHT

2.5.1 EQUIPMENT LIST

Equipment approved for fitting to the Pegasus Quasar without violation of the UK Permit to Fly is as listed below :

ITEM NUMBER	ITEM	WEIGHT	
1.	PZL ASI	0.85 lbs	0.384 kg
2.	WINTER ASI(inc pitot & piping)	0.38 lbs	0.174 kg
3.	Large SILVA compass and mounting	0.66 lbs	0.3 kg
4.	AIRPATH compass	0.54 lbs	0.244 kg
5.	Small WINTER altimeter	0.24 lbs	0.11 kg
6.	UNITED INSTRUMENTS altimeter	0.83 lbs	0.376 kg
7.	WINTER VSI including flask	0.77 lbs	0.35 kg
8.	UNITED INSTRUMENTS VSI	0.75 lbs	0.342 kg
9.	WESTACH hourmeter(inc DC module)	0.30 lbs	0.134 kg
10.	WESTACH twin cht gauge	0.22 lbs	0.1 kg
11.	WESTACH egt/cht gauge	0.22 lbs	0.1 kg
12.	WESTACH rev counter/cht gauge	0.22 lbs	0.1 kg
13.	WESTACH rev counter	0.22 lbs	0.1 kg
14.	WESTACH egt/rev counter	0.22 lbs	0.1 kg
15.	AVIASPORT rev counter	0.40 lbs	0.180 kg
16.	Westach twin egt gauge	0.22 lbs	0.1 kg

2.5.2 EQUIPMENT FITTED

Equipment fitted(by item number) as shown in Equipment List:

2.5.3. EMPTY WEIGHT OF PEGASUS QUASAR REG : G-M

Total Equipment Fitted (as shown above):	lbs	kg
Wing	lbs	kg
Trike	lbs	kg
Unuseable fuel(2 litres)	3.14 lbs	1.42 kg
Total	lbs	kg

This defines the aircraft weight as originally manufactured.
- Includes gearbox oil, unuseable fuel, seat, cushions, harnesses, optional instruments and equipment as specified in section 2.5.2 above.

2.5.4. EMPTY WEIGHT LIMITATION

MAXIMUM PERMISSIBLE EMPTY WEIGHT	375.5 lbs	170.7 kg

2.6. RUNNING GEAR:

Tyre Pressures. 22 psi front.
22 psi rear.

2.7. PLACARDS, DECALS AND LOCATIONS:

TITLE	LOCATION.
Flight Limitations.	Upper side of map box.
In Flight Restart Limitations	Upper side of map box.
Engine Limitations.	Upper side of map box.
Aircraft Weights.	Upper side of map box.
Map Box Weight limitations.	Upper side of map box.
Fuel Type, Capacity and Mix Ratio.	Adjacent to Fuel filler neck and on upper side of map box.
Fuel Cock On/Off Positions.	On Engine Cowl Top.
Ignition Switch On/Off Positions.	On Ignition Switch Bracket.
Propeller Pitch Setting.	On Engine Cowl Top.
Hand Throttle.	On throttle unit.
Wiring Loom Disconnection Warning.	On Pylon near wiring loom.
Connector Block Wiring.	On basetube below connector block.
Fuse allocations.	On basetube below fuse rack.

2.8. PERFORMANCE:

2.8.1. GENERAL:

Best safe descent rate power off at max. auw:	400 fpm.	2 mps.	4 kts.
Airspeed for best safe descent rate power off:	40 mph.	64 kph.	35 kts.

Distance covered from 2000 ft(610 m)
in still air, power off at max auw:
3.3 nautical miles(3.8 statute miles,6 km) at 30 kts(35 mph,55 kph)
2.2 nautical miles(2.5 statute miles,4 km) at 40 kts(46 mph,74 kph)

Best rate of climb at max auw:	475 fpm	2.4 mps	4.7 kts
Airspeed for best rate of climb at max auw:	45 mph	73 kph	40 kts
Take off distance to clear 50 ft at max. auw:		607 ft.	185 m
Landing distance from 50 ft (no brakes) at max. auw:		623 ft.	190 m
Flight manoeuvre loads:		+4 g. -2 g	
Vne:	82 mph.	131 kph.	72 kts.
Cruise at max auw:	58 - 60 mph.	93 - 96 kph	51 - 53 kts.
Cruise at min auw:	58 - 60 mph.	93 - 96 kph	51 - 53 kts

2.8.2. STALLS:

Wings level stall speed power off at max. auw:	26 mph	42 kph	23 kts.
Height loss during power off recovery at max. auw:		50 ft.	15.2 m
Maximum pitch down below horizon during recovery at max auw:			30 degrees

Wings level stall speed power on at max. auw: - No stall exhibited, mushing commences at-	25 mph	40 kph	22 kts.
Height loss during power on recovery at max. auw:		0 ft.	0 m
Maximum pitch down below horizon during power on recovery at max auw:		0 degrees	

Wings level stall speed power off at min. auw:	21.5 mph	34.5 kph	19 kts
Height loss during power off recovery at min auw:		30 ft.	9 m
Maximum pitch down below horizon during recovery at min auw:			30 degrees

Wings level stall speed power on at min. auw: - Stall buffet and mushing commences at-	21.5 mph	34.5 kph	19 kts
Height loss during power on recovery at min auw:		0 ft.	0 m
Maximum pitch down below horizon during power on recovery at min auw:		0 degrees	

30 degree banked stalls power off at max auw: - No stall exhibited, minimum possible speed is:	32 mph	51 kph	28 kts
30 degree banked stalls power on at max auw: - No stall exhibited, minimum possible speed is:	32 mph	51 kph	28 kts
30 degree banked stalls power off at min. auw: - No stall exhibited, minimum possible speed is:	30 mph	47 kph	26 kts
30 degree banked stalls power on at min. auw: - No stall exhibited, minimum possible speed is:	30 mph	47 kph	26 kts

NOTES ON STALLS:

i) The aircraft is control-limited so that a true stall is not possible without an accelerated entry. The aircraft will continue to fly under control, although the roll response will be slow. Some pre-stall buffet may be felt.

ii) Under full power the aircraft will continue to climb in this condition.

iii) With no power the aircraft will descend in a controlled mush.

iv) It is important to understand that the data recorded during stall tests were ascertained using the CAA requirement of a reduction of airspeed by 1kt per second until the stall is attained. If radical and therefore unauthorized stalls are undertaken, the aircraft may then lose significant height before recovery is made. See also Para 7.6, Stall Characteristics.

2.9. ELECTRICAL SYSTEM SPECIFICATION :

2.9.1. **THE ALTERNATOR** : Power is derived from the engine alternator which has two separate power output windings which are isolated from the chassis and each other. These outputs consist of a high power winding and a low power winding. When connected in parallel these give a nominal maximum current of 12 amps AC or voltages up to about 50 volts RMS with very low current. The nominal power rating of the combination is 140 watts with up to 250 watts available.

The high power winding gives a nominal power output of 110 watts with a maximum of about 190 watts. Maximum current is about 10 amps. Alternatively, voltages up to about 45 volts RMS can be obtained with very low current.

The low power winding is rated at a nominal 30 watts.

For each winding, The power available is a function of engine revs and electrical load characteristics.

2.9.2. **POWER WIRING** : The power wiring loom consists of 8 high current conductors inside a woven nylon sheath with a rubber connector at the rear end and a screw terminal block at the front. A 2 core cable for engine ignition control is also included. All power wires in the engine compartment have wide temperature range low toxicity insulation. Four of these are connected to the two power AC windings from the alternator. In addition, one of the remaining wires is connected to the engine chassis to act as a general purpose 0 volt return. Spare wires are also provided.

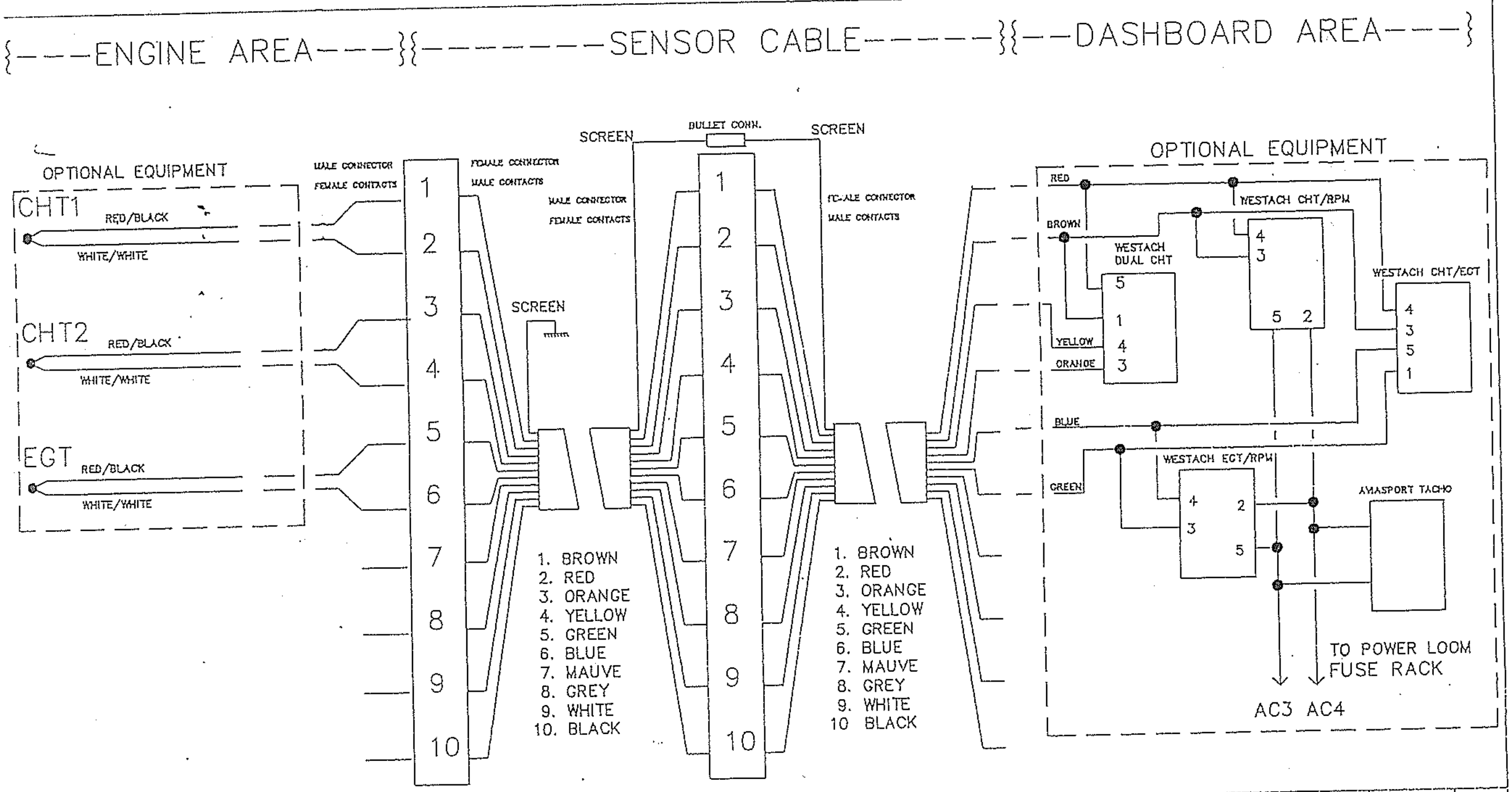
The two AC power supplies may be connected in parallel to provide the full alternator power output in the manner indicated on the power wiring loom circuit diagram following this section. However, some items of equipment may disturb the power supply in normal operation and, for this reason, the low power output from the alternator is supplied wired separately and is used to drive supply sensitive AC instruments such as tachometers.

The wires allocated to the above tasks can withstand the maximum current that the alternator can supply in all circumstances including a short circuit. Therefore, it is unnecessary to supply overload protection devices such as fuses to protect these wires and, in fact, none are fitted. Note that airworthiness requirements specify that all electrical equipment attached to the wiring system must be protected by overload protection devices and that no protective device may protect more than one circuit essential to flight safety.

The power wiring circuit diagram indicates the manner in which optional items of extra equipment should be attached to the loom. This is in order to simplify servicing by establishing a standard wiring system. Operators wishing to fit equipment themselves are requested to follow the layout indicated on the circuit diagram where appropriate.

2.9.3 SENSOR WIRING : The sensor wiring system comprises a multicore cable intended for transmission of signals not involving significant power levels. The relevant circuit diagram follows this section. No items requiring significant power with an alternating component should have their supply lines attached to this loom as electrical interference with sensor signals may occur.

The circuit diagram indicates the manner in which some optional items of equipment should be attached to the loom. This is in order to simplify servicing by establishing a standard wiring system. Operators wishing to fit equipment themselves are requested to follow the layout suggested on the circuit diagram where appropriate.



	DATE	NAME
DRAWN	10/2/90	E JELONEK
APPROVED	10/2/90	
CHECKED	10/2/90	

A/C TRIKE WIRING
-SENSORS-

Drawing No.
SW-89246

ISS.	DESCRIPTION OF Iss	APPROVED	DATE
A	INITIAL ISSUE		10/2/90

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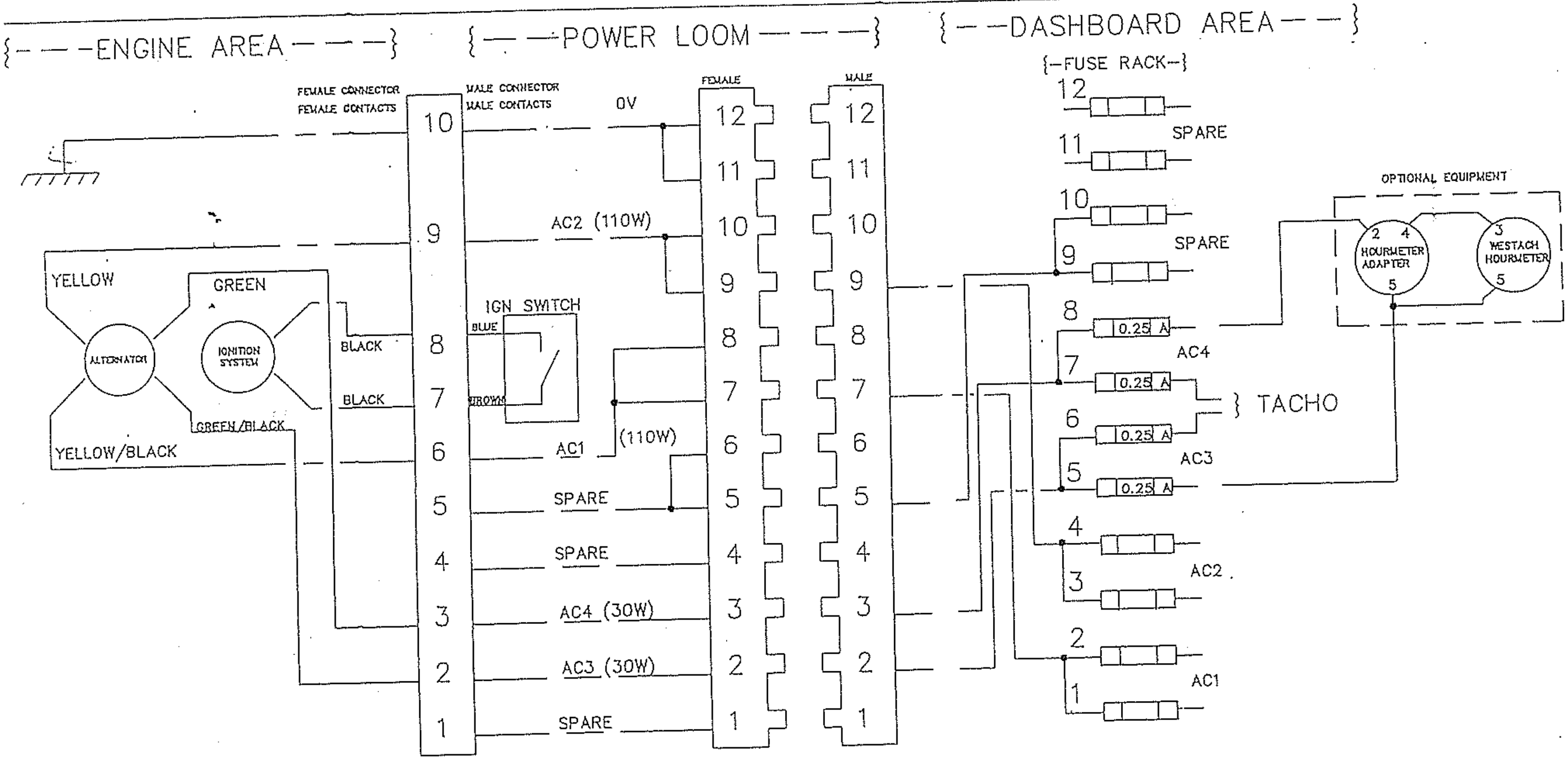

ALTERNATOR POWER WINDINGS.
– PARALLEL OPERATION –

JOIN AC1 TO AC3 AND JOIN AC2 TO AC4.

	DATE	NAME
DRAWN	10/2/90	E JELONEK
APPROVED	10/2/90	[signature]
CHECKED	10/2/90	[signature]

POWER WIRING
UK VERSION

Drawing No.
SW-89245

Iss.	DESCRIPTION OF Iss	APPROVED	DATE
A	INITIAL ISSUE	[signature]	10/2/90

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56 George Lane
Marlborough
Wiltshire SN8 4BY
Tel: 0672 – 55066

3.0. AIRWORTHINESS OPERATING LIMITATIONS.

In accordance with Condition no. 4 of the Permit to Fly, the aircraft must be operated in compliance with the following limitations :

The aircraft is to be flown only under visual flight rules (VFR).
The minimum equipment required to operate under VFR. conditions is:
1 - Air speed indicator.
1 - Altimeter.
(The altimeter may be a wrist altimeter worn by the pilot).
All aerobatic manoeuvres including whipstalls, wingovers, tailslides, loops, rolls and spins are prohibited. The aircraft must be flown such as to maintain positive normal accelleration (positive 'g') at all times. Negative 'g' must be avoided.
Do not pitch nose up or nose down more than 30 degrees from the horizontal.
Do not exceed more than 60 degrees of bank.

Max empty weight		170.7 kgs.	
Max take off weight		381.6 kgs.	
Min total occupant weight		55 kgs.	
Max total occupant weight		180 kgs.	
Max number of occupants		2	
Manoeuvring Airspeed (Va)	59 mph	94 kph	52 kts
Load Factor at Va		4g	
Vne.	82 mph.	130.8 kph	72 kts
Max Load Factor at Vne		4 g	
Max wind operating conditions	28 mph.	45 kph	24.6 kts

90 degree cross winds of up to:

	Min AUW.	Max AUW.
Taxiing.	17 mph/27 kph/15kts	17 mph/27 kph/15kts
Take Off.	11 mph/18 kph/9.7kts	13 mph/21 kph/11.4kts
Landing.	11 mph/18 kph/9.7kts	13 mph/21 kph/11.4kts

........have been demonstrated during test but lower limits for takeoff and landing apply for pilots of average ability(see sections 7.4 and 7.7.1).

When flown solo the aircraft must be flown from the front seat only.

4.0. RIGGING THE AIRCRAFT:

4.1. GENERAL: As you rig your aircraft, you should always be meticulous in your inspection of each component. This is the best time to see potential faults which may be missed when the aircraft is fully rigged. Never allow yourself to be distracted during assembly of your aircraft and always rig to a repeatable sequence. Do not rely on the pre-flight check to find faults, but look carefully at all aspects of your aircraft as you put it together. Great care should be taken with wings which are left fully rigged, for checks cannot be omitted on that account, and the full inspection procedures should be followed. The design brief for the Pegasus Quasar called for easy inspectability, so those components not open to view may be reached from zipped inspection panels.

Special attention should be paid to the following:

4.1.1. The symmetry of the wing and the angle of the kingpost.

4.1.2. All tubes straight, undented and without cracks.

4.1.3. All cables unkinked, unfrayed and with undamaged sleeves.

4.1.4. All nuts and bolts secure and locked appropriately.

4.1.5. All quick-release fittings secure.

4.1.6. Hang-point and heart-bolt undamaged and secure.

4.1.7. All sail seams intact, with no frayed stitching.

4.1.8. No tears in the sail.

4.1.9. Double check 4.0.7. and 4.0.8. in sail areas of high stress. Particular areas of high stress are:

4.1.9.1. Both tip fabric areas including tip fastening.

4.1.9.2. Both leading edge upper surfaces.

4.1.9.3. At the nose of the wing check that the securing screws and grommets have not become detached from the sail.

4.1.9.4. The trailing edge stitching, grommets and shock cords.

4.1.9.5. Keel pocket, particularly at the point of attachment to the upper surface.

4.1.9.6. Keel pocket to keel tube fastening.

4.1.9.7. The point of attachment in the root area of the undersurface to the upper surface.

4.1.9.8. All cable entry and exit points with particular regard to the rear upper rigging cable entry.

4.1.9.9. The area above the crossboom centre ball.

4.1.10. Sail tension settings correctly aligned and symmetrical.

4.1.11. Battens undistorted, undented and in good condition.

4.2. WING RIGGING:

4.2.1. Select a clean, dry area and lay the wing down, opening the zip to reveal the control frame and underside of the wing.

4.2.2. Open out the control frame and attach the base bar to the corner joints.

4.2.3. Lift the wing from the front and rotate it so that the wing is now laying on the ground with the assembled control frame flat on the ground underneath.

4.2.4. Remove all the sail ties and open each wing about a metre. Lift the spring retained kingpost and checking that the crossboom restraint cables pass cleanly either side, locate the king post onto the spigot.

4.2.5. Ensure that the upper cables are free from kinks and with the over-centre lever in the open position locate the king post crown into the top of the king post.

4.2.6. Open the wings in 4 stages, alternating between wings to prevent damage to the crossboom and fittings.

4.2.7. Ensure that all wires are untangled and free from twist, particularly at the connections.

4.2.8. Excluding the nose rib, fit all the top surface ribs starting with the out-board main ribs and working in-board towards the root. Do not force the ribs if they seem hard to push fully home.

4.2.9. On all the complete aluminium upper surface ribs fit the single lower elastic and on all aluminium/composite ribs fit the end caps. If the elastics appear overtight at this stage, leave them off until after the final tensioning of the crossboom when it is easier to push the ribs finally home and requires less effort to fit the elastics.

4.2.10. After fitting the upper surface ribs, unzip the keel fin access panel and remove the safety pin from the crossboom restraint cable stud. Using the nylon cord pull back the crossboom until the keyhole tang can be located on the restraint cable stud. Make sure that:

a). The tang is located in the stud recess.
b). The restraint cables are not twisted.
c). The safety pin secures the cable onto the stud and is re-fitted correctly into restraint cable stud.
d). The fin access panel is zipped up.

4.2.11. With the crossboom now tensioned, ensure that the previously fitted ribs are pushed fully home and that the upper and lower elastics are fitted to the aluminium ribs and all remaining end caps fitted to the aluminium/composite ribs.

4.2.12. Locate the washout tubes onto the sockets, ensuring they are seated firmly down to the limit.

4.2.13. Proceed to the front of the wing, lift and support the nose of the wing on the knee. Locate, fit and push fully home the nose rib, finally locating the front end onto the spigot provided on the keel tube.

4.2.14. The wing may now be erected fully by raising it allowing the control frame to swing forward. Do not lift the nose too high while doing this, lest the rear of the ribs sustain damage from contact with the ground. Hook the S-catch onto the rear pin of the nose channel and then, to tension the rigging, lever the S-catch forwards and lock it by passing the pip-pin through the S-catch and S-catch Channel. This operation is helped by having an assistant lift the keel at the rear at the same time as you lift the nose.

4.2.15. Fit the nose cone upper velcro to the wing top side velcro and, ensuring symmetry, pull the lower part of the nose cone around the lower front rigging cables. Join the nose cone rigging cable slot edges with the velcros provided and attach the nose cone underside to the wing undersurface velcro.

4.2.16. Adjust either the upper or lower wing attachment velcro patches to give the smoothest and most symmetrical fit.

WARNING - NOSE CONE MUST BE FITTED BEFORE FLYING. FAILURE TO DO SO WILL ADVERSELY AFFECT STABILITY AND CONTROL.

4.2.17. In light winds the nose can be lowered and the wing allowed to rest on the nose and control frame. In turbulence or strong winds it is best to have an assistant hold the wings level at the nose whilst the under surface ribs are located.

4.2.18. Push fully home the undersurface ribs so that the curved aluminium section is facing rearwards and downwards. Fit the single elastic to each undersurface rib rear.

4.2.19. Proceed to the rear of the wing and tension the overcentre lever in the rear top rigging.

4.3. TRIKE RIGGING:

4.3.1. Rigging the trike is the relatively simple operation of lowering and raising the pylon whilst connecting the trike to the wing.

4.3.2. To erect the trike from the folded state, the pylon should be raised and locked geometrically by pushing down on the seat-frame hinges. Fit the front strut and ensure that the upper and lower securing pins and rings are fitted correctly. It is particularly important that the two lower pins pass through both the lower and upper sections of the front strut.

Now is a good time to inspect the interior of the trike including the engine mounts and fuel lines. Depress the drain valve on the underside of the fuel tank and drain off a little fuel into a container. Check for discolouration due to contamination and for water present in the fuel. If in doubt, drain off all contaminated fuel and replace it.

Also check for loose objects in the belly pan.

Note: In the event of there being any significant wind, the trike rigged in the above state without the wing being attached makes it considerably easier to carry out the engine run-up and any remedial action required, without worrying about the control of the wing.

4.3.3. To convert the tandem seat for solo operation, it is merely necessary to secure the rear seat belt buckle and to tighten the straps so that there is no slack.

4.3.4. The fully-rigged wing may now be parked nose down. If there is to be a delay before fitting the wing to the trike, and if the wind strength is above 7 mph, the wing should be laid flat; if the wing is laid flat in winds above 16 mph the nose should be tethered.

4.4. CONNECTING THE WING TO THE TRIKE:

4.4.1. Before mating the wing to the trike, complete the walk-around inspection of the wing as detailed in the pre-flight checks. Then position the wing on its control frame, into wind, with its nose on the ground. Move the propeller to a position which will allow the wing keel tube to rest on the hub while the wing is being lifted and, with the pylon of the trike folded down and ignition switched off, wheel the trike in behind the wing, rolling the front wheel over the control bar. Lift the pylon high enough to connect to the roll bracket on the wing, and secure with the bolt, wing nut and safety ring. Go to the nose of the wing, and then rotate the wing about its control bar until the keel tube rests on the propeller hub. Do not use force, and in strong winds maintain a firm grip on the wing. The front wheel will roll back behind the control bar, and the rear wheels should now be chocked or the parking brake applied. Lift the wing, either by the control frame uprights or base bar, and push down the seat frame hinges. Fit the seat moulding and feed the seat belts through the seat apertures. Secure the side panels to the seat sides. Fit the front strut and secure with the pins and rings as outlined in 4.3.2. Securing the control bar with the front lap strap is sufficient to stabilize the wing in light winds while the pre-flight checks are carried out.

5.0. PRE-FLIGHT INSPECTION:

5.1. PRE-FLIGHT INSPECTION (WING): Assuming the machine is now fully assembled and is ready for the final pre-flight checks. Start at the nose and move around the wing making the following checks:

Nose catch secure and locked
Leading-edge spar undented
Crossboom junction secure (zip flap closed)
Sail secure on tip
Washout tube secure and undamaged
Ribs secure
Reflex retention lines secure
Crossboom tensioner secure
Keel pocket and fin components undamaged
Top rigging over centre lever is tensioned
Hang-point secure and freely rotating
Control frame locked
Control frame cables secure
Reflex retention lines secure
Ribs secure
Washout tube secure and undamaged
Crossboom junction secure
Leading edge spar undented
Nose rib and nose cone secure and correctly fitted
Top rigging secure

5.2. PRE-FLIGHT INSPECTION (TRIKE): After returning to the nose, move around the trike making the following checks:

Ignition off; engine controls closed
Front strut secure
Front tyre inflated and in good condition
Front forks and suspension in good condition
Axles secure
Rear tyres inflated and in good condition
Seat-frame secure
Control cables - no kinks
Engine mountings secure
Exhaust secure
Carburettor secure
Gearbox - no oil leakage
Propeller secure and undamaged
Plugs and leads secure
Fuel tank secure; fuel contents adequate
Brake, throttle and steering functioning correctly

The aircraft is now ready for engine starting procedures.

6.0. PREPARATION FOR FLIGHT:

6.1. STRAPPING IN: The engine should not be started without the pilot being strapped into the front seat. Any passenger should also be strapped in and briefed. Lap straps should adjusted tightly accross the hips to reduce any tendency for either occupant to slide forwards under the strap. Shoulder straps should be adjusted with a little slack to allow any necessary movement during flight and to ensure that the lap straps remain in place without slipping upwards in the event of accident.

NOTE. Wearing a crash helmet is essential.

6.2. STARTING ENGINE: All controls should be checked closed and ignition should be off. The parking brake should be applied. Ensure that the engine is primed with fuel. Unless the engine is hot, apply full mixture enrichment by pulling the mixture control knob out. Twisting the knob clockwise will lock it at any setting and twisting anti-clockwise will free it. Adjust the mixture with the knob in the freed state. Pulling the knob out(towards the front of the aircraft) enriches the mixture and pushing it in weakens it. Normal running is in the fully weakened condition.

Check visually that the propeller area is clear and call "Clear Prop" loudly. Switch on the ignition when the area is clear, take hold of the starting handle, pull gently until it is felt to engage and lock, and then pull forcefully. Repeat until the engine starts. If the engine refuses to start, close the controls and switch off the ignition before investigation.

6.3. ENGINE RUN-UP: When the engine starts, increase the rpm to a little above tickover and gradually weaken the mixture until the engine idles normally with the mixture control fully closed. Warm up the engine. Before flight a full-throttle check is carried out for at least two minutes. The brakes will hold against a full power run-up but the aircraft may slide on wet grass or slippery surfaces. In this case check the engine at reduced RPM. During this operation the pilot must be mentally prepared to switch off the ignition at very short notice. If the engine is stopped after a period of running, the ignition should be switched off at tickover. Switching off at high rpm floods the engine and makes restarting difficult.

6.4. The engine maintenance manual should be consulted for information on gear oil reservoir levels and specifications, carburettor tuning, timing etc.

7.0 FLIGHT CHARACTERISTICS :

7.1. GENERAL FLIGHT CONTROL: It is important that the wing is tuned to ensure equal wing section and therefore balance trim (See section 10.). A wing which exhibits a constant turn when flying 'hands off' will be tiring to fly and uncomfortable in turbulence, particularly when landing or taking off. A properly tuned wing will fly completely 'hands off' throughout the whole range of power settings, although a slight tendency to turn owing to the torque reaction of the engine may be present. The roll control response will increase as the speed increases, and turns are very easy to co-ordinate. Prior to moving the bar sideways to roll, speed should be increased by pulling back slightly. Once the aircraft has started to roll it should be pitched around the turn by moving the bar forwards. This action should be a smooth, fluid action; the bar movement completely related to both speed and angle of turn. Steeper turn angles require more speed, more roll and more pitch. Shallow turns, less of all three. Great care must be taken to ensure both sufficient speed for the rate of turn required and to ensure that too much 'pitch' (bar forward) is not applied or the wing will stall in the turn. Clean and co-ordinated roll control can be accomplished easily by thoughtful practice, and pays dividends in smooth and efficient flying. Microlighting is, in general, a fair-weather sport. Light rain will influence flying control by making control inputs heavier, although the effect is minimal. Ice, however, is more serious and can occur through icing conditions, or by flying a wing which is wet from the bag, without giving it time to dry out. Severe icing can affect handling and speeds markedly and at the first sign you should cease flying or fly below icing conditions.

7.2. FLIGHT CONTROLS: The Pegasus Quasar microlight wing is controlled by standard 'weight-shift' techniques. The speed of response and lightness of action should be borne in mind for those pilots converting from other makes of wing.

-Control Bar Movements-	-Aircraft Response-
Bar pulled rearwards	Nose pitched down - aircraft speeds up
Bar pushed forwards	Nose pitch up - aircraft slows down
Bar pushed across to the right	Aircraft rolls to the left
Bar push across to the left	Aircraft rolls to the right

It is absolutely essential that 3-axis pilots undertake a weight-shift conversion course on a dual-control machine before flying the Pegasus Quasar. Flex-wing pilots unfamiliar with the type should undertake a mandatory check flight before becoming P1.

7.3. GROUND HANDLING: Flex wing microlights are unique in their ground handling ability. In winds over 5 mph, always turn the aircraft until one wing is resting on the ground which will help stabilise the craft until you are ready for flight. A ground picket or weight (fuel can or similar) is very useful to tie the wing tip to in order to prevent damage to the tip and to hold the wing steady. When taxiing cross wind do not make the mistake of letting the up-wind wing go up as this will greatly increase the risk of the craft being blown over. Instead, try to hold the wings dead level as this will present the minimum obstruction to the cross wind. When taxiing down wind, push the bar out to prevent the wind getting under the sail and putting you out of control.

7.3.1. **FOOT OPERATED BRAKE:** To prevent the aircraft rolling further than desired during taxiing on hard surfaces and slight inclines, a foot operated brake system has been introduced. This consists of a foot operated lever which controls two drum brake units in the rear wheels.

There is also an incorporated parking brake which locks the brake pedal by means of a hand lever and detent system. This acts as an added safety feature during engine run-up. To engage the parking brake, press the brake pedal and lift the hand lever until it engages with the hoop on the side of the steering assembly. Release occurs automatically the next time the brake pedal is pressed.

7.3.1.1. **OPERATING LIMITATIONS:**

7.3.1.2. **TAXIING:**

Due to the drop in braking efficiency in wet and icy conditions, extra stopping distance should be allowed for.

7.3.1.3. **ENGINE RUN-UP:**

(i) Operators should note that above 5000 engine rpm the aircraft may tend to creep forward with the rear wheels locked on some surfaces.

(ii) Due to the drop in braking efficiency in wet and icy conditions, allowances should be made by the operator for creep to occur at a lower rpm than stated in (i) above.

7.3.1.4. **INSPECTION:**

The amount of wear that takes place on the tyres and drum brake shoes will vary from one aircraft to another, depending on the type of surface the aircraft normally takes off and lands on. Close inspection of the rear tyres and brake shoes should be made at intervals of no more than 100 hours.

7.4. TAKE OFF: At sea level, on firm ground with grass of moderate length, the take-off run in zero wind at Max AUW(381.6 kg.) may be 185 metres(607 ft). Flown solo with a 90 kg. pilot in the same conditions, a take-off run of as little as 100 metres(330 ft) is possible. The take-off run is considered to be the horizontal distance covered by the aircraft, from being stationary until it reaches a height of 15 metres(49 ft) above the average elevation of the runway used. These figures could be shorter if the take-off should be from tarmac, but longer if from wet ground. A significant headwind would reduce the length of the take-off run considerably. Crosswind components of up to 6 mph(10 kph, 5 kts) at Min Auw. and 11 mph(17 kph, 10 kts) at Max Auw. are within limits for pilots of average ability. Higher crosswind components have been safely demonstrated during test(see section 3.0) but only experienced pilots should approach these limits. Such pilots should exercise great care in strong crosswind conditions.

Take-offs are straight forward. The hand throttle should not be used during take-off. The correct technique on smooth surfaces is to allow the wing to trim in pitch during the initial stages of the take off run so as to reduce the drag and increase the acceleration. In smooth air conditions, push forward fully at around 20 mph(32 kph, 18 kts) until the aircraft un-sticks and then adjust the bar pressure to maintain a steady climb at around 45 mph(72 kph, 40 kts). For more turbulent air conditions, keep the aircraft on the ground until around 45 mph(74 kph, 40 kts) has been achieved and then gently ease the bar forwards until the aircraft rotates. This allows a more positive initial climb and a more rapid control response.

In smooth air conditions on rougher ground, push the bar out to its fullest extent for the whole takeoff run. The Trike unit will then swing forward under the wing. Allow the base bar to float back as this happens and climb away in the manner indicated above.

It follows that taking off from rough ground in turbulent air conditions could either result in a slower takeoff speed than is desirable or in greater stress to the aircraft structure during a fast takeoff run. Therefore, consider carefully the advisability of flying in such circumstances.

WARNING - Allowing a steep climb to develop at a slow airspeed after takeoff is dangerous. If the engine fails, the aircraft will pitch nose down through a large angle before taking up a glide. Roll control is also impaired at low airspeed. Therefore **DO NOT PERFORM STEEP CLIMB-OUTS.**

7.4.1. **SOLO FLIGHT TAKE-OFF:** It is normal for the aircraft to be flown solo from the front seat, there being no ballast required if the pilot weight is above 55 kg. The initial rotation of the trike to a nose-up attitude will be more pronounced when flying solo. For the initial 200 ft(61m) of climb, the attitude of the trike should be controlled to allow for the possibility of engine failure. The full-power setting may have to be reduced to achieve a safe climb angle.

7.5. **EN-ROUTE:** During all aspects of flight the aircraft must be flown so that in the event of engine failure or loss of power, safe landing areas are always within reach. Providing the aircraft is being flown sensibly, an engine failure need not lead to an accident and any competent and well-trained pilot should be able to cope.

7.5.1.. **DESCENT RATE:** Fully loaded the engine-off sink rate is around 400 fpm(2.0 mps, 4.0 kts) and increases rapidly as speed is increased.

7.5.2. **PITCH:** Whether flown solo or dual, pitch control is very smooth and positive, progressive and slightly damped, providing good "feel" at all times and in all manoeuvres. Pitch control is lighter when flown solo than dual.
DO NOT PITCH NOSE UP OR NOSE DOWN MORE THAN 30 DEGREES FROM THE HORIZONTAL.

7.5.3. **ROLL CONTROL AND TURNS:** Whether flown solo or dual, roll control presents no difficulty. At normal cruising speeds of 45mph(72 kph, 40 kts) upwards, turns may be initiated by simply moving the trike in the required direction. As the turn develops, the bar should be eased out to maintain the desired airspeed. As the desired bank angle is reached, the turn control input should be relaxed. Increasing bank angles require increasing bar-out pitch control forces to coordinate the turn. Roll control becomes slower at low airspeeds, so the bar should be pulled in slightly to increase airspeed before commencing the turn. For roll-out the trike is moved towards the higher wingtip, and the nose is lowered as the horizon levels. When the aircraft is flown solo, the roll response is faster for the same control force. Roll response is also less damped especially at high speeds in excess of 65mph (104 kph, 57 kts). Small control inputs should be used. Co-ordinated turns can be achieved with a maximum bar movement of 3 inches(7.6cm).

DO NOT EXCEED MORE THAN 60 DEGREES OF BANK.

7.5.4. **TRIM:** The Pegasus Quasar may be flown with the same hang-point setting, whether dual or solo. New wings are supplied from the factory on the rear hang-point. This is because the initial tightness of the wing gives low washout and hence a high trim speed, typically 55mph IAS(88 kph, 48 kts). During the initial 20 hours or so of flying, the sail will bed in and the trim speed will reduce. When the trim speed has dropped to 50mph(80 kph, 44 kts) or less, the front hang-point can then be used. No ballast is required for single seat operation when the payload is above 55 kg.

7.5.5. **EFFECT OF POWER ADJUSTMENT ON PITCH:** As the thrust line is set low, the effect of reducing power is to lower the nose of the trike, and an increase in power will cause it to rise. There is no need to alter the control bar position as power is adjusted.

7.5.6. **HAND THROTTLE:** The engine rpm can be set with the cruise control lever and then the pressure on the foot pedal may be removed until an increase in rpm is required. Thereafter, the rpm will always return to the cruise setting when foot pressure is removed. To obtain the full rpm range on the foot pedal, the hand throttle lever must be in the fully-off position.

7.6. **STALL CHARACTERISTICS:** Fully loaded, the stall occurs at 26 mph(42 kph, 23 kts) and is clean and easily handled. As the speed is reduced, aft bar pressure increases, noticeably so immediately prior to the stall. You will also notice a slight nodding tendency and a stiffening of roll response. As the wing stalls, the nose pitches down and corrective action is to bring the bar back slightly to prevent the aircraft re-entering the stall state. If the control bar is held lightly enough to damp out oscillations, the aircraft will automatically recover from a stall and return to trimmed flight. Slight wing drop may be found but is easily corrected. If necessary, hold the bar firmly to counter any tendency for the nose to pitch up excessively during the recovery. The Pegasus Quasar wing is remarkably stable, and even if stalled in a turn will not spin, but pitch down, increase air speed and roll out into a shallow turn or straight flight.

WARNING

Whipstalls are prohibited (See section 3.0.).

7.7. **LANDING:** The hand throttle should not be used during landing. Make your approach airspeed about 50-55 mph(80-88 kph, 44-46 kts) and be aware of wind gradient during strong wind days. The flare is conventional, but the light pitch response can cause over correction and 'ballooning'. As soon as the wheels touch down pull back a little on the control bar if the surface is not too rough. This will eliminate bounce and slow down the aircraft. Note that pulling the bar too far back at speed, particularly on rough ground, can cause excessive stress on the structure due to the download generated by the wing.

High airspeed on finals is of great importance for engine-off landings, the approach speed must not be allowed to decay, and there must be a margin to permit rotation before touchdown.

7.7.1. CROSS-WIND LANDING: The Pegasus Quasar copes well with cross-wind landings, but sensible pilots take great care to land exactly into wind wherever possible. If a cross-wind landing is unavoidable, make a conventional approach, but be ready for the twisting of the Trike unit as soon as the rear wheels touch. Whenever possible utilise whatever into-wind distance you can. Cross-wind components of upto 6 mph(10 kph, 5 kts) at min. AUW. and 11 mph(17 kph, 10 kts) at max. AUW are within limits for pilots of average ability. Higher crosswind components have been safely demonstrated during test(see section 3.0) but only experienced pilots should approach these limits. Such pilots should exercise great care in strong crosswind conditions.

Because of the high torsional loads which can be imparted to the trike pylon and wing keel tube, always carry out a detailed inspection after every cross-wind landing.

7.8. EMERGENCY PROCEDURES:

7.8.1. IN FLIGHT RESTARTING: In the event of the engine stopping while en-route, it may be possible to restart before it becomes necessary to perform an engine-off landing as described in the next section. The procedure is the same as for the initial startup with the exception that the temperature of the engine will dictate the degree of use of the mixture control. Attempts to restart are subject to the following limitations :

Retain a grip on the starting handle after the engine starts and follow the handle back into its recess on the pylon. Do not release it until there is no risk of the handle swinging back into the propeller arc.

Attempts to restart must be discontinued in good time to allow preparation for a safe engine-off landing.

7.8.2. ENGINE-OFF LANDINGS: Always be prepared for the engine to fail when it is least convenient and therefore always ensure that you are within gliding distance of a suitable emergency landing field. High airspeed on finals is of great importance for engine-off landings, the approach speed must not be allowed to decay, and there must be a margin to permit rotation before touchdown. However, as a well executed landing in the Pegasus Quasar is effectively power-off there is no inherent safety hazard involved in an engine off landing.

7.8.3. ENGINE FAILURE ON TAKE-OFF: In order to minimise the potential safety hazard in the event of an engine failure on take-off, never climb-out at a steep angle when close to the ground and always use an airfield long enough to allow a safe engine off landing straight ahead when the aircraft is too low to turn into a shortened circuit. Resist the temptation to pull the control bar in after such a power failure as this could produce a radical nose down attitude. Instead, let the bar assume the neutral trim position until the aircraft regains airspeed and levels out. From that point, treat the situation as an engine off landing.

7.8.4. INSTRUMENT FAILURE: The essential instruments required by the conditions of the Permit to Fly are an altimeter and an airspeed indicator. In the event of failure of either of these it is not permissible to continue flying and a landing should be made as soon as it is possible and safe to do so. Failure of other instruments does not constitute grounds for abandoning a flight providing safety is not dependent upon them.

7.8.5. ENGINE OVERHEATING: The correct course of action depends on the severity of the problem. As safety is paramount and dependent on the correct operation of the engine it is necessary to land. In order to prevent the manufacturers temperature limitations (see section 2.0) being exceeded, switch off and proceed with an engine off landing as described above. If there is risk of fire, turn off the fuel cock.

7.8.6. FIRE: If a fire occurs on the ground, then immediately close both throttles, switch off the engine and exit the aircraft, turning off the fuel as you go.

A fire in the air is a considerably greater hazard. Two possible causes are electrical or fuel. Smoke or fire at the front of the aircraft is almost certain to be electrical in origin while occurrence at the rear could be from either cause.

In the case of an electrical fire, turn off all electrical equipment and land as soon as is safely possible.

In the case of a fuel fire, select a landing area, turn off the fuel and the ignition and perform an engine-off landing as described above.

8.0. **POST FLIGHT INSPECTION:** After flight, and particularly if you have had a heavy landing or suspect damage may have occurred through ground handling or cross wind landings, you must inspect the aircraft thoroughly. Please check the maintenance and repair section in this manual and pay special attention to the areas of inspection outlined in section 4.1..

9.0. **DE-RIGGING THE AIRCRAFT:** The de-rigging procedure is a direct reversal of that for rigging. As with the preparation before flight, it is also important when de-rigging that the pilot carries out an inspection.

9.1. With the rear wheels chocked, lower the wing until the control frame base is on the ground. Unbolt the trike from the hang-point and wheel out the trike unit.

9.2. After detaching the wing from the trike, reverse the procedures listed in para's 4.2.1. to 4.2.19 above. When preparing the wing for stowage in the bag, furl the wing fabric carefully, ensuring that the protection patches are correctly positioned at the following positions:

a) Control frame knuckle joints.

b) Roll bracket and upper control frame.

c) Washout tube plugs.

Rigging cables should be stowed simply and, especially at the control frame, logically.

10.0. TUNING THE WING:

10.1.NEW AIRCRAFT :
PRIOR TO DELIVERY TO THE CUSTOMER ALL NEW AIRCRAFT ARE FLOWN AND SET UP BY EITHER THE FACTORY OR BY APPOINTED DEALERS. A FULL CHECK FLIGHT IS CARRIED OUT AND ADJUSTMENTS MADE TO THE WING TO ENSURE THAT IT IS PROPERLY TRIMMED OUT AND FLIES HANDS OFF AT THE RIGHT SPEED. OWNERS ARE DISCOURAGED FROM MAKING ANY ADJUSTMENTS AND ACCORDINGLY IF YOU FEEL YOUR NEW PEGASUS AIRCRAFT IS NOT PERFORMING AS IT SHOULD, IT IS ESSENTIAL THAT YOUR DEALER IS IMMEDIATELY INFORMED. IF NECESSARY THE DEALER WILL ARRANGE FOR THE AIRCRAFT TO BE RETURNED TO THE FACTORY FOR TESTING.

THE FOLLOWING NOTES ARE FOR GUIDANCE ONLY AND SINCE TUNING OF FLEX WINGS IS A COMPLICATED AND EXACTING PROCEDURE, NO ADJUSTMENT SHOULD BE MADE WITHOUT A FULL UNDERSTANDING OF THE PRINCIPLES INVOLVED.

10.2. WING TRIM: A well tuned wing will fly in a straight line hands off and will respond to control inputs equally in each direction. However, fabric can stretch slightly with age and battens can alter shape and get bent or distorted. The most common problem with flex wings is the tendency for the wing to acquire a turn one way which can be irritating and tiring on a long flight. Turns like this can almost always be tuned out and are invariably due to rib shape. However, it may be that airframe damage has occurred so the first thing to do is to check the frame carefully, inspecting for bends and distortion particularly in the leading edges. If the frame is alright, you should check the ribs against the template and adjust accordingly. If the ribs match the template, the fault may be due to wing stretch and you may have to compensate by altering the ribs beyond the template shape. Maximum allowance is 15mm.

10.2.1. Tuning Guide. For successful tuning, the weather conditions must be smooth, small adjustments must be made one at a time, and notes must be made immediately any changes have been made and check flown. The loading of the aircraft must also be similar for trials to have comparable results.

Example: At high speed, the aircraft turns to the right. At low speed, the turn is not so pronounced.
Solution : Use the tip four ribs 7-10 on the starboard side to tune out the turn. The tip ribs tend to affect the wings yaw stability by differential drag. Decamber, or add reflex to those on the starboard side slightly. The reduced drag due to reduced camber on the starboard side will counteract the turn by allowing the starboard wing to lead the port wing slightly. The starboard wing will then produce more lift at a greater distance from the C.G than the port wing, so correcting the turn. Increasing the camber of the port tip ribs will also help but is best avoided as the trim speed will be increased.

Example: The aircraft turns right at low speed. The turn is less pronounced at high speed.
Solution : In this case ribs 5 and 6 can be used to counteract the turn. Increase lift on the starboard wing by increasing the camber slightly. Reduce lift on the port wing by reducing camber slightly. These ribs do not affect the yaw so much, and so can be used directly.

If a turn is incurable by making small adjustments, it may be necessary to return the wing to our approved agents or ourselves to have it checked out and corrected.

10.3. PITCH TRIM: Adjustment to trim is made by moving the nylon roll bracket block on the wing keel. Moving the block forward will increase the 'hands off' trim speed and rearwards decrease it. DO NOT INCREASE THE TRIM SPEED BY INCREASING CAMBER FROM THE PLAN AS PITCH STABILITY WILL BE REDUCED. DO NOT DECREASE TRIM SPEED BY DE-CAMBERING THE TIP RIBS AS THIS WILL AFFECT HIGH SPEED YAW STABILITY. The Pegasus Quasar wing requires very little adjustment to pitch and alterations from the series test flight status should not be made without consultation with the factory or our approved agents.

10.4. REFLEX RETENTION LINES: The whole pitch stability of the aircraft depends on the reflex retention lines and no adjustment should be made without consultation with the Solar Wings Factory. Incorrect reflex retention line adjustment can be <u>exceedingly dangerous</u>.

10.5. WARNING: Those operators who wish to tune the Quasar should contact a Solar Wings agency for additional advice. Before any tuning is attempted, a careful and thorough check of the airframe is essential. A sudden indication that the wing requires tuning may be the result of damage caused in an unreported accident or from a heavy landing.

11.0. MAINTENANCE:

11.1. GENERAL: Apart from the consequences of heavy landing, or of exceeding flight limitations, the major factors for attention are corrosion and fatigue. There is no inherent fatigue problem with the Pegasus Quasar, but excessive loads and vibration can weaken the structure, and a regular watch for hair-line cracks, most likely in areas under high stress, such as around bolt holes, will give warning. All Pegasus Quasar components can be replaced without difficulty. Repairs should be undertaken by the Solar Wings factory or a Solar Wings approved repair agency.

11.1.1. ALUMINIUM TUBEWORK: Care and consideration in de-rigging and transportation will pay huge dividends in airframe life. Any damage to any one of the structural members is serious and can usually only be repaired by replacement. Tubes suffer from abrasion or indentation, the first accelerating fatigue fracture and the second reducing the strength of the part. If you bend, dent or damage the tubular members in any way, seek immediate professional advice before flying again and have replacement parts fitted.

11.1.2. COMPOSITE COMPONENTS: The rear undercarriage beam is immensely strong. Overloading through heavy landings may be shown by localised crazing around bolt holes. The undercarriage pickup fittings should be regularly checked for wear. The beam must not be painted any dark colour in order to prevent any loss of strength through solar heating.

Special care must be taken to ensure the drain holes in the fuselage belly pan and map boxes are clear and that no foreign objects are loose in the bottom.

11.1.3. FASTENERS: Only fasteners purchased from Solar Wings either direct or through an approved stockist should be used for replacement. Any fastener which is bent or shows sign of wear or corrosion should be immediately replaced. Nylock nuts should only be used once.

11.1.4. RIGGING CABLES: The main danger with the rigging lies in kinking the cable, usually caused by careless rigging and de-rigging. Once a cable has a kink, the strands are damaged and replacement is the only cure. The side cables are particularly important and should receive a frequent detailed inspection. Check for cable damage along the length but the main failure area lies immediately adjacent to the swaged fitting. Look carefully for signs of strand fracture at this position. Corrosion is a serious problem particularly in coastal areas and shows itself as a white powdery deposit. Corrosion cannot be cured and replacement is the only answer.

11.1.5. FITTINGS: Many fittings on Pegasus aircraft are manufactured from aluminium alloy and then anodised. Damage can occur through scratching or by the stress of an unduly heavy landing or crash, or by general wear. Look for elongated holes and stress lines in the aluminium. Damaged items should be replaced.

11.2. WING:

11.2.1. GENERAL: Careful attention to the recommended rigging and derigging sequences will protect the wing from the risk of unnecessary damage. The wing must always be transported inside its bag, and the bag zip must face downwards to prevent the entry of rainwater. During transportation, or when stored on slings, the wing must be supported at its centre and at two points not more than one metre from each end. Supports should be softly padded, and any support systems used for transport, such as roof racks, must use attachment straps which are sufficiently secure to eliminate the possibility of damage from vibration and abrasions.

11.2.2. **WING FABRIC MAINTENANCE:** Despite the best care you can take, you may still have accidents with the odd wall or wire fence or your protection pads may slip and you will be faced with slight damage to the fabric. Where this takes place influences repair, high load areas such as a trailing edge being critical. Any cuts or tears through the trailing edge, sail fixing points or similar high load areas must be repaired at either the Solar Wings factory or a Solar Wings approved workshop. Small damage to panels, leading edge cover etc. can be repaired with self adhesive tape which is cut to size, pressed into place on the clean dry sail and warmed gently with a hair dryer to melt the adhesive, being careful not to apply too much heat. We define small damage as abraded holes no more than 10mm diameter and small cuts no longer than 15mm. Anything larger should be inspected by a qualified engineer.

11.2.3. **STITCHING DAMAGE:** All the seams are firstly joined with a double sided sail adhesive tape and then double zig zag sewn. Thread damage never ever gets better and eventually runs. Since the wing is held together with stitches, its pretty obvious what will happen when the stitching fails. If you abrade a seam, then have the damage repaired before it gets worse. Small non loaded areas can often be repaired in-situ by the tedious but effective method of hand sewing back through the original stitch holes. Never use anything but matching polyester thread which is available from Solar Wings or any good workshop or sail makers.

11.2.4. **WING FABRIC CLEANING:** The best answer to dirty sails is to keep them clean, but if all else fails and you need to wash your wing, then select a dry day and have access to a good hose and clean water supply. Never use strong soaps or detergents since soap residue can re-act with ultra violet light and degrade your fabric. We recommend a very mild liquid soap (washing up liquid) and a soft sponge. Gently wash the fully rigged wing, frequently hosing clean. Copious amounts of clean water will not harm the wing and can be very beneficial in removing sand and grit which may get trapped inside the leading edge pocket usually in the nose or wing tip areas. Ensure the wing is completely dry before de-rigging.

11.2.5. **RIBS:** The ribs form the wing shape and hence dictate the whole performance of the wing. They need treating with care, and since they are subject to constant tension both during flight and rigging, tend to lose their shape and flatten out. It is essential that they are reformed at frequent intervals and checked against the template. The best way to reform is to hold the batten against your knee and, whilst applying pressure to bow the batten, slide it side to side over the area you want to bend. Direct point bending will usually result in either a poor shape or a broken batten.

11.3. TRIKE:

11.3.1. **GENERAL:** The Pegasus Quasar trike has been designed to permit easy inspection and operators should have no difficulty in assessing problems or recognising damage if visual checks are carried out conscientiously. The trike may be transported fully assembled or folded down providing the pylon is supported to prevent excessive stress being applied to the structure. The trike may also be stored either fully rigged or folded, again providing the pylon is supported and not allowed to rest on the pod fairing.

General care should include:

Washing down the tube work and composite parts with warm water and a light detergent followed by rinsing with fresh water.

Fabric sponged with warm water and a mild detergent and rinsed with fresh water.

The pod and wheel spats washed and polished using commercially obtainable shampoos and polishes.

The cockpit area should have all litter removed.

11.3.2. ENGINE: For engine maintenance details see engine manufacturers manual.

11.3.3. PROPELLER: The condition and torque settings of the propeller bolts should checked with the frequency recommended in the inspection schedules laid out below.

Torque should be applied by progressively tightening all the bolts to 15 ft lbs in the following sequence :

1 - 4 - 2 - 5 - 3 - 6

Other general maintenance should include replacing any leading edge tape as required by inspection and regular wiping off of the propeller with a damp cloth to remove insect and other foreign body build-up. If left unchecked, both the condition of the tape and particle build-up can significantly reduce propeller efficiency.

11.3.4. PROPELLER PITCH SETTING:

The correct pitch setting for the Arplast propeller is specified in Section 2.4.

Slacken the bolts clamping the hub around the root of each blade and then slacken the main propeller mounting bolts. Each blade has a datum enscribed into the alloy collar at the root. Aligning this datum with the seam between the propeller hub halves sets the correct pitch.

Alternatively, The pitch gauge supplied with the propeller is laid accross the face of the hub so that the attached pitch setting plate rests on the underside of the blade at the distance from the hub centre specified in section 2.4. The blade is then twisted until the undersurface leading and trailing edges both rest on the pitch setting plate.

Re-tighten the bolts at the root of each blade to 6 ft lbs and re-tighten the main mounting bolts as described above.

Full throttle static RPM should be 6000 RPM +/- 100 RPM.

11.4. LUBRICATION:

11.4.1. TRIKE:

a). The rear steering bar, foot throttle, hand throttle and choke lever pivots should be lubricated with machine oil weekly.

b). All other bearings are life sealed and require no additional lubrication.

c). Refer to the engine manufacturers handbook for gearbox lubrication details.

d). The brass bush at the top of the pylon should have a light application of general purpose grease every 10 hours.

11.4.2. WING: a). The keel tube roll bracket nylon requires to be sprayed monthly with a commercial silicone spray.

11.5. RECOMMENDED INSPECTION SCHEDULES:

Solar Wings strongly recommends that all parts are visually inspected and assessed by an approved Solar Wings inspector and any repairs carried out as outlined in section 12.

11.5.1. TRIKE AND WING: Complete strip down and inspection including replacement of appropriate mandatory lifed components: 500 hours.

11.5.2. TRIKE:

11.5.2.1. ENGINE:

Engine: For inspection schedules refer to the engine manufacturers manual.	
Engine mountings: Cracks, bond failure and reduced stiffness:	25 hours.
Engine controls: Cable fraying, adjustment and operating freedom:	25 "
Engine electrical connections: Tightness and corrosion:	25 "
Engine airfilters: Clean and re-oil as per Filter manufacturers instructions: Maintenance periods are a function of environment and are therefore cleaned upon inspection or a minimum of:	50 hours.

11.5.2.2. FUEL SYSTEM:

Fuel filters: Replace if necessary:	25 hours.
Fuel lines: Cracks end fitting security and joints.	25 "
Fuel tank including vents: Clean and check vent function:	25 "
Fuel pump diaphragm: Check for cracks and signs of perishing:	50 "
Fuel tank: Flush and check for abrasion from mountings:	50 "

11.5.2.3. TRANSMISSION:

Propeller: Check for leading edge damage, delamination and splits:	25 hours.
Propeller: Check propeller fasteners for tightness:	10 "
Gearbox bearing: Check for play:	50 "
Gearbox oil level:	10 "

11.5.2.4. FRAME:

All tube work: Check for damaged or fatigue cracked tubes:	50 hours.
All fixings: Elongation of holes and tube damage:	50 "
Seat frame and seat belts including hinge plates: Tube cracks and elongation of holes:	25 "
Seat base bracket: check for damage and welds:	50 "
Hang point bolt and bush: Grease and check for wear and damage:	10 "
Undercarriage pickup fittings: Check for wear	25 "

11.5.2.5. CABLES:

All cables: Check for broken strands, thimble damage and stretch:	25 "

11.5.2.6. STEERING:

Front forks: Check for straightness, elongation and cracks:	25 "
Connecting link: Check for cracks, and rod end security:	25 "
Rear steering bar pivot: Check for cracks and straightness:	25 "

11.5.2.7. WHEELS AND TYRES:

Rear Brakes: Check brake shoes and lubricate mechanism:	500 landings or every 6 months.
Tyres: Check for splits, wear, perishing and pressures:	25 hours
Wheel hubs: Check for damage:	25 "
Wheel bearings: Check for play and grease:	25 "

11.5.2.8. BODYWORK:

Pod: Check for Splits and general soundness:	50 "
Spats: Check for splits and general soundness:	50 "
Engine Cowl: Check for splits and general soundness	50 "
Other fairings: Check for general soundness:	50 "

11.5.3. WING:

11.5.3.1. FRAME:

Visual check on all exposed parts and those parts accessible through inspection zips: Check tube and fastener condition:	25 hours.

11.5.3.2. CABLES:

Lower: Check for broken strands, thimble damage and stretch:	25 hours.
Upper: Check for broken strands, thimble damage and stretch:	25 hours.
Restraint: Check for broken strands, thimble damage and stretch:	25 hours.

11.5.3.3. FASTENERS:

All fasteners: Check for wear, straightness and signs of fatigue:	25 hours.

NOTE: These inspections do not obviate the need for the Pre-flight and Post flight inspections outlined in sections 5 and 8.

11.6. RECOMMENDED COMPONENT LIFE:

11.6.1. GENERAL: In the main, the safe working life of the structural components of the Pegasus Quasar is dictated by the environment in which the aircraft is used and the care taken during day to day operations. Inspection therefore, is an essential tool in deciding the continued use of most components. However, by the nature of their material, construction and position within the structure, certain components have a critical fatigue life and it is mandatory that these components are replaced within the time stated below.

11.6.2. WING:

Crossbooms	2000 hours
Leading Edges	1000 "
Control Frame Base Bar and fittings	1000 "
Keel	1000 "
Rigging Wires	200 "
Roll Bracket	500 "
Hang bolt	200 "

11.6.3. TRIKE:

Pylon to Wing Connection Block	500 hours
Pylon and Pylon to Basetube Plates	500 "
Front Strut and connecting channels	1000 "
Basetube and Steering Head	1000 "
Seat Frame	1000 "
Undercarriage pickup bolts and channels	500 "

12.0. REPAIR:

12.1. WARNING - THE PEGASUS QUASAR AIRFRAME IS DECEPTIVELY SIMPLE, BUT LIKE ALL AIRCRAFT REQUIRES SKILLED AND QUALIFIED ATTENTION. WE DO NOT RECOMMEND SELF REPAIR OR RE-ASSEMBLY BY OTHER THAN SOLAR WINGS OR SOLAR WINGS NOMINATED REPAIR AGENTS. NO REPLACEMENT PARTS SHOULD BE FITTED UNLESS THEY ARE FACTORY SUPPLIED AND IDENTIFIED.

12.2. WING:

No repairs are to be undertaken by the operator.
Sail repairs are only to be undertaken by the Solar Wings factory.
Repairs by replacement only.
Replacement parts must be obtained from Solar Wings Ltd. or a Solar Wings appointed agency.
Bent aluminium tubes must never be straightened, always replaced.
Frayed cables and cables with damaged or twisted thimbles must be replaced.

12.3. TRIKE:

No repairs are to be undertaken by the operator.
Repairs by replacement only.
Replacement parts must be obtained from Solar Wings Ltd. or a Solar Wings appointed agency.
Bent aluminium tubes must never be straightened, always replaced.
Frayed cables and cables with damaged or twisted thimbles must be replaced.
Repairs to composite structures must first be assessed by the factory or a factory approved composites facility.