ZODIAC CH 601 XL

SLSA

Continental 0-200 Engine

MAINTENANCE MANUAL

Dec. 05

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SERVICE MANUAL UPDATE LOG

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0	**Dec. 05**	AT ISSUE	

Note: 0.1 and 0.2 with Update sheet(s) are replaced for each new update.

SECTION 1

GENERAL

INTRODUCTION

This manual contains service and maintenance instructions for the ZODIAC, designed and manufactured as a versatile two-seat aircraft

In the text, reference is made to the following publications:

- General: Pilots' Operation Handbook ZODIAC SSLSA

- ZODIAC parts assembly drawings. VERY important to have when repairing and assembling the airframe. Each CH 601 comes with detailed parts assembly drawings.

- Engine: Operator's Manual from the engine manufacturer

- Engine: Maintenance and overhaul Manual from the engine manufacturer

- Propeller: Prop. book (instructions for use and care) from the propeller manufacturer

FAA AC-43.13.-1B and 2A Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair is a useful handbook.

The description of the aircraft included in this section is limited to general information; however, the figure gives specific external dimensions.

Before performing maintenance on the aircraft, make sure that you are authorized to do so. See Appendix 2.

When disassembling and reassembling the aircraft, see Appendix 1.

DESCRIPTION

The ZODIAC is a single engine, two-seat, low-wing monoplane of all-metal construction.

WING: The wing is of all-metal stressed-skin, full cantilever, low-wing design, consisting of two wing panels bolted to a spar box assembly in the fuselage. The ailerons are cable and push rod controlled. The wing trailing edge hinged flaps are electrically operated.

EMPENNAGE: The empennage consists of the rudder, stabilizer, and elevator trim tab.

FUSELAGE: The fuselage consists of three basic sections: the engine section, the cabin section, and the sheet-metal tail cone.

LANDING GEAR: The tricycle landing gear is of the fixed type, consisting of a nose wheel and two main wheels.

HYDRAULIC SYSTEMS: The optional dual brake system is operated by master cylinders.

ENGINE: The aircraft is powered by one horizontally opposed Continental 0-200 four-cylinder air-cooled engine.

PROPELLER: The propeller used is a two blade wood fixed pitch propeller.

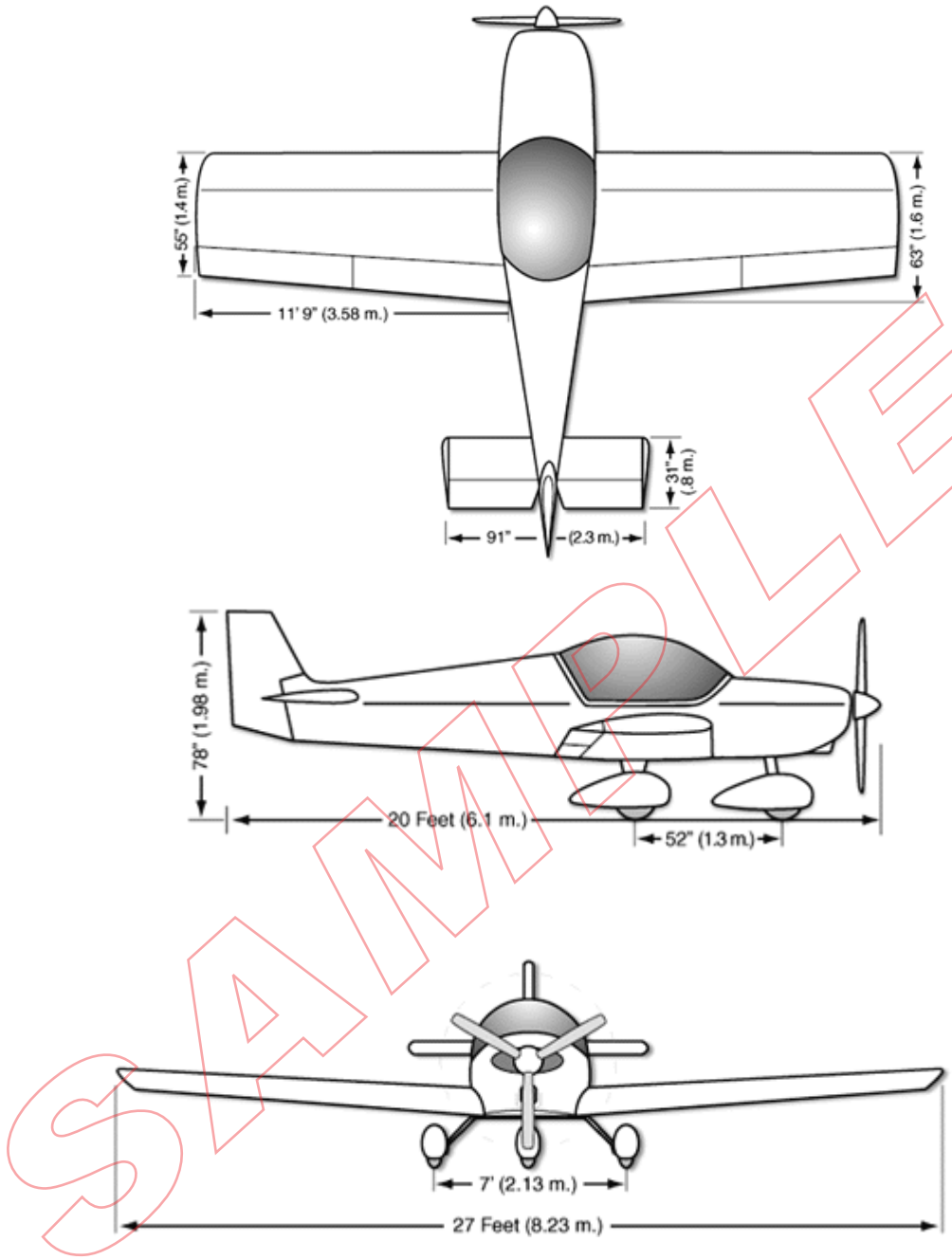
FUEL SYSTEM: The fuel system on the ZODIAC consists of aluminum tanks in the wings, one engine-driven pump, and one electrical auxiliary pump.

FLIGHT CONTROLS: The flight controls are conventional equipment, consisting of a center Y stick that control ailerons and elevator, and pedals which operate the rudder. Duplicate rudder controls are provided for the co-pilot. Dual sticks are optional.

RADIO: Provisions for radio installations consist of microphone and headset jacks and mounting brackets, necessary wiring, and panel space for extra radios.

CABIN HEATER, AND FRESH AIR SYSTEM: Heated air for the cabin is obtained directly from the exhaust system muffler shroud. Fresh air is supplied to the cabin through two individual and orientable air inlet vents in the right and left fuselage sides.

INSTRUMENTS: Provisions for optional instruments are provided.



CH 601XL SLSA GENERAL DIMENSIONS

SECTION II

HANDLING AND SERVICING

GENERAL

This section provides ground handling and servicing instructions.

Recommended ground handling procedures, and recommended methods of servicing are provided in following paragraphs. If trouble or damage to the aircraft is discovered during ground handling or servicing, refer to the appropriate section for the system concerned. Lubrication is treated as a separate function.

ACCESS PROVISIONS

Access door on rear fuselage is located on the bottom of the aircraft. Aileron belcrank access doors are located on the bottom– center of each wing, fuel strainer access panels are located beside left and right wing fuel drain valves. Oil door is located on the top engine cowling. Engine top and bottom cowlings must be removed for engine access. Seats and cabin side upholstery can be removed. Access doors provide access for purposes of service and maintenance.

GROUND HANDLING

GENERAL. The aircraft must not be pushed, pulled, or lifted by any other means than those described. Procedures are given for the proper execution of all necessary handling operations and, if the instructions are followed, damage to the aircraft or its equipment will be prevented.

Caution: Use the utmost care at all times during ground handling operations.

STEP AND WALKWAYS

A fixed step is located on each side, below and aft of the inboard end of the wing trailing edge. The walkway is made up of a non-skid compound applied to the wing surface.

Caution: Walk on the walkways only, to avoid damage to the wings.

WEIGHT & BALANCE AND EQUIPMENT LIST

See Flight Manual

HOISTING

Nose Gear Hoisting - Remove the cowl and lift the aircraft with a hoist attached to the metal loop on top of the engine.

Main Gear Hoisting - Lift the aircraft one side at a time and insert a padded sawhorse or equivalent under wing at main wing spar and rib rivet line.

LEVELING

The aircraft may be leveled while the wheels are on the ground or during the weighing procedure while the wheels are on scales. Leveling the aircraft for purposes of reweighing or rigging is accomplished as follows:

Position the level on the canopy sill (upper fuselage longeron). See Weight & Balance drawing in Pilots Operating Handbook.

To put the airplane in a longitudinally level position, either on scales or on the floor, deflate the nose wheel tire until the proper position is reached (or add shims under the two main wheels).

To level the airplane laterally, place a level across the cabin on the right and left longerons, shim one main wheel as required. (repeat longitudinal leveling).

WEIGHING PROCEDURE - See Pilots Operating Handbook.

TIEING DOWN

Secure tie-down ropes to the wing tie-down rings and the tail skid at approximately 45° angles to the ground. Leave sufficient slack to avoid damage to the aircraft when the ropes contract due to moisture.

TOWING

Move the aircraft using the nose wheel optional tow bar hooked into the nose gear strut rings.

Caution: Remove the tow bar when not in use as the propeller may hit it when engine is started.

SERVICING

FUEL SYSTEM

The fuel tanks and sumps are drained through the push-to-drain valves under the wings just rear of the wheels.

The fuel strainers at the tank outlets are accessed for removal and cleaning through the access panels beside the push-to-drain valves.

Gascolator is located under the fuselage near the firewall.

LUBE OIL SYSTEM

FILLING ENGINE SUMP

Fill the oil tank with the specified lubricating oil. (Engine Manual.)

BRAKE SYSTEM

FILLING BRAKE CYLINDER RESERVOIRS

The brake cylinder reservoirs are an integral part of the master cylinders on pilot side. They must be checked at every 50-hour inspection and replenished when necessary. No adjustment of brake clearance is necessary on the brakes.

DRAINING BRAKE SYSTEM

To drain the brake system, disconnect the hydraulic brake lines from the brake assembly of the main gear, and place the end of each line in a suitable container. Slowly pump the brakes until fluid ceases to flow. To clean the brake system, flush with denatured alcohol.

LUBRICATION

Airframe must be lubricated every 50-hours. This includes all moving parts including aileron-flaps-elevator and trim piano hinges, all control bearings, nose wheel bearing struts, aileron bellcranks, etc. Wheel bearings need to be repacked and grease each time new tires are installed.

LIST OF WEARABLE REPLACEMENT PARTS:

- Oil filter – Cessna 150 type. Order from AMD, Aircraft Spruce & Specialty, etc.
- Carb. air filter – Cessna 150 type. Order from AMD, Aircraft Spruce & Specialty, etc.
- Spark plugs – Auto type. Order from AMD, Aircraft Spruce & Specialty, etc. See engine manual for type.
- Wheels and brakes – Cessna 150 type. Order from AMD, Aircraft Spruce & Specialty, etc.

SECTION III

INSPECTION

GENERAL

This section provides instructions for conducting scheduled inspections, unscheduled inspections, replacement of time limited parts and corrosion control. Repair or replacement instructions for those components found to be unserviceable are in the sections covering the applicable aircraft system.

Lubrication and servicing intervals should be adjusted to take into account the aircraft operating conditions.

All of the inspections are generally visual inspections unless otherwise specified. They are to be performed by trained and qualified personnel using appropriate tools and adequate lighting.

Prior to commencing the scheduled inspections listed in Table 1:

a. Thoroughly clean the aircraft and engine;
b. Remove and or open the necessary inspection and access panels, the engine cowlings, the spinner and the optional wheel fairings; and
c. Review the aircraft records for outstanding "SAFETY ALERTS", "SERVICE BULETINS" and "NOTIFICATIONS". You must contact the manufacture for the latest list of above documents.
   Manufacturer can be contacted by telephone at 478-374-2759 or by fax at 478-374-2793 or by mail at 415 Airport Road, Eastman GA, 31023 USA.
   For engine and propeller Service Bulletins, Airworthiness Directives, and Service Letters, contact the original manufacturers.
   Section F2295 of the ASTM SLSA lists the Owner/Operator Responsibilities for Continued Operational Safety Monitoring of a Light Sport Airplane. Complete and submit Form #1 for maintenance, service and safety difficulties.

Note: In addition to the tasks specified in Table 1, do the preflight inspections described in the Owner's Manual.

SCHEDULED INSPECTIONS

Scheduled inspections include the items listed in Table 1 Inspection Form, the overhaul requirements for the engine and propeller, the calendar time inspections and the one-time inspections done following specified tasks. Do the following:

Inspection Form Requirements

Perform the tasks in Table 1 at the intervals shown.

Overhaul Requirements

a. Overhaul the engine (Continental 0-200-A (82)). See engine manuals
b. Overhaul the propeller. See propeller manufacturers instructions

Replacement of Time Limited Parts

No parts listed at this time.

UNSCHEDULED INSPECTIONS

Unscheduled inspections must be performed anytime that unusual operating conditions are encountered which may affect the integrity or airworthiness of the aircraft. Actions to be taken following the reporting of such events are as follows:

Hard Landing	a) Check ELT for inadvertent activation. b) Check main gear spring for deformation. c) Check nose gear and firewall for damage.
Propeller Strike	a) Check propeller for damages. b) Check prop flange re crankshaft damage. C) Check engine manufacturers Service Manual
Lightning Strike	a) Check ELT for inadvertent activation. b) Check skins for damages. c) Check control connections for damages.
Bird Strike	Check the area for damages
Exceedence of Operational Limits	Refer to applicable manuals
Tire Change	Replace tires when required. Do not wait until next scheduled inspection if tire(s) need to be changed.

CORROSION CONTROL

To avoid the deterioration of the ZODIAC SLSA aircraft due to the effects of corrosion, monitor the condition of protective coatings on exterior and interior surfaces. If damage to coatings is found, restore surfaces prior to the occurrence of damage caused by environmental effects.

INSPECTION SCHEDULE

The required inspection tasks and their intervals are listed in Table 1. The tasks are placed in seven groups: Propeller, Engine, Cabin, Landing Gear, Wing, Fuselage and Empennage.

The first column of Table 1 states the task to be performed; the second column states the applicable references(s). The third column is divided into four sub-columns, each of which corresponds to an inspection interval. The last column may be used to verify that a task has been completed. Perform the stated tasks at the intervals shown when a plus (+) symbol is shown in an interval column. A minus (-) symbol indicates no maintenance action is required. Tasks may be performed sooner but not later than the stated intervals. If done sooner, tasks must next be performed at the stated interval (e.g. at 790 flight hours airframe time, a 100 hour task is performed 10 flight hours before it is due. It must next be performed 100 hours later, at 890 flight hours (or sooner).

Operational checks are tasks that determine that an item is fulfilling its intended purpose. No verification of meeting tolerances is required.

Functional checks are tasks which determine if one or more functions of an item are performing within specified limits. Quantitative checks must be performed.

Useful Note: The 50 hour inspection has a tolerance of ± 16% (i.e. between 42 and 58 hours)

Perform inspections as per section VII of Engine Operators Manual.

TABLE 1 – ZODIAC INSPECTION FORM

Make / Model **ZODIAC**	**Serial No.**	**Airframe Hours**	**Type of Inspection** (Circle One)
	Registration No:	Engine Hours	50 100 500 1000

Symbols: + Indicates perform task, - Indicates do not perform task

Task	**Refer to**	Intervals (Flight Hours) 50	100	500	1000	**Initials**
Propeller Group						
1. Check propeller bolts for torque and safeties.	Sensenich Continued Airworthiness Requirments	+	+	+	+	
2. Inspect blades and hub for cracks, corrosion, damage, etc.		+	+	+	+	
3. Inspect spinner and backing plate.		+	+	+	+	
Engine Group **Danger** Ground magneto primary circuit before working on engine.	See Engine Operators Manual.					
1. Check for oil/fuel leaks.		+	+	+	+	
2. Check for particles on oil suction screen and sump drain plug.		+	+	+	+	
3. Drain oil and refill. Safey.		+	+	+	+	
4. Perform cylinder compression test.		-	+	+	+	
5. Clean the spark plugs. Adjust gap	Section 6.5	-	+	+	+	
6. Check and set magneto timing. See 29.		-	+	+	+	
7. Check magneto breaker points and lubricate breaker point felt.		-	+	+	+	
8. Clean oil suction and oil pressure screens		+	+	+	+	
9. Inspect the wet type foam air filer.		+	+	+	+	
10. Inspect the exhaust manifold for cracks (carb and cabin heat shroud removed).		+	+	+	+	
11. Inspect the heat shrouds for cracks, etc.		-	+	+	+	
12. Inspect the motor mount fuselage and engine attachment points and braces.		+	+	+	+	
13. Inspect the rubber engine vibration isolating mounts for cracks damage, etc.		+	+	+	+	
14. Inspect engine for security of all attaching hardware (nuts, bolts, screw, etc.)		-	+	+	+	

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Task	**Refer to**	Intervals (Flight Hours)				**Initials**
		50	100	500	1000	
15. Perform valve clearance check		-	+	+	+	
16. Inspect the ignition harnesses for general condition.		+	+	+	+	
17. Inspect the carburetor air intake box for leaks.		+	+	+	+	
18. Drain carburetor and clean carburetor fuel strainer and strainer bowl.		-	+	+	+	
19. Inspect engine cowlings for cracks, damage, loose rivets, etc.		+	+	+	+	
20. Inspect the vacuum pump, lines and separator,		-	+	+	+	
21. Change the Oil filter.		+	+	+	+	
22. Inspect the oil radiator, oil lines and attaching brackets (if installed).		+	+	+	+	
23. Clean and flush oil radiator (if installed).		-	-	+	+	
24. Inspect engine, firewall and firewall seals for deterioration, cracking, etc.		-	+	+	+	
25. Inspect cabin heat control box for cracks, condition, etc.		+	+	+	+	
26. Inspect engine controls for defects, safeties, etc. Check control travels.		-	+	+	+	
27. Check starter, alternator, fuel pump and vacuum pump for proper mounting, security and defects		-	+	+	+	
28. Perform operational checks of all systems (fuel, oil, heating, etc.)		-	+	+	+	
29. Run engine and check:						
- Magneto drop:		+	+	+	+	
- Full power RPM		+	+	+	+	
- Idle RPM		+	+	+	+	
30. Check and adjust magnetos only if discrepancies were noted in step 29.						

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Task	**Refer to**	Intervals (Flight Hours)				**Initials**
		50	100	500	1000	
CABIN GROUP						
1. Inspect the control stick(s), linkages, column and torque tube assemblies for cracks, distortion, etc.		-	+	+	+	
2. Check controls for ease of operation and correct travel.		+	+	+	+	
3. Check operation lights.		+	+	+	+	
4. Check operation of all circuit breakers and switches.		+	+	+	+	
5. Check flight control cables for routing, fraying, corrosion and tension.		-	+	+	+	
5a Inspect flight control turnbuckles, pulleys and guides for wear, damage and safeties.		-	+	+	+	
6. Check elevator trim tab switch/ indicator for correct operation.		+	+	+	+	
7. Inspect the flap motor actuator, extension tube, actuator lever, interconnect tubes, control levers and control rods for cracks, distortion, security, etc.		-	+	+	+	
7a Inspect flap indicator cable and indicator for security and correct Operation.		-	+	+	+	
8. Perform functional check of the flap system.		+	+	+	+	
9. Inspect windshield for cracks, cleanliness, etc.		+	+	+	+	
10. Check cabin finish for damage, deterioration, etc.		-	+	+	+	
11. Perform operational check of the fuel selector valve and safety lock.		+	+	+	+	
12. Inspect canopy fit and latching mechanisms.		+	+	+	+	
13. Check upholstery for condition		+	+	+	+	

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Task	**Refer to**	Intervals (Flight Hours) 50	100	500	1000	**Initials**
14. Inspect safety belts, attaching hardware, etc. for condition security.		+	+	+	+	
15. Verify appropriate compass correction card is in aircraft.		-	+	+	+	
16. Clean or replace filters in the gyro vacuum system (if installed).		-	+	-	+	
17. Inspect radio installations and mounting hardware for security, condition. etc.		-	+	+	+	
18. Inspect electrical wiring for condition, security, routing, damage, etc.		-	+	-	+	
19. Check condition and security of all bonding wires.		-	+	-	+	
20. Inspect antenna installations for condition, security, etc.		-	+	+	+	
21. Inspect instruments for security, markings, condition and perform operational check.		-	+	+	+	
22. Inspect fuel sender units for security, leaks, etc.		-	-	-	+	
23. Inspect fuel primer (if installed) for security, condition, leaks, etc.		+	+	-	+	
24. Check brake fluid level.		+	+	+	+	
25. Inspect the aft side of the firewall from inside the cabin for cracks around any rivets.		-	+	+	+	
Landing Gear Group						
1. Inspect the main landing gear mainspring attachment bolts for safeties, etc.		-	+	+	+	

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Task	**Refer to**	Intervals (Flight Hours)				**Initials**
		50	100	500	1000	
2. Check security, condition, etc., of lateral stop and bolts and axle bolts.		-	+	+	+	
3. When removing wheels, inspect the brake assemblies, axles, pins and spacers for security, condition, leaks, etc.		+	+	+	+	
4. Check the brake pads and brake discs for excessive wear.		-	+	+	+	
5. Inspect the main wheels for cracks, corrosion, etc.		-	+	+	+	
6. When removing wheels re-pack wheel bearings.		+	+	+	+	
7. Inspect the master and slave brake cylinders, brake lines, connections for damage, corrosion, leaks, etc. Service the master brake cylinders.		+	+	+	+	
7a Inspect the rubbers at the main landing gear attachments for condition and abrasion damage, and position		-	+	+	+	
8. When removing wheel, the airplane hoisted remove the nose wheel and inspect wheel for cracks, corrosion, etc.		+	+	+	+	
9. Inspect the nose gear lower front bearing plate, cam centering, steering connections strut, strut supports and stop plate for cracks, distortion, corrosion, etc.		-	+	+	+	
10. Inspect the steering rods for security, distortion, etc.		-	+	+	+	
11. Inspect the shock cord for damaged threads and weakness.		-	+	+	+	
12. Inspect the lower shock ring support for cracks, distortion, etc.		-	+	+	+	
13. Check tire pressure. (30 PSI)		+	+	+	+	
14. When removing wheel, inspect the nose wheel axle bolt, spacers and axle for wear, damage, corrosion, etc.		+	+	+	+	

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Task	**Refer to**	Intervals (Flight Hours)				**Initials**
		50	100	500	1000	
Wing Group						
1. Check the torque and safeties of the front spar, main spar and rear spar wing to fuselage attachment bolts.	AC 43-13-1B Section 3	-	+	+	+	
2. Inspect the external surfaces of the ailerons and flaps for cracks, deformation, etc.		+	+	+	+	
3. Inspect the aileron and flap hinge pins for corrosion, wear, safeties and adequate lubrication.		-	+	+	+	
4. Inspect flap and aileron rods and rod attachment bolts for wear, damage safeties, etc.		-	+	+	+	
5. Inspect aileron bellcranks, stops, cable ends and pulley assembly for cracks, damage, corrosion safeties, etc.		-	+	+	+	
6. Inspect upper and lower wing skins and leading edges for cracks, loose fasteners, damage, etc.		+	+	+	+	
7. Lubricate the aileron and flap hinges, control rod ends, bellcranks, etc.		+	+	+	+	
8. Inspect the dual landing/taxi lights for security, clean lenses, etc.		+	+	+	+	
9. Drain water from wing fuel tanks (if applicable) using sump drains. Check sump drains for leaks. Clean fuel strainers.		+	+	+	+	
10. Check fuel tank filler caps (if installed) for security, condition, etc.		+	+	+	+	
11. Perform an operational check of the stall warning system (option).		-	+	+	+	

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Task	**Refer to**	Intervals (Flight Hours)				**Initials**
		50	100	500	1000	
12. Perform operational check of the pitot static heater (if installed).		-	+	+	+	
13. Perform operational check of fuel quantity indicating system.		+	+	+	+	
Fuselage Group						
1. Inspect the outer fuselage skin for cracks, corrosion, loose rivets, damage, etc.		+	+	+	+	
2. Inspect fuselage bulkheads, stiffeners and internal structure for cracks, corrosion, damaged fasteners, etc.		-	+	+	+	
3. Inspect flight control cables for routing, fraying, corrosion and tension.		-	+	+	+	
4. Inspect flight control turnbuckles, pulleys and guides for wear, damage and safeties.		-	+	+	+	
5. Check flight control torque tube bearings for wear.		-	+	+	+	
6. Inspect electrical wiring for condition, security, routing, damage, etc.		-	+	+	+	
7. Inspect fuel lines for security, damage, and leaks.		-	+	+	+	
8. Inspect the battery for condition, fluid level and clean terminals		-	+	+	+	
9. Clean gascolator fuel filter. Check for debree and water.		+	+	+	+	
10. Check fuel tank filler caps for security, condition, etc.		+	+	+	+	
Empennage Group						
1. Inspect the rudder, stabilizer, and elevator, and trim tab skins for cracks, loose fasteners, damage, etc.		-	+	+	+	

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Task	**Refer to**	Intervals (Flight Hours)				**Initials**
		50	100	500	1000	
2. Inspect elevator trim lever/fork for security, wear, damage, etc.		-	+	+	+	
3. Perform operational check of elevator trim system.		-	+	+	+	
4. Inspect rudder, elevator/stabilator and trim tab hinges for wear and excessive play.		-	+	+	+	
5. Lubricate the rudder bearings, elevator hinges, and elevator trim tab hinges.		+	+	+	+	
6. Inspect the elevator deflection stops for condition, damage, etc.		-	+	+	+	
Deflections / Cable Tensions						
1. Check elevator deflections up-down	ZODIAC part drawings	-	+	+	+	
2. Check trim tab deflections up-down	ZODIAC part drawings	-	+	+	+	
3. Check aileron deflections up-down	ZODIAC part drawings	-	+	+	+	
4. Check flap deflections up-down	ZODIAC part drawings	-	+	+	+	
5. Check rudder deflection side-side	ZODIAC part drawings	-	+	+	+	
6. Check elevator cable tensions	ZODIAC part drawings	-	+	+	+	
7. Check aileron cable tensions	ZODIAC part drawings	-	+	+	+	
8. Check Rudder cable tensions	ZODIAC part drawings	-	+	+	+	

SECTION IV

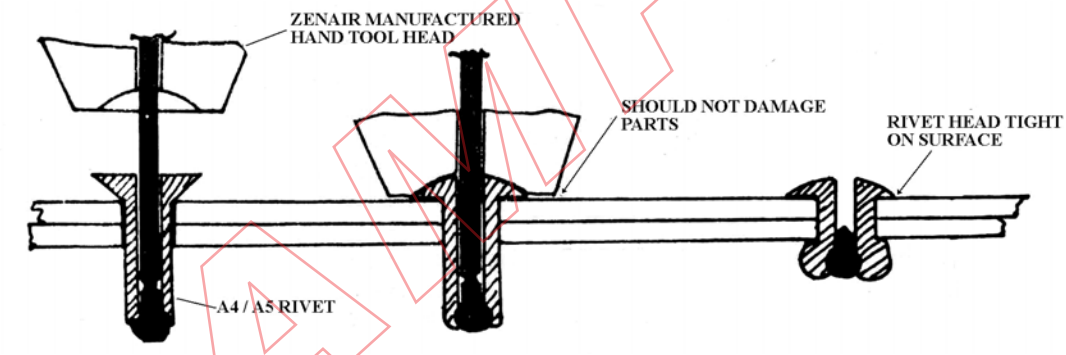
STRUCTURE

GENERAL

No structural repairs are recommended without contacting the manufacturer, however, minor repairs such as patching the skin, etc., may be made in accordance with AC43-13-XX for the airframe. It may be necessary to cut access holes to make skin repairs in some areas of the aircraft.

Caution: Skin repairs must result in a surface which is as strong as, or stronger than, the original skin. However, flexibility must be retained so that the surrounding areas will not receive extra stress.

The rivets used on most parts are of the blind rivet type, reference #A4 (1/8" dia.) or A5 (5/32" dia.); to be set with the hand tool, reference #HP-A4-A5. Aircraft quality aluminum "Cherry" rivets are an approved substitute. Standard MS20470 rivets may be used where access is possible.



Repair Fiberglass parts with standard / typical Fiberglass type resin and woven Fiberglass cloth. Using AC43-13-XX Chapter 3 is also acceptable.

When nylon locknuts are removed, the installation of new locknuts is highly recommended.

Bolt torque valves are given in AC-43-13-1B Section 3

PRIMARY STRUCTURAL PARTS

Following list gives the “primary structural” parts which cannot be repaired:

- Wing Spars
- Spar box assembly in fuselage
- Stabilator and Elevator spars
- Rudder spar
- Landing gear main spring and nose gear leg and fork

AIRCRAFT STRUCTURE

The ZODIAC parts drawings are to be used when performing any type of repairs on the airframe. When removing or installing wings, tail etc. use the parts drawings for control cable routing and for proper hardware.

See Service Manual Appendix 2.

AIRCRAFT PAINTING AND COATINGS

Aircraft is painted with basic automotive type paint. No special type paint is required when repainting the aircraft. In order for the paint to properly adhere to the aluminum, it is recommended that when purchasing the paint, all required procedures and materials are sued for “aluminum painting”. Each paint manufacturer has its own materials and procedures.

CORROSION PROTECTION

The aircraft has been designed to minimize exposure to corrosion problems. When replacing parts, the internal structure must be primed with Zinc-Chromate (Zn-Cr) primer. This must be applied before parts are riveted together.

Purchase Zinc Chromate Primer from Aircraft spruce 877-4-SPRUCE or other source.

SECTION V

LANDING GEAR AND BRAKE SYSTEM

GENERAL

The landing gear incorporated on the ZODIAC is a fixed, tricycle type of gear, fitted with three 500-5 wheels, using four ply tires with tubes. The nose gear is steerable through the rudder pedals. The fixed cam automatically centers the nose wheel and rudder in the shock extended position. The main gear shock absorber is a mono leaf metal spring. The two main gear wheels are equipped with single disc hydraulic brake assemblies which are actuated by the brake pedals connected to the brake master cylinders located forward of the rudder pedals. The brake fluid reservoirs are an integral part of the pilot side master cylinders.

ALIGNMENT OF NOSE GEAR

1. Hoist the airplane.
2. Locate the center line of the fuselage directly behind the nose wheel assembly and attach a plumb bob, also attach a plumb bob to the tail tie down ring. Using the two plumb bobs as a guide, snap a chalk line, extending several feet beyond each bob on the ground.
3. Stand in front of the nose wheel and orient the tire with the chalk line. Sight along the center rib of the tire.
4. Adjust both rod ends at the end of the nose gear steering rod assemblies to align the cockpit rudder pedals. Do not attempt to make the adjustment by means of one rod end but divide the adjustment between the two rod ends. A 3/8” (10mm) minimum thread engagement must be maintained.
5. Check the nose gear steering for travel by measuring the maximum deflection each side from the center of the chalk line.

REMOVAL AND INSTALLATION OF GEAR AND WHEELS

Tools required: Standard type socket wrenches and tools.
Parts required: None
Level of Maintenance: Heavy
Certification required: A&P or SLSA Repairman Maintenance

NOSE WHEEL

1. Hoist aircraft up at engine.
2. Remove the axle bolt and remove the wheel and tire.
   Caution: Do not lose the spacers.
   Check wheel as indicated for the main wheels, and grease the wheel bearings.

REINSTALL in reverse order of removal. Perform Landing gear section of Table 1.

ALIGNMENT OF NOSE GEAR

1. Hoist aircraft up at engine.
2. Locate the center line of the fuselage directly behind the nose wheel assembly and attach a plumb bob, also attach a plumb bob to the tail tie down ring. Using the two plumb bobs as a guide, snap a chalk line, extending several feet beyond each bob on the ground.
3. Stand in front of the nose wheel and orient the tire with the chalk line. Sight along the center rib of the tire.
4. Adjust both rod ends at the end of the nose gear steering rod assemblies to align the cockpit rudder pedals. Do not attempt to make the adjustment by means of one rod end but divide the adjustment between the two rod ends. A 3/8" (10mm) minimum thread engagement must be maintained.
5. Check the nose gear steering for travel by measuring the maximum deflection each side from the center of the chalk line.

MAIN GEAR

1 Hoist the airplane. Lift wings by placing one saw-horse under each wing (under spar) and lift engine.
2. Drain the fluid from the brake system and disconnect the brake lines from gear assembly.
3. Remove the four bolts which attach the spring to the fuselage.
4. Remove the gear assembly.

REINSTALL the main gear in reverse order of removal, safety the bolts.

***Note*:** Torque value on the four bolts – Tighten snug (approximately 110 LB. IN.). Do not bend bracket / extrusion when tightening. Make sure that the rubber padding top/bottom are in place before tightening the four bolts. Perform Landing gear section of Table 1.

REPLACEMENT OF MAIN WHEEL

1. Hoist aircraft up. This can be done by placing a floor “jack” under main gear near fuselage.
2. Remove the cotter pin and axle nut, disassemble the brake assembly and remove the wheel and tire.

Check the wheel casting for visible signs of cracks, corrosions, loose or broken bolts, and any defects which may impair its operation.

Note: If there are any indications of defects, deflate the tire, remove the three wheel bolts, remove the tire and tube and perform a thorough inspection of the suspicious area..

Remove wheel bearings from the wheel hub and clean thoroughly with a suitable solvent. When repacking with grease, be sure the lubricant enters the space between the rollers in the retainer ring. Do not pack the grease into the wheel hub.

REINSTALL in reverse order, using the shims to prevent lateral floppiness. Safeties the nut. ***Note:*** Bolt torque values are given in AC-43-13-1B. Perform Landing gear section of Table 1.

BRAKE MAINTENANCE

BLEEDING PROCEDURE

If the brake line has been disconnected for any reason, it will be necessary to bleed the brake and line as described below.

Connect the bleeding unit hose to the fitting at the bottom of the brake unit and pressure fill the brake system with MIL-H-5606 fluid.
Remove the bleeding unit hose after tightening the fitting.
Repeat the bleeding procedure on the other gear.

BRAKE PADS REPLACEMENT

When the brake pads become worn excessively (1/16” pad thickness), they are replaced with new pads.

Remove the wheel (see previous pages).
Remove the two bolts holding the pads.
Remove the pads.

REINSTALL in reverse order. Check for safeties and operation.
Note: - No adjustment of brake clearance is necessary on the brakes.
- The brake disc should not necessarily be replaced because of circumferential grooving.
Perform Landing gear section of Table 1.

SECTION VI

POWER PLANT

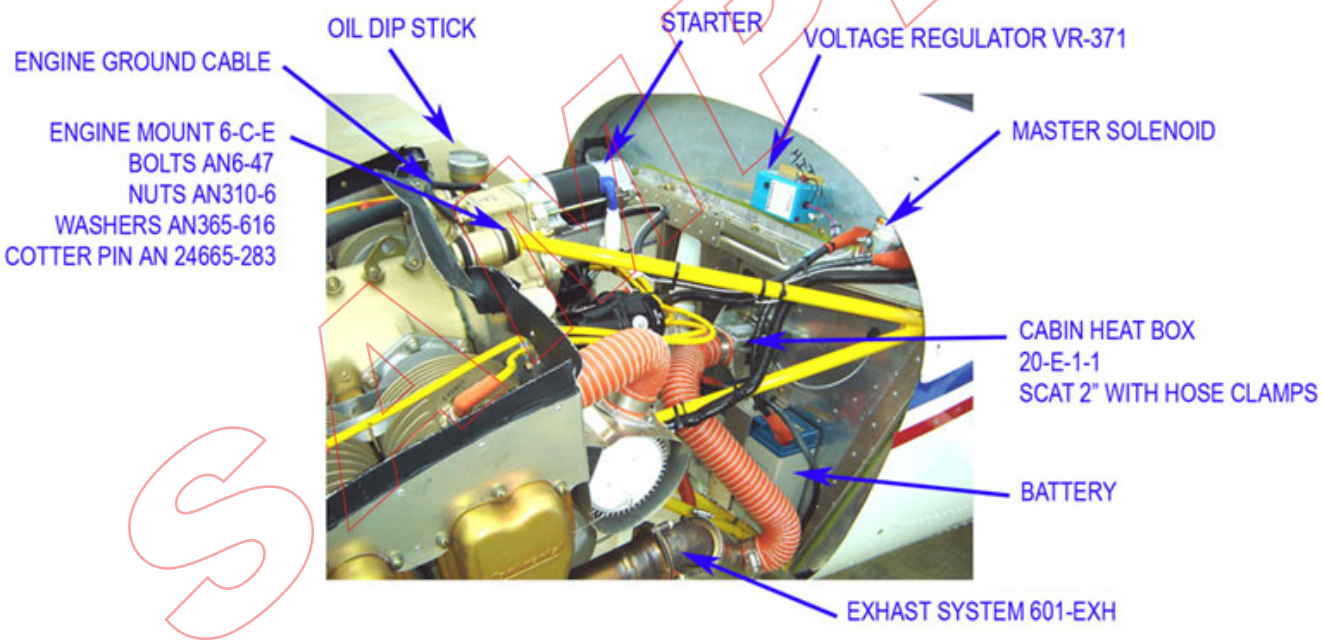
GENERAL

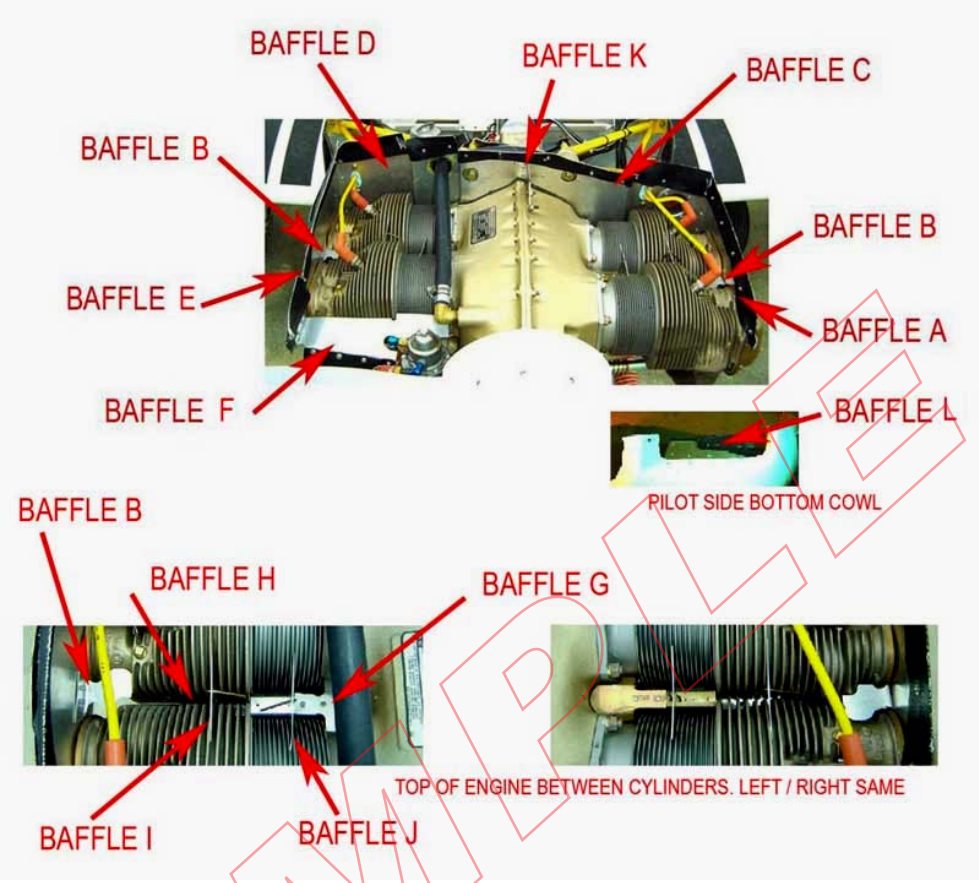
The ZODIAC SLSA is powered by a Continental 0-200 engine. For engine maintenance, refer to the engine manual.

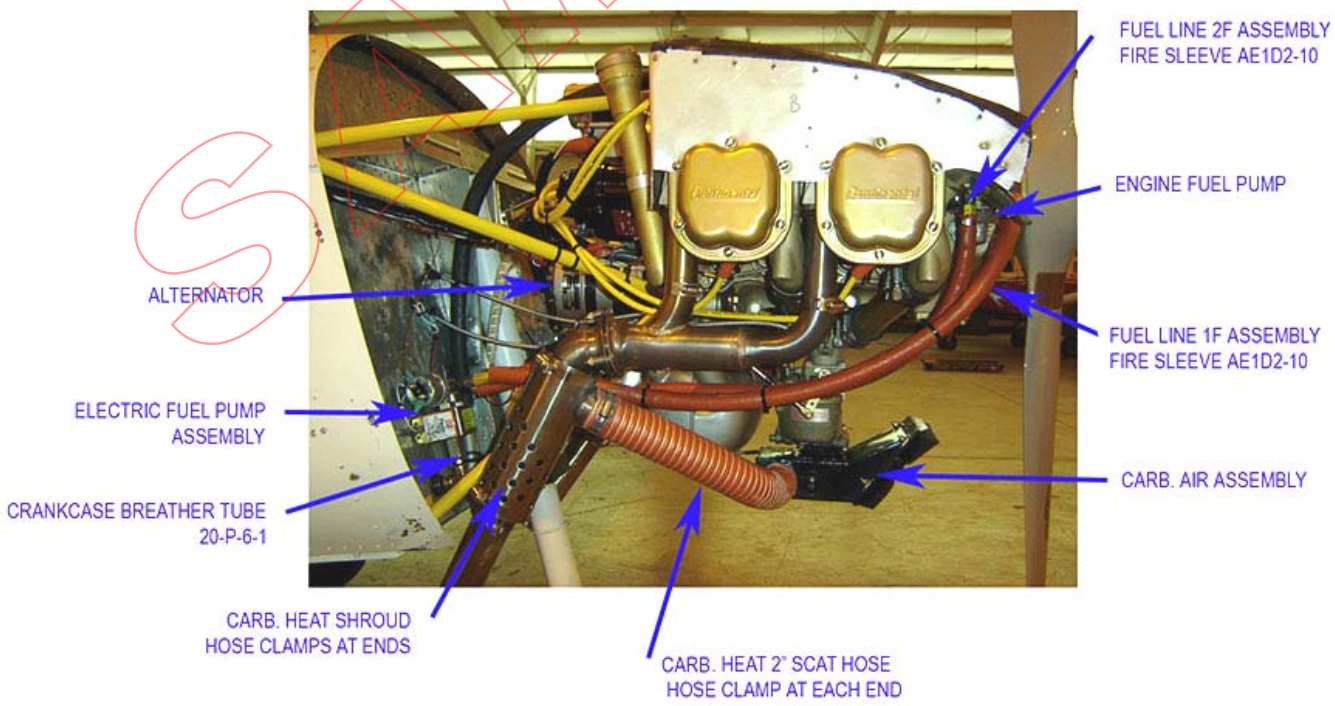
TROUBLESHOOTING

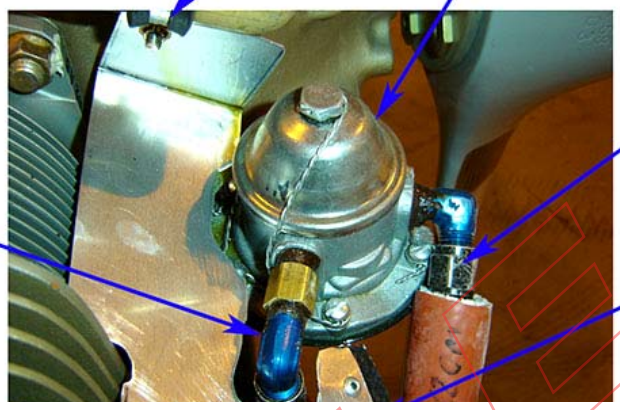
Troubles peculiar to the power plant are listed in the Continental 0-200 Engine Manual along with their probable causes and suggested remedies.

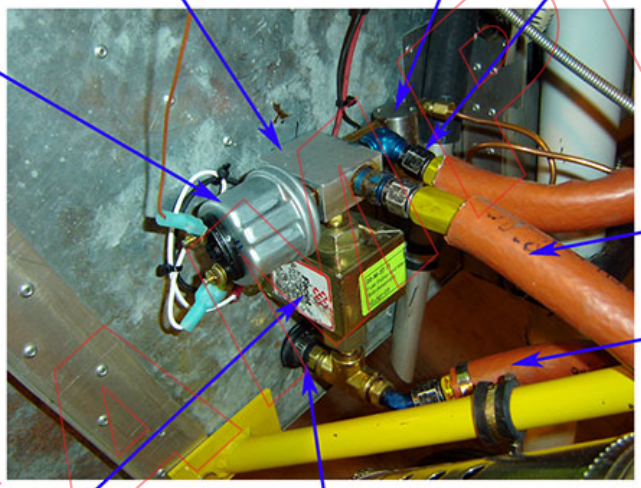
Use the ZODIAC parts drawings for installation and removal of the engine mount system.

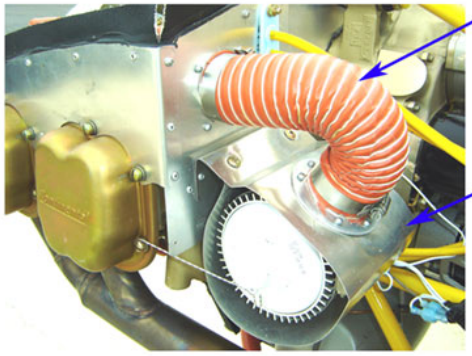


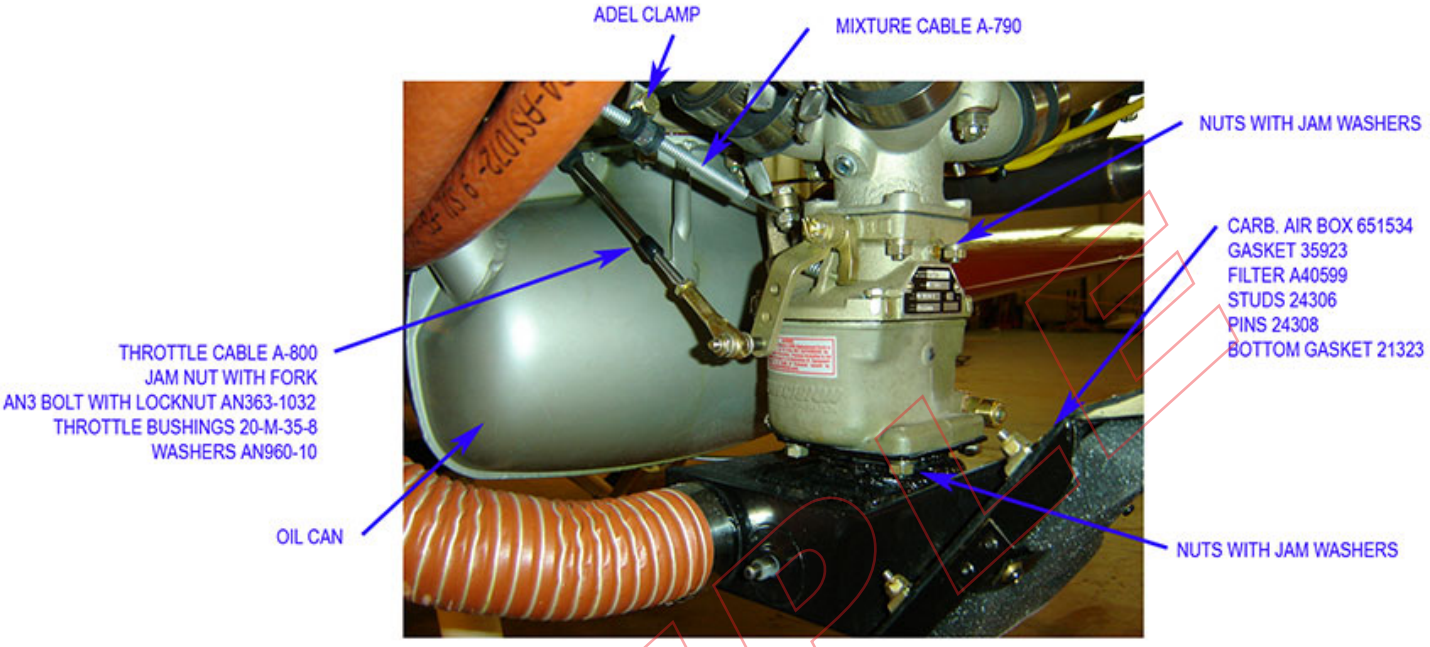

BAFFLE D
BAFFLE K
BAFFLE C
BAFFLE B
BAFFLE B
BAFFLE E
BAFFLE A
BAFFLE F
BAFFLE L
PILOT SIDE BOTTOM COWL
BAFFLE B
BAFFLE H
BAFFLE G
TOP OF ENGINE BETWEEN CYLINDERS. LEFT / RIGHT SAME
BAFFLE I
BAFFLE J

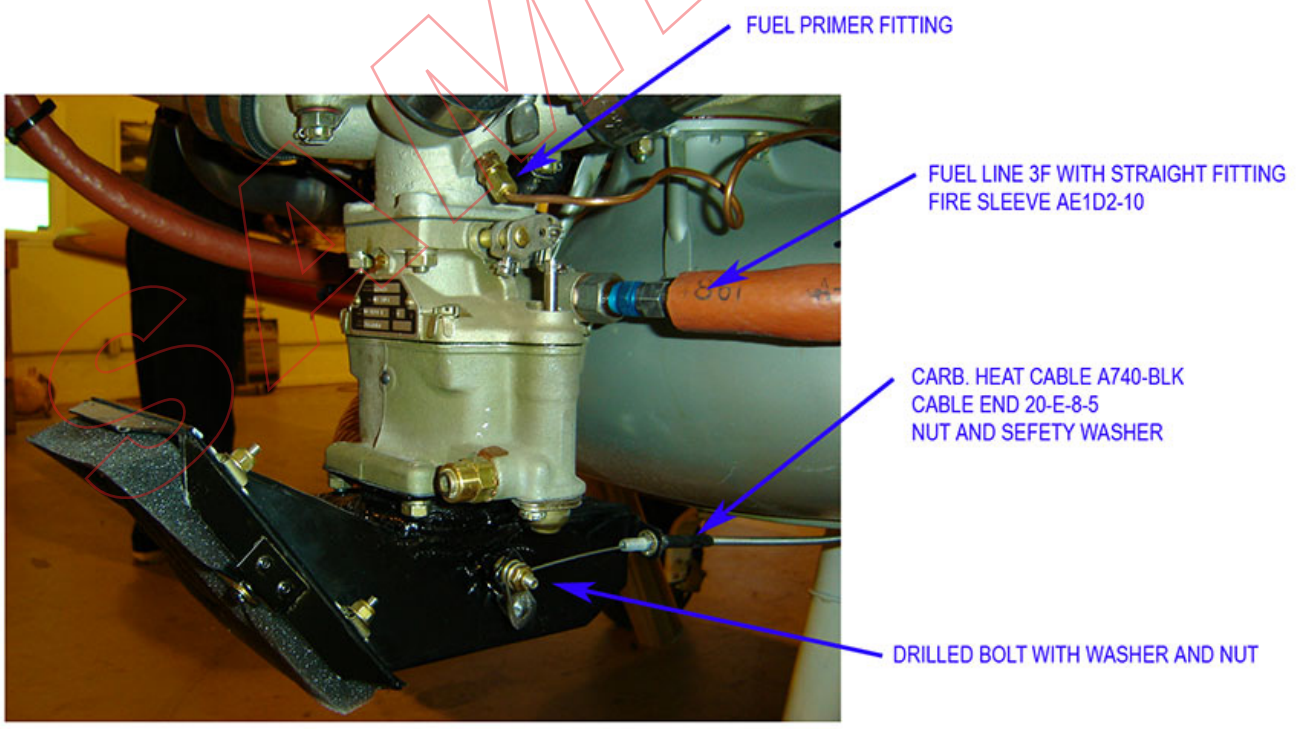

FUEL LINE 2F ASSEMBLY
FIRE SLEEVE AE1D2-10
ENGINE FUEL PUMP
ALTERNATOR
FUEL LINE 1F ASSEMBLY
FIRE SLEEVE AE1D2-10
ELECTRIC FUEL PUMP
ASSEMBLY
CARB. AIR ASSEMBLY
CRANKCASE BREATHER TUBE
20-P-6-1
CARB. HEAT SHROUD
HOSE CLAMPS AT ENDS
CARB. HEAT 2" SCAT HOSE
HOSE CLAMP AT EACH END


ADEL CLAMP HOLDING BAFFLE TO BREATHER HOSE
ENGINE DRIVE FUEL PUMP
FUEL LINE 1F
90 DEG. FITTING AT END
FUEL LINE 2F GOING TO "IN"
SIDE OF PUMP.
90 DEG. FITTING WITH EXTENSION
BAFFLE A WITH BAFFLE TAPE


FUEL PRIMER
FUEL MANIFOLD 20-M-37-1
FUEL LINE 3F GOING TO CARB.
90 FITTING.
FUEL PRESSURE SENSOR
FUEL LINE 1F WITH STRAIGHT FITTING
FUEL LINE 2F WITH 45 DEG. FITTING
GOES TO 'IN' OF ENGINE FUEL PUMP
40105
BARB FITTING GOING THROUGH FIREWALL
FUEL HOSE WITH HOSE CLAMPS AT ENDS


SCAT 2" HOSE
HOSE CLAMPS AT ENDS
ALUMINUM FLANGE AT ENDS
OIL FILTER SHROUD
WITH OIL FILTER COOLER COLLAR
AROUND OIL FILTER.
HOSE CLAMP AROUND COOLER


ADEL CLAMP
MIXTURE CABLE A-790
NUTS WITH JAM WASHERS
CARB. AIR BOX 651534
GASKET 35923
FILTER A40599
STUDS 24306
PINS 24308
BOTTOM GASKET 21323
THROTTLE CABLE A-800
JAM NUT WITH FORK
AN3 BOLT WITH LOCKNUT AN363-1032
THROTTLE BUSHINGS 20-M-35-8
WASHERS AN960-10
OIL CAN
NUTS WITH JAM WASHERS


FUEL PRIMER FITTING
FUEL LINE 3F WITH STRAIGHT FITTING
FIRE SLEEVE AE1D2-10
CARB. HEAT CABLE A740-BLK
CABLE END 20-E-8-5
NUT AND SEFETY WASHER
DRILLED BOLT WITH WASHER AND NUT

ENGINE SPECIFICATIONS

- 4 Cylinders Horizontally Opposed - Air Cooled

Engine Manufacturer	Teledyne Continental
Engine Model Number	0-200-A (82)
Rated Horsepower	100
RPM Rating, standard atmosphere Max. continuous	2750
Recommended cruising RPM	2500
Maximum allowed Pressure in Hg. At rated RPM at seal level	29.3
Compression Ratio	7.0:1

See engine Operator's Manual for more information.

SPARK PLUGS

Engine is equipped with the "Light Speed Engineering" spark plug conversion kit. Use only **Denson Spark plugs W24EMR-C**. Spark plug gap. 0.032" with wear limit 0.045".

Install plugs with their washers – **use antiseize compound**. Torque to 15 ft/lbs.

Spark plug maintenance. Do not bead blast the ceramic insulator. If fouled and wet, use a propane torch to burn off deposits. Remove dry deposits using a sharp steel tool. Re-gap at 100 hour intervals or sooner. Recommended that plugs be replaced every 200 hours.

Plugs can be purchased from AMD 478-374-2759 or from Light Speed Engineering. 805-933-3299.

REMOVAL OF ENGINE

Tools required: Standard type socket wrenches and tools.
Parts required: None
Level of Maintenance: Heavy
Certification required: A&P or SLSA Repairman Maintenance

1. Remove the propeller.
2. Remove top and bottom cowl.
3. Disconnect the heat hose from the muffler
4. Disconnect the mechanical fuel pump inlet line at front of engine.
5. Disconnect the fuel inlet line at the carburetor.
6. Disconnect the starter lead.
7. Disconnect the alternator leads.
8. Disconnect the grounding wire.
9. Disconnect the control cables from the engine components.(throttle mixture, carb. heat)
10. Disconnect the tachometer electric cable from the rear of the engine.
12. Disconnect the magneto "P" leads. Insert a protective cover over the connection.
13. Disconnect the oil pressure wire. Disconnect manifold pressure line from the left rear cylinder of the engine. (option)
14. Attach a 1,500 Lbs. (minimum) hoist to the hoisting hook and relieve the tension on the engine mount.
15. Place a tail stand under the tail of the aircraft before removing the engine.
16. Check the engine for any attachments remaining to obstruct its removal.
17. Remove the cotter pins, nuts, washers, rear rubber mount and bolt from each engine mounting. Swing the engine free, being careful not to damage any attached parts.

REINSTALLATION OF ENGINE

Attach a one-half ton hoist to the hoisting hook and lift the engine. Position the mounting lugs of the engine so that they align with the engine mount attaching points.
Insert the rubber mounts and the spacers between engine and engine mount. Position the rear rubber mounts and insert the bolts.
Install a washer and castellated nut on each mounting bolt. Tighten the nuts until the inner spacer is tight, then align castle nut with cotter pin hole in the bolt (approx. 40-inch pounds) and install cotter pins..
Reconnect all engine connections in the reverse order they were removed.

Note: Adjust all controls to provide full travel in particular when the throttle control is full forward, it must contact the stop on the carburetor before it bottoms. Same for Mixture. Cables must not be close or touch muffler or engine.

Perform Engine section of Table 1 and engine related sections of Appendix 1.

SECTION VII

FLIGHT CONTROL SYSTEM

The ZODIAC SLSA is controlled in flight by the use of the three standard primary flight control surfaces, consisting of the ailerons, elevator and the rudder. Operation of these controls is through the movement of the control stick and pedals. The individual surfaces are connected to their control components by the use of cables and push-pull rods. Provision for longitudinal trim control is provided by an electric trim tab. The flaps are electrically operated through an interconnecting tube and adjustable rods.

Use the ZODIAC parts drawings for installation and removal of the control system.

For flight control deflections, see the part parts drawings.

REMOVAL AND INSTALLATION OF FLYING SURFACES

Tools required: Standard type socket wrenches and tools.
Parts required: None
Level of Maintenance: Heavy
Certification required: A&P or SLSA Repairman Maintenance

WING

REMOVAL

1. Place saw-horse under outer part of wing at spar.
2. Drain the gas.
3. Remove the seat bottom inspection panels.
4. Disconnect the aileron control cables (center of fuselage rear of seat).
5. Disconnect the fuel lines (center of fuselage front).
6. Disconnect the pitot and static lines (left wing only).
7. Disconnect the electric wirings.
8. Remove the bolts on rear spar, and the six main spar bolts.
9. Pull the wing out.

REINSTALL the wing in reverse order of removal.
Torque bolts as per FAA AC 43-13-1B, Check aileron and flap deflections. See aircraft part drawings for details. Perform wing section of Table 1. Perform Pitot Static test.

FLAPS

REMOVAL

1. Remove the hinge pins and the flap will be loose.

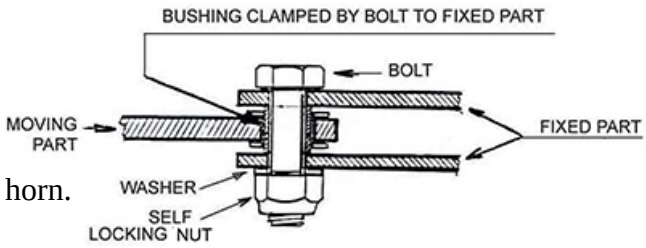
REINSTALL the flap in reverse order of removal, safety the hinge pins, check deflection Left and Right. See aircraft part drawings for details. Perform wing section of Table 1.

AILERON

REMOVAL

1. Disconnect the aileron push rod at the inboard end of the aileron.
2. Remove the hinge pin and the aileron will be loose.

REINSTALL the flap in reverse order of removal, safety the hinge pins, check deflection and control stops Left and Right. See aircraft part drawings for details. Perform wing section of Table 1.



RUDDER

REMOVAL
1. Disconnect the two control cables from the rudder horn.
2. Disconnect the tail light wiring.
3. Remove the lower hinge bolt.
4. Remove the upper hinge bolt and remove the rudder.
   Caution: Do not lose the hinge bushings.

REINSTALL the rudder in reverse order of removal. Check all bolts for safety. Check deflection and control stops. See aircraft part drawings for details. Perform Empennage section of Table 1.

Rudder deflection. Locate the center line of the fuselage directly behind the nose wheel assembly and attach a plumb bob, also attach a plumb bob to the lower rudder hinge. Draw exact point on floor at rear. Using the two plumb bobs as a guide, snap a chalk line, extending several feet beyond each bob on the ground. Draw left and right lines on floor representing full deflection. Attach a plumb line at the rear bottom of the rudder. Move rudder to stops and check.

ELEVATOR

REMOVAL
1. Remove the rudder.
2. Disconnect the electric wiring for electric trim.
3. Disconnect the control cables from the horn.
   Note: Attach the cables to the fuselage for easy reinstallation.
4. Remove the hinge pin and the aileron will be loose.

REINSTALL the elevator in reverse order of removal. Check all bolts for safety. Check deflection and control stops. See aircraft part drawings for details. Perform Empennage section of Table 1.

STABILATOR

REMOVAL
1. Remove the rudder.
2, Remove elevator.
3. Remove fasteners at front of saddle (fiberglass center piece).
4. Remove the 4 bolts attaching elevator to fuselage.

REINSTALL the stabilator in reverse order of removal. Check all bolts for safety. See aircraft parts drawings for details of installation. Perform Empennage section of Table 1.

SECTION VIII

FUEL SYSTEM

GENERAL

When work is performed on the fuel system, assure good ventilation, no smoking, ready availability of fire fighting equipment.

WING TANK SYSTEM

The wing tanks are installed behind the wing spar, outside the walkway, and held in place by the bottom wing panels. The filler neck and vent tube are integral parts of the tank. Each tank has a sump easy drain. The finger screen is at the tank outlet and accessible through the small inspection plate. Each tank feeds the selector shut off valve.

Use the ZODIAC parts drawings for installation and removal of the fuel system.

REMOVAL AND INSTALLATION OF FUEL SYSTEMS

Tools required: Standard type socket wrenches and tools. Special rivet gun as detailed in section IV is required.
Parts required: Rivets as detailed in section IV is required.
Level of Maintenance: Heavy
Certification required: A&P or SLSA Repairman Maintenance

REPLACEMENT OF WING TANK

1. Drain the fuel from tank.
2. Disconnect the filler neck. Screwed onto tank from top.
3. Drill out top part of leading edge skin. Hold it down with straps when drilling.
4. Disconnect the wiring from sender unit.
5. Disconnect the fuel lines at the tank outlet (bottom of tank).
6. Disconnect the grounding wire
7. Remove tank

REINSTALL in the reverse order, after checking the cork padding for damage and proper position. (All upper edges, top and sides, and under the straps: adhesive - “3M Scotch Grip 847”.

Check all connections for condition, leaks and safety. As you fill talk, make sure that the fuel gauge is reading proper.

FUEL SENDER UNIT (under the fuel gauge cover plate)

REMOVE the sender after removing the rivets.

REINSTALL with the cork seal ring and rivets.

FINGER SCREENS

The finger screens are easily accessible at the tank outlet, bottom of wing near root.

1. Drain the tank.
2. Disconnect the fuel lines.
3. Unscrew the finger screen fitting.

REINSTALL in reverse order after inspection and cleaning.
Check the connection for condition, leaks and safety.

ELECTRIC FUEL PUMP

The auxiliary fuel pump is bolted to the front of the firewall.

REMOVAL

1. Ensure fuel valve is in OFF position.
2. Disconnect fuel lines from pump.
3. Disconnect electrical wiring from pump.
4. Remove pump attachment bolts.

REINSTALL in the reverse order of removal and check all connections for conditions and safety.

Open the fuel valve and run the pump: check for leaks.

CAUTION: Verify the pump will operate in the correct direction. (Flow direction is indicated by arrow stamped on pump.)

FUEL SYSTEM TROUBLESHOOTING

Trouble	Cause	Remedy
Fuel gauge fails to indicate	Broken wiring	Check and repair
	Gauge not operating	Replace
	Float partially or completely filled with fuel	Replace float
	Float touching tank	Bend float arm
	Circuit breaker out	Reset and check
Fuel gauge indicates full when tanks are not full	Incomplete ground	Check ground connections at fuel transmitter
No fuel pressure indication	Fuel valve stuck	Check valve
	No fuel in tanks	Check fuel, fill
	Defective fuel pump	Check pump for pressure buildup. Check diaphragm and relief valves in engine pump. Check for obstruction Air leak in intake lines
	Defective gauge	Replace gauge
Pressure low or pressure surges	Obstruction in inlet side of pump	Trace lines and locate obstruction
	Faulty diaphragm	Replace or rebuild pump
Unidentified leak	Fuel lines damaged or improperly installed	Locate and repair or tighten
Fuel valve leaks	Worn parts	Replace valve

SECTION IX

INSTRUMENTS

GENERAL

The instrumentation in the ZODIAC SLSA is designed to give a quick and actual indication of the attitude, performance and condition of the airplane. The instrument panel has been arranged to accommodate all the advanced flight instruments in front of the pilot.

The two types of instruments installed in the ZODIAC SLSA have been classified in this section as standard and optional. The first part of this section will pertain to maintenance and troubleshooting of all the standard instruments and their systems. The remaining portion of this section is directed to maintenance and troubleshooting of optional instruments.

AIRSPEED INDICATOR

GENERAL

The airspeed indicator provides a means of indicating the speed of the airplane passing through the air. The airspeed indication is the differential pressure reading between dynamic air pressure and static air pressure. This instrument has the diaphragm vented to the dynamic air source and the case is vented to the static air system. As the airplane increases speed, the dynamic air pressure increases, causing the diaphragm to expand. A mechanical linkage picks up this motion and moves the instrument pointer to the indicated speed. The instrument dial is calibrated in MPH, and also has the necessary operating range markings for safe operation of the airplane.

TROUBLESHOOTING See following table:

AIRSPEED TUBES AND INDICATOR

Trouble	Cause	Remedy
Pointers of static instruments do not indicate properly.	Leak in instrument case or in lines.	Check for leak and seal.
Pointer of instrument oscillates.	Leak in instrument case.	Check for leak and seal.

ALTIMETER

TROUBLESHOOTING See following table:

ALTIMETER

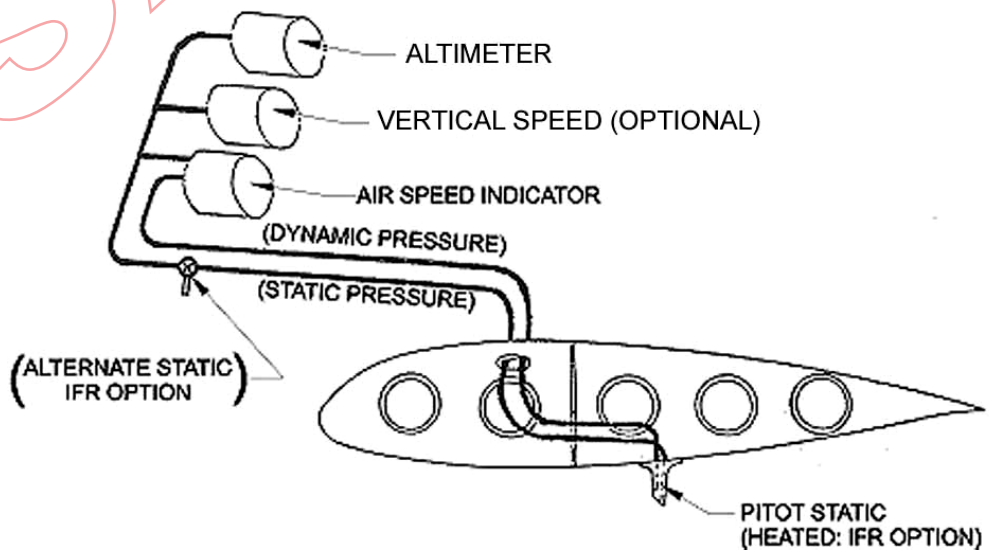
Trouble	Cause	Remedy
Excessive scale error.	Improper calibration adjustment.	Replace instrument.
Excessive pointer oscillation.	Defective mechanism.	Replace instrument.
High reading.	Improper venting.	Eliminate leak in static pressure system and check alignment of airspeed tube.
Setting knob is hard to turn.	Wrong lubrication or lack of lubrication.	Replace instrument.
Inner reference marked fails to move when setting knob is rotated.	Out of engagement.	Replace instrument.
Setting knob set screw loose or missing.	Excessive vibration.	Tighten instrument screw, if loose. Replace instrument, if screw is missing.
Cracked or loose cover glass.	Excessive vibration.	Replace instrument.
Dull or discolored markings.	Age.	Replace instrument.
Barometric scale and reference markers out of synchronism.	Slippage of mating parts.	Replace instrument.
Barometric scale and reference markers out of synchronism with pointers.	Drift in mechanism.	Reset pointers.

PITOT STATIC SYSTEM:

REMOVAL OF PITOT STATIC

1. Remove the three retaining screws.
2. Remove the lines from the barbed fittings.

REINSTALL in reverse order. - Check for leaks, proper installation, operation and safety.
- Pitot static connection at wing root must be checked



MAGNETIC COMPASS

GENERAL

The magnetic compass installed in the ZODIAC is a self-contained instrument and is mounted at the panel. The compass correction card is located in the card holder mounted on the instrument panel.

TROUBLESHOOTING See following table:

MAGNETIC COMPASS

Trouble	Cause	Remedy
Excessive card error.	Compass not properly compensated.	Compensate instrument.
	External magnetic interference.	Locate magnetic interference and eliminate if possible.
Excessive oscillation.	Improper mounting on instrument panel.	Align instrument.
	Insufficient liquid.	Replace instrument.
Sluggish.	Weak card magnet.	Replace instrument.
	Excessive pivot friction or broken jewel.	Replace instrument.
	Instrument too heavily compensated.	Remove excess compensation.
Liquid leakage.	Loose bezel screws.	Replace instrument.
	Broken cover glass.	Replace instrument.
	Defective sealing gaskets.	Replace instrument.
Discolored markings.	Age.	Replace instrument.

TACHOMETER

GENERAL

The tachometer is connected to the engine regulator which provide rpm data to the indicator.
A separate hour meter records engine operation time. Aircraft may have mechanical or Electric Tachometer.

TROUBLESHOOTING See following table:

TACHOMETER

Trouble	Cause	Remedy
No reading on indicator, either permanent or intermittent.	Broken wire or connection.	Replace. Replace sensor (electric) Recalibrate instrument (electric) Replace instrument.

ENGINE GAUGES

Aircraft may be equipped with individual gauges or all in one - Engine Information System (EIS)
When aircraft is equipped with e EIS, see the EIS manufacturers instructions.

When individual gauges, see the following:

ENGINE OIL PRESSURE GAUGE

GENERAL

The oil pressure gauge is mounted in the cluster on the instrument panel. This gauge will indicate the amount of oil pressure in PSI available at the pressurized engine oil passage.

TROUBLESHOOTING

ENGINE OIL PRESSURE GAUGE

Trouble	Cause	Remedy
Excessive error at zero.	Pointer loose on shaft. Overpressure or seasoning of bourdon tube.	Replace instrument.
Excessive scale error.	Improper calibration adjustment.	Replace instrument.
Excessive pointer oscillation.	Improper damping or rough engine relief valve.	Disconnect line and drain. Check for leaks. If trouble persists, clean and adjust relief valve.
Sluggish operation or pointer or pressure fails to build up.	Engine relief valve open.	Check and clean.
		Replace sensor on engine

ENGINE OIL TEMPERATURE INDICATOR

GENERAL

The oil temperature indicator is mounted in the instrument cluster on the instrument panel. This instrument will provide a temperature indication of the engine oil in degrees Fahrenheit. The instrument has a temperature sender located on the engine accessory section.

TROUBLESHOOTING See following table:

ENGINE OIL TEMPERATURE INDICATORS

Trouble	Cause	Remedy
Instrument fails to show any reading.	Broken or damaged capillary. Wiring open.	Check engine unit and wiring to instrument.
Excessive scale error.	Improper calibration adjustment.	Repair or replace.
Pointer fails to move as engine is warmed up.	Broken or damaged capillary or open wiring.	Check engine unit and wiring.
Dull or discolored luminous marking.	Age.	Replace instrument.
		Replace sensor on engine

FUEL QUANTITY INDICATOR

GENERAL

The fuel quantity gauges used on the ZODIAC are mounted in the cluster on the instrument panel. These instruments are calibrated in fractional divisions of one fourth, one half, three fourths and full. A transmitter unit is installed in each fuel tank. This unit contains a resistance strip and a movable control arm. The position of this arm is controlled by a float in the fuel tank and this position is transmitted electrically to the indicator gauge to show the amount of fuel in the tank.

TROUBLESHOOTING See following table:

FUEL QUANTITY INDICATORS

Trouble	Cause	Remedy
Fuel gauge fails to indicate.	Broken wiring. Gauge not operating. Float partially or completely filled with fuel. Circuit breaker out. Float touching tank	Check and repair. Replace. Replace float. Reset and check. Bend float arm
Fuel gauge indicates full when tanks are not full.	Incomplete ground.	Check ground connections at fuel transmitter.

FUEL PRESSURE GAUGE

GENERAL

The fuel pressure gauge instrument is mounted in the cluster on the instrument panel. This gauge is connected to the sender at the carburetor fuel inlet fitting.

TROUBLESHOOTING See following table:

FUEL PRESSURE GAUGE

Trouble	Cause	Remedy
No fuel pressure indication.	Fuel valve stuck. No fuel in tanks. Defective fuel pump. Defective gauge/sender.	Check valve. Check fuel, fill. Check pump for pressure build up. Check diaphragm and relief valves in engine pump. Check for obstruction in electric pump. Replace gauge/sensor.
Pressure low or pressure surges.	Obstruction in inlet side of pump. Faulty bypass valve. Faulty diaphragm.	Trace lines and locate obstruction. Replace. Replace or rebuild pump.
Needle fluctuation.	Surge dome on pump filled with fuel.	Remove and empty.

Note that fuel pressure can read very low. See engine manual for minimum fuel pressure.

AMMETER - OPTIONAL

GENERAL

The ammeter is mounted in the instrument cluster located on the instrument panel. This instrument measures the amount of current received and the amount of current drain on the battery. When not working, change instrument and or check electric wires.

VOLTMETER

GENERAL

The Voltmeter is mounted in the instrument cluster located on the instrument panel. This instrument measures the level of the battery or Alternator output. When not working, change instrument and or check electric wires.

OPTIONAL INSTRUMENTS

RATE OF CLIMB INDICATOR - OPTIOANL

GENERAL

The rate of climb indicator measures the rate of change in static pressure when the airplane is climbing or descending. By means of a pointer and dial, this instrument will indicate the rate of ascent or descent of the airplane in feet per minute.

TROUBLESHOOTING See following table:

RATE OF CLIMB INDICATOR

Trouble	Cause	Remedy
Pointer does not set on zero.	Aging of diaphragm.	Reset pointer to zero by means of setting screw. Tap instrument while resetting.
Pointer fails to respond.	Obstruction in static line.	Disconnect all instruments connected to the static line. Check individual instruments for obstruction in lines.
Pointer oscillates.	Leaks in static lines. Defective mechanism.	Disconnect all instruments connected to the static line. Check individual instruments for leaks. Reconnect instruments to static line and test installation for leaks. Replace instrument.

TURN AND BANK GYRO INDICATOR - ELECTRIC - OPTIONAL

GENERAL

The turn and bank indicator is an electric instrument used for making correctly controlled turns. The turn portion of the indicator is an electrically driven gyroscope, while the bank portion is a ball sealed in a curved glass tube filled with damping fluid.

TROUBLESHOOTING

TURN AND BANK INDICATOR

Trouble	Cause	Remedy
Pointer fails to respond.	Foreign matter lodged in instrument.	Replace instrument.
Incorrect sensitivity.	Misadjustment of sensitivity spring.	Adjust by means of sensitivity spring screw. If this pulls the pointer from zero, replace instrument.
Not working	No power to indicator	Check wires / fuse / power Replace instrument.
Incorrect reading that cannot be corrected.	Defective mechanism.	Replace instrument.

DIRECTIONAL GYRO INDICATOR - ELECTRIC - OPTIONAL

GENERAL

The directional gyro is a flight instrument incorporating an gyro stabilized in the vertical plane. The gyro is rotated at high speed. Due to gyroscopic inertia, the spin axis continues to point in the same direction even though the aircraft yaws to the right or left. This relative motion between the gyro and the instrument case is shown on the instrument dial which is similar to a compass card. The dial, when set to agree with the airplane magnetic compass provides a positive indication free from swing and turning error.

TROUBLESHOOTING

DIRECTIONAL GYRO INDICATOR

Trouble	Cause	Remedy
Indicator fails to respond.	Foreign matter lodged in instrument.	Replace instrument.
Incorrect sensitivity.	Misadjustment of sensitivity spring.	Adjust by means of sensitivity spring screw. If this pulls the pointer from zero, replace instrument.
Not working	No power to indicator	Check wires / fuse / power Replace instrument.
Incorrect reading that cannot be corrected.	Defective mechanism.	Replace instrument.

ATTITUDE GYRO INDICATOR - OPTIONAL

GENERAL

The attitude gyro is essentially a gyroscope rotating in an horizontal plane and is operated by the same principal as the directional gyro. Due to the gyroscopic inertia, the spin axis continues to point in the vertical direction, providing a constant visual reference to the altitude of the airplane relative to pitch and roll axis. A bar across the face of the indicator represents the horizon. A miniature adjustable airplane is mounted to the case and aligning the miniature airplane to the horizon bar simulates the alignment of the airplane to the actual horizon. Any deviation simulates the deviation of the airplane from the true horizon. The gyro horizon is marked for different degrees of bank.

TROUBLESHOOTING See following table:

HORIZON GYRO INDICATOR

Trouble	Cause	Remedy
Bar does not settle.	Excessive vibration. Defective instrument.	Check shock mounts. (Replace if necessary.) Replace.
Not working	No power to indicator	Check wires / fuse / power Replace instrument.
Incorrect reading that cannot be corrected.	Defective mechanism.	Replace instrument.
Bar oscillates or shimmies continuously.	Excessive vibration. Defective mechanism.	Check shock mounts. Replace instrument.

REPLACEMENT OF INSTRUMENTS

GENERAL

Since all instruments are mounted in a similar manner, a description of a typical removal and installation is provided as a guide for the removal and installation of the instruments. Special care should be taken when any operation pertaining to the instruments is performed.

Remove the connections to the instrument and remove the mounting screws of the instrument.
Note: Tag connections for ease of reinstallation.

Installation of the instruments will be in the reverse order given for removal. After the installation is completed, check all components for clearance of the control column, condition, proper operation and safety.

SECTION X

ELECTRICAL SYSTEM

GENERAL

The electrical system of the is a 12 volt, direct current, single wire, negative ground system. All electrical equipment is grounded to the metal structure of the airplane, therefore the structure takes the place of the second wire. A 12 volt battery is incorporated in the system to furnish power for starting and as a reserve power source in case of alternator failure. The battery and alternator are both connected to the bus bar; from which all the electrical equipment is powered, with the exception of the starter which receives its power from the load side of the battery. The master switch, located on the switch panel below the instruments, controls the battery relay. The master switch must be on before any electrical equipment will operate. The can be equipped with the standard navigation lights, strobes, and dual landing lights located in the wing leading edge.

Alternator output is 60 AMP when aircraft is equipped for IFR.

TROUBLESHOOTING

Troubles peculiar to the electrical system are listed in a Table at the end of this section along with their probable causes and suggested remedies.

After the trouble has been corrected, check the entire electrical system for security and operation of its components.

ELECTRICAL POWER SUPPLY

The electrical power is supplied by one 12 volt battery and one 12 volt direct current alternator. A voltage regulator is incorporated to prevent overloading of the battery and electrical circuits.

For electric wire schematics, conatact the manufacturer.

SERVICING THE BATTERY

The battery should be checked for proper fluid level (not required when using a SEALED LEAD ACID battery), but must not be filled above the baffle plates. A hydrometer check should be performed to determine the specific gravity of the electrolyte (1.268 standard, and 1.285 for better cold-weather cranking capacity). All connections must be clean and tight. If battery is not up to normal charge, recharge starting with a charging rate of 4 amperes and finishing with 2 amperes. The normal charged battery will indicate 11.5 Volts or more.

VOLTMETER - OPTIONAL

The voltmeter indicates the level of the battery (11.5 or more volts, engine off and master on).

AMPMETER - OPTIONAL

The amp meter is mounted in series with the battery and bus bar(s). It shows in (positive) or out (negative) current to/from the battery.

With a charged battery, the ammeter should read near zero when the engine is running and has recharged (3 to 5 minutes) the battery previously discharged by the starter current, and no other loads are applied. (lights, radios, etc....off)

STALL WARNING - OPTIONAL

The stall warning system (optional) consists of an electric buzzer located behind the pilot on the cabin ceiling, and activated by the airflow closing the contact on the right wing leading edge when the aircraft operates at a high angle of attack near the stall of the wing.

If the buzzer does not operate when lifting the contact: check the contact, the buzzer and the breaker for proper operation.

The contact element on the wing leading edge is replaced by removing the blind rivets and pulling it out. Reinstall with blind rivets at the same location to obtain the warning (buzzer) 5 kts above the stall speed.

TABLE - ELECTRICAL SYSTEM TROUBLESHOOTING

Trouble	Cause	Remedy
BATTERY		
Discharged battery.	Battery worn out. Charging rate not set right. Standing too long. Equipment left on accidentally. Impurities in electrolyte. Short circuit (ground) in wiring. Broken cell partitions.	Replace battery. Reset. Remove and recharge battery if left in unused airplane for too long. Remove and recharge. Replace electrolyte. Check wiring. Replace battery.
Battery life is short.	Overcharge due to level of electrolyte being below top of plates. Sulfation due to disuse. Impurities in electrolyte.	Maintain electrolyte. Replace battery. Replace battery.
Cracked cell jars.	Hold-down bracket loose. Frozen battery.	Replace battery and tighten. Replace battery.
Excessive corrosion inside container.	Spillage from overfilling.	Use care in adding water.
Battery freezes.	Discharged battery. Water added and battery not charged immediately.	Replace battery. Always recharge battery for 1/2 hour following addition of water in freezing weather.
Leaking battery jar. Battery polarity reversed.	Frozen. Connected backwards on airplane or charger.	Replace battery. Battery should be slowly discharged completely and then charged correctly and tested.
Battery consumes excessive water.	Cracked jar (one cell only).	Replace battery.

When using a sealed battery and the battery is not charging or not holding charge, replace battery.

TABLE. ELECTRICAL SYSTEM TROUBLESHOOTING (cont'd)

Trouble	Cause	Remedy
STARTER Motor fails to operate.	Low battery charge. Defective or improper wiring or loose connections. Defective starter solenoid or control switch.	Check and recharge if necessary. Refer to electrical wiring diagram and check all wiring. Replace faulty unit.
Low motor and cranking speed.	Worn, rough, or improperly lubricated motor or starter gearing. Same electrical causes as listed under "Motor fails to operate".	Disassemble, clean, inspect, and relubricate, replacing ball bearings if worn. Same remedies listed for these troubles.

ELECTRICAL LOADS (AMPS)

Equipment	Continuous	Intermittent
Battery solenoid	.65	
Voltage Regulator	3.0	
Clock	.1	
Hour meter	.1	
Fuel Gauge	.1 (ea)	
Fuel Pressure	.1	
Oil Temperature	.1	
Voltmeter	.1	
Ammeter	.1	
Aux. fuel pump		5.0
Flap Actuator		2.0
Trim Actuator (if applicable)		2.0
Nav. Light	10	
Landing Light	10	
Strobe	10	
Starter		10
Pitot Heat		10
Flaps		
Trim		2
Field	2	
XPND	3	
COM	1	4
GPS	2	

SECTION XI

CABIN HEATER AND VENTILATION SYSTEM

GENERAL

Heat for the cabin of the ZODIAC is provided by an air heater installed on the exhaust. Fresh air enters the engine compartment through the nose cowling and is vented to the heater muff through a flexible hose located at the front of the engine. The air is then heated and vented into the cabin area through a valve which can be controlled from the instrument panel. When the valve is completely closed off, the heated air is vented back into the engine compartment. The heater outlet in the cabin is located in front of the pilot's feet.

Fresh air is supplied to the cabin by adjustable vents in the right and left fuselage sides.

SECTION XII

PROPELLER SYSTEM

5. WOOD PROPELLER INSPECTION.

If instructions are not available from the propeller manufacturer, the following may be used:

Inspection of a wood propeller. Inspect to ensure the following:
(1) The drain holes are open on metal edged blade tips
(2) The metal/composite leading edge is secured and serviceable
(3) The blades, hub, and leading edge have no scars or bruises
(4) The mounting bolt torque and safety wire or cotter pins are secure
(5) There are no cracks on the propeller spinner (if applicable), and the safety wire is secure
(6) There are no small cracks in the protective coating on the propeller, which are caused by UV radiation
(7) The charring around the mating surface of the prop and the engine flange -- both indications of a loose propeller

Torque: A new, wooden propeller should have the mounting bolts checked for proper torque within the first hour of flight and every hour for 10 operational hours thereafter.
(1) After 10 hours, check the bolt torque every 5 hours thereafter. The mounting bolt torque also should be checked prior to flight if the aircraft has been in storage for a long period of time (3 to 6 months).
(2) If the bolts need to be torqued, it is suggested all the bolts be loosened for an hour to allow the wood to relax. ‘‘Finger tighten’’ the bolts until snug and tighten the attaching bolts in small increments, moving diagonally across the bolt circle. It is good practice to check the propeller track) as the bolts are torqued down. The torqued bolts should be safety wired in pairs.
(3) If nylon/fiber insert type nuts are used, they should be changed every time the propeller bolts are re-torqued. They should never be used with a bolt with a cotter key hole in the threaded area because the sharp edges around the hole will cut the nylon/fiber insert and reduce the fasteners effectiveness. All self-locking nuts should have at least two bolt threads visible pass the nylon/fiber insert after torquing.
(4) If any of the following damage is found, a wood propeller should be removed from the aircraft and sent back to the manufacturer / repair station for repair. If the propeller cannot be saved, it should be marked unserviceable.
(i) Any cracks in the blades or hub
(ii) Deep cuts across the wood grain
(iii) Blade track that exceeds 1/16” limits after attempts to repair
(iv) Any warpage or obvious defect
(v) Extreme wear (leading edge erosion, bolt hole elongation)
(vi) Any separation

NOTE: When parking the aircraft, always leave the wood propeller in the horizontal position. This position will allow the wood to absorb small amounts of moisture evenly across it’s entire span rather than concentrating the moisture (weight) in the low blade and creating a vibration problem.

APPENDIX 1

Aircraft Testing

INTRODUCTION
For a factory new SLSA, use this Appendix when reassembling the aircraft, after performing major alterations or repairs. To prevent errors in assembling and or reassembling the aircraft, follow the instruction. FOLLOW THE MANUFACTURERS INSTRUCTIONS.

USE THE ZODIAC PARTS DRAWINGS AS YOU ASSEMBLE AND INSPECT YOUR AIRCRAFT.

USE THE ENGINE MANUALS AS YOU ASSEMBLE AND INSPECT YOUR AIRCRAFT.

USE THE PROPELLER MANUALS AS YOU ASSEMBLE AND INSPECT YOUR AIRCRAFT.

Once the aircraft is reassembled, perform:

FITNESS INSPECTION
Static system: The best procedure to check the altimeter for **leaks and accuracy** is to have the entire static system checked in accordance with FAR Part 43, appendix E, at an FAA-approved repair station

1. Field Check.
Two people are needed to accomplish the following field check that will enable the owner / mechanic to detect if the aircraft's instrument system is leaking: (Note: This field check is not an accuracy check.)

a. Airspeed check: Slip a long rubber hose over the pitot mast (surgical tubing is recommended). As one person reads the airspeed, the other should very slowly roll up the other end of the tubing. This will apply pressure to the instrument. When the airspeed indicator needle reaches the aircraft's approximate recommended cruise speed, pinch the hose shut, and hold that reading. The airspeed needle should remain steady for a minute if the system is sound. A fast drop off will indicate a leak in the instrument, fittings, lines, or the test hose attachment. NEVER force air in the pitot tube or orally apply suction on a static vent. This will cause damage to the instruments.

b. Altimeter/vertical speed check.
(1) To check the static side, apply low suction at the end of the static vent port. The easiest way to gain access to the static system is to remove the static line at the static port. Next, get two feet of surgical tubing, seal one end, and tightly roll it up. Attach the open end to the static line and slowly unroll the tubing. This will apply a suction, or low pressure, to the static system.
(2) The altimeter should start to show an increase in altitude. The vertical speed indicator also should indicate a rate of climb. The airspeed may show a small positive indication. When the altimeter reads approximately 2,000 feet, stop and pinch off the tube. There will be some initial decrease in altitude and the vertical speed will read zero. The altimeter should then hold the indicated altitude for at least a minute. If altitude is lost, check for leaks.
(3) *IMPORTANT:* The above airspeed and altimeter field checks should not be considered the equivalent of airspeed or static system accuracy tests as certified by a certificated repair station, but a check of the system for possible leaks. Make sure that the location of the pitot static tube location is as per illustration in Maintenance Manual.

2. New/newly overhauled

Follow the engine manufacturer's instructions. These instructions are found either in the manufacturer's overhaul manuals, service bulletins, or service letters. Following the manufacturer's instructions is especially important if the engine has chrome cylinders which require special run-in procedures.
Also, before running-up the engine, be certain that it has the proper grade oil in the sump. Some new and newly overhauled engines are shipped with a special preservative oil to prevent corrosion. Drain this out and reservice the engine with the correct oil before starting.

3. Pre run-in checks:
(1) Before beginning the powerplant tests, inspect the engine and propeller carefully. With cowling removed, check all fuel and oil line connections. They should be tight. Check the torque on the engine mount attaching bolts. Be certain that there are no tools, hardware, or rags laying between the cylinders or under the magnetos.
(2) Check for the proper amount of oil in the oil tank and that the dip stick gives an accurate reading of the oil quantity.

4. Safety Precautions: Before the first engine run, ensure the aircraft is tied down, brakes on, and the wheels are chocked. The builder and flight test team should wear ear and eye protection. All flight test participants should be checked out on fire extinguisher use and operation. During engine runs, do not allow anyone to stand beside the engine, or inline or close to the propeller. Making minor adjustments to a running engine, such as idle and mixture settings, **is a very dangerous procedure** and should be done with great care by experienced individuals.

5. The First Engine Run:
(1) The first start of the engine is always a critical operation. The engine should be pre-oiled in accordance with the manufacturer's instructions. After completing the starting engine checklist in the Pilots Operating Handbook, the first concern is to get an oil pressure reading within the first 10 seconds. If there is no oil pressure reading -- shut down.
(2) There are three common problems that would cause low or fluctuating oil pressure.
(i) Oil pressure gauge or sender not working. This is easily checked with a meter.

6. Record the engine run-in data: During the engine run, monitor temperatures. Record the readings and adjustments for future reference. If the temperatures are rising close to the red line, reduce power and stop the test. Some causes of high temperatures include using wrong spark plugs, engine improperly timed either mechanically and/or electrically; and the carburetor fuel mixture set excessively lean.

7. After shut-down:
(a) After each engine run, check for fuel and oil leaks, loose connections, and hot spots on cylinders (burnt paint).
(b) A very **small quantity** of metal in the screen is not uncommon in a new or newly overhauled engine. It is part of the painful process of ''running-in.'' If subsequent oil screen checks (2 hours apart) show the engine is ''making metal,'' this indicates a problem inside the engine and a tear down inspection is required.
(c) It also is recommended all fuel sumps, filters, and gasolators be checked for debris after each engine run. Special attention should be given to the fuel system by the builder who constructed fuel tanks out of composite or fiberglass materials. Composite and fiberglass strands can be very fine, making visual detection difficult. Frequent cleaning of the fuel filters and screens early in the flight testing phase will avoid a gradual build up of loose composite fibers.

8. Mixture and Idle Speed Check: After completing the initial engine ‘‘run-in’’ tests, check the idle speed and mixture settings. To determine if the mixture setting is correct, perform the following:
(a) Warm up the engine until all readings are normal
(b) Adjust the engine rpm to the recommended idle rpm
(c) Slowly pull the mixture control back to idle cut-off
(d) Just before the engine quits, the engine rpm should rise about 50 rpm if the mixture is properly adjusted. If the rpm drops off without any increase in rpm, the idle mixture is set too lean. If the rpm increases more than 50 rpm, the idle mixture is set too rich.

9. Magneto - Ignition Check:
(a) The magneto checks should be smooth and the difference between both magnetos rpm drops should average about 50 rpm. (engine manual may require more drop in RPM. Check. The builder also should perform a ‘‘HOT MAG’’ check, to ensure against the engine, on its own, deciding when and where to start. To perform a hot mag check, run up the aircraft until the engine is warm. At idle rpm turn the magneto switch off; the engine should stop running. If the engine continues to run, one or both of the magnetos is hot (not grounded).
(b) The usual causes for a hot magneto area broken ‘‘P’’ lead coming out of the magneto or a bad magneto switch. THIS IS AN IMMEDIATE THREAT TO THE PERSONAL SAFETY OF ANYONE NEAR THE AIRPLANE AND MUST BE REPAIRED AT ONCE.

10. Carburetor Heat:
Be certain there is a positive reduction in rpm each time ‘‘carb heat’’ is applied. If there is no reduction, or the rpm drop is less than expected, check the carb heat control in the cockpit and on the carb heat air box for full travel. Also check for air leaks in the ‘‘SCAT TUBE’’ that connects the heat muff to the carburetor air box.

FOLLOW THE ZODIAC “GROUND TEST CHECK LIST”
Request this form from the manufacturer.

TAXI TESTS.
a. The pilot should spend an hour or more in the cockpit to become accustomed to the aircraft’s takeoff position. This small but important aspect of training will help the pilot avoid overreacting to an unexpected deck angle on the first flight.
NOTE: All taxi tests should always be monitored by a minimum of one other member of the flight test team, who will watch for evidence of fire/smoke or other problems not visible to the pilot.

b. The taxi tests should begin with a taxi speed no faster than a man can walk. The pilot should spend this time getting acquainted with the aircraft’s low speed handling characteristics by practicing 90, 180, and 360 degree turns and braking action. The pilot should also remember that monitoring the oil pressure, and oil temperature, and maintaining them within limits is a critical function that must not be overlooked.
NOTE: The Pilot should be aware that some aircraft brake manufacturers have specific brake lining conditioning procedures (break-in) for metallic and non-asbestos organic linings. Proper brake lining conditioning should be completed before starting the low and high speed taxi tests. If not properly conditioned, the brake lining will wear quickly and give poor braking action at higher speeds.

c. The pilot should check the flight instruments for operation each time the aircraft is taxied out. The compass should match the magnetic heading of the runway or taxi way the aircraft is on. When making a turn (e.g., right hand turn), the turn coordinator/turn and bank should indicate a right hand turn but the ball should skid to the left. The vertical speed indicator should read zero and the artificial horizon should indicate level.

d. After each taxi run, inspect the aircraft for oil, fuel and brake fluid leaks. No leak should be considered a minor problem. Every leak must be repaired and the system serviced prior to the next taxi test.

HIGH SPEED TAXI TESTS

1. OBJECTIVE. To determine the aircraft's high speed handling and braking parameters.

a. Propeller rotation will determine which rudder pedal is pressed to compensate for the asymmetrical thrust of the propeller blades.

b. Each taxi run should be 5 mph faster than the last run until the aircraft is within 80 percent of the predicted stall speed. Prior to reaching the predicted stall speed, the pilot should test aileron effectiveness by attempting to rock the wings slightly. As taxi speeds increase, the rudder becomes more responsive and directional control will improve.
(1) In a nose gear aircraft, the pilot should be able to raise the nose of the aircraft to a take off attitude at 80 percent of the stall speed. If the nose cannot be raised at this speed, the weight and balance and CG range should be rechecked. Most likely there is a forward CG problem or the main gear is too far aft.

c. If runway conditions permit, duplicate each taxi test with the flaps in the take-off and landing configuration.

d. Determine the approximate point on the runway where lift-off will occur and mark it with a green flag if no other existing reference is available.

e. Determine how much runway the pilot will need if it becomes necessary to abort the take-off. This is usually accomplished by accelerating to 80 percent of lift off speed, bringing the engine back to idle, and applying heavy braking action to bring the aircraft to a full stop. After each take-off/abort test, the brakes must be allowed to COOL DOWN. The lining must be examined carefully and replaced if necessary.

f. After determining the distance required to come to a full stop after aborting, add 30 percent to the distance. Measure that distance from the OPPOSITE end of the active runway which will be used. If no existing reference is available, mark it with a red flag. The taxi tests are completed when the test pilot is satisfied with both the aircraft's and his/her individual performance. Prior to the first flight, the aircraft should be thoroughly inspected with special attention given to the flight controls, landing gear, brake system, fuel system, engine, and propeller.

g. During this inspection all discrepancies must be fixed. Examine the screens/filters for metal, flush the fuel system, and clean all the screens/filters. Perform a leak check on the engine and the fuel system by running-up the engine.
h. Notes.

(1) The first high speed taxi tests should be made in a no wind or a light head wind condition. The pilot should ensure that the tests will not interfere with the normal airport operations or create a safety hazard for other aircraft.

Annual inspection must be performed as per Table #1 in the Maintenance Manual before first flight.

BEFORE FLYING, THE PILOT MUST BE SIGNED-OFF IN A SIMILAR AIRCRAFT DESIGN TYPE BY A FLIGHT INSTRUCTOR. FOLLOW THE PILOTS OPERATING HANDBOOK.

FOR FLIGHT TEST, USE THE ZODIAC "FLIGHT TEST CHECK LIST"
Request this form from the manufacturer.

AIRSPEED IN-FLIGHT ACCURACY

CHECK. The following procedure for airspeed calibration is offered for evaluation:

a. A measured course should be chosen with readily identifiable landmarks at each end. The landmarks should be a known distance apart, and the length of course should be at least 1 to 2 miles long.

b. The pilot must fly a precision course maintaining a constant altitude (e.g., 1,000 feet), constant airspeed, constant magnetic heading, and constant engine rpm. The pilot must record the temperature, altitude, indicated airspeed and the time over each landmark for both directions. The average of these speeds is the ground speed of the aircraft. An E6B computer will convert the temperature, altitude, and ground speed into True Indicated Airspeed for the tests.

NOTE: The difference between the E6B computer readings and the aircraft's ground speed readings is the error in the instrument and the error caused by the installation of the system in the aircraft.

c. The airspeed calibrations runs should be made several times in opposite headings for each of the selected airspeeds the pilot wants to check. Such accuracy test runs should start at the lowest safe airspeed and work up to cruise speed using 10 mph/knot increments.

d. Most errors will be found at the low end of the speed range due to the angle of the pitot mast to the relative wind and/or the location of the static ports. Using a Global Positioning Satellite (GPS) hand held receivers to check airspeed accuracy is also acceptable.

e. Retractable Flaps
Test the accuracy of the airspeed indicator with the flaps up and down.

Appendix 2

Major Alterations, Major Repairs, and Preventive Maintenance

(a) ***Major alterations****. Must be pre-approved by the Manufacturer and performed by an FAA certified A&P*

(1) *Airframe major alterations.*

(i) Wings.

(ii) Tail surfaces.

(iii) Fuselage.

(iv) Engine mount.

(v) Control system.

(vi) Landing gear.

(vii) Hull or floats.

(viii) Elements of an airframe including spars, ribs, fittings, shock absorbers, bracing, cowling, fairings, and balance weights.

(ix) Hydraulic and electrical actuating system of components.

(x) propeller blade(s).

(xi) Changes to the empty weight or empty balance which result in an increase in the maximum approved weight or center of gravity limits of the aircraft.

(xii) Changes to the basic design of the fuel, oil, cooling, heating, electrical, hydraulic, or exhaust systems.

(xiii) Changes to the wing or to fixed or movable control surfaces which affect flutter and vibration characteristics.

(2) *Powerplant major alterations*.

(i) Conversion of an aircraft engine from one approved model to another, involving any changes in compression ratio, propeller reduction gear, impeller gear ratios or the substitution of major engine parts which requires extensive rework and testing of the engine.

(ii) Changes to the engine by replacing aircraft engine structural parts with parts not supplied by the original manufacturer or parts not specifically approved by the manufacturer.

(iii) Installation of an accessory which is not approved for the engine.

(iv) Removal of accessories that are listed as required equipment on the aircraft or engine specification.

(v) Installation of structural parts other than the type of parts approved for the installation.

(vi) Conversions of any sort for the purpose of using fuel of a rating or grade other than that listed in the engine specifications.

(3) *Propeller major alterations.*

(i) Changes in blade design.

(ii) Changes in hub design.

(iii) Installation of parts not approved for the propeller.

(iv) Change of propeller pitch.

(b) ***Major repairs****. Must be pre-approved by the Manufacturer or other identity and performed by an FAA certified A&P*

All major repairs or alterations made to aircraft subsequent to its initial design and production acceptance testing to applicable ASTM standards and sale to a consumer must be evaluated relative to the requirements of the applicable ASTM design and production acceptance specification(s).

The manufacturer or other entity that performs the evaluation of an alteration or repair shall provide a written affidavit that the aircraft being altered will still meet the requirements of the applicable ASTM design and performance specification subsequent to the alteration.

(1) *Airframe major repairs.* Repairs to the following parts of an airframe and repairs of the following types, involving the strengthening, reinforcing, splicing, and manufacturing of primary structural members or their replacement, when replacement is by fabrication such as riveting or welding, are airframe major repairs.

(i) Spars.

(ii) Monocoque or semimonocoque wings or control surfaces.

(iii) Spar flanges.

(iv) Wing main ribs and compression members

(v) Wing or tail surfaces

(vi) Engine mount.

(vii) Fuselage longerons.

(viii) Members of the side truss, horizontal truss, or bulkheads.

(ix) Main seat support braces and brackets.

(x) Landing gear brace struts.

(xi) Axles.

(xii) Wheels.

(xiii) Parts of the control system such as control columns, pedals, shafts, brackets, or horns.

(xiv) Repairs involving the substitution of material.

(xv) The repair of damaged areas in metal stressed covering exceeding six inches in any direction.

(xvi) The repair of portions of skin sheets by making additional seams.

(xvii) The splicing of skin sheets.

(xviii) The repair of three or more adjacent wing or control surface ribs or the leading edge of wings and control surfaces, between such adjacent ribs

(xix) Repairing, including rebottoming, of removable or integral fuel tanks and oil tanks.

(2) *Powerplant major repairs.* Repairs of the following parts of an engine and repairs of the following types, are powerplant major repairs:

(i) Separation or disassembly of a crankcase or crankshaft.

(ii) Special repairs to structural engine parts by welding, plating, metalizing, or other methods.

(3) *Propeller major repairs.* Repairs of the following types to a propeller are propeller major repairs:

(i) Any repairs to, or straightening of blades.

(ii) Repairing or machining of hubs.

(iii) Shortening of blades.

(iv) Retipping of wood / composite propellers.

(v) Replacement of outer laminations on fixed pitch wood propellers.

(vi) Repairing elongated bolt holes in the hub of fixed pitch wood propellers.

(vii) Inlay work on wood blades.

(viii) Repairs to composition blades.

(ix) Replacement of tip fabric.

(x) Replacement of plastic covering.

(xi) Repairs to deep dents, cuts, scars, nicks, etc., and straightening of blades.

(xii) The repair or replacement of internal elements of blades.

(4) *Appliance major repairs.* Repairs of the following types to appliances are appliance major repairs:

(i) Calibration and repair of instruments.

(ii) Calibration of radio equipment.

(iii) Rewinding the field coil of an electrical accessory.

(iv) Complete disassembly of hydraulic systems.

(v) Overhaul of pressure type carburetors, and pressure type fuel, oil and hydraulic pumps.

(c) *Preventive maintenance.*

As per FAA regulations, the FAA authorizes aircraft owners who holder at least a Sport Pilot certificate to perform maintenance as outlined in 14 CFR Part 43. This maintenance may be performed only on an aircraft which the pilot owns or operates and which is not used in commercial service. This list does not supersede maintenance as outlined in 14 CFR Part 43.

Preventive maintenance is limited to the following work, provided it does not involve complex assembly operations:

(1) Removal, installation, and repair of landing gear tires.

(2) Replacing elastic shock absorber cords on landing gear.

(3) Servicing landing gear.

(4) Servicing landing gear wheel bearings, such as cleaning and greasing.

(5) Replacing defective safety wiring or cotter keys.

(6) Lubrication not requiring disassembly other than removal of nonstructural items such as cover plates, cowlings, and fairings.

(7) Making simple patches not removal of structural parts or control surfaces.

(8) Replenishing hydraulic fluid in the hydraulic reservoir.

(9) Refinishing decorative coating of fuselage, wings tail group surfaces (excluding balanced control surfaces), fairings, cowlings, landing gear, cabin, or cockpit interior when removal or disassembly of any primary structure or operating system is not required.

(10) Applying preservative or protective material to components where no disassembly of any primary structure or operating system is involved and where such coating is not prohibited or is not contrary to good practices.

(11) Repairing upholstery and decorative furnishings of the cabin, cockpit, interior when the repairing does not require disassembly of any primary structure or operating system or interfere with an operating system or affect the primary structure of the aircraft.

(12) Making small simple repairs to fairings, nonstructural cover plates, cowlings, and small patches and reinforcements not changing the contour so as to interfere with proper air flow.

(14) Replacing safety belts.

(15) Replacing seats or seat parts with replacement parts approved for the aircraft, not involving disassembly of any primary structure or operating system.

(16) Trouble shooting and repairing broken circuits in landing light wiring circuits.

(17) Replacing bulbs, reflectors, and lenses of position and landing lights.

(18) Replacing wheels where no weight and balance computation is involved.

(19) Replacing any cowling not requiring removal of the propeller or disconnection of flight controls.

(20) Replacing or cleaning spark plugs and setting of spark plug gap clearance.

(21) Replacing any hose connection except hydraulic connections.

(22) Replacing prefabricated fuel lines.

(23) Cleaning or replacing fuel and oil strainers or filter elements.

(24) Replacing and servicing batteries.

(25) Replacement or adjustment of nonstructural standard fasteners incidental to operations.

(26) Removing and replacing self-contained, front instrument panel-mounted navigation and communication devices that employ tray-mounted connectors that connect the unit when the unit is installed into the instrument panel, (excluding automatic flight control systems, transponders, and microwave frequency distance measuring equipment (DME)). The approved unit must be designed to be readily and repeatedly removed and replaced, and pertinent instructions must be provided. Prior to the unit's intended use, and operational check must be performed in accordance with the applicable sections of part 91.

Any work accomplished must include an entry in the appropriate logbook. The entry should contain:

(a) The date the work was accomplished.
(b) Description of the work.
(c) Number of hours on the aircraft.
(d) The certificate number of pilot performing the work.
(e) Signature of the individual doing the work.

(d) *Line Maintenance, Repairs and Alterations.*

The holder of an SLSA repairman certificate with either an inspection or maintenance rating is the minimum level of certification to perform line maintenance of SLSA.

Typical tasks allowed by Line Maintenance:

(1) 100 hour inspection

(2) Annual condition inspection

(3) Service of fluids

(4) Removal and replacement of components for with instructions are provided in maintenance such as

(i.) Fuel pumps

(ii.) Batteries

(iii.) Instruments, switches, lights, and circuit breakers

(iv.) Starters / generations / alternators

(v.) Exhaust manifolds / mufflers

(vi.) Wheel and brake assemblies

(vii.) Propeller

(viii.) Sparkplugs, ignition wires, and electronic ignition models / components limited to the use of mechanical connections

(ix.) Hoses and lines

(x.) Ballistic recovery system

(xi.) Floats and skis

(5) Patching of holes

(6) Stop-drilling of cracks

(7) Alterations for which specific instructions and provided in the maintenance manual, such as

(i.) Installation of communications radios, transponder, GPS, and antenna

(ii.) Installation of strobe light system

(iii.) Compliance with manufacturer creative directive when repairman is listed as an authorized person to accomplish the alteration

(e) ***Heavy Maintenance, Repairs, and Alterations***

Authorization to Perform—The holder of a mechanic certificate with airframe or powerplant rating(s), or both, or an SLSA Repairman maintenance that has received additional task specific training for the function to be performed is generally considered the minimum level of certification to perform heavy maintenance of SLSA.

Typical Tasks Considered as Heavy Maintenance for SSLSA's Include:

(1) Removal and replacement of components for which instructions are provided in the maintenance manual or service directive instructions, such as:

(i.) Complete engine removal and reinstallation in support of an engine overhaul or to install a new engine

(ii.) Remove and replacement of engine cylinders, pistons

(iii.) or valve assemblies, or a combination thereof

(iv.) Primary flight control cables/components

(v.) Landing gear assemblies.

(2) Repair of components or aircraft structure, or both, for which instructions are provided in the maintenance manual or service directive instructions, such as:

(i.) Repainting of control surfaces,

(ii.) Structural repairs, and

(iii.) Recovering of a dope and fabric covered aircraft.

(3) Alterations of components or aircraft structure, or both, for which instructions are provided in the maintenance manual or service directive instruction, such as:

(i.) Initial installation of skis, and

(ii.) Installation of new additional pitot static instruments

(f) *Overhaul*

Overhaul of components is to be treated the same as typical FAR 23 type aircraft. Overhaul manual in addition to manufacturers maintenance is required to perform the overhaul of an SLSA or SLSA component.

(1) Typical components that are overhauled include:

(i.) Engines

(ii.) Carburetors/fuel injection systems

(iii.) Starters/alternators/generators, and

(iv.) Instruments