Aircraft Service Manual

For the
Arion Aircraft, LLC
Lightning LS-1

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Arion Aircraft, LLC
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Shelbyville, TN 37160 USA

Record of Manual Revisions

Revision	Date	Pages/ Section	Description	Signature
Original	13 April 2009	All	Initial Release	Arion Aircraft, LLC

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List of Effective Sections

The table below shows the current effective sections and dates in this revision of the manual. The applicable manual revision is listed on the lower left corner of this page.

Supplements are issued and controlled separately by the Log of Supplements in Section 10.

Section	Change	Date
Table of Contents	A0	13-April-2009
Foreword	A0	13-April-2009
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Foreword

This manual contains recommended procedures and instructions for ground handling, servicing and maintaining the following Arion Aircraft, LLC aircraft models:

Lightning LS-1 Jabiru 3300 powered

The Lightning LS-1 may be registered under the Light Sport Aircraft (LSA) rules has a MTOW of 1320 lbs.

It is the owner's responsibility to become fully aware of the particular maintenance requirements and limitations applicable to the LSA airworthiness certification.

The information in this manual is based upon data available at the time of publication, and is supplemented and kept current by "Air Safety Alerts", "Service Bulletins", or "Notifications" published by Arion Aircraft, LLC. These are posted on the Arion Aircraft, LLC web at www.flylightning.net and are available through local authorized Lightning LS-1 dealers (as recorded by Arion Aircraft, LLC). New owners of pre-owned aircraft should ensure that notice of transfer of their aircraft has been sent to Arion Aircraft, LLC or their local dealer or distributor. Existing owners should ensure that their postal address remains current.

In addition to the information in this Service Manual, vendor publications will periodically be available from Arion Aircraft, LLC which describe disassembly, overhaul and parts breakdown of some of the various vendor equipment items. A listing of the available publications is issued from time to time in service letters.

Symbols

This manual uses the following symbols and definitions to emphasize important information.

⬢		WARNING: Identifies an instruction which, if not followed, may cause serious injury or death.
❖	CAUTION:	Denotes an instruction which, if not followed, may severely damage the aircraft or aircraft hardware.
➢	NOTE:	Indicates supplementary information that may be required to fully complete or understand an instruction.

IMPORTANT

All maintenance should be undertaken with careful regard for the procedures outlined in this manual. A detailed record of maintenance undertaken should be recorded in the Aircraft Log Books.

In the interests of product development, we encourage owners to make suggestions related to design improvements. However, the final decision on their adoption or otherwise rests with Arion Aircraft, LLC

Manual Revisions

This manual utilizes section-level revision control. Each page of the manual contains a revision indication in the lower, inside corner. Revision indicators are consistent throughout an entire section, but vary from section to section.

A major release of the manual is called an “Issue.” The issue letter and its effective date are listed on the title page of the manual using a letter code; for example, “Issue A”.

Updates and changes to the manual are called “Revisions” and are designated using an issue prefix followed by a number; for example, “Revision A2” is the second revision of “Issue A”.

These revisions are listed on the Record of Manual Revisions page near the front of the manual. Owners are responsible for keeping this page updated when manual revisions are issued by Arion Aircraft, LLC.

Updates and changes to sections of the manual are called “Changes” and are designated using the issue prefix followed by a number; for example, “Change A0” is the original release of a section in Issue A and “Change B3” is the third revision of a section in Issue B of the entire manual.

The “List of Effective Sections” near the front of the manual documents the applicable section “Changes” associated with a given manual revision.

Revisions to this Maintenance Manual will be distributed to all Arion Aircraft Service Agents.

Distribution will include new pages for the sections that have changed, a new List of Effective Sections, and any necessary instructions. Revisions should be examined immediately upon receipt and incorporated into this manual per the instruction provided.

It is the responsibility of the owner to maintain this Maintenance Manual in a current status when it is being used for operational purposes. Owners should contact Arion Aircraft, LLC whenever the revision status of their Maintenance Manual is in question.

General Information Section

1.0 General Description

The Arion Aircraft Lightning LS-1 aircraft described in this manual is 2-seat, low-wing monoplane composite aircraft of monocoque construction. It is equipped with fixed tricycle landing gear of spring aluminum construction. The limited caster nose gear is a welded metal, spring aluminum type

The aircraft is equipped with JABIRU, 6 cylinder, 4 stroke engines driving a Sensenich wooden fixed pitch propeller or optionally a Sensenich Carbon Fiber ground adjustable propeller.

1.1 Aircraft Specification

Aircraft type	Lightning LS-1	
Engine	Jabiru 3300 120 HP	
Propeller	Sensenich Wood	
Height	6’ 6”	
Length	20’ 8”	
Width (tail plane)	99.625”	
Cabin Width Hip	37.5”	
Elbow	41”	
Shoulder	40”	
Wing Span	30’ 6”	
Wing Chord	Tip cord 28.75”	Root cord 49.654”
Wing Area	103 sq feet	
Wing Load @ Gross	12.8 lbs per sq foot	
Aspect Ratio	9.13	
Empty Weight	820lbs	
Gross Weight	1320 lbs	
Useable Load	500lbs	
Structural Loading	+4.0G -2.0G	
Fuel Capacity	22gallons	30 gallon option
Range	480nm	720nm
Endurance	4 hours no reserve	6 hours no reserve
Fuel Consumption @ Cruise	4.5 – 5.5 gallons/hour	

Table 1 – Lightning LS-1 Specifications

1.2 Three View Drawings

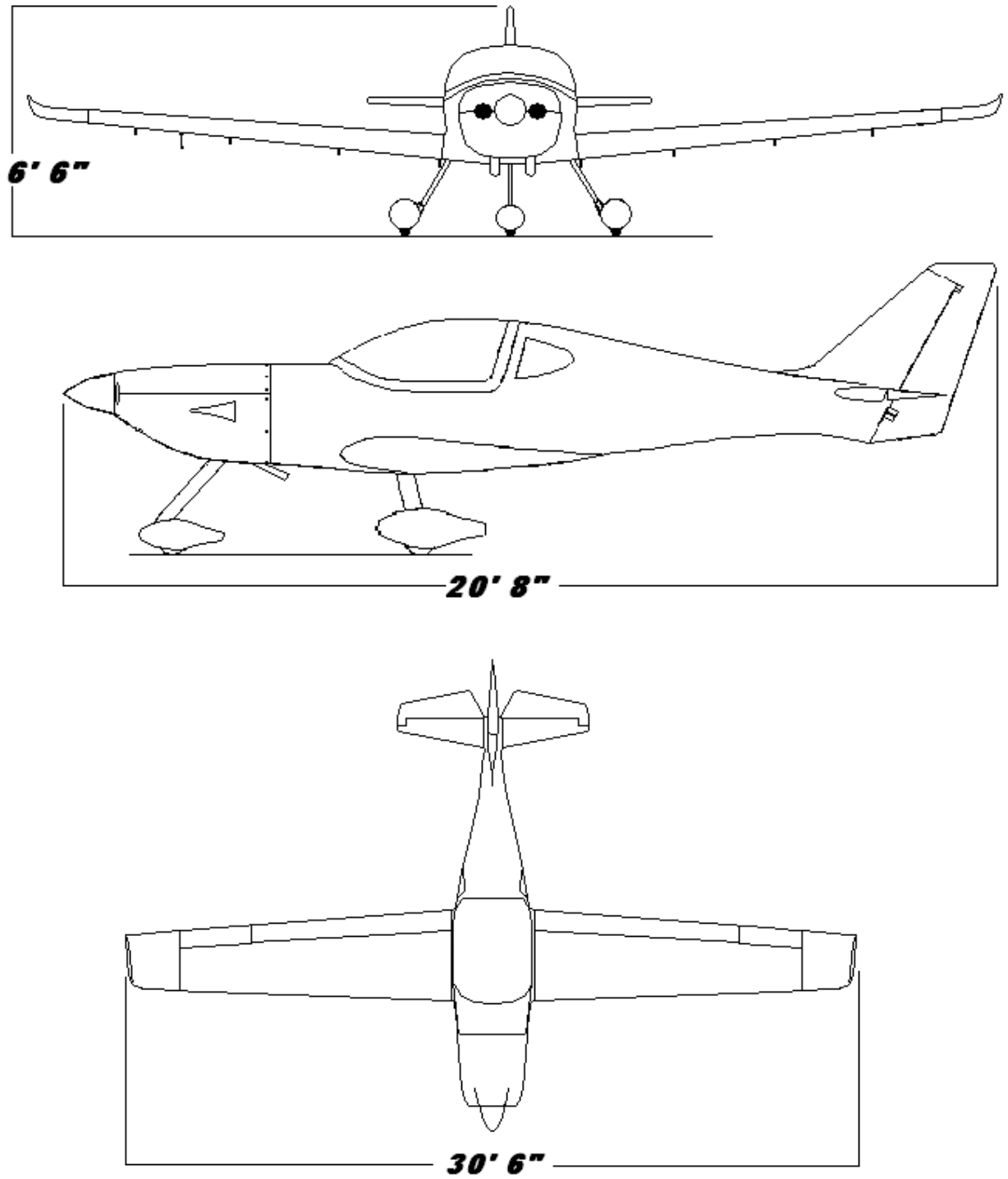


Figure 1 3-view drawing Lightning LS-1

2.0 Equipment List

The following is a comprehensive list of all available equipment that affects aircraft weight and balance. The leftmost column indicates whether the item is standard (S) or optional (O).

S/O	Item
Exterior Paint	
S	Two Stripe Single Color
O	Paint Scheme 1, Two Stripes Two Colors
O	Scheme 2, Three Colors Belly and Tips
Interior	
O	Cloth Interior Package
S	Vinyl Interior Package
O	Leather Interior Package
Other Equipment	
S	Wheel Pants Lightning LS-1
S	Tinted Windshield
S	Wing Tip LED Nav and Strobe Package
O	Leading edge mounted Landing Light
O	Clear Windshield
O	Canopy cover
Powerplant and Accessories	
S	Jabiru 3300 Engine
S	Sensenich Wood Propeller W60ZK57G
S	Propeller Painted White with Red Tips
O	Propeller Clear Coat Wood Finish
O	Sensenich Carbon Fiber Propeller
S	Aluminum Spinner
S	Odyssey PC625 Electrical Storage Battery
S	Cabin Heat
O	Tanis Engine Heater

S/O	Item
Avionics and Instruments	
S	2 ¼" Airspeed Indicator
O	2 ¼" Pictorial Pilot
S	GRT EIS 6000J
S	Garmin SL-40 Comm Radio
O	Garmin SL-30 Nav Comm Radio
S	PM 1000 Intercom
O	PM 3000 Intercom
S	Kannad 406 MHz ELT
S	Single Horizon Sport EFIS Display 8.4"
O	Dual Horizon Sport EFIS Display
S	Garmin GTX327 Transponder
O	Dynon Skyview 10" Sport EFIS
O	Garmin GTX330 Mode S Transponder
S	Internal GPS
O	XM Weather
O	GRT Autopilot
O	Dynon Autopilot

Table 2 – Equipment List

2.1 Sources to Purchase Parts

All airframe and engine parts are available from any Arion Aircraft full service distributor. As of this printing those distributors are:

Arion Aircraft, LLC 2842 Hwy 231N Shelbyville, TN 37160 931-680-2800 www.flylightning.net

2.2 List of Disposable Replacement Parts

Some disposable airframe and engine parts can be sourced from automotive parts stores.

Part	Manufacturer	Part #
Air Filter	NAPA	6016
Spark Plug	NGK	D9EA
Distributor Cap	Bosch	GB73
Rotor	Bosch	GB74
Oil Filter	NAPA Gold	1394
	Fram	PH4967
Tires Main	Various	5.00 x 5 Ribbed Six Ply Aircraft Tires
Tire Nose		11.50 X5
Fuel Filter	Fram	G1
Voltage Regulator	Kubota	RP501-7211

Table 3 – List of Disposable Replacement Parts

3.0 Specifications

3.1 Engine Specifications

Manufacturer.....Jabiru Aircraft Pty, Ltd, Aero Engines Division

Type .....3300 Air Cooled

Power Rating..... 107 hp @ 2750 RPM

..... 120 hp @ 3300 RPM

Torque.....228 ft lb @ 2500 RPM

Displacement.....3300 cc / 202 Cubic Inches

Rotation.....Clockwise when viewed from aft end of engine

Prop Hub..... SAE 1 -- 4.375 inch radius bolt pattern for wood propeller

.....4 inch radius bolt pattern for the carbon prop

3.2 Weight & Balance Information

The Lightning LS-1 is a very light aircraft. The installation of equipment may significantly alter the approved CG limits of the aircraft. Therefore, all proposed fixed installations must be approved by Arion Aircraft, LLC. Refer to Section 4 of the Pilot Operating Manual for weighing and center of gravity calculation instructions and limitations.

Lightning LS-1

Most Forward C.G. Location ..... 30" inches aft of datum

Most Aft C.G. Location ..... 34" inches aft of datum

Datum:..... Firewall

3.3 Tire Inflation Pressures

Standard Mains .....25-28 psi

Nose .....30 psi

3.4 Approved Oils and Capacities

Oils developed and branded for use in air-cooled aircraft piston engines which conform to the requirements of SAE J-1899 (formerly MIL-L-22851D), Textron Lycoming Specification No. 301F, or Teledyne-Continental Motors MHS-24B. Oils meeting these requirements include, but are not limited to, AeroShell W100 and AeroShell part synthetic 15W-50.

AeroShell part synthetic 15W-50 (or equivalent) is the recommended oil for all climates after the initial engine break in period.

Sump capacity.....3.7 US Quarts

3.5 Recommended Fastener Torque Values

BOLT SIZE	TORQUE (INCH.LB)
AN3	20 - 25 (2 FT LB)
AN4	50 - 70 (4-5 FT LB)
AN5	100 – 140 (8-12 FT LB)
AN6 PROPELLER	180 – 228 (17-19 FT LB)

Table 4 – Torque Values

These values relate only to steel nuts on oil-free cadmium plated threads.

For Engine Bolt Torque Values see Engine Instruction & Maintenance Manual.

The above values are recommended for all installation procedures contained in this Manual, except where other values are stipulated.

The above values are not to be used for checking tightness of installed parts during service

4.0 General Safety Information

Safety information will be maintained by Arion Aircraft, LLC and will be made available to interested parties.

4.1 Reporting Safety of Flight or Service Difficulties

Report any Safety of Flight concerns on form AA-501 found in the appendix of this manual or on line at www.flylightning.net in the LSA Owners Info section.

4.2 Extreme Climatic Conditions

4.2.1 Dust

Dust induced into the carburetor air intake system is probably the greatest single cause of early engine wear. When operating under high dust conditions, the carburetor air filters should be serviced daily as outlined in Paragraph 5.3.3

4.2.2 Seacoast and Humid Areas

In salt water areas, special care should be taken to keep the engine and accessories clean to prevent oxidization.

In humid areas, fuel should be checked frequently and drained of condensed moisture.

5.0 Ground Handling, Servicing, & Lubrication

5.1 Ground Handling

5.1.1 Towing

The Lightning aircraft is very light and should always be moved by hand.

Moving the aircraft is accomplished by using the prop hub or solid rear fuselage join of the fin to the tail plane.

❖ **CAUTION:** Do not use control surfaces to move the aircraft—Damage to the control system may result.

When pushing at the joint of the fin and Tail Plane, take care that you do not jam your fingers under the rudder or in the rudder hinge.

❖ **CAUTION:** When moving the aircraft, never turn the Nose Wheel more than 15 degrees either side of center or Nose Gear may be damaged.

The aircraft may also be moved by placing the propeller in the horizontal and then placing one hand on the propeller on either side of the spinner. The aircraft can then be pulled forward.

CAUTION: Never move the aircraft in this manner while the engine is hot as it may fire when the propeller is moved and result in severe injury!

- **CAUTION:** Always ensure that the Master and Ignitions are OFF!
- **CAUTION:** Never approach the propeller when anyone is in the aircraft.
- **CAUTION:** Always treat the propeller as LIVE! IT KILLS!

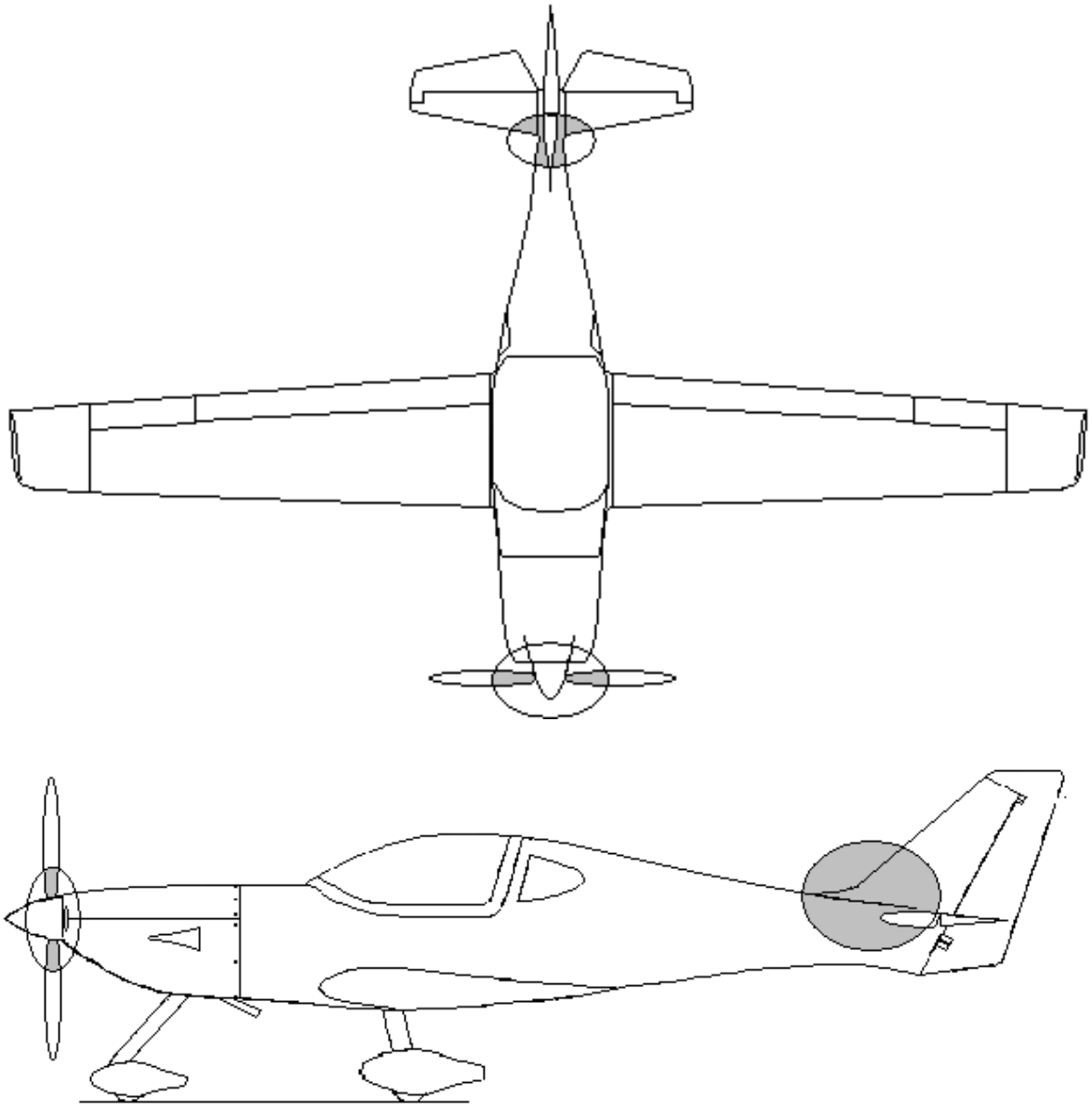


Figure 2 – Approved Push/Pull Points

5.1.2 Jacking

The Lightning LS-1 is a very light aircraft. Before jacking, ensure that it is as light as possible by removing luggage and any unnecessary fuel.

5.1.3 Jacking Main Gear

Remove main gear spat on the side to be jacked or both spats if both wheels to be jacked.

The aircraft can be jacked under the axle stub which protrudes inboard of the main gear leg attach point.

Be careful not to interfere with brake components or Wheel Spat attachments.

Repeat for other side if necessary.

The above procedure is useful for wheel/brake servicing or repairs, but is of no value in removing the main undercarriage.

5.1.4 Jacking Nose Gear

Push down on tail Plane (**NOT THE ELEVATOR**) until nose gear is off the ground.

Place trestle or drum under rear fuselage together with absorbent material such as foam block, sandbags or a pillow.

❖ **CAUTION:** Ensure trestle does not foul the rudder or elevators..

Weigh down tail plane with sandbags or similarly heavy and cushioned material (not hard items like bricks are likely to damage the aircraft).

❖ **CAUTION:** Do not lift using control surfaces. Damage to the control surface or control system may result.

5.1.5 Hoisting

This procedure should not be necessary for most service or maintenance procedures. Should hoisting be necessary:

1. Drain fuel from both wings
2. Remove all interior components, seat pans and cushions. Remove top engine cowl.
3. Fit cables/rope to the main spar box carry thru outboard points near the gear leg attachment points. Fit cables or ropes to the engine mount, pad cables ropes where needed to avoid damage to paint and canopy.
4. Hoist only from these points ensuring that cables/ropes do not mark the top of the fuselage or supporting structures.

5.1.6 Leveling

For lateral leveling use a bubble level across the cockpit opening at 43" aft of the datum (firewall).

For longitudinal leveling place a level at 43" aft of the datum on the cockpit sill.

5.1.7 Parking

Parking precautions depend principally on local conditions. As a general precaution, chock the wheels and tie the control handle back firmly with a seat belt to lock the controls. Park into the wind and tie down the aircraft as outlined in below if a hangar is not available.

5.1.8 Tie Down

When mooring the aircraft in the open, head into wind if possible. Secure control surfaces by tying the control handle back firmly with a seat belt.

Then:

Attach ropes around the 3rd wing flap bracket out. Secure opposite end of the ropes to ground anchors located at approximately 30 degrees out and forward at least 2 feet from the leading edge. Ensure that the ropes have sufficient slack to not strain the wing attachments should a tire deflate while the aircraft is tied down.

Tie rope to the Tail Tie-down ring under ventral fin. Secure the opposite end of rope to ground anchors directly aft 2 feet from the tail.

5.2 Storage

5.2.1 Flyable Storage

Flyable storage is defined as a maximum of 30 days non-operational storage.

Ensure that the engine has been stopped by turning off the fuel valve, thereby not leaving any fuel in the carburetor bowl.

❖ **CAUTION:** Ensure that the Master and Ignition Switches are OFF!

Every 7th day the propeller should be rotated through 5 revolutions, without running the engine. Leave the propeller in the horizontal position to ensure even distribution of liquids in the wood. If left in the vertical position, liquids will drain to the lower tip resulting in an unbalanced propeller.

Store under cover, away from direct sunlight as ultra-violet rays may damage composite structures.

In addition, the Pitot tube, static air vent, air vents, openings in the engine cowl and other similar openings should have protective covers fitted to prevent entry of foreign materials and insects (especially wasps).

5.2.2 Returning Aircraft to Service

After flyable storage, returning the aircraft to service is accomplished by performing a thorough pre-flight inspection. Ensure all protective covers are removed.

5.2.3 Temporary or Indefinite Storage

Temporary storage is defined as aircraft in non-operational status for a maximum of 90 days.

Treat as for flyable storage (see Paragraph 3.1.10), plus:

- For temporary storage, fill fuel tank with correct grade of gasoline (to prevent moisture accumulation).
- For indefinite storage, drain fuel tank, ensure carburetor bowl is empty by running engine with fuel valve off until it stops or by draining bowl.

Then:

1. Clean aircraft thoroughly.
2. Clean any dirt, oil or grease from tires and coat tires with a tire preservative. Cover tires to protect against dirt and oil.
3. Either block up undercarriage/fuselage to relieve pressure on tires or rotate wheels every 30 days to prevent flat spotting the tires.
4. Seal or cover all openings.
5. Remove battery and store in a cool dry place. Service the battery periodically and charge as required.

➢ **NOTE:** It is recommended that a battery which is not used should be charged every 30 days.

6. Disconnect spark plug leads and remove spark plugs from each cylinder. Using an oil can or spray atomizer, spray preservative oil through a spark plug hole of each cylinder with the piston in the down position.

➢ **NOTE:** Use shell Aero fluid 2UN (MIL-C-6529C Type 1) or similar engine corrosion inhibitor.

❖ **CAUTION:** Ensure that the Master and Ignition Switches are OFF!

7. Rotate the propeller 10 – 12 times, leaving it in the horizontal position.
8. Install spark plugs and connect leads.

9. Seal exhaust pipes. Attach a red streamer to each. DO NOT seal fuel tank breathers. Cover the breathers to prevent bugs and dirt but still allowing the system to breath.

10. Place protective covers over Pitot tube, static source vents, air vents and openings in engine cowl to prevent the entry of foreign material or insects (especially wasps).

11. Attach a warning placard to the propeller stating that vents and breathers have been sealed. The engine must not be started with the seals in place.

12. Every 7 days the propeller should be rotated

❖ **CAUTION:** Ensure that the Master and Ignition Switches are OFF!

5.2.4 Inspection During Storage

- Generally inspect airframe and clean as necessary.
- Inspect the interior of at least one cylinder through the spark plug hole for corrosion at least once a month.
- If, at the end of the 90 day period, the aircraft is to be continued in non-operational storage – repeat Steps 1-12 above (most will only need to be checked).

5.2.5 Returning the Aircraft to Service

After temporary storage, the procedures for returning the aircraft to service are as follows:

1. Remove aircraft from blocks and check tires for proper inflation.

2. Check battery, charge if needed, and install.

3. Check carburetor air filter and service if necessary.

4. Remove warning placard from propeller.

5. Remove materials used to cover openings.

6. Remove, clean and gap spark plugs.

❖ **CAUTION:** Ensure that the Master and Ignition Switches are OFF!

7. While spark plugs are removed, rotate propeller several revolutions to clear excess preservative oil from cylinders.

8. Install spark plugs – torque to 8 ft-lbs.

9. Check fuel filter – replace if necessary.

10. Check brake fluid level.

11. If returning to service after indefinite storage, fill fuel tanks with correct grade of fuel.

12. Check fuel tank and fuel lines for moisture and sediment. Drain enough fuel to eliminate any moisture and sediment.

13. Check fuel tank breather is clear.

14. Perform a thorough pre-flight inspection.

15. Start and warm engine.

5.3 Servicing

- Pre-Flight:

  Refer to Pilot's Operating Handbook

- 25 Hour Service (to be done one time at end of engine break in period ~ 25 hours)

  Change engine oil and replace with Aeroshell 15-50

  Check head bolt torque

  Complete 25-50 hour inspection checklist

- 50 Hour Service

  Change Oil and Filter

  Check Brake Fluid Level

  Complete 25-50 hour inspection & service checklist

- 100 Hour Service

  All 50 Hour Service Items (50 hour checklist)

  All 100 Hour Service Items (100 hour checklist)

  Air Filter (Clean and replace if needed)

  Clean or Replace Spark Plugs

- Other Maintenance Procedures:

  Refer to Engine Instruction & Maintenance Manual.

  Replace Brake Pads as Needed See Structures Section 5.5

  Replace flexible oil & fuel line in engine compartment every 2 years or when visible deterioration (cracking, hardening) occurs.

5.3.1 Fuel

The fuel tanks should be filled immediately after flight to lessen condensation of moisture. The tank capacity is 30 gallons.

5.3.2 Fuel Drain

A fuel drain is located in the Left & Right hand fuel tanks near the wing root and in the gascolator under the lower right hand side of the cowl. Drain fuel after each refueling prior to flight to ensure moisture and contaminants are not present.

5.3.3 Carburetor Air Filter

The Carburetor air filter keeps dust and dirt from entering the induction system. The value of maintaining the air filter in a good, clean condition cannot be overstressed. More engine wear is caused through the use of a dirty or damaged air filter than is generally believed.

The frequency with which the filter should be removed, inspected and cleaned will depend on the operating conditions. A good general rule, however, is to remove, inspect and clean the filter every 100 hours of engine operating time and more frequently if warranted by the operating conditions. Clean only with compressed air. Under extreme operating conditions, daily servicing of the filter is recommended.

5.3.4 Battery

The Battery is a fiberglass mat gel type, and is not a serviceable item. If electrolyte corrosion occurs, Use bicarbonate of soda (baking soda) and clean water to neutralize electrolyte of corrosion. Follow with a thorough flushing with clean water. Remove battery and clean residue from aircraft.

Clean cable and terminal connections with a wire brush, then coat with petroleum jelly before connecting cables. Check the battery every 50 hours (or at each oil change), more often in hot weather. Inspect the Battery Box and attachments. Clean and remove any signs of spillage or corrosion.

5.3.5 Tires

Maintain tire pressure at the air pressure specified in Aircraft Specifications above. When checking tire pressure, examine tires for wear, cuts, bruises and slippage. Remove oil, grease and mud from tires with soap and water.

➢ **NOTE:** Recommended tire pressures should be maintained, especially in cold weather. Remember that any drop in temperature of the air inside the tire causes a corresponding drop in tire pressure.

5.3.6 Hydraulic Brakes

Check brake master cylinder and refill with **ATF fluid or MIL-H.** Bleed the brake system of any trapped air whenever there is a spongy response on the brake lever.

Refer to Structures Section paragraph 5.5 for filling and bleeding of the brake system.

❖ **CAUTION:** All Lightning LS-1 Aircraft use the above hydraulic fluid (mineral based) **DO NOT** use DOT3-4 fluids as damage to the brake system will result.

5.4 Cleaning

Keeping the aircraft clean is important. Besides maintaining the appearance of the aircraft, cleaning makes inspection and maintenance easier.

5.4.1 Canopy and Quarter Windows

These should be cleaned carefully with plenty of fresh water and a mild detergent, using the palm of the hand to feel and dislodge any caked dirt or mud. A sponge, soft cloth or chamois may be used but only as a means of carrying water to the plastic. Rinse thoroughly then dry with a clean, moist chamois.

DO NOT rub the plastic with a dry cloth as this builds up an electrostatic charge, which attracts dirt. Oil and grease may be removed by using a soft cloth moistened with mineral turpentine.

❖ **CAUTION:** DO NOT **use gasoline, alcohol, Buzene, Acetone, Carbon Tetrachloride, fire extinguisher fluid, de-icer fluid, lacquer thinner or glass window cleaning spray.**

These solvents will soften and craze the plastic.

❖ **CAUTION:** DO NOT use a canvas cover on the canopy or windows as the cover may scratch the plastic.

5.4.2 Interior Surfaces

Interior painted surfaces should be cleaned with a soft cloth, fresh water and a mild detergent. Volatile substances such as those mentioned in the previous section must never be used.

Interior upholstery surfaces can be cleaned with automotive upholstery cleaner and a damp cloth.

5.4.3 Exterior Surfaces

The exterior surfaces, under normal conditions, require a minimum of polishing and buffing.

Generally, the exterior surfaces can be kept bright by washing with water and a mild soap or detergent, followed by a rinse with water and drying with a cloth or a chamois. The paint finish is an automotive base coat / clear coat system similar to modern automobiles and can be maintained with ordinary automotive cleaning materials.

Remove stubborn oil and grease with a cloth moistened with mineral turpentine, then wash with water and a mild soap, rinse and dry as stated before.

After the curing period the aircraft may be waxed with a good quality automobile wax. A heavier coating of wax on the leading edges of the wing, tail and on the engine nose cap will help reduce abrasion encountered in these areas.

❖ **CAUTION:** DO NOT use Silicon based cleaning materials as Silicon is absorbed into the composite Materials and may affect reparability.

5.4.4 Aluminum Surfaces

The aluminum surfaces require a minimum of care, but should not be neglected. Wash and clean as detailed in paragraph 3.3.3 above.

❖ **CAUTION:** **Lightning LS-1 aircraft are designed for minimum maintenance.** However, special attention should be applied when the aircraft has been used in extremely corrosive conditions, e.g. beach landings with sand and salt. Always ensure the aircraft is thoroughly hosed and washed immediately after such use**. Pay particular attention to wheels and external controls. Always hose down wheels and spats after landings in mud or sand to ensure brakes, wheels and spats are free of dirt build-up.**

5.4.5 Engine and Engine Compartment

The engine should be kept clean since dirty cooling fins and baffles can cause overheating of the engine. Also, cleaning is essential to minimize any danger of fire and provide easy inspection of components.

❖ CAUTION: DO NOT hose engine. Electrical components may be damaged by moisture. Ensure electrical components are protected against moisture. Caustic cleaning solutions should not be used.

Recommended cleaning procedure is spray lightly with degreasing fluid – after sealing coils and starter motor. WIPE clean with brush and cloth.

5.4.6 Propeller

Wash with soap and water, rinse with clean water and dry with cloth or chamois.

5.4.7 Wheels

The wheels should be washed at least annually (more frequently if used in harsh environments) and examined for corrosion, cracks or dents in the wheel halves or in the flanges or hubs. If defects are found, remove and

repair in accordance with Structures Section 5. Discard cracked wheel halves, flanges or hubs and install new parts.

5.4.8 Wheel Bearing – Mains and Nose

At each 100 hour inspection, jack the wheel, spin the wheel and check for free running and any play on the axle shaft. Remove and replace bearings if there is any sign of binding or wear.

5.5 Lubrication

There are no lubrication requirements for the Lightning LS-1 other than those listed below.

- Nose Gear Lower fork phenolic block
- Control Stick
- All control system rod end bearings
- Control surface hinge point radial bearings.

Inspection & Service

1.0 Inspection Charts

The inspection & service checklists in Appendix 1 of this manual show the recommended intervals at which items are to be inspected and serviced.

As shown in the chart, there are items to be inspected and serviced each 50 hours and each 100 hours. The 100 hour checklist serves as the annual condition inspection checklist. There are also special inspection items which require inspection of servicing at intervals other than 50, and 100 hours.

The engine Instruction Manual also details engine inspection schedules and should be consulted in addition to this chart.

When conducting an inspection at 50 hours, all items included in the 50 hour Inspection and Servicing checklist would be inspected, serviced or otherwise completed as necessary to ensure continuous airworthiness.

At each 100 hours or at least annually, the items on both the 50 hour inspection and service checklist and the 100 hour inspection and service checklist would be inspected and serviced as necessary to insure continuous airworthiness.

An annual condition inspection is required to be completed every 12 calendar months using the 100 hour inspection and service checklist as a guide.

2.0 Inspection Guidelines

2.1 Moveable Parts

Inspect for adequate lubrication, servicing, security of attachments, binding, excessive wear, safety, proper operation, proper adjustment, correct travel, cracked fittings, security of hinges, defective bearings, cleanliness, corrosion, deformation, sealing and tension.

2.2 Fluid Lines and Hoses

Check for leaks, cracks, kinks, chafing, proper radius, security, corrosion, deterioration, obstruction and foreign matter.

2.3 Metal Parts

Check for security of attachment, cracks, metal distortion, broken welds, corrosion, and any other apparent damage.

2.4 Wiring

Check for security, chafing, burning, defective insulation, loose or broken terminals, heat deterioration and corroded terminals.

2.5 Bolts in Critical Areas

Correct torque in accordance with torque values given in the chart in Paragraph 3.5, when installed or when visual inspection indicates the need for a torque check.

➢ **NOTE:** Torque values listed in 3.5 are derived from oil-free cadmium-plated threads, and are recommended for all installation procedures contained in this manual except where other values are stipulated. They are not to be used for checking tightness of installed parts during service.

2.6 Filters, Screens and Fluids

Check for cleanliness, contamination and/or replacement at specified intervals.

2.7 Aircraft Documents

To be displayed in the aircraft at all times:

- Placards as detailed in Flight Manual / Owner's Manual.
- Airworthiness Certificate
- Aircraft Registration

To be carried in the aircraft at all times:

- Flight Manual / Owner's Manual
- Operating Limitations

2.8 Engine Run Up

Before beginning the step-by-step inspection, start, warm, run-up and shut-down the engine in accordance with instructions in the Flight Manual and the Jabiru Instruction & Maintenance manual in Appendix 1 of this manual. During the run-up, observe the following, making note of any discrepancies or abnormalities:

1. Engine temperatures and pressures.
2. Static RPM. (Also refer to Engine Instruction Manual).
3. Magneto drop. (Also refer to Engine Instruction Manual).
4. Engine response to changes in power.
5. Any unusual engine noises.
6. Fuel shut-off valve; operate engine in ON position and in OFF position long enough to ensure shut-off functions properly.
7. Idling speed.

After the inspection has been completed, an engine run-up should again be performed to determine that any discrepancies or abnormalities have been corrected.

3.0 Inspection Checklists

Inspection and service checklists for 50 and 100 hour inspections are located in Appendix I at the end of the airframe manual

Structures

1.0 Fuselage

1.1 Description

The Fuselage is a composite monocoque (self-supporting) structure and includes the Vertical Fin.

All repairs to structural components must be approved by Arion Aircraft, LLC.

Figure3 fuselage shell

1.2 Canopy and Quarter Windows

Figure 4 Canopy assembly

1.2.1 Description

The canopy is a one-piece molded acrylic plastic part bonded to a fiberglass frame and captured by a fiberglass outer skin with Epoxy Resin & Fiber Flock and secured to the fuselage with tip up supports and gas struts.

Windows are one-piece acrylic plastic panels bonded into a joggle with Epoxy Resin & Fiber Flock.

- **NOTE:** In the event of a bird strike, the canopy is the only protection for the crew and therefore must be maintained in

excellent condition. Cracks up to 25 mm in length should be stop drilled; those longer than 25 mm should NOT be repaired – the canopy must be replaced.

1.2.2 General Upkeep

1. **Waxing**

Waxing will fill in minor scratches in clear plastic and help protect the surface from further abrasion. Use a good grade of commercial wax (NOT SILICON BASED) applied in a thin, even coat. Bring wax to a high polish by rubbing lightly with a clean, dry flannel cloth.

❖ **CAUTION:** Silicon based waxes and polishes are not recommended as silicon may be absorbed into the glass fiber laminate and affect reparability due to impairing bonding.

Damaged window panels and canopy may be removed and replaced if damage is substantial. However, certain minor repairs as prescribed in the following paragraphs can be made successfully without removing the damaged part from the aircraft.

The procedure for repairing cracks is only recommended for low stress areas. No repairs of any kind are recommended on highly stressed or compound curved areas or where repair would be likely to affect the pilot's field of vision.

2. **Scratches**

Scratches on clear plastic surfaces can be removed by hand buffing and polishing using Plastic Polish available from most aircraft supply companies.

➢ **NOTE:** Rubbing plastic surface with a dry cloth will build up an electrostatic charge which will attract dirt particles and may eventually cause scratching of the surface. After applying polish, dissipate this charge by rubbing surface with a slightly damp chamois. This will also remove dust particles which have collected while wax is hardening.

1.2.3 Crack Repair

Required tools:	1/16 inch drill and drill motor
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I,

Cracks up to 25 mm in length should be stop drilled; those longer than 25 mm should NOT be repaired – the canopy must be replaced

When a crack appears, drill a hole at the end of the crack to prevent further spreading. Hole should be approximately 1/16 inch in diameter, depending on length of crack and thickness of material. An unfluted drill should be used.

1.2.4 Removal

Required tools:	Angle grinder, cut off wheel.
Parts Required:	As required
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I,

As the Canopy and quarter windows are bonded to the frame and fuselage respectively, it is not possible to remove them without destroying them. Remove the outer skin by grinding down the lower flange to the inside frame. Grind the skin off to the canopy at the upper flange. Cut the canopy away and then grind remaining canopy material from the frame upper flange. For the quarter windows, break out the windows. Use caution when grinding out the old epoxy and flock to not grind through the fiberglass of the joggle joint.

1.2.5 Inspection

Inspection is limited to checking for scratches and cracks.

1.2.6 Repair

Repair is limited to scratch or crack repair outlined above. Otherwise repair is limited to replacement

1.2.7 Reinstallation

Refer to the Lightning LS-1 processes manual Section 43 “Fitting canopy” for proper installation of the canopy and outside skins.

1.2.8 Canopy Latches and Locks

There is one main latch over head mounted in the canopy frame that contacts a striker plate on the fuselage. Refer to the Arion Aircraft Lightning LS-1 process manual section 42 “Canopy Latches” for proper installation.

Canopy latch or component parts must be replaced if worn or damaged.

A cylinder and key lock is installed in the airframe overhead. The keyed barrel lock is located in the fuselage over the rear of the canopy. Spare keys are available to Lightning registered owners by quoting the aircraft Serial Number.

1.3 Seats

1.3.1 Description

The Lightning LS-1 seats are a 2 part assembly. The seat back is an integral part of the structure of the aircraft and therefore is fixed in position. The seat pans can be removed for inspection of the spar-box and related assemblies

⬢ **WARNING:** DO NOT MODIFY SEATS.

Required tools:	None
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I,

1.3.2 Removal

The seat pans are held in place by friction and the occupant belted to the seat. The seat backs are formed by the seat back bulkhead which is not removable.

1.3.3 Inspection

Inspect fiberglass lay-ups in the seat structure for cracking or delamination.

1.3.4 Repair

The seat back bulkhead is a structural element in the fuselage and the manufacturer must approve all repairs to the seat back. Seat pans may be repaired per Arion Aircraft, LLC general fiberglass repair procedures.

1.3.5 Adjustment

Forward and upward adjustment can be achieved by placing a cushion behind and/or under the occupant.

1.3.6 Upholstery

Seat upholstery is provided through removable cushions. These are easily removed for cleaning and inspection of the seat structures.

Cabin lining is standard, together with map Pockets.

1.3.7 Baggage Area

The baggage area is a flat floor directly behind the seats. There is a 50 lb limit in the baggage and the aircraft must be loaded within the takeoff and landing Center of Gravity range. All baggage must be secured before flight.

1.4 Seat Belts

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I,

1.4.1 Description

Aircraft grade seatbelts, bolted to the fuselage structure are provided for both seats. Belts are rated to 9 G and have metal to metal buckles.

1.4.2 Removal

Belts are attached in three places and can be removed by removing the AN4 attach bolts at the belt anchor locations.

1.4.3 Inspection

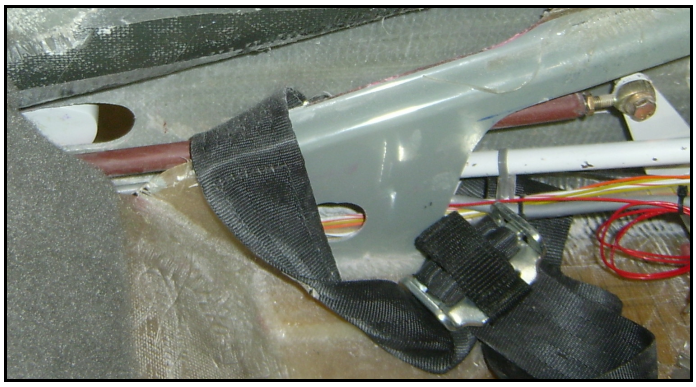
Belts should be replaced if frayed or cut, latches are defective or stitching is broken.

1.4.4 Repair

Repair is limited to replacement. Belts should be replaced if frayed or cut, latches are defective or stitching is broken. Attachment parts should be replaced with equivalent grade parts if excessively worn or defective.

1.4.5 Reinstallation

Refer to the Arion Aircraft Lightning LS-1 process manual section 7 “seatbelt installation”.



2.0 Wing

2.1 Description

Each composite wing is a cantilever, monocoque type with a main spar. The wing is a molded structure with a series of ribs that are bonded through the molding process to the fiberglass skin, fuel tanks and to the spar.

The main wing attachment is from the main spar which carries thru the spar box and locks with the other opposite wing spar. Rear spars are integrated and molded to the wing trailing edge. Forward and rear AOI attach hard points are molded into the wing and fuselage. These are attached thru AN5 hardware.

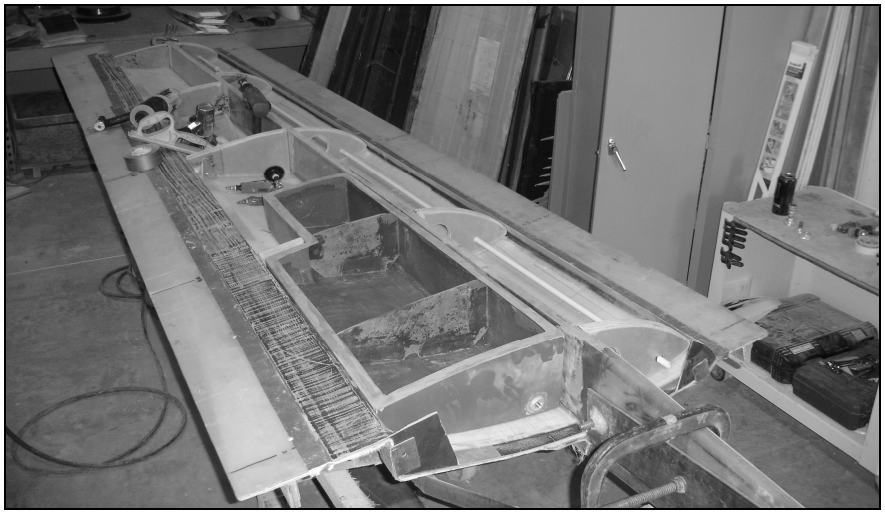


Figure 5 wing assembly

2.2 Removal

Required tools:	SAE hand tools, support benches, fuel cans
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M,

The Lightning LS-1 aircraft is designed with wings which are removable for storage or transport.

Wing removal is most easily achieved if two persons are available to handle the wing.

1. Remove seat cushions, seat pans, side panels.
2. Drain Fuel out of Quick Drain (***Note: This will take some time***.).
3. Disconnect Pitot tube – RH wing only.
4. Disconnect Recognition Light Wires.
5. Unbolt flap control rods – 1 each wing.
6. Remove flap from wing so it does not crush the wheel fairing when lowering down.
7. Unbolt aileron pushrods (2) from bottom of each control stick inside cabin.
8. Loosen hose clamps from Fuel lines.
9. Disconnect wiring to fuel sending units.
10. Support both wing tips with a saw horses.
11. Remove forward and rear AOI bolts from both wings
12. Remove nut, lock washer and washer from main 5/8" spar-bolts.
13. Use a tapered punch to drive the spar bolts forward out of the spar box and spars. It may be needed to have a helper on each wing at this point to take some load off of the wings if not completely supported by the saw horses.
14. Carefully remove wing by moving it out, watch the wires, pushrods and fuel line as the wing is removed so they do not get caught on something.
15. Place wing on cushioned structure to avoid damage.
16. Repeat Steps a – s to remove other wing

2.3 Inspection

Inspect wing skin for cracks, breaks or delamination. Check closely around flap and aileron hinges for signs of stress or cracks. Look for signs of leaking fuel from the wing fuel tank or tank fittings.

2.4 Repair

The wing is a composite monocoque structure. All damage involving a break or deformation in the wing skin inboard of the outer end of the ailerons must be referred to Arion Aircraft, LLC or our approved local agent for an appropriate repair procedure. Wingtips outboard of the aileron may be repaired using the Arion Aircraft Standard fiberglass repair procedures.

2.5 Reinstallation

Refer to the Arion Aircraft process manual section 16 “Wing final installation”.

- **NOTE:** After installation carry out a fuel flow test, check that both wing tanks are feeding fuel by turning on both of the wing tanks, pumping about a quart out and then turning the left wing tap off, repeat to check the right tank is feeding.. This must be repeated for the right wing. If a wing is not flowing correctly, check lines for kinks, blockages & airlocks.

3.0 Horizontal Stabilizer

3.1 Description

The horizontal tail plane is made from two separate tails. Horizontal tails are molded monocoque structure incorporating an aluminum spar. These spars are inserted into the rear fuselage with the spars overlapping and are then bolted to brackets in the fuselage (similar to the wing attachment) at the tail root molded in the fuselage.

3.2 Removal

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M,

1. Remove baggage floor.
2. Disconnect rudder cables at turnbuckles.
3. Remove Rudder.
4. Disconnect elevator pushrod from elevator interconnect.
5. Remove rear elevator bell-crank.
6. Remove elevators and disconnect trim motor wires.

7. Remove AOI inspection covers on lower HT skins.

8. Remove AOI bolts.

9. Remove main AN6 horizontal tail spar bolts.

10. Slide Horizontal tail out.

3.3 Inspection

Check for cracks or breaks in the skin. Look carefully at the join area between fuselage and horizontal tail for cracks or delamination. Look closely at the aluminum spars to check for cracks or delamination in the bond of spar to tail skin structure. Cracks, breaks or dents in the skin must be repaired before the next flight.

3.4 Repair

The horizontal stabilizer is a composite monocoque structure. All damage involving a break, delamination or deformation in the skin or damage to the spar must be referred to Arion Aircraft, LLC for an appropriate repair procedure.

3.5 Installation

Refer to Arion Aircraft process manual section 20 “Horizontal tail installation”, section 21 “Elevator final installation” and section 23 “Rudder installation” for correct installation and rigging procedures

4.0 Vertical Stabilizer

4.1 Description

The Vertical Stabilizer is a molded composite structure supported by a rear spar. The vertical stabilizer is an integrated part of the aft fuselage section. Hinges attach the rear vertical spar to the rudder.

4.2 Removal and Installation

The vertical stabilizer is an integral part of the fuselage structure and cannot be removed.

4.3 Inspection

Inspection is limited to inspection of the stabilizer skin for cracks or delamination and inspection of the vertical spar for cracking or delamination or other damage.

4.4 Repair

All damage involving a break or deformation in the skin or damage to the spar or ribs must be referred to Arion Aircraft, LLC for an appropriate repair procedure. Repair must be made before the next flight.

5.0 Main Under Carriage

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I,

5.1 General Description

The main gear system includes Matco 5 inch wheels and hydraulic brake system, aluminum spring rod gear legs that bolt into welded fittings in the main spar carry through truss.

5.2 Main Troubleshooting Chart

Trouble	Probable Cause	Remedy
Aircraft leans to one side	Incorrect tire inflation	Inflate to 25-30 psi
	Landing gear attaching parts not tight	Tighten loose parts. Replace defective parts.
	Bent axle stubs	Install new part(s)
Tires wear excessively	Incorrect tire inflation	Inflate to 25-30 psi
	Main wheels out of alignment	Align as specified above
	Bent axle stubs	Install new part (s)
	Dragging Brakes	Refer to Section 5.5

Table 5. Troubleshooting – Main Undercarriage

5.3 Main Wheel Fairing

5.3.1 Description

Main wheel fairings are a one piece molded fiberglass structure

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, Owner

5.3.2 Removal

1. Remove the machine screws on the outside of the fairing.
2. Remove the machine screws (2) on the inboard side brackets.
3. Lift fairing from its mounting brackets.
4. Reverse the preceding steps for installation.

5.3.3 Inspection

Check for cracks or delamination of the fiberglass fairing. Check for elongation of bolt holes. Check that clearance between wheel and pant is at least ½ inch.

5.3.4 Repair

Parts required: 9 oz fiberglass cloth, 24 hour laminating epoxy.

Field repair of wheel fairings is authorized. Refer to the Arion Aircraft general fiberglass repair procedure in the Structural Repair Section paragraph #2. Repair cracks or tears in the fiberglass by sanding off the paint and gel coat 1.5 inches each side of the crack or tear. Overlay with two layers of 9 oz fiberglass cloth and wet out with 24 hour epoxy. Allow to cure and then fill and sand until level and repaint. See paint & coatings for paint details.

5.3.5 Reinstallation

1. Reverse steps in 5.3.2

5.4 Main Gear Legs

5.4.1 Description

Main gear legs are a aluminum spring rod structure incorporating a compound taper machined into the rod.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I,

5.4.2 Removal

1. Drain all fuel from side to be removed.
2. Remove interior.
3. Remove AN4 bolt in main upper receptacle.
4. Disconnect brake line from fuselage bulkhead fitting.
5. Jack aircraft under lower main axle socket stud until 6-8" of clearance is under the tire.
6. Place a sawhorse or support bench under the wing at the inboard aileron bracket location. Heavily pad the support with several inches of foam or blankets.
7. Lower aircraft on to support.
8. Remove gear assembly from socket.

5.4.3 Inspection

1. Check for bends, twist or cracking. Look for dents or gouges in the spring rod.

5.4.4 Repair

1. Shallow gouges or scratches can be filed out to prevent stress risers if the rod is not deformed or bent. If rod is deformed repair is limited to replacement.

5.4.5 Reinstallation

1. Reverse steps in 5.4.2
2. Align wheels if new rod gear is installed. See procedure 5.6.6

5.5 Main Wheels & Brakes

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, Owner

5.5.1 SERIES FIVE INCH WHEEL

1. DIMENSIONS

The W50CC.75 is a five inch wheel from MATCO mfg with a width of 4.73 inches and 1.39 inch caliper spacing. Wheels utilize external calipers for easy maintenance. Bearing spacing is 1.25 inches and axle spacing is 0.68 inches. Total weight of the wheel and brake assembly is 5.4 pounds including bearing and brake plate. The W50c.75 utilize a 0.75" inch bearing /axle.

2. FEATURES

The W50CC.75 series wheel on Lightning LS-1 LSA aircraft utilizes CNC spun aluminum alloy wheel halves for superior strength, lightweight, and resistance to corrosion that is inherently found in magnesium wheels. The W50CC.75 wheel utilizes a 1.25 inch bearings. These bearings are designed and rigorously tested for long life and resistance to bearing fatigue.

The "E" series wheel features a single piston brake assembly with an external caliper for easy maintenance. Caliper removal is accomplished by removing two bolts, thus giving easy access to the linings. Al-Ni-Brz bushings are used on 'E' series wheels to ensure smooth caliper travel. The CNC spun wheel halves offer a precision surface for use with a variety of commercial tires.

The W50CC.75 is fitted with the WHAXLE A8 bolt on axle. The axles are 4140 heat treated steel and finished in a zinc alloy.

3. PERFORMANCE

The W50CC.75 wheels are designed for the following performance standards per wheel:

Static Capacity ..... 660 pounds

Limit..... 2000 pounds

Max Accelerate/Stop (Kinetic Energy)..... 93,441 foot-pounds

Torque Rating ..... 1540 in-lbs at 450psi

4. TIRE & TUBE

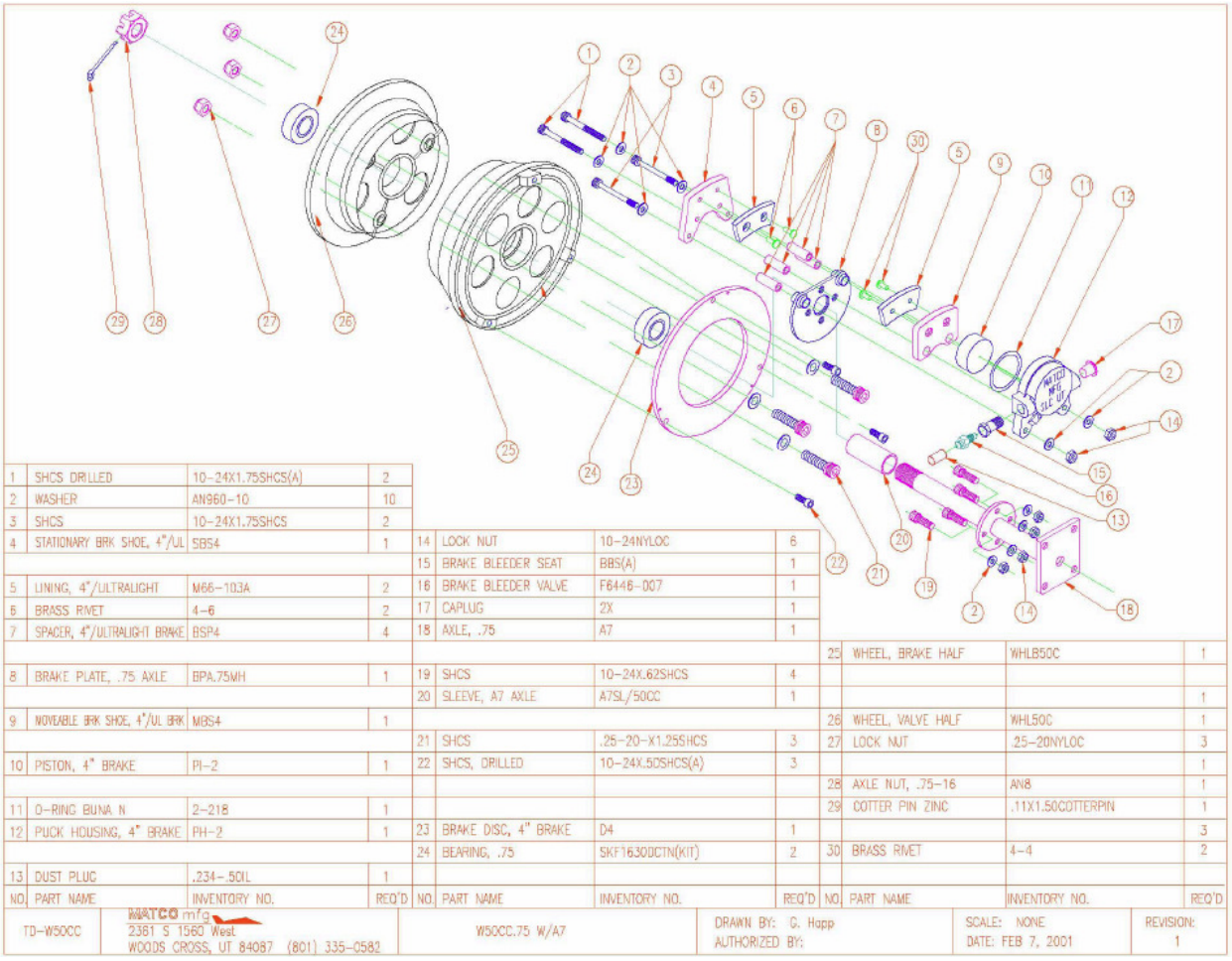
The W50CC.75wheel uses a 500x5" tire. Precision machining on the wheel allows for a variety of choices in tire manufacturers to include Goodyear, McCreary and Michelin.

5.5.2 MHE51J PARTS LIST

#	Part Name	Qty	MATCO Part Number
1	Bolt	2	.25-20X1.75HH
2	Rivet	3	MSC4-4
3	Washer	2	MSCAN960-416L
4	Stationary Brake Shoe	1	SBS4XT
5	Lining	2	M66-103A
6	Brass Rivet	3	MSC4-6
7	Brake Plate 1.38	1	See manuafatuer
8	Spacer	1	BSP4 and BSP40S
9	Movable Brake Shoe	1	MBS4
10	Piston 5/6” Brake	1	PI-1
11	O-Ring Buna N	1	2-218
12	Puck Housing 5/6” Brake	1	PH4XT
13	Bushing, AL-NI-BRZ	2	MSC1216-10
14	Bolt, SHCS	2	MSC.25-20X1.75SHCS
15	Caplug	1	MSC-2X
16	Locknut	2	MSC.25-20XCRLOCK
17	Brake Bleeder Seat	1	MSCBBS(A)
18	Brake Bleeder Valve	1	MSCF6446-007
19	Dust Plug	1	MSC.234-X.50IL
20	Bolt, SHCS	3	MSC.31-18X.785SHCS
21	Washer	9	MSCAN960-516L
22	Bolt, SHCS	3	MSC.31-18X1.25SHCS
23	Bearing	2	SKF1630DCTN
24	Hub, Front	1	WHL50C
25	Wheel, Back Half	1	WHLB50CC
26	Brake Disc 4”	1	D4
27	Tubeless Kit	1	MH62-121
28	Wheel, Valve Half	1	MH62-51-20H
29	Locknut	6	MSC.31-18NYLOCK
30	Spacer	2	WHLBSP6
31	Bolt, SHCS	3	MSC.25-20X.75SHA

Table 6 Brake pats list

5.5.3 BRAKE ASSEMBLY DRAWING



NO.	PART NAME	INVENTORY NO.	REQ'D
1	SHCS DRILLED	10-24X1.75SHCS(A)	2
2	WASHER	AN960-10	10
3	SHCS	10-24X1.75SHCS	2
4	STATIONARY BRK SHOE, 4"/UL	SBS4	1
5	LINING, 4"/ULTRALIGHT	M66-103A	2
6	BRASS RIVET	4-6	2
7	SPACER, 4"/ULTRALIGHT BRAKE	BSP4	4
8	BRAKE PLATE, .75 AXLE	BPA.75MH	1
9	MOVEABLE BRK SHOE, 4"/UL BRK	MBS4	1
10	PISTON, 4" BRAKE	PI-2	1
11	O-RING BUNA N	2-218	1
12	PUCK HOUSING, 4" BRAKE	PH-2	1
13	DUST PLUG	.234-.50IL	1
14	LOCK NUT	10-24NYLOC	6
15	BRAKE BLEEDER SEAT	BBS(A)	1
16	BRAKE BLEEDER VALVE	F6446-007	1
17	CAPLUG	2X	1
18	AXLE, .75	A7	1
19	SHCS	10-24X.62SHCS	4
20	SLEEVE, A7 AXLE	A7SL/50CC	1
21	SHCS	.25-20-X1.25SHCS	3
22	SHCS, DRILLED	10-24X.5DSHCS(A)	3
23	BRAKE DISC, 4" BRAKE	D4	1
24	BEARING, .75	SKF1630DCTN(KIT)	2
25	WHEEL, BRAKE HALF	WHLB50C	1
26	WHEEL, VALVE HALF	WHL50C	1
27	LOCK NUT	.25-20NYLOC	3
28	AXLE NUT, .75-16	AN8	1
29	COTTER PIN ZINC	.11X1.50COTTERPIN	1
30	BRASS RIVET	4-4	2

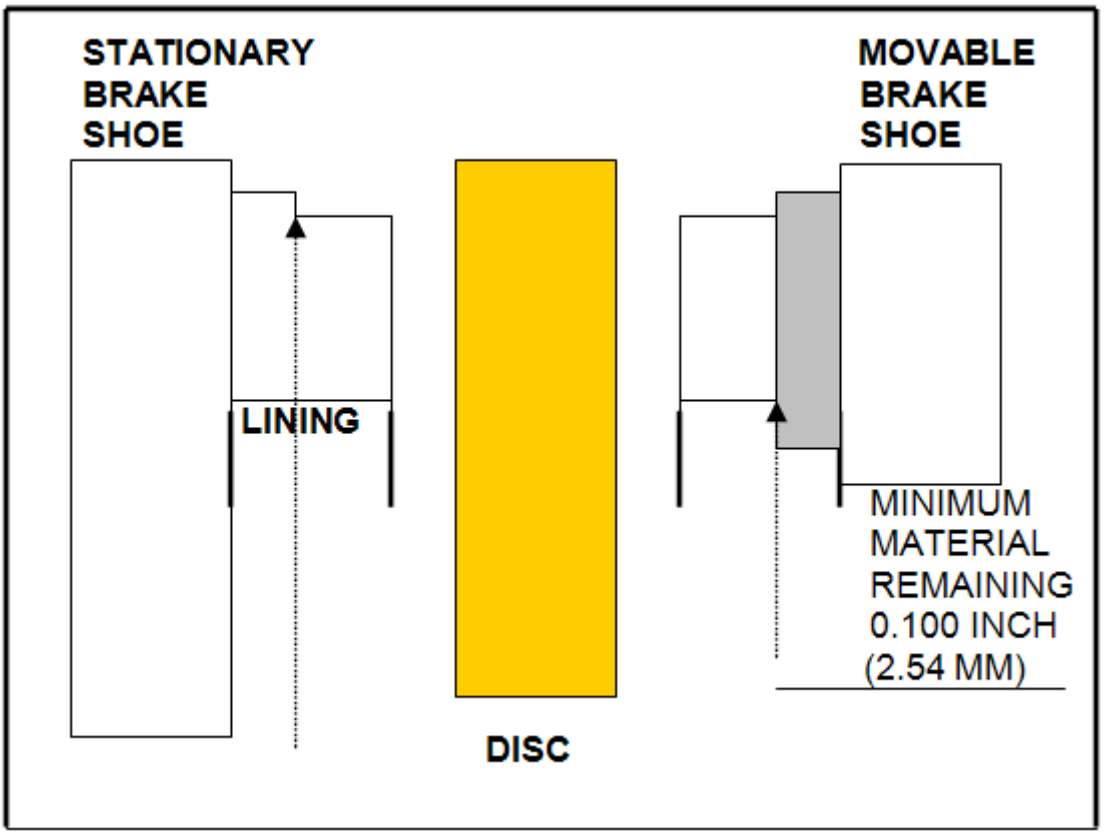
TD-W50CC | MATCO mfg 2361 S 1560 West WOODS CROSS, UT 84087 (801) 335-0582 | W50CC.75 W/A7 | DRAWN BY: C. Happ AUTHORIZED BY: | SCALE: NONE DATE: FEB 7, 2001 | REVISION: 1

Figure 1 – Brake Assembly Drawing

5.5.4 BRAKE LINING WEAR LIMITS

To eliminate wear on brake linings beyond design limitation and reduce possible piston damage or fluid leakage, the following information is presented. The M66 series lining (*as found on the W50CC series wheel*) should be replaced when the thickness of the remaining wear material reaches 0.100 IN (2.54mm), See **Fig.2**. The M66 lining has a visible wear notch located on the end of the lining that will tell the user when the pad is at the minimum material condition.

5.5.5 BRAKE DISC INSPECTION & SERVICE



SwiftLine Pad Replacement Program for the W50CC

The *Swiftline* Pad Replacement program is designed to:

- Simplify pad replacement on MATCO mfg brakes
- Eliminate the need to rivet linings, saving maintenance. & tooling.
- Provide a 20 % discount on reline kits saving you money

For more information on Swiftline call 801-335-0582

5.5.6 BRAKE DISC INSPECTION

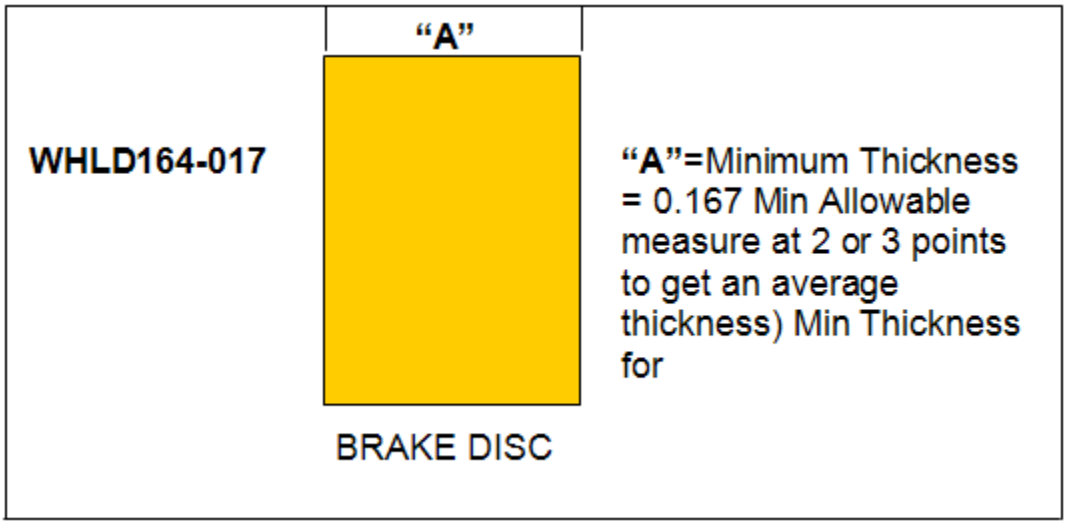
The MATCO brake disc will give years of trouble free service under normal field conditions. Conditions such as unimproved fields, standing water, industrial pollution, or frequent use of the aircraft may require more frequent inspection of the brake system and disc in order to prolong the life of the brake linings.

The disc should be checked for wear (**Fig.3 Dim.“A”),** grooves, deep scratches, excessive pitting or coning of the brake disc. Although coning is rarely a problem with the MATCO disc, if it should occur, coning beyond 0.015 inch (0.381mm) in either direction is cause for replacement.

Isolated grooves up to .030 inch (0.76mm) deep should not be cause for replacement. Any grooving of the disk however, will reduce the service life of the linings.

The W50CC series disc is plated for rust prevention. Within a few landings, the plating will wear off where the linings rub against the disc. The remaining portion of the disc will remain plated and corrosion free for an extended period of time under normal use. Chrome plated discs are available from MATCO mfg. for those demanding increased corrosion protection and wear.

Rust in varying degrees may form on the exposed portion of the disc. If a powdered rust appears on this surface, one or two braking applications during taxiing should wipe the disc clear. Rust build up beyond this point, may require removal of the disc from the wheel to properly clean both surfaces. A wire brush followed by 220-grit sandpaper should restore the braking surface adequately. Do not remove plating in areas that are not contacted by the linings.



5.5.7 BRAKE LINING INSTALLATION

The following instructions offer a guide for properly removing and replacing the WHLM66-106 brake linings.

1. Remove the caliper from the wheel by removing the two MSCAN4H9-16A bolts that hold it on.

2. Remove old linings by drilling the crimped side of the rivet (Do not use a punch & hammer). Using a #25 drill (0.1495 diameter), drill through rivet taking care to avoid damaging the rivet hole. After drilling crimped edge off rivets, lift old lining and remaining rivet pieces from the brake shoe.

3. Inspect the brake shoe for any bending or other damage that may have occurred during service. A shoe with more than 0.010 bend should be replaced. Inspect rivet holes to ensure that no damage has occurred during removal.

4. Using a brake relining tool (*MATCO recommends a Threaded Screw Action such as the W404 from Aircraft Tool Supply Co*.) or pneumatic press, replace the lining using the brass rivets shown on the illustrated parts list and install the hub.

5.5.8 MOUNTING THE TIRE & TUBE

Care should be taken when mounting the tire and the tube on the wheel so as not to pinch the tube between the wheel halves. Slightly inflate the tube after placing it in the tire. This will keep it from being pinched between the halves. Tire mounting soap may also help. A thin strip of cardboard or poster paper wrapped around the wheel between the mounting half and the tube will help in preventing the tube from being pinched during assembly if it is unusually tight. Another method is to use a strand of monofilament fishing line placed between the wheel and the tube, and running in the same direction as the axle. Move the line back and forth around the wheel as it is being tightened. When satisfied that the tube is clear of the wheel, simply pull it out.

5.5.9 Wheel Assembly Instructions

1. The brake mounting plate (# 8 on assembly drawing) should be spaced from the bearing so that it aligns in the same plane and is parallel with the brake disc. (#23)

2. The sealed bearings are packed from the factory to prevent rust..

3. Tighten the axle nut until all play is out of the assembly. Rotate the wheel back and forth while tightening the nut to help seat the bearings. When all play is out and the wheel rotates freely, **tighten** to the next slot and insert cotter pin.

4. The rubber seal on the tapered roller bearing should remain stationary while the wheel rotates around it

5. All o-rings in the brake and master cylinder assembly are To be use with ATF fluid or MIL-H5606.

➢ **NOTE:** ***Do not Use automotive DOT 4 brake fluid.***

6. The ideal mounting position for the brake caliper is on the trailing side of the wheel with the inlet and bleeder valve in a vertical axis. However, the caliper may be mounted at any location as long air can be properly bled from the system.

5.5.10 Wheel Assembly Torque Values

DWG #	PART NUMBER	TORQUE VALUE (Inch Lbs)
1	MSCAN4-17A	100
14	MSC.25-20x1.75	100
16	MSC.25-20x1.75	100
20	MSC.31-18x.875	100
22	MSC.31-18X1.25	100
29	MSC.31-18NYLOCK	100
33	MSC.25-20x.75	50

Table 7

The brake caliper must be positioned properly when assembled on the axle. When using MATCO mfg. axles, the caliper alignment is assured due to the bearing stops which are machined into the axle.

5.5.11 Bleeding the Brake System

1. Open the brake bleeder valve slightly *(# 16 on the assembly drawing*) to facilitate bleeding of air from the system. Attach a short plastic tube to the bleeder which will submerge the end in brake fluid in a cup.

2. Attach a tube from the nozzle of a squirt can (*such as the MATCO squirt can part # MSCCHPSS* or a portable weed sprayer)of brake fluid, to the feed line from the resivoir to the system on the firewall.

3. Make sure that the master cylinder shaft is fully extended to open up the internal bypass valve.

4. Inject brake fluid MIL-H-5606 or equivalent, into the firewall feed line and continue injecting until the fluid travels through the system and out the bleed valve on the caliper.

5. Air in the system will be pushed down and out in to the master cylinder **ONLY IF** the master cylinder or remote reservoir is at the highest point in the system, and there are no loops in the brake lines.

6. Fluid should be pushed through the system until no bubbles are visible.

7. Close the brake bleeder valve, and remove the service hose.

8. If the brake system is free of air, the brake pedals should feel firm and not spongy. If not, repeat steps 1 through 7 until the system is free of trapped air.

9. Fluid leakage from the top of the master cylinder during operation indicates too high a fluid level.

10. Ensure that all drilled bolts are properly safety wired.

5.5.12 Conditioning Procedures

➢ **NOTE:** It is important to condition the new linings after installation to obtain maximum service life and performance. The procedures below show when and how this should be done.

1. After the linings have been installed, apply brake pressure during high throttle static run-up. Note RPM at creep if any occurs.

2. Perform two or three high speed taxi runs. Apply firm braking at 30-40 mph down to 5 mph to generate the necessary 300 – 400 degree temperatures at the brake pads. DO NOT bring the aircraft to a complete stop during taxi runs, and continue to roll aircraft until reaching the tie down area. Release brake pressure at tie down area as soon as practical and park with brake pressure released. Allow brakes to cool for 10-15 minutes.

3. Repeat step one and note RPM at creep if any occurs. There should be a noticeable increase in holding torque.

4. If properly conditioned, the pads will have a uniform shiny appearance (*glaze*) on the surface. Repeat steps 1-3 if necessary to produce glaze.

➢ **NOTE:** Forward movement of the aircraft during static run up could be caused by the wheels skidding and not break malfunction

Conditioning removes high spots, and creates a layer of glazed material at the lining surface. Normal braking will produce enough heat to maintain glazing during the life of the lining. Glazing can be worn off during light use such as taxiing.

5.5.13 Lubricants

Elastomeric Compound Lubricants	
Hydraulics	MIL-H-5606 or ATF fluid
Petroleum Lubricants	
Wheel Bearings	MIL-G-81322 Mobil 28 Aeroshell 22 Or equivalent
Wheel Nuts/Bolts	MIL-T-5544 Antiseize or equivalent
Thread Sealant	
Tapered Pipe Thread	Locktite 567 Or equivalent petroleum product

Table 8 – Brake Parts Lubricants

5.5.14 Technical Assistance

For technical information, product matching,and helpful hints, see the Matco Mfg. website at: www.matcomfg.com. E-mail Matco Technical Service Manager for specific information at: tech@matcomfg.com

To speak with someone in person about specific products or to find answers to technical questions, please contact Matco's technical hotline at **801-335-0582** or fax Matco at **801-335-0581**

5.5.15 MATCO Mfg Technical Support Disclaimer:

While MATCO mfg. strives to ensure that the advice/information provided through our support is correct, MATCO mfg. does not accept any responsibility for errors or omissions. Any advice or information that MATCO mfg. gives you, via any form of communication is not a guarantee that it will correct your problem. It is only offered as assistance to you.

MATCO mfg. will not be held responsible for any loss or damage as a result of our advice or information supplied.

5.5.16 Main Wheel Removal

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, Owner

1. Jack aircraft as outlined in the General Information Section paragraph 5.1.3.
2. Remove speed fairing, if installed, in accordance with paragraph 5.3.2.
3. Remove outboard brake pad plate by cutting safety wire and removing retaining bolts.
4. Remove lock bolt/nut through center of axle and spacer.
5. Remove lock spacer.
6. Pull wheel from axle.

5.5.17 Main Wheel Disassembly

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, Owner

1. Deflate tire and break tire beads loose from tire rims.

⬢ **WARNING:** Injury can result from attempting to separate wheel halves with the tire inflated. Avoid damaging wheel flanges when breaking beads loose as a scratch, nick or gouge may cause wheel failure.

2. Remove through-bolts/nuts and separate wheel halves, removing tire, tube and wheel hub.
3. Remove brake disc.

5.5.18 Main Wheel Inspection, Assembly and Repair

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, Owner

1. Clean all metal parts in solvent and dry thoroughly.

2. Inspect wheel halves for cracks. Cracked wheel halves should be discarded and new parts used. Sand out nicks, gouges and corroded areas.

3. If excessively warped or scored or worn to a thickness of 2 mm, brake discs should be replaced with a new part. Sand smooth small nicks and scratches.

4. Carefully inspect bearings for damage and discoloration.

5. Replace bearings if worn.

6. Apply automotive wheel rim lubricant to the tire bead areas of the rim halves.

7. Position tire and tube between wheel halves with tube inflation valve through hole in outside wheel half.

Mate wheel halves. While holding halves together, assemble a washer and nut on one through-bolt and tighten snugly. Assemble the remaining washers and nuts on the through-bolts and torque to the value specified in Table

❖ **CAUTION:** Ensure tube is not pinched between wheel halves during assembly. Uneven or improper torque of through-bolt nuts can cause failure of bolts with resultant wheel failure.

8. Insert through-bolts through brake disc and position disc on the inner wheel hub flange.

9. Inflate tire to seat tire beads, then adjust to correct tire pressure – Refer Aircraft Specifications above.

5.5.19 Main Wheel Installation

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, Owner

1. Lightly coat axle with “Anti-Seize” or a Water Proof grease.
2. Install the inboard tapered bearing
3. Place wheel assembly on axle.
4. Install outboard tapered bearing
5. Install washer and axle nut-tighten to required specification
6. Install cotter pin
7. Place outboard brake pad plate and spacer in position and secure with bolts. Replace safety wire.
8. Install speed fairing (if used) as outlined in Paragraph 5.3.5.

5.6 Main Wheel Stub Axle

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I,

5.6.1 Description

Main stub axle is a 4140 HT steel tube with a 0.75” diameter and machined to accept the Matco wheel & brake system

5.6.2 Removal

1. Remove speed fairing (if installed) in accordance with Paragraph 5.3.2.
2. Remove wheel in accordance with Paragraph 5.5.16.
3. Disconnect flexible brake hose and drain brake fluid.
4. Remove the AN4 bolts/nuts/washers securing axle to lower socket assembly.

5.6.3 Inspection

Check to see if axle is bent or cracked. Check for gouges or scratches in bearing seat areas.

5.6.4 Repair

Repair is limited to replacement with new part.

5.6.5 Reinstallation

1. Install axel to socket assembly in accordance with the Lightning process manual section #39 “Main gear and Axel assembly”.
2. Install wheel assembly on axle in accordance with Paragraph 5.5.18.

5.6.6 Main Wheel Alignment

1. Main gear alignment is set at the factory and unless replacing the gear leg need not be re-set. It can not be adjusted.
2. If re-alignment is needed refer to the Lightning process manual section #40 “Setting main gear toe”.

6.0 Nose Gear

6.1 Description

The nose gear assembly consists of an aluminum spring rod gear leg mounted to the engine mount. The lower section is a socket assembly which the forks assembly pivots on. This is a limited caster nose wheel and is not steerable.

A nose wheel speed fairing (wheel spat) is standard equipment.

The wheel is in two halves which are joined by through-bolts to the wheel hub as shown in Figure 14. During assembly of the nose wheel, the through-bolts must be tightened evenly and torqued to the value specified in Table 4 – Torque Values.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I,

6.2 Trouble Shooting – Nose Leg

Trouble	Probable Cause	Remedy
Nose wheel shimmy	Nose strut bolts loose	Tighten bolts
	Loose or worn steering link	Tighten, replace defective parts
	Nose wheel out of balance	Balance Wheel & Tire
	Wheel bearings loose	Replace

6.3 Removal

1. Remove nose wheel fairing.
2. Weight or tie tail of aircraft down to raise the nose tire off the ground.
3. Remove cotter key and castle nut from bottom of fork assembly.
4. Remove AN4 pivot stop bolt.
5. Slide fork assembly off of nose socket.
6. Remove gear leg from motor mount.

6.4 Inspection

1. Inspect nose leg for cracks, scratches, gouges or deformation.
2. Inspect bolts/nuts for torque – see torque values Table 4 – Torque Values.
3. Inspect lower socket assembly for cracks or deformation.
4. Inspect upper leg receiver in the motor mount assembly, check mount and related attach points for cracks.

6.5 Repair

1. Shallow scratches or gouges may be filed smooth to prevent stress risers.

2. Repair of deformation of the nose leg is limited to replacement.

3. Repair of lower leg socket is limited to replacement.

6.6 Reinstallation

1. Refer to the Lightning process manual section #38 “Nose leg and fork assembly”.

6.6.2 Nose Wheel Speed Fairing Removal and Installation

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, Owner

1. Remove the machine screws that join the forward and rear sections of the fairing and remove the fairing.

2. Reverse the preceding steps for installation.

6.6.3 Nose Wheel Removal and Installation

1. Weight or tie-down tail of aircraft to raise the nose wheel off the floor.

2. Remove nose wheel axle bolt.

3. Pull nose wheel assembly from yoke. Take note of position of spacers.

4. Reverse the preceding steps to install nose wheel. Tighten axle bolt.

6.6.4 Nose Wheel Disassembly

Completely deflate tire and break tire beads loose at wheel rim. Refer to Figure 14.

⬢ **WARNING:** Injury can result from attempting to separate wheel halves with the tire inflated. Avoid damaging wheel

flanges when breaking beads loose as a scratch, nick or gouge may cause wheel failure.

1. Remove through-bolts and separate wheel halves.
2. Remove wheel hub.
3. Remove tire and tube from wheel halves.
4. Remove bearings.

➢ **NOTE:** The bearings are "press-fit" in the wheel hub and should not be removed unless a new part is to be installed.

6.6.5 Nose Wheel Inspection and Repair

1. Clean metal parts in solvent and dry thoroughly.
2. Inspect wheel halves for cracks. Cracked wheel halves should be discarded and new parts used. Sand out nicks, gouges and corroded areas. Clean thoroughly
3. Carefully inspect bearings for damage and discoloration.
4. Refit bearings.

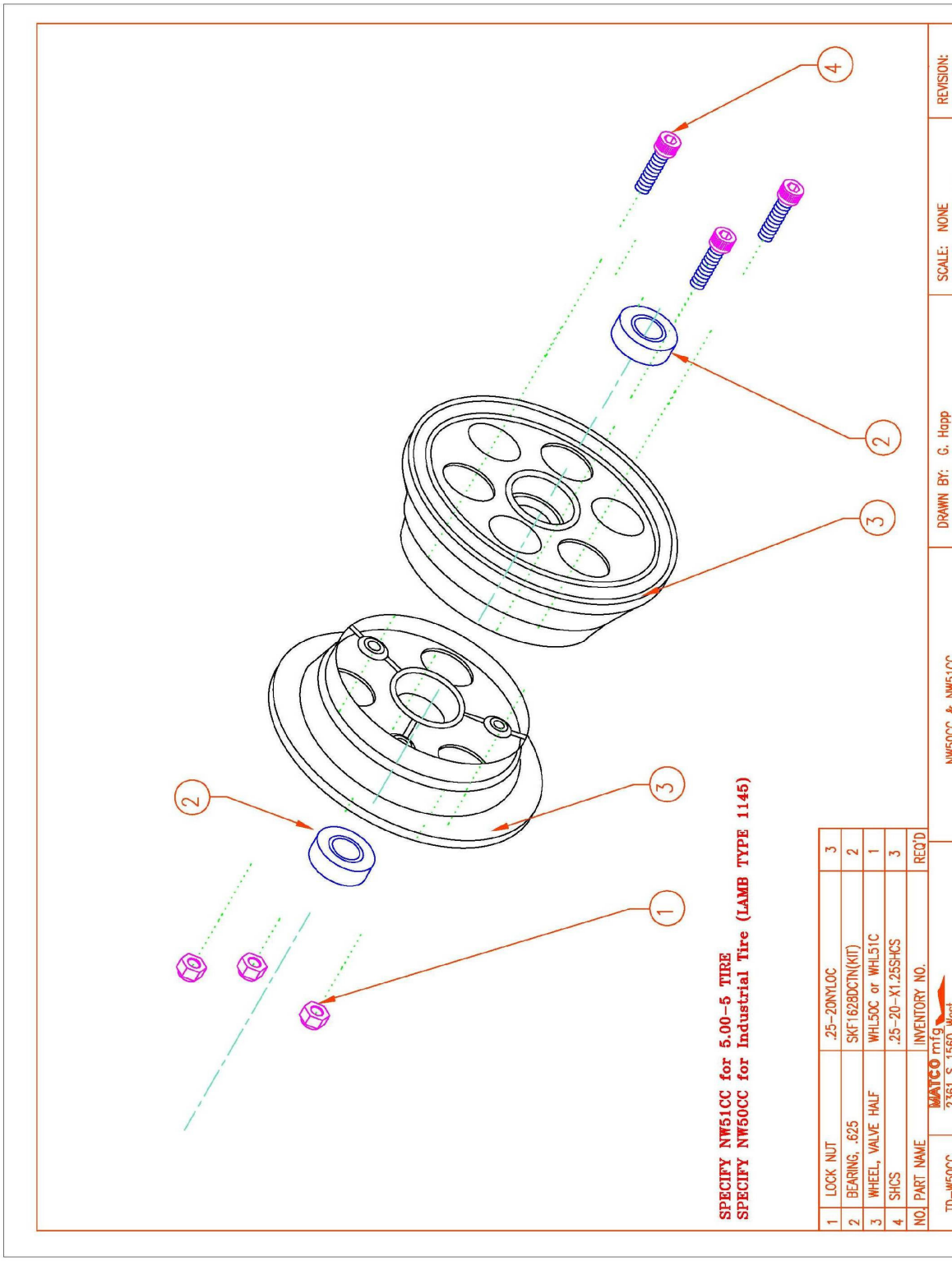
6.6.6 Nose Wheel Reassembly

1. Replace bearings in wheel hub.
2. Apply automotive wheel rim lubricant to the tire bead faces on the inside of the wheel rims.
3. Position tire and tube between wheel halves with tube inflation valve through hole in outside wheel half.
4. Mate wheel halves. While maintaining a light force, assemble a washer and nut on one through-bolt and tighten snugly. Assemble the remaining washers and nuts on the through-bolts and torque to the value specified in Table Table 4 – Torque Values.

⬢ **WARNING:** Ensure tube is not pinched between wheel halves during assembly. Uneven or improper torque of through-bolt nuts can cause failure of bolts with resultant wheel failure.

5. Inflate tire to seat the tire beads, adjust to correct tire pressure – Refer Aircraft Specifications above.

6.6.7


SPECIFY NW51CC for 5.00-5 TIRE
SPECIFY NW50CC for Industrial Tire (LAMB TYPE 1145)
NO. PART NAME
INVENTORY NO.
REQ'D
1 LOCK NUT .25-20NYLOC 3
2 BEARING, .625 SKF1628DCTN(KIT) 2
3 WHEEL, VALVE HALF WHL50C or WHL51C 1
4 SHCS .25-20-X1.25SHCS 3
MATCO mfg
SCALE: NONE
DRAWN BY: G. Hopp
REVISION:

7.0 Brake System

7.1 Description

The hydraulic brake system consists of master cylinders mounted to the pedal with conventional toe brakes. Flexible hoses connecting the master cylinders to each wheel brake cylinder and the single disc, floating-cylinder type brake assembly, located at each main landing gear wheel.

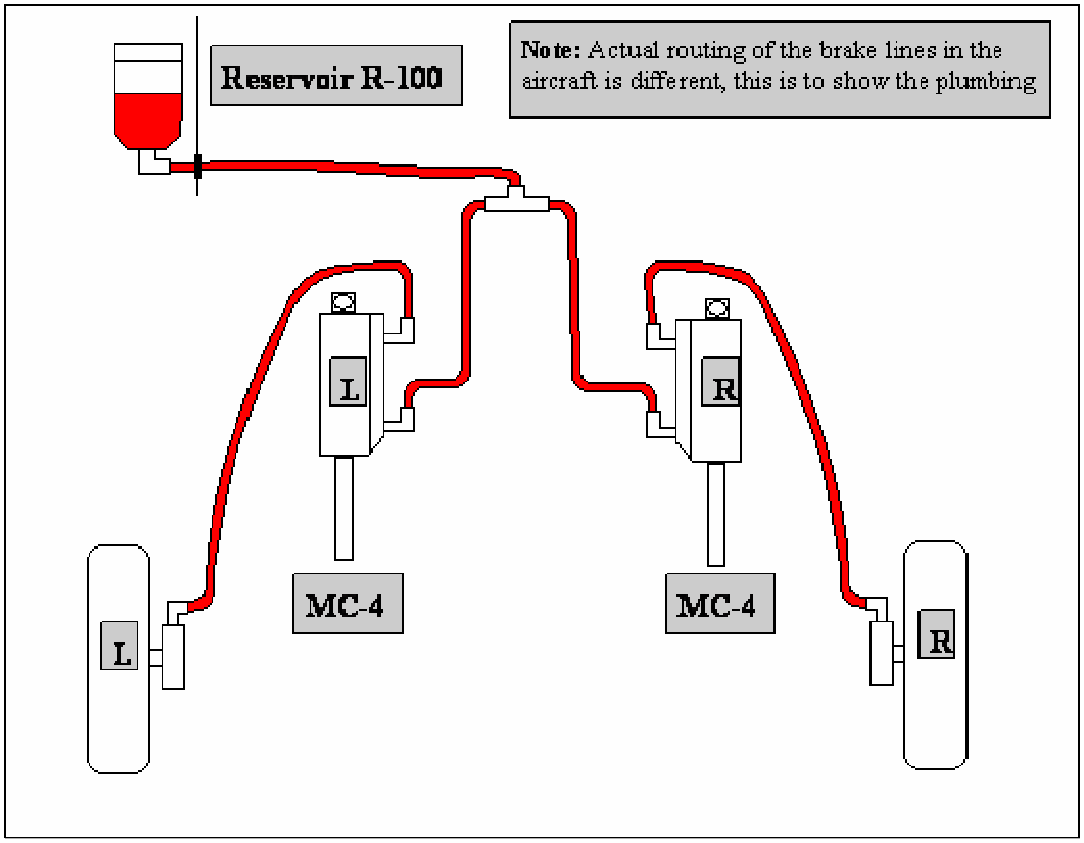


Figure 6 Pilot side brakes only

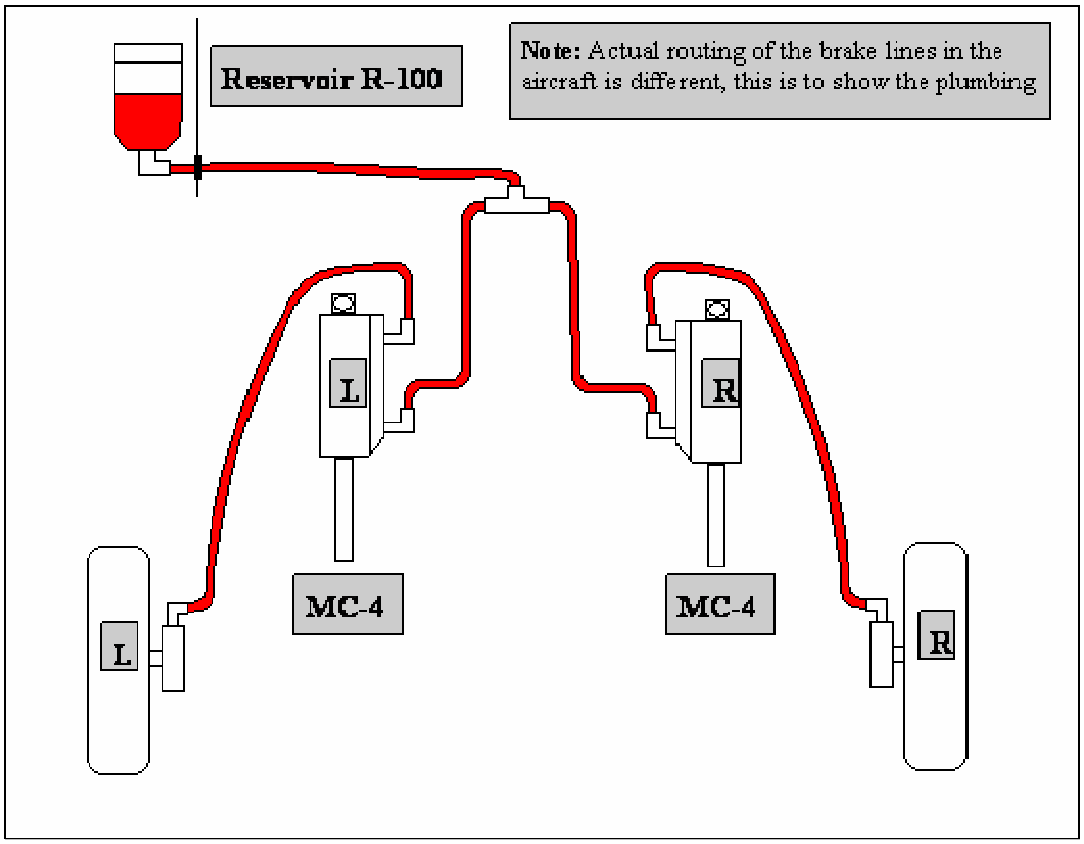


Figure 7 Dual occupant brakes.

7.2 Troubleshooting – Brakes

Trouble	Probable Cause	Remedy
Dragging brakes	Pedal binding	Check and adjust
	Worn or broken master cylinder piston return spring	Repair or install new master cylinder
	Restriction in hydraulic lines or in master cylinder	Drain brake line, clear with compressed air. If cleaning lines fails, the master cylinder may be faulty and should be repaired or replaced.
Brakes fail to operate	Leak in system	If master cylinders or wheel cylinders are leaking, repair or install new parts.
	Air in system	Bleed system
	Lack of fluid in resivoir	Fill and bleed system
	Master cylinder defective	Repair or install new parts
	Brake pads worn	Replace with new parts

Table 9 - Trouble Shooting – Brakes

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

7.3 Removal

For wheel & brake service see section 5.6

7.4 Inspection

Inspect master cylinder for leaks

7.5 Repair

Refer to the Matco service manual in section 5.5 for repair and part replacement.

7.5.1 Hydraulic Brake Lines

These lines are flexible hoses plumbed thru the pedal mounted master cylinder and then to the calipers. There is one t in the system on the non pressure side of the pedals to the reservoir. Repair is limited to replacement.

7.6 Reinstallation

Refer to the Lightning process manual section #24 “Master cylinder installation”

See section 5.6 for wheel and brake installation

7.7 Brake Master Cylinder

7.7.1 Description

The brake master cylinders are mounted to the pedal assembly for a conventional toe brake system. If dual brakes are installed for both occupants than there are MC installed on the co-pilot pedals as well.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

7.7.2 Removal

1. Remove the flexible hose from one wheel brake assembly and drain the hydraulic fluid from the brake system.
2. Disconnect flexible hose at master cylinder.
3. Unbolt master cylinder retaining bolts (2).
4. Plug or cap hydraulic fittings and hoses to prevent the entry of foreign material.
5. Repeat for multiple master cylinder removals.

7.7.3 Inspection

Inspect for leaks at fittings. Check for damage to brake piston and O rings.

7.7.4 Repair

- **WARNING:** Use onlyMIL-H-5606 or ATF fluid.
- **DO NOT** Dot 4 fluid damage will result

7.7.5 Reinstallation

1. Refer to Lightning process manual Section #24 “Master cylinder installation”.

8.0 Aileron Control System

8.1 Description

The aileron control system is comprised of a stick for each occupant. The sticks are interconnected with a mixer tube. From the stick to the respective aileron a large diameter push tube runs to a bell-crank in the wing. From the bell-crank a short push tube runs to the aileron attach horn.

- **WARNING:** All spherical bearings must be fitted with a large washer on the outside of the through-bolt to prevent the bearing case and rod-end releasing in the event of a bearing failure.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

8.2 Control Column

8.2.1 Description

The control sticks are a welded structure and mount to a mixer torque tube mounted on the front of the spar box truss structure.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

8.2.2 Removal and Reinstallation

1. Disconnect long push pull tube from stick
2. Remove nut from stick pivot pin
3. Slide stick forward from pivot pin and nylon bushing
4. To reinstall reverse procedures 1-3

8.2.3 Inspection

1. Check for deformation, bends or dents in the stick weldment. Look for any scratches or gouges that could cause stress risers. Check condition of nylon bushing. Look for wear or deformation of pivot tube.

8.2.4 Repair

1. File scratches or gouges until smooth to eliminate stress risers
2. Repair of dents or deformation is limited to replacement of the affected part.
3. Replace nylon bushing if worn

8.3 Push Rods

8.3.1 Description

The stick interconnect mixer and bell-crank to aileron tubes are welded 4130 tube which accepts a male ¼ -28 male rod-end with jam nut for adjustment.

The long push tubes in the wings are 7/8" 6061T6 aluminum tubes with threaded adapter cones bolted to each end. The cones are tapped to accept a ¼ -28 male rod end with jam nuts for adjustment.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

8.3.2 Removal

1. The stick interconnect push rod can be removed by disconnecting the long push rods and removing the bolts that hold the interconnect rod in place.

2. The bellcrank to aileron push rod can be removed by removing the bolts on each end of the rod.

3. The long push pull tubes cannot be removed without removing the wing.

8.3.3 Inspection

1. Check rods for deformation.

2. Check rod ends for bearing security and wear

3. Check threaded ends of rods for thread integrity.

8.3.4 Repair

1. Repair is limited to replacement of damaged parts.

9.0 Ailerons

9.1 Description

Ailerons comprise a molded and bonded monocoque structure embodying an aluminum control horn at the inboard end and hinges at both ends.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

9.2 Removal

1. Unbolt push-rod from aileron control arm.
2. Remove AN4 hinge bolts
3. Remove aileron.
4. Reverse the preceding steps for installation.

9.3 Inspection

Inspect ailerons for any signs of delamination or cracking in the aileron skin. Pay particular attention to the Control Horn and hinges and their surrounding fiberglass areas.

9.4 Repair

All damage involving cracking, delamination, or hinge damage must be referred to Arion Aircraft, LLC or our approved local agent for an appropriate repair procedure.

9.5 Control Rigging

9.5.1 Description & Positioning

1. Move right aileron up to stop.
2. Required up travel is 3.5" +- ¼"
3. Aileron travel is adjusted thru the short pushrod from the aileron to the wing bell-crank.

9.5.2 Rigging Procedure

1. Loosen the jam nuts on both ends of the pushrod.
2. Remove the bolt that is attached to the bell crank.
3. To increase the aileron travel, shorten the push rod.
4. To decrease the aileron travel, lengthen the pushrod.
5. Reinstall the bolt in the bell-crank, the rod end must be captured by a large area washer.

6. Use a new AN354-428 elastic stop nut.

7. Tighten the jam nuts.

10.0 Wing Flap Control System

10.1 Description

Refer to Figures 17 to 19.

The electric wing flap control system comprises a switch & position indicator mounted on the instrument panel, and an electric linear actuator-driven common shaft assembly, with pushrods connecting to the flap control surface horns.

⬢ **WARNING:** All spherical rod end bearings must be fitted with a large washer on the outside of the through-bolt to prevent the bearing case and cable releasing in the event of a bearing failure.

10.2 Operational Check

Operate flaps through their full range of travel, observing for uneven or jumpy motion or binding in the system. Ensure flaps are moving together through their full range of travel.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

10.3 Flap Motor Assembly

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

10.3.1 Removal

1. To remove, clamp the flaps in place so they do not fall on the wheel pant.

2. Disconnect electrical wires. Remove the bolt in each end of the flap motor.

10.3.2 Repair

Repair is limited to replacement of a faulty flap motor.

10.3.3 Reinstallation

1. Refer to the Lightning processes manual Section 16 “Wing final installation” for flap motor installation.

10.4 Flap Switch Assembly

10.4.1 Description

The flap position controlling switch uses a manual toggle switch with position indicator to control the flap deflection.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

10.4.2 Removal

The Flap Electrical Controls may not be removed or repaired without reference to Arion Aircraft LLC or our approved local agent by a technician with the appropriate maintenance rating for LSA aircraft. Remove switch jam nut, disconnect wires and remove. Reverse to install.

10.5 Flap Control Rod

10.5.1 Description

1. Flap control push rods are a welded 4130 steel tube with a threaded boos at each end. Spherical rod end bearings are threaded into the ends of the control rods and provide rigging adjustment for the

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

10.5.2 Removal

1. To remove, clamp flaps in position so they do not fall.
2. Unbolt control rod at both ends and remove.

⬢ **WARNING:** All spherical rod end bearings must be fitted with a large washer on the outside of the through-bolt to prevent the bearing case and cable releasing in the event of a bearing failure.

10.5.3 Inspection

1. Inspect for cracks in the welds or deformation of the steel push rod.

10.5.4 Repair

1. Repair is limited to replacement.

10.5.5 Reinstallation

1. Refer to Lightning processes manual Section#16 “Wing final installation”.

10.6 Flaps

10.6.1 Description

The flaps comprise a molded and bonded monocoque structure embodying a welded control arm at the inboard end, and aluminum flap hinges bonded in to the body of the flap.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

10.6.2 Removal

1. Support the flap so it will not fall.
2. Unbolt rod end from flap control arm.
3. Remove each flap hinge bolt.
4. Remove Flap.

10.6.3 Inspection

1. Inspect flaps for any signs of delamination or cracking. Pay particular attention to the Control Horn and hinges and their surrounding areas.

10.6.4 Repair

1. All damage involving cracking, delamination, or hinge damage must be referred to Arion Aircraft, LLC or our approved local agent for an appropriate repair procedure.

10.6.5 Reinstallation

1. Refer to Lightning Process manual Section #16 “Wing final installation”

10.7 Flap Rigging

1. Place the flap motor in the full up position.
2. Rotate the flap up until the trailing edge of the flap is at 1/8” below the wing root on the fuselage.
3. Adjust with the rod ends. Ensure that the lock nut is tight on the control ends and that the thread is visible through the hole in the rod.
4. Check for FULL DOWN travel using a protractor. Full travel should be 45 degrees +- 1.0 degrees.

11.0 Elevator Control System

11.1 Description

The elevator control system is comprised of a stick for both pilots. These are attached to a mixer with a center bell-crank, a short pushrod from the mixer bell-crank attaches to the top of a bell-crank in the seat bulk-head. A large diameter aluminum push rod attaches to the bottom of that bell crank and runs to the elevator interconnect bell-crank.

⬢ **WARNING:** All spherical bearings must be fitted with a large washer on the outside of the through-bolt to prevent the bearing case and cable releasing in the event of a bearing failure.

11.2 Troubleshooting

Operate the elevator control while observing for friction and interference. Elevator should move stop to stop with no rubbing, scraping, or other interference.

12.0 Elevator

12.1 Description

The elevator comprises of a left and right molded structure to which the stainless elevator hinges are riveted. The elevator haves are interconnected with a center bell-crank assembly.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

12.2 Removal

1. Detach Rear bell-crank from elevators, each elevator has 3 AN4 bolts in the inboard end plates.

2. Block the elevators in a vertical position, these can be placed 90 degrees from the horizontal with the bell-crank detached and held with tape.

3. Remove all hardware and remove the elevators.

12.3 Inspection

Inspect elevator for any signs of delamination or cracking. Pay particular attention to the Control Horn and hinges and their surrounding areas.

12.4 Repair

All damage involving cracking, delamination, or hinge damage must be referred to Arion Aircraft LLC or our approved local agent for an appropriate repair procedure.

Surface cracks in the paint or body filler around hinges can be repaired using auto body repair techniques and repainting.

12.5 Reinstallation

1. Refer to the Lightning process manual section 21

12.6 Push rod assembly.

12.6.1 Description

12.6.2 Removal

The Main Push rod is a Primary Control and may not be repaired or removed without reference to Arion Aircraft LLC or our approved local agent.

12.6.3 Rigging

1. Place control stick in the full up position with the mixer at the stop.
2. The mid bell crank should have the long arm protruding thru the seat bulkhead vertically.
3. The bell-crank should be at 1/8” clearance from the bulk-head.
4. Set the length of the 5/8” steel pushrod between the stick mixer and the bulkhead bell crank. Install with new elastic stop nuts and tighten the jam nuts.
5. Place the elevators at 15 +2-0 degrees up travel.
6. Set the length of the long aluminum tube.
7. Install with new elastic stop nuts and torque to specs.
8. Tighten the jam nuts.
9. Down travel should be 12 degrees +-2 degrees if the up travel is set correctly.

13.0 Elevator Trim Control System

13.1 Description

The pitch trim is a conventional electric trim tab integrated into the elevator. The tab is operated by a servo mounted internally in the elevator and actuated by a pushrod. A switch on the panel allows the pilot to make adjustments form the cockpit.

13.2 Operational Check.

Pushing the top of the trim switch to down will run the trim tab up, this flies the elevator down and trims the nose down. Pushing the bottom of the switch will run the tab down, flying the elevator up and trimming the nose up.

Check binding or rough operation in the hinge, pushrod, or related parts.

⬢ **WARNING:** It is important to carry out this operational check when ever electrical equipment is disconnected or parts reinstalled.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

13.3 Removal

1. Remove trim motor inspection cover from the lower skin of the right elevator.

2. Disconnect pushrod from trim tab.

3. Remove trim motor from upper skin.

13.4 Inspection

Inspection should be for worn wires or slop in the pushrod actuation portion of the trim motor.

13.5 Repair

Repair is limited to replacement.

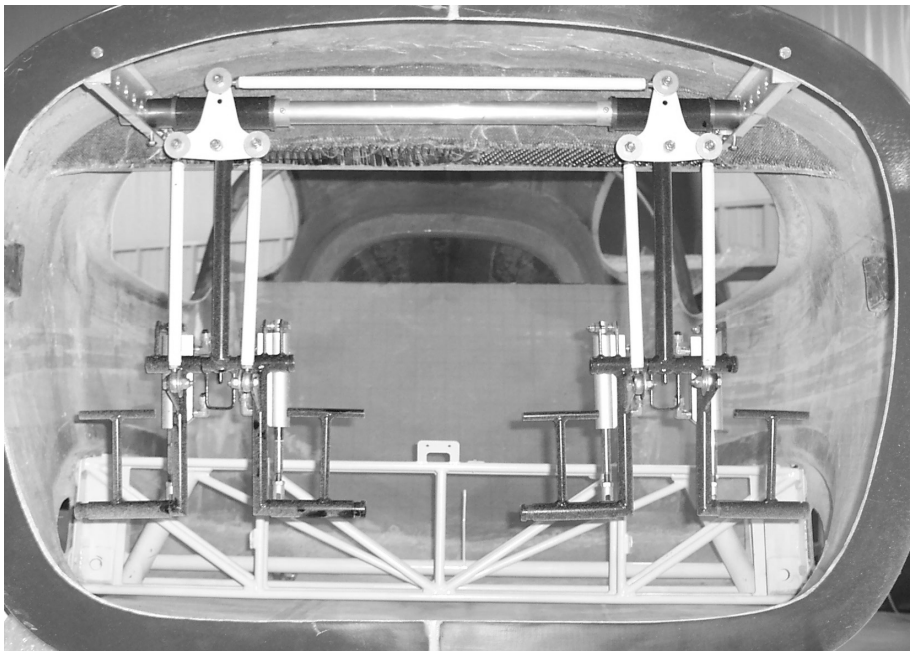
13.6 Installation

See document AA-PMLS1-SEC6-R1 for installation.

14.0 Rudder Control System

14.1 Description

Rudder control is maintained through the use of rudder pedals. The system is comprised of rudder pedals, interconnecting pushrods and bell-cranks, and cables running thru a pulley system to the rudder. See photo below.



14.1.1 Rudder Pedals

The pedals are welded assemblies that includes the toe brakes. These hang from a cross tube mounted to the upper longerons. Pedal adjustment is accomplished thru an adjuster tube with several locating holes in it. It is attached to a vertical support on the firewall. The pedal is kept locked up into position by a heavy spring which holds the tube up on the pedal locking pin.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

14.1.2 Removal

1. The rudder pedals are a complex assembly and may not be removed, repaired, or re-installed without first consulting Arion Aircraft LLC or its approved dealers and service centers.

15.0 Rudder

15.1 Troubleshooting – Rudder

Operate rudder pedals. Rudder should operate smoothly without interference. Isolate cause of any interference.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

15.2 Removal

1. Remove the baggage area floor.
2. Cut the safety wire and remove from the rudder cable turn-buckles.
3. Insert a small screw driver thru the turnbuckle to hold it, loosen the jam nuts at both ends of each turn buckle.
4. Remove the turn buckle from the cables.
5. Un-bolt the upper and lower hinge bolts.
6. Remove the rudder.

15.3 Inspection

Inspect rudder for any signs of delamination or cracking. Pay particular attention to the Control Horn and hinges and their surrounding areas.

15.4 Repair

All damage involving cracking, delamination, or hinge damage must be referred to Arion Aircraft LLC or our approved local agent for an appropriate repair procedure.

15.5 Reinstallation

Refer to the Lightning process manual Section 23

16.0 Control Cable and Attachments

16.1.1 Description

The control cable for the rudder is of the pull-pull type, one end is attached to the rudder pedal interconnect bell-crank. This runs thru a series of pulleys down to the floor of the aircraft at the firewall. From the firewall the cables will cross, the cable coming from the co-pilot side will be the top cable. These pass thru phenolic blocks mounted to the bottom of the spar box and then the seat back bulk-head were they terminate under the baggage area.

Under the baggage area the front cables attach to the rear cables thru a turn-buckle. The rear cables run straight to the rudder.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

16.1.2 Removal

The front cables are part of a more complex assembly and may not be removed without contacting Arion Aircraft LLC or one of the authorized dealers or service centers.

The Rear cables can be removed as follows.

1. Follow section 15.3 of this manual for removal of the rudder.
2. Remove the AN3 bolt which holds the cable to the u bracket attached to the rudder .

16.1.3 Inspection

1. Inspect the cable for frays, wear marks, or kinks.

16.1.4 Repair

1. Repair is limited to replacement.

16.1.5 Reinstallation

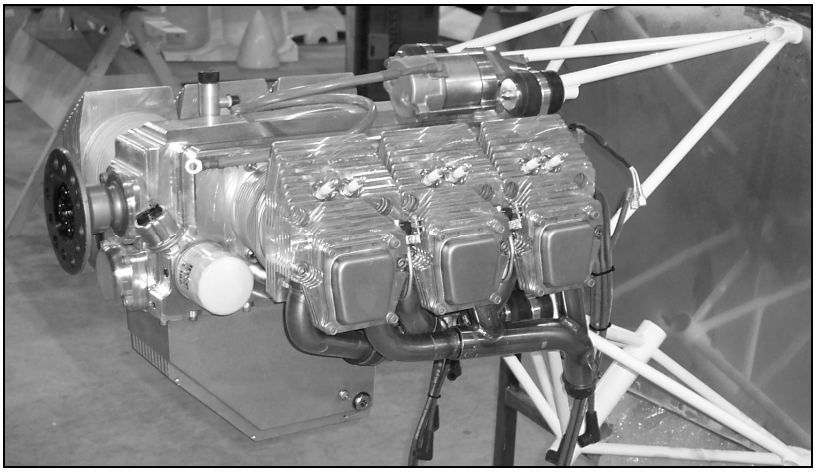
1. Bolt the Cable to the u-bracket on the rudder using an AN3-10A and new AN365-1032 nylock nut.

2. Be sure to place the rubber o-rings on top and bottom of the cable end between the u-bracket when bolting the cable in place.

3. Refer to the Lightning Process manual Section#??? For proper re-installation.

Engine Section

1.0 Engine



1.1.1 Description

The engine is a JABIRU, 6-cylinder, 4-stroke, air-cooled, driving a fixed-pitch wooden propeller. The front Starboard cylinder is numbered 1, the front Port is numbered 2, the center Starboard is numbered 3, the center Port is numbered 4, the rear Starboard is numbered 5 and the rear Port cylinder is numbered 6.

Always refer to the Latest repair and maintenance data available from Jabiru PTY LTD www. Jabiru.au.net

Documents:

JEM0002-1 Maintenance 3300

JEM0001-4 Overhaul 3300

1.1.2 Engine Data

Refer Engine Instruction & Maintenance Manual JEM0002-1 Maintenance 3300

1.1.3 Engine Trouble Shooting

Refer Engine Instruction & Maintenance Manual JEM0002-1 Maintenance 3300

1.1.4 Engine Cleaning

Refer Paragraph 5.4.3

1.1.5 Engine Accessories Removal

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

Removal of engine accessories for inspection involves stripping the engine of parts, accessories & components as appropriate. During removal of all parts, carefully examine & tag defective parts for repair or replacement with a new part.

➢ **NOTE:** All openings exposed by the removal of an item should be closed by installing a suitable cover or cap over the opening. This will prevent the entry of foreign particles. If suitable covers are not available, tape should be used to cover the opening.

1.1.6 Inspection

For specific items to be inspected and for periodic inspection details, refer to Engine Instruction & Maintenance Manual.

1. Visually inspect the engine for loose bolts, nuts, cracks, leaks & cooling fin damage.

2. Inspect baffles, baffle seals & brackets for cracks, deterioration or damage.

3. Inspect hoses for internal swelling, chafing, cuts, breaks, stiffness or loose connections. Excessive heat on hoses will cause them to

become brittle & easily broken. Hoses are most likely to crack or break near the ends & at support points. Check fire sleeves on fuel lines within the engine compartment.

- **NOTE:** Avoid excessive flexing & sharp bends when examining hoses for stiffness.

4. All flexible hoses in the engine compartment should be replaced at engine overhaul or every 2 years whichever comes first. Hoses which show visible deterioration (cracking, excessive hardening) should be replaced immediately, irrespective of age.

5. For major engine repairs, refer to Jabiru USA Sport Aircraft, LLC or an Approved Jabiru Service Center.

Engine System Section

1.0 Engine Cowls

1.1 Description

The engine cowls comprise both an Upper and Lower composite structure.

The Upper Cowl is fitted with five locating Cam Locks at the rear of the cowl thru the main firewall flange joggle. The lower cowl attaches to the fuselage joggle with 8 machine screws. The upper and lower cowls are attached together with 12 cam-locs along the join line.

1.2 Upper Cowls

1.2.1 Removal

Required tools:	Screw drivers
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, owner

1. Remove the five Cam Locks from the rear of the top cowling and the 6 cam locks per side on the cowl join line.

2. Grasping the cowl around the front nose, pull carefully upwards and forwards until the lower edge of the cowl clears the upper edge of the Spinner, than pull forward.

3. Remove the cowl.

4. Replace the cam locks in the cowling to ensure they are not misplaced.

➢ **NOTE:** Always ensure that the cowl is placed in a position where it cannot be damaged by persons walking around the aircraft or by wind.

● **WARNING:** Ensure the cam locks are properly engaged before starting engine.

1.2.2 Inspection

Inspect top cowl for cracks, tears in the fiberglass or delamination.

1.2.3 Repair

Repair of cracks or tears can be made using the general fiberglass repair procedure outlined in Structural Repair Section paragraph 2.

1.2.4 Reinstallation

1. Reverse the Removal steps for Reinstallation.

1.3 Lower Cowls

1.3.1 Removal

Required tools:	Screw drivers
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, owner

1. Remove the top cowl – Refer above.
2. Disconnect the engine air inlet SCAT hose and cabin heat inlet hose (if fitted)
3. Remove the piano hinge from the oil cooler.
4. Remove lower cowl screws at rear of cowl. Support the lower cowl as screws are being removed.
5. Reverse the preceding steps for installation.

1.3.2 Inspection

Inspect top cowl for cracks, tears in the fiberglass or delamination.

1.3.3 Repair

Repair of cracks or tears can be made using the general fiberglass repair procedure outlined in the Structural Repair Section paragraph 2

1.3.4 Reinstallation

Reverse the Removal steps for Reinstallation.

2.0 Engine Compartment

2.1 Inspection and Cleaning

1. Wipe the inner surfaces of the cowlings with a cloth saturated with Mineral Turpentine.

2. Wash with a solution of mild soap and water and rinse thoroughly. After cleaning, inspect for dents, burns, rubbing marks, cracks and any signs of delamination.

3. Inspect cowling Camloc mounts for rigidity & bonding & for wear. Inspect locking pins for damage. Inspect rubber grommets in firewall for wear or damage.

2.2 Repair

1. Replace any damaged or worn parts with new parts.

Repair is limited to replacement cam locks. Rivets fixing cam lock anchor lugs should be backed with washers.

Repair of cracks or tears can be made using the general fiberglass repair procedure outlined in the Structural Repair Section paragraph 2.

3.0 Engine Mount

3.1 Description

The engine mount is a welded assembly. Its purpose is to support the engine and attach the engine to the airframe. The engine is attached to the mount with rubber cushions which absorb engine vibrations.

3.2 Removal

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

Spacers are used to correctly align the engine. Ensure that they are correctly marked on removal and correctly replaced on reassembly.

❖ **CAUTION:** The bolts on the engine mount must only be fitted with high temperature nuts. DO NOT USE NYLOC NUTS as the nylon insert may melt causing failure.

3.3 Inspection

Inspect the engine mount for cracks at the welding joints, the firewall flanges or engine attach pin-weldments.

3.4 Repair

❖ **CAUTION:** The engine mounts should not be repaired. If damaged, replace with a new part.

3.5 Reinstallation

Refer document AA-PMLS1-SEC32-R1 for installation

4.0 Shock Mount

4.1 Description

The rubber engine cushions are comprised of a male and

Female molded part.

4.2 Removal

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

Removal is only accomplished thru the removal of the engine.

4.3 Inspection

Inspect for cracking, checking or deformation. Check for engine sag. Replace mount cushions if indicated.

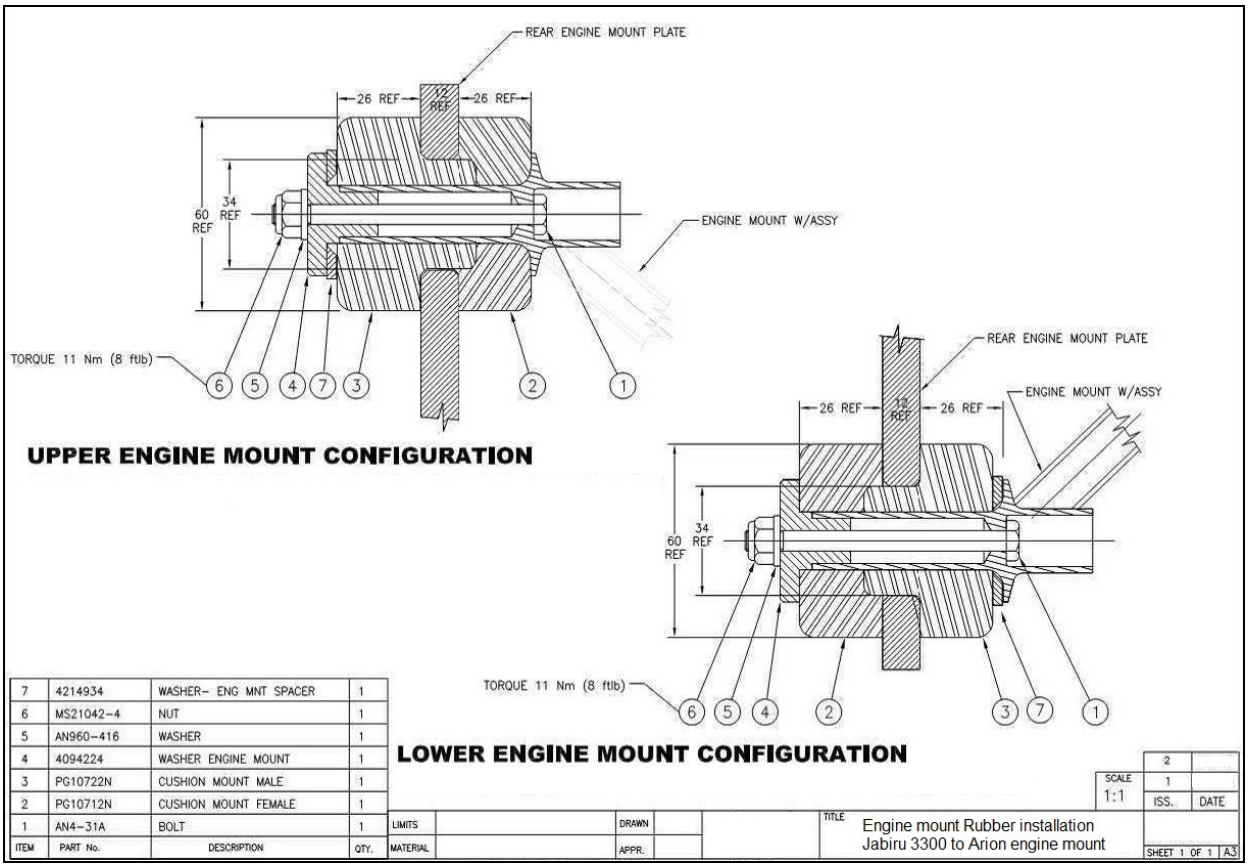


Figure 2 –Engine Mount Rubber Configuration

5.0 Oil System

5.1 Description

The oil system is comprised of an oil pump located at the end of the cam shaft. Oil is pumped out the side of the crankcase, through an oil cooler adapter and oil cooler radiator and then through the oil filter. Oil is then fed under pressure to the interior of the engine and returns to a wet sump at the bottom of the engine.
Oil pressure is monitored just before the oil leaves the crankcase on the way to the cooler. Oil temperature is measures in the sump. A pressure regulating valve is under the oil cooler adapter.

5.2 Filter Removal

Required tools:	Oil filter wrench
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, Owner

Refer to the Engine Installation and Maintenance Manual

Using the oil filter wrench turn the filter counter clockwise to remove the oil filter.

5.3 Inspection

Using an oil filter cutter open the filter can and remove the filter paper. Carefully wash the paper in gasoline or similar solvent. Inspect the filter media for metal debris.

Some amount of non magnetic aluminum particles are to be expected. Fine rusty bronze colored particles that look the size of squashed sugar grains indicate rocker bushing wear. Larger copper / bronze colored particles indicate main or rod bearing wear.

5.4 Repair

Repair is limited to replacement

5.5 Reinstallation

To install lubricate the rubber seal of the new filter with engine oil, screw the filter onto the threaded adapter and turn clockwise until the filter contacts the cooler adapter. Continue clockwise for 1/3 turn. The filter is not lock wired into place.

6.0 Oil Cooling System

6.1 Description

An oil cooling radiator is mounted to a NACA scoop on the pilot side of the cowling. Hoses route the oil from oil cooler adapter under the filter to the cooler and back.

Required tools:	Oil filter wrench
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

6.2 Removal

1. Disconnect braided hoses from oil cooler and oil cooler adapter
2. Remove the piano hinge which attaches the cooler to the firewall support mount.
3. Remove cooler.

6.3 Inspection

1. Inspect hoses for kinks, leaks, cracks or loose fittings
2. Inspect radiator for leaks, bent fins, damaged fittings or damaged attachment.

6.4 Repair

1. Repair of hoses is limited to replacement of the Stainless braided hose. The AN fittings are removable and can be reused if not damaged.
2. Repair of radiator should be referred to a qualified radiator repair facility or returned to Pacific Oil Cooler Service for inspection, testing and repair.
3. Fittings are standard AN flare fittings and repair is usually limited to replacement.

6.5 Reinstallation

1. Reinstall fittings into radiator using Loctite 567 sealant.
2. Reinstall radiator onto support mount
3. Reconnect braided hoses to cooler and adapter.
4. Run engine – then shut down and inspect for leaks.

7.0 Oil Recovery System

7.1 Description

The oil recovery bottle is fitted to the oil cooler support mount. A breather line from the oil fill tube runs to the bottle and another tube from the bottle dumps over board.

Required tools:	Oil filter wrench
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, Owner

7.2 Removal

1. Disconnect the breather from the top of the bottle.
2. Disconnect the dump line from the side of the bottle.
3. Remove bottle.

7.3 Inspection

1. Inspect for cracks around the tubes and leaks at the base of the bottle.

7.4 Repair

1. Repair is limited to replacement.

7.5 Reinstallation

1. Is the reverse of removal.

8.0 Carburetor

8.1 Description

1. The Bing carb is a CV crab and is an altitude compensating carb with no manual mixture control.

8.2 Removal

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

Refer to Engine Instruction & Maintenance Manual

⬢ **WARNING:** Fuel lines within the engine compartment are fitted with fireproof sleeves. These sleeves must not be removed.

1. Disconnect fuel line from carb
2. Disconnect throttle cable from carb
3. Disconnect choke cable from carb
4. Disconnect ground strap from carb
5. Loosen clamp on rubber carb adapter
6. Pull the carb to the rear and down to remove.

8.3 Inspection and Repair

1. Inspect rubber carb connector for cracks or deformation. Repair is limited to replacement.
2. Remove carb dome and inspect diaphragm for cracks or breaks. Replace if damage is observed
3. Inspect the needle for damage or deformation. Repair is limited to replacement.
4. Inspect floats for damage or fuel saturation. Repair is limited to replacement.
5. Inspect float valve for rubber tip damage or deformation. Repair is limited to replacement.
6. Inspect all other o rings and seals for evidence of leaking or damage. Repair is limited to replacement.

8.4 Idle Speed Adjustment

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

Refer to Engine Maintenance & Instruction Manual for carburetor jet removal, idle adjustment and carburetor bowl cleaning procedures.

1. Run engine until warmed to operating temperature
2. With engine running turn idle limit screw until an idle rpm of 800 – 850 is achieved with throttle closed

3. Adjust secondary stop (barrel with set screw) located and attached to the throttle cable, so that it contacts the cable end adjuster at idle.

9.0 Induction Air System

9.1 Description

The engine air intake system includes a cold air inlet in the lower cowl, a hot air muff attached to the exhaust system, a mixer assembly mounted on the firewall and connected to a carburetor. The mixer box incorporates the air filter and a pressure relief dump valve.

The air filter should be cleaned every 100 hours or more regularly if the engine is operated in dusty conditions.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

9.2 Removal

1. Disconnect SCAT duct from airbox outlet
2. Remove screws (4) from corners of filter box.
3. Remove filter

9.3 Inspection and Repair

1. Inspect for breaks in the filter medium by shining a light through. Repair is limited to replacement
2. Inspect for dirt – clean by blowing air back through the filter. Replace if dirt does not blow away.

9.4 Reinstallation

1. Place new filter into air box base
2. Position cover in place over the filter
3. Install screws (4)
4. Reconnect SCAT duct to airbox cover

9.5 Carb Heat Section

Carburetor Heat is activated by pulling the Carburetor Heat Control on the panel OUT. This opens the hot air valve in the mixer assembly and permits hot air to flow from the muff into the carburetor.

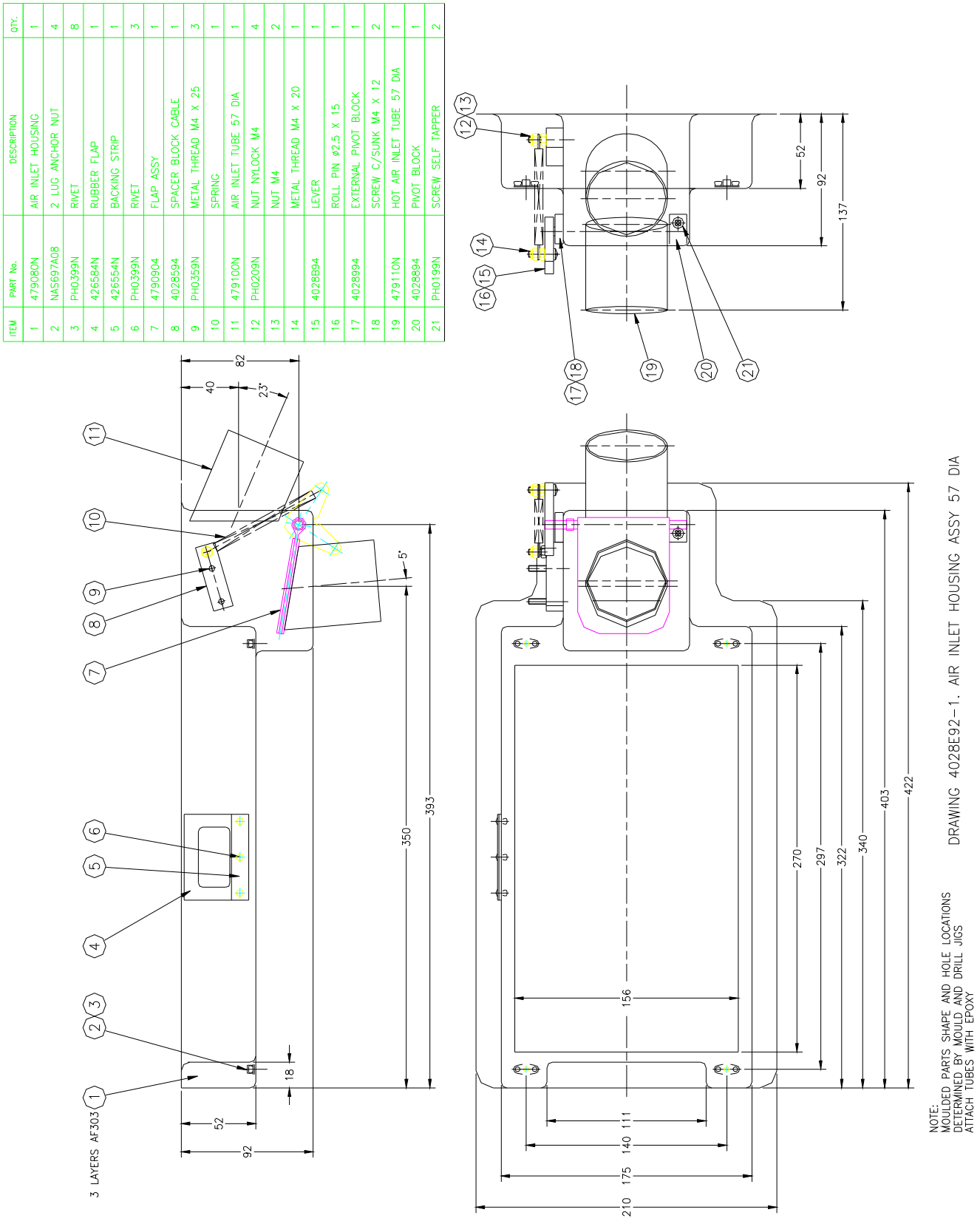


Figure 3 - Carburetor Heat Box

10.0 Fuel System FWF

10.1 Description

10.2 The fuel system on the firewall side consists of in the order that the fuel passes: Bulk head fuel fitting, electric boost pump, gascolator, mechanical fuel pump, carb.

11.0 Flexible Hoses

11.1 Inspection

After each 50 hours of operation, flexible hoses should be checked for leaks, cracks or other weathering damage.

Examine the exterior of hoses for evidence of leakage or wetness.

Replace any doubtful hoses.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

11.2 Repair

- Hoses should not be twisted on installation.
- Provide as large a bend radius as possible.
- Hoses should have a minimum of 12mm clearance from other hoses or surrounding objects or be tie-clamped to them.

➢ **NOTE:** Rubber hoses will take a permanent set during extended use in service. Straightening a hose with a bend having a permanent set will result in hose cracking. Care should be taken during removal so that hose is not bent excessively, and during reinstallation to assure hose is returned to its original position.

11.3 Reinstallation

1. Is the reverse of removal

12.0 Cooling Air Baffles

12.1 Description

The baffles installed around the engine direct the cooling air flow to the radiator and to other engine components to provide optimum engine cooling. The baffles,

air inlets and outlets and air scoops are accurately positioned to maintain engine cooling efficiency and their removal will cause improper air circulation and engine overheating.

12.2 Removal

Required tools:	Screw drivers 3/16 hex driver
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I ,owner

1. Remove only the upper cap head valve cover bolts that retain the airduct.

2. Remove the spring on the inboard side of the duct attached to the center cylinder.

12.3 Inspection and Cleaning

Engine baffles should be cleaned with detergent and water or a suitable solvent (Mineral Turpentine) to remove dirt and oil. Inspect baffles for cracks, splits or damage. Repair of cracks or tears can be made using the general fiberglass repair procedure outlined in the General Information Section, paragraph 5.4.5 Replace defective parts if worn beyond reasonable repair.

12.4 Repair

Repair of baffles is limited to the replacement of rubber seals. These may be replaced by removing the existing rubber seals, rubbing back the bonding face of the fiberglass baffles to bare glass (using 80 grit sandpaper or similar) and bonding new rubber strips in place with 5-Minute epoxy. Repair of cracks or tears can be made using the general fiberglass repair procedure outlined in the Structural Repair Section paragraph 2.

12.5 Installation

Reverse the Removal steps for installation.

13.0 Engine Controls

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line

Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I ,

13.1 Panel Throttle System

13.1.1 Description

An ACS friction lock throttle is mounted in the center of the instrument panel surround. This attaches directly to the throttle arm with a wire.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

13.1.2 Removal

1. Disconnect throttle cable from carb
2. Remove the locking ring on the back side of the instrument panel.
3. Disconnect the set screw from the ferrle in the end of the throttle arm.
4. Remove the throttle assembly.

13.1.3 Inspection

1. Inspect all parts for damage or wear.

13.1.4 Repair

1. Repair is limited to replacement

13.1.5 Reinstallation

1. Reverse steps from removal.

13.1.6 Adjustment

1. Adjust cable end connection at the throttle with the throttle arm at full open and the throttle knob at the panel full open. Primary idle position will be set by the stop.

2. Re-adjustment of the secondary idle stop (barrel with set screw) must be accomplished.

13.2 Choke

13.2.1 Description

The Choke Control is located in the center of the main instrument panel & is connected to the carburetor by a solid wire control cable.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I

13.2.2 Removal

1. Disconnect choke form carburetor by removing the cotter pin from the cable ferrule and pulling ferrule form choke arm.

2. Remove jam nuts from cable end adjuster at the carb bracket.

3. Remove jam nut form back side of instrument panel.

4. Pull cable from the aircraft.

13.2.3 Inspection

1. Check for kinks or breaks in the cable sheath. Check for smooth operation.

13.2.4 Repair

1. Repair is generally limited to replacement.

13.2.5 Installation

1. Reverse steps in paragraph 13.3.2

14.0 Ignition System

14.1 Description

Ignition is provided by a dual independent magneto module energized by rare earth magnets on the flywheel.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I ,

14.1.1 Removal

1. Disconnect spark lead wire form distributor cap.
2. Remove two SHCS bolts that hold magneto module in place.
3. Remove magneto module

14.1.2 Inspection

Inspect lead wire for insulation cracks and breaks. Repair of cracks in the lead wire insulation can be repaired with shrink tubing. Other repair is limited to replacement.

14.1.3 Repair

Repair is limited to replacement

14.1.4 Installation

1. Position the module in place. Place some Loctite 242 on the SHCS bolts and install the two SHCS bolts finger tight.
2. Turn the crankshaft until a magnet is directly opposite the module
3. Using a feeler gauge create a .010 inch gap between module and magnet. A non ferrous feeler gauge will help avoid interference from the strong magnet.

4. When happy with the gap tighten the two SHCS bolts.

14.1.5 Spark Plugs

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I ,

1. Removal
    1. Remove cooling air plenums
    2. Disconnect spark plug wires
    3. Using a 18mm socket remove the spark plug
2. Inspection
    1. Check for cracks in the insulator or damage to the electrode. Check the color of the electrode insulator. Medium brown indicates correct mixture. White or light gray color indicates a lean mixture. Black and sooty indicates a rich mixture.
3. Repair
    1. Repair is limited to cleaning and regapping if plug is in good shape. Otherwise repair is limited to replacement.
4. Installation
    1. Adjust plug gap to .022 inch.
    2. Apply nickel anti seize to threads
    3. Install CHT probe on plugs where appropriate by removing the compression washer from the plug, installing the probe washer, and reinstalling the compression washer.
    4. Install the plug into the head and torque to 8 ft lbs
    5. Reattach spark plug leads.

15.0 Exhaust System

15.1 Description

The exhaust system consists of individual exhaust manifolds attached to the engine block and a muffler assembly and springs which attach the muffler to the manifolds.

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I ,

15.2 Removal

1. Remove both top and bottom engine cowls.
2. Remove springs.

⬢ **WARNING:** Never remove coupling spring with a sharp object or one which can mark the spring material. A rounded screwdriver shank or a hook fashioned from ¼" bar stock is ideal.

3. Disconnect the carb heat and cabin heat scat hoses
4. Remove muffler assembly.
5. If necessary, remove exhaust manifolds from engine.
6. Reverse the preceding steps for installation.

15.3 Inspection

As all exhaust systems are subject to burning, cracking and general deterioration from alternate thermal stress and vibration, inspection is very important and should be carried out every 50 hours of operation.

In addition, an inspection of the exhaust system must be undertaken anytime exhaust fumes are noticed in the cabin.

1. Remove engine cowlings.
2. Inspect complete system, starting at the connection to the head. Inspect the securing bolts and move outwards looking for cracks.

Especially check areas adjacent to welds. Look for exhaust gas deposits in surrounding areas, indicating that exhaust gas is escaping through a hole or crack.

For a more thorough inspection, the following procedure is recommended.

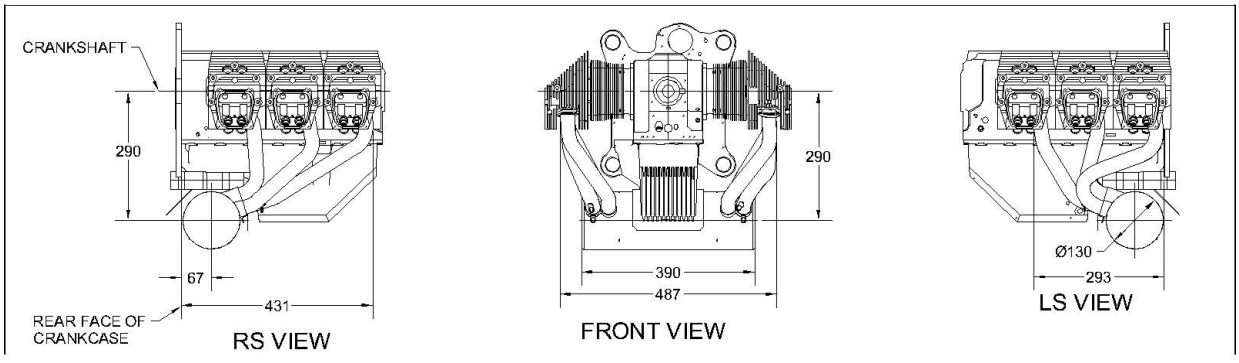
1. Remove manifolds and/or muffler.
2. Use rubber expansion plugs to seal openings.
3. Using a manometer or gauge, apply approximately 1-1/2 psi (3 inches of mercury) air pressure while the manifold and/or muffler are submerged in water. All leaks will appear as bubbles and can be readily detected.
4. It is recommended that any exhaust system component found to be defective is repaired or replaced with a new part before the next flight.

15.4 Repair

1. Cracks or leaks can be welded by a technician skilled in TIG welding of stainless exhaust pipes.
2. Cracks not suitable for welding require replacement of the exhaust component.

15.5 Reinstallation

1. Reverse steps in paragraph 15.2



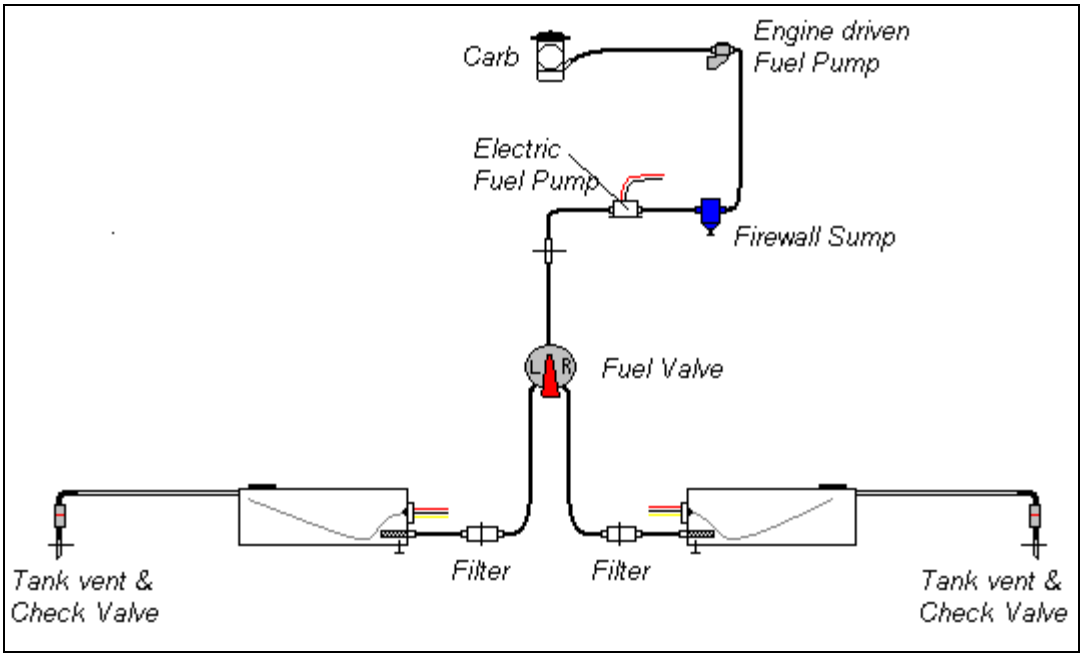
Fuel System

1.0 Description

The engine is equipped with a carburetor mounted behind the engine and a fuel pump at the starboard rear of the engine.

Refer to Engine Maintenance & Instruction Manual for carburetor jet removal, idle adjustment and carburetor bowl cleaning procedures.

- A schematic drawing of the system is shown.
- A fuel filter is mounted under each seat pan against the main spar box.
- The auxiliary electronic fuel pump is located on the firewall.
- The main fuel valve is located on the fuel console under the throttle.



Standard Fuel System

2.0 Fuel Tanks

2.1 Description

Fuel is stored in fiberglass tanks located in each of the aircraft wings. Fuel is routed in automotive ethanol resistant to a fuel selector in the panel sub console. From the fuel selector which allows for left right or off, the fuel goes to the firewall bulkhead and thru the engine compartment as described in the FWF section.

A vent line for each tank runs to the wing tip.

2.2 Removal

1. Wing tanks are not removable

2. Fuel lines can be removed

2.3 Inspection

1. Check for fuel stains near the inboard rib. If stains are evident determine whether stains come form leaking fittings or from the tank itself

2. Inspect lines for cracking or leaks.

3. Blow through vent lines to make sure they are clear

2.4 Repair

1. Wing tanks can be resealed (sloshed) if a leak appears. Contact manufacturer for procedure and materials

2. Fuel line repair is limited to replacement

Propeller

1.0 Description

1.1 Wood Propeller:

The Propeller is constructed from 4 laminations of approved species timber and is manufactured in accordance with the relevant Sensenich specifications. They are a single piece 2 blade propellers with a bonded in place polyurethane leading edge protection.

The propeller finish is a either a clear marine polyurethane varnish or epoxy paint.

1.2 Composite Ground Adjustable Propeller:

The propeller consists of a two piece machined anodized aluminum hub and two carbon fiber composite blades. A nickel steel leading edge protector is bonded to the leading edge.

The propeller finish is epoxy paint

- **WARNING:** MAKE SURE IGNITION SYSTEM IS "OFF" BEFORE COMMENCING ANY WORK ON PROPELLER.

- **WARNING:** DO NOT RUN ENGINE WITH PROPELLER DISCONNECTED OR ENGINE DAMAGE WILL RESULT.

2.0 Removal

Required tools:	SAE hand tools
Parts Required:	None
Level of Maintenance:	heavy
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I ,

2.1 Wood Propeller

1. Remove Machine Screws and Fiber Washers from Spinner.
2. Remove Spinner Cone.
3. Unbolt the six AN6-45A Propeller Bolts.
4. Remove Bolts, Aluminum Propeller Flange, Belleville Washers - 2 per Bolt, and Propeller.

2.2 Composite Ground Adjustable Propeller

1. Using a propeller protractor located 12 inches inboard from the prop tip take note of the prop angle relative to the top of the crankcase when the blades are in a horizontal position.

2. Remove Machine Screws and Fiber Washers from Spinner.

3. Remove Spinner Cone.

4. Remove the six hub bolts from the front half of the hub. Take care to support the prop blades when the hub is removed.

5. Remove front half of prop hub. Support the blades when removing the hub half. Remove the center positioning nylon block.

6. Remove the six hub retaining bolts in the rear hub half to completely remove prop and hub.

3.0 Inspection and Repair

Any service or repair must take account of the risk of subsequent Propeller failure. Therefore repairs are limited to the filling of small nicks in the Propeller. Maximum size of nicks approved for repair is:

- Those in Leading Edge: 4mm deep x 20mm long
- Those across the drive face (flat sides): 2mm deep x 6mm diameter or scratches not more than 0.5mm deep.

Repairs must also take account of the changes to balance of the Propeller and therefore the Propeller should be removed in accordance with the procedure described in Paragraph 15.5 above. It must be checked for balance prior to reinstallation, checked for tracking after reassembly (see Paragraph 15.6.1) and the Spinner checked for balance after reassembly.

Only nicks within the size tolerances described above may be repaired. All propellers with cracks or splits (or any delamination of the composite sheath in the case of sheathed Propellers) must be either Rejected as unserviceable or returned to Sensenich Wood Propeller Company for assessment and possible repair.

In composite leading edges, nicks of a size described above may be repaired by filling with epoxy resin and Fibreflock using the procedure outlined below – wood propellers only:

1. Remove Propeller as per Paragraph 2.1 or 2.2

2. Sand nick with abrasive paper to remove any fractured particles.

3. Mix resin carefully and thoroughly (equal parts resin and hardener) and thicken with Fibre Flock to form a paste.

4. Apply paste to sanded nick and allow it to cure in low moisture environment for 24 hours.

5. Lightly and carefully sand excess cured resin to a smooth surface matching exactly the previous airfoil.

6. Refurbish with Epoxy paint or varnish to match.

7. Rebalance Propeller.

8. Reassemble and replace Propeller and Spinner (see Paragraph 4).

9. Check Propeller tracking and Spinner balance (see Paragraph 7).

Damaged urethane leading edges should be referred to Sensenich Wood Propeller Company for repair.

4.0 Reinstallation

The Propeller is bolted to the Propeller Drive Flange with 6 x AN6-45A aircraft grade bolts attaching to AN365-624 nuts. There are 2 Belleville Washers between the Aluminum Propeller Flange and each bolt head. These Belleville washers must be fitted as shown in the attached drawing, i.e. domed side out on each washer. Bolts should be torqued to18 ft/lbs in accordance with the torque sequence shown in the attached drawing.

❖ **CAUTION:** The Spinner is an important and integral part of the propeller Assembly. It is essential to ensure adequate engine cooling. The aircraft must not be flown with the Spinner removed.

4.1 Wood Propeller

1. Ensure that Propeller Drive Bushings - 6 off, are in place in the Crankshaft Propeller Flange

2. Position the spinner back plate on the Crankshaft Propeller Flange and insert the prop drive bushings through the back plate.

3. Install prop over back plate and drive bushings. Make sure the prop and spinner back plate are in the right position for spinner cone installation.

4. Insert the AN6-45A bolts from the rear.

5. Install the crush plate over the bolts.

6. Install the two Belleville washers on each prop bolt with cupped sides toward the prop.

7. Install one AN960-616 washer on each bolt.

8. Install AN365-624 nuts on bolts. Use new nuts.

9. Torque to 18 ft lbs in the sequence indicated on the drawing attached.

10. Check tracking of Propeller by locating a fixed object on a flat floor so that it just clears the Propeller tips when rotating the Propeller by hand.

11. Check that each blade clears the object by the same amount. If the Propeller is outside the approved tolerance, refer to Sensenich Wood Propeller Company or Jabiru USA Sport Aircraft for service.

12. Maximum Tracking Error Tolerance is +/- 2mm.

13. Locate Spinner on Spinner Flange and fix with Machine Screws and fiber Washers.

4.2 Composite Propeller:

1. With the Sensenich prop drive bushings and spinner in place, position the rear hub half on the prop flange and install the six cap screws into the tapped prop bushings. Torque to 17 ft lbs.

2. Position the center nylon block and the two blades in place while putting the front hub half into position.

3. Install the six prop hub bolts with the stepped washers and tighten until just snug.

4. Using the propeller protractor set each blade to the same angle as they were before disassembly. Be precise as a small difference in angle will result in propeller vibration.

5. When happy with the blade angl;e torque the front half hub bolts to 17 ft lbs. Recheck blade angle to make sure there was no change.

6. Locate Spinner on Spinner Flange and fix with Machine Screws through fiber washers.

5.0 Approved Installations

The following combinations are approved.

Manufacturer	Model	Diameter	Pitch	Construction
Sensenich	W60ZK57G	60 Inches	57 inches	Wood
Sensenich	2A0J5R64Z-N	64 Inches	Ground Adjustable	Composite

6.0 Identification Stampings

Each wood propeller is marked with the particulars indicated below:

- Model Number
- The diameter and pitches in inches is part of model number.
- Manufacturer's Serial Number

7.0 Propeller Balancing Procedure

1. Propeller balance should be checked by locating a 16mm tube to firmly fit the centre mounting hole of the Propeller and balancing on "knife edges".

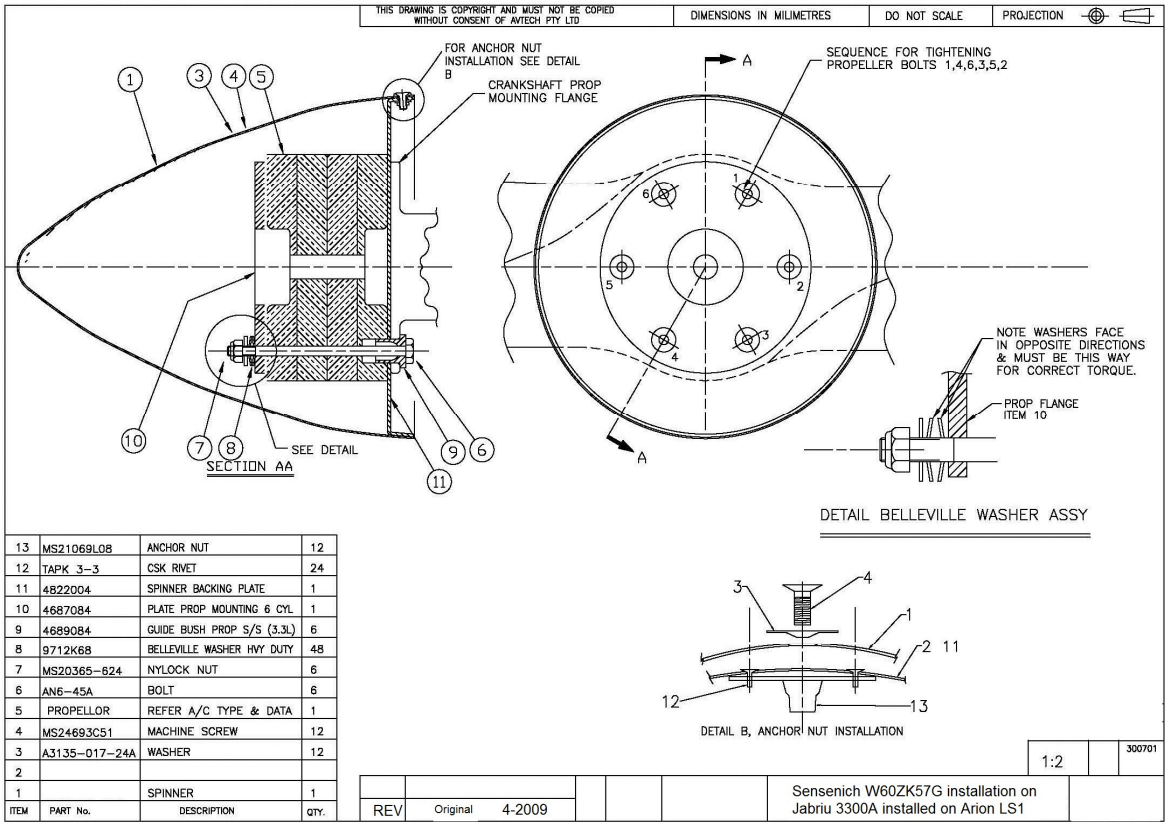
2. Tolerances: Imbalance shall not exceed the following limit whatever the position of the Propeller in the plane of rotation: 750 mm-gms (approximately 1 gm at the tip).

3. The balance may only be corrected by the application of epoxy paint or varnish as appropriate. Any other method of securing balance is PROHIBITED.

4. Propellers outside these limits should be rejected as unserviceable or returned to Sensenich Wood Propeller Company for assessment and possible repair.

8.0 Parts List

8.1 Wood Prop



ITEM	PART No.	DESCRIPTION	QTY.
13	MS21069L08	ANCHOR NUT	12
12	TAPK 3-3	CSK RIVET	24
11	4822004	SPINNER BACKING PLATE	1
10	4687084	PLATE PROP MOUNTING 6 CYL	1
9	4689084	GUIDE BUSH PROP S/S (3.3L)	6
8	9712K68	BELLEVILLE WASHER HVY DUTY	48
7	MS20365-624	NYLOCK NUT	6
6	AN6-45A	BOLT	6
5	PROPELLOR	REFER A/C TYPE & DATA	1
4	MS24693C51	MACHINE SCREW	12
3	A3135-017-24A	WASHER	12
2			
1		SPINNER	1

Figure 5 – Wood Prop and Spinner

8.2 Composite Propeller

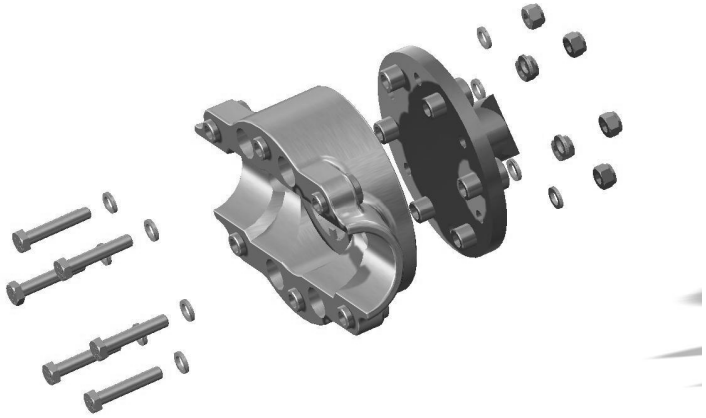


Figure 6

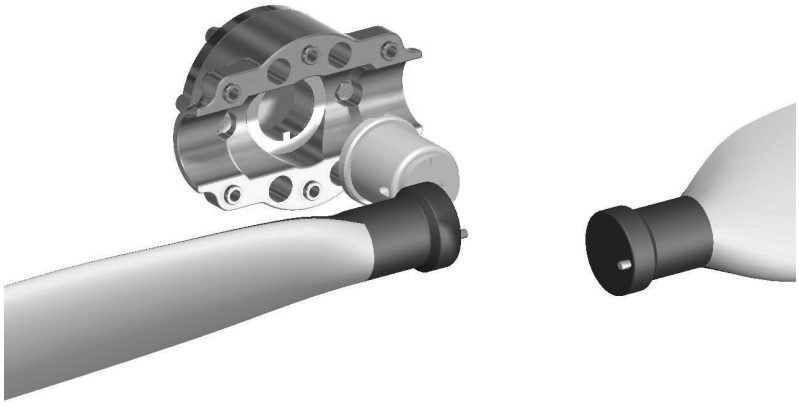


Figure 7 – Composite Prop

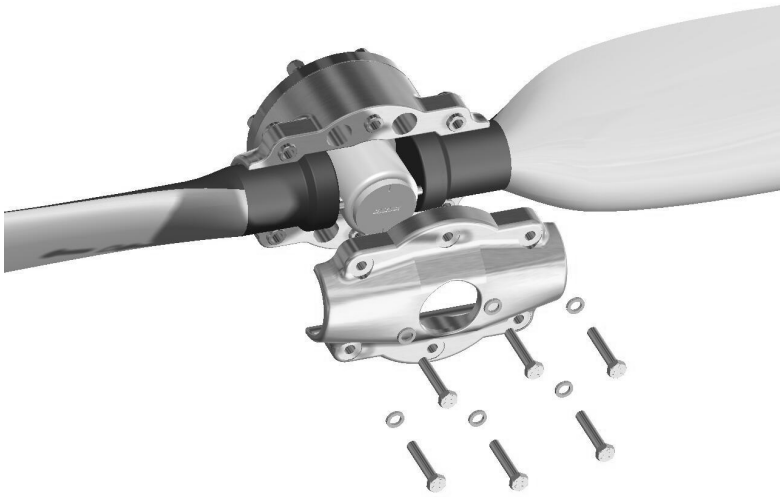


Figure 8 – Composite Prop

Figure 9 – Composite Prop

Utility Systems

1.0 Cabin Heat

1.1 Description

Cabin heat is provided by air from a cowl intake that is warmed over the muffler and delivered to a firewall mounted mixer box

Required tools:	SAE tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I,

1.2 Removal

1. Disconnect SCAT intake hose from muff and from cowl intake
2. Disconnect SCAT duct from muff and firewall mixer box
3. Loosen strap clamps from muffler to remove heat muff.
4. Firewall mixer box is riveted to firewall and can be removed only by drilling out the blind rivets.

1.3 Inspection and Repair

1. Check the SCAT for cracks or breaks. Replace if damage found.
2. Check the aluminum muff for cracks or deformation. Small cracks can be repaired by riveting a .025 aluminum patch over the crack. Otherwise repair is limited to replacement.
3. Inspect the firewall mixer box for cracks or damage. Replace mixer box if damage found.
4. Check push pull cable for smooth operation. Replace cable if damage found or smooth operation cannot be achiv=eved.

1.4 Reinstallation

1. Reverse steps in 1.2

2.0 Cabin Ventilation

2.1 Description

Ventilation is provided through vents attached to NACA inlets in the cabin side walls.

Required tools:	SAE tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I,

2.2 Removal

1. The Plastic vents are bolted to the inlet.
2. Remove the bolts to remove vents

2.3 Inspection and Repair

1. Check the vents for smooth operation and proper closure. Repair is limited to replacement.

2.4 Reinstallation

1. Reverse steps in 2.2

Instruments and Avionics

1.0 Description

A description of and instructions for the maintenance, repair, replacement, and installation of existing and additional instruments and avionics

2.0 Engine Information System

2.1 Description

EIS Model 6000J is used to monitor all engine parameters. The instrument monitors: RPM, OAT, CHT (6), EGT (6), Oil Pressure, Oil Temp, Voltmeter, Flight Timer, Hobbs Meter. High and low limits are programmed into the unit for all measureable parameters. A warning light flashes and the instrument screen flashes to highlight the out of parameter function

2.2 Removal

Required tools:	SAE tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, owner

1. Remove the four screws at the corners of the unit.
2. Pull the unit from the panel and disconnect the D Plugs from the rear of the unit.

2.3 Inspection

1. Inspection is limited to checking the cables and D Plugs for damage or bad pins.

2.4 Repair

1. Any other repair must be done by Grand Rapids Technologies at their facility.

2.5 Reinstallation

1. Reverse steps in 2.2
2. Run engine and check for proper operation.

3.0 Horizon Sport EFIS Display

3.1 Description

The EFIS display presents flight information including ASI, ALT, VSI, Heading, Attitude, Skid Ball, Wind direction and speed, heading bug, altitude bug and more. It also displays navigation information from an internal GPS receiver.

3.2 Removal

Required tools:	SAE tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, owner

1. Remove the four screws at the corners of the unit.

2. Pull the unit from the panel and disconnect the D Plugs from the rear of the unit.

3.3 Inspection

1. Inspection is limited to checking the cables and D Plugs for damage or bad pins.

3.4 Repair

1. Any other repair must be done by Grand Rapids Technologies at their facility.

3.5 Reinstallation

1. Reverse steps in 3.2

2. Power up unit and check for proper operation. Magnetometer calibration may have to be done and setting parameters may have to be reset. Consult the GRT Horizon Sport manual for guidance.

4.0 Garmin SL-40 Communications Radio

4.1 Removal

Required tools:	SAE tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, owner

1. Using the 7/64 allen wrench loosen the retaining screw through the radio face
2. Turn counterclockwise until it stops
3. Pull radio from tray

4.2 Inspection

1. Check pin connections at rear of radio for damage
2. Inspect tray for bent pins or loose connections
3. Inspect antenna coax for damage

4.3 Repair

1. Repair of bent pins can be made by standard radio repair procedures
2. Repair of the radio itself is limited to sending the radio to an approved repair center

4.4 Reinstallation

1. Reverse section 4.2

5.0 Garmin GTX 327 Transponder

5.1 Removal

Required tools:	SAE tools

Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, owner

1. Using the 7/64 allen wrench loosen the retaining screw through the radio face
2. Turn counterclockwise until it stops
3. Pull radio from tray

5.2 Inspection

1. Check pin connections at rear of radio for damage
2. Inspect tray for bent pins or loose connections
3. Inspect antenna coax for damage

5.3 Repair

1. Repair of bent pins can be made by standard radio repair procedures
2. Repair of the radio itself is limited to sending the radio to an approved repair center

5.4 Reinstallation

1. Reverse section 5.2

6.0 AmeriKing AK450 ELT

6.1 Removal

Required tools:	SAE tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, owner

1. Disconnect remote cable
2. Disconnect Antenna Coax
3. Loosen hold down clamp

6.2 Inspection

1. Check batteries for charge level
2. Check connections at antenna and remote cable

6.3 Repair

1. Cable connections can be replaced with standard radio connection procedures
2. Batteries – repair limited to replacement

6.4 Reinstallation

1. Reverse section 6.2

7.0 PS Engineering PM1000 Intercom

7.1 Removal

Required tools:	SAE tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P , LS R/M, LS R/I, Avionics repair station.

1. Remove the 2 knobs by way of the set screw at the base of the knob
2. Remove the 2 screws in the face of the intercom
3. Remove the sub D connector

7.2 Inspection

If removed for trouble shooting refer to PS engineering inspection guide

7.3 Repair

Return unit to PS Engineering for service.

7.4 Reinstallation

Reverse of removal

8.0 Garmin SL-30 Nav Comm Radio

8.1 Removal

Required tools:	SAE tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, owner

1. Insert 3/32” allen key into the removal drive lug located at the bottom of the radio.
2. Turn counter clockwise until radio backs out of tray fully.

8.2 Inspection

1. Check pin connections at rear of radio for damage
2. Inspect tray for bent pins or loose connections
3. Inspect antenna coax for damage

8.3 Repair

Return unit to garmin for repair.

8.4 Reinstallation

Reverse of removal

9.0 Garmin GTX330 Transponder

9.1 Removal

Required tools:	SAE tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I, owner

1. Insert 3/32” allen key into the removal drive lug located at the bottom of the radio.
2. Turn counter clockwise until radio backs out of tray fully.

9.2 Inspection

1. Check pin connections at rear of radio for damage
2. Inspect tray for bent pins or loose connections
3. Inspect antenna coax for damage

9.3 Repair

Return Unit to Garmin for Service

9.4 Reinstallation

Reverse of removal

Electrical System

1.0 Description

Electrical power is generated by a 20 amp permanent magnet alternator that is integral to the flywheel. AC current is rectified to DC current and is regulated to 14 volt DC by a solid state regulator mounted on the firewall. 14 volt DC current is routed from the regulator/rectifier to the Odyssey PC625 battery mounted on the firewall.

Aircraft electrical power is conducted from the battery to the main bus via a master contactor located on the firewall. The Master contactor is of the continuous duty type and is energized by the master switch. Power than goes thru a 30amp blade fuse (located on the firewall) to the main and instrument busses. Switches and circuit breakers feed and circuit protect the electrical appliances in the aircraft.

In general the system will contain a major wire bundle that runs from the panel, above the rudder pedal cross tube, and exit the firewall in the top center of the aircraft. This bundle contains all engine information data, power wires, ignition connections. IT is wrapped in a protective sleeve up to the firewall exit where the wires are separated and run to the respective components.

Main panel ground is maintained thru a forest of tabs both on the canopy tip up bulkhead behind the panel and above the battery on the firewall. All ground wires from the panel are connected to the cockpit forest of tabs. A 4 gauge ground wire runs from the tab plate to a large brass bolt that is connected thru the firewall to the tab plate on the firewall side. A 4 gauge ground from the firewall side tab than goes directly to the battery. All firewall forward grounds are connected to the firewall side tab plate.

A cockpit bundle than runs down the center fuel console to under the seats where it is separated and run to the respective components.

Electrical circuit diagrams are provided for the three available panel layouts and other standard and optional electrical devices in this section.

Consult the engine Instruction & Maintenance manual from jabiru JEM0002-1for guidance on removal, inspection, and reinstallation of the electrical generating system.

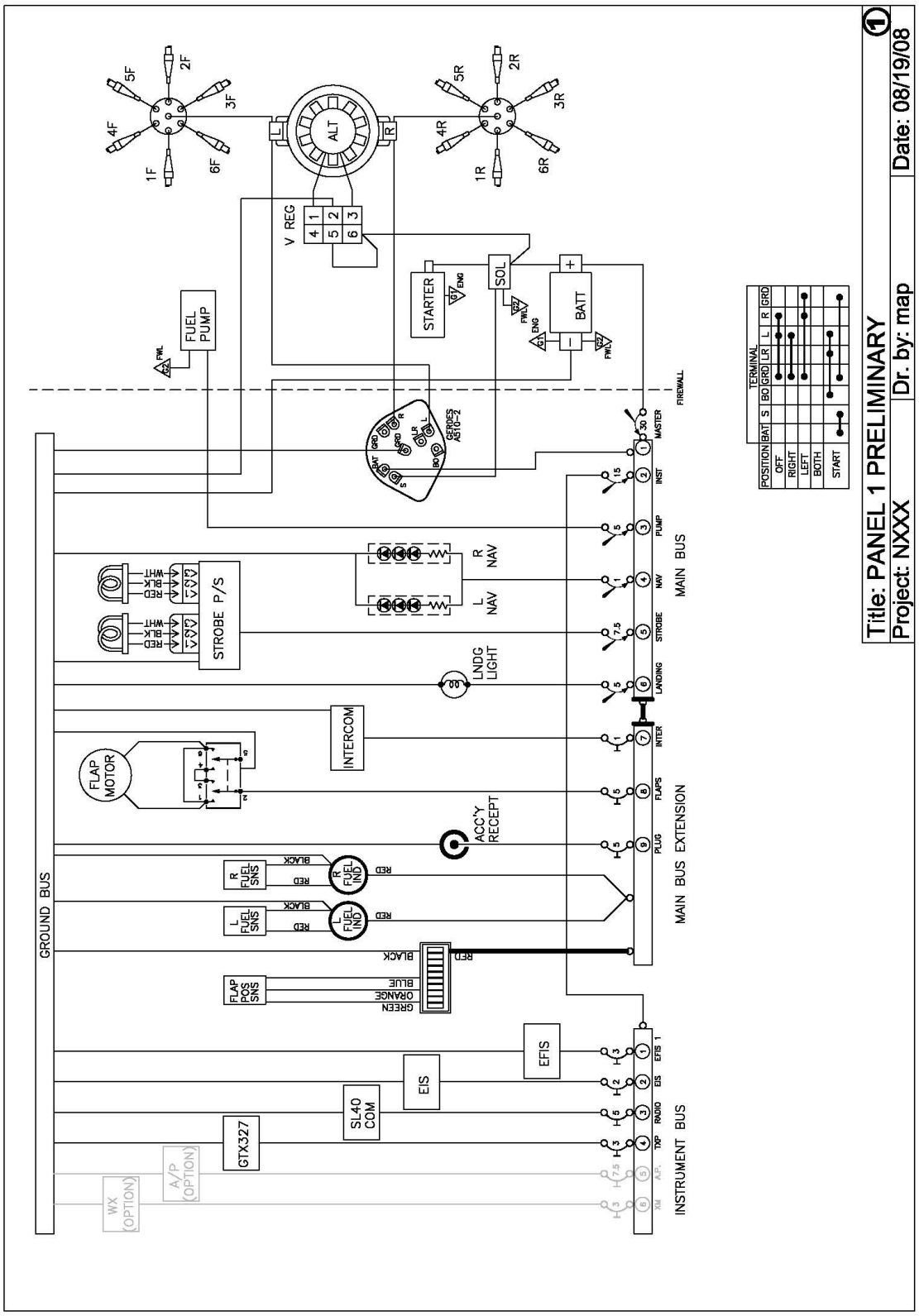
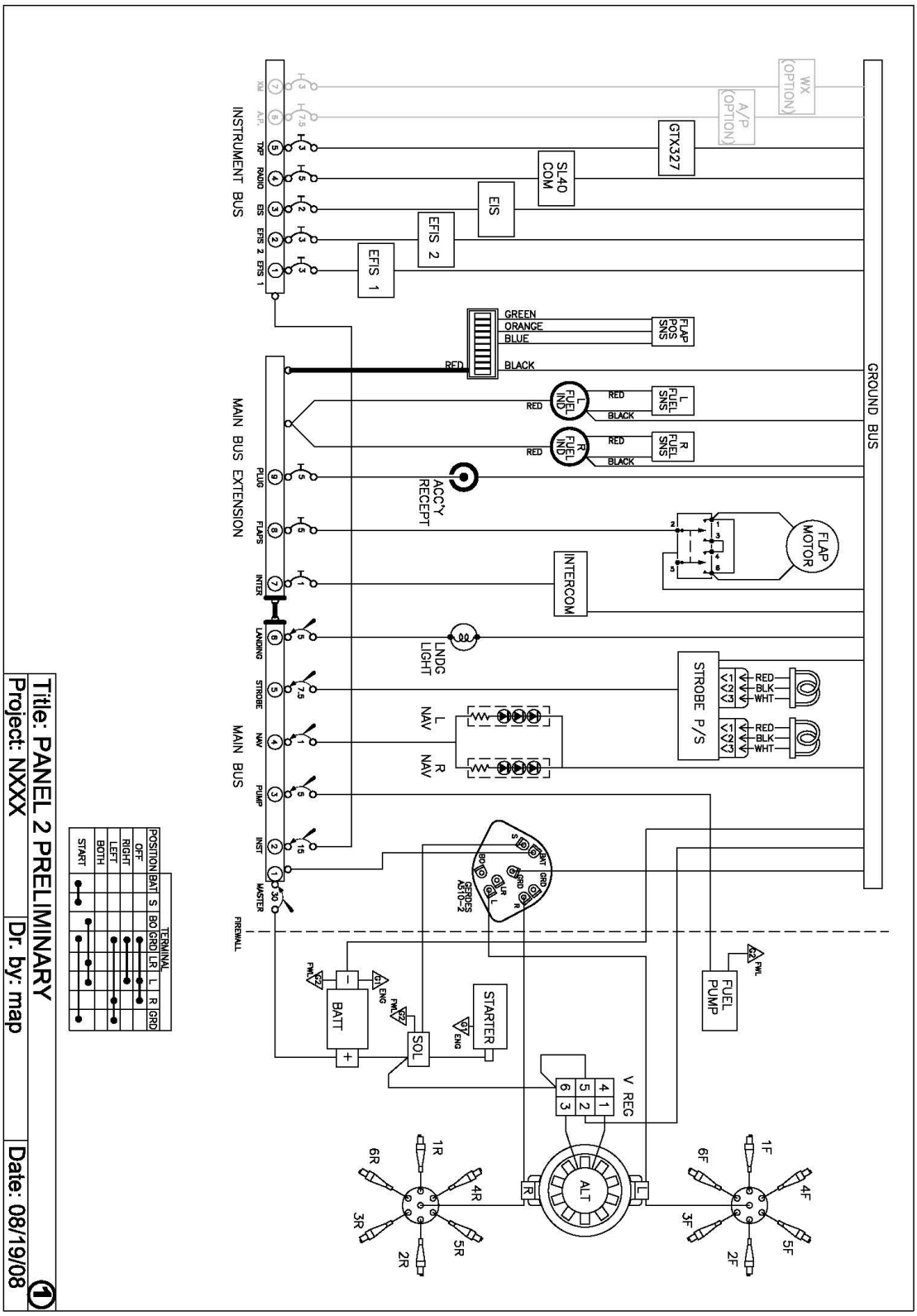


Figure 10 – Panel 1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Project: NXXX
Dr. by: map
Date: 08/19/08
INSTRUMENT BUS
MAIN BUS EXTENSION
MAIN BUS
GROUND BUS
FIREWALL
WX (OPTION)
A/P (OPTION)
GTX327
SL40 COM
EIS
EFIS 2
EFIS 1
GREEN
ORANGE
BLUE
RED
BLACK
FLAP POS SNS
L FUEL IND
R FUEL IND
FUEL SNS
ACCY RECEPT
FLAP MOTOR
INTERCOM
LNDG LIGHT
STROBE P/S
L NAV
R NAV
SERIES 3510-2
BATT
SOL
STARTER
FUEL PUMP
V REG
ALT
1F
2F
3F
4F
5F
6F
1R
2R
3R
4R
5R
6R
TERMINAL
POSITION
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GRD
OFF
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BOTH
START

Figure 11

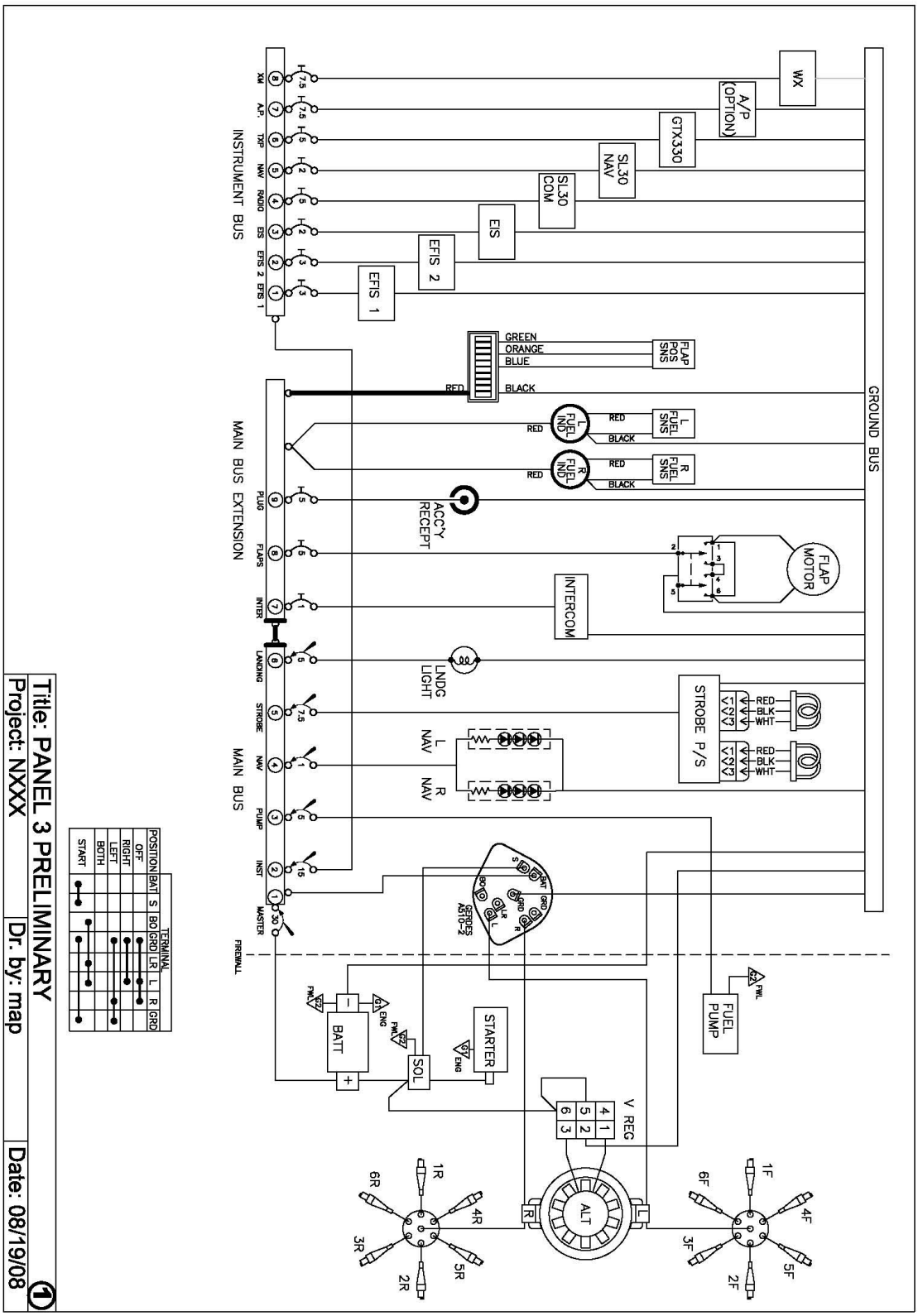
Title: PANEL 3 PRELIMINARY
Project: NXXX
Dr. by: map
Date: 08/19/08
INSTRUMENT BUS
MAIN BUS EXTENSION
MAIN BUS
GROUND BUS
FIREWALL
WX
A/P (OPTION)
GTX330
SL30 NAV
SL30 COM
EIS
EFIS 2
EFIS 1
GREEN
ORANGE
BLUE
RED
BLACK
FLAP POS SNS
L FUEL SNS
R FUEL SNS
ACC'Y RECEPT
FLAP MOTOR
INTERCOM
LNDG LIGHT
STROBE P/S
L NAV
R NAV
BATT
SOL
STARTER
FUEL PUMP
V REG
ALT
POSITION
OFF
RIGHT
LEFT
BOTH
START
TERMINAL

Figure 12

2.0 Removal

Required tools:	SAE tools
Parts Required:	None
Level of Maintenance:	Line
Level of Certification Required:	A&P, IA, LSA R/M, LSA R/I,

Most all electrical components firewall forward have been installed with ease of maintenance in mind. Before any electrical work can be conducted the ignition must be in the off position and the battery must be disconnected from the system.

Most electrical work on the panel can be accomplished by removing the EFIS system screens for access behind the panel.

The main cockpit bundle runs under the seats and can be accessed by removal of the seat pans. Items such as the Flap motor, fuel probe access holes, flap indicator and such are mounted under the seats.

Many remote mounted components, such as ELT, autopilot servos, antennas are mounted under the baggage floor or in the tail cone. Those can be accessed by removing the baggage floor and vertical baggage bulkhead. **CAUTION** when working in the back of the aircraft it is advised to place a tail stand of some sort to keep the aircraft from falling on the rudder.

1. Ignition key off.
2. Battery disconnected from system
3. When removing any component from the system, clearly label all wire connections and make note of the units orientation. Make sure powers and grounds are clearly marked. If equipped pull the breaker for the component being removed.
4. Once the unit is removed replace any hardware removed to the stud or attach point that is was removed from. This will prevent losing bolts, nuts, washers/

3.0 Inspection

1. General inspection of the units for corrosion especially electrical connections, such as studs or pins should be made.
2. Check for burnt areas or melted components suggesting an overload of the unit.
3. Frayed or chaffed wires especially at bulkhead connections or around secured portions.

4.0 Repair

1. Repair is limited to replacement for components. Wire can be repaired using acceptable methods and general wire gauges listed below.

2. CHT and EGT probe leads are factory built by the OEM and can not be repaired, repair is limited to replacement.

3. Wire gauges are as listed below.

1) Main Power	4 gauge welding cable.
2) Main Grounds	4 gauge welding cable.
3) Power to panel	10 gauge stranded
4) Alternator out	16 gauge
5) Regulator out	16 gauge
6) Ignition key out	16 gauge shielded
7) Assy grounds FWF	16 gauge
8) Panel grounds	16 guage
9) Panel power dist	16 gauge
10) EFIS loom	See OEM manual
11) EIS loom	See OEM manual
12) All other general	16 gauge
13) Nav/strobes	4 wire 20 gauge shielded
14) Landing/taxi lights	5 wire 20 gauge shielded
15) Head phone jacks	4 wire 20 gauge shielded

5.0 Reinstallation

1. Installation of OEM components should follow OEM installation instructions.

2. Installation is reveres of removal for components.

3. Re-connect the battery to the system.

4. With power applied, push the breaker in 1 at a time for each component removed

5. Verify that the component removed is now powered up and working correctly.

Structural Repair

1.0 Description

No structural repair is authorized without manufacturers consent and procedures other than those included in this manual. Arion Aircraft LLC will provide specific or expanded procedures for any structural repair after receipt of full details of the extent of the damage.

2.0 General Non Structural Fiberglass Repair

Tools needed: Sandpaper, epoxy brush, mixing cups and stir sticks

Parts needed: 9 oz fiberglass cloth, System 2000 epoxy or other aircraft laminating epoxy like Aeropoxy.

Level of certification: A&P or LSA R/M

Most non structural fiberglass is in wing tips, horizontal or elevator end caps, cowls, fairings or wheel pants. These parts are generally made from three layers of 9 oz fiberglass or from a sandwich of two layers glass, one layer coremat, and another two layers of glass. Repair of breaks, delaminations or tears can easily be made by applying fiberglass cloth to one or both sides of the damage area.

The epoxy used in Lightning aircraft manufacture is System 2000 from Fiberglast Developments Inc. System 2000 is the preferred repair epoxy. Other laminating epoxy resins can be used if they have similar properties.

Remove paint and gel coat from the damaged area extending to an area approximately two inches beyond the damage area. Take care to sand only paint and gel coat – not into the glass fiber as well. To prep non gel coated areas rough up the fiberglass and epoxy coat with 220 grit sandpaper to allow mechanical adhesion of the repair epoxy.

Apply a light coat of epoxy to the repair area. Align the broken parts. Apply two layers of 9 oz fiberglass cloth to the area and wet out. Allow to cure. Apply two layers of cloth to the other side if necessary.

3.0 Structural Fiberglass Repair

Tools needed: Sandpaper, epoxy brush, mixing cups and stir sticks

Parts needed: 9 oz fiberglass cloth, System 2000 epoxy or other aircraft laminating epoxy like Aeropoxy, Dacron peel ply.

Level of certification: A&P or LSA R/M

It is strongly recommended that any damage to fiberglass in structural areas be reported to manufacturer and manufacturer's advice be considered in the repair process.

Wrinkles or folds in fuselage skin generally may be repaired by applying four layers of 9 oz glass cloth to each side of the fold.

Surface prep:

Remove paint and gel coat from the damaged area extending to an area approximately two inches beyond the damage area. Take care to sand only paint and gel coat – not into

the glass fiber as well. To prep non gel coated areas rough up the fiberglass and epoxy coat with 220 grit sandpaper to allow mechanical adhesion of the repair epoxy.

Before applying the fiberglass repair make sure that repair area is put back in proper alignment and position as it was in the undamaged state.

Apply a light coat of epoxy to the repair area. Apply the glass cloth and wet out with epoxy. Cover with peel ply, smoothing out any folds or wrinkles in the cloth. Peel ply will make the finishing and paint process easier.

4.0 Damage to Wing or Horizontal Tail

Damage to skin may be repaired using the procedures in this manual as long as there is no damage to underlying structures.

Damage to leading edge skin:

Cut out damaged area. Prep area per instructions above.

Insert Styrofoam into leading edge area to maintain shape. Cover with four layers of 9 oz cloth per instructions above. Overlap damaged area by two inches. Apply peel ply. Finish and repaint per procedures in the paint & finishes section.

5.0 Damage to Underlying Structure

Any damage of any kind to structures that support the skin of any of the aircraft structural components must be reported to the manufacturer. The manufacturer must evaluate the damage and in consultation with Arion Aircraft LLC will make a determination of the reparability of the damage. The manufacturer will then issue an appropriate repair procedure or will specify that components must be replaced.

The integrity of the underlying structure is critical to the structural integrity of the aircraft. Any damage to any of the underlying structure is considered major damage and careful application of specific repair procedures provided by the manufacturer is required.

Paintings and Coatings

6.0 Description

The paint finish is an automotive base coat / clear coat system similar to modern automobiles.

7.0 Repair

Repair procedures are similar as well to those used in auto body shops.

7.1 Paint Repair

Paint repair whether over a fresh fibreglass repair or simply over a scrape or mar:

Sand off existing clear coat and base color coat over and around the repair area. Extend the surface prep about 2 inches from the damage. Sand off the sealer / primer as well. Be careful to not remove the underlying gel coat and use extreme caution to avoid sanding into or cutting any fibreglass strands.

Fill and smooth the area with Evercoat Lightweight Fiberglass body filler or equivalent. Apply a coat of automotive primer sealer primer over the damage area. When dry follow with a base color coat and clear coat. Jabiru USA uses PPG brand but any compatible automotive base coat / clear coat is acceptable. After paint cures use a buffer to blend the repair area into the rest of the paint.

7.2 Complete Repaint

For a complete repaint the clear coat and most of the base coat and primer sealer should be removed. Wet sanding is the preferred method to remove paint. Take care not to sand through gel coat or fibreglass strands.

Repaint with a quality brand of primer sealer that includes a UV barrier , base color coat, and finally a clear coat following the paint manufacturer's instructions.

Appendix

Document Name	Document number
LS1 Parts List	AA-PL-LS1
25hrand 50hr inspection checklist	AA-2550ISP-LS1
100hr and condition inspection checklist	AA-100CONISP-LS1
Service Difficulty report	AA-501