



# RANGER

## AIRCRAFT MAINTENANCE MANUAL

Serial Number: \_\_\_\_\_

N Number: \_\_\_\_\_

Vashon Aircraft™ | 19825 141<sup>st</sup> PI NE | Woodinville, WA 98072  
[www.vashonaircraft.com](http://www.vashonaircraft.com)

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# RECORD OF REVISIONS

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0	All	Initial Release	03-23-16	KLK	EJF
1	5.2,6.3.3, A	Check oil quantity changed from 6 quarts to 5 quarts.	01-14-19	KAH	
2	All	Complete Revision for Readability	11-15-19	JJR	

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# **SECTION**

# **1**

# **SCOPE**



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## 1. SCOPE

### 1.1 GENERAL

This manual has been prepared by Vashon Aircraft™ in accordance with the standards of ASTM F2483. The manual provides the practices for the servicing and maintenance of the RANGER R7™ "Ranger" Light Sport Aircraft (LSA) and guidance for the necessary qualifications of personnel performing the various levels of maintenance. It provides practices and guidance for servicing and maintenance that can be performed by a qualified pilot and owner, the preventive maintenance requirements of a 100-hour and an annual inspection, and the corrective line maintenance actions for the repairs, alterations, and the removal and re-installation of components.

The owner is reminded that it is her/his responsibility to ensure that Vashon Aircraft™ has the appropriate contact information so that flight safety and other important information can be communicated in a timely manner. Please use the form on the Vashon Aircraft™ website ([www.vashonaircraft.com](http://www.vashonaircraft.com)) to register any changes in ownership or address. Alternatively, complete the form on page 1-4 and e-mail, fax, or mail to the address below:

E-mail: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)

Fax: +1 425 527 9941

Address: 19825 141st PL NE

Woodinville, WA 98072

USA

Vashon Aircraft™ may also be contacted by telephone at: +1 425 527 9940. Vashon Aircraft™ office hours are from 8:00 am to 5:00 pm, US Pacific Time.

Service Alerts, Service Bulletins, and the latest versions of the Pilot's Operating Handbook and Maintenance Manual Supplements for the Ranger aircraft may be found in the product support section of Vashon Aircraft's website ([www.vashonaircraft.com/support](http://www.vashonaircraft.com/support)).



Figure 1.1.1 The Vashon Aircraft™ RANGER R7™ “Ranger” Light Sport Aircraft (LSA).

## 1.2 SAFETY OF FLIGHT AND SERVICE DIFFICULTY REPORTING

Please report any service difficulties or any other issue relating to flight safety directly to Vashon Aircraft™ using the form on the website. Alternatively, complete the form on page 6 and e-mail, fax or mail to the address in Section 1.1.

## 1.3 PILOT/OWNER SERVICING AND MAINTENANCE

This manual identifies servicing and maintenance actions which can be performed by the owner who holds a pilot certificate but who may not have received any specific authorized training in the maintenance of the Vashon Aircraft RANGER R7™. The maintenance actions authorized in

this manual comply with the intent of FAA 14 CFR Part 43.3 with regard to preventive maintenance.

#### **1.4 PREVENTIVE MAINTENANCE**

This manual identifies the Ranger's preventive maintenance tasks, which are to be accomplished by qualified personnel, and include the actions for the 100-hour inspection and the annual inspection.

#### **1.5 CORRECTIVE MAINTENANCE AND ALTERATIONS**

This manual identifies the line maintenance, minor repair, and minor alteration tasks that can be accomplished by a holder of an LSA repairman certificate with either an inspection or maintenance rating. Furthermore, it also instructs on heavy maintenance tasks that require a certified airframe and powerplant mechanic and the approval of Vashon Aircraft to perform.

No major repairs, or major alterations, as outlined in ASTM F2483 Sections 7 through 9, or in this maintenance manual, are authorized at this time for the Ranger aircraft.

Any major repairs, or major alterations, as outlined in ASTM F2483 Sections 7 through 9 can only be performed by Vashon Aircraft or only as provided by Vashon Aircraft's approved engineering data.

## CHANGE OF ADDRESS/OWNERSHIP FORM

<b>Aircraft Serial Number:</b> RANGER R7-		<b>Aircraft Registration Number:</b>	
<b>CURRENT OWNER (Last, First)</b>		<b>NEW OWNER (Last, First)</b>	
<b>COMPANY/ORGANIZATION</b>		<b>COMPANY/ORGANIZATION</b>	
<b>PREVIOUS ADDRESS</b> Number and Street		<b>NEW ADDRESS</b> Number and Street	
City		City	
State/Province	Postal Code	State/Province	Postal Code
Country		Country	
<b>TELEPHONE NUMBER(S)</b>		<b>TELEPHONE NUMBER(S)</b>	
SIGNATURE		DATE	
<b>FOR VASHON AIRCRAFT USE ONLY</b>			
Change of Ownership/Address Log Number:		Date Received:	

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# CONTINUED OPERATIONAL SAFETY REPORTING FORM

**NAME (Last, First)**

**COMPANY/ORGANIZATION**

**ADDRESS**

Number and Street

City

**AIRCRAFT MODEL**

State/Province

Postal Code

**AIRCRAFT SERIAL NUMBER**

RANGER R7-

Country

**AIRCRAFT REGISTRATION NUMBER**

**TELEPHONE NUMBER(S)**

**DESCRIPTION OF SAFETY OF FLIGHT ISSUE OR SIGNIFICANT SERVICE  
DIFFICULTY:**

SIGNATURE

DATE

**FOR VASHON AIRCRAFT USE ONLY**

COS Log Number:

Date Received:

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# **SECTION 2**

# **REFERENCE DOCUMENTS**

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## 2. REFERENCE DOCUMENTS

ASTM F2483	Standard Practice for Maintenance and the Development of Maintenance Manuals for Light Sport Aircraft
ASTM F2245	Specification for the Design and Performance of a Light Sport Aircraft
ASTM F2295	Practice for Continued Operational Safety Monitoring of a Light Sport Aircraft
14 CFR Part 43	Maintenance, Preventive Maintenance, Rebuilding, and Alteration

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# **SECTION 3**

# **TERMINOLOGY**

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## 3. TERMINOLOGY

### 3.1 DEFINITIONS

- 3.1.1 Annual Condition Inspection – detailed inspection accomplished once a year on an LSA in accordance with instructions provided in the maintenance manual supplied with the aircraft. The purpose of the inspection is to look for any wear, corrosion, or damage that would cause an aircraft to not be in a condition for safe operation.
- 3.1.2 A&P – airframe and powerplant mechanic as defined by 14 CFR Part 65 in the U.S. or equivalent certification in other countries.
- 3.1.3 FAA – United States Federal Aviation Administration.
- 3.1.4 Heavy Maintenance – any maintenance, inspection, repair, or alteration a manufacturer has designated that requires specialized training, equipment, or facilities.
- 3.1.5 Line Maintenance – any repair, maintenance, scheduled checks, servicing, inspections, or alterations not considered heavy maintenance that is approved by the manufacturer and in specified in the manufacturer's maintenance manual
- 3.1.6 Light Sport Aircraft – aircraft designed in accordance with ASTM standards under the jurisdiction of Committee F37 Light Sport Aircraft, for example, Specification F2244 for powered parachutes, Specification F2245 for airplanes, and Specification F2352 for gyroplanes.
- 3.1.7 LSA Repairman Inspection – U.S. FAA-certificated repairman (light sport aircraft) with an inspection rating as defined by 14 CFR Part 65, authorized to perform the annual condition inspection on experimental light sport aircraft or an equivalent rating issued by other civil aviation authorities.
- 3.1.8 LSA Repairman Maintenance – U.S. FAA-certificated repairman (light sport aircraft) with a maintenance rating as defined by 14 CFR Part 65, authorized to perform line maintenance on aircraft certificated as special light sport aircraft. Authorized to perform the annual condition/100-h inspection on a light sport aircraft, or an equivalent rating issued by other civil aviation authorities.
- 3.1.9 Maintenance Manual(s) – manual provided by the manufacturer or supplier of a light sport aircraft that specifies all maintenance, repairs, and alterations authorized by the manufacturer.

- 3.1.10 Major Repair, Alteration, or Maintenance – any repair, alteration, or maintenance for which instructions to complete the task excluded from the maintenance manual(s) supplied to the consumer are considered major.
- 3.1.11 Manufacturer – any entity engaged in the production of a light sport aircraft or component used on a light sport aircraft.
- 3.1.12 Minor Repair, Alteration, or Maintenance – any repair, alteration, or maintenance for which instructions provided for in the maintenance manual(s) supplied to the consumer of the product are considered minor.
- 3.1.13 Overhaul – maintenance, inspection, repair, or alterations that are only to be accomplished by the original manufacturer or a facility approved by the original manufacturer of the product.
- 3.1.14 Overhaul Facility – facility specifically authorized by the aircraft or component manufacturer to overhaul the product originally produced by that manufacturer.
- 3.1.15 Repair Facility – facility specifically authorized by the aircraft or component manufacturer to repair the product originally produced by that manufacturer.
- 3.1.16 14 CFR – Code of Federal Regulations Title 14 Aeronautics and Space also known as the “FARs” or Federal Aviation Regulations.
- 3.1.17 100-h Inspection – same as an annual condition inspection, except the interval of inspection is 100 h of operation instead of 12 calendar months. This inspection is utilized when the light sport aircraft is being used for commercial operations such as flight instruction or rental, or both.

## 3.2 ACRONYMS

- 3.2.1 POH – pilot operating handbook
- 3.2.2 LSA – light sport aircraft



# **SECTION 4**

# **SIGNIFICANCE AND USE**

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#### **4. SIGNIFICANCE AND USE**

The purpose of this maintenance manual is to provide guidance to owners, mechanics, airports, regulatory officials, and aircraft and component manufacturers who may accomplish maintenance, repairs, and alterations on the Vashon Aircraft model RANGER R7 RANGER.

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# **SECTION 5**

# **AIRCRAFT MAINTENANCE MANUAL**

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## **5. AIRCRAFT MAINTENANCE MANUAL**

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**APPENDIX A**

**1**



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## 5.1 FORMAT & GUIDANCE FOR THE USE OF THIS MANUAL

### 1. GENERAL

Vashon Aircraft, Inc. prepared this aircraft maintenance manual. It contains the information that a trained mechanic will need to maintain the aircraft in an airworthy condition.

The Aircraft Maintenance Manual was prepared to meet the ASTM F2483 Standard Specification requirements. The format of the manual is designed to be familiar to most modern aircraft mechanics.

This maintenance manual does not reflect part numbers and cannot be used for ordering replacement parts.

The wiring schematics that have been included in the manual are for general information purposes only. Aircraft will have optional equipment for which there will be specific drawings that will either be included with the aircraft's documentation on delivery or be available from Vashon Aircraft, Inc.

### 2. LAYOUT OF THE MANUAL

This maintenance manual is divided into chapters. The chapter numbers appear at the foot of each page.

Each chapter contains its own table of contents. Where the systems are complex, the table of contents will be found in the sub chapter (as is the case of Chapter 6).

### 3. WARNINGS, CAUTION, AND NOTES

**WARNING**  
**AN OPERATING PROCEDURE, PRACTICE, OR A CONDITION, WHICH,  
IF NOT CORRECTLY FOLLOWED OR REMEDIED, COULD RESULT  
IN SERIOUS PERSONAL INJURY OR LOSS OF LIFE.**

**CAUTION**  
**An operating procedure, practice, or a condition, which, if not strictly  
Observed or corrected, could result in destruction of, or damage to  
equipment.**

**NOTE**  
An operating procedure, practice, or condition,  
which is important to emphasize.

#### **4. REVISION SERVICE**

The Maintenance Manual will be made available to aircraft owners and repair shops on a subscription basis. Revisions will be sent to registered subscribers as they become available.

Revisions may also be obtained by submitting a request to:

**Vashon Aircraft™**  
**19825 141<sup>ST</sup> PL NE**  
**Woodinville, WA 98072**  
**USA**  
**Tel: +1 425 527 9940**  
**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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## 1. GENERAL

The location of any point on the aircraft is identified in a three-axis grid as follows (refer to Figure 5.2.1):

- FS – Fuselage Station is a horizontal reference designation starting in front of the nose of the airplane at a point 2540 mm/100 in forward of the wing leading edge.
- WL – Water Line is a vertical reference designation measured parallel to the ground from a point 970 mm/31.189 in below the door sill.
- BL – Buttock Line is a horizontal reference designation starting at the airplane centerline. When the aircraft is viewed from above, the letters "L" and "R" indicate whether the point is to the left or the right of the centerline.

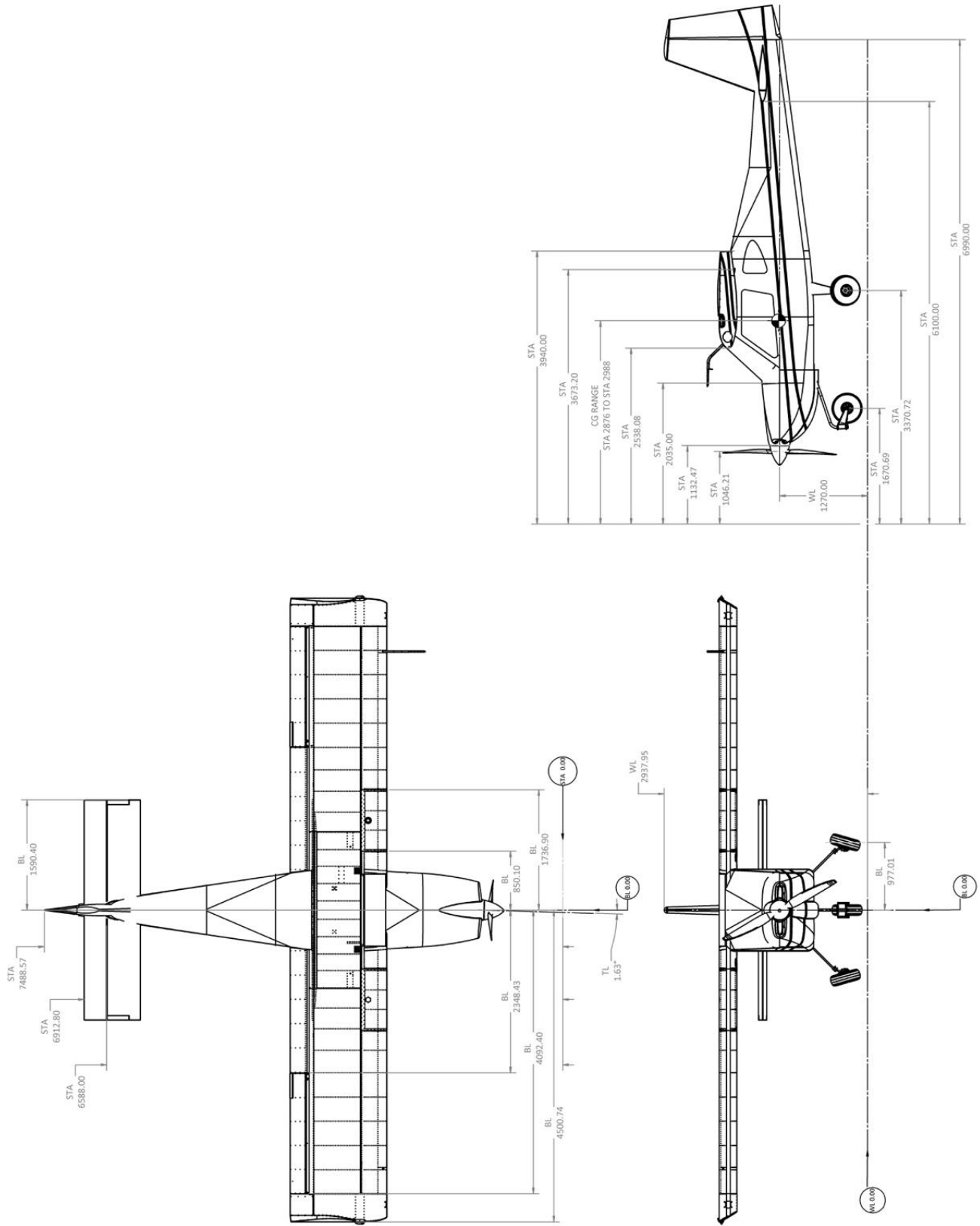


Figure 5.2.1 Vashon Ranger datums and dimensions.

**(1) MAIN DIMENSIONS**

Span	9.00 m/29.53 ft
Length	6.64 m/21.77 ft
Height (ground attitude)	2.66 m/8.74 ft
Propeller Ground Clearance*	312 mm/12.3 in
Design Gross Weight (wheels)	600 kg/1323 lb
Design Gross Weight (floats)	650 kg/1433 lb

\*With 70 inch diameter propeller and 6.00-6 tires.

**(2) WINGS**

Type	Cantilever, High Wing
Airfoil Section	NACA 23018
Chord	1400 mm/55.118 in
Dihedral	0°
Area	12.6 m <sup>2</sup> /135.63 ft <sup>2</sup>
Aspect Ratio	6.43

**(3) AILERONS**

Area (both ailerons)	1.2 m <sup>2</sup> /12.96 ft <sup>2</sup>
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**(4) FLAPS**

Area (both flaps)	0.97 m <sup>2</sup> /10.46 ft <sup>2</sup>
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**(5) HORIZONTAL STABILIZER AND ELEVATORS**

Airfoil Section	NACA 63A015
Span	3.18 m <sup>2</sup> /10.44 ft <sup>2</sup>
Chord	812.8 mm/32.000 in
Dihedral	0°
Area (horiz. stab. & elevators)	2.59 m <sup>2</sup> /27.83 ft <sup>2</sup>
Aspect Ratio	3.91

**(6) VERTICAL STABILIZER AND RUDDER**

Airfoil Section	NACA 63A015 - modified
Span (dist. above fuse ref. plane)	1.37 m/4.50 ft <sup>2</sup>
Mean Aerodynamic Chord	978 mm/38.496 in



Area (vert stab & rudder)	1.38 m <sup>2</sup> /14.88 ft <sup>2</sup>
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Aspect Ratio	2.72
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(7) LANDING GEAR

Wheel Track (main to main)	2.15 m/7.04 ft
----------------------------	----------------

Wheel Base (nose to main)	1.70 m/5.58 ft
---------------------------	----------------

(8) CONTROL SURFACE DEFLECTIONS

(a) Aileron

Trailing Edge UP	30.0°
------------------	-------

Trailing Edge DN	15.0° ± 2.0°
------------------	--------------

(b) Flaps

Take-Off Position	20.0° ± 2.0°
-------------------	--------------

Landing Position	40.0° ± 2.0°
------------------	--------------

(c) Elevators

Trailing Edge UP	22.8°
------------------	-------

Trailing Edge DN	19.0°
------------------	-------

(d) Elevator Trim Tab

Trailing Edge UP	27.0° ± 2.0°
------------------	--------------

Trailing Edge DN	23.0° ± 2.0°
------------------	--------------

(e) Rudder

Trailing Edge LEFT	32.0°
--------------------	-------

Trailing Edge RIGHT	32.0°
---------------------	-------

## 2. EQUIPMENT LIST

This section provides a list of components and equipment that the operator is likely to change on the aircraft.

Description	Ref. In AMM
6.00-6, 8.00-6, 8.50-6 main wheel and tires	5.7.8
6.00-6 nose wheel and tire	5.7.8
-23 Fixed Pitch Propeller	5.7.16

For more information on the latest equipment, please see the component's respective section in the Maintenance, Repairs, and Alterations part of this manual, or contact Vashon Aircraft.

## 3. PURCHASE PARTS SOURCE LISTS

Consumable or Frequently Replaced Items. For oil, see Table 5.4.1.

Description	Part Number (Reference purpose)	Source
Engine Oil Filter	TEMPEST OIL FILTER AA48162	Vashon Aircraft or Aircraft Parts Store
Air Filter	657514	Vashon Aircraft
Fuel Filter	RUS-650133	Vashon Aircraft
Brake Pad Lining	WHLM66-106	Vashon Aircraft

**4. ENGINE SPECIFICATIONS AND DATA**

<b>Engine Model</b>	<b>O-200-D</b>
Number of Cylinders	4
Bore & Stroke	4.062 in x 3.875 in
Compression Ratio	8.5:1
Piston Displacement	201 in <sup>3</sup>
Rated Power at Seal Level	100 HP @ 2750 RPM
Rated Manifold Pressure	29.5 in Hg
Oil Pressure at Cruising	30-60 psi
Minimum Idling Oil Pressure	10 psi
Minimum Oil Temperature	75° F
Maximum Oil Temperature	240° F (detergent oil)
Maximum Cylinder Head Temperature	525°F
Engine Weight - Dry	168.53 lb.
Oil Sump Capacity	5 quarts
Recommended TBO	2000 hours or 12 years

Refer to Continental Motor's Engine Operator's Manual for the operating limits.

**5. WEIGHT AND BALANCE DATA**

Refer to RANGER R7 Pilot's Operating Handbook, Section 6 for the most current Weight and Balance Data.

**6. TIRE INFLATION**

Refer to section 5.4 part 3 of this manual for the tire inflation data.

**7. APPROVED OILS AND CAPACITIES**

Refer to the POH or section 5.4 part 3SERVICING OF FLUIDS of this manual for the approved oil and capacity data.

**8. RECOMMENDED FASTENER TORQUES**General Torque Values:

This chapter gives the requirements for torquing the fasteners.

No lubricating or anti-seize compounds are to be applied to threaded fasteners except when specified. At the time of installation, the threads must be clean and free of corrosion, paint or any products other than those applied by the fastener's manufacturer.

**8.1 Definitions**

**Running Torque:** The average torque developed after the fastener is at least one full thread through the nut, but prior to the tightening of the joint (also called tightening torque or installation torque).

**Assembly Torque:** The torque required by design engineering in order to create the desired axial load on the bolt/nut assembly (also called tightening torque or installation torque).

**Prevailing Torque:** the driving torque required to overcome friction in a threaded fastening application. Standard maintenance practice dictates that mechanics add this value to the specified torque. Prevailing Torque is the driving torque required to overcome friction in a threaded fastening application. Standard maintenance practice dictates that mechanics add this value to the specified torque.

**8.2 Torquing Requirement**

Whenever possible, the nut shall be turned during torquing.

Where it is necessary to tighten the fastener assembly from the head, the installation torque shall be the maximum torque (accounting for prevailing torque if applicable) indicated in part 8.6 of this section plus 10 percent.

**NOTE**

This is only applicable for fasteners greater than 3/16" in diameter.

When nuts are to be secured to fasteners by means of cotter pins or lock wire, the low side of the specified torque range shall be approached for tightening. If necessary, tightening shall be continued until the next slot aligns with the hole.

Nuts shall not be loosened to obtain the required alignment.

Maximum torque shall not be exceeded.

Threaded fasteners which have been torqued above the maximum value specified shall not be backed off and re-torqued but shall be removed, rejected and rendered unserviceable.

If there is any doubt a fastener has been under-torqued, the nut shall be backed off one complete rotation (360°) maximum and retightened to the specified value; the bolt, screw or stud must not be allowed to rotate.

### 8.3 Use of Torque Wrenches and Adaptors

All final torquing shall be carried out with certified torque wrenches or torque screwdrivers.

When adaptors or extensions are used on manually operated torque wrenches, they shall be used as shown in Figure 5.2.2 and the dial reading required shall be calculated from the following formula:

$$\text{Dial Reading} = \frac{\text{Specified Torque} \times L}{L + A}$$

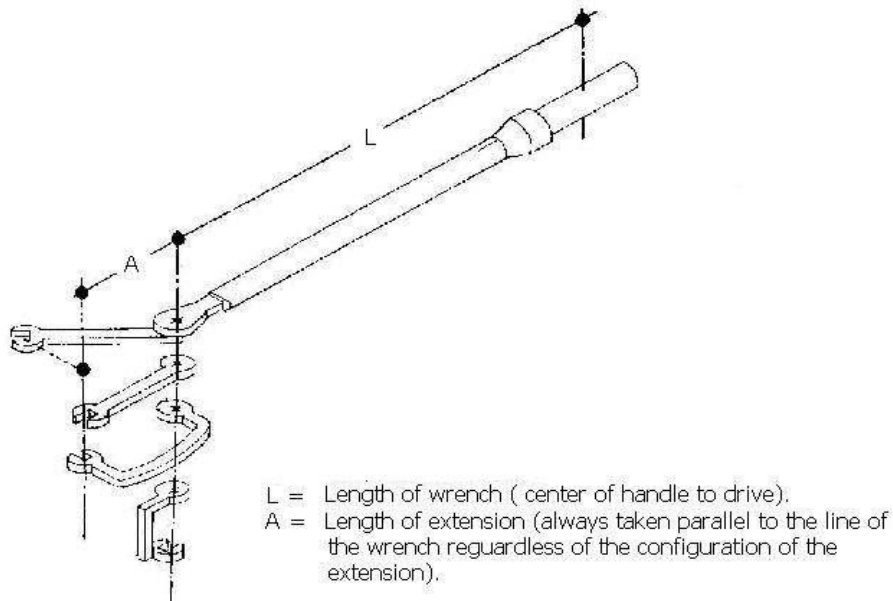
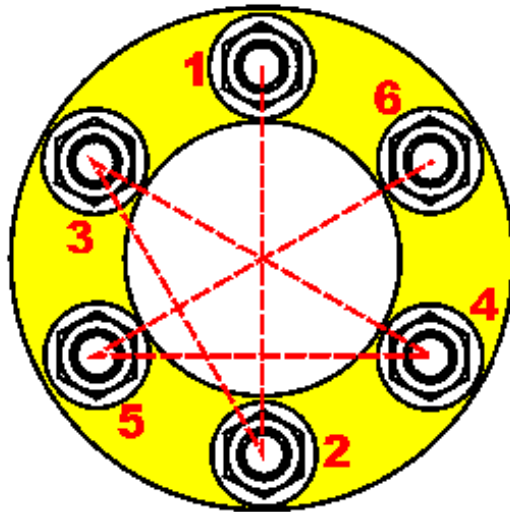


Figure 5.2.1.1.1.1 Torque wrench with extension.

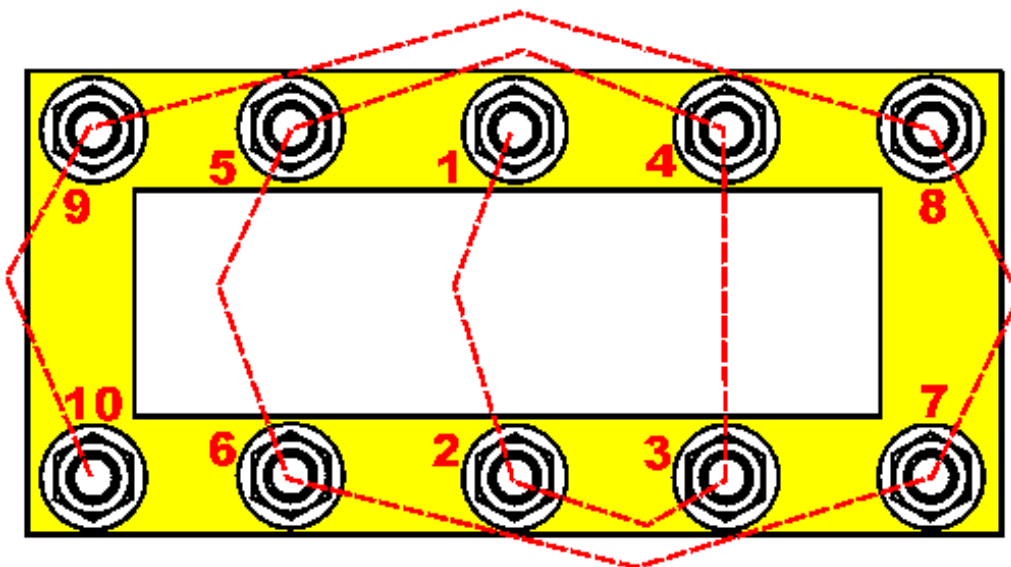
Dimensions must be measured in the same units (i.e. both in inches, both in feet, etc.) for each calculation. Different units must not be mixed.

#### 8.4 Torquing Patterns

Whenever applicable, one of the patterns shown in Figure must be followed when torquing fasteners.



**Criss-Cross Tightening Sequence for Circular Bolt Patterns**



**Spiral Tightening Sequence Starting in the Middle for Non-Circular Bolt Patterns.**

Figure 5.2.3 Torquing patterns.

## 8.5 Specific Torque Requirements

### NOTE

These values do not account for prevailing torque. Prevailing Torque is the driving torque required to overcome friction in a threaded fastening application. Standard maintenance practice dictates that mechanics add this value to the specified torque.

For example, a random sample of new and used AN365-4, and -5 nuts shows that the torque required to turn AN4 (1/4") nuts varied between 15-19 in/lbs. The torque required on AN5 (5/16") nuts varied between 18-22 in/lbs. This value must be added to the torque value.

Item	Chapter/Section Reference	Minimum Dry Torque Inch Pounds	Maximum Dry Torque Inch Pounds
Catto CPX-01 Propeller Bolts (see reference for torquing procedure)	5.7.16	300	
Propeller Extension Bolts (see reference for torquing procedure)	5.7.16	360	
Spark Plugs	5.7.15	300	360
Front Wheel Axle Nut	5.7.8	190	220
Engine to Engine Mount Bolts	5.7.11	180	190
Brake Caliper Bolts	5.7.8	100	
Brake Rotor Bolts	5.7.8	100	
Wheel Half Bolts and Locknuts	5.7.8	100	
Nose Wheel Axle	5.7.8	See 5.7.8	
Rudder Pedal Attach Bolts	5.7.6	15-18	
Elevator Idler Bolt	5.7.6	28	

## 8.6 General Torque Values (Given in in-lbs)

### NOTE

These values do not account for prevailing torque. Prevailing Torque is the driving torque required to overcome friction in a threaded fastening application. Standard maintenance practice dictates that mechanics add this value to the specified torque.

For example, a random sample of new and used AN365-4, and -5 nuts shows that the torque required to turn AN4 (1/4") nuts varied between 15-19 in/lbs. The torque required on AN5 (5/16") nuts varied between 18-22 in/lbs. This value must be added to the torque value.

BOLTS – STEEL TENSION		BOLTS – STEEL TENSION		BOLTS – ALUMINUM	
AN3 THRU AN20 AN42 THRU AN 49 AN73 THRU AN81 AN173 THRU AN186 MS20033 THRU NS20046 MS20073 MS20074 AN509 MS24694 AN525 MS20739		MS20004 THRU MS20024 NAS144 THRU NAS158 NAS333 THRU NAS340 NAS538 THRU NAS590 NAS624 THRU NAS644 NAS1303 THRU NAS1320 NAS172 NAS174 NAS517		AN3D THRU AN20D AN173DD THRU AN186DD MS20033 THRU NS20046 AN509D AN525D MS24694DD MS20739D MS24694DD	
<b>NUTS - STEEL</b>		<b>NUTS - STEEL</b>		<b>NUTS - ALUMINUM</b>	
TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR
AN363 AN365 NAS1021 MS21045 MS20365 MS20500 NAS679	AN364 MS20364 NAS1022 NAS1024- 1030 NAS1067- 1068 NAS680-687 NAS696-698	AN363 AN365 NAS1021 MS21045 MS20365 MS20500 NAS679	AN364 MS20364 NAS1022	AN365D NAS1021D	AN364D NAS1022D

THREAD SIZE (FINE)	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
10-32	20	25	12	15	25	30	15	20	10	15	5	10
¼-28	50	70	30	40	80	100	50	60	30	45	15	30
5/16-24	100	140	60	85	120	145	70	90	40	65	25	40
3/8-24	160	190	95	190	200	250	120	150	75	110	45	70
7/16-20	450	500	270	300	520	630	300	400	180	280	110	170
THREAD SIZE (COARSE)	MIN.	MAX.	MIN.	MAX.								
8-32	12	15	7	9								
10-24	20	25	12	15								
¼-20	40	50	25	30								
5/16-18	80	90	48	55								



3/8-16	160	185	95	100
7/16-14	235	255	140	155

All final torquing shall be carried out with certified torque wrenches or torque screwdrivers.

## 9. GENERAL SAFETY INFORMATION

There are many hazards inherently present when performing any maintenance task on this aircraft. To minimize the risk to both yourself and others, begin by thinking through each task that is to be performed before starting any work. Think of ways to avoid these hazards and remember that many accidents happen because of carelessness. Be sure to also use the right tool for the task at hand and to use the proper personal protective equipment. Such equipment may include, but is not limited to:

- Eye protection – safety glasses, goggles, and face shield
- Gloves
- Hearing protection – ear plugs or muffs
- Apron
- Protective footwear with non-slip soles

You should also keep on hand a suitable fire extinguisher, absorbent material to contain spills, an eyewash bottle, and a general-purpose first aid kit. It is also advisable to have on hand the material safety data sheet (MSDS) for all products and chemicals that will be used during the servicing of the aircraft.

Some other general rules to follow are:

- Never leave the ignition switch or the master switch turned on when the engine is not running. Doing so could allow the engine to fire if the propeller were rotated by hand or for the starter to be inadvertently engaged.
- Never operate the engine with untrained personnel around – everyone who is essential to be in the area should be reminded that a spinning propeller may be lethal yet almost invisible. Remove hats when running the engine to keep them from being removed by the propeller slipstream.
- Remove any loose clothing, such as neckties and scarves. Tuck in your shirt and secure any long hair to prevent them from becoming tangled in power tools.
- Remove all jewelry. Not only can items such as rings, watches, and necklaces become caught in rotating tools, they can also conduct electricity and may cause a short circuit. This could result in burns or damage to electrical circuits.
- Disconnect the negative lead from the battery when doing any electrical work that does not involve troubleshooting the electrical systems. This will reduce the risk of a short circuit or even a fire.
- Aviation gasoline is also highly flammable. When working with the fuel system, always work in a well-ventilated environment. Any nearby source of ignition such as sparks or an open flame can result in a fire or explosion. Keep all ignition sources away. Always ground the airframe to a suitable earth ground during fueling/defueling operations to reduce the risk of a static discharge ignition source.
- When working with the landing gear, always support the aircraft properly with jacks. Do not work underneath the aircraft unless it is properly supported.

**10. FLIGHT SAFETY AND SERVICE DIFFICULTY REPORTING INSTRUCTIONS**

This form is to be used for the owner/operator of the aircraft to provide information to Vashon Aircraft, of any safety of flight or service difficulty experienced with the aircraft in accordance with ASTM F2295. Additional forms may be obtained by writing or calling Vashon Aircraft's customer service department at +1 425 527 9940.

It is the responsibility of the owner/operator to notify Vashon Aircraft of any safety of flight issue or significant service difficulty upon discovery.

After completing the form below, e-mail or mail it to:

**Vashon Aircraft™**  
**19825 141<sup>ST</sup> PL NE**  
**Woodinville, WA 98072**  
**USA**  
**Tel: +1 425 527 9940**  
**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**



VASHON AIRCRAFT <b>CONTINUED OPERATIONAL SAFETY REPORTING FORM</b>		
<i>Print or type all entries</i>		
<b>NAME</b> (Last, First and Middle)	<b>AIRCRAFT MODEL</b>	
<b>ORGANIZATION</b> (if applicable)	<b>AIRCRAFT SERIAL NUMBER</b>	
<b>ADDRESS</b> (Number, street, city, state, and postal code)	<b>AIRCRAFT REGISTRATION NUMBER</b>	
<b>PRIMARY TELEPHONE NUMBER</b>	<b>ALTERNATE TELEPHONE NUMBER</b>	<b>E-MAIL ADDRESS</b> (optional)
<b>DESCRIPTION OF SAFETY OF FLIGHT ISSUE OR SIGNIFICANT SERVICE DIFFICULTY</b> (Describe in detail. Use additional pages if necessary.)		
<b>SIGNATURE</b>	<b>DATE</b>	

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## 5.3 PERIODIC AND CONDITION INSPECTION REQUIREMENTS

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1.	GENERAL	5.3-2
2.	CONDITION INSPECTION TASKS	5.3-4
3.	PERIODIC INSPECTION TASKS	5.3-5

## 1. GENERAL

This section is intended to serve as a guide for a certified airframe and powerplant mechanic to perform routine maintenance on the aircraft. It is the responsibility of the owner and/or the operator to maintain the aircraft in an airworthy condition and ensure that the airplane is inspected as specified in Parts 43 and 91 of the Federal Aviation Regulations. This inspection guide is not intended to replace the good judgement of a certified airframe and powerplant mechanic.

The guide will refer to service information provided by other vendors, such as the manufacturer of the engine. The persons performing the maintenance on the aircraft must ensure that they have the latest editions of these publications. This guide will not refer to revision levels of vendor publications.

This guide will be applicable to the aircraft in the configuration it left Vashon Aircraft when it was first delivered, and it may not cover modifications made to the aircraft subsequently.

### Inspection Groups and Criteria

#### (1) Visual Inspection

Visual inspections will normally apply to those areas, surfaces, and/or items that become visible by the removal or opening of access doors, panels, fairings, or cowlings.

Visual Inspection criteria will normally consist of, but are not limited to the following criteria:

##### (A) Moving Parts

Proper operation, correct alignment, security, sealing, cleanliness, lubrication, adjustment, tension, travel, condition, binding, excessive wear, cracking, corrosion, deformation, and any other apparent damage.

##### (B) Metal Parts

Security, condition of finish, cleanliness, dents, distortion, fatigue cracks, cracked welds, corrosion, and any other apparent damage.

##### (C) Non-Metal Parts

Security, condition, cleanliness, wear, cracking, deformation, heat deterioration, fluid saturation, and any other apparent damage.

##### (D) Fuel and Hydraulic Oil Lines and Hoses

Cracks, dents, kinks, loss of flexibility, deterioration, obstruction, chafing, improper bend radius, cleanliness, security, and any other apparent damage.

##### (E) Electrical Wiring

Cleanliness, loose, corroded, or broken terminals, chafed, broken, or worn insulation, security, heat deterioration, and any other apparent damage.

##### (F) Bolts and Nuts

Fretting, wear, damage, stretch, proper torque and safety wiring.

(G)Filters and Screens

Filters and screens shall be removed, cleaned, inspected for contamination, or replaced as applicable.

(H)Fuel Tank Areas

Evidence of leaks

Inspection forms in Appendix A may be used as a guidance to perform the visual inspection.

(2) Operational Inspection

An operational inspection is a check intended to determine that a component or system is fulfilling its intended purpose. The operational inspection does not require quantitative tolerances.

(3) Functional Inspection

When called for by an inspection task, a functional inspection is a quantitative check to determine if one or more functions of a component perform within specified limits. The functional inspection is a comparative examination of a component or system against a specific standard.

NOTE

The operational and functional checks involve operating the engine and taxiing the aircraft. Therefore, whoever performs this check must be familiar with the aircraft and its systems and the risks and dangers of operating an aircraft on the ground.

During the check, observe engine temperature limitations.

## **2. CONDITION INSPECTION TASKS**

If the aircraft is registered in the United States, ASTM F2483 requires that all LSA category airplanes must undergo a complete inspection at least once every 12 calendar months. An authorized maintenance person, as described in ASTM F2483, must perform the inspection. A signed and dated record must be maintained as each inspection task is completed. When the last task of the inspection has been completed, the Inspection Report is to be signed-off in the logbook/maintenance record. The inspection items to be covered in the condition inspection are identical to the 100-hour Inspection items. The inspection interval to the next condition inspection may not exceed twelve calendar months. Refer to Appendix A of this manual for the inspection forms.



### **3. PERIODIC INSPECTION TASKS**

If the aircraft is operated commercially (for hire) in the United States, it must also have an inspection every 100 flight hours. The 100-hour interval between inspections should never be exceeded by more than 10 hours, and then only if additional time is required to reach a place where the inspection can be satisfactorily accomplished. Additionally, the time the interval was exceeded must be included as flight hours in the next 100-hour interval. Inspection tolerances cannot be accumulated. Refer to Appendix A of this manual for the inspection forms.

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**5.4 MAINTENANCE OVERVIEW, SERVICING OF FLUIDS, AND PERSONNEL  
AUTHORIZATION**

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<b>1.</b>	<b>100 HOUR INSPECTION</b>	<b>5.4-2</b>
<b>2.</b>	<b>CONDITION INSPECTION</b>	<b>5.4-2</b>
<b>3.</b>	<b>SERVICING OF FLUIDS</b>	<b>5.4-2</b>
<b>4.</b>	<b>REPLACEMENT INTERVALS</b>	<b>5.4-6</b>
<b>5.</b>	<b>AUTHORIZATION TO PERFORM LINE MAINTENANCE, REPAIRS, ALTERATIONS, &amp; INSPECTIONS</b> <b>5.4-8</b>	
<b>6.</b>	<b>FAA AUTHORIZATION FOR PILOT/OWNER TO PERFORM LINE MAINTENANCE TASKS</b>	<b>5.4-11</b>

### **1. 100 HOUR INSPECTION**

Refer to APPENDIX A of this manual for 100 Hour Inspection requirements.

### **2. CONDITION INSPECTION**

Refer to APPENDIX A of this manual for Condition Inspection requirements.

### **3. SERVICING OF FLUIDS**

This information gives the general servicing procedures and maintenance practices that are to be used when servicing the airplane. For additional detailed information concerning unit servicing of the various airplane systems and components, refer to the applicable chapters. For electrical wiring diagrams, please contact Vashon.

The interval specified in Appendix A are considered adequate to meet average requirements under normal operating conditions. However, it is advisable to shorten the service and maintenance intervals when operating under abnormal environmental conditions, such as high humidity and moisture, saltwater environments, dusty atmospheric conditions, extreme temperature ranges, unimproved airport facilities, or other unusual operating requirements. In saltwater areas, special care should be taken to keep the engine, accessories, and airframe clean to help prevent oxidation.

#### **CAUTION**

**The operation of the airplane can be seriously impaired if unapproved or contaminated fuel, oil, fluids, lubricants or materials are used. Adherence to instructions, cautions, and warnings can avoid injury to personnel and damage to the airplane or associated equipment.**

Mixing of various brands, types, and weights of materials should be avoided. Specified lubricants will meet requirements for extreme hot or cold temperature operations. Use of substitutes or other lubricants may cause a malfunction when operating in extreme temperature conditions or may cause excessive wear due to improper lubrication.

Table 5.4.1 Fuel, oil, brake fluid, and tire pressures.

Item	Specifications		Capacity
<b>Fuel</b>	Aviation Grade 100/100LL		28.1 US Gallons Total 27.6 US Gallons Usable
<b>Oil (See note below)</b>	Average Ambient Temperature	SAE J-1899* ashless- dispersant oil grades	5 Quarts
	Above 40°F	SAE 40 or SAE 50	
	Below 40°F	SAE 20W-50 or SAE 15W-50	
<b>Brake Fluid</b>	MIL-H-5606G		As required
<b>Main Tire Pressure</b>	6.00 x 6	Dry Air	25 ± 3 psi
<b>Nose Tire Pressure</b>	6.00 x 6	Dry Air	22 ± 2 psi

**NOTE**

\*The engine must be operated on non-dispersant mineral (non-detergent) oil (SAE J-1966) during the first 25 hours of operation.  
For further information, refer to the Continental Motors Service Manual.

**CAUTION**

**Use only oils conforming to Continental Motors Specification SAE J-1899 after break-in period.**

For further information, refer to the Continental Motors Service Manual.

Table 5.4.2 Lubrication chart.

<b>LUBRICATION CHART</b>		
<b>ITEM</b>	<b>SUGGESTED</b>	<b>SPEC</b>
<b>ENGINE</b>		
Engine Oil	Appropriate for temperature	See Table 5.4.1
Spark Plug Thread Lubricant	Champion Aerospace #2612	
Oil Fittings with Pipe Threads	Loctite 567	
<b>COCKPIT</b>		
Hydraulic Fluid (Brake)	Any Brand	MIL-H-5606
Control Stick Pivot Points & Torque Tube Bearings	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Elevator Pushrod Bearings	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Elevator Torque Tube Bearings	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Aileron Torque Tube Bearings	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Aileron Pushrod Bearings	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Aileron Bellcrank Bearings	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Rudder Pedal, Brake Pedal, and Master Cylinder Pivot Points	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Door Latch Mechanism	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Fuel Fittings with Pipe Threads	EZ TURN Lubricant on NPT threads only	MIL-G-6032D
<b>FUSELAGE</b>		
Fuel Fittings with Pipe Threads	EZ TURN Lubricant on NPT threads only	MIL-G-6032D
<b>LANDING GEAR</b>		
Nose Wheel Swivel	Aeroshell 5	MIL-G-3545C
Wheel Bearings	Aeroshell 22	MIL-G-81322E
<b>EMPENNAGE</b>		
Elevator Pushrod Bearings	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Elevator Hinge Bearings	LPS 2	MIL-C-16173E GRADE 3 CLASS I

Trim Tab Hinge Pin	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Rudder Hinge Bearings	LPS 2	MIL-C-16173E GRADE 3 CLASS I
<b>WING</b>		
Aileron and Flap Pushrod Bearings	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Aileron Hinge Bearings	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Flap Hinge Pin	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Rudder Hinge Bearings	LPS 2	MIL-C-16173E GRADE 3 CLASS I
Fuel Fittings with Pipe Threads	EZ TURN Lubricant	MIL-G-6032D

#### 4. REPLACEMENT INTERVALS

This section lists the components that Vashon Aircraft recommends be replaced at specified intervals. Whenever this is carried out, ensure that the following information is properly recorded in the airplane maintenance log:

- Date of removal, installation, or overhaul of the component.
- Time on the component since last overhaul (if appropriate).
- Aircraft's flight hours.

##### (1) Replacement Times

	ITEM	INTERVAL	REPLACE	OVERHAUL	REF. IN THIS MANUAL	NOTES
1	Engine	2000 Hours		X		Refer to the latest revision of the manufacturer's maintenance manual
2	Propeller				5.7.16	See manufacturer's maintenance manual
3	Plane Power Alternator	At engine overhaul		X	5.7.20	Refer to the latest revision of the manufacturer's maintenance manual
4	Starter	At engine overhaul		X	5.7.20	Refer to the latest revision of the manufacturer's maintenance manual
6	Induction Air Box	2000 Hours/engine overhaul, whichever comes first	X		5.7.13	Refer to the latest revision of the manufacturer's maintenance manual
7	Flexible Fuel Lines	12 years/engine overhaul, whichever comes first	X		5.7.23	
8	Flexible Oil System Lines	12 years/engine overhaul, whichever comes first	X		5.7.23	



	ITEM	INTERVAL	REPLACE	OVERHAUL	REF. IN THIS MANUAL	NOTES
9	Emergency Locator Transmitter Batteries	After 1 hour of cumulative transmitting. Date marked on the batteries.	X		5.7.21	Refer to ACK Technologies Model E-01 Installation and Operation Manual
10	Remote ELT Switch Battery (if installed)	8 years Lithium, 4 years Alkaline	X			Refer to the latest revision of the manufacturer's maintenance manual
11	Rubber Engine Mount Bushings	At engine overhaul	X		5.7.11	

## 5. AUTHORIZATION TO PERFORM LINE MAINTENANCE, REPAIRS, ALTERATIONS, & INSPECTIONS

Table 5.4.3 shows the certifications required to perform line maintenance, repairs, alterations, and inspections on Vashon Aircraft RANGER R7 aircraft, as defined by ASTM F2483 Section 3.1.12. Guidance for accomplishing such maintenance, repairs, alterations, and inspections is contained in this manual and is to be accomplished in accordance with the practices contained in FAA Advisory Circular 43.13.

Table 5.4.3 VASHON AIRCRAFT RANGER R7 MAINTENANCE BREAKDOWN

DESCRIPTION	OWNER/ OPERATOR OR ABOVE	LSA REPAIRMAN- I, REPAIRMAN- M, A&P, OR REPAIR STATION	LSA REPAIRMAN-M, A&P, OR REPAIR STATION	A&P OR REPAIR STATION
<b>AIRCRAFT SHEET METAL</b>				
Minor Repairs			X	
Major Repairs				X
<b>AIRCRAFT PAINTING</b>				
Minor Repairs			X	
Major Repairs			X	
<b>AIRCRAFT TASKS</b>				
Rigging wings			X	
Rigging Tail Brace Wires			X	
Rigging Tail Control Surfaces			X	
Jacking Aircraft			X	
Condition Inspection			X	
100-Hour Inspection			X	
Preventive Maintenance			X	
Lubrication			X	
<b>PREPARATION</b>				
For Storage	X			
For Use	X			
For Shipment				X
<b>SYSTEM DIAGRAMS</b>				
Electrical System			X	
Avionics System			X	
Avionics System - Intercom			X	
Lighting			X	
Brake System			X	
Fuel System			X	

DESCRIPTION	OWNER/ OPERATOR OR ABOVE	LSA REPAIRMAN- I, REPAIRMAN- M, A&P, OR REPAIR STATION	LSA REPAIRMAN-M, A&P, OR REPAIR STATION	A&P OR REPAIR STATION
<b>FLIGHT CONTROLS</b>				
Aileron Controls			X	
Elevator Controls			X	
Flap Controls			X	
Rudder Pedals/Controls			X	
<b>WING INSTALLATION</b>				
Wingtip Lights			X	
Landing Lights			X	
Ailerons				X
Flaps				X
Pitot/Static/AoA Head				X
Fuel & Vent Lines				X
Fuel Tanks				X
Wing Attach/Removal				X
<b>ENGINE INSTALLATION</b>				
Engine Assembly				X
Air Filter			X	
Exhaust System				X
Oil Cooler				X
Oil Filter and Oil Change			X	
Alternator				X
Magnetos				X
Carburetor				X
Starter				X
Propeller - Spinner				X
<b>FUSELAGE</b>				
Cowling Removal	X			
Cowling Repair			X	
Firewall Components			X	
Fuel Lines, Fittings, and Parts			X	
Fuel Shut-Off Valve			X	
Fuel Filter			X	
Fuel Pump			X	

DESCRIPTION	OWNER/ OPERATOR OR ABOVE	LSA REPAIRMAN- I, REPAIRMAN- M, A&P, OR REPAIR STATION	LSA REPAIRMAN-M, A&P, OR REPAIR STATION	A&P OR REPAIR STATION
Fuel Flow Transducer			X	
Fuel Drain			X	
Seatback Assembly			X	
Seat Belt/Shoulder Harness			X	
Brake Master Cylinder			X	
Brake Lines and Fittings			X	
Windscreen				X
Front Windows			X	
Rear Windows			X	
Doors			X	
Battery			X	
ELT Assembly				X
ELT Battery				X
ELT Antenna				X
Instrument Panel Assembly			X	
Instrument Panel Wiring			X	
AFS Switch Module			X	
AFS Power Module			X	
Alternator Fuse Replacement			X	
EFIS Display (Removal)			X	
Com Radio (Removal)			X	
Intercom (Removal)			X	
Auto Pilot Control (Removal)			X	
Transponder (Removal)			X	
Landing Gear Installation				X
Wheels and Tires			X	
Tire Inflation	X			
Brake Assembly			X	
Nose Wheel Friction			X	
Pitch Trim Motor			X	
<b>MISCELLANEOUS</b>				
Placards and Data Plates			X	

**6. FAA AUTHORIZATION FOR PILOT/OWNER TO PERFORM LINE MAINTENANCE TASKS**

The tasks listed in this Manual, and considered to be Minor Maintenance, Repairs, or Alteration tasks – as defined in ASM F2483 Section 3.1.12 – and may be performed by the Pilot/Owner and who is the holder of an FAA Sport Pilot, Recreational Pilot, Private Pilot, Commercial, or Airline Transport Pilot Certificate

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## 5.5 REPAIR OVERVIEW

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## **1. GENERAL**

This section describes the process and method of repairing non-structural metal or composite components.

## **2. NON-STRUCTURAL SHEET METAL REPAIRS**

### 1.1 Level of Certification

Non-structural sheet metal repairs are to be accomplished by: a certificated LSA Repairman; Maintenance Rated and FAA certified LSA Pilot/Owner, or a suitably qualified and experienced FAA certified A&P Mechanic.

### 1.2 Authorized Non-Structural Sheet Metal Repairs

Damage to non-structural sheet metal parts may be repaired using the techniques of FAA Aircraft Circular 43.13, Chapter 4, Section 4.

At this time repairs to primary or secondary structures by others than Vashon Aircraft are not authorized. Description, by electronic photos or similar means, of the damaged primary structures, secondary structures, or flight control structures are to be forwarded to Vashon Aircraft accompanied by a suggested repair scheme.

## **3. NON-STRUCTURAL COMPOSITE MATERIAL REPAIRS**

### 2.1 Level of Certification

Non-structural composite material repairs are to be accomplished by: a certificated LSA Repairman; Maintenance Rated and FAA certified LSA Pilot/Owner, or a suitably qualified and experienced FAA certified A&P Mechanic.

### 2.2 Authorized Non-Structural Composite Material Repairs

Damage to non-structural composite material parts may be repaired using the techniques of FAA Aircraft Circular 43.13, Chapter 3, Section 1.

At this time repairs to primary or secondary structures by others than Vashon Aircraft are not authorized. Description, by electronic photos or similar means, of the damaged primary structures, secondary structures, or flight control structures are to be forwarded to Vashon Aircraft accompanied by a suggested repair scheme.



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## 5.6 ALTERATIONS OVERVIEW

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## **1. COMPLIANCE WITH MANUFACTURER'S SERVICE DIRECTIVE**

When service directives are issued, they will be in the form described in Chapter 7.2 of this manual. These will be issued to the owner/operator in the most current Vashon Aircraft database and will be in the form of safety alerts, service bulletins, and notifications.

## **2. MAJOR REPAIRS AND/OR ALTERATIONS**

All major repairs and/or alterations require an approved MRA (Major Repair and/or Alteration) form from Vashon Aircraft. Requests for an MRA can be made to Customer Support at Vashon Aircraft or through a form on the company website.

The latest revisions of all applicable service documents released by Vashon Aircraft do not require an MRA form. These documents, which include service alerts, service bulletins, notifications, and service instructions, are considered appendices to this maintenance manual.

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## 5.7.1 RAISING THE AIRCRAFT

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**1. GENERAL**Tools Required:

Depending on the procedure used, the following tools outlined in Table 5.7.1 may be required.

Table 5.7.1 Tools required for jacking up the aircraft.

Description	P/N or Spec	Supplier	Purpose
Floor Jack	-	Any Source	Jack Main Wheels
Padded Wooden Sawhorse or Bench	-	Any Source	Place Under Fwd Fuselage
Wing Jack	-	Any Source	Jack From Wing
Axle-Jack Adapter	-	Vashon	Jack from Axle Bracket

**CAUTION**

**Do not jack the aircraft outside or in an open hangar with winds in excess of 10 knots.**

**NOTE**

Raise airplane no more than required for the maintenance being performed.

Parts Required:

No parts are required at this time.

Level of Maintenance:

Line maintenance.

Certification Required:

Please see Table 5.4.3 in Section 5.4.

**2. RAISING THE NOSE**

This method is recommended to service the nose wheels and/or nose gear leg unless required otherwise.

- (a) Place chocks under main wheels.
- (b) Push down on inboard third of horizontal stabilizer front spar with force sufficient to raise the nose wheel.
- (c) Place a padded sawhorse under forward fuselage as indicated in Figure 5.7.1.1.

- (d) Remove downward load on horizontal stabilizer.
- (e) Ensure aircraft is firmly supported and will not fall before working under it.

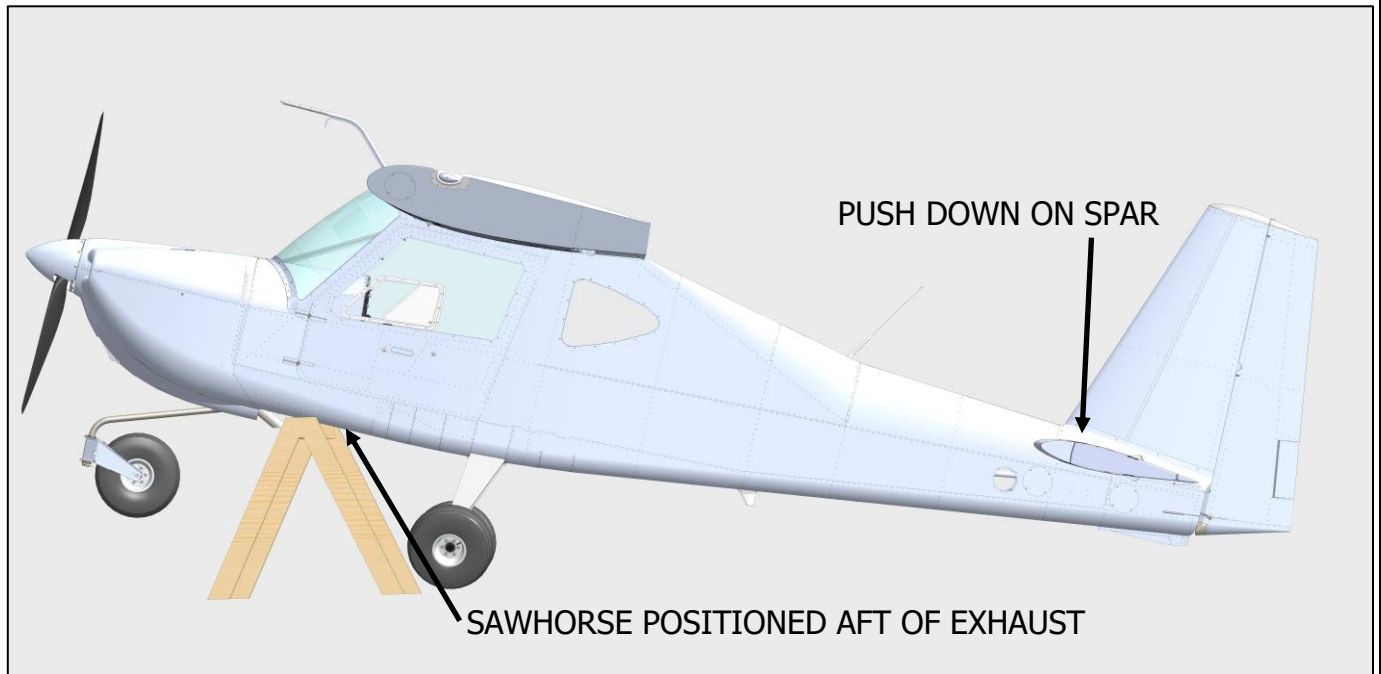


Figure 5.7.1.1 Lifting front of aircraft.

### 3. RAISING THE AIRCRAFT FROM THE FUSELAGE

This method is recommended to lift the aircraft from the ground unless required otherwise.

- (a) Place chocks under main wheels.
- (b) Push down on inboard third of horizontal stabilizer front spar with force sufficient to raise the nose wheel.
- (c) Place a padded sawhorse under forward fuselage as indicated in Figure 5.7.1.2.
- (d) Remove download on horizontal stabilizer.
- (e) Lift up gently on the inboard third of horizontal stabilizer front spar.
- (f) Place a padded sawhorse beneath first bulkhead behind the baggage area window and unload the stabilizer.
- (g) Ensure aircraft is firmly supported and will not fall before working under it.

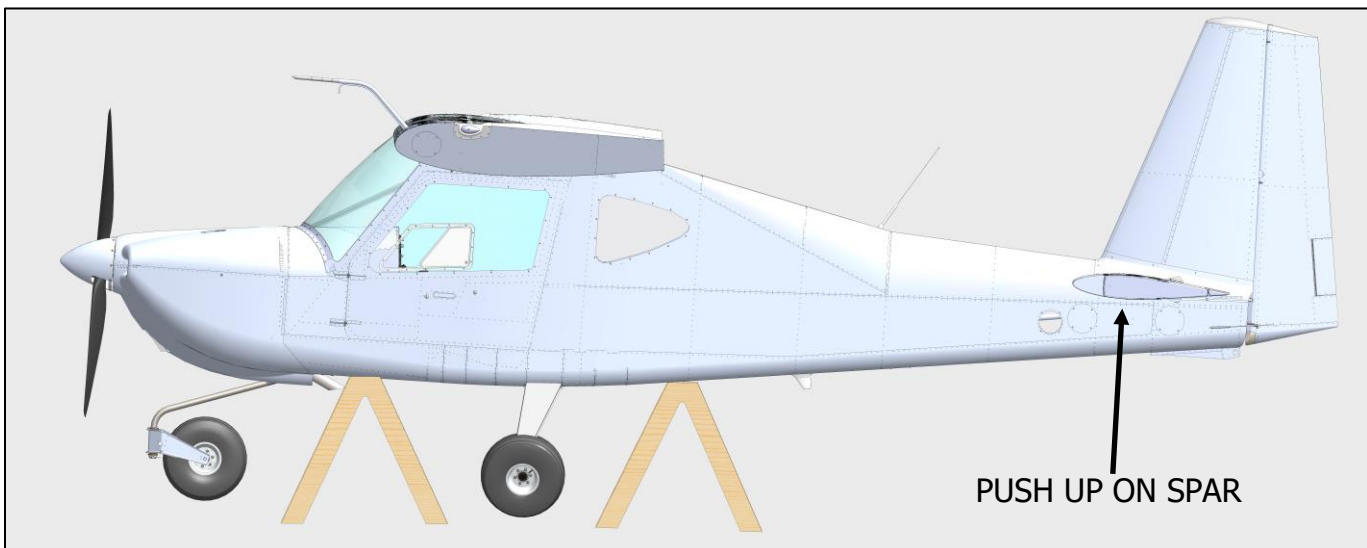


Figure 5.7.1.2 Lifting aircraft up from front and rear.

**4. RAISING THE AIRCRAFT FROM THE MAIN LANDING GEAR**

- (a) Place chocks under opposite main wheel and nose wheel.
- (b) Insert Vashon Aircraft Axle-Jack Adapter.
- (c) Lift aircraft up by jacking up on the adapter.
- (d) Ensure aircraft is firmly supported and will not fall before working under it.

## **5. RAISING THE AIRCRAFT FROM THE WING**

- (a) Place chocks under main wheels.
- (b) Lift up gently on the forward wing spar at a rib intersection inboard of the inboard aileron bracket.
- (c) Put jack under the lifting point and unload the wing.
- (d) Ensure aircraft is firmly supported and will not fall before working on it.

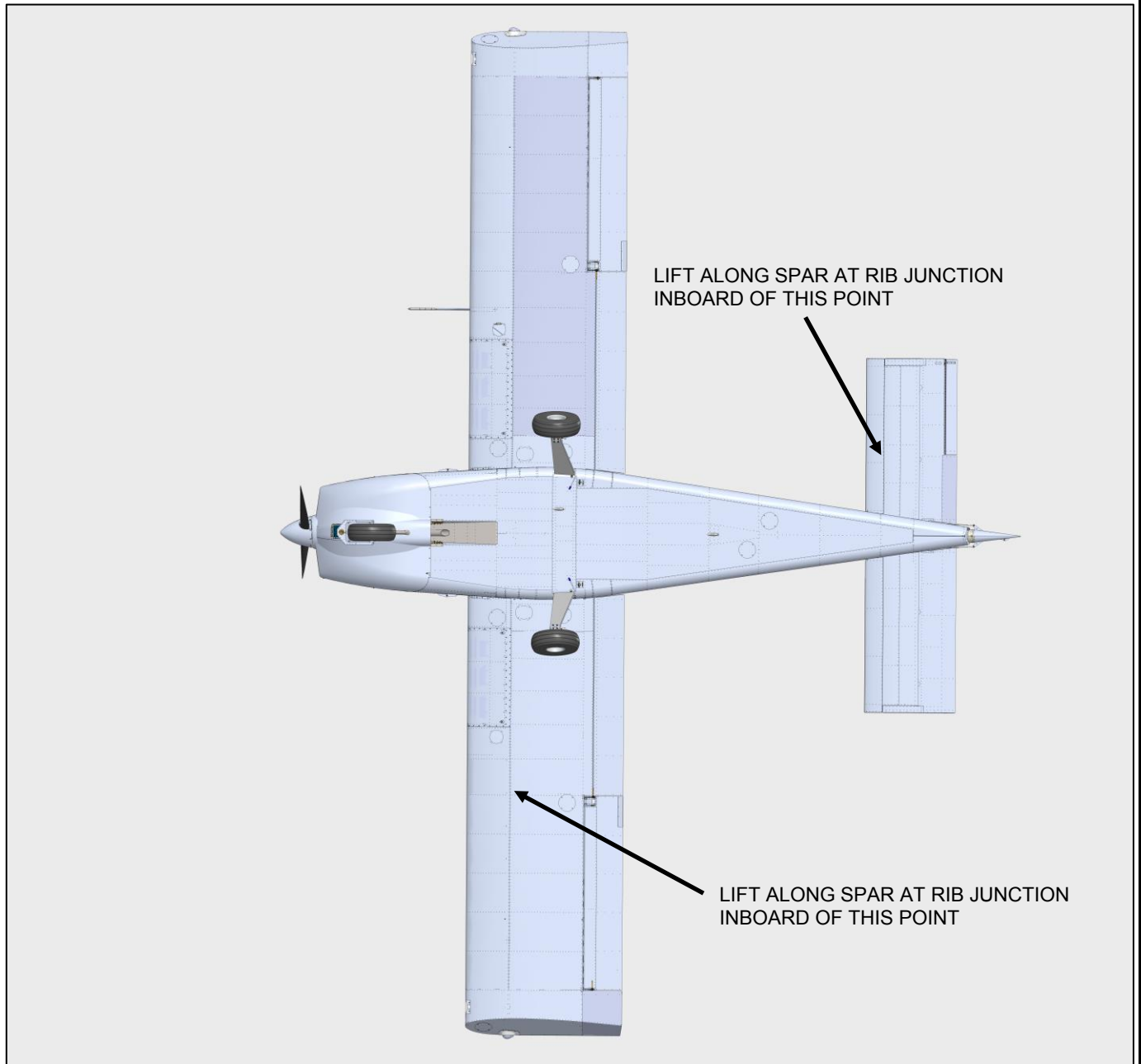


Figure 5.7.1.3 Lifting the aircraft by its wings.

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**5.7.2 WINDSCREEN**

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## **1. GENERAL**

The windscreen is made from clear acrylic and is manufactured through a thermoforming process. It is attached to the fuselage through screws and washers and are drilled to allow for thermal expansion and shrinkage. It is sealed with a combination of foam weather-stripping and silicon sealant.

## **2. REMOVAL**

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

(1) REMOVAL

(a) Protect surrounding areas with tape.

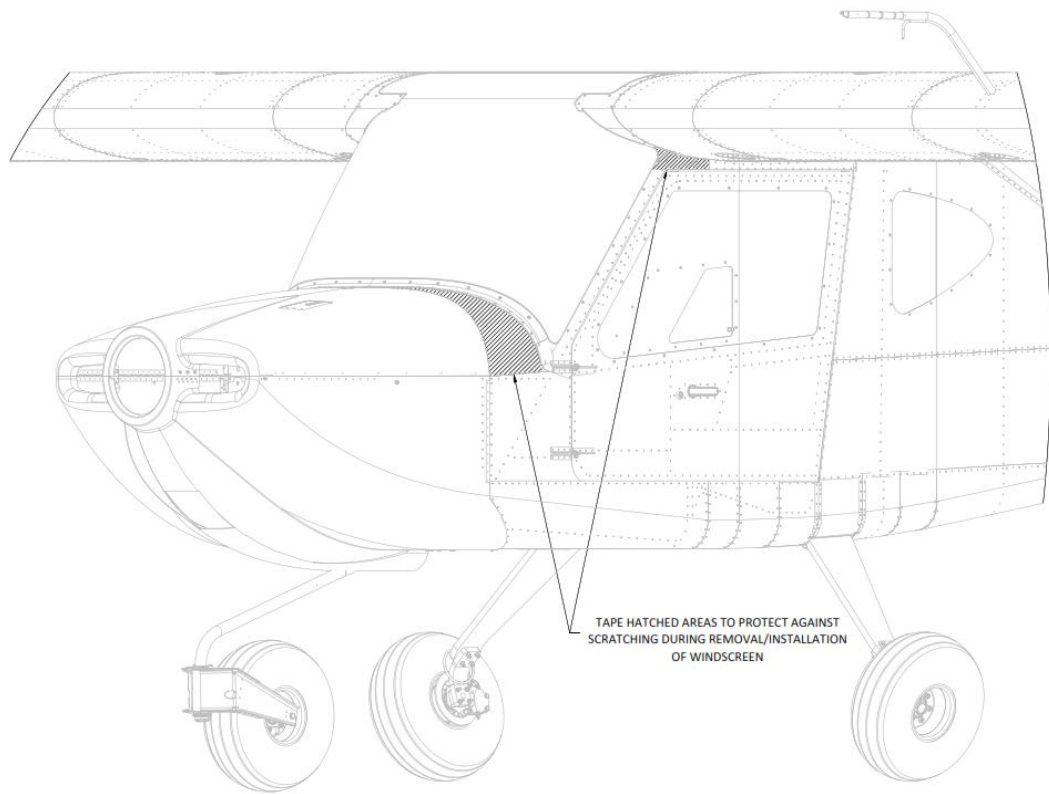


Figure 5.7.2.1 Protect surrounding areas.

(b) Cut silicone seal with a sharp edge. This will prevent the windscreen from “sticking” to airframe during removal.

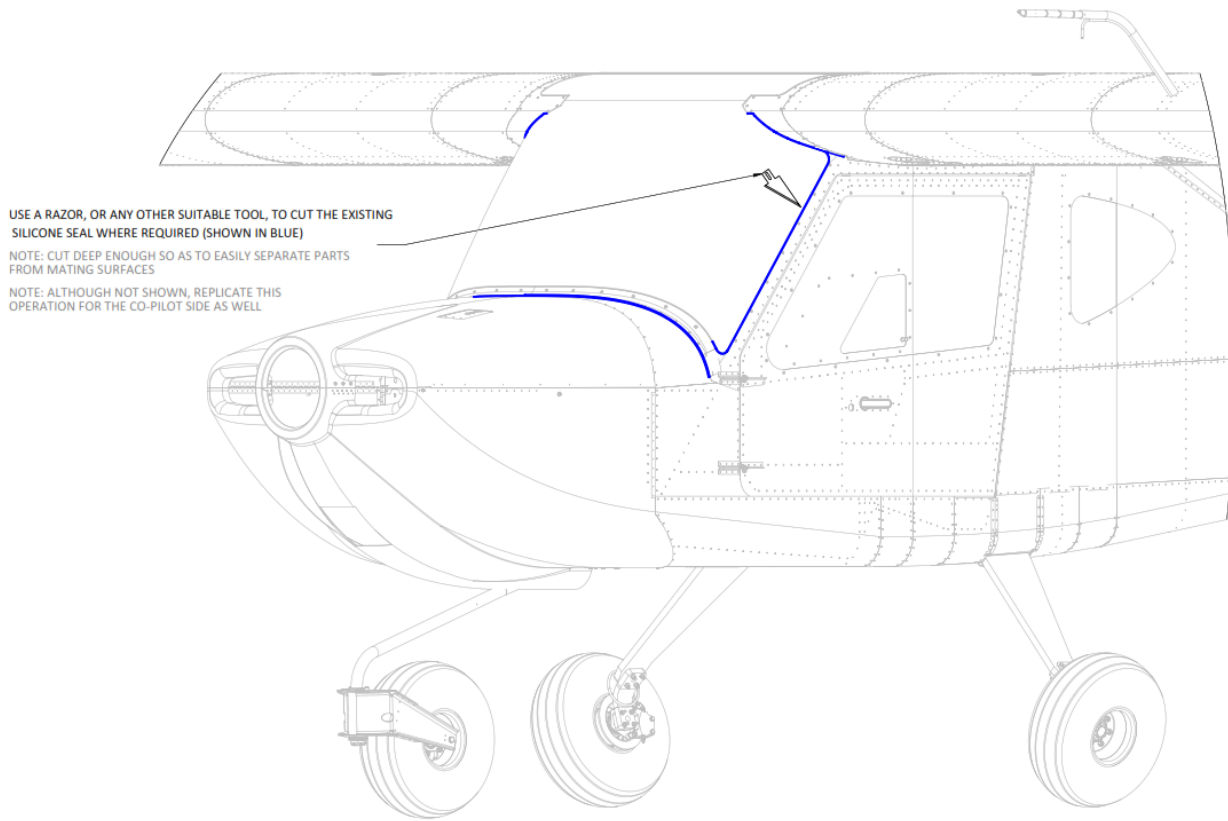


Figure 5.7.2.2 Cut existing silicone seal.

(c) Remove COM coax cable from position along the side rail, leading up to the wing.

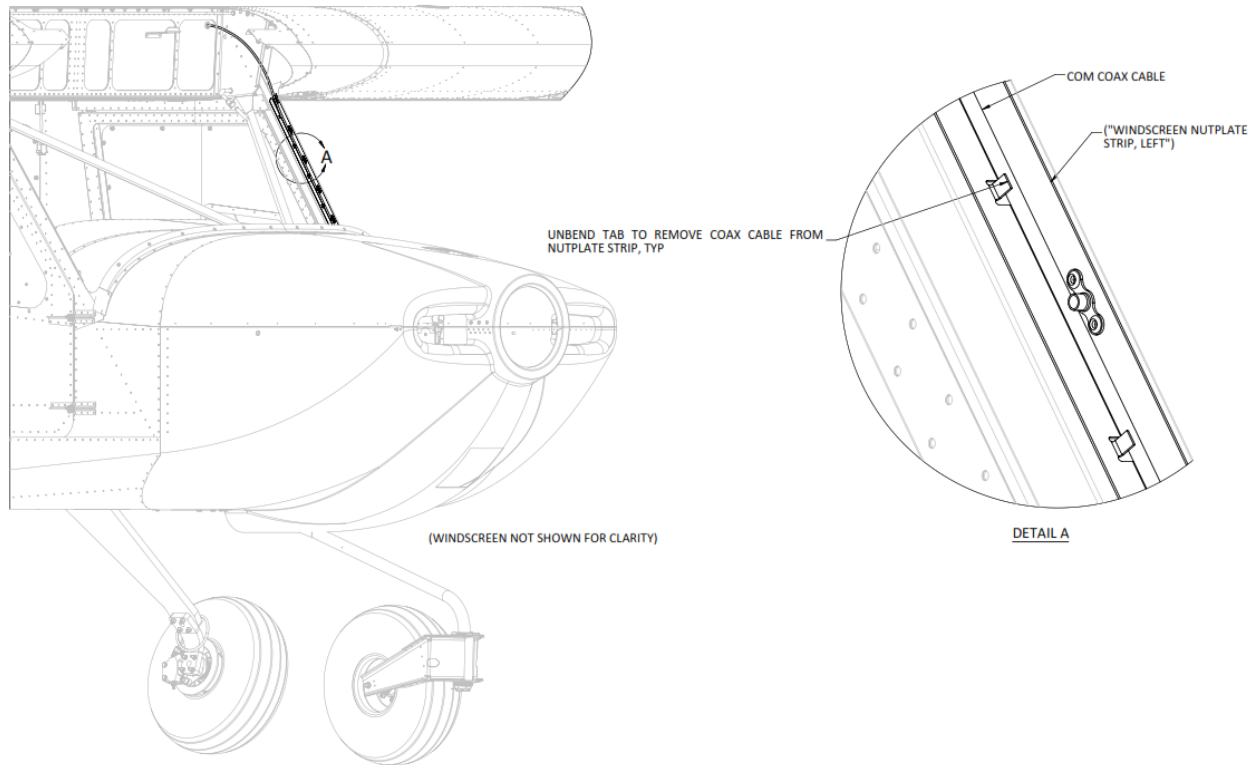


Figure 5.7.2.3 Remove COM coax cable from installed position.

(d) Drill out the windscreen base fairing rivets.

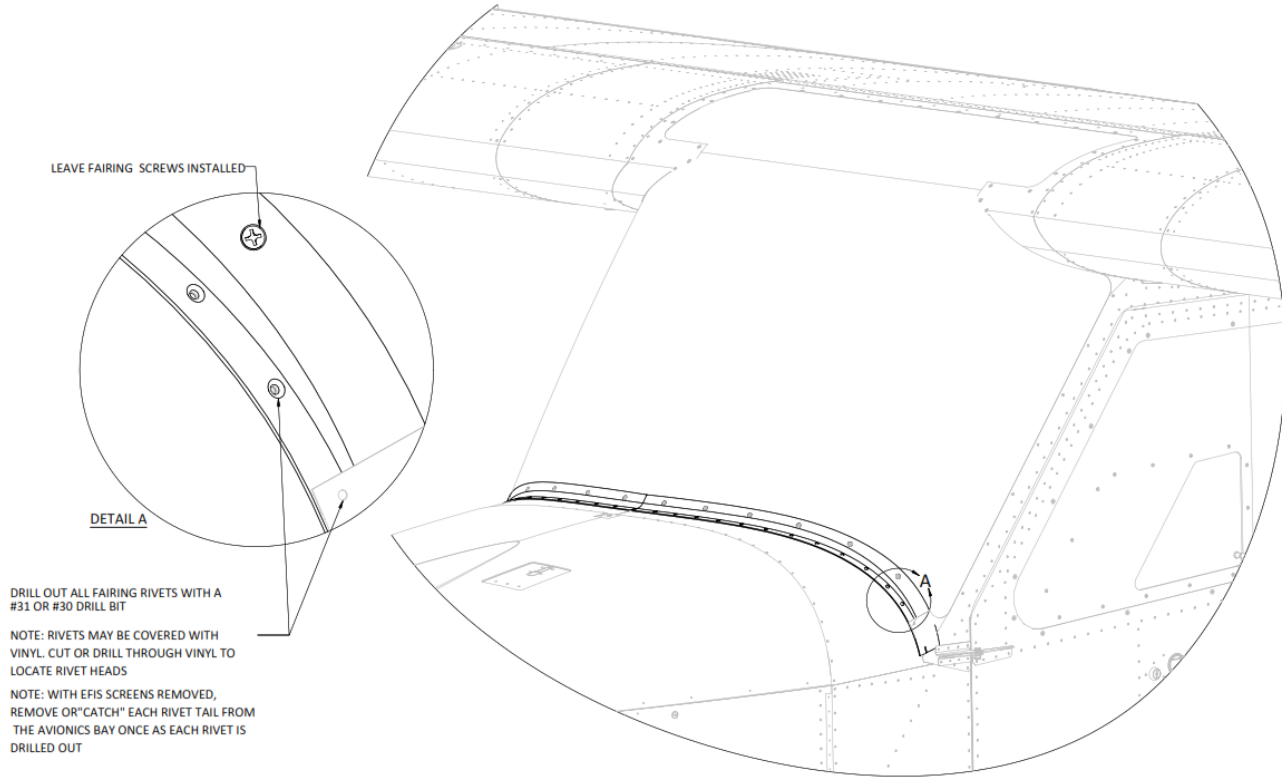


Figure 5.7.2.4 Drill out windscreen base fairing rivets.

(e) Unscrew and remove the windscreen attach brackets that help to secure the windscreen.

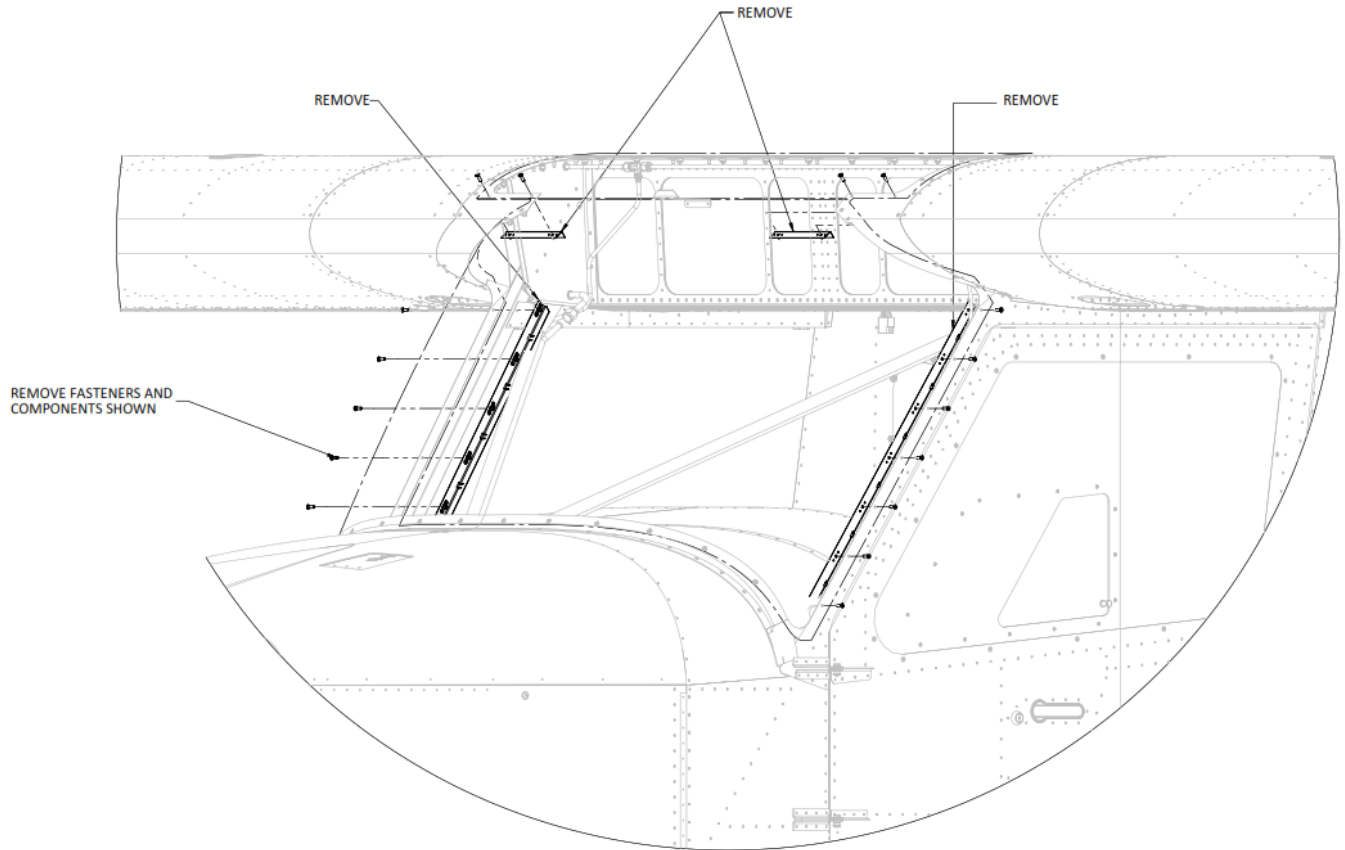


Figure 5.7.2.5 Unscrew windscreen attach brackets.

(f) Unscrew the upper windscreen fairing from the wing.

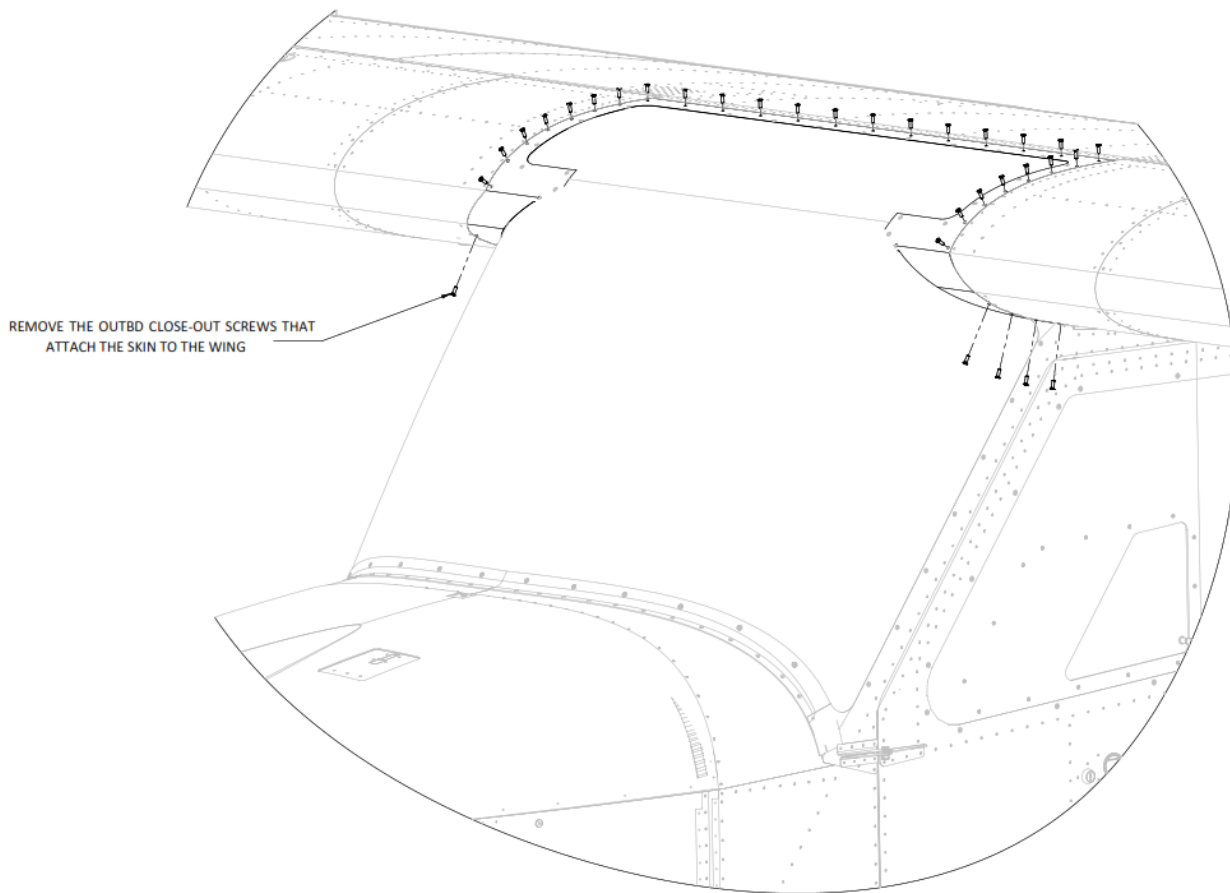


Figure 5.7.2.6 Unscrew the upper windscreen fairing from the wing.

(g) Carefully remove the entire windscreen assembly from the airframe.



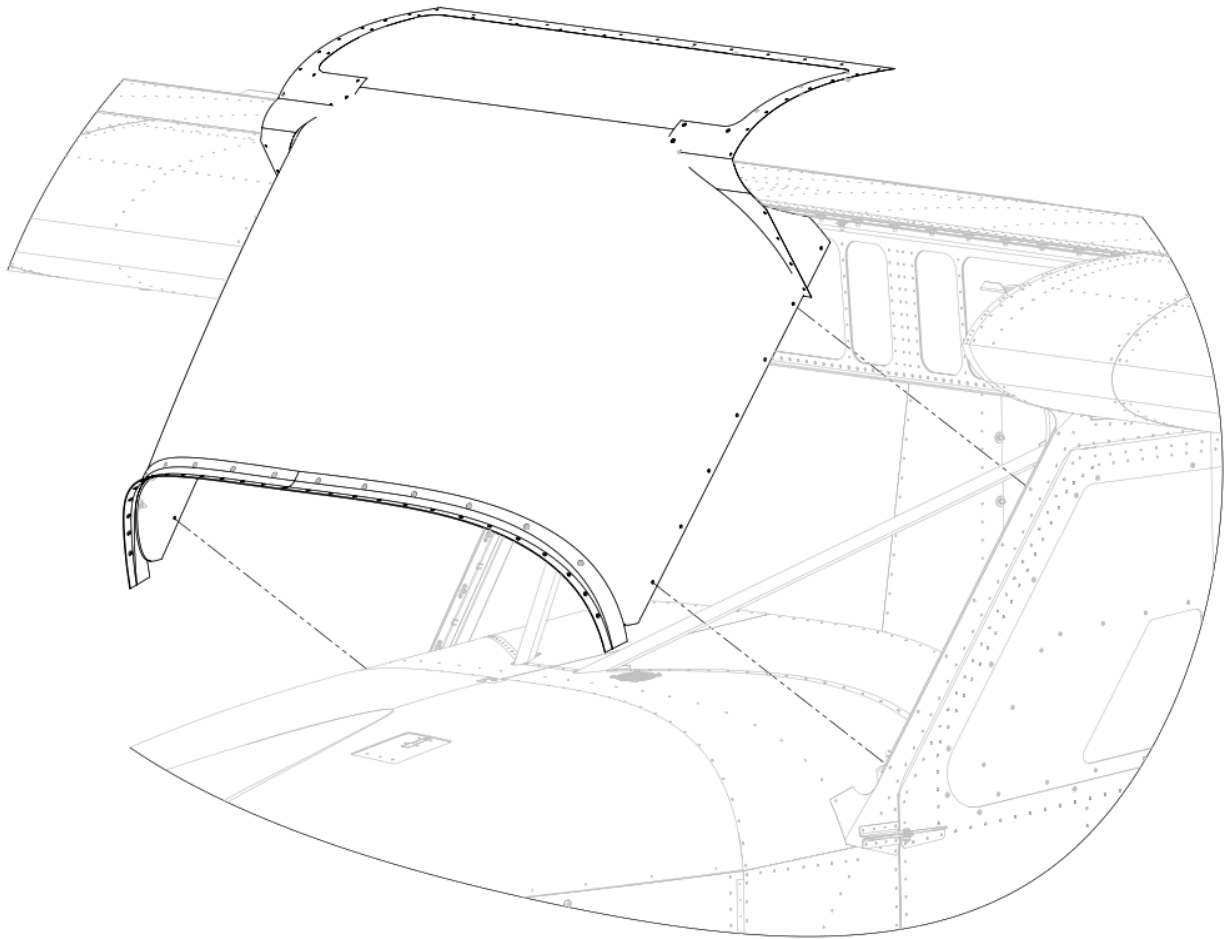


Figure 5.7.2.7 Windscreen assembly removal.

(h) Remove any residual silicone sealant left on the mating surfaces.

### 3. INSTALLATION

(a) Installation of the windscreen is the reverse of removal. Please ensure surfaces are clean and free of residual silicone sealant before resealing windshield with silicon. See Section 5.2 for torque specifications.

NOTE: Do not overtighten the threaded fasteners securing the windscreen into place. This could cause the brittle plastic to crack.

(b) Use only approved rivets for riveting the windscreen base fairing back into place. Contact Vashon Aircraft for Approval.

#### **4. REPAIRS AND ALTERATIONS**

No major repair or alterations, as outlined as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141ST PL NE**  
**Woodinville, WA 98072**  
**USA**  
**Tel: +1 425 527 9940**  
**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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**5.7.3 FUSELAGE**

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<b>3.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.3-9</b>

## 1. GENERAL

The fuselage structure is of monocoque design in which the outer skin carries the major part of the load. Bulkheads and stiffeners are present but primarily for the purpose of stabilizing the outer skin such that it can carry greater loads than if it were not supported. Because the outer skin contributes such a large percentage of the load carrying capability of the fuselage, dents, cracks, or other defects in the skin must be carefully scrutinized and evaluated in order to ensure that there is no loss in load carrying capacity.

The majority of the structural parts in the fuselage are produced from sheets of inherently corrosion resistant 6061-T6 aluminum using a CNC turret punch press. The machine cut "flat patterns" which require forming are either hydropress formed over dedicated "formblocks" or bent using a press-brake machine.

The predominant method for joining parts is with blind rivets although solid rivets and threaded fasteners (screws and/or bolts and nuts) are used where the fasteners either must be removable or where high shear-strength fasteners are required.

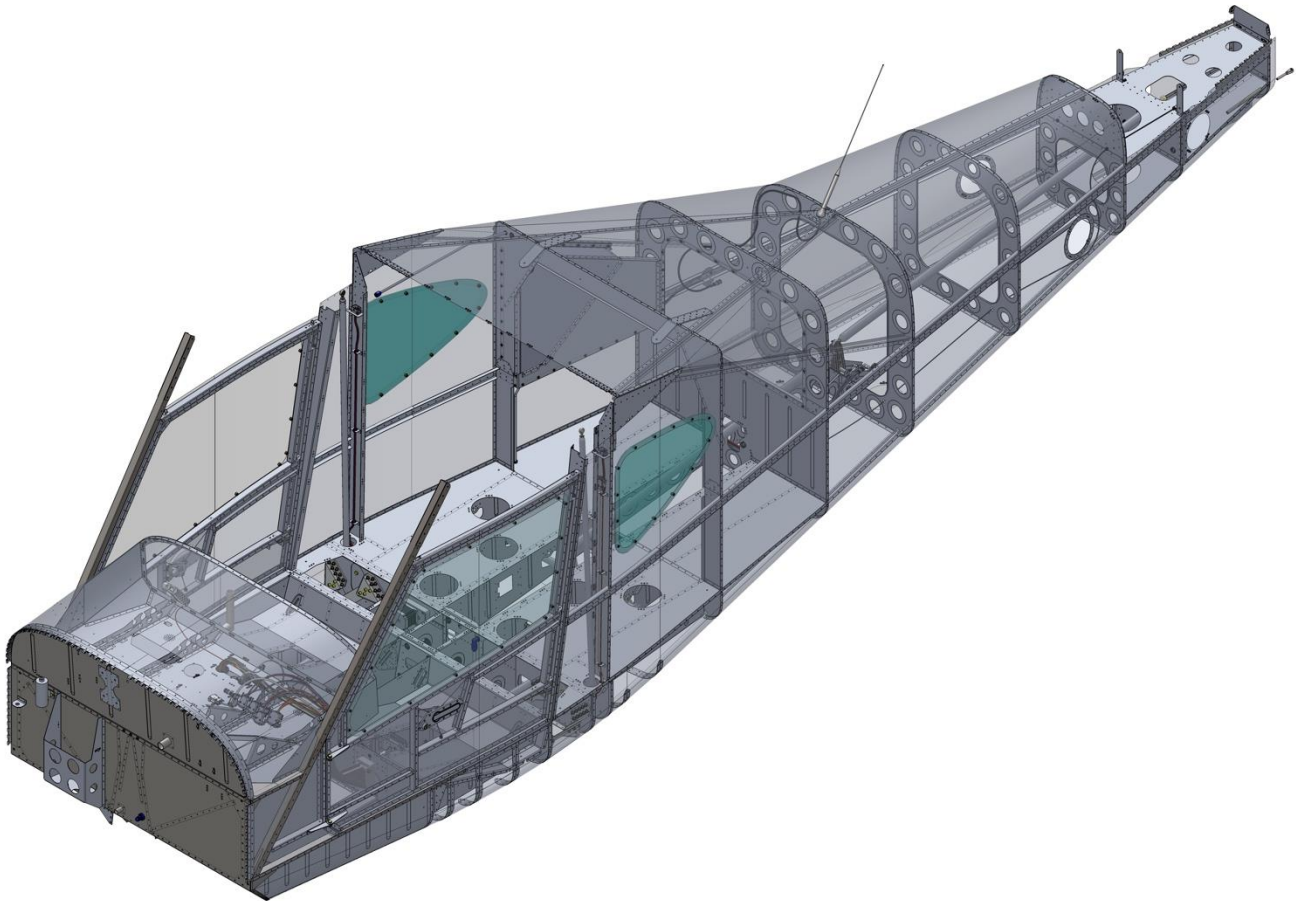


Figure 5.7.3.1 Fuselage structure with skin hidden.

## 2. INSPECTION

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Line Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

#### (1) ACCESS COVER REMOVAL

- (a) Remove EFIS screen by unfastening the four bolts, disconnecting the EFIS harnesses, and setting both screens aside.

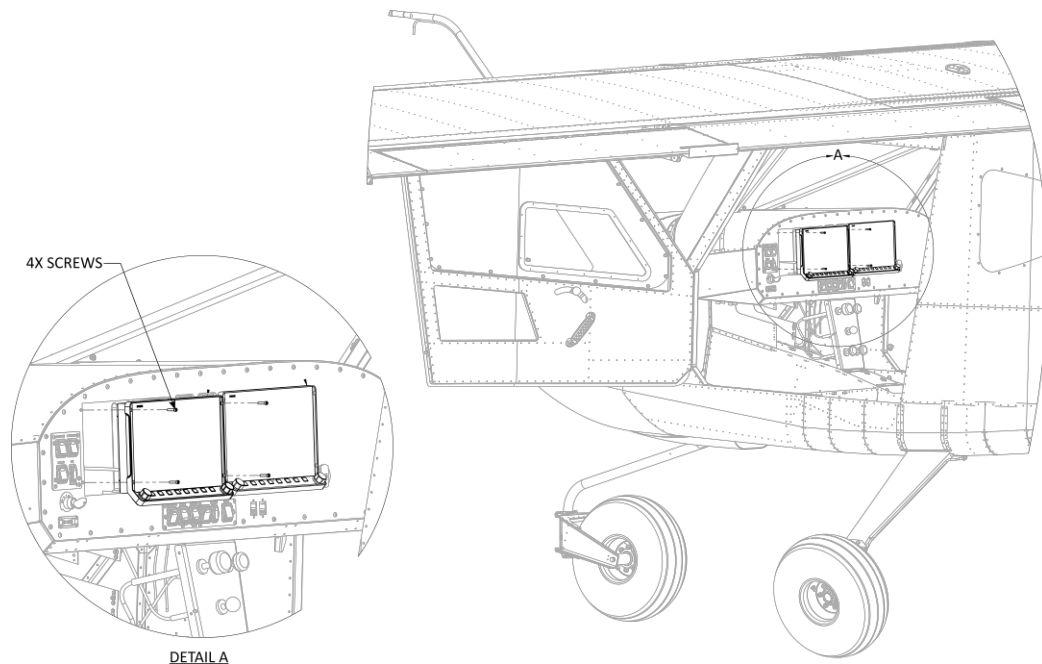


Figure 5.7.3.2 EFIS screen removal for avionics bay inspection.

- (b) Remove the panel into the avionics bay on the passenger side by unfastening the 10 screws, as shown below.

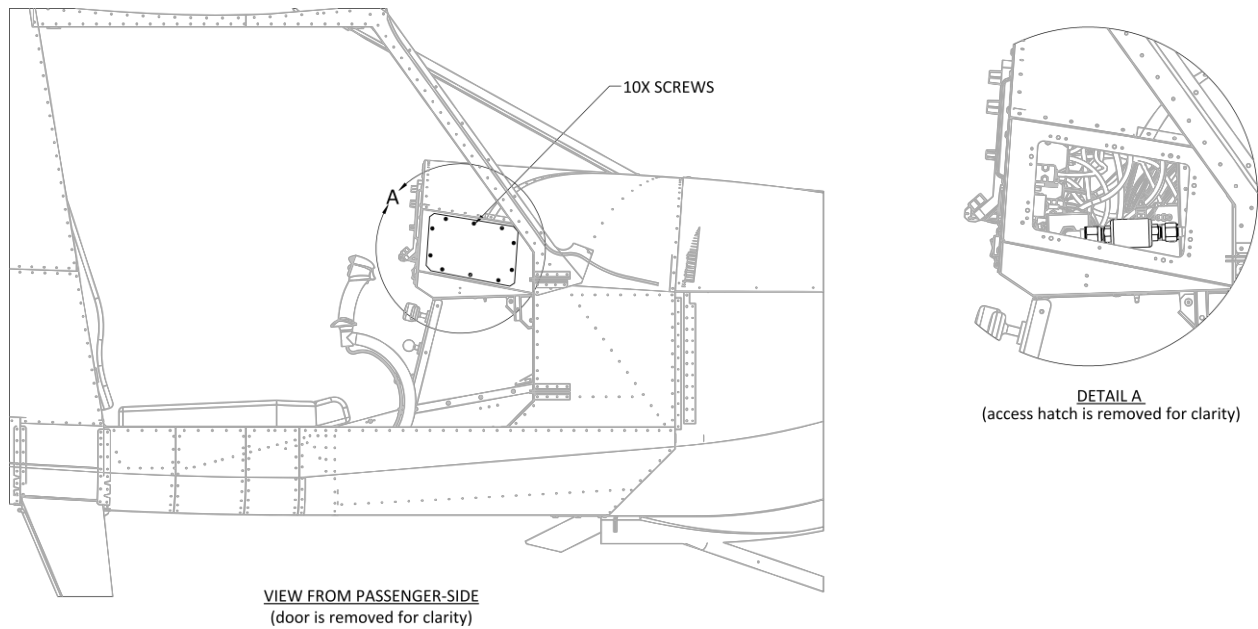


Figure 5.7.3.3 Removal of the panel into the avionics bay on the passenger side.

(c) Remove access panel on the rear bulkhead of the baggage compartment and access hole covers on the floor of the fuselage. Set aside.

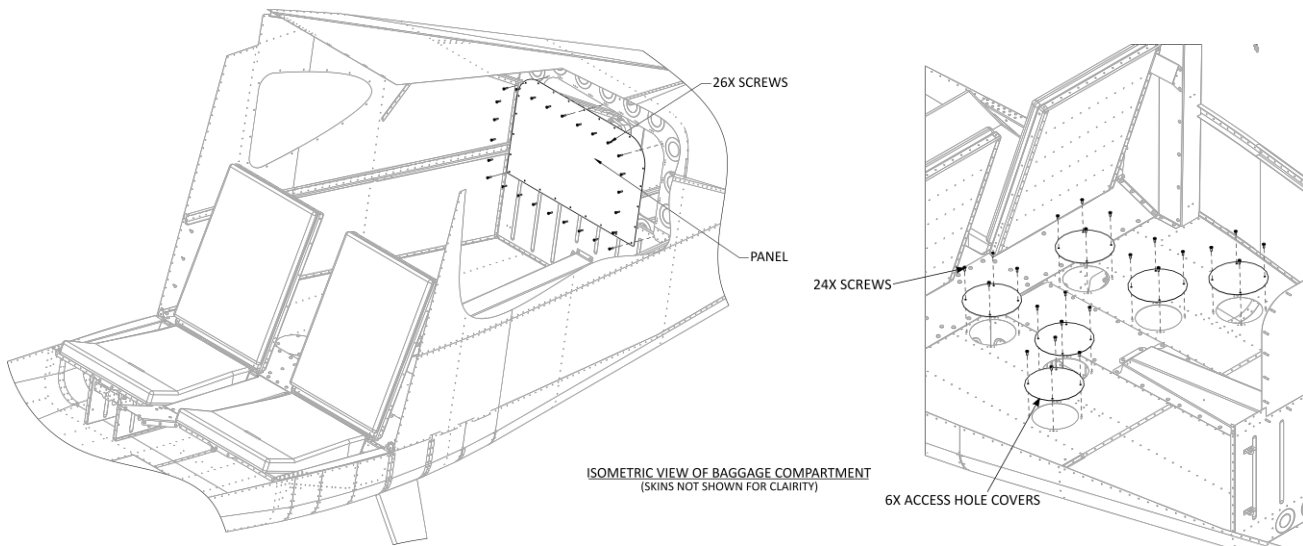


Figure 5.7.3.4 Baggage compartment access panel removals.

(d) Remove pilot and passenger seats.

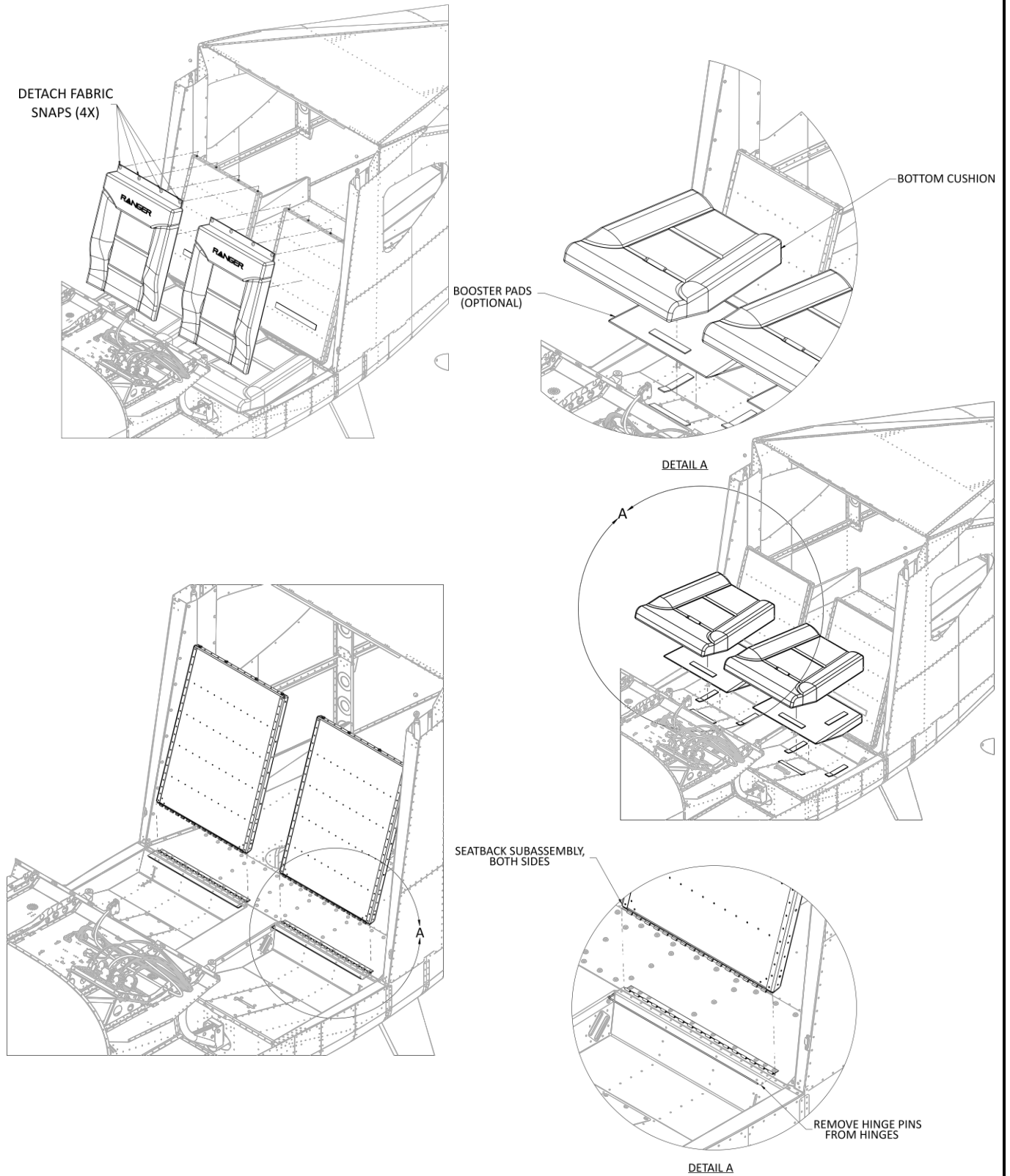


Figure 5.7.3.5 Seat removal.



(e) Remove seat hinges, control access panels, and seat access panel covers, as shown below. Set aside.

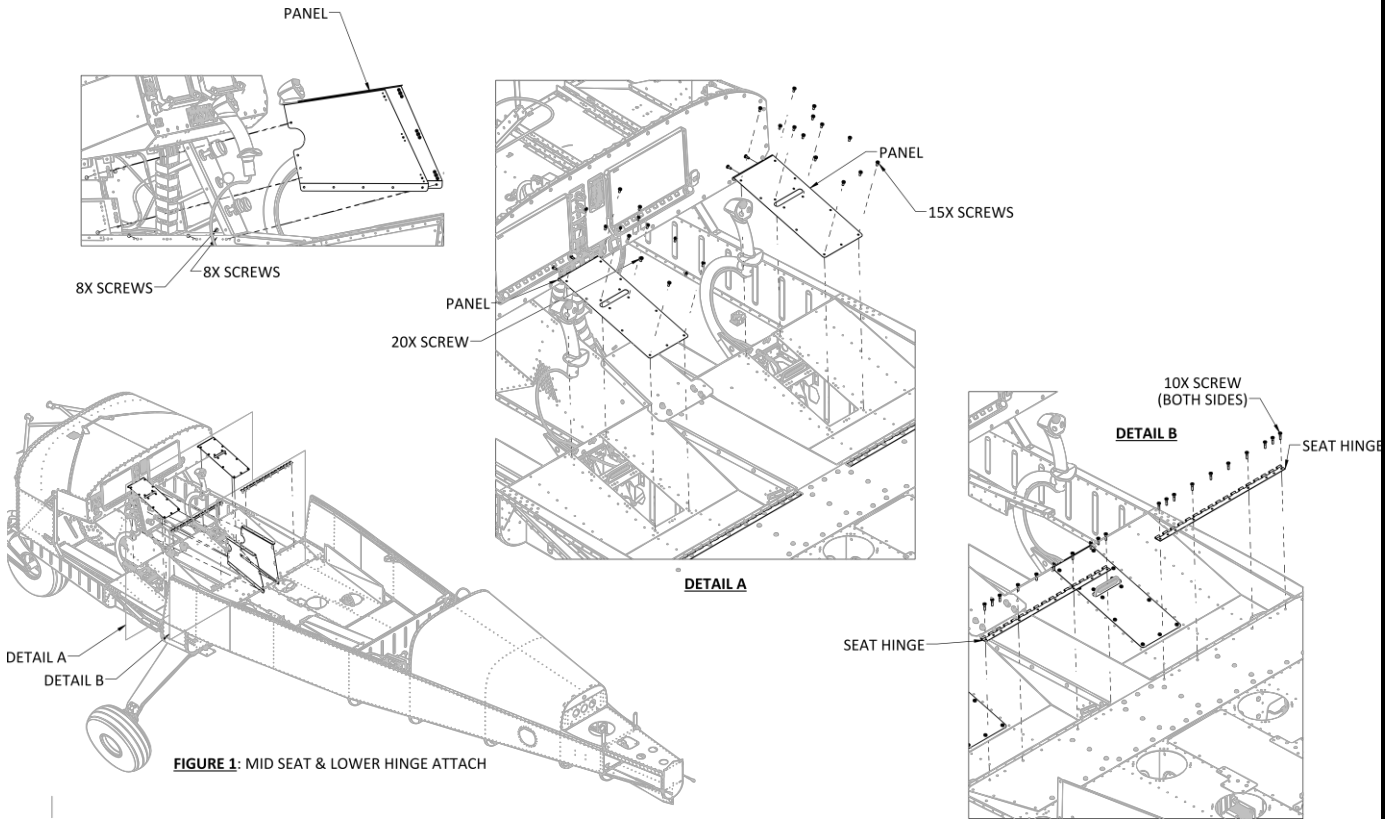


Figure 5.7.3.6 Cabin access panel removals.

(f) Remove the main landing gear access panel, and both access panels that cover the central tunnel through the cabin of the fuselage.

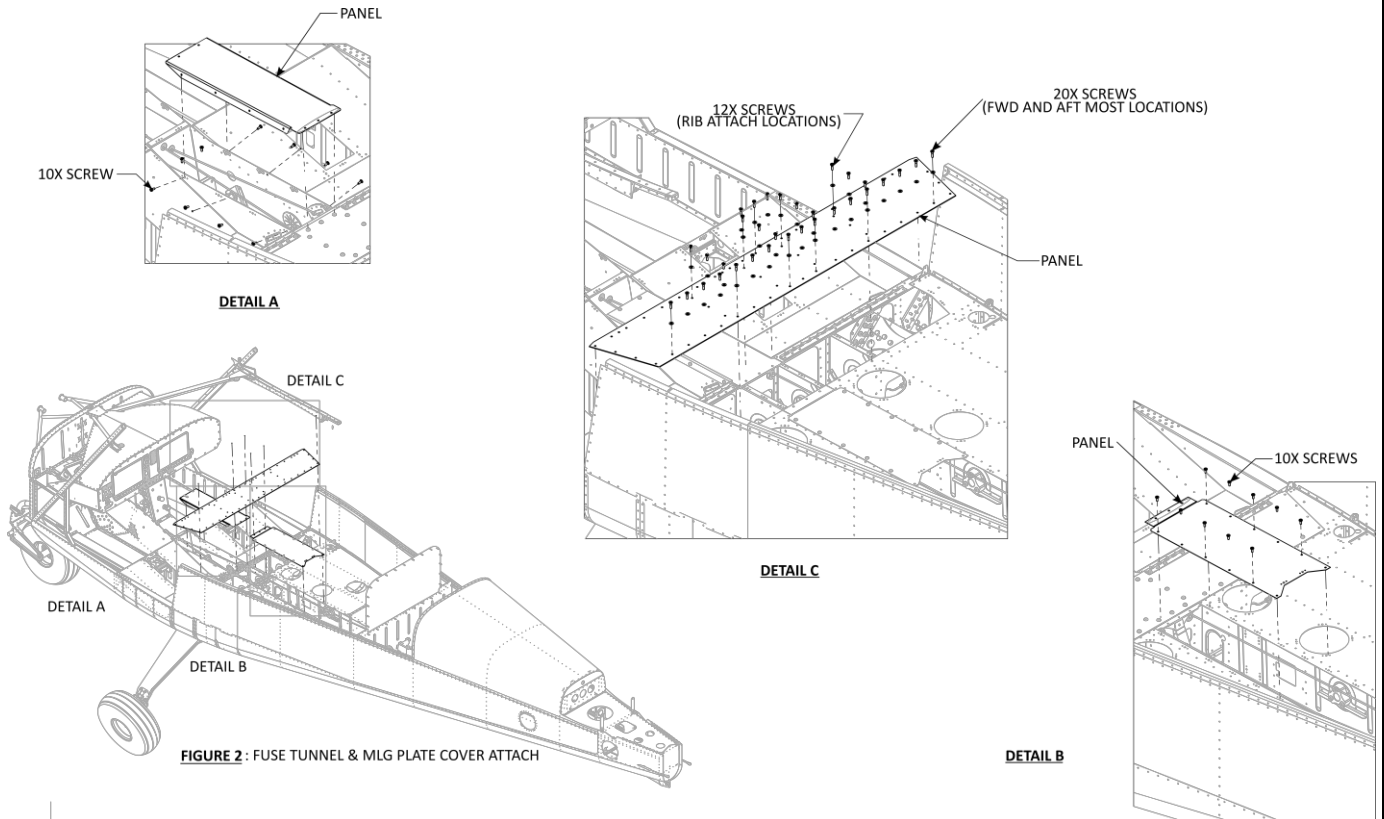


FIGURE 2 : FUSE TUNNEL & MLG PLATE COVER ATTACH

Figure 5.7.3.7 Main landing gear and tunnel access panel removals.

- (g) Remove the access hole covers near the epennage on pilot and passenger sides of the plane, and on the bottom of the aircraft.

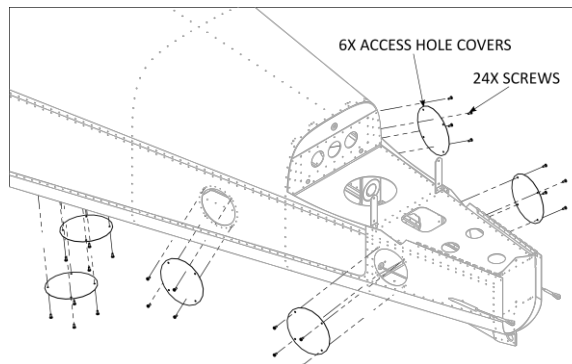


Figure 5.7.3.8 Rear-outer fuselage access hole cover removals.

(2) INSPECTION

- (a) Visually inspect outer surface for damage, dents, missing/loose rivets, scratches in finish.

(b) Visually inspect interior of fuselage of structure for cleanliness, damage, missing/loose rivets, and corrosion.

(c) Visually inspect flight control linkage for wear, security of attachment, binding/interference.

(3) INSTALLATION

(a) Installation of the components are the reverse of their removal.

**3. DOORS**

Required Tools:

No special tools are required for this operation.

Parts Required:

No parts are required at this time.

Level of Maintenance:

Line Maintenance.

Certification Required:

Please see Table 5.4.3 in Section 5.4.

(1) DOOR REMOVAL

(a) Unfasten the two hinges that connects the door to the fuselage.

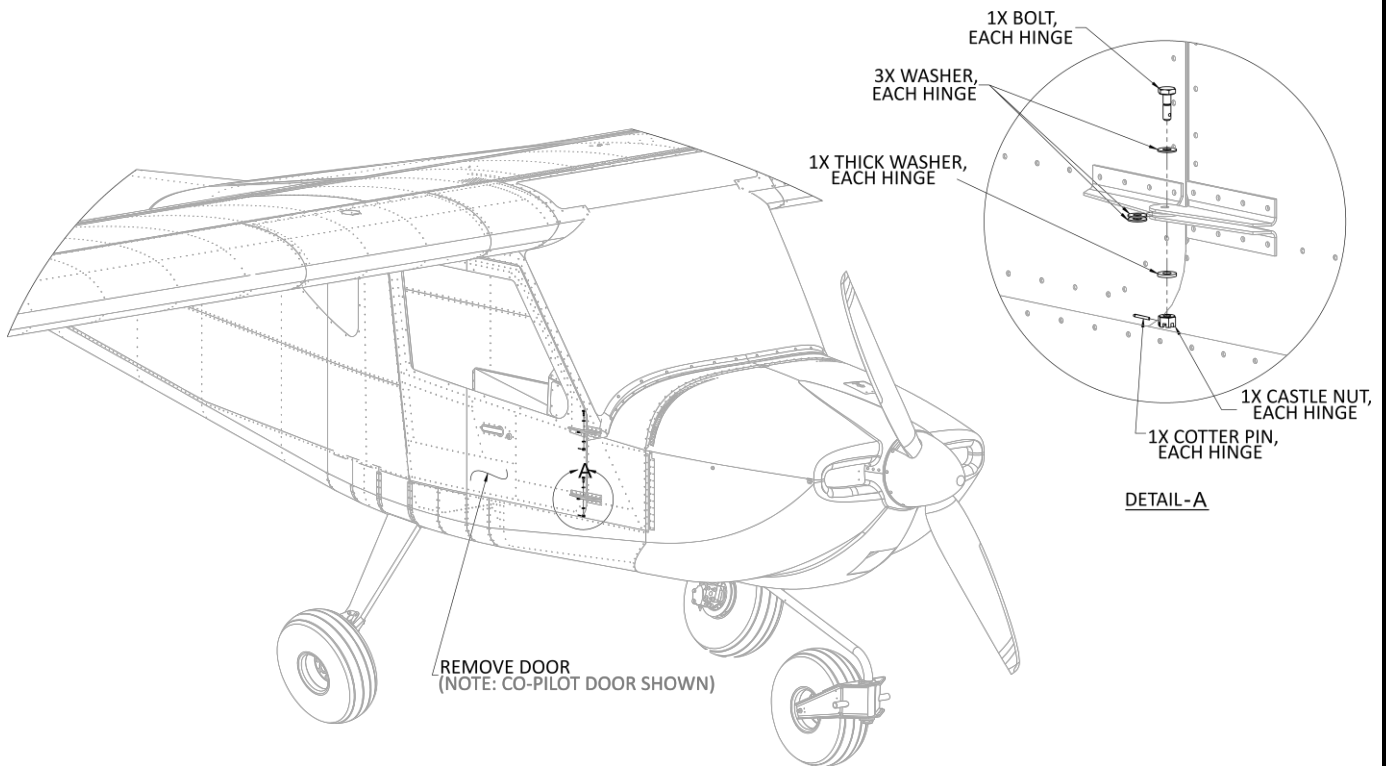


Figure 5.7.3.9 Door removal.

- (b) Turn door handle to the open position and remove the door carefully. Place on a padded surface so no denting, or scratching can occur.

## (2) INSTALLATION

- (a) Installation of the door is the reverse of its removal.

## 4. REPAIRS AND ALTERATIONS

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**5.7.4 WINGS**

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<b>4.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.4-12</b>

## 1. GENERAL

The wing has two spars - a main spar, located at approximately 25% of the wing chord, and a rear spar located at approximately 75% of the wing chord. The main spar carries the majority of the wing bending loads and is comprised of a c-channel shear web with upper and lower spar caps both comprised of four aluminum bars of varying length. The spar assembly is held together with solid driven aluminum rivets. The two main fuel tanks are in the inboard leading edge of the wing and are removable. The wing incorporates plain wing flaps inboard of the ailerons and both the flaps and ailerons are mounted off the rear spar. Wing main ribs and leading-edge ribs provide support to the skins which form two closed cells to carry the majority of the torsional loads on the wing. Because the outer skin contributes such a large percentage of the load carrying capability of the wing, dents, cracks, or other defects in the skin must be carefully scrutinized and evaluated in order to ensure that there is no loss in load carrying capacity.

An LED landing light is installed in the outboard leading edge of each wing and combination position/strobe light units are mounted at the tip of each wing. A combination pitot/static/angle of attack head is mounted to a mast located approximately 1/3 out on the left wing. The fuel system vent line is also attached to the mast.

The majority of the structural parts in the wing are produced from sheets of inherently corrosion resistant 6061-T6 aluminum using a CNC turret punch press. The machine cut "flat patterns" are either hydropress formed over dedicated "formblocks" or bent using a press-brake machine.

The predominant method for joining parts is with blind rivets although solid rivets and threaded fasteners (screws and/or bolts and nuts) are used in places where fasteners must be removable or where high shear strength fasteners are required.

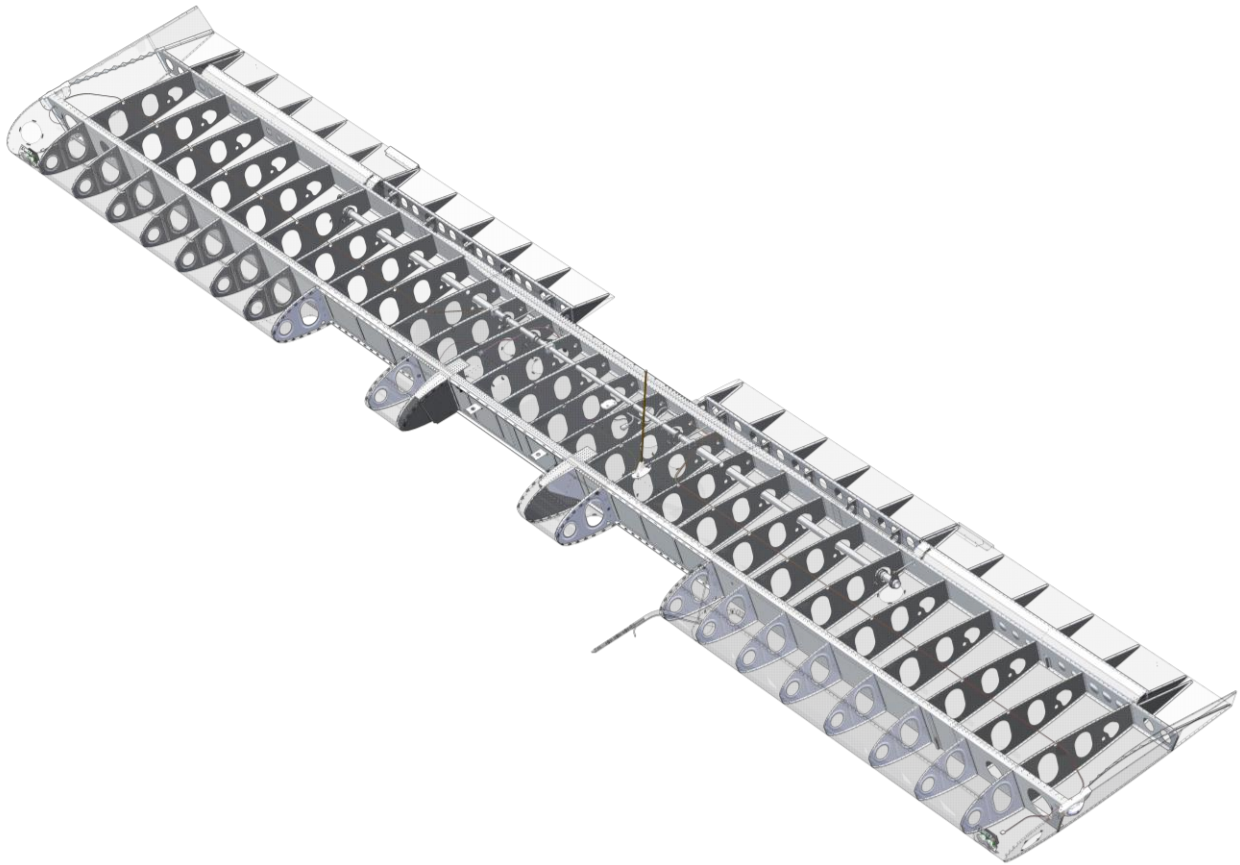


Figure 5.7.4.1 Wing structure with skin hidden.



## 2. REMOVAL

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

### (1) REMOVAL

**CAUTION**  
**Before removing the wing, chock the wheels.**

- (a) Remove the windscreen attach fairing and windscreen. Please see Section 5.7.2 for the removal procedure.

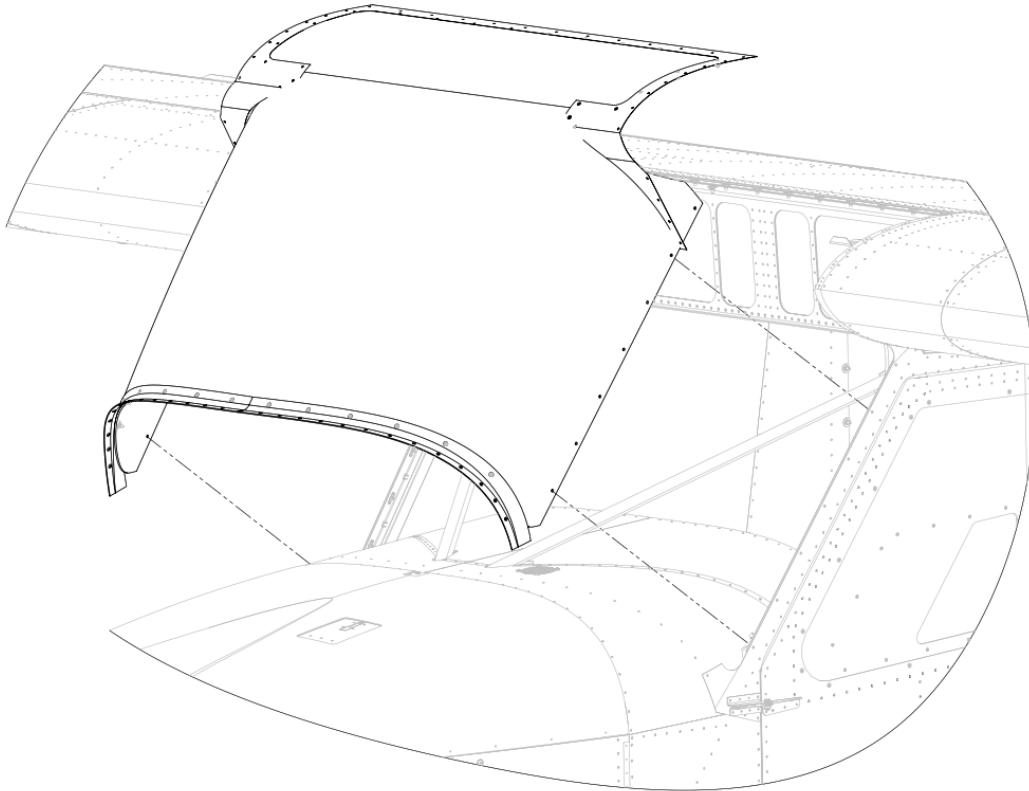


Figure 5.7.4.2 Windscreen fairing and windscreen removal.

- (b) Remove ailerons and flaps, see Section 5.7.6 for more details.
- (c) Remove all access panels from the bottom skin of the wing. Remove the aileron pushrod access panels located just aft of the aft door jamba.

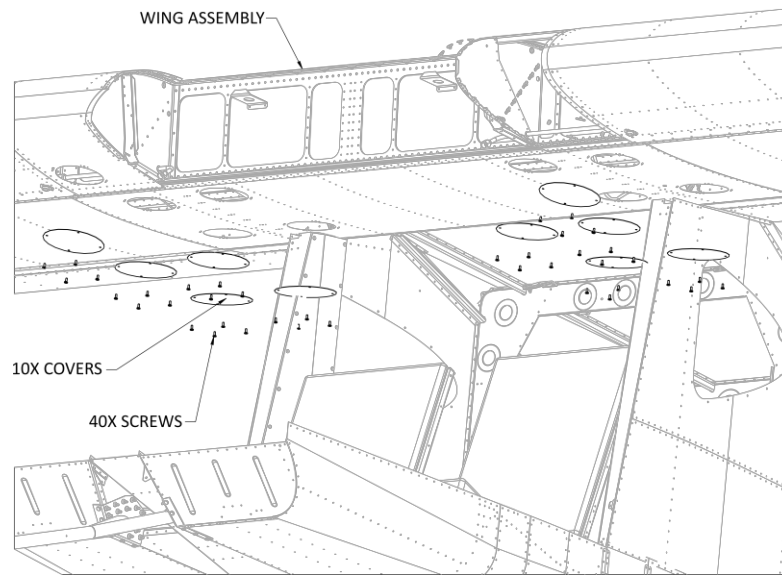


Figure 5.7.4.3 Aileron pushrod access panels covers.

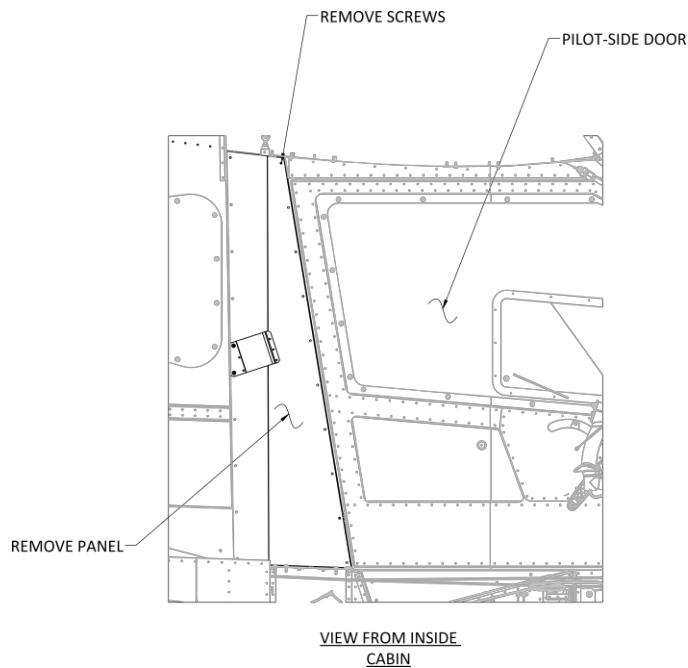


Figure 5.7.4.4 Aileron pushrod access panel located inside the cabin.

- (d) Drain the wing fuel tanks and the fuel lines that attaches to the header tank.

(e) Disconnect the fuel and vent lines at the forward side of the spar in the cabin. Cover all exposed ends of tubing to prevent dirt or debris from entering the fuel system.

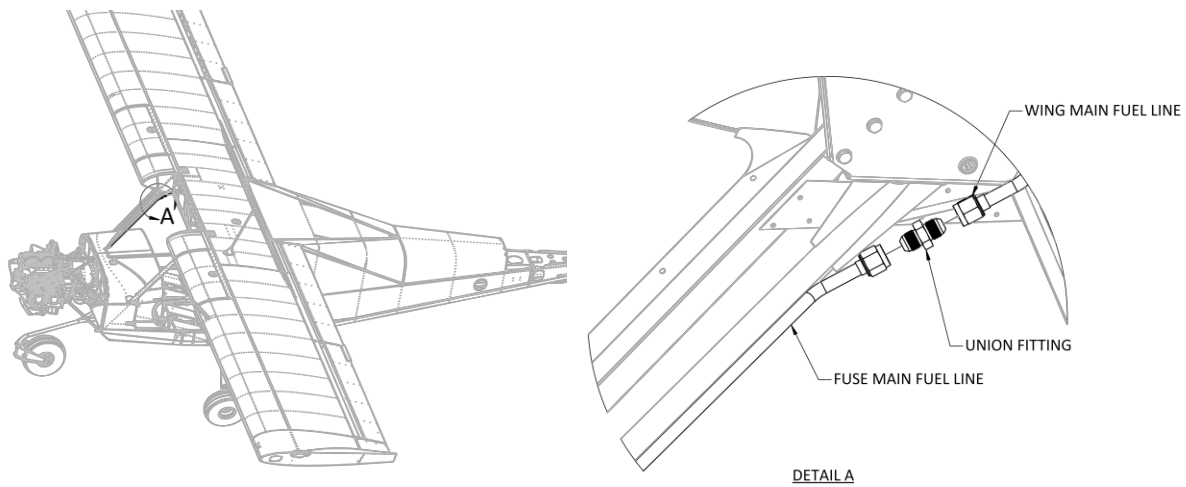


Figure 5.7.4.5 Fuel line disconnect. Follow the same operation for disconnecting the pilot-side fuel line.

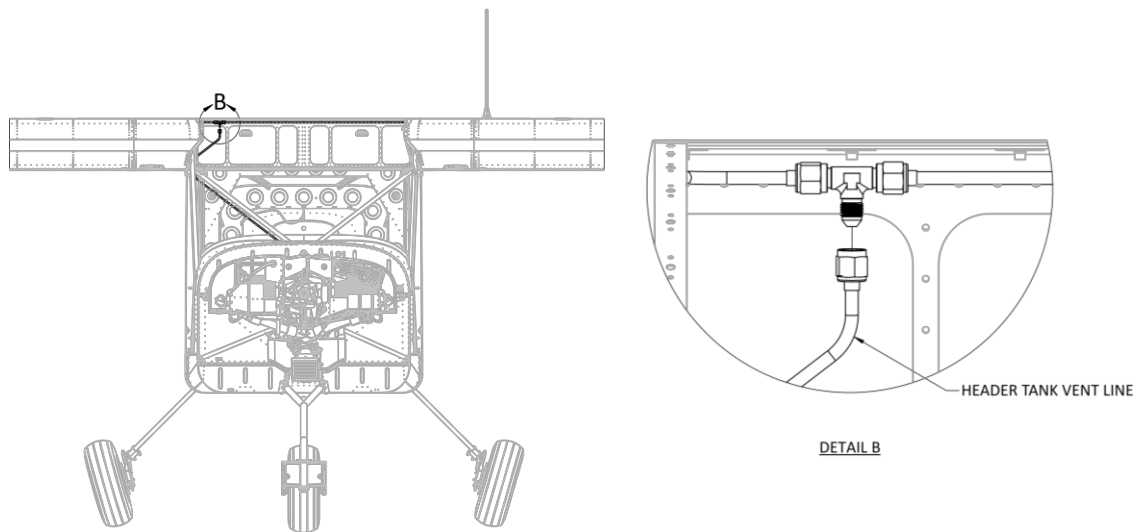


Figure 5.7.4.6 Header tank vent line disconnect.

(f) Disconnect the aileron pushrods from the aileron torque tube arms.

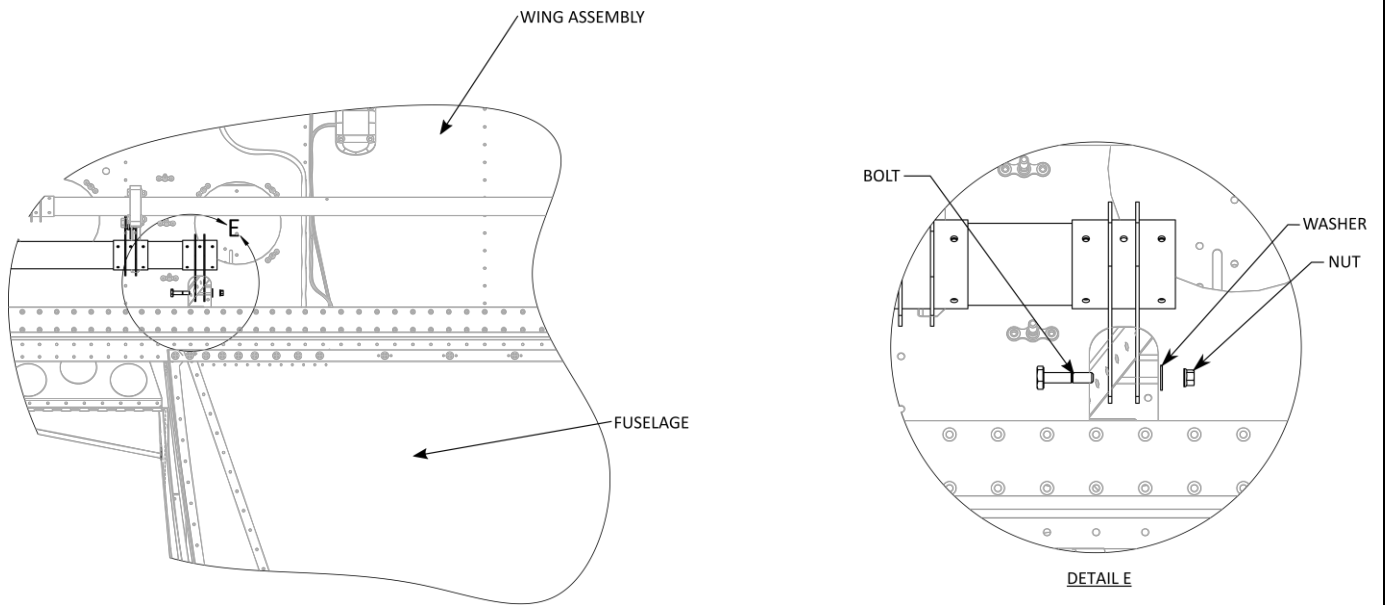


Figure 5.7.4.7 Aileron torque tube disconnect. Use same procedure on opposite wing.

**NOTE**

The flaps and ailerons may be removed from the wings at this point.  
See Section 5.7.6.

(g) Disconnect electrical connectors in the rear spar.

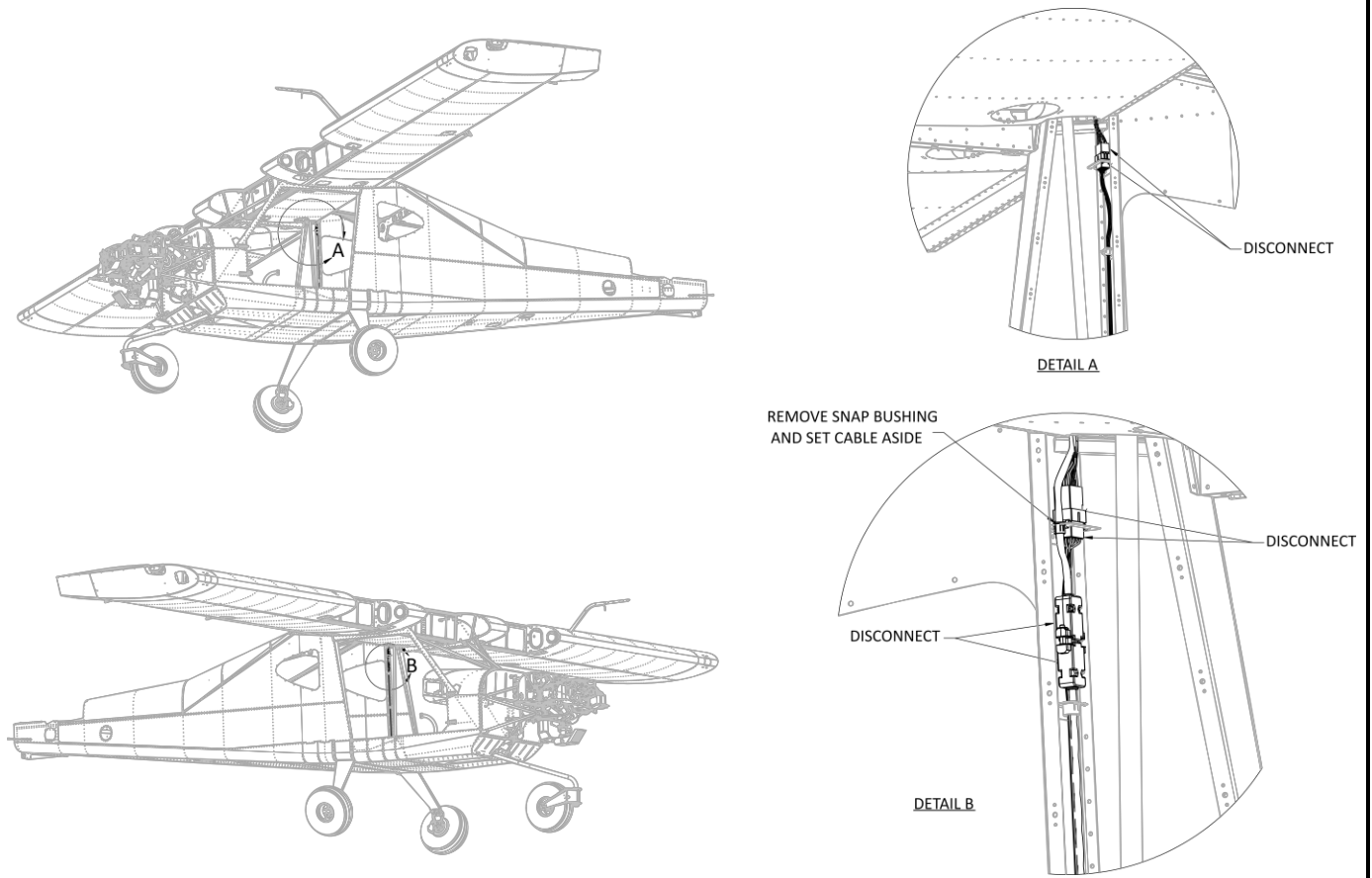


Figure 5.7.4.8 Electrical harness disconnect.

- (h) Disconnect the com radio antenna cable from the antenna and then push the connector out through the opening in the spar web and secure the loose cable with a tie-wrap.

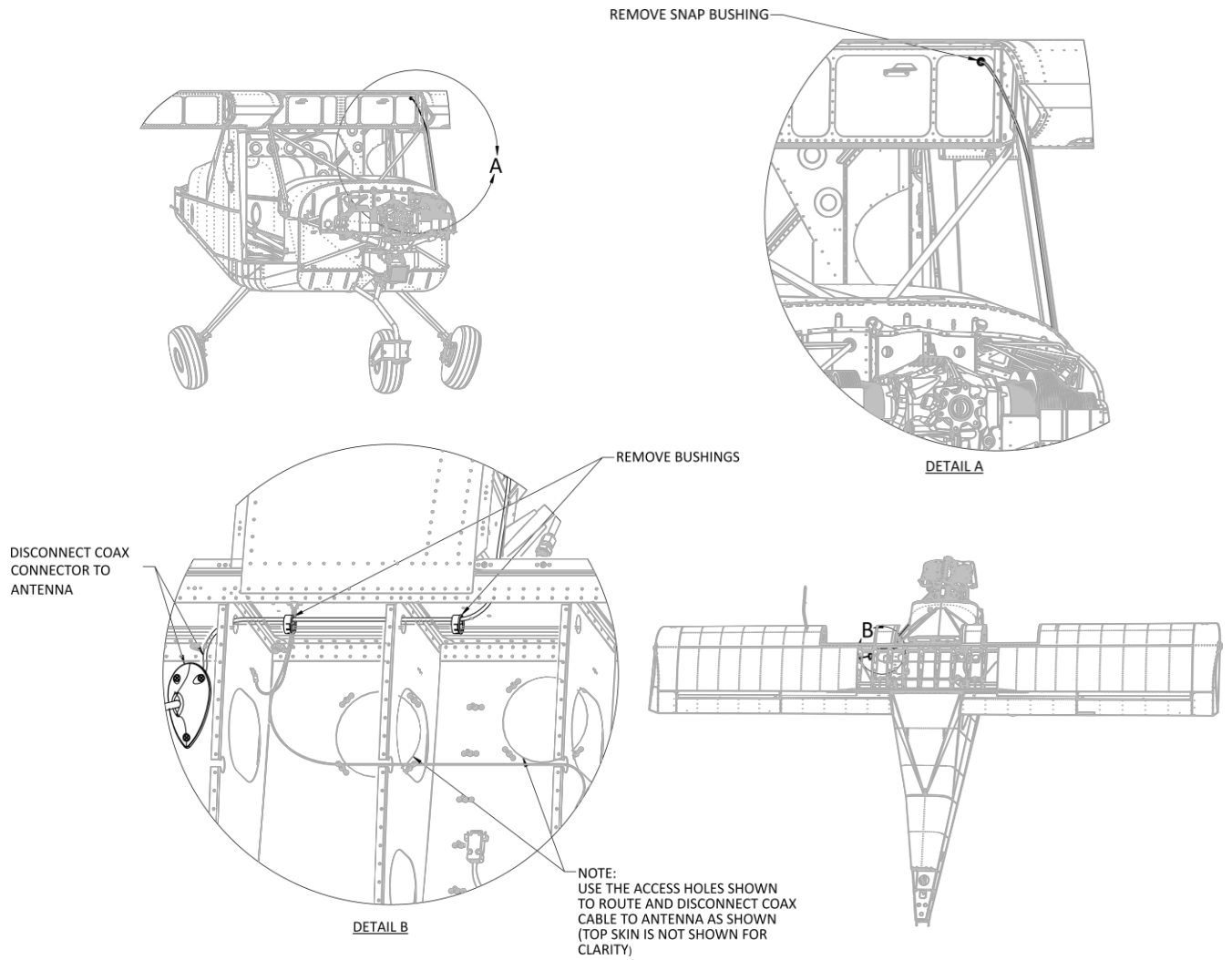


Figure 5.7.4.9 Antenna cable disconnect as shown from above the wing.

- (i) Remove the screws that attach the wing lower skin to the upper door jambs.

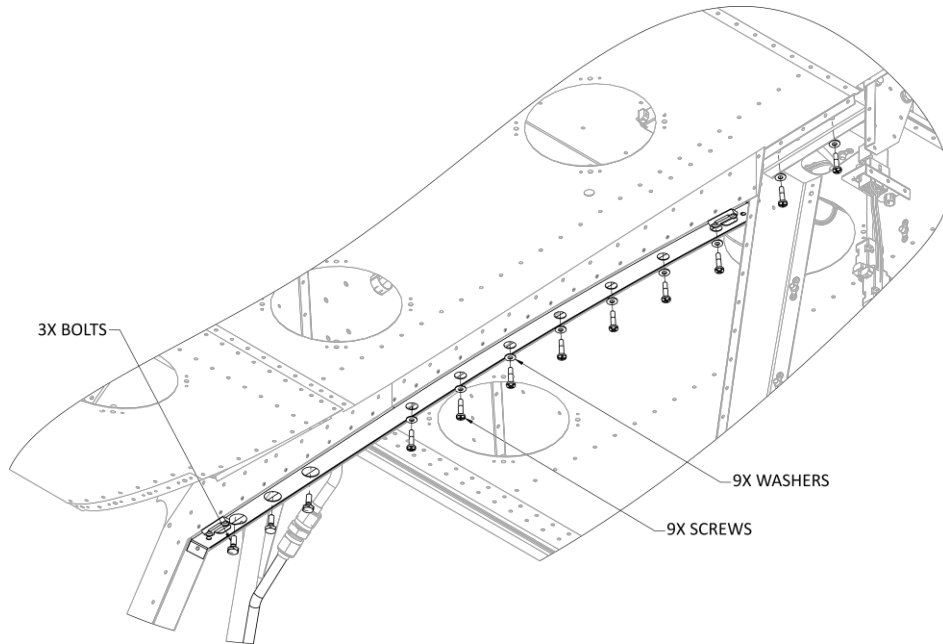


Figure 5.7.4.10 Door frame screw removal. Use same procedure for passenger-side bolts.

- (j) Remove the screws that attach the aft edge of the wing upper skin to the forward edge of the upper aft fuselage skin and remove the bolts attaching the rear spar to the fuselage.

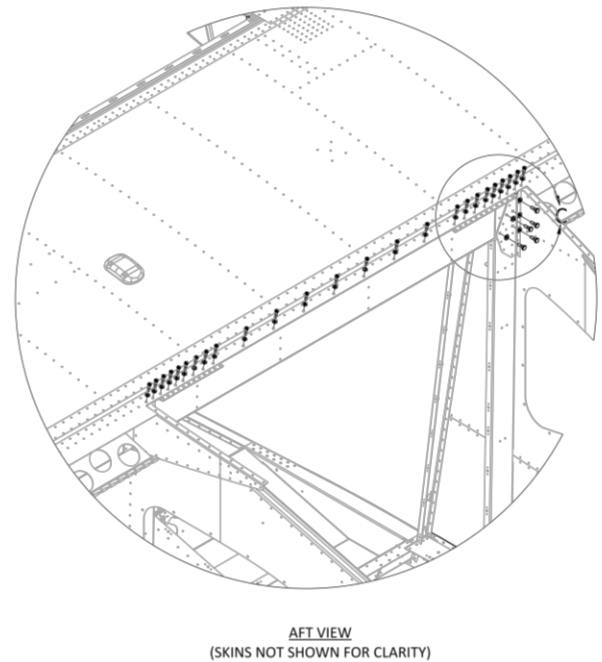
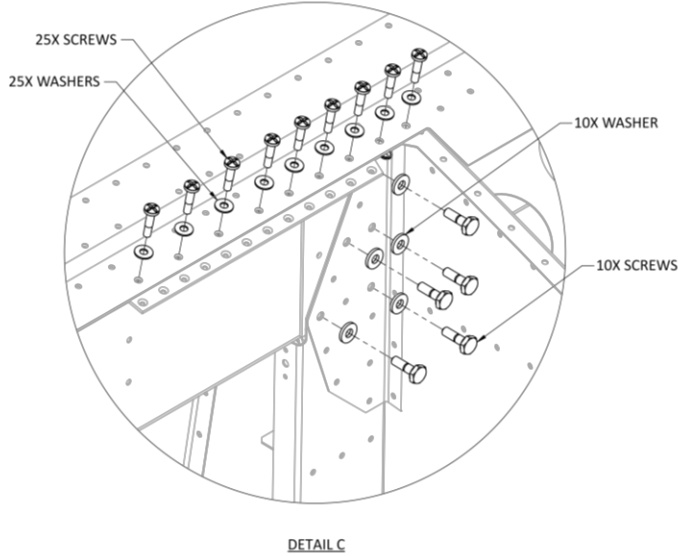
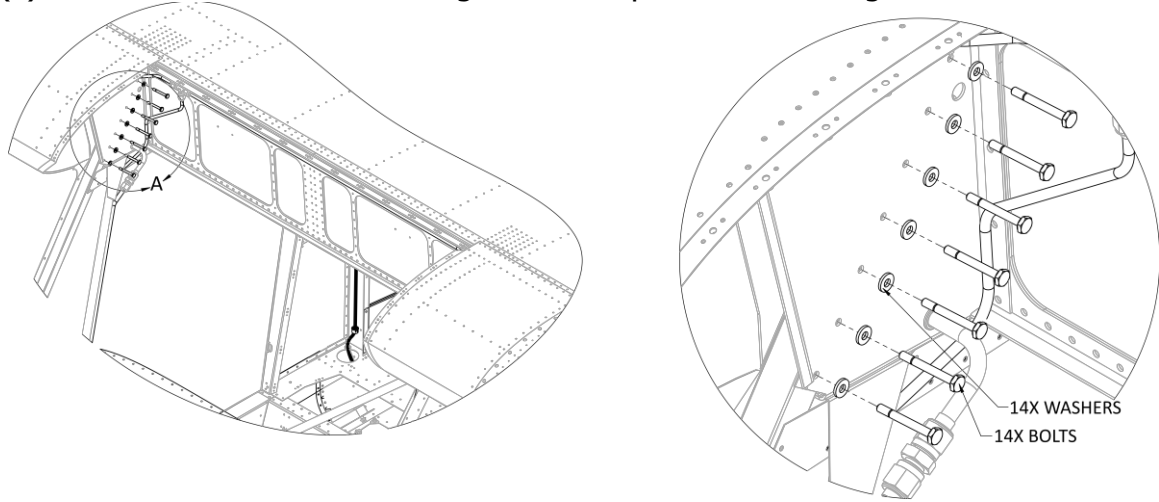


Figure 5.7.4.11 Aft edge skin and rear spar bolt removal. Use same procedure for pilot-side rear spar bolts.

**CAUTION**  
**To accomplish removal and installation of the wing, at least three people will be required.**  
**Use one person to support each side of the wing at or near the tie-down bolt location while the third person removes the attaching hardware.**

(k) Remove the bolts attaching the front spar to the fuselage.



DETAIL A

Figure 5.7.4.12 Front spar bolt removal. Use same procedure for pilot-side bolts.

(l) Remove the wing from the fuselage. This will require two to three people.

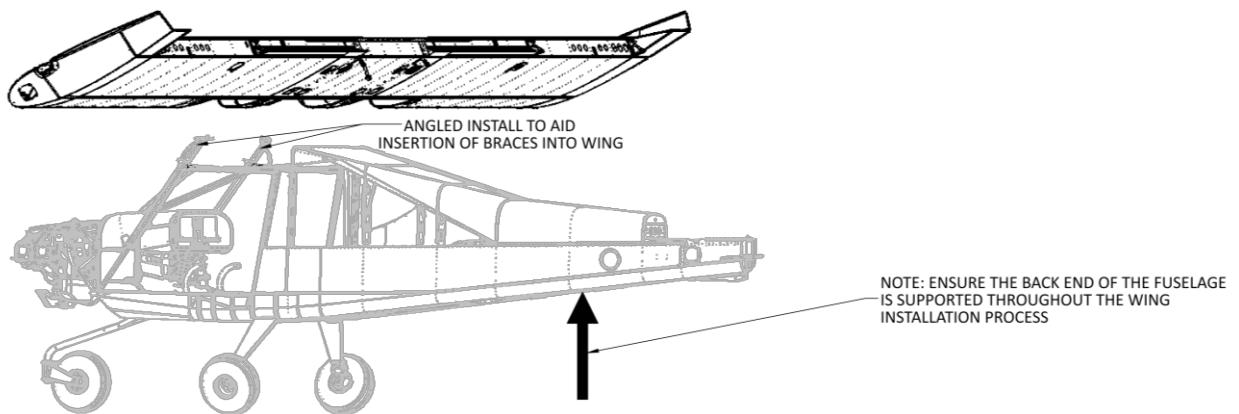


Figure 5.7.4.13 Wing removal procedure from the fuselage.



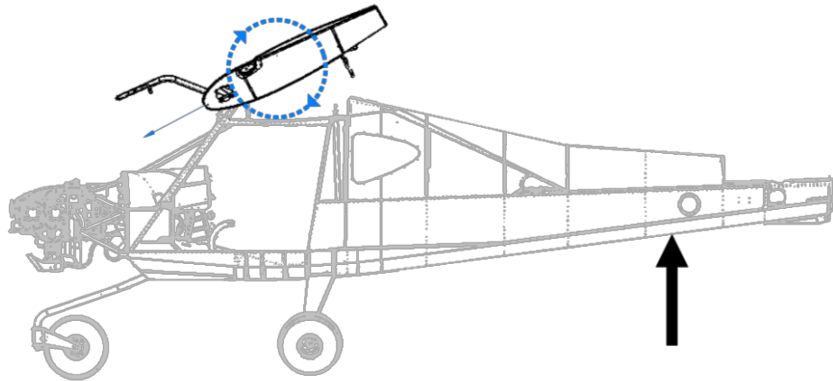


Figure 5.7.4.14 Side-view of wing removal procedure.

- (m) Place the wing horizontally on padded sawhorses or on pads placed directly on the floor. If using padded sawhorses, the wing may be placed with either the top or bottom surface resting on the pads. If using pads on the floor, the wing must be placed with the bottom surface resting on the pads. In any case, position the pads and place the wing so as not to dent or damage the wing skins.

### 3. INSTALLATION

#### Required Tools:

No special tools are required for this operation.

#### Parts Required:

No parts are required at this time.

#### Level of Maintenance:

Heavy Maintenance.

#### Certification Required:

Please see Table 5.4.3 in Section 5.4.

- (a) Installation of the wing is the reverse of removal. Please see Section 5.2 for torque specification and torque seal all bolts.

### 4. REPAIRS AND ALTERATIONS

No major repair or alterations, as outlined as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

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**Woodinville, WA 98072**  
**USA**  
**Tel: +1 425 527 9940**  
**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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## **5.7.5 EMPENNAGE**

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<b>5.</b>	<b>HORIZONTAL STABILIZER</b>	<b>5.7.5-6</b>
<b>6.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.5-8</b>

## 1. GENERAL

The structure of the horizontal stabilizer, elevators, vertical stabilizer, and rudder is of monocoque design in which the outer skin carries the majority of the load. Ribs and stiffeners are present but primarily for the purpose of stabilizing the outer skin such that it can carry greater loads than if it were not supported. Because the outer skin contributes such a large percentage of the load carrying capability of the fuselage, dents, cracks, or other defects in the skin must be carefully scrutinized and evaluated in order to ensure that there is no loss in load carrying capacity.

The majority of the structural parts in the empennage are produced from sheets of inherently corrosion resistant 6061-T6 aluminum using a CNC turret punch press. The machine cut "flat patterns" are either hydroformed over dedicated "formblocks" or bent using a press-brake machine.

The predominant method for joining parts is with blind rivets although solid rivets and threaded fasteners (screws and/or bolts and nuts) are used in places where fasteners must be removable or where high shear strength fasteners are required.

The aircraft is trimmed in flight by changing the position of a tab on the left elevator. The tab is actuated by an electric servo mounted within the counterbalance arm of the left elevator. The servo is operated via a rocker switch located on the control stick.

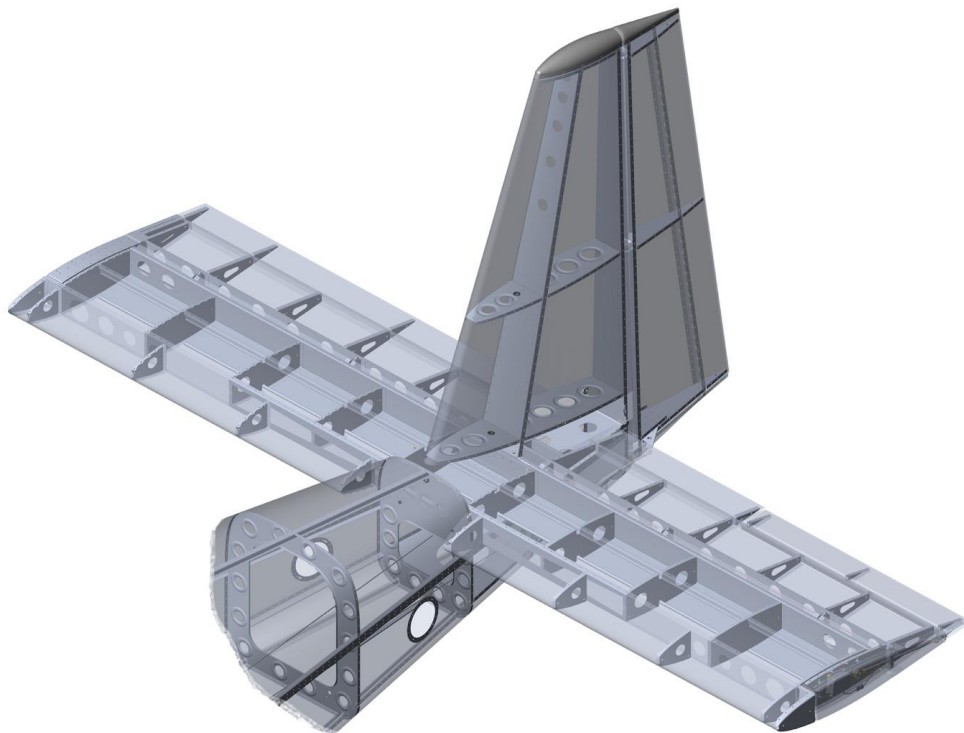


Figure 5.7.5.1 Empennage structure with skin hidden.

**FUSELAGE INSPECTION****Required Tools:**

No special tools are required for this operation.

**Parts Required:**

No parts are required at this time.

**Level of Maintenance:**

Line Maintenance.

**Certification Required:**

Please see Table 5.4.3 in Section 5.4.

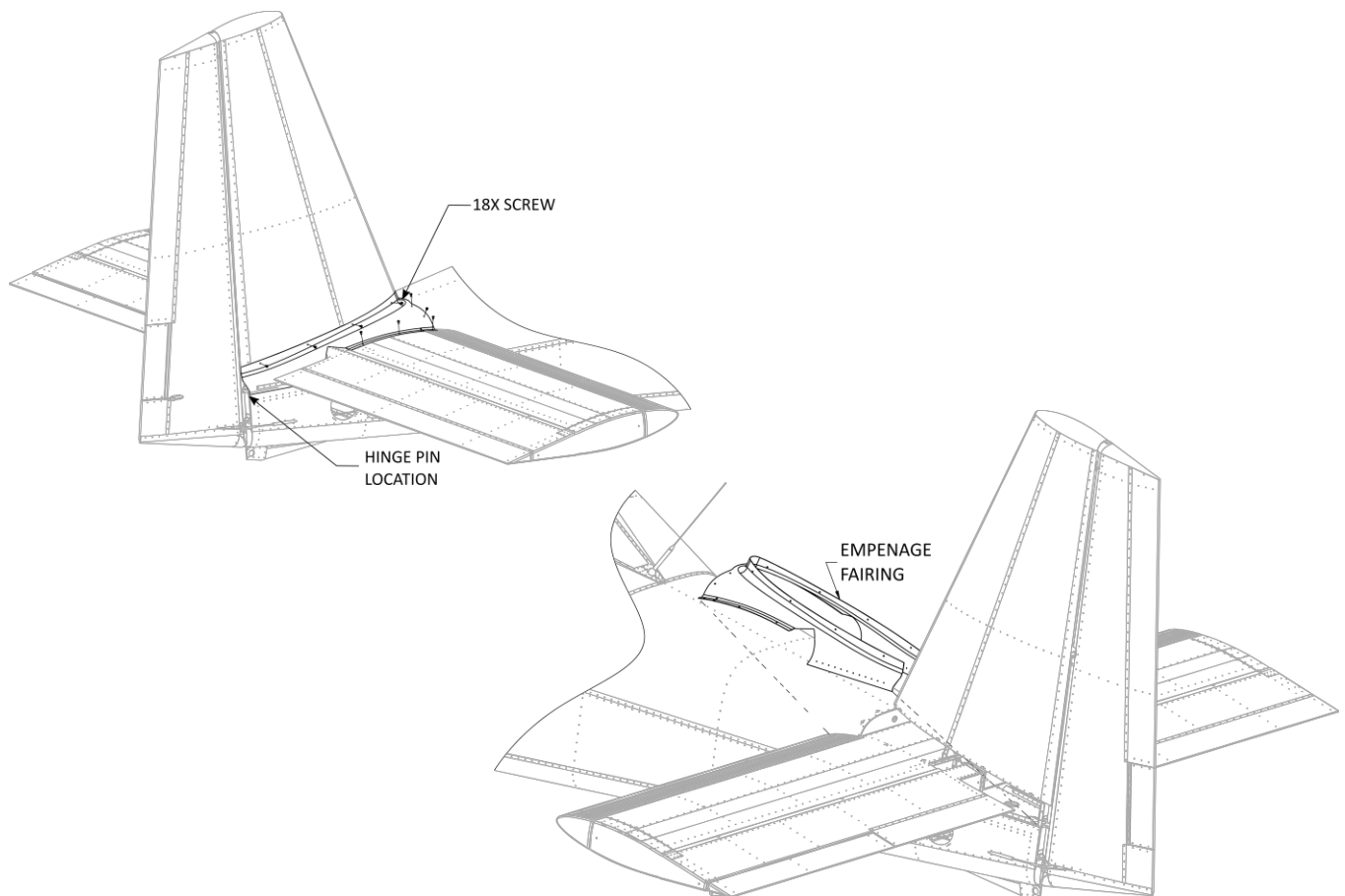


Figure 5.7.5.2 Empennage fairing removal.

**(1) INSPECTION**

- (a) Remove empennage fairing by unfastening screws and removing the hinge pin located under the trailing edge of the elevator.

- (b) Remove (4X) aft fuselage side skin inspection panels below horizontal stabilizer.
- (c) Visually inspect the aft fuselage skins for dents, damage, corrosion, and loose or missing rivets.
- (d) Visually inspect the upper aft fuselage bulkhead and fuselage rear bulkhead for damage, corrosion, or fretting.
- (e) Visually inspect the rudder cables for wear or corrosion. Check for proper cotter pin installation in the bolts attaching the rudder cables to the rudder horn.
- (f) Check the elevator pushrod for cracks, corrosion, and freedom of movement. Check for looseness or wear of the elevator pushrod rod end bearings.
- (g) Installation of fairings is the reverse of removal.
- (h) Safety wire the (2X) hinge pins.

## **2. TAIL SURFACES INSPECTION**

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Line Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

#### (1) INSPECTION

- (a) Inspect all tail surface skins for dents, damage, corrosion, and loose or missing rivets.
- (b) Check that the rudder and elevators move freely from stop-to-stop with no binding or interference.
- (c) Check that the trim tab does not have excessive play, no signs of wear or binding of the trim tab pushrod. Check for looseness or wear of the trim tab pushrod rod-end bearings. Check for proper safetying of the trim tab hinge pin.

### 3. VERTICAL STABILIZER

#### Required Tools:

No special tools are required for this operation.

#### Parts Required:

No parts are required at this time.

#### Level of Maintenance:

Heavy Maintenance.

#### Certification Required:

Please see Table 5.4.3 in Section 5.4.

#### NOTE

Vertical stabilizer and rudder can be removed as one unit.

#### (1) REMOVAL

- (a) Remove vertical stabilizer top fairing.

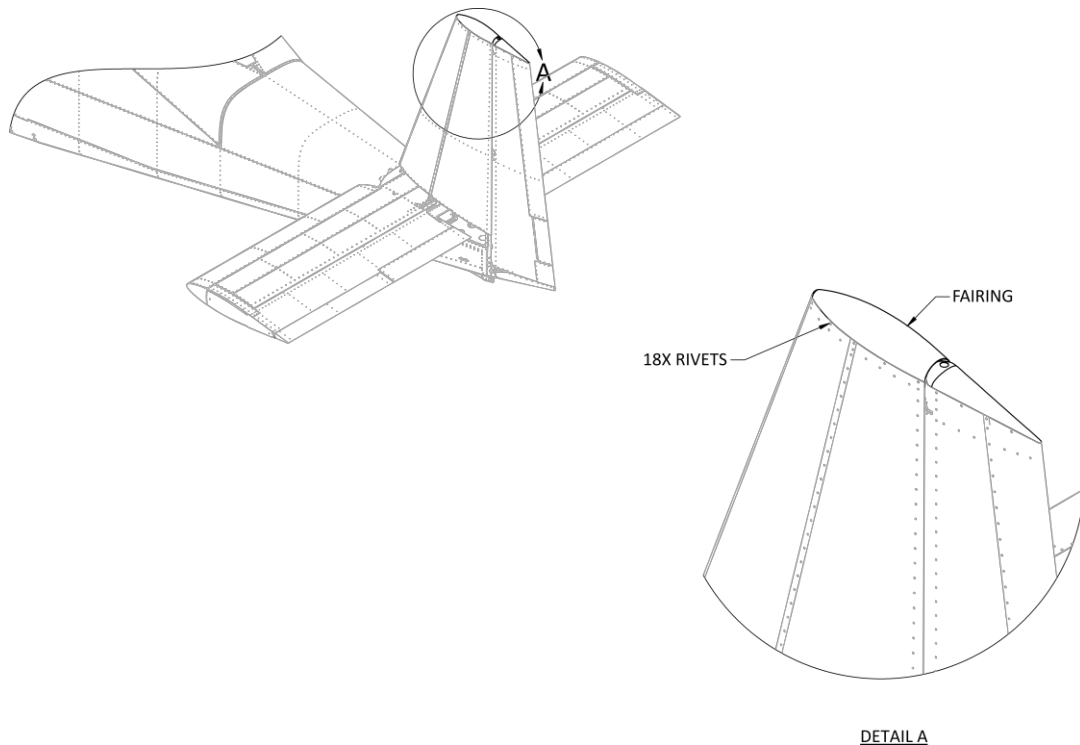


Figure 5.7.5.3 Empennage fairing removal.

- (b) Remove four bolts attaching the vertical stabilizer front spar to the horizontal stabilizer rear spar.



- (c) Remove four bolts attaching the vertical stabilizer rear spar to the fuselage rear bulkhead and separate the vertical stabilizer assembly from the fuselage.

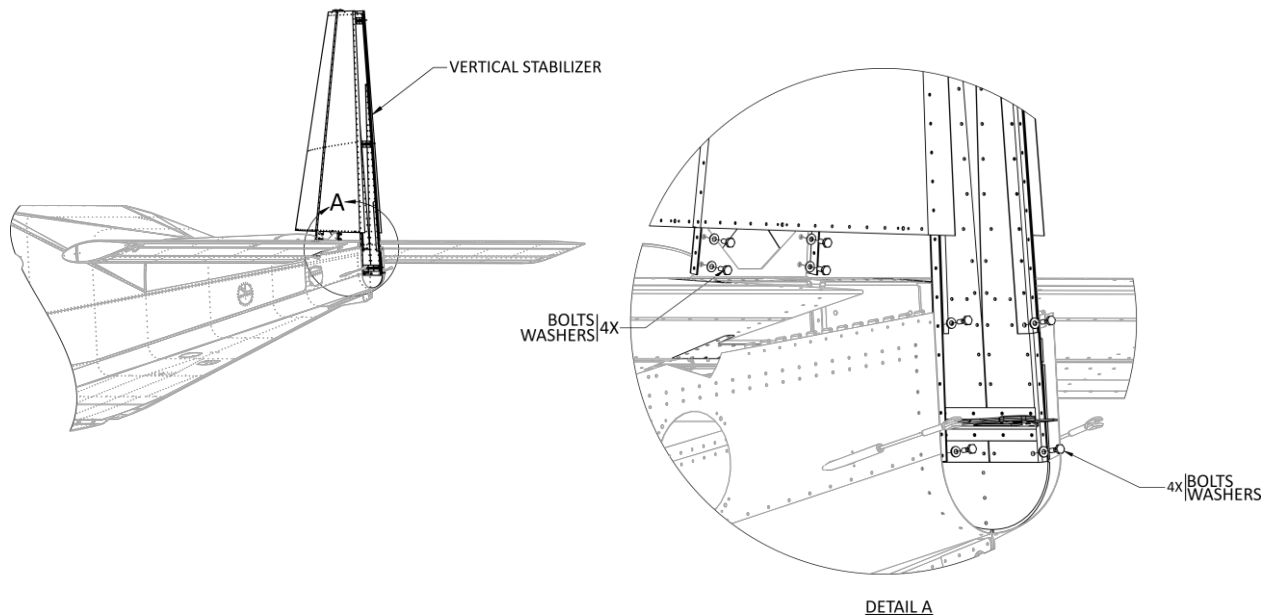


Figure 5.7.5.4 Vertical stabilizer removal.

- (d) Place the vertical stabilizer on any flat surface that is covered or padded such that the skin will not become dented or damaged.

## (2) INSTALLATION

- (a) Installation of the vertical stabilizer is the reverse of removal. Please see Section 5.2 for torque specification and torque seal all bolts.

## 4. HORIZONTAL STABILIZER

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

**Certification Required:**

Please see Table 5.4.3 in Section 5.4.

**NOTE**

It is not necessary to remove elevators for this disassembly.  
The vertical stabilizer and rudder must be removed to remove the horizontal stabilizer.

**(1) REMOVAL**

- (a) Working through the opening in the aft fuselage side skin, remove the four bolts attaching the horizontal stabilizer front spar to the upper aft fuselage bulkhead.

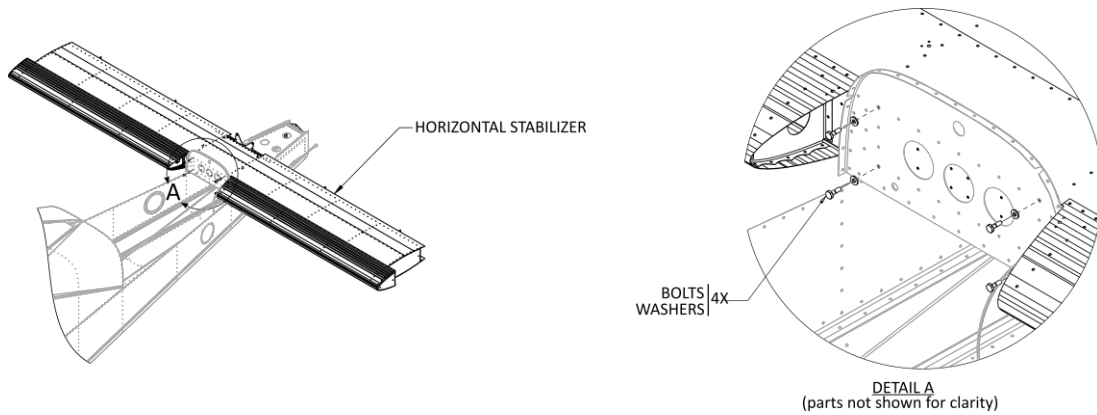


Figure 5.7.5.5 Horizontal stabilizer front spar detachment.

- (b) Remove the four bolts attaching the horizontal stabilizer rear spar to the attach bars that are part of the horizontal stabilizer rear spar bulkhead assembly.

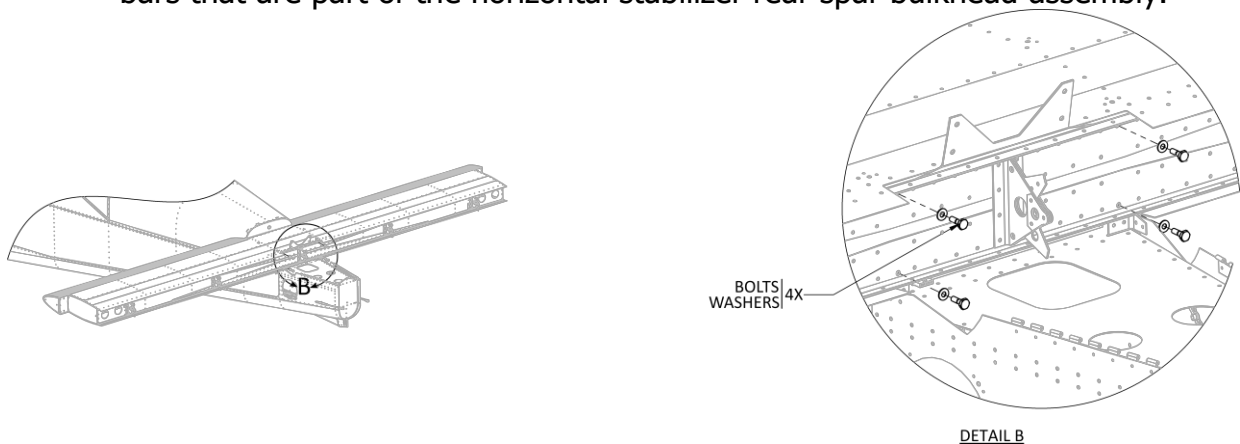


Figure 5.7.5.6 Horizontal stabilizer rear spar detachment.

- (c) Separate the horizontal stabilizer from the fuselage by lifting the horizontal stabilizer straight up until the attach bars are fully disengaged.

(d) Place the horizontal stabilizer on any flat surface that is covered or padded such that the skin will not become dented or damaged.

(2) INSTALLATION

(a) Installation of the horizontal stabilizer is the reverse of removal. Please see Section 5.2 for torque specification and torque seal all bolts.

**5. REPAIRS AND ALTERATIONS**

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**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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**5.7.6 FLIGHT CONTROLS**

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<b>8.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.6-19</b>

## 1. GENERAL

The aircraft has conventional ailerons and elevators that are operated with a stick and are mechanically actuated via systems of pushrods and bellcranks.

The rudder is operated with overhead pivoting rudder pedals and is actuated via cables. Each set of rudder pedals is independently adjustable to accommodate variations in height and body proportions of both pilot and passenger.

The flaps are actuated electrically via a linear actuator mounted in the wing directly above the passenger seat. The actuator is attached to the center arm of a torque tube assembly while the flap pushrods are attached to arms at the ends of the torque tube assembly. Synchronization of the motion of the left and right flaps is assured by virtue of the torque tube. The flap actuator is controlled via a rocker switch located on the instrument panel. Flap position is displayed on the EFIS screen with the signal coming from a position potentiometer inside the flap linear actuator.



Figure 5.7.6.1 Flight control system overview.

The control surfaces of the aircraft must be rigged within the prescribed limits in order to maintain adequate margins of safety. This section specifies the procedures that must be used to rig the flight control surfaces. The flight controls consist of ailerons, rudder, elevators, and flaps.

## 2. TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Control sticks are displaced when ailerons are in neutral	Aileron pushrods improperly adjusted	Adjust length of aileron pushrods
Improper trailing edge down aileron travel	Aileron pushrods improperly adjusted	Adjust length of aileron pushrods
Lost motion in control sticks	Pushrod rod-end bearing bolts not tightened properly	Check pushrod rod-end bearing bolts for proper length and proper nut & washer installation
	Pushrod rod-end bearings worn and loose	Replace pushrod rod-end bearings
	Worn holes in control stick, torque tube arm, bellcrank, or idler where pushrod rod-end bearings are attached	Replace worn-out components
Excessive resistance to movement of control sticks	Binding or interference between pushrods and structure or control system torque tubes or bellcranks	Check system for proper pushrod lengths, neutral positions of torque tubes and bellcranks and adjust pushrod lengths as required
	Control system bearings not lubricated	Lubricate control system bearings
Full elevator travel cannot be achieved	Elevator pushrods improperly adjusted	Adjust length of elevator pushrods
Trim tab does not move up or down when actuating the trim switch	Loose wiring	Secure wiring connections
	Broken switch	Replace switch
	Inoperative electric servo	Replace electric servo
Flaps do not move up or down when actuating the flap switch	Loose wiring	Secure wiring connections
	Broken switch	Replace switch
	Inoperative electric actuator	Replace electric actuator

Flaps do not move in unison	Flap torque tube bent/twisted	Replace flap torque tube
	Flap pushrod broken or bent	Replace flap pushrod
AoA stall warning tone comes on well above stalling speed	AoA not calibrated properly	Calibrate AoA
AoA stall warning tone comes on at a speed less than 5kt above stall	AoA not calibrated properly	Calibrate AoA
AoA system does not work	AoA port clogged	Check that AoA port is clear
	AoA tube broken or not attached at pitot/static/aoa head or ADAHRS	Check AoA tube for proper installation
	AoA functionality not enabled in EFIS	Enable AoA in EFIS

### 3. AILERON REMOVAL

#### Required Tools:

No special tools are required for this operation.

#### Parts Required:

No parts are required at this time.

#### Level of Maintenance:

Heavy Maintenance.

#### Certification Required:

Please see Table 5.4.3 in Section 5.4.

#### (1) REMOVAL

- (a) Using the access hole shown below, disconnect aileron pushrod by unfastening the bolt that connects it to the torque-tube plate.



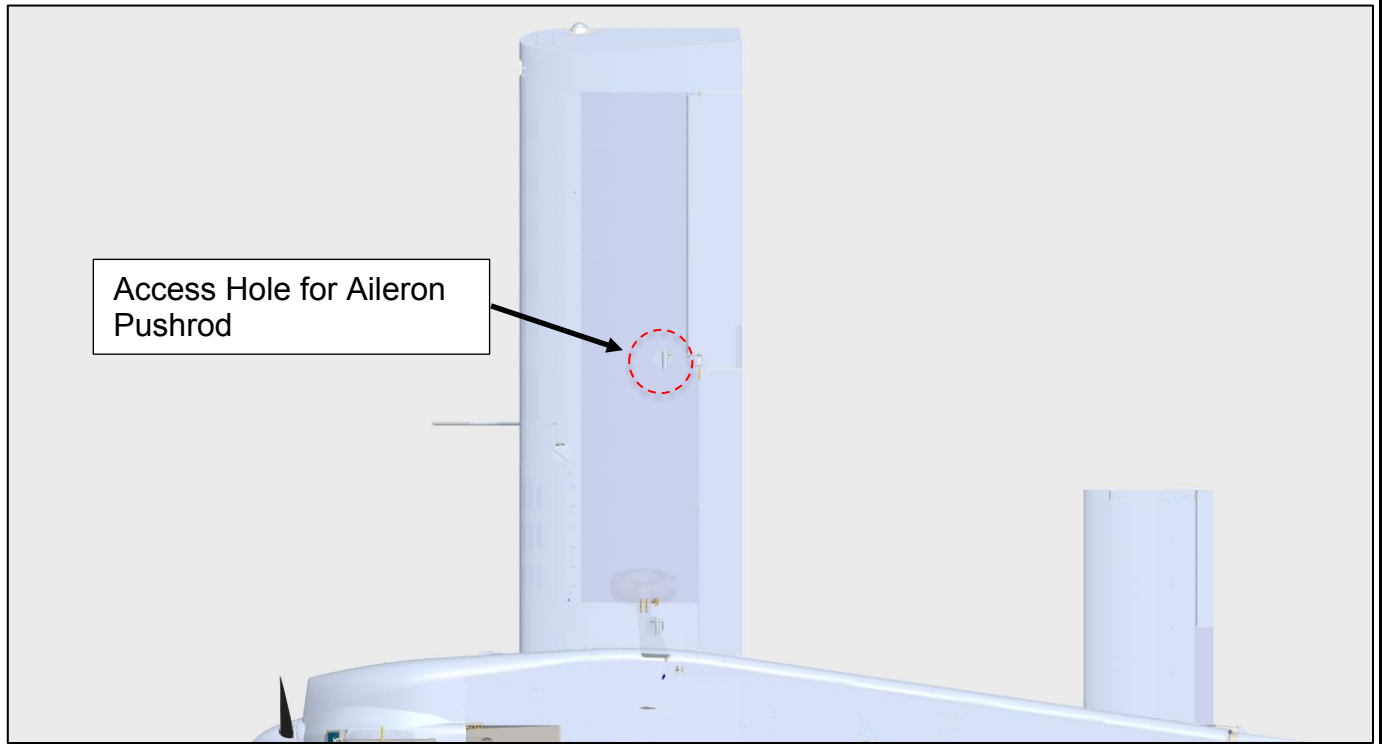


Figure 5.7.6.2 Access hole location for aileron pushrod.

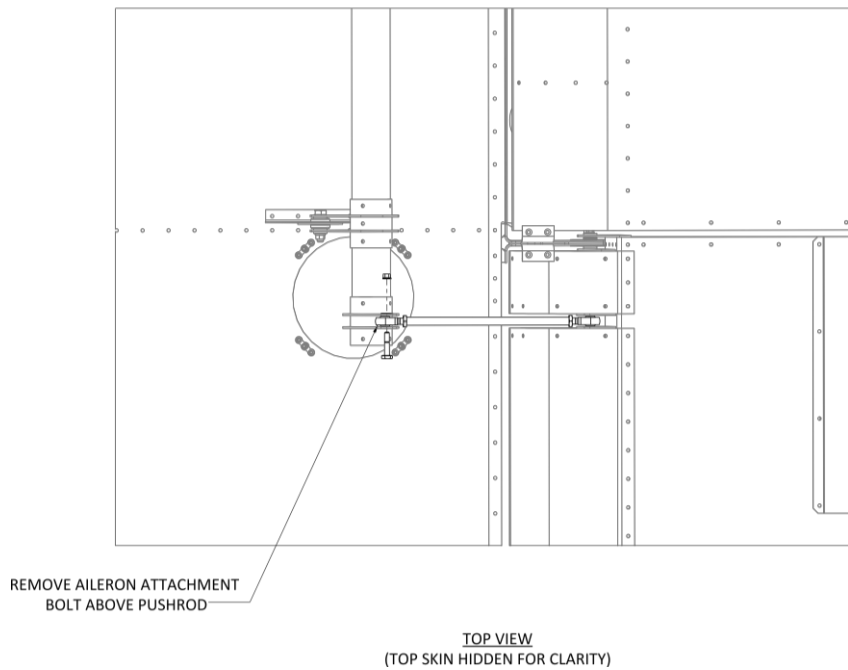


Figure 5.7.6.3 Pushrod removal.

(b) Remove the hinge bolts and washers while firmly holding the aileron.

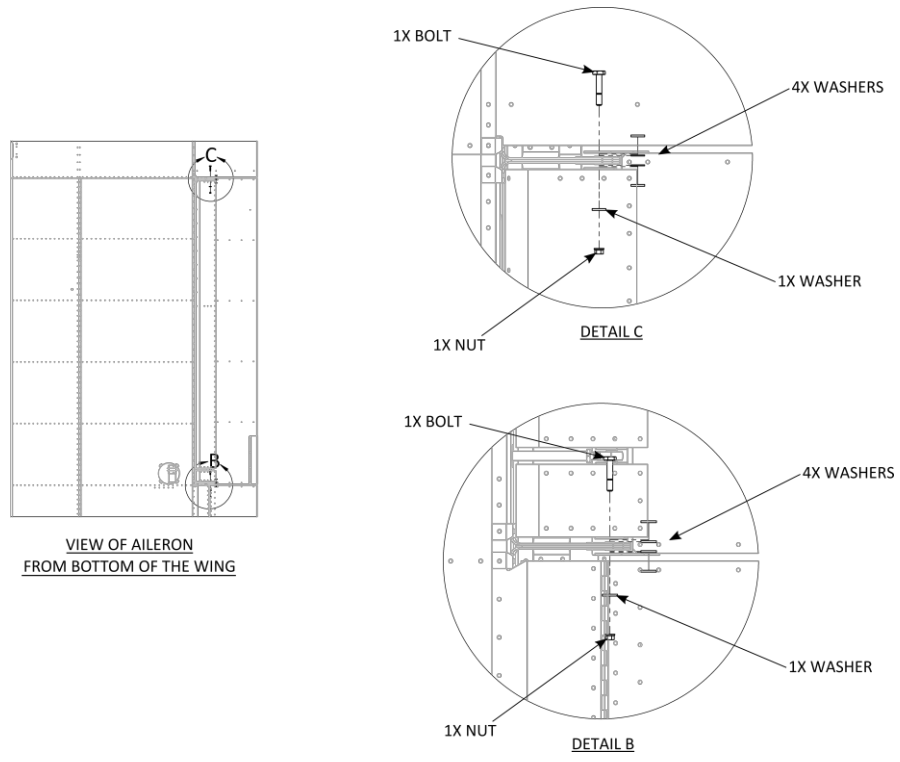


Figure 5.7.6.4 Removal of aileron hinge bolts.

(c) Carefully remove the aileron from the wing.

### (2) INSTALLATION

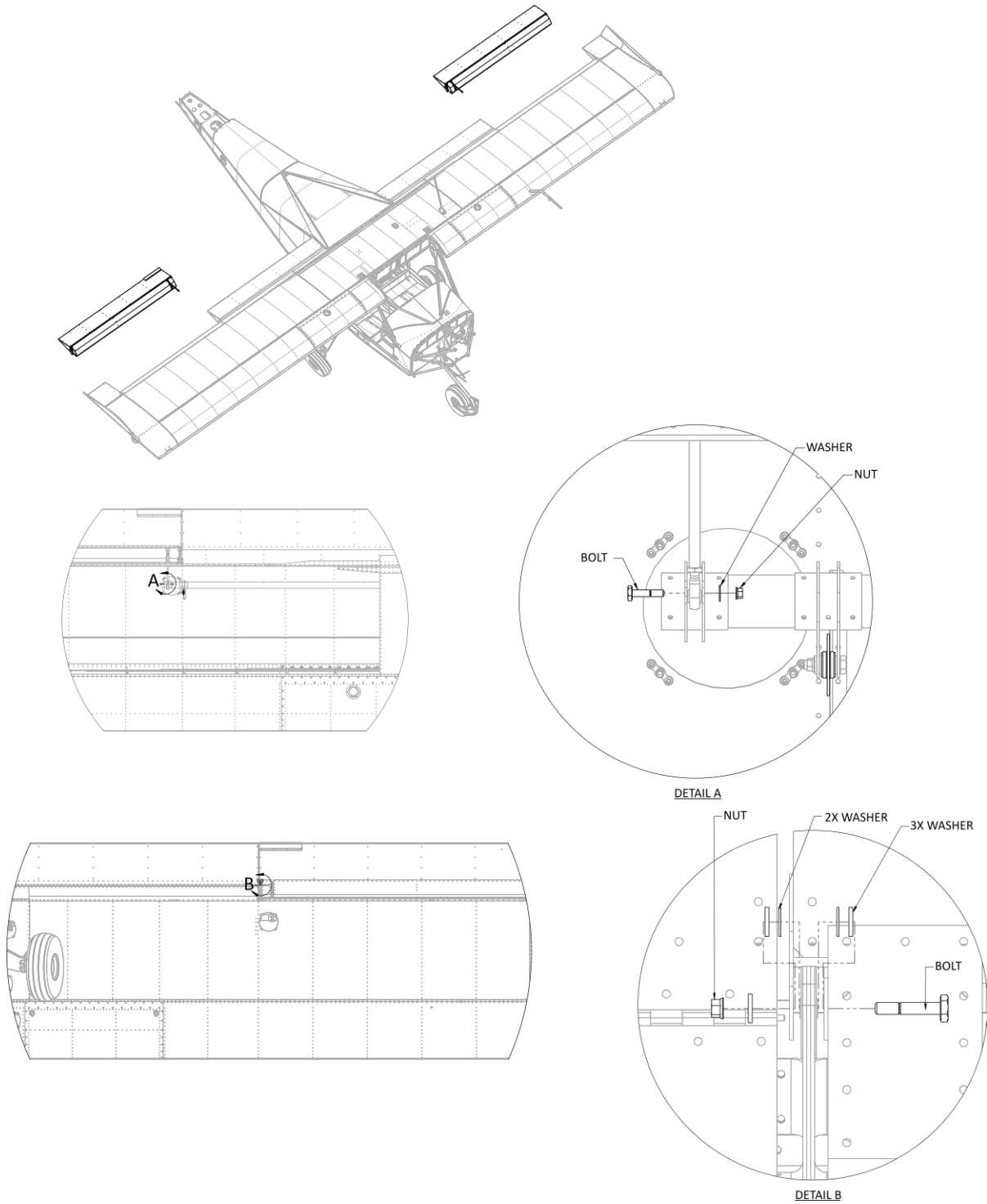


Figure 5.7.6.5 Aileron installation.

(a) Installation of the ailerons is the reverse of its removal.

(b) When adjusting the pushrod for the aileron, ensure that there is a slight spring-back on each aileron. This allows the torque tube to have slight play that reaches equilibrium during flight.

(3) RIGGING

(a) The neutral position of the ailerons is found by positioning the trailing edge of the ailerons 1/8" below the trailing edge of the wing tip.

NOTE

In addition to ensuring proper assembly, check spring back, and that the ailerons are free and correct.

**4. FLAP REMOVAL**

Required Tools:

No special tools are required for this operation.

Parts Required:

No parts are required at this time.

Level of Maintenance:

Heavy Maintenance.

Certification Required:

Please see Table 5.4.3 in Section 5.4.

NOTE

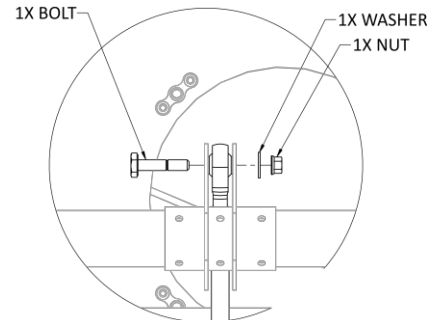
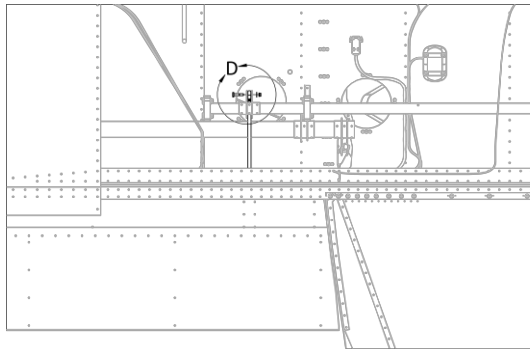
Add protective layer between fuselage and flap to prevent scratching.

(1) REMOVAL



Figure 5.7.6.6 Flap access hole location.

(a) Through the access hole shown above, remove the bolt that fastens the flap pushrod to the torque tube.



TOP VIEW  
(TOP SKIN NOT SHOWN FOR CLARITY)  
OPPOSITE SIDE SIMILAR

DETAIL D

Figure 5.7.6.7 Flap pushrod removal.

(b) Unfasten the safety wire and remove the flap hinge pin.

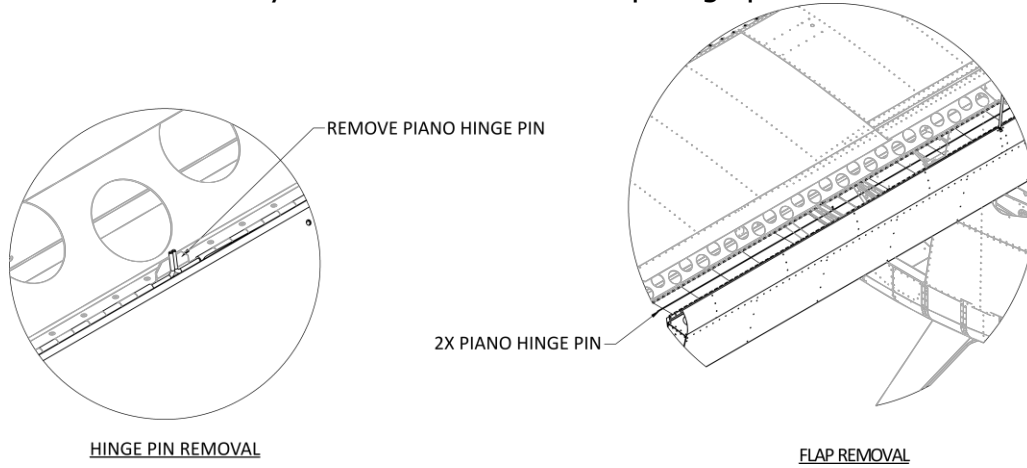


Figure 5.7.6.8 Flap hinge pin removal.

(c) Lower flaps carefully to remove.

(2) INSTALLATION

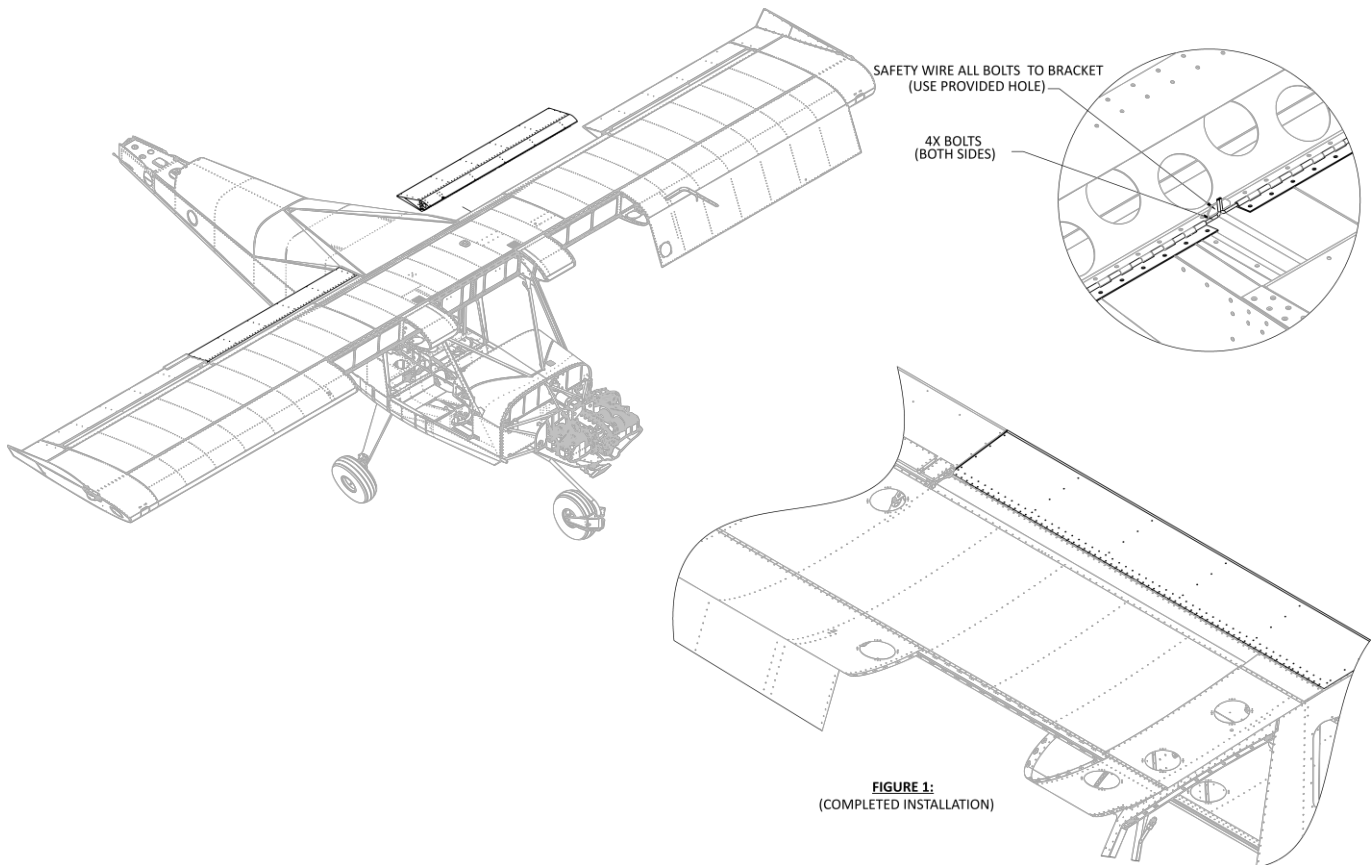


Figure 5.7.6.9 Flap installation.

(a) Installation of the flaps are the reverse of their removal.

**NOTE**

It may be necessary to check the flap rigging depending on the parts that were removed.

**(3) RIGGING THE POSITION OF THE FLAPS**

(a) Position and secure the ailerons in the neutral position. Note: ailerons must be properly rigged before rigging flaps.

(b) Position the flap switch to the "UP" position.

(c) Adjust the flap actuator tube rod end to match the flap trailing edge with the aileron trailing edge in the neutral position.

(d) Connect the flap actuator rod end to the flap nose rib by installing the actuator bolt with Loctite 601 or equivalent. Make sure the flap actuator rod end does not bind on the flap actuator bolt.

(e) Tighten the flap actuator tube rod end jam nut.

(f) Repeat steps a-e for opposite side.

**NOTE**

Flaps should be assembled properly and have full range of movement with the correct amount of spring back.

**5. RUDDER**

Required Tools:

No special tools are required for this operation.

Parts Required:

No parts are required at this time.

Level of Maintenance:

Heavy Maintenance.

Certification Required:

Please see Table 5.4.3 in Section 5.4.

**(1) REMOVAL**

- (a) Remove the cotter pins from the rudder cable attach bolts. Disconnect the rudder cables from the rudder horn.

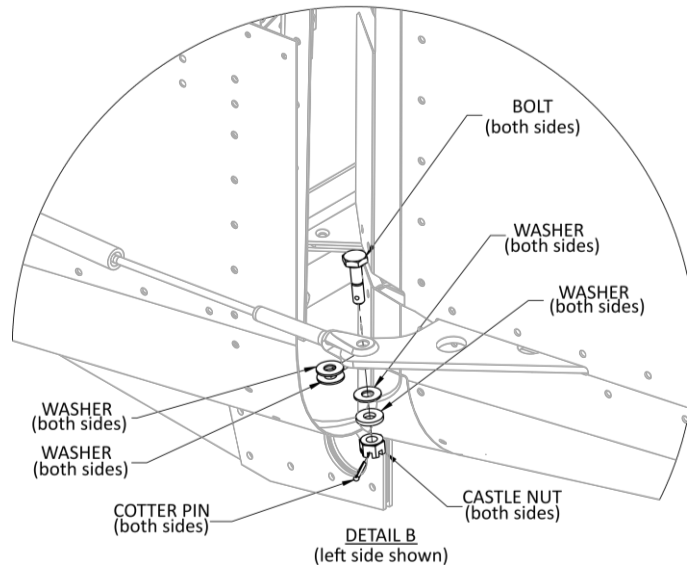


Figure 5.7.6.10 Rudder cable detachment.

- (b) Remove the bolt from the lower, mid, and upper rudder hinge brackets then separate the rudder assembly from the vertical stabilizer (as shown below).



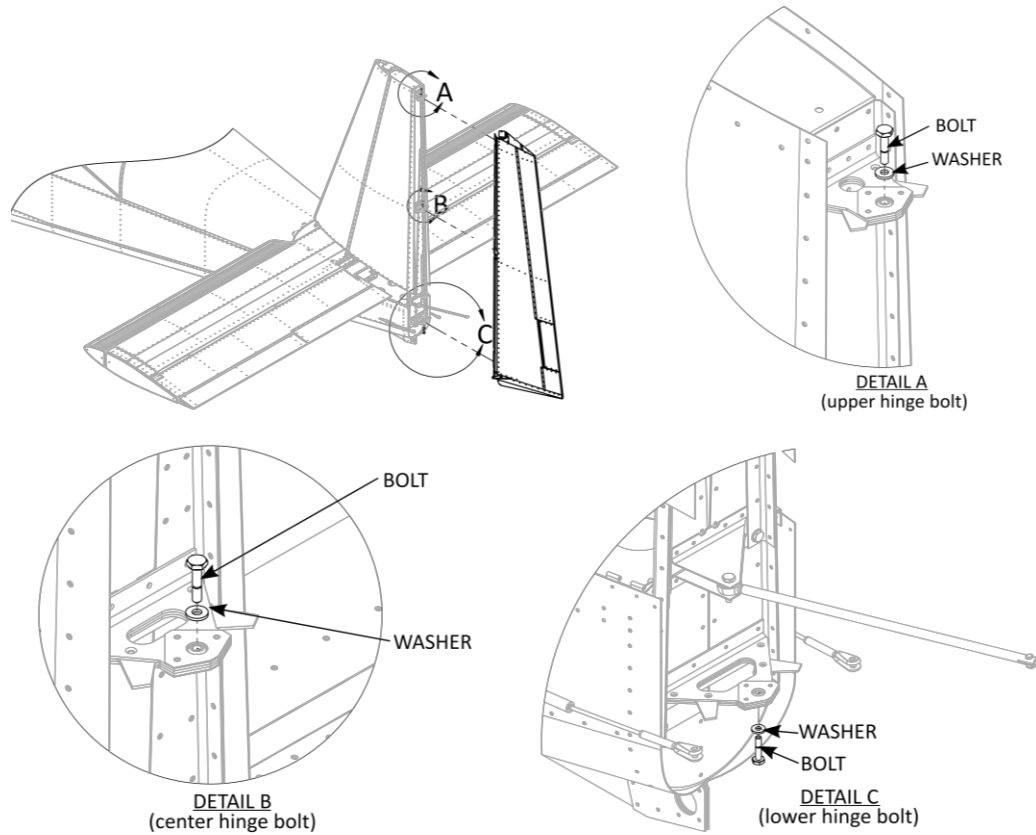


Figure 5.7.6.11 Rudder removal.

(c) Place the rudder on any flat surface that is covered or padded such that the skin will not become dented or damaged.

(2) INSTALLATION

(a) Installation of the rudder is the reverse of removal. Please see Section 5.2 for torque specification and torque seal all bolts.

(b) In addition to proper assembly and fastening of the rudder, ensure free and correct rudder control before completing the installation.

## 6. ELEVATORS

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

Level of Maintenance:

Heavy Maintenance.

Certification Required:

Please see Table 5.4.3 in Section 1.1.

**NOTE**

Elevator removal is not necessary for horizontal stabilizer removal.  
Elevators will be removed one at a time. Order is not important.  
Elevators can be removed without removing the vertical stabilizer or rudder.

**(1) REMOVAL**

(a) Remove the bolt attaching elevator pushrod to the elevator horns.

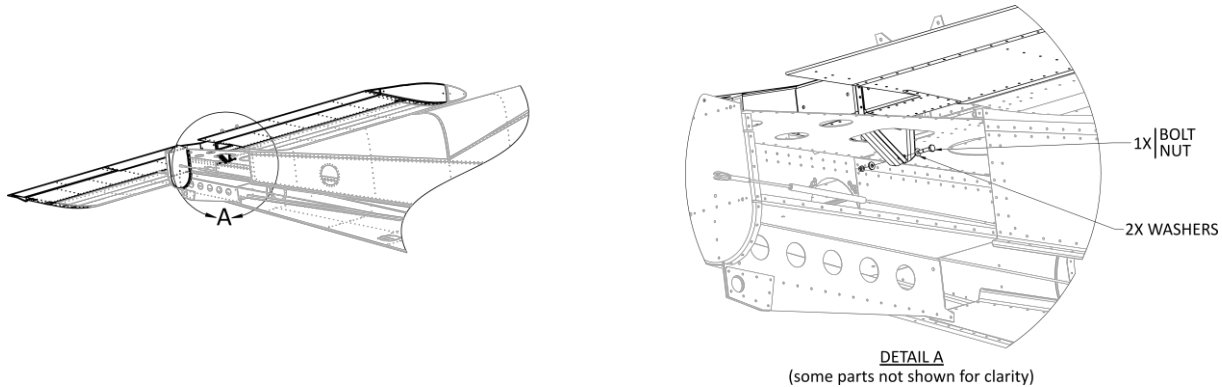


Figure 5.7.6.12 Elevator pushrod detachment.

(b) Disconnect the trim motor wire connector (not applicable for the right elevator).

(c) Remove the center hinge bracket bolt.

(d) Rotate the elevator being removed first to the full trailing-edge-up position and, working from the underside of the elevator, remove the bolt from the mid and then outboard elevator hinge brackets, then separate the elevator assembly from the horizontal stabilizer.

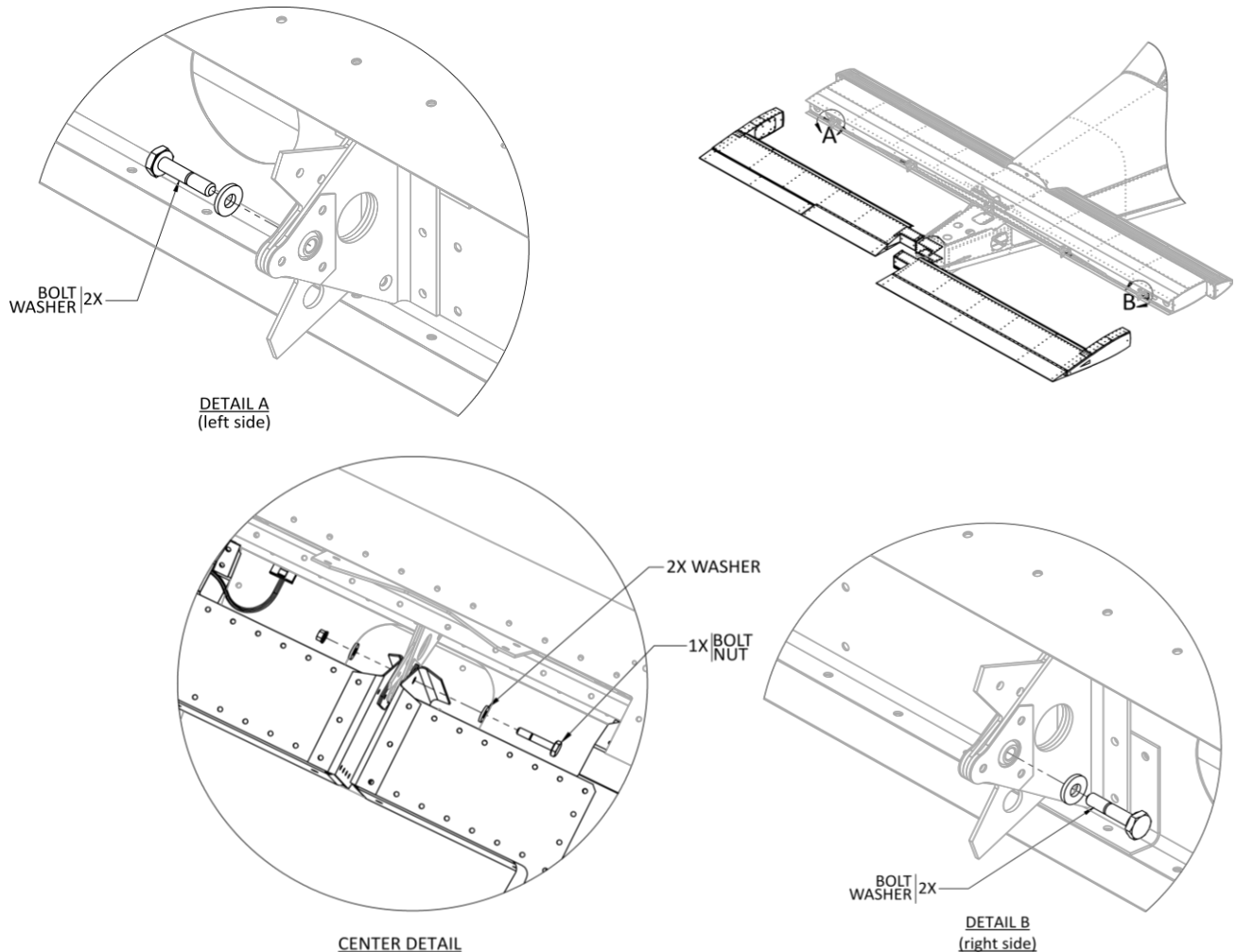


Figure 5.7.6.13 Elevator removal.

- (e) Place the elevator on any flat surface that is covered or padded such that the skin will not become dented or damaged.
- (f) Remove the bolts from the opposite side elevator and separate from the horizontal stabilizer using the same procedure as steps (c) and (d).

## (2) INSTALLATION

- (a) Installation of the elevators is the reverse of removal. Please see Section 5.2 for torque specification and torque seal all bolts.

## **7. RUDDER PEDAL AND LINKAGE**

### **GENERAL**

The rudder pedals operate a series of cables to move the rudders. They also serve as the brake controls, which are hydraulically actuated. When rotated, the pedal pushes on a master cylinder located on each pedal. The rudder pedals are constructed from welded steel tubing and are fastened to the linkages. The pedal position can be adjusted forward and aft through removing a pin on the track rail and sliding it to the proper position.

### **REMOVAL**

#### Required Tools:

No special tools are required for this operation.

#### Parts Required:

No parts are required at this time.

#### Level of Maintenance:

Heavy Maintenance.

#### Certification Required:

Please see Table 5.4.3 in Section 5.4.

#### (1) REMOVAL

- (a) Remove control access panel below the control panel and set aside (shown below).
- (b) Unfasten top rudder cable connection.
- (c) Remove the separator plate located underneath the top rudder cable connector.
- (d) Unfasten the lower rudder cable connector.

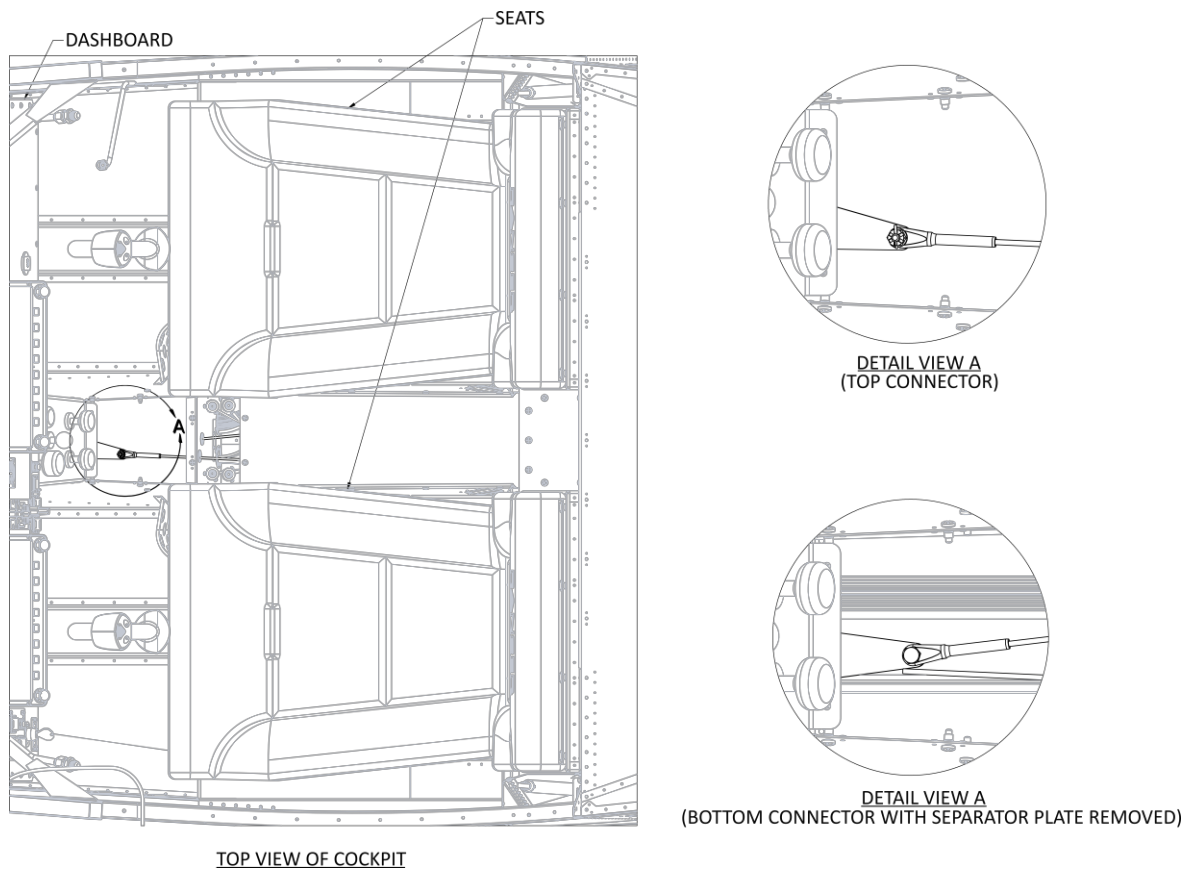


Figure 5.7.6.14 Rudder cable disconnect.

- (e) Remove EFIS screen by unfastening the four bolts, disconnecting the EFIS harnesses and setting screens aside.
- (f) Remove rudder cable anchor as shown below. This may include removing the engine cowling to remove the nuts in front of the fire wall. See Section 5.7.9 for engine cowling removal.

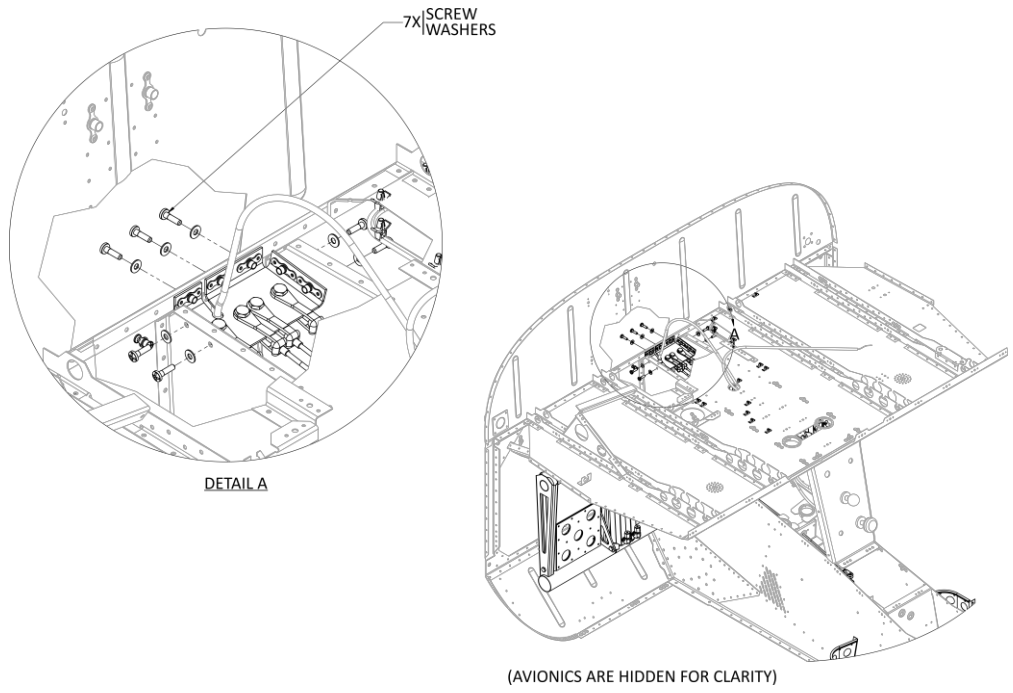


Figure 5.7.6.15 Rudder cable anchor removal.

(g) From the pilot and passenger side, unfasten the rudder pedal brackets underneath the dashboard that holds the rudder adjustment tubes.

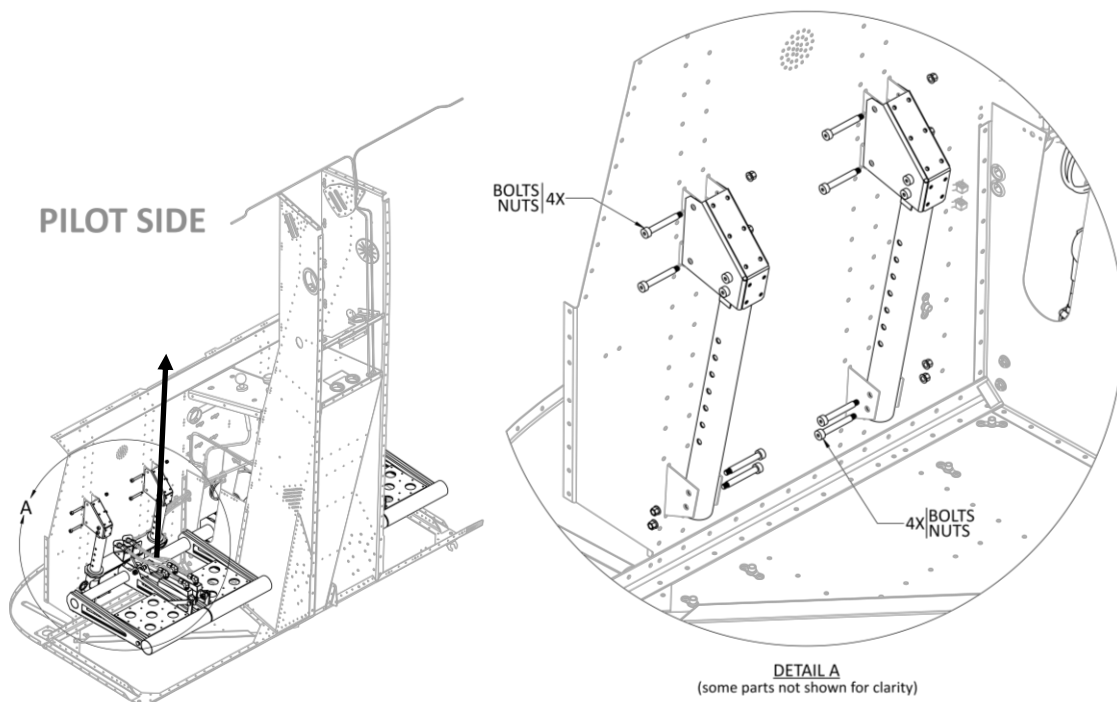


Figure 5.7.6.16 Rudder pedal bracket removals with rudder attachment bolts in Detail A.

- (h) Disconnect brakes as given in part 6 section 5.7.8.
- (i) Remove rudder pedal assembly by sliding pedal assembly aftward as shown above.

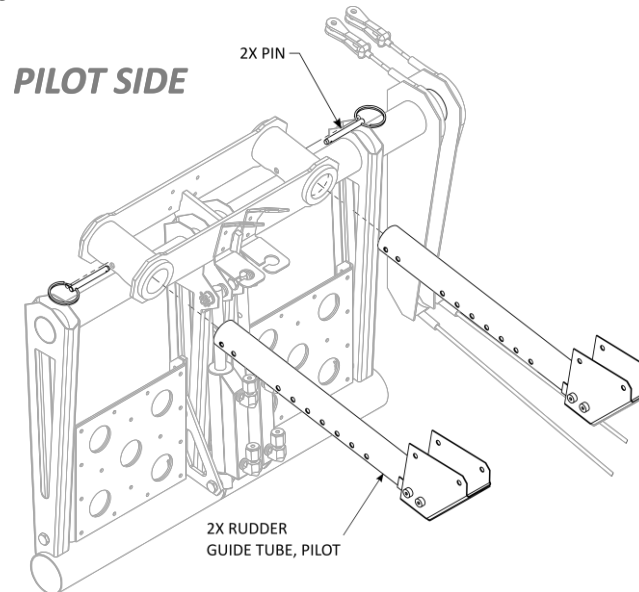


Figure 5.7.6.17 Rudder adjustment tube removal.

- (j) Remove pins from the rudder adjustment tube to the rudder pedal assembly.

## (2) INSTALLATION

- (a) Installation is the reverse of its removal. Please see part 6 section 5.7.8 for brake installations. See section 5.2 (part 8.5 for the rudder attachment bolts) for specific torque specifications.

## 8. REPAIRS AND ALTERATIONS

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141<sup>ST</sup> PL NE**  
**Woodinville, WA 98072**  
**USA**  
**Tel: +1 425 527 9940**  
**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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**5.7.7 LANDING GEAR**

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<b>3.</b>	<b>MAIN LANDING GEAR</b>	<b>5.7.7-4</b>
<b>4.</b>	<b>MAIN LANDING GEAR AXLE SUBASSEMBLY</b>	<b>5.7.7-8</b>
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## 1. GENERAL

The tricycle type landing gear is fixed (i.e. not retractable). The main landing gear legs are leaf springs made from composite sheet and are bolted directly to the fuselage structure. Both main wheels are fitted with hydraulically operated disc brakes, actuated by pressing toe brakes at each crew position. The nose landing gear leg is made from welded high strength steel tubing and sheet. The nose wheel is castoring (i.e. non-steerable).

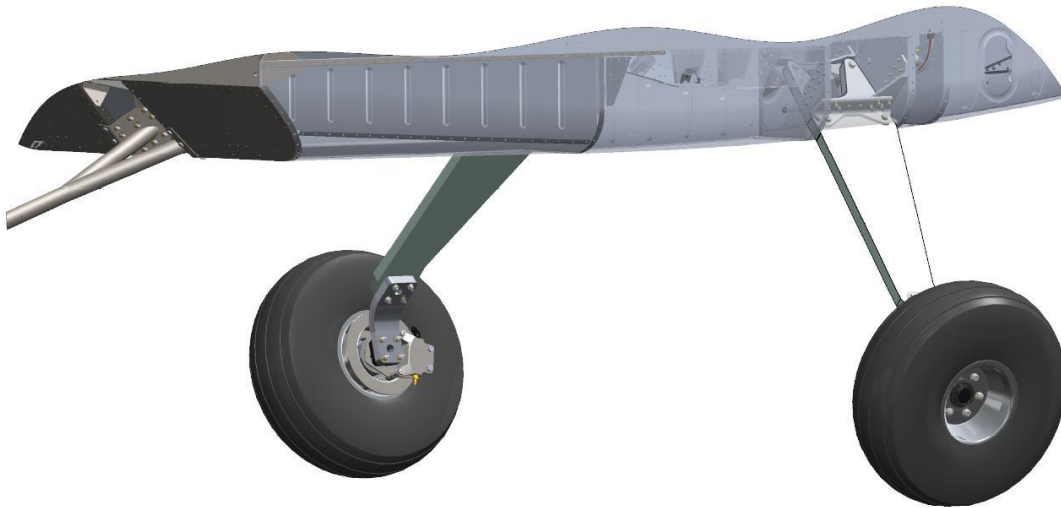


Figure 5.7.7.1 The main landing gears with fuselage skin hidden for clarity.



Figure 5.7.7.2 The nose gear.

**2. TROUBLESHOOTING**

<b>PROBLEM</b>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>
Landing Gear Sags	Crack in landing gear	Replace landing gear.
Vibrations	Loose bolts	Ensure all bolt torques are that in Section 5.2.
Nose wheel has difficulty turning.	Breakout force too large (See for breakout force in installation in part 6 of this section.)	Ensure proper washer stack/orientation and properly lubricated nose wheel swivel. Replace bushings as needed. Tighten nose swivel to proper breakout force. See part 6 of this section.
	Uneven rotation	Ensure nose wheel fork bushing and nose swivel surfaces are smooth and free of corrosion. Replace bushings as needed. See part 6 of this section.
Nose wheel turns easily	Breakout force too small (See for breakout force in installation in part 6 of this section.)	Ensure proper washer stack/orientation. Ensure bushing is in working order. Tighten nose pivot fork to proper breakout force. See part 6 of this section.

### 3. MAIN LANDING GEAR

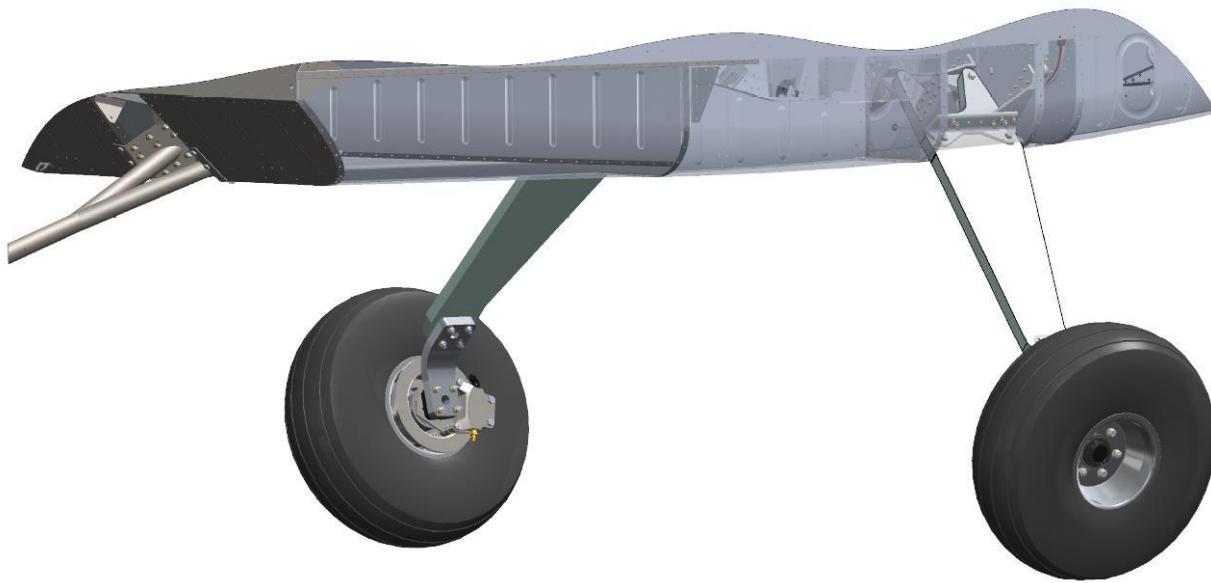


Figure 5.7.7.3 Main landing gear arrangement.

Required Tools:

No special tools are required for this operation.

Parts Required:

No parts are required at this time.

Level of Maintenance:

Heavy Maintenance.

Certification Required:

Please see Table 5.4.3 in Section 5.4.

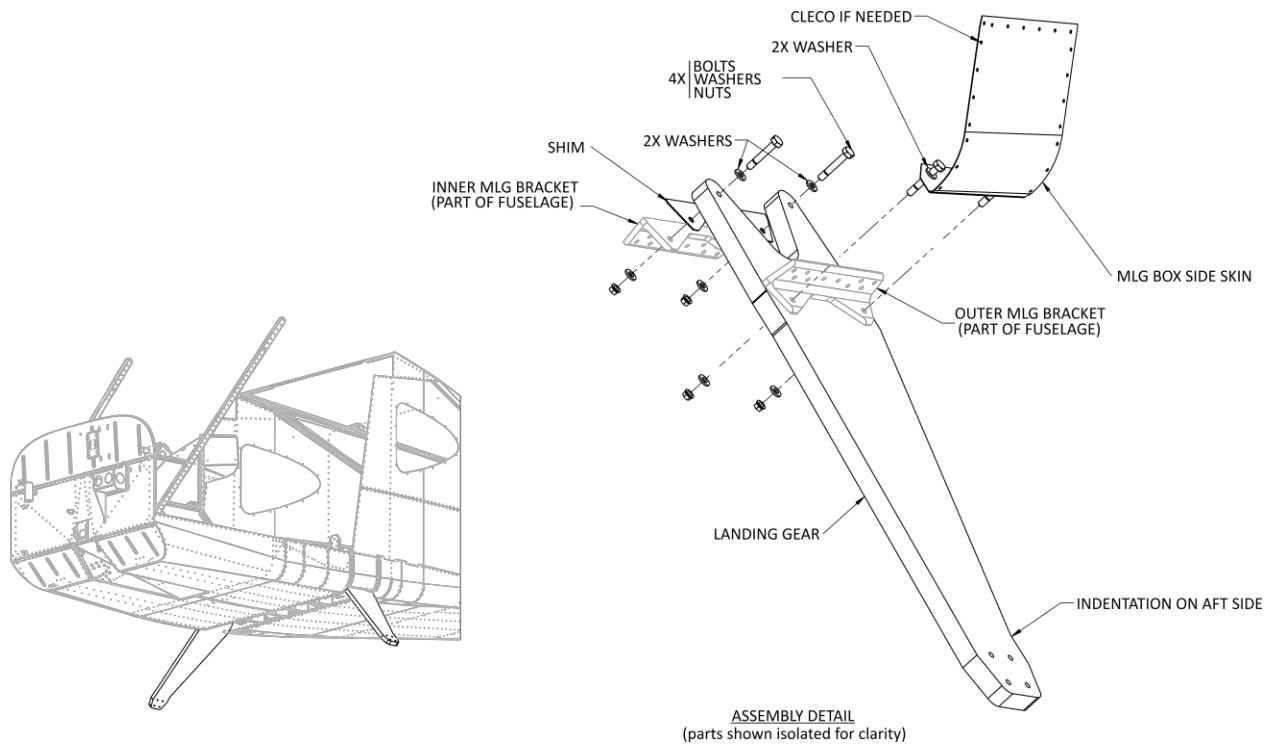


Figure 5.7.7.4 Landing gear removal overview.

(1) REMOVAL

- (a) Raise the aircraft by placing one stand aft of the nose gear bracket and one under the main bulk head aft of the baggage compartment window (see Section 5.7.1). It is recommended to carry this work out in a sheltered hangar.

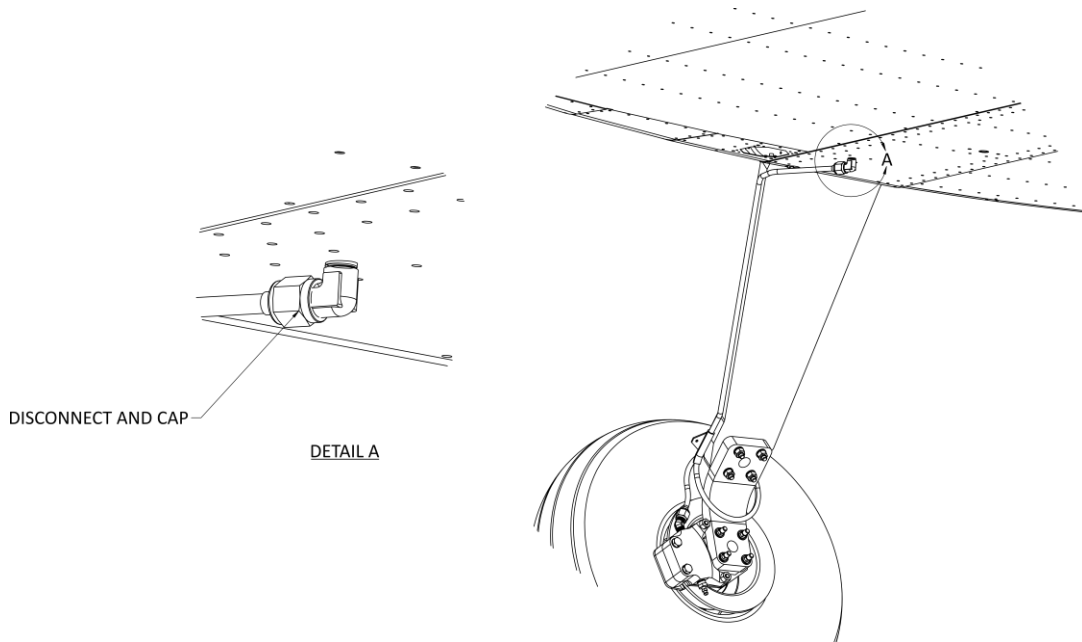


Figure 5.7.7.5 Brake line disconnect.

(b) Disconnect the brake line from the fuselage.

(c) Drill out hole into skin (shown below) and remove both nuts as shown. Alternatively, the bottom panel can be partially removed by drilling out the rivets on the desired side and partially pulled down.

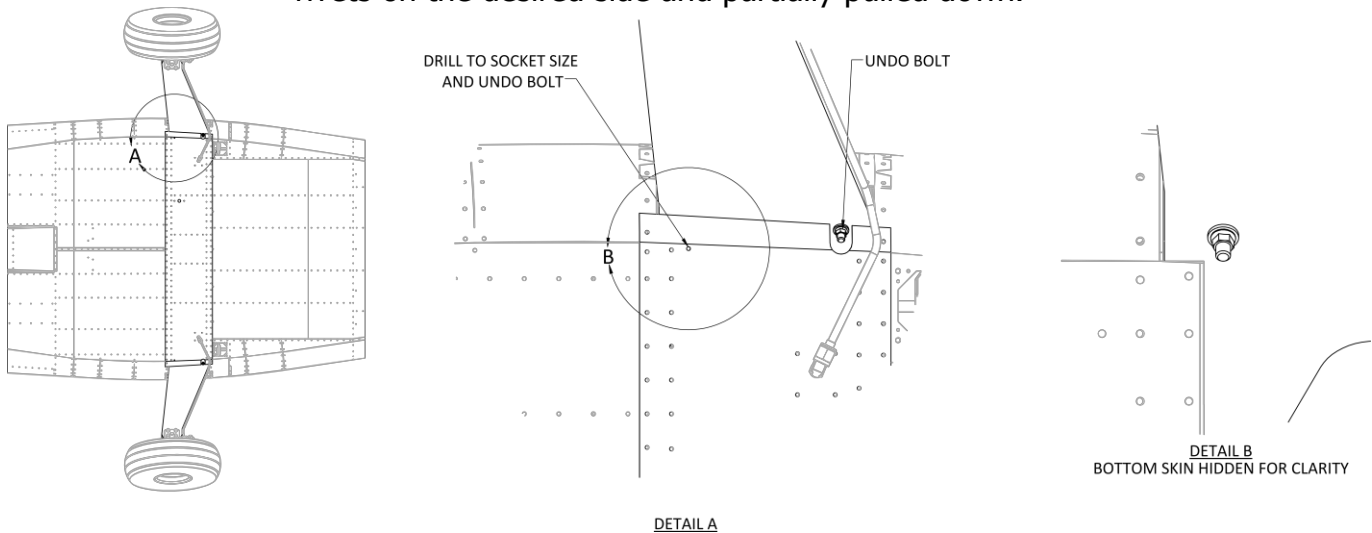


Figure 5.7.7.6 Lower landing gear nut removal.

(d) Remove upper landing gear bolts (2X), as shown below.

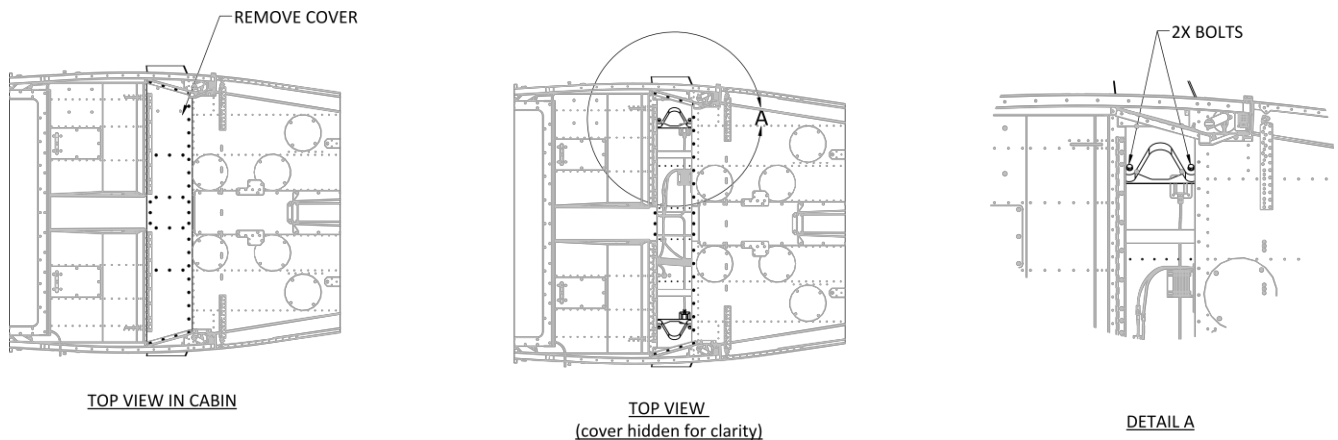


Figure 5.7.7.7 Upper landing gear bolt removal.

(e) Remove upper landing gear skin (shown below) and uninstall lower landing gear bolts (4X). Remove landing gear and shims if needed.

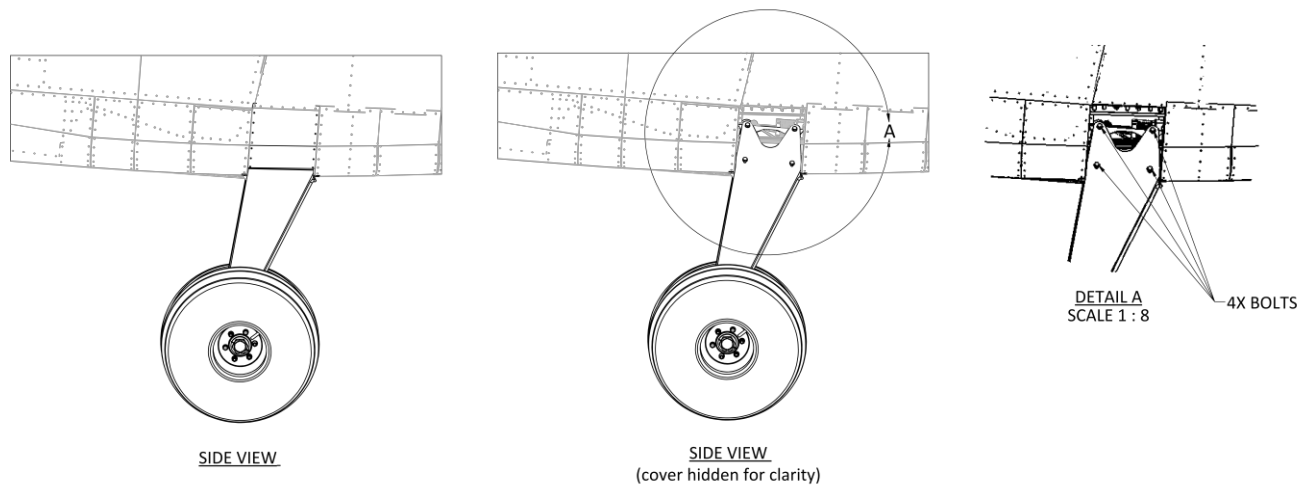


Figure 5.7.7.8 Lower landing gear bolt removal.

#### NOTE

Each landing gear has its own shim/shim-stack. Ensure that each shim/shim-stack documented/and or kept with each landing gear for instillation.

#### (2) INSPECTION

(a) Inspect the landing gear and the fuselage attachment brackets for cracks, damage, and oversized holes.

(b) Inspect shim stacks for fit and corrosion.

(c) Replace or repair affected parts.

(d) Replace any hardware that is excessively corroded or worn.

### (3) INSTALLATION

(a) Installation of the main landing gear is the reverse of its removal. Please see Section 5.2 for the correct torque values and torque seal bolts.

(b) Verify that all the hardware is installed properly, reconnect the brake lines and tighten the fittings, and lower the aircraft to the ground.

(c) Service the brakes, if needed, to obtain the proper pedal travel (see Section 5.7.8).

## **4. MAIN LANDING GEAR AXLE SUBASSEMBLY**

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.



(1) REMOVAL

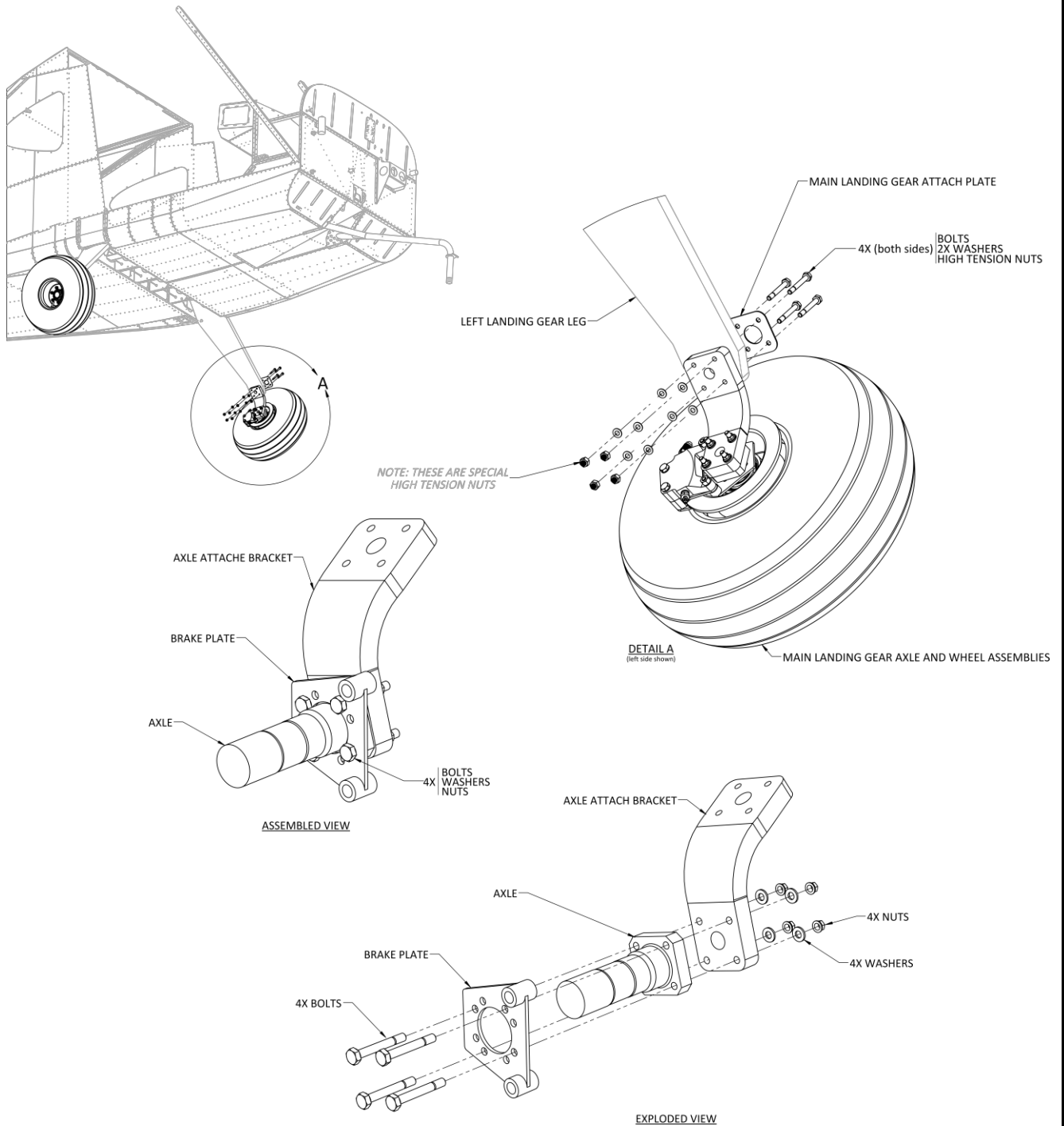


Figure 5.7.7.9 Main landing gear axle assembly removal.

- (a) Unfasten main landing gear plate (4X bolts, 6X washers, 4X nuts), and remove main landing gear axle and wheel assemblies.
- (b) Remove main landing gear wheel assembly as outlined in section 5.7.8.
- (c) Unfasten (4X bolts, 4X washers, 4X nuts), then remove the axle and brake plate.

## (2) INSPECTION

- (a) Axle (See section 5.7.8 for complete axle inspection)
  - Visually inspect the axle to make sure there are no cracks or grooves.
- (b) Inspect the landing gear and fuselage attachment points for cracks, damage, and oversized holes.
- (c) Replace unserviceable parts as required.

## (3) CLEANING

- (a) Clean with degreaser and lubricate if needed with grease from Section 5.4.

## (4) INSTALLATION

- (a) Installation of the nose landing gear is the reverse of removal. Please see Section 5.2 for the correct torque values and torque seal bolts.

## **5. NOSE LANDING GEAR**

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.



Figure 5.7.7.10 Nose landing gear arrangement.

(1) REMOVAL

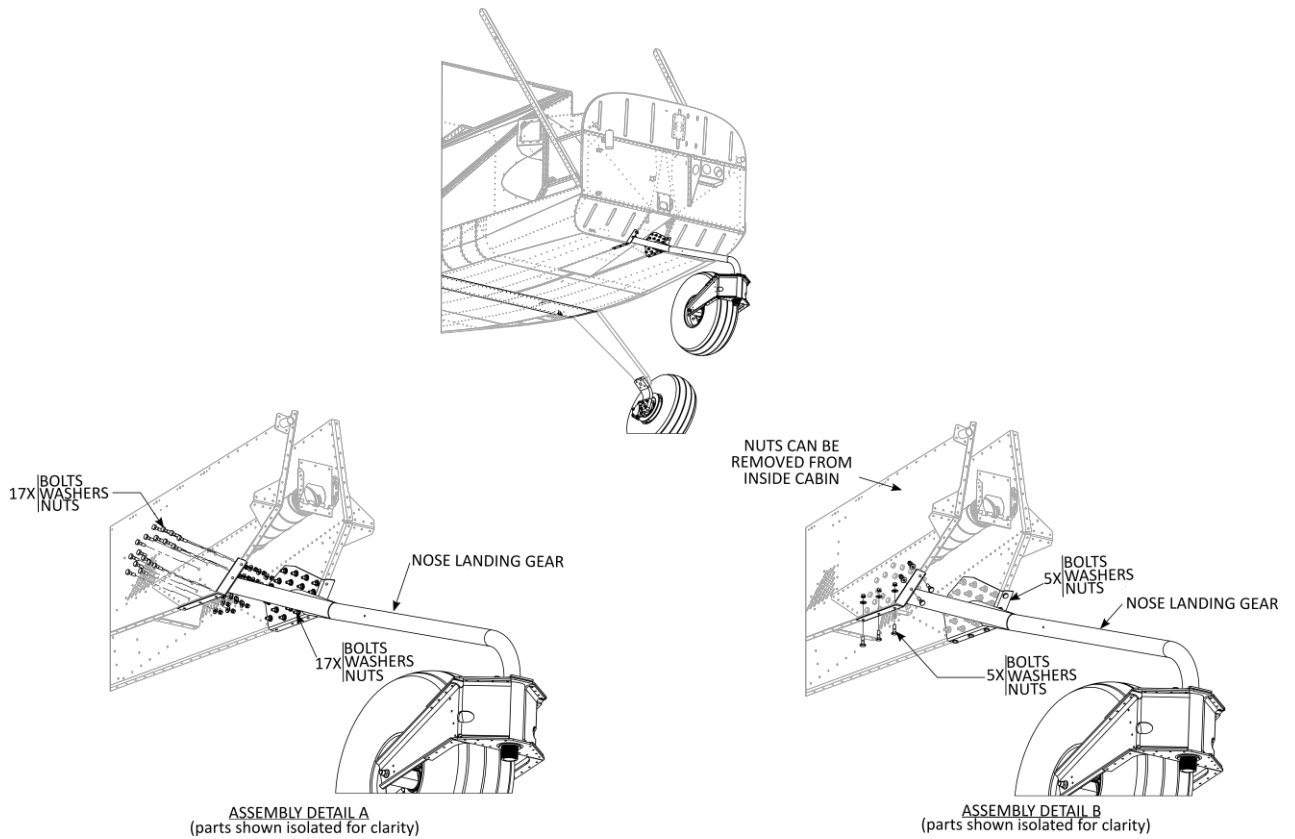


Figure 5.7.7.11 Nose landing gear removal.

(a) Remove inner 34 bolts from the main landing gear bracket into the fuselage. The nuts are located inside the nose strut well and the bolts inside the cabin near the rudder pedal.

(b) Remove the outer 5 bolts on the nose landing gear bracket and remove nose landing gear.

## (2) INSPECTION

(a) Inspect the landing gear and fuselage attachment points for cracks, damage, and oversized holes.

(b) Replace or repair affected parts.

## (3) INSTALLATION

(a) Installation of the nose landing gear is the reverse of removal.

(b) Ensure that each nut is torqued as outlined in the Specific Torque Requirement part of section 5.2; apply torque seal.

## 6. NOSE FORK

### (1) REMOVAL

(a) With aircraft jacked as outlined in Section 5.7.1, remove cotter pin from front nose gear.

(b) Remove nut and washers (note Belleville washer orientation for installation). Slide front wheel assembly from nose wheel fork.

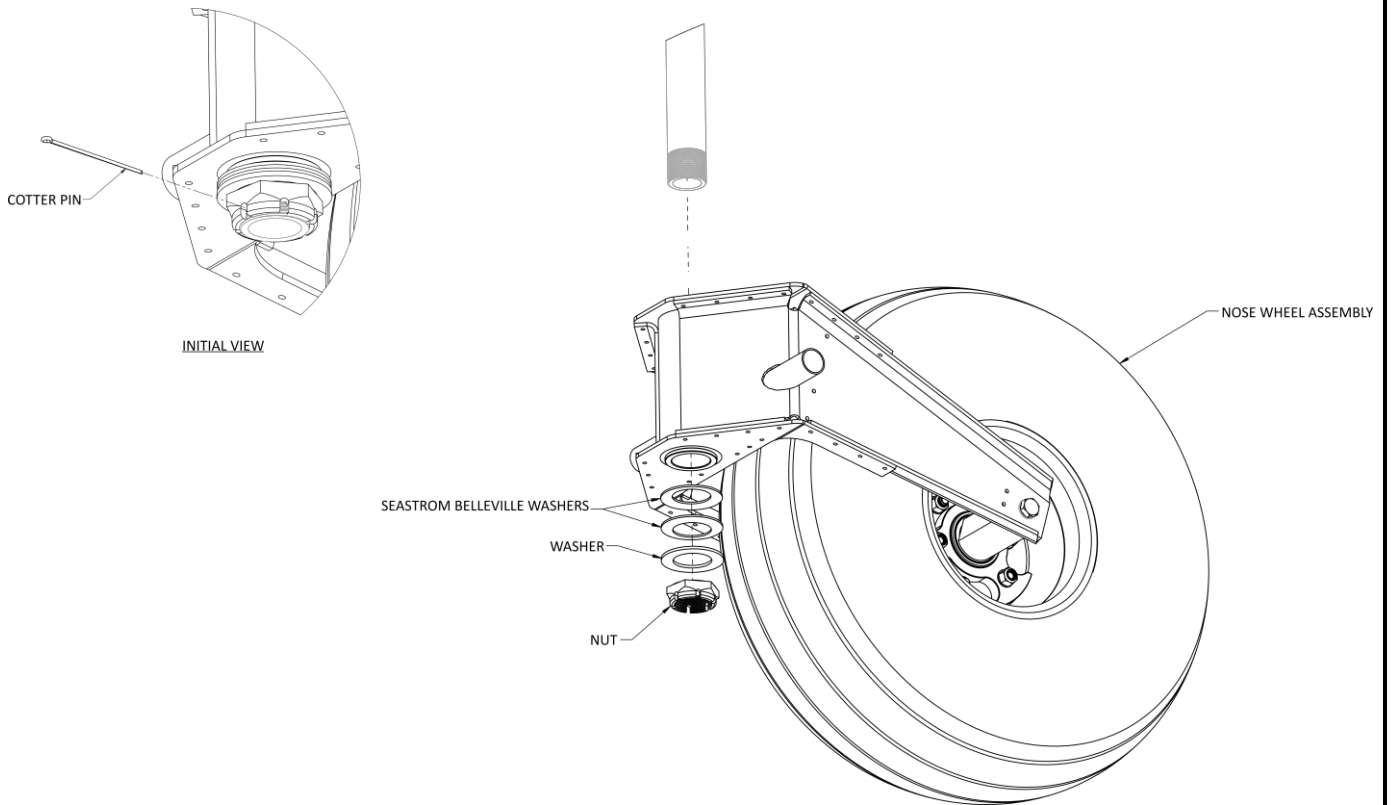


Figure 5.7.7.12 Nose wheel assembly removal.

## (2) INSPECTION

- (a) Check for cracks near welds and on any joints/surfaces.
- (b) Check for excess wear and or elongation in nose pivot hole and wheel axle hole.
- (c) Check nose pivot spindle for excess wear and/or damage.

## (3) INSTALLATION

- (a) Grease nose leg pivot spindle and nose pivot bushings as per Section 5.4.
- (b) Insert front wheel assembly and nose wheel fork onto nose landing gear spindle with Belleville washers as shown below. Tighten nose fork pivot nut snug.

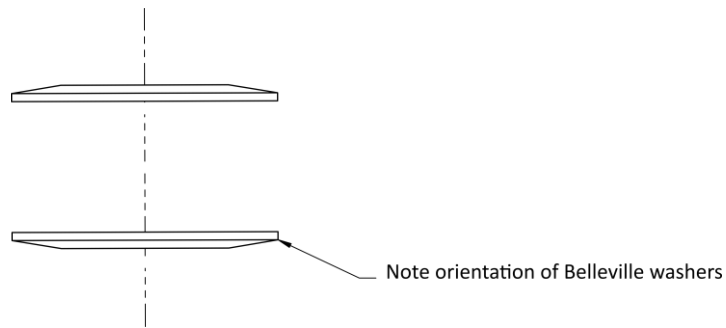


Figure 5.7.7.13 Belleville washer assembly orientation.

- (c) Connect scale to axle location and pull sideways to pivot nose fork.
- (d) Tighten nose fork pivot nut until it takes 15-20lb (26lbs for new assembly before break-in) to break free from the axle location.
- (e) Installation is complete when nose wheel is properly assembled in working order, with a breakout force as specified above, and the cotter pin installed in the nose fork pivot nut.

## **7. REPAIRS AND ALTERATIONS**

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141<sup>ST</sup> PL NE**  
**Woodinville, WA 98072**  
**USA**  
**Tel: +1 425 527 9940**  
**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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**5.7.8 WHEEL AND BRAKE ASSEMBLIES**

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<b>6.</b>	<b>MASTER CYLINDER REMOVAL AND INSPECTION</b>	<b>5.7.8-14</b>
<b>7.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.8-18</b>

## 1. GENERAL

The main wheels and nose wheels are supplied by Matco Manufacturing. The type wheels are of aluminum construction and come with tubes. The approved tire size is 6.00 x 6.

Each main wheel is provided with a set of single disc brakes. The left and right systems are independent of each other. There is a total of four master cylinders – pilot side left brake, pilot side right brake, passenger side left brake, and passenger side right brake. The master cylinders push hydraulic fluid to the calipers where pistons are displaced and force the brake linings against a disc. The brake discs, calipers, and master cylinders are all supplied by Matco Manufacturing.

The nose wheel is free to caster through 60 degrees each direction from neutral. A pair of “Belleville” spring washers provide friction to nosewheel caster which, in conjunction with proper tire inflation, serve to prevent unwanted and possibly damaging “shimmy” of the nosewheel.

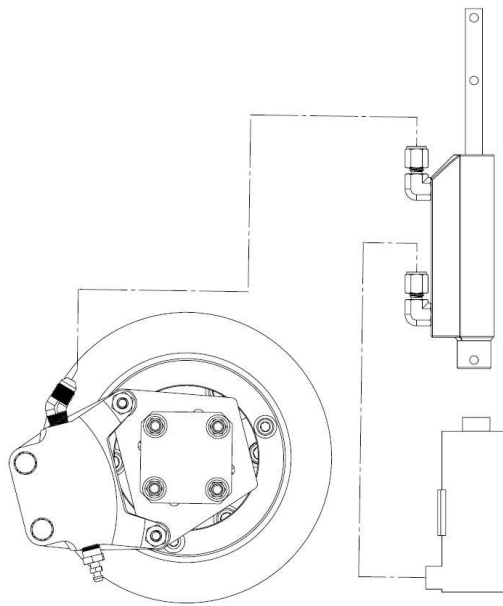


Figure 5.7.8.1 Brake system overview.

**2. TROUBLESHOOTING**

<b>PROBLEM</b>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>
Brakes drag	Pressure build up in system	Bleed off excess pressure
	Foreign matter wedged in brakes	Locate and remove
	Pistons cocked in cylinder	Inspect lining and/or disc for wear and replace as necessary
	Piston does not retract	Remove Caliper and Inspect Piston O-Ring and Cylinder
	Back pressure due to malfunction of master cylinder or parking valve	Bleed hydraulic system and/or repair/replace master cylinder or parking valve
	Water or ice in hydraulic system	Flush and bleed hydraulic system (thaw ice first)
	Bent or cracked torque plate	Replace
	Corroded anchor bolts and/or torque plate bushings	Clean and lubricate or replace
	Warped brake disc; inspect by laying a straight edge across disc face	Replace and use caution during operation to prevent excessive energy input into brake
	Out of position/stuck lining	Repair or replace
	Restriction in hydraulic line	Isolate and remove restriction
Brakes inoperative	Lining not firmly seated flush against pressure/black plate	Deburr rivet hole on surface adjacent to lining
	Brake fluid level low	Replenish brakes fluid
	Air in brake system	Bleed brake system
	Worn brake linings	Replace linings
	Defective caliper	Replace caliper
	Defective master cylinder	Replace master cylinder
Leaky brake line connections	Tighten or replace connectors	

Unable to obtain sufficient hydraulic brake pressure, excessive toe pedal travel, or spongy pedal	Air in hydraulic system	Check for source, then bleed hydraulic system
	Leak in system; brake, master cylinder, fittings, or lines	Locate leak and repair
	Defective master cylinder	Replace or repair
	Back plate bolts loose or not properly torqued, causing excessive brake deflection	Torque bolts to proper value
	Excessive rusting, scoring, or pitting of brake disc	Clean and replace bolts
	Excessive brake shoe deflection caused by bent bolts or over torquing bolts	Check and replace bolts
	Incorrect lining and/or disc	Replace with correct parts
	Defective caliper	Rebuild caliper
Rapid disc and lining wear	Excessive rusting, scoring, or pitting of brake disc	Clean or replace disc
	Excessive brake shoe deflection caused by bent bolts or over torquing bolts	Check and replace bolts
Brakes will not hold	Lining worn below minimum wear limits	Replace linings
	Discs worn below minimum wear limits	Replace discs
	Contaminated lining	Replace lining
	New lining installed with old disc, lining not seated in wear track creating partial contact with disc	Replace excessively worn disc
	Brake lining plate installed backwards	Remove, inspect, and install

### 3. MAIN WHEELS

#### Required Tools:

No special tools are required for this operation.

**Parts Required:**

No parts are required at this time.

**Level of Maintenance:**

Heavy Maintenance.

**Certification Required:**

Please see Table 5.4.3 in Section 5.4.

**NOTE**

The general removal, inspection, and assembly procedure are outlined below. For more information on the removal, inspection, and assembly of the brake and wheel assemblies, please see the manufacturer's manual.

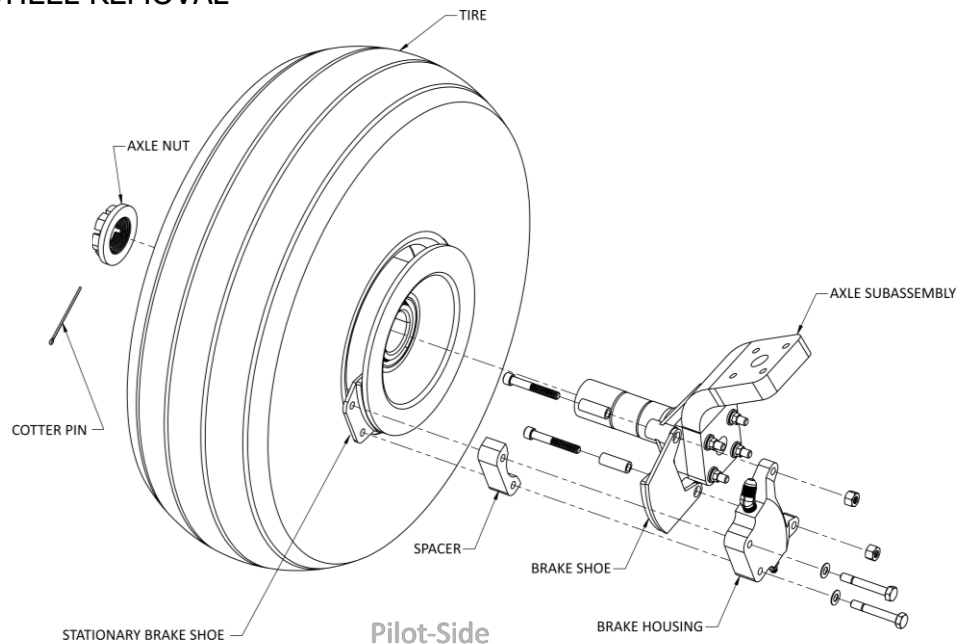
**(1) MAIN WHEEL REMOVAL**

Figure 5.7.8.2 Main wheel assembly removal.

- (a) Remove brake calipers as instructed in Subsection 5 of this section.
- (b) Remove cotter pin and unfasten the axle nut.
- (c) Slide wheels off axle to remove the wheel assembly.

**(2) MAIN WHEEL DISASSEMBLY**

**CAUTION**

**Care must be taken to avoid damaging wheel halves when breaking tire beads loose.**

**WARNING**

**DO NOT ATTEMPT TO REMOVE VALVE CORE UNTIL TIRE HAS BEEN COMPLETELY DEFLATED. THE VALVE CORE WILL BE EJECTED AT A HIGH VELOCITY IF IT IS UNSCREWED BEFORE THE AIR PRESSURE HAS BEEN RELEASED.**

**WARNING**

**INJURY CAN RESULT WHEN ATTEMPTING TO SEPARATE WHEEL HALVES WITH THE TUBE INFLATED.**

- (a) Deflate the tire.
- (b) Break the tire bead loose from the wheel.
- (c) Remove the brake disk by unfastening the three bolts attaching it to the hub.
- (d) Remove the three bolts fastening the hub to the wheel assembly.
- (e) Remove the three bolts fastening the wheel halves together and pull them apart. Note: be careful not to damage the inner tube valve stem.
- (f) Bearing race and inner bearing assembly can be removed from the hub.

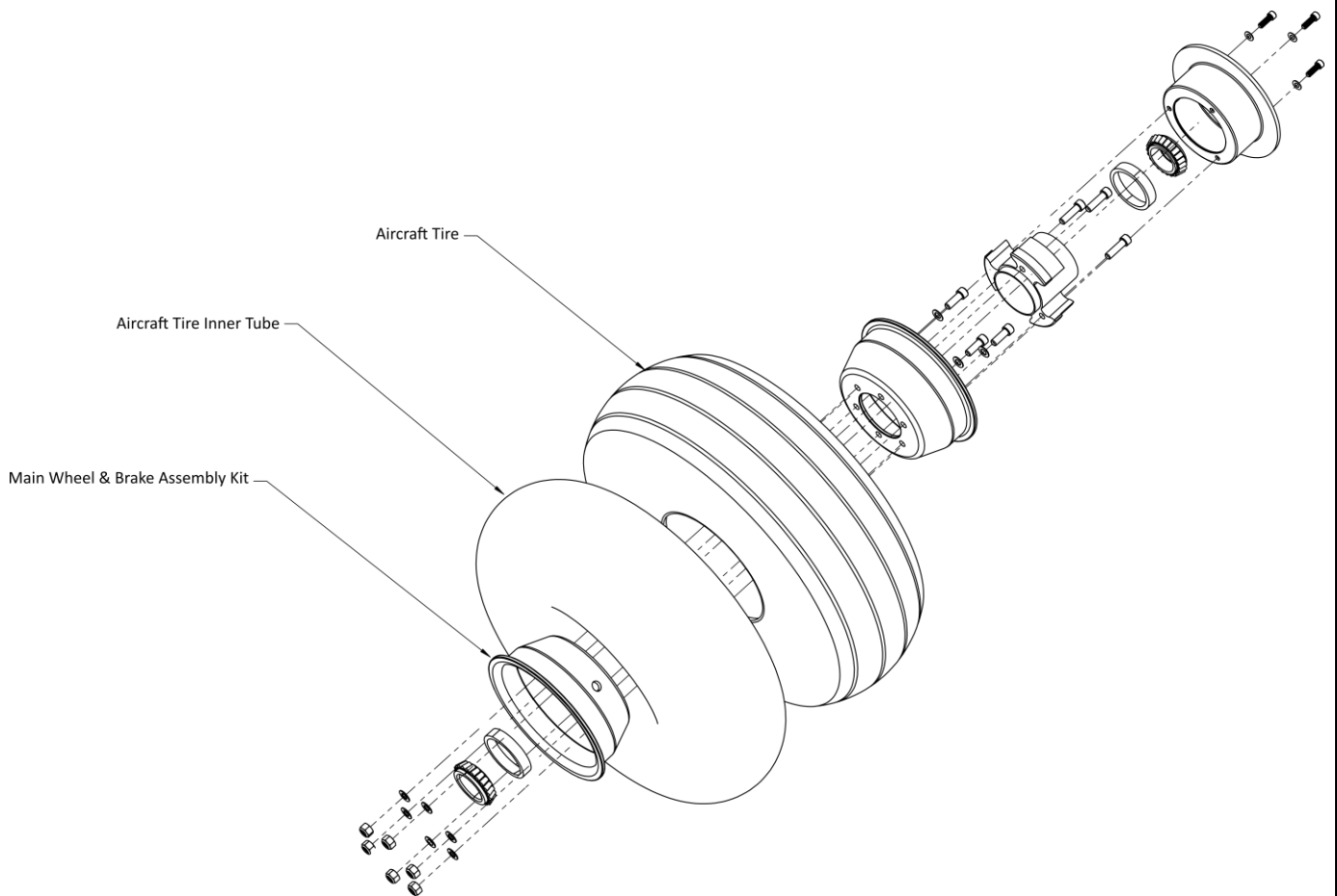


Figure 5.7.8.3 Main landing wheel disassembly.

### (3) INSPECTION

#### (a) Axle

- Visually inspect the axle to make sure there are no cracks or grooves.

#### (b) Tire and Tube

- Visually inspect the tires inside and outside for cuts, uneven or excessive wear, and penetration by foreign objects.
- Visually inspect the inner tube for wear, cuts, or cracks. Pay close attention to the valve stem base.
- The tire should be removed when the tread is worn to the base of a groove. Tires with wear through the top fabric layer can only remain in service long enough to return to a maintenance base to be replaced.

(c) Wheel Halves

- Inspect the wheel halves for cracks or corrosion.

(d) Discs

- Inspect the brake disc attachment points for cracking or distortion.
- Minimum disc thickness is 0.167 in.
- Inspect for rust. Light rust may be acceptable, but heavier rust may need removal. See Matco Manual for definitions and more information.

(e) Bearings

- Clean all metal parts in a cleaning solution. Dry all parts with compressed air.
- Inspect the bearing and races for wear or damage. Replace if necessary.

(f) Replace unserviceable parts as required.

(4) MAIN WHEEL ASSEMBLY



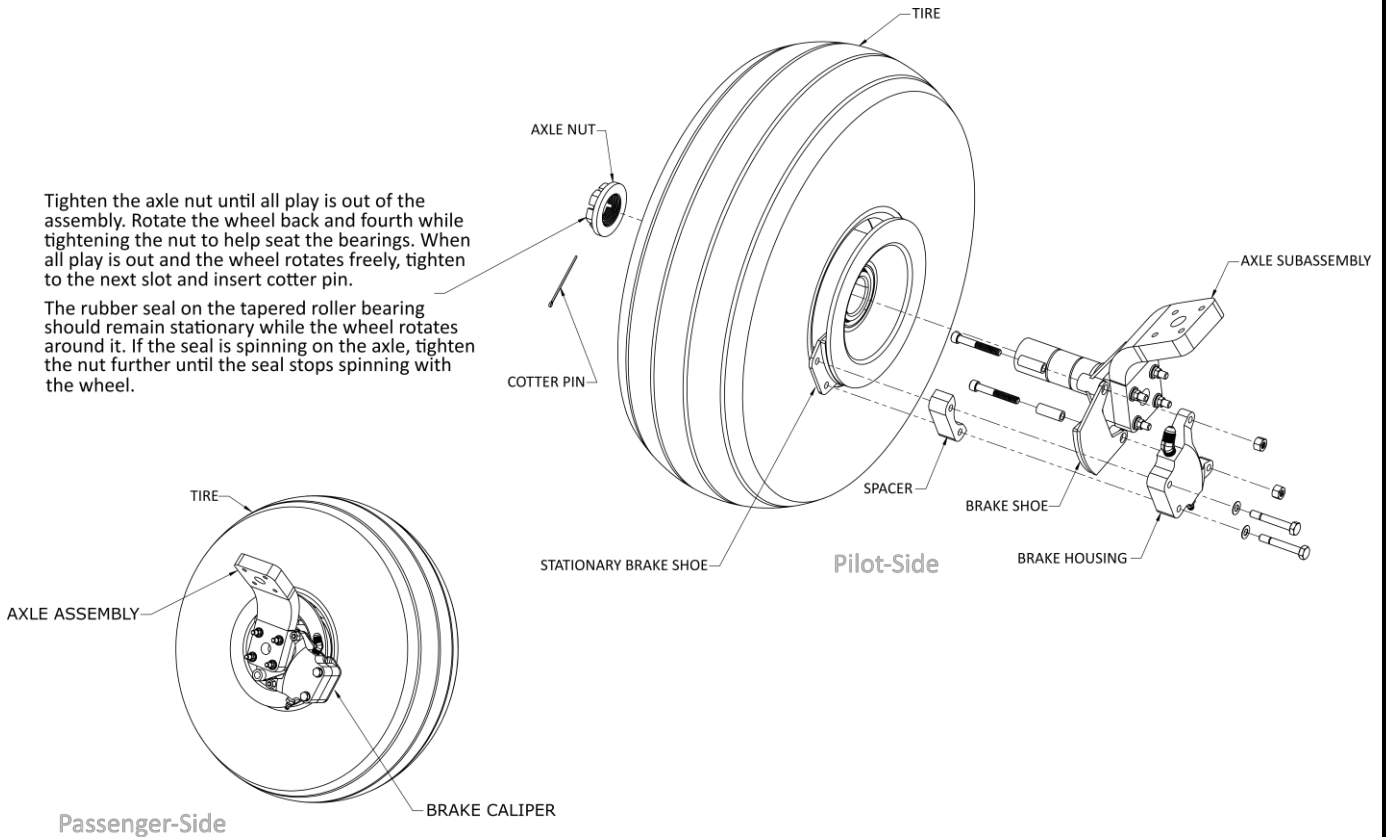


Figure 5.7.8.4 Main wheel assembly.

- (a) Apply a thin layer of talcum powder on the clean inside surface of the tire if needed.
- (b) Slightly inflate the tube inside the tire to negate pinching during assembly.
- (c) Assemble the main wheel assembly in the reverse order of its removal while repacking the bearings. Tighten axle nut while moving wheel back and forth to seat bearing. Tighten until rubber bearing seal is stationary, but wheel can rotate freely. Add cotter pin in the next slot after tightened.
- (d) Refer to Section 5.2 for proper tire inflation and grease requirements.
- (e) Installation is complete when the wheel is properly assembled in working order and axle nut is tightened as specified above.

#### 4. NOSE WHEEL

##### Required Tools:

No special tools are required for this operation.

**Parts Required:**

No parts are required at this time.

**Level of Maintenance:**

Heavy Maintenance.

**Certification Required:**

Please see Table 5.4.3 in Section 5.4.

**(1) NOSE WHEEL REMOVAL**

(a) Remove nose wheel axle bolt, washers, and nut.

(b) Slide wheel out of nose wheel fork. Remove nose wheel axle and nose wheel axle spacer from front wheel hub.

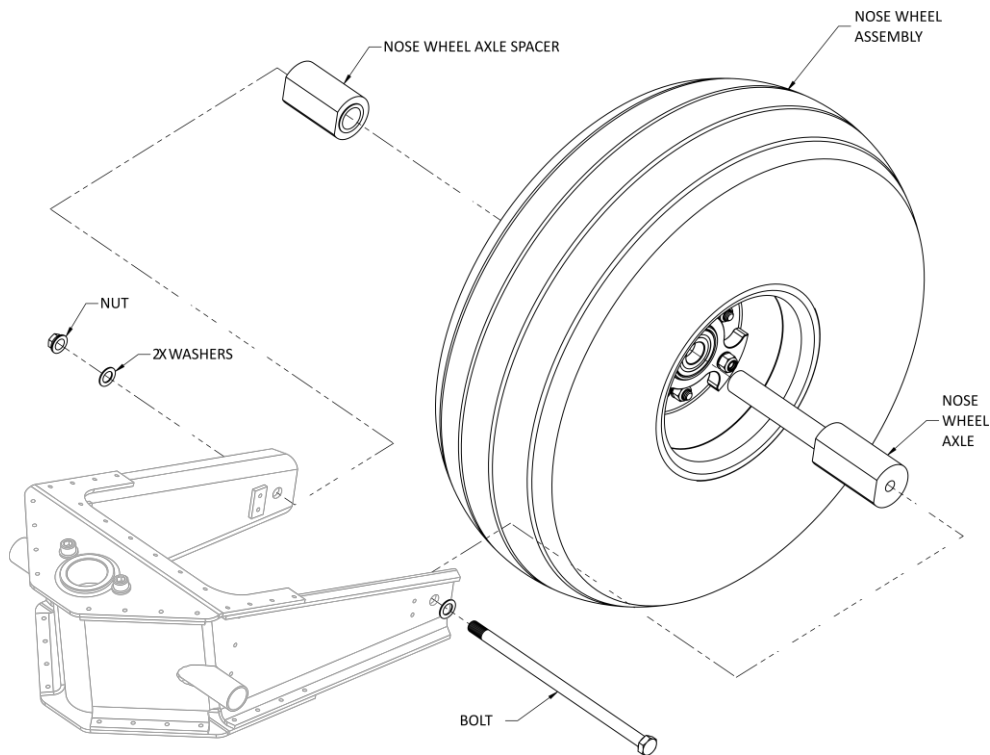


Figure 5.7.8.5 Nose wheel axle removal.

**(2) NOSE WHEEL DISASSEMBLY**

**NOTE**

The general removal, inspection, and assembly procedure are outlined below. For more information on the removal, inspection, and assembly of the brake and wheel assemblies, please see the manufacturer's manual.

- (a) Deflate the tire.
- (b) Break the tire bead loose from the wheel.
- (c) Remove the 6 bolts fastening the hub and wheel halves together and pull them apart. Note: be careful not to damage the inner tube valve stem.

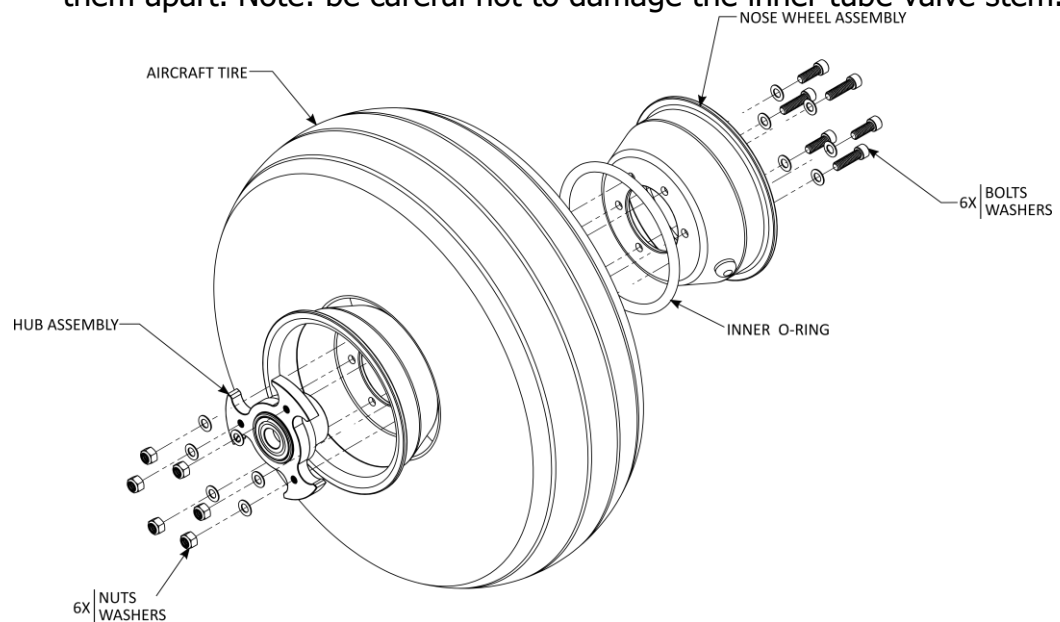


Figure 5.7.8.6 Nose wheel disassembly.

**(3) INSPECTION****(a) Axle**

- Visually inspect the axle to make sure there are no cracks or grooves.

**(b) Replace unserviceable parts as required.****(4) NOSE WHEEL ASSEMBLY****(a) Apply a thin layer of talcum powder on the clean inside surface of the tire if needed.****(b) Slightly inflate the tube inside the tire to negate pinching during assembly.**

(c) Assemble the main wheel assembly in the reverse order of its removal while repacking the bearings.

(d) Refer to Section 5.2 for proper tire inflation and grease requirements.

(5) INSTALLATION

(a) Insert nose wheel axle and nose wheel spacer into wheel assembly.

(b) Place nose wheel into nose wheel fork and insert axle bolt through nose wheel axle.

(c) Fasten nose wheel axle bolt with washers (2X) and nut. Torque axle bolt until wheel will only rotate 2.5 turns or less when spun from tire (roughly 190-220 in lbs.). Torque other bolts to the specifications of Section 5.2, and torque seal all bolts. Insert axle bolt and washers then tighten AXLE NUT until slight wheel bearing friction is felt and loosen AXLE NUT 1/4 turn.

## 5. BRAKE CALIPERS

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.



Figure 5.7.8.7 Main wheel brake caliper.

(1) REMOVAL

- (a) Unfasten the two bolts that connects the brake housing to the stationary brake shoe.
- (b) The movable (inboard) brake shoe can be removed by sliding it out of the torque plate bushings.
- (c) If needed, the brake line can be unfastened at the fitting above the brake caliper and the remaining two bolts to finish the removal of the brake from the landing gear.

(2) INSPECTION

- (a) Inspect the brake linings for loose rivets, cracks, and uneven wear.
- (b) The minimum lining thickness is 0.100 inches (not including thickness of the shoe). Selected brake pads may have a wear notch to notify when the pad is at the end of its life.
- (c) Inspect the calipers for leaks and excessive corrosion.
- (d) If leaks are present at the pistons, overhaul the caliper.
- (e) Inspect the brake backing plate for cracks or excessive wear.
- (f) Replace the parts if their condition so dictates.

(3) INSTALLATION

- (a) Assemble the brake caliber assembly in the reverse order of its removal while ensuring that the brakes are bled if the brake lines are broken.
- (b) Ensure that all bolts on the brake caliber assembly are torqued to the specifications outlined in Section 5.2 and that the cotter pin is on the wheel axle nut. Torque seal bolts.

## **6. MASTER CYLINDER REMOVAL AND INSPECTION**

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.



Figure 5.7.8.8 Brake master cylinders.

(1) REMOVAL

- (a) Drain hydraulic fluid from system and disconnect brake lines from 90° brass fittings.

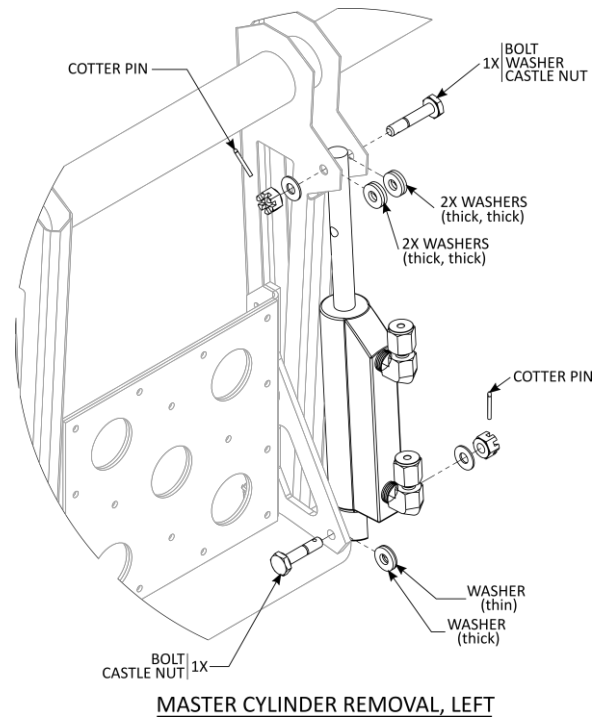


Figure 5.7.8.9 Brake master cylinder removal.

(b) Remove the cotter pins and bolts holding the master cylinders to the pedals.

(2) INSPECTION

(a) Inspect master cylinder for signs of leaks, cracks, or any other damage.

(b) Inspect all fittings for signs of leaks, cracks, or any other damage.

(3) INSTALLATION

(a) With the brake master cylinder positioned below, insert the top and bottom bolts noting the correct washers.



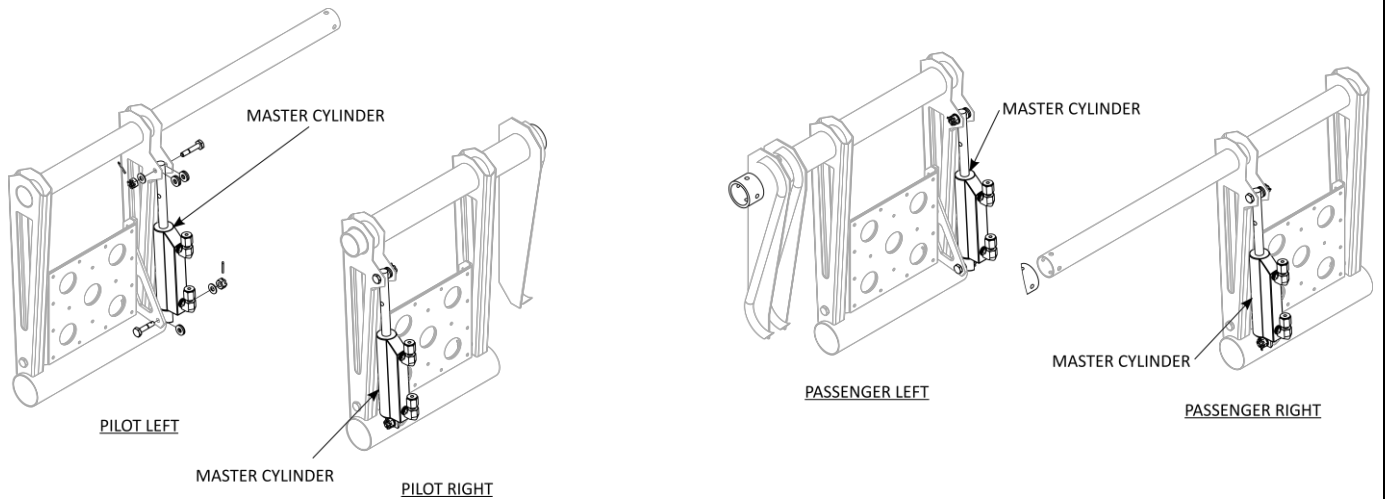


Figure 5.7.8.10 Master cylinder orientation.

- (b) Install castle nuts finger tight and lock the nuts with cotter pins.
- (c) Connect brake lines to 90° fittings.
- (d) After installation of the master cylinder, carefully fill brake system from the brake calipers and ensure no air is in the system. The brake reservoir is located on the front of the firewall (as shown below). See section 1.1 for brake fluid specifications.

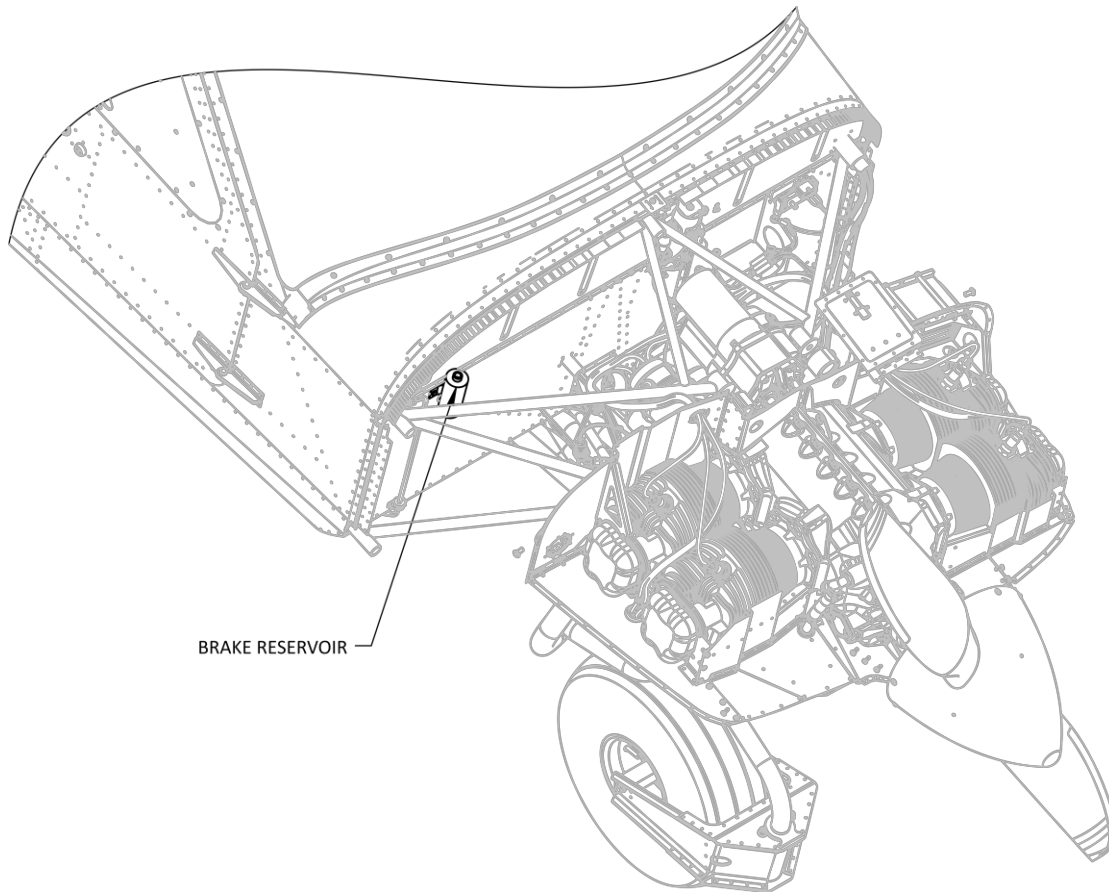


Figure 5.7.8.11 Brake reservoir location.

- (e) Cycle the brake pedal until it is firm. Inspect all fittings for signs of leaks. Top-off the brake reservoir making sure that it is a minimum of  $\frac{3}{4}$  full.

## 7. REPAIRS AND ALTERATIONS

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141<sup>ST</sup> PL NE**  
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**USA**  
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**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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## 5.7.9 ENGINE COWL

### TABLE OF CONTENTS

1.	GENERAL	5.7.9-2
2.	ENGINE COWL	5.7.9-2
3.	REPAIRS AND ALTERATIONS	5.7.9-6

## 1. GENERAL

The engine cowl is made in two pieces and can be removed without the propeller having to come off. The upper and lower portions are made of composites using fire-resistant resins.

## 2. ENGINE COWL

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Line Maintenance.

### Certification Required:

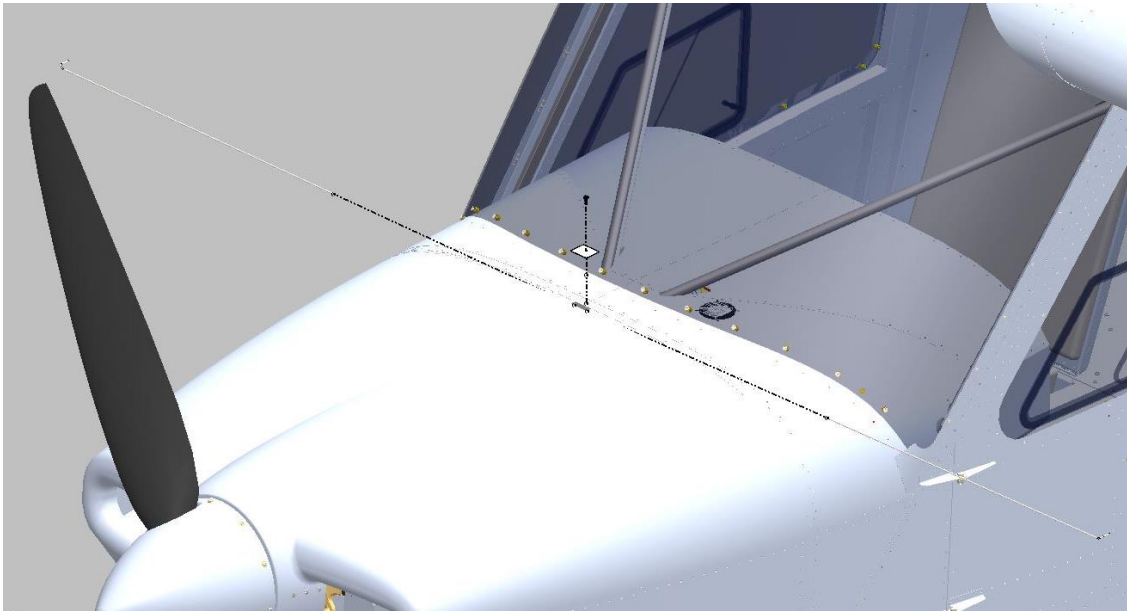
Please see Table 5.4.3 in Section 5.4.

### (1) REMOVAL

#### NOTE

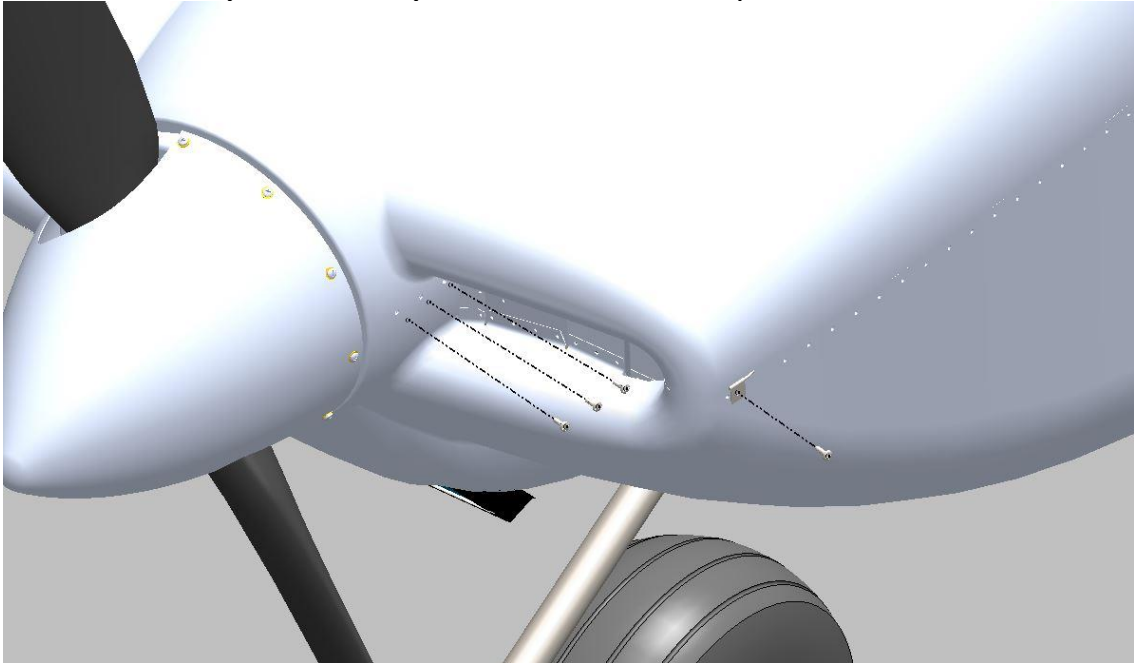
Turn propeller blades horizontal and place towel between cowling and spinner to negate scratching.

- (a) Unfasten and remove upper cowl hinge pin retainer. Disconnect upper cowl hinges by removing both pins.

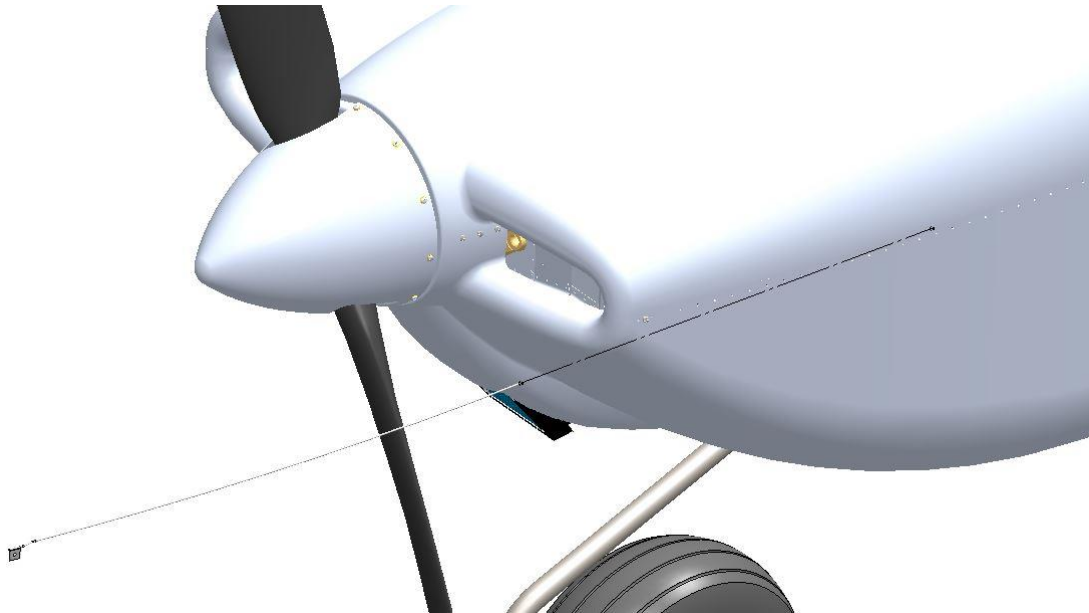


## Figure 5.7.9.1 Removing top cowl pins.

(b) Unfasten and remove the cowl side hinge pin on both sides. Unfasten the top screws (3X each side) from the cowl attach plates on both sides.



## Figure 5.7.9.2 Top cowl side hinge pin and cowl attach plate removal.



## Figure 5.7.9.3 Top cowl side hinge removal.

(c) Carefully remove the upper cowl.

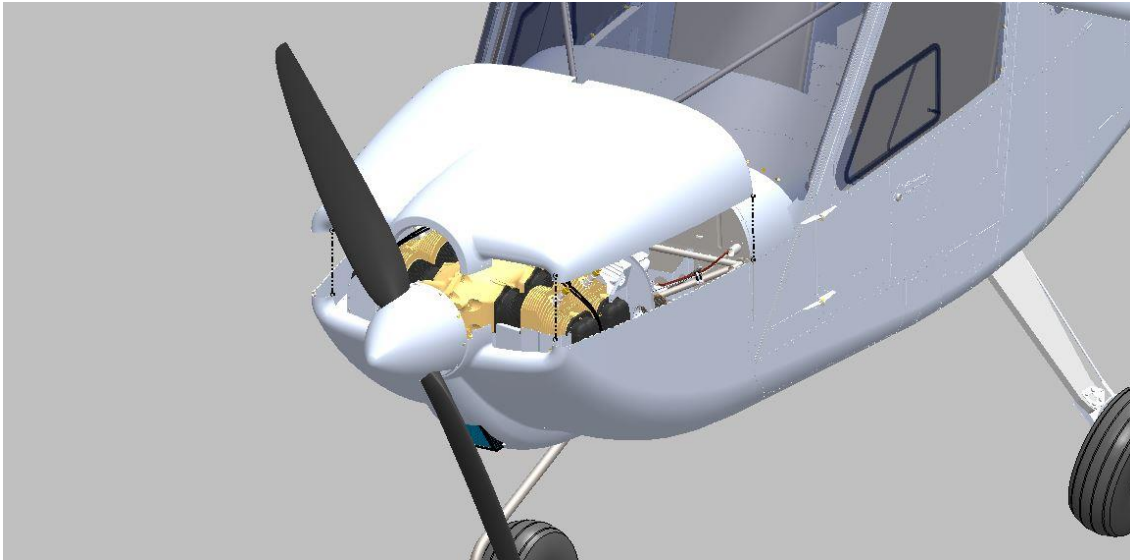


Figure 5.7.9.4 Top cowl removal.

(d) Unfasten the screws (6X) on the bottom aft of the lower cowling.

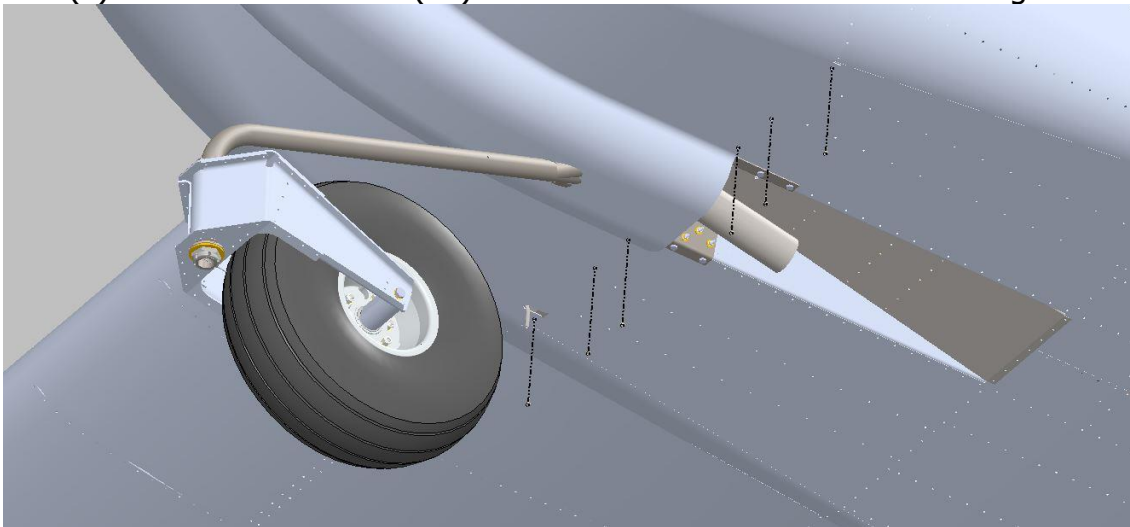


Figure 5.7.9.5 Bottom cowl screw removal.

(e) Remove both hinge pins on the sides of the lower cowling.



Figure 5.7.9.6 Lower cowl hinge pin removal.

(f) Carefully remove the lower cowling.

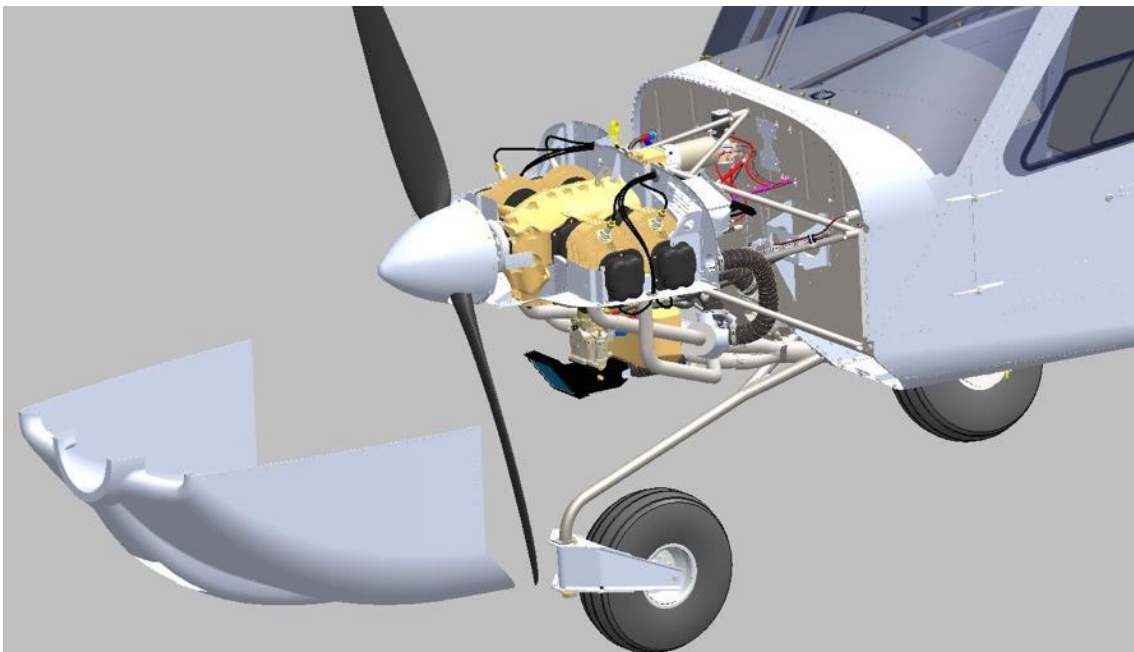


Figure 5.7.9.7 Lower cowl removal.

(2) INSPECTION

(a) Inspect the cowl for loose rivets, wear points and cracking.



(3) INSTALLATION

(a) Installation of the cowl is the reverse of its removal.

**3. REPAIRS AND ALTERATIONS**

No major repair or alterations, as outlined as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
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**5.7.10 ENGINE**

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<b>3.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.11-3</b>

### **1. GENERAL**

The aircraft is powered by a Continental Motors O-200-D engine. This is an air-cooled, direct-drive four-cylinder powerplant that is capable of delivering up to 100 hp at 2750 RPM.

A throttle controls power to the engine. The throttle is located in the center console and is accessible from either seating position. The air-to-fuel mixture is adjusted manually with a control in the center console. Pulling the mixture control all the way back operates a cut-off valve on the carburetor that stops the supply of fuel to the engine. The mixture control should always be used to stop the engine.

### **2. ENGINE SERVICING**

Refer to publications by Continental Motors in conjunction with this section for servicing, maintenance, and overhaul of the engine.

### **3. TROUBLESHOOTING**

This section is prepared to help the owners/operators diagnose the probable causes and determine appropriate corrective actions. For additional information on more specific troubleshooting procedures, refer to Continental Motors' Operator's Manual and their Maintenance and Overhaul Manual.

#### **WARNING**

**DO NOT ATTEMPT TO USE THIS MANUAL AS A GUIDE FOR PERFORMING REPAIR OR OVERHAUL OF THE ENGINE. THE ENGINE OVERHAUL MANUAL MUST BE CONSULTED FOR SUCH OPERATIONS.**

<b>PROBLEM</b>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>	<b>Reference in this manual</b>
Engine does not start	Insufficient fuel	Fill tank	
	Fuel does not reach carburetor	Clean tank vents, blowout supply line, clean filter, replace shut-off valve, check for obstruction in fuel flow transducer	5.7.12
	Carburetor float valve stuck shut	Remove carburetor and repair	5.7.13
	Carburetor screen or jets plugged	Remove and clean	5.7.13
	Insufficient priming (weak explosions)	Repeat starting procedure with more priming	
	Excess priming (puffs of black smoke)	Clear cylinders by turning propeller several revolutions with ignition switch "OFF" and throttle wide open	
	Engine hot (vapor lock in fuel system)	Disconnect fuel line at carburetor and purge system	5.7.12
	Low battery charge	Recharge battery	5.7.20
	Cold oil	Turn propeller by hand several revolutions to break loose congealed oil	
	Spark plugs fouled.	Remove and clean. Check gaps.	5.7.15
	Spark plug cables defective.	Replace defective parts.	5.7.15
	Magneto breaker points burned or fouled.	Remove oil from breaker. Replace defective condenser.	5.7.15
	Magnetos incorrectly timed internally or to engine.	Check and correct timing to engine. Overhaul if internal.	5.7.15

<b>PROBLEM</b>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>	<b>Reference in this manual</b>
Irregular idling	Incorrect idle mixture adjustment.	Correct carburetor adjustment.	
	Carburetor idle air bleed plugged.	Disassemble as required and clean.	
	Spark plugs fouled.	Remove and clean.	5.7.15
	Leak in air induction system.	Tighten loose joints. Replace damaged parts.	
Rough running	Propeller out of balance.	Remove and inspect.	5.7.16
	Engine mount bolts loose.	Tighten.	5.7.11
	Defective spark plug cables.	Test for break-down at high voltage.	
	Cracked magneto distributor block.	Overhaul magneto. Check for very fine cracks in block.	5.7.15
	Worn cam lobe.	Overhaul engine.	
	Defective valve lifter.	Remove and test hydraulic unit. Replace if worn.	
	Scored valve stems.	Replace valves and guides.	
	Warped valves.	Replace. Grind seats.	
	Detonation.	Use specified fuel. Keep cylinder head temperature below specified maximum.	
Poor acceleration	Engine not warm enough.	Continue warm-up.	
	Defective throttle control.	Check for binding, kinks, slipping, worn parts.	5.7.19
	Plugged air filter.	Remove and clean filter.	
	Idling mixture too lean.	Readjust.	
	Idling jet plugged.	Clean carburetor.	
	Water in fuel.	Drain tank sumps (3).	
	Leak in air induction system.	Check all joints and throttle shaft bearings.	
Low power	Defective ignition cable.	Test for high voltage leaks. Replace parts.	

<b>PROBLEM</b>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>	<b>Reference in this manual</b>
Low power (continued)	Scored valve stems.	Replace valves and guides.	
	Warped valves.	Replace valves. Grind seats.	
	Defective magneto.	Overhaul magneto.	5.7.15
	Throttle not fully open.	Readjust linkage.	5.7.19
	Carburetor air heat valve not closing fully.	Remove filter, inspect valve, straighten plate.	
	Ice forming on carburetor throttle valve.	Apply full carburetor heat.	
	Air filter plugged.	Remove and clean.	
	Fuel flow restricted.	Inspect tank vents, blowout supply line, inspect shut-off valve, clean filter, check for obstruction in fuel flow transducer, clean carburetor screen.	5.7.13, 5.7.12, 5.7.23
	Worn cylinders, pistons and/or piston rings.	Overhaul engine.	
Low oil pressure	Low oil supply.	Replenish.	
	Low oil viscosity.	Drain sump. Refill with correct grade.	5.7.10
	Plugged oil filter.	Replace oil filter.	5.7.10
	Dirt on oil pressure relief valve seat.	Clean plunger and seat. Replace dirty oil.	5.7.10
	Oil pressure relief valve seat worn.	Overhaul engine. Refinish valve seat.	
	Oil pressure relief valve plunger sticking.	Remove cap and plunger. Clean parts.	
	Oil pump suction tube screen plugged.	Remove sump. Clean screen.	
	Engine bearings worn.	Overhaul engine.	
	Oil pressure indicating system defective.	Test transducer, replace as required. Check electrical connections, correct as required.	
Internal oil leak.	Overhaul engine.		

<b>PROBLEM</b>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>	<b>Reference in this manual</b>
Low oil pressure (continued)	Cracked crankcase cover casting, defective oil pump, leaking suction tube.	Overhaul engine. Replace damaged parts.	
High oil temperature	Low oil supply	Replenish.	5.2
	Dirty or diluted oil.	Drain sump and fill with fresh oil of proper grade.	5.7.10
	Prolonged ground operation at high speed.	Avoid prolonged running on the ground.	
	Excessive rate of climb.	Avoid prolonged high power operation at low airspeed.	
	Lean fuel-air mixture	Refer to Continental Motors' overhaul manual.	

#### **4. OIL SYSTEM SERVICING**

The oil system is integrated into the engine, except for the oil cooler that is mounted on the pilot side of the engine baffling.

Refer to the latest revision of Continental Motors Service Information Letter SIL99-2B to determine the frequency of oil changes and screen inspections.

##### **4.1 CHANGING ENGINE OIL AND FILTER**

###### Required Tools:

No special tools are required for this operation.

###### Parts Required:

No parts are required at this time.

###### Level of Maintenance:

Line Maintenance.

###### Certification Required:

Please see Table 5.4.3 in Section 5.4.

###### (1) PROCEDURE

###### (a) Warm engine.



(b) Remove the upper and lower engine cowlings. (Refer to Section 5.7.9)

(c) Place a suitable drain pan under the oil drain.

(d) Open the oil drain. Allow the oil to completely drain out.

(e) Replace oil filter and safety wire. (See Figure 5.7.10.1)



Figure 5.7.10.1 Oil filter secured by safety wire.

(f) Close the oil drain making sure it is sealed.

(g) Fill the engine with an approved oil (See Chapter 5.4 for specifications and amount).

(h) Verify oil quantity with dipstick and secure dipstick.

(i) Install engine cowling. (Refer to Chapter 5.7.9)

(j) Start the engine in accordance with Pilot's Operating Handbook procedures and monitor the engine oil pressure gauge for proper oil pressure. Allow the engine to idle for a few minutes and shut down the engine in accordance with POH procedures.

**CAUTION**  
**If the oil pressure does not rise in 30 seconds, stop the engine and determine the trouble.**

(k) Visually check inside of cowling for any obvious leaks and correct them as necessary.

## **4.2 OIL COOLER**

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

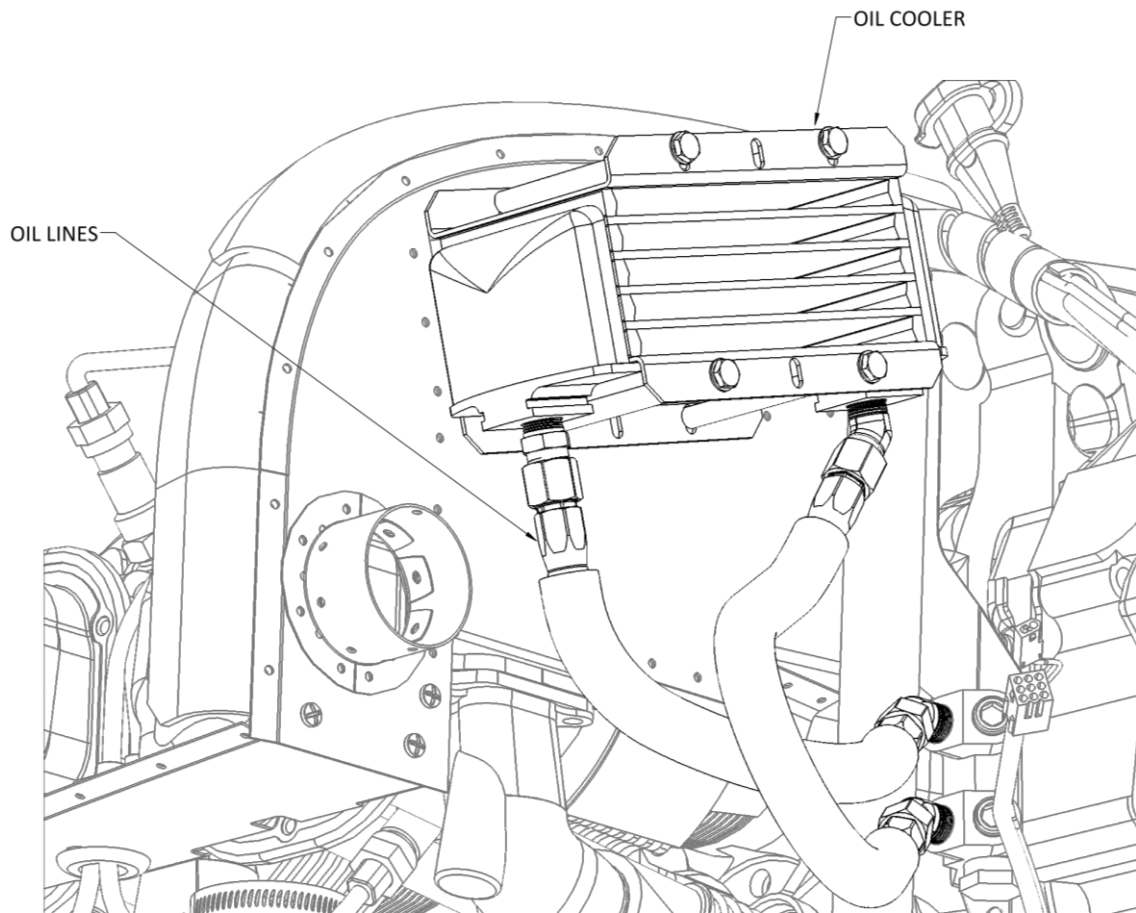


Figure 5.7.10.2 Oil cooler with oil line connections.

### (1) REMOVAL

- (a) Disconnect the hose fittings from the elbows that go into the oil cooler. Use a backup wrench on the elbow fittings to prevent damage to the oil cooler. Contain and dispose of any oil that may leak from the tubes and cooler.
- (b) Remove the through-bolts and carefully remove the oil cooler.
- (c) Disconnect the hoses from the oil cooler elbows.
- (d) Remove the elbows from the oil cooler.

### (2) INSTALLATION

- (a) Apply thread sealant (Teflon pipe paste) to all but the most inner pipe thread on each elbow (but not on the flare fitting threads). Screw the elbows into the oil cooler. Be very careful to start the threads properly and tighten with the elbow pointing the proper direction.

- (b) Position the oil cooler and install bolts and washers through the long spacer tubes between the oil cooler webs with washers.
- (c) Torque the bolts/nuts as outlined in Section 5.2.
- (d) Attach the oil hoses to the elbows on the oil cooler and tighten the fitting while holding the elbow with a wrench.
- (e) Replenish/replace oil as needed.

## **5. REPAIRS AND ALTERATIONS**

No major repairs or alterations as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141<sup>ST</sup> PL NE**  
**Woodinville, WA 98072**  
**USA**  
**Tel: +1 425 527 9940**  
**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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## 5.7.11 ENGINE MOUNT

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### 1. GENERAL

The structure of the engine mount is made of high-strength steel and the engine is attached to the mount through rubber mounts that help reduce vibration

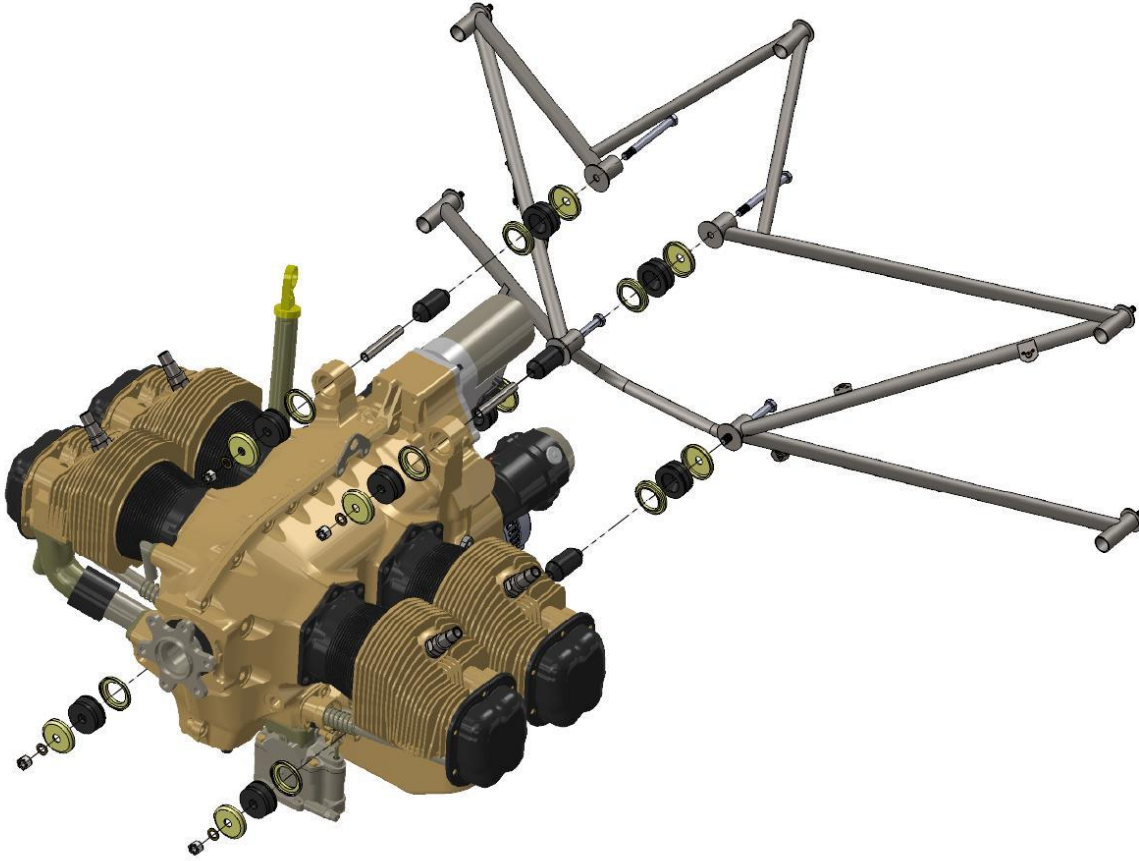


Figure 5.7.11.1 Engine mount overview.



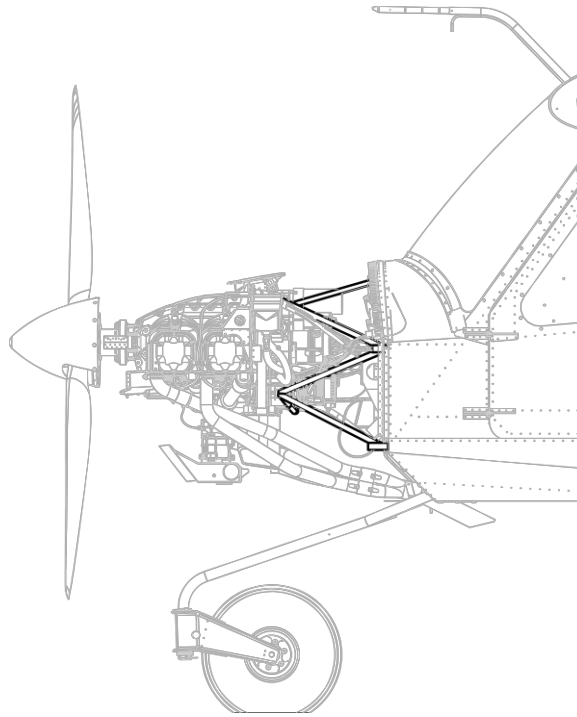


Figure 5.7.11.2 Engine mount.

## 2. INSPECTION

Inspect tubing and rubber bushings for cracks or distortion and security.

## 3. REPAIRS AND ALTERATIONS

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

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**Vashon Aircraft™**  
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**5.7.12 FUEL SYSTEM**

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<b>2.</b>	<b>TROUBLESHOOTING</b>	<b>5.7.12-3</b>
<b>3.</b>	<b>DRAINING FUEL</b>	<b>5.7.12-4</b>
<b>4.</b>	<b>REPLACING FUEL TANKS</b>	<b>5.7.12-6</b>
<b>5.</b>	<b>REPLACING WING TANK FUEL SUMPS</b>	<b>5.7.12-6</b>
<b>6.</b>	<b>REPLACING FUEL FILTERS</b>	<b>5.7.12-8</b>
<b>7.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.12-10</b>

## 1. GENERAL

The aircraft is equipped with two 12.5 US gallon main tanks in the leading edge of the wing and a single non-integral 2.5 US gallon header tank located in the avionics bay. The header tank fuel sump and the drain are located on the bottom of the fuselage on the copilot side beneath the firewall. There is a wing tank drain on the bottom of each wing. Fuel samples should be taken at each of the three drain locations before each flight to verify that there is no water or sediment in the fuel system.

Fuel flows via gravity from the main tanks to the header tank then through a shut-off valve, boost pump, filter, fuel flow transducers, and finally to the carburetor. The header tank remains full whenever there is fuel in either main tank. There is an electric boost pump located just downstream of the header tank outlet which is to be turned-on any time the header tank is not full.

The air-spaces at the tops of all three tanks are interconnected and the fuel system is vented via an aluminum vent tube connected to the top of the outboard end of the passenger-side main fuel tank that runs along the front side of the main spar to the the pitot/static/aoa mast. The vent line opening faces downward from the pitot/static/aoa mast to discharge clear of the leading edge of the wing. The vent line discharge is shielded to prevent in-flight obstruction of the vent opening due to bird/insect/debris impact or icing. The vent opening should be inspected for obstruction prior to each flight.

If the aircraft is parked on a slope for longer than just a few minutes, the "low-side" tank will have more fuel than the "high-side" tank. For this reason, when visually checking the quantity of the low-side tank it is suggested to first unlatch the filler cap and only if fuel does not flow out from under the filler cap should it then be slowly removed. When fueling the aircraft, it is suggested that the low-side tank be filled first to maximize the amount of fuel that may be added.

The quantity of fuel in each main fuel tank is displayed on the EFIS. The electrical signal to the EFIS is derived from a float-type variable resistance sender located in each main tank. The header tank fuel state ("Full" or "Not Full") is displayed on the EFIS. The electrical signal to the EFIS comes from an "on/off" float switch mounted near the top of the header tank.

Prior to refueling the aircraft, connect the fueling equipment's grounding cable to either of the wing tie-downs or to the engine exhaust pipe. This will ensure that there is no difference in electrical potential between the aircraft and the fueling equipment and will minimize the risk of electrical sparks when the aircraft is being refueled.

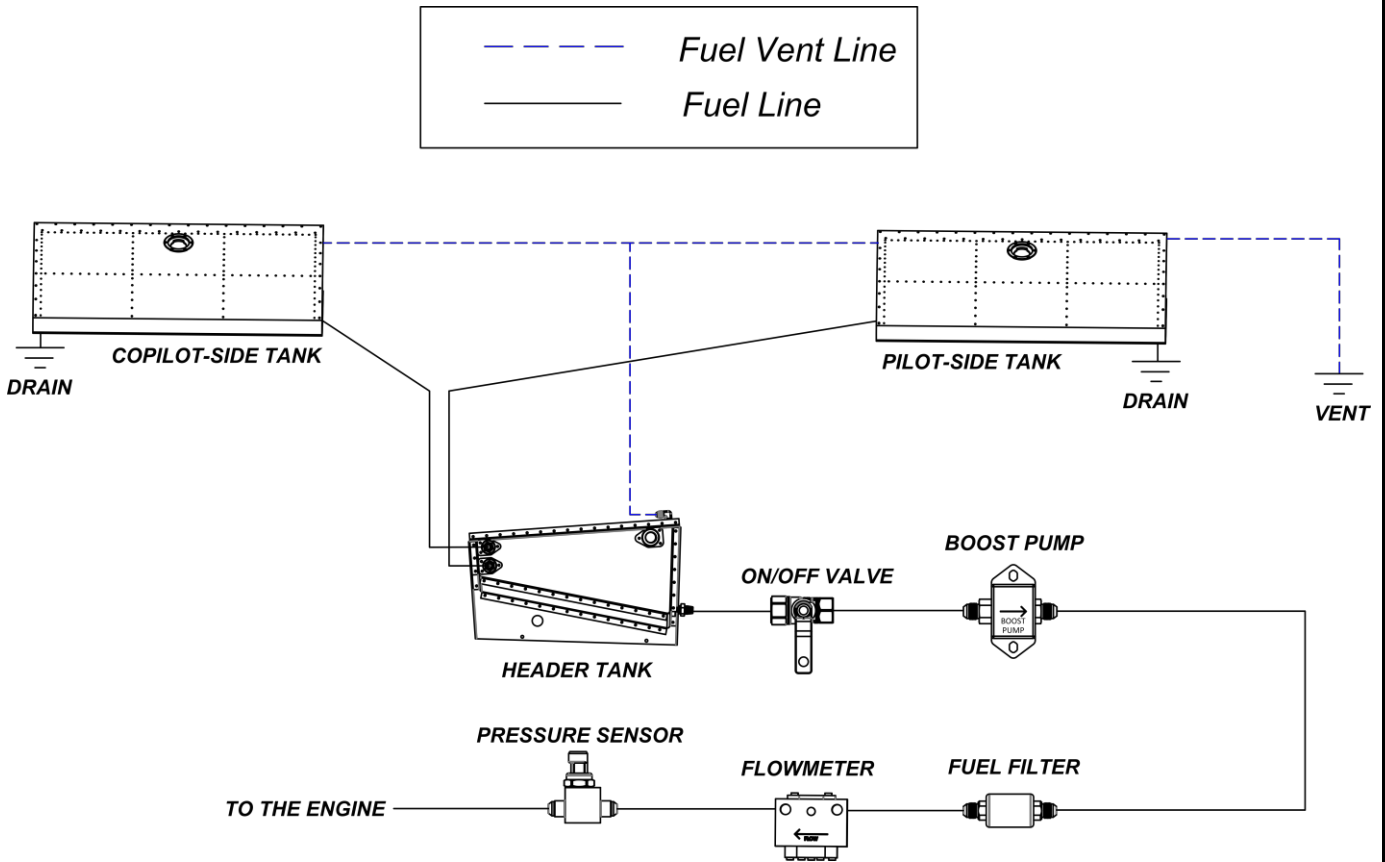


Figure 5.7.12.1 Fuel line diagram.

**2. TROUBLESHOOTING**

PROBLEM	PROBABLE CAUSE	REMEDY
Different Fuel Levels in Main Tank	Main Tanks Not Level	Check Levels While Wings Level
Fuel Leaking	Leak at drain or in system.	Check drains and fuel lines for leakages
Fuel Level High with Fuel Starvation into the Engine	Clogged Vent Tube, Clog in Fuel System	Verify vent, screens, and fuel lines are clear of debris.
Fuel Levels Erratic, or Not Moving Over Time	Fuel sending units and electrical grounds.	Verify fuel level, and check sending units/ electrical system for those sensors.
Remaining Fuel Value Inaccurate	Skyview did not update to new fuel level after filling.	See SkyView Manual
Water/Debris in Fuel Tank	Impure fuel or fuel cap leak.	Drain fuel from sumps and replace cap if needed.

### 3. DRAINING FUEL

#### Required Tools:

No special tools are required for this operation.

#### Parts Required:

No parts are required at this time.

#### Level of Maintenance:

Line Maintenance.

#### Certification Required:

Please see Table 5.4.3 in Section 5.4.

The aircraft has fuel sumps on each wing tank, and one at the bottom of the aircraft. For a complete drain of the fuel system, disconnecting the fuel line from the carburetor is recommended.

#### **CAUTION**

**Observe all precautions related to fueling and de-fueling the aircraft. In particular, the following are highlighted:**

- **Connect grounding wire to one of the wing tie-downs and ground the aircraft to an earth ground.**
- **Do not allow smoking or open flames within 100 feet of the aircraft or fuel servicing vehicle are prohibited.**
- **Do not operate radios, electrical system, or electronic equipment during the fueling or de-fueling operations.**
- **Do not drain fuel tanks within 100 feet of any electrical equipment capable of producing sparks.**
- **Have a suitable fire extinguisher available at all times.**

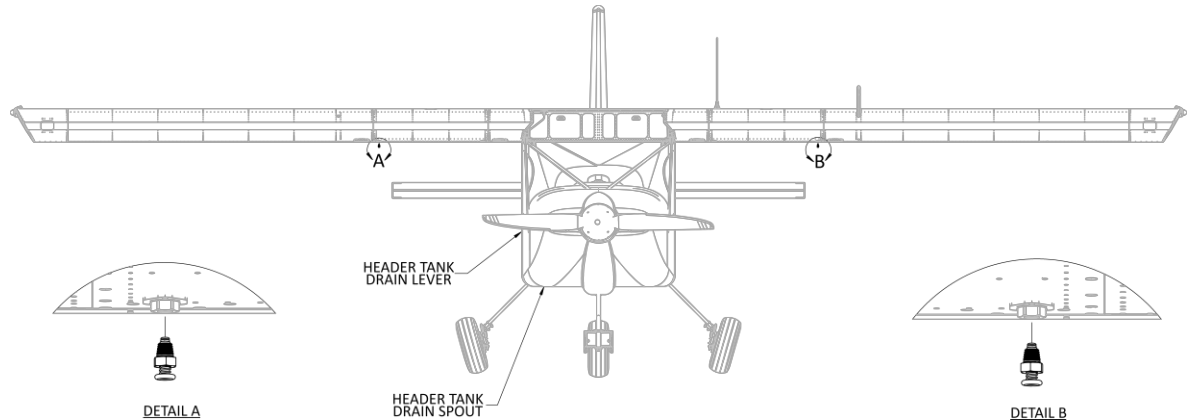
**(1) DRAINING FUEL FROM SUMPS**

Figure 5.7.12.2 Draining the fuel from the sumps.

- (a) Open the fuel sump drain(s) valve (either by pressing the valve or removing the fuel drain valve and reinstalling when done) and allow fuel to drain from the wing into the container(s).
  - (b) To drain the header tank, push on the sump aft of the exhaust outlet underneath the aircraft and drain fuel into a container.
  - (c) If the fuel has been drained and then the aircraft has been re-fueled, the engine must be run on the ground for enough time to purge the system of air prior to flight.
- (2) DRAINING FUEL FROM FUEL LINE INTO CARBURETOR**
- (a) Ensure fuel shut off valve is in "off" position.
  - (b) Remove cowl. Please see Section 5.7.9.
  - (c) Have container for fuel ready.
  - (d) Remove fuel delivery line at the carburetor.
  - (e) Position fuel line into fuel container.
  - (f) Place fuel valve into "on" position.
  - (g) Shut off fuel valve & reinstall fuel delivery line when completed.
  - (h) If the fuel has been drained and then the aircraft has been re-fueled, the engine must be run on the ground for enough time to purge the system of air prior to flight.

**4. REPLACING WING TANK FUEL SUMPS**

- (a) Drain all fuel out of the wing tank.
- (b) Unfasten screws on both sides of the sump.
- (c) Remove fuel sump by lowering it from the tank.
- (d) To install, clean sealing edges of the tank and sump, and install in the reverse order of its removal.

**5. REPLACING FUEL TANKS**Required Tools:

No special tools are required for this operation.

Parts Required:

No parts are required at this time.

Level of Maintenance:

Heavy Maintenance.

Certification Required:

Please see Table 5.4.3 in Section 5.4.

**(1) REPLACING WING TANKS**

- (a) Drain all fuel out of the wing tank and fuel lines into the header tank. Please see part 3 of this section for more information.
- (b) Disconnect all fuel lines from inside the cockpit, as shown below.



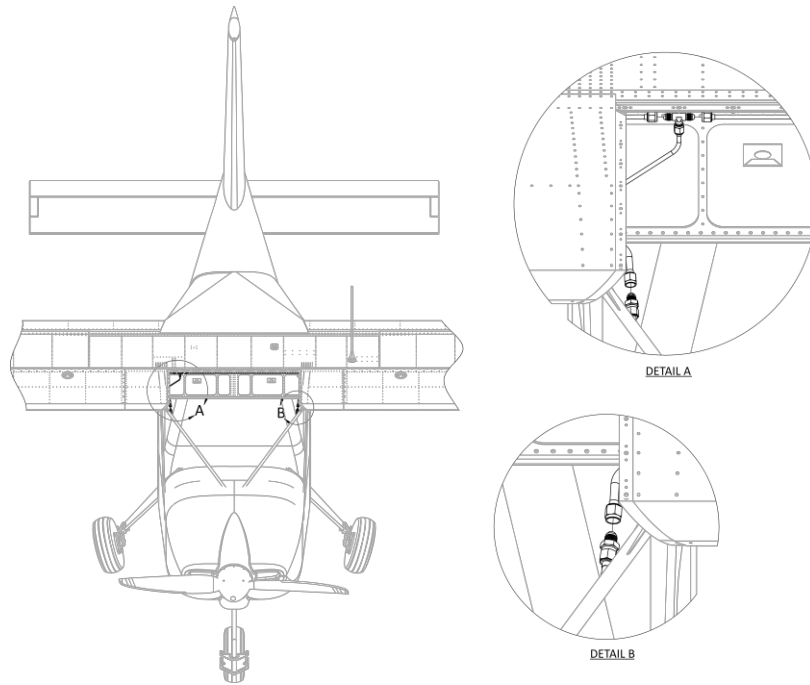


Figure 5.7.12.3 Disconnecting fuel lines in cockpit.

(c) Use access panels on the underside of the wing to disconnect the fuel line, fuel vent line, and wiring connector for each side of the tank.

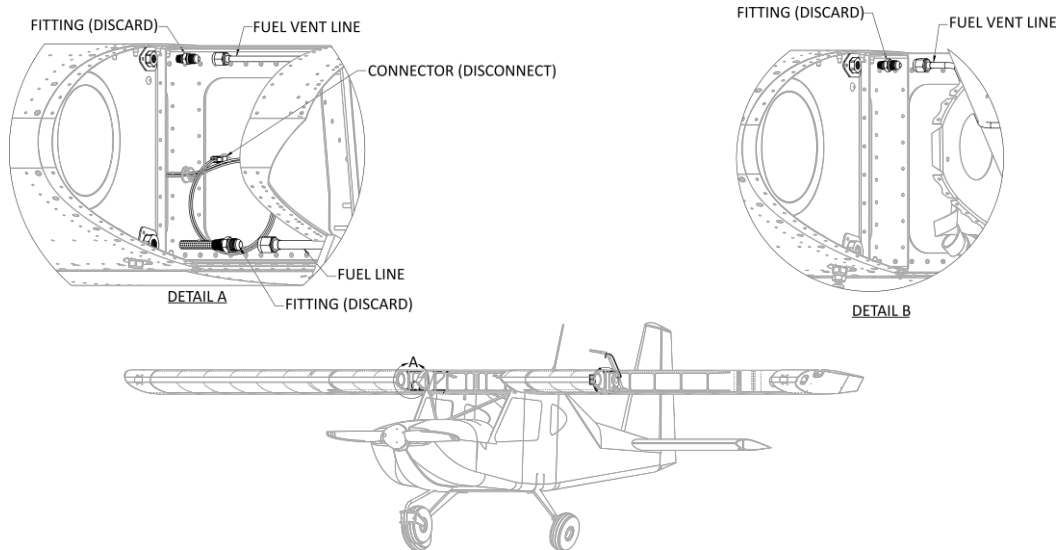


Figure 5.7.12.4 Disconnecting fuel lines in wings.

(d) Unfastened the skin of the aircraft to remove the fuel tank.

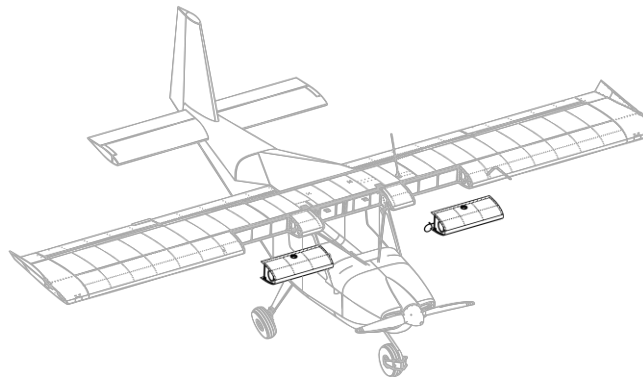
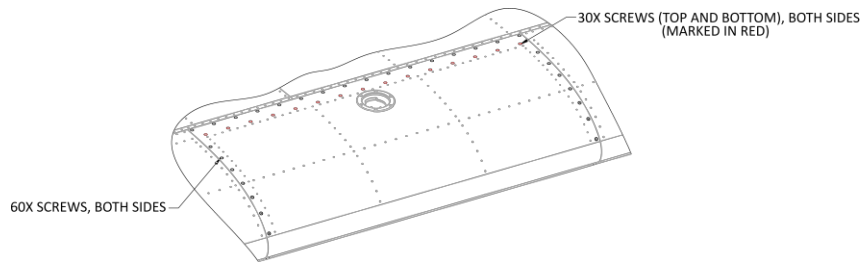


Figure 5.7.12.5 Fuel tank removal.

(e) Installation is the reverse of the removal procedure.

## 6. REPLACING FUEL FILTERS

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Line Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

### (1) FUEL FILTER SERVICING

(a) Turn fuel selector to "OFF" position.

(b) Open the panel into the avionics bay on the passenger side to gain access to the fuel filter.

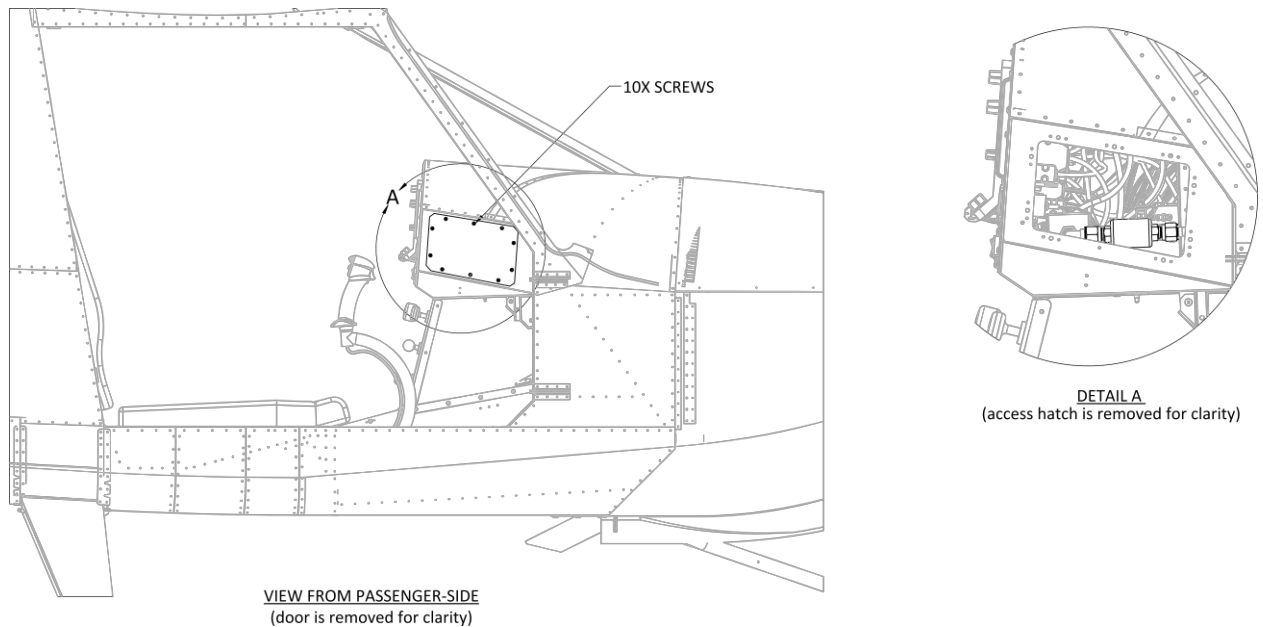


Figure 5.7.12.6 Fuel screen removal.

(c) Disconnect the fuel line connectors on both sides of the fuel filter to remove the inline fuel filter. Contain any residual fuel that may drain from the fuel lines.

(d) Replace the filter if needed. Installation is the reverse of its removal.

## (2) CARBURETOR INLET SCREEN SERVICING

(a) Turn fuel selector to "OFF" position.

(b) Remove the large hex plug in the left side of the float chamber. Contain any fuel that may drain out of the line.

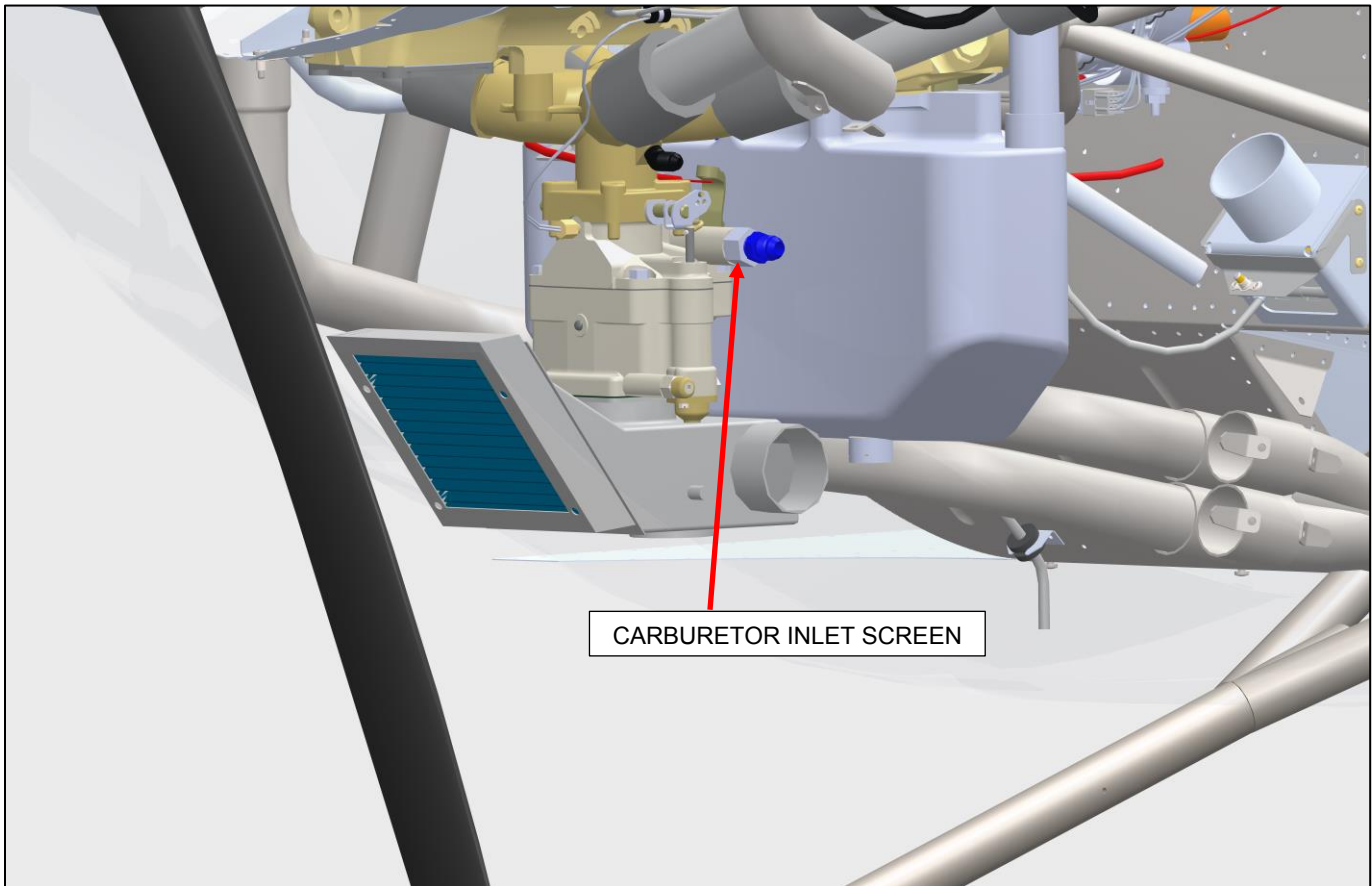


Figure 5.7.12.7 Carburetor fuel screen removal.

(c) Clean the screen and flush accumulations of dirt and water from the chamber.

(d) Install the hex plug.

## 7. REPAIRS AND ALTERATIONS

No major repairs or alterations as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141ST PL NE**  
**Woodinville, WA 98072**  
**USA**  
**Tel: +1 425 527 9940**  
**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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**5.7.13 INDUCTION SYSTEM**

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<b>1.</b>	<b>GENERAL</b>	<b>5.7.13-2</b>
<b>2.</b>	<b>REPLACING AIR FILTER</b>	<b>5.7.13-2</b>
<b>3.</b>	<b>CARBURETOR HEAT</b>	<b>5.7.13-3</b>
<b>4.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.13-6</b>

## 1. GENERAL

The induction air for the engine enters through a filter which protrudes through the lower cowling. Alternatively, the pilot may use the carburetor heat control, which operates a butterfly valve that allow heated, unfiltered air to feed into the carburetor. The carburetor heat control is located on the instrument panel and is discuss further in Section 5.7.19 and 5.7.13.

### CAUTION

**Ground operations with the carburetor heat control in the hot position must be limited because it allows air to bypass the filter.**

Should the air filter become obstructed, the carburetor heat control provides an alternate means of supplying the engine with air for the induction system.

## 2. REPLACING AIR FILTER

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Line Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

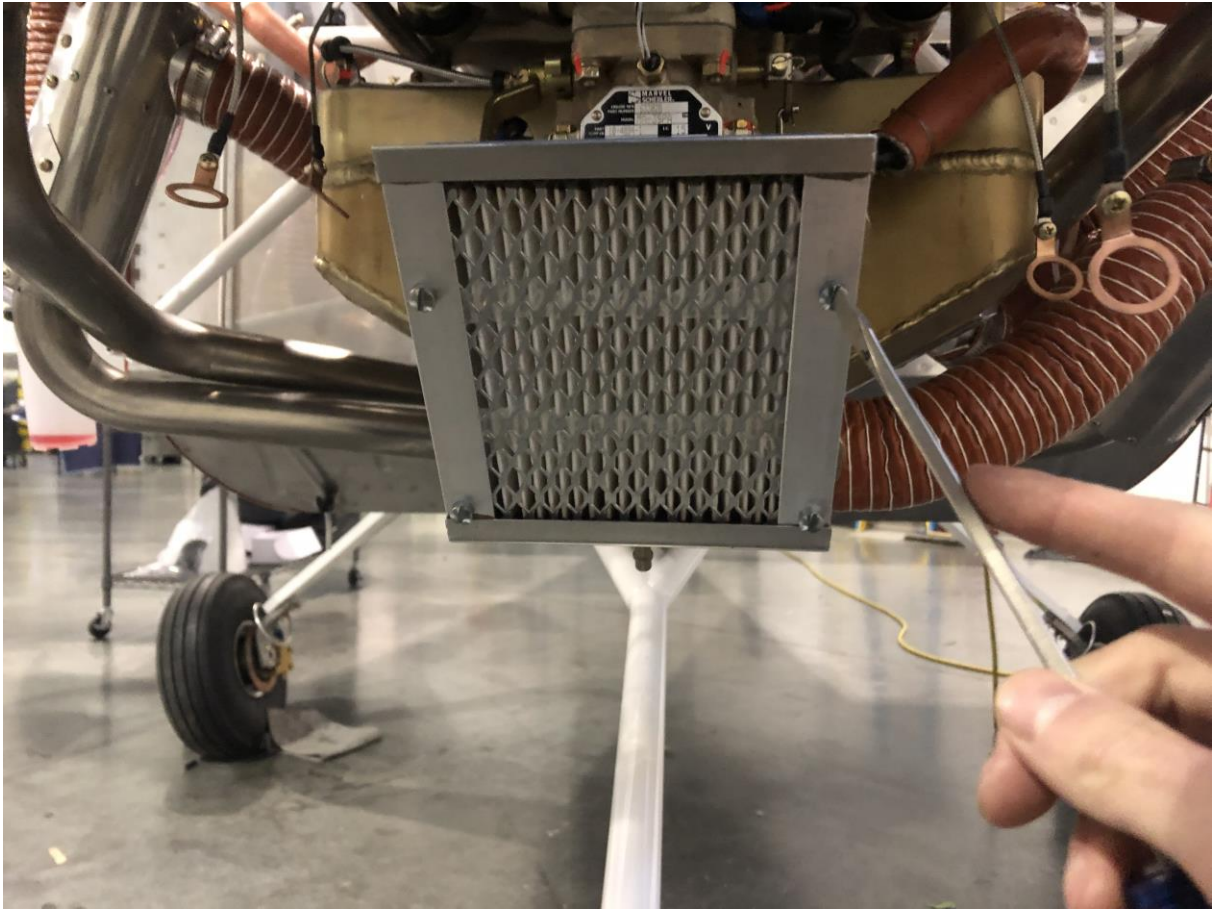


Figure 5.7.13.1 Air filter removal.

(1) REMOVAL

(a) Remove the screws and then remove the filter.

(b) If a new filter is required, contact Vashon Aircraft.

(2) INSPECTION

(a) Inspect the filter for any damage such as tears or large holes.

(b) Clean the filter by blowing compressed air on the aft side of the filter to remove dirt and other accumulated debris.

(3) INSTALLATION

(a) Hold the filter in position on the air box and install the screws.

### 3. CARBURETOR HEAT

Required Tools:



No special tools are required for this operation.

Parts Required:

No parts are required at this time.

Level of Maintenance:

Line Maintenance.

Certification Required:

Please see Table 5.4.3 in Section 5.4.

**NOTE**

Please see Section 5.7.13 for the carburetor heat muff.

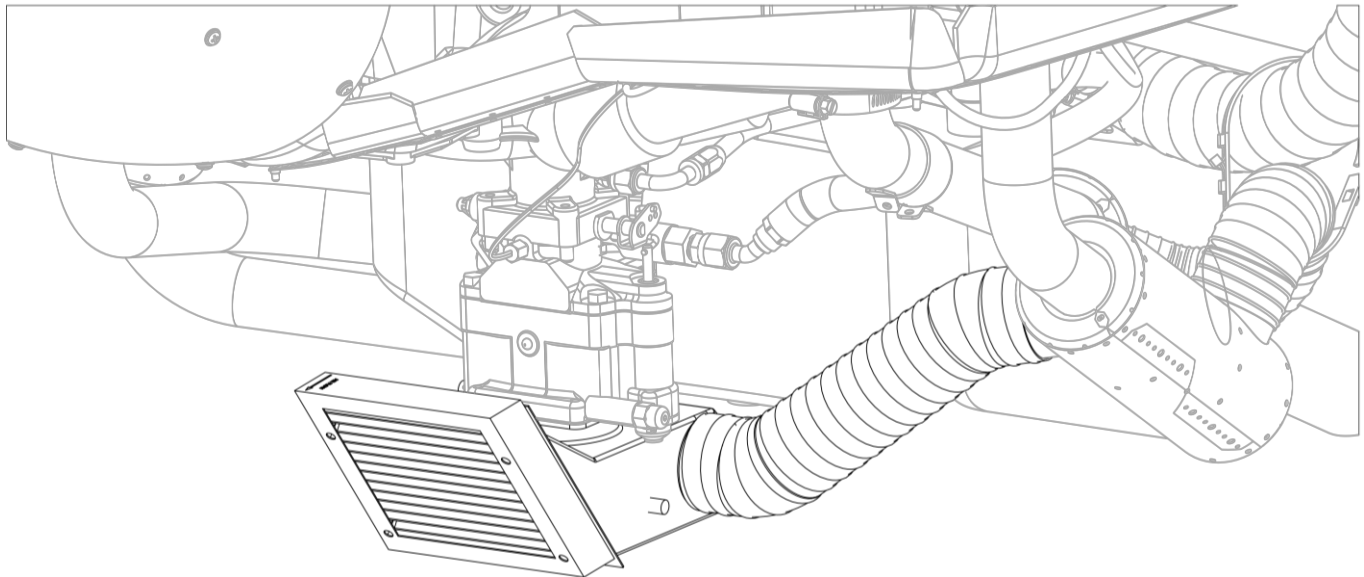


Figure 5.7.13.2 Carburetor heat inlet on induction system.

(1) CARBURETOR HEAT CONTROL CABLE TO PANEL ATTACHMENT

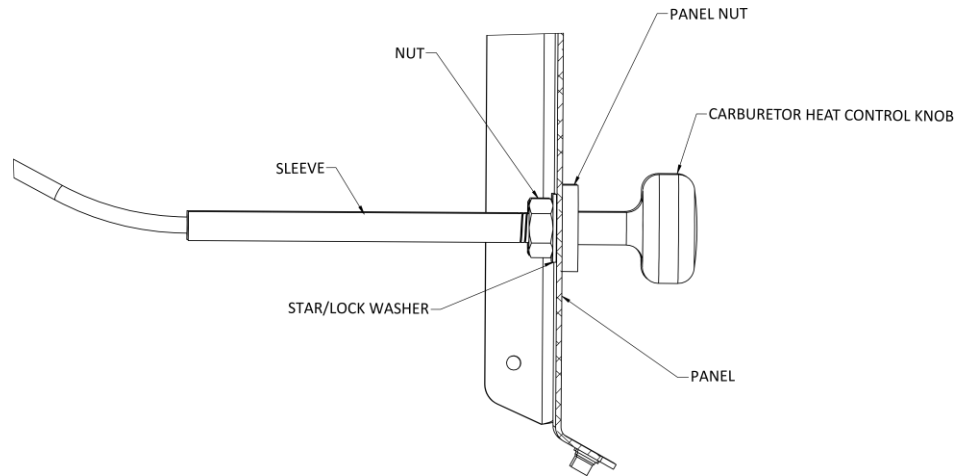


Figure 5.7.13.3 Carburetor heat control knob.

- (a) The carburetor heat control knob is secured to the center console with a lock washer and a nut.
- (b) It is important that the knob should have enough movement so that the carburetor heat lever contacts the stops at both extents of its travel. However, there should not be more than 1/8" cushion between the knob and the panel nut when the knob is fully closed (pushed in).

## (2) CARBURETOR HEAT CABLE ROUTING

- (a) Route the cable so that the wire departs the firewall at the control cable fire sleeve, passes through the cable holder around the oil vent tube, under the oil pump, through a clamp attached to the airbox, and into the carburetor heat arm on the induction box without pinching or binding.

## (3) INSTALLATION OF CABLE TO VALVE ARM SWIVEL FITTING

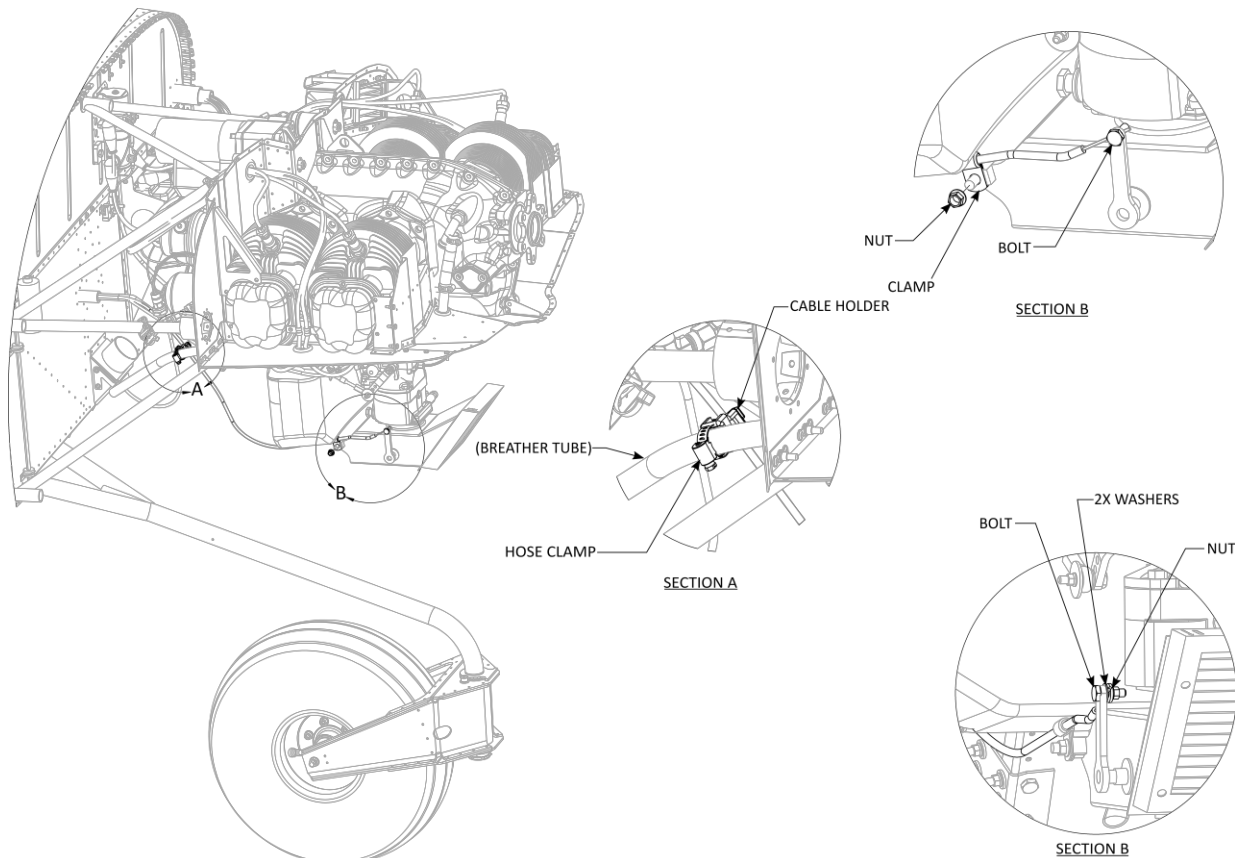


Figure 5.7.13.4 Carburetor routing and attachment.

- (a) Insert the carburetor heat control cable through the swivel fitting stud.
- (b) Insert the threaded end of the stud through the swivel fitting and through the carburetor heat valve arm.
- (c) Place the washer and castle nut on the stud.

#### (4) INSPECTION

- (a) Ensure no visible damage and loose parts.
- (b) Ensure full range of motion is achieved when the lever is actuated.

#### 4. REPAIRS AND ALTERATIONS

No major repair or alterations, as outlined as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141ST PL NE**  
**Woodinville, WA 98072**  
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## **5.7.14 EXHAUST SYSTEM**

### **TABLE OF CONTENTS**

<b>1.</b>	<b>GENERAL</b>	<b>5.7.14-2</b>
<b>2.</b>	<b>ENGINE EXHAUST</b>	<b>5.7.14-2</b>
<b>3.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.14-4</b>

## 1. GENERAL

The exhaust system is designed to efficiently remove the combusted gases from the cylinders. The system is made from stainless steel tubing and contains heat exchangers for both the carb heat and cabin heat functions.

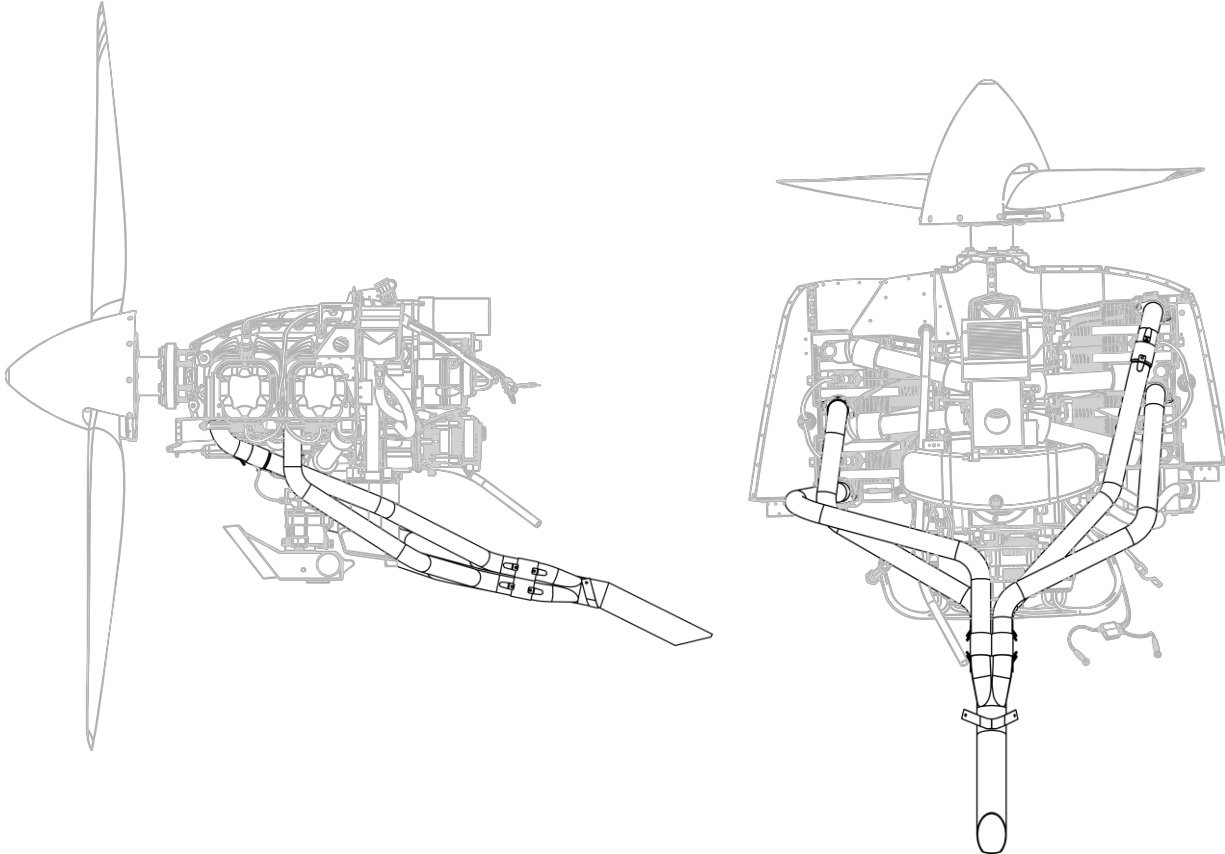


Figure 5.7.14.1 Exhaust system (heat mufflers not shown).

## 2. ENGINE EXHAUST

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

### (1) REMOVAL

- (a) Remove the cowl as described in Section 5.7.9.
- (b) Remove SCAT tubing from the Carburetor and Cabin Heat shrouds.
- (c) If needed, the Carburetor and Cabin Heat shrouds can be removed by unfastening the screws shown below.

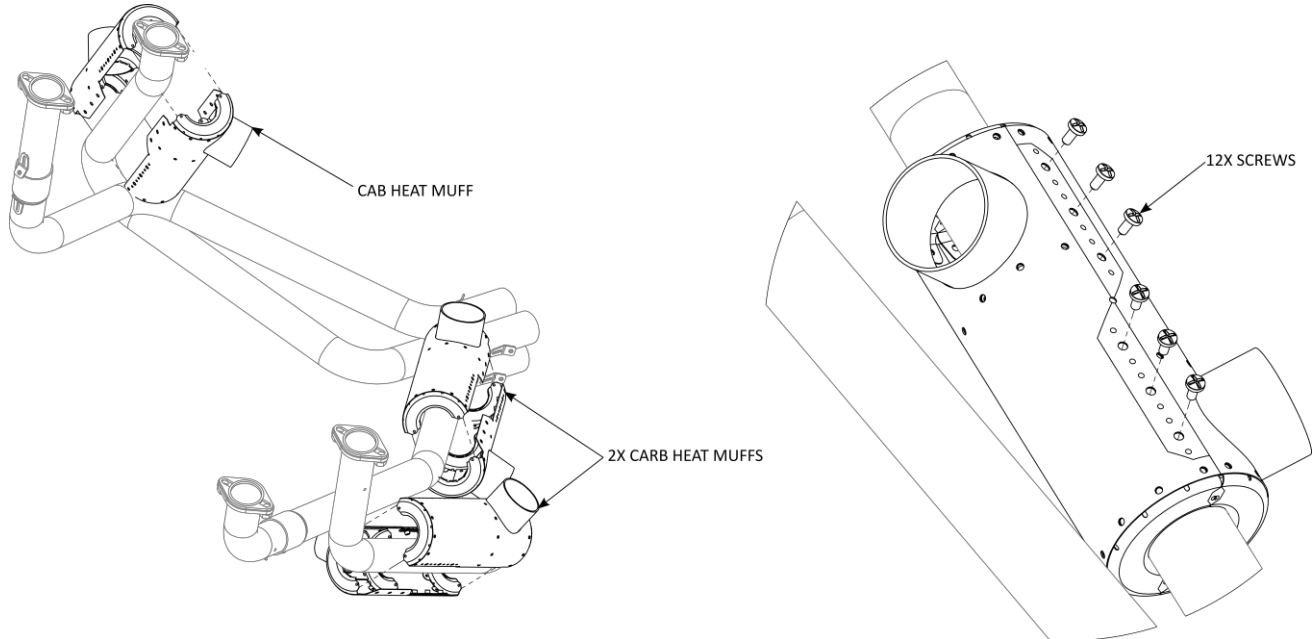


Figure 5.7.14.2 Exhaust heat muff removal.

- (d) Remove exhaust by disconnecting the springs hanging the exhaust tubing to the fuselage and to the 4 header tubes.

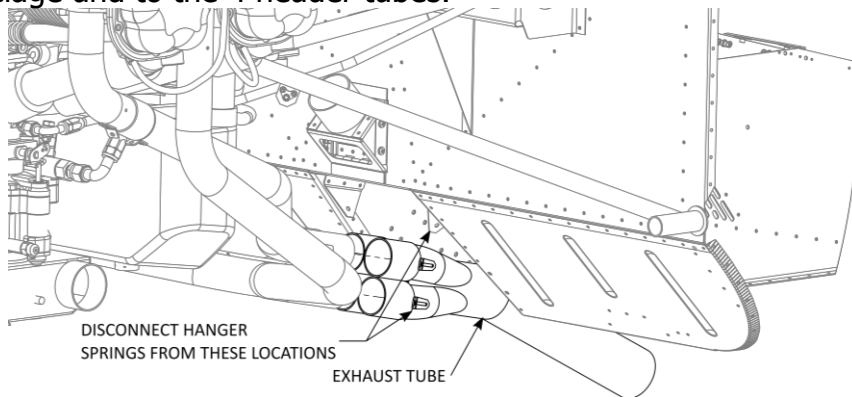
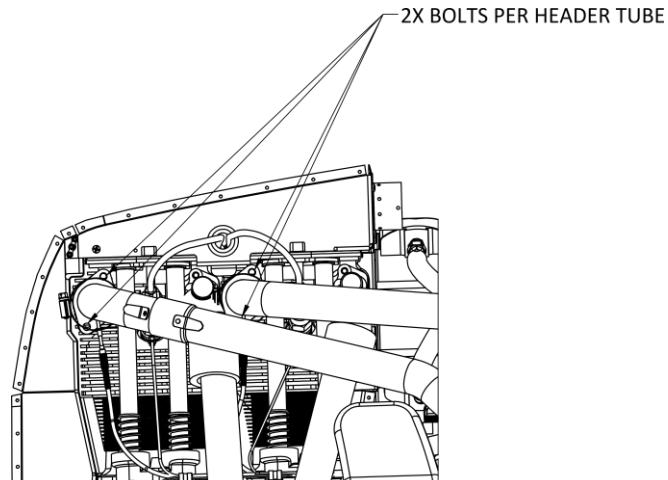


Figure 5.7.14.3 Aft exhaust removal.

- (e) Remove each of the exhaust tubes by unfastening the nuts that connects each one to the cylinder and lower them away from the engine.





VIEW FROM BOTTOM OF THE ENGINE

Figure 5.7.14.4 The exhaust attachment to the engine.

## (2) INSPECTION

- (a) Inspect the components of the exhaust system for signs of cracking. Have any cracks repaired by an FAA-approved or Vashon Aircraft-approved repair facility. If the cracking is excessive, replace the exhaust system component(s).

**WARNING**  
**CRACKS IN THE EXHAUST SYSTEM WILL ALLOW CARBON MONOXIDE TO BE PRESENT INSIDE THE COWL. THIS MAY TRAVEL THROUGH THE FIREWALL AND INTO THE COCKPIT. CARBON MONOXIDE MAY RESULT IN DEATH. NEVER OPERATE THE AIRCRAFT WITH ANY CRACKS IN THE EXHAUST SYSTEM.**

## (3) INSTALLATION

- (a) Install the exhaust system in the reverse order of removal.
- (b) Add a bead of high temperature RTV onto the all springs that support the exhaust to absorb vibrations.
- (c) Replace exhaust flange gaskets.
- (d) Torque the nuts connecting flanges to the engine cylinders to the specifications in the Continental overhaul manual.

## 3. REPAIRS AND ALTERATIONS

No major repair or alterations, as outlined as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141ST PL NE**  
**Woodinville, WA 98072**  
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**5.7.15 POWERPLANT – IGNITION**

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<b>2.</b>	<b>MAGNETOS</b>	<b>5.7.15-3</b>
<b>3.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.15-5</b>

## **1. SPARK PLUGS**

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Line Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

The following instructions are a general guide. Defer to the Continental Maintenance Manual for detailed instructions.

#### (1) REMOVAL

- (a) Unfasten all the spark plug lead wires.
- (b) Unscrew all the spark plugs, while keeping note of the location they were in.

#### (2) INSPECTION

- (a) Inspect the firing end of the spark plugs for any foreign material lodged between electrodes or around the insulator that could be conductive. Clean as needed.
- (b) Check the electrode gap. For the correct electrode gap, please see Continental Maintenance Manual.
- (c) Check connector for any abnormalities and clean if needed.
- (d) Inspect spark plug leads for heat damage, wear, cracking, or signs of rubbing. Replace cables or harnesses if needed.

#### (3) INSTALLATION

- (a) Clean spark plug lead connector clean with a lint-free cloth and isopropyl alcohol.
- (b) Coat the insulating sleeves as specified in the Continental Maintenance Manual.
- (c) Apply a small amount of Spark Plug Thread Lubricant (refer to Section 5.2) to the threaded area at the firing end of each spark plug. Using a new copper gasket, install each plug and torque to that in section 5.2.
- (d) Connect the spark plug lead wires.

## 2. MAGNETOS

The Continental O200-D is equipped with two Continental magnetos that supply electricity to the spark plugs through the ignition cables. The magnetos are wired in a way such that the firing order of the engine is 1-3-2-4. The right magneto supplies power to the upper spark plugs, and the left magneto supplies power to the lower spark plugs.

### FRONT OF AIRCRAFT

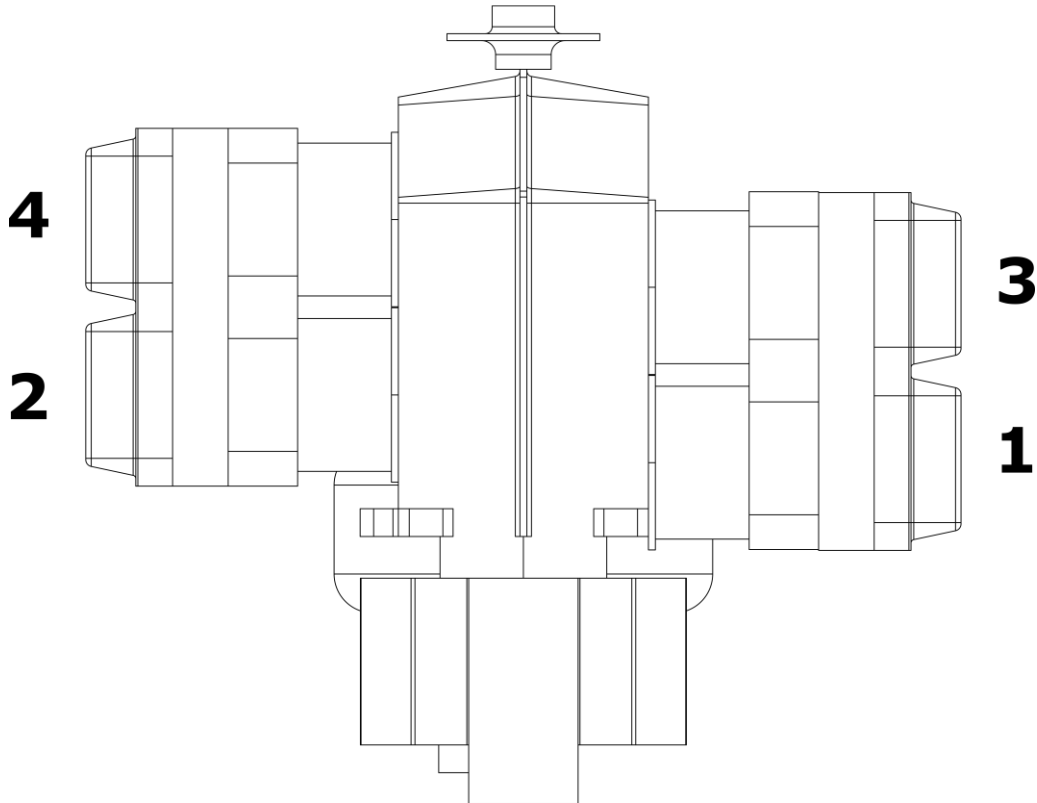


Figure 5.7.15.1 Cylinder number designation.

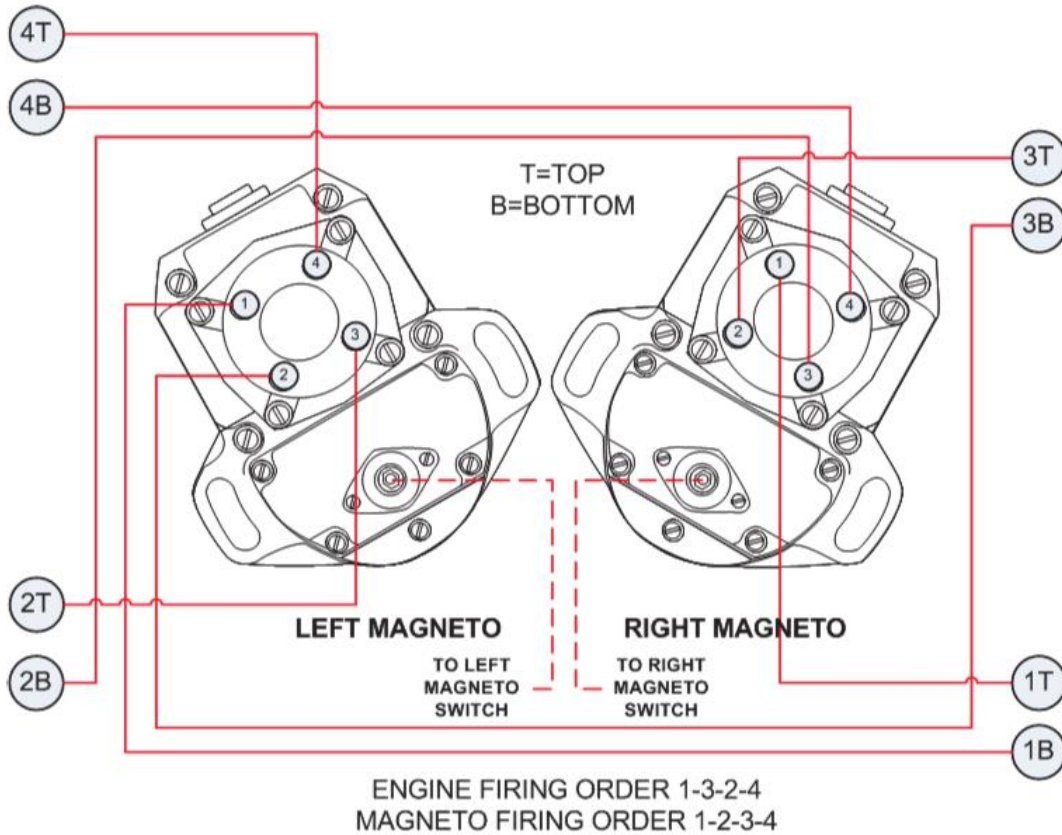


Figure 5.7.15.2 Magneto routing diagram.

Required Tools:

No special tools are required for this operation.

Parts Required:

No parts are required at this time.

Level of Maintenance:

Heavy Maintenance.

Certification Required:

Please see Table 5.4.3 in Section 5.4.

(1) REMOVAL

**PRIOR TO REMOVING THE MAGNETOS, MAKE SURE THE FUEL MIXTURE IS IN THE IDLE CUT-OFF POSITION AND THE MAGNETOS ARE TURNED OFF.**

(a) Remove magnetos as per Continental's Standard Practice Maintenance Manual.

(2) INSPECTION

(a) Inspect the magnetos in accordance with the Continental Motors Operator's Manual.

(3) INSTALLATION

(a) Install the magnetos as per Continental 's Standard Practice Maintenance Manual.

**3. REPAIRS AND ALTERATIONS**

No major repair or alterations, as outlined as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141ST PL NE**  
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**USA**  
**Tel: +1 425 527 9940**  
**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**



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**5.7.16 PROPELLER**

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<b>3.</b>	<b>REMOVAL, INSPECTION, AND INSTALLATION</b>	<b>5.7.16-3</b>
<b>4.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.16-12</b>

## 1. GENERAL

The aircraft is equipped with a CATTO two-bladed 70"x48" propeller, a hybrid construction of wood and composite materials consisting of two-blades, fixed pitch and 70-inch diameter. Do not use the propeller as a tow-bar to move the aircraft.

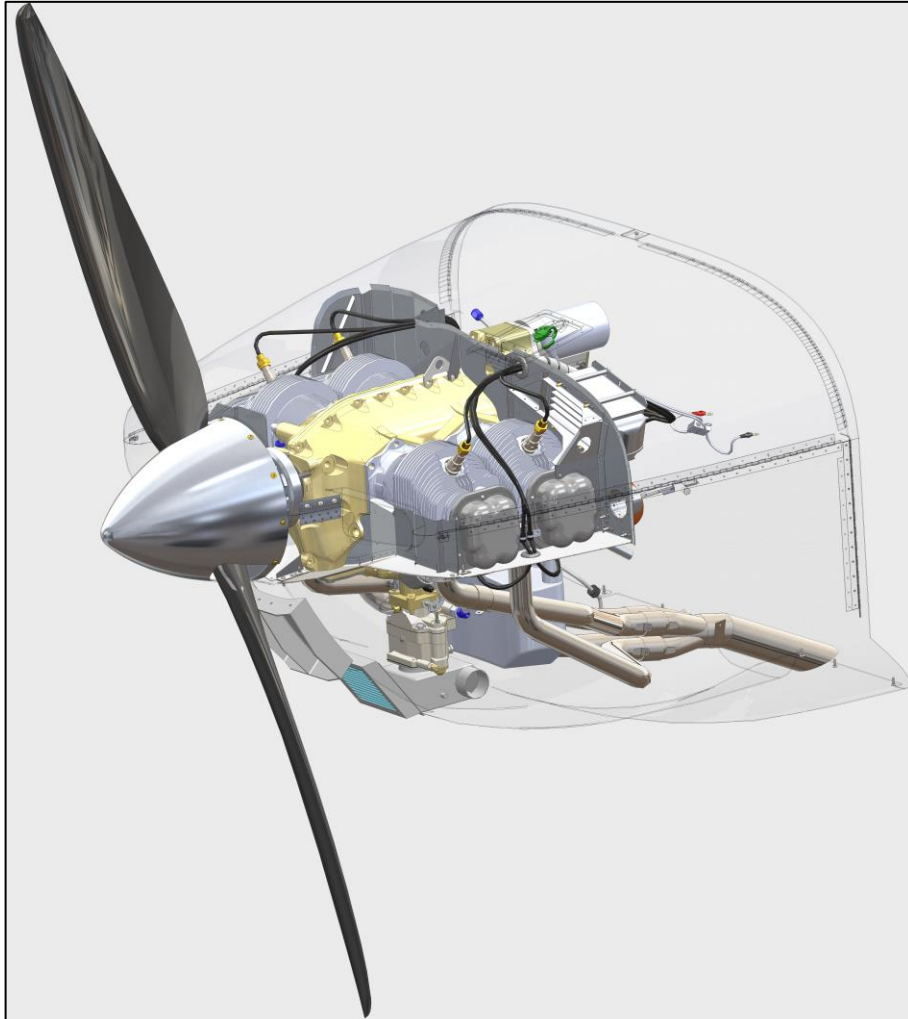


Figure 5.7.16.1 Propeller overview.

This section is prepared to give an outline of the removal and installation. For the more information on the removal, inspection, and installation procedures, refer to Catto Propeller's Customer Operation and Maintenance Manual.

## 2. TROUBLESHOOTING

If the propeller-engine combination feels rough in flight;

- (a) Check that the mounting face off the propeller is tight against the engine flange and check the blade track.

- (b) Verify that the attaching bolts have reached their required torque and have not bottomed out on the threads.
- (c) Check blade track (see AC 43.13-1B).
- (d) If roughness or vibration is still present, please contact Vashon with the information given in the maintenance part of this section.

### **3. REMOVAL, INSPECTION, AND INSTALLATION**

#### Required Tools:

No special tools are required for this operation.

#### Parts Required:

No parts are required at this time.

#### Level of Maintenance:

Heavy Maintenance.

#### Certification Required:

Please see Table 5.4.3 in Section 5.4.

#### **CAUTION**

**Ensure Magnetos are off and grounded.**

#### **CAUTION**

**Prevent the aircraft from moving by chocking each wheel.**

#### **CAUTION**

**Never use grease or oil as lubricant on the propeller bolts. Clean the propeller bolts and threads with a de-natured alcohol to ensure threads are free of grease and oil.**

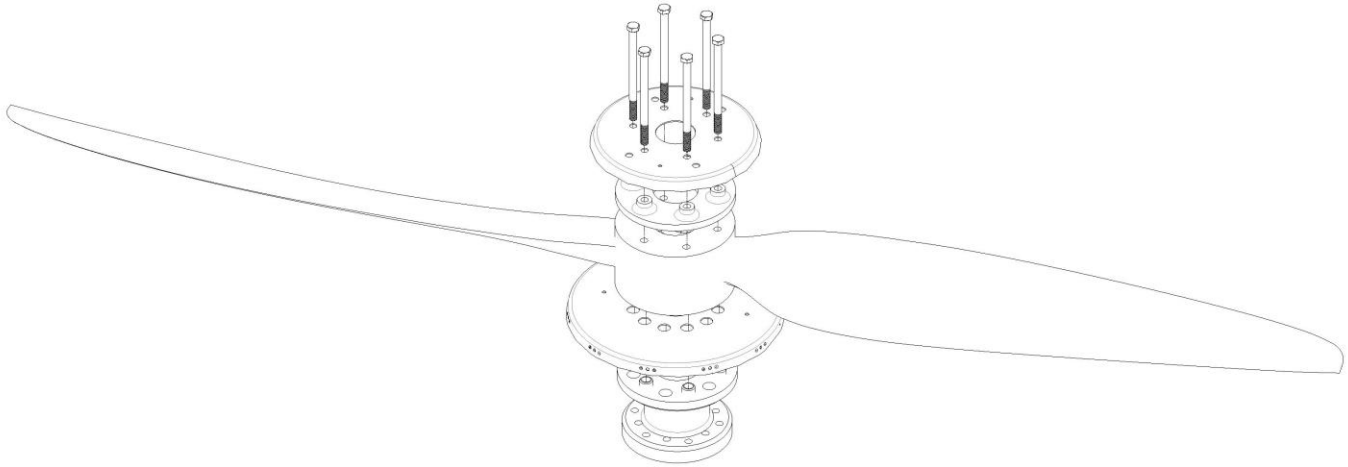


Figure 5.7.16.2 Propeller removal with spinner hidden.

#### (1) PROPELLER REMOVAL

- (a) Remove the spinner by unfastening the screws that attach it to the forward and rear bulkhead.
- (b) Remove the safety wire.
- (c) Loosen each bolt one at a time in a star pattern by releasing the torque in small increments. Support the propeller to ensure that it does not fall.
- (d) Once torque is released remove all bolts with the crush plate and the adapter plate.

#### (2) PROPELLER INSPECTION

Defer to propeller manufacturers detailed instructions as required.

- (a) Examine the propeller blades for cracks, nicks, or dents beyond permissible limits in the blade leading edge protection. These limits will be found in the propeller manufacturer's service manual. If a blade is unserviceable, return it to the factory.
- (b) Inspect the attaching bolts for worn or damaged threads and heads. Replace damaged bolts with new ones.

- (c) Inspect the spinner bulkhead, dome, and mounting plate for areas of fretting, cracks, or elongated holes. Replace any damaged parts.
- (d) Inspect the spinner hub front and hub for areas of fretting, cracks, damaged threads, or elongated holes. Return any damaged or questionable parts to the factory.
- (e) Nicks and scratches no deeper than 1/32" inch or longer than 3" inch can be touched up with any sand-able epoxy paste (e.g. JB Weld). Please return propeller to Catto for replacement if fatigue, damage, or cuts that are deeper or longer than what is listed above is noted.
- (f) Using the butt end of a screwdriver, tap the Nickel Leading Edges for change in sound, higher pitch vs. lower pitch. The pitch sounds should be constant.
- (g) If the propeller shows any of the following damage, it should be removed from service:
  - a. Cracks in hub bore or bolt holes.
  - b. Visually Bubbled or Separated surface lamination
  - c. Oversize or elongated hub bore or bolt holes.
  - d. If there is any major visual damage due to impact.
  - e. Obvious damage or wear beyond economical repair.
- (h) Inspect and check propeller bolt torque at least every 50 hours or 6 months according to the Torque Procedures outlined in this manual. More frequent inspection may be necessary when climatic changes are extreme, such as change of season.
- (i) During conditional inspection, un-torque propeller bolts and re-torque as per specifications (see 5.2, part 8.5).
- (j) If torque of propeller bolts is at any time below the required value, a thorough hub inspection is required, as outlined below:
  - a. Ensure that the magneto switch is off, and that both magnetos are grounded and or electronic ignition circuit breakers are pulled. Remove the spinner dome, if applicable.
  - b. Remove safety wire on the propeller mounting bolts. Loosen and remove bolts, crush plate, and front spinner bulkhead (if applicable). Remove propeller from flange. A slight rocking may be necessary to remove the propeller, use caution when removing so as not to damage or bend any of

the connection faces on the flange or on the aluminum side of the propeller hub.

- c. Clean both propeller hub faces with de-natured alcohol.
- d. Inspect propeller hub face for any galling of the aluminum, cracks or elongation of the bolt holes.
  - i. Galling of the aluminum plate generally occurs concurrently with an elongation of the bolts or bolt holes. If ANY bolt-hole elongation is more than .010" inch then the propeller must be returned to CATTO for a closer inspection and the attaching bolts must be replaced.
- e. Inspect the spinner rear bulkhead and engine flange for fretting. If the fretting is severe and cannot be dressed out with emery cloth and re-anodized (for aluminum parts only) then the parts must be replaced. Clean the flange faces for re-installation.

### (3) INSTALLATION

The following instructions are a general guide. Defer to propeller manufacturers detailed instructions as required. For this procedure, 0.041" stainless steel safety wire. De-natured alcohol, paraffin wax is needed. For the propeller assembly components, please see below.

#### **CAUTION**

**Ensure Magnetos are off and grounded.**

#### **CAUTION**

**Prevent the aircraft from moving by chocking each wheel.**

#### **CAUTION**

**Never use grease or oil as lubricant on the propeller bolts. Clean the propeller bolts and threads with a de-natured alcohol to ensure threads are free of grease and oil.**

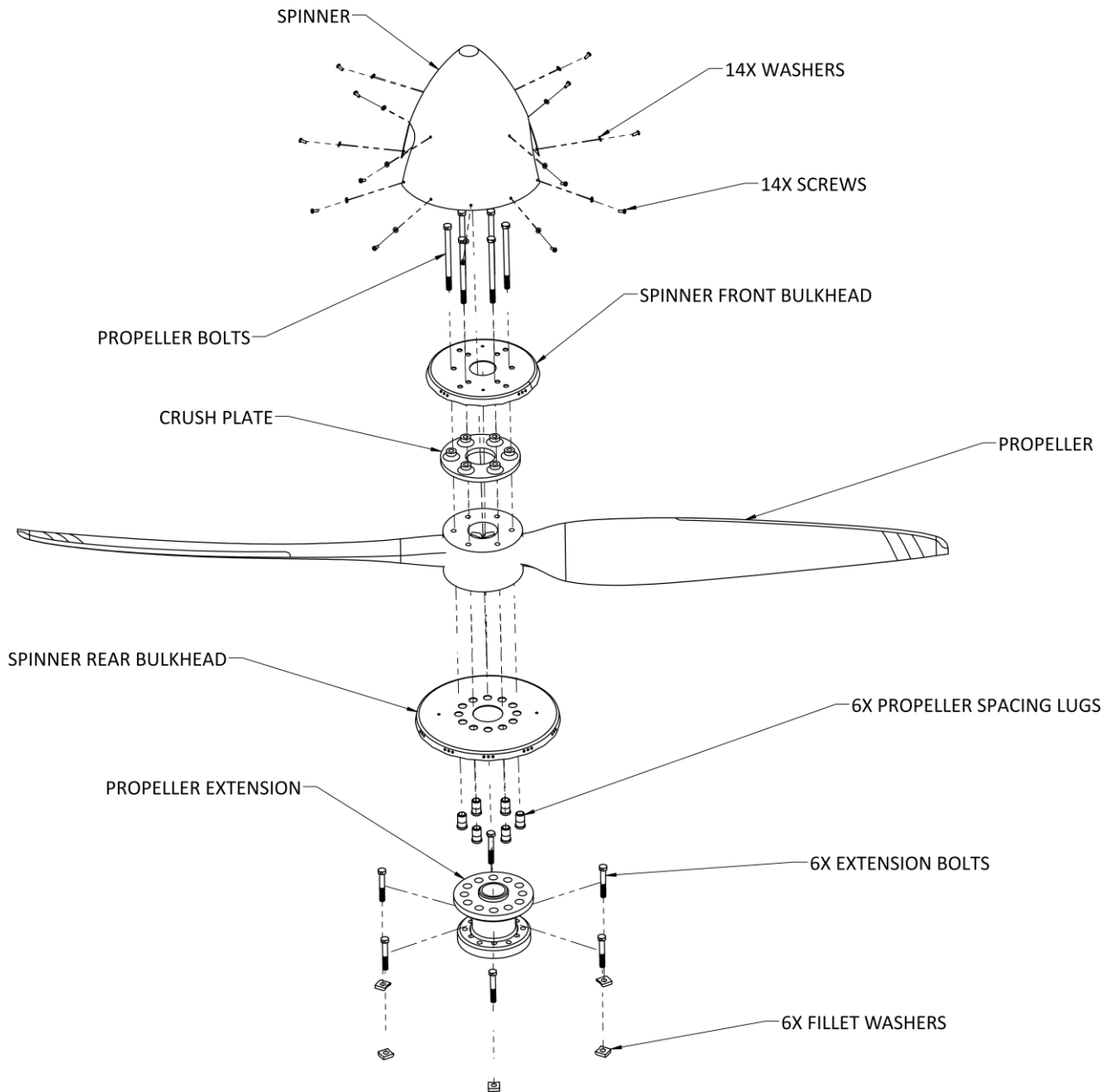


Figure 5.7.16.3 Propeller installation.

- (a) Clean with de-natured alcohol the surfaces of both propeller hub faces and mounting flange, and the front and rear surfaces of the spinner backing plate. ENSURE both surfaces are free of contaminants.
- (b) Make sure that the propeller hub bolts and the threads in the drive bushings are cleaned with de-natured alcohol and are dry. Do not lubricate, as warned above.



- (c) Align crankshaft at top dead center using the mark on the crankshaft and crankcase backbone/seam.
- (d) Attach prop extension to crankshaft. Note the 12 O'CLOCK position.

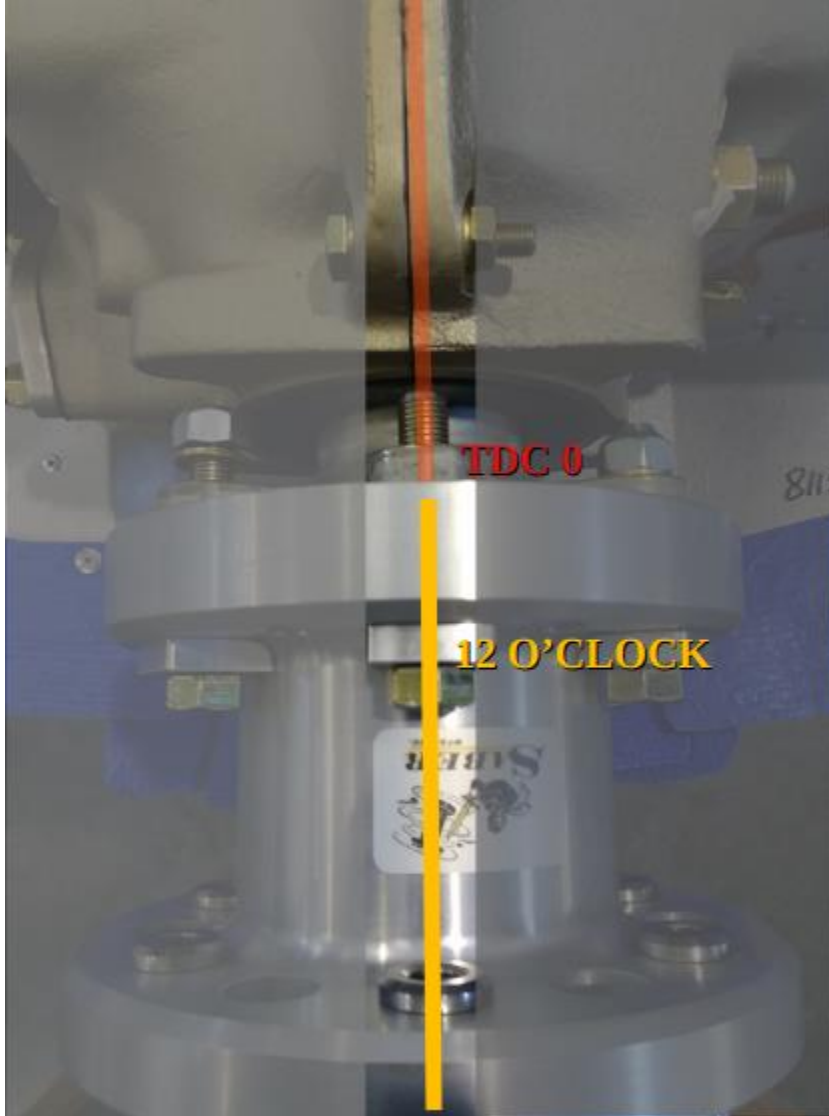


Figure 5.7.16.4 Propeller extension alignment.

- (e) Torque the extension bolts with washers to 10 ft. lb. in a star bolt pattern, then to 20 ft lbs., before finally torquing the bolts to 30 ft lbs.
- (f) Install rear spinner bulkhead. Position tooling holes in the 2 and 8 positions referencing the 12 o'clock position noted from step (d).

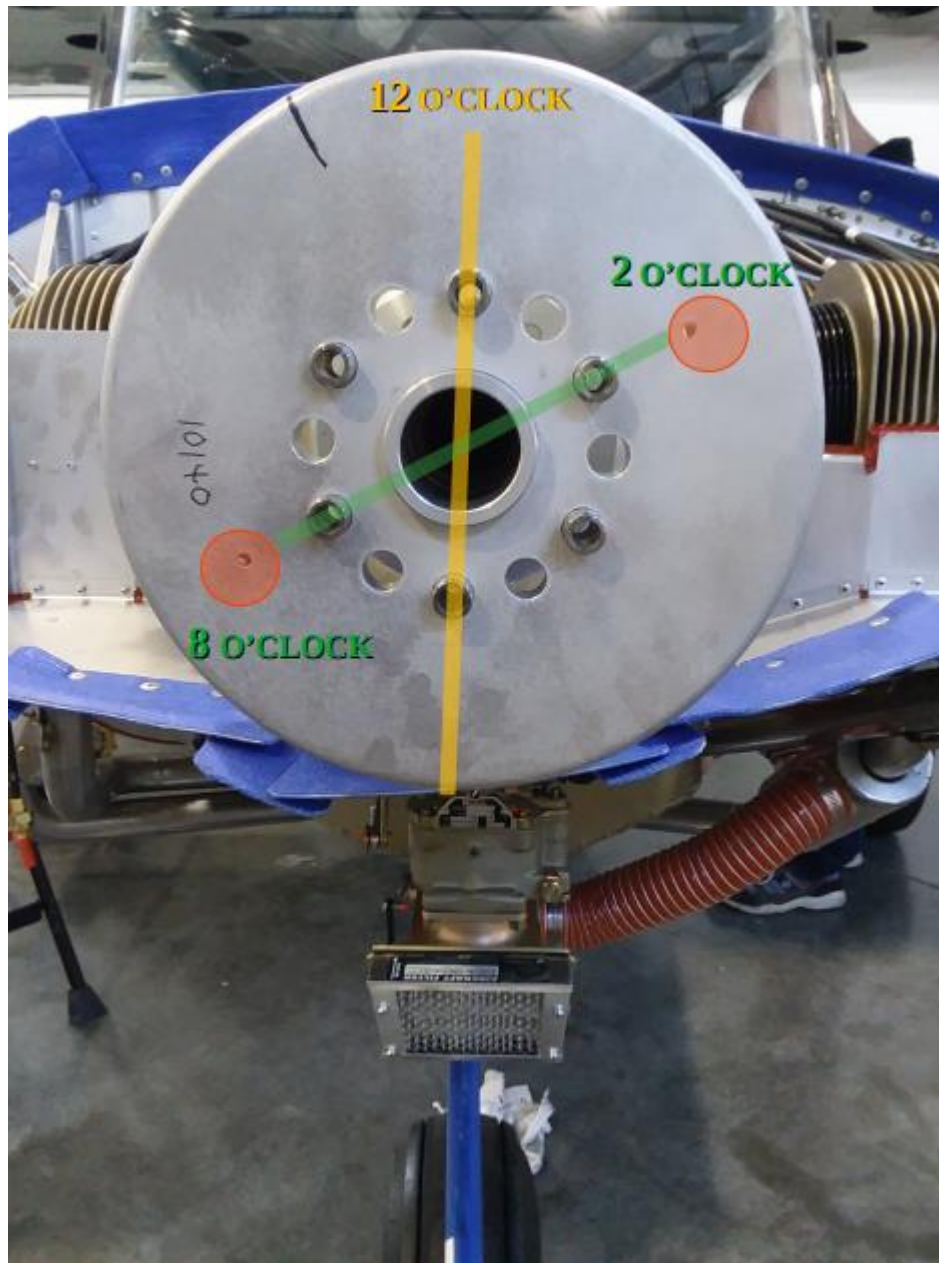


Figure 5.7.16.5 Rear spinner bulkhead alignment.

(g) After installing spinner bulkhead install propeller. Position the blades at the 2 and 8 o'clock position referencing the 12 o'clock position noted earlier, as shown below.

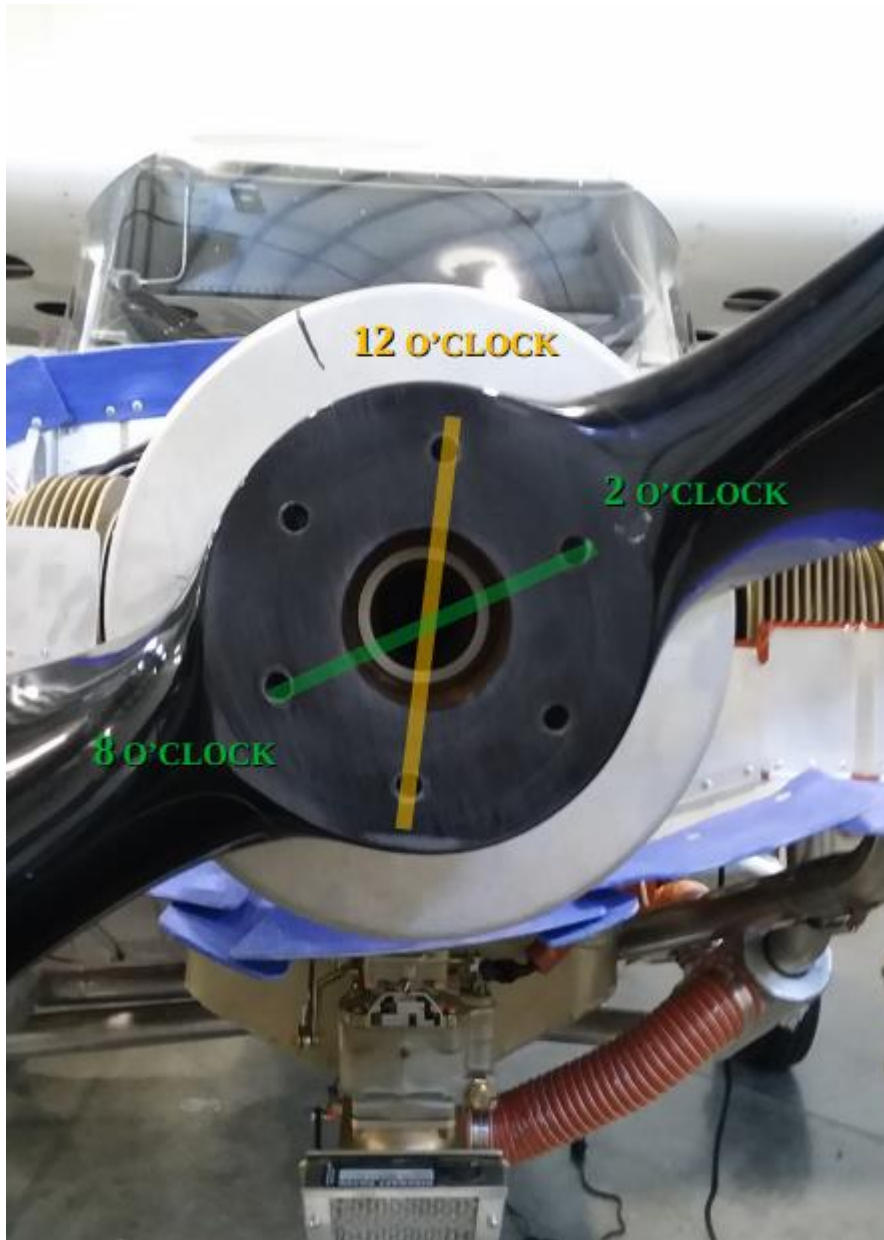


Figure 5.7.16.6 Propeller alignment.

- (h) Install crush plate, forward bulkhead, washers and bolts on to prop. (Note alignment marks on forward and aft bulkheads made during the assembly process shown below).



Figure 5.7.16.7 Front spinner bulkhead alignment.

- (i) Tighten snug in a star pattern.
- (j) Torque hub bolts to 10 ft lb., then 15-17.5 ft lb., and finally to 25 ft lbs. in a star pattern. Check blade track (see FAA AC 43.13-1B.) during tightening and DO NOT OVER TORQUE. For more information, please see Catto Propeller's Customer Operation and Maintenance Manual.
- (k) If propeller is new, let propeller rest 10 minutes. Recheck bolt torque after first 2 to 3 hours of operation and then again at 10 to 15 hours.
- (l) It is mandatory to recheck the bolt torque every 50 hours or 6 months, whichever comes first. If there are any significant changes in environmental conditions ( $\pm 40$  °F in temperature, and  $\pm 50\%$  relative humidity consistent with changing environmental seasons) the propeller bolt torque must be rechecked.
- (m) Install stainless steel safety wire 0.041inch in accordance with the double twist method of standard safety wire practices for aircraft as outlined in the current version of FAA AC 43.13-1B.
- (n) Install the spinner dome.
- (o) If propeller bolt torques do not meet specifications, inspect the propeller hub as outlined in the inspection part of this section (Part 3, Section 2, Step (j))

#### **4. REPAIRS AND ALTERATIONS**

No major repairs or alterations as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141ST PL NE**  
**Woodinville, WA 98072**  
**USA**  
**Tel: +1 425 527 9940**  
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**5.7.17 UTILITY SYSTEMS**

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## 1. GENERAL

The aircraft is equipped with cabin heat system. The cabin heat system draws ambient air from the high pressure side of the engine cooling baffles, passes the air through a heat exchanger located around the engine exhaust, and then directs the heated air through a diverter box which routes the air either out the bottom of the cowling with the rest of the engine cooling air or into the cabin through an opening in the firewall. To select cabin heat, the control on the lower part of the center console must be pulled aft.

## 2. REPAIRS AND ALTERATIONS

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

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	SV-EMS-220	5.7.18-5
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<b>3.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.18-14</b>

## 1. GENERAL

The aircraft is equipped with Dynon's SkyView system. SkyView is an integrated glass panel avionics system. Its capabilities include Primary Flight Display (PFD) information, Engine Monitoring, GPS moving map with procedure and en-route charts, two-axis approach-capable Autopilot, Mode-S Transponder with 2020-compliant ADS-B Out capability, ADS-B Traffic and Weather (US only), as well as COM Radio.

Table 5.4.13.1 summarizes that equipment that can be installed on the airplane and whether it is included as standard equipment or available as optional equipment.

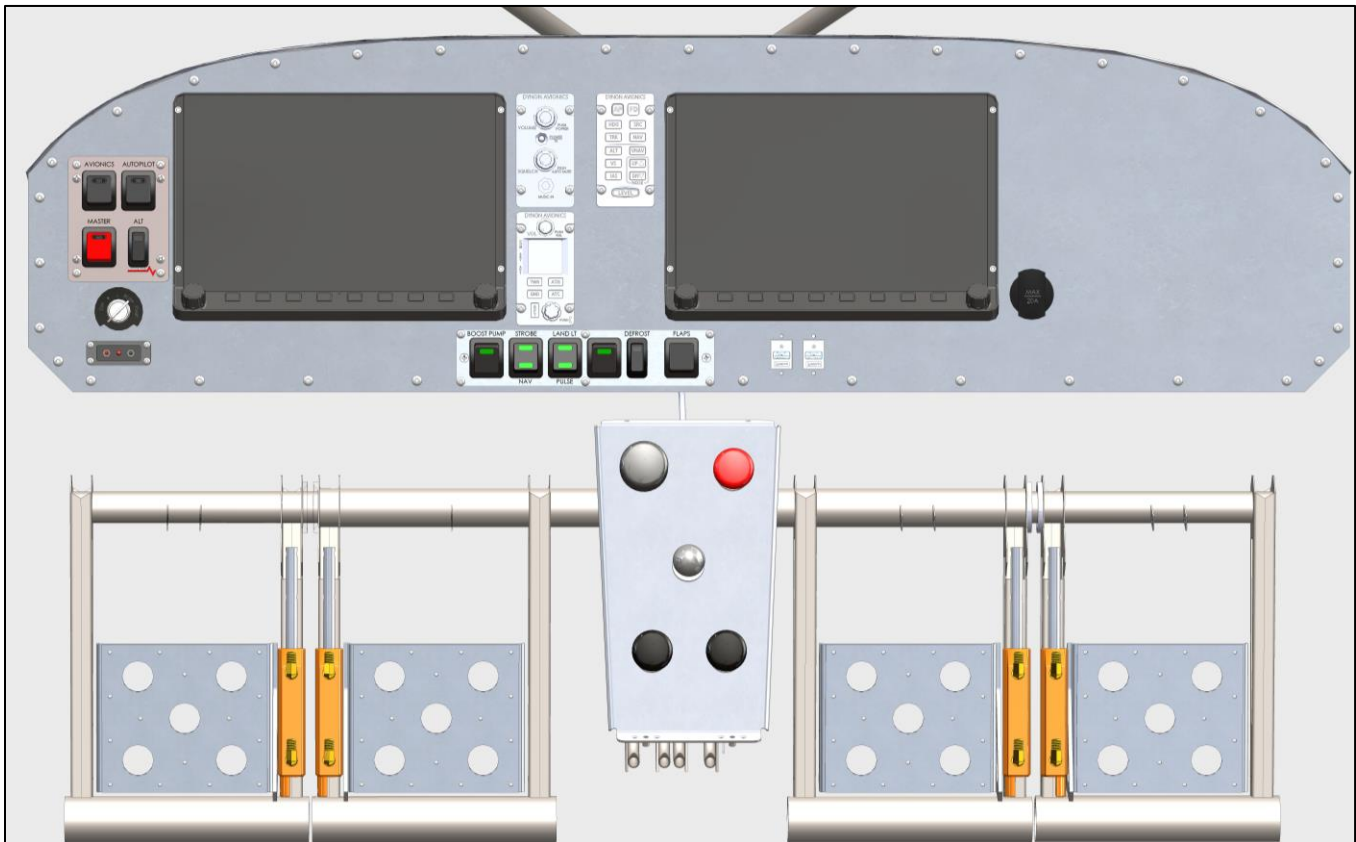


Figure 5.7.18.1 Instrument and control panels.

Table 5.7.2 Instrument and avionics equipment list.

<b>INSTRUMENTS</b>	<b>STANDARD</b>	<b>OPTIONAL</b>
SV-D1000 EFIS (left side)	<b>X</b>	
SV-D1000 EFIS (right side)		<b>X</b>
SV-ADAHRS-200	<b>X</b>	
SV-ADAHRS-201		<b>X</b>
SV-EMS-220	<b>X</b>	
SV-BAT-320	<b>X</b>	
<b>COM SYSTEM</b>	<b>STANDARD</b>	<b>OPTIONAL</b>
SV-COM-C25 VHF Transceiver (primary)	<b>X</b>	
SV-COM-C25 VHF Transceiver (secondary)		<b>X</b>
SV-INTERCOM-2S Intercom	<b>X</b>	
<b>NAV SYSTEM</b>	<b>STANDARD</b>	<b>OPTIONAL</b>
SV-XPNDR-261 Mode S Transponder	<b>X</b>	
SV-GPS-2020 GPS Antenna/Receiver Module (primary)	<b>X</b>	
SV-GPS-2020 GPS Antenna/Receiver Module (secondary)		<b>X</b>
SV-ADSB-470 ADS-B	<b>X</b>	
<b>AUTOPILOT SYSTEM</b>	<b>STANDARD</b>	<b>OPTIONAL</b>
SV-42 Autopilot Servo (roll)	<b>X</b>	
SV-42 Autopilot Servo (pitch)	<b>X</b>	
SV-AP-PANEL Autopilot Panel	<b>X</b>	

### INSTRUMENTS

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

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### SV-D1000 EFIS

The primary instrument is the SV-D1000 EFIS as shown in Figure 5.7.18.2. As an option, a second SV-D1000 EFIS may be installed.



Figure 5.7.18.2 SV-D1000 EFIS.

### SV-ADAHRS-200/201

The primary ADAHRS is the SV-ADAHRS-200 as shown in Figure 5.7.18.3. For redundancy, a second ADAHRS, the SV-ADAHRS-201 may be installed as an option. The OAT probe connects to the ADAHRS. The pitot, static, and AoA pressure tubes connect to the ADAHRS. The ADAHRS is installed in the wing, just above the left seat



Figure 5.7.18.3 SV-ADAHRS-200

### SV-EMS-220

The instrument system utilizes a separate Engine Monitoring Module to connect to all engine and fuel system probes. See Figure 5.7.18.4. This module is mounted on the cabin side of the firewall above the rudder pedals. Note that no engine/fuel system probe wires are routed to the back of the instrument panel.



Figure 5.7.18.4 SV-EMS-220

### SV-BAT-320

A back-up battery is provided which is capable of powering the primary EFIS plus all core SkyView Network modules in the SkyView system. See Figure 5.7.18.5. Note that the autopilot Servos, COM Radio, Mode-S Transponder, and ADS-B receiver are powered directly by aircraft power. The back-up battery is mounted on the shelf between the instrument panel and the firewall.



Figure 5.7.18.5 SV-BAT-320

### COM SYSTEM

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

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### SV-COM-C25

The SkyView COM Radio consists of a dedicated control panel and a remote-mounted transceiver module. Both the primary transceiver module and optional second transceiver module are installed in the wing, just above the right seat.



Figure 5.7.18.6 SV-COM-C25

### 1.1 SV-INTERCOM-2S

The SV-INTERCOM-2S connects all the audio devices in the instrument panel. It provides dual stereo headset connections and dual radio outputs as well as an input for stereo music. See Figure 5.7.18.7.



Figure 5.7.18.7 SV-INTERCOM-2S



## NAVIGATION SYSTEM

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

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### SV-XPNDR-261

A remote-mounted Mode-S transponder with control and annunciation appearing on the SkyView displays. See Figure 5.7.18.8. The transponder module is mounted in the aft fuselage and may be accessed by removing the baggage bulkhead close-out panel.



Figure 5.7.18.8 SV-XPNDR-261

### SV-GPS-2020

The SV-GPS-2020 is a high integrity GPS that meets the 2020 ADS-B Out requirements. See Figure 5.7.18.9. For redundancy, a second GPS may be installed as an option. Both the standard and optional GPS's are mounted externally on the upper surface of the wing.



Figure 5.7.18.9 SV-GPS-2020

SV-ADASB-470

A remote mounted receiver for ADS-B IN information that utilizes an externally mounted antenna. See Figure 5.7.18.10. The ADS-B receiver is mounted on the shelf between the instrument panel and the firewall.



Figure 5.7.18.10 SV-ADSB-470

## AUTOPILOT SYSTEM

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

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### SV-42

The autopilot consists of two SV-42 servos connected to the SkyView system. One servo is used to drive the aileron control, and the other servo is used to drive the elevator control. An SV-42 servo is shown in Figure 5.7.18.11. Both servos are mounted in the aft fuselage below the baggage floor.

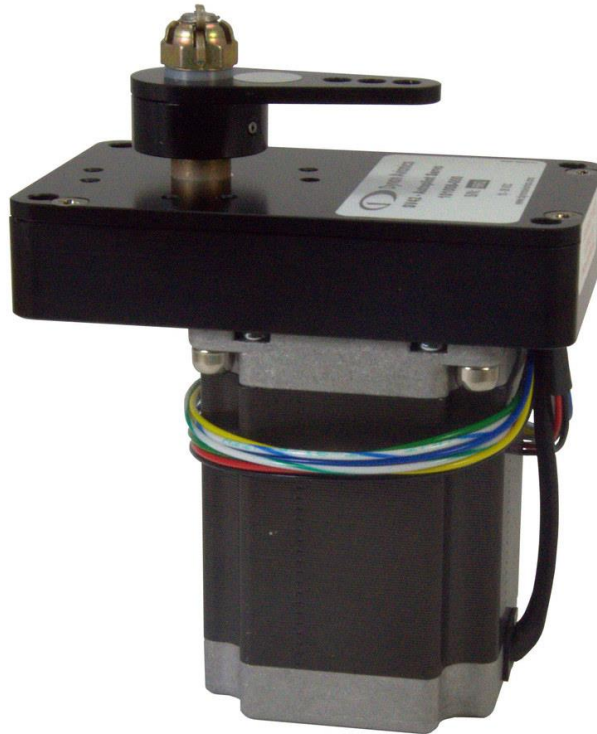


Figure 5.7.18.11 SV-42

### SV-AP-PANEL

The SV-AP-PANEL, shown in Figure 5.7.18.12, has dedicated buttons for all autopilot modes, including the flight director and level mode. It also has an integrated two channel trim controller that eliminates the need to equip with relay decks for trim control. The trim controller does not depend on the autopilot servos and continues to operate independently of them. It has SkyView-adjustable airspeed-based speed scheduling that can slow down trim motor movements as airspeed increases and it is even able to continue operation without SkyView as long as it is receiving aircraft power. Safety features include trim runaway protection and pilot command priority override.



Figure 5.7.18.12 SV-AP-PANEL

### ANTENNAS

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

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**USA**  
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## ANTENNA LOCATIONS

See Figure 5.4.13.13 for the location of the various standard and optional antennas on the aircraft.

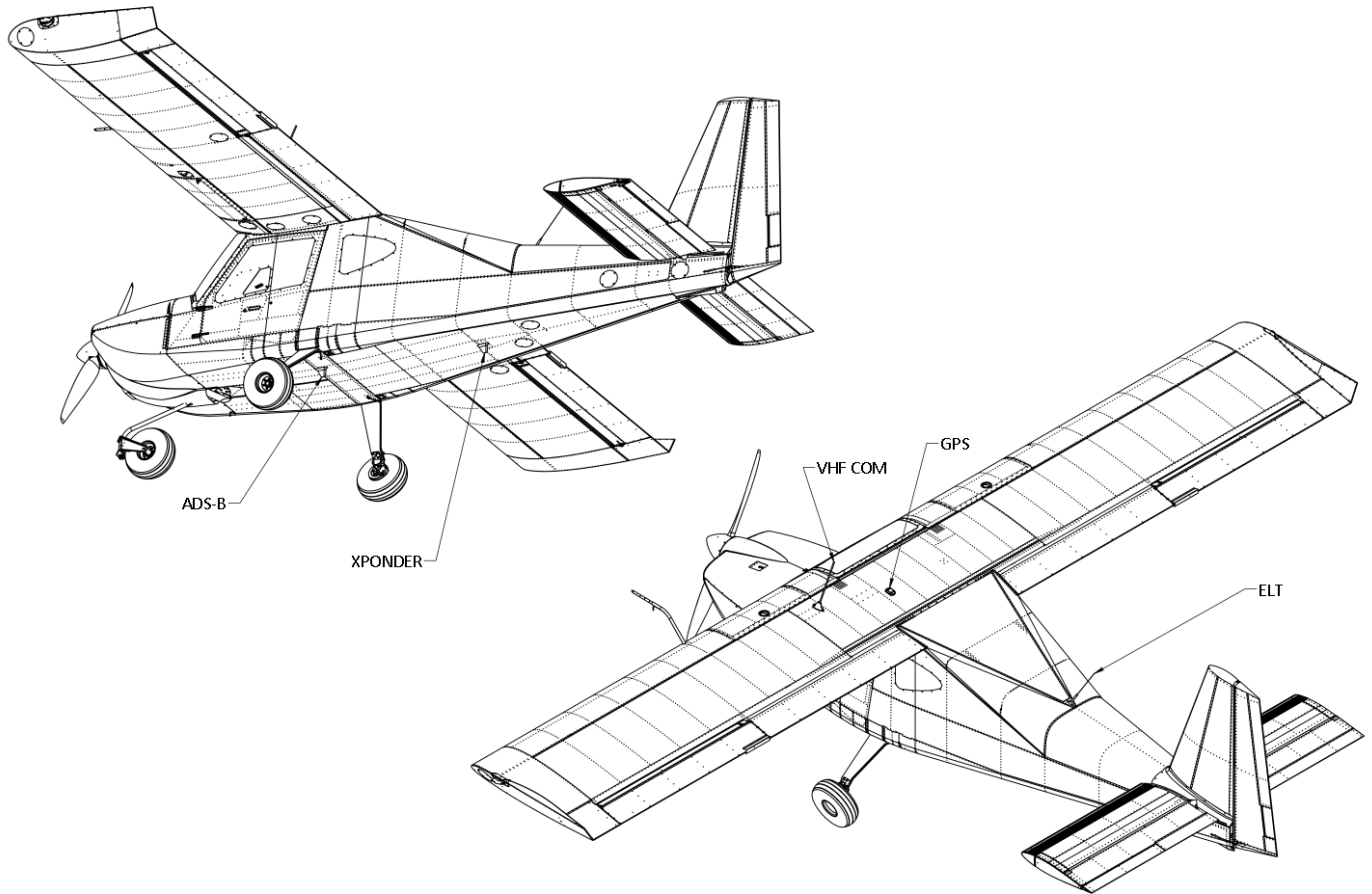


Figure 5.7.18.13 Antenna locations on the Vashon Ranger.

## **2. AVIONICS REMOVAL**

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

## (1) REMOVAL

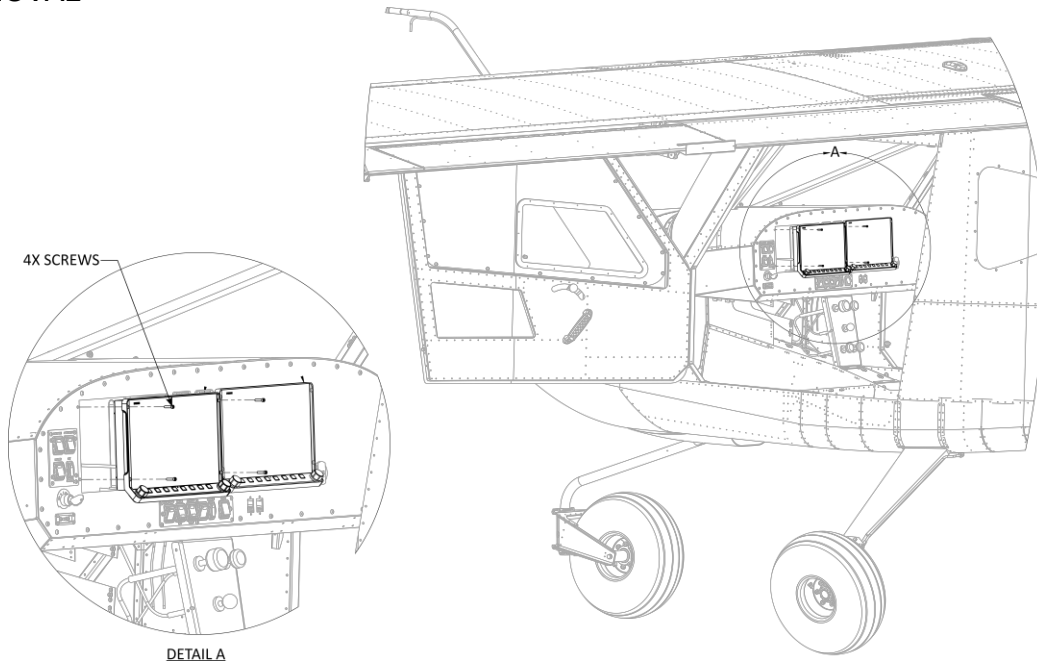


Figure 5.7.18.14 EFIS removal for access to avionics bay.

- (a) Remove EFIS screen by unfastening the four bolts, disconnecting the EFIS harnesses and setting both screens aside.
- (b) The wiring harnesses, control module, and various avionic components are accessible.
- (c) Components on the front panel can be removed by unfastening their screws.

## (2) INSPECTION

- (a) Ensure wiring harnesses and connectors are secure. Visually inspect for damage.

## (3) INSTALLATION

- (a) Installation is the component in the reverse order of its removal.

### 3. REPAIRS AND ALTERATIONS

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## 5.7.19 ENGINE CONTROLS

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## 1. GENERAL

The engine controls are located in the center of the cabin where they are easily accessible from either seating position. There is a single black throttle control knob located in the center console just below the instrument panel. The air-to-fuel mixture is adjusted manually with a red control knob also in the center console but placed just below the throttle control. Pulling the mixture control all the way back operates a cut-off valve on the carburetor that stops the supply of fuel to the engine.

## 2. THROTTLE

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 1.1.

### (1) THROTTLE CONTROL CABLE TO CENTER CONSOLE ATTACHMENT

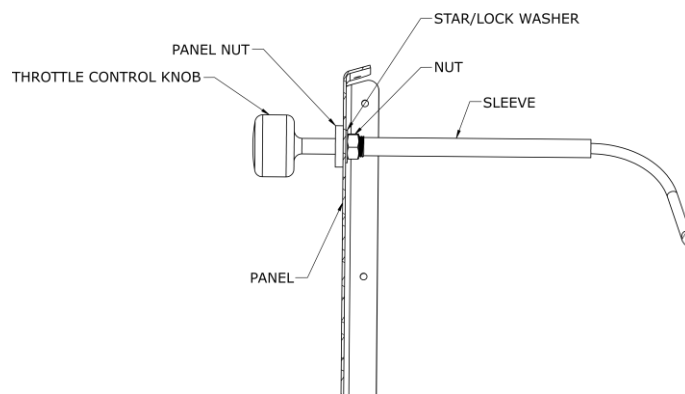


Figure 5.7.19.1 Throttle control nob.

- (a) The throttle control knob is secured to the center console with a lock washer and a nut.
- (b) The throttle knob should have enough movement so that the carburetor throttle lever contact the stops at both extents of its travel. It is important that there is a cushion when throttle knob is in the fully open position (the cushion

should not be more than 1/4" between the knob and the panel nut when the throttle is in the fully open position).

(2) THROTTLE CABLE ROUTING

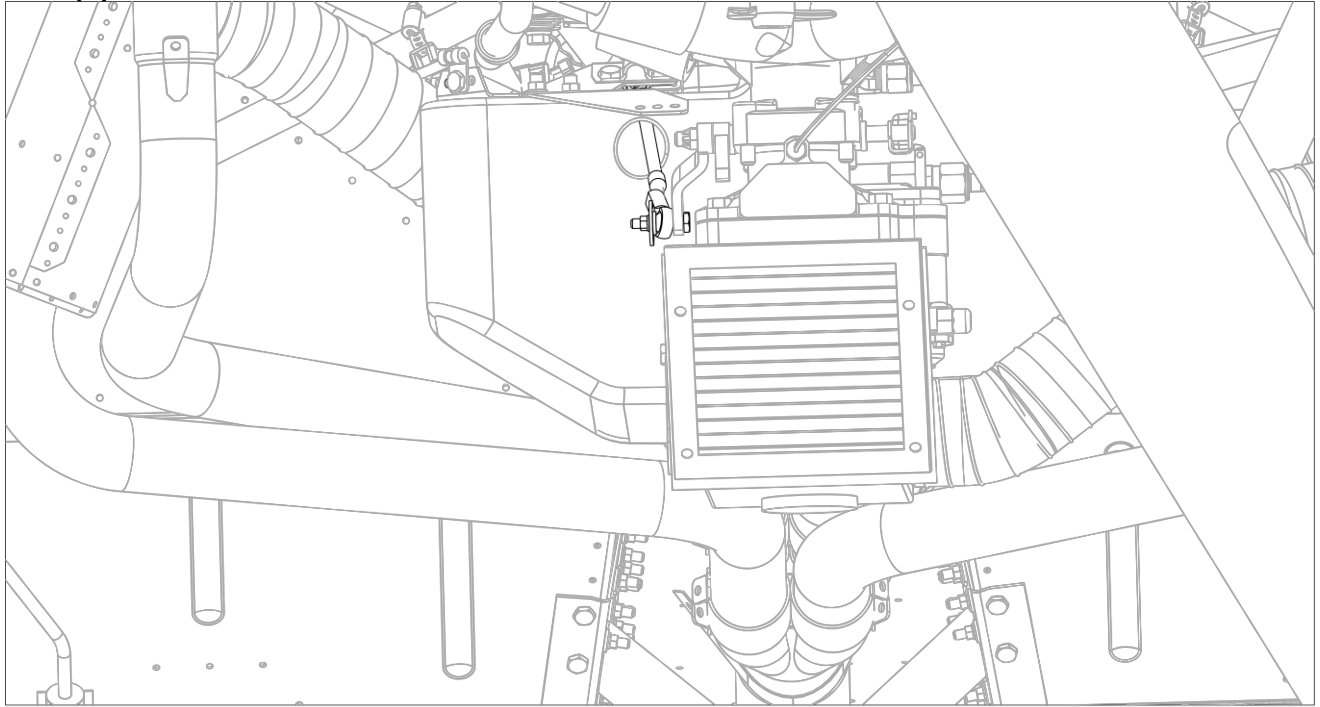


Figure 5.7.19.2 Throttle cable routing in front of the oil sump.

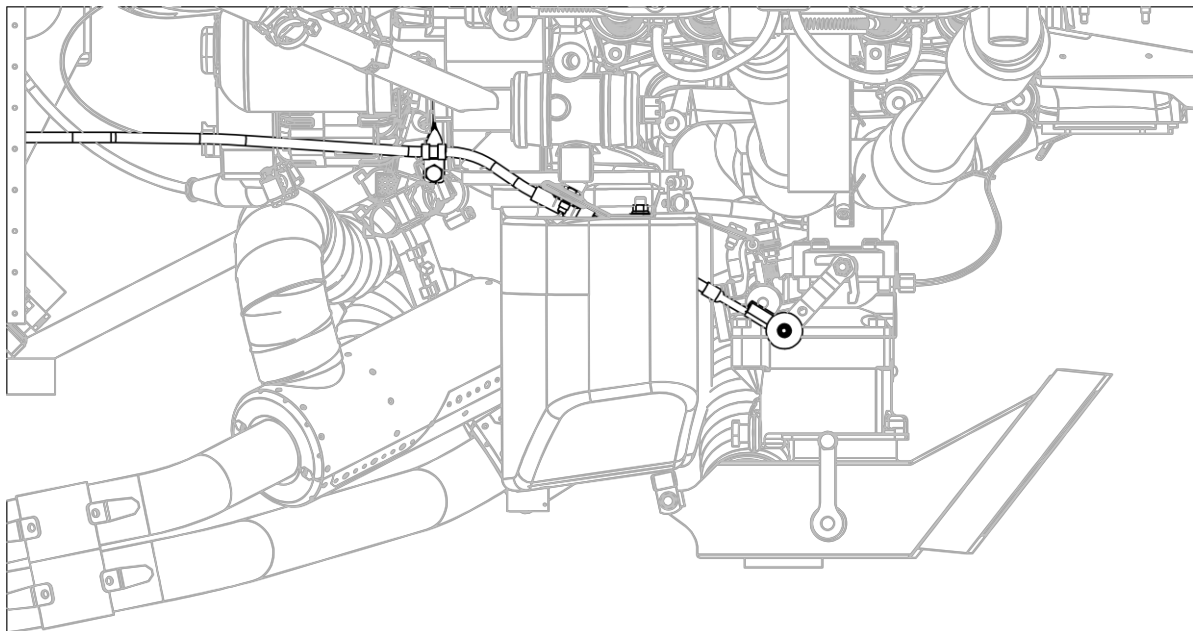


Figure 5.7.19.3 The cable routing from the firewall through the oil sump.

(a) The throttle cable is routed from where it is attached to the center console through the firewall, then through adel clamp mounted the oil filter stud and routing passage in the oil sump, and to the carburetor throttle arm.

(b) The throttle cable is secured to the oil sump via the bracket supplied.

### (3) THROTTLE CABLE TO CARBURETOR ARM ATTACHMENT

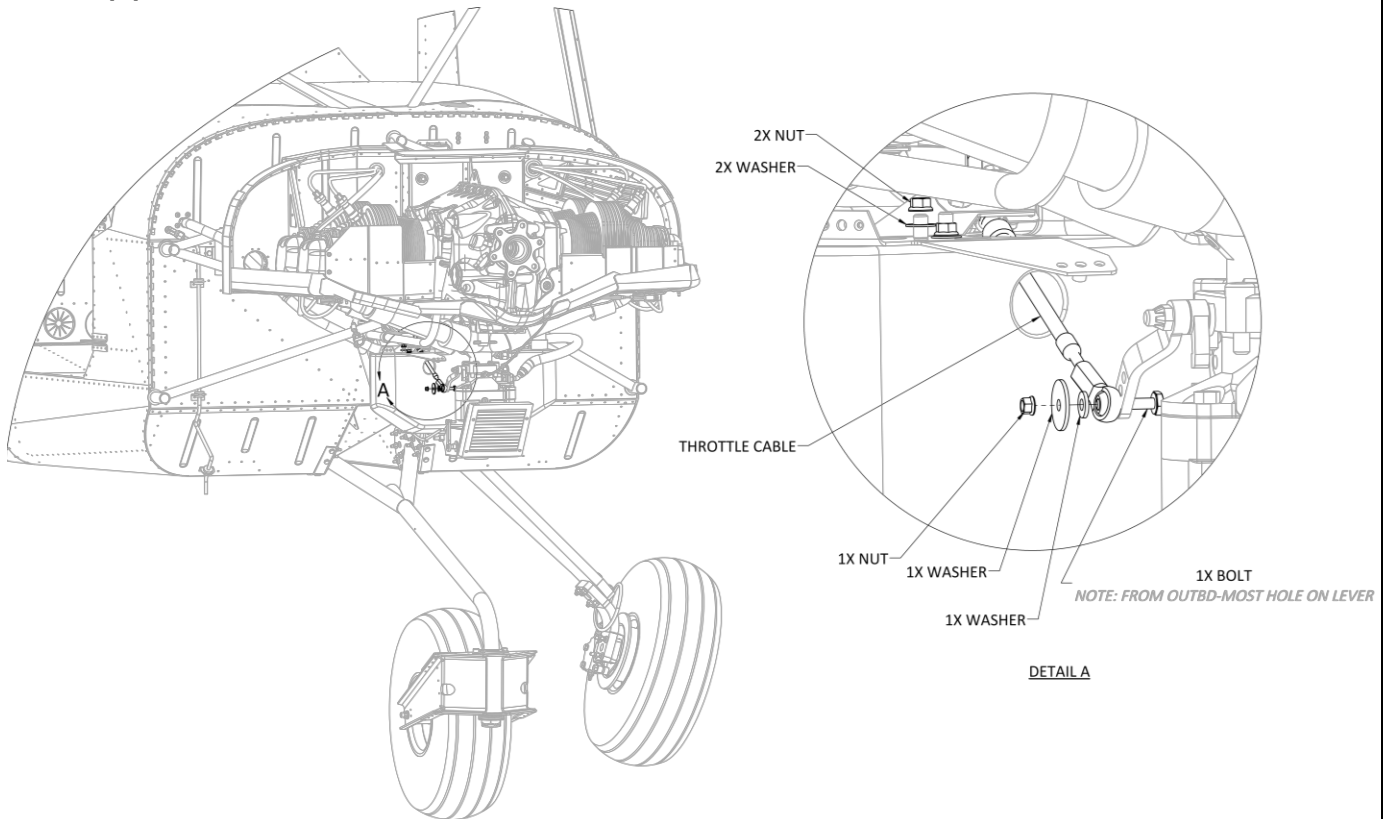


Figure 5.7.19.4 Throttle cable attachment to carburetor.

(a) The throttle cable is secured to the carburetor arm with a bolt, through bushings, washers, and an all metal lock nut.

(b) The throttle travel can be adjusted by adjusting the engagement of the rod end bearing and threads on the throttle cable. Be sure that the jam nut is retightened after making any adjustment.

### (4) INSPECTION

(a) Ensure that the throttle arm at the carburetor contacts both stops at either extreme of its travel. It is important that there is a cushion when mixture knob is in the fully open position (there should be no more than  $\frac{1}{4}$ " cushion between the knob and the panel nut in the full open throttle position).

- (b) Move the throttle to either full open or full closed, inspect cable attachment at the carburetor. Repeat the same procedure with the full opposite throttle setting.
- (c) Control operation should be smooth. Lubricate the cable as specified in Section 5.2 if/as required.

### 3. MIXTURE CONTROL

#### Required Tools:

No special tools are required for this operation.

#### Parts Required:

No parts are required at this time.

#### Level of Maintenance:

Heavy Maintenance.

#### Certification Required:

Please see Table 5.4.3 in Section 5.4.

#### (1) MIXTURE CONTROL CABLE TO CENTER CONSOLE ATTACHMENT

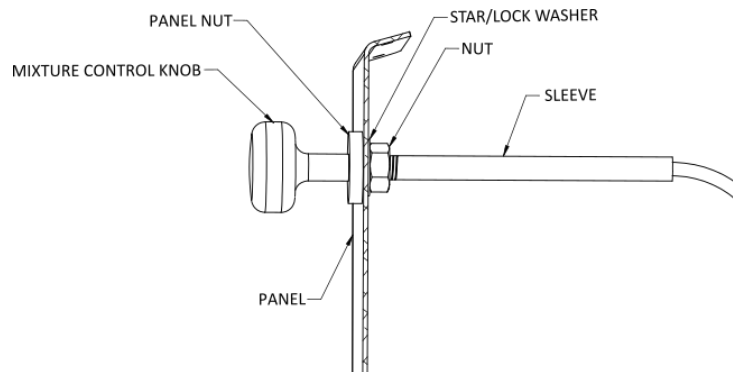


Figure 5.7.19.5 Mixture control nob.

- (a) The mixture control knob is secured to the center console with a lock washer and a nut.
- (d) The mixture knob should have enough movement so that the carburetor mixture arm contacts the stops at both extents of its travel. It is important that there is a cushion when mixture knob is in the fully open position (there should be no more than ¼" cushion between the knob and the panel nut in the full open throttle position).

## (2) MIXTURE CABLE ROUTING

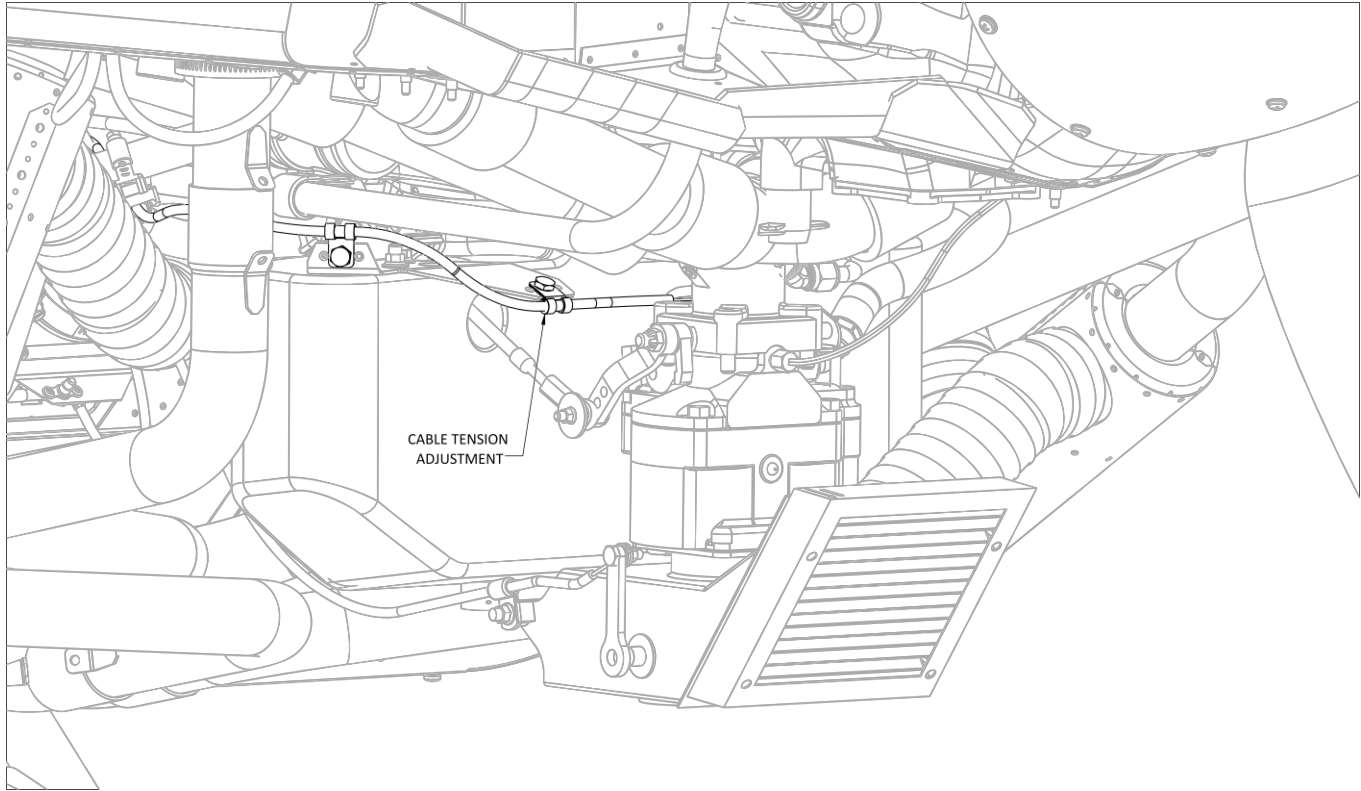


Figure 5.7.19.6 Mixture cable attachment. Can be used to adjust cable tension.

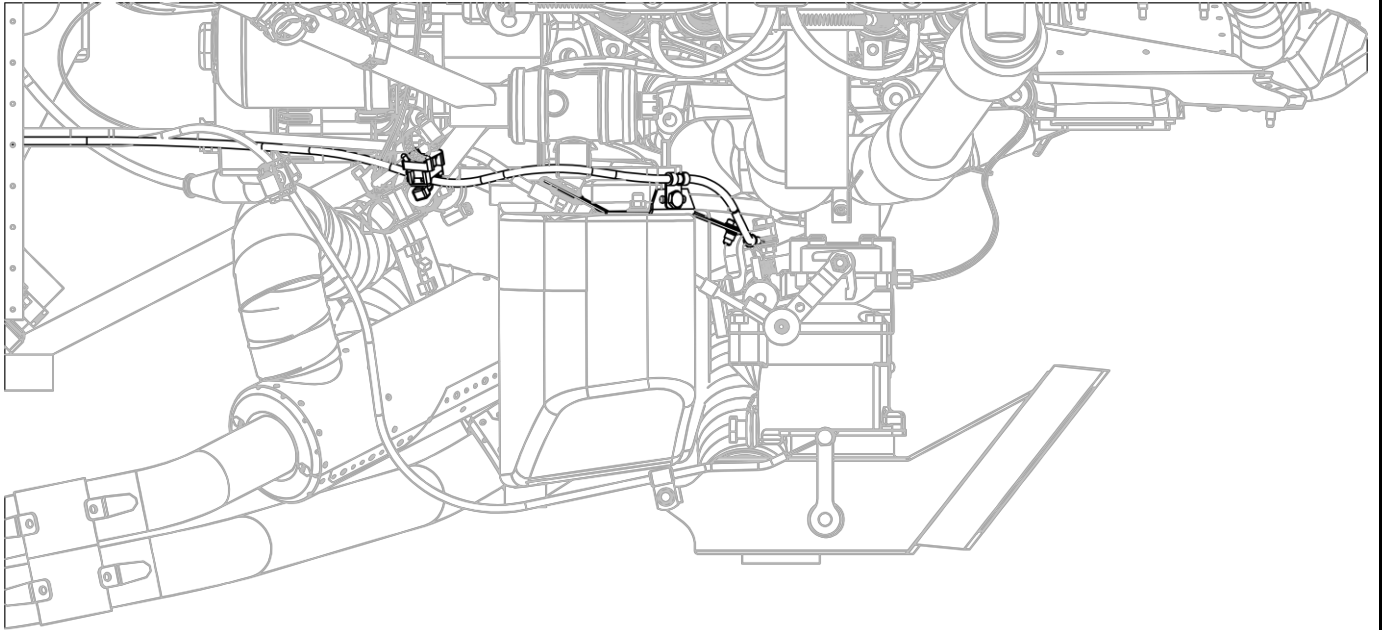


Figure 5.7.19.7 Mixture cable routing around the oil sump.

- (a) The mixture cable is routed from where it is attached to the center console through the firewall and then around the right side of the oil sump to the carburetor mixture arm.
- (b) The mixture cable is secured to the oil sump via the two mounting points.
- (c) The position of the cable housing in the mixture bracket affects the travel of the knob in relation to the instrument panel. The travel can be adjusted by loosening the bolt holding the cable housing clamp and sliding the cable housing in the clamp. Re-tighten the clamp and check travel.
- (d) Be sure the cable housing is held tightly in the clamp after making any adjustments.



## (3) MIXTURE CABLE TO CARBURETOR ARM ATTACHMENT

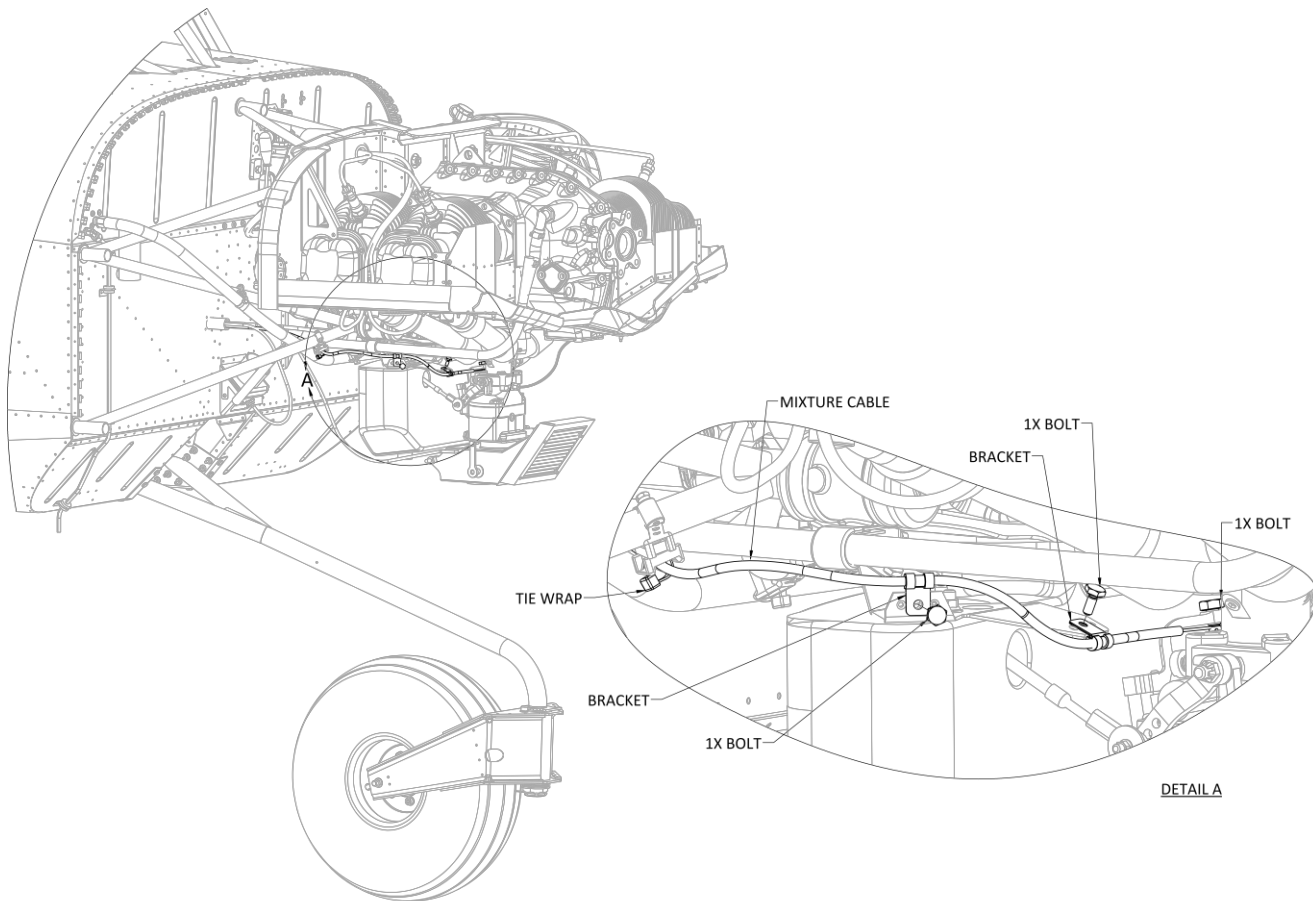


Figure 5.7.19.8 Mixture cable carburetor attachment.

- (a) The control cable rod pivots the mixture control lever on the carburetor. The rod is held tight by the mixture swivel fitting.
- (b) Adjusting the cable rod length at the swivel fitting affects the travel of the mixture control lever. There should be enough travel in the lever that it reaches the stops on either extreme of its travel.
- (c) The swivel nut should be tightened enough to hold the cable rod firmly but not enough to shear it or strip the threads. In addition, the bolt should be able to move freely on the carburetor arm. If an improper washer stack is used, then the inner wire of the mixture control may clamp the bolt too tight. This can cause binding and may restrict movement.

**(4) INSPECTION**

- (a) Ensure that the mixture lever at the carburetor contacts both stops at either extreme of its travel. It is important that there is a cushion when mixture knob is in the fully open position. At the same time, there should be no more than ¼" cushion between the knob and the panel nut in the full rich position.
- (b) Inspect to be sure the cable attach swivel does not have excessive play and the cable is held tightly by the clamp. However, it is important that the carburetor arm moves freely. If an improper washer stack is used, then the mixture control can clamp the bolt too tight and restrict.
- (c) Control operation should be smooth. Lubricate the cable as specified in Section 5.2 if/as required.

**4. REPAIRS AND ALTERATIONS**

No major repair or alterations, as outlined as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

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## **5.7.20 ELECTRICAL POWER SYSTEMS**

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<b>5.</b>	<b>BATTERY</b>	<b>5.7.20-9</b>
<b>6.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.20-11</b>

## **1. GENERAL**

The electrical system in the Vashon Ranger uses an alternator to power the avionics, lights, and other electrical equipment. A Sky-Tec starter is used with a Plane-Power alternator, and a 12 Volt Lithium Iron Phosphate EarthX battery in the aircraft. The following section will outline the power system from the alternator, battery, and starter. It will include a brief outline of the components followed by their removal. Please see the section 5.7.21, electrical systems, for information about the electrical system in general.

**2. TROUBLESHOOTING**

PROBLEM	PROBABLE CAUSE	REMEDY
No Operation	Engine speed too low	Check for output at higher speed
	Blown circuit protection	Replace fuse(s) and or reset electronic circuit breakers
	Bad wire connections	Replace bad connectors
	Shear coupling broken	Replace shear coupling
	Regulator faulty	Replace alternator
	Alternator faulty	Overhaul or replace alternator
Low Voltage	Engine speed too low	Increase engine speed
	Very low battery	Charge battery
	Bad battery (shorted cell)	Replace battery
	Load exceeds alternator output	Decrease load or increase engine RPM
High Voltage	Bad battery (open)	Check connections and/or replace battery
	Bad regulator	Replace alternator

Refer to Figure 5.7.21.2, and use a high-impedance (preferably digital) volt/ohmmeter (DVM) to make the following checks:

**WARNING**  
**THE ENGINE SHOULD NOT BE RUNNING AND THE MAGNETOS SHOULD BE OFF!**

- (a) Check the electrical page of SkyView to ensure that the field breaker is not tripped.
- (b) Check the voltage at the alternator on the field pin (see part 4 of this section).
- (c) If problem persists, please see part 4 of this section.

### 3. STARTER

#### (1) GENERAL

The starter is manufactured by Sky-Tec. It is a model C12ST2 12 Volt High-Torque starter with a built-in electro-mechanical pinion to actuate the gear.

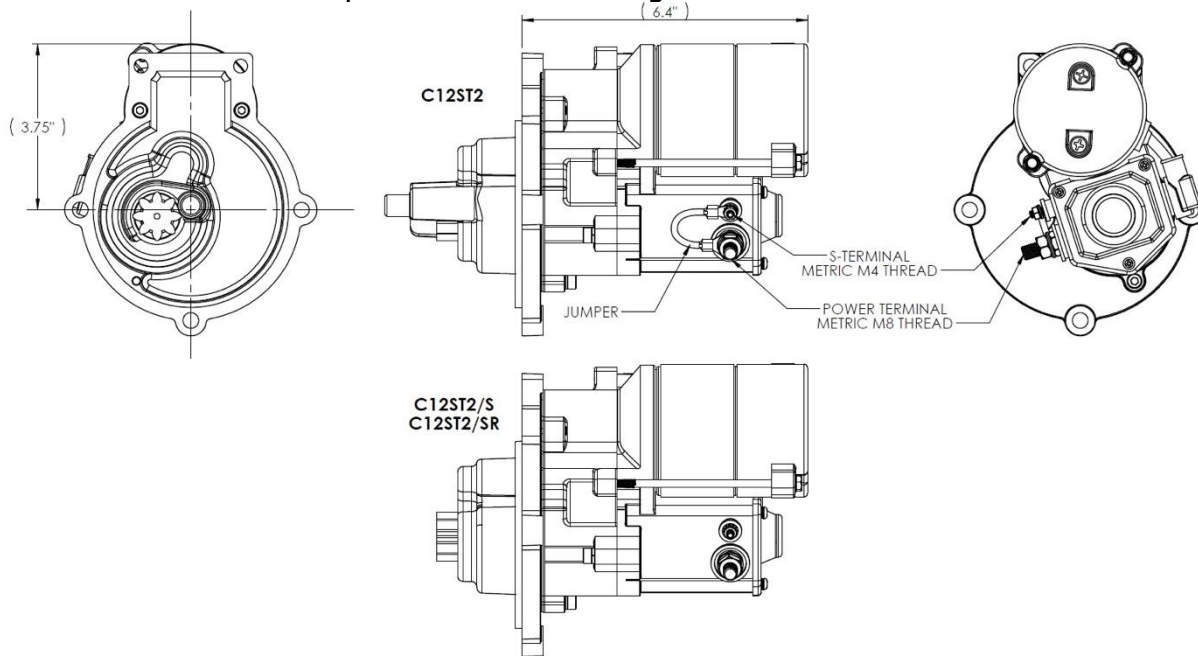


Figure 5.7.20.1 Starter assembly.

#### Required Tools:

No special tools are required for this operation.

#### Parts Required:

No parts are required at this time.

#### Level of Maintenance:

Heavy Maintenance.

#### Certification Required:

Please see Table 5.4.3 in Section 5.4.

**(2) TROUBLESHOOTING**

PROBLEM	PROBABLE CAUSE	REMEDY
Starter turns engine slowly when cold	Weak battery	- Charge battery - Test - Replace, if necessary
Starter turns engine slowly when hot	Bad connection, cable, or solenoid	- Clean connections and/or - replace faulty component
When starter engages, it makes a loud grinding noise	Starter damaged by engine kicking back	- Correct the ignition problem - Repair or replace starter
When the starter is engaged, there is a click and the engine does not turn	Voltage not getting to starter Starter solenoid defective	- Replace starter solenoid
Starter drive gear stays engaged for some length of time after the start button released	Stuck starter solenoid	- Replace starter solenoid - Repair or replace starter

**(3) REMOVAL**

Remove starter as per manufacturer's instructions. Please see below for guidelines.

- (a) Disconnect negative terminal of the aircraft battery.
- (b) Disconnect the power cable.
- (c) Unbolt the starter attachment bolts and nuts.
- (d) Retain all existing attach hardware.
- (e) Remove starter from engine.

**CAUTION**

**The following step removes a pinion shaft support bearing which is pressed into the crankcase. The bearing may fall apart during extraction. Take care to insure that bearing needles do not drop into the accessory case**

- (f) Remove needle bearing, if present. Refer to Figure 5.7.20.2.
- (g) Clean gasket surface on accessory case starter mounting pad.



(h) Thoroughly clean the bearing bore.

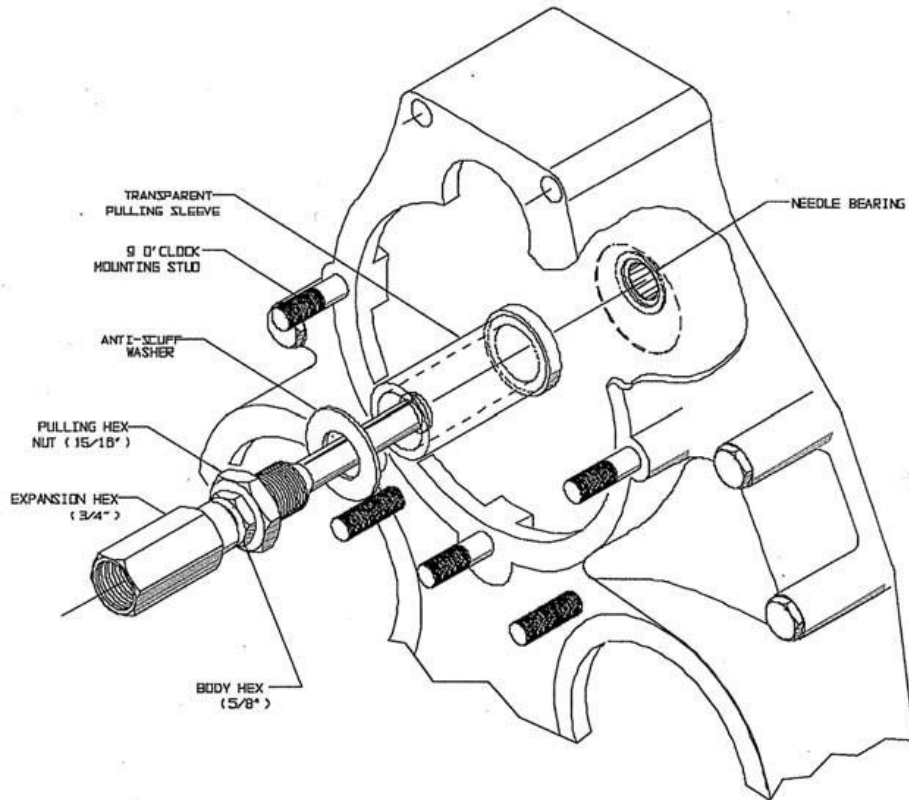


Figure 5.7.20.2 Starter needle bearing removal.

(4) INSPECTION

(a) Visually inspect the teeth of the starter gear and starter's housing for damage.

(5) INSTALLATION

(a) Install starter as per manufacturer's instructions.

## 4. ALTERNATOR

### (1) GENERAL

The alternator is manufactured by Plane Power. It is a model EX14-50, gear-driven, 50 ampere, internally regulated alternator as shown in Figure 5.7.20.3. Please see the manufacturer's manual for more information.

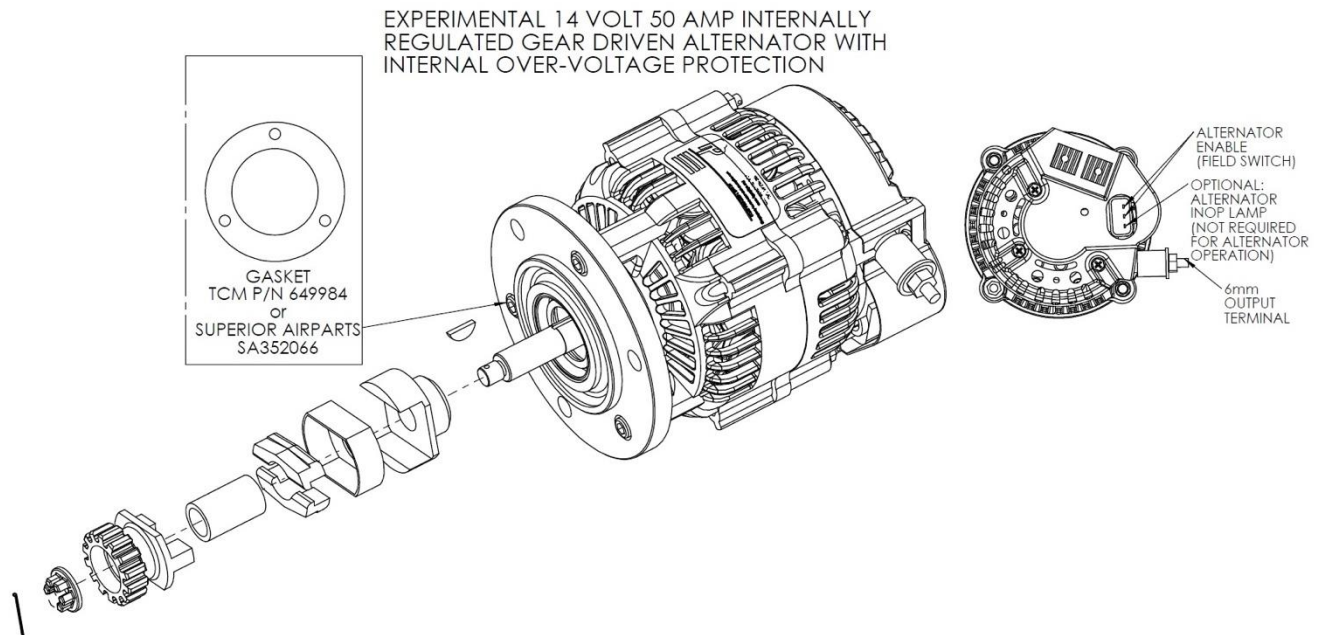


Figure 5.7.20.3 Alternator overview.

#### Required Tools:

No special tools are required for this operation.

#### Parts Required:

No parts are required at this time.

#### Level of Maintenance:

Heavy Maintenance.

#### Certification Required:

Please see Table 5.4.3 in Section 5.4.

### (2) REMOVAL

(a) Ensure that aircraft is disconnected from the battery.

(b) Disconnect the wires.

(c) Remove the mounting bolts.

### (3) INSPECTION

#### NOTE

Unless repairing broken connectors/wires in the field, repairs should be conducted by personnel outlined in Section 5.4.

(a) Inspect drive gear assembly and replace bushings if needed. Torque shaft nut to 180 in-lb. min., do not exceed 220 in-lb. install cotter pin if needed.

(b) Turn on FIELD/ENABLE switch with engine running at 1200 RPM. Verify the voltage to be 14.2+- 0.3 volts from the alternator (with EFIS or voltmeter). Turn on Landing Lights and ensure that the voltage stays at 14.2+/-0.3 V.

(c) After 5 years of 500 hours, check the field brush for proper length. If the field brush extends less than 0.250" from the edge of the brush holder, than the bushes are excessively worn and should be replaced.

### (4) INSTALLATION

(a) Install alternator as per manufacturer's instructions.

## 5. BATTERY

The battery is a 12 Volt Lithium Iron Phosphate battery. It is sealed and has built-in circuitry to prevent excessive discharge or damage due to overcharging. Inspect annually for physical condition and cleanliness. For an up to date or more in depth inspection, please visit the manufacturer's manual ([https://earthxbatteries.com/wp-content/uploads/2019/08/ETX\\_Manual\\_111017\\_X.pdf](https://earthxbatteries.com/wp-content/uploads/2019/08/ETX_Manual_111017_X.pdf)).

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

#### (1) REMOVAL

- (a) Remove the engine top cowl as described in Section 5.7.9.
- (b) Disconnect the battery negative cable, then the positive cable.
- (c) Remove the battery hold-down bar and then remove the battery.

#### (2) INSPECTION

- (a) Inspect the battery and terminals for condition and corrosion. Ensure battery terminals are torqued to correct values.
- (b) Test fault indicator by touching the battery's fault with output to ground and checking if the internal battery LED/ Battery indicator on the EFIS appears.

#### (3) CHARGING

##### NOTE

Charging should be conducted in an environment cooler than 140°F (60°C and 30°C) and not in direct sunlight.

## NOTE

Unplug chargers after batteries reach full charge.

## NOTE

Never leave a battery unattended while charging and unplug charger while not in use.

(a) The recommended battery charger is the Optimate lithium battery charger supplied with the aircraft. Do not use a battery charger with a de-sulfate mode, deep conditioning mode, pulse mode, or on which pulses above 15V. Charger maintenance mode should range from 13.3-13.9V. If the battery has been over-discharged and "disconnected", the voltage at the battery terminal should be near zero volts if the battery still has a load on it. If the battery is disconnected from the load it will automatically reconnect and the terminal voltage will be between 9-12V (remove the load by removing the positive or negative cables from the battery). In this case, simply connect the battery to a charger to restore charge (charge with 1-5 amps for 20-30 minutes), and then re-check the voltage. If the voltage is 12.8V or greater, the battery should be ok and can be fully charged. If the battery that displays zero volts, check EarthX's website for a list of compatible chargers, and specifically chargers that will work for recharging an "over-discharged" battery (referred to as a BMS reset) for which the BMS's over-discharge protection has activated and won't reset automatically when the load is removed. Charging time using a 1-amp charger is 12 hours; charging rate will vary depending on the type of charger used.

(b) For more information, including a list of chargers, please see the manufacturer's installation manual at: [https://earthxbatteries.com/wp-content/uploads/2019/08/ETX\\_Manual\\_111017\\_X.pdf](https://earthxbatteries.com/wp-content/uploads/2019/08/ETX_Manual_111017_X.pdf) or the charging instructions: <https://earthxbatteries.com/our-batteries/battery-charging>

#### (4) INSTALLATION

(a) Place the battery in the tray and install the battery hold-down bar.

(b) Connect the battery positive cable, then the negative cable.

(c) Install the engine top cowl as described in Section 5.7.9.

## **6. REPAIRS AND ALTERATIONS**

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or this manual are authorized at this time.

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**Vashon Aircraft™**  
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**5.7.21 ELECTRICAL SYSTEMS**

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<b>5.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.21-11</b>



## **1 GENERAL**

This section outlines the general wiring structure of the aircraft, the lighting system, and the emergency locator transmitter (ELT) system. For more information on the alternator, battery, or starter, please see section 5.7.20. For more information on the avionics system, see section 5.7.18.

## **2 ELECTRICAL POWER SYSTEMS**

### **(1) GENERAL**

The aircraft uses a 12-volt DC electrical system with the power supplied by a 50-amp engine-driven alternator and a 12-volt storage battery.

In addition to the alternator and the battery, the electrical system consists of an internally regulated over-voltage protection system, master and starter solenoids, an AFS module incorporating electronic circuit breakers for protection, and an Advanced Flight System switch module. The battery is located on the firewall.

(2) SCHEMATICS

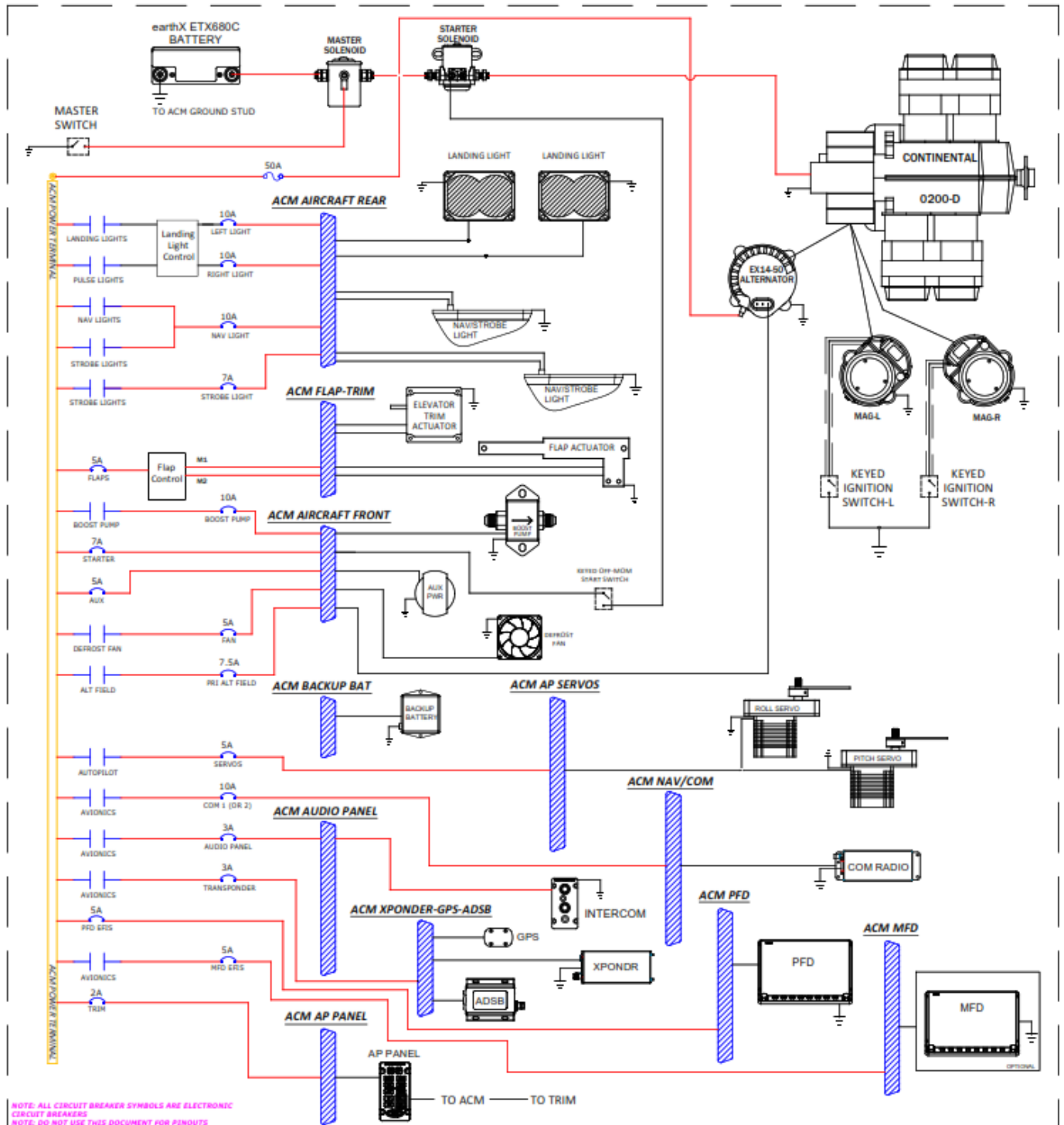


Figure 5.7.21.1 Main bus power schematic.

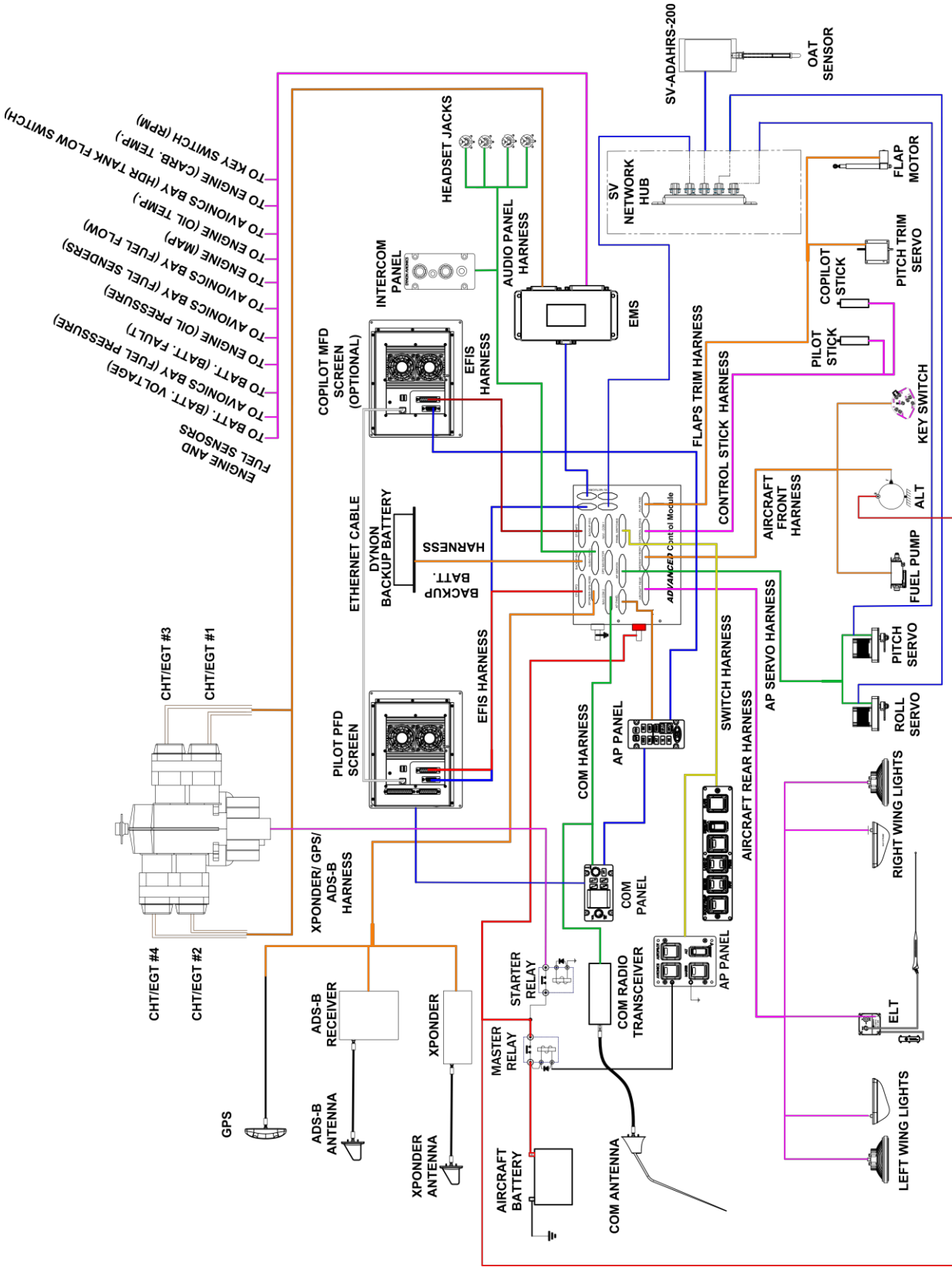


Figure 5.7.21.2 General wiring schematic.

NOTE: SV-NET HARNESSSES ARE SHOWN IN BLUE

### **3 LIGHTING SYSTEMS**

#### **(1) GENERAL**

The Vashon Ranger is equipped with Landing lights on each wing and LED anti-collision lights on each wing tip. Each landing light consists of two LED lights in an assembly. In addition, each anti-collision light assembly consists of a front-facing red or green position light, a strobe light, and an aft-facing white position light.

(2) SCHEMATIC

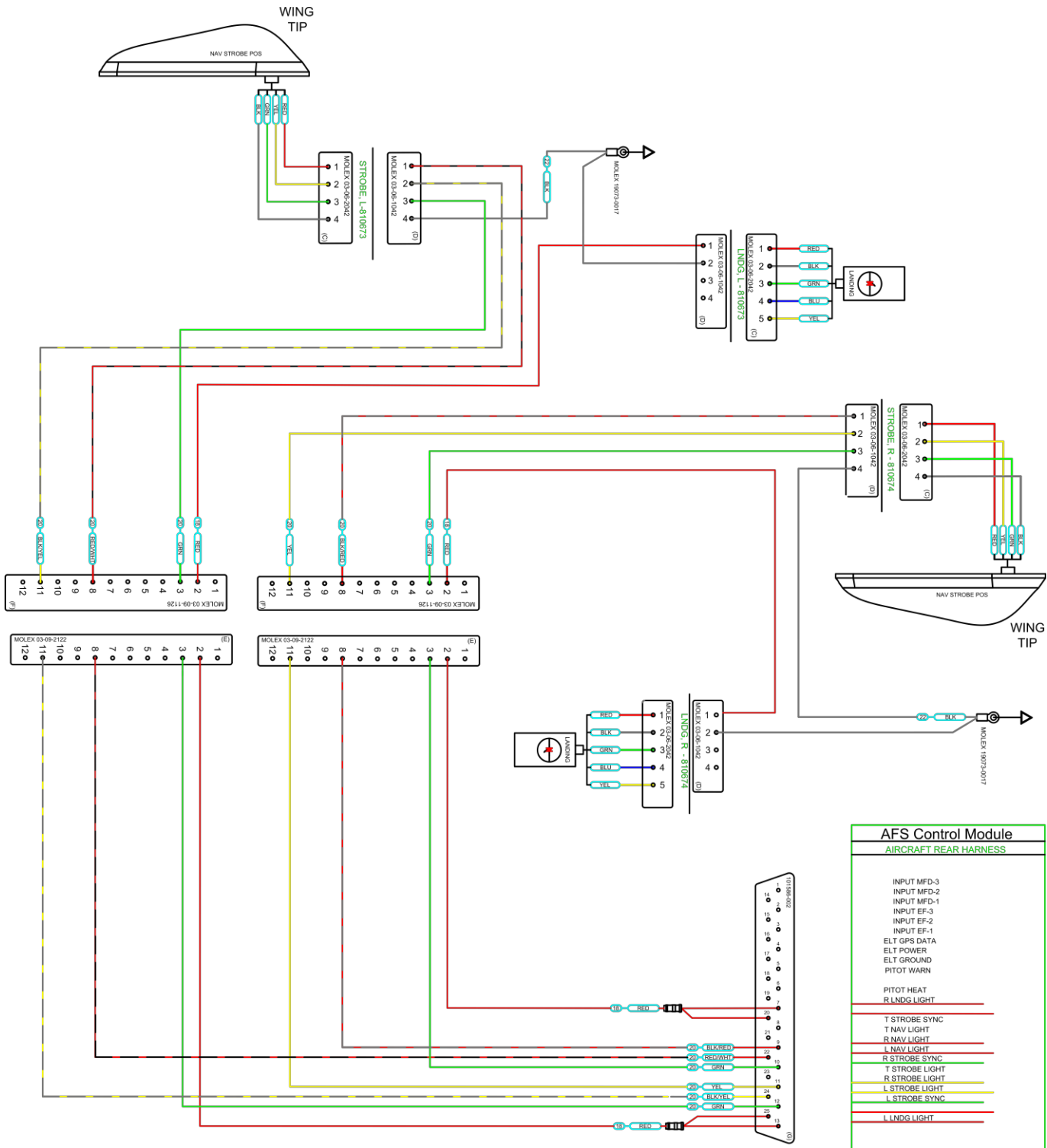


Figure 5.7.21.3 Wiring schematic for lighting system.

## 1. LANDING LIGHTS

The landing lights consist of an LED light unit mounted in the leading edge of each wing. The LED light is an integrated unit and any non-functional light units must be returned to the manufacturer for repair and/or replacement.

A Plexiglas lens the same shape of the leading edge is attached to each LED light unit via an aluminum bracket. The bracket also includes four nut plates for attachment to the wing.

The landing and taxi lights have two modes of operation, "LAND LT" in which both lights are continuously on and "PULSE" in which one light is on while the other light is off and then off while the other is on.

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

### (1) TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Both lights do not work	Blown circuit breaker	Reset electronic circuit breaker
	Loose wiring	Check wiring to lights
One light does not work	Loose wiring	Check wiring to non-functional light
	Faulty light unit	Remove light unit and return to manufacturer
Lights do not alternately come on and off with switch in "PULSE" position	EFIS setting	Ensure pulse setting in EFIS are correct.

**(2) REMOVAL**

- (a) Remove the access cover from the wing tip.
- (b) Remove the four screws holding the LED light unit/bracket/lens assembly to the wing. It will be necessary to reach in the access opening in the wing tip to hold the light unit as the screws are being removed.
- (c) Rest the light unit/bracket/lens assembly on the inside of the wing skin. Reaching with one hand through the opening in the leading edge and the other hand through the access opening in the wing tip, de-mate the light unit connector.
- (d) Remove the light unit/bracket/lens assembly by passing it through the wing tip access opening.

**(3) DISASSEMBLY**

- (a) Using a #30-bit, drill-out the blind rivets holding the lens to the bracket being careful to not enlarge the hole in the lens or bracket.
- (b) Remove the nuts/washers/bolts attaching the light unit to the bracket and separate the bracket and light unit.

**(4) REASSEMBLY**

- (a) Install the nuts/washers/bolts to reattach the bracket and light unit.
- (b) Attach the lens to the bracket /light unit by installing screws into each nutplate on the bracket.
- (c) Rivet the lens to the bracket then remove the screws.

**(5) INSTALLATION**

- (a) Pass the light unit/bracket/lens assembly through the opening in the wing tip and rest it on the inside of the wing skin.
- (b) Mate the light unit electrical connector to the aircraft wiring harness.
- (c) Hold the light unit/bracket/lens assembly in place on the wing leading edge and install screws.
- (d) Install the cover plate on the wing tip.

## 2. NAVIGATION AND ANTI-COLLISION LIGHTS

The navigation and anti-collision lights consist of LED lights integrated into single units mounted to fiberglass pads located on each wing tip. Each unit consists of a red or green forward-facing light, a white aft facing light, and a side facing anti-collision light.

A single rocker switch on the instrument panel controls both the navigation and anti-collision lights. With the switch in the "STROBE" position both anti-collision and navigation lights are on. With the switch in the "NAV" position, only the navigation lights are on.

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

### (1) TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Both anti-collision lights do not work	Tripped anti-collision light electronic circuit breaker	Reset electronic circuit breaker
	Loose wiring	Check wiring to lights
One anti-collision light does not work	Loose anti-collision light wiring	Check anti-collision wiring to non-functional light unit
	Faulty light unit	Remove light unit and return to manufacturer
Both navigation lights do not work	Tripped navigation light electronic circuit breaker	Reset electronic circuit breaker
	Loose navigation light wiring	Check wiring to lights
One navigation light does not work	Loose navigation light wiring	Check navigation wiring to non-functional light unit
	Faulty light unit	Remove light unit and return to manufacturer
One light unit does not work in either strobe or nav mode	Loose wiring	Check wiring to non-functional light
	Faulty light unit	Remove light unit and return to manufacturer
Flashing of anti-collision lights not synchronized	Loose synchronize wire	Check synchronize wire between light units



(2) REMOVAL

Unfastened the single screw and remove the light unit from its mounting bracket. Pull it away from the mounting pad until the electrical connector is exposed then disconnect the light unit electrical connector from the aircraft wiring harness.

(3) INSTALLATION

Mate the light unit electrical connector to the aircraft wiring harness and pass the electrical connector into the mounting pad then attach and fasten the light unit to its mounting bracket.

**3. CABIN LIGHTING**

Backlighting of the switch panels, com radio control panel, and autopilot control panel is controlled via the dimmer function of the EFIS. No other cabin lighting is provided.

**4. ELT EMERGENCY SYSTEM**

(1) GENERAL

The aircraft is supplied with an emergency locator transmitter (ELT) that meets TSO C91a. The ELT is mounted in the aft fuselage and may be accessed by removing the baggage bulkhead close-out panel. The ELT remote control/indicator panel is mounted on the right side of the instrument panel.

(2) SCHEMATIC

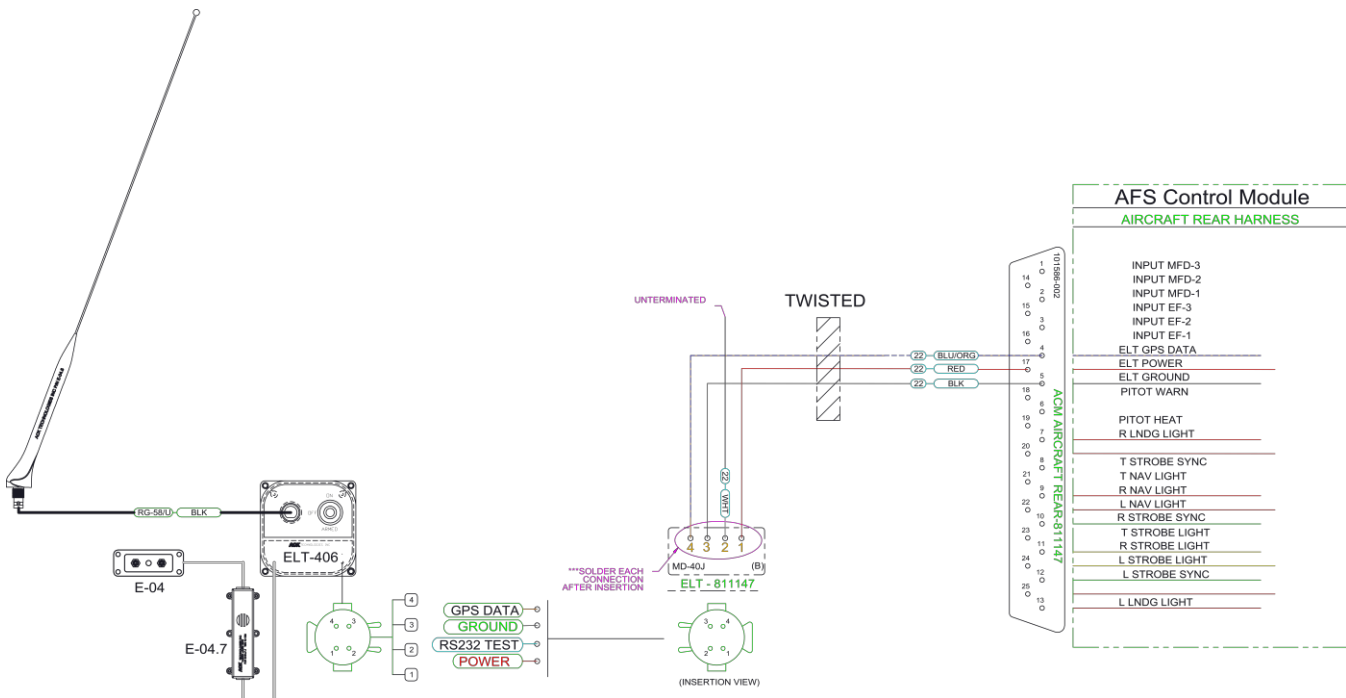


Figure 5.7.21.4 Wiring schematic for ELT.

## **5. REPAIRS AND ALTERATIONS**

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

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**5.7.22 SEATS**

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<b>3.</b>	<b>REPAIRS AND ALTERATIONS</b>	<b>5.7.22-3</b>

## 1. GENERAL

Each seating position consists of a seat well or seat pan that is built into the floor structure and a backrest that is attached to the floor with a piano hinge and is supported by a brace on the interior sidewall just aft of the aft edge of the door. See Figure 5.7.22.1.

Separate cushions are provided for the seat bottom and the backrest. The seat bottom cushion consists of a main cushion and a small "booster" cushion that can be removed or installed depending upon the sitting height of the pilot.

The backrest is designed to hinge forward to provide ready access to the aft fuselage for stowage of baggage or for access to perform maintenance tasks. With both seat bottom and seat back cushions removed, the seat back may be hinged forward and left to rest on the forward edge of the seat.

**WARNING**  
**THE BACKREST MUST NOT BE HINGED FORWARD DURING FLIGHT AS THIS WILL RESTRICT MOVEMENT OF THE FLIGHT CONTROLS.**

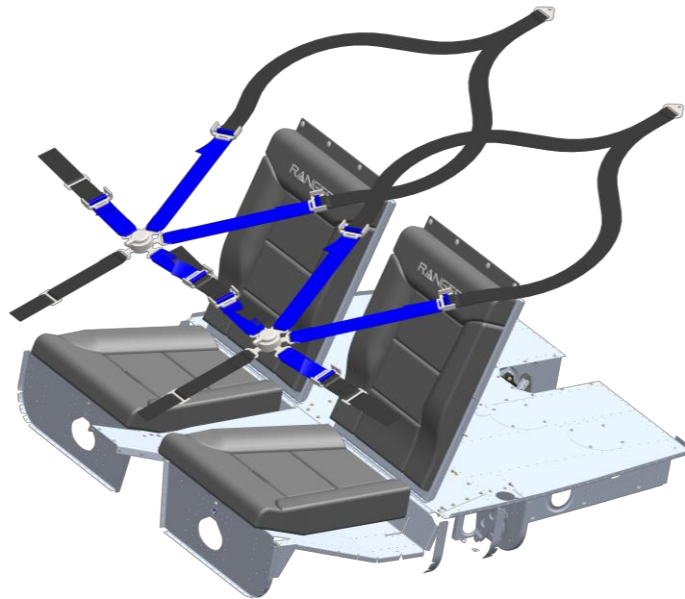


Figure 5.7.22.1 Seat assembly.

## **2. SEAT BACKREST REMOVAL**

### Required Tools:

No special tools are required for this operation.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

The seat backrest may be removed for maintenance or for stowage of large items in the aft fuselage.

Remove the seat bottom and backrest cushions and then pivot the backrest partially forward to gain access to the hinge pin. Remove the pin. It may be helpful to rotate the backrest back and forth while applying force to the pin.

The aircraft may be flown solo with the passenger seatback removed so long as any items that may be in the baggage area are restrained such that they cannot slide forward during flight and impede movement of the flight controls.

Installation of the backrest is the reverse of removal.

## **3. REPAIRS AND ALTERATIONS**

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### **5.7.23 HOSES AND LINES**

For replacement hoses, please contact:

**Vashon Aircraft™**  
**19825 141ST PL NE**  
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**5.7.24 LEVELING**

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<b>4.</b>	<b>LATERAL LEVELING</b>	<b>5.7.24-3</b>

### 1. GENERAL

Leveling is necessary for proper weight and balance calculations and is meant to simulate level flight. To do this, air is added or removed from each tire until the levels are measured flat.

### 2. PREPARATION

Place the aircraft in a closed hangar where the wind will not affect the aircraft. Also required will be a source of compressed air and a tire pressure gage.

### 3. LONGITUDINAL LEVELING

Open the pilot side door and place a spirit level on the bottom of the door opening as shown in Figure 5.7.24.1. Raise the tail/lower the nose until the aircraft is level. This is accomplished by adding air to each main tire and/or by letting air out of the nose tire.



Figure 5.7.24.1 Longitudinal leveling of the aircraft.

#### 4. LATERAL LEVELING

Place the level on the lower surface of the wing at or near its forward edge as shown in Figure 5.7.24.2. Center the bubble by adding air to one main tire and/or by letting air out of the other main tire. Re-check the longitudinal leveling of the aircraft to verify that the process of lateral leveling has not measurably altered longitudinal level.



Figure 5.7.24.2 Lateral leveling of the aircraft.

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**5.7.25 WEIGHING**

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<b>5.</b>	<b>CALCULATE EMPTY WEIGHT AND EMPTY CENTER OF GRAVITY LOCATION</b>	<b>5.7.25-3</b>

## 1. GENERAL

This section describes the methods for determining the empty weight of the aircraft and the position of its center of gravity relative to the datum.

Weight and balance limits are placed on aircraft for two reasons:

- First, the structure was designed to carry a certain weight;
- Second, the operating weight of the aircraft and the position of the center of gravity affect performance, stability, and control characteristics, particularly in stall and spin recovery.

The aircraft will only attain the performance and exhibit the handling characteristics used for certification if it is flown when both the weight and center of gravity are within the approved range.

Prior to leaving the factory, the empty aircraft was weighed, and the CG location was computed. You will find this information in Section 6 of the Pilot's Operating Handbook (POH). If it should become necessary to re-weigh the aircraft, follow the procedures given in this section.

### Required Tools:

Have available a set of calibrated weighing scales. The range should be 500 lbs. for each wheel. Zero the scales or record the tare as appropriate.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

## 2. PREPARATION

- (a) Clean the aircraft, exterior as well as interior, to remove excess dirt and grease.
- (b) Remove all useable fuel from the aircraft. This is accomplished by disconnecting the fuel line at the inlet to the carburetor and allowing the fuel to drain into a container. After all fuel has drained-out, re-connect the fuel line and reinstall the cowling.
- (c) Check that the oil is full.

(d) Remove all miscellaneous items (chocks, tie-down ropes, tool bags, etc.) from the cabin, except for the POH.

(e) Zero the scales or record the tare as appropriate.

### **3. MEASURING WHEEL LOCATIONS**

(a) Drop a plumb line off the leading edge of the wing to the floor at a location just outboard of the main wheel. Mark the floor at this location.

(b) Repeat for the other side of the aircraft.

(c) Connect the two marks on the floor using a taught string or snap line and mark a line. This line represents the location of the wing leading edge as shown in Figure 5.7.25.1 on the following page.

(d) Measure the distance forward from the center of the left main wheel axle perpendicular to the line. Enter this distance in Table 5.7.3 as "D1".

(e) Repeat for the right main wheel. Enter this distance in Table 5.7.3 as "D3".

(f) Measure the distance aft from the center of the nose wheel axle perpendicular to the line. Enter this distance in Table 5.7.3 as "D2".

### **4. WEIGHING THE AIRCRAFT**

(a) Place the aircraft on calibrated scales. The range of the scales should be at least 500 lbs. for each wheel.

(b) Level the aircraft as described in Section 5.7.241.1.1.

(c) Place both headsets on the seat bottom cushion, raise the flaps, and close both doors.

(d) Record the left main wheel weight in Table 5.7.3 as "W1".

(e) Record the nose wheel weight in Table 5.7.3 as "W2".

(f) Record the right main wheel weight in Table 5.7.3 as "W3".

(g) Roll aircraft off scales and re-inflate tires to pressure called-out in 5.2.

### **5. CALCULATE EMPTY WEIGHT AND EMPTY CENTER OF GRAVITY LOCATION**

(a) Enter the values for D1, D2, and D3 from Table 5.7.3 into Table 5.7.4.



- (b) Enter the values for W1, W2, and W3 from Table 5.7.3 into Table 5.7.4.
- (c) Calculate the empty weight, empty moment, and empty arm as shown on Page 5.7.25-7.
- (d) Enter the values for Empty Weight, Empty Moment, and Empty Arm into the table on Page 6-4 of the Pilot Operating Handbook.

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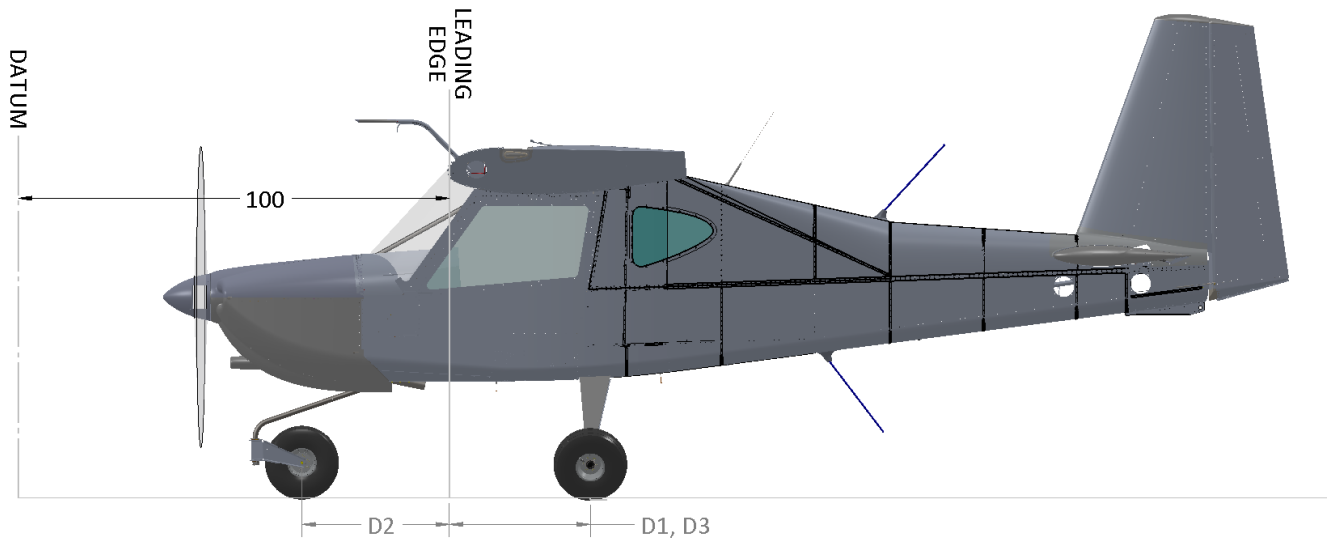


Figure 5.7.25.1 Weighing & Distance Measurement Diagram

Table 5.7.3 Weight on Each Wheel & Distance to Wing Leading Edge

	LEFT WHEEL	NOSE WHEEL	RIGHT WHEEL
WEIGHT	_____ lb (W1)	_____ lb (W2)	_____ lb (W3)
DISTANCE FROM AXLE CENTER TO LEADING EDGE	_____ inches (D1)	_____ inches (D2)	_____ inches (D3)

Table 5.7.4 Calculate Arm &amp; Moment for Each Wheel

	WEIGHT	ARM	MOMENT
LEFT WHEEL	$\frac{\text{lb}}{(W1)}$	$(100 + \frac{\text{inches}}{(D1)}) = \frac{\text{inches}}{(A1)}$	$(\frac{\text{in-lb}}{(W1)}) * (\frac{\text{in-lb}}{(A1)}) = \frac{\text{in-lb}}{(M1)}$
NOSE WHEEL	$\frac{\text{lb}}{(W2)}$	$(100 - \frac{\text{inches}}{(D2)}) = \frac{\text{inches}}{(A2)}$	$(\frac{\text{in-lb}}{(W2)}) * (\frac{\text{in-lb}}{(A2)}) = \frac{\text{in-lb}}{(M2)}$
RIGHT WHEEL	$\frac{\text{lb}}{(W3)}$	$(100 + \frac{\text{inches}}{(D3)}) = \frac{\text{inches}}{(A3)}$	$(\frac{\text{in-lb}}{(W3)}) * (\frac{\text{in-lb}}{(A3)}) = \frac{\text{in-lb}}{(M3)}$

EMPTY WEIGHT =  $\frac{\text{lb}}{(W1 + W2 + W3)}$     EMPTY ARM =  $\frac{\text{inches}}{(\text{Empty Moment} / \text{Empty Weight})}$

EMPTY MOMENT =  $\frac{\text{in-lb}}{(M1 + M2 + M3)}$

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**5.7.26 PARKING & MOORING**

**TABLE OF CONTENTS**

<b>1.</b>	<b>PARKING</b>	<b>5.7.26-2</b>
<b>2.</b>	<b>MOORING</b>	<b>5.7.26-2</b>
<b>3.</b>	<b>STORAGE</b>	<b>5.7.26-4</b>

**1. PARKING**

- (a) Position the aircraft on a level surface and headed into the wind.
- (b) Lock the controls.
- (c) A good practice is to position the propeller in an angled or horizontal position when parked.
- (d) Chock the main wheels.
- (e) In gusty or stormy weather, moor the aircraft.
- (f) When the aircraft is to be parked for an extended time, it should be moved frequently to prevent corrosion in the wheel bearings and to prevent flat spots on the tires.

**2. MOORING**

- (a) Position the aircraft on a level surface and headed into the wind.
- (b) Lock the controls
- (c) A good practice is to position the propeller in an angled or horizontal position when parked.
- (d) Chock the main wheels.
- (e) There are threaded receptacles in the underside of each wing which are attached to the wing main spar into which forged steel tie-down rings may be installed. Install a tie-down ring in the receptacle in each wing and tie mooring lines or attach tie-down chains. See Figure 5.7.26.1.
- (f) The tail skid plate features a hole which is to be used for mooring. Tie a mooring line or attach a tie-down chain through this hole. See Figure 5.7.26.2.

**NOTE**

In severe weather, it is advisable to use multiple mooring lines. During gusty or high wind conditions, mooring lines may require periodic tightening to prevent excessive movement of the aircraft. Use a secure knot such as a bowline knot to ensure security.

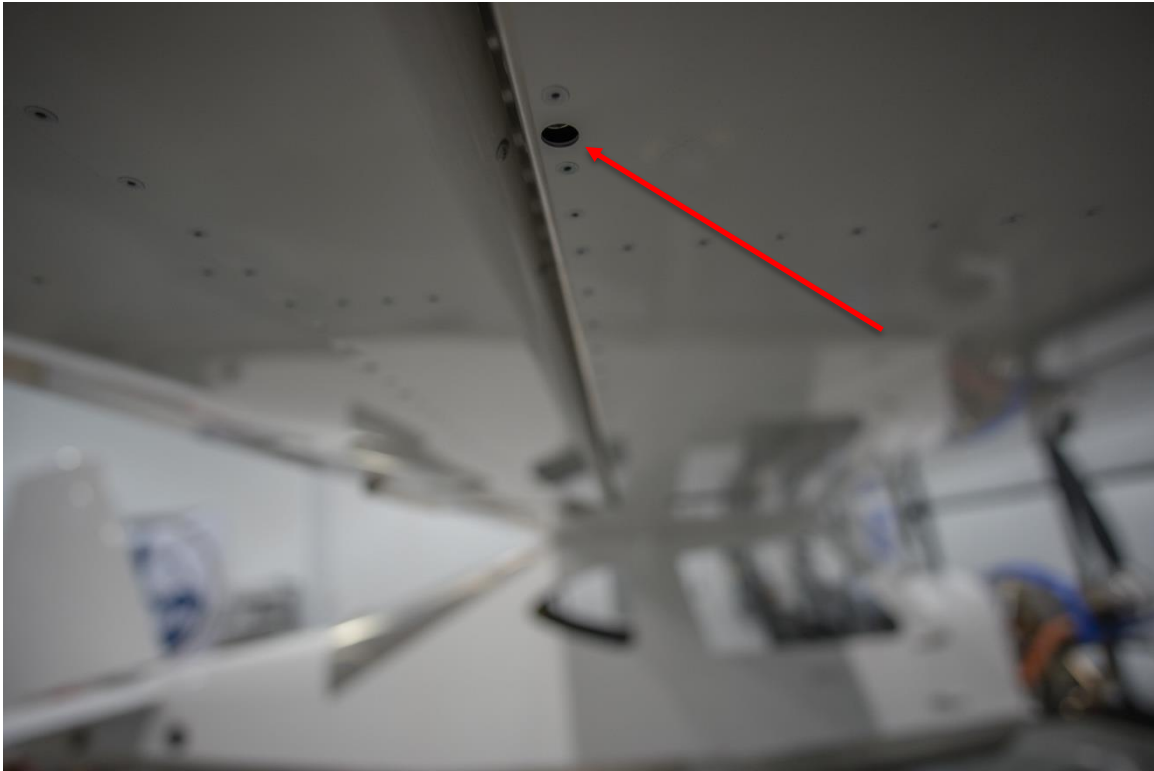


Figure 5.7.26.1 Wing Tie-Down



Figure 5.7.26.2 Tail Tie-Down



### 3. STORAGE

#### 3.1 GENERAL

The procedures outlined in this section must be followed if it is expected that the aircraft will remain inactive for longer than 30 days.

#### 3.2 MAINTENANCE PRACTICES

##### (1) TEMPORARY STORAGE – 30 to 90 Days

- (a) Park and moor the airplane.
- (b) Apply engine preservation. In extremely cold weather, it is advisable to drain the oil sump immediately after stopping for a long period and to warm the oil to 100°F before refilling the sump. To prevent excessive cooling of the oil sump and excessively high oil viscosity in cold weather, the sump may be covered with an oil-proof lagging. Refer to the latest edition of the engine manufacturer's Service Letter.
- (c) Fill the fuel tanks completely. Check for water accumulating each week.
- (d) Wipe the tires with a dry cloth and treat them with a tire protector spray. Mark the tire positions and date with chalk. Turn the wheels and check air pressure regularly.
- (e) Remove the battery (refer to Chapter 5.7.20) and ELT battery (refer to Chapter 5.7.21) and store in accordance with standard practices. Clean the battery tray and the battery cable terminals to neutralize any battery acid that may be present.
- (f) Lubricate according to lubrication schedule. (Refer to Chapter 5.4.)
- (g) Clean the propeller to remove dirt, oil, and bug accumulation. A good practice is to position the propeller in an angled or horizontal position.
- (h) Clean and cover the instruments and panel. Observe any additional precautions recommended by the various manufacturers of the avionics and the instruments.
- (i) Clean the seats and install protective covers.

## (2) INDEFINITE STORAGE

### **CAUTION**

**Do not set the parking brake as brake seizing can result.**

- (a) Park and moor the airplane.
- (b) Apply engine preservation. Refer to the latest edition of the engine manufacturer's Service Letter.
- (c) Drain the fuel tanks. (Refer to Chapter 5.7.12.)
- (d) Clean the brake assemblies. The wheels should be turned three to four revolutions per 30 days to prevent corrosion. Touch-up all spots where paint has been chipped from the wheels. Wipe the tires with a dry cloth and treat with tire protector spray. Turn the wheels. Mark the tire position and date with chalk. Check the air pressure periodically and inflate the tires as necessary. (Refer to Chapter 5.4.)

### **NOTE**

It is advisable to use unserviceable tires for prolonged storage.

- (e) In severe weather, it is advisable to use multiple mooring lines. During gusty or high wind conditions, mooring lines may require periodic tightening to prevent excessive movement of the aircraft. Use a secure knot such as a bowline knot to ensure security.
- (f) Remove the battery (refer to Chapter 5.7.20) and ELT battery (refer to Chapter 5.7.21) and store in accordance with standard practices. Clean the battery tray and the battery cable terminals to neutralize any battery acid that may be present.
- (g) Lubricate according to lubrication schedule. (Refer to Chapter 5.4.)
- (h) Clean the propeller to remove dirt, oil, and bug accumulation. A good practice is to position the propeller in an angled or horizontal position.
- (i) Clean and cover the instruments and panel. Observe any additional precautions recommended by the various manufacturers of the avionics and the instruments.
- (j) Clean the seats and install protective covers.

(k) Remove all loose equipment and store.

(l) Clean the windscreen and windows and install covers.

(3) PREPARATION FOR SERVICE

(a) Engine preparation for service – Refer to the latest edition of the engine manufacturer's Service Letter.

(b) Remove all covers, tapes, and tags from the aircraft.

(c) Reinstall the battery (refer to Chapter 5.7.20) and the ELT batteries (refer to Chapter 5.7.21).

(d) Fill the fuel tanks (if applicable).

(e) Thoroughly clean and visually inspect the airplane. It is recommended to carry-out at least a 100-hour inspection prior to flying the aircraft (refer to Chapter 5.4).

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## **5.7.27 PAINTING AND COATINGS**

### **TABLE OF CONTENTS**

<b>1.</b>	<b>GENERAL</b>	<b>5.7.27-2</b>
<b>2.</b>	<b>PAINTING</b>	<b>5.7.27-2</b>

## 1. GENERAL

For a detailed description of repair and maintenance of paint, refer to the following pages of the poly fiber website:

<http://www.polyfiber.com/techquestions/surfaces/aluminumsurfaces.htm>

<http://www.polyfiber.com/techquestions/surfaces/fiberglasssurfaces.htm>

<http://www.polyfiber.com/techquestions/surfaces/steelsurfaces.htm>

<http://www.polyfiber.com/techquestions/topcoats/index.htm>

### Required Tools:

HVLP spray gun, 180-320 grit sandpaper, and very fine (red) Scuff pads.

### Parts Required:

No parts are required at this time.

### Level of Maintenance:

Heavy Maintenance.

### Certification Required:

Please see Table 5.4.3 in Section 5.4.

## 2. PAINTING

### 2.1 Preparation

#### (1) PREPARATION OF METAL

- (a) Sand surfaces with 180-320 grit sandpaper and very fine (red) Scuffpads.
- (b) Degrease components with DX330 per manufacturer's instructions.
- (c) Mix and apply PPG Metal Primer DX1787 and DX1788 per manufacturer's instructions.
- (d) Allow primer to dry at 140° F for 20 minutes.
- (e) Sand primed surfaces with 400 grit sandpaper.

#### (2) PREPARATION OF COMPOSITES

- (a) Degrease components with an alcohol-based cleaner per manufacturer's instructions.
- (b) Sand with 400 grit sandpaper, blow and tack-off.

## 2.2 Painting

### (1) GENERAL

- (a) The final finish is a polyurethane paint from PPG.
- (b) Mix the paint in accordance with the PPG's application guide.
- (c) Spray the first coat with an HVLP gun with a 30-50 psi inlet pressure. Allow the first coat to become hand slick, then apply a second coat.
- (d) After a minimum of 15 minutes (or after the paint has flashed-off), bake the surface for a minimum of 30 minutes at 120° F +/- 10° F or air dry at 70° F for approximately eight hours.

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**5.8 MAJOR REPAIRS AND ALTERATIONS**

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<b>5.8.1 ALTERATIONS GENERAL</b>	<b>5.8-2</b>
<b>5.8.2 EVALUATION TO ASTM STANDARD WITH PRODUCTION ACCEPTANCE SPECIFICATIONS</b>	<b>5.8-4</b>
<b>5.8.3 ALTERATION AFFADAVIT</b>	<b>5.8-6</b>
<b>5.8.4 WRITTEN INSTRUCTIONS AND DIAGRAMS FOR CERTIFICATION</b>	<b>5.8-8</b>
1. Ground and Flight Test Program for Verification of Safe Operation	5.8-8
<b>5.8.5 OWNER INFORMATION ON ALTERATION DOCUMENTATION FOR AIRCRAFT RECORDS</b>	<b>5.8-10</b>

### **5.8.1 ALTERATIONS GENERAL**

No major alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141ST PL NE**  
**Woodinville, WA 98072**  
**USA**  
**Tel: +1 425 527 9940**  
**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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## **5.8.2 EVALUATION TO ASTM STANDARD WITH PRODUCTION ACCEPTANCE SPECIFICATIONS**

No content available at this time.

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### **5.8.3 ALTERATION AFFADAVIT**

No content available at this time.

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#### **5.8.4 WRITTEN INSTRUCTIONS AND DIAGRAMS FOR CERTIFICATION**

No content available at this time.

##### **1. Ground and Flight Test Program for Verification of Safe Operation**

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### **5.8.5 OWNER INFORMATION ON ALTERATION DOCUMENTATION FOR AIRCRAFT RECORDS**

No content available at this time.

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## 5.9 OVERHAUL

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5.9.1 AUTHORIZATION TO PERFORM OVERHAULS

5.9-2

### **5.9.1 AUTHORIZATION TO PERFORM OVERHAULS**

No overhauls, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time. Overhauls can only be performed by Vashon Aircraft.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141ST PL NE**  
**Woodinville, WA 98072**  
**USA**  
**Tel: +1 425 527 9940**  
**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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**APPENDIX A****Inspection Forms**

<b>Scheduled Inspection Report</b>			
<b>Make:</b> Vashon Aircraft	<b>Model:</b> RANGER R7	<b>Serial Number:</b>	<b>Registration:</b>
<b>Owner:</b>		<b>Date:</b>	
<b>Type of Inspection:</b>		<b>Hobbs/Tach Time:</b>	

<b>Visual Pre-Inspection</b>		<b>Ref.</b>	<b>Interval</b>		<b>Initials</b>
			<b>100</b>	<b>Special</b>	
1	Review compliance with current Federal Aviation Regulations, including visual inspection of: - Pilot's Operating Handbook - Aircraft Logbook - Registration Certificate - Weight & Balance Record - Aircraft Equipment List - FAA Airworthiness Directives - Vashon Aircraft Service Documents		X		
2	Visual Inspection of Aircraft				
3	Check Oil Quantity (5 Quarts)	5.4	X		
4	Operational Check	POH	X		
5	Perform walk-around inspection to detect fluid leaks. - Make a record of all malfunctions and discrepancies		X		

Engine Group		Ref.	Interval		Initials
			100	Special	
1	Engine	Continental Motors	X		
2	Engine Cowl: - Remove, clean, and check for cracks, distortion, missing hinge eyelets	5.7.9	X		
3	Engine Oil: - Drain	5.7.10		After first 25 hrs. and every 50 hrs. or 4 months	
4	Oil Filter: - Replace with new filter - Cut open old filter then perform visual inspection of filter element for foreign particles	5.7.10		After first 25 hrs. and every 50 hrs. or 4 months	
5	Oil Temperature Sensor Unit: - Check for leaks and security	Continental Motors, Dynon Avionics	X		
6	Oil Lines & Fittings: - Check for leaks, security, chafing, dents, and cracks	5.7.23, Continental Motors	X		
7	Oil Cooler: - Clean and check cooling fins for damage	5.7.10	X		
8	Engine Oil: - Fill with 5 Quarts	5.4		After first 25 hrs. and every 50 hrs. or 4 months	
9	Spark Plugs: - Remove ignition leads from plugs - Remove - Visual inspection and re-gap as necessary	Continental Motors	X		



Engine Group (continued)		Ref.	Interval		Initials
			100	Special	
10	Check Cylinder Differential Compression: Cylinder 1 _____ Cylinder 2 _____ Cylinder 3 _____ Cylinder 4 _____	Continental Motors	X		
11	Cylinders: Visual inspection for cracked or broken fins	Continental Motors	X		
12	Electrical wiring to engine and accessories: - Visual inspection and replace damaged wires and clamps - Visual inspection of terminals for security and cleanliness	5.7.20, Continental Motors	X		
13	Ignition Harness and Insulators: - Visual inspection for high-tension leaks and continuity	Continental Motors	X		
14	Magnetos: - Check magneto to engine timing and adjust as required	5.7.15, Continental Motors	X		
15	Magnetos: - Inspect plug wires and P-lead for condition and security - Verify vent hole is clean and clear of obstructions	5.7.15, Continental Motors	X		
16	Magnetos: - Remove and inspect in accordance with latest version of overhaul manual	5.7.15, Continental Motors		500 hrs.	
17	Induction Air Filter: - Remove, inspect, and clean - Replace at 500 hrs or when filter is more than 50% covered by foreign material	5.7.13	X	500 hrs. or 50% covered	

Engine Group (continued)		Ref.	Interval		Initials
			100	Special	
18	Carburetor: - Drain and clean inlet line fuel strainer	Continental Motors	X		
19	Induction Air Box: - Visual inspection for cracks or other damage - Visual inspection for proper travel and operating condition of carburetor heat control	5.7.13, Continental Motors	X		
20	Intake Seals: - Visual inspection for leaks and clamps for tightness	Continental Motors	X		
21	Flexible Fuel Lines: Visual inspection for condition	Continental Motors	X		
22	Throttle and Mixture Controls: - Visual inspection for operating condition - Check travel from stop to stop Lubricate	5.7.19	X		
23	Exhaust Stacks, Connections, Gaskets, and Braces: - Visual inspection Replace exhaust gaskets as required	5.7.13, Continental Motors	X		
24	Exhaust Stacks, Heat Muffs, and Hoses: - Remove heat muffs Visual inspection	5.7.13	X		
25	Oil Breather Tube: Visual inspection for obstructions and security	Continental Motors	X		
26	Crankcase: Visual inspection for cracks, leaks, and security of case bolts	Continental Motors	X		
27	Engine Mount: Visual inspection for cracks or distortion and security	5.7.10	X		
28	Engine Baffles: Visual inspection for damage and security		X		

Engine Group (continued)		Ref.	Interval		Initials
			100	Special	
29	Rubber Engine Mount Bushings: Visual inspection for deterioration	5.7.10	X		
30	Firewall and Seals: Visual inspection		X		
31	Cabin Heater Control: Visual inspection	5.7.13, 5.7.17	X		
32	Alternator: - Visual inspection for condition and security - Ensure alternator is in working condition.	5.7.20, Continental Motors	X		
33	Starter: - Visual inspection for condition and security	5.7.20, Continental Motors	X		
34	Battery and Cables - Visual inspection for cleanliness and security - Ensure battery is in working condition.	5.7.20	X		
35	Engine Cowl: - Install, ensuring good clearance	5.7.9	X		

	<b>Propeller Group</b>	<b>Ref.</b>	<b>Interval</b>		<b>Initials</b>
			<b>100</b>	<b>Special</b>	
1	Spinner and Bulkheads: - Visual inspection for condition and security	5.7.16	X		
2	Propeller Blades: - Visual inspection for nicks, cracks, or delamination	Prop Mfgr's Manual	X		
3	Propeller Hub: - Visual inspection for damage and security	Prop Mfgr's Manual	X		
4	Propeller Mounting Bolts: - Visual inspection for damage and security - Un-torque propeller bolts and re-torque as per specifications NOTE: if propeller mounting bolt torque does not meet specifications, remove propeller and inspect hub as per section 5.7.16.	5.7.16	X	50 hrs (See Section 5.7.16 for new propeller)	

Cabin Group		Ref.	Interval		Initials
			100	Special	
1	Doors: - Visual inspection for damage, operation, and security		X		
2	Door Latches and Hinges: - Visual inspection and lubricate		X		
3	Windscreen and Windows: - Clean and visual inspection for cracking, crazing, and general condition	5.7.2	X		
4	Upholstery: - Remove from cabin and set aside - Visual inspection for tears and fraying	5.7.22	X		
5	Seat Belts and Shoulder Harnesses: - Visual inspection for general condition and security of attachment		X		
6	Seat Backs: - Remove from cabin and set aside - Visual inspection for dents, wrinkles, and general condition - Inspect hinge eyelets for damage or distortion	5.7.22	X		
7	Cabin Access Panels: - Remove and set aside	5.7.3	X		
8	Flight Control Bearings and Bushings: - Visual inspection for wear, security of attachment, binding/interference - Lubricate per Chapter 5.4.	5.4	X		
9	Elevator Trim: - Operational check - Position indication on EFIS		X		
10	Flaps: - Operational check - Position indication on EFIS - Visual inspection of flap motor attachment	5.7.6	X		

Cabin Group (continued)		Ref.	Interval		Initials
			100	Special	
11	Rudder Pedals/Brake Master Cylinders: - Visual inspection for damage, operation, and security - Visual inspection for brake fluid leakage	5.7.6	X		
12	Throttle: - Verify freedom of movement and ensure it contacts engine stops	5.7.19	X		
13	Mixture: - Verify freedom of movement and ensure it contacts engine stops	5.7.19	X		
14	Carburetor Heat Control: - Verify freedom of movement and ensure full travel	5.7.13	X		
15	Cabin Heat Control: - Verify freedom of movement and ensure full travel	5.7.17	X		
16	Fuel and Vent Lines: - Visual inspection for leakage, chafing, and general condition	5.7.12	X		
17	2 <sup>nd</sup> EFIS Screen (if installed): - Remove and set aside	5.7.18	X		
18	Header Tank: - Visual inspection for leakage, security of attachment, and general condition	5.7.12	X		
19	Forward of Instrument Panel: - Visual inspection of wiring and equipment for chafing, damage, security of attachment	5.7.18, 5.7.21	X		
20	Strobe, Landing, and Navigation Lights: - Operational check in all modes - Visual inspection of light units for condition and security	5.7.21	X		

	<b>Fuselage and Empennage Group</b>	<b>Ref.</b>	<b>Interval</b>		<b>Initials</b>
			<b>100</b>	<b>Special</b>	
1	Outer Surfaces Overall: - Visual inspection for damage, dents, missing/loose rivets, scratches in finish		X		
2	Access Panels and Empennage Fairing: - Remove and set aside	5.7.5	X		
3	Fuselage Interior Spaces: - Visual inspection of structure for cleanliness, damage, missing/loose rivets, and corrosion	5.7.3	X		
4	Flight Control Linkages: - Visual inspection for wear, security of attachment, binding/interference - Lubricate per Chapter 5.4	5.7.5, 5.7.6	X		
5	Elevators and Rudder: - Visual inspection for rotation from stop-to-stop without binding/interference	5.7.6	X		
6	Elevator and Rudder Hinge Points: - Visual inspection for wear, security of attachment, binding/interference - Lubricate per Chapter 5.4	5.4, 5.7.6	X		
7	Rudder Cables: - Visual inspection of attachment to rudder horn for freedom of movement, excessive wear, proper installation of cotter pins	5.7.6	X		
8	Vertical Stabilizer Structure: - Visual inspection for cleanliness, damage, missing/loose rivets, and security of attachment to the aircraft	5.7.5	X		
9	Horizontal Stabilizer Structure: - Visual inspection for cleanliness, damage, missing/loose rivets, and security of attachment to the aircraft	5.7.5	X		

<b>Fuselage and Empennage Group (continued)</b>		<b>Ref.</b>	<b>Interval</b>		<b>Initials</b>
			<b>100</b>	<b>Special</b>	
10	Elevator Trim Tab: - Visual inspection for excessive free-play, proper safety of hinge pin, distortion of hinge eyelets - Inspect for security of pushrod attachment to tab horns, security of rod-end bearing jam nuts, freedom of movement of pushrod	5.7.6	X		

<b>Wing Group</b>		<b>Ref.</b>	<b>Interval</b>		<b>Initials</b>
			<b>100</b>	<b>Special</b>	
1	Outer Surfaces Overall: - Visual inspection for damage, dents, missing/loose rivets, scratches in finish	5.7.4	X		
2	Access Panels: - Remove and set aside	5.7.4	X		
3	Wing Interior Spaces: - Visual inspection of structure for cleanliness, damage, missing/loose rivets, and corrosion	5.7.4	X		
4	Flight Control Linkages: - Visual inspection for wear, security of attachment, binding/interference - Lubricate per Chapter 5.4	5.4, 5.7.4,5.7.6	X		
5	Ailerons: - Visual inspection for rotation from stop-to-stop without binding/interference	5.7.6	X		
6	Aileron Hinge Points: - Visual inspection for wear, security of attachment, binding/interference - Lubricate per Chapter 5.4.	5.4, 5.7.6	X		



<b>Wing Group (continued)</b>		<b>Ref.</b>	<b>Interval</b>		<b>Initials</b>
			<b>100</b>	<b>Special</b>	
7	Fuel Caps: - Visual inspection for ease of operation, wear, damage, leakage, and deterioration of O-ring		X		
8	Fuel Tanks: - Visual inspection for damage, leakage, and security of attachment	5.7.12	X		
9	Fuel and Vent Lines: - Visual inspection for leakage, chafing, and general condition	5.7.12	X		
10	Pitot Mast: - Visual inspection for damage, security of attachment		X		
11	Fuel Vent Outlet: - Visual inspection for damage, obstruction	5.7.12	X		
12	Pitot-Static-AoA Head: - Visual inspection for damage, obstruction of all air pressure and fluid drain ports		X		
13	Wing Attach Bolts: - Visual inspection for security of installation, signs of damage or distress to the bolts/nutplates or surrounding structure.	5.7.4	X		

<b>Landing Gear Group</b>		<b>Ref.</b>	<b>Interval</b>		<b>Initials</b>
			<b>100</b>	<b>Special</b>	
1	Outer Surfaces Overall: - Visual inspection for damage, dents, missing/loose rivets, scratches in finish		X		
2	Raise Aircraft	5.7.1	X		
3	Main Landing Gear Box: - Visual inspection of structure for cleanliness, damage, missing/loose bolts/rivets, and corrosion	5.7.7	X		

Landing Gear Group (continued)		Ref.	Interval		Initials
			100	Special	
4	Main Landing Gear Attachment: - While an assistant applies fwd/aft load on wheel, visual inspection for free-play or looseness of attachment inside the Main Landing Gear Box - While applying fwd/aft load on wheel, visual inspection for free-play or looseness of attachment of the axle bracket to the gear leg	5.7.7	X		
5	Main Landing Gear Legs: - Visual inspection for cracking, delamination, or other damage to the gear leg, especially at/around attach points	5.7.7	X		
6	Main Wheel Tires: - Visual inspection for cuts, uneven or excessive wear and slippage	5.7.8	X		
7	Main Wheels: - Remove, clean, check, and re-pack bearings	5.7.8	X		
8	Main Wheel Tires: - Inflate to proper pressure	5.7.8	X		
9	Brake Lining and Disks: - Visual inspection for excessive wear	5.7.8	X		
10	Brake Lines: - Visual inspection for chafing and security	5.7.8	X		
11	Brake Fluid Reservoir: - Add fluid if/as required	5.4, 5.7.8, 5.7.6	X		

Landing Gear Group (continued)		Ref.	Interval		Initials
			100	Special	
12	<p>Nose Landing Gear Attachment:</p> <ul style="list-style-type: none"> <li>- While an assistant applies fwd/aft load on wheel, visual inspection for free-play or looseness of attachment to the bottom of the fuselage</li> <li>- While an assistant applies fwd/aft load on wheel, visual inspection for free-play or looseness of attachment to the inside of the fuselage</li> </ul>	5.7.7	X		
13	<p>Nose Landing Gear Attach Bolts:</p> <ul style="list-style-type: none"> <li>- Visual inspection for security of installation, signs of damage or distress to the bolts/nuts or surrounding structure</li> </ul>	5.7.7	X		
14	<p>Nose Landing Gear Leg:</p> <ul style="list-style-type: none"> <li>- Visual inspection for cracks, especially adjacent to welds and bolt holes</li> <li>- Visual inspection for damage, dents, distortion, and scratches in finish</li> </ul>	5.7.7	X		
15	<p>Nose Wheel Fork:</p> <ul style="list-style-type: none"> <li>- After cleaning any accumulated grease and dirt, visual inspection for cracks, especially adjacent to welds and bolt holes</li> <li>- Visual inspection for damage, distortion, and surface gouges</li> </ul>	5.7.7	X		
16	<p>Nose Wheel Fork Bushings:</p> <ul style="list-style-type: none"> <li>- While applying up/dn load on wheel, visual inspection for free-play or looseness between nose fork and the gear leg</li> </ul>	5.7.7	X		

Landing Gear Group (continued)		Ref.	Interval		Initials
			100	Special	
17	Nose Wheel Fork Pivot Friction: - Check for proper breakout force (section 5.7.7, installation section of part 6) adjust as required. - Visual inspection for proper installation of cotter pin on nose fork nut	5.7.7	X		
18	Nose Wheel Tire: - Visual inspection for cuts, uneven or excessive wear and slippage	5.7.8	X		
19	Nose Wheel: - Remove, clean, check, and re-pack bearings with lubricant specified in section 5.4.	5.4,5.7.8	X		
20	Nose Wheel Tire: - Inflate to proper pressure per section 5.4	5.4	X		

Return to Service		Ref.	Interval		Initials
			100	Special	
1	Install fuselage access panels and empennage fairing	5.7.3, 5.7.5	X		
2	Install wing access panels	5.7.4	X		
3	Verify oil level is 5 quarts	5.4	X		
4	Perform engine run-up in accordance with operational/functional check: - After completion, perform a walk-around inspection for fluid leaks or other discrepancies	POH	X		
5	Install engine cowling	5.7.9	X		
6	Verify all Vashon Aircraft Service Letters, Bulletins, and instructions have been complied with		X		
7	Verify the aircraft's documentation is in order: - Airworthiness Certificate - Registration - Pilot's Operating Handbook - Weight & Balance - Equipment List		X		

<b>Operational/Functional Inspection Report</b>		<b>Initials</b>	<b>Notes</b>
1	Flight Controls: <ul style="list-style-type: none"> <li>- Check that controls operate in the correct direction</li> <li>- Ensure movement through full range of travel without binding and that there is no excessive friction</li> </ul>		
2	Engine Controls: <ul style="list-style-type: none"> <li>- Ensure movement through full range of travel without binding</li> </ul>		
3	Battery Master Switch: <ul style="list-style-type: none"> <li>- Switch on</li> <li>- Verify voltage indication on EFIS</li> </ul>		
4	Flaps: <ul style="list-style-type: none"> <li>- Check that flaps go from zero to 20° position with first push of switch “DN”, verify position indication on EFIS</li> <li>- Check that flaps go from 20° position to 40° with second push of switch “DN”, verify position indication on EFIS</li> <li>- Check that flaps go from 40° to 20° with first push of switch “UP”</li> <li>- Check that flaps go from 20° to 0° with first push of switch “UP”</li> <li>- Ensure operation through full range of travel without binding</li> </ul> Note: some aircraft may be configured differently.		
5	Elevator Trim: <ul style="list-style-type: none"> <li>- Ensure operation through full range of travel without binding</li> <li>- Verify proper position indication on EFIS</li> </ul>		
6	Altimeter: <ul style="list-style-type: none"> <li>- Must indicate within 50 feet of field elevation when set to correct barometric pressure</li> </ul>		
7	Start engine using procedure in Pilot’s Operating Handbook, Section 4		
8	Set 1700 RPM: <ul style="list-style-type: none"> <li>- Perform magneto check</li> <li>- Drop not to exceed 150 RPM or 75 RPM differential between magnetos</li> <li>- No engine roughness</li> </ul>		
9	Apply Carburetor Heat: <ul style="list-style-type: none"> <li>- Verify slight drop in engine RPM</li> <li>- Verify increase in carb temp</li> </ul>		

<b>Operational/Functional Inspection Report (continued)</b>		<b>Initials</b>	<b>Notes</b>
10	Apply a Load to the Electrical System (e.g. switch landing lights ON): - Verify that voltage remains constant and amperage increases when load is applied		
11	Check the radio(s) for proper Comm operation (and Nav operation, if installed)		
12	Check the transponder for proper operation		
13	Verify proper ELT operation		
14	Set throttle to idle: - Verify smooth running at idle speed of 600 to 750 RPM		
15	Set 1000 RPM		
16	Turn engine off by slowly pulling mixture control <b>NOTE</b> An increase in RPM may occur prior to the control reaching the idle cut-off position indicates proper air fuel mixture.		

# **CHAPTER 6**

# **TASK SPECIFIC TRAINING**

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## **6. TASK SPECIFIC TRAINING**

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## **6.1 VASHON AIRCRAFT "RANGER" SPECIFIC TRAINING - GENERAL**

No content available at this time.

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## **6.2 TYPE SPECIFIC TRAINING REQUIRED BY VASHON AIRCRAFT**

### **6.2.1 CONTINENTAL O-200 FACTORY TECHNICAL TRAINING.**

<http://www.continentalmotors.aero/services/factory-training.aspx>

### **6.2.2 EAA SPORT AIR SHEET METAL BASICS COURSE**

[https://www.eaa.org/sitecore/commerce/products/eaashop/events-and-workshops/sports-air-workshops/sheet\\_metal\\_basics?sc\\_lang=en](https://www.eaa.org/sitecore/commerce/products/eaashop/events-and-workshops/sports-air-workshops/sheet_metal_basics?sc_lang=en)

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### **6.2.3 OVERHAUL MANUAL FOR LSA OR LSA COMPONENTS**

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## **6.2.4 COMPONENTS PLANNED FOR OVERHAUL**

### **1. Engine**

Refer to component manufacturer's overhaul manual

### **2. Propeller**

Refer to component manufacturer's overhaul manual

### **3. Carburetor**

Refer to component manufacturer's overhaul manual

### **4. Carburetor Air Box**

Refer to component manufacturer's overhaul manual

### **5. Starters, Generators, & Alternators**

Refer to component manufacturer's overhaul manual

### **6. Oil Cooler**

Refer to component manufacturer's overhaul manual

### **7. Brake System**

Refer to component manufacturer's overhaul manual



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## **6.2.5 STRUCTURAL REPAIRS**

No major repair or alterations, as outlined in ASTM F2483, FAR 43, or in this manual are authorized at this time.

To obtain engineering approvals for any major repairs or alterations, please contact Vashon Aircraft at:

**Vashon Aircraft™**  
**19825 141ST PL NE**  
**Woodinville, WA 98072**  
**USA**  
**Tel: +1 425 527 9940**  
**Email: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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# **CHAPTER 7**

# **SAFETY DIRECTIVES COMPLIANCE**

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## **7. SAFETY DIRECTIVES COMPLIANCE**

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## **7.1 SAFETY DIRECTIVES FOR CONTINUED AIRWORTHINESS**

In the event of an aircraft component failure, defect, or other discrepancy on this aircraft, contact Vashon Aircraft quality department via postal mail, e-mail, fax, or telephone. If the problem relates to safety of flight or is a significant service issue, use the form and procedures specified in section 5.2, part 10 of this manual to initiate corrective action.

Vashon Aircraft maintains an Operational Safety Monitoring System in accordance with ASTM F2295 through which all continued airworthiness issues are resolved.



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## 7.2 TYPES OF SAFETY DIRECTIVES

When corrective action has been determined to be warranted, Vashon Aircraft will issue a safety directive to all owner/operators within the current database. These directives will be classified in three different categories:

- SAFETY ALERT – The safety alert is a directive that relates to safety of flight and requires immediate action.
- SERVICE BULLETIN – A service bulletin is a directive which does not require immediate action, however compliance with the directive is strongly recommended.
- NOTIFICATION – A notification will not necessarily recommend any action but is provided as a method of disseminating information relating to the continued airworthiness of the aircraft.

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### **7.3 MANDATORY SAFETY DIRECTIVES**

When a safety directive requiring mandatory action has been issued, it is the owner/operator's responsibility to ensure that the directive is fully complied with to allow the continued safe operation of the aircraft. Vashon Aircraft assumes no responsibility for problems arising from non-compliance with such directives.

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## 7.4 OBTAINING LATEST SAFETY OF FLIGHT INFORMATION

To ensure that you have the latest safety of flight information, please contact:

**Vashon Aircraft™**  
**19825 141ST PL NE**  
**Woodinville, WA 98072**  
**USA**  
**Telephone: 425 402 1234**  
**E-mail: [support@vashonaircraft.com](mailto:support@vashonaircraft.com)**

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