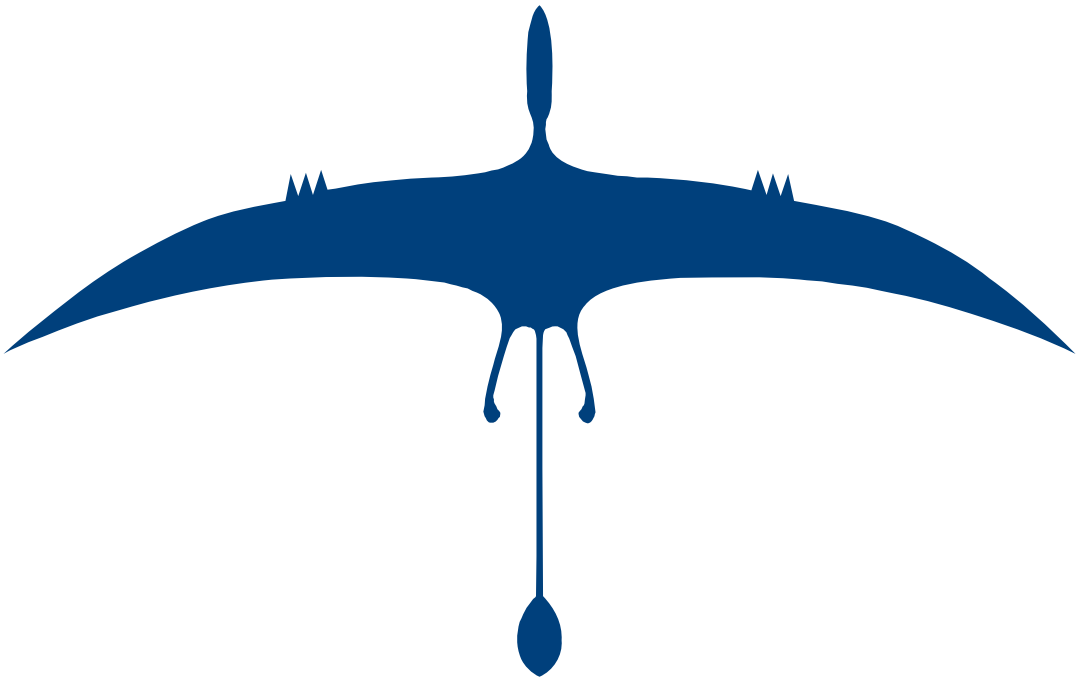
Ramphos Trident Maintenance Manual

Revision 01



Part Type	Model	Serial Number
Carriage	Ramphos Trident S	
Wing	HZ15S	
Engine	Rotax 582UL/912UL Smart M160/1	
Propeller	Kiev Models 163/165/273/275 Bolly series 3	
Registration Number		

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NOTE

Manuals can be revised in the future and pages and/or sections re-issued or a whole revision issued to the manual. Amendments will also be available on the website. www.ramphosusa.com The amended pages and/or sections should be printed and replaced in the manual at the earliest possible time for safety of flight. The amendment should be logged and recorded in the table above by the user.

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The Ramphos Trident is a two seat tandem WSC aircraft. The layout is typical for two seat trike design with the passenger and hull/frame being suspended by a triangular frame, hanging from the top of the mast about the pitch and roll axes, to provide for weight shift control.

The Ramphos Trident has amphibious capability. The repositionable gear system is actuated by a single lever. The frame and gear system of the Ramphos Trident is constructed of high quality stainless steel and the hull is made with vinyl ester resin and several types and weights of fiberglass cloth.

The front wheel is equipped with a type of scrub brake. The nature of salt water operations precludes the use of more traditional braking systems.

The pilot and passenger seats are made of water proof cloth.

Under the back seat is a 15.3 gallon(US), 60 liter fiberglass gas tank, securely fastened to the seat frame and base tube of the trike frame.

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1 GENERAL

This manual contains recommended procedures and instructions for ground handling, servicing and maintaining the Ramphos Trident aircraft. The procedures described are to be used in addition to the particular governing body's regulations for each country where the aircraft is being flown.
Where a maintenance procedure contravenes local regulations, the procedures of the local governing body will take precedence.
This manual may refer you to the wing manual(s) for maintenance required for the relevant wing.
This manual may refer you to the engine manual(s) for maintenance required for the relevant engine.

Definitions used in this handbook such as WARNING, CAUTION and NOTE are employed in the following context.

WARNING
Procedures or instructions that if not followed correctly may result in injury or death

CAUTION
Procedures or instructions that if not followed correctly may result in damage to the aircraft or its parts

NOTE
Procedures or instructions which are essential to highlight

- *Annual Condition Inspection*—detailed inspection accomplished once a year on a LSA in accordance with instructions provided in the maintenance manual supplied with the aircraft. The purpose of the inspection is to look for any wear, corrosion, or damage that would cause an aircraft to not be in a condition for safe operation.
- *A&P*—airframe and power plant mechanic as defined by 14 CFR Part 65 in the U.S. or equivalent certification in other countries.
- *FAA*—United States Federal Aviation Administration.
- *Heavy Maintenance*—any maintenance, inspection, repair, or alteration a manufacturer has designated that requires specialized training, equipment, or facilities.
- *Line Maintenance*—any repair, maintenance, scheduled checks, servicing, inspections, or alterations not considered heavy maintenance that is approved by the manufacturer and is specified in the manufacturer's maintenance manual.

LSA (light sport aircraft)—aircraft designed in accordance with ASTM standards under the jurisdiction of Committee F37 Light Sport Aircraft, for example, Specification F 2244 for powered parachutes, Specification F 2245 for airplanes, and Specification F 2352 for gyroplanes.

- *LSA Repairman Inspection*—U.S. FAA-certificated repairman (light sport aircraft) with an inspection rating as defined by 14 CFR Part 65, authorized to perform the annual condition inspection on experimental light sport aircraft, or an equivalent rating issued

by other civil aviation authorities. This requires a 16 hour course for Weight Shift Control category aircraft like this one.

- *Discussion*—Experimental LSA do not require the individual performing maintenance to hold any FAA airman certificate in the U.S.
- *LSA Repairman Maintenance*—U.S. FAA-certificated repairman (light sport aircraft) with a maintenance rating as defined by 14 CFR Part 65, authorized to perform line maintenance on aircraft certificated as special LSA aircraft. Authorized to perform the annual condition/100-h inspection on an LSA, or an equivalent rating issued by other civil aviation authorities.
- *Maintenance Manual(s)*—manual provided by an LSA manufacturer or supplier that specifies all maintenance, repairs, and alterations authorized by the manufacturer.
- *Major Repair, Alteration, or Maintenance*—any repair, alteration, or maintenance for which instructions to complete the task excluded from the maintenance manual(s) supplied to the consumer are considered major.
- *Manufacturer*—any entity engaged in the production of an LSA or component used on an LSA.
- *Minor Repair, Alteration, or Maintenance*—any repair, alteration, or maintenance for which instructions provided for in the maintenance manual(s) supplied to the consumer of the product are considered minor.
- *Overhaul*—maintenance, inspection, repair, or alterations that are only to be accomplished by the original manufacturer or a facility approved by the original manufacturer of the product.
- *Overhaul Facility*—facility specifically authorized by the aircraft or component manufacturer to overhaul the product originally produced by that manufacturer.
- *Repair Facility*—facility specifically authorized by the aircraft or component manufacturer to repair the product originally produced by that manufacturer.
- *14 CFR*—Code of Federal Regulations Title 14 Aeronautics and Space also know as the "FARs" or Federal Aviation Regulations.
- *100-h Inspection*—same as an *annual condition inspection*, except the interval of inspection is 100 h of operation instead of 12 calendar months. This inspection is utilized when the LSA is being used for commercial operations such as flight instruction or rental, or both.

Abbreviations:

AOI — Aircraft Operating Instructions
FTS — Flight Training Supplement
MIP — Maintenance and Inspection Procedures
PIC — Pilot In Command
C — Celsius
CAS — Calibrated air speed
F — Fahrenheit
Hg — Mercury
IAS — Indicated Air Speed
ISA — International Standard Atmosphere
Kg — Kilogram
km/hr — Kilometers per hour

MPH — Miles per hour
kt(s) — Nautical Mile per Hour (knot) (1 nautical mph = (1852/3600) m/s)
lb(s) — Pound(s) (1 lb = 0.4539 kg)
mm — Millimeter
cm — Centimeter
m — Metre
in — Inch
ft — Feet
sq. m — Square Metre
sq. ft — Square Feet
cu. in — Cubic Inches
cm3 — Centimeter Cube
mb — Millibars
N — Newton
Nm — Newton Meter
kW — KiloWatt
HP — Horse Power
RPM — Revolutions Per Minute
ft. lbs — Foot Pounds
in. lbs — Inch Pounds
psi — Pounds per Square Inch gage pressure
s — Seconds
min — Minute(s)
hr(s) — Hour(s)
SI — International System of units
V_A — Maneuvering Speed
V_C — Operating Cruising Speed
V_{DF} — Demonstrated Flight Diving Speed
V_H — Maximum Sustainable Speed in straight and level flight
V_{NE} — Never Exceed Speed
V_{S0} — Stalling Speed, or the minimum steady flight speed in the landing configuration
V_{S1} — Stalling Speed, or the minimum steady flight speed in a specific configuration
V_x — Speed at which Best Angle of Climb is achieved
V_y — Speed at which Best Rate of Climb is achieved
V_T — Maximum Glider Towing Speed
TOSS — Take Off Safety Speed
Wsusp — Highest Trike Carriage Weight suspended under the wing
Wwing — Wing Weight
Wtkmt — Trike Carriage Empty Weight (including required minimum equipment, unusable fuel, maximum oil, and where appropriate, engine coolant, hangbolt and hydraulic fluid)
W_{MAX} — Maximum Design Weight (Wwing + Wsusp)
WSC — Weight Shift Control (aircraft)
Max — Maximum
Min — Minimum

Units:

Speed: Kts (Knots) = 1.15 mph (miles per hour) = 1.84 km/hr

1 km/hr = 1.6 MPH

Pressure: PSI = Pounds per Square Inch
in Hg = inches of Mercury
mb = millibar

Distances: in. = inches = 25.4 millimeters
ft = foot (feet) = .305 meters

Weights: Kg = kilograms = 2.2 lbs = 2.2 pounds

Misc.

1 Pound (Ib) = 0.4536 Kilogram (kg)
1 Pound per sq in (psi) = 6.895 Kilopascal (kPa)
1 Inch (in) = 25.4 Millimeters (mm)
1 Foot (ft) = 0.3048 Meter (m)
1 Statute mile = 1.609 Kilometres (km)
1 Nautical mile (NM) = 1.852 Kilometres (km)
1 Millibar (mb) = 1 Hectopascal (hPa)
1 Millibar (mb) = 0.1 Kilopascal (kPa)
1 Imperial gallon = 4.546 Liters (I)
1 US gallon = 3.785 Liters (I)
1 US quart = 0.946 Liter (I)
1 Cubic foot (ft_3) = 28.317 Liters (I)
1 Degree Fahrenheit (F) = (1.8 X C)+32
1 Inch Pound (in Ib) = 0.113 Newton Meters (Nm)
1 Foot Pound (ft Ib) = 1.356 Newton Meters (Nm)

1.1 Equipment List

1.1.1 Tooling

Tooling required to do maintenance on this aircraft is listed below. Please note that the list may not be comprehensive

- Loctite (243, 567 and Antisieze Lubricant # 76764) For the frame section.
- The Rotax and Smart Turbo G Maintenance Manuals gives a list of consumable materials in section 2.5.
- Open ended Metric Spanner set
- Torque wrench
- Air Pump
- Various petroleum lubricants
- Dry Lubricant – lubricant which doesn't attract dust after application.
- UV Resistant Tie wraps, and tooling
- Stainless Steel aircraft Cable and Swages and tooling
- Metric Hex key set
- Gasoline resistant thread sealant tape
- Various general care items
- Metric Socket Wrench Set
- Pliers and Wise Grips
- Phillips and Regular Screw Driver Set

- A hoist pulley system
- Flexible neck funnel

1.1.2 Other Possible Required Items

- Safety Rings
- Safety Pins
- WD-40, CRC or another water displacement compound
- Sail Strength Checking Tool
- K&N air filter cleaning spray and oil
- Good flashlight
- 5x to 10x magnifying glass

1.2 Sources to Purchase Parts

Parts can be purchased from the following sources

Component	Source
Carriage Tubing	• RamphosUSA Inc..
Carriage Hardware	• RamphosUSA Inc. • Other aircraft specialty hardware shops or aircraft manufacturer selling metric aircraft hardware
Wing Components and Hardware	• Ramphos USA for HZ15S wings and hang bolts
Propeller Parts	• Kiev Props America • Other prop manufacturers if other props are approved by RamphosUSA Inc. on the trike in future

1.3 List of Disposable Replacement Parts

Dispose of all disposable parts properly following local laws and regulations

Part	Comment
Fuel Filters	Disposable fuel filters or metal mesh non-disposable ones allowed by the engine manual can be used
Air Filters	Generally K&N air filters are used. They can be cleaned following K&N air filter cleaning guidelines but if appropriate, they

	can also be replaced with new ones and old ones disposed
Tires	4.8x8x4, 4-ply tires when worn should be properly replaced and old ones disposed of properly per local laws
Oil Filters	Oil filters should be properly disposed along with the oil at each oil change
GMA Fuses	The fuses used in this aircraft are disposable when blown (10 amps and 15 amps)
Fuel Line	When fuel line has to be replaced, the old one should be properly disposed
Battery	When the sealed maintenance free battery is to be replaced, the older battery should be properly recycled according to local laws

1.4 Engines

Ramphos Trident is available with the following ASTM complaint engines:

1.4.1 Rotax 582 UL

Version	Performance			Torque			Max RPM
	kW	HP	RPM	Nm	ft.lb.	RPM	RPM
Rotax 582 UL	48	64.4	5300	75	55.3	6000	6500
Max 1 min (take-off)	48	64.4	6800				

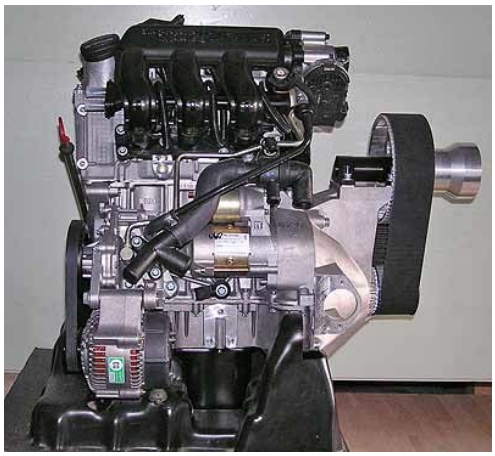
Bore		Stroke		Displacement		Compression Ratio
76.0 mm	2.99 in.	64.0mm	2.52 in.	580.7 cm^3	35.44 cu. in.	11.5 T. 5.75 Effective

1.4.2 Rotax 912 UL2

Version	Performance			Torque			Max RPM
	kW	HP	RPM	Nm	ft. lb.	RPM	RPM
912 UL2	58.0	79	5500	103	75.9	4800	5800
Max 5 min (take-off)	59.6	81	5800				

Bore		Stroke		Displacement		Compression Ratio	
79.5 mm	3.13 in.	61 mm	2.4 in.	1211.2 cm^3	73.91 cu. in.	9.0:1	

1.4.3 Smart TurboGasoline M160-UL- Engine



Version	Performance			Torque			Max RPM
	kW	HP	RPM	Nm	ft. lb.	RPM	RPM
M160-UL	58.0	79	5300	130	90	5300	5800
Max 5 min (take-off)	60	81	5800				

Bore		Stroke		Displacement		Compression Ratio	
66 mm	2.59 in.	68 mm	2.67 in.	698 cm^3	42.5 cu. in.	9.5:1	

1.5 Weight and Balance Information

Centre of gravity limits are not critical in a flex wing weight shift control aircraft. The carriage attaches to the wing through a universal junction known as hang block assembly.
Variations in cockpit and fuel loading cannot affect aircraft's balance. The Ramphos Trident is therefore not critical in terms of centre of gravity. However, distribution of load in a trike carriage affects the attitude of the trike carriage and hull in-flight in a minor way.
Please refer to weight and balance calculation for airworthiness as well.

1.5.1 Centre of Gravity Limits

Base Suspension Range (Measured from the front of the nose plate attached to the wing keel to the suspension point on the hang block)	**Dimension (Metric)**	**Dimension (Imperial/US)**
Ramphos trident HZ15S	1570 mm – 80 mm	61.81" – 3.15"

1.6 Tire Inflation Pressures

Tires should be inflated to between 20 and 25 psi (1.38 to 1.72 bars) for both front and back tires

1.7 Approved Oils and Capacities

Please refer to Rotax and Smart engine manuals for oil recommendations

1.8 Recommended Fastener Torque Values

Fastener	Metric	Imperial
Hang Bolt and Folding Mast Bolt	Hand tight ONLY with safety pin or ring	Hand tight ONLY with safety pin or ring
Axle Bolts	Snug tight with a wrench enough so the cotter pin can be inserted for safety. If needed appropriate washers can be added	Snug tight with a wrench enough so the cotter pin can be inserted for safety. If needed appropriate washers can be added
Other Carriage Bolts and Nylock Nuts*	6 mm class 8.8 coarse thread – 10 NM	6 mm class 8.8 coarse thread – 88 inch pounds (7 foot pounds)
	8 mm class 8.8 coarse thread – 25 NM	8 mm class 8.8 coarse thread – 220 inch pounds (18 foot pounds)
	10 mm class 8.8 coarse thread engine mount bolts – 35 NM. One to three threads should be showing	10 mm class 8.8 coarse thread engine mount bolts – 310 inch pounds (26 foot pounds). One to three threads should be showing
Propeller	Refer to the propeller Manual	Refer to the propeller manual
Wing Fasteners	Refer to the wing manual. If values are found in wing manual they override these recommendations. If using nylocks, they should not be torqued down but just kept snug tight with one to three threads showing. We do not recommend more than 20 NM for nylock nuts on wings	Refer to the wing manual. If values are found in wing manual they override these recommendations. If using nylocks, they should not be torqued down but just kept snug tight with one to three threads showing. We do not recommend more than 178 inch-pounds (15 foot pounds) for nylock nuts on wings
Engine Hardware	Please refer to engine manual	Please refer to engine manual

* In preparing this guide to torque values, the following basic assumptions have been made:
(a) Bolts and nuts are new, standard finish class 8.8 coarse metric hardware. For older nuts and bolts 10 to 20 percent lower torque specification should be used
(b) The load will be 90% of the bolt yield strength
(c) The coefficient of friction (μ) is 0.14
(d) The final tightening sequence is achieved smoothly and slowly, until the torque tool indicates full torque has been obtained.

1.9 General Safety Information

Qualifications for the person doing the maintenance vary from country to country. The operator/mechanic should be familiar with the local requirements. Maintenance requirements are outlined in the maintenance manual for the base unit and in the wing manual for the wing and for engine maintenance refer to the engine manuals.

NOTE

To protect hardware from elements it is highly recommended that a water displacement compound like WD-40 or the like be sprayed from time to time to prevent galvanic corrosion. This can be done by the owner. Excess should be wiped off immediately after spray. Alternately compounds like Pennzoil Marine sprays after replacement of hardware can be used as they make a waxy film around the metal and protect it from the elements for up to 6 months or as advertised. Treating engine with WD-40 or another water displacement compound also makes it easier to clean and maintain engine's appearance. Excess should be wiped off with a soft cloth.1.9.1

1.9.1 Propeller

Propeller hub bolts (8 mm, class 8.8) should be re-torqued every 25 hours with an accurate torque wrench to propeller manufacturer values. Refer to the propeller manual.
Propeller blade bolts should be re-torqued every 40 hours with an accurate torque wrench to propeller manufacturer values. Refer to the propeller manual.

1.9.2 Fuel to Use

The following fuels are preferred to be used on the Ramphos S:

1.3.5.1 Lead Free 89 Octane US or higher for 912UL/582

1.3.5.2 **Lead Free 91 Octane US or higher for Smart**

NOTE

Occasional use of Avgas 100LL is permitted. Due to higher lead content in AVGAS, the wear of the valve seats and deposits in the combustion chamber will increase. Therefore, use AVGAS only if you encounter problems with vapor lock or if the other fuel types are not available.

1.9.3 Dimensions

	Metric		USA	
Wing Span	HZ15S	10.38 m	HZ15S	34 ft
Wing Area	HZ15S	15 sq. m	HZ15S	161.46 sq. ft
Aspect Ratio	HZ15S	7.2	HZ15S	7.2
Wing Weight	HZ15S	55 kg	HZ15S	121 lbs
Lowest Overall Trike Height	HZ15S	2.4 m	HZ15S	7.9 ft
Wing Length (Long Pack)	HZ15S	5.18 m	HZ15S	17 ft
Wing Length (Short Pack)	HZ15S	4.6 m	HZ15S	15 ft
Hull Width Outside to Outside	1.52 m		5 ft	
Hull Length	3.66 m		12 ft	
Wheel Inside to Inside Width	1.30 m		5.4 ft (51.5”)	
Wheel Outside to Outside Width	1.46 m		4.6 ft (57.5”)	
Carriage Height	2.3 m		7.8 ft (93.5”)	

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1.9.4 Parking, Moving on the Ground and Storage

Make sure area is clear, ignition is off and if applicable BRS safety pin is in before moving the aircraft on the ground manually.
While moving the aircraft take care to not put weight or excessive pressure on the front fiberglass. Before moving, the aircraft secure the wing's A-frame and move carefully negotiating the wind direction with the wing's position.
Pulling the trike: Moving the base (with or without the wing) is facilitated by lifting the front wheel and walking the base. Do not pull excessively hard on the compression strut or nose strut of the aircraft carriage. If a hard pull is needed, it's best to push the aircraft from the prop hub (back). Steer the trike while manually moving by pushing the nose wheel or front steering in the desired direction. Alternately the front wheel can be placed on a castering support and steered freely.
Pushing the trike: The trike can be pushed using pushing on the prop hub on even surface. Steering is slower and harder using this method except when using castering support on the front wheel
Parking: Parking the aircraft requires using chocks and securing the wing with the upwind wing down. In higher or gusty wind conditions, the wing should be tied down or if appropriate taken down or the trike should be moved indoors.
Please refer to section 4 of the Aircraft Operating Instructions or the POH for further information.

NOTE

The trike hull or base can be moved with or without the wing

Long term Storage: Long term storage will require the supplied air filter(s) be covered to prevent foreign objects getting in the air intake area. Full covers for the carriage and prop blades are advisable, which are available as after market items from Kiev Prop America. The engine manual should be consulted for long term storage practices for the engine. Consult the POH, section 4, for further information regarding long term storage.

NOTE

Do not store the trike outside for any appreciable length of time where it is exposed to the elements. This may reduce life of the sail and other items

1.9.5 Transporting the Aircraft

Refer to section 4 of the Pilot Operating Handbook/Aircraft Operating Instructions

1.9.6 Approved Sources of Information and Maintenance

The following are the approved sources for further information regarding maintenance:

- Ramphos USA (http://www.ramphosusa.com)
- Rotax Austria and its authorized representatives (Rotax Engines)

1.9.7 Instructions for Reporting Possible Safety of Flight Concerns

If you discover any problems during maintenance of this aircraft that in your opinion can cause safety of flight issues, please report that concern to RamphosUSA Inc. in the following way

1) **Compose an e-mail** to safety@ramphosusa.com with subject "Safety Of Flight Issue – Ramphos Trident – Ser#xxxxxx". Where xxxxxx is the aircraft's serial number
2) In the **body of the message** please follow this format:

Model:	Ramphos Trident
Serial Number:	xxxxxx
Date Of Manufacture:	mm/yyyy (from the data plate)
Number of Hours:	Enter number of flight hours on aircraft
Wing:	List the wing model you have on the trike carriage
Name of Part/Area:	Example, Mast/Pylon, Trike Base tube, Wing Keel, Hull etc..
Description:	Please describe the issue as best as you can
Images/Pictures:	Please attach digital format pictures of the problem area(s)
Suggested Remedy:	Enter any suggested remedy if you have one
Name:	Enter your full name here
Title:	Enter your title here (owner/mechanic/inspector)
Qualification:	16-hour class, 110-hour class, A&P mechanic etc.
Address:	Enter your address here
Phone(s):	Enter phone number(s) we can contact you at
e-mail:	Enter your e-mail address if applicable

Please note that if the concern is related to the engine internals, you should notify the engine manufacturer.

1.9.8 Placard Replacement

If placards need to be replaced you can order them through RamphosUSA Inc.. at http://safety@ramphosusa.com

INSPECTIONS

2.1 General

This section covers instructions and checklists for the completion of periodic and annual condition/100-h inspections, as appropriate.

2.2 One time Inspections

2.2.1 Rotax 912/582 and Smart M 160/1 Motors

Run-in: The initial engine run-in of Rotax 912/582 was carried out by the Rotax factory. The purging of the oil circuit, carburetor balancing was carried out by RamphosUSA Inc. prior to delivery. The initial engine run-in for the Smart M 160/1 was carried out at the Ramphos factory. During the first two (2) hours of use, we advise you to fly only solo, only use maximum power at takeoffs if necessary, and avoid prolonged use at maximum power. (Also consult the engine manual). The propeller blades have been adjusted at the factory to not exceed 5300 RPM on the ground. Use the tool recommended by the propeller manufacturer for any modification to the propeller pitch.

2.2.1.1 After Two (2) hours

NOTE

If unsure about how to do a certain task we recommend that you refer to FAA AC 43.13-1B for details

Type	Action	Description	Personnel Authorized
Line Maintenance	Re-torque the exhaust manifold bolts	Re-torque the exhaust manifold bolts to engine manufacturer's specifications	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Re-torque the propeller bolts and check the state of the propeller	Re-torque the propeller bolts and check the state of the propeller. For procedure please look at the propeller manual	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station

Line Maintenance	Lubricate hardware on the wing	Use a spray lubricant and a water displacement compound on the joints and hardware of the wing, wiping away excess immediately with a soft cloth	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Check all bungee cords in wheel wells and rudder	Bungee must keep gear doors tightly closed and rudder fully retracted	

2.2.1.2 after first Twenty Five (25) hours

NOTE

If unsure about how to do a certain task we recommend that you refer to FAA AC 43.13-1B for details

Pre-Requisites:

1. Tools and materials necessary to perform this inspection are listed in section 1.1 of this manual
2. If unsure about how to do a certain task we recommend that you refer to FAA AC 43.13-1B for details

Type	Action	Description	Personnel Authorized
Line Maintenance	Change Oil if applicable	Refer to engine manual	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Check oil filter for metal deposits	Open the oil filter and check for the presence of metal deposits	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Magnetic Pickup in gearbox cleaned	Clean the magnetic 'pick-up' bolt in the gearbox housing	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station

Line Maintenance	Oil Hose and connections	Check the state of the oil hose and the tightness of the oil connections	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Carburetors, carburetor supports and air filters secure	Check that the carburetors, carburetor supports and air filters are secure	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Throttle cable tension	Check the tension and stops of the throttle cables	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Idle RPM	Check Idle RPM. Consult engine manual	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Color and State of Spark Plugs	Check the state and the color of the spark plugs (for a correct air/fuel mixture). Replace if necessary. Consult engine manual	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Bolts, nuts, safety pins	Check that no bolt, nut, or safety pin is missing or loose or rusting	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station

Line Maintenance	Fuel System	Check the fuel system, hose connections, filter, pump (leaks – abnormal wear). Replace if necessary	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Electric Wire Harness	Check the electric wire harness for abnormal wear	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Liquid coolant level	Check the level of the liquid coolant in the radiator reservoir (above the minimum mark – do not overfill)	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Check Bungees	**Bungees must be in good condition. They must keep gear doors tightly shut and sea rudder fully retracted**	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station

2.3 Routine Periodic Inspections and Maintenance

2.3.1 Rotax Motors and Smart M160/1-UL Motors

Consult the engine manuals, Technical bulletins and Service Information for getting the intervals to do routine maintenance on your engine

NOTE

You will find more information and will be kept informed of the last Rotax instructions by consulting Internet site: www. Rotax–aircraft–engines.com

2.3.2 Airframe

NOTE

If unsure about how to do a certain task we recommend that you refer to FAA AC 43.13-1B for details

By consistently carrying out an effective PREFLIGHT you should discover any possible irregularities. For that reason your attention is drawn to POH section 4 to the preflight checklists.
The maintenance of your machine should be carried out adhering to the component replacement cycle of each sub-component (Section 2.3.5 of this manual).

2.3.2.1 Forty (40) hour Interval maintenance and inspection

Pre-Requisites:

1. Open all access panels.
2. Clean airframe and wing.
3. Tools and materials necessary to perform this inspection are listed in section 1.1 of this manual

Type	Action	Description	Personnel Authorized
Line Maintenance	Apply WD-40, CRC or other water displacement spray	Apply to hardware, can be used on electrical connections. Spray inside of steel tubing. Excess wiped off with a soft cloth immediately after spraying. Can be used to lubricate any rotating free joint like front fork etc.	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Apply Vaseline	Apply to folding mast joint area	• Owner • LSA Repairman Inspection • LSA Repairman

			Maintenance • A&P
Line Maintenance	Check all bolts, nuts, safety wires and lock pins for condition and rust	Safety wires if broken or rusted should be replaced. Lock pins should be in good condition and not bent or rusted. Replace if necessary	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance A&P
Line Maintenance	Change Oil if applicable (courtesy reminder only)	Refer to engine manual	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station **WARNING: Please follow proper procedure for safety wiring the propeller and exhaust springs. If in doubt ask more qualified personnel or refer to FAA Advisory Circular AC 43.13-1B**
Line Maintenance	Check coolant level in reservoir (courtesy reminder only)	Add coolant if necessary. Refer to engine manual for more information	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Check all hoses, clamps for leaks	Check all hoses including oil, fuel and coolant lines for condition and leaks. Replace and/or tighten as necessary. Hose clamps should be decently snug but not overly tight. A force of 18 inch pounds (2 NM) is generally sufficient to make a good seal	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Check fuel filter and fuel flow sensor if applicable	Check visually for contamination and replace or clean if necessary	• Owner • LSA Repairman Inspection

			• LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Check air filter and clean if necessary	Check K&N air filter and if necessary clean using cleaning spray and oil for K&N air filters. Follow directions of cleaning bottles	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Check all Bungee cords in wheel wells and sea rudder	It is recommended to change all bungee cords at wheel wells and sea rudder areas.	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Check operation of carb heat electrically actuated valve if applicable	Run the engine and turn on the carb heat if equipped. Notice with feel heated element around the air filter gets warm or not. If necessary contact manufacturer for replacement parts	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Propeller checked and re-torqued	Blades and hub bolts torque checked. Look for any cracks in the hub and de-lamination of propeller blades using a 5x to 10x magnifying glass. Clean propeller with mild detergent, water and sponge	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Throttle and choke cables and stops	Check operation of throttle and choke for smoothness. Cable has been oiled at factory but if necessary re-oil with light machine oil. Stops should be secured	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station

Line Maintenance	Battery condition	Check battery voltage and condition. If below 12 volts, recharge. Voltage can be easily checked by turning on the glass cockpit without the engine running and noting the voltage. If the battery terminals need cleaning, clean them and apply di-electric grease	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station **WARNING** **If unsure of how to do this please refer this to a qualified mechanic**
Line Maintenance	Wiring Harness	Check wiring connections visually for obvious defects and arrange correction with a qualified person if necessary	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Check hull	The hull should be inspected overall and especially at hull/frame attachment points.	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Seatbelt condition	Check seatbelts for cuts and nicks. If any found replace the item (This should be done in every pre-flight as well)	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Hang bolt condition	Check the hang bolt and hang block area. Bolt should not be bent and use a magnifying glass of 5x to 10x	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance

		magnification to check for any cracks especially near the head of the bolt. Replace at once if necessary	• A&P • Repair Station
Line Maintenance	Tire Tread	Check tires for abnormal wear	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Idle RPM	Check Idle RPM. Consult engine manual	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Carburetors, carburetor supports and air filters secure	Check that the carburetors, carburetor supports and air filters are secure	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Clean the hull and frame	Follow the cleaning procedures in the POH to clean the trike carriage	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station

2.3.3 Wing

NOTE

If unsure about how to do a certain task we recommend that you refer to FAA AC 43.13-1B for details

2.3.3.1 Forty (40) hour Interval Maintenance and Inspection

Pre-Requisites:

1. Tools and materials necessary to perform this inspection are listed in section 1.1 of this manual
2. Use magnifying glass where appropriate when checking sail and cabling and tubing
3. It is not necessary to de-rig the wing to perform this inspection

Type	Action	Description	Personnel Authorized
Line Maintenance	Check Hardware for corrosion	Check all fasteners (bolts, screws, rollers, nuts, splint pins etc.) for corrosion. Any corroded fasteners should be replaced. Bolts should not be worn and/or bent. Key bolts should be checked most thoroughly for cracks between the head and the bolt body. These are the bolts at the control bar side and bottom joints, the central spreader bar tensioning cable attach point and the rear cable attachment point on the keel tube. If any cracks are observed – **REPLACE IMMEDIATELY!**	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station

Line Maintenance	Apply WD-40, CRC or other water displacement spray	Apply to hardware and joints. Excess wiped off with a soft cloth immediately after spraying. Can be used to lubricate.	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Checking the sail surface and seams	There should be no cuts, ruptures, threadbare holes and torn seams on the sail. Any torn seams should be re-stitched. Cuts and ruptures on the fairing and bottom surface (BS) of the sail that are not longer than 30 mm can be patched up with self-adhesive Dacron. The Dacron must be of a weight of not less than 100 g/m. larger cuts and ruptures are to be repaired by stitching on a reinforcing piece of the same fabric (stitched along the edges). Any rupture shorter than 50 mm can be repaired in this manner, but more complicated repairs and **all cuts near the trailing edge** should be carried out in the workshop of producing company. If any of the batten tightening cords or plastic inserts are torn or heavily worn they must be replaced.	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station **WARNING** **The inspection can be done by the above personnel but any stitching or large cuts or trailing edge nicks and cuts should be fixed by personnel authorized by the wing or trike manufacturer ONLY! That have specialty knowledge of trike or hang glider wing sail repair**

		NOTE **Keep an eye on the sail grommets/eyelets and all areas of the sail that are subject to extra stress, especially the keel section, the nose section of leading edge and the outer tip section of leading edge.**	
Line Maintenance	Check Cabling	The cables must be checked for broken wires and corrosion. If any defect on a wire is observed, no matter how small, the cable in question **MUST BE REPLACED**. It is recommended that the entire cable system be replaced once every four years irrespective of service conditions **NOTE** **Use magnifying glass here if necessary**	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station **WARNING** **The inspection can be done by the above personnel but if any repairs are required, they need to be carried out by personnel authorized by the wing or trike manufacturer ONLY!**
Line Maintenance	Check Tubing Visually	Check all tubing joints and fastener locations carefully. Visually look inside the sail for any bends in tubes or any cracks in any brackets connected to the tubes. If any cracks, dings or bends are found consult the manufacturer **WARNING** **In case that there are**	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station

		cracks, dings or bends discovered in any tubing on the wing, GROUND THE WING AND CONSULT THE WING MANUFACTURER OR TRIKE MANUFACTURER IMMEDIATELY!	
Line Maintenance	Check the battens and symmetry	Visually inspect the curvature of the wing very carefully to make sure its symmetrical. If a turn has developed please follow the wing manual suggestion to tune the turn out. Battens should produce a symmetrical shape on both sides of the wing. If any batten tips etc. are broken or worn, replace them before flight. **CAUTION You may have to de-tension the wing to take battens out. Refer to the POH or the wing manual for instructions on de-rigging the wing. Don't try and force the batten out when the wing is tensioned**	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance • A&P • Repair Station
Line Maintenance	Clean the wing	Follow wing manual procedures to clean and wash the wing. In absence of this procedure in the wing manual, proceed as	• Owner • LSA Repairman Inspection • LSA Repairman Maintenance

		follows: 1) Cover the trike base with trike cover or plastic sheets so water does not fall inside of it 2) Wash the wing with luke warm water with a regular garden hose pressure. DO NOT USE HARSH CHEMICALS OR DETERGENTS	• A&P • Repair Station

2.3.4 Hundred (100) Hour/Annual Inspection (100-h)

NOTE
If unsure about how to do a certain task we recommend that you refer to FAA AC 43.13-1B for details

NOTE
Please also refer to section 2.3.5 for component replacement schedule while performing this annual inspection

WARNING
The checks listed in "Wing", "Carriage Structure" and "Landing Gear" in this list should also be performed if a hard landing has been experienced and filled results saved and logged with aircraft logs to maintain airworthiness and SLSA status of your machine. Your life depends on it. Any item showing deformation indicates the aircraft has experienced extreme loads and a qualified mechanic (A&P, LSA Repairman Maintenance or higher) needs to do further analysis before declaring it safe and airworthy.

Please print these pages and perform the inspection as listed every 100 hours or annually whichever comes first to maintain SLSA status of your aircraft.

Condition Inspection Checklist based on FAA FAR 43, Appendix D

Aircraft Make/Model: Ramphos Trident S/N: _____
Engine Make/Model: _____ S/N: _____
Wing Make/Model: _____ S/N: _____
Date of Inspection: _____
TT Airframe:
TT Engine:
TT Wing:
Inspector _____
Check all that apply
____ Owner ____ Operator ____ Pilot ____ A&P ____ LSA Repairman Inspection
____ LSA Repairman Maintenance
____ 100 hour or ____ Annual (which ever is less) or
____ After Hard Landing
Last Inspection performed when date _____ Hours_____
Scope and Detail of Items (As Applicable to the Particular Aircraft) to be Included in Annual and 100-Hour Inspections

Ready the aircraft to be inspected
☐ Remove or open all necessary inspection plates.
☐ Separate wing from the carriage (See section 4 of POH if necessary)
☐ Remove seats to inspect systems under
☐ Thoroughly clean the aircraft and propulsion system

Mark “P” for pass or “F” fail at each line _____

WING

Cable System

The cables must be checked for broken wires (frays), corrosion, niko and thimble condition. If any defect is observed, no matter how small, the cable in question **MUST BE REPLACED**. It is recommended that the entire cable system be replaced **once every four (4) years or 400 hours** irrespective of service conditions. Cables can be obtained from the wing manufacturer or assembled by a repair station with proper expertise and equipment. Alternately they can be assembled to custom lengths and thicknesses by aviation supply stores such as Aircraft Spruce

A NOTE ABOUT CABLES AND CABLE MAINTENANCE

The cables which support the wing’s airframe are critical components of the wing’s structure, and must be maintained in an air worthy condition. It is a general practice in the design of aircraft structures to design to an ultimate strength of 1.5 times the highest expected load in normal service.

Cables, like other structural components on the wing, are typically designed with a structural safety factor of only about 50% above the expected maximum load. No significant loss in cable strength can be tolerated.

A cable with even a single broken strand must be replaced before the wing is flown again. A cable which has been bent sharply enough to have taken a permanent set must also be replaced immediately.

Some degree of fatigue due to repeated bending of cables is almost unavoidable in an aircraft that is assembled and disassembled with every flight. Bottom side wires (if not using strutted wing) are subject to the highest loads in flight, and are therefore the most critical.

Sail Check-Up

Checking the sail surface and seams

There should be no cuts, ruptures, threadbare holes and torn seams on the sail. Any torn seams should be re-stitched. Cuts and ruptures on the leading edge and bottom surface (BS) of the sail that are not longer than 1.25” (30 mm) can be patched up with self-adhesive Dacron sail appropriately. The Dacron must be of a weight of not less than 100 g/m. Larger cuts and ruptures are to be repaired by stitching on a reinforcing piece of the same fabric (stitched along the edges). Any rupture shorter than 2” (50 mm) can be repaired in this manner, but more complicated repairs and **all cuts near the trailing edge** should be carried out in the workshop of producing company or approved service stations..

Sail Strength

Sail strength has to be tested if the general sail condition looks deteriorated or if the sail is has 300 flying hours on it at the time of this inspection.

Sail cloth strength is assessed by testing the strength of the top surface (TS) of the wing. For sail assessment a qualified mechanic should test sail strength. Refer to wing manual for more details and wing specific methods recommended by the wing manufacturer or refer to FAA AC 43.13-1B Chapter 2.

Keep an eye on the sail grommets/eyelets and all areas of the sail that are subject to extra stress, especially the wing keel section, the nose section of leading edge and the outer tip section of leading edge.

Tubing and Structure

Check all nuts, bolts, safety pins, and hardware on the wing.

Check all tubing visually for corrosion, straightness, dings cracks etc. If there is absolutely any doubt, check the tubing as described below in full tubing inspection.

Check all brackets and connections in the structure for cracks etc.

Full tubing inspection

If it is known that the wing has had hard landing or the trike has flipped over due to adverse weather conditions when outside, it is imperative that tubing and brackets be inspected fully in the following manner:

To check the condition of the wing tubes the sail should be removed from the wing frame by unlocking all the fasteners that secures outside cabling and/or struts to the wing structure, removing the hang block plates or hang block as applicable so the keel pocket can slide through the keel tube, close the wing in so its in packed position and snaking the fabric off the structure. Then the tubes should be detached at the joints. The tubes are to be inspected visually. When there is suspicion of damage, the points in question should be inspected using a magnifying glass of (5-10) X magnification.

A straight edge may be used on the tubing to ascertain straightness.

There should be no trace of corrosion, cracks, bends or dents.

Take all battens out, loosen all fasteners, struts, cabling and cross tube and leading edge junction, hardware, straps and hang block elements that hinder the sail from coming off the tube structure

After closing the wing frame can
now be snaked out through the nose

Fasteners

Check all fasteners (bolts, screws, rollers, nuts, splint pins etc.) for corrosion. Any corroded fasteners should be replaced. Bolts should not be worn and/or bent. Key bolts should be checked most thoroughly for cracks between the head and the bolt body. These are the bolts at the control bar side and bottom joints, the cross tube tensioning cable attach point and the rear cable attachment point on the keel tube. If any cracks are observed – **REPLACE IMMEDIATELY!**

Battens/Ribs and Batten Tips and Trailing Edge Tips or Cords

The batten profiles should be checked against the template and the bends should be adjusted if necessary. Check all the plastic batten heads and tails and replace if necessary. Batten templates can be ordered from the manufacturer. Only those battens that are known to be bent

beyond the original template for wing tuning purposes and logged in aircraft maintenance log as such should be allowed to deviate from the manufacturer batten template. Battens are numbered in increasing order from the root outward starting from 0.
If any of the batten tightening cords are torn or heavily worn they must be replaced. Any batten trailing edge tips that are worn should be replaced if applicable

Hull/AIRFRAME

Carriage Structure:

Hang Block Assembly

Hang block assembly should be checked for cracks, elongated holes, general condition and excessive unusual play.
Bolts should be checked for bends and cracks where head joins the rest of the bolt. Nuts should be checked for general condition and safety rings replaced if rusted or bent.
Hang block assembly including all the bolts and nuts should be replaced **every 200 hours** and can be ordered from the manufacturer.

Mast

General condition, all structural attachments condition good, and security of all attachments, tubing not bent. A straight edge may be used on the tubing to ascertain straightness

Compression Strut/Front Strut

General condition good with good upper and lower attachments. A straight edge may be used on the tubing to ascertain straightness

Base Tube/Trike Keel

General condition with structural attachments to front tube/triangle, mast/pylon, and front/back landing gear. A straight edge may be used on the tubing to ascertain straightness

Seat Frame

General condition with secure attachments to mast/pylon and base tube.

Landing Gear:

Main Landing Gear

General condition, security and operation and properly secured.

Front Fork

Nose wheel steering, security and reasonable play.

Wheels

Check for smooth operation, tightness, cracks, defects, condition of bearings and alignment.

Tires

Check for pressure, wear, cuts and out of round.

Brake

Check for proper operation, adjustment,

Cockpit:

Loose Unsecured Items/Cleanliness

Check for cleanliness and loose equipment that could become dislodged and go through the propeller.

Seats and Safety Belts

Check for good condition, operation, secure attachment, and acceptable wear.

Instruments

Check for general condition, mounting, marking, and (where practicable) operation.

Flight controls

Check full range operation.

Engine Throttles and Mixture (choke/primer)

Check for proper installation, smooth operation, locking.

Controls and Systems

Check all cockpit controls and systems for proper installation, general condition, apparent and obvious defects, and security of attachment.

Certificates, Documents and Placards

All certificates, documents, placards, nameplates and airworthiness certificates are current and in aircraft.

Propulsion system:

NOTE

Please refer to the engine manual as well

Basic Maintenance

Basic maintenance items general condition and within recommended schedule (oils, cooling fluids, fuel filter, air filters, and spark plugs as required).

Leaks

Inspect engine section for visual evidence of excessive oil, fuel, exhaust or hydraulic leaks.

Torque of Engine Components

Torque induction, exhaust, and cylinder heads to specifications as required. (refer to engine manual)

Fuel System

Fuel tank general condition, fuel pick up screen, fuel tank vent, fuel lines to carburetor, primer bulb and primer system (if applicable), fuel flow sensor, fuel line condition, fuel filter and fuel system general condition and security.

NOTE

Replace Fuel filter every 100 hours. Replace fuel lines every 200 hours ¼" and 5/16" fuel lines of high quality. Refer to engine manual

Induction inlet boots

Check for cracks and leaks

Cylinder compression

Check as required. Record values (refer to engine manual)

Evidence of Metal Particles

Check for Metal particles or foreign matter on screens and sump drain plugs.

Engine Mounts

Check for cracks, and security. Torque to proper values.

Flexible Vibration Dampeners

Check for general condition and security. Look for large cracks in aged or dried out rubber.

Engine Controls

Check general condition, travel, and safe tied where required.

Lines, Hoses, and Clamps

Check for leaks, condition and looseness.

Exhaust pipes

Check for cracks, and proper attachment. Springs secured and safe tied.

NOTE

Replace exhaust springs every 100 hours

Hull

Check for cracks, defects and security.

Propeller Assembly

Check assembly for cracks and nicks. Torque propeller and gearbox to specifications.

Propeller Balance, Pitch and Tracking

Refer to propeller manual for tolerances

Accessories and Systems

Check for proper installation, general condition, defects, and secure attachment.

Belts

Check condition and tension as required. Refer to engine manual

Control Cables

Check lubrication where appropriate.

Refer to Engine Manual

Follow 100 hour manufacture's maintenance specifications

Systems:

Radio and Electronic Equipment

Check for proper installation and secure mounting.

Radio Antenna Position

Check for security and operation.

Electric System Wiring

Check wiring and conduits for proper routing, secure mounting against vibration, and obvious defects.

Batteries

Check for proper installation, charge, secure installation and general condition.

All Other Systems

Check for proper attachment, security, and operation.

Ballistic Parachute

Check for proper attachment, routing, and general condition

Other:

Other Items

That are not listed here for proper installation, condition, operation or safety of flight.

Notes and explanation of any problems, or items found that could progress to a safety of flight issue (use additional sheets of necessary)

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Inspector Name and Signature _____

Date Completed and Airworthy _____

2.3.5 Component Replacement Schedule

Airframe	Lifespan	
Whole Hang block Assembly – including hang bolt	200 H	3 years
Hang Bolt (x1)	50 H	1 year
All nuts and bolts of mast/pylon	200 H	4 years
All brackets like the compression strut securing brackets etc.	400 H	6 years
Front suspension bolts/nuts Rear suspension securing bolts (x4)	200 H	3 years
All bungee cords	50 H	1 year
All airframe ball-joints, bolts and nuts	400 H	6 years
Ground steering and water rudder cables	200 H	3 years
Mast/Pylon	600 H	6 years
Tires	200 H or as needed	3 years
Seatbelts	As needed	As needed
Wheel bearings (must be stainless steel)	50 H	1 year
Metal Airframe components	2400 H	

Propulsion Area	Lifespan	
Fuel – Line/hose	200 H	2 years
Fuel – Primer Bulb (if applicable)	100 H	2 years
Fuel – Filter	100 H	1 year
Battery	400 H	2 years
Hose – Oil	400 H	4 years
Hose – Coolant	400 H	4 years
Rubber Mounts (all)	400 H	4 years
Cables – Throttle and Choke	400 H	4 years
Engine Mount Nuts and bolts	200 H	4 years
Muffler Springs	100 H	
All engine mount components	1200 H	
Fuel Tank	1200 H	6 years

Propulsion Area – Replacement Items	Lifespan	
Engine overhaul or replacement	As specified by the engine manual	
Chute repack or replacement	6 years or as specified by manufacturer	
Propeller	As specified by propeller manufacturer	

STRUCTURES

3.1 General

This section provides a description of and instructions for the maintenance, repair, and alteration of the aircraft primary structures

3.2 Wing

Ramphos Trident is to be flown with the HZ15S wing. The aircraft as typical of its category of aircraft has a universal connection point on which different wings can be secured on top of the mast/pylon.
The wing consists of a skeleton structure composed of
1) Wing keel
2) Leading edge tubes
3) Cross tube or cross bar
4) A-frame (2 down tubes and control bar)
5) Cabling system main flying wires,
6) Struts
7) Sprogs
8) Hang block assembly
9) Battens or ribs

The sail of the wing is generally Dacron, Polyester or Trylam. In some cases PX-20 carbon thread embedded sail can also be used.

3.2.1 Maintenance of the Wing:

General maintenance of the wing can be accomplished using strategies suggested under inspections and in combination with the wing manual. Washing should be with cool low pressure garden hose water. WD-40 should be used in pivot areas and on hardware to prevent from corrosion and rust as suggested in the routine inspections checklists.

3.2.2 Repair of the Wing:

Checking the sail surface and seams

There should be no cuts, ruptures, threadbare holes and torn seams on the sail. Any torn seams should be re-stitched. Cuts and ruptures on the leading edge and bottom surface (BS) of the sail that are not longer than 1.25" (30 mm) can be patched up with self-adhesive Dacron sail appropriately. The Dacron must be of a weight of not less than 100 g/m. Larger cuts and ruptures are to be repaired by stitching on a reinforcing piece of the same fabric (stitched along the edges). Any rupture shorter than 2" (50 mm) can be repaired in this manner, but more complicated repairs and **all cuts near the trailing edge** should be carried out in the workshop of producing company or approved service stations.

Sail Strength

Sail strength has to be tested if the general sail condition looks deteriorated or if the sail is has 300 flying hours on it at the time of this inspection.

Sail cloth strength is assessed by testing the strength of the top surface (TS) of the wing. For sail assessment a qualified mechanic should test sail strength. Refer to wing manual for more details and wing specific methods recommended by the wing manufacturer or refer to FAA AC 43.13-1B Chapter 2.

Keep an eye on the sail grommets/eyelets and all areas of the sail that are subject to extra stress, especially the wing keel section, the nose section of leading edge and the outer tip section of leading edge.

Full tubing inspection

To check the condition of the wing tubes the sail should be removed from the wing frame by unlocking all the fasteners that secures outside cabling and/or struts to the wing structure, removing the hang block plates or hang block as applicable so the keel pocket can slide through the keel tube, close the wing in so its in packed position and snaking the fabric off the structure. Then the tubes should be detached at the joints. The tubes are to be inspected visually. When there is suspicion of damage, the points in question should be inspected using a magnifying glass of (5-10) X magnification.

A straight edge may be used on the tubing to ascertain straightness.

There should be no trace of corrosion, cracks, bends or dents.

Take all battens out, loosen all fasteners, struts, cabling and cross tube and leading edge junction, hardware, straps and hang block elements that hinder the sail from coming off the tube structure

After closing the wing the frame can now be snaked out through the nose

Fasteners
Check all fasteners (bolts, screws, rollers, nuts, splint pins etc.) for corrosion. Any corroded fasteners should be replaced. Bolts should not be worn and/or bent. Key bolts should be checked most thoroughly for cracks between the head and the bolt body. These are the bolts at the control bar side and bottom joints, the cross tube tensioning cable attach point and the rear cable attachment point on the keel tube. If any cracks are observed – **REPLACE IMMEDIATELY!**

Battens/Ribs and Batten Tips and Trailing Edge Tips or Cords
The batten profiles should be checked against the template and the bends should be adjusted if necessary. Check all the plastic batten heads and tails and replace if necessary. Batten templates can be ordered from the manufacturer. Only those battens that are known to be bent beyond the original template for wing tuning purposes and logged in aircraft maintenance log as such should be allowed to deviate from the manufacturer batten template. Battens are numbered in increasing order from the root outward starting from 0.
If any of the batten tightening cords are torn or heavily worn they must be replaced. Any batten trailing edge tips that are worn should be replaced if applicable

3.2.3 Alteration

No alteration of the wing structure is allowed except by the manufacturer. All tubing should be bought from the manufacturer if replacement is deemed necessary.

3.3 Hull/Frame

The Ramphos Trident is a two seat tandem WSC aircraft. The layout is typical for two seat trike design with the passenger and hull/frame being suspended by a triangular frame, hanging from the top of the mast about the pitch and roll axes, to provide for weight shift control.
The Ramphos Trident has amphibious capability. The repositionable gear system is actuated by a single lever. The frame and gear system of the Ramphos Trident is constructed of high quality stainless steel and the hull is made with vinyl ester resin and several types and weights of fiberglass cloth.
The front wheel is equipped with a type of scrub brake. The nature of salt water operations precludes the use of more traditional braking systems.
The pilot and passenger seats are made of water proof cloth.
Under the back seat is a 15.3 gallon(US), 58 liter fiberglass gas tank, securely fastened to the seat frame and base tube of the trike frame.
There are 2 versions of the Ramphos hull, these can be chosen by the customer when ordering. The type 1 hull does not have cutout holes on the inner part of the hull and the type 2 hull has cutouts for storage on the inner part of the hull.


TYPE 1 HULL NO INBOARD CUTOUTS


TYPE 2 HULL WITH INBOARD CUTOUTS

3.3.1 Maintenance of the Frame/Hull

The frame/hull can be maintained by following the strategies and inspections as suggested in section 2 of this manual and the POH.

3.3.2. Repair of Hull/Frame

Mast: To prevent wear, and allow a degree of flexibility during wing attachment, the upper mast hinge point is sleeved and secured with 12mm bolt. Care should be taken not to bend the mast or put undue stress on it during wing attachment or by parking the unit in an unsecured fashion outdoors which can sway the wing from side to side.
Rear landing gear: The rear landing gear is composed of stainless steel square stock and is designed to operate from asphalt and prepared grass/dirt fields. If there is damage to the landing gear, it simply has to be replaced by purchasing components from the manufacturer.
Front and rear wheels: These are 4-ply equivalent deep tread tires on one piece plastic rims in 3.00-4 size. The proper pressure is between 22 and 25 psi for normal operations.
Front fork: The front fork is also constructed of stainless steel square stock and has attached a scrub type brake that is actuated by a lever located between the pilots legs and on the base tube. If damaged, components may be purchased from the manufacturer.
Seat belts: Ramphos provides a lap sash seat belt for the front seat occupant and a 3-point harness for the passenger. The belts have quick release buckles and are ASTM compliant. Any cuts in the webbing require replacement of the belts.

NOTE:
Do not use lap belts as a mechanism for securing the wing while parked.

Hull: The Ramphos Trident hull is made of fiberglass. It requires washing and soft waxing at consistent intervals to maintain its finish. To repair the hull please consult a composite repair manual as that is out of the scope of this manual.
Instrument Pod: A separate instrument pod is installed. It may contain standard analog instruments or optional digital instrument package such as the AMPtronic system or Smart MIP. Please refer to the AMPtronic or Smart MIP manual if installed.
Compression Strut/Front Strut: Made out of Aluminum, this tube experiences some tension in normal flight and possibly compression on hard lading and heavy seas. If damaged it should be replaced with another one from the manufacturer.
Base Tube/Trike Keel: Made out of stainless steel, this is the main weight bearing tube of the trike. If damaged it should be completely replaced with another one from the manufacturer.
Seat Frame: The seat frame on the Ramphos Trident consists of curved stainless steel tubing that secures that secures into the mast towards the rear and on the base tube towards the front. Damaged seat frame should be replaced by ordering a new one from the manufacturer.

3.4 Engine

Please refer to the engine manual for description, maintenance and repair of the engine

3.5 Fuel System

The fuel tank is a 15.3 US gallon (60 Liters) tank made out of fiberglass. The fuel level can be seen by looking at the left side of the tank. The fuel system is as follows:

Fuel flows from tank through a shutoff valve located at the bottom of the tank.
Above the shut off valve is an ACS Gascolator with drain valve.
From the Gascolator fuel flows to a primer bulb (only on 582 and 912) or on the Smart, to the electric fuel pump.
Then the fuel travels to a filter and then onto the engine.

3.5.1 Maintenance

Maintain the fuel system by following the replacement cycle for fuel line, fuel pump (refer to Rotax manual) and fuel filter.

3.5.2 Alteration

No alteration is allowed for the fuel system

3.6 Propeller

Please refer to the propeller manual for description, maintenance and repair of the propeller

3.7 Utility Systems

There are no utility systems in the Ramphos Trident.

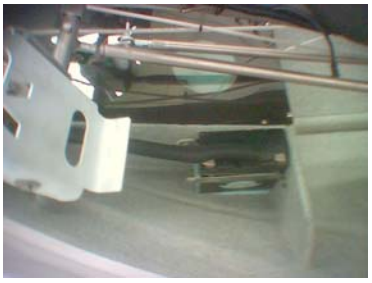
3.8 Instruments and Avionics

The instruments supplied are either the standard analog, or AMPtronic digital for the 912 or 582 Rotax and for the Smart a Smart MIP package. A full supplement manual for the Smart MIP instrument is provided. Please refer to that manual.
Only a transponder and panel radio permanent installation is allowed by a qualified avionics shop.

3.9 Electrical System

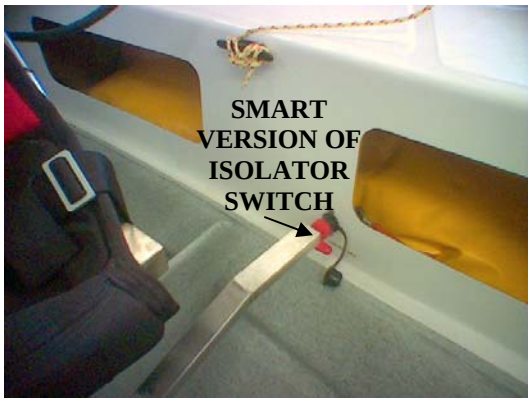
The Ramphos Trident series Rotax or Smart M 160/1 engines whose electrical system can be referenced from The Rotax 582/912 or Smart M 160/1 engine manuals.
The 582/ 912/Smart Trike base has a 12V electrical system essentially comprising of a 12V battery, the Rotax/Smart alternator and accessories. The Rotax/SmartTG manual should be consulted for the maintenance of the engines electrical system (Rotax 912 UL, 582 or Smart M/160 TG).

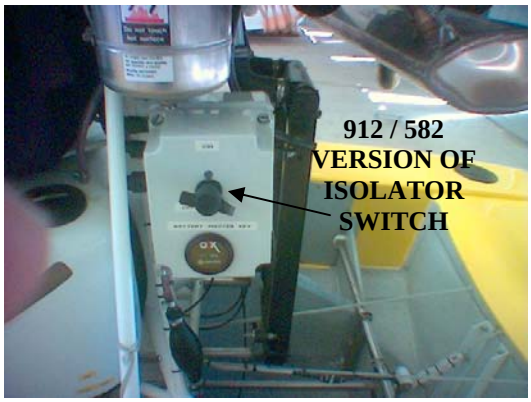
Smart Battery Placement



Rotax 912 Battery Placement

The locations of the batteries differ between the Smart powered Ramphos and Rotax powered Ramphos. Because of the weight difference, the battery for the Rotax version is located further to the front of the hull and with the Smart version; it is located on the port side, next to the front landing gear housing.
The battery isolation switches differ in both the Smart and 912 / 582 Ramphos Trident. Please see picture below.





3.9.1 Maintenance

The maintenance of the electrical system should include periodic inspection of the wiring loom for chafing and other damage through its entire length. Pay special attention to the areas that are subject to possible wear points such as sharp corners or proximity to parts which move. It should be noted that the electrical wires may be subject to wear through vibration in flight. Wiring that is damaged should be replaced and if any wear points are identified then a product such as spiral wrap should be used to cover the area. The advantage with the use of spiral wrap is that it allows inspection of the wires even after it is installed.

3.9.2 Alteration

No alteration is allowed in the electrical system unless performed by a qualified avionics shop only for the purpose of installation of a transponder, GPS or a panel radio.

4.0 Structural Repair

No structural repair is authorized in the metal structure of the aircraft without consultation with the manufacturer in any part of the aircraft. The parts should be specific and bought from the manufacturer of aircraft carriage or wing as appropriate as long as the manufacturer is able to supply them. Written authorization from the manufacturer is needed if this is to be overridden.

Painting and Coatings
The metal frame if painted uses powder coat on Stainless steel parts. The hull (if painted) is finished with auto paint and can be re-painted by any qualified auto shop or an aircraft paint shop.