DISCLAIMER

Applicability:
Carbon Cub CCK-1865, CCX-1865
Carbon Cub CCK-2000, CCX-2000

This document is intended as a **TEMPLATE ONLY** to be used as a guideline for experimental aircraft builders to generate their own aircraft maintenance manual. Builders are responsible for documenting information specific to their aircraft.

The owner or operator of an aircraft is primarily responsible for maintaining that aircraft in an airworthy condition, including compliance with Airworthiness Directives. The owner or operator is also responsible for ensuring that a properly certified person perform any work. Maintenance personnel have the responsibility of compliance at the time they are performing inspections to determine all airworthiness requirements are met.
(Per FAA AC 39-7C, paragraph 13, FAR § 91.403)

Cub Crafters, Inc. provides this as a reference only consideration template, and accepts no liability for the content of this document. The consequences of any actions taken on the basis of the information provided, remains with the aircraft builder and/or mechanic. The discretion for safe operation of the aircraft is the sole responsibility of the Pilot in Command.

The owner is responsible to ensure that Cub Crafters 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 Cub Crafters website (www.cubcrafters.com) to register any changes in ownership or address.

Cub Crafters, Inc.
1918 South 16th Avenue
Yakima, WA 98903-1212
United States
www.cubcrafters.com
Phone: 509-248-9491
1-877-484-7865
Fax: 509-248-1421

(Cub Crafters is on US Pacific Time and office hours are from 8:00 am to 5:00 pm.)

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CARBON CUB

EX FX

AIRCRAFT MAINTENANCE MANUAL

CCK-1865
CCX-1865
CCK-2000
CCX-2000

S/N: ______________________________

Registration Number: ______________________________

Manufacturer Name: ______________________________

Address: ______________________________

City, State/Province, Country: ______________________________

Phone: ______________________________

Email: ______________________________

RECORD OF REVISIONS

REV	CHAPTER	DESCRIPTION	DATE
NC	ALL	Initial Release	03-01-2019

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1 GENERAL

________________________ *(builder)* prepared this document, which contains the information needed to maintain the aircraft in an airworthy condition.

This Aircraft Maintenance Manual was designed to be familiar to most aircraft mechanics.

This Aircraft Maintenance Manual does not reflect part numbers and cannot be used for ordering replacement parts. Wiring schematics that have been included in the manual are for general information purposes only.

This manual provides the practices for the servicing and the maintenance of Cub Crafters CCK-1865, CCX-1865, CCK-2000, and CCX-2000 Carbon Cub Experimental Amateur Built Kit Aircraft. It provides practices and guidance for:

§ preventive maintenance requirements of 100-hour, annual condition inspection
§ maintenance actions for repairs, alterations, removal, and re-installation of components

2 SIGNIFICANCE AND USE

The purpose of this maintenance manual is to provide guidance to builders, owners, mechanics, airports, regulatory officials, and component manufacturers who may accomplish maintenance, repairs, and alterations on the Carbon Cub EX-2/FX-2 & EX-3/FX-3 Aircraft.

3 LAYOUT OF THE MANUAL

This Aircraft Maintenance Manual is divided into chapters. The chapter numbers appear at the foot of each page. Each chapter contains its own table of contents.

4 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.

5 SERVICING AND MAINTENANCE

This manual identifies servicing and maintenance actions, which can be performed by the builder. The maintenance actions authorized in this manual comply with the intent of FAA 14 CFR Part 43.3 with regard to preventive maintenance.

6 REFERENCE DOCUMENTS

§ 14 CFR Part 43 – Maintenance, Preventive Maintenance, Rebuilding, and Alteration
§ Superior Air Parts XCP360 Operators Manual
§ Superior Air Parts O-360 & IO-360 Series Overhaul manual
§ Hartzell Propeller Manual 115N Propeller Owner’s Manual
§ Polyfiber Procedure Manuals
§ Stewart Systems Fabric Covering and Finishing Procedures Manual
§ Light Speed Engineering, Installation and Operation Manual for PLASMA III, II+, and I CDI SYSTEMS
§ Lycoming Operator’s Manual #60297-12
§ Lycoming Overhaul Manual #60294-7
§ Clamar Floats Operators Manual
§ Installation and Operation Manual for PLASMA III, II+, and II CDI Systems

7 TERMINOLOGY

7.1 DEFINITIONS

§ Annual Condition Inspection – detailed inspection accomplished once a year on an aircraft. The purpose of the inspection is to look for any wear, corrosion, or damage that would cause an aircraft to not be in a condition for safe operation.

§ A&P – airframe and powerplant mechanic as defined by 14 CFR Part 65 in the U.S. or equivalent certification in other countries.

§ FAA – United States Federal Aviation Administration.

NOTE

As FAR Part 43 does not apply, Experimental Aircraft do not require the individual performing maintenance to hold any FAA airman certificate in the U.S.

- Maintenance Manual(s) – manual provided by a manufacturer or supplier that specifies all maintenance, repairs, and alterations authorized by the manufacturer.
- Manufacturer – any entity engaged in the production of, or a component used on, the airframe.
- Overhaul – maintenance, inspection, repair, or alterations that are only to be accomplished by the original manufacturer or a facility approved by the original manufacturer.
- Overhaul Facility – facility specifically authorized by the aircraft or component manufacturer to overhaul the product originally produced by that manufacturer.
- Repair Facility – facility specifically authorized by the aircraft or component manufacturer to repair the product originally produced by that manufacturer.
- Technical Standard Order (TSO) – a minimum performance standard for specified materials, parts, and appliances used on civil aircraft.
- 14 CFR-Code of Federal Regulations Title 14 Aeronautics and Space also known as the "FARs" or Federal Aviation Regulations.

8 SAFETY OF FLIGHT AND SERVICE DIFFICULTY REPORTING

Please report any service difficulties or any other issue relating to flight safety directly to Cub Crafters using the online form.

9 SAFETY DIRECTIVES FOR CONTINUED AIRWORTHINESS

In the event of an aircraft component failure, defect, or other discrepancy, contact Cub Crafters Customer Support via e-mail, phone, or fax.

If the problem relates to a safety of flight or is a significant service issue, use the Continued Operational Safety Reporting form available on the Owner Support page of the Cub Crafters website to initiate corrective action.

9.1 TYPES OF SAFETY DIRECTIVES

When corrective action has been determined to be warranted, Cub Crafters will issue a safety directive to all owner/operators within the current database. All Service Documents for this aircraft may be found on the Cub Crafters website. These directives will be classified in four different categories:

- SAFETY ALERT – The safety alert is a directive that relates to safety of flight and requires immediate action. Compliance is required.
- SERVICE BULLETIN – A service bulletin is a directive which does not require immediate action; however, an action is required on the part of the customer for the continued operational safety of the product and compliance is required.
- SERVICE INSTRUCTION – Information that does not necessarily recommend a future action but is relevant to the aircraft and may include product improvements or information from vendors. Compliance is optional.
- SERVICE LETTER – A notification may not recommend any action but is provided as a method of disseminating information relating to the continued airworthiness of the aircraft.

9.2 MANDATORY SAFETY DIRECTIVES

When a safety directive has been issued which requires mandatory action, 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. Cub Crafters, Inc. assumes no responsibility for problems arising from non-compliance with such directives.

10 GENERAL SAFETY PRACTICES

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. Use common sense to think of ways to avoid these hazards. Remember that many accidents happen because of carelessness. Be sure to 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, or 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 turned on when the engine is not running. Doing so could allow the engine to fire if the propeller were rotated by hand.
- 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.
- The lead acid battery will emit hydrogen gas when charging, which is highly flammable. Any nearby source of ignition such as sparks or an open flame can result in an explosion. Keep all ignition sources away from the battery.
- 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.

CHAPTER 04

AIRWORTHINESS LIMITATIONS

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04 AIRWORTHINESS LIMITATIONS

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1 GENERAL

This chapter outlines replacement intervals, maintenance requirements and means of monitoring aircraft components, systems, and structures determined to be life limited.

2 DESCRIPTION

The following airworthiness limitations and requirements are separated into four groups as described below:

- Maintenance Limitations - Checks of components and systems that are required to be performed during scheduled maintenance.
- Replacement Limitations - List of time limits that the kit manufacturer considers specific components must be replaced.
- Vortex Generators - This limitation is related to the number of vortex generators that may be missing from an aircraft.
- Gap Seals – This limitation is related to flying with some of the gap seals removed.
- Propeller / Tire Configurations – This limitation is related to the allowable tires to be used with the installed propeller.

3 MAINTENANCE LIMITATIONS

Chapter 12 (Servicing) lists scheduled maintenance requirements considered essential for the safe continued airworthiness of the aircraft.

4 REPLACEMENT INTERVALS

Chapter 12 (Servicing) lists scheduled replacement intervals considered essential for the safe continued airworthiness of the aircraft.

5 VORTEX GENERATORS

The aircraft is allowed to fly with the following number of vortex generators missing:

- Not more than 3 vortex generators missing on an aircraft.
- Not more than 2 vortex generators missing on a wing.
- The missing vortex generators must not be next to each other.

6 GAP SEALS

The aircraft is allowed to fly with, or without gap seals, and in the following gap seal configurations:

- The rudder gap seal removed and all elevator gap seals installed.
- All elevator gap seals removed and the rudder gap seal installed.

The aircraft is NOT allowed to fly with one elevator gap seal missing.

7 PROPELLER / TIRE CONFIGURATIONS

The CCK/CCX-2000 aircraft is limited to the tires that are allowed to be installed, when the aircraft is equipped with the 83” Hartzell propeller. See the table below for the allowed propeller/tire configurations for the CCK/CCX-2000 aircraft.

PROPELLER	TIRES ALLOWED
80” Hartzell Propeller HC-C2YR-1N/NG8301W-3	8:50 X 6 Goodyear
	26 X 10.5-6 Goodyear
	26” Alaska Bushwheel
	29” Alaska Bushwheel
	31” Alaska Bushwheel
83” Hartzell Propeller HC-C2YR-1NW/NG8301W	29” Alaska Bushwheel
	31” Alaska Bushwheel

CHAPTER 05

MAINTENANCE CHECKS

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05 MAINTENANCE CHECKS

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1 GENERAL

This section is intended to serve as a guide for a 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 all applicable Safety Directives, Safety Alerts, and Service Bulletins have been complied with. Furthermore, it is the responsibility of the owner and/or the operator to ensure that the airplane is inspected as specified in Parts 43 and 91 of the Federal Aviation Regulations.

This guide will make reference 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 make reference to revision levels of vendor publications.

This template may not cover custom modifications made to the aircraft.

2 INSPECTION GROUPS AND CRITERIA

A. 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:

§ 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.

§ Fabric Covered Parts: Security, condition, cleanliness, wear, cracking, obstruction of drainage or vent holes, deformation, heat deterioration, fluid saturation, and any other apparent damage.

§ Metal Parts: Security, condition of finish, cleanliness, distortion, fatigue cracks, cracked welds, corrosion, and any other apparent damage.

§ Fuel and Hydraulic Oil Lines and Hoses: Cracks, dents, kinks, loss of flexibility, deterioration, obstruction, chaffing, improper bend radius, cleanliness, security, and any other apparent damage.

§ Electrical Wiring: Cleanliness, loose, corroded, or broken terminals, chaffed, broken, or worn insulation, security, heat deterioration, and any other apparent damage.

§ Bolts and Nuts: Fretting, wear, damage, stretch, proper torque and safety wiring.

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

§ Fuel Tank Areas: Evidence of leaks.

Inspection forms in Appendix A may be used as a guide to perform the visual inspections.

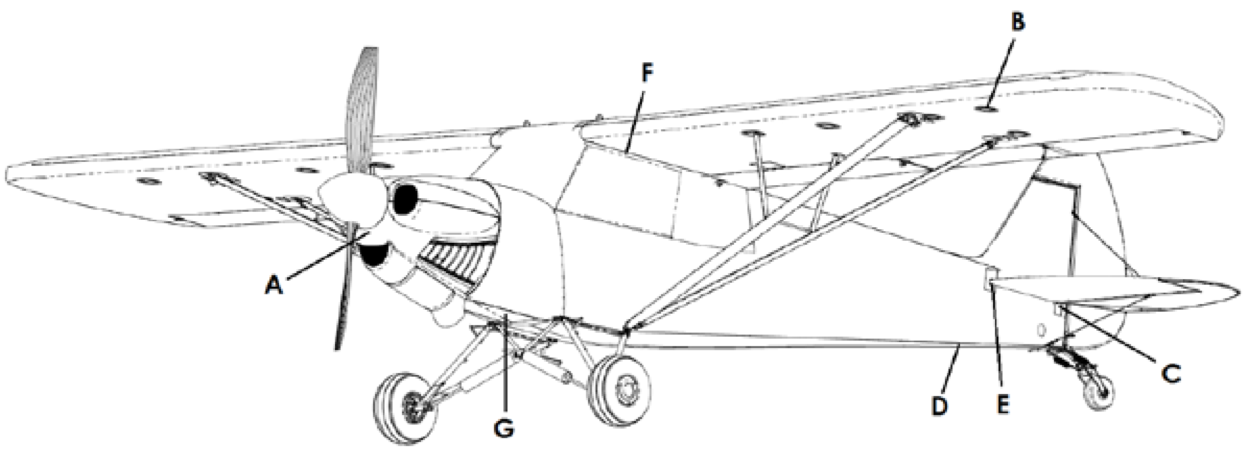
B. OPERATIONAL INSPECTION

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.

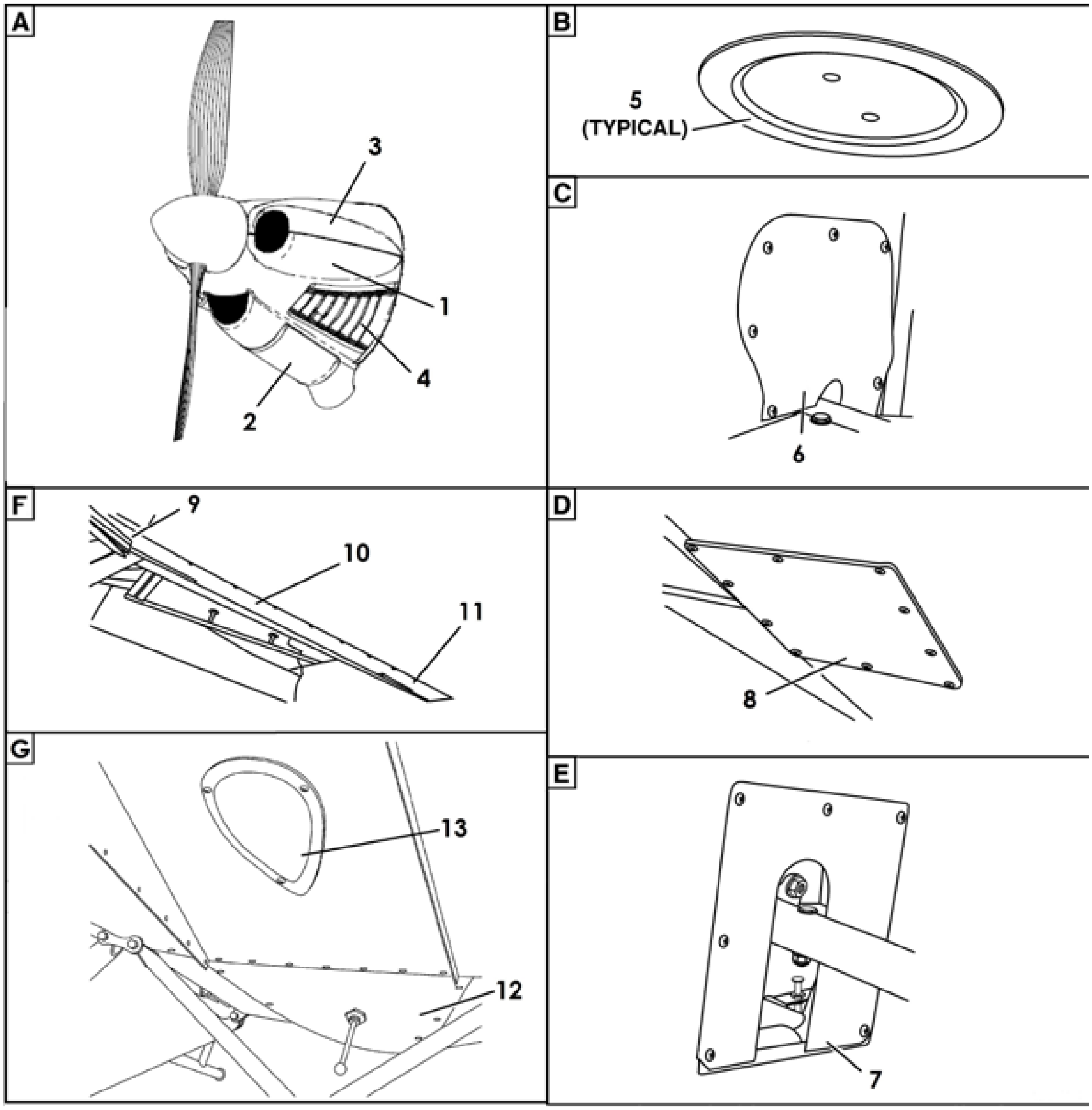
C. FUNCTIONAL INSPECTION

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, its systems, and the risks and dangers of operating an aircraft on the ground. Attention is drawn to the fact that this aircraft has a tail wheel configuration and its behavior during taxiing is different from an aircraft with a nose gear. The operator must be familiar with taxiing a tailwheel aircraft before attempting to perform these checks.
>
> During the check, observe engine temperatures limitations.



*CCK/CCX-2000 shown. CCK/CCX-1865 same except as noted.



LEGEND:

1. LOWER ENGINE COWLING
2. INSPECTION COVER
3. UPPER ENGINE COWLING
4. COWL LOUVER (2) OR FLAP (2)
5. INSPECTION COVER, ROUND (5 INCH)
6. INSPECTION COVER (2)
7. INSPECTION COVER (2)
8. INSPECTION COVER (1)
9. WING TRIM, FRONT (2)
10. WING TRIM STRIP (2)
11. WING TRIM, AFT (2)
12. BELLY PANEL/XPDR ANT.MOUNT
13. PULLEY COVER

3 CONDITION INSPECTION TASKS

If the aircraft is registered in the United States, the FAA requires that all airplanes must undergo a complete inspection at least once every 12 calendar months. 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 log book/maintenance record. The inspection interval to the next condition inspection may not exceed twelve calendar months. Refer to Appendix A of this manual for the inspection form.

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CHAPTER 06

AREAS, DIMENSIONS, AND GEOMETRY

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06 DIMENSIONS AND AREAS

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1 GENERAL

The location of any point on the aircraft is identified in a three axis grid as follows (see Figures 1 and 2).

§ FS – Fuselage Station is a horizontal reference designation starting in front of the nose of the airplane at a point 60.00 inches ahead of the wing leading edge.

§ WL – Water Line is a vertical reference designation measured parallel to the ground from a point 60.00 inches below the center of the propeller attach flange. 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" indicates whether the point is to the left or the right of the centerline.

§ WS – Wing Station is measured outboard from the center line of the fuselage. The letters "L" and "R" designate left or right wing respectively.

2 AIRPLANE DIMENSIONS AND AREAS

DIMENSION	CCK/X-1865	CCK/X-2000	CCK/X-2000 2180 Clamar Floats Installed
MAIN DIMENSIONS			
Wing Span	411.4 in.		
Length in Level Flight Attitude	279 in.*	287 in.*	298 in.*
Length in Three Point Attitude	278 in.*	284 in.* (Larger Spinner)	301.7 in.*
Height in Level Flight Attitude- 8.50x6-6 wheels and tires	112 in.*	112 in.*	130.2 in.*
Height in Three Point Attitude- 8.50x6-6 wheels and tires, 78" prop for CCK/X-1865, 80" prop for CCK/X-2000	101 in.*	105 in.* (Larger Prop)	124.1 in.*
Propeller Ground Clearance- 8.50x6-6 wheels and tires, 80" prop		9.14 in. *	36.9 in. *
Gross Weight (Wheels, Floats, or Skis)	1865 lbs	2000 lbs	
WINGS			
Type	Externally Braced, High Wing		
Airfoil Section	USA-35B Mod		
Wing Chord	63 in.		
Wing Dihedral	0.75°		
Wing Area	175 ft.^{2}		
Aspect Ratio	6.72		
AILERONS			
Area of Both Ailerons	19.0 ft.^{2}		
FLAPS			
Area of Both Flaps	12.6 ft.^{2}		
HORIZONTAL STABILILZER			
Stabilizer Span	105 in.		
Stabilizer Chord	27 in.		
Stabilizer Dihedral	0°		
Stabilizer Area	15.7 ft.^{2}		
Elevator Area	14.1 ft.^{2}		
FIN AND RUDDER			
Vertical Stabilizer Area	4.58 ft.^{2}		
Rudder Area	6.76 ft.^{2}		
LANDING GEAR			
Wheel Track, main to main - 3X3 Gear, measured Axle to Axle	82.8 in.		
Wheel Base, main to tail	202.4 in.		

***For reference only.** **Table 1 – Airplane Dimensions and Areas**

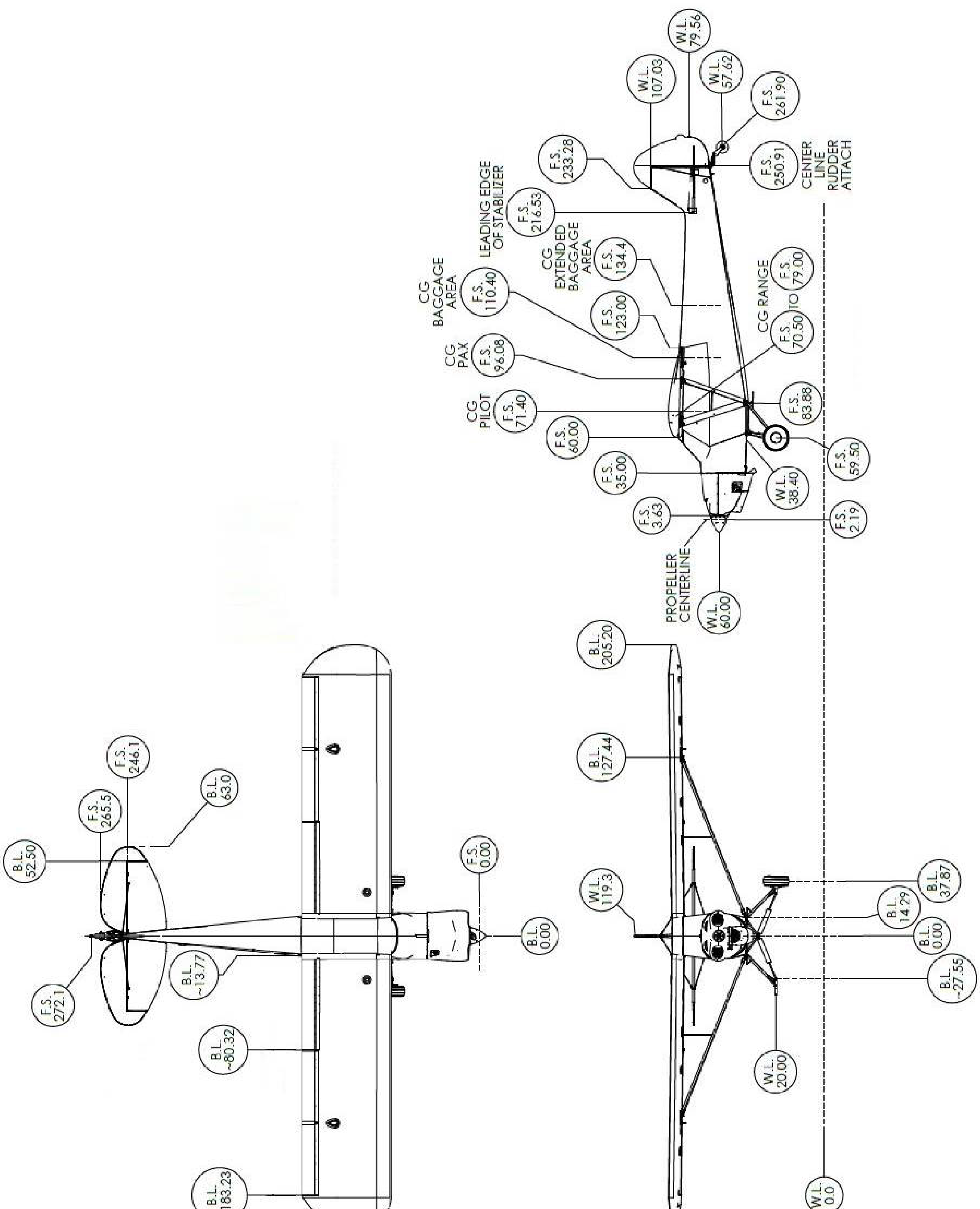

Figure 1 – Aircraft Geometry (CCK/CCX-1865)

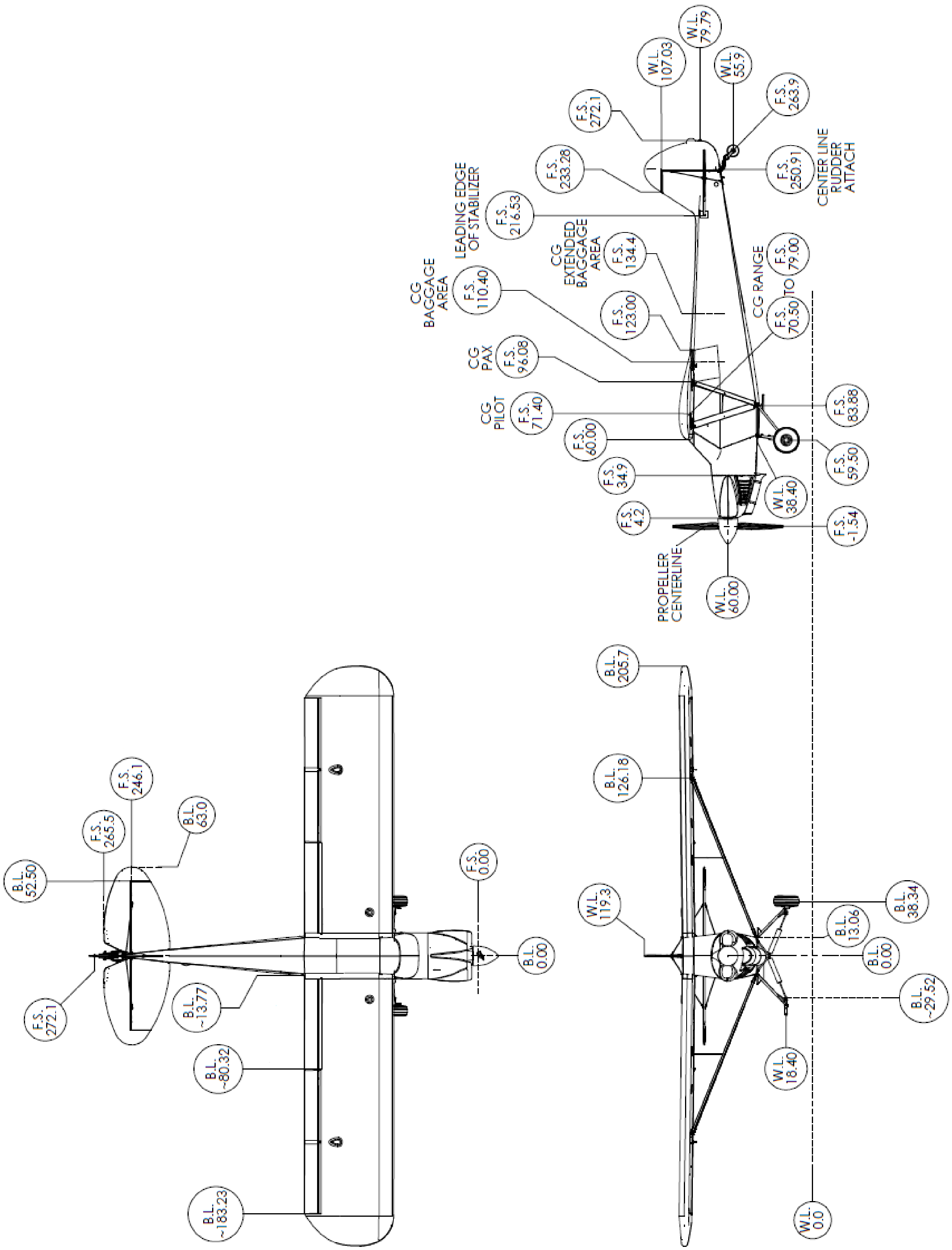

Figure 2 – Aircraft Geometry (CCK/CCX-2000)

CHAPTER 07

JACKING AND LIFTING

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07 JACKING AND LIFTING

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1 TOOLS EQUIPMENT AND SUPPLIES

Description	P/N or Spec.	Supplier	Purpose
Floor Jack	-	Any Source	Jack Main Wheels
Tripod or Saw Horse	-	Any Source	Place Under Tail
Wing Jack	-	Any Source	Jack From Wing
Chocks	-	Any Source	Place Under Main Wheels

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

NOTE
Do not raise the airplane higher than required for the maintenance being performed.

NOTE
Additional weight aft of the CG may be required to stabilize the aircraft with the tail raised.

2 MAINTENANCE PRACTICES

A JACKING THE AIRPLANE

(1) RAISING THE TAIL

(a) Set the parking brakes and place chocks under the main wheels.
(b) Lift under the inboard side of the empennage and raise the airplane to place a tripod or saw horse under the tail wheel springs, as indicated in Figure 1.

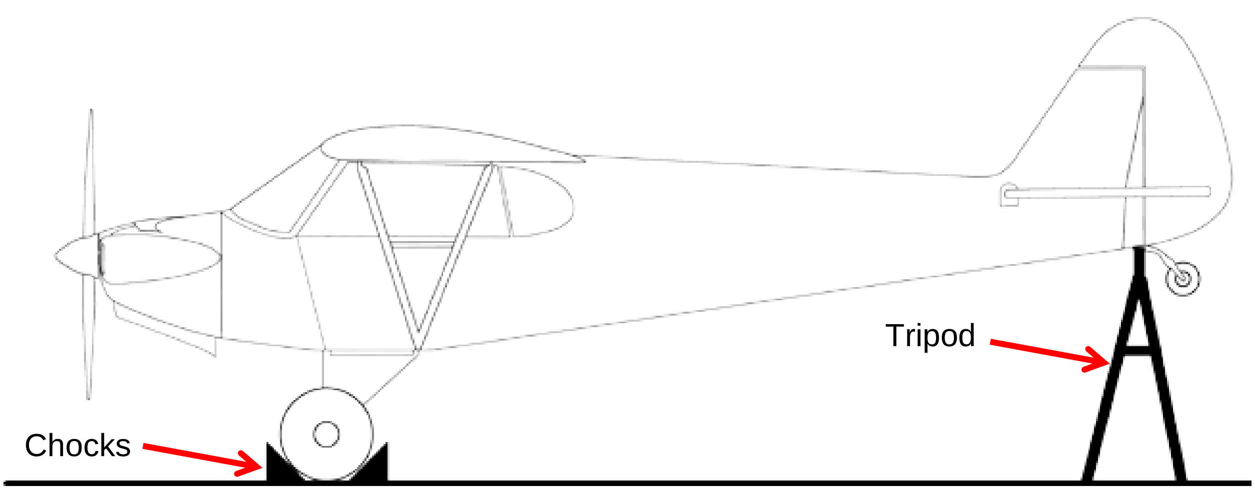


Figure 1 – Raising the Tail

(2) RAISING THE AIRCRAFT FROM THE LANDING GEAR

NOTE
Use this method to service a single wheel or brake. The tail wheel may be on the ground when using this method.

(a) Place a chock under the opposite main wheel and tail wheel.
(b) Place a jack under the main axle as shown in Figure 2.

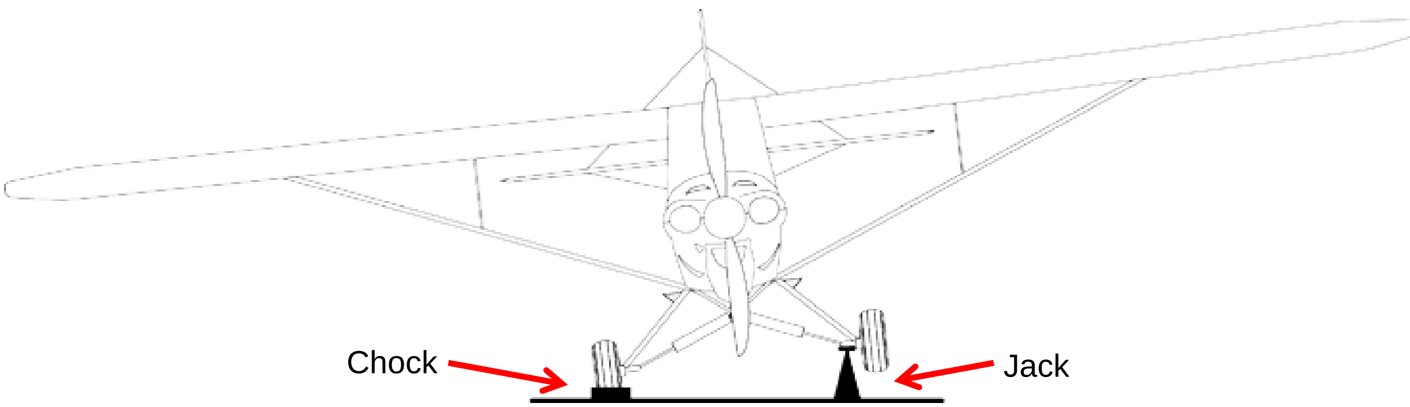


Figure 2 – Jacking from Main Axle

(3) RAISING THE AIRCRAFT FROM THE WING

NOTE
Use this method for complete removal of landing gear leg.

(a) Place a chock under the opposite main wheel and tail wheel.
(b) Place jack between the main lift strut wing attachment point and the tie down (Refer to Figure 3). Jack one side at a time. Do not jack both sides simultaneously.

Figure 3 – Jacking from the Wing

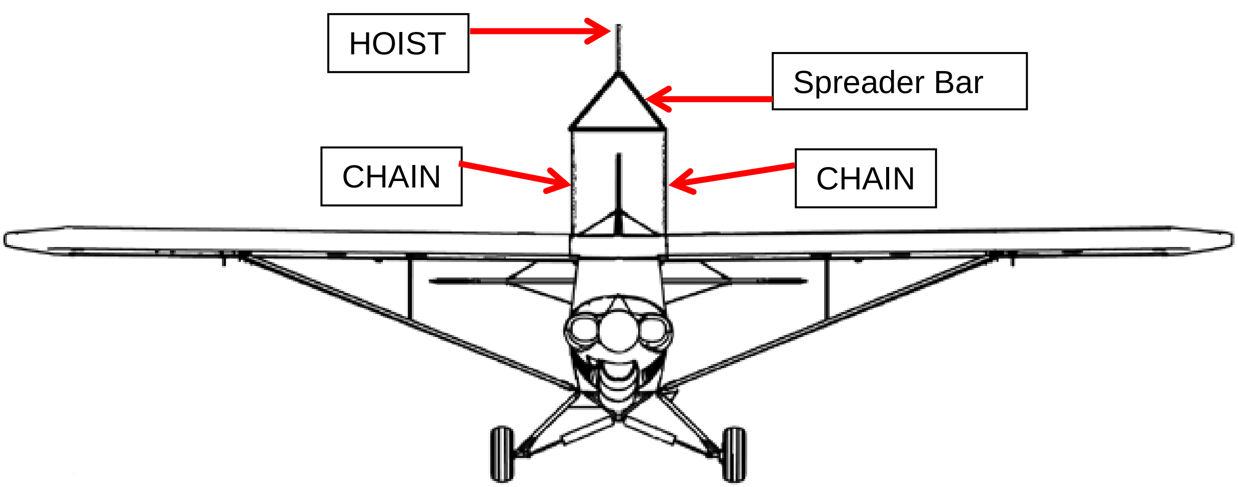
(4) LIFTING THE AIRCRAFT FROM THE LIFT RINGS (ALL LANDING GEAR CONFIGURATIONS)

(a). Acquire the necessary tools and equipment.

Description	P/N or Spec.	Supplier	Purpose
1 ea. Hoist 3000 lbs. capacity	-	Any Source	Hoist Aircraft
1 ea. Spreader bar	-	Any Source	Vertical Hoist on Rings
2 ea. Chains	-	Any Source	Hoisting

(b). Position the aircraft so that the lift rings (at wing root) are directly below the aircraft hoist.

(c). Secure chains of equal length around both lift rings. Attach the chains to the hoist ensuring the aircraft is clear of surrounding objects.



CAUTION
As aircraft is lifted, support the tail to ensure that the aircraft does not swing.

(d). Slowly raise aircraft.

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CHAPTER 08

LEVELING AND WEIGHING

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08 LEVELING AND WEIGHING

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1 LEVELING

A. PREPARATION

Place the aircraft in a hangar with the doors closed where the wind will not affect the aircraft. Lift the empennage, and support the tail wheel on a bench to obtain an approximate flight level attitude. Refer to Chapter 7.

B. LEVELING

(1) LONGITUDINAL LEVELING

Secure a spacer block (1.69 ± 0.04 inches) with masking tape to the forward end of a straight edge. Straight edge must be long enough to reach both the forward and aft carry through spars. Support the tail with a saw horse under the tailwheel springs. Place the straightedge such that the spacer block is under the forward wing spar carry through and the aft edge is on the aft wing spar carry-through. See figure 1. Adjust the height of the tail until the aircraft is level.

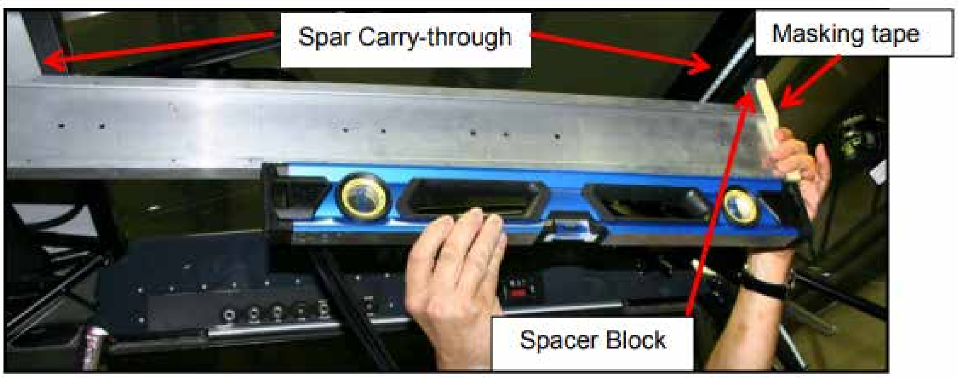

Figure 1 - Longitudinal Leveling

(2) LATERAL LEVELING

Place the level on the upper forward cross tube located in the cabin just behind the windshield, as shown in figure 2. If using a spirit level, center the bubble to level the aircraft laterally.

Figure 2 – Lateral Leveling

2 WEIGHING

A. 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 if it is flown when the weight and the center of gravity are within the approved range.

Have a set of calibrated weighing scales available. The capacity should be 1,000 lbs. for each main and 250 lbs. for the tail. Zero the scales or record the tare, as appropriate.

B. PREPARATION

(a) Clean the aircraft to remove excess dirt and grease.

(b) Remove the fuel from the aircraft. This may be accomplished by opening the fuel drains until all remaining fuel is drained.

- Standard range fuel tanks should retain one gallon unusable fuel total.
- Extended range fuel tanks should retain five gallons unusable fuel total.

(c) Check that the oil is full.

(d) Position the pilot’s seat in the middle position.

C. WEIGHING THE AIRCRAFT

(a) Place the aircraft on the calibrated scales.

(b) Level the aircraft as required.

(c) Record the weight of the main wheels and the tail wheel in Table 1.

Table 1 – Landing Gear Weighing Form

Aircraft Serial Number: ______________________

Registration Number: ______________________

Date: ______________________

NOTE

For 3X3 landing gear, use 59.50” for each main wheel arm.
For CCK/CCX-1865, use 261.90” for the tail wheel arm.
For CCK/CCX-2000, use 263.90” for the tail wheel arm.

Line Number	Position	Recorded Weight	Tare (+/-)	Actual Weight	Arm	Moment
1	Left Main Wheel					
2	Right Main Wheel					
3	Tail Wheel					
			TOTAL WEIGHT		**TOTAL MOMENT**	

TOTAL MOMENT	TOTAL WEIGHT	C.G. LOCATION
÷	=	

(d) Compute the moment by multiplying the actual weight by the arm in lines 1, 2, and 3, , and write the result.

(e) Add the actual weights to calculate TOTAL WEIGHT.

(f) Add the moments to calculate TOTAL MOMENT.

(g) Divide the TOTAL MOMENT by the TOTAL WEIGHT to calculate the location of the center of gravity.

(h) Record new empty weight and position of center of gravity in the POH/AFM, Weight & Balance section and the Equipment List.

D. WEIGHING THE AIRCRAFT (AMPHIBIOUS FLOATS)

WEIGHT AND CG CHANGE ARE UNKNOWN

(a) Acquire necessary equipment,

Description	P/N or Spec.	Supplier	Purpose
4 scales with capacity up to 1000 lbs.	-	Any Source	Weighing aircraft
2 Hydraulic Jacks (1 ton minimum)	-	Any Source	Jack rear wheels

(b) Place weighing pads under the front wheels.
(c) Place the jacks for the rear wheels on weighing pads.
(d) Level the aircraft per Section 1 of this Chapter.
(e) Measure the arm for the front and rear wheels. This is to be done by dropping a plumb bob off the left and right leading edge of the wing and marking these locations on the floor. Draw a line on the floor between these points. Then, measure the longitudinal distance from the center each of the nose and main wheels to the line. The leading edge of the wing is located at Fuselage Station 60.0.

Fuselage station of left nose wheel
= ________ 60 inches - (measured distance Inches)
Fuselage station of right nose wheel
= ________ 60 inches - (measured distance Inches)
Fuselage station of left main wheel =
________60 inches + (measured distance Inches)
Fuselage station of right main wheel =
________60 inches + (measured distance Inches)

(f) Record the weights of the wheels in lines 1, 2, 3, and 4 of **Table 2.**

NOTE
Due to the position of the nose wheels relative to the datum, and the leading edge of the wing, the arm of the front wheels will be a negative number.

Table 2 Landing Gear Weighing Form

Aircraft Serial Number: ______
Registration Number: ______
Date: ______

Line Number	Position	Recorded Weight	Tare (+/-)	Actual Weight	Arm	Moment
1	Left Nose Wheel				-	
2	Right Nose Wheel				-	
3	Left Main Wheel					
4	Right Main Wheel					
	TOTAL WEIGHT				**TOTAL MOMENT**	

TOTAL MOMENT	TOTAL WEIGHT	C.G. LOCATION
÷	=	

(g) Compute the moment by multiplying the actual weight by the arm in lines 1, 2, 3, and 4, and write the result.
(h) Add the actual weights to calculate TOTAL WEIGHT.
(i) Add the moments to calculate TOTAL MOMENT.
(j) Divide the TOTAL MOMENT by the TOTAL WEIGHT to calculate the location of the center of gravity.
(k) Record new empty weight and position of center of gravity in the POH/AFM, Section 6: Weight & Balance and the Equipment List.

E. WEIGHING THE AIRCRAFT (STRAIGHT FLOATS)
WEIGHT AND CG CHANGE ARE KNOWN

(a) After removing the landing gear, weigh the landing gear wheels and brakes separately.
(b) Subtract the weight and moment of the landing gear wheels and brakes from the empty weight of the airplane.
(c) Add the weight of the floats and estimated CG location of floats, then calculate the moment of the floats.
(d) Divide the resultant moment by the weight to calculate the new center of gravity.

Table 3 Reference Weights

Component	Weight (lbs.)	C.G. Location (in. aft of datum)	Moment (in.lbs.)
Basic Empty Weight and CG on Wheels			
Minus Main Landing Gear			
Minus Wheels, Brakes and Tires		59.5	
Minus Tail Wheel Assembly		261.9 (CCX/K-1865) 263.9 (CCX/K-2000)	
Plus Floats*			
New Empty Weight on floats			

* If the weight and center of gravity location of the floats is not known, contact the manufacturer.

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CHAPTER 10

PARKING AND MOORING

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10 PARKING AND MOORING

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1 MAINTENANCE PRACTICES

A. PARKING

(a) Position the airplane on level surface, headed into the wind.

(b) Set the parking brakes. The parking brake valves are located on the forward portion of the passenger rudder pedals. To engage, press both brake pedals and turn the brake valve on each pedal to the horizontal position.

(c) Chock the main gear wheels.

(d) In gusty or stormy weather, moor the airplane.

(e) When the aircraft is to be parked for an extended time, it should be moved periodically to prevent corrosion in the wheel bearings and flat spots on the tires.

B. MOORING

(a) Position the airplane on level surface, headed into the wind.

(b) Set the parking brakes. The parking brake valves are located on the forward portion of the passenger rudder pedals. To engage, press both brake pedals and turn the brake valve on each pedal to the horizontal position.

(c) A good practice is to position the propeller in an angled or horizontal position.

(d) Chock the main gear wheels.

(e) There is a tie-down ring underneath each wing next to the forward lift strut (refer to Figure 1). The tail should be tied down by wrapping straps/rope/chains at least once around the tail wheel head (refer to Figure 2). In severe weather, use multiple lines. During gusty or high wind conditions, lines may require periodic tightening to prevent excessive movement of airplane. Use a safety knot (such as a bowline knot) to ensure security.

Figure 1 – Wing Tie Down

Figure 2 – Tailwheel Tie Down

C. STORAGE

(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.

(2) 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 manufacturer’s service letter.

(c) Fill the fuel tanks completely. Check for water accumulating each week.

(d) Wipe the tires with dry cloth, and treat them with tire protector spray. Mark the tire positions and date with chalk. Turn the wheels and check air pressure regularly.

(e) Remove the battery and ELT (refer to Chapter 24) and store in accordance with standard practices. Clean the battery compartment and the battery cable terminals to neutralize any battery acid that may be present.

(f) Lubricate according to lubrication schedule (refer to Chapter 12).

(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 and install protective covers on the seats.

(3) 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 manufacturer's service letter.

(c) Drain the fuel tanks (refer to Chapter 28).

(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 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 12).

NOTE
It is advisable to use unserviceable tires for prolonged storage.

(e) Remove the battery and the ELT (refer to Chapter 24) and store in accordance with standard practices (refer to Chapter 20). Clean the battery compartment and the battery cable terminals to neutralize any battery acid that may be present.

(f) Lubricate according to lubrication schedule (refer to Chapter 12).

(g) Clean the propeller to remove dirt, oil, and bug accumulation. Coat the blades with a corrosion preventive soft compound or film and wrap with moisture proof material. A good practice is to position the propeller in an angled or horizontal position.

(h) Clean and cover the instruments and the panel. Take any additional precautions according to the manufacturer.

(i) Clean and install protective covers on the seats.

(j) Remove all loose equipment and store.

(k) Clean and install covers over windshield and windows.

(4) PREPARATION FOR SERVICE

(a) Engine preparation for service - Refer to the manufacturer's service letter.
(b) Remove all covers, tapes and tags from airplane.
(c) Reinstall the battery and the ELT (refer to Chapter 24).
(d) Fill the fuel tanks (if applicable) (refer to Chapter 12).
(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 Appendix A).
(f) Replace O-rings in the fuel selector and (if equipped) engine primer if the fuel system has been left dry for an extended period of time.

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CHAPTER 12

SERVICING

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12 SERVICING

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1 GENERAL

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.

The intervals specified 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, salt water environments, dusty atmospheric conditions, extreme temperature ranges, unimproved airport facilities, or other unusual operating requirements. In salt water 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.

2 CONSUMABLE OR FREQUENTLY REPLACED ITEMS

Item	Specifications		Capacity
Air Filter	CCK/CCX-1865: Cub Crafters Part Number: PC54108-001		N/A
	CCK/CCX-2000: Cub Crafters Part Number: XC53110-001 (filter will need to be cut to fit)		
Fuel	Aviation Grade 100LL	Standard Range (CCK/X-1865 only)	25 gallons total 24 gallons usable
		Extended Range (CCK/X-1865 and CCK/X-2000)	44 gallons total 39 gallons usable (-2000) 42 gallons usable (-1865)
Oil	All Temperature	CCK/CCX-1865: Phillips XC 20W-50	3.5 Quarts (3.3L) Min 4 Quarts (3.8L) Rec 6 Quarts (5.7L) Max
		CCK/CCX-2000: AeroShell 15W-50*	4 Quarts (3.8L) Min 6 - 7 Quarts Rec 8 Quarts (7.5L) Max
Oil Filter	CCK/CCX-1865: SP56011-001 Spin-On Oil Filter		
	CCK/CCX-2000: CH48108-1 Spin-on Oil Filter or AA48108-2 Spin-on Oil Filter (Tempest)		
Hydraulic Fluid	MIL-H-5606G		As required
Main Tire Pressure	6.00 x 6	Dry Air	26 ± 2 psi (165 ± 14 kPa)**
	8.00 x 6	Dry Air	23 ± 2 psi (158 ± 14 kPa)**
	8.50 x 6	Dry Air	20 ± 2 psi (124 ± 14 kPa)**
	26” Bushwheels	Dry Air	12 ± 2 psi (83 ± 14 kPa)**
	29” Bushwheels	Dry Air	12 ± 2 psi (83 ± 14 kPa)**
	31” Bushwheels	Dry Air	12 ± 2 psi (83 ± 14 kPa)**
Tail Wheel Pressure	ABW 3200-Type	Dry Air	38 ± 5 psi (262 ± 29 kPa)**
	ABW-3200B “Tundra”	Dry Air	23 ± 2 psi (158 ± 14 kPa)**

Table 1 – Fuel, Oil, Brake Fluid, and Tire Pressures

Notes:
*CCK/X-2000 Engine break-in oil differs depending on OAT. Such as Aeroshell 80 or 100.
**Tire pressure values are reference only. Refer to tire sidewall to verify proper pressures.

3 LUBRICATION

ITEM	SUGGESTED	SPEC
ENGINE		
Engine Oil	See List Above	MIL-L-22851, MIL-L-6082, SAW J1899, or SAE J1966
Spark Plug Thread Lubricant	Champion Aerospace # 2612	
Oil Filter Gasket	Dow Corning 4 Lubricant	MIL-S-8660C
PROPELLER		
Lubricate according to the Hartzell Propeller Owner's Manual. (CCK/CCX-2000 only)		Reference: -Chapter 60 -Propeller Owner's Manual
COCKPIT		
Hydraulic Fluid (Brake)	Any Brand	MIL-H-5606G
Control Stick Pivot Points Torque Tube Bearings	LPS 2	MIL-C-16173E Grade 3 Class I
Elevator Pulley Shafts and Bushings	LPS 2	MIL-C-16173E Grade 3 Class I
Aileron Pulley Shafts and Bushings	LPS 2	MIL-C-16173E Grade 3 Class I
Rudder Pedal Pivot Points Brake Pedal Pivot Points	LPS 2	MIL-C-16173E Grade 3 Class I
Flap Handle Shaft	LPS 2	MIL-C-16173E Grade 3 Class I
Door Hinges	LPS 2	MIL-C-16173E Grade 3 Class I
Fuel Fittings w/Pipe Threads	EZ TURN Lubricant	MIL-G-6032D
Fuel Selector O-Rings	Dow Corning 4 Lubricant	MIL-S-8660C
FUSELAGE		
Flap Rod Ball Ends	LPS 2	MIL-C-16173E Grade 3 Class I
Stabilizer Jackscrew	Mobilgrease 28	MIL-G-81322E
Trim Jackscrew & Yoke Bushings	LPS 2	MIL-C-16173E Grade 3 Class I
Fuel Fittings w/Pipe Threads	EZ TURN Lubricant	MIL-G-6032D
LANDING GEAR		
Main Landing Gear Shock Strut Pivot Points	LPS 2	MIL-C-16173E Grade 3 Class I

ITEM	SUGGESTED	SPEC
Main Landing Gear Pivot Points	LPS 2	MIL-C-16173E Grade 3 Class I
Main Wheel Bearings	Mobilgrease 28	MIL-G-81322E
Tail Wheel Swivel	Mobilgrease 28	MIL-G-81322E
Tail Wheel Bearings	Mobilgrease 28	MIL-G-81322E
EMPENNAGE		
Rear Stabilizer Tube Liner	Mobilgrease 28	MIL-G-81322E
Elevator Hinge Pins	LPS 2	MIL-C-16173E Grade 3 Class I
Rudder Hinge Pins	LPS 2	MIL-C-16173E Grade 3 Class I
WING		
Aileron and Flap Hinge Pins	LPS 2	MIL-C-16173E Grade 3 Class I
Aileron Pulley Shafts and Bushings	LPS 2	MIL-C-16173E Grade 3 Class I
Flap Crossbar Bushings, Arm, Pushrod, and Hinge Pivot Points	LPS 2	MIL-C-16173E Grade 3 Class I

4 REPLACEMENT TIMES

The following replacement times are a sample of standard replacement times as recommended by the kit manufacturer and are for use as REFERENCE ONLY.

	ITEM	INTERVAL	REPLACE	OVERHAUL	REF. IN THIS MANUAL	NOTES
1	Engine			X		Reference CC340 Engine Manual / XP360 Operator's Manual
2	Propeller				Chapter 60	See manufacturer's Maintenance Manual
3	Air Inlet Plenum (CCK/CCX-2000 Only)	At engine overhaul	X		Chapter 71	
4	Alternator	At engine overhaul		X		
5	Starter	At engine overhaul		X		
6	Exhaust System	1000 Hours		X		

	ITEM	INTERVAL	REPLACE	OVERHAUL	REF. IN THIS MANUAL	NOTES
7	Induction Air Box	2000 hours	X			
8	Flexible Fuel Lines	12 years or engine overhaul, whichever comes first	X			
9	Flexible Oil System Lines	12 years or engine overhaul, whichever comes first	X			
10	Ignition Backup Battery	Annually	X			
11	Emergency Locator Transmitter	After 1 hour of cumulative transmitting, 50% of useable life has expired, or expiration date marked on the ELT.	X		Chapter 24	Refer to Manufacturer’s Installation and Operation Manual
12	Remote ELT Switch Battery (if installed)	8 years Lithium 4 years Alkaline	X		Chapter 24	
13	Fire Extinguisher	Upon expiration, see cylinder label	X			Applicable to model RT A400: Replace if gross weight is less than 17.7 oz.
14	Rubber Engine Mount Bushings	At engine overhaul or on condition	X			

	ITEM	INTERVAL	REPLACE	OVERHAUL	REF. IN THIS MANUAL	NOTES
15	Landing Gear Bungees	5 Years	X			Replace more frequently when bungees are no longer strong enough to return the landing gear to its stops or whenever they are frayed or damaged
16	Tail Brace Wires	2000 hours	X			

5 CONTROL SURFACE TRAVELS AND CABLE TENSION SETTINGS

Aileron
- Aileron Up .... +18º ± 2.0º
- Aileron Down .... -18º ± 2.0º
- Aileron Cable Tension .... 40 ±5 lbs

Flaps
- First Notch .... 16° ± 1°
- Second Notch .... 33° ± 1°
- Third Notch .... 46° ± 1°

Stabilizers
- Neutral Setting .... 0°
- Stabilizers Up .... +4.5°
- Stabilizers Down .... -3°

Elevators
- Elevator Up .... +25° ± 2°
- Elevator Down .... -15° ± 2°
- Elevator Cable Tension .... 60 ± 2 lbs

Rudder
- Rudder Left .... +25° ± 2°
- Rudder Right .... -25° ± 2°

6 ENGINE SPECIFICATIONS AND DATA

6.1 CCK/X-2000

Engine Model	CC363i
Number of Cylinders	4
Bore & Stroke (inches)	5.125 / 4.375
Compression Ratio	9.0:1
Piston Displacement	361 CI
Ignition Type	Dual Elec. Ignition
Maximum Continuous Power	186 HP @ 2700 RPM
Minimum Idling Oil Pressure	25 psi
Minimum Oil Pressure	55 psi
Maximum Oil Pressure	95 psi
Maximum Oil Pressure for Takeoff	115 psi
Maximum Oil Temperature	245°F
Maximum Cylinder Head Temperature	450°F Superior Variant 500°F Lycoming Variant
Engine Weight – Dry, Assembled	296 lbs ± 2%
Oil Sump Capacity	6 quarts Maximum
Recommend TBO	Reference Manuals: Superior: XP-360 Operators Manual Lycoming: #60297-7 and #60297-12
Engine to Engine Mount Torque Value	480-590 IN-LBS

6.2 CCK/X-1865

Engine Model	CC340
Number of Cylinders	4
Bore & Stroke	5.125 / 4.175
Compression Ratio	9.0:1
Piston Displacement	340.4 CI
Ignition Type	Dual Elec. Ignition
Takeoff Power	180 HP @ 2700 RPM
Maximum Continuous Power	80 HP
Minimum Idling Oil Pressure	25 PSI
Minimum Oil Pressure	60 PSI
Maximum Oil Pressure	90 PSI
Maximum Oil Pressure for Start-Up and Warm Up	100 psi
Maximum Oil Temperature	Reference SSC50000 CC340 Manual
Maximum Cylinder Head Temperature	475°F Takeoff 400°F Cruise
Engine Weight – Dry	251.3 lbs
Oil Sump Capacity	6 quarts with light weight sump
Recommend TBO	Reference SSC50000 CC340 Manual
Engine to Engine Mount Torque Value	60-65 IN-LBS.

CHAPTER 20

STANDARD PRACTICES

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20 STANDARD PRACTICES

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1 GENERAL

This chapter gives the requirements for torquing fasteners. No lubricating or anti-seize compounds are to be applied to threaded fasteners except where 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.

2 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 self-locking torque, locking torque, friction drag 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).

3 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 indicated + 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. The 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.

4 USE OF TORQUE WRENCHES AND ADAPTERS

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

When adapters or extensions are used on manually operated torque wrenches, they shall be aligned as shown in Figure 1 and the dial reading required shall be calculated from the following formula:

$$\text{Dial Reading} = \frac{\text{Specified Torque} \times L}{L + L_1}$$

A = fulcrum point of handle
B = center line of wrench drive
C = center line of adaptor or extension drive
L = distance from the fulcrum point to the handle to the center line of wrench drive
L1 = distance from center line of the wrench drive to center line of adaptor or extension drive

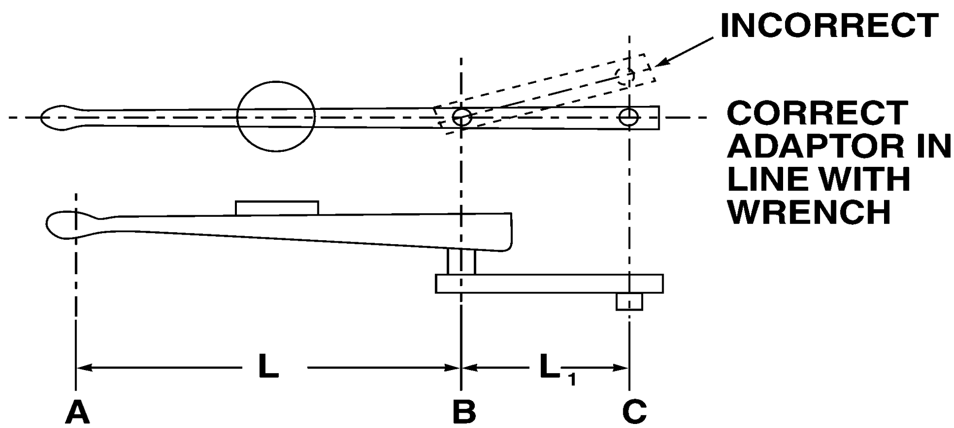

Figure 1 – Use of Torque Wrenches

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.

5 TORQUING PATTERNS

Whenever applicable, the following patterns must be followed when torquing fasteners:

Typical Circular Pattern Torquing Sequence

Typical Linear Pattern Torquing Sequence

Figure 2 – Torque Patterns

6 SPECIFIC TORQUE REQUIREMENTS

Item	Chapter/Section Reference
Propeller	60
Spark Plugs	Reference Engine-specific Manual and Lightspeed Ignition System Manual

7 GENERAL TORQUE VALUES

NOTE: ADD FRICTION DRAG TO ALL VALUES.

BOLTS - STEEL TENSION	BOLTS - STEEL TENSION	BOLTS - ALUMINUM
AN3 THRU AN 20 AN42 THRU AN49 AN73 THRU AN81 AN173 THRU AN186 MS20033 THRU MS20046 MS20073 MS20074 AN509 NK9 MS24694 AN525 NK525 MS27039 MS21250	MS20004 THRU MS20024 NAS 144 THRU NAS158 NAS333 THRU NAS340 NAS538 THRU NAS590 NAS624 THRU NAS644 NAS1303 THRU NAS1320 NAS6203 THRU NAS6220 NAS172 NAS174 NAS517 **BOLTS – STEEL SHEAR** NAS464 NAS1103 THRU NAS1120 NAS6606	AN3DD THRU AN20DD AN173DD THRU AN186DD AN509DD AN525D MS27039D MS24694DD

NUTS - STEEL		NUTS - STEEL		NUTS - ALUMINUM	
TENSION	**SHEAR**	**TENSION**	**SHEAR**	**TENSION**	**SHEAR**
AN310 AN315 AN363 AN365 NAS1021 MS17825 MS21044 MS21045 MS20365 MS20500 NAS679	AN320 AN364 NAS1022 MS17826 MS20364 MS21042 MS21083	AN310 AN315 AN363 AN365 MS17825 MS20365 MS21045 NAS1021 NAS1291 NAS679	AN320 AN364 NAS1022 MS17826 MS20364	AN365D NAS310D NAS1021D	AN320D AN364D NAS1022D

THREAD SIZE (FINE)	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
8-36	12	15	7	9	-------	--------	-------	-------	5	10	3	6
10-32	20	25	12	15	25	30	15	20	10	15	5	10
1/4-28	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	110	200	250	120	150	75	110	45	70
7/16-20	450	500	270	300	520	630	300	400	180	230	110	170
1/2-20	480	590	290	410	770	950	450	550	280	410	160	260
9/16-18	800	1000	480	600	1,100	1,300	650	800	380	580	230	360
5/8-18	1,100	1,300	660	730	1,250	1,550	750	950	550	670	270	420
¾-18	2,300	2,300	1,300	1,500	2,650	3,200	1,600	1,900	950	1,250	560	880
7/8-14	2,500	3,000	1,500	1,800	3,550	4,350	2,100	2,600	1,250	1,900	750	1,200
1 -14	3,700	4,500	2,200	3,300	4,500	5,500	2,700	3,300	1,600	2,400	950	1,500
1 1/8-12	5,000	7,000	3,000	4,200	6,000	7,300	3,600	4,400	2,100	3,200	1,250	2,000
1 3/8-12	9,000	11,000	5,400	6,600	11,000	13,400	6,800	8,000	3,900	5,600	2,300	3,650

Table 1 – Torque Values (All values in in-lbs.)

	NOTE: ADD FRICTION DRAG TO ALL VALUES			
	NUTS AND BOLTS - STEEL			
	TENSION		SHEAR	
THREAD SIZE (COARSE)	MIN.	MAX.	MIN.	MAX.
8-32	12	15	7	9
10-24	20	25	12	15
1/4-20	40	50	25	30
5/16-18	80	90	45	55
3/8-16	160	185	95	110
7/16-14	235	255	140	155
1/2-13	400	480	240	290
9/16-12	500	700	300	420
5/8-11	700	900	420	540
3/4-10	1,150	1,600	700	950
7/8-9	2,200	3,000	1,300	1,800
1 -8	3,700	5,000	2,200	3,000
1 1/8-8	5,500	6,500	3,300	4,000
1 3/8-8	6,500	8,000	4,000	5,000

Table 1 – Torque Values (Continued) (All values in in-lbs.)

CHAPTER 24

ELECTRICAL POWER SYSTEMS

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24 ELECTRICAL POWER SYSTEMS

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1 GENERAL

The aircraft uses a 14 volt DC electrical system with the power supplied by a 40 amp belt-driven alternator and a 12 volt storage battery. The aircraft is / is not *(circle one)* equipped with a 12 volt ignition battery backup.

In addition to the alternator and the battery, the electrical system consists of a solid-state linear regulator, master and starter solenoids, circuit breakers, and switches. Generally the battery is located underneath the pilot's seat. The Ignition Backup Battery is located behind the right front interior panel.

Optional anti-collision light assemblies may be installed on each wingtip. These consist of navigation light and a strobe light. There is also a position and strobe light on the tail of the aircraft.

An optional landing light may be mounted in the leading edge of the left wing. Another option includes a second landing light in the leading edge of the right wing.

2 TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
No Operation	Engine speed too low	Check for output at higher speed
	Blown fuse(s)	Replace fuse(s)
	Bad Wire Connections	Replace bad connectors
	Drive belt broken	Replace belt
	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 contacts and/or replace battery
	Bad regulator (integral to alternator)	Replace/Repair Alternator

WARNING
THE ENGINE AND THE IGNITION SWITCHES MUST BE OFF.

Refer to Main Power Distribution Schematic and use a high-impedance digital volt/ohmmeter (DVM) to make the following checks:

(a) Turn all switches off. Use the lowest resistance scale on the DVM. Check the resistance between the battery negative (-) terminal and the engine case. Measurements over 0.5 Ohm should be investigated. Check the engine ground strap and the battery ground strap for loose or contaminated connections, broken conductors or bad crimp joints. If these measurements are less than 0.5 Ohm, any of these points may be used as reference (-) for the following measurements.

(b) Turn on the master switch. Measure the voltage on the battery bus and on pin + of the regulator. The voltages should be equal, or within 0.2 volts. A difference of more than 0.2 volts may be caused by a bad breaker.

(c) Try a five pound pull test on all crimp joints and make sure that the terminals are crimped on the wire, not the insulation.

(d) Troubleshoot systems to determine the root cause of the problem.

3 ALTERNATOR

The alternator is a belt-driven, 40 ampere, internally regulated alternator.

A. REMOVAL

(a) Disconnect the wires and remove the mounting bolts.

B. INSPECTION

Inspect the alternator for general condition. Broken wires or damaged connectors may be corrected in the field.

(b) Check belt for cracking or fraying and replace if defective.

(c) Inspect the alternator for general condition. Broken wires or damaged connectors may be corrected by qualified personnel.

C. INSTALLATION

(d) Locate the alternator in place.

(e) Secure the alternator with the mounting bolts; torque the bolts.

(f) Attach the alternator wires.

5 MAIN BATTERY

The battery is a sealed, 12 Volt lead acid battery. Electrolyte replenishment is not required. Inspect every 100 hours for physical condition and cleanliness.

A. REMOVAL

(a) Remove the pins from each side of pilot’s seat base.

(b) Slide the seat fully forward and tilt the seat forward.

(c) Disconnect the battery strap and cables, positive first, then negative. Remove the battery.

B. INSPECTION

(a) Inspect the battery and terminals for condition and corrosion.

(b) Clean as required.

(c) If necessary, charge the battery in accordance with the following instructions.

C. CHARGING

The battery may be charged using a 12 volt, 1 ampere battery charger. Charging time using a 1 amp charger is 4.5 hours; charging rate will vary depending on the type of charger used. If a trickle charger is used, charging time may be longer.

NOTE
Charging should be conducted in an environment between 70º F and 90º F (20ºC and 30ºC). The battery capacity may vary if charged outside of this recommended temperature range.

NOTE
If battery becomes very hot to touch, cease charging and allow battery to cool down.

NOTE
Voltage reading should be a minimum of 12.5-13.0 volts after charging. If voltage reading using voltmeter is not 12.5 volts or more, repeat charging cycle.

D. INSTALLATION

(a) Place the battery in the mounting space. Secure in place with installed strap.

(b) Connect the positive lead.

(c) Connect the ground lead.

(d) Reinstall the pilot’s seat by securing with the pins.

6 IGNITION BACKUP BATTERY

The battery is a sealed, 12 volt lead acid battery. Electrolyte replenishment is not required.

A. REMOVAL

(a) Remove right forward interior panel.

(b) Release four quick-turn fasteners and remove battery cover bracket.

(c) Remove battery.

(d) Disconnect terminals.

B. INSPECTION

(a) Inspect the battery and terminals for condition and corrosion.

(b) Clean as required.

(c) If necessary, charge the battery in accordance with the following instructions.

C. CHARGING

The battery may be charged using a 12 volt, 1 ampere battery charger.

NOTE
Charging should be conducted in an environment between 70º F and 90º F (20ºC and 30ºC). The battery capacity may vary if charged outside of this recommended temperature range.

NOTE
If battery becomes very hot to touch, cease charging and allow battery to cool down.

NOTE
Do not use greater than two ampere battery charger to charge ignition backup battery.

D. INSTALLATION

(a) Connect negative lead (the black heat shrink covered wire) to battery.

(b) Connect positive lead (the wire with white silicone tube over it) to battery.

(c) Place the battery in the mounting space. Place cover over battery and secure four quick turn fasteners.

(d) Reinstall right forward interior panel.

7 EMERGENCY LOCATOR TRANSMITTER

The aircraft is equipped with an emergency locator transmitter (ELT) that meets TSO C91a. The ELT is mounted in a bracket (select all that apply):

☐ Directly underneath the pilot's seat and is accessed through an opening on the forward face of the seat base.

☐ The RCPI Unit (Remote Switch) is installed including wiring.

☐ ____

____

____

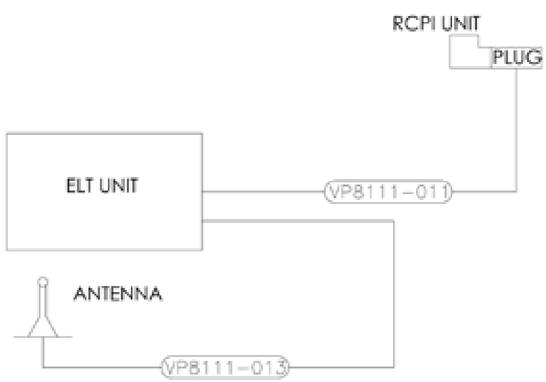

Figure 1 – ELT Schematic

CHAPTER 25

EQUIPMENT AND FURNISHINGS

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25 EQUIPMENT/ FURNISHINGS

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1 GENERAL

The front seat is made from composite with a foam cushion and covered with either nylon canvas or leather material. The seat is attached to the seat base at the front with bolts on both sides. There are two quick-release pins, one on each side of the seat base, used to adjust the seat position fore and aft (see Figure 1 and 2).

WARNING
QUICK-RELEASE PINS MUST BE SECURED IN PLACE PRIOR TO TAKE OFF.

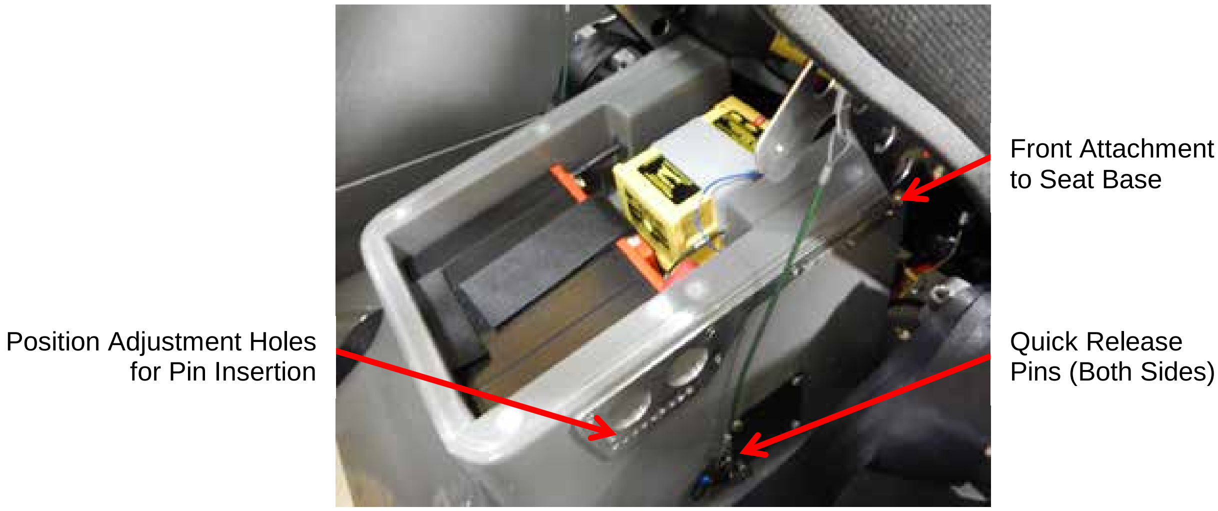

Figure 1 – Front Seat Attachment

Figure 2 – Front Seat

The rear seat is made of fabric with inserted composite stringers. The seat is attached in front by a steel cross bar. The steel cross bar is held in place to the floorboard by two cinched nylon straps. The top of the rear seat is secured in place by nylon straps integrated into the seat. The upper straps are wrapped around the fuselage tubes above and incorporate a slide adjuster (see Figure 3).

Figure 3 – Rear Sling Seat Installed

2 MAINTENANCE PRACTICES

A. REAR SEAT STOWAGE

(a) Disconnect the two cinched nylon straps holding the seat cross bar in place. Unscrew and push the screw in to allow the tab to rotate and slide pin out of seat base connector (see Figure 4).

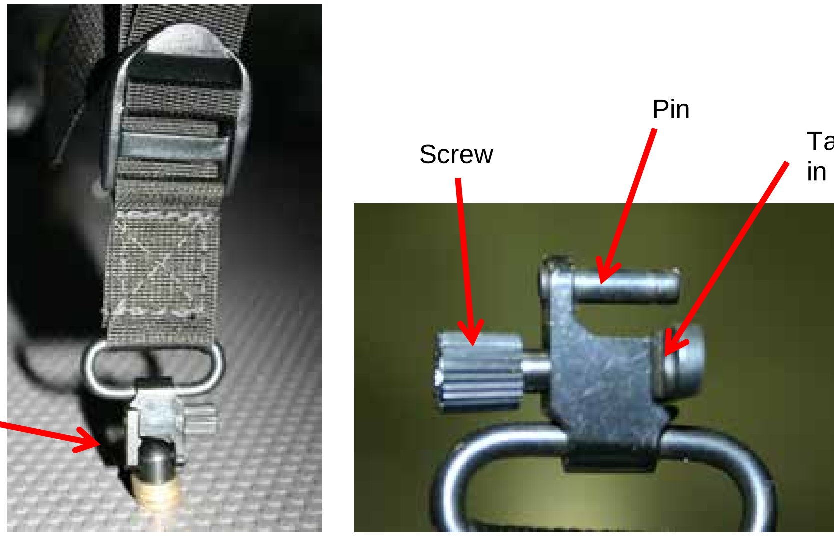

Figure 4 – Cross Bar Strap Attachment

(b) Remove cross bar from fuselage slots. Slide the seat straps and nylon straps off of the cross bar. Place and secure cross bar in aft storage compartment. Remove cushion from seat (see Figure 5).

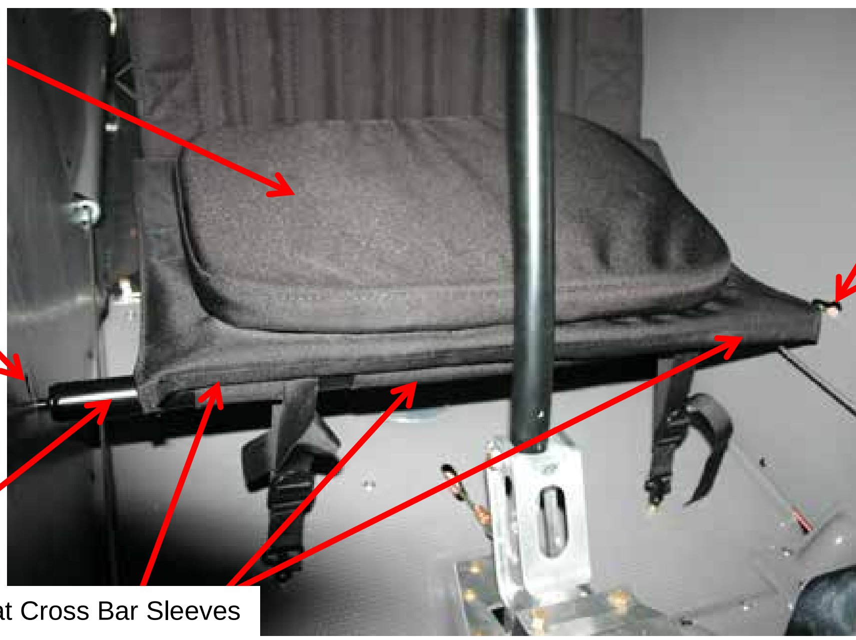

Figure 5 – Rear Cross Bar and Strap Attachment

(c) Fold rear seat up and stow in sling seat holder. Place seat cushion and cross bar straps in sling seat holder (see Figure 6).

Figure 6 – Rear Seat Stowage in Sling Seat Holder

REAR SEAT INSTALLATION

(a) Slide the seat straps and nylon straps on the cross bar in the correct order. Install the cross bar into the fuselage slots (see Figure 5).
(b) Connect the two cinched nylon straps to the floorboard to hold the seat cross bar in place (see Figure 4). Install the seat cushion by lining up the hook and loop tape on the bottom of the seat cushion and top of rear seat.
(c) Ensure the straps in front of the seat are cinched tight enough to hold cross bar in slots at either end. Ensure the top straps are secure and verify proper routing of straps around fuselage tube and through slide adjuster (see Figure 7).

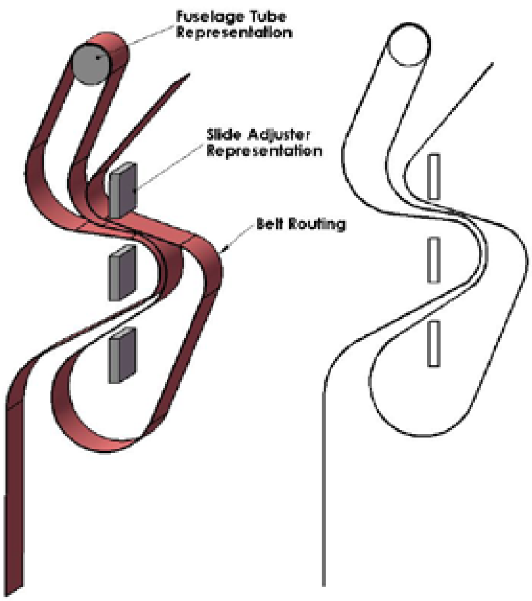

Figure 7 – Rear Seat Upper Strap Routing

B. INTERIOR PANELS

CAUTION

Use extreme care in handling interior panels as they can crack easily and sharp corners may damage fabric covering on the aircraft.

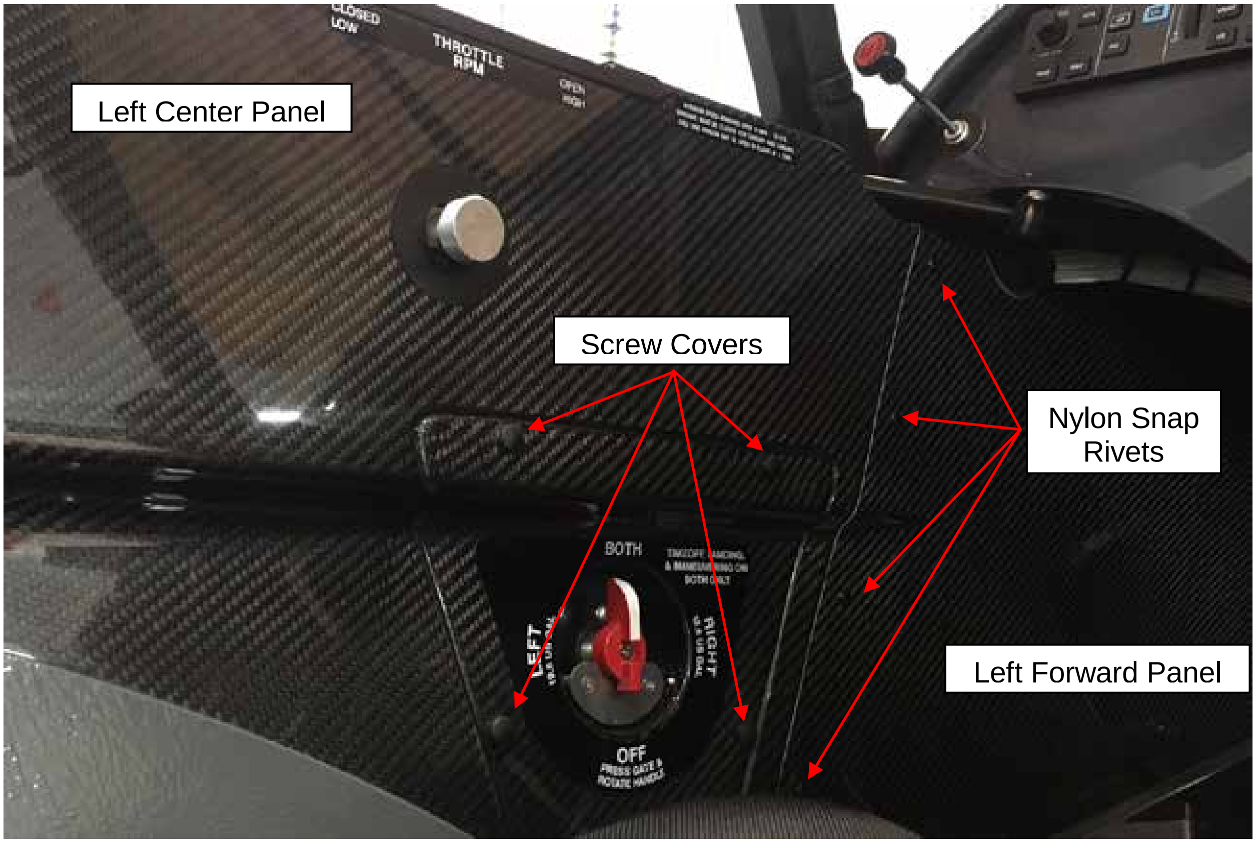

Figure 8a – Left Side Panels

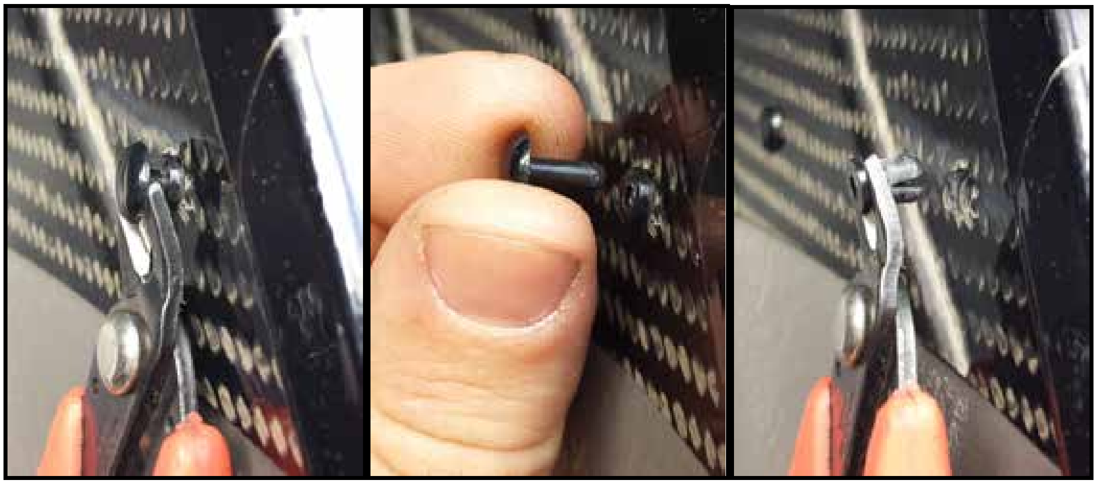

Figure 9b – Removal of Nylon Snap Rivet

(1) REMOVE LEFT CENTER INTERIOR PANEL

(a) Remove fuel selector handle, gate and fuel selector panel from the left center panel (refer to Chapter 28). Note that the screws for the fuel selector panel have covers over them to be removed first (see Figure 8a).

(b) Remove the pulley cover on the left side of the floor near the center of the interior panel.

(c) Remove nylon snap rivets along the bottom edge of the left center panel, and the rivets along the bottom edge of the aft interior panel.

(d) Remove nylon snap rivets along the vertical seams between left center interior panel and left-aft /left-forward interior panels.

(e) Open the top of the left center interior panel by slipping a piece of sheet metal (approximately 2” wide and about 2” shorter than the Velcro length) in one end and keep pushing it in, unlocking the Velcro (see Figure 9). Place tape on strap to hold in place.

Figure 10 – Metal Strap Placement

(f) Reach behind left aft interior panel through the lap seam between left center and left aft interior panels. Using a putty knife, unstick the left center panel from the double sided tape along its aft edge (if applicable).

(g) Remove fasteners securing the pilot’s throttle assembly from the left center panel. There are multiple spacers on each bolt, use care to ensure hardware is not dropped (refer to Chapter 76).

(h) Remove clevis screw holding the throttle linkage rod to the forward throttle lever. Tape the throttle linkage rod to the panel so it doesn’t puncture the fabric.

(i) Removed the left forward panel (after all nylon snap rivets are removed) to gain access to the cabin heat intake of the left center panel. Remove the SCAT tubing connected to the composite intake tube (integrated with left center panel).

(j) Remove left center panel by gently bending the front corner of the panel inward. Pull forward to free the aft edge of the panel then slide the panel aft to clear instrument panel. Lift panel out of aircraft front end first and set aside. It may be necessary to disconnect LH rudder cable from rudder pedal in order to gain sufficient clearance at the lower aft corner of the front interior panel section where it wraps around rudder cable fairlead.

(2) OTHER INTERIOR PANELS

Other composite interior panels are removed and installed in a similar way. Reference Figure 8 for removal of nylon snap rivets.

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CHAPTER 27

FLIGHT CONTROLS

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27 FLIGHT CONTROLS

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1 GENERAL

The flight controls consist of ailerons, rudder, elevators, and flaps. The aircraft has conventional ailerons that are operated with a control stick and actuated with cables. The flap and aileron control surfaces have an aluminium structure and are covered with aluminium sheet. The rudder and elevator control surfaces have a steel tube structure and are covered with fabric. The rudder is operated with two rudder pedals on the floor just aft of the firewall. If equipped, the passenger's control stick and rudder pedals are interconnected with the pilot's.

The flaps are operated mechanically by moving a lever located in the upper, left-hand side of the cockpit ahead of the pilot. The flaps are slotted and have four detent positions: retracted, first notch, second notch, and full flaps. The flap lever has a spring latch system that holds the flap in the selected position. To extend the flaps, depress the trigger and then move the lever down. To retract them, depress the trigger while simultaneously applying a slight back pressure. Smoothly move the handle forward and release the trigger.

The aircraft is trimmed in flight by changing the stabilizer's angle of incidence. The pitch trim is controlled by an electric servo, which moves the leading edge of the horizontal stabilizer up or down. The servo is actuated with a rocker switch located on the front control stick. Some aircraft are also equipped with an aft control stick rocker switch. If equipped with rear seat trim, there will be a selector switch (with center off) for the trim switch in the upper left wing root.

The control surfaces of the aircraft must be rigged within the prescribed limits in order to maintain adequate margins of safety. This chapter specifies the procedures that must be used to rig the flight control surfaces.

2 TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Control sticks are displaced when ailerons are in neutral	Control cables improperly rigged	Adjust control cables
Improper aileron travel	Control cables improperly rigged	Adjust control cables
	CCK/CCX-1865 ONLY: Torque tube stop plate incorrectly adjusted	**CCK/CCX-1865-ONLY:** Replace torque tube stop plate
	CCK/CCX-2000 ONLY: Stop bolts need to be adjusted	**CCK/CCX-2000 ONLY:** Adjust stop bolts
Lost motion in control sticks	Loose control cables	Adjust control cables
	Broken pulley	Replace broken pulley
	Worn holes in control stick stub or torque tube at attachment	Replace worn control stick stub or torque tube
Excessive resistance to movement of control sticks	Control cables too taut	Adjust control cable tensions
	Pulleys binding	Replace damaged pulleys
	Hinge pins & pulley pivots dry	Lube hinge pins, cable attach & pulley pivots
Full elevator travel cannot be achieved	Pulleys binding	Replace damaged pulleys
Stabilizer 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 when flap control arm is actuated	Flap actuator tubes broken / disconnected	Replace/reconnect flap actuator tubes
Flap control arm cannot be actuated	Flap control arm release button not working properly	Repair release mechanism
Flaps do not move in unison	Flap actuator tube bent	Replace
	Improperly rigged	Re-rig flap actuator arm
	Flap actuator tube rod end broken	Replace actuator tube rod end
Flaps won’t stay in position at second or third notch	Flap handle lock has been bent	Replace flap handle lock
	Ratchet bracket worn	Replace with new part
Stall warning comes on well above stalling speed	Stall warning vane not calibrated properly	Move stall warning vane up
Stall warning does comes on at a speed less than 6 mph above the stall	Stall warning vane not calibrated properly	Move stall warning vane down
Stall warning does not work	Problem in the electric circuit, switches or horn	Inspect and replace or repair damaged components

3 PREPARATORY PROCEDURE

Prior to rigging and setting the travels of all control surfaces, ensure that the aircraft is level, the empennage is rigged correctly, and that the dihedral and washout are correct.

A. LEVELING

Level the aircraft per Chapter 08.

B. EMPENNAGE RIGGING

(1) VERTICAL FIN

Plumb the vertical fin at the rudder hinges. If the fin is not vertical, check that the aircraft is level. If fin is still not vertical, adjust the tension of the top and/or bottom tail brace wires to ensure the stabilizers are level and the fin is vertical.

(2) HORIZONTAL STABILIZER

The tail brace wires must be tensioned in such a fashion to ensure that the horizontal stabilizers remain horizontal and the fin remains vertical.

(a) Level the stabilizer laterally at the rear spars by adjusting the bracing wires.

(b) Place elevator trim in the center of the takeoff position.

(c) Adjust the tension of the upper tail brace wires to obtain 7/16” to 9/16” (.44” to .56”) deflection when a load of 10 pounds plus or minus 0.5 pound is applied at right angles at the center of the wire.

(d) The rear spar of the stabilizer must be level; the elevator hinge line must remain straight. The tolerance is plus or minus 0.5 degrees.

(e) Ensure that the fin remains vertical at the rudder hinge center line and the rear spar straight. The tolerance is plus or minus 0.5 degrees.

(3) RECORD

Record the following:

- Verification that the fin is vertical
- Horizontal stabilizers are horizontal
- Load and deflection of top wires
- Position of elevator trim

C. DIHEDRAL AND WASHOUT

Set the dihedral and washout per Chapter 57.

4 MAINTENANCE PRACTICES

A. HORIZONTAL STABILIZERS

(1) REMOVAL

(a) Unbolt the upper and lower tail brace wire assemblies.

(b) Unbolt the left stabilizer from the tubes and carefully pull it off.

(c) Carefully slide the right stabilizer, together with the tubes, out of the mounting points in the fuselage.

(2) INSTALLATION (RIGHT)

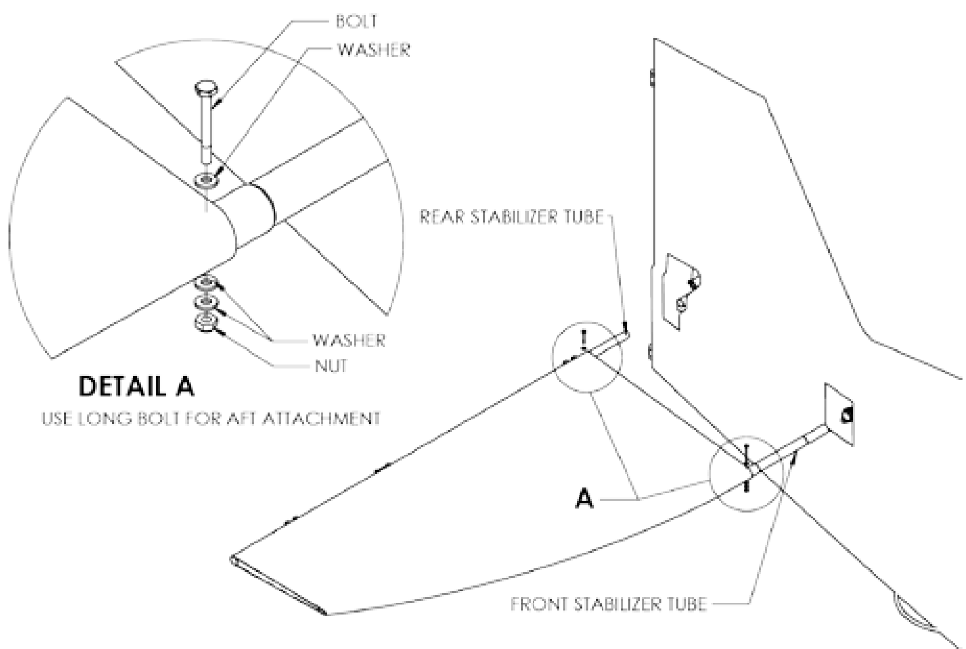


Figure 1 – Horizontal Stabilizer Installation

(a) Identify the right stabilizer (note that the fabric seam should be on the bottom of the surface). Lay the stabilizer on a suitable work surface and apply a thin coat of grease (MIL-G-81322E) to the inside ends of the front and rear tubes.

(b) Attach the front tube with a long bolt and washer inserted through the stabilizer and tube and secure it with a washer and nut. Torque the nut to 38-43 in. lbs.

(c) Attach the rear tube with a bolt and washer inserted through the stabilizer and tube and secure it with a washer and nut. Torque the nut to 38-43 in. lbs.

(d) Apply a thin coat of grease (MIL-G-81322E) to the inside of the stabilizer attachment tubes on the airframe and slide the stabilizer on until it is tight against the mounting points.

(e) Bolt upper and lower brace wire assemblies back in place. Rig brace wires. See Chapter 27 Section 4D.

(3) INSTALLATION (LEFT)

(a) Apply grease (MIL-G-81322E) to the inside of the front and rear tubes of the right stabilizer. Install onto the ends of the tubes that protrude from the side of the fuselage. It may be necessary to have a second person hold the left stabilizer as a backup.

(b) Make sure the sewn seams on the trailing edge of both stabilizers are on the bottom.

(c) Make sure the stabilizer frame fits tightly against the fuselage attachments.

(d) If the tail surfaces have been changed and new tube liners are installed complete the following;

(e) Attach with a long bolt and washer inserted through the stabilizer and tube. Secure in place with a washer and nut. Torque the nut to 38-43 in. lbs.

(f) Pump grease (MIL-G-81322E) into the stabilizer link assembly grease fittings (if equipped) until it starts to squeeze out.

(g) Bolt upper and lower brace wire assemblies back in place. Rig brace wires. See Chapter 27 Section 4D.

(4) HORIZONTAL STABILIZER TRIM

(a) Use a straight edge long enough to rest on the forward and aft stabilizer spars, approximately 4” inboard from the first rib, parallel to the first rib (see Figure 2).

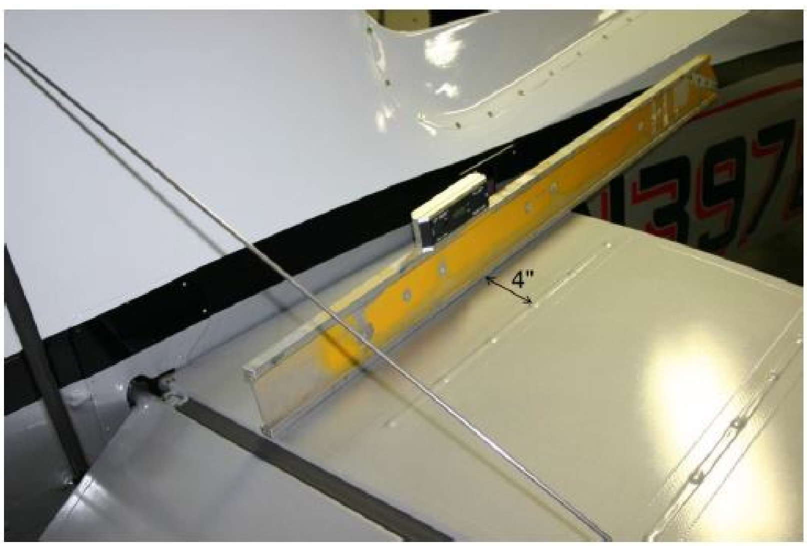


Figure 2 – Horizontal Stabilizer Trim Rigging

(b) Verify the digital level is zeroed with horizontal reference line.

(c) Run the trim leading edge up to +4.5° and set stop.

(d) Run the trim leading edge down to -3° and set stop.

(e) Verify that jam nuts are torqued properly.

(f) Verify trim stops are correct and the trim system operates smoothly through the entire range without binding.

B. ELEVATOR

(1) REMOVAL

(a) Remove left hand and right hand tail inspection covers.

NOTE
It is recommended to loosen the turnbuckle before removing the clevis bolt.

(b) Refer to Figure 3. Remove the cotter pin (4), nut (3), and washer (2) on the top side of the elevator horns (8 and 9).

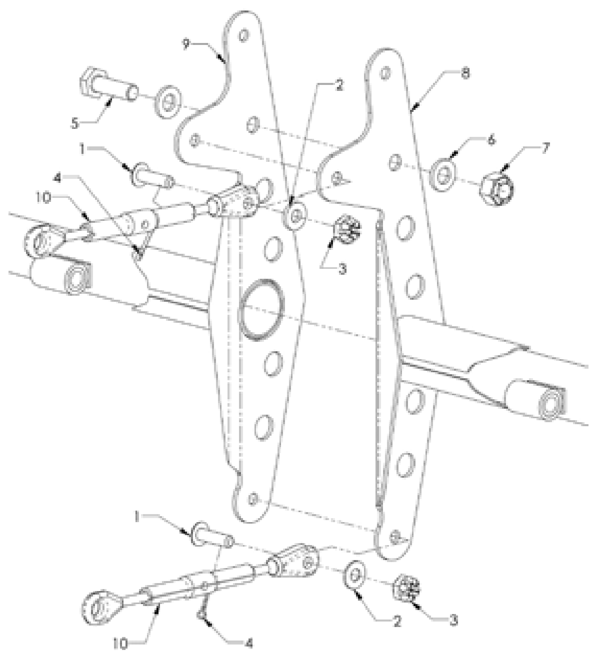
(c) Carefully remove the clevis bolt (1) to disconnect the upper elevator cable connection (10).

(d) Remove the cotter pin (4), nut (3), and washer (2) on the bottom side of the elevator horns (8 and 9).

(e) Carefully remove the clevis bolt (1) to disconnect the lower elevator cable connection (10).

(f) Remove the lock nut (7), washers (6), and bolt (5) and carefully separate the elevators from the stabilizer and fuselage.

(1) INSTALLATION



1 – Clevis Bolts	2 – Washers
3 – Castle Nuts	4 – Cotter Pins
5 – Bolt	6 – Washers
7 – Lock Nut	8 – Elevator Assembly – Left (Horn)
9 – Elevator Assembly – Right (Horn)	10 – Elevator Control Cable Connections

Figure 3 – Elevator Horn (REFERENCE ONLY, actual configuration may vary slightly)

(a) Identify the left and right elevators. The sewn seams are on the bottom trailing edge of each.

(b) Install each elevator onto the matching hinges on the stabilizers using clevis pins, wire pull brackets, with a washer at each end of every pin, and then secure each with a cotter pin (Figure 3).

(c) Connect the elevator horns (8 and 9) to the stabilizer and fuselage, and secure with the bolt (5), washers (6) and lock nut (7) at the top of the horns.

(d) Attach the lower elevator cable connection (10) on the bottom of the elevator horns, and install a clevis bolt (1), and washer (2). Secure with a nut (finger tight) and cotter pin (4), through the nut (3)

(e) Repeat on the upper elevator cable connection (10). Torque the nut (7) to 38-43 in. lbs. Check to verify proper elevator movement and routing of cables.

(f) Safety each turnbuckle barrel with two wire lock clips, making sure that each clip end is locked in the hole. Alternatively, use the single wrap method with 0.040” stainless steel safety wire. Reattach the left hand and right hand tail inspection covers.

(3) ELEVATOR RIGGING

(a) Use a straight edge long enough to rest on the forward and aft spars, approximately 4” inboard from the longest rib (see Figure 4).

(b) Verify the digital level zeroed with horizontal reference line.

(c) Using the pilot’s control stick, set the travel to the following specifications:

- Trailing Edge UP: +25° ±2°
- Trailing Edge DOWN: -15° ±2°

(d) Tighten jam nuts on elevator stops and verify travel is unchanged and unrestricted by deflecting elevator with control stick.

(e) Verify the front stick clears the instrument panel by at least 1/8 inch when the stick is moved all the way forward. Verify that the control link assembly clears the torque tube when the stick is moved all the way forward.

(f) With the forward seat all the way forward, verify the front stick clears the base of the seat by at least 1/8 inch when the stick is moved all the way aft.

(g) With the forward seat all the way back, verify the rear stick clears the back of the forward seat by at least 1/8 inch when the stick is moved all the way forward.

(h) Verify the rear stick clears the rear seat bar when the stick is moved all the way aft.

(i) Verify elevator cable tension is 60 ± 2 lbs.

(j) Safety each turnbuckle barrel with 2 wire lock clips making sure the clip ends are locked in the hole. Alternatively use the single wrap method with .032 stainless safety wire.

Figure 4 – Elevator Rigging

C. RUDDER

Figure 5 – Rudder Installation

(1) REMOVAL

Refer to Figure 5.

(a) Remove rudder gap seals (if installed).

(b) Unhook the tail wheel steering springs from the rudder arm.

(c) Disconnect the rudder cables from the rudder horn.

(d) Remove the rectangular inspection cover and disconnect the electrical wiring to the rudder.

(e) Remove the hinge pins and separate the rudder assembly from the fin.

(2) INSTALLATION

(a) Position the rudder hinges in line with the hinges on the fin and fasten with two clevis pins, washers, and cotter pin (Figure 6).

Figure 6 – **Clevis Pins at Rudder Hinges**

(b) Reconnect the electrical wiring to the lights in the fuselage.

(c) Secure each rudder cable fitting to a rudder horn with a clevis bolt, washer, castle nut, and cotter pin. Make certain the connections pivot freely and that the rudder is centered when rudder pedals are in line with each other.

(d) Hook each tail wheel steering spring to a rudder arm. Lubricate the hinge pins and pivot points with LPS-2 oil.

(3) RIGGING

Before rigging the rudder, verify horizontal stabilizers have been installed (Section 4A) and tail brace wires rigged correctly (Section 4D).

(a) Check that the rudder is centered when rudder pedals are in line with each other.

(b) File stops to provide proper rudder travel, ends shall be filed parallel to contacting surface of rudder horn. Ensure that the rudder can travel through its full range, left and right.

(c) Adjust rudder travel trailing edge RIGHT to +25° ± 2°. Be sure not to flex the rudder while deflecting.

(d) Adjust rudder travel trailing edge LEFT to -25° ± 2°. Be sure not to flex the rudder while deflecting.

(e) Make any adjustments at the rear cable attach fitting by placing the clevis screw through one of the other holes in the fitting. Safety each nut with a cotter pin. The same hole of the cable fitting must be used on both sides of the aircraft.

(f) Make sure all castellated nuts and clevis pins are secured with cotter pins.

(g) Verify full rudder and brake travel is unrestricted. Verify rudder and brake pedals cannot contact interior panels or structural tubes by firewall.

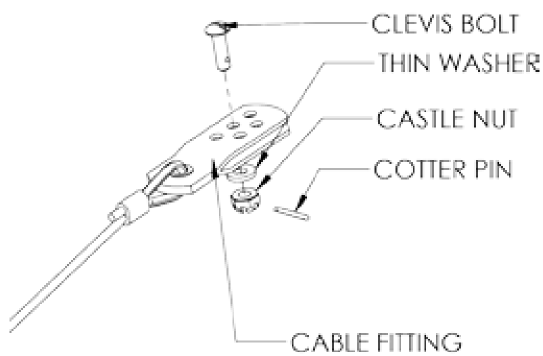


Figure 7 – Attachment of Rudder Cable Fitting

D. TAIL BRACE WIRES

(1) REMOVAL

(a) Reference figures 8, 9, and 10 for hardware setup.

(b) Remove hardware, retaining all fasteners.

(2) INSTALLATION

(a) Set the tail of the aircraft on a sawhorse or a bench. Level the aircraft laterally (see Chapter 8).

(b) Remove the inspection cover located on the left side of fuselage beneath the horizontal stabilizer.

(c) Position the long tail wires with the fin stringer and insert a clevis pin with washer through the fin and rudder (refer to Figure 8). Secure with washer and cotter pin.

(d) Position the long tail wires with the horizontal stringer on the horizontal stabilizer and insert a clevis pin with washer through the elevator. Secure with washer and cotter pin (see Figure 9).

(e) Repeat on the opposite side.

(f) Insert the short tail wire through the fuselage longeron. Secure with a washer and nut and torque to 38-43 in.-lbs. (see Figure 10).

(3) RIGGING

(a) Hang a plumb bob from the top rudder hinge and line up the tip with the bottom rudder hinge.

(b) If needed, adjust the tension of the tail brace wires to straighten the fin. Accomplish this by loosening the jam jut on either end of the wire and turn the brass barrel. Turn the barrel in to shorten the wire, and out to lengthen it.

(c) Ensure that the horizontal stabilizers remain horizontal and the fin vertical while tensioning the tail brace wires.

(d) Lay a level along the rear spar of the stabilizers.

(e) Adjust the tension of the tail brace wires such that a deflection of .44 (7/16) inches ± .0625 (1/16) inches may be reached when applying a 10 ± 1 pound load at a right angle to the center of either top wire.

(f) Ensure that the rear spar of the stabilizer is level and the fin remains vertical at the rudder hinge centerline after tensioning. The tolerance is ± .5 degrees.

(g) Tighten all 8 jam nuts on the brass barrels.

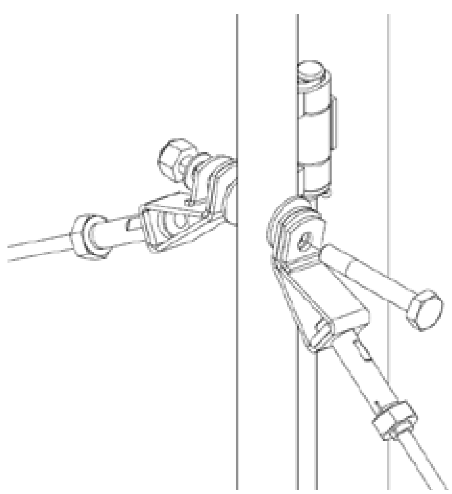


Figure 8 – Vertical Stabilizer Tail Brace Wire

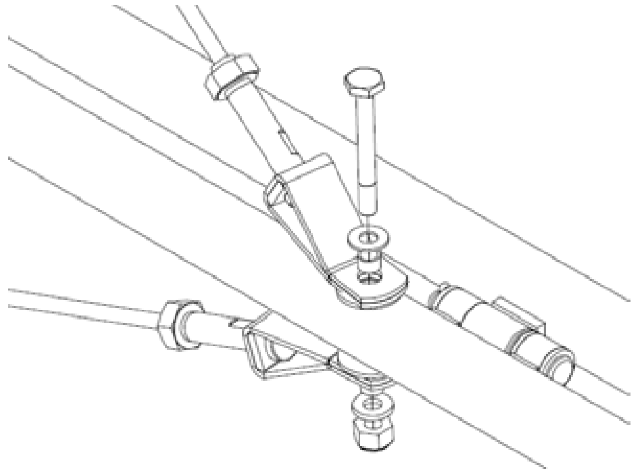


Figure 9 – Horizontal Stabilizer Tail Brace Wire Installation

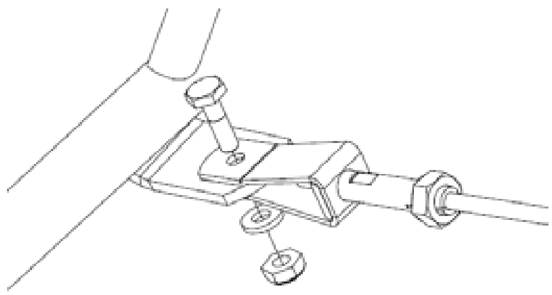


Figure 10 – Lower Tail Brace Wire Installation

E. GAP SEALS

(1) PREPARATION

(a) Carefully clean the gap between the horizontal stabilizer and elevators and the fin and rudder with soap and water to remove any grease or grit. If a solvent is used, ensure it is approved for the type of finish on the aircraft.

(b) Cut two strips of seal 39½ inches long. These will be used for the inboard portion of the elevators. Cut two strips 11 ½ inches long. These will be used of the outboard portion of the elevators.

(c) Cut one strip of seal 33 inches long if no navigation light wire is present or cut one strip of seal 27 ⅝ inches long if the navigation light wire is present. A 6 ½ inch long piece may be installed below the navigation light wire to prevent the upper piece from slipping down over time. Cut a 5 ½ inch piece for above the upper rudder hinge.

NOTE
Cut lengths are longer than necessary to account for shrinkage of gap seal material.

(2) INSTALLATION

(a) Press the long elevator seals into the gap between the hinges (see Figure 11). Either flat edge may be on top. Make sure that the seals are evenly spaced between the hinges. Rubbing alcohol may be used to ease installation.

(b) Ensure each gap seal butts against each hinge. Inspect both the top and the bottom to ensure the gap seal is flat and the lip is not folded in at any point.

(c) Carefully press the short elevator seals between the hinge and the elevator horn. Either flat edge may be on top.

(d) Be especially careful to ensure that the seals do not impede the travel of the elevator throughout its range of travel.

Figure 11 – Installing Elevator Gap Seal between the Hinges

(e) Repeat the process with the rudder seal. Ensure it is evenly spaced between the hinges. If navigation light wire is present, gap seal material is not necessary between the wire and lower hinge but a 6 inch piece may be installed below the navigation light wire (see Figure 12 and 13).

(f) Ensure the gap seal butts against the top and bottom hinge.

(g) If the wire for the navigation light is present, the gap seal butts against the top hinge and is clear of the wire mentioned above.

(h) Inspect both sides to make sure the gap seal is flat and the lip is not folded in at any point.

Figure 12 – Installing Rudder Gap Seal

Figure 13 – Lower Rudder Gap Seal Position with Navigation Light Wire

(3) REMOVAL

(a) To remove seals, gently lift it out of the gap.

WARNING

DO NOT OPERATE WITH ONE ELEVATOR GAP SEAL MISSING.

NOTE

It is permissible to operate with the rudder gap seal removed and all elevator gap seals installed.

NOTE

It is permissible to operate with all elevator gap seals removed and the rudder gap seal installed.

F. FLAPS

(1) REMOVAL

Figure 14 – Flap Attachment

(a) Refer to Figure 15. Remove the cotter pin and nut holding the bolt on the flap cone and flap hinge; keep the bolt in place temporarily.

(b) Remove the cotter pin and nut holding the bolt on the flap hinge and aileron hinge, refer to Figure 16.

(c) Remove wing root fairings. Disconnect forward end of the flap actuator rod.

(d) Remove the outboard bolt first and carefully remove the flap and flap actuator rod by sliding the system aft and outboard.

Figure 15 – Inboard Flap Hinge

(2) INSTALLATION

(a) Ensure the flap rod connection eye is installed on the flap.

(b) Install flap cone bolt, washers and flap cone assembly from the inside of the aircraft pointing outboard.

(c) Using two people, set the flap and flap actuator rod in place. Slide the inboard side of the flap onto the flap cone attach bolt (Figure 16) and the flap actuator rod forward at the wing root. Install washers, nut and cotter pin. Refer to Chapter 20 for torque value.

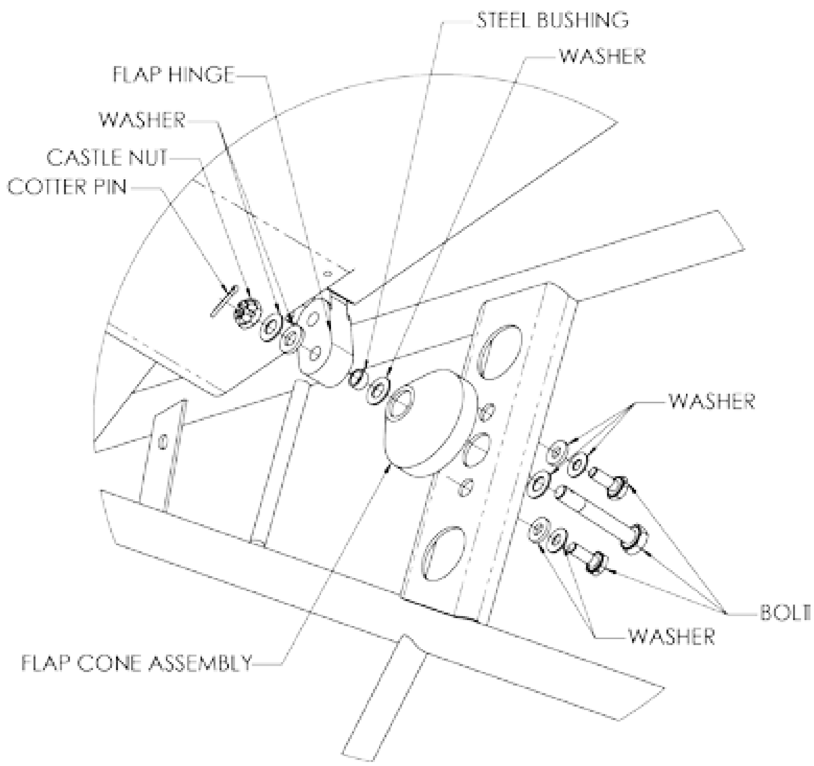


Figure 16 – Inboard Flap Hinge Exploded View

(d) At the outboard hinge (Figure 17), install a bolt and washer pointing inboard, through the flap hanger rib, washer flap hinge and washer.

NOTE
Fill any gaps between hinges with washers as required.

(e) Secure with a nut and a cotter pin to allow for proper flap and aileron function.

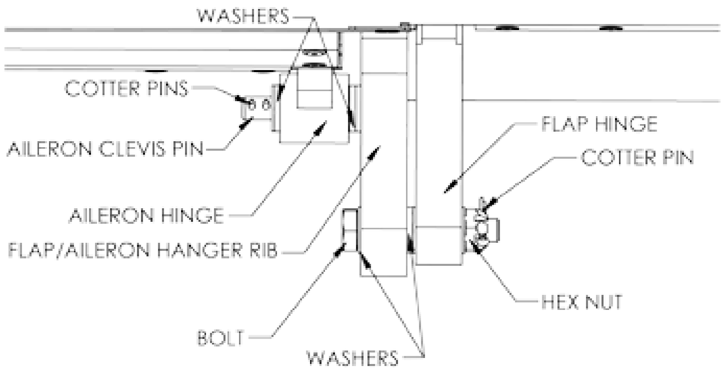


Figure 17 – Outboard Flap Hinge

(3) RIGGING

(a) Flaps should be in the LANDING (fully extended) position to start. Using cable ties, secure the flap handle to the fuselage top tubes against the stop while measuring position (see Figure 18). To measure flap deflection, level should be as close as possible to a flap rib while still clear of any rivets.

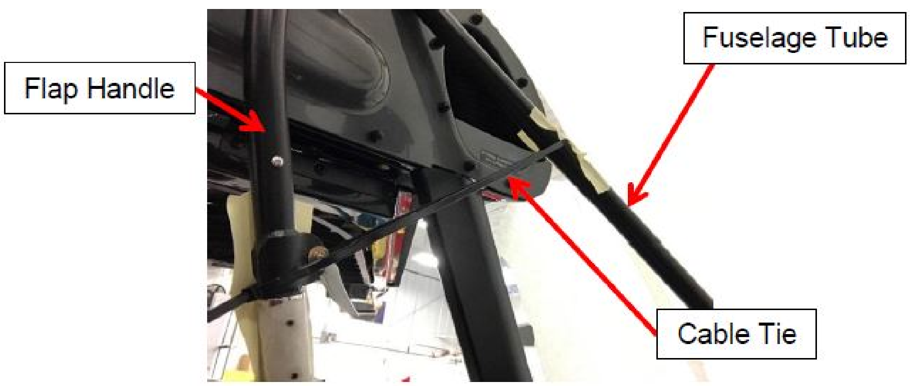


Figure 18 – Flap Handle Secured

(b) Flaps are to be adjusted by changing the length of the push-pull rod between the flap and flap handle bell crank. Adjust flap such that the lower surface is 46.0° ±1.0° relative to the horizontal reference line of the aircraft as established during longitudinal leveling (see Figure 19).

NOTE
The flap push/pull rod has opposite thread directions on either end, so length adjustments can be made simply by rotating the rod if the jam nuts are loosened.

(c) Verify flap deflection at two points along the flap to check for twist. The deflection at both points is to be within the specified tolerances in Table 1

(d) Verify that the 0°, 16°, and 33° positions are within the tolerances listed in Table 1. Ensure that the turtle deck is installed when checking the 0° position, as the turtle deck can affect the allowable retraction of the flap.

Table 1 – Flap Deflection Tolerance

Flight Control	Deflection
Flaps (CCX-1865/2000) (G-Series)	0° ± 1°
	16° ± 1°
	33° ± 1°
	46° ± 1°

NOTE
Intermediate flap deflections are set by the flap ratchet and are not adjustable.

Figure 19 – Flap Angle Measurement

(e) Tighten jam nuts on both ends of the flap control rod and verify cotter pins are installed on the bolts on both ends.

(f) Repeat steps for opposite side.

G. AILERONS

(1) REMOVAL

(a) Disconnect both aileron control cables from the upper and lower aileron horns.

(b) Remove the pins while firmly holding the aileron.

(c) Carefully remove the aileron from the wing panel.

(2) INSTALLATION

(a) Refer to Figure 20. Position the ailerons on the wing panels and secure with the bolts (1), washers (2 and 3), nuts (4) and cotter pins (5) (Figure 21). The ailerons are not interchangeable left/right; each can be identified by the weight being on the outboard end.

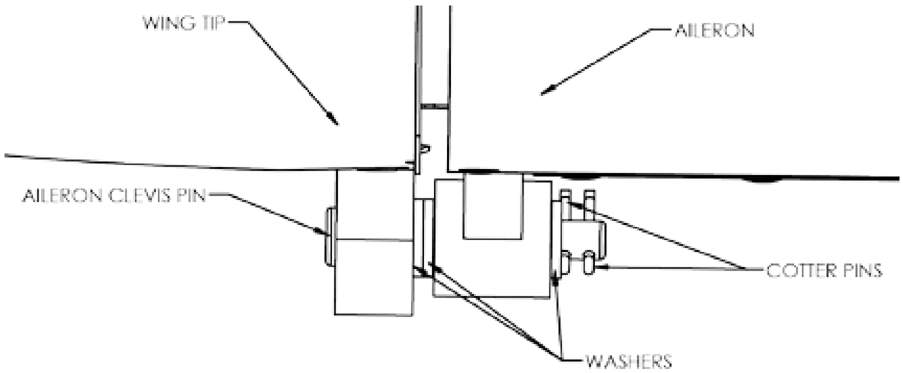
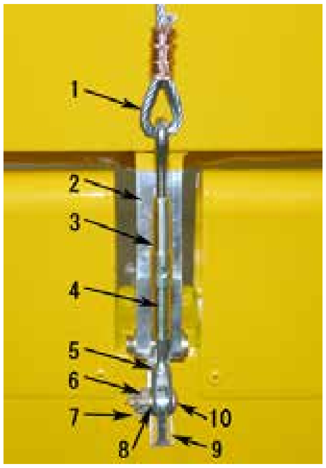


Figure 20 – Aileron Hinge

(b) Attach each aileron control cable turnbuckle fork to the proper aileron horn with a screw (10), a thin washer (8), a nut (6) and a cotter pin (7) (Figure 21).



1 - Aileron Control Cable	2 – Hinge
3 – Turnbuckle Barrel	4 - Wire-Lock Clip
5 - Turnbuckle Fork	6 - Castle Nut
7 - Cotter Pin	8 - Thin Washer
9 – Hinge Arm	10 – Screw

Figure 21 – Installation of Control Cable on Aileron Horn

(3) RIGGING

NOTE
The flaps must be properly rigged before rigging the ailerons.

(a) Secure the flap handle so that it is pressed forward against the stop (see Figure 22). Ensure that the turtle deck is installed, as the turtle deck can affect the allowable retraction of the flap.

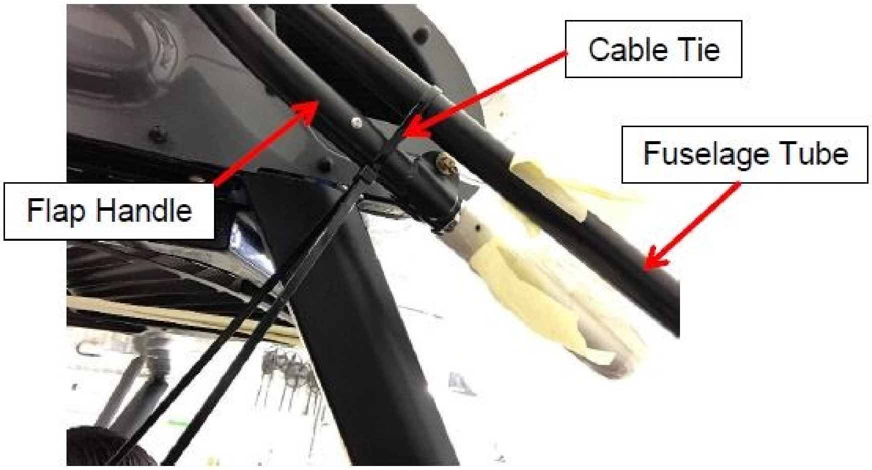


Figure 22 – Flap Handle Secured

(b) Ensure that the control stick is vertical in the lateral (roll) sense.

(c) Adjust the aileron such that the upper surface of the trailing edge of the aileron is at the same level as the upper surface of the trailing edge of the flap (see Figure 23).

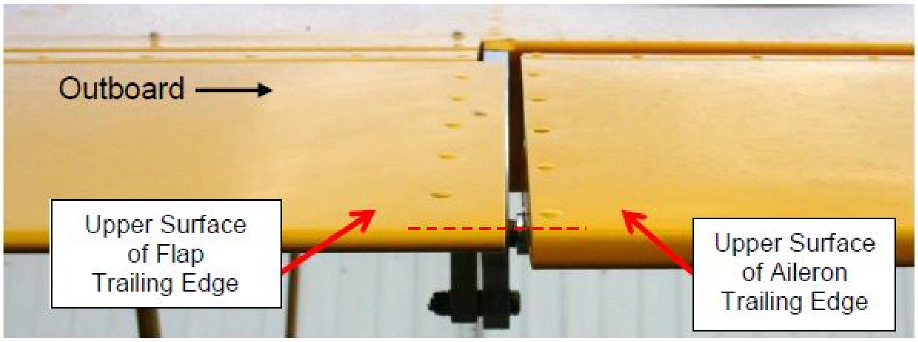


Figure 23 – Aileron Rigging

(d) Ensure that the cable tension is 40 ± 5 lbs.

(e) Safety each turnbuckle barrel with 2 wire lock clips making sure the clip ends are locked in the hole. Alternatively use the single wrap method with .032 stainless safety wire.

(f) Repeat for opposite side. Verify the control stick is neutral when ailerons are neutral. Verify correct cable tension. Verify that the system operates without binding.

(g) **CCK/CCX-1865 ONLY:** With the ailerons and stick at neutral, center the aileron stop plate with the aft mast. Verify that the mast arm makes contact with the stop plate when the aileron is at the extent of its deflection. Aileron deflection should be UP +18° ± 2°, and DOWN -18° ± 2°.

(h) **CCK/CCX-2000 ONLY:** From under the belly, adjust the aileron stop bolts to ensure that the mast arm makes contact when the aileron is at the extent of its deflection. Place level on upper surface of aileron to verify proper deflection. Aileron deflection should be UP +18° ± 2°, and DOWN -18° ± 2°.

H. STALL WARNING SYSTEM

The stall warning system is electrically powered and is made up of a horn and an actuating switch. The horn is mounted in the left wing root panel and the switch is on the leading edge of the left wing. As the stall condition progresses, the air stream lifts the switch vane, closing the circuit and activating the horn.

(1) STALL WARNING SWITCH ADJUSTMENT

The stall horn should be activated at a speed that is no less than 6 MPH prior to the stall occurring in any configuration. However, the stall warning should not come on so often that it becomes a nuisance.

Figure 24 – Stall Warning Vane

(a) Refer to Figure 24. Loosen the screws and slide the switch up or down. Down will cause the horn to activate earlier and up will cause the horn to activate later.

(b) Tighten the screws in the desired position.

(c) See Chapter 91 Electrical Systems Schematics for system details.

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CHAPTER 28

FUEL SYSTEM

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28 FUEL SYSTEMS

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The fuel system has a sump and drain located in the bottom right side of the fuselage aft of the door opening. Some aircraft have an additional sump and drain located on the bottom left side of the aircraft just aft of the firewall. These should be drained before each flight to test for water and sediment in the fuel system.

The fuel system is as follows:

- CCK/CCX-1865: The fuel system is a gravity flow system with no separate boost pump. Fuel drains from the wing tanks through a selector valve and fuel strainer to the carburetor.
- CCK/CCX-2000: Fuel is stored in two fuel tanks located in the wing. Fuel flows from these tanks to a fuel selector valve which allows the pilot to turn the fuel on and off and select which tank to draw fuel from. From the fuel selector valve the fuel flows through a gascolator, a fuel filter, an electric fuel pump, a mechanical fuel pump, a pressure transducer, and through a fuel metering device (servo). The fuel metering device provides the appropriate amount of fuel for the air quantity flowing into the engine. From the fuel metering device, the fuel flows through a fuel flow transducer and then onto the individual engine cylinders.

Fuel may flow from one tank to the other when the selector is in either the OFF or the BOTH position. When parking the aircraft on a slope, leave the selector on either the left or the right position to prevent cross feeding and possibly overfilling the lower of the two tanks.

CCK/CCX-1865 is equipped with an engine fuel primer system that may be used to start the engine, especially in cold conditions. The fuel primer draws fuel from the strainer by means of a hand-operated pump on the instrument panel and injects it into cylinder #3 for starting.

The fuel flows from the tanks into a selector valve that has four positions and is located on the lower, left side of the cockpit:

- Both - The engine is fed by both fuel tanks
- Left - Fuel is supplied by the left tank
- Right - Fuel is supplied by the right tank
- Off - Fuel supply to the engine is cut off

The engine may be operated in the Both, Left, or Right positions. However, the Both position is required for takeoff and landing.

Fuel quantity is determined with two sight gauges located on either side of the cockpit at the wing root. The ventilation of the tanks is through tubes located on each of the fuel tank caps. The vented caps must face forward.

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

2 STANDARD FUEL TANKS

The aircraft can be equipped with two tanks located on the inboard end of the wings. Each tank has a total capacity of 12.5 gallons for a total of 25 gallons. The total usable fuel is 24 gallons. The tanks are made of aluminum.

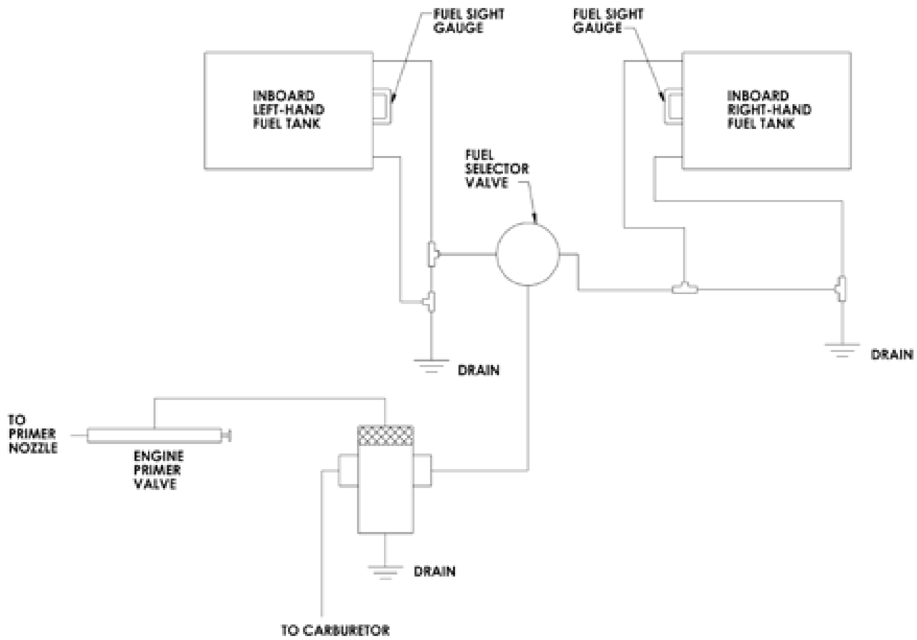


Figure 1 – CCK/CCX-1865 Standard Range Fuel Tank Configuration

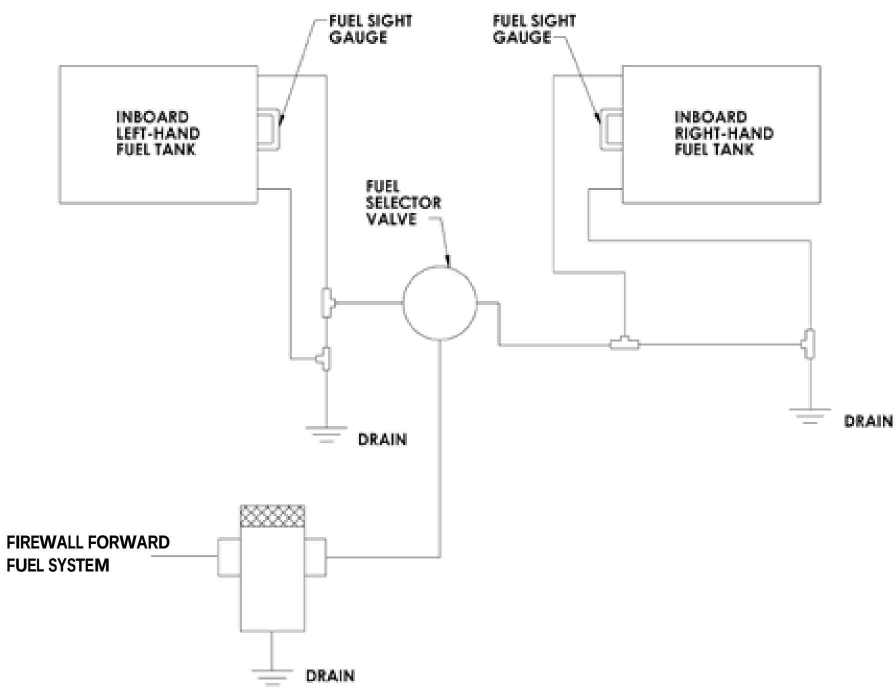


Figure 2 – CCK/CCX-2000 Standard Range Fuel Tank Configuration

3 EXTENDED RANGE FUEL TANKS

The aircraft can be equipped with two interconnected tanks on the inboard end of each wing. Each tank has a total capacity of 22 gallons for a total of 44 gallons. The total usable fuel is 39 gallons. The tanks are made of aluminum.

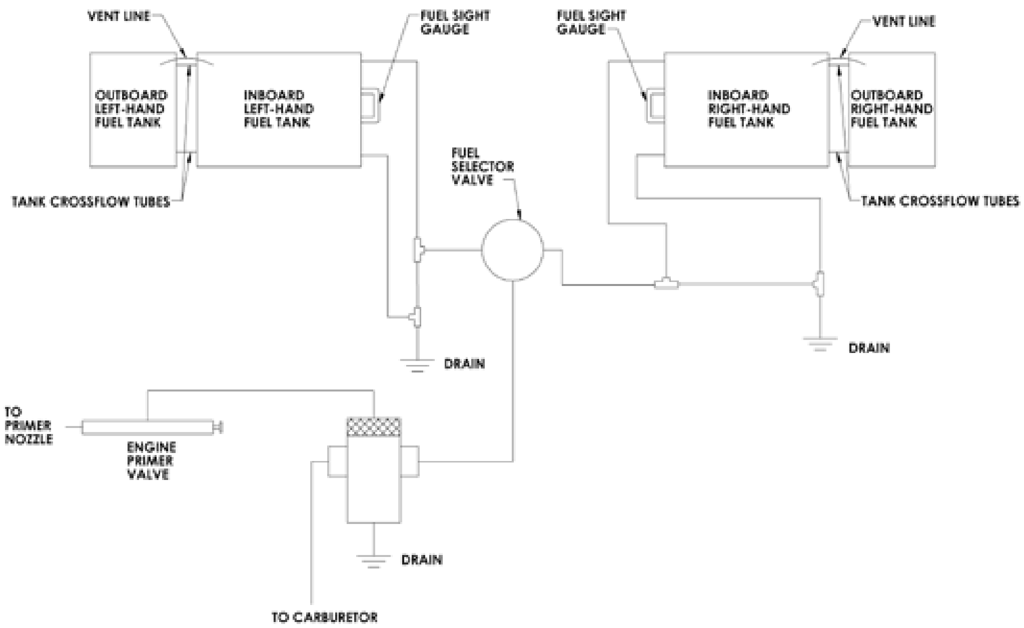


Figure 3 – CCK/CCX-1865 Extended Range Fuel Tank Configuration

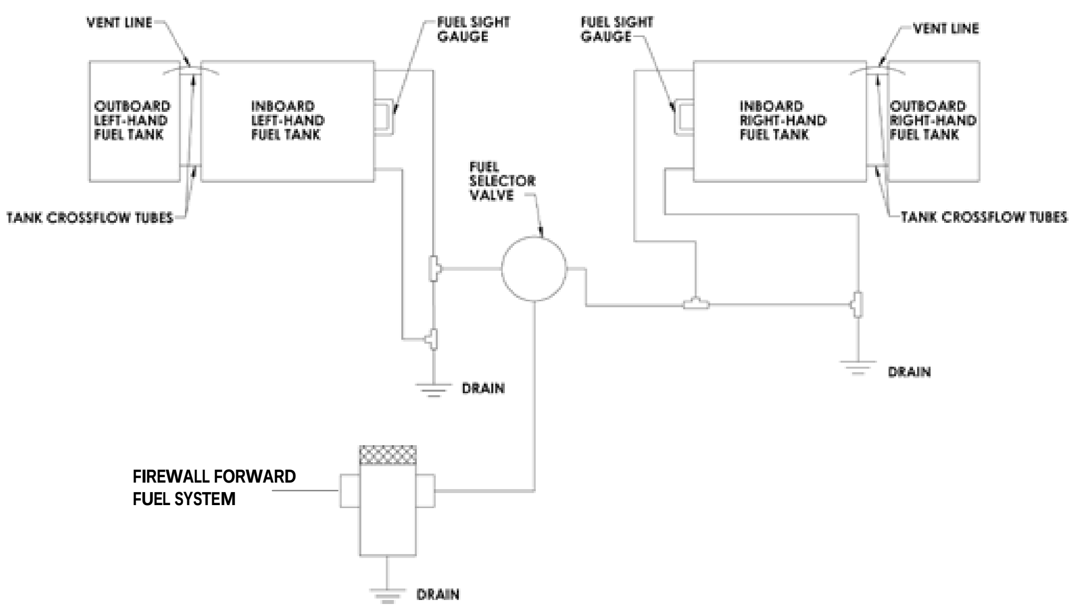


Figure 4 – CCK/CCX-2000 Extended Range Fuel Tank Configuration

4 SERVICING

A. DRAINING FUEL

The aircraft may have three fuel drains, one on the right underside of the fuselage, one on the fuel strainer, located on the engine firewall, and one on the bottom left side of the fuselage, just aft of the firewall on the boot cowl.

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 operate any electrical equipment during the de-fueling operation.**
- **Operation of any electrical switch during the fueling operation is prohibited.**
- **Do not allow smoking or open flames within 100 feet of the aircraft or fuel servicing vehicle.**
- **Do not operate radios, electrical systems, 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.**

(a) If your aircraft does not have the additional drain, jack the tail of the aircraft to flight level attitude (Chapter 7 and 8).

(b) Open the fuel strainer drain valve(s) and allow fuel to drain into container.

(c) If the fuel has been drained and the aircraft has then been re-fueled, the engine must be run on the ground for enough time to purge the system of air prior to flight.

5 TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Filler Cap Leaks	Filler Cap Improperly Installed	Install Filler Cap Properly
	Seal Improperly Installed	Replace Fuel Cap Seal
	Deteriorated Seal	Replace Fuel Cap Seal
Leak in Fuel Line	Loose Fittings	Inspect and Tighten Fittings
	Chaffing	Replace Fuel Line
	Defective Thread	Replace Threaded Component

6 FUEL FILTERS

A. FUEL STRAINER SERVICING

(a) Turn fuel selector to “OFF” position.

(b) Drain fuel from strainer.

(c) Remove the cotter pin that locks the bowl.

(d) Place a metal container under the bowl to catch the residual fuel.

(e) Twist bowl to remove and empty the residual fuel.

(f) Remove the wire clip ring with fingers and gently remove the screen.

(g) Inspect and clean the screen.

(h) Check the condition of the O-ring.

(i) Carefully install the screen and hold it in place with the wire snap ring.

(j) Insert and twist the bowl into position.

(k) Install a new safety cotter pin.

(l) Turn on fuel and check for leaks.

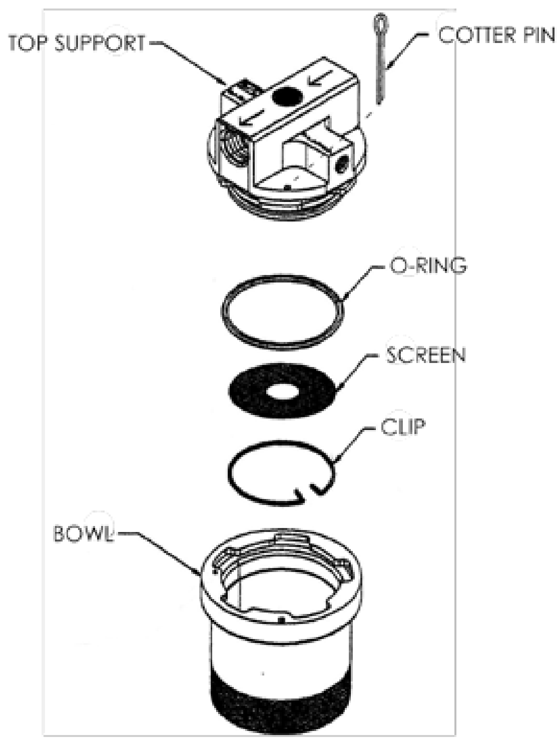


Figure 3 – Fuel Strainer Assembly

B. INLINE FUEL FILTER SERVICING (CCK/CCX-2000 ONLY)

(a) Remove cowling.
(b) Turn the fuel selector to the “OFF” position.
(c) Drain fuel from Gascolator.
(d) If required, remove fuel pump splash guard.
(e) Disconnect the inlet line of the Gascolator to the fuel filter.
(f) Disconnect the line to the fuel pump from the fuel filter, and remove filter.
(g) Remove housing from filter.
(h) Inspect and clean the filter screen.
(i) Replace housing
(j) Reconnect fuel lines to pump and Gascolator.
(k) Re-safety wire.
(l) Turn on fuel to check for leaks.

C. CARBURETOR INLET SCREEN SERVICING (CCK/CCX-1865 ONLY)

(a) Turn fuel selector to “OFF” position.

(b) Remove the large hex plug in the left side of the float chamber.

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

(d) Install the hex plug.

7 FUEL SELECTOR

A. FUEL SELECTOR OVERHAUL

(a) Drain the fuel tanks through the drains located on the underside of the fuselage and fuel strainer.

(b) Drain the remaining fuel out of the fuel strainer drain.

(c) Remove the selector handle and handle button plate with the springs by loosening the screws (refer to Figure 4).

(d) Put a rag under the valve to catch any residual fuel.

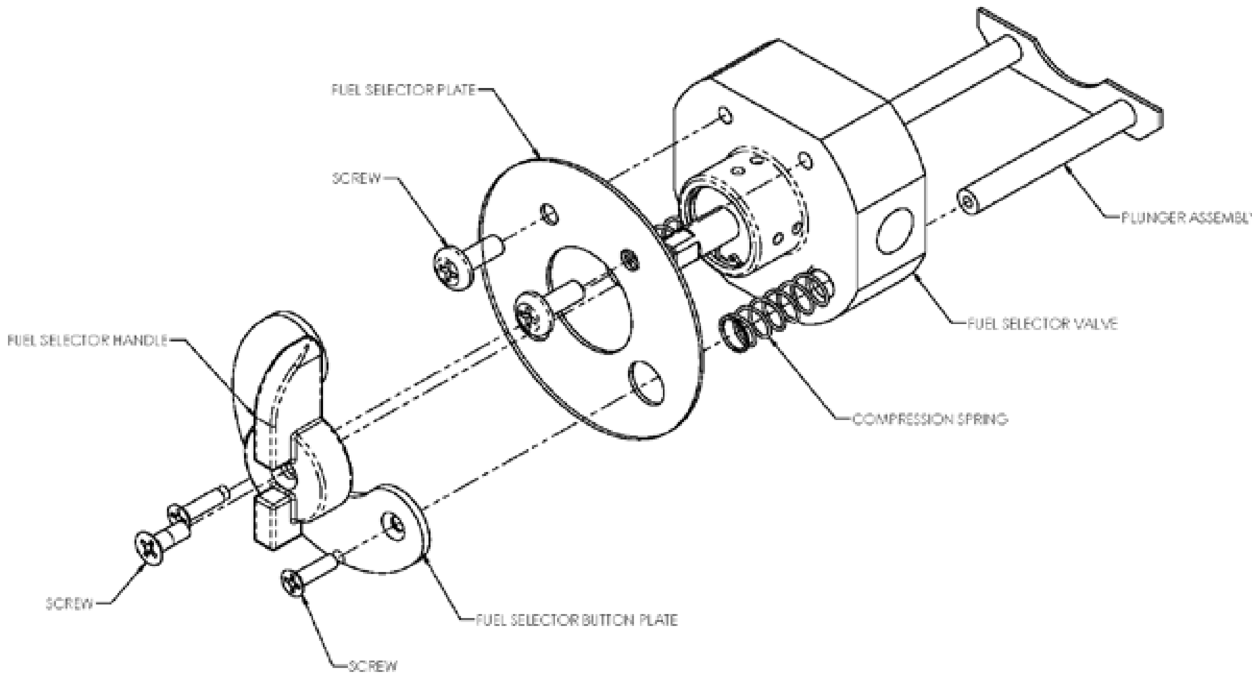


Figure 4 – Fuel Selector Assembly

Refer to Figure 5.

(e) Rotate the shaft so the detent balls are between the detent holes.

(f) Remove the snap ring holding the handle barrel in the housing.

(g) Carefully pull the barrel out of the housing with fingers positioned to catch each set of balls and springs.

(h) Remove the small O-ring and the large O-rings, then clean the barrel.

(i) Inspect for wear and grooves.

(j) Replace the small O-ring and the large O-rings with new parts and lubricate per Chapter 12 on installation.

(k) Insert the barrel part way in the housing.

(l) One set at a time, insert a spring with a ball on each end and push the barrel the rest of the way in.

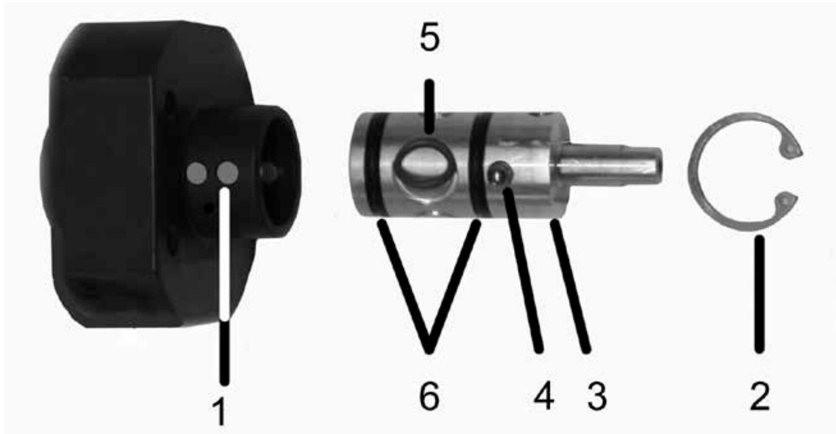
(m) Secure with the snap ring.

(n) Check the operation for positive detent and smooth turning.

(o) Remove the rag.

(p) Reattach the cover and the handle stop plate with the springs and the handle.

(q) Check to make sure the handle stop is working properly.



1. – Detent Holes
2. – Snap Ring
3. – Barrel
4. – Detent Balls and Springs
5. – Small O-Ring
6. – Large O-Rings

Figure 5 – Fuel Selector Detail

8 FUEL PUMPS (CCK/CCX-2000 ONLY)

A. ENGINE DRIVEN FUEL PUMP

(1) REMOVAL

(a) Turn off fuel selector.

(b) Remove cowling.

(c) Drain gascolator.

(d) Remove inlet and outlet line to/from pump and cap.

(e)

NOTE
Some fuel may remain in lines. Catch in appropriate container.

(f) Cut safety wire and remove two internal wrenching bolts on fuel pump.

(g) Maneuver fuel pump out from behind engine.

(2) INSTALLATION

(a) Place fuel pump in place behind engine.

(b) Support fuel pump while bolting into place.

(c) Replace safety wire.

(d) Replace inlet and outlet lines to/from pump.

(e) Turn on fuel selector and check for leaks.

B. ELECTRIC FUEL PUMP

(1) REMOVAL

(a) Turn off fuel selector.

(b) Turn off master and pull fuel pump circuit breaker. Remove engine cowl. Remove electric fuel pump shield by removing the two screws on the upper edge. Note that they are screwed into nutplates.

(c) Drain gascolator sump.

(d) Remove inlet and outlet lines.

(e) Locate end of pigtail on fuel pump harness where it joins with engine harness. Unplug connectors on fuel pump wires.

(f) Remove 4 screws & nuts through the firewall securing fuel pump and Adel clamp for wires.

(g) Remove fuel pump and fuel filter.

(h) If replacing fuel pump, remove fittings from pump and install in new pump.

(2) INSTALLATION

(a) Ensure fuel pump installed and tighten clamp on mounting bracket.

(b) Re-install the 4 screws and nuts through the firewall securing fuel pump and Adel clamp for wires.

(c) Re-connect wire where it joins engine harness.

(d) Replace inlet and outlet lines.

(e) Reset breaker, turn on master and verify fuel pressure of pump.

CAUTION
Do not run fuel pump with no flow, and the engine stopped, for prolonged periods of time. The pump will overheat and become damaged.

(f) Reinstall cowl.

CHAPTER 32

LANDING GEAR

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32 LANDING GEAR

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1 GENERAL

The conventional landing gear is fixed (not retractable) and has a tailwheel. The main landing gear has bungee shock absorbers / Alpha Omega Suspension System *(circle one)*. The landing gear legs are made from welded high strength steel tubing. Both main wheels are fitted with hydraulically operated disc brakes, actuated by pressing toe brakes at each crew position. The tailwheel has leaf springs, is steerable, and has the ability to caster through 360º via the rudder pedals. If equipped with floats (straight or amphibious), refer to the float manufacturer for maintenance procedures.

Figure 1 – Main Landing Gear, shown with AOSS, CCK/CCX-1865 Shown

WARNING
AFTERMARKET LANDING GEAR AND/OR SHOCK ASSEMBLIES THAT HAVE NOT BEEN EVALUATED OR TESTED IN ACCORDANCE WITH THE FUSELAGE STRUCTURAL LIMITATIONS ARE NOT RECOMMENDED FOR USE

2 TROUBLESHOOTING

The troubleshooting mentioned below for the main gear is in reference to the bungee shock absorbers. Refer to manufacturer for AOSS troubleshooting.

PROBLEM	PROBABLE CAUSE	REMEDY
Landing gear sags	Bungees aren't strong enough to return the landing gear to its stops	Replace bungee cords
Shocks bottom on landing	Inspect for weak bungee cords	Replace bungee cords
Tail Wheel does not respond to rudder pedal	Broken steering chains, links or springs	Replace defective steering chain, link, or spring
	Broken rudder control cables	Replace broken rudder control cables
Tail Wheel shimmies	Steering springs have weakened	Replace weakened steering springs
	Tire worn	Replace tire
	Spring / chain tension	Springs should neither be slack or in tension when wheel is centered
	Tail Wheel assembly is loose	Ensure the tail wheel assembly is properly secured to the fuselage
	Tail Wheel assembled incorrectly	Remove tail wheel assembly, dismantle, clean, and reassemble
	Tail spring bent	Replace spring
Tail Wheel does not swivel	Fork binds in bracket because of dirt or lack of lubricant	Disassemble, clean, reassemble, and lubricate
Parking brake inoperative	Parking brake valve defective	Replace valve
3200-Type Tail Wheel does not absorb shock	Broken leaf spring	Replace leaf spring
	Tail Wheel tire over inflated	Reduce pressure
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

PROBLEM	PROBABLE CAUSE	REMEDY
Brakes drag (cont.)	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
	Lining not firmly seated flush against pressure / back plate	Deburr rivet hole on surface adjacent to lining
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 brake line (ballooning)	Replace
	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 or replace disc
	Excessive back plate deflection caused by bent or over torqued 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 back plate deflection caused by bent or over torqued bolts	Check and replace bolts
	Incorrect lining and/or disc	Replace with correct parts
Brakes inoperative	Brake fluid level low	Replenish brake 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
Brakes will not hold	Lining worn below minimum limit	Replace linings
	Discs worn below minimum limit	Replace discs
	Contaminated lining	Replace lining

PROBLEM	PROBABLE CAUSE	REMEDY
Brakes will not hold (cont.)	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 backward	Remove, inspect, and install

3 MAIN LANDING GEAR

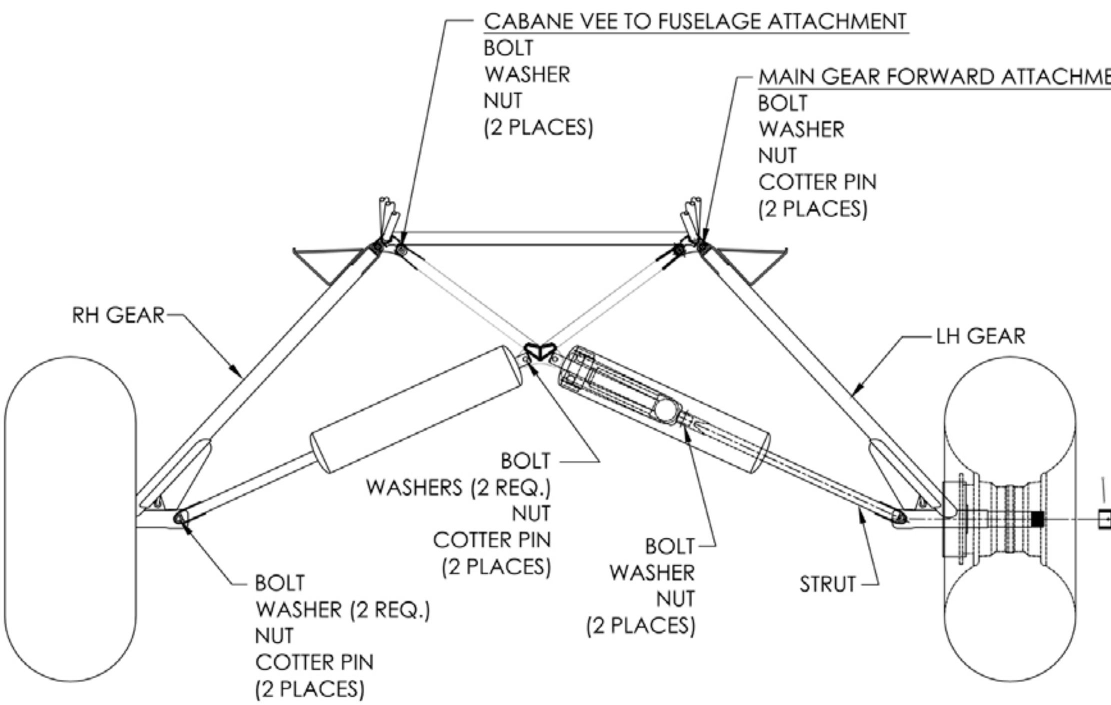


Figure 2 – Main Landing Gear Arrangement, Bungee

A. BUNGEE ASSEMBLY

(1) REMOVAL

(a) Chock the main wheel on the opposite side of the landing gear that is to be worked on. Chock the tail wheel. It is not recommended to perform this work in windy conditions.

(b) Remove the top bungee cover screws and slide the cover down until the lower bungee bolt is exposed (the bungee cords can be inspected at this point and if replacement is required, accomplish the following steps).

(c) Jack the aircraft by lifting the wing that is on the same side as the landing gear that is to be worked on. The jack is placed at the forward wing strut to spar attachment point on the desired side (see Chapter 7).

(d) Remove the upper shock assembly attach bolt and lower the shock assembly.

(e) Remove the bungee cover end from the shock assembly.

(f) Remove the lower attach bolt and pull the shock out of the strut.

(2) INSPECTION

(a) Check the bungee cords for broken bands, threads, and signs of weakness. Inspect the hydraulic strut for leaking fluid or damage.

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

(3) INSTALLATION

(a) Insert the shock assembly in the strut. Insert a bolt with a washer through the shock and strut and place a washer and nut on the end of the bolt. Torque the nut to 160-200 in-lbs.

(b) Place the bungee cover end over the top shaft of the shock assembly. Align with the top shock hole and the holes in the cabane vee and insert bolt.

(c) Place the washer and the nut on the end of the bolt. Torque to 130 in-lbs. If necessary, tighten past this torque value to align the nut with the nearest hole in the bolt. Safety the nut with a new cotter pin.

(d) Verify that all hardware is installed properly, then lower the aircraft back to the ground.

B. LANDING GEAR LEG

(1) REMOVAL

(a) Chock the main wheel on the opposite side of the landing gear that is to be worked on. Chock the tail wheel. It is recommended to perform this work in a sheltered hangar.

(b) Disconnect the brake line from the fuselage.

(c) Jack the aircraft by lifting the wing that is on the same side as the landing gear that is to be removed. The jack is placed at the forward wing strut to spar attachment point on the desired side (refer to Chapter 7).

(d) Remove the lower shock strut attach bolt.

(e) Remove both upper landing gear bolts.

(2) INSPECTION

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

(b) Replace or repair affected parts.

(c) Inspect the brake backing plates for cracks or excessive wear.

(3) INSTALLATION

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

(b) Align the upper landing gear attachment holes with the corresponding ones in the fuselage.

(c) If there is a gap between a landing gear leg and the corresponding fuselage ear, fill the gap with washers of the appropriate thickness.

(d) Apply grease to slow corrosion and insert the upper landing gear bolts.

(e) The rear bolt on the right landing gear is longer than the one on the left because the ear of the passenger step must be placed over the bolt end.

(f) Place washers and nuts on the end of the bolts.

(g) Align the hole at the bottom of the shock strut with the holes in the landing gear.

(h) Apply grease to slow corrosion and insert the bolt with a washer under the head. Place washer and nut on the end of the bolt.

(i) Torque all nuts to 130 in-lbs. or if necessary, past this value so that the nuts may be aligned with the nearest hole on the corresponding bolt.

(j) Safety the nuts with new cotter pins.

(k) Verify that all the hardware is installed properly and lower the aircraft to the ground.

(l) Reconnect the brake lines and tighten the fittings.

(m) Service the brakes, if needed, to obtain the proper pedal travel.

C. AOSS GEAR - OPTIONAL

Similar to Bungee Gear. See manufacturer's maintenance manual.

4 MAIN WHEELS

The main wheels are of aluminum construction and are designed to be used with tires and tubes.

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 valve at the front of each rudder pedal that operates the parking brake. The units form an integral part with the copilot's rudder brakes. To operate the parking brake, press the upper section of both rudder pedals and toggle the valve (vertical is open, horizontal is locked). The master cylinders push hydraulic fluid to the calipers where two pistons are displaced and force the brake pads against a disc. Each main wheel utilizes a hydraulic caliper, secured by a backing plate.

The tailwheel swivels through 360 degrees and is steerable via the rudder pedals. It is mounted to the fuselage with steel spring leafs. Refer to Chapter 12 of this manual for maintenance and servicing of the wheel and brake assemblies.

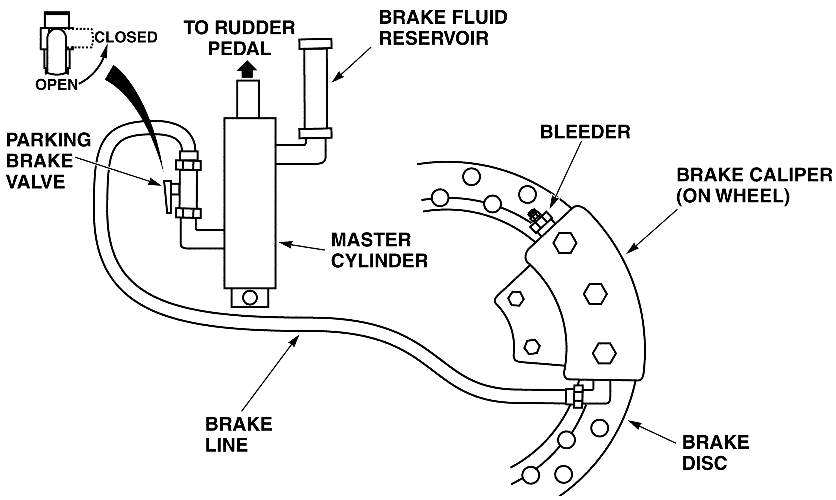


Figure 3 – Brake Assembly

A. REMOVAL

(a) Chock the main wheel on the opposite side of the landing gear that is to be worked on. Chock the tail wheel. Working outside in windy conditions is not recommended.

(b) Remove the hubcap and the axle nut cotter pin.

(c) Cut the safety wire and remove the brake back plate bolts.

(d) Place a jack under the axle and raise the tire off the ground (See Chapter 7).

(e) Remove the axle nut and wheel.

(f) The bearings can be removed, cleaned and inspected without disassembling the wheel and removing the tire.

B. 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.

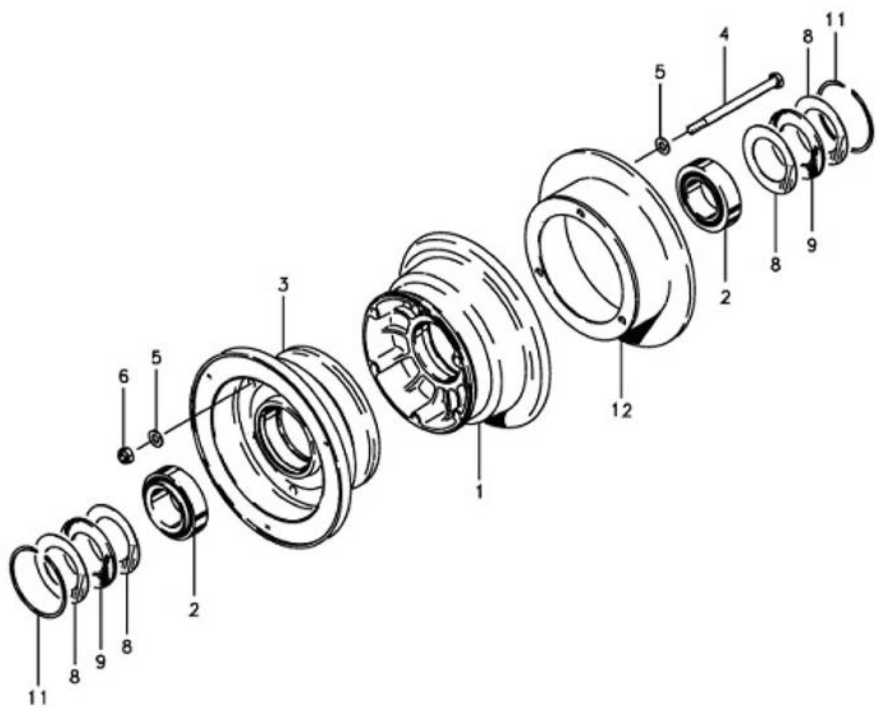
(a) Deflate the tire.

(b) Break the tire bead loose from the wheel.

(c) Remove the wheel nuts and washers (see Figure 4).

(d) Pull the wheel halves (1, 3) apart being careful with the tubes valve stem.

(e) Remove the snap ring (11), grease seals (8, 9) and bearing (2). Repeat on other wheel half.



1 - Inner Wheel Half	2 - Bearing	3 - Outer Wheel Half
4 - Bolt (3)	5 - Washer (6)	6 - Nut (3)
7 - Tire	8 - Grease Seal Ring (4)	9 - Grease Seal Felt (2)
10 - Tube	11 - Snap Ring	12 - Brake Disc

Figure 4 – Wheel Assembly

C. INSPECTION

(1) AXLE

(a) Visually inspect the axle to make sure there are no cracks or grooves.

(2) TIRE AND TUBE

(a) Visually inspect the tires inside and outside for cuts, uneven or excessive wear, and penetration by foreign objects.

(b) Visually inspect the inner tube for wear, cuts or cracks. Pay close attention to the valve stem base.

(c) 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.

(3) WHEEL HALVES & BRAKE DISCS

(a) Inspect the wheel halves for cracks or corrosion.

(b) Inspect the brake disc attachment points for cracking or distortion.

(c) New disc thickness is .190, minimum disc thickness is 0.170 in.

(4) BEARINGS

(a) Clean all metal parts (including the bearings) in a cleaning solution. Dry all parts with compressed air.

(b) Inspect the bearing and races for wear or damage, replace if necessary.

(c) Replace unserviceable parts as required.

D. WHEEL ASSEMBLY

(a) If a new tire or tube is used or the old one is sticky, dust the inside of the tire lightly with talcum powder.

(b) Inflate the tube, inside the tire, with enough air to start to fill it out so it will not be pinched between the wheel halves.

(c) Insert the outboard wheel half (1) over the valve stem and into the tire.

(d) Mount the inner wheel half (1) onto the outer wheel half (3).

(e) Secure the brake disc (12) using three bolts (4) with a washer (5) under each head.

(f) Place a washer (5) and nut (6) on each bolt (4) and torque per Chapter 20.

(g) Refer to Chapter 12 for proper tire inflation.

(h) Allow time for the air trapped between the tube and tire to escape and recheck the pressure.

(i) Pack the bearings with grease (MIL-G-81322E).

(j) Insert the bearing (4), inner grease seal ring (8), grease seal felt (9), outer grease seal ring (8) and secure with a snap ring (11). Repeat on the opposite side.

E. MAIN WHEEL INSTALLATION

(a) Place the wheel on the axle and tighten the axle nut so the tire will turn 1 ½ -2 times after a good spin.

(b) Safety with a cotter pin.

(c) Verify the tire pressure (Chapter 12).

(d) Safety the axle nut with a cotter pin. Verify before attaching the hubcaps.

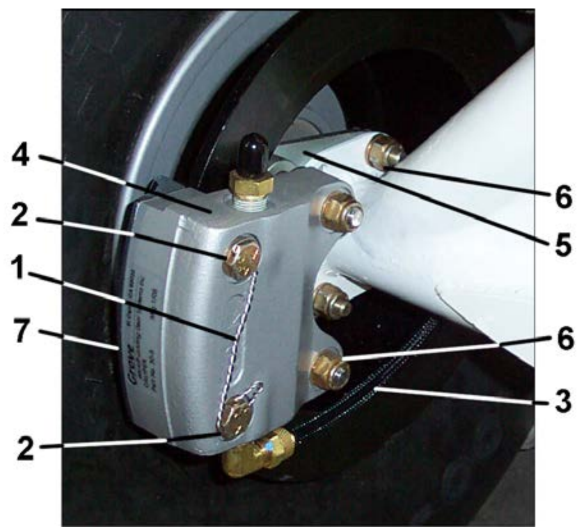
(e) Position the brake back plates, insert the bolts, and torque to 65-75 in-lbs.

(f) Safety the bolts in pairs with 0.032 safety wire.

(g) Lower the aircraft to the ground.

5 BRAKE CALIPERS

1.25" brake calipers are shown in Figure 5. 1.5", and 1.75" brake calipers have similar removal, inspection, and installation instructions.



1 - Safety Wire	2 - Bolts	3 - Brake Line
4 - Caliper	5 - Backing Plate	6 - Anchor Lugs
7 - Brake Back Plates		

Figure 5 – Brake Calipers, 1.25" Shown, Other Options Similar

A. REMOVAL

(a) Refer to Figure 5. Cut the safety wire (1) and remove the brake back plate bolts (2).

(b) Disconnect the brake line (3) from the caliper (4).

(c) Separate the caliper (4) from backing plate (5).

B. INSPECTION

(a) Inspect the brake linings for loose rivets, cracks and uneven wear. The minimum lining thickness is 0.100 inches.

(b) Inspect the calipers for leaks and excessive corrosion. If leaks are present at the pistons, overhaul the caliper.

(c) Inspect the brake backing plate for cracks or excessive wear.

C. INSTALLATION

(a) Position the brake pressure plate on the caliper so the linings are facing the disc.

(b) Insert the caliper anchor lugs (6) into the backing plate (5) holes.

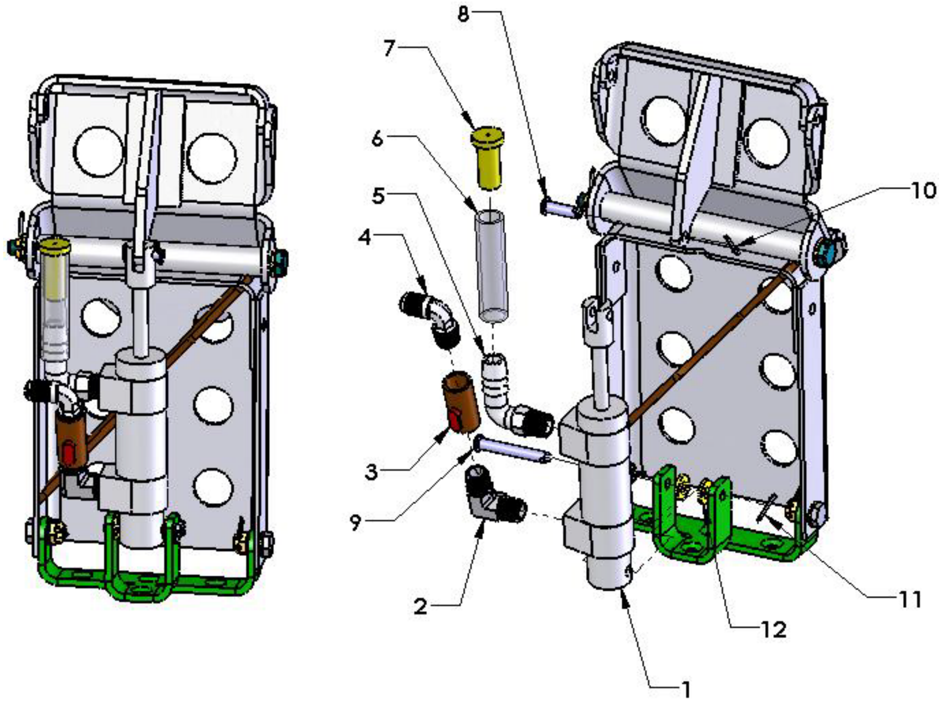
(c) Connect the brake line (3) and tighten. Make sure the wheel turns freely.

(d) Position the brake back plates (7), insert the bolts (2), and torque to 65-75 in/lbs.

(e) Safety (1) bolts (2) with 0.032 safety wire.

(f) Make sure the wheel turns freely.

6 MASTER CYLINDER AND PARKING BRAKE VALVE



1 – Master Cylinder	2 – 90° Male Elbow	3 – Ball Valve
4 – 90° Brass Poly-Flow Fitting	5 – Nylon 90° Tube Fitting	6 – Brake Reservoir
7 – Reservoir Plug	8 – MS20392-2C17 Clevis Pin	9 – MS20392-2C39 Clevis Pin
10 – AN380-2-2 Cotter Pin	11 – AN380-2-2 Cotter Pin	12 – AN960-10 Washer

Figure 6 – Brake Master Cylinder and Parking Brake Valve

A. REMOVAL

(a) Drain hydraulic fluid from system.

(b) See figure 6. Disconnect brake line from 90° Brass Poly-Flow Fitting (4).

(c) Remove Cotter Pins (10) (11) from Clevis Pins (8) (9).

(d) Remove Clevis Pins (8) (9) and AN960-10 Washers (12).

(e) Remove Master Cylinder (1) and attached components.

B. INSPECTION

(a) Inspect Master Cylinder (1) for signs of leaks, cracks, or any other damage.

(b) Inspect Brake Reservoir (6) for signs of leaks, cracks, or any other damage.

(c) Inspect all fittings (2) (3) (4) (5) for signs of leaks, cracks, or any other damage.

C. INSTALLATION

(a) See Figure 6. Ensure center to center distance of bottom hole to upper hole on Master Cylinder (1) is 5.125”. Adjust distance as required by twisting nut on Master Cylinder arm.

(b) Ensure Master Cylinder lock nut is tight.

(c) Locate Master Cylinder (1) on rudder pedal as shown in Figure 6.

(d) Insert Clevis Pin (9) thru rudder pedal, AN960-10 Washers (12), and bottom of Master Cylinder (1).

(e) Insert Clevis Pin (8) through rudder pedal and top of Master Cylinder (1) arm.

(f) Secure both clevis pins (8) (9) with Cotter Pins (10) (11).

(g) Connect brake line to 90° Brass Poly-Flow Fitting (4).

(h) Fill brake system with MIL-H-5606 hydraulic fluid. Bleed system carefully ensuring no air is left in the brake lines. Top off Brake Reservoir (6) making sure that it is a minimum of ¾ full.

(i) If any fittings are replaced, seal all pipe threads with Loctite 567.

7 TAIL LANDING GEAR

A. 3200-TYPE STEERABLE TAIL WHEEL

(1) INSPECTION

(a) Refer to Figures 8 and 9. Check the leaf springs for damage or twisting.

(b) Inspect the arm assembly, flat spring, fork, and bracket for excessive wear, cracks or other damage. Replace damaged parts.

(c) Examine the thrust washers for wear, scoring, or other damage. Inspect the bearing and races for wear or damage.

(d) Wipe the tire and the tube with a dry cloth. If the tire or the tube is spotted with grease, oil or other deposits, wash in a solution of soap and water. Rinse with clean water and dry with a clean cloth.

(e) Visually inspect for cuts, uneven or excessive wear, and penetration by foreign objects. Replace if the tire is in poor condition. The tire should be removed when the tread is worn to the base of a groove. Tires that are worn through the top fabric layer can only remain in service long enough to return to a maintenance base to be replaced.

(2) REMOVAL

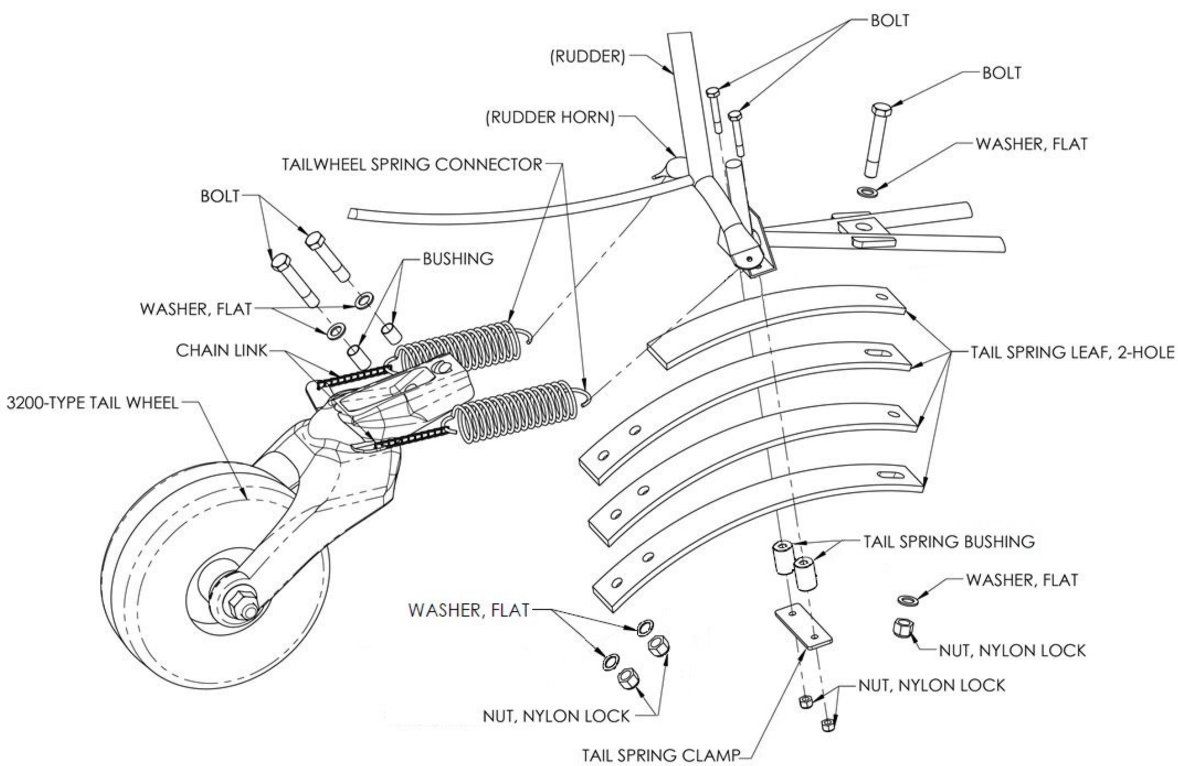


Figure 7 – 3200 – Type Tail Wheel and Leaf Spring Installation

NOTE
Figures 7, 8, and 9 are reference only. Actual assemblies may differ slightly.

(a) Lift the tail section of the airplane and rest the fuselage on a bench so the tail landing gear clears the ground.

(b) Disconnect the chain links from the tail wheel arms.

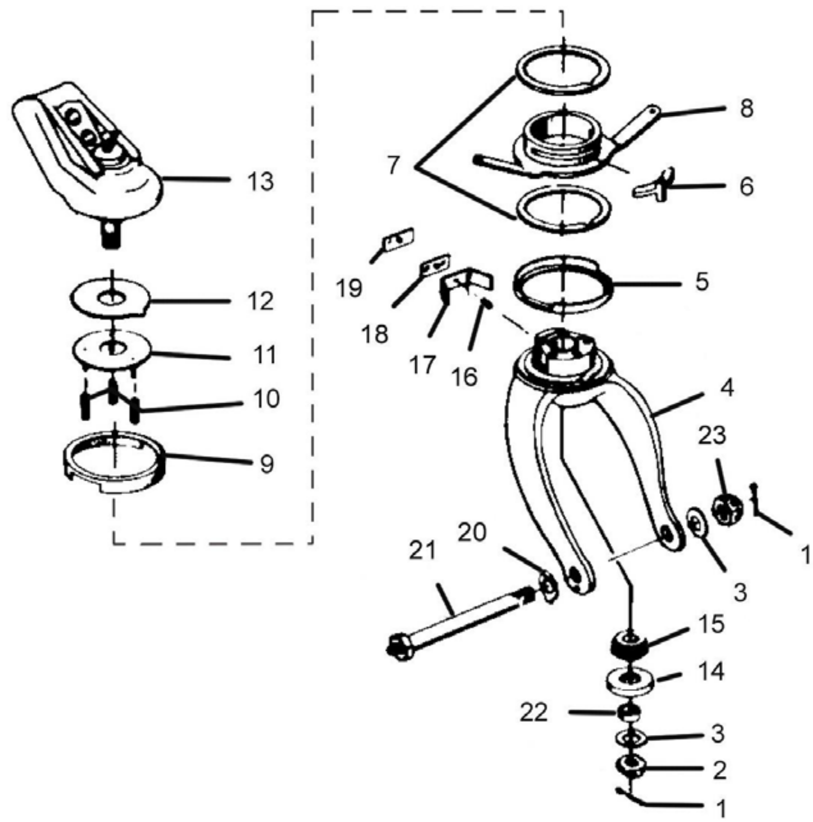
(c) Remove the front tail spring attach nut and washer.

(d) Disconnect the tail spring clamp by removing the nuts, washers, and bolts.

(e) To separate the springs from the tail wheel, remove the large area nut, washers, and bolt.

(f) The components that make up the tail wheel assembly may not be repaired except minor realignments are permitted, such as minor dents and bends.

(3) DISASSEMBLY



1 - Cotter Pin	2 - Short Castle Nut	3 - Washer
4 - Fork Assy.	5 - Lower Dust Cap	6 – Pawl
7 - Thrust Washer	8 - Arm Assy.	9- Upper Dust Cap
10 - Springs	11 - Thrust Plate	12 - Fiber Thrust Plate
13 - Bracket Assy.	14 - Grease Retainer	15 - Bearing
16 - Pin	17 - Flat Spring	18 - Shim
19 - Shim	20 - Lock Washer	21 - Axle
22 - Spacer	23 - Castle Nut	

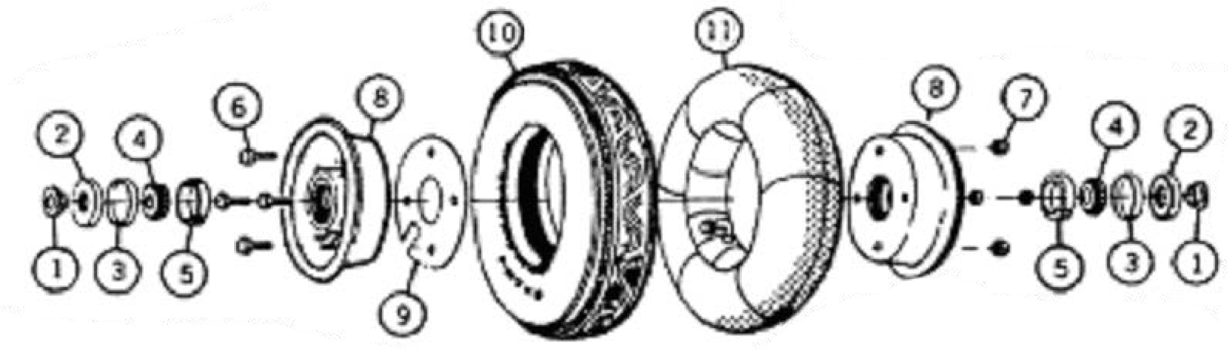
Figure 8 – 3200-Type Tail Wheel Assembly

(a) Refer to Figure 8. Remove the tire assembly from the fork by removing the cotter pin (1), castle nut (23), and washer (3) then sliding the axle (21) out.

(b) At the bottom of the fork (4) remove the cotter pin (1), short castle nut (2), and washer (3). Carefully pull the fork (4) off of the bracket (13).

(c) Separate the spacer (22), grease retainer (14), and the bearing (15) from the fork (4).

(d) Disengage the lower dust cap (5), thrust washer (7), arm assembly (8), thrust washer (7), pawl (6), upper dust cap (9), springs (10), thrust plate (11), and fiber thrust plate (12) from the fork (4) and bracket (13).



1 – Spacer	2 - Grease Retainer	3 - Inner Spacer	4 - Bearing
5 - Bearing Race	6 - Bolt	7 - Nut	8 - Hub
9 - Gasket	10 - Tire	11- Tube	

Figure 9 – Tail Wheel Assembly

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. IF IT IS UNSCREWED BEFORE THE AIR PRESSURE HAS BEEN RELEASED, THE VALVE CORE WILL BE EJECTED AT A HIGH VELOCITY.

WARNING

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

(e) Deflate the tube (11) (see Figure 9).

(f) Break the tire bead loose from the wheel.

(g) Remove the wheel half nuts (5) and bolts (6).

(h) Pull the wheel hubs (8) apart being careful with the valve stem.

(i) Remove the spacer (1), grease retainer (2), inner spacer (3) and bearing (4) from each hub.

(j) Visually inspect the inner tube for wear, cuts or cracks taking a close look at the valve stem base. Replace if the tube is in poor condition.

(k) Inspect the bearing and races for wear or damage. Replace if necessary.

(4) CLEANING

Clean metal parts (including bearings) in a cleaning solution. Dry all parts with compressed air.

(5) REASSEMBLY

NOTE
Replace all cotter pins that have been removed with new cotter pins.

(a) Refer to Figure 8. Hand apply grease to all internal parts and pack the bearing (15) with grease (MIL-G-81322E).

(b) Place the lower dust cap (5) on the fork (4) and the thrust washer (7) on the fork (4) being sure to align the notch with the locking pin in the fork (4).

(c) Position the pawl (6) on the arm (8) with the longest lobe down and place the arm assembly (8) on the fork (4).

(d) Position the other thrust washer (7) and the upper dust cap (9) on the arm assembly (8).

(e) Insert 3 springs (10) in the proper holes on the top of the fork (4) so the thrust plate (11) can be placed on top.

(f) Position the fiber thrust plate (12) in the bracket (13) so the nub is aligned with the groove and insert the bracket assembly (13) into the fork (4) maintaining the alignment of all the interlocking parts.

(g) Place the bearing (15), grease retainer (14), spacer (22), and washer (3) in the fork (4). Exert pressure on the bracket (13) to engage the short castle nut (2) with the bracket assembly post.

(h) Tighten the nut (2) securely, back off to the first cotter pin hole in the bracket post, and secure with a cotter pin (1). These last steps may be accomplished once the tail wheel assembly is installed back on the fuselage.

(i) Check to verify proper tail wheel pivoting and tension.

(j) Install the tire assembly on the fork by sliding the axle (21) with the lock washer (20) through the fork and tire assembly.

(k) Secure with a washer (3) and castle nut (23). Tighten the nut until there is no free play in the bearings and there is a slight amount of friction. Safety with a cotter pin (1).

(l) Pump the tail wheel bracket assembly (13) and axle (21) full of grease (MIL-G-81322E) then wipe off the excess.

(6) INSTALLATION

(a) See Figure 7. Position the tail wheel springs on the fuselage with long bolt and hold in place with a washer and a nut.

(b) Install the small bolts, clamp, and small washers with the small nuts only finger tight.

(c) Insert the bushing into the tail wheel assembly, if they were removed.

(d) Insert the bolt through the bushings and tail wheel assembly.

(e) Hold in place with washer and large area nut.

(f) Tighten the large area nut to 270-300 in-lbs. Tighten the small nuts to 70-100 in-lbs.

(g) Reconnect the chain links to the tail wheel arms. The springs and chains should neither be slack nor have tension when the wheel is centered. It may be necessary to adjust the number of chain links to achieve this.

(h) Lower the tail section to the ground.

8 CLAMAR 2180 AMPHIBIOUS FLOATS

Refer to the *Clamar Floats Operators Manual* for direction regarding inspection, maintenance, rigging, and troubleshooting.

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CHAPTER 33

LIGHTS

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33 LIGHTS

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1 GENERAL

This chapter contains information for troubleshooting, removal, installation and adjustments of the interior and exterior lighting systems used on the airplane. Exterior lighting consists of (select all that apply):

- ☐ Lightweight LED Navigation and anti-collision lights located on each wing tip and the rudder.
- ☐ There is one landing/taxi light on the leading edge of the left wing.
- ☐ There is one landing/taxi light on the leading edge of the right wing. This alternates with the landing/taxi light on the left wing (Wig Wag functionality).
- ☐ ____

____

The flight instruments are lit / unlit *(circle one)*, glass panel and/or GPS units are integrally lighted. There is / is not *(circle one)* a map light located on the upper right panel in the cockpit.

WARNING:
ALWAYS DISCONNECT THE POWER SUPPLY PRIOR TO SERVICING ANY PORTION OF THE ELECTRICAL SYSTEM. ENSURE THAT THE MAIN POWER SWITCH IS IN THE OFF POSITION; THEN REMOVE THE NEGATIVE BATTERY CABLE FOLLOWED BY THE POSITIVE BATTERY CABLE.

2 CABIN LIGHTING

The map light is mounted on the right hand interior wing root panel. It is an LED connected to the aircraft's power. No maintenance tasks are expected. Note that the map light turns on with the Nav lights and has a high/low/white selector switch adjacent on the wing root panel.

3 LANDING AND TAXI LIGHTS

The landing/taxi light consists of one PAR 36 LED type lamp mounted in the left wing leading edge. A similar landing light is available as an option for the right wing. The light is covered with a Plexiglas lens the same shape of the leading edge. A breaker switch on the instrument panel turns on the light.

A. REMOVAL

(a) Remove six screws holding the lens in place, breaking the silicone seal. Remove the lens.

(b) Remove two screws and the lamp assembly. Disconnect wiring.

B. INSTALLATION

(a) Attach wiring; note the polarity must be correct for the LED light. Reposition front mounting plate and secure with two screws.

(b) Reattach the lens. Use care not to crack the Plexiglas. Use silicone as required to reseal the lens in place.

4 LIGHTWEIGHT LED NAVIGATION LIGHTS AND ANTI-COLLISION

The LED navigation and anti-collision lights are integrated into single solid units, operated by breaker switches on the instrument panel. The NAV lights switch controls the navigation lights and the STROBE switch controls the anti-collision lights. The LED navigation and anti-collision lights are manufactured by Aveo Engineering. Aveo Engineering offers a free replacement warranty for the lifetime of the aircraft to which it is installed and registered. This coverage includes all failures except aircraft crashes.

CHAPTER 34

PITOT STATIC SYSTEM

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34 PITOT STATIC SYSTEM

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1 GENERAL

This section covers the Pitot and Static systems. These systems provide the information required by the airspeed indicator, the altimeter, the vertical speed indicator and the altitude encoder.

The pitot system senses dynamic pressure through a tube that is aligned with the flow of air and is located under the left wing or the leading edge of the left front jury strut.

The static pressure ports are located on both sides of the fuselage, on the boot cowl. There are two ports to counteract the effects of yaw.

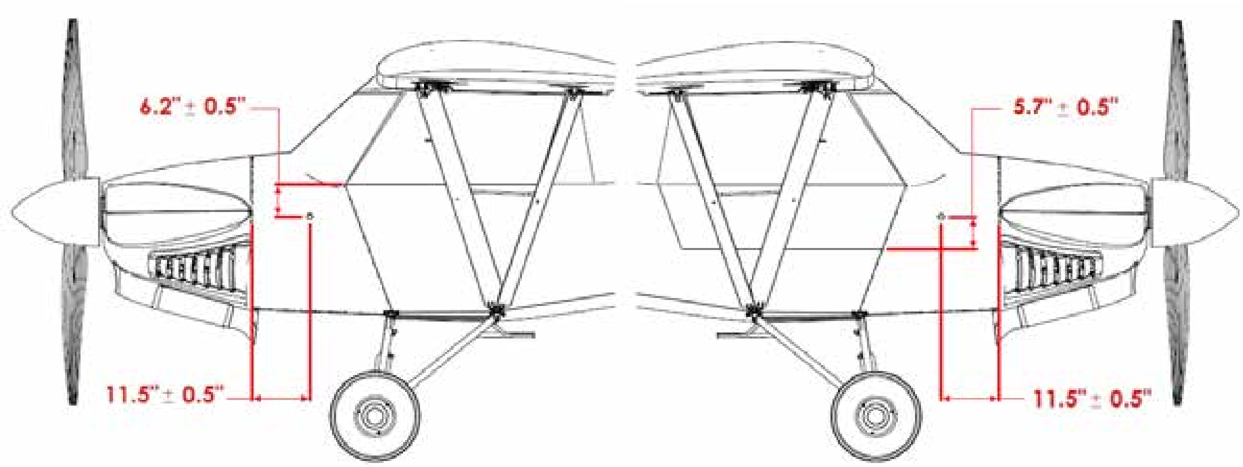

Figure 1 – Static Port Position (REFERENCE ONLY) *CCX-2000 Shown

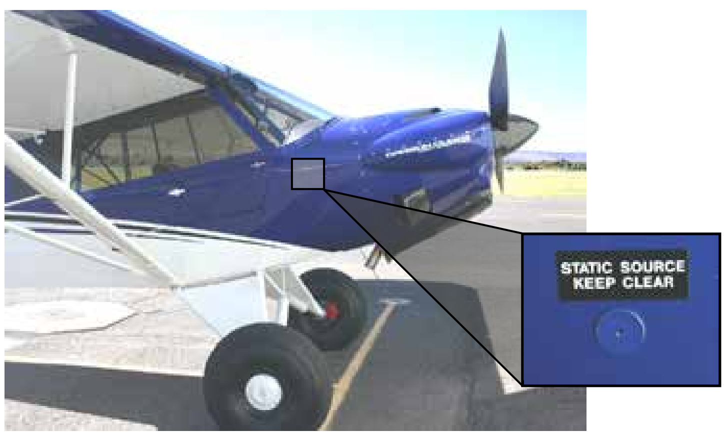

Figure 2 – Static Port *CCX-1865 Shown

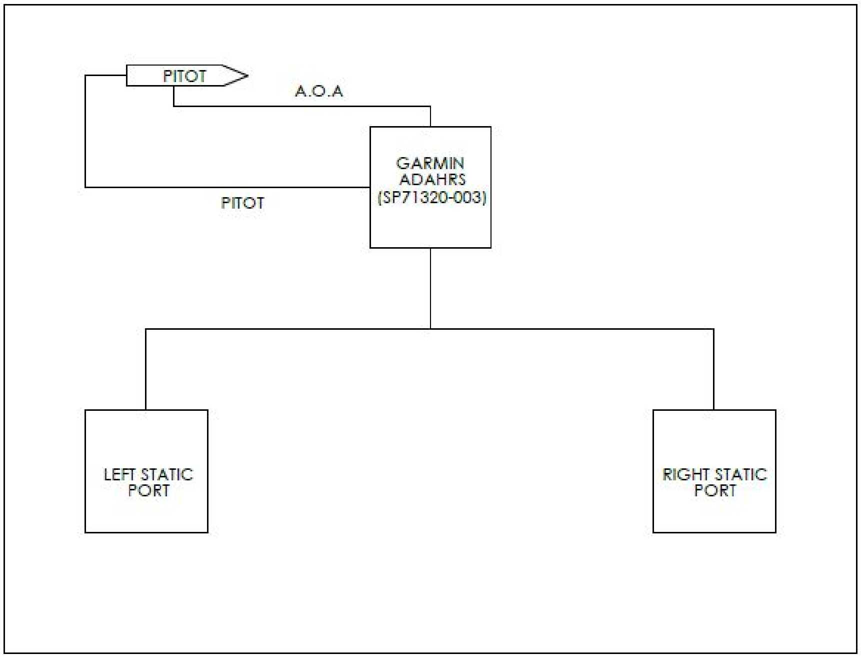

Figure 3 – Executive Glass Touch Instrument Panel

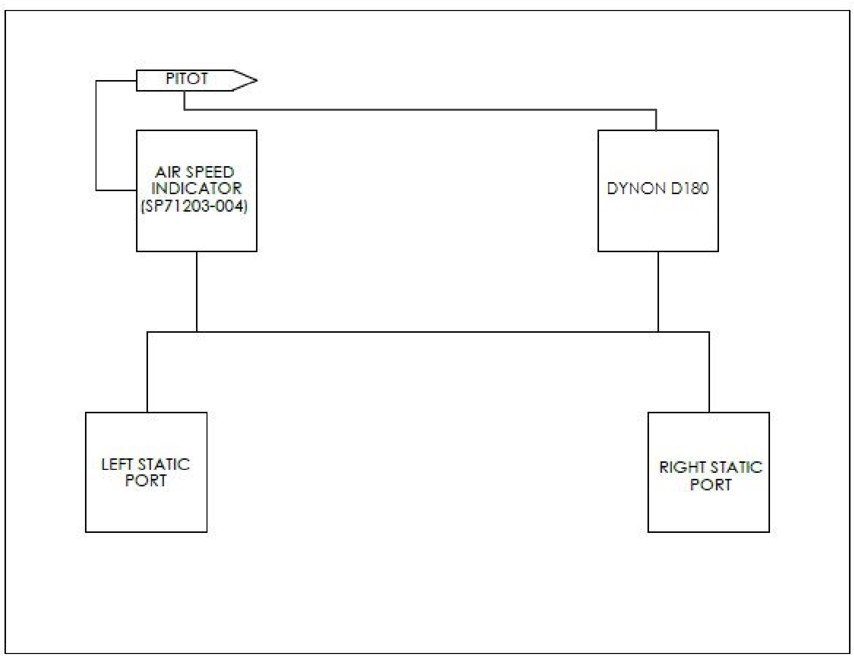

Figure 4 – Dynon D180 Instrument Panel

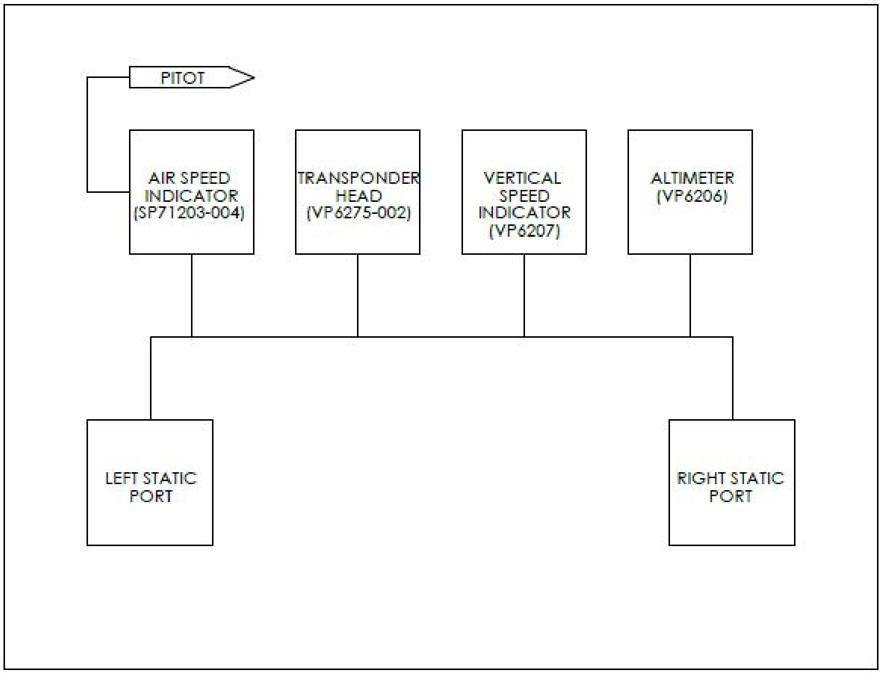

Figure 5 – World VFR Instrument Panel

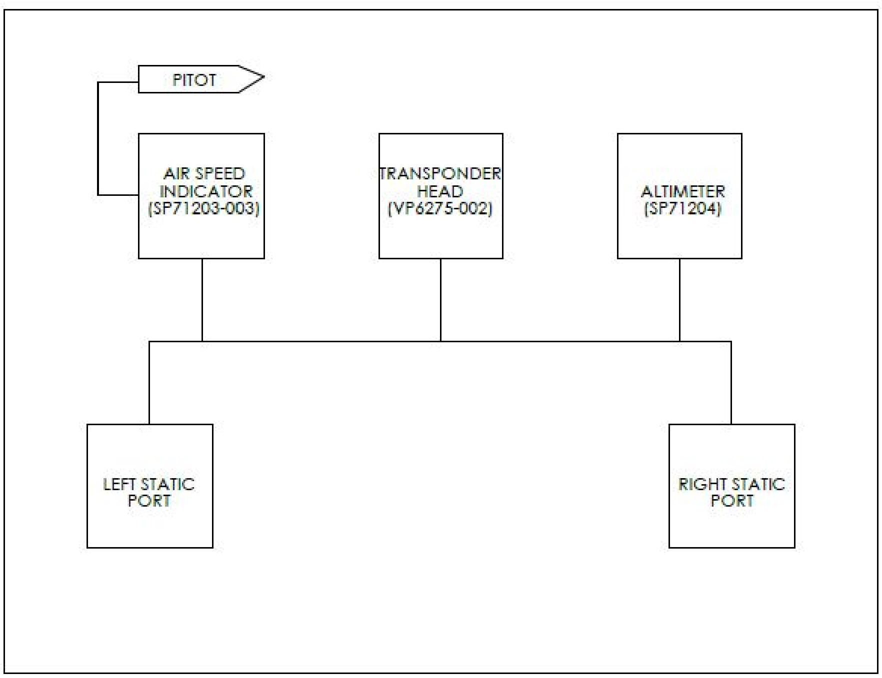

Figure 6 – MyPanel Instrument Panel

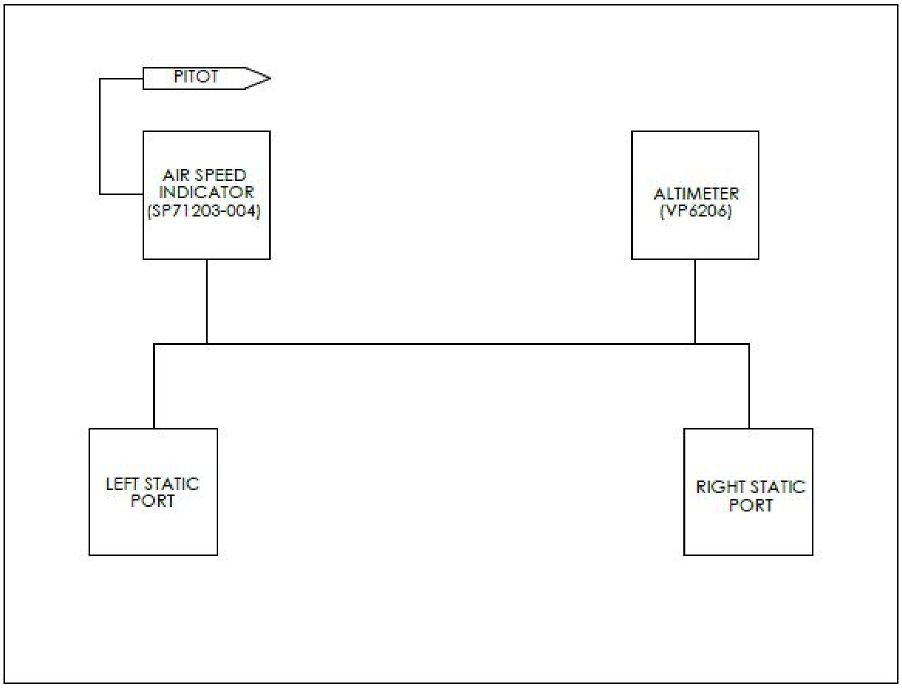

Figure 7 – Standard Instrument Panel

2 TROUBLESHOOTING

PROBLEM - PITOT STATIC	PROBABLE CAUSE	REMEDY
Low or sluggish airspeed, Indication, Normal altimeter and vertical speed indication	- Pitot tube deformed - Leak or obstruction in pitot line	- Repair or replace damaged component
Incorrect or sluggish response on all pitot-static instruments	- Leaks or obstruction in static line	- Repair or replace line - Remove obstruction
PROBLEM – ALTIMETER	**PROBABLE CAUSE**	**REMEDY**
Excess scale error	Improper calibration adjustment	Repair or replace damaged component
Excessive pointer oscillation	Defective instrument	Replace or repair instrument
High reading	Static system leak	Inspect static system
PROBLEM – AIRSPEED INDICATOR	**PROBABLE CAUSE**	**REMEDY**
- Pointer fails to respond - Indicates improperly or oscillates	Leak in instrument case	Replace or repair instrument
	Obstruction in pitot line	-Check line for obstruction - Replace lines on Gauge and blow out lines
	Leak in pitot or static lines	- Repair or replace damaged lines - Tighten connections

3 MAINTENANCE PRACTICES

A. ATC TRANSPONDER TEST

A transponder test is required every 24 calendar months in accordance with 14 CFR 91.413.

B. ALTIMETER STATIC SYSTEM TEST AND INSPECTION

Static system tests must comply with the requirements of 14 CFR 91.411 and be performed by a rated repair station with the appropriate test equipment. A static leak test should be accomplished whenever a connection has been loosened or an instrument replaced.

C. STATIC SYSTEM LEAK TEST

Connect the test equipment directly to a static port and seal off the opposite static port with plastic tape.

CAUTION
Do not blow air through the line toward the instrument panel. This may seriously damage the instruments.

Apply a vacuum equivalent to 1,000 feet altitude, (differential pressure of approximately 1.07 inches of mercury or 14.5 inches of water) and hold. After 1 minute, check that a leak has not exceeded the equivalent of 100 feet of altitude (decrease in differential pressure of approximately 0.0105 inches of mercury or 1.43 inches of water). Unseal the static port and disconnect the equipment.

D. PITOT SYSTEM LEAK CHECK

CAUTION
Do not apply suction to pitot lines.

Seal the drain hole on the bottom of the pitot tube and connect the pitot pressure opening to a tee to which a source of pressure and manometer or reliable indicator is connected.

Restrain the hoses to prevent them from moving excessively when the pressure is applied.

Apply pressure until the airspeed indicator indicates 100 MPH. (87 KTS) (equivalent to a differential pressure 1.1 inches of mercury or 14.9 inches of water). Hold this pressure and clamp off from the source of pressure. After 1 minute, the leakage should not exceed 10 MPH. (8.7 KTS) (decrease in differential pressure of approximately 0.15 inches of mercury or 2.04 inches of water). If the airspeed indicator reading declines, check the system for leaky hoses and loose connections.

CAUTION
To avoid rupturing the diaphragm of the airspeed indicator, apply pressure slowly and do not build up excessive pressure in the line. Release pressure slowly to avoid damaging the airspeed indicator.

Inspect the hoses for signs of deterioration, particularly at bends and at the connection points to the pitot mast and airspeed indicator. Replace any hoses that are cracked or hardened. Any time a hose is replaced, perform a pressure check. Unseal the drain hole and disconnect the equipment when leak check is complete.

CHAPTER 39

ELECTRIC PANELS

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39 ELECTRIC PANELS

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1 GENERAL

The aircraft is equipped with an instrument panel containing all flight, navigation, and engine instruments that are required for VFR operations. Table 1 summarizes the equipment installed in each configuration.

Figure 1 – Standard Instrument Panel (CCX-1865 ONLY)

Figure 2 – MyPanel Instrument Panel (CCK/CCX-1865 ONLY)

Figure 3 – World VFR Instrument Panel (CCK/CCX-1865 Shown, CCK/CCX-2000 Similar)

Figure 4 – Executive Glass Touch Instrument Panel (CCK/CCX-1865 Shown, CCK/CCX-2000 Similar)

Table 1 – Instrument and Avionics Equipment List

Standard Instrument Panel	
Tachometer	Garmin GTR200 COM
Altimeter	SMARTmonitor
Air Speed Indicator	CHT Monitor
Oil Pressure / Temperature Gauge	
Inclinometer (skid/slip indicator)	
MyPanel Instrument Panel	
Airspeed Indicator	2 ¼” Round Trig COM Radio
Digital Tachometer	2 ¼” Round Trig Mode S Transponder
Altimeter	SMARTmonitor
Digital Oil Pressure/Temperature Gauge	CHT Monitor
	PM3000 Remote Intercom
World VFR Instrument Panel	
Electronics International CGR-30P Engine Monitoring System	2 1/4” Round Trig COM Radio
Altimeter	Garmin (aera™ 795 or aera™ 796)
Airspeed Indicator	2 1/4 “ Round Trig Mode S Transponder
Inclinometer (skid/slip indicator)	PM3000 Remote Intercom
Vertical Speed Indicator	SMARTmonitor
Executive Glass Touch Instrument Panel	
For maintenance information, refer to the Garmin G3X Installation Manual, Section 30, P/N 190-01115-01 Rev. M dated March 2014 or later revision.	
Garmin G3X Touch 10.6” Flight Display System · GDU 465 Display · GSU 25 Air Data Computer and Attitude and Heading Reference System · GMU 22 Magnetometer · GTP 59 Temperature Probe · GAP 26 Pitot/AOA Probe · GEA 24 Engine and Airframe Unit	Garmin GTR200 VHF COM Garmin GTX23 ES Mode S Transponder Garmin GDL39R ADS-B (Optional) Garmin GTX335R ADS-B (Optional) Garmin GTX345R ADS-B (Optional)
Custom Instrument Panel	

2 INSTRUMENTS

3 COM SYSTEM

A RADIO

B INTERCOM

4 NAVIGATION SYSTEM

A TRANSPONDER

B GPS

5 ANTENNA LOCATIONS

A COM ANTENNA

B TRANSPONDER ANTENNA

C GPS ANTENNA

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CHAPTER 51

REPAIR OF STRUCTURE & COMPONENTS

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51 REPAIR OF STRUCTURE & COMPONENTS

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1 GENERAL

This section describes the process and method of repairing fabric and non-structural metal or composite components. Refer to Polyfiber Procedure Manual or Stewart Systems Fabric Covering and Finishing Procedures Manual as required.

2 PATCHING HOLES IN FABRIC COMPONENTS

Refer to Polyfiber Procedure Manual or Stewart Systems Fabric Covering and Finishing Procedures Manual for fabric repair instructions.

3 NON-STRUCTURAL SHEET METAL REPAIRS

A. LEVEL OF CERTIFICATION

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

B. 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 the kit manufacturer are not authorized. Description, by electronic photos or similar means, of damaged primary or secondary structures, or flight control surfaces structures, are to be forwarded to the kit manufacturer accompanied by a suggested repair scheme.

4 NON-STRUCTURAL COMPOSITE MATERIALS REPAIRS

A. LEVEL OF CERTIFICATION

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

B. AUTHORIZED NON-STRUCTURAL COMPOSITE MATERIALS REPAIRS

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

5 STRUCTURAL REPAIRS

A. AUTHORIZED STRUCTURAL REPAIRS

Repair all tubular structures per Aircraft Circular 43.13. Reference chapter 5 for inspection procedures. For all structural repairs submit an MRA request form to Cub Crafters, Inc. see section 5.B below

B. MAJOR REPAIR AND/OR ALTERATIONS (MRA) REQUESTS

For any and all major repairs or alterations, contact Cub Crafters, Inc. to obtain and submit a Major Repair and/or Alteration (MRA) request from.

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CHAPTER 53

FUSELAGE

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53 FUSELAGE

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1 GENERAL

The structure of the fuselage consists of a truss made of high-strength steel tubing. The members are joined together using inert gas fusion welding. The steel structure is powder coated to protect it from corrosion.

The stabilizers, elevators, and rudder are constructed of tubular steel with steel channel ribs. Stainless steel tie rods and fittings brace the horizontal stabilizers to the vertical stabilizer and fuselage.

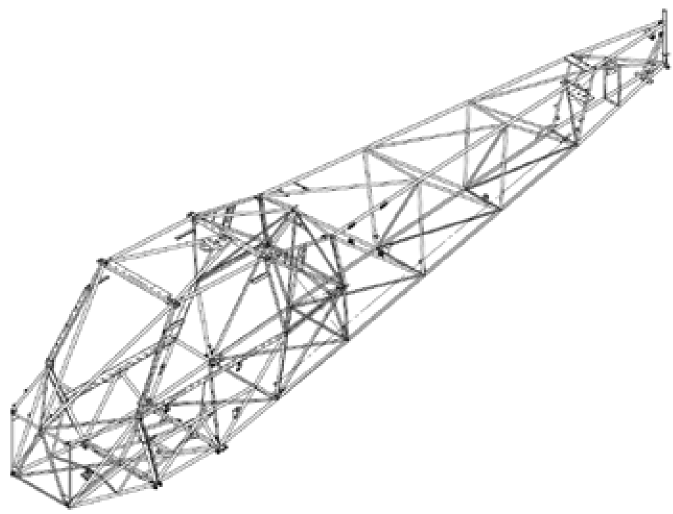

Figure 1 – Fuselage Frame (CCK/CCX-2000 shown)

2 MAINTENANCE PRACTICES

A. REPAIR

Repair all tubular structures per Aircraft Circular 43.13. Reference chapter 5 for inspection procedures.

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CHAPTER 57

WINGS

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57 WINGS

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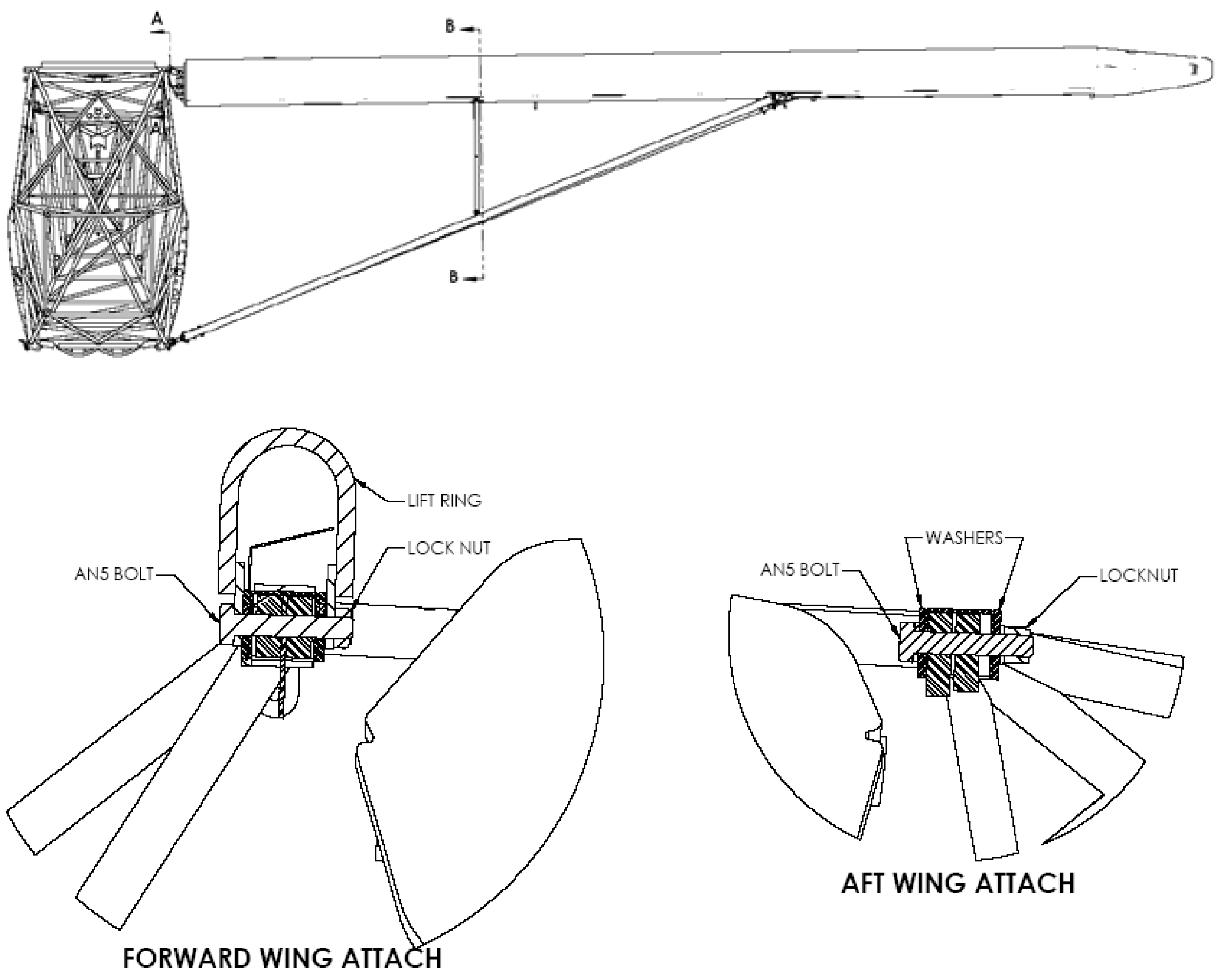
1 GENERAL

The wing is covered with fabric, has two extruded aluminum spars, formed aluminum ribs, and aluminum leading and trailing edge skins. Rigidity is provided by drag wires and drag braces. The left or right wing panels may house optional landing lights. A stall warning vane is installed on the leading edge of the left wing. The wing incorporates slotted wing flaps inboard of the ailerons.

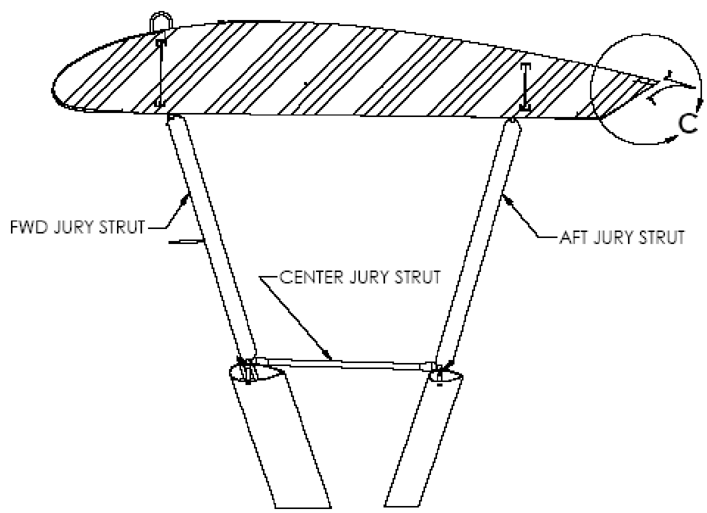
2 MAINTENANCE PRACTICES

A. WING

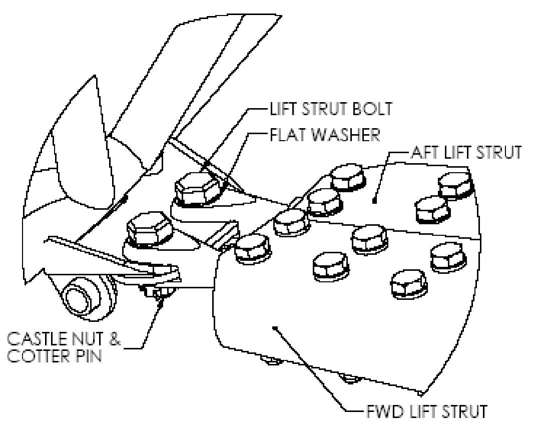


SECTION A-A

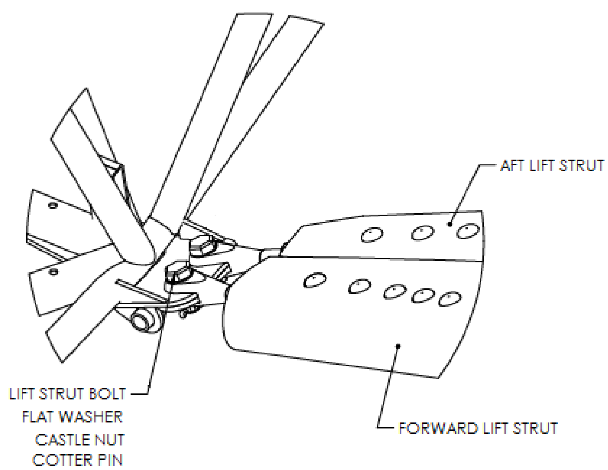
Figure 1 – Wing Installation Reference Configuration



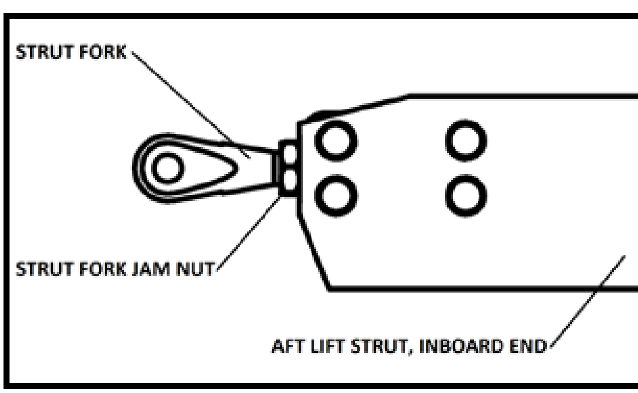
SECTION B-B



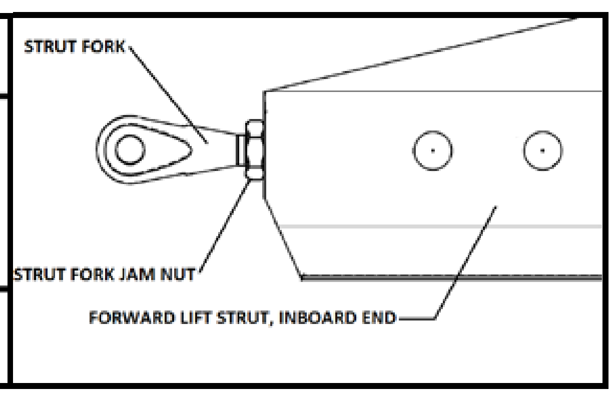
LIFT STRUT FORK INSTALLATION, CCK/CCX-1865



LIFT STRUT FORK INSTALLATION, CCK/CCX-2000

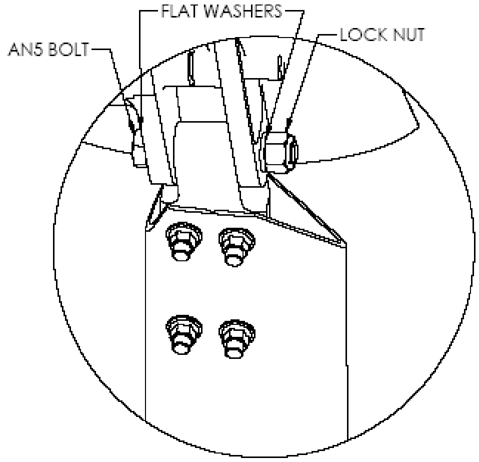


CCK/X-1865 AFT LIFT STRUT

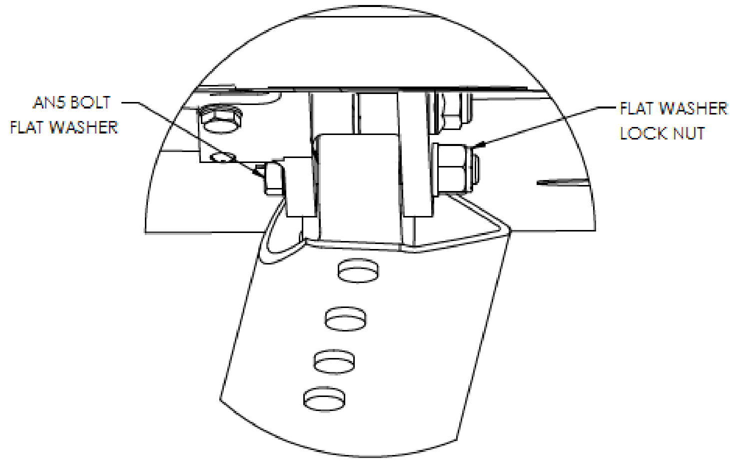


CCK/X-2000 FORWARD LIFT STRUT

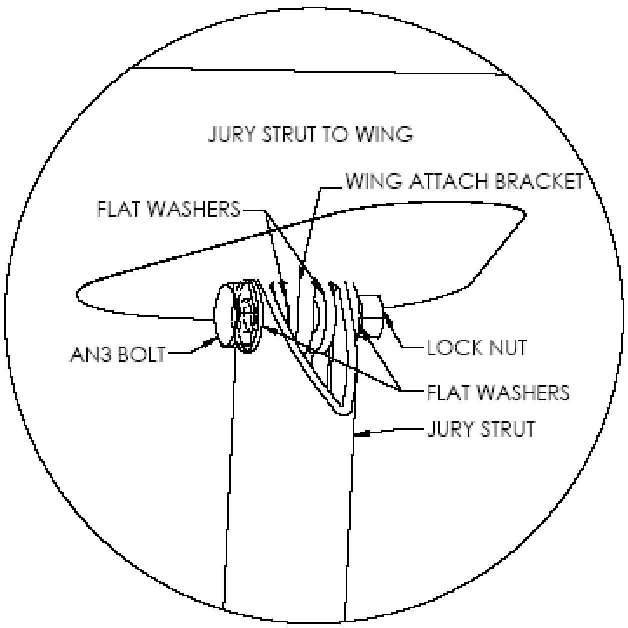
Figure 2 – Wing Installation (Continued)



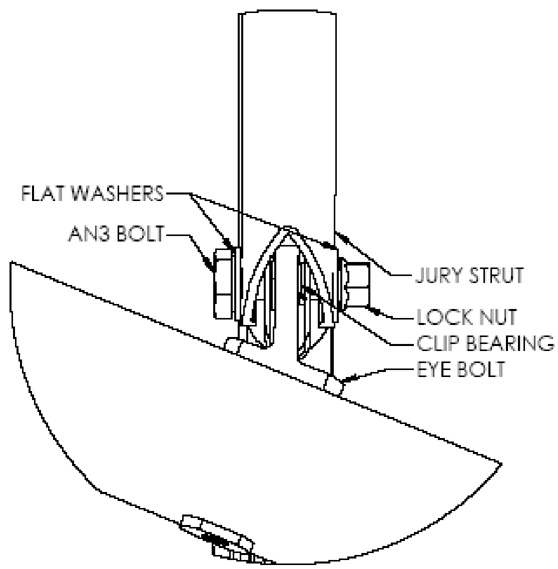
AFT LIFT STRUT ATTACHMENT, CCK/CCX-1865



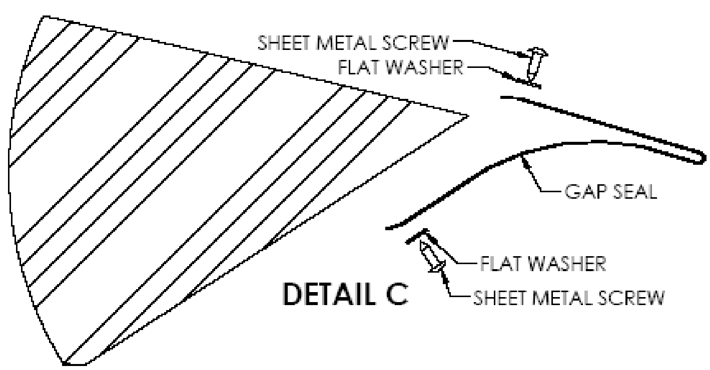
AFT LIFT STRUT ATTACHMENT, CCK/CCX-2000



JURY STRUT UPPER ATTACH



JURY STRUT TO LIFT STRUT



DETAIL C

Figure 3 – Wing Installation (Continued)

(1) REMOVAL

> **CAUTION**
> **Before removing the wings, set the parking brakes and chock the wheels.**

(a) Remove the front wing root fairing, rear wing root fairing, wing/root panel interface, skylight, and turtle deck.

(b) Drain the fuel tank(s). Disconnect fuel supply and gauge lines inboard ends at the wing root. Cover all exposed ends of tubing and hoses with tape to prevent contamination of the fuel from dirt or debris.

(c) Disconnect the pitot air tube at the wing root.

(d) Disconnect the appropriate wiring, stall warning system, navigation, and landing light at the wing root butt splices.

(e) Disconnect the top aileron cable from the top aileron horn.

(f) Remove wing pulley inspection plate covers from the wing. Remove pulley and aileron upper cable attachment. Remove lower aileron pulley cover and pulley in the fuselage.

(g) Remove fairleads from wing strut. Disconnect the lower aileron control cables from the torque tube link below the control stick.

(h) If the wings are to be completely removed, disconnect and remove the upper aileron crossover cable.

(i) Disconnect the flap control rod from the flap lever arm and flap. Remove flaps.

> **NOTE**
> The ailerons may be removed from the wings at this point. See Chapter 27, Flight Controls.

(j) Unbolt and remove the jury strut braces. They are secured to the wing from the middle of the struts. Mark the struts LH and RH so they may be reinstalled in the same location.

> **CAUTION**
> **For removal and installation of the wings, at least three people will be required.**
> **Use one person to support the outboard portion of the wing, one person to support the inboard end while the third person removes the attaching hardware.**

(k) With a person holding the wing and one person holding the rear lift strut, remove the lower and upper rear lift strut bolts and separate the strut from the fuselage.

(l) Remove the nuts from the wing and strut attachment bolts.

(m) Remove the lower and upper front lift strut bolts and separate the strut from the fuselage.

(n) Remove the wing from the fuselage.

(o) Rest the wing on the leading edge using soft pads along the leading edge or place horizontally on padded sawhorses so as not to dent or damage the surfaces.

(p) Repeat all the procedures on the opposite wing, if necessary.

(2) INSTALLATION

(a) Support the wing at the outboard end and at the wing root. Align the wing root attachment points with the fuselage attachment points and insert bullets. (It is easier to temporarily secure the wing with bullets of the same diameter as the bolts and then push the bullets out with the bolts.)

(b) Position front strut fork on the fuselage attachment point and align the hole with a bullet.

(c) Align top hole of the front strut with the wing attachment hole and secure with a bullet.

(d) Position rear strut fork on the fuselage attachment point, align the hole with a bullet; align top hole of the rear strut with the wing attachment point and secure with a bullet.

(e) Repeat the procedure on the opposite wing, if necessary.

(f) Apply a light coat of grease to the wing attachment bolts before installation.

(g) Press out the bullets at the wing to fuselage attachment points with the proper bolts. Secure the bolts using the appropriate washers and nuts. Torque the nuts to 160-200 in. lbs. (refer to Chapter 20).

(h) Press out the bullet at the wing to front strut attachment point with the proper bolt. Slide the spacer and pulley bracket over the end and secure the bolt using the appropriate washer and nut. Torque to 160-200 in. lbs. (refer to Chapter 20).

(i) Press out the bullet at the wing to rear strut attachment point with the proper bolt. Secure using the appropriate washer and nut. Torque to 160-200 in. lbs. (refer to Chapter 20).

(j) Support the outboard end of the wing and remove the lower strut bullets. Insert the proper bolts. Torque the nut to 95 in. lbs., torque up to the nearest castellation, and safety with a cotter pin. Ensure the strut fork jam nuts are tight.

(k) Check the dihedral angle and wing washout per Section 3. Adjust if necessary.

(l) Install the jury struts making sure the longer vertical tube is in front. Secure using the appropriate bolt, washer, and nut then torque the top bolt to 38-43 in. lbs., bottom bolt to 23-28 in. lbs.

(m) Connect upper aileron and the crossover upper cables to aileron horns.

(n) Connect the flap to the flap control rod. Connect the control arm to the flap handle lever.

(o) Route the lower aileron cable down the strut.

(p) Install the associated pulley and fairleads. Make sure the cable is not hooked on a strut.

(q) Connect the lower aileron control cables to the torque tube link. Ensure that the nuts have the appropriate cotter pins. Reinstall lower aileron pulley covers.

(r) Connect the pitot air tube at the wing root. Reconnect the stall warning system, navigation, and landing light wires at the wing root.

(s) Remove the tape from the fuel line ends. Reconnect the fuel supply and gauge lines at the wing root. Torque the ¼ inch hose clamps to 10-14 in. lbs. Reconnect plastic fuel line fittings, torque to finger tight plus 1 ½- 2 additional revolutions.

(t) Ensure that the aileron cables are not rubbing or hung up. Check to verify the cable tension is 40 ± 5 lbs. and adjust in accordance with Chapter 27. Install the wing pulley inspection plate covers.

(u) Reinstall front and rear wing root, turtle deck, skylight, and wing/root panel interface.

3 RIGGING THE WINGS

A. PREPARATION

The aircraft must be level longitudinally and laterally prior to setting or adjusting the dihedral or the washout angles. Refer to the leveling procedure described in Chapter 8.

B. DIHEDRAL ANGLE

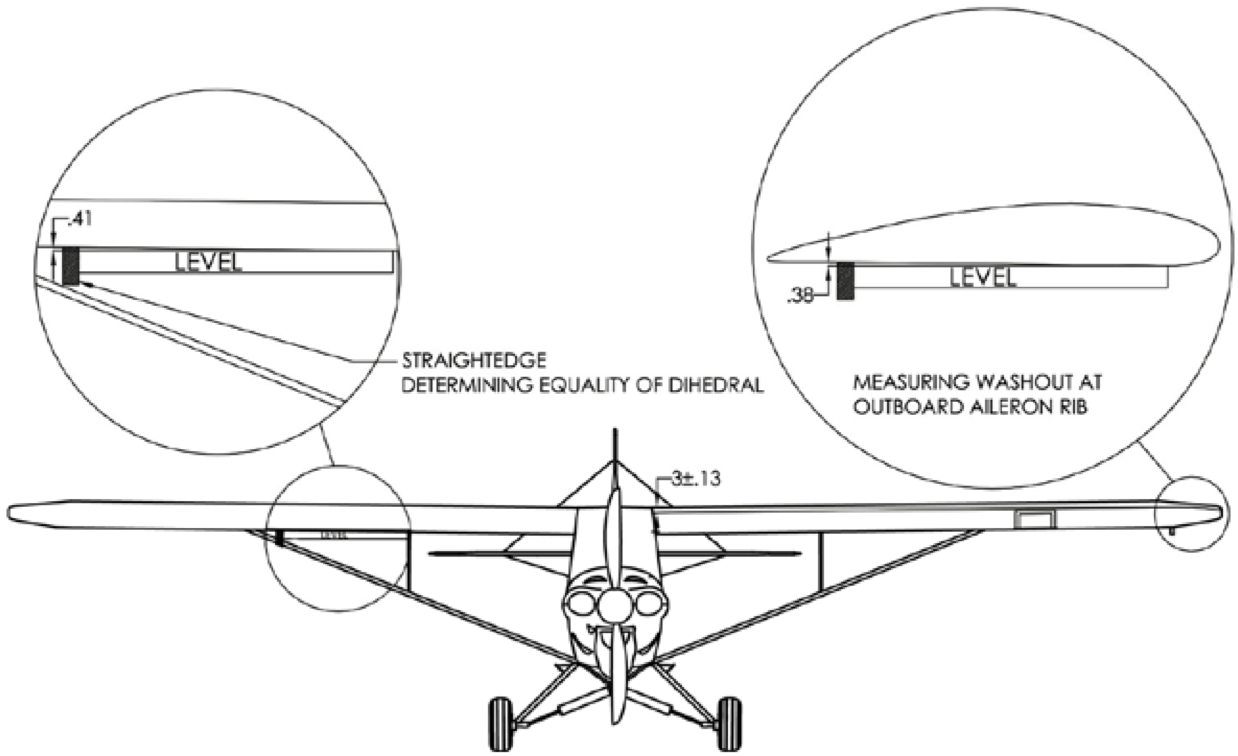


Figure 4 – Dihedral Angle and Washout

(a) Remove the front wing root fairings.

(b) Stretch a string from wing tip to wing tip above the front spar and pull tight and secure.

(c) Measure down from the string to the top of the inboard edge of the front spar cap (Figure 4). The measurement should be 3 inches ± 0.13 (1/8) inches. This adjustment is accomplished by turning the forks of the lower end of the front strut in or out.

(d) To determine that each wing panel has the same dihedral, hold a straightedge on the end of a 30-inch level so that one end of the straightedge protrudes 0.41 (13/32) of an inch above the level (see Figure 4). Place the level combination along the front spar bottom between the lift strut and jury strut attachment fittings as illustrated in Figure 4. The bubble should be approximately centered. Check the opposite wing panel in the same manner.

(e) If the dihedral angle is not equal for both wing panels, adjust the threaded fork on the lower end of the front strut until dihedral angle is the same. Recheck the total dihedral and readjust as necessary.

(f) Record the actual results in the aircraft logbook.

(g) NOTE: Rigging of the wings is not complete until the washout angle is set.

C. WASHOUT ANGLE

(a) Check the washout of each wing by holding a straightedge on the end of a 30-inch level so that one end of the straightedge protrudes 0.38 (3/8) inches above the level (see Figure 4). Place this combination along the bottom surface of the full rib next to the outboard end of the aileron. The level end with straightedge space should fit to the rear of the rib while the other end of the level should be placed under the front spar.

(b) To obtain the proper washout, adjust the threaded fork at the lower end of the rear strut at the fuselage end until the bubble is centered.

(c) Repeat on the opposite wing if needed.

(d) Record the actual results in the aircraft logbook.

CAUTION
There should not be more than 15 threads exposed on the lift strut forks.

4 VORTEX GENERATORS

Each wing has 36 vortex generators on the top leading edge. The aircraft is allowed to fly with the following number of vortex generators missing:

§ Not more than 3 vortex generators missing on an aircraft.

§ Not more than 2 vortex generators missing on a wing.

§ The missing vortex generators must not be next to each other.

If a vortex generator should fall off, it must be glued on at the same location as follows:

(a) Ensure that the area where the vortex generator fell off is dry and free of grease and dirt.

NOTE
If the color of the vortex generator does not match the aircraft, it is advisable to paint the exposed part of the vortex generator prior to installation.

(b) Clean the bottom surface of the vortex generator, removing any old adhesive.

(c) Mask off the rectangular footprint of the vortex generator.

(d) Reattach the vortex generator with Loctite Depend® glue.

(e) Remove masking and wipe off excess glue with cleaner.

CHAPTER 60

PROPELLERS

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60 PROPELLERS

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1 GENERAL

The aircraft is equipped with a:

	Manufacturer	Diameter	Pitch	Materials
☐	Catto Propeller			Nickel Leading Edge (NLE), Wood/ Fiberglass/ Carbon Composite
☐	Hartzell Propeller			Composite Materials
☐				

A. TROUBLESHOOTING

If the propeller-engine combination feels rough in flight;

(a) Check that the mounting face of 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 of the threads.

(c) Remove the propeller, rotate it 180 degrees on the engine crankshaft flange, and re-install. Again, check the blade track.

(d) If roughness or vibration is still present, dynamic propeller balancing may be required.

(e) Inspect engine installation to verify clearance between engine mount, exhaust and cowling.

NOTE
The Catto Propeller is not for use with the CC363i engine

NOTE
The following instructions apply to the Catto Propeller only, for Hartzell Propellers refer to the Hartzell Owner's Manual.

B. REMOVAL

(a) Turn ignition switch to OFF, and ensure that the ignition and starter circuit breakers are pulled.

(b) Remove the spinner and retain all fasteners.

(c) Cut and remove the safety wire from the propeller bolts.

(d) Remove the propeller bolts. Assistance may be needed to hold the propeller and aft spinner bulkhead.

C. INSPECTION

(a) Examine the propeller blades for corrosion, cracks, nicks, or dents beyond permissible limits found in the propeller manufacturer's service manuals. If the propeller is unserviceable, replace it with a new one and return the damaged propeller to the factory.

(b) Remove the spinner. Inspect the attaching bolts for worn or damaged threads and heads. Replace damaged bolts with new ones.

(c) Inspect the spinner bulkheads for cracks or broken brackets. Replace if any damage is noted.

D. INSTALLATION

The following instructions are a general guide. Refer to propeller manufacturer's detailed instructions as required.

(a) Thoroughly clean the surfaces of the crankshaft flange and pilot stub, the rear/mounting face of the propeller, and the pilot bore. Carefully examine each surface and especially examine the end of the crankshaft pilot stub; minor nicks or burrs must be smoothed.

(b) Ensure the propeller attaching bolts and the threads in the drive bushings or retaining nuts are clean and dry.

(c) Turn ignition switch to OFF, and ensure that all circuit breakers are pulled.

(d) Place the spinner backing plate on the crankshaft flange ensuring the prop blade orientation is correct.

(e) Position the propeller in the correct orientation. Tighten the bolts snug and ensure the spinner backing plate is positioned properly on the flange bushings before torquing the bolts.

(f) Apply torque in several increments, working diagonally across the bolt circle until reaching proper torque.

Manufacturer	Catto Propeller	Hartzell Propeller
Material	Composite	Composite
Reference Torque	Per Catto MFG Spec*	60-70 FT-LBS* (720-840 IN-LBS)*
***Disclaimer: Values are reference only, verify with the applicable installation documents provided by manufacturer.**		

(g) Check to make sure the propeller track is within 1/8-inch.

(h) Install 0.041-inch diameter stainless steel safety wire in the propeller bolt heads locking bolt heads together in a tightening moment. Bolts should be wired in pairs, twisting the wire between the bolt heads.

CHAPTER 71

POWERPLANT

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71 POWERPLANT

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1 GENERAL

The aircraft is powered by a CC340 / CC363i (circle one) engine. This is an air-cooled, four cylinder, direct drive, horizontally opposed piston powerplant that is capable of delivering up to 80 / 186 (circle one) HP at 2700 RPM for the maximum continuous power.

A throttle lever controls power to the engine. There is a forward and aft throttle control lever on the left side of the cockpit. The aft throttle control lever is optional on some models. The air-to-fuel mixture is adjusted manually with a control on the left side of the instrument panel. The mixture control should always be used to stop the engine.

CCK/CCX-2000 models are also equipped with a forward and aft propeller control lever, near the throttle controls.

Refer to the appropriate manufacturer's maintenance manual for servicing, maintenance and overhaul of the engine and/or engine components.

The engine mount is conical with the attach points orienting the engine parallel with the firewall. The structure of the mount is made of high-strength steel and the engine is attached to the mount through rubber mounts that help reduce vibration.

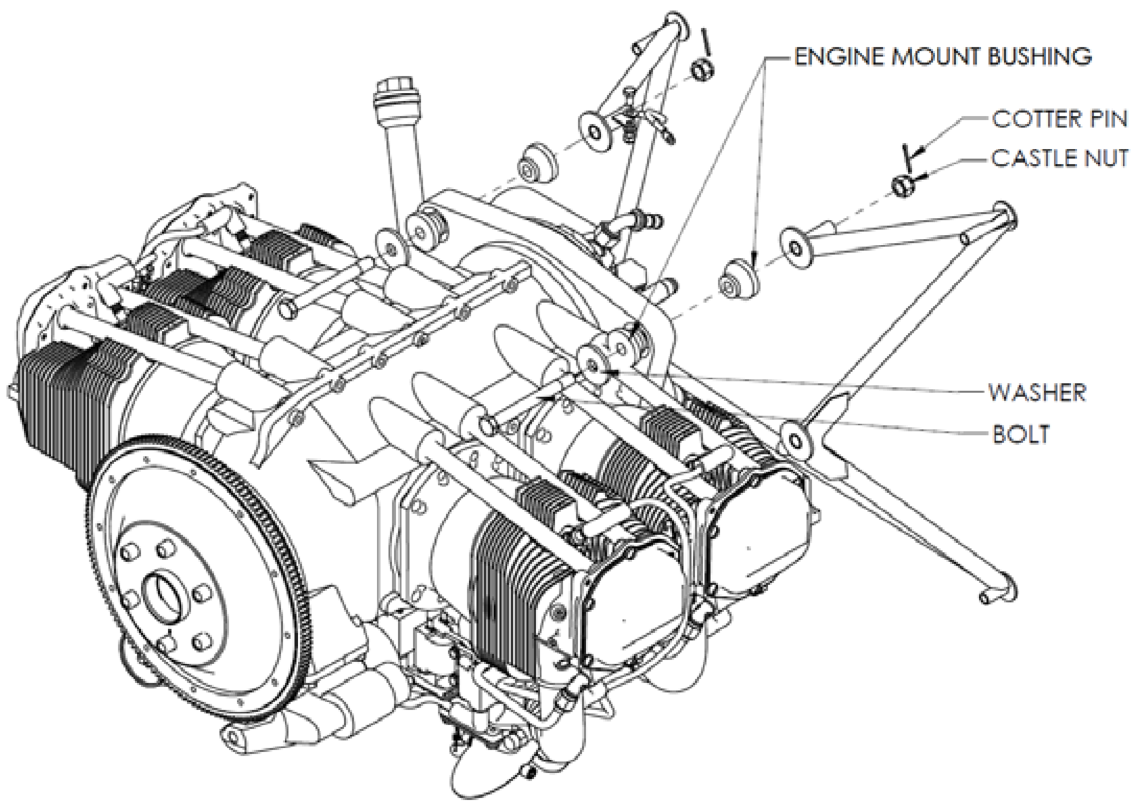

Figure 1 – Engine Mount Assembly (Shown with CC340 Engine)

2 TROUBLESHOOTING, SERVICING, AND MAINTENANCE

This section is prepared to help diagnose probable causes and determine appropriate corrective actions.

PROBLEM	PROBABLE CAUSE	REMEDY
Engine does not start	Insufficient fuel.	Fill tanks.
	Fuel does not reach carburetor.	Clean tank vents, blowout supply line, clean out shut-off valve, repair pump, clean filter.
	Carburetor float valve stuck shut. (CCK/X-1865)	Remove carburetor and repair.
	Carburetor screen or jets plugged (CCK/X-1865).	Remove and clean.
	Insufficient priming (weak combustion).	Repeat starting procedure with more priming.
	Excess priming (puffs of black smoke).	Clear cylinders by turning propeller several revolutions, with ignition switch "OFF", throttle wide open.
	Engine hot (vapor lock in fuel system).	Disconnect fuel line at carburetor and purge system.
	Low battery charge	Recharge battery.
	Cold oil.	Verify Master and Ignition are off. Rotate propeller by hand several times to break loose congealed oil.
	Incorrect starter adjustment.	Readjust shift lever screw.
	Spark plugs fouled.	Remove and clean. Check gaps.
	Spark plug leads defective.	Replace defective parts.
	Engine flooded	See AFM
	Fuel Filter Clog (CCK/X-2000)	Clean Fuel Strainer - See Chapter 28-00 §6.A
	Fuel pump failure (CCK/X-2000)	Inspect and/or replace pump. See Chapter 28-00 §8.A and also Superior XP-360 Engine Manual
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.
	Leak in air induction system.	Tighten loose joints. Replace damaged parts.
Rough running	Propeller out of balance.	Remove and inspect.
	Engine mount bolts loose.	Tighten.
	Defective spark plug leads.	Test for break-down at high voltage.
	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.
	Plugged air filter.	Remove and clean filter.
	Idling mixture too lean.	Readjust.

PROBLEM	PROBABLE CAUSE	REMEDY
	Idling jet plugged.	Clean carburetor.
	Water in fuel.	Drain sediment trap.
	Leak in air induction system.	Check all joints and throttle shaft bearings.
Low power	Defective ignition cable.	Test for high voltage leaks. Replace parts.
	Scored valve stems.	Replace valves and guides.
	Warped valves.	Replace valves. Grind seats.
	Throttle not fully open.	Readjust linkage.
	Carburetor heat valve not closing fully.	Remove filter, inspect valve. Straighten plate.
	Propeller blades warped.	Inspect pitch. Replace.
	Ice forming on carburetor throttle valve.	Apply full carburetor heat.
	Air filter plugged.	Remove and clean.
	Fuel flow restricted.	Inspect tank vents. Inspect shutoff valve. Clean strainer. Clean carburetor screen. Blow out fuel supply line.
	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.
	Dirt on oil pressure relief valve seat.	Clean plunger and seat. Replace dirty oil.
	Oil pressure relief valve seat worn.	Overhaul engine. Refinish valve seat.
	Oil pressure relief valve plunger sticking.	Remove cap and plunger. Clean parts.
	Engine bearings worn.	Overhaul engine.
	Oil pressure gauge defective.	Test gauge, and replace or repair.
	Internal oil leak.	Overhaul engine.
	Cracked crankcase cover casting, defective oil pump, leaking suction tube.	Overhaul engine. Replace damaged parts.
High oil temperature	Low oil supply.	Replenish.
	Dirty or diluted oil.	Drain sump, and fill with fresh oil of proper grade.
	Prolonged ground operation at high speed.	Avoid prolonged running on the ground.
	Excessive rate of climb.	Avoid low air speed.
	Lean fuel-air mixture.	Refer to overhaul manual.
Induction leak	Loose connection in ducting	Ensure hose clamps are tight around ducting.
	Loose connection at plenum	Ensure hose clamps are tight at plenum to induction tube interface.
	Cracked plenum	Contact Cub Crafters for replacement plenum.
Air blockage	Blocked air filter	Clean or replace air filter

PROBLEM	PROBABLE CAUSE	REMEDY
Fuel seeping or dripping from sniffle valve when parked	Mixture not at idle cut-off	Ensure mixture is all the way out. Verify mixture arm contacts stop on the right side of the servo when mixture control is moved all the way out.

3 ENGINE COWLING

The engine cowl is made of two pieces and can be removed without the propeller being detached. The upper and lower portions are made of composites, using fire-resistant resins.

A. INSPECTION

Inspect the cowl for loose rivets, wear points and cracks.

B. REMOVAL

(a) Remove screws along lower access panel. Be sure to hold on to the air filter so it does not fall to the ground.

(b) Carefully remove the lower access panel with the air filter.

(c) Disconnect the induction tube and cabin heat air inlet.

(d) Remove and retain the screws holding the upper cowl to the lower cowl and the fuselage.

(e) Carefully remove the upper cowl.

(f) Remove the screws holding the lower cowl to the fuselage.

(g) Carefully remove the lower cowl.

Figure 2 – Lower Access Panel, CCK/CCX-1865 Shown, CCK/CCX-2000 Similar

C. COWL FLAP POSITION ADJUSTMENT, CCK/CCX-1865 ONLY

(a) While lower cowl is detached, remove aft screws from the top and bottom of each cowl flap.

(b) Adjust cowl flap position.

(c) Install aft screws on the top and bottom of each cowl flap.

(d) Reinstall lower cowl as directed in Installation.

NOTE

Position of cowl flaps should be determined by the pilot depending on weather conditions. Flaps should be in the closed position during winter months.

D. INSTALLATION

(a) Carefully position the lower cowl in place; secure the cowl to the fuselage with screws.

(b) Carefully position the upper cowl in place; secure it to the lower cowl and to the fuselage with screws.

(c) Make sure the seal around the inlets is properly positioned around the inlet openings.

(d) Double check to make sure all the hardware is tight.

(e) Connect SCAT tubing to cabin heat air inlet in cowl.

(f) Reinstall the induction tubing, ensure hose is secure. Do not overtighten.

(g) Carefully position the lower access panel in place. Secure the lower access panel to the lower cowl with screws.

(h) Verify there is clearance between the cowl and prop spinner.

Figure 3 – Engine Cowl Installation, CCK/CCX-1865 Shown, CCK/CCX-2000 Similar

4 AIR INDUCTION

The induction air for the engine enters through a filter on the lower forward side of the cowling. Attention is drawn to the fact that operation under severe dust conditions will require shorter air filter replacement intervals. These conditions may be encountered in aircraft operating from dusty areas.

CCK/CCX-1865 has an alternate carburetor heat control, which operates a butterfly valve that allows heated, unfiltered air to feed into the carburetor. The carburetor heat control is located on the instrument panel. Should the air filter become obstructed, the carburetor air control provides an alternate manual means of supplying the engine with air for the induction system.

CAUTION
Ground operations with the carburetor heat control in the hot position must be limited because it allows air to bypass the filter. (CCK/CCX-1865 Only)

5 AIR FILTER

Figure 4 – Air Filter, CCK/CCX-1865 Shown, CCK/CCX-2000 Similar

A. REMOVAL

(a) Remove screws holding the lower access panel to the lower cowl.

(b) Remove lower access panel with air filter.

B. INSPECTION

(a) Inspect the foam filter for any damage, such as tears or large holes. If a new filter is required, contact the kit manufacturer for replacement filter part number PC54108-001 (CCK/CCX-1865), or XC53110-001 (CCK/CCX-2000).

(b) Clean the filter in a mild degreasing cleanser to remove dirt and other particles. Wring the excess from the element and allow it to dry.

(c) Apply filter oil, such as Castrol Foam Filter Oil or Amsoil High Tack Foam Filter Oil, to the element and work it into the 7ells throughout.

C. INSTALLATION

(a) Align air filter with opening in lower access panel.

(b) Carefully position lower access panel on to lower cowl. Make sure air filter is inside lower access panel.

(c) Secure lower access panel to lower cowl with screws.

6 AIR INLET PLENUM (CCK/CCX-2000 ONLY)

The CC363i engine is equipped with Cub Crafter's proprietary air inlet plenum as standard equipment. The air inlet plenum is made from reinforced thermoplastic or composite materials. The air inlet plenum incorporates a fuel sniffle valve.

A. REMOVAL

(a) Loosen 8X hose clamps on the rubber couplings at the induction tubes.

(b) Slide the rubber couplings down the induction tubes, away from the plenum.

(c) Remove the attachment hardware connecting the air inlet plenum to the fuel injection servo.

B. INSPECTION

(a) Inspect plenum for cracks or visible damage.

(b) Inspect the induction tubes for any signs of slippage or disconnection at the cylinder attachment.

C. INSTALLATION

(a) Re-install the attachment hardware at the fuel injection servo. Torque bolts to 120-145 IN-LBS and safety wire the bolt heads.

(b) Slide the rubber couplings into place at the plenum to induction tube interface.

(c) Tighten 8X hose clamps around the rubber couplings.

7 CARBURETOR (CCK/CCX-1865 ONLY)

A. INSTALLATION OF CABLE TO VALVE ARM SWIVEL FITTING

(a) Insert the carburetor heat control cable end 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 and tighten it one half turn past finger tight. NOTE: Do not over or under tighten as this can adversely affect actuation.

(d) Test the travel of the carburetor heat control knob in the cockpit and adjust the position of the cable within the fitting. When the position is correct, tighten the castle nut until the cable is close to bottoming out on the swivel, then install a cotter pin.

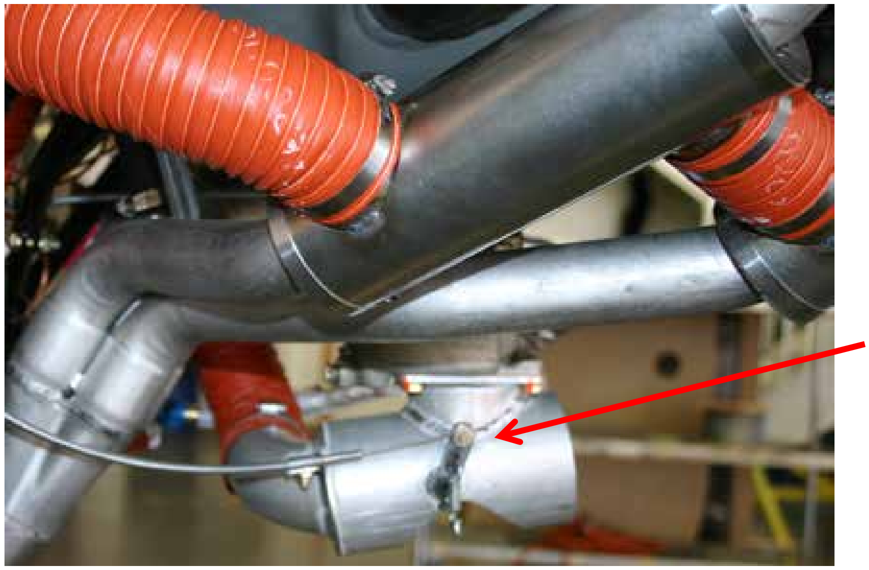

Figure 5 – Carburetor Heat Valve, CCK/CCX-1865 Only

B. REMOVAL

(a) Turn fuel selector to "OFF"

(b) Remove engine cowling.

(c) Remove safety wire and the four bolts holding the carburetor air box to the bottom of the carburetor. Discard used lock washers.

(d) Disconnect fuel inlet line from the fitting on the carburetor and install a temporary plug to prevent fuel line contamination.

(e) Remove the cotter pin and disconnect the throttle cable from the carburetor arm by removing the bolt and washer(s) (refer to Chapter 76).

(f) Remove the cotter pin and disconnect the mixture cable swivel from the carburetor arm by removing the nut and washers from the swivel stud.

(g) Remove four of each: nuts, lock washers, and washers holding the carburetor to the bottom of the oil pan. Discard used lock washers and gasket.

C. INSTALLATION

(a) Install the carburetor on the bottom of the oil pan using a new gasket, washers, new lock washers, and nuts.

(b) Connect the mixture cable and safety in place (refer to Chapter 76).

(c) Connect the throttle cable and safety.

(d) Remove the temporary plug from the fuel line and briefly turn the fuel selector handle to "BOTH" to flush the line of possible contaminants. Collect the fuel in an appropriate container.

(e) Inspect the screen in the fuel strainer, clean if needed. Reassemble and safety (refer to Chapter 28).

(f) Reinstall the carburetor air box on the bottom of the carburetor. Use new lock washers and safety wire.

(g) Reconnect fuel line to the fitting on the carburetor. Ensure it will not contact the cowling, cowl flaps, or the exhaust pipe.

(h) Turn fuel selector to “BOTH” and verify there are no leaks.

D. VERIFICATION

Perform ground run and leak check.

NOTE
Ensure adequate fire extinguishing equipment is available and that its correct use is understood.

8 FUEL INJECTION (CCK/CCX-2000 ONLY)

The CCK/CCX-2000 is equipped with a Precision Airmotive LLC, Silver Hawk EX-5VA1 fuel injection servo (EX360-4, EX390-1 or Lycoming variation depending on engine variant). The servo is mounted to the forward side of the plenum through the plenum bracket.

A. REMOVAL

(a) Disconnect all fittings, inlet and outlet fuel lines, from the servo.

(b) Disconnect all control cables from the servo.

(c) Remove fasteners connecting the servo to the intake hanger bracket.

(d) Remove fasteners connecting the servo to the aft servo bracket mount.

(e) Carefully remove servo.

B. INSTALLATION

(a) Install servo to the attach brackets that it was removed from. Install hardware in the same orientation that it was removed.

(b) Reconnect all fittings and control cables. NOTE: Do not over or under tighten the control cable castle nut on the stud as this can adversely affect actuation.

C. TROUBLESHOOTING

For troubleshooting and other maintenance practices, reference the latest revision of the Precision Airmotive LLC, *INSTALLATION AND DETAILED SPECIFICATIONS FOR THE SILVER HAWK™ EX-5VA1 SERVO KIT.*

9 SUPERIOR XP360 & LYCOMING 363i (CCK/CCX-2000 ONLY)

The CC363i engine utilizes engine components from either the Superior XP360, or alternatively, the Lycoming CC363i variant. Reference the latest revision of the following manuals:

- Superior Air Parts: *SUPERIOR XP360 OPERATOR’S MANUAL* & *360 & IO-360 SERIES OVERHAUL MANUAL*.
- Lycoming: *LYCOMING OPERATOR’S MANUAL* #60297-12 & *LYCOMING OVERHAUL MANUAL* #60294-7

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CHAPTER 74

IGNITION

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1 SPARK PLUGS

A. REMOVAL AND INSPECTION

Remove spark plug caps and spark plugs. 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 required.
Check the electrode gap per the manufacturer specifications and re-set if necessary. Check connector for any abnormalities and clean if needed. Refer to the latest revision of Light Speed Engineering, *INSTALLATION AND OPERATION MANUAL For PLASMA III, II+, and I CDI SYSTEMS*

B. INSTALLATION

Apply a small amount of Spark Plug Thread Lubricant to the threaded area of each spark plug at the firing end. Install the plugs and torque to 15 ft/lb. Connect the spark plug caps.

2 ELECTRONIC IGNITION

The ignition system on the engine uses two Plasma III ignition modules (from Light Speed Engineering) and a DC Mini Sensor system with magnets in the ring gear to provide the triggers for timing. The cylinder firing order is 1,3,2,4.
The dual system is connected such that each system knows if the other one is operating. If one of the two systems is turned off or has failed, the remaining system will automatically shift its timing curve to provide optimum engine performance with one system. This eliminates the common power loss when one magneto is turned off. The wide operating voltage range, from 5v-35v allows hand starting long after the electric starter has stopped due to a low battery. Refer to Chapter 24 for Ignition Backup Battery information.

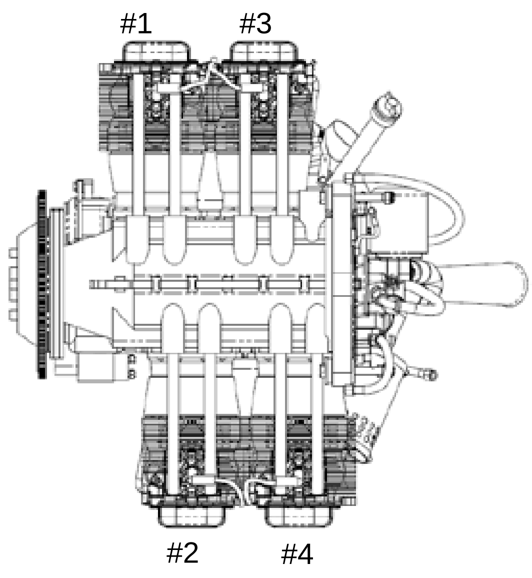

Figure 1 Cylinder Arrangement (Shown on CC340 Engine, viewed from above)

A. MAINTENANCE PRACTICES

Refer to the latest revision of Light Speed Engineering, *INSTALLATION AND OPERATION MANUAL For PLASMA III, II+, and I CDI SYSTEMS.*

3 IGNITION INDICATION VERIFICATION

The following is an ignition module connection and indication verification checklist. This is for duel electronic ignition systems with IGN back up battery and both ignitions wired (primarily) directly to main battery.

WARNING: The ignition will be on for various steps, take care not to rotate the propeller or otherwise inadvertently start the engine. The engine should be stopped for the entire test. The main and backup batteries are connected and checked for at least 11 volts.

A. **QUICK CHECK** for ignition connection and indication system

3.A.1 Verify IGN L and IGN R C/Bs are pushed in, RT IGN BACKUP BATTERY switch NORMAL.

3.A.2 Key switch to BOTH.
- IGN SYS red LEDs illuminate to turn and extinguish when BOTH is reached

3.A.3 Pull out IGN L C/B

3.A.3.1 L IGN YS red LED Illuminates
- If TRUE then C/Bs are wired correct ignition modules
- If FALSE then C/Bs are wired incorrectly

3.A.4 Key switch to R.

3.A.4.2 L IGN SYS red LED stays illuminated
- If TRUE then key switch is wired to correct ignition modules
- If FALSE then key switch is wired incorrectly

3.A.5 Pull out IGN R C/B
- If TRUE then IGN circuit breakers are correct
- If FALSE then IG L and IGN R are switched

3.A.6 RT IGN BACKUP BATTERY switch to EMERGENCY
- RT IGN BACKUP BATTERY amber LED illuminates
- L IGN SYS red LED illuminates
- If TRUE then backup battery system operating correctly
- If FALSE then backup battery system wired incorrectly

1.A.7 RT IGNBACKUP BATTERY switch to NORMAL
- Amber and red LEDs extinguish

1.A.8 Push in IGN L and IGN R C/Bs
- L IGN SYS red LED illuminates

1.A.9 Key switch to LEFT
- L IGN SYS red LED extinguishes
- R IGN SYS red LED illuminates

1.A.10 Turn key switch OFF

1.A.10.1 All LEDs extinguished

B. ABSOLUTE VERIFICATION OF LEFT AND RIGHT:

1.B.1 Key switch is OFF, RT IGN BACKUP BATTERY switch NORMAL, IGN L and IGN R C/Bs are pulled out.
- Both red IGN LEDS extinguished
- RIT IGN BACKUP BATTERY amber LED extinguished

1.B.2 Physically disconnect the INPUT connector from the RIGHT ignition module.

1.B.3 RT IGN BACKUP BATTERY to EMBERGENCY

1.B.4 Check for voltage on RIGHT ignition module INPUT connector
- Check for battery voltage positive on both pins 7 and 8
- Any ground may be used for reference, including pins 14 or 15
  - o If voltage present, correct INPUT connector
  - o If violated not present, connector should go to LEFT ignition module.

1.B.5 RT IGN BACKUP BATTERY to NORMAL

1.B.6 Reconnect ignition module.

CHAPTER 76

ENGINE CONTROLS

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1 GENERAL

Throttle control levers are located on the left side of the cockpit. The air-to-fuel mixture is adjusted manually with a red control knob located on the instrument panel. Pulling the mixture control all the way back operates a cut-off valve that stops the supply of fuel to the engine.

2 MAINTENANCE

A. THROTTLE CABLE ASSEMBLY

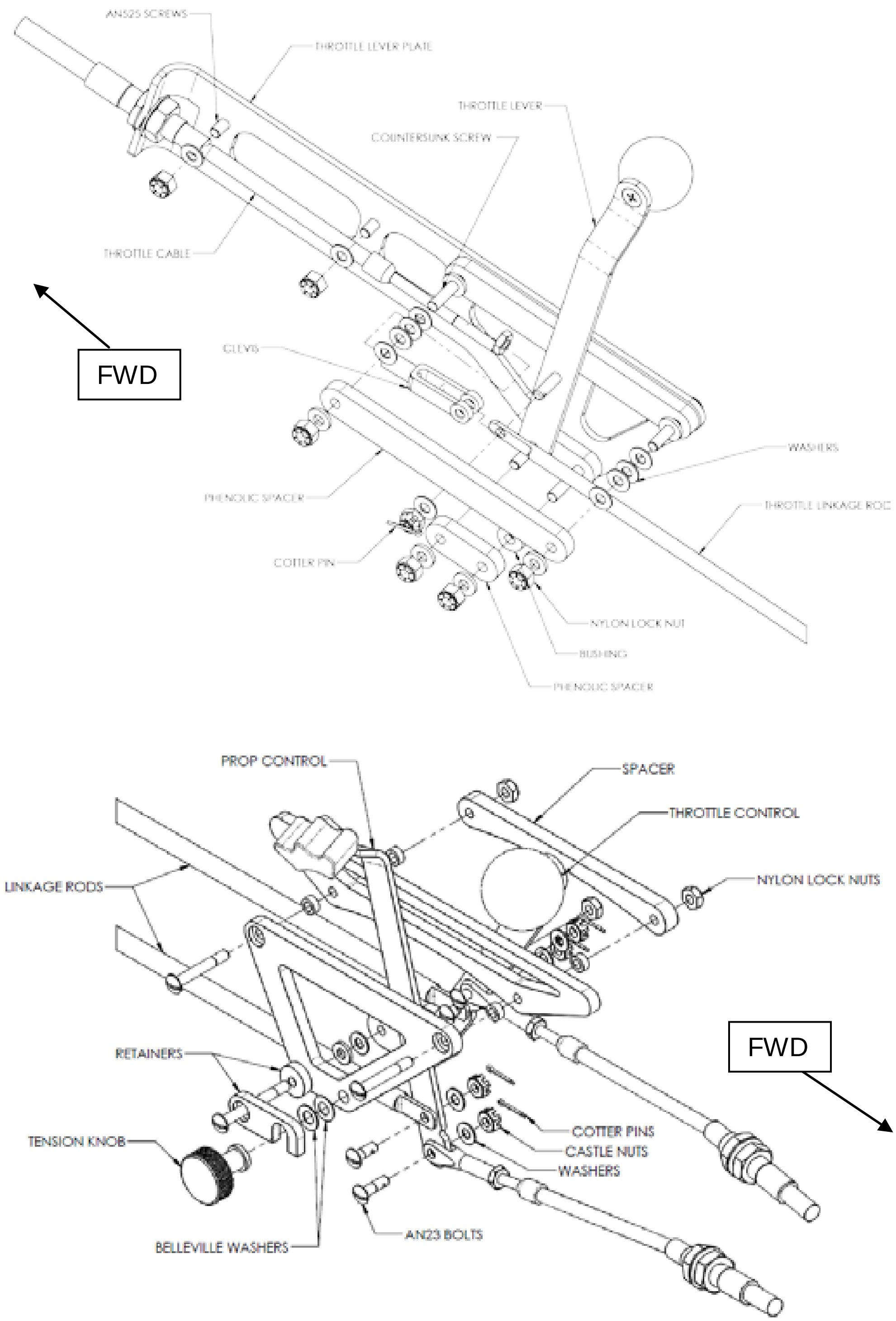


Figure 1 – Throttle Installation, CCK/CCX-1865 & CCK/CCX-2000 (Forward Throttle Shown)

B. LEVER ATTACHMENT

Throttle control levers, and prop control levers (CCK/CCX-2000 only) are mounted and installed per Figures 1 and 2.

C. LEVER INTERCONNECT LINKAGE

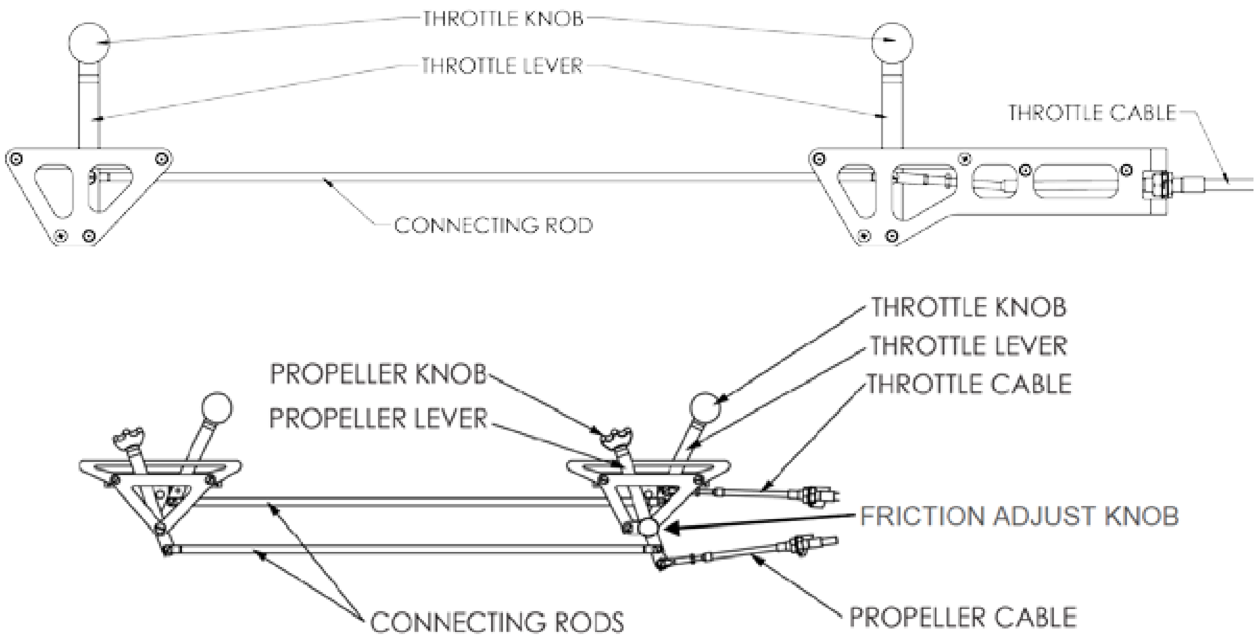
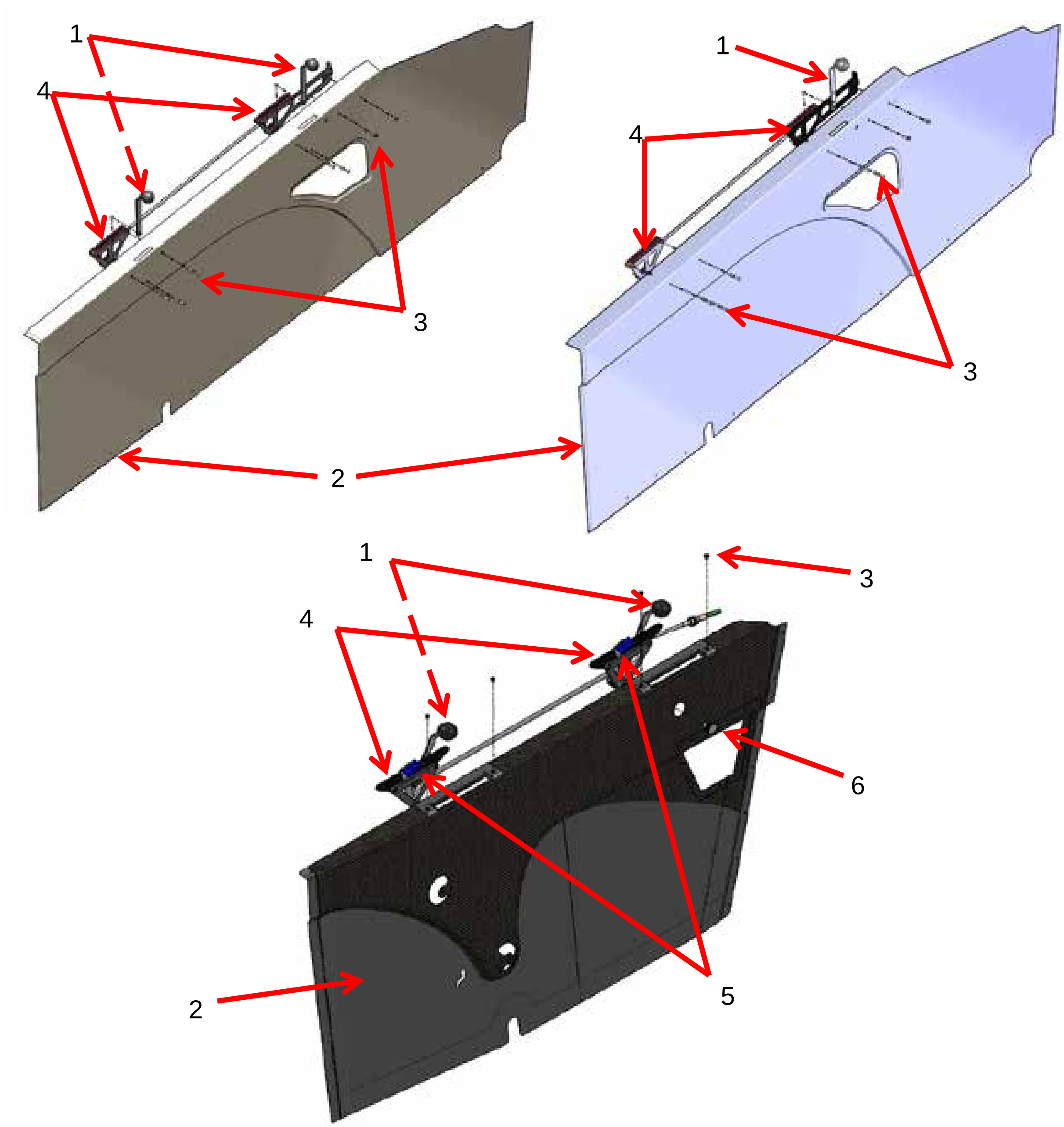


Figure 2 – Throttle Interconnect Linkage, CCK/CCX-1865 & CCK/CCX-2000
(View from the cockpit, looking outboard, Dual Throttle Controls Shown)

D. ATTACHMENT OF THROTTLE CABLE TO SIDE PANEL



1 – Throttle Lever	2 – Side Panel	3 – Screw
4 – Throttle Plate	5 – Prop Lever	6 – Tension Knob

Figure 3 – Attachment of Throttle to Side Panel, CCK/CCX-1865 & CCK/CCX-2000
(Dual and Single Throttle Attachments Shown)

The throttle plates are kept from moving by screws that are bolted through the left hand composite side panel for CCK/X-1865, while the throttle plates for CCK/X-2000 are attached to the fuselage.

E. MOTOR MOUNT THROTTLE CABLE ATTACHMENT

The throttle cable is directly routed through a hole in the firewall (refer to Figure 4) to the engine mount tube bracket. The grommet is not sealed around the cables.

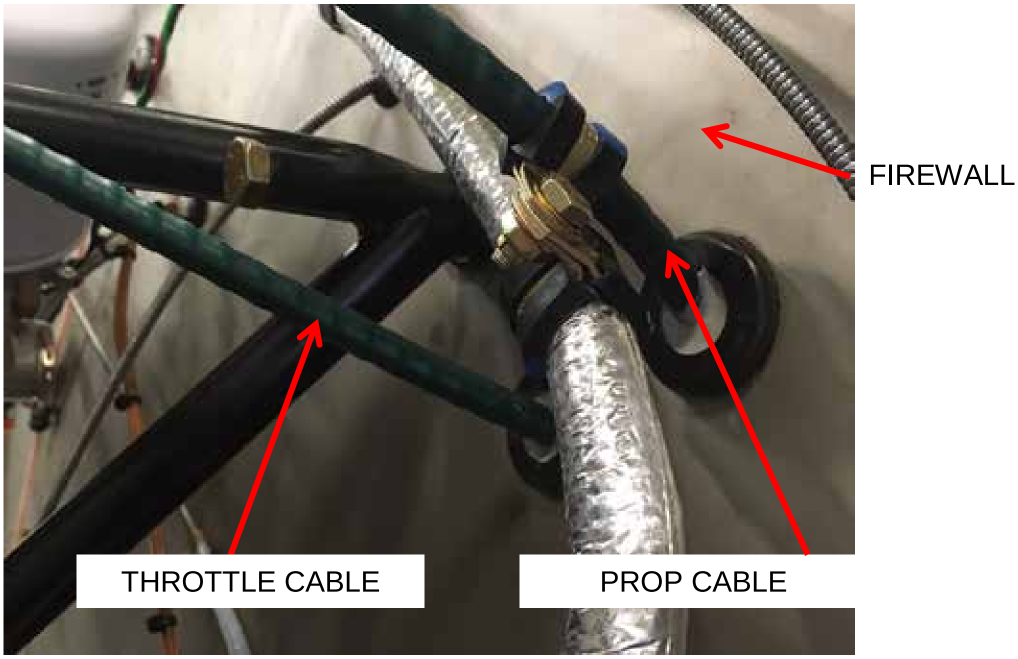


Figure 4a – (CCK/CCX-2000) Routing of Throttle Cable through Firewall
Prop control cable (CCK/CCX-2000 only) is mounted similar to throttle cable.

Figure 5b – (CCK/CCX-1865) Routing of Throttle Cable through Firewall

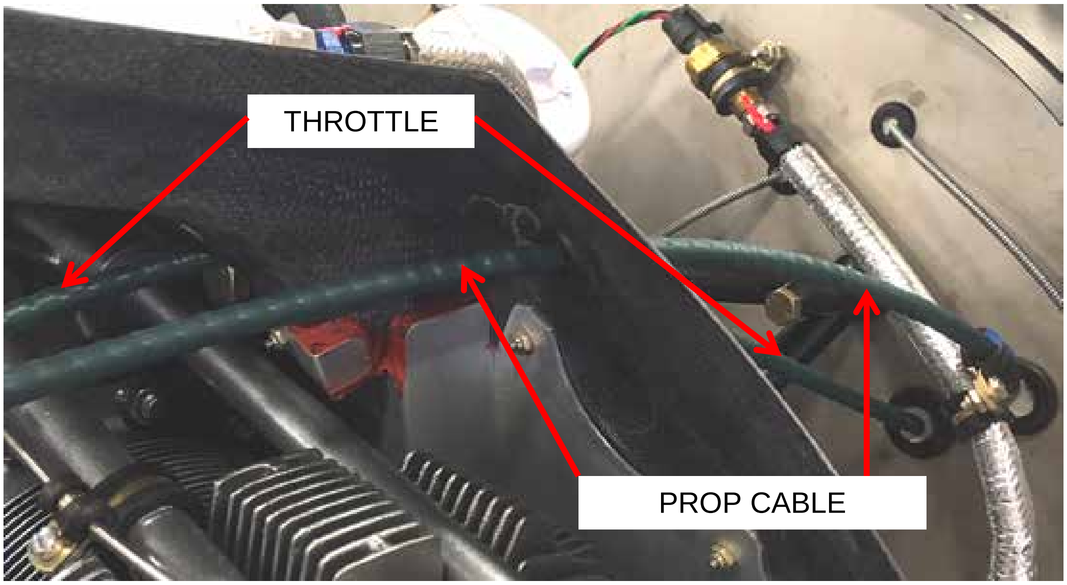


Figure 6a – (CCK/CCX-2000) Cables Passing Through Baffle
Prop control cable (CCK/CCX-2000 only) is mounted similar to throttle cable.

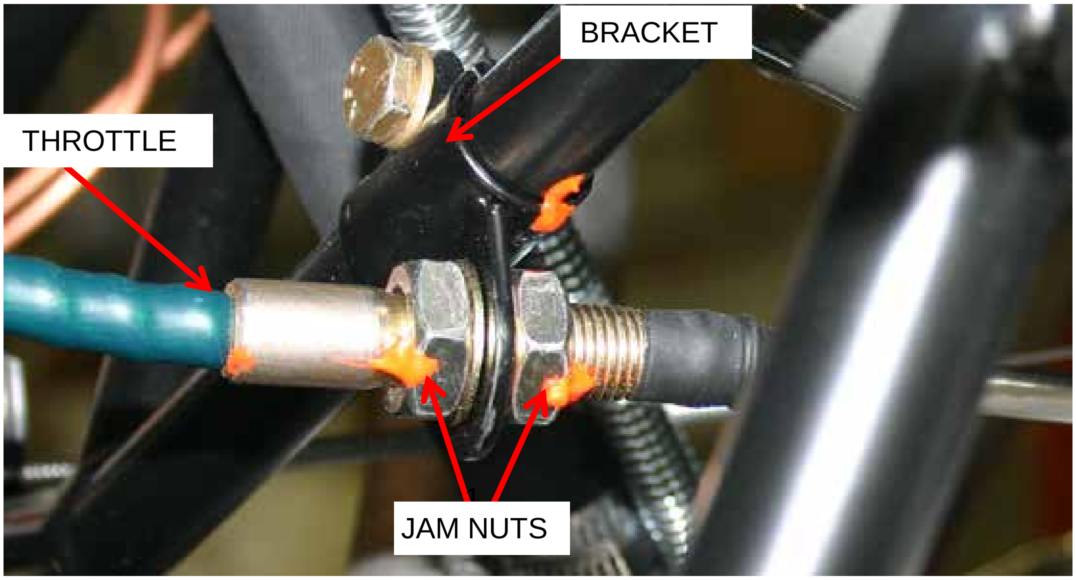
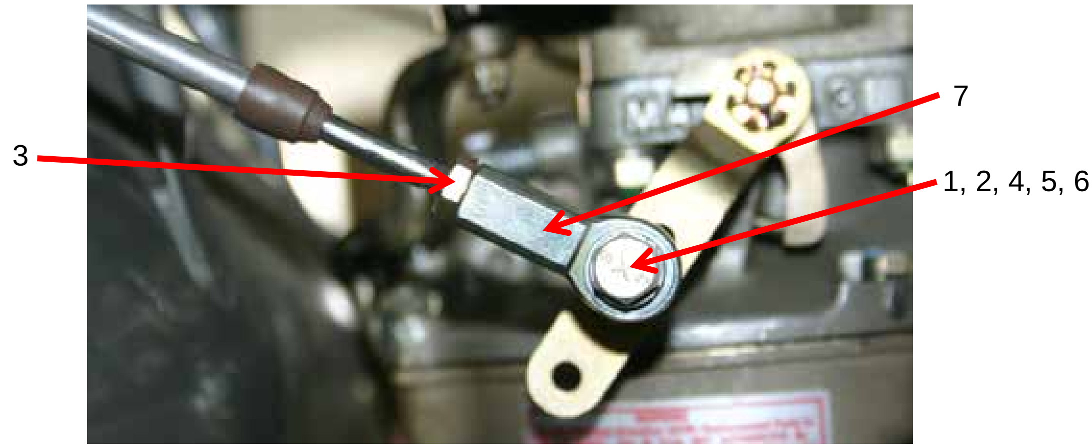


Figure 7b – (CCK/CCX-1865) Attachment of Throttle to Engine Mount Tube Bracket

A bracket secures the throttle cable to the engine mount on the left hand side of the engine (see Figure 5).The throttle cable is held in place to the bracket with two jam nuts. The bracket is held in place on the engine mount tube with a bolt, two washers and nut.

F. THROTTLE CABLE TO CARBURETOR ARM ATTACHMENT



1 – AN3 Bolt	2 – Castle Nut	3 – Nut
4 – Bushings	5 – Cotter Pin	6 – Washer
7 – Bearing Rod End		

Figure 8 – Attachment of Throttle Cable to Carburetor Arm, CCK/CCX-1865 Only

Refer to Figure 6.

The throttle cable is secured to the carburetor arm with a bolt, through-bushings, a washer, a castle nut, and a cotter pin.

The throttle travel can be adjusted by screwing the bearing rod end. Be sure that the bearing rod end jam nut is retightened after making any adjustment.

G. INSPECTION

(a) Ensure that the throttle arm at the carburetor contacts both stops at either extreme of its travel while the throttle levers in the cabin have positive clearance from the panel.

(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) Ensure that the cable meets the manufacturer's designed deflection range of 16° conical swivel throughout entire range of motion (±8° from centerline).

(d) Control operation should be smooth. Lubricate the cable with LPS #2 if needed.

(e) The throttle lever(s) and cable should have enough friction so that the lever(s) does/do not creep at full power while at the same time operating easily.

3 MIXTURE

A. MIXTURE CONTROL CABLE TO PANEL ATTACHMENT

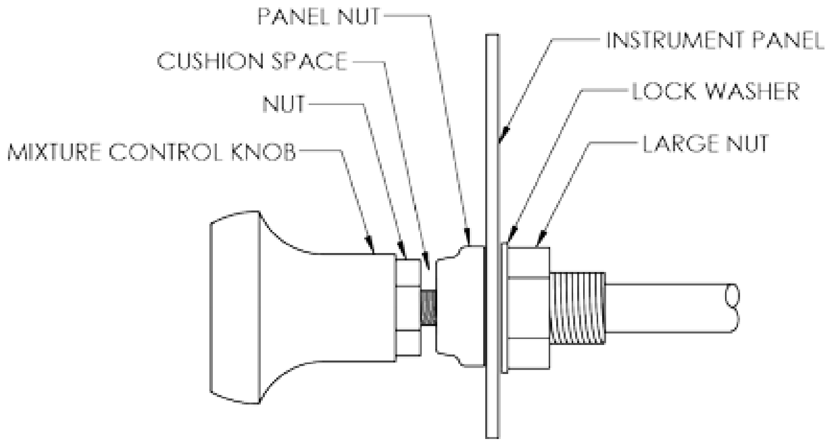


Figure 9 – Mounting of the Mixture Control at the Instrument Panel

The mixture control knob is secured to the instrument panel with a lock washer and a nut.

The mixture knob should have enough movement so that the carburetor mixture lever contacts the stops at both extents of its travel and there should not be more than ¼" cushion between the knob and the panel nut in the full rich position.

B. MOTOR MOUNT MIXTURE CABLE ATTACHMENT

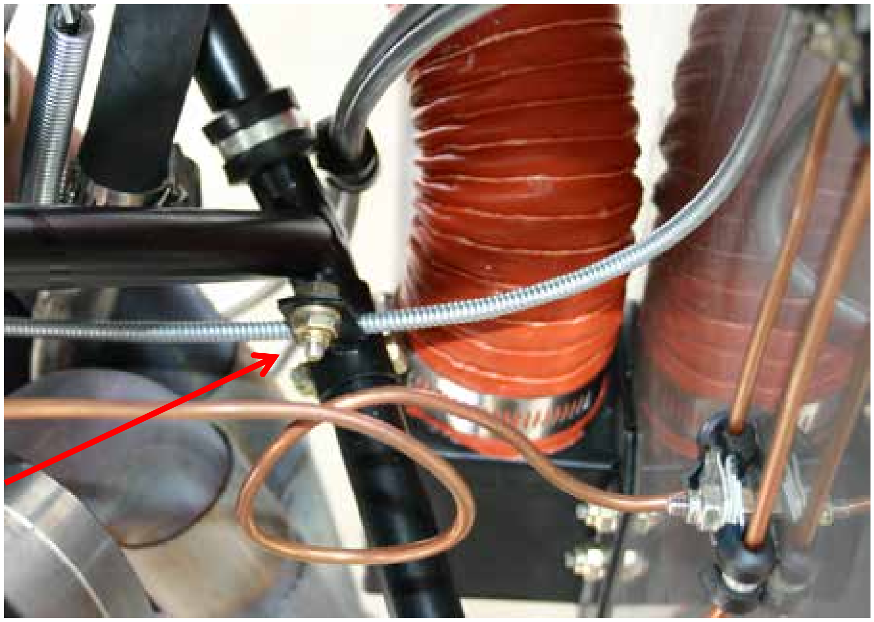


Figure 10 – Mounting of the Mixture Cable to Engine Mount

(a) The mixture cable is fastened to the mixture bracket clamp with a bolt, washers, and a nut (refer to Figure 8).

(b) The mixture bracket is secured to the engine mount with a bolt, a washer, and a nut.

(c) The position of the cable housing in the mixture bracket clamp affects the travel of the knob in relation to the instrument panel. The travel can be adjusted by loosening the mixture bracket clamp holding the cable housing and sliding the cable housing in the clamp. Retighten the clamp and check travel.

(d) Be sure the cable housing is held tightly in the clamp after making any adjustments.

C. MIXTURE CABLE TO CARBURETOR LEVER SWIVEL ATTACHMENT (CCK/CCX-1865 ONLY)

Figure 11a – Attachment of Mixture Cable to Carburetor Swivel Arm, CCK/CCX-1865 Only

(a) The control cable rod pivots the mixture control lever on the carburetor. The rod is held tight by the mixture swivel fitting (refer to Figure 9).

(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.

Figure 9b – Attachment of Mixture Cable to Mixture Arm of Servo, CCK/X-2000 only

(a) The control cable rod pivots the mixture control arm on the injection servo. The rod is held tight by the mixture swivel fitting (refer to Figure 9a).

(b) Adjusting the cable rod length at the swivel fitting affects the travel of the mixture control arm. There should be enough travel in the arm 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.

D. INSPECTION

(a) Ensure that the mixture lever at the carburetor (or injection servo) contacts both stops at either extreme of its travel. 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 ensure the cable attach swivel does not have excessive play and the cable is held tightly by the clamp.

(c) Control operation should be smooth. Lubricate with LPS #2 if required.

(d) Confirm that the mixture control hits the stops and the cable DOES NOT hit the engine cowl.

CHAPTER 78

EXHAUST SYSTEM

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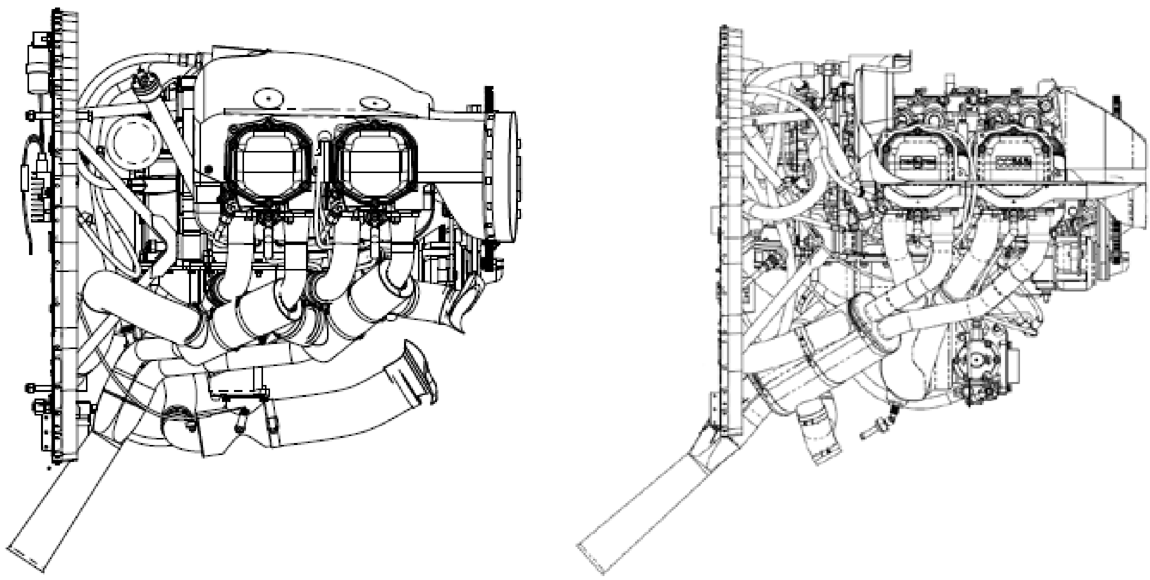
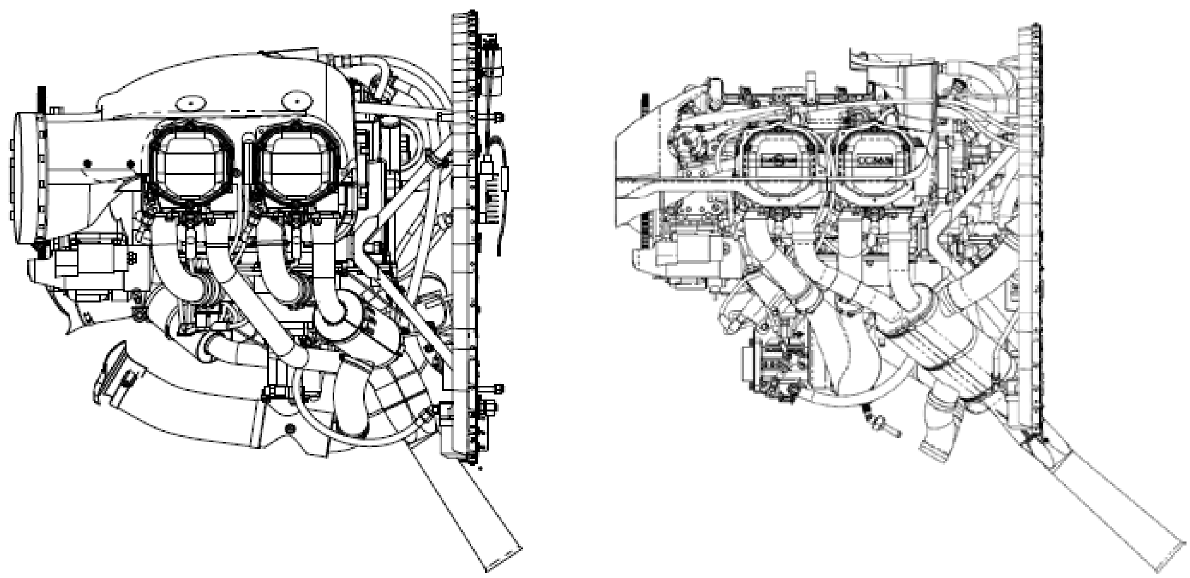
1 GENERAL

The exhaust system is a four-into-one system. Shrouds mounted on the exhaust pipes provide heat for the carburetor and/or the cabin.



Viewed from Right Side of Aircraft (CCK/CCX-1865 & CCK/CCX-2000)



Viewed from Left Side of Aircraft (CCK/CCX-1865 & CCK/CCX-2000)

Figure 1 – Exhaust System

A. REMOVAL

(a) Remove the cowl per Chapter 71, Powerplant.

(b) Disconnect all of the SCAT hoses from the heat shrouds by loosening all hose clamps.

(c) .Remove the collector by removing the pair of springs supporting the collector to the engine. Remove each individual pipe from the connector. If equipped, remove the EGT probes.

(d) Remove the nuts attaching the exhaust flanges to the engine cylinders and lower the exhaust system away from the engine.

B. INSPECTION

Inspect the components of the exhaust system for signs of cracking. Any cracks must be repaired, or 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. FUMES MAY TRAVEL THROUGH THE FIREWALL INTO THE COCKPIT. CARBON MONOXIDE INHALATION CAN CAUSE DEATH. NEVER OPERATE THE AIRCRAFT WITH ANY CRACKS IN THE EXHAUST SYSTEM.

C. INSTALLATION

Install the exhaust system in the reverse order from which it was removed. Replace the gaskets on the exhaust flanges and on the induction elbows. Torque the exhaust flange nuts to 90 in-lbs.

D. SUPPLEMENTARY AIR

The aircraft is equipped with a cabin heat system. Hot air for heating the cabin is supplied by a heat exchanger located around the engine exhaust. Hot air enters the cabin through openings on the floorboard. To select the heater, the control on the instrument panel must be pulled aft.

CCK/CCX-2000 aircraft are also equipped with rear seat heat and defrost. There are two additional controls on the instrument panel: one to select defrost or rear seat heat, and another to turn it off and on. To turn on, the control must be pulled aft.

CHAPTER 79

OIL SYSTEM

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79 OIL SYSTEM

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1 GENERAL

The oil system is an integral part of the engine, except for the cooler that is mounted on the top aft of the engine.

A. CHANGING ENGINE OIL

(a) Warm engine.

(b) Remove the upper and lower engine cowlings (refer to Chapter 71).

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

(d) Open the oil drain and allow to drain completely.

(e) Replace old oil filter with new filter.

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

(g) Fill the engine with an approved oil.

(h) Remove the dipstick to verify correct oil quantity. Secure dipstick.

(i) Install engine cowling (refer to Chapter 71).

(j) Run up 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. Shutdown the engine in accordance with POH procedures.

(k) Visually check inside the cowling for any leaks and make any adjustments as necessary.

CAUTION
If the oil pressure does not rise in 30 seconds, stop the engine and investigate the cause.

2 OIL COOLER

Figure 1 – Oil Cooler – CCK/CCX-1865 pictured, CCK/CCX-2000 is similar

A. 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.

(b) Remove the attaching screws and carefully remove the oil cooler.

(c) Disconnect the hoses from the oil cooler fittings and remove.

B. INSTALLATION

(a) Apply thread sealant (Loctite 567) to all but the most inner pipe thread on each fitting but not on the flare fitting threads. Screw the fittings into the oil cooler. Be very careful to start the threads properly and tighten the fitting.

(b) Position the oil cooler and install the fasteners.

(c) Attach the oil hoses to the oil cooler and tighten each fitting.

3 OIL SUMP

The CCK/CCX-2000 oil sump is a weldment made from a hydroformed aluminum alloy, and is proprietary to Cub Crafters. It incorporates a drain plug, and an oil suction screen. This sump may also be included on the CCK-1865 aircraft.

CHAPTER 80

STARTER

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80 GENERAL

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1. GENERAL

The starter is a Hartzell 12 volt SRZ-9021 (SRZ-9021-1 for some CC340 installations on CCK/X-1865) lightweight neodymium permanent magnet motor with an external solenoid. An alternate is the Sky-Tec 149-12LS 12 volt Flyweight External left-hand-mounted solenoid (CCK/X-2000).
While cranking, you can make a ten (10) second start attempt with a twenty (20) second rest twenty (20) times. After this, observe a ten (10) minute cool down period before attempting another start. (Refer to the starter's Manufacturer specifications, such as the HET Service Information Letter No. A-132)

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 ignition switch is released	- Stuck starter solenoid	- Replace faulty starter solenoid - Replace or repair starter

3. MAINTENANCE PRACTICES

A. STARTER

Figure 80-00-1 – Starter

(1) REMOVAL

(a) Disconnect the negative lead from main battery.

(b) Disconnect the power cable from starter.

(c) Unbolt the starter attachment bolts and nuts.

(d) Retain all existing attach hardware except lock washers which will be replaced.

(2) INSPECTION

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

(b) Visually inspect electrical connections on the starter.

(3) INSTALLATION

CAUTION

Do not over torque the nut on the copper stud.

(a) Secure the starter using the original hardware and new lock washers.

(b) Torque the bolts and nuts to 95-105 in/lbs.

(c) Attach the power cable using the nut and new lock washer. Torque the nut to 50-60 in/lbs.

(d) Reattach the negative lead to the main battery.

CHAPTER 91

WIRING DIAGRAMS

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91 ELECTRICAL SYSTEMS

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1 GENERAL

Refer to Chapter 24 for maintenance and servicing the electrical systems. The schematics in this manual are a sample of schematics as recommended by the kit manufacturer and are for use as **REFERENCE ONLY**.

2 SCHEMATICS

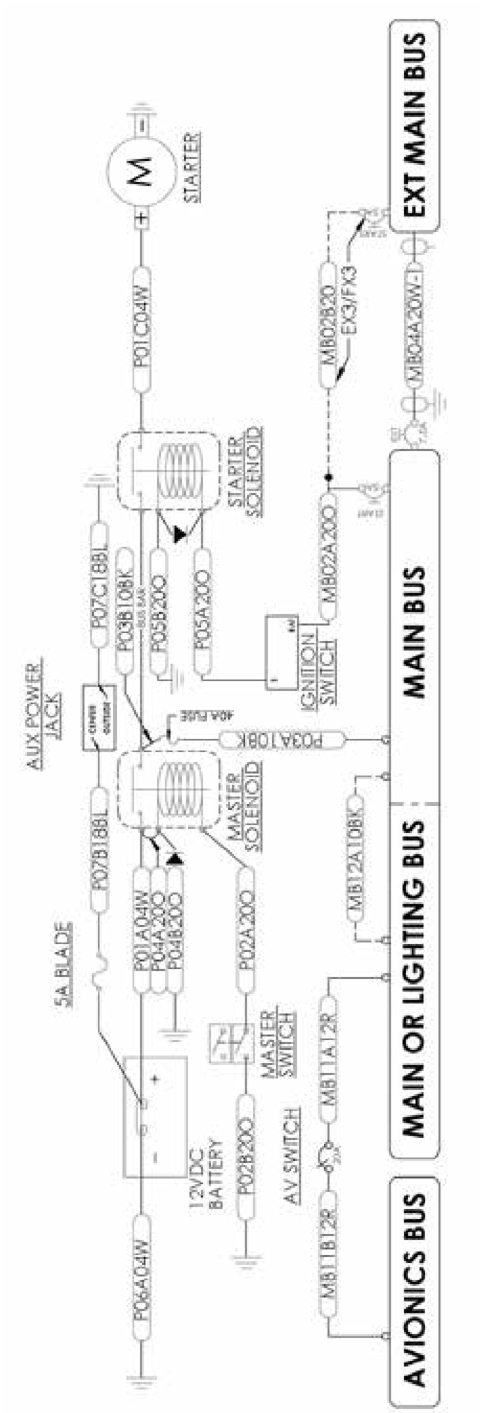

Figure 1 – Main Power Distribution Schematic

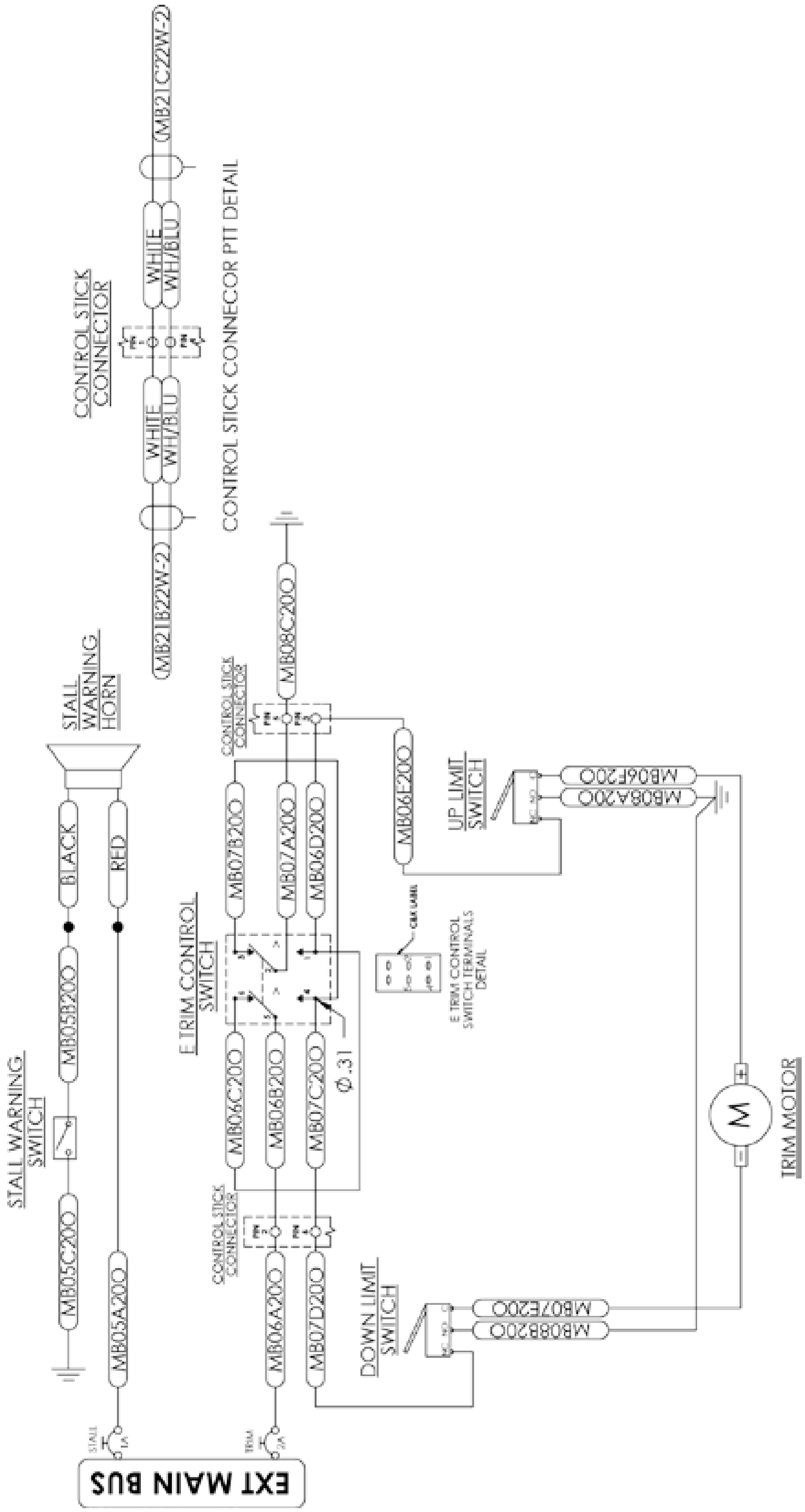

Figure 2 – Main Bus Circuit Schematic

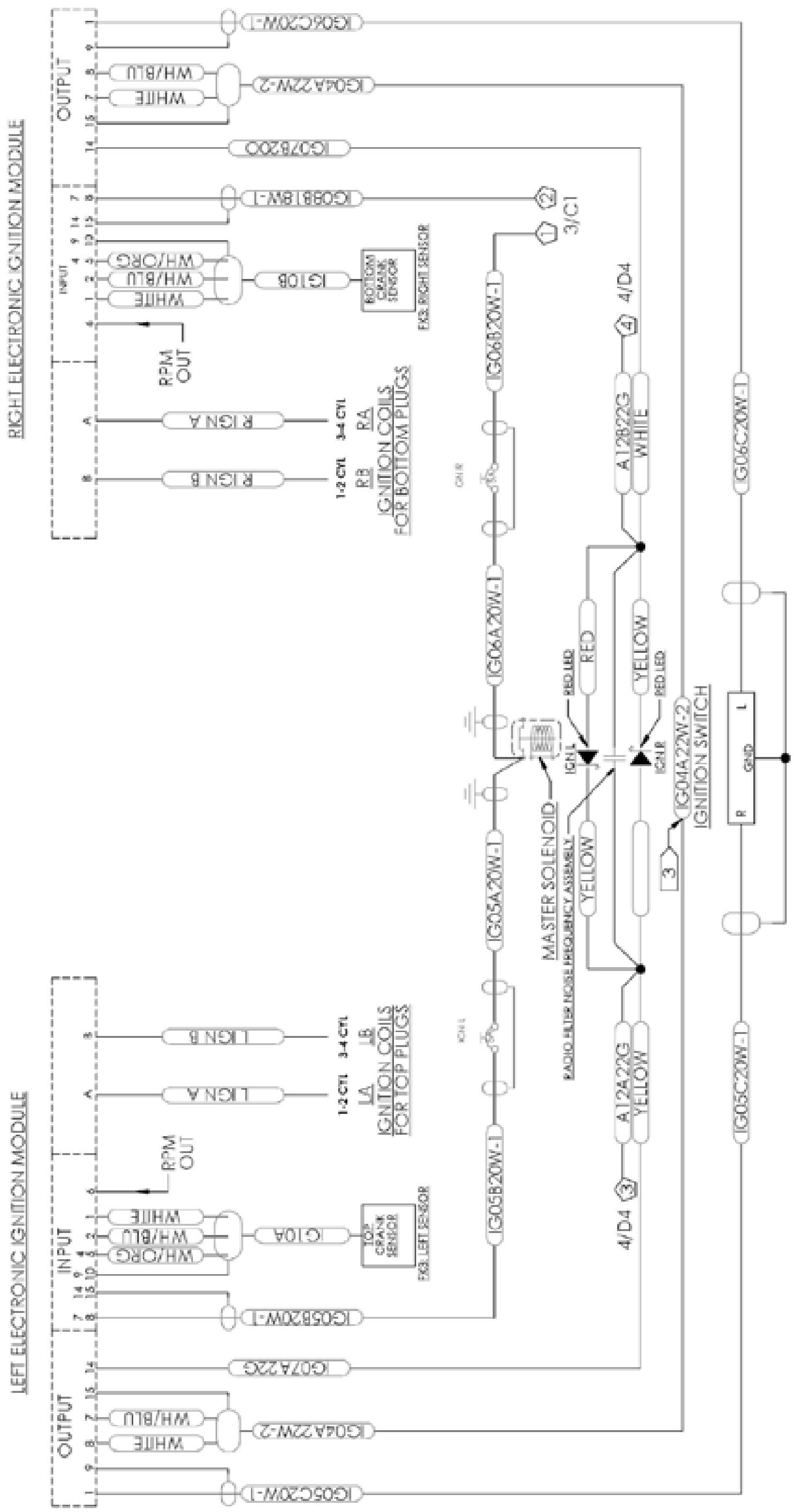

Figure 3 – Ignition System Schematic

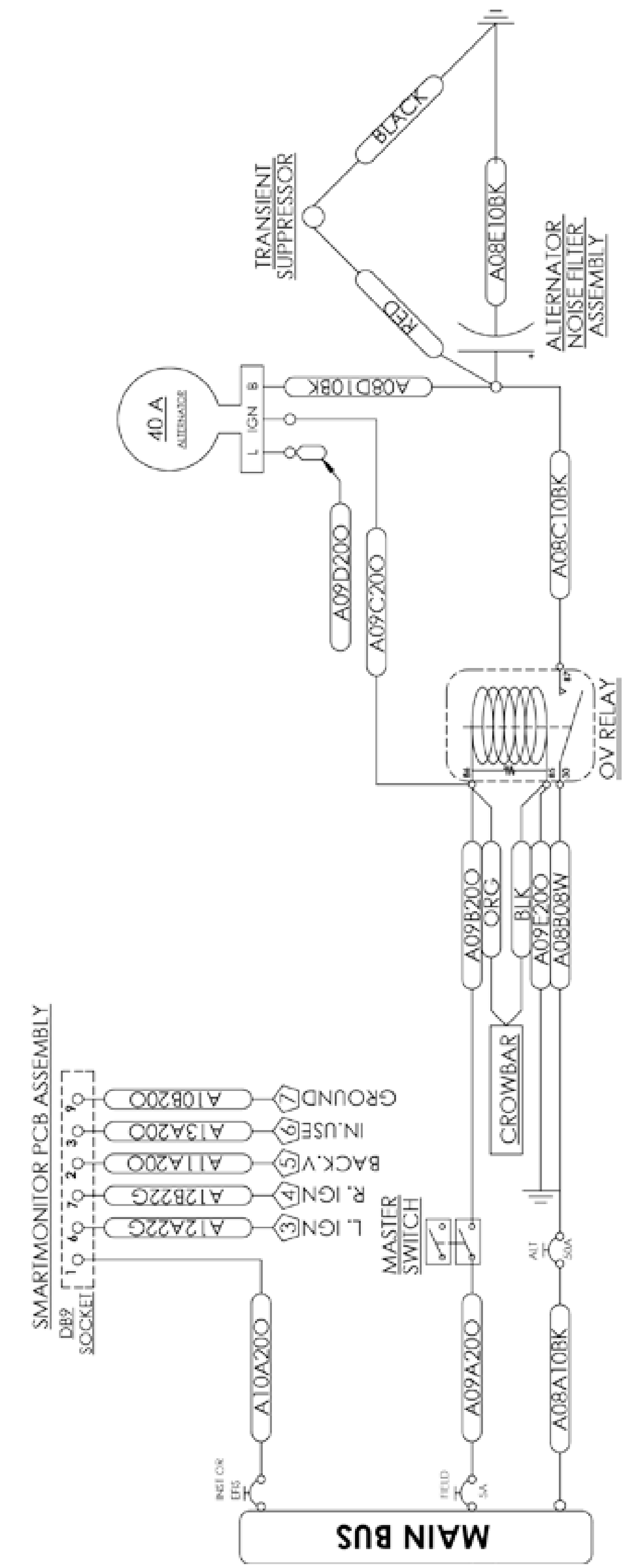

Figure 4 – Charging System Schematic

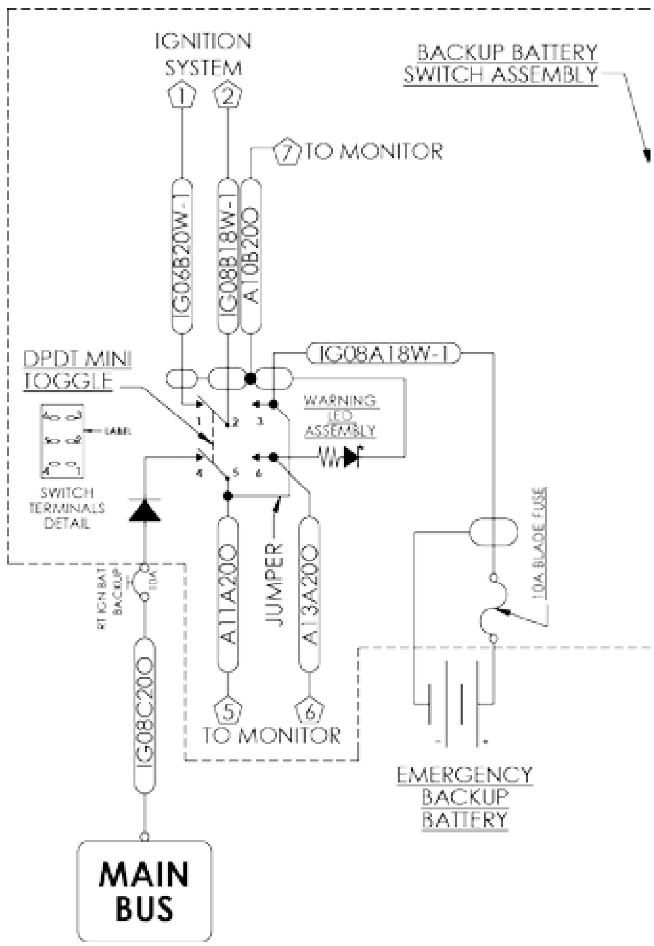

Figure 5 – Ignition Backup Battery System Schematic

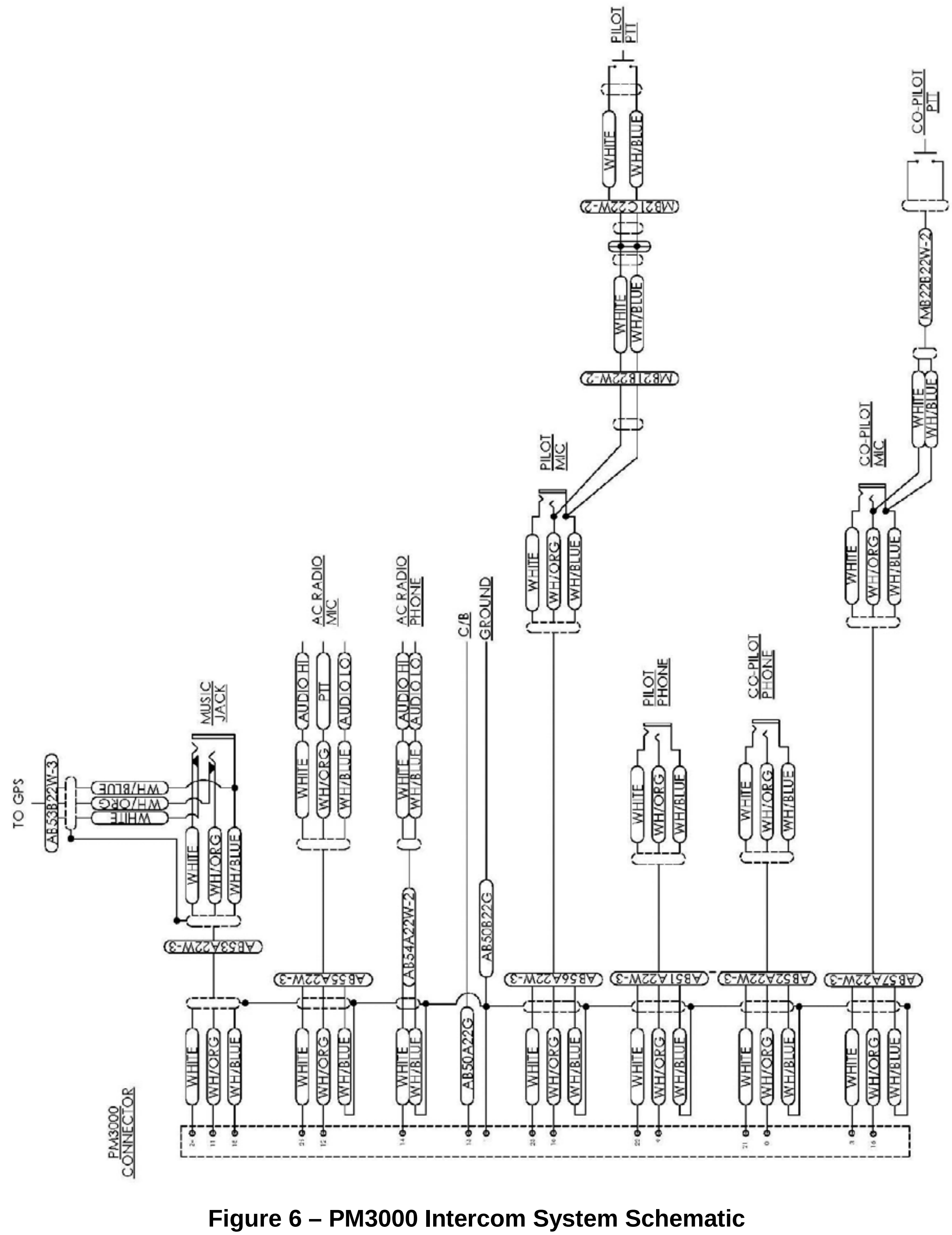

Figure 6 – PM3000 Intercom System Schematic

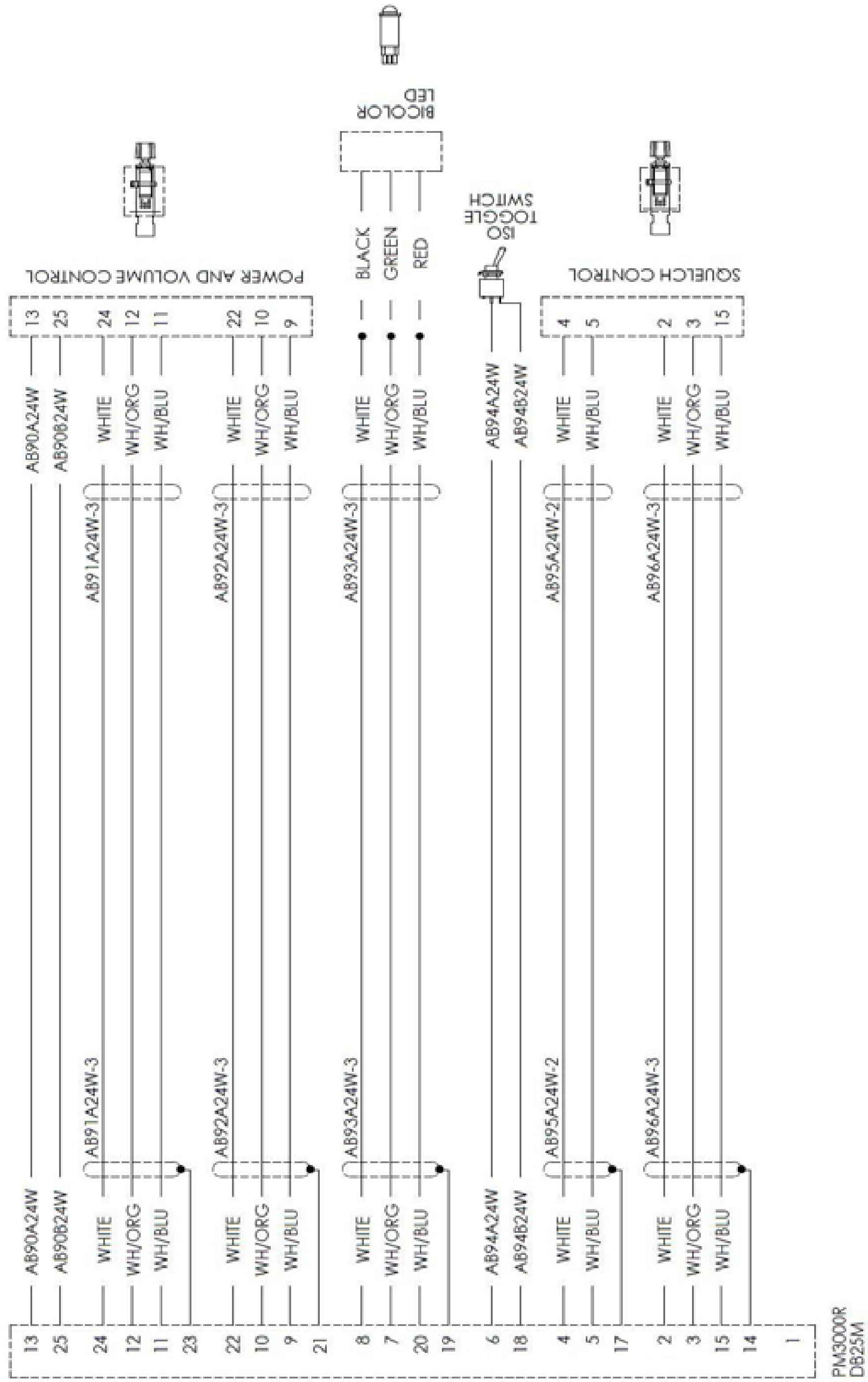

Figure 7 – PM3000R Remote Intercom System also includes previous PM3000 Intercom System Schematic

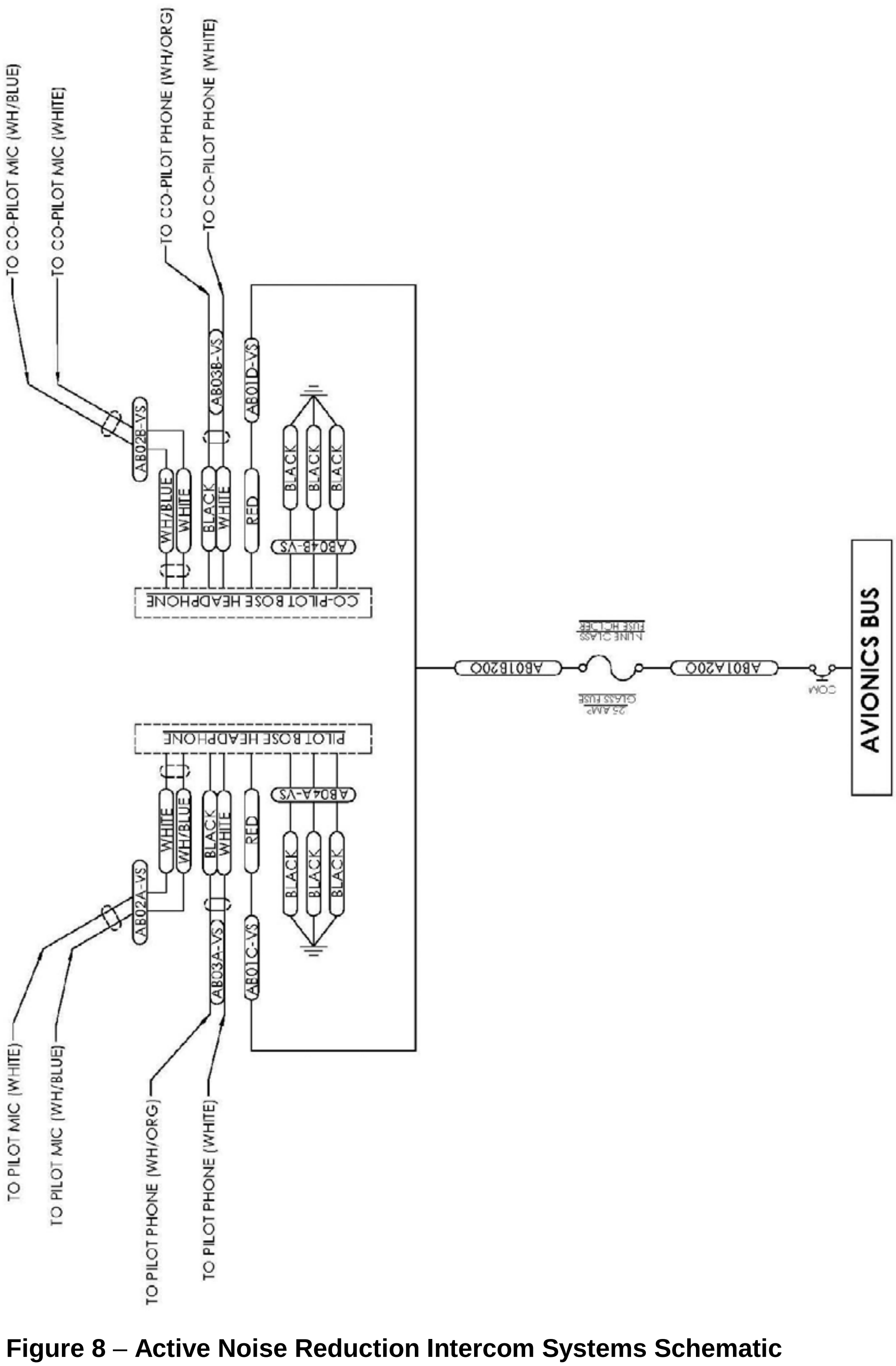

Figure 8 – Active Noise Reduction Intercom Systems Schematic

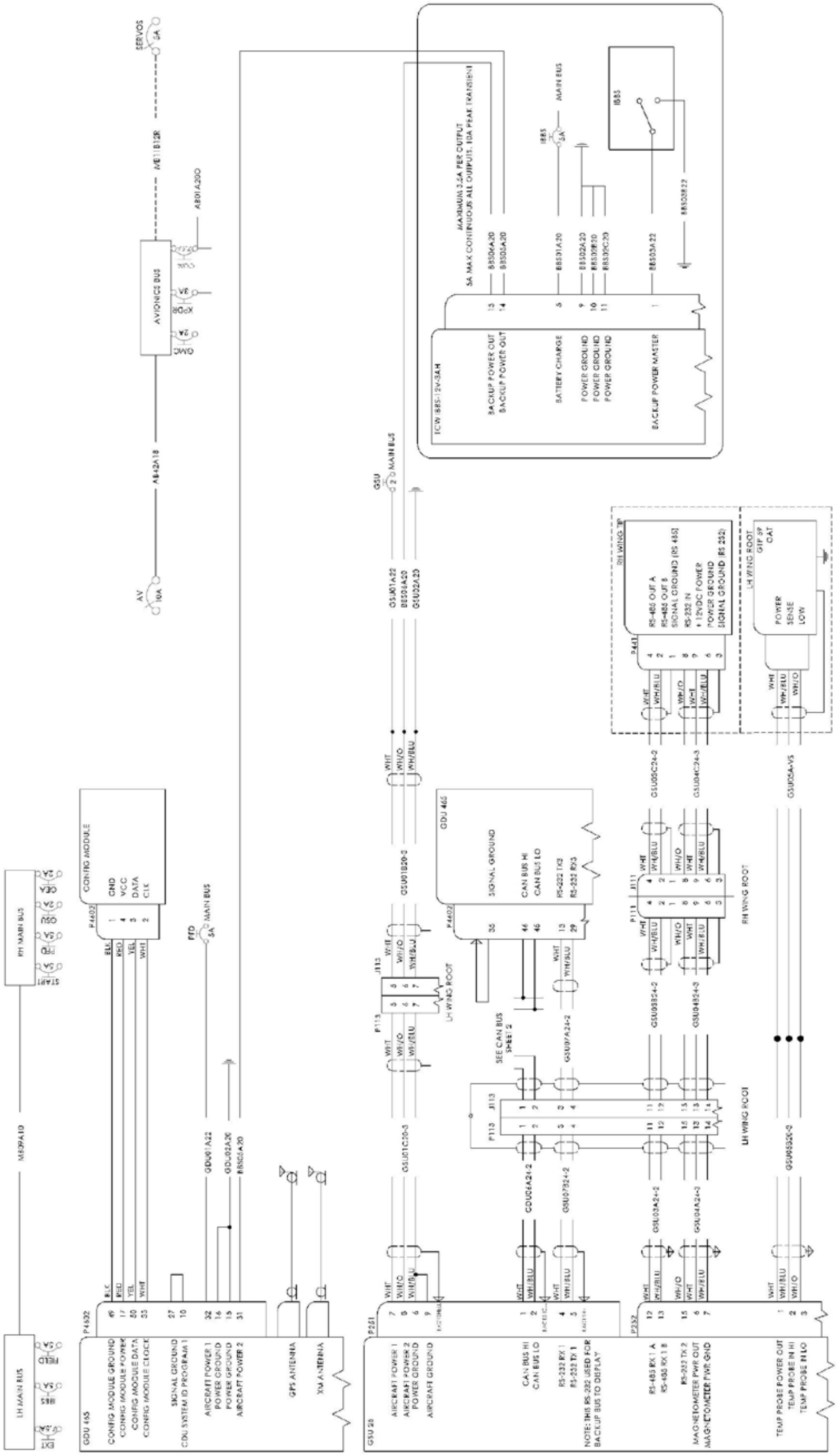

Figure 9 – Executive Glass Touch (Garmin) GDU and GSU Schematic

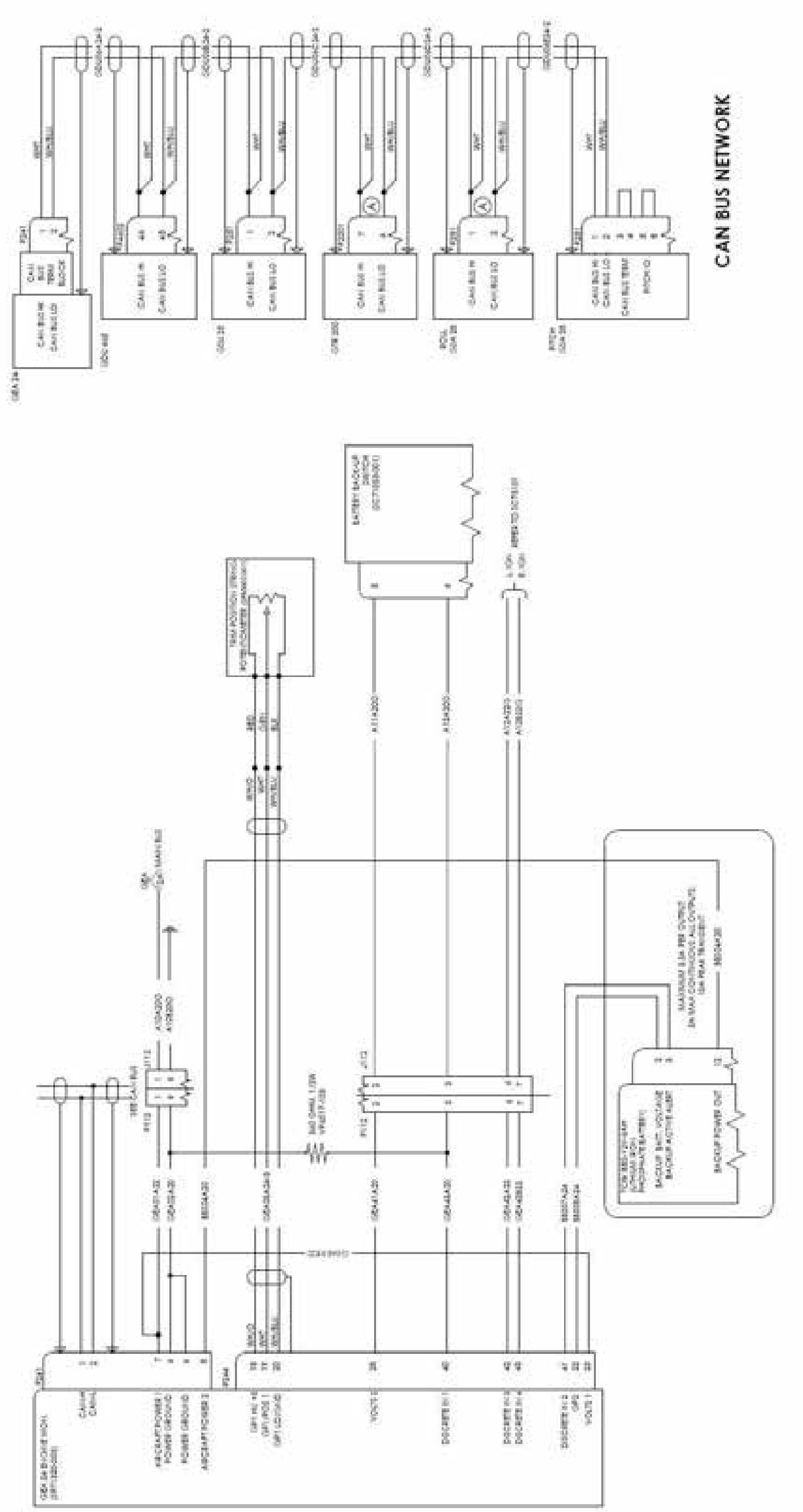

Figure 10 – Executive Glass Touch (Garmin) Engine Sensors 1 and CAN Bus Schematic

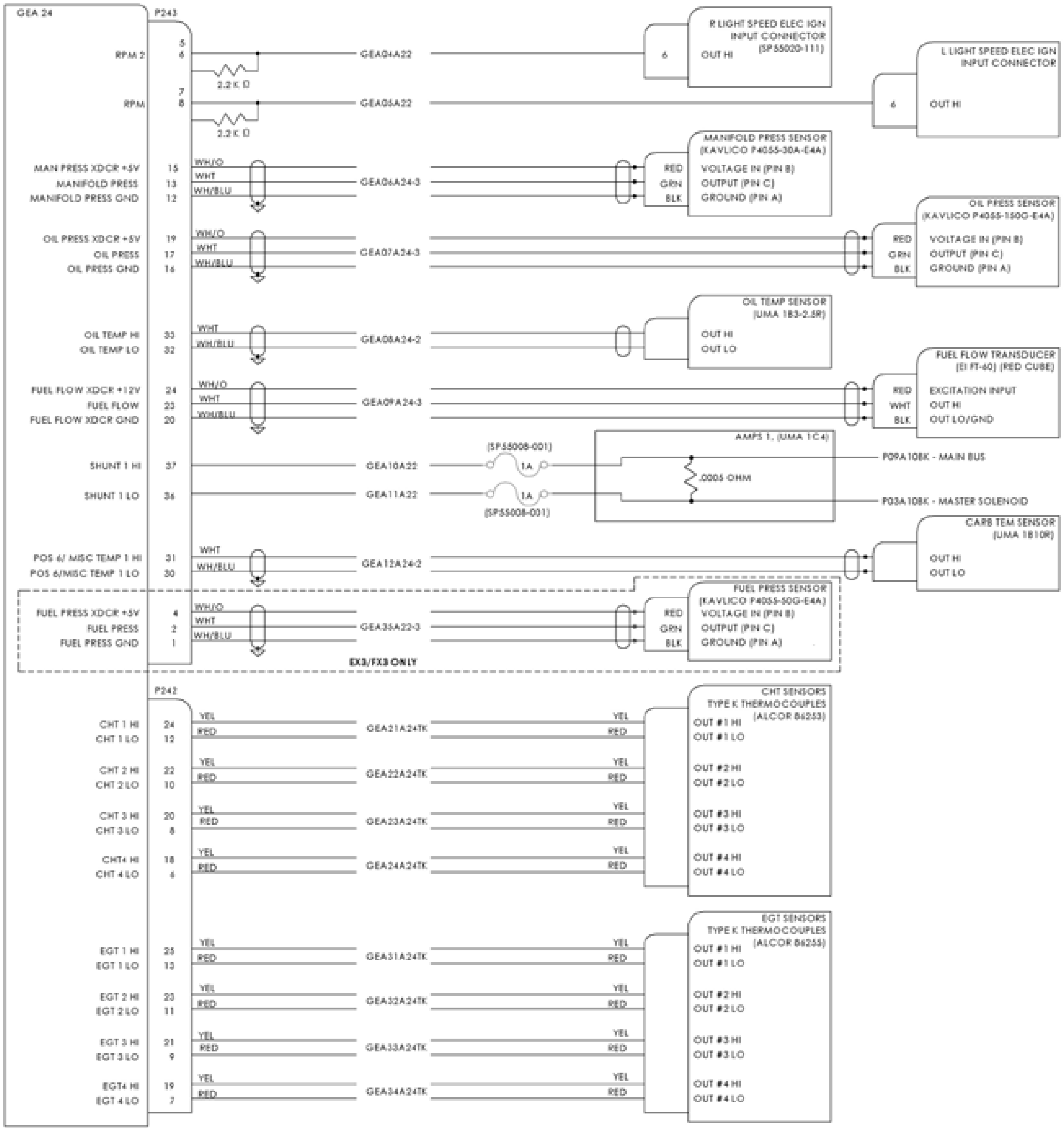

Figure 11 – Executive Glass Touch (Garmin) Engine Sensors 2 Schematic

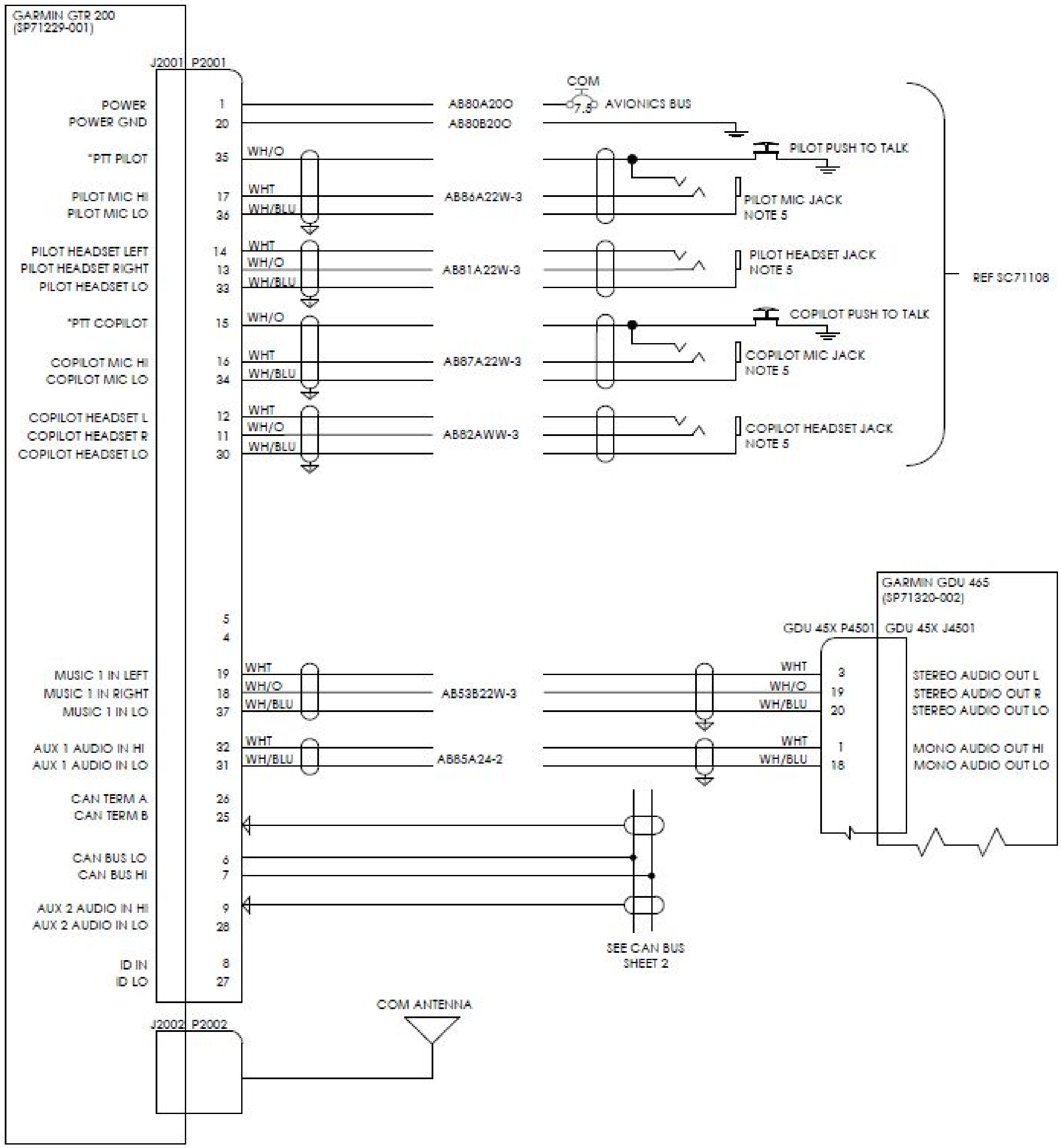

Figure 12 – Executive Glass Touch (Garmin) COM Schematic

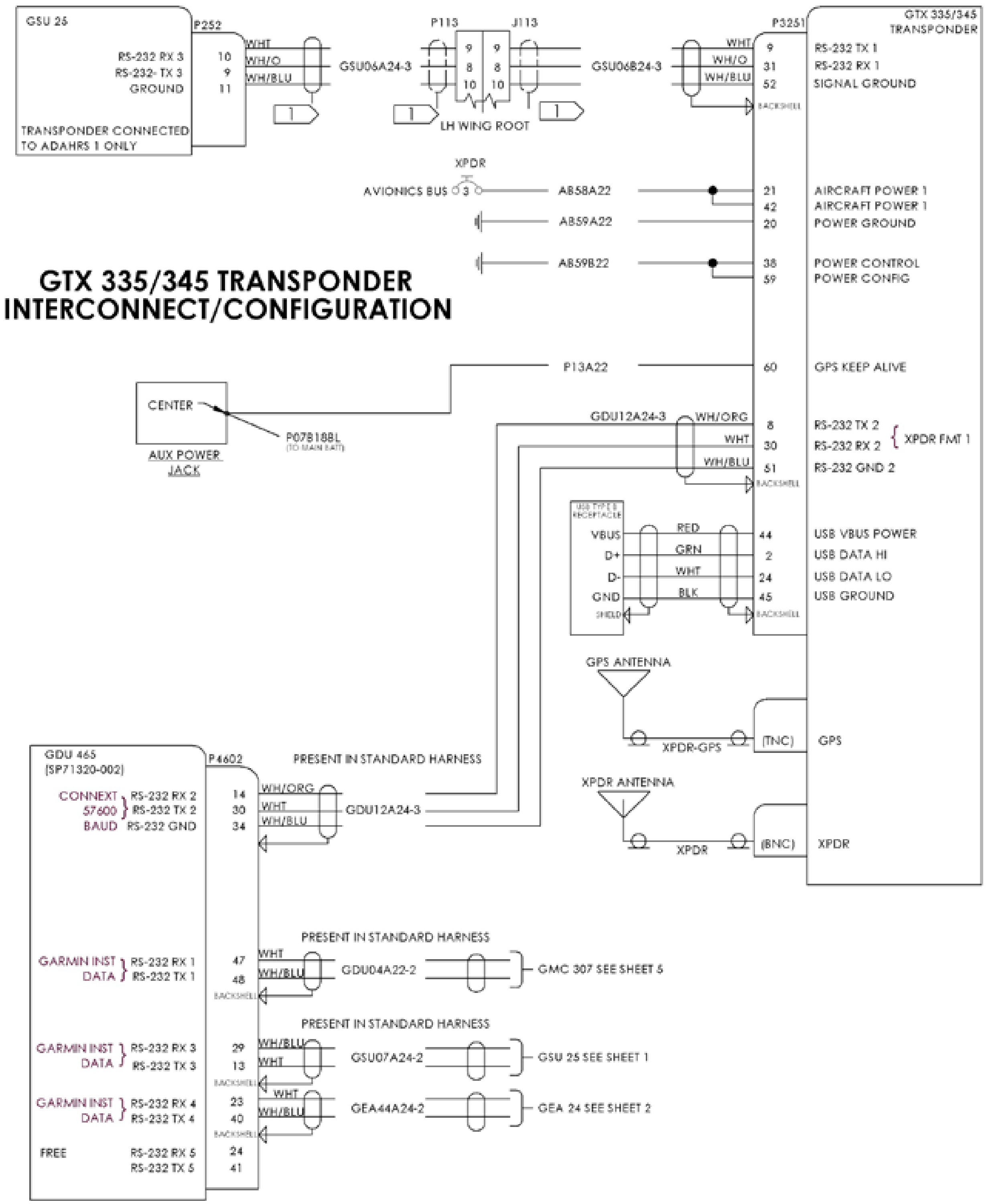

Figure 13 – Interconnect / Configuration

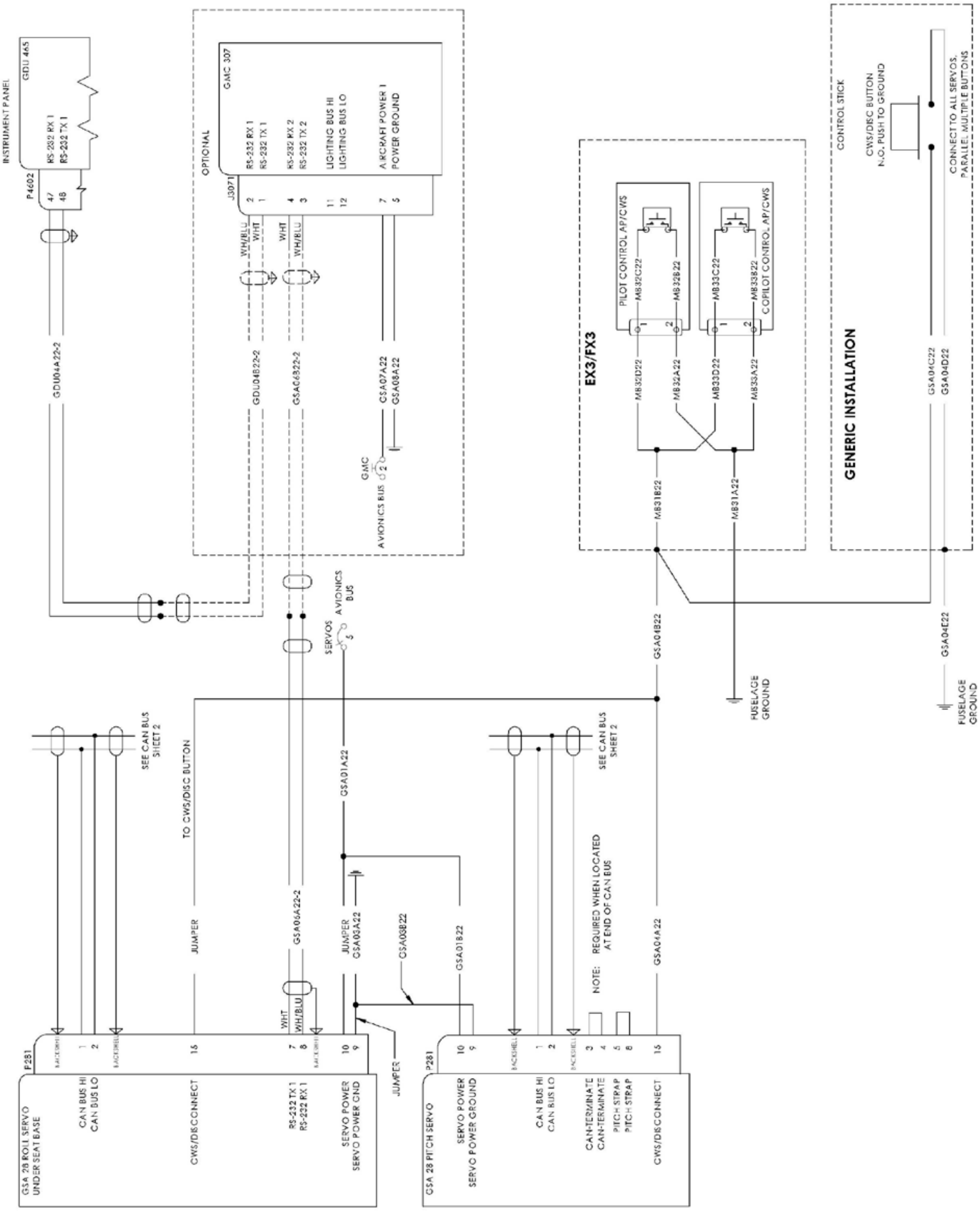

Figure 14 – Executive Glass Touch

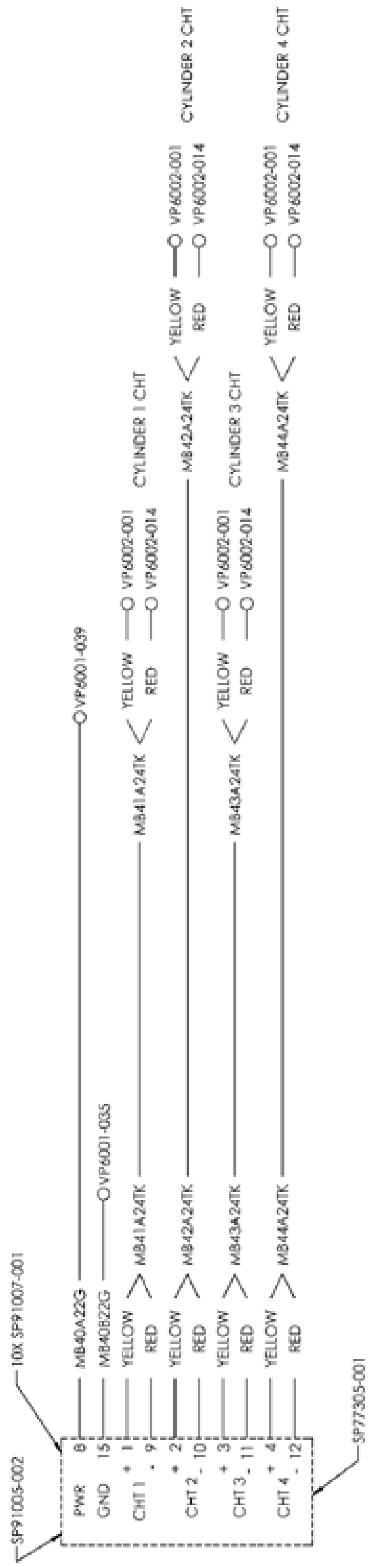

Figure 15 – CHT Monitor Wiring Schematic

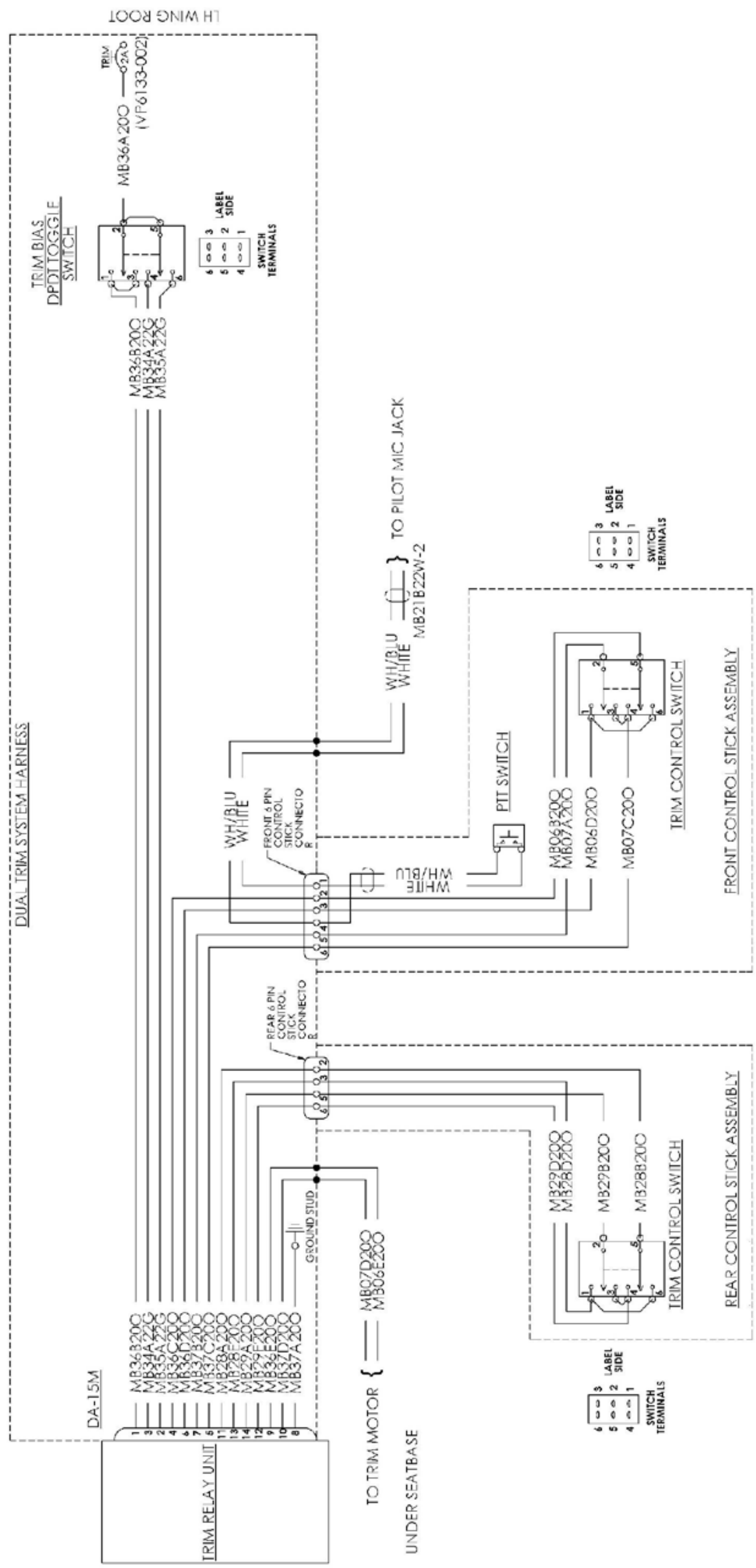

Figure 16 – Dual Trim Wiring Schematic

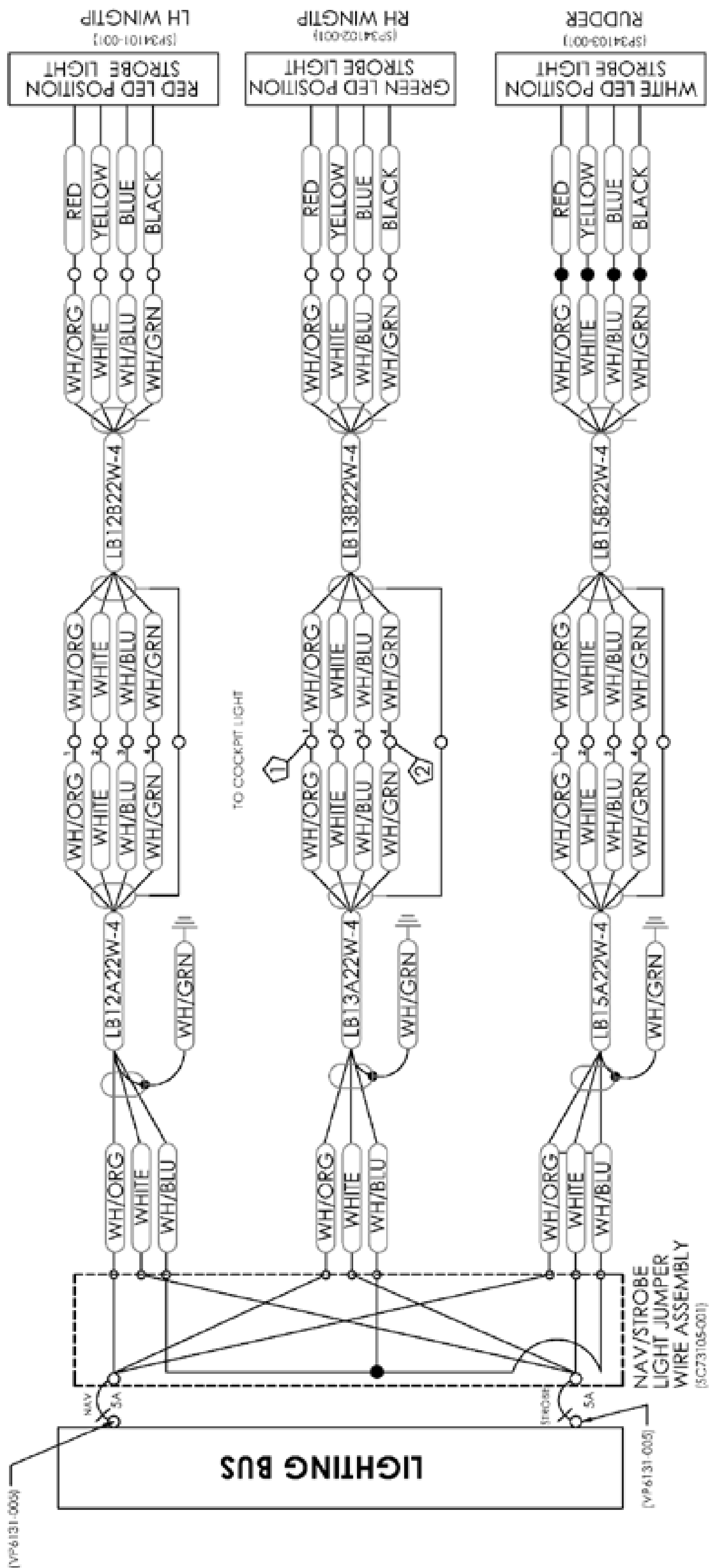

Figure 17 – LED Lighting System Schematic

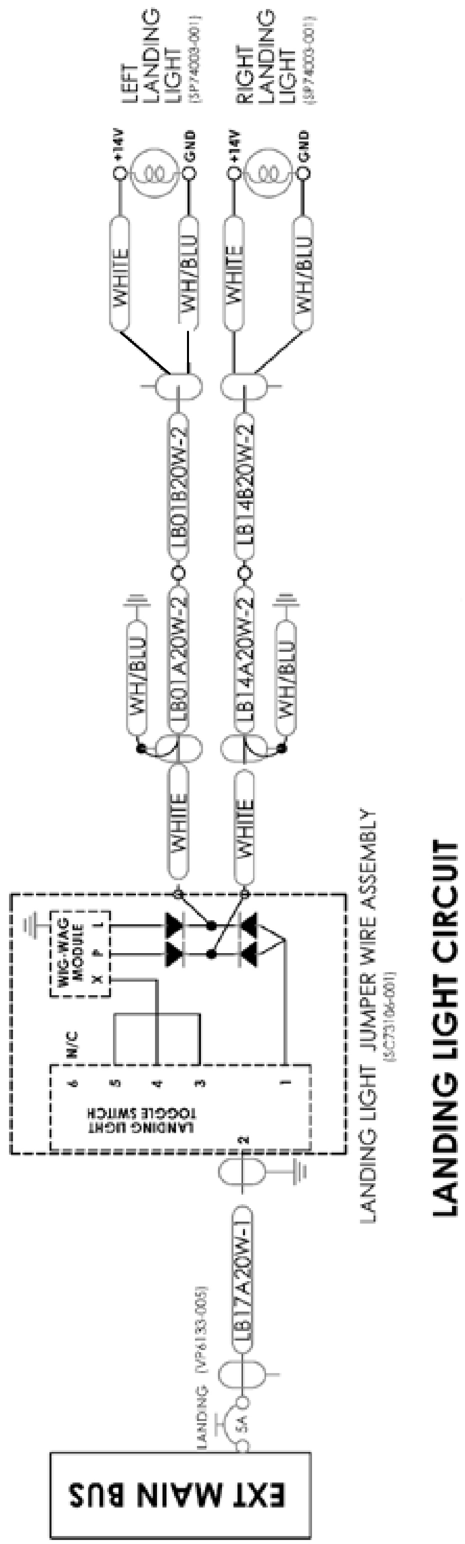

Figure 18 – Landing Light System Schematic

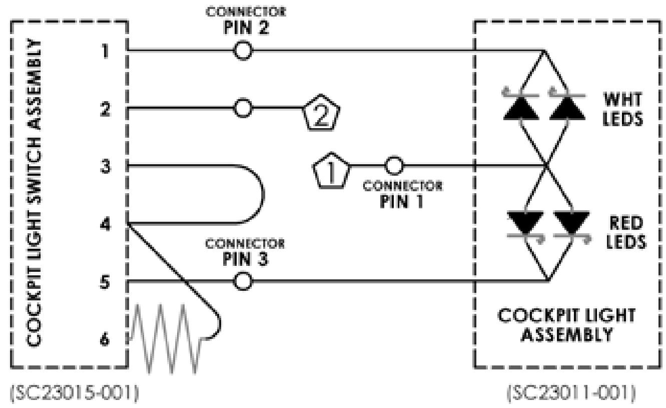

Figure 19 – Cockpit

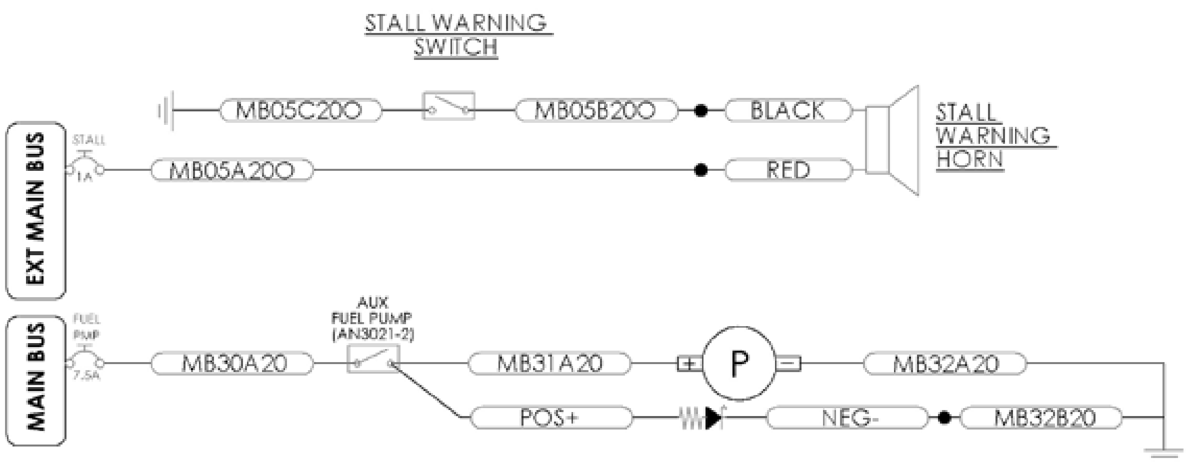

Figure 20 – CCK/CCX-2000 Main Bus Circuits

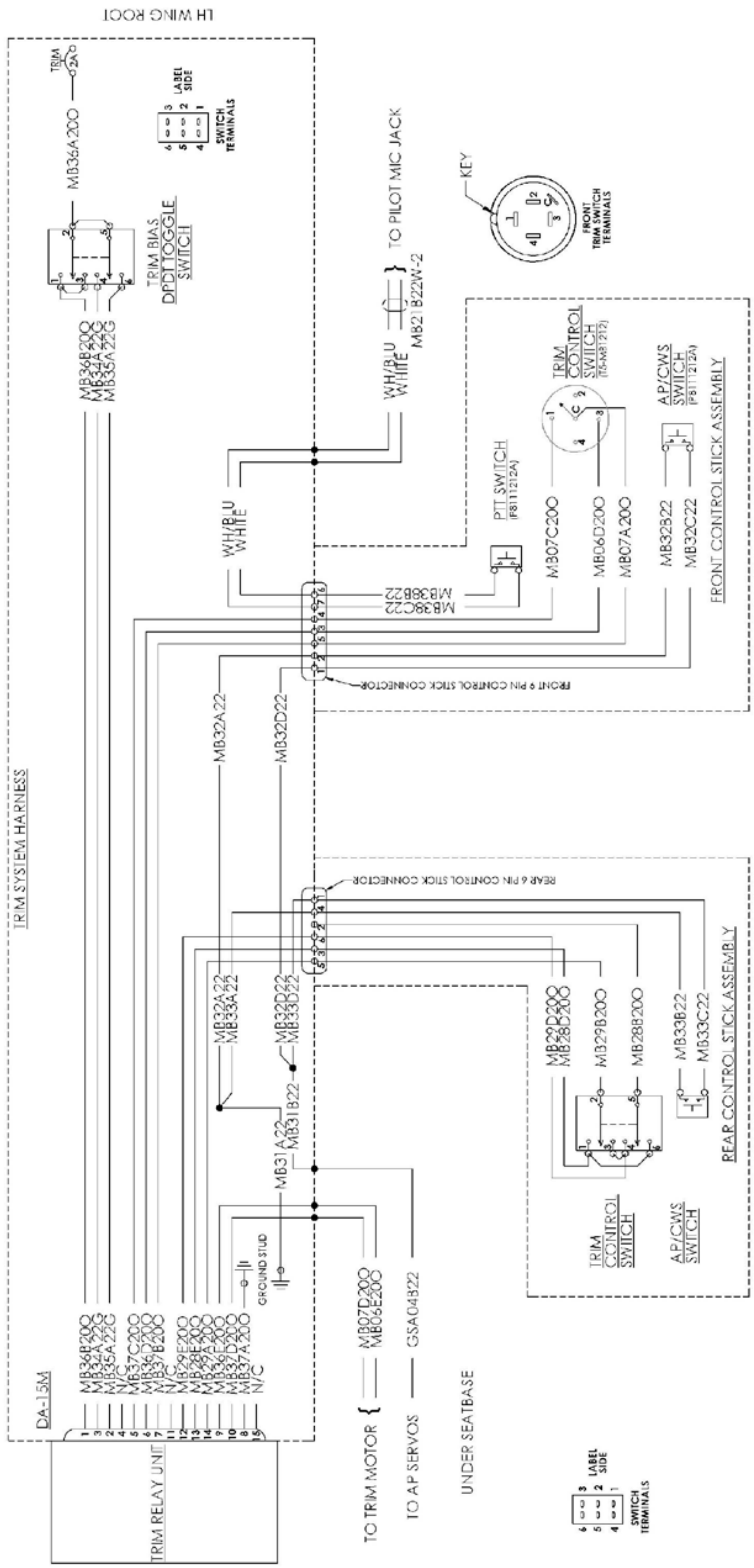

Figure 21 – CCK/CCX-2000 Trim System

APPENDIX A

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APPENDIX A FORMS

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1 SAMPLE INSPECTION FORMS (REFERENCE ONLY)

Scheduled Inspection Report			
Make:	Model:	Serial Number: CC__ -____-____	Registration:
Owner:		Date:	
Type of Inspection:		Hobbs/Tach Time:	

	Visual Pre-Inspection	Ref.	Interval		Initials
			100	Special	
1	Review compliance with current Federal Aviation Regulations, including visual inspection of: § Aircraft Flight Manual Current Revision § Aircraft Log Book § Registration Certificate § Weight and Balance Record § Aircraft Equipment List § FAA Airworthiness Directives § Kit Manufacturer Service Documents		X		
2	Visual Inspection of Aircraft				
3	Check Oil Quantity		X		
4	Operational Check		X		
5	Perform walk-around to detect fluid leaks. § Make a record of all malfunctions and discrepancies.		X		

	Engine	Ref.	Interval		Initials
			100	Special	
1	Engine Cowl: § Remove, clean and check for cracks distortion, loose, or missing fasteners. § Adjust Engine Cowl Flaps position for conditions if required.	Chapter 71	X		
2	Engine Oil: § Drain every 25 flight hours or 3 months	Chapter 12, 79, and applicable manufacturer manual		X	
3	Oil Temperature Sender Unit: § Check for leaks and security.				
4	Oil Lines and Fittings: § Check for leaks, security, chafing, dents, and cracks.				
5	Oil Cooler: § Clean and check cooling fins for damage.				
6	Engine Oil: § Fill			25 hours	

	Engine	Ref.	Interval		Initials
			100	Special	
7	Spark Plugs § Visual inspection and re-gap as necessary to .032-.040”		X		
8	Check Differential Cylinder Compression: Cylinder 1 ____________ Cylinder 2 ____________ Cylinder 3 ____________ Cylinder 4 ____________		X		
9	Cylinders: § Visual inspection for cracked or broken fins.	Chapter 71	X		
10	Electrical wiring to engine and accessories: § Visual inspection and replace damaged wires and clamps. § Visual inspection of terminals for security and cleanliness.	Chapter 24	X		
11	Ignition Harness and Insulators: § Visual inspection of high-tension leads and boots.		X		
12	Spark Plug High Tension Leads: § Replace every 500 hours or 3 years	Chapter 74		X	
13	Induction Air Filter: § Remove, inspect, and clean. § Replace at 500 hours, or when filter is more than 50% covered by foreign material.	Chapter 71	Inspect X	Replace X	
14	*Carburetor: § Drain and clean inlet line fuel strainer.	Chapter 71	X		
15	Induction Air Box: § Visual inspection condition.	Chapter 71	X		
16	**Air Inlet Plenum § Visual inspection condition.	Chapter 71	X		
17	**Fuel Injection § Visual inspection condition.	Precision Airmotive LLC, Manual		TBO: 2600hrs or 10 yrs	
	**Fuel Filter § Visual inspection and clean if necessary	Andair LTD	X	100 hrs or less	
18	Intake Seals: § Visual inspection for leaks and clamps for security.		X		
19	Flexible Fuel and Primer Lines: § Visual inspection condition.	Chapter 28	X		
20	Throttle, Mixture Controls: § Visual inspection for proper travel and operating condition.	Chapter 76	X		

	Engine	Ref.	Interval		Initials
			100	Special	
21	Exhaust Stacks, Connections, Gaskets, and Attach Spring: § Visual inspection § Replace exhaust gaskets as required.	Chapter 78	X		
22	Muffler, Heat Exchanger, and Hoses: § Remove shroud, inspect visually.	Chapter 78		50 hours	
23	Oil Breather Tube: § Visual inspection for obstructions and security. Clean tube if necessary.			Every Oil Change 50hrs	
24	Crankcase: § Visual inspection for cracks, leaks, and security of case bolts.		X		
25	Engine Mounts and Rubber Bushings: § Visual inspection for cracks, distortion and security.	Chapter 71	X		
26	Engine Baffles: § Visual inspection for damage and security.		X		
27	Firewall and Seals: § Visual inspection		X		
28	Cabin Heat Control: § Visual inspection.		X		
29	Alternator: § Visual inspection for condition, and security	Chapter 24	X		
30	Starter: § Visual inspection for condition and security.	Chapter 24	X		
31	**Connectors to Ignition Coils: § Visual inspection for connection, condition, and security.		X		
32	Engine Controls: § Check travel from stop to stop and lubricate.	Chapter 76	X		
33	Engine Cowl: § Install, ensuring good clearance.	Chapter 71	X		

*Applicable to CCK/CCX-1865 only
**Applicable to CCK/CCX-2000 only

	Propeller	Ref.	Interval		Initials
			100	Special	
1	Spinner and Bulkheads: § Visual inspection for damage and security.	Chapter 60, Propeller Owner's Manual	X		
2	Propeller Blades: § Visual inspection for nicks and cracks.		X		
3	Spinner Mounting Brackets: § Visual inspection for damage and security.		X		
4	Propeller Mounting Bolts: § Visual inspection § Check torque, if safety wire is broken.		X		

	Propeller	Ref.	Interval		Initials
			100	Special	
5	**Propeller Lubrication § Lubricate according to the Hartzell Propeller Owner's Manual.	Chapter 60, Propeller Owner's Manual	X	Not more than 12 months	

**Applicable to CCK/CCX-2000 only

	Cabin	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	Cabin Windows and Windshield: § Clean and visual inspection for cracking, crazing, and general condition.		X		
4	Upholstery: § Visual inspection for tears and fraying.		X		
5	Seat Belts, Inertia Reel, and Harnesses: § Visual inspection.	AmSafe Supplement	X		
6	Pilot Seat: § Visual inspection and verify latch security.	Chapter 25	X		
7	ELT (if applicable): § Replace after 1 hour of cumulative transmitting, 50% of useable life has expired, or expiration date marked on the ELT.	ELT Manufacturer Manuals	Inspect X	Replace X	
8	Battery and Cables: § Visual inspection.	Chapter 24	X		
9	Control Bushings, Cables, and Pulleys (including control stick and torque tube): § Visual inspection and lubricate bearing surfaces only.		X		
10	Elevator Trim: § Visual inspection of complete System Operational check.	Chapter 27	X		
11	Fuel Lines and Gauges: § Visual inspection for leaks, chaffing, obstruction, security, general condition.	Chapter 28	X		
12	Flap Lever, Crossbar, Control Rod, Spring Pins and Blocks: § Operational Check § Visual inspection of ratchet and latch through the range of operation. § Lubricate Shaft.	Chapter 27	X		

	Cabin	Ref.	Interval		Initials
13	Rudder Pedals: § Operational Check and lubricate.	Chapter 25	X		
14	Throttle Lever(s): § Verify freedom of movement and ensure it contacts engine stops.	Chapter 76	X		
15	**Propeller Lever(s): § Verify freedom of movement and ensure it contacts engine stops.	Chapter 76	X		
16	Mixture: § Verify freedom of movement and ensure it contacts engine stops.	Chapter 76	X		
17	*Carburetor Heat Control: § Verify free, full travel movement.	Chapter 71	X		
18	Cabin Heat Control: § Verify free, full travel movement.		X		
19	Placards and Instrument Markings: § Visual inspection for conformity, security, and condition.		X		
20	Instrument Panel: § Visual inspection for security of lines and wiring.	Chapter 31	X		
21	Pitot System: § Visual inspection of lines for leaks and chaffing.	Chapter 34	X		
22	Landing, Strobe, and Navigation Lights: § Visual inspection for condition and security § Operational inspection.	Chapter 24	X		
23	Stall Warning: § Operational inspection.	Chapter 27	X		
24	Altimeter: § Visual and functional inspection for condition and calibration.			24 mos	
25	Transponder (if applicable): § Visual and functional inspection for condition and calibration.	Chapter 24		24 mos	
26	Antennas: § Visual inspection for condition and security.		X		
27	Brake Cylinders and Parking Valves: § Operational and visual inspections for leaks § Fill with fluid, as required.	Chapter 12	X		
28	Fire Extinguisher (if applicable): § Visual inspection of extinguisher and mounting bracket. § Visual inspection of safety seal.	Chapter 25	X		
29	Ignition Backup Battery (if applicable) § Visual inspection of battery and mounting	Chapter 25 for panel	X Inspect	X Replace	

<table>
<tr><th colspan="2">Cabin</th><th>Ref.</th><th colspan="2">Interval</th><th>Initials</th></tr>
<tr><td></td><td>bracket.
§ Replace Annually</td><td>removal</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">30</td><td rowspan="2">IBBS Battery (G3X TOUCH ONLY)
§ Visual inspection of battery and mounting bracket.
§ Confirm endurance capability per the manufacturer requirements for continued airworthiness.</td><td>Chapter 25 for panel removal.</td><td>X</td><td></td><td></td></tr>
<tr><td>TCW Technologies Installation Instructions</td><td></td><td>Annually</td><td></td></tr>
</table>

*Applicable to CCK/CCX-1865 only
**Applicable to CCK/CCX-2000 only

<table>
<tr><th colspan="2" rowspan="2">Fuselage and Empennage</th><th rowspan="2">Ref.</th><th colspan="2">Interval</th><th rowspan="2">Initials</th></tr>
<tr><th>100</th><th>Special</th></tr>
<tr><td>1</td><td>Fabric and Finish:
§ Visual inspection for cracks and deterioration.</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td>2</td><td>Fuel Lines:
§ Visual inspection for security and damage.</td><td>Chapter 28</td><td>X</td><td></td><td></td></tr>
<tr><td>3</td><td>Fuselage Frame Tubing, Longerons, and Stringers:
§ Visual inspection for damage and corrosion.</td><td>Chapter 53</td><td>X</td><td></td><td></td></tr>
<tr><td>4</td><td>Rudder, Elevator and Stabilizer Trim Cables, Turnbuckles, Guides, and Pulleys:
§ Inspect for tension, safety, wear, damage, corrosion, and operation.</td><td rowspan="7">Chapter 27, 53</td><td>X</td><td></td><td></td></tr>
<tr><td>5</td><td>Stabilizer Yoke and Screw:
§ Visual inspection for end play, security, and excessive wear.</td><td>X</td><td></td><td></td></tr>
<tr><td>6</td><td>Rudder, Stabilizer, and Elevator Structures:
§ Visual inspection for damage.</td><td>X</td><td></td><td></td></tr>
<tr><td>7</td><td>Rudder Hinge Pins and Bushings:
§ Visual inspection for excess wear, and corrosion.</td><td>X</td><td></td><td></td></tr>
<tr><td>8</td><td>Elevator Hinge Pins and Bushings:
§ Visual inspection for excess wear, and corrosion.</td><td>X</td><td></td><td></td></tr>
<tr><td>9</td><td>Stabilizer Brace Wires:
§ Visual inspection for corrosion, security, and safety.</td><td>X</td><td></td><td></td></tr>
<tr><td>10</td><td>Empennage Gap Seal
§ Visual inspect for embrittlement, cracks and missing portions.
§ Remove, clean, and reinstall</td><td>X</td><td></td><td></td></tr>
<tr><td>11</td><td>Lubricate as required</td><td>Chapter 12</td><td>X</td><td></td><td></td></tr>
</table>

	Wings	Ref.	Interval		Initials
			100	Special	
1	Fabric and Finish: § Visual inspection for cracks and deterioration.		X		
2	Aileron, Flap, and Wing Structure: § Visual inspection for damage.	Chapter 57	X		
3	Fuel Tanks, Caps, and Lines: § Visual inspection for damage, leaks and deterioration.	Chapter 28	X		
4	Wing Attachment Bolts: § Visual inspection for security.	Chapter 57	X		
5	Lift and Jury Struts: § Visual inspection for security.	Chapter 57	X		
6	Lift Strut Forks: Visual inspection for damage and security.	Chapter 57	X		
7	Aileron and Flap Cables, Turnbuckles, Guides, and Pulleys: § Visual inspection for safety, damage, corrosion, and operation.	Chapter 27	X		
8	Ailerons Attachments and Brackets: § Visual inspection for security and damage.		X		
9	Aileron Hinge Pins and Blocks: § Visual inspection for excess wear and corrosion.		X		
10	Flap Attachments and Brackets: § Visual inspection for security and damage.		X		
11	Lubricate as required.	Chapter 12	X		

	Landing Gear	Ref.	Interval		Initials
			100	Special	
1	Fabric and Finish: § Visual inspection for cracks and deterioration.		X		
2	Jack Airplane.	Chapter 7	X		
3	Gear, Cabane, and Shock Strut Bolts and Nuts: § Visual inspection for safety.	AOSS Manual if equipped	X		
4	Shock Absorber and Shock Cords: § Visual inspection for broken bands, threads, and weakness.	AOSS Manual if equipped	X		
5	Tires: § Visual inspection for cuts, uneven or excessive wear and slippage.	Chapter 32	X		
6	Wheels: § Remove, clean, check, and repack bearings.	Chapter 32	X		

	Landing Gear	Ref.	Interval		Initials
7	Main Wheel Tire Pressure: § Check pressure.	Chapter 12	X		
8	Brake Lining and Disks: § Visual inspection for excessive wear.	Chapter 32	X		
9	Brake Lines: § Visual inspection for chafing and security.	Chapter 32	X		
10	Tail Wheel Attachments: § Visual inspection for security and safety.	Chapter 32	X		
11	Tail Wheel Fork: § Visual inspection for looseness on bracket.	Chapter 32	X		
12	Tail Wheel Tire: § Visual inspection for cuts and uneven or excessive wear.	Chapter 32	X		
13	Tail Wheel: § Remove, clean, and visually inspect for damage and corrosion § Functionally check tail wheel swivel lock § Repack bearings (if applicable).	Chapter 32	X		
14	Tail Wheel Tire Pressure (applicable to 3200 Series tail wheels only): § Verify pressure.	Chapter 12	X		
15	Lubricate as required	Chapter 12	X		

	Return To Service	Ref.	Interval		Initials
			100	Special	
1	Install engine cowling.		X		
2	Install fuselage and empennage access panels.				
3	Install wing access panels.				
4	Verify oil level is full.				
5	Perform engine run-up in accordance with operational / functional check: § After completing, perform a walk around to detect fluid leaks or other discrepancies.		X		
6	Verify all Service Documents are complied with. Refer to Cub Crafters Owner Support webpage.		X		
7	Garmin G3X Software Updates: http://www.garmin.com/us/support/		Refer to Garmin Software Support for updates.		
8	Verify aircraft documentation is in order: § Airworthiness Certificate § Registration § Pilot's Operating Handbook /Aircraft Flight Manual § Weight and Balance § Equipment List		X		

	Operational/Functional Inspection Report	Initials	Notes
1	Flight Controls: § Check controls operate in the correct direction § Ensure movement through full range of travel without binding and there is no excessive friction.		
2	Flaps: § Lower flaps to the first, second and third notches § Ensure each notch holds, both upward and downward.		
3	Elevator Trim Controls: § Full range of travel without binding.		
4	Engine Controls: § Full range of travel without binding or cable wear.		
5	Altimeter: § Must indicate within 50 feet of field elevation when set to correct barometric pressure.		
6	Vertical Speed Indicator (VSI): § Must indicate zero.		
7	Battery Master Switch: § Switch on, verify voltage.		
8	Start engine		
9	Set RPM: 1700 (CCK/CCX-1865) or 2000 (CCK/CCX-2000) § Perform ignition check, should be little or no drop between left and right systems. § No engine roughness.		
	Turn Fuel Pump On: § Note Slight increase in Fuel Pressure		
	Cycle Propeller: § Note RPM Drop		
10	*Pull Carburetor Heat Knob: § Engine RPM should slightly drop.		
11	Apply a Load to the Electrical System § Observe that voltage remains constant and amperage increases when load is applied (if ammeter installed).		
13	Ignition Battery Backup System (if installed): § Switch key to R position. § Switch "RT IGN BACKUP BATTERY" to "EMERGENCY" position. Should have no change to engine performance. § Amber Light should illuminate. § Switch "RT IGN BACKUP BATTERY" to "NORMAL" position. § Switch key to BOTH.		
14	Check the radio for proper Nav and Com operation.		
15	Check the transponder for proper operation.		
16	Verify proper ELT operation in accordance with federal regulations.		
17	Set throttle to idle (between 500 and 650 RPM)		

Operational/Functional Inspection Report		Initials	Notes
18	Pull mixture to Idle Cut-Off **NOTE** An increase in 20-50 RPM prior to the control reaching idle cut-off position indicates proper air fuel mixture.		

*Applicable to CCK/CCX-1865 only
**Applicable to CCK/CCX-2000 only

CONTINUED OPERATIONAL SAFETY REPORTING FORM			
Aircraft Serial Number: CC____-_____-_____			
Aircraft Registration Number:			
First Name		**Last Name**	
Company/Organization			
Email Address:			
PHONE NUMBER(S)			
ADDRESS			
Number and Street			
City			
State/Province	Postal Code	Country	
DESCRIPTION OF SAFETY OF FLIGHT ISSUE OR SIGNIFICANT SERVICE DIFFICULTY			
SIGNATURE			DATE
FOR CUB CRAFTERS USE ONLY			
COS Log Number:		Date Received:	

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APPENDIX B

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APPENDIX B CONVERSION CHARTS

TABLE OF CONTENTS

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1 CONVERSIONS

2 WEIGHT – POUNDS INTO KILOGRAMS (LIVRES EN KILOGRAMMES)

(Kilograms x 2.205 = Pounds)
(Pounds x 0.454 = Kilograms)

LB	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
	kg	**kg**	**kg**	**kg**	**kg**	**kg**	**kg**	**kg**	**kg**	**kg**
0	0.0	0.454	0.907	1.361	1.814	2.268	2.722	3.175	3.629	4.082
10	4.536	4.990	5.443	5.897	6.350	6.804	7.257	7.711	8.165	8.618
20	9.072	9.525	9.979	10.433	10.886	11.340	11.793	12.247	12.701	13.154
30	13.608	14.061	14.515	14.969	15.422	15.876	16.329	16.783	17.237	17.690
40	18.144	18.597	19.051	19.504	19.958	20.412	20.865	21.319	21.772	22.226
50	22.680	23.133	23.587	24.040	24.494	24.948	25.401	25.855	26.303	26.762
60	27.216	27.669	28.123	28.576	29.030	29.484	29.937	30.391	30.844	31.298
70	31.752	32.205	32.659	33.112	33.566	34.019	34.473	34.927	35.380	35.834
80	36.287	36.741	37.195	37.648	38.102	38.555	39.009	39.463	39.916	40.370
90	40.823	41.277	41.731	42.184	42.638	43.091	43.545	43.999	44.452	44.906
100	45.359	45.813	46.266	46.720	47.174	47.627	48.081	48.534	48.988	49.442

3 LENGTH – FEET INTO METERS (PIEDS EN METRES)

(Meters x 3.281 = Feet)
(Feet x 0.305 = Meters)

Ft	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
	Meters	**Meters**	**Meters**	**Meters**	**Meters**	**Meters**	**Meters**	**Meters**	**Meters**	**Meters**
0	0.0	0.305	0.610	0.914	1.219	1.524	1.829	2.134	2.438	2.743
10	3.048	3.353	3.658	3.962	4.267	4.572	4.877	5.182	5.486	5.791
20	6.096	6.401	6.706	7.010	7.315	7.620	7.925	8.230	8.534	8.839
30	9.144	9.449	9.754	10.058	10.363	10.668	10.973	11.278	11.582	11.887
40	12.192	12.497	12.802	13.106	13.411	13.716	14.021	14.326	14.630	14.935
50	15.240	15 545	15.850	16.154	16.459	16.764	17.069	17.374	17.678	17.983
60	18.288	18.593	18.898	19.202	19.507	19.812	20.117	20.422	20.726	21.031
70	21.336	21.641	21.946	22.250	22.555	22.860	23.165	23.470	23.774	24.079
80	24.384	24.689	24.994	25.298	25.603	25.908	26.213	26.518	26.822	27.127
90	27.432	27.737	28.042	28.346	28.651	28.956	29.261	29.566	29.870	30.175
100	30.480	30.785	31.090	31.394	31.699	32.004	32.309	32.614	32.918	33.223

4 LENGTH – INCHES INTO CENTIMETERS (POUCES EN CENTIMETRES)

(Centimeters x 0.394 = Inches)
(Inches x 2.540 = Centimeters)

In.	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm
0	0.00	2.54	5.08	7.62	10.16	12.70	15.24	17.78	20.32	22.86
10	25.40	27.94	30.48	33.02	35.56	38.10	40.64	43.18	45.72	48.26
20	50.80	53.34	55.88	58.42	60.96	63.50	66.04	68.58	71.12	73.66
30	76.20	78.74	81.28	83.82	86.36	88.90	91.44	93.98	96.52	99.06
40	101.60	104.14	106.68	109.22	111.76	114.30	116.84	119.38	121.92	124.46
50	127.00	129.54	132.08	134.62	137.16	139.70	142.24	144.78	147.32	149.86
60	152.40	154.94	157.48	160.02	162.56	165.10	167.64	170.18	172.72	175.26
70	177.80	180.34	182.88	185.42	187.96	190.50	193.04	195.58	198.12	200.66
80	203.20	205.74	208.28	210.82	213.36	215.90	218.44	220.98	223.52	226.06
90	228.60	231.14	233.68	236.22	238.76	241.30	243.84	246.38	248.92	251.46
100	254.00	256.54	259.08	261.62	264.16	266.70	269.24	271.78	274.32	276.86

5 VOLUME – GALLONS INTO LITERS (GALLONS EN LITRES)

(Gallons x 3.785 = Liters)
(Liters x 0.264 = Gallons)

Gal.	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
	Liters	Liters	Liters	Liters	Liters	Liters	Liters	Liters	Liters	Liters
0	0.0	3.79	7.57	11.36	15.14	18.93	22.71	26.5	30.28	34.07
10	37.85	41.64	45.42	49.21	52.10	56.78	60.57	64.35	68.14	71.92
20	75.71	79.49	83.28	87.06	90.85	94.64	98.42	102.21	105.99	109.78
30	113.56	117.35	121.13	124.92	128.70	132.49	136.27	140.06	143.85	147.63
40	151.42	155.20	158.99	162.77	166.56	170.34	174.13	177.91	181.7	185.49
50	189.27	193.06	196.84	200.63	204.41	208.20	211.98	215.77	219.55	223.34
60	227.12	230.91	234.70	238.48	242.27	246.05	249.84	253.62	257.41	261.19
70	264.98	268.76	272.55	276.34	280.12	283.91	287.69	291.48	295.26	299.05
80	302.83	306.62	310.40	314.19	317.97	321.76	325.55	329.33	333.12	336.90
90	340.69	344.47	348.26	352.04	355.83	359.61	363.34	367.18	370.97	374.76
100	378.54	382.33	386.11	389.90	393.68	397.47	401.25	405.04	408.82	412.61

6 TEMPERATURE – FAHRENHEIT INTO CELSIUS

(°F - 32) x (0.556) = °C
(°C x 1.8) +32 = °F

°F	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
0	-17.8	-17.2	-16.7	-16.1	-15.6	-15.0	-14.4	-13.9	-13.3	-12.8
10	-12.2	-11.7	-11.1	-10.6	-10.0	-9.4	-8.9	-8.3	-7.8	-7.2
20	-6.7	-6.1	-5.5	-5.0	-4.4	-3.9	-3.3	-2.8	-2.2	-1.7
30	-1.1	-0.6	0.0	0.6	1.1	1.7	2.2	2.8	3.3	3.9
40	4.4	5.0	5.6	6.1	6.7	7.2	7.8	8.3	8.9	9.4
50	10.0	10.6	11.1	11.7	12.0	12.8	13.3	13.9	14.4	15.0
60	15.6	16.1	16.7	17.2	17.8	18.3	18.9	19.4	20.0	20.6
70	21.1	21.7	22.2	22.8	23.3	23.9	24.4	25.0	25.6	26.1
80	26.7	27.2	27.8	28.3	28.9	29.4	30.0	30.6	31.1	31.7
90	32.2	32.8	33.3	33.9	34.4	35.0	35.6	36.1	36.7	37.2
100	37.8	38.3	38.9	39.4	40.0	40.6	41.1	41.7	42.2	42.8

7 TORQUE – INCH POUNDS, FOOT POUNDS INTO NEWTON METERS

INCH POUNDS INTO NEWTON METERS

In.-lbs.	+0	+10	+20	+30	+40	+50	+60	+70	+80	+90
	N-m	N-m	N-m	N-m	N-m	N-m	N-m	N-m	N-m	N-m
0	0.0	1.1	2.3	3.4	4.5	5.6	6.8	7.9	9.0	10.2
100	11.3	12.4	13.6	14.7	15.8	16.9	18.1	19.2	20.3	21.5
200	22.6	23.7	24.9	26.0	27.1	28.2	29.4	30.5	31.6	32.8
300	33.9	35.0	36.2	37.3	38.4	39.5	40.7	41.8	42.9	44.1

FOOT POUNDS INTO NEWTON METERS

Ft-lbs.	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
	N-m	N-m	N-m	N-m	N-m	N-m	N-m	N-m	N-m	N-m
20	27.1	28.5	29.8	31.2	32.5	33.9	35.3	36.6	38.0	39.3
30	40.7	42	43.4	44.7	46.1	47.5	48.8	50.2	51.5	52.9
40	54.2	55.6	56.9	58.3	59.7	61.0	62.4	63.7	65.1	66.4
50	67.8	69.1	70.5	71.9	73.2	74.6	75.9	77.3	78.6	80.0
60	81.3	82.7	84.1	85.4	86.8	88.1	89.5	90.8	92.2	93.6

8 SPEED – MILES PER HOUR INTO KNOTS

MPH	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
	knots	knots	knots	knots	knots	knots	knots	knots	knots	knots
0	0.0	0.9	1.7	2.6	3.5	4.3	5.2	6.1	7.0	7.8
10	8.7	9.6	10.4	11.3	12.2	13.0	13.9	14.8	15.6	16.5
20	17.4	18.2	19.1	20.0	20.9	21.7	22.6	23.5	24.3	25.2
30	26.1	26.9	27.8	28.7	29.5	30.4	31.3	32.2	33.0	33.9
40	34.8	35.6	36.5	37.4	38.2	39.1	40.0	40.8	41.7	42.6
50	43.4	44.3	45.2	46.1	46.9	47.8	48.7	49.5	50.4	51.3
60	52.1	53.0	53.9	54.7	55.6	56.5	57.4	58.2	59.1	60.0
70	60.8	61.7	62.6	63.4	64.3	65.2	66.0	66.9	67.8	68.6
80	69.5	70.4	71.3	72.1	73.0	73.9	74.7	75.6	76.5	77.3
90	78.2	79.1	79.9	80.8	81.7	82.6	83.4	84.3	85.2	86
100	86.9	87.8	88.6	89.5	90.4	91.2	92.1	93.0	93.8	94.7
110	95.6	96.5	97.3	98.2	99.1	100.0	100.8	101.7	102.5	103.4
120	104.3	105.1	106.0	106.9	107.8	108.6	109.5	110.4	111.2	112.1
130	113.0	113.9	114.8	115.6	116.5	117.3	118.2	119.1	120.0	120.8
140	121.7	122.6	123.5	124.3	125.2	126.0	126.9	127.8	128.7	129.5
150	130.3	131.2	132.1	132.9	133.8	134.7	135.6	136.5	137.4	138.2
160	139.0	139.9	140.8	141.6	142.5	143.4	144.3	145.2	146.1	146.9
170	147.7	148.6	149.5	150.3	151.2	152.1	152.9	153.8	154.7	155.5
180	156.4	157.3	158.2	159.0	159.9	160.8	161.6	162.5	163.4	164.2

9 DISTANCE – STATUTE MILES, NAUTICAL MILES, AND KILOMETERS

Statute Miles x 1.609 = Kilometers
Statute Miles x 0.869 = Nautical Miles
Kilometers x 0.622 = Statute Miles
Kilometers x 0.540 = Nautical Miles
Nautical Miles x 1.852 = Kilometers
Nautical Miles x 1.151 = Statute Miles