AMERICAN CHAMPION AIRCRAFT
CORPORATION

"Dedicated to Preserving a Classic"

SM-601
8KCAB SERVICE MANUAL

This manual applies to 8KCAB aircraft
model years 1991 and up.

Original Issue - May 11, 2001
Reissue A - November 29, 2011
Reissue B - October 3, 2017

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1.0 Introduction

1.1 Forward

This manual is provided as a guide to overhauling, maintaining and repairing the 8KCAB aircraft manufactured by American Champion Aircraft Corporation.

The information in this manual concerns only components manufactured by American Champion Aircraft Corporation. Information necessary for overhaul of the engines, radio, etc. must be obtained from the manufacturer of the individual component.

1.2 Revisions

The information in this manual will be kept current by revisions distributed by subscription service through Aircraft Technical Publishers, www.atp.com. Revision status is available through the factory and factory website, www.amerchampionaircraft.com.

1.2.1 Page Revisions

Temporary page revisions are distributed any time it is necessary to provide new or revised service information. Page revisions are provided in the form of page replacements and must be inserted in the service manual in place of existing pages. A list of effective pages is provided with page revisions. Verify page revision number and page date match the list of effective pages to assure the manual is in the most current form. Revised text is indicated with a vertical bar in the left margin.

1.2.2 Manual Revisions

The entire manual may be revised when substantial changes are necessary or to periodically condense page revisions. Discard the entire manual and replace with the revised version. The manual revision level is listed in the log of revisions and on each page. Verify the manual revision letter on each page matches the log of revisions to assure the manual is in the most current form.

1.3 Vendor Equipment

The instructions that are necessary for disassembly, check, repair, maintenance, or overhaul of vendor equipment are not incorporated in this manual. Use the most current revisions of the following documents in connection with this maintenance manual:

Engine: Lycoming AEIO-360-H1A or H1B

- 60297-21, Operator's Manual AEIO-320, -360, and -540 Series
- 60294-7, Maintenance and Overhaul Manual AEIO-360

Engine: Lycoming AEIO-390-A1B6

- 60297-42, Operation and Installation Manual IO-390
- LMO-AEIO-390A, Maintenance and Overhaul Manual AEIO-390

Propeller: MT Propeller MTV-15-B-C/C188-34, MTV-9-B-C/C188-18a, MTV-9-B-C/C188-18b, or MTV-15-B-C/C193-25

- E-124, Operation and Installation Manual
- E-220, Maintenance and Overhaul Manual

Propeller: HC-C2YR-4CF/FC7666A-2

- 115N, Owners Manual

Governor: MT Propeller P-880-3
- E-1048, Operation and Installation Manual

Governor: Aero Technologies ATF6-58-1 or ATB210988
- AT1431299, Maintenance and Overhaul Manual

Governor: Ontic B210988
- 33201, Specification Manual

Alternator: Plane Power AL12-P70
- 10-3001, Installation Instructions

Magneto: Slick 4345, 4370, 4371
- L-1363C, Magneto Maintenance and Overhaul Manual

Ameri-King AK-451 ELT
- IM-451, Installation and Operation Manual

ACK Technologies E-04 ELT
- E04M, Installation and Operation Manual

Aspen EFD 1000 PFD
- 900-00003-001, Installation Manual
- 900-00012-001, ICA Document

JPI EDM-930
- 908, Installation Manual
- EDM-930, Pilot's Guide

AeroLEDs NSP Lights
- AAI-0008-0005, Installation Manual

Grove Main Wheel and Brake Assemblies
- 13046-11, Instructions for Continued Airworthiness

Log of Revisions

Revision	By	Description of Change	Date
Original	JKM	None	5-11-2001
Reissue A	MCR	Add EDM-930, Add EVS-100, Add AEIO-390	11-29-2012
A1	JJB	Add Grove Wheels, Revise Brace Wire, Add SI-1042	4-28-2014
A2	JJB	Add Aileron Hinge Inspection	7-6-2017
Reissue B	JJB	Update Cover, Log of Revisions, and Effective Pages	10-3-2017

List of Effective Pages

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Table of Contents

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2.0 Description

2.1 Exploded View

Use the index number below to identify the item and location on the airplane.

1. Spinner Assembly
2. Propeller
3. Engine Cowling
4. Firewall
5. Wraparound
6. Windshield
7. Pitot Mast
8. Wing Navigation Light
9. Aileron
10. Wheels
11. Landing Gear Leg
12. Gap Cover - Bottom
13. Stabilizer
14. Elevator - Right
15. Elevator - Left
16. Stabilizer Brace Wires
17. Rudder
18. Fuselage Fin
19. Elevator Trim Tab
20. Tail Wheel
21. Wing
22. Wing Struts
23. Jury Struts
24. Wheel Pants

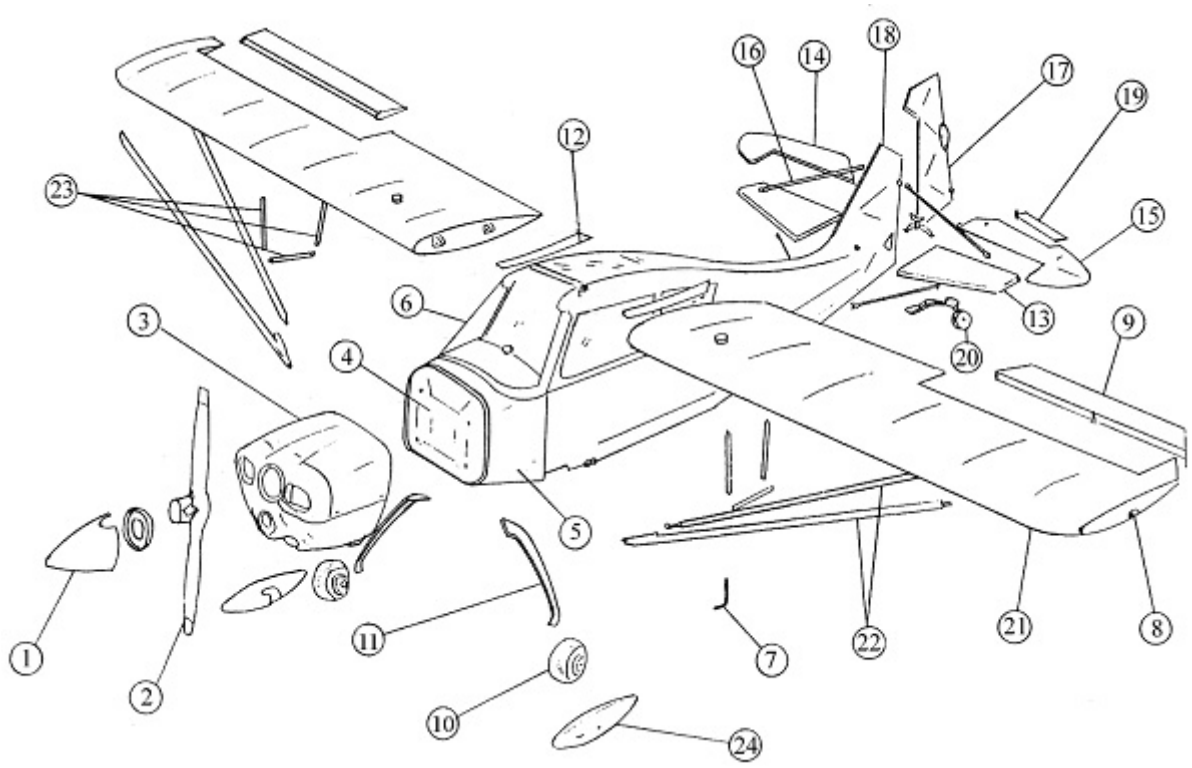

Figure 2-1, Exploded View

2.2 Main Components

General
The 8KCAB is a two-place tandem, high-wing monoplane. The fuselage is a welded steel frame covered with Dacron fabric. The wings are also Dacron covered and have aluminum metal spars and formed aluminum ribs. The aircraft is powered by a Lycoming engine with a constant speed propeller.

Wing
The wings are of conventional construction with aluminum spars, formed aluminum ribs, drag wire bracing, and Dacron covering. The ailerons are cable controlled.

Empennage
The elevators are cable controlled and are aerodynamically balanced. The elevator trim is cable activated and located on the left elevator. The trim tab is of aluminum and utilizes a piano hinge attachment. The rudder is cable controlled and partially balanced. All surfaces are constructed of steel tubing and steel channels, and covered with SF102 Dacron fabric using adhesive (green or clear).

Fuselage
The fuselage frame consists of a welded steel tubing assembly which forms the body of the fuselage. The external fuselage shape is formed by wooden bulkheads, stringers and formers which are attached to the frame.

Landing Gear
The landing gear is of the fixed gear type consisting of two steel main gear legs and a steerable tailwheel.

Brake System
The brakes are disc type, activated by hydraulic systems which are independently operated by toe type brake pedals.

Fuel System
The fuel system consists of two 20 gallon welded aluminum main wing tanks and a header tank. The main tanks are interconnected and vented. Fuel is gravity fed from both wing tanks to the header tank and is then pumped to the fuel injector for proper distribution to the cylinders.

Cabin Heat and Fresh-Air System
The heated air for the cabin is obtained directly from the exhaust system muffler shroud. Fresh air is provided from vents on the sides of the fuselage and is controlled by locking knobs on fuselage interior under instrument panel. Some models also include an adjustable fresh air vent located in the center of the instrument panel.

Engine and Propeller
The Decathlon is powered by a Lycoming 180 or 210 horsepower fuel injected engine. The propeller is of the counterweighted constant speed type. See Tables 2.4-2.5 for applicable engine and propeller information. The fuel injection in combination with an inverted fuel system and inverted engine oil system allows limited inverted operations.

Flight Controls
The flight controls are conventional consisting of a control stick which operates the ailerons and elevators and foot pedals which operate the rudder. Duplicate controls are provided for the co-pilot.

2.3 Aircraft Specifications and Principal Dimensions

General	
Certification Basis	FAR 23
Category	Normal / Acrobatic
Gross Weight (Normal Category)	1950 lb
Gross Weight (Acrobatic Category)	1800 lb
Width (Span)	384 in (369 in Optional)
Length (Level)	272 in
Wings	
Airfoil Section	NACA 1412
Span	384 in (369 in Optional)
Chord	64 in
Dihedral	1.0°
Incidence	1.5°
Aileron Area, Total	20.68 ft^2
Empennage	
Stabilizer Overall Span	122 in
Stabilizer Incidence	-1.0°
Stabilizer Area	12.25 ft^2
Elevator Area	13.75 ft^2
Fin Area	7.02 ft^2
Rudder Area	6.83 ft^2
Fuel System	
Fuel Tanks	2
Total Fuel Capacity	43.0 US Gal
Useable Fuel	40.0 US Gal
Unusable Fuel	3.0 US Gal
Landing Gear	
Type	Single Leaf Spring
Wheel Tread	78 in
Wheel Base (3 Point)	196 in
Brake Type	Hydraulic Disc
Tires, Main	6.00 x 6, 4 ply
Tire Pressure, Main	29 +2/-0 psi
Tire, Tailwheel	2.80 x 2.50
Tire Pressure, Tailwheel	40 ± 5 psi
Electrical	
Battery	Concorde RG-25 or Enersys SBS J16
Alternator	Kelly ALY8520 LS Plane Power AL12-P70
Voltage Regulator	Lamar B-00371-14 Zeftronics 15V0L

2.4 Powerplant Specifications (AEIO-360)

Engine

Manufacturer	Textron – Lycoming
Model – Constant Speed Propeller	AEIO-360-H1A or H1B
TCDS	1E10
Rated HP @ RPM	180 @ 2700
Fuel, Aviation Grade Minimum Octane	91/96
Fuel Injector	RSA-5AD1
Magneto, Left	Slick 4370
Magnet, Right	Slick 4371
Firing Order	1-3-2-4
Magneto Timing	25° BTC
Spark Plugs	Champion REM38E
Spark Plug Gap Setting	.016-.022
Starter	Kelly MZ-4222
	Skytech 149-12LS
Governor	Ontic/Woodward B210988
	MT Propeller P-880-3
	Aero Tech ATB210988 or ATF6-58-1
Isolator	ACA 11-1025
	Lord J-6230-1

Propeller

Manufacturer	Hartzell
Model (Constant Speed)	HC-C2YR-4CF/FC7666A-2
TCDS	P-920
Diameter	74 in
Manufacturer	MT Propeller
Model (Constant Speed)	MTV-15-B-C/C188-34
TCDS	P23BO
Diameter	74 in
Manufacturer	MT Propeller
Model (3-Blade Constant Speed)	MTV-9-B-C/C188-18b or MTV-9-B-C/C188-18a
TCDS	P24NE
Diameter	74 in

2.5 Powerplant Specifications (AEIO-390)

Engine

Manufacturer	Textron – Lycoming
Model	AEIO-390-A1B6
TCDS	E00006NY
Rated HP @ RPM	210 @ 2700
Fuel, Aviation Grade Minimum Octane	100/100LL
Fuel Injector	RSA-5AD1
Magneto, Left	Slick 4345
Magneto, Right	Slick 4370
Firing Order	1-3-2-4
Magneto Timing	20° BTC
Spark Plugs	Champion REM38E
Spark Plug Gap Setting	.016-.022
Starter	Skytech 149-12LS
Governor	Aero Tech ATF6-58-1
Isolator	Barry 94016-02
	Lord J-7764-31

Propeller

Manufacturer	MT Propeller
Model	MTV-15-B-C/C193-25
TCDS	P23BO
Diameter	76 in

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3.0 Handling and Servicing

This section provides ground handling and servicing instructions.

3.1 Access Provisions

Figure 3-1 shows the locations and identity of the access panels and plates that provide access for purposes of service and maintenance.

To open inspection rings:

1. Remove fabric with razor blade from inspection rings.
2. Install inspection covers on the openings after service.

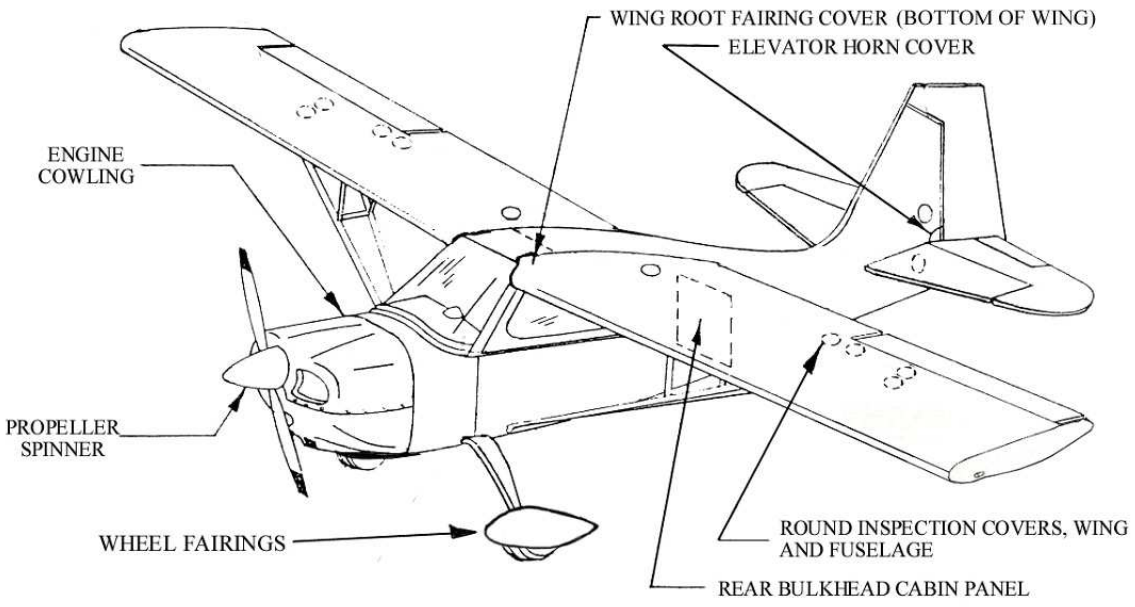

Figure 3-1, Access Provisions

3.1.1 Optional Flush Inspection Covers

Inspection covers may be installed in leading edge skin of wing per Figure 3-2. No more than one cover may be installed in each bay between wing ribs.

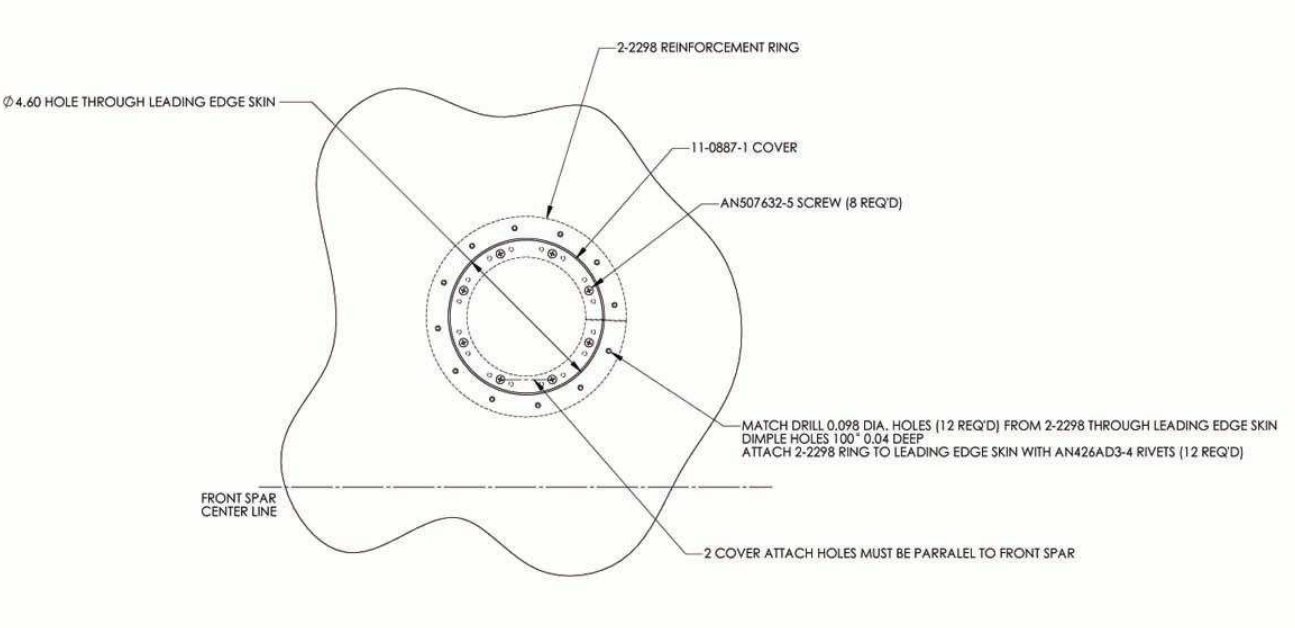

Figure 3-2, Optional Flush Inspection Cover

3.2 Ground Handling

WARNING

Do not push or pull on wing struts to move aircraft. Improper handling can damage struts.

CAUTION

Use the utmost care at all times during ground handling operations. Ground handlers should specifically avoid pushing or pulling on propeller spinner, propeller blades, wing struts, fuselage stringers and tail surfaces.

Ground handling procedures:

1. A hand grip is provided on the right lower longeron.
2. The tail can be lifted and the airplane can be pushed, pulled, and turned from this position.
3. Moor per Section 3.6

3.3 Jacking and Hoisting

Jack procedure:

1. Chock the tail wheel.
2. Chock opposite main wheel; to raise both main wheels two jacks may be used, raise evenly
3. Position bottle jack below fuselage strut attach fitting
4. Jack from fuselage strut attach fitting using jack adapter.

Hoisting procedure:

The aircraft may be hoisted by a spreader bar type sling attached to the fuselage-front spar attach fitting bolts inboard of these bolts.

CAUTION

During lifting operations assure that aircraft is sufficiently supported so that personnel are not injured and that damage is not done to the aircraft. Three or more persons are necessary during hand lifting.

NOTE

When means of jacking or hoisting is unavailable, the aircraft may be temporarily raised on one side by lifting struts at the wing strut attachment. Lift only near the strut-wing attachment. Do not lift from any other point on the wing strut. Lift on both the front and rear struts or the front strut only; do not lift on rear strut alone. Lifting may be assisted by pulling down on opposite wing in same location. Do not raise opposite side solely by pulling down, load should be distributed between both wings.

3.4 Leveling

The aircraft may be leveled while the aircraft is on scales or while the wheels are on the ground.

To longitudinally level the aircraft:

1. Raise the tail to an approximately level position.
2. Place a suitable support under the tail wheel.
3. With the aircraft in this position, drop a plumb line over the leading edge of the wing, just outboard of the wing root gap cover.
4. Adjust the height of the tail so that the plumb line is 12.18 in. forward of front face of fuselage-strut attach fitting. At this point the aircraft is longitudinally level. Reference Figure 3-3.

To laterally level the aircraft:

1. Place a level across the front dash panel.
2. Raise or lower one wing by shimming under wheel or deflate an appropriate tire until an accurate level reading is obtained.

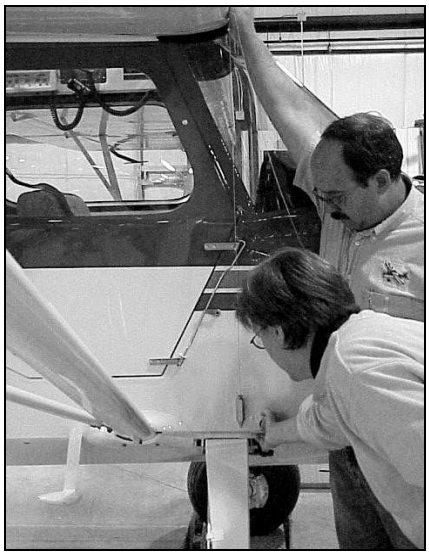

Figure 3-3, Longitudinal Leveling

3.5 Weighing

Weighing procedure:

1. Position a ramp of the same height as the scales to be used, in front of each main landing gear wheel.
2. Place one set of weighing scales in front of each ramp and push the aircraft on to the scales. Chock the main wheels. Level the aircraft with the use of a support and third scale positioned under the tail wheel.
3. Determine the following weights and measurements.
    a. Main wheel weights.
    b. Tail wheel weight.
    c. Distance between main wheel to tail wheel centerlines.
    d. Distance between the wing leading edge (datum) and main wheels centerline. Average values if different from side to side. Reference Figure 3-4.

Figure 3-4, Measuring Datum to Main Wheel

3.6 Mooring

Mooring procedure:

1. The aileron and elevator controls may be locked with the seat belt. Secure front control stick in a full aft position with belt.
3. Block the wheels.
4. Tie-down rings are provided under each wing at the main wing strut; the tail is secured by tying the rope through the tail wheel unit.
3. Secure tie-down rope to the wing tie-down ring and the tail wheel assembly at approximately 60-degree angle to the ground.

CAUTION

Secure only the front stick. Securing the rear stick may result in inadvertent operation with the rear control stick secured.

3.7 Setting the Brakes

To set the brakes:

1. Depress the brake pedals and pull out the park brake knob located under the right side of the instrument panel. Parking brake knob must be against the stop to function properly.
2. To release the brake, push the park brake knob full in. The brakes will release. Push pedals again verify brake function.

3.8 Locking the Aircraft

The cabin door is provided with an exterior key lock.

3.9 Draining Fuel System

To drain the fuel:

1. Open the drain plugs on the underside of both wing tanks, open the gascolator quick drain located on the lower left of the firewall, and open the quick drain the on the left underside of the rear fuselage.
2. To drain only the fuel strainer bowl, turn fuel valve located under the left side of the instrument panel to the off position and open the gascolator quick drain.

3.10 Filling and Bleeding Hydraulic Brakes

To fill or bleed the brake system:

1. Connect pressure style brake bleeder to the bleeder valve located on the brake caliper assembly.
2. Open the bleeder valve.
3. Fill until brake fluid runs out of the overflow tube on the underside of the fuselage and clear tubes between the master cylinder and reservoir are free of air.
4. Close bleeder valve; verify brakes function. Pedals should be firm when pressure is applied.

3.11 Lubrication

To find the correct lubrication to use on a certain component of the plane, match the component number in Figure 3-5 to the index number in Table 3-1.

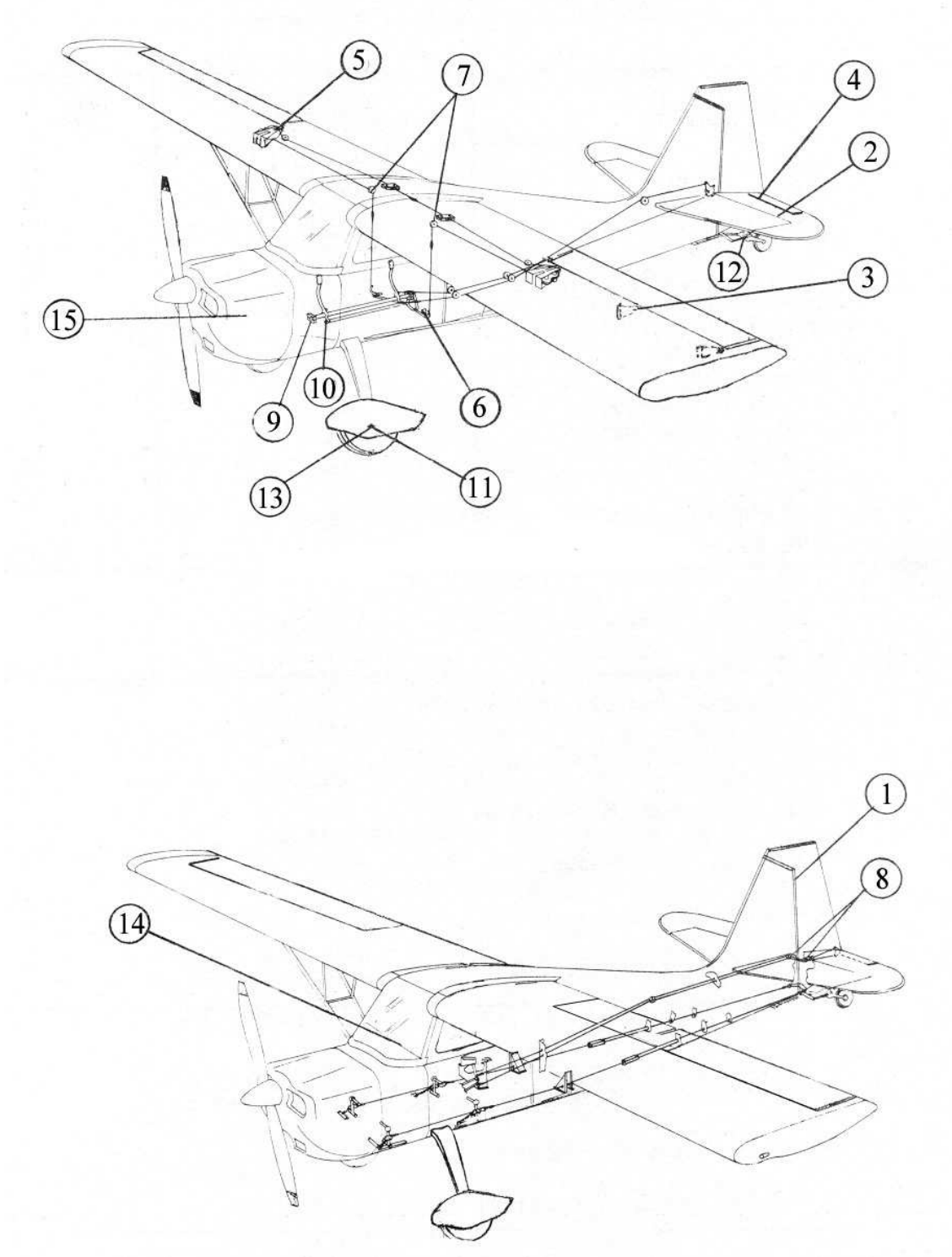

Figure 3-5, Lubrication Items

Table 3-1: Lubrication Chart

Index No.	Mechanism	Lubricant Code	Hour Interval
1	Rudder Hinges	A	100
2	Elevator Hinges	A	100
3	Aileron Hinges	A	100
4	Trim Tab Hinges	A	100
5	Aileron Bellcrank – Wing	A	100
6	Aileron Sector – Fuselage	A	100
7	Aileron Control Pulleys	A	100
8	Trim Tab Pulleys	A	100
9	Aileron Torque Tube Bearing	B	500
10	Stick Socket Bearings	A	500
11	Main Wheel Bearings	C	100
12	Tail Wheel Zerk Fitting	C	100
13	Brake Fluid	D	As Required
14	Control Casing	E	As Required
15	Engine Oil	F	*25
LUBRICANTS			
CODE	**TYPE**		
A	Oil - General Purpose (MIL-L-7870)		
B	Grease - General Purpose (MIL-L-7711)		
C	Grease - Hi Temp (MIL-L-3545)		
D	Brake Fluid (MIL-H-5606)		
E	Powdered Graphite		
F	Engine Oil - See Table 3-2		
* 50 hour interval if external oil filter is installed			

CAUTION

Do not use a hydraulic fluid with a castor oil or ester base. Do not apply lubricant to rubber parts. Remove all excess grease from fittings.

3.12 Recommended Oil Grade

Use an aviation grade oil of the proper viscosity. The proper grades of oil are listed in Lycoming Service Instruction 1014 and Table 3-2. Ashless dispersant grade oil is recommended after engine break-in. Mineral grade oil is recommended for the first 25 hours of operation.

Table 3-2: Recommended Lubricating Oil

Ambient Air Temperature (Ground)	SAE Mineral Grades		SAE Ashless Dispersant Grades	
	Single Viscosity	Multi Viscosity	Single Viscosity	Multi Viscosity
All Temperatures				15W50 or 20W50
Above 80°F	60		60	
Above 60°F	50		40 or 50	
30 to 90°F	40		40	
0 to 70°F	30		30 or 40	20W40
0 to 90°F		20W50		20W50 or 15W50
Below 10°F		20W50	30	20W30

3.13 Filling Engine Oil Sump

Fill engine sump with the aviation grade oil specified in Table 3-2. Total capacity of the oil sump, oil cooler and constant speed propeller system is 10 quarts. Only the sump capacity is indicated on the engine dipstick. Maintain indicated dipstick level of 6 to 8 quarts.

NOTE
8 quarts are drainable; 2 quarts are not drainable

3.14 Draining Engine Oil Sump

Drain engine sump by means of the oil drain valve or plug located on right rear corner of engine oil pan (AEIO-360) or plug located on front right corner of oil pan (AEIO-390).

4.0 Airworthiness Limitations

The Airworthiness Limitations Section is FAA approved and specifies maintenance required under 14 CFR 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

Approved: _____ Date: _____
For: Tim Smyth, Manager
Chicago ACO, AIR-7C0

4.1 Maintenance Limitations

Aileron Hinge Support
The aileron hinge support structure requires inspection at 400 hours time in service. After 400 hours time in service, inspect at every 100-hour / annual inspection. The required inspection of the aileron hinge support is described in Section 5.1.6. Components found to have cracks or other damage are not airworthy. The inspection must be recorded in the aircraft logbook including findings and time of next inspection.

Aircraft modified with Service Letter 444 gussets require inspection per Section 5.1.6 at every 100-hour / annual inspection. Service Letter 444 is required for aircraft and wings manufactured on or prior to 2-3-2017 with part number 4-2142 ailerons. Components found to have cracks or other damage are not airworthy. The inspection must be recorded in the aircraft logbook including findings and time of next inspection.

4.2 Replacement Limitations

There are no life limits on the engine, engine components, propeller, or propeller components. Reference Table 5-2 Recommended Replacement Times for the overhaul schedule.

4.3 Structural Limitations

Wing Strut Attach Fittings
Wing strut attach fittings, part number 3-1691, require 1000 hour inspection or replacement. The required maintenance of the strut attach fittings is described in Section 5.1.3. Fittings found to have cracks, corrosion, or elongated holes are not airworthy. The inspection must be recorded in the aircraft logbook including serial numbers inspected, findings, and time of next inspection.

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5.0 Time and Maintenance Checks

This section provides instructions for conducting inspections. Repair or replacement instructions for those components found to be unserviceable at inspection may be found in the section covering the applicable aircraft system.

CAUTION

When working on engines, ground the magneto primary circuit before performing any operation.

5.1 Scheduled Maintenance Checks

The schedule of required inspections are listed in Table 5-1. The inspection procedure is broken down into major groups; Engine Run-up, Propeller, Engine, Cabin, Fuselage and Empennage, Wing, Landing Gear, Operation Check, and General. The first column in each group lists the inspection procedure to be performed. The second column indicates the required inspection interval of 50 hours, 100 hours, 500 hours or 1000 hours. The inspection or operation is required at the inspection intervals as indicated by an X. If an item is not entirely accessible or must be removed, refer to the applicable section of this manual for additional instructions.

Table 5-1: Maintenance Check Schedule

	Inspection Interval			
	50	**100**	**500**	**1000**
A. Engine Run-up				
1. Check general engine smoothness.	X	X	X	X
2. Check all engine instruments.	X	X	X	X
3. Check magneto RPM variation.	X	X	X	X
4. Check for RPM drop with alternate air on.	X	X	X	X
5. Check operation of engine controls.	X	X	X	X
6. Check alternator operation.	X	X	X	X
7. Check operation of brakes and ground handling.	X	X	X	X
8. Check propeller control system operation.	X	X	X	X
9. Check electric fuel pump operation and pressure	X	X	X	X
B. Propeller				
1. Inspect blades for nicks and cracks.	X	X	X	X
2. Inspect spinner and backplate.	X	X	X	X
3. Remove spinner.		X	X	X
4. Check propeller mounting bolts, torque and safety.		X	X	X
5. Check propeller for track ± 1/8 in.		X	X	X
6. Check for grease and oil leaks.		X	X	X
7. Inspect hub for cracks and corrosion.		X	X	X
8. Check blades for excessive play in hub.		X	X	X

Table 5-1: Maintenance Check Schedule (continued)

		Inspection Interval			
		50	**100**	**500**	**1000**
C.	**Engine**				
1.	Remove engine cowl.	X	X	X	X
2.	Clean cowling. Check for cracks and loose or missing fasteners.	X	X	X	X
3.	Drain oil sump.	X	X	X	X
4.	Remove and clean oil screen, check for foreign particles. Replace engine oil filter if equipped, check for foreign particles.	X	X	X	X
5.	Check oil temperature gauge fitting for leaks and security.	X	X	X	X
6.	Check oil lines and fittings for leaks and condition.	X	X	X	X
7.	Clean and oil cooler fins, check cooler for leaks.		X	X	X
8.	Remove and flush oil cooler.		X	X	X
9.	Fill engine with oil.	X	X	X	X
10.	Clean engine.	X	X	X	X
11.	Check condition of spark plugs, clean and adjust gap.		X	X	X
12.	Check magneto timing.		X	X	X
13.	Check magneto wiring and ignition harness for condition		X	X	X
14.	Check magneto for oil leakage.	X	X	X	X
15.	Remove magneto, inspect per Slick instruction L-1363			X	X
16.	Overhaul or replace magnetos if necessary. (*See Note 1*)				X
17.	Remove rocker box covers and check for proper oiling and wear.		X	X	X
18.	Check fuel injector for condition and security.	X	X	X	X
19.	Replace air filter if necessary.	X	X	X	X
20.	Drain gascolator and clean screen. (*See Note 2*)	X	X	X	X
21.	Remove and clean fuel inlet strainer. (*See Note 2*)		X	X	X
22.	Check airbox for security, cracks, and operation		X	X	X
23.	Check engine intake seals for leaks and clamps for tightness.		X	X	X
24.	Inspect condition of flexible fuel lines.		X	X	X
25.	Replace flexible fuel lines.				X
26.	Replace flexible oil lines.				X
27.	Check throttle, alternate air and mixture for travel and condition.		X	X	X
28.	Inspect exhaust stacks, connections, and gaskets.		X	X	X
29.	Inspect muffler and tail pipe, verify flame baffle is intact. (AEIO-360)		X	X	X
30.	Remove heat muff and check muffler for cracks. (AEIO-360)		X	X	X
31.	Check condition of cabin heat and other flexible tubes.		X	X	X
32.	Check breather tube for obstruction at exit and vent hole.		X	X	X
33.	Remove oil breather line, flush and inspect.			X	X

Table 5-1: Maintenance Check Schedule (continued)

		Inspection Interval			
		50	**100**	**500**	**1000**
34.	Check engine mount for cracks and condition.		X	X	X
35.	Check engine baffling for security, cracks, and condition of seals.		X	X	X
36.	Check engine isolators for condition. Inspect for delamination, deterioration, or excessive sag. Replace as necessary.		X	X	X
37.	Check engine attach and mount attach bolts for condition and torque.		X	X	X
38.	Check condition of firewalls seals.		X	X	X
39.	Check condition and tension of alternator drive belt.		X	X	X
40.	Check condition of alternator and starter.		X	X	X
41.	Lubricate (*Refer to Section 3.11*).		X	X	X
42.	Determine engine condition. Overhaul or replace engine when necessary. (*See Note* 1)		X	X	X
43.	Check intake tube for condition. Verify inlet is free obstruction or tube collapse after cowl installation. (AEIO-360)	X	X	X	X
44.	Install cowling and check for position of baffle seals and operation of cowl door fasteners.	X	X	X	X
45.	Check landing light for clearance to engine and operation.	X	X	X	X
46.	Check cowling for clearance to all engine components.	X	X	X	X
47.	Check fuel injector for condition and security		X	X	X
48.	Check fuel system for leaks with emergency fuel pump on (mixture rich until air is purged, then idle cut off)		X	X	X
49.	Inspect exhaust per section 5.1.5 (AEIO-390)		X	X	X
50.	Disassemble and inspect exhaust per section 5.1.5 (AEIO-390)			X	X
D.	**Cabin**				
1.	Inspect cabin entrance, doors, and windows for damage and operation.	X	X	X	X
2.	Check upholstery for tears.		X	X	X
3.	Check seat and seat belt attachments.		X	X	X
4.	Inspect seat belts for chafing and condition.	X	X	X	X
5.	Check trim tab operation.	X	X	X	X
6.	Check rudder pedals, springs, and cables for security and condition.		X	X	X
7.	Check parking brake operation.		X	X	X
8.	Check control sticks for security and blockage at stick boots.	X	X	X	X
9.	Inspect rudder cables and pulleys for free operation and wear.		X	X	X
10.	Check lights for proper operation.	X	X	X	X
11.	Check instruments, lines, and attachments.		X	X	X
12.	Check pitot-static system.		X	X	X
13.	Check operation of fuel valve.	X	X	X	X
14.	Check operation of cabin heaters.	X	X	X	X
15.	Check condition and operation of air vents.	X	X	X	X
16.	Check fuel lines and fittings for chafing, cracks, leaks, and security.		X	X	X
17.	Lubricate (*Refer to Section 3.11*).		X	X	X

Table 5-1: Maintenance Check Schedule (continued)

		Inspection Interval			
		50	**100**	**500**	**1000**
E.	**Fuselage and Empennage**				
1.	Remove inspection covers.		X	X	X
2.	Remove elevator horn access cover.		X	X	X
3.	Remove aft baggage compartment panel.	X	X	X	X
4.	Remove belly pan and metal belly panels.		X	X	X
5.	Check security of battery and cables.	X	X	X	X
6.	Inspect battery. (*Refer to Section 11.3*)		X	X	X
7.	Check bulkheads and stringers for damage.		X	X	X
8.	Check antenna mounts and electric wiring.		X	X	X
9.	Drain rear fuel drain and check attaching lines for security and leakage.		X	X	X
10.	Check vertical fin and rudder surfaces for damage.		X	X	X
11.	Check rudder hinges, horn, and stops for damage and operation.		X	X	X
12.	Check rudder hinge bolts and bushings for excessive wear.		X	X	X
13.	Check elevator and stabilizer surfaces for damage.		X	X	X
14.	Check elevator hinges, horn, and stops for damage and operation.		X	X	X
15.	Check elevator hinge bolts and bushings for excessive wear.		X	X	X
16.	Check stabilizer attach bolts for security.		X	X	X
17.	Check tail brace wires for condition, tension, and security.		X	X	X
18.	Check elevator trim mechanism.		X	X	X
19.	Check control cables, trim cables, turnbuckles, guides, and pulleys for security, wear, and operation.		X	X	X
20.	Check rudder, elevator and trim tab cables for proper tension.		X	X	X
21.	Check brake cylinders for security and operation.		X	X	X
22.	Check brake reservoir and lines for chafing, cracks, and leaks.		X	X	X
23.	Check security of stick sockets, torque tube, and cable attachments.		X	X	X
24.	Inspect aileron cable bellcranks and links for security and operation.		X	X	X
25.	Check fuselage and tail surfaces for condition of fabric and paint.		X	X	X
26.	Check fuselage frame for bent, cracked, corroded, or otherwise damaged members.		X	X	X
27.	Check fuselage and tail surface drain holes for opening.		X	X	X
28.	Check rudder trim tab for security.		X	X	X
29.	Lubricate (*Refer to Section 3.11*)		X	X	X

Table 5-1: Maintenance Check Schedule (continued)

		Inspection Interval			
		50	**100**	**500**	**1000**
F.	**Wing**				
1.	Remove inspection covers.		X	X	X
2.	Remove wing gap fairings.		X	X	X
3.	Check wings, ailerons, and struts for damage.		X	X	X
4.	Check ailerons and wings for condition of fabric and paint.		X	X	X
5.	Check condition and security of aileron and hinge bolts.		X	X	X
6.	Check condition and security of front and rear strut attach bolts.		X	X	X
7.	Check fuel tank outlet lines for security and leaks.		X	X	X
8.	Check fuel gauge for leakage.		X	X	X
9.	Check fuel tanks for leaks and security.		X	X	X
10.	Check fuel tank caps and gaskets for sealing and condition.		X	X	X
11.	Check wings for fuel capacity and octane markings.		X	X	X
12.	Check security of rear strut jam nuts.		X	X	X
13.	Check rear strut drain holes for opening and corrosion.		X	X	X
14.	Check wing and aileron trailing edge drain holes for opening.		X	X	X
15.	Check aileron for signs of chafing on adjacent parts.		X	X	X
16.	Check aileron hinge support. (*Refer to Section 5.1.6*)		X	X	X
17.	Check aileron cables, pulley guides, and turnbuckles for security, wear, and operation.		X	X	X
18.	Check aileron cables for proper tension.		X	X	X
19.	Check aileron hinge bolts and bearings for excessive wear and freedom of operation.		X	X	X
20.	Check aileron pushrods and rod ends for excessive wear and freedom of operation.		X	X	X
21.	Check aileron sectors for proper operation.		X	X	X
22.	Check aileron travel and operation.		X	X	X
23.	Check operation of stall warning indicator.		X	X	X
24.	Check fuel vent system for security and leaks.		X	X	X
25.	Check pitot tube and lines for security and damage.		X	X	X
26.	Lubricate (*Refer to Section 3.11*)		X	X	X

Table 5-1: Maintenance Check Schedule (continued)

		Inspection Interval			
		50	**100**	**500**	**1000**
G.	**Landing Gear**				
1.	Check all main gear bolts for torque and condition. Remove and replace as necessary. (*Refer to Section 5.1.4*)		X	X	X
2.	Replace main landing gear thru bolts. (*Refer to Section 5.1.4*)			X	X
3.	Check gear leg for nicks, scratches, and corrosion.		X	X	X
4.	Check exterior brake lines for leaks and security.		X	X	X
5.	Bleed brakes (*If necessary*).		X	X	X
6.	Check brake linings and discs for wear.		X	X	X
7.	Visually check wheel alignment.		X	X	X
8.	Check tires for cuts, wear, and inflation pressure.	X	X	X	X
9.	Remove and inspect wheels.		X	X	X
10.	Check torque on wheel thru bolts.		X	X	X
11.	Clean and repack wheel bearings (main and tail).		X	X	X
12.	Check condition and operation of tail wheel.		X	X	X
13.	Check condition of tail springs, rubber block, and u-bolt bar assembly.		X	X	X
14.	Check torque of tail spring thru bolt and tail wheel attach bolt.		X	X	X
15.	Lubricate (*Refer to Section 3.11*).		X	X	X
H.	**Operation Check**				
1.	Fill fuel tanks and check for gauge operation. Check oil level.	X	X	X	X
2.	Start engine and warm to operating temperature.	X	X	X	X
3.	Check alternator output.	X	X	X	X
4.	Check manifold pressure. (*If installed*)	X	X	X	X
5.	Check alternate air.	X	X	X	X
6.	Check cabin heater operation.	X	X	X	X
7.	Check magneto operation.	X	X	X	X
8.	Check throttle and mixture operation.	X	X	X	X
9.	Check general engine smoothness.	X	X	X	X
10.	Check engine idle speed and mixture setting.	X	X	X	X
11.	Check electrical accessories.	X	X	X	X
12.	Check flight controls for freedom and correct direction of movement.	X	X	X	X
I.	**General**				
1.	Verify aircraft conforms to FAA specifications.	X	X	X	X
2.	Comply with all FAA airworthiness derivatives.	X	X	X	X
3.	Comply with all American Champion service letters.	X	X	X	X
4.	Check aircraft documents.	X	X	X	X

NOTE 1: Replace or overhaul as required by manufacturer or at engine overhaul. For engine overhaul, refer to Lycoming Service Instruction No. 1009 and Lycoming Service Bulletin 240.

NOTE 2: Clean gascolator screen and fuel inlet screen in gasoline or acetone. Remove all dust, lint and dirt. Replace screen if damaged. Replace gasket if damaged. Safety wire bail to strainer body.

5.1.1 Recommended Replacement Times

It is recommended that the components listed in Table 5-2 be replaced with new, overhauled, or components with life remaining at the intervals specified. Reference the latest revision of the manufactures instructions for additional maintenance requirements.

The replacement times are based on time since installation. When a component is replaced, enter the date of installation and the time and/or date of the next replacement in the aircraft logbook.

Table 5-2: Recommended Replacement Times

Item	Replacement Limits	Component ICA Document
Engine		
Lycoming AEIO-360-H1A, -H1B	1600 hours / 12 years	Operator's Manual 60297-21 Overhaul Manual 60297-7 Service Instruction SI 1009
Lycoming AEIO-390-A1B6	1400 hours / 12 years	Operator's Manual 60297-42 Overhaul Manual LMO-AEIO-390A Service Instruction SSP-112
Propeller		
Hartzell HC-C2YR-4CF/FC7666A-2	1000 hours / 72 months	Propeller Owner's Manual 115N
MT Propeller MTV-15-B-C/C188-34	1800 hours / 72 months	Install and Operation Manual E-124 Overhaul Manual E-220 Service Bulletin 1
MT Propeller MTV-9-B-C/C188-18	2400 hours / 72 hours	Install and Operation Manual E-124 Overhaul Manual E-220 Service Bulletin 1
MT Propeller MTV-15-B-C/C193-25	1800 hours / 72 months	Install and Operation Manual E-124 Overhaul Manual E-220 Service Bulletin 1

NOTE: Table is for reference only. Service instructions from manufacturer supersede data listed.

5.1.2 25-Hour Engine Service

Change the oil and clean engine oil screen every 25 hours for aircraft not equipped with an external oil filter.

5.1.3 Wing Strut Attachment Fitting Inspection

Wing strut attachment fittings P/N 3-1691 must be inspected every 1000 flight hours.

Remove fittings as follows:

1. Support the wing tip. Unbolt the rear strut and the jury strut eye bolt from the front strut. Unbolt the front strut and tie down ring and remove from the front strut to wing attach fitting. The end of the strut should be supported if it is still attached to the fuselage
2. Remove the two round inspection hole covers by the strut attach fitting. After cutting the safety wire, remove all fitting attach hardware including the compression tube spacer.
3. Tighten one of the attached drag wires on the attachment lug to gain clearance. If the inboard drag wire is tightened, the inspection hole by the aileron bell crank will need to be opened to loosen the jam nut. If the outboard drag wire is tightened, the wing tip will have to be removed to loosen the jam nut. When, tightening drag wire, record the number of turns, so that upon reassembly, factory tension can be restored.
4. Remove the fittings by pushing it into the wing and pulling it out through the inspection hole.

Inspect removed fittings as follows:

1. Perform a visual inspection of the entire part under magnification of at least 10X.
2. Perform a 100% fluorescent liquid dye penetrant inspection of each fitting. Both sides of the fitting must be inspected with particular attention paid to the bores of each hole. The penetrant used must meet Specification MIL-I-25135 and the inspection procedure must comply with MIL-STD-6866. This inspection must satisfy the requirements of the appropriate portions of MIL-STD-410.

Rejection criteria:

1. Any fitting found to have a crack, no matter how small, is not airworthy. It must be replaced with an airworthy part before further flight.
2. Any fitting found to be corroded or to have elongated bolt holes is not airworthy. It must be replaced with an airworthy part before further flight.

Reinstallation of parts:

1. Reinstall the fittings by reversing the method used to extract them.
2. Install all attach bolts through the fittings except for the AN4H-11A through the compression tube fitting and drag wire lug. Loosen the previously tightened drag wire back to factory tension so that it lines up with the bolt hole and reinstall the bolt.
3. Retighten the jam nuts on the drag wire. Safety wire the bolts in place again. Reinstall inspection hole covers.
4. Reinstall struts and jury struts.

5.1.4 Landing Gear Thru-Bolt and U-Bolt Bar Assembly Inspection

Every 100 hours check torque of thru-bolt and u-bolt bar assembly:

1. U-bolt bar bolt torque value should be 450-500 in lbs.
2. Thru-bolt torque value should be 650-700 in lbs.
3. If torque value is below minimum value, remove and inspect u-bolt bars, bolts, nuts, and washers. Inspect for straightness, excessive wear, cracks, corrosion, and thread condition. If cracks are suspected accomplish dye penetrant or magnetic particle inspection. Replace any damaged parts.

Every 500 hours replace or inspect landing gear thru bolt:

1. Remove thru-bolt per Section 8.1.
2. Conduct magnetic particle inspection of thru-bolt or replace with new MS20007 bolt.
3. Install thru-bolt; torque to 650-700 in lbs.

NOTE

When BAC-N10-HR7 nuts are removed, replace with new.

5.1.5 Exhaust System Inspection (AEIO-390)

Exhaust 100 hour / annual inspection:

1. Remove lower portion of shroud wraparound, ten screws.
2. Inspect interior of shroud and tubes for sooting that may indicate an exhaust leak. Use a mirror or remove entire shroud wraparound to inspect top of interior tubes. Any leak within the shroud requires repair or replacement.
3. Inspect exhaust tubes and collector for cracks, holes, burned spots, chaffing, and excessive sooting. Mild sooting of the slip joints outside of the shroud is acceptable. Replace or repair exhaust components if integrity is compromised in any manner.
4. Inspect condition of alternate air flange and inlet screen. Verify that there is .060 in or greater clearance between exhaust shroud and alternate air flange and there is no chaffing of the inlet flange
5. Inspect condition of exhaust hanger.

Exhaust 500 hour inspection:

1. Remove and disassemble exhaust.
2. Inspect slip joints for wear as indicated by galling. Minimum tube wall for .035 wall tubes is 0.028. Minimum tube wall for .049 wall tubes is 0.039. Wear up to these limits is acceptable.
3. Inspect tubes for chafing with shroud components and adjacent tubes.
4. Inspect tubes and collector for cracks, holes, or burned spots.
5. Replace or repair exhaust components if integrity is compromised in any manner.
6. Lubricate slip joints per section 9.15.

5.1.6 Aileron Hinge Support

Aileron hinge support 100 hour / annual inspection:

1. Remove 64 screws securing left and right wing tips.
2. Remove wing tip by disconnecting tip light molex.
3. Remove four inspection covers per wing at rear spar (77.5, 114.0 (2 locations), and 119.0 as measured from the butt rib).
4. Visually inspect condition of hinge support, hinge bracket, and associated fasteners at middle and tip hinge locations. Emphasis should be placed on the bend in the hinge support and fastener locations.
5. Visually inspect condition of aileron sector casting at the inner hinge location. Emphasis should be placed on the casting where the hinge arm joins the sector body.
6. Visually inspect condition of the hinge ribs and spar-to-rib gussets. Emphasis should be placed at bends and fastener locations.
7. Visually inspect condition of rear spar at hinge locations. Emphasis should be placed on the middle hinge location. Verify condition of spar, spar cap doublers, spar web doublers, and fasteners.
8. Reinstall four inspection covers removed in step 3.
9. Connect tip light molex.
10. Secure left and right wing tips to wing with 64 screws.
11. Verify navigation, position, and strobe light function by viewing with welding goggles.

5.2 Unscheduled Maintenance Checks

5.2.1 Preflight Inspection

A preflight inspection should be conducted before each flight. Complete preflight and operational checklists are provided in the Airplane Flight Manual. The Airplane Flight Manual is part of the required equipment and must remain in the airplane at all times.

5.2.2 Over Limit Inspections

If the airplane has been operated such that any of its components have exceeded their maximum operational limits, check with the appropriate component manufacturer for inspection and maintenance requirements. Appropriate notation of the over limit inspection shall be made in the aircraft or engine logbook. These inspections are not inclusive of major damage to the aircraft; i.e. nose over, propeller strike, ground loop, wing tip strike, etc. Conditions that are not described below require thorough inspection of the entire airframe and repair of all damage. The following inspections are to assist the mechanic by providing a description of the minimum required inspection and maintenance following an over-limits condition.

Excessive Indicated Airspeed

Considerable margin for overspeed is present due to position errors of the aircraft static system. The inspection and maintenance described herein is not necessary if the indicated airspeed was a result of static system blockage and it is determined that the aircraft was not operated outside of the normal limits.

Operation of the aircraft at indicated airspeed from 207 to 232 mph requires the following inspections:

1. Verify windshield is not cracked at the forward attach bracket. Inspection will require removal of the glare shield.

2. Verify windshield is not cracked at side rubber wellnuts. Verify rubber well nuts remain engaged in windshield and have not partially or fully pulled from windshield. Replace wellnuts with new if necessary.
3. Verify windshield is not cracked at upper attach screw locations. It will be necessary to remove upper windshield retainer and fabric seal tape. It is not necessary to replace fabric tape, if replacement is desired reference Section 6.24 procedures.
4. Inspect windshield for any other cracks, particularly center and at wing root relief portions. Any crack is cause for rejection and requires windshield replacement per Section 6.24.

Operation of the aircraft at indicated airspeeds in excess of 232mph requires the following maintenance and inspection:

1. Replace windshield with new per Section 6.24.
2. Inspect wraparound for damage at windshield front attach point. Inspection will require removal of the windshield and glare shield.
3. Inspect length of rear spar for indication of buckling or failure.
4. Inspect the rear spar fuselage attach point and wing bracket, replace AN4A rear attach bolt with new.
5. Inspect fuselage cross tube at rear spar attachment for straightness.

Operation Beyond Limit Loads

Operation in excess of +3.8 and –1.52 (Normal Category) or +6.0 and –5.0 (Acrobatic Category) requires the following maintenance and inspection:

1. Inspect wing strut attachment fittings per Section 5.1.3.
2. Inspect main spar fitting attach holes for elongation.
3. Reinstall strut fitting with new attachment hardware.
4. Inspect length of main and rear spar for damage, particular emphasis should be placed on all lightening holes, compression tube attach points, areas adjacent to doublers, and attachment fittings.
5. Inspect drag truss and compression tube members for damage.
6. Inspect main strut for damage particularly at upper and lower attach points.
7. Replace wing root and mains strut attachment hardware in accordance with Section 6.13.
8. Inspect fuselage wing and wing strut attachment points for damage.
9. Inspect fuselage cluster at station 2U (pilot's knee) for indications of damage.
10. Inspect engine mount for indications of damage.
11. Replace engine to mount attach bolts.
12. Conduct general inspection of aircraft for additional damage.

5.2.3 Hard Landing

The gear is designed for limit landing loads of approximately +3g. An excessive decent rate, soft or irregular surface, severe braking, or severe side load may result in damage. If a hard landing is reported or suspected conduct the following inspection:

1. Inspect gear camber per Section 8.14.
2. Inspect toe-in and toe-out per Section 8.15.
3. Remove wheel, inspect axle shank and axle to gear attachment.
4. Inspect u-bolt bar and bolts, check torque per Section 5.1.4. Replace u-bolt bar and bolts if elongation or deformation is suspected.
5. Inspect fuselage longerons at gear leg and gear bolt locations.
6. Replace inner thru bolt per Section 5.1.4, inspect gear truss for damage.
7. Inspect tail wheel leaf springs for set. If tail wheel rotation axis in exceeds vertical, replace leaf springs and forward AN6 attach bolt.
8. Inspect tail wheel to leaf spring attachment.
9. Inspect fuselage structure at leaf spring attachment and tail post.
10. Conduct general inspection of aircraft for any additional damage.

5.2.4 Sudden Stoppage

In the event of a propeller strike or sudden stoppage of the engine. The entire engine must be disassembled and inspected, the crankshaft damage may be damage. The propeller must be repaired and inspected in accordance with the manufactures instructions for continued airworthiness.

5.2.5 Engine Fire

After an engine fire, perform a check as follows:

1. Check all cables and hoses, replace when necessary.
2. Check engine according to the Lycoming Manual.
3. Check firewall and engine cowling for damage by high temperatures.

For damage evaluation consult the manufacturer, before the aircraft is put back into service.

5.3 Special Inspections

The special inspections given in the following paragraphs, supplement the scheduled inspections as outlined in Table 5-1. The inspections include items that are required to be examined at intervals not compatible with hourly aircraft inspection intervals.

5.3.1 Annual Inspection, FAR 91.409

FAR 91.409 specifies annual inspections at 12 calendar month intervals. The annual and the 100-hour inspections are complete inspections of the aircraft, identical in scope. Annual inspection shall include all 100-hour interval items listed in Table 5-1. Annual inspection must be accomplished by persons authorized by the FAA or controlling administrator.

5.3.2 Additional FAR Part 91 Maintenance

FAR Part 91 specifies additional required maintenance. The inspection of all items required by FAR Part 91 shall be conducted at the required intervals. These items include but are not limited to the emergency locator transmitter, transponder, and altimeter. Inspection and maintenance may also be required because of special conditions or incidents that arise, and because of these conditions or incidents, an immediate inspection would be required to ensure further safe flight. Specifically reference FAR 91.207, 91.405, 91.411, and 91.413.

5.3.3 Maintenance of Individual Component or Appliance

The manufacture of any component or appliance may issue specific maintenance recommendations or requirements. This may include the propeller, engine, engine appliances and avionics. Reference the individual manufacturers service document for additional maintenance that may be required.

5.4 Inspection and Overhaul Report

The recommended inspection procedures are listed in Table 5-1, which indicates the operations to be performed and the inspection time intervals of 50, 100, 500, or 1000 hours. Where necessary, detailed inspection instructions are given in the applicable sections of this manual.

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6.0 Airframe and Structure

Minor repairs such as patching the fabric, welding, wing rib repair, etc. may be made in accordance with regulations set forth in FAA Advisory Circular 43.13-1. No major structural repairs are recommended without consulting the manufacturer.

NOTE

Specific instructions by the manufacturer for major repair should be referred and reported on FAA form 337.

Recommended torque values are listed in Table 6-1 and 6-2.

Table 6-1: Specific Torque Limits

Item	Torque
Landing Gear Thru-bolts	650-700 in lbs
Landing Gear U-bolt Bar	450-500 in lbs
Exhaust Flange Nuts	80-90 in lbs
Cleveland and Grove Wheel Halves	150 in lbs
Grove Brake Caliper Bolts	70-80 in lbs
Cleveland Brake Caliper Bolts	90 in lbs
Hartzell Propeller Bolts	60-70 ft lbs
MT Propeller Bolts	60-70 ft lbs

Table 6-2: General Torque Limits

Thread Size	Tension Type Nuts	Shear Type Nuts
8-36	12-15 in lbs	7-9 in lbs
10-32	20-25 in lbs	12-15 in lbs
1/4-28	50-70 in lbs	30-40 in lbs
5/16-24	100-140 in lbs	60-85 in lbs
3/8-24	160-190 in lbs	95-110 in lbs
7/16-20	450-500 in lbs	270-300 in lbs
1/2-20	480-690 in lbs	290-410 in lbs

6.1 Removal of Aileron (4-1533 Aileron)

To remove the aileron:

1. Disconnect aileron push rod at aileron.
2. Remove hinge access covers, top and bottom aileron gap covers.
3. Remove screws attaching aileron gap seals to aileron bay.
4. Remove aileron hinge bolts. Center and outboard hinges use spacers on either side of hinge bracket; retain spacers for reinstallation.

6.2 Removal of Aileron (4-2142 Exposed Balance Aileron)

To remove the aileron:

1. Disconnect aileron push rod at aileron.
2. Remove hinge access covers.
3. Remove aileron hinge bolts. Center and outboard hinges use spacers on either side of hinge bracket; retain spacers for reinstallation.

6.3 Removal of Wing Assembly

NOTE

Wing panel removal can be accomplished best using four people. Wing panel weight is approximately 120 pounds. Store panel carefully to avoid concentrated loading and damage.

To remove a wing:

1. Drain all fuel from entire system.
2. Disconnect the aileron cables at the turnbuckles located under cable covers at forward edge of rear windows. It will be necessary to remove cable covers to expose turnbuckles.
3. Disconnect aileron balance cable at turnbuckle located above zipper opening in rear cabin headliner.
4. Remove all wing-fuselage gap fairings.
5. Disconnect electrical wires, fuel lines, vent lines, and pitot system lines (left only) in wing-fuselage gap area. Remove aileron cable pulley and pull cable thru from fuselage. Loosen balance cable fairleads to allow removal of cable from fuselage. Identify cables to assure proper reconnection.
6. Remove jury struts and spreader bar.
7. Support wing tip and remove rear main strut.
8. Remove nuts from bolts on main wing strut and from wing spar-fuselage connection bolts.
9. Lift slightly on wing outboard panel and remove front strut.
10. Support entire wing panel and remove front and rear spar-fuselage attach bolts. Remove wing panel.
11. Remove other wing panel in identical manner.

6.4 Removal of Rudder

To remove the rudder:

1. Disconnect navigation wires at taped terminals inside grommet or rear fuselage. Disconnect ground wires at stud on inside fuselage member.
2. Disconnect tail wheel steering springs at tail wheel horn.
3. Disconnect rudder cables at rudder control horn. Hold rudder to side to release cable tension when disconnecting cable. Have a second person support a rudder pedal in the fuselage.
4. Remove rudder hinge pins.
5. Remove rudder.

6.5 Removal of Elevator

To remove the elevator:

1. Remove elevator horn access cover.
2. Disconnect elevator cables from elevator horn. Identify up and down cables to assure proper reconnection. Wire or tie cables to rear structure to prevent falling into fuselage belly.
3. Disconnect trim tab cables at tab horn. Remove turnbuckles from swaged cable fittings.
4. Remove bolt and bushing connect right and left elevators.
5. Remove left elevator hinge pins. Remove left elevator by first lifting elevator up free of stabilizer and then pulling outboard to disengage stud from right elevator.
6. Remove large washer from connecting stud.
7. Remove right elevator hinge pins. Remove right elevator.

6.6 Removal of Elevator Trim Tab

To remove the elevator trim tab:

1. Disconnect tab cables at tab horn.
2. Remove screws holding tab to elevator frame and remove tab.

6.7 Removal of Stabilizer

To remove the stabilizer:

1. Remove elevator.
2. Remove nut from outboard brace wire attach bolt. Remove bolt.
3. Remove lower brace wire attach pin at fuselage.
4. Remove upper brace wire attach pin on fin.
5. Remove bolt at inboard leading edge of stabilizer.
6. Work the outboard end of stabilizer fore and aft while pulling outboard on the stabilizer.

6.8 Removal of Door

To remove the door:

1. Remove full door by actuating quick release mechanism.

6.9 Removal of Door Quick Release Mechanism

To remove door quick release mechanism:

1. Remove handle.
2. Remove cam and pin mechanism.

6.10 Removal of Windshield

To remove the windshield:

1. Remove wings.
2. Remove screws from side and top retainer strips at rear edges of retainer.
3. Remove windshield.

6.11 Removal of Left Front Window Assembly

To remove the left front window:

1. Remove stop arm assembly connection at window by removing screw in window.
2. Remove window assembly by drilling off rivets on window side of hinge.

6.12 Removal of Left and Right Rear Window

To remove the left and right rear windows:

1. Remove forward retainer strips.
2. Remove windows by pulling window forward and bowing forward edge slightly to pass out of window channels at forward edge.

6.13 Removal of Greenhouse Roof Window

To remove the greenhouse roof window:

1. Remove wings.
2. Remove top windshield retainer strip.
3. Remove 3" fabric tape strip from window rear edge.
4. Remove rear edge retaining screws.
5. Remove window side fabric tapes.
6. Remove window.

6.14 Installation of Wing Assembly

NOTE

All main structure attach bolts are installed with bolt head either forward or up.

To install the wing assembly:

1. Attach front main strut to fuselage fitting (do not tighten nut at this time).
2. Lift wing panel into position and attach front and rear spar to fuselage.
3. Attach front main strut to wing and rear strut at wing and at lower front strut fitting (support wing at tip until both struts are attached).
4. Install jury struts and tighten all attachments. Tighten the following attach bolts.
    a. Front spar fuselage attach top – AN7 bolt
    b. Rear spar fuselage attach - AN4 bolt
    c. Front strut wing attach – AN6 bolt
    d. Rear strut wing attach - AN6 bolt
    e. Front strut fuselage attach – AN7 bolt

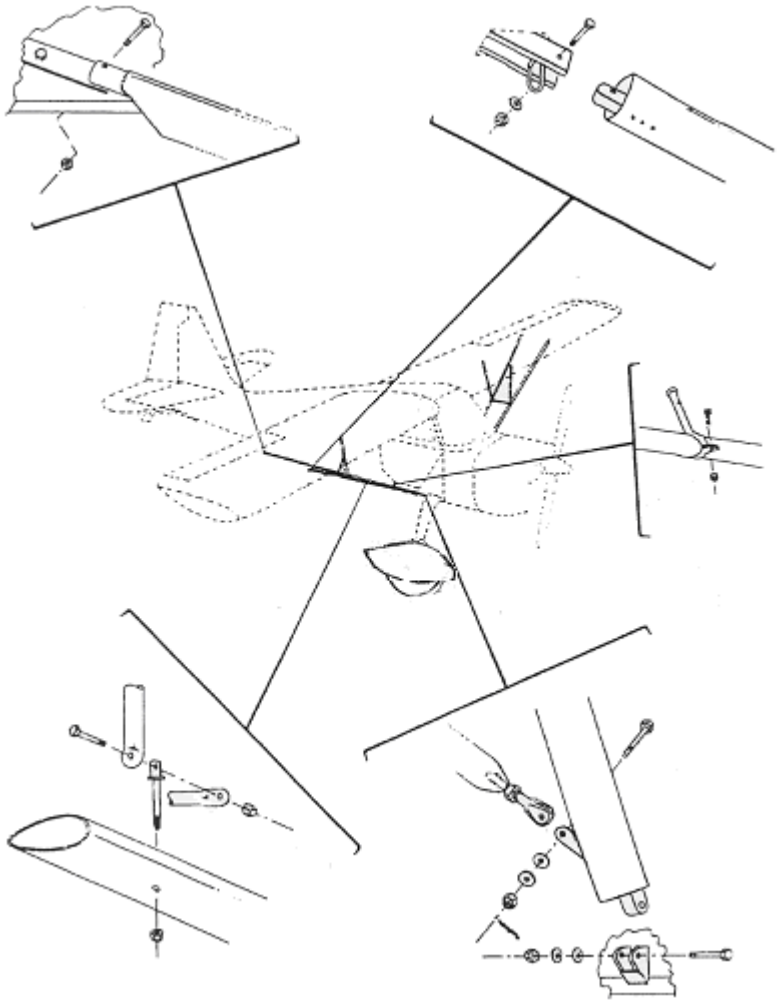

Figure 6-1, Struts and Jury Struts

5. Identify aileron actuating cable (located on forward side of aileron bellcrank) and pass it over pulley and attach to side adjusting turnbuckle.

6. Install cable guard cotter pin in pulley lugs
7. Connect aileron balance cable to center overhead turnbuckle after passing thru fairlead blocks. Tighten bolts on fairlead blocks.
8. Connect forward and rear fuel supply line to fuel tanks outlets and tighten. Make sure there is a ¼" clearance of rear spar and pulley.
9. Connect pitot line at wing butt to fuselage pitot line and clamp with safety wire.
10. Connect wing light electrical wires.
11. Connect fuselage crossover fuel vent line to fuel tank vent outlets.

NOTE

Check for proper line connection and system leaks (refer to Figure 6-2).

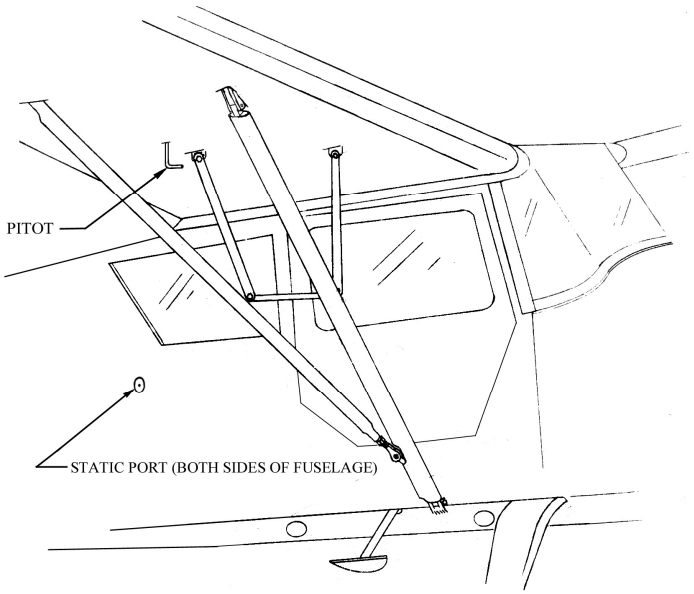

Figure 6-2, Pitot and Static Leak Check

6.15 Installation of Aileron (4-1533 Aileron)

To install the aileron: (refer to Figure 6-3)

1. Attach aileron to aileron hinges, tighten hinge bolts.
2. Attach aileron gap seal to aileron bay.
3. Attach aileron pushrod (do not tighten or safety attach bolt until rigging is accomplished).
4. Install hinge covers.
5. Verify travel per Table 7-1.

6.16 Installation of Aileron (4-2142 Exposed Balance Aileron)

To install the aileron: (refer to Figure 6-3)

1. Attach aileron to aileron hinges, tighten hinge bolts.
2. Attach aileron pushrod (do not tighten or safety attach bolt until rigging is accomplished).
3. Install hinge covers.
4. Verify travel per Table 7-1.

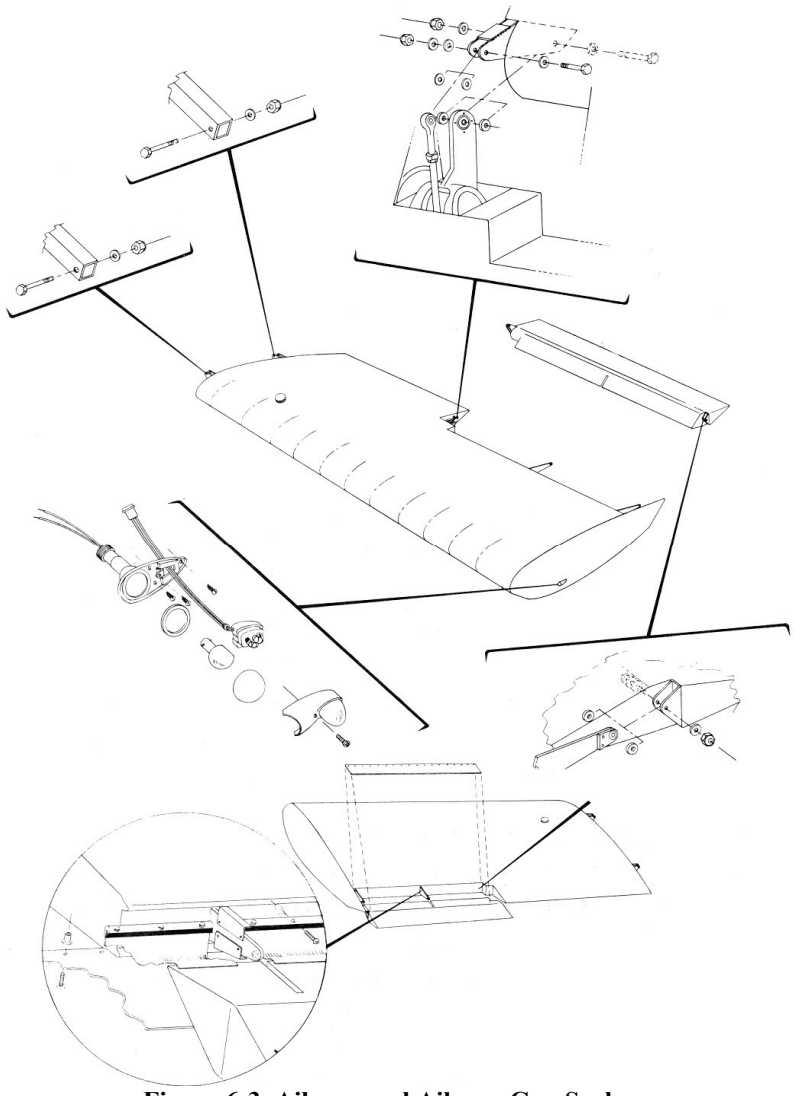

Figure 6-3, Aileron and Aileron Gap Seals

6.17 Installation of Gap Seals (4-1533 Aileron Only)

Aileron gap seals are fabricated from a special grade of coated fabric and should not be replaced with any other material. The gap seals must be purchased as an assembly consisting of the rubber seal and the aluminum retaining strip. Should the seal need replacement, proceed as follows.

To install gap seals:

1. Remove top aileron gap cover plate.
2. Remove screws holding seal retainer to aileron bay.
3. Peel the seal from the aileron by pulling aft on the retainer strip, keeping the retainer as close to the aileron surfaces as possible. Be careful not to peel the paint or the fabric while removing the seal.
4. Inspect retainer well nuts (B832) and replace if necessary.
5. Remove any dirt or oil from the aileron surface to be glued with a clean rag moistened with zyolene or enamel thinner.
6. Install retainer end of new seal. Be sure that all screws are fully tightened.
7. Temporarily tape free end of seal to top wing surface with masking tape.

8. Check aileron travel and adjust if necessary.
9. Tie control stick so that aileron to be glued is in full down position (against top).
10. Apply a medium, even coat of RTV silicone sealant. Apply sealant about ¼" beyond the seal end. Adhesive should not extend on to the nose radius of the aileron and may be stopped 1/8" short of the beginning of the nose radius. This step should be completed as rapidly as possible to prevent adhesive from drying before seal is applied.
11. Remove tape from seal and press seal smoothly onto adhesive. Seal should not sag between aileron and retainer, but should not be pulled excessively tight.
12. Rub the entire glued area to insure contact, remove any excess adhesive with clean rag.
13. Allow eight hours drying time.
14. Trim ends of seal if necessary and check for full travel and smooth operation.
15. Install top aileron gap cover plate and recheck for full down travel (against stop).

6.18 Wing Rigging Instruction

The 1º angle of dihedral is fixed by length of the front strut. The 1.5º angle of incidence is fixed in the manufacture of the airplane, at the wing root fittings on the fuselage. The angle of incidence at the rib nearest the strut point attachment fitting of the wing may be corrected to agree with the angle of incidence at the root, by adjusting the screw adjustment at the lower end of the rear strut where it attaches to the front strut. This provides zero washout. (refer to Figure 6-4)

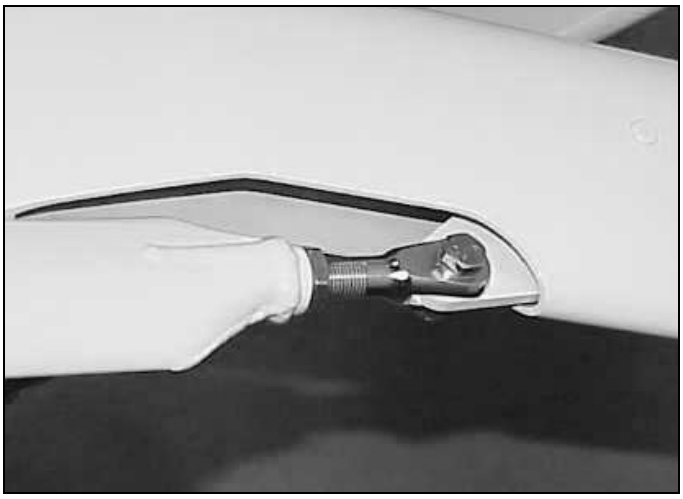

Figure 6-4, Rear Strut Adjusting Screw

If the airplane seems to have a tendency towards wing heaviness, the necessary wash in or wash out may be obtained by adjusting the rear strut at its lower attachment point. Wash out (reduce incidence) the high (light) wing; then, if necessary, wash in the low (heavy) wing. Adjust in one turn increments.

6.19 Installation of Fuselage Wing Gap Fairings

To install the fuselage wing gap fairings:

1. If wings have been removed, be sure to install lower gap cover track to wing butt and angle to fuselage before installing wings.
2. Install lower gap cover by sliding cover in track from rear. Cover when in position is under leading edge skin and flush with trailing edge of wing, secure the inboard edge of gap cover to angle of fuselage.

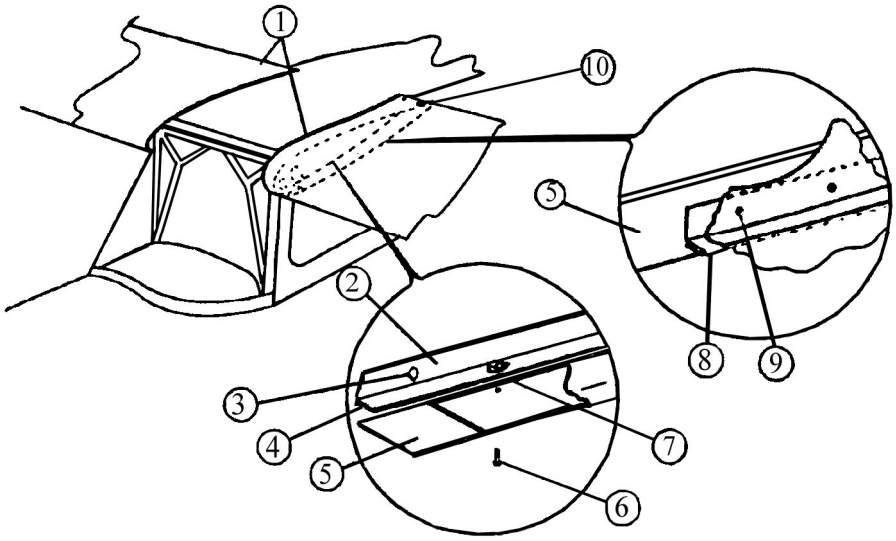

Figure 6-5, Wing Root Fairing

6.20 Installation of Stabilizers

To install the stabilizers:

1. Mate stabilizer spars with fuselage connecting members. Rear spar must be against stop on fuselage.
2. Install top and bottom brace wire (do not tighten).
3. Align stabilizers using string along hinges or level (refer to Figure 6-6).
4. Install and safety front spar attach bolt at fuselage.

NOTE

If installing new stabilizer, attach hole in stabilizer must first be enlarged to 3/16" diameter.

5. Once stabilizer is adjusted and leveled, tighten top and bottom brace wire to 320 to 420 pounds of tension (measured with tensiometer). Alternately proper tension may be determined by 3/8” to 5/8” deflection of the brace wire with 20 pounds of force mid span.

Figure 6-6, Attaching and Leveling Stabilizer

6.21 Installation of Elevators

To install elevators:

1. Install right elevator.
2. Attach elevator control cables to elevator horn.

NOTE

Before attaching elevator control cables trace the cables thru the fuselage and check to assure that the cables are not crossed or improperly routed.

3. Install left elevator using sufficient washers on left elevator spar engagement pin to prevent hinge binding.
4. Connect left elevator arm to right elevator horn using proper hardware (refer to Figure 6-7).
5. Safety all connections.
6. Verify travel per Table 7-1.

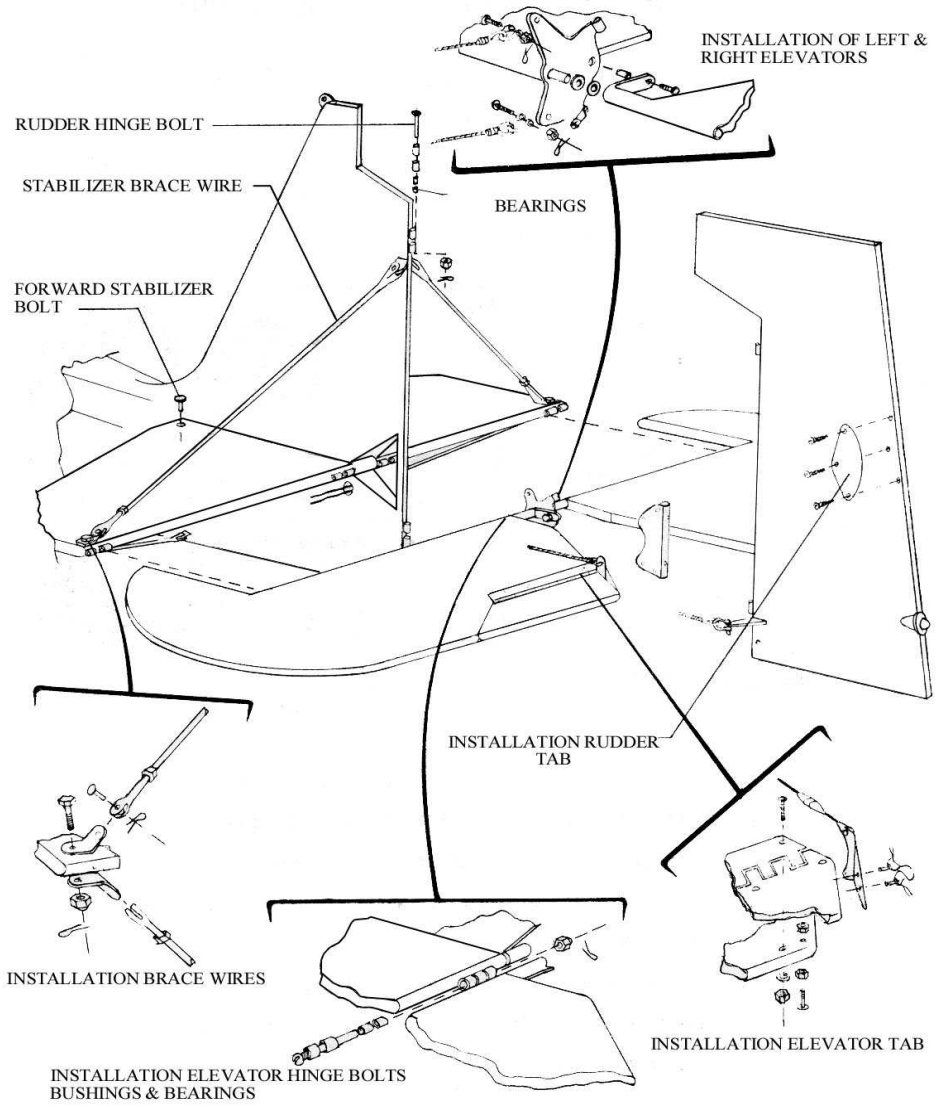

Figure 6-7, Tail Surfaces

6.22 Installation of Elevator Trim Tab

To install elevator trim tab:

1. Install tab by attaching four forward mounting screws at elevator
2. Connect tab horn turnbuckles.
3. Safety the connections.
4. Verify travel per Table 7-1.

6.23 Installation of Rudder

To install rudder:

1. Position rudder and pin hinges, safety.
2. Attach rudder cables making sure that cables are properly routed.
3. Connect steering horn-to-tail wheel horn springs.
4. If steering horn to rudder is new match drill thru rudder and horn (2 places) with horn and rudder surface at right angles to each other.
5. Connect electrical wires.
6. Safety all connections (see Section 7.0 for rigging).
7. Verify travel per Table 7-1.

6.24 Installation of Door Release Mechanism

To install door release mechanism:

1. Install cam and pin mechanism.
2. Install handle.

6.25 Installation of Door

To install door:

1. Position door in opening and on hinges.
2. Install pin mechanism and cotter pin.
3. Install pull pin.

6.26 Installation of Windshield

NOTE

Use extreme caution when placing windshield against mating surfaces to avoid cracking of windshield glass. Also the glass will scratch easily if touched by a sharp metal object. Do not force windshield in any manner.

To install windshield:

1. Install side retainers and rubber strips on windshield.
2. Install in reverse order of removal.
3. If it is necessary to install new bottom wraparound retainer, position retainer approximately in center and begin attaching at center line of airplane moving toward each side with attach rivets. Retainer may then be trimmed at rear edges to match side retainers. Using a soft rubber mallet, lightly tap top of retainer against windshield to seal. Caulking compound and rubber should be placed at bottom of windshield before attaching bottom retainer.
4. Place a 3 inch strip of fabric tape over top rear edge of windshield lapping onto fuselage fabric. Glue down.
5. Attach top retainer using proper screws thru retainer and windshield and into rubber nuts on bracket.
6. Upper retainer must overlap greenhouse roof by at least one half inch and be against the roof and windshield throughout full retainer length.

Figure 6-8, Windshield Installation

6.27 Installation of Left Front Window Assembly

To install left front window assembly:

1. Place window in position such that adequate clearance around entire inside portion is obtained. It may be necessary to trim around outside flange edges with a sandpaper board to achieve the best fit.
2. Match drill thru window from hinges with window in correct position. Attach window to hinges with appropriate fasteners.
3. With scissors, hinge center pivot up and parallel to forward window channel, close window and mark position on window directly aft of hinge rivet on forward channel. Open window and drill for window hinge attachment. Attach hinge to window.
4. Install and set latch striker plate to maintain closed window.

6.28 Installation of Left and Right Rear Windows

To install rear windows:

1. Check for any obstructions in window channels.
2. Install window rubber seal strip around window edges. Use masking tape to hold rubber on window temporarily.
3. Using petroleum jelly or grease wiped lightly over outside of rubber seals, slide window aft into lower channel. Before window reaches extreme aft position, deform window slightly to allow passage into upper channel. Lightly slide window aft to rear channel stop.
4. Install interior upper window retainer angle. Position aft bulkhead top panel against window.

6.29 Installation of Greenhouse Roof

To install greenhouse roof:

1. Position roof window flush at forward wood former and match holes at rear window edge with rear retainer.
2. Install rear retaining screws and nuts.
3. Install 4 inch fabric tape over window rear edge and aft main fabric.
4. Install 3 inch fabric side tapes - glue to roof and glue or staple to wood former sides.
5. Install top windshield retainer being sure that retainer overlaps roof by at least 1/2 inch.
6. Reinstall screws that attach upper windshield wire deflector (if aircraft so equipped). If greenhouse is new, match drill screw holes thru glass from fuselage bracket with a very dull drill bit or special plastic drill bit.

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7.0 Rigging and Control Surfaces

This section comprises information for removal, installation, rigging and adjustment of surface controls and their related components.

NOTE

When removing control cables, attach a line and identify each cable to facilitate installation.

7.1 Removal of Torque Tube Assembly

To remove the aileron torque tube assembly: (see Figure 7-1)

1. Open the lower wraparound cowl.
2. Slit belly fabric in center and directly under torque tube assembly.
3. Remove control sticks, seats and carpet.
4. Disconnect elevator control cables at forward cable attachments.
5. Disconnect aileron connecting links at torque tube bellcrank.
6. Remove bearing block bolts from both end bearings.
7. Remove torque tube assembly.
8. Check all components for worn or damaged parts. Replace as necessary.

7.2 Removal of Side Aileron Sectors

To remove the side aileron sector: (see Figure 7-1)

1. Remove attaching screws from sector covers.
2. Slide covers forward on rudder cable.
3. Remove main hinge bolt.
4. Remove sector assembly.
5. Check all component parts for worn or damaged parts. Replace as necessary.

7.3 Removal of Aileron Actuating Sector in Wing

To remove the aileron actuating sector in wing: (see Figure 7-1)

1. Remove aileron.
2. Disconnect balance cable turnbuckle located thru zipper in rear headliner.
3. Disconnect the actuating cable beneath the side aileron cable covers.
4. Remove wing-fuselage fairing covers. Loosen balance cable fairlead nuts. Pass cables out of fuselage into wing-fuselage gap area.
5. Cut fabric sufficiently to loosen adjacent rib and to enable removal of aileron sector and hinge bracket assembly.
6. Remove hinge bracket spar bolts. Remove hinge bracket assembly.
7. Check all components for worn or damaged parts. Replace as necessary.

7.4 Removal of Elevator Cables

To remove elevator cables: (see Figure 7-1)

1. Disconnect cables at rear stick socket.
2. Disconnect cables at elevator horn on elevator.
3. Remove all elevator cable pulleys in fuselage.
4. Check all parts for wear and damage. Replace as necessary.

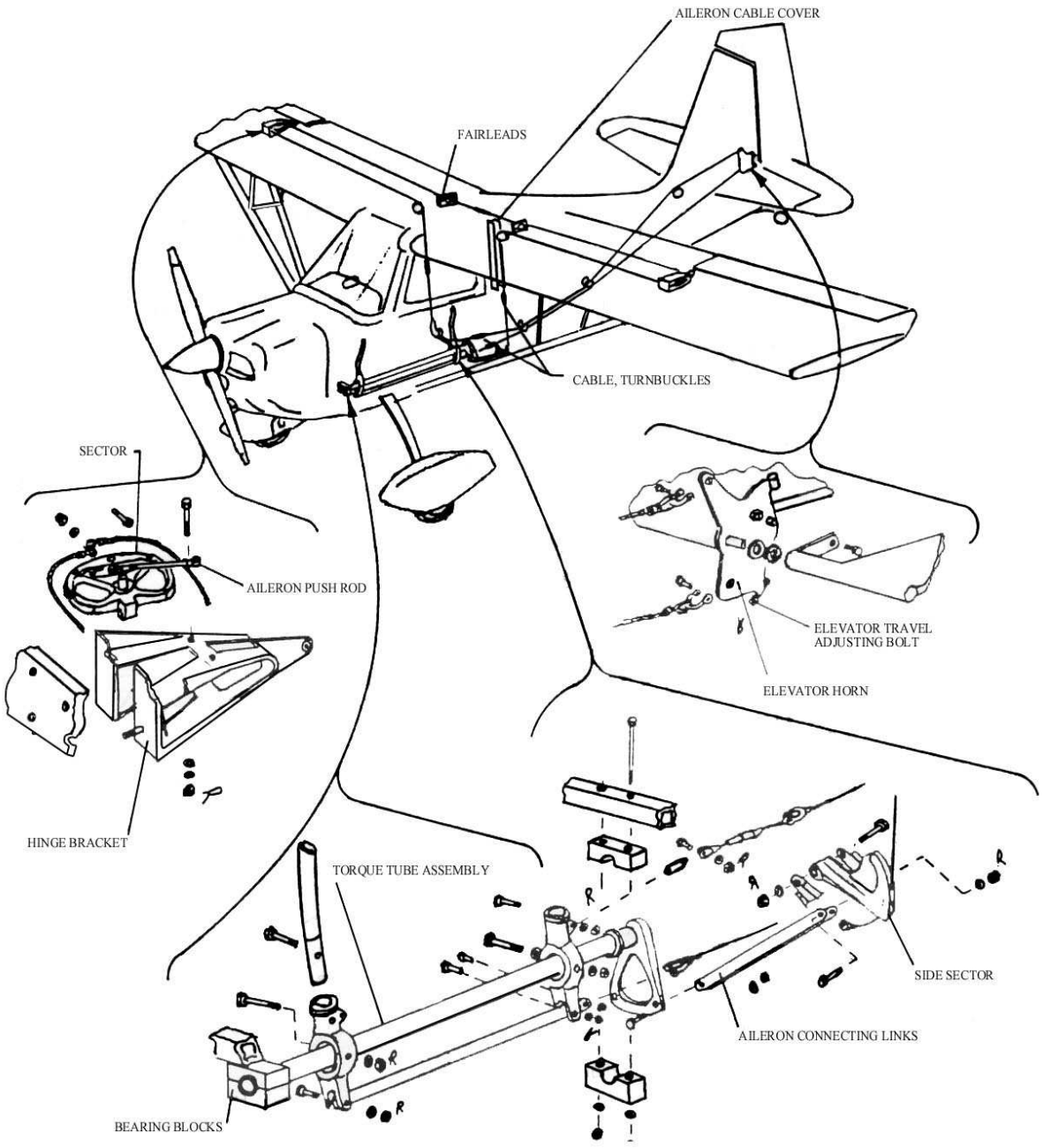

Figure 7-1, Elevator and Aileron Control System

7.5 Removal of Elevator Trim Tab Control

To remove the elevator trim tab control: (see Figure 7-2)

1. Remove top left side panel and loosen lower side panel from coil spring hangers.
2. Remove cotter pin from handle hinge bolt and hinge bolt.
3. Remove handle and friction control parts. Take note of the position of washers, grommets and leathers for reinstallation purposes.
4. Remove trim tab cables at handle connections.
5. Disconnect trim tab cables at rear turnbuckles.
6. Remove trim cable pulleys. Take note of the position of pulleys, washers and guard for reassembly.
7. Remove trim cables forward thru fairlead and grommets
8. Check all parts for wear and damage. Replace as necessary.

7.6 Removal of Rudder Pedal Assembly

To remove the rudder pedal assembly: (see Figure 7-2)

1. Remove front seat assembly per instructions.
2. Disconnect rudder pedal springs front and rear.
3. Disconnect rudder cables at rear rudder pedal and rudder.
4. Remove bushings in rudder pedals. Front pedals bushings can be pushed out, and rear pedal bushings must be pulled out after dislodging plywood floor board upwards.
5. Remove rudder pedal assembly.
6. Check all parts for wear and damage. Replace as necessary.

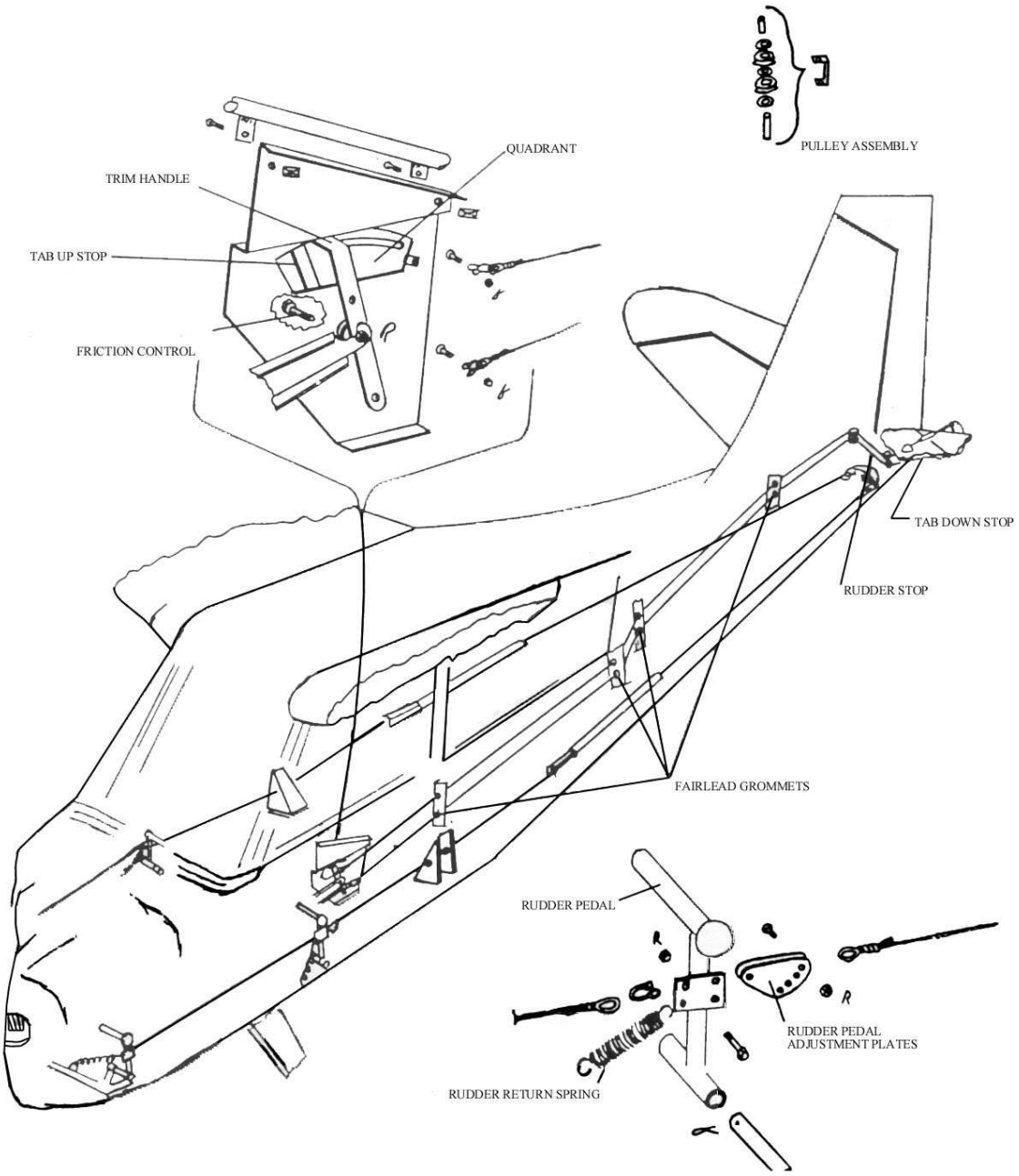

Figure 7-2, Rudder and Trim Control System

7.7 Surface Travels and Tensions

Travel limits and cable tensions for the control surfaces are listed in Table 7-1.

Table 7-1: Surface Travels and Tensions

Aileron	Up	19º	±1	Down	19º	±1
Elevator	Up	29º	±1	Down	29º	±1
Tab-Elevator	Up	18.5º	±1	Down	43º	±1
Rudder	Left	29º	±1	Right	29º	±1

NOTE: Surface travels to be measured perpendicular to hinge line.

CABLE TENSIONS (LBS)

Aileron	30 ± 5
Elevator	45 to 55
Tab-Elevator	20 ± 5
Rudder	Within 5 lbs. of each other

7.8 Installation of Aileron Controls

To install the aileron controls:

1. Install torque tube assembly in reverse order of removal. Grease end bearings (see Table 3-1).
2. Install side aileron bellcrank in reverse order of removal.
3. Install wing aileron hinge bracket and sector in reverse order of removal. Do not over tighten bolts thru spars. Cables should be connected before installing sector.
4. Route aileron actuating cable from wing thru side pulley and connect to side cable at turnbuckles.
5. Route aileron balance cable thru fuselage fairlead and connect to opposite cable at cabin center.
6. Check right and left aileron up travel, adjust to correct up travel with push rod (see Table 7-1). When up travel has been obtained, the stop on the bellcrank should contact hinge bracket housing in up position only.
7. With control stick centered adjust the two side turnbuckles so that ailerons are in an up position approximately ½" to 1".
8. Tighten center turnbuckle (balance cable) so that ailerons come down to neutral position, and cable tension is obtained (see Table 7-1).

NOTE

If cable tension is too high, loosen center turnbuckle. Then loosen side turnbuckles evenly. Retighten center and recheck tension. If cable tension is too low, loosen center turnbuckle, and then tighten side turnbuckles evenly. Retighten center and recheck tension.

9. Check aileron up travel and down (see Table 7-1).
10. Safety all turnbuckles, pushrods and cable attach nuts.

7.9 Installation of Elevator Control System and Rigging

To install the elevator control system and rigging:

1. Install elevators cables by connecting at rear stick socket and push-pull tube. Cable with the turnbuckle at end should be top cable. Route cables thru pulleys. Push-pull tube cable routes over rear top pulley. Connect cables to elevator horn after making sure that cables are not crossed or routed around fuselage members, bulkheads, or other cables.
2. With elevator in down position, draw-turnbuckles evenly tight to give proper tension (see Table 7-1).

3. Measure up travel from neutral (parallel to stabilizer). Adjust with elevator stop bolts on elevator horn (or by removing material from stop bushing). Measure travel using stabilizer surface as a base.
4. Measure down travel. Set travel with stop bolts on elevator horn (or by removing material from stop bushing).
5. Recheck tension.
6. Stick extreme locations may be moved slightly fore or aft by loosening one elevator cable turnbuckle and tightening the other. Rear stick must not contact back of front seat when in extreme forward position.
7. Safety all connections.
8. Install horn cover at rear fin post.
9. Secure stick boot (if stick is installed) or socket cover

7.10 Installation of Rudder Controls

To install rudder controls:

1. Install rudder pedals and cables in reverse order of removal. Check for binding of cables and pulleys in baggage compartment cable guard tubes.
2. Connect rudder cables at rudder. Install rudder springs, large springs on rear pedals, and smaller springs on forward pedals.
3. Check travel using angle movement jig or measure using fin surface as base. Remove or add steel material to studs on fin tube to allow proper rudder horn movement.
4. Set tension (see Table 7-1). Tension may be set up by placing main rudder cables forward connections in various locations on adjustment plates.

NOTE

Placing cable connections in other locations in plates will position rudder pedals slightly further aft.

7.11 Installation of Trim Tab Control System and Rigging

To install trim tab control system and rigging:

1. Install trim tab handle, cables and pulleys in reverse order of removal. Check for proper routing and operation of pulleys and for binding or rubbing of cables.
2. Connect cables to trim tab horn thru turnbuckles.
3. With elevator in neutral, set tension by use of turnbuckles.
4. Set trim tab handle full forward. Measure tab up travel (with respect to elevator surface) (see Table 7-1).
5. Adjust to correct value with turnbuckles.
6. Set down travel to correct value. Adjust down stop at trim tab horn to agree.
7. Recheck tension.
8. Safety all turnbuckles and attachments.
9. Check location of trim tab handle placard. Reposition placard such that with elevator and trim tab in neutral, handle indicates neutral on placard.

7.12 Surface Balancing

The elevator, rudder, and ailerons are designed with consideration to their mass distribution. The elevators incorporate a specific mass balance with lead added forward of the hinge line. The following guidelines should be followed when recover or repair is made to any control surface.

1. Verify the appropriate mass balance of the elevators per Section 7.12.1 after any repair (including fabric patching) or recover.
2. The ailerons and rudder do not have a mass balance requirement; avoid repairs that would significantly affect the mass distribution of the control surface.

3. The elevator trim tab may not be repaired by any method requiring addition of material aft of the tab hinge line. Repair the tab by bending the damaged section to the original shape. Alternatively, the skin or entire tab may be replaced.

7.12.1 Elevator Balancing Procedure

To measure the static unbalance, the surface must be mounted as shown in Figure 7-3 with hinges adjusted to minimum friction. Using a spring scale, obtain the weight in pounds (w) at a point on the trailing wedge of the surface, at a measured distance of 14.18 inches (d) from the hinge line. The static unbalance is then (w)(d) = in lbs. The allowable values for the elevators are 1 to 13.5 in lbs for left elevator and 0 to 7.94 in lbs for right elevator. Using a small measuring scale graduated in ounces and using ounce inches is recommended for necessary accuracy. If the static unbalance exceeds the required minimum, consult the factory. The elevators need to be in the following configuration for unbalance measurement.

1. Fabric covered and painted.
2. Trim tab, turnbuckles, pulleys, elevator horn stop bolts and tab stop bolts installed (left only).

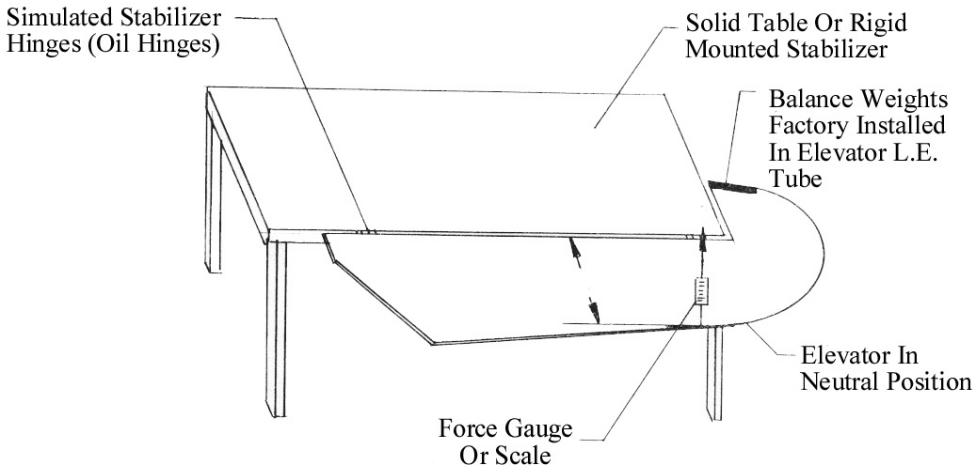

Figure 7-3, Measuring Elevator Control Surface Static Unbalance

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8.0 Landing Gear and Brake System

During normal landing and taxi operations the main gear legs act as the primary shock absorbing units and provide support for the majority of aircraft weight. The tailwheel provides for longitudinal support at the aircraft tail. Steering is accomplished through the rudder control system and interconnected tailwheel. Brakes on each main wheel give forward motion control and aid in steering.

Loads from main gear are transferred thru the inboard main attach bolt and thru the u-bolt assembly surrounding the gear leg at the outboard longeron into fuselage structure.

8.1 Removal of Main Landing Gear Leg Assembly

NOTE

Do not allow leg to rotate any direction excessively or damage may be sustained on adjacent parts.

To remove the main landing gear leg assembly:

1. Disconnect and cap the brake line at fuselage.
2. Remove belly pan.
3. Hoist or jack one side of the aircraft (refer to Section 3.3).
4. Loosen u-bolt assembly nuts and gently tap u-bolt bar out approximately 1/8 inch.
5. Remove thru bolt located at inboard end of gear leg. Gear leg may now be removed by sliding outboard and up.

8.2 Removal of Main Wheel Assembly

To remove the main wheel assembly: (see Figure 8-1)

1. Remove wheel fairings.
2. Disconnect and cap brake line at wheel cylinder.
3. Remove the two bolts holding the brake calipers against wheel disc.
4. Remove cotter pin from outboard wheel nut.
5. Hoist aircraft (refer to Section 3.3).
6. Remove outboard wheel nut.
7. Slide wheel and tire assembly off end of axle.

8.3 Disassembly of Main Wheel

To disassemble the main wheel: (see Figure 8-1)

1. Deflate tire completely by removing tire tube valve stem.
2. Remove the three wheel thru bolts.
3. Break tire loose from wheel rim and disassemble. Protect wheel rims from abrasive damage.
4. Remove felt keeper rings, remove felt and remove bearing races.
5. Inspect for tire wear and replace when tire is worn smooth, uneven and smooth or is cut, cracked or bruised.
6. Clean bearing races.
7. Inspect and replace if rollers or cones are scored or excessively worn.
8. Replace felt seals if they have become hard or dirty.

8.4 Replacement of Brake Linings

To replace the brake linings: (see Figure 8-1)

1. Visually inspect brake while it is installed on airplane. No adjustment of brake clearance is necessary.

NOTE

Linings should be replaced with new brake linings when the thickness of any one segment is 3/32 inch or less, or the lining is worn uneven.

2. Remove the brake back plates and spacer by removing the two bolts from the brake assembly.
3. Move the balance of the brake assembly away from the brake disc far enough to remove the brake pressure plate. (It will not be necessary to disconnect the hydraulic lines).
4. Remove the used linings by drilling and punching out the old rivets. Install the new brake linings and rivets.
5. Move the balance of the brake assembly away from the brake disc and re-install the brake pressure plate. Clean the tube guide pins before installation.
6. After positioning brake assembly on the brake disc, bolt the brake back plate and spacer to the balance of brake assembly with the two bolts.

NOTE

The first three or four brake applications, after brake relining, should be moderate to allow the resins in the lining to burn out slowly. The burning out of resins is also the determining factor in the useful life of the brake lining and if high speed stops are avoided, whenever possible, brake lining life and brake performance will be considerably improved.

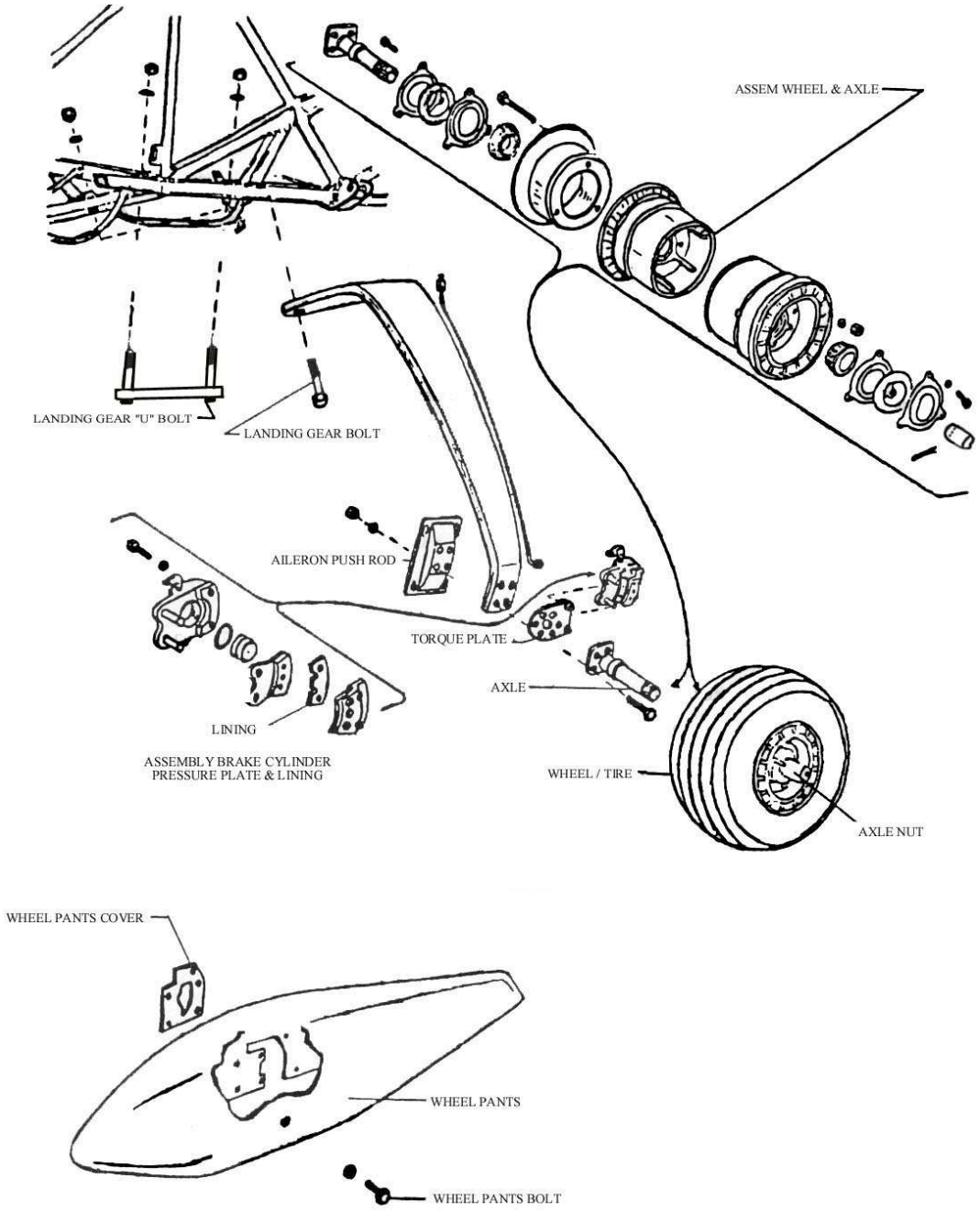

Figure 8-1, Landing Gear and Wheel Assembly

8.5 Removal of Tail Wheel Assembly

To remove the tailwheel assembly:

1. Support aircraft just forward of tailwheel spring forward thru bolt. Avoiding damage to bottom center stringer.
2. Disconnect tailwheel steering springs by holding rudder extreme left or right.
3. Remove single bolt holding wheel casting on to the leaf springs.
4. Disassemble tailwheel.

8.6 Removal of Tail Wheel Spring

To remove the tailwheel spring:

1. Remove u-bolt assembly support and forward single attach bolt.
2. Single bolt is accessible thru left side inspection opening.
3. Take note of the position of springs and rubber pad.

8.7 Removal of Brake Hydraulic System

To remove the brake hydraulic system:

1. Brake system is accessible thru wraparound cowl lower opening. Disconnect and cap hydraulic lines at master cylinders.
2. The master cylinder can now be removed by disconnecting from brake pedal and rear mounting support.
3. Take note of the position of bolt heads, washers and rear pedal connecting rod.
4. On aircraft equipped with a hydraulic parking brake valve, remove the valve by disconnecting parking brake control wire, disconnecting hydraulic lines and removing floorboard supporting bolts.
5. Cap or plug all open hydraulic lines.

8.8 Replacement of O-Rings in Parking Brake Valve

To replace the o-rings in parking brake valve:

1. Remove snap ring from shaft end opposite the control arm.
2. Take note of the direction of arm and cam assembly with respect to valve body.
3. Remove arm and cam assembly.
4. Remove inlet and outlet fittings.
5. Clean in suitable solvent.
6. Replace o-rings on cam assembly and in ball seats in outlet fittings.

NOTE

Use caution when installing cam assembly into body so as not to cut o-rings on sharp machined surfaces.

7. Install cam assembly in reverse order of disassembly.

8.9 Replacement of O-Rings in Master Cylinder

To replace the o-rings in the master cylinder:

1. Remove snap ring on forward end of body.
2. Remove piston rod assembly.
3. Thoroughly clean all parts with suitable solvent.
4. Replace any defective parts.
5. Replace all o-rings and dyna-seal.
6. Reassemble.

8.10 Installation of Master Cylinder

To install the master cylinder:

1. Install master cylinder in reverse order of removal.

8.11 Installation of Parking Brake Valve

To install the parking brake valve:

1. Install valve in reverse order of removal.
2. Connect park brake control wire temporarily. Check travel on control to maintain 2 inch travel on control.
3. Connect all hydraulic lines.

8.12 Assembly and Installation of Main Wheel

To assemble and install the main wheel:

1. Pack bearings with grease and dust inside of tire with tire talc.
2. Install tire and tube on proper wheel halves. Install three thru bolts and nuts. Install bearings, felts and retainer rings.
3. Reinstall wheel on axle (axle, brake torque plate, and wheel pant mounting bracket must be attached to gear leg previous to installing wheel assembly).
4. Install axle nut to allow wheel to turn free yet not fit loose on axle. Cotter key nut. Install dust cover or wheel pant.

8.13 Installation of Main Gear and Wheel Assembly

To install the main gear and wheel assembly:

1. Inflate tire to 24 ± 2 psi (6.00 x 6 tires).
2. Position upper gear leg thru loosened u-bolt. Install MS20007 thru-bolt with MS20002-C7 washer from bottom side thru gear leg and fuselage frame. Countersink on washer to face bolt head.
3. Install BAC-N10-HR7 nut and MS20002-7 washer on thru bolt.
4. Torque u-bolt to 450-500 in lb with gear off ground.
5. Install brake line at fuselage bulkhead fitting and at brake wheel cylinder.
6. Bleed brakes (refer to 3.10).

8.14 Replacement of Gear Leg

Replace Gear leg if:

1. Gear leg should be replaced if damaged, nicked or scarred.
2. With aircraft loaded and rolled forward approximately 20 feet, camber angle should not exceed -5º (top of wheel inboard). Replace gear leg if angle exceeds this amount.

CAUTION

Handle gear leg carefully at all times to avoid damage to edges and surfaces. The gear leg is heat-treated and must not be repaired by welding, drilling, bending or machining.

8.15 Alignment of Wheel

To align the wheel for toe-in: (see Figure 8-2)

1. Inflate tires to 24 ± 2 psi.
2. With airplane longitudinally level, lay straight edge across aft face of tires. Block straight edge up to approximate centerline of tire if necessary.
3. Shim straight edge aft to achieve same measurement from plumb line to straight edge on both wheels.
4. Using large square, place square against straight edge and tire surfaces.
5. Determine angle difference if wheel is not perpendicular or has more than 1º toe in.
6. If toe exceeds above values in either direction, add sufficient shims between gear leg and brake torque plate to correct. No more than three shims should be installed. Wheel and axle must be removed to install shims.

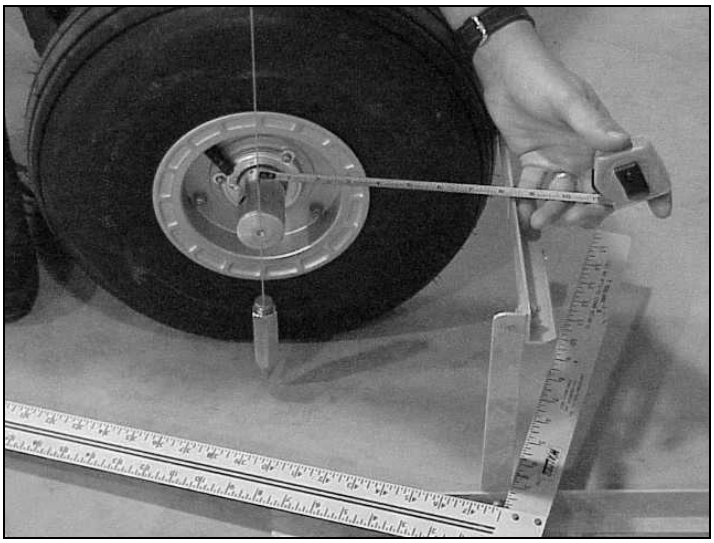

Figure 8-2: Measuring Gear Alignment

8.16 Installation of Tail Wheel Assembly

To install the tail wheel spring:

1. Install tail wheel spring in reverse order of removal.
2. Install tail wheel.
3. Connect steering spring to rudder horn and tail wheel horn.

NOTE

Tail wheel must be parallel to rudder surface. If not, the aluminum steering horn at bottom of rudder post should be removed, replaced and realigned by match drilling horn with rudder.

9.0 Powerplant

The Decathlon is equipped with a Lycoming fuel injected engine. The propeller is constant speed. For detailed specifications see Sections 2.3 to 2.5.

9.1 Powerplant Instrument Markings

Table 9-1: Instrument Markings (AEIO-360)

Tachometer HC-C2YR-4CF/FC7666A-2	Green Arc Red Arc Green Arc Red Arc Red Radial	500-2000 RPM 2000-2250 RPM 2250-2600 RPM 2600-2700 RPM 2700 RPM
Tachometer MTV-15-B-C/C188-34, MTV-9-B-C/C188-18( )	Green Arc Red Arc Red Radial	500-2600 RPM 2600-2700 RPM 2700 RPM
Oil Temperature	Green Arc Alternate Green Arc Red Radial	100°-245°F 120°-245°F 245°F
Oil Pressure	Green Arc Yellow Arc Red Radial	60-100 psi 25-60 psi 25 psi, 100 psi
Fuel Pressure	Green Arc Red Radial	14-45 psi 14 psi, 45 psi
Manifold Pressure	Red Radial	29 in-Hg

Table 9-2: Instrument Markings (AEIO-390)

Tachometer MTV-15-B-C/C193-25	Green Arc Red Radial	500-2700 RPM 2700 RPM
Oil Temperature	Green Arc Alternate Green Arc Red Radial	120°-235°F 100°-235°F 235°F
Oil Pressure	Green Arc Yellow Arc Red Radial	60-100 psi 25-60 psi 25 psi, 100 psi
Fuel Pressure	Green Arc Red Radial	14-45 psi 14 psi, 45 psi
Manifold Pressure	Red Radial	29 in-Hg

9.2 Removal of Cowling

To remove the cowling (AEIO-360):

1. Remove screws from cowl split and firewall attach points.
2. Remove top half of cowl.
3. Disconnect landing light wires at oil dipstick access door.
4. Remove screws from lower cowl firewall attach points and remove lower cowl.

To remove the cowling (AEIO-390):

1. Loosen eight cowl door camlock fasteners.
2. Disconnect landing light connector and remove two cable ties securing harness to left side of lower cowling.
3. Remove seven lower cowling to nose bowl screws.
4. Remove eight lower cowling to firewall screws.
5. Remove lower cowling.

6. Remove four upper cowling to nose bowl screws.
7. Remove four upper cowling to firewall screws.
8. Remove upper cowling.

9.3 Removal of Propeller Spinner

To remove the propeller spinner:

1. Remove supporting screws.
2. Remove spinner.

9.4 Removal of Propeller

To remove the fixed pitch propeller:

1. Remove six bolts from prop hub attach.
2. Remove spinner bulkhead.
3. Remove propeller.
4. Remove propeller spinner backplate.

To remove the constant speed propeller:

1. Loosen six nuts on propeller flange. These nuts are pinned to the studs.
2. Pull propeller from engine shaft.

9.5 Removal of Engine

To remove the engine (AEIO-360):

1. Shut off fuel valve in cabin.
2. Disconnect battery from electrical system.
3. Disconnect the following controls, hoses, etc.:
    a. Throttle control at injector and engine mount clamp.
    b. Injector alternate air control from air box and engine mount clamp.
    c. Mixture control from injector and engine mount clamp.
    d. Fuel line at injector inlet.
    e. Cabin heater (front and rear heater) flex hoses at firewall.
    f. Tachometer shaft from rear of engine.
    g. Oil temperature gauge wire or line at rear of engine.
    h. Oil pressure gauge line at firewall.
    i. Electrical wires from starter and alternator. Disconnect wires from wire clamps on engine.
    j. Magneto ground leads from magneto, one on each magneto. (Identify for ease of installation).
    k. Vacuum pump hoses at vacuum pump rear of engine, if installed.
    l. Disconnect oil hose lines at engine sump.
    m. Disconnect breather line at engine sump.
    n. Disconnect governor control at governor and pushrod attachment.
4. Support engine with engine hoist (approximate engine weight 300 pounds).
5. Remove four bolts at engine mount-firewall attach.
6. Remove engine with engine mount.

To remove the engine (AEIO-390):

1. Shut off fuel valve in cabin.
2. Disconnect battery from electrical system.
3. Disconnect the following controls, hoses, etc.:
    a. Throttle control and injector and engine sump.
    b. Mixture control at injector and engine sump.
    c. Alternate air control from air box valve and clamp.

d. Fuel line engine driven pump inlet.
e. Fuel pressure sender wires from sender and mount.
f. Manifold pressure line at firewall.
g. Cabin heater flex hoses at firewall.
h. Tachometer shaft from rear of engine.
i. Oil temperature gauge wire at rear of engine.
j. Oil pressure line at sender
k. Electrical wires from starter and alternator. Disconnect wires from clamp on engine and mount.
l. CHT and EGT probe wires. Disconnect probe connection or remove probe from engine.
m. Magneto ground and shield leads at magneto, left and right.
n. Vacuum pump hoses at rear of engine if installed.
o. Disconnect oil hose lines at engine sump.
p. Disconnect breather line at engine sump.
q. Disconnect governor control at governor and pushrod attachment.

4. Support engine with hoist (approximate weight 350 lbs).
5. Remove four bolts at engine mount-firewall attach.
6. Remove engine with engine mount.

9.6 Removal of Engine from Engine Mount

To remove the engine from engine mount (AEIO-360):

1. Remove electrical ground wire from right side of mount.
2. Remove four engine mount-engine attach bolts.
3. Remove engine from mount.

NOTE

Engine may be removed directly from engine mount by omitting operations (5) and (6) in Section 9.5 and proceeding with Section 9.6, leaving the engine mount attached at firewall.

To remove the engine from engine mount (AEIO-390):

1. Remove electrical ground wire from right side of mount.
2. Remove oil cooler hoses as necessary.
3. Disconnect ignition harness at plugs, rear engine baffles, and cylinder clamps.
4. Disconnect fuel pressure line at sender and remove mount clamp.
5. Disconnect fuel line at fuel pump outlet.
6. Remove fuel pump blast tube.
7. Remove four engine mount-engine attach bolts.
8. Remove engine from mount.

NOTE

Engine may be removed directly from engine mount by omitting operations (5) and (6) in Section 9.5 and proceeding with Section 9.6, leaving the engine mount attached at firewall.

9.7 Installation of Engine Mount on Firewall

To install the engine mount on firewall with or without engine attached:

1. Install mount on mounting bolts.
2. Install washer and nut, torque to 450-500 in lb.

9.8 Installation of Engine

To install the engine (AEIO-360):

1. Place engine on hoist and lift into approximate position at mount.
2. Install rubber shock mounts and mounting bolts in proper position on all four engine lugs.
3. Insert mounting bolts with rubber shock mount into engine mount attach bushings.
4. Install washers and nut on bolt, tighten and torque to 35 ft lb (see Figure 9-1).

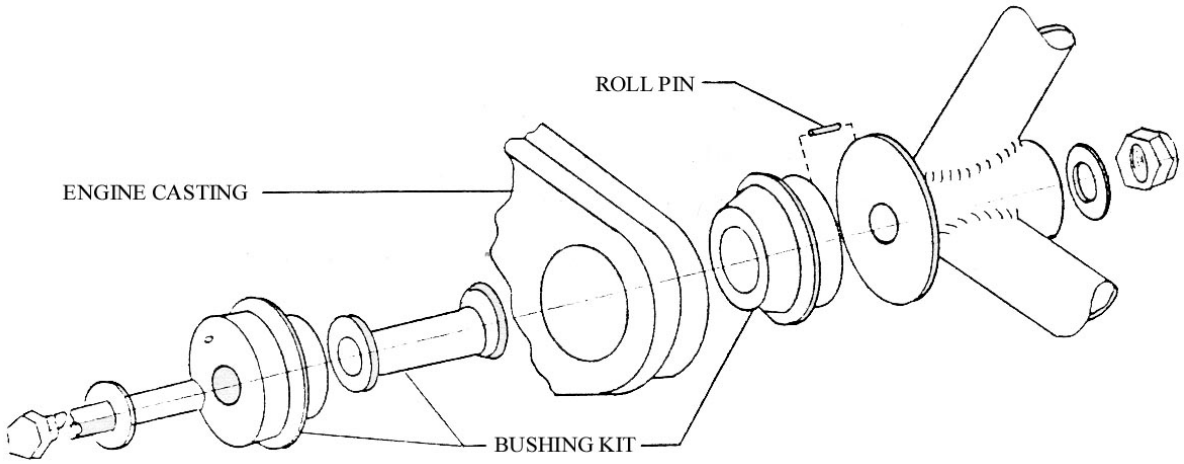

Figure 9-1, Installation Engine Isolator

5. Connect the following controls, hoses, etc.:
    a. Vacuum pump hoses at vacuum pump (rear of engine).
    b. Magneto ground leads from magnetos.
    c. Electrical wires to starter and to alternator. Connect wires to clamps on engine.
    d. Oil pressure gauge line at rear of engine.
    e. Oil temperature gauge line at rear of engine.
    f. Tachometer shaft from rear of engine.
    g. Cabin heater (front and rear heaters) flex hoses at firewall.
    h. Fuel line to injector inlet.
    i. Mixture control to engine mount clamp and to mixture arm on injector. Insure full movement at control panel gives full movement at injector.
    j. Alternate air control to engine mount clamp and to air box arm. Insure full movement at control panel gives full movement at air box.
    k. Throttle control to engine mount clamp and to throttle arm on injector. Insure full movement at control panel gives full movement at injector arm.
    l. Electrical ground wire to right side of engine mount.
    m. Conduct engine run-up per Airplane Flight Manual.

To install the engine (AEIO-390):

1. Place the engine on hoist and lift into approximate position at mount.
2. Install engine isolators and mounting bolts as shown in Figures 9-2 and 9-3.
3. Torque mounting bolts to 450-500 in-lb.
4. Connect the following controls, hoses, etc:
    a. Throttle control at injector and engine sump.
    b. Mixture control at injector and engine sump.
    c. Alternate air control from air box valve and clamp.
    d. Fuel line at engine driven pump inlet and outlet.
    e. Fuel pressure sender wires from sender and mount.
    f. Fuel pressure line at sender, clamp line to engine mount.
    g. Manifold pressure line at firewall.

h. Cabin heater flex hoses at firewall.
i. Tachometer shaft at rear of engine.
j. Oil temperature gauge wire at rear of engine.
k. Oil pressure line at sender.
l. Electrical wires at starter and alternator. Clamp wires at engine sump and mount.
m. CHT and EGT probe wires.
n. Magneto ground and shield leads at magneto, left and right.
o. Vacuum pump hoses at rear of engine if installed.
p. Governor control at governor and pushrod attachment.
q. Electrical ground wire from right side of mount.
r. Engine breather at rear of engine.
s. Oil cooler hoses.
t. Ignition harness at plugs, rear engine baffles, and cylinder clamps.
u. Fuel pump blast tube at rear of engine.
v. Conduct engine run-up per Airplane Flight Manual.

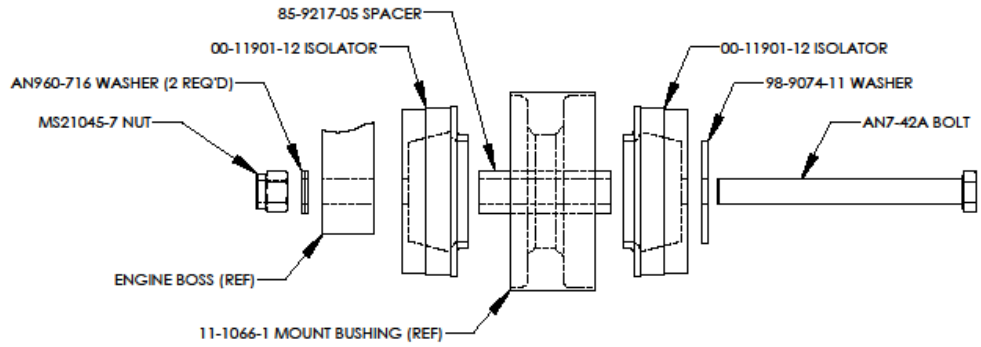

Figure 9-2, Engine Isolator Upper

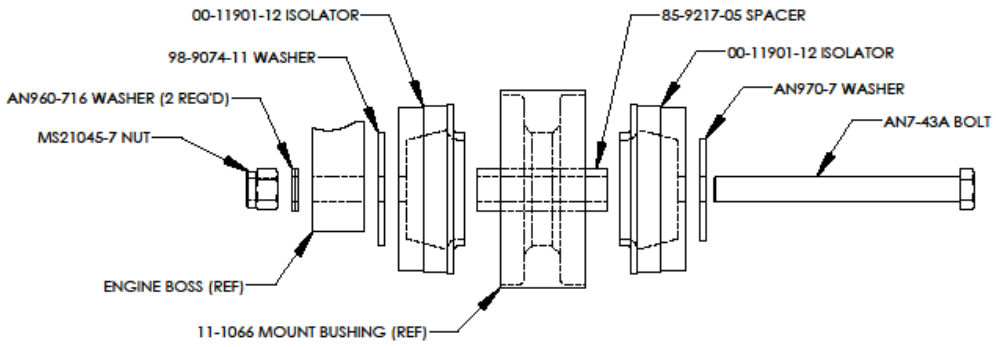

Figure 9-3, Engine Isolator Lower

9.9 Installation of Constant Speed Propeller

To install the propeller: (see Figure 9-4)

1. Installation of propeller is most easily accomplished with the cowling removed and with the spinner back plate loosened from its attach bolts.
2. Clean crank flange and propeller mating surfaces thoroughly.
3. Push propeller onto crank flange.

NOTE

Prop will mate with flange bushings in two positions only. Either position is satisfactory.

4. Torque prop attachment studs to 60-70 ft. lbs.
5. Safety studs with steel safety wire thru roll pins in stud nut.
6. Reposition spinner back plate and secure nuts, torque to 22 ft. lbs.
7. Install cowling and spinner.

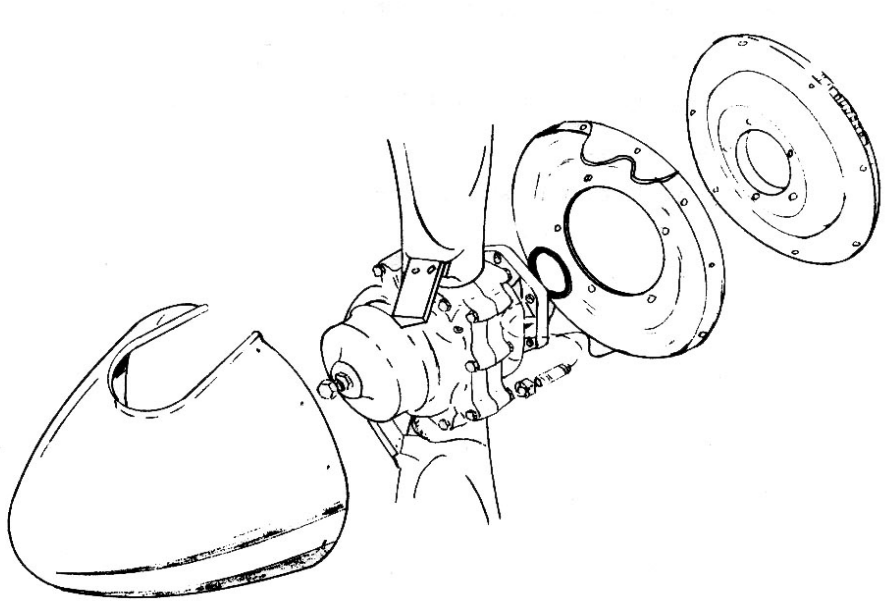

Figure 9-4,Installation of Propeller and Spinner - Constant Speed

9.10 Installation of Cowling

To install the cowling (AEIO-360):

1. Put lower cowl in position, insuring that the rubber duct which connects the air filter to the airbox is installed over the connecting flange. Attach the ten screws at firewall. Do not tighten.
2. Connect landing light wire at the firewall.
3. Position top half of cowl over engine. With all screws and fasteners in place, adjust cowl if needed to center propeller shaft in the propeller shaft opening in cowl. Tighten all cowl fasteners and aft lower cowl screws.
4. If cowling is equipped with a ground adjustable cowl flap, refer to placards and flight manual for proper position.

To install the cowling (AEIO-390):

NOTE:

Cowling to nose bowl and cowling to firewall screws should not be tightened during initial installation. Tighten screws after cowl door camlocks are secured and cowling is in desired position.

1. Position lower nose bowl behind spinner and over air filter housing.
2. Position upper nose bowl behind spinner and forward of lower nosebowl.
3. Secure upper and lower nosebowl with eight screws and fiber washers.
4. Ensure front and side baffle seals are positioned upward and forward.
5. Position upper cowling.
6. Install four screws and fiber washers to front of upper cowl. Install four screws and countersunk washers to rear of upper cowling.
7. Ensure rear baffle seal is positioned forward.
8. Position lower cowling.
9. Install eight screws and countersunk washers to rear of lower cowl. Install seven screws and fiber washers to front of lower cowling.
10. Secure eight cowl door camlock fasteners. Ensure rear baffle seal is positioned forward.
11. Ensure cowling to air filter housing clearance. Air filter housing should be centered in nosebowl opening.
12. Tighten all cowling screws.
13. Unsecure four left cowl door camlock fasteners.
14. Connect landing light molex connector.
15. Secure landing light harness to lower cowling with two cable ties. Ensure harness is routed clear of engine exhaust components.
16. Secure four left cowl door camlock fasteners. Ensure rear baffle seal is positioned forward.

9.11 Fuel Servo Maintenance

In general little attention is required between overhauls. Check the following items during periodic inspection of engine:

1. Check tightness and lock wire of all nuts and screws which fasten the fuel servo to the engine.
2. Check all fuel lines for tightness and evident of leakage.
3. Check throttle and mixture control rods and levers for travel, tightness and lock wiring.
4. Clean the fuel inlet screen.
5. Check air box for wear and full travel of alternate air door.
6. Check adjustment of idle mixture and idle speed.

9.12 Adjustment of Idle Mixture

To adjust the idle mixture:

1. After starting the engine, operate the engine for at least 2 minutes at 1500 RPM to ensure proper warm-up. Set mixture control to full rich.
2. Reduce the throttle to 700 RPM.
3. When idling speed has been stabilized, move the cockpit mixture control lever with a smooth, steady pull into the IDLE CUT-OFF position and observe the tachometer for any change during the leaning. Caution must be exercised to return the mixture control to the FULL-RICH position before RPM can drop to a point where the engine stops. An increase in RPM while leaning out indicates the idle mixture is rich of best power. An immediate decrease in RPM (if not preceded by a momentary increase) indicates that the idle mixture is lean of best power.
4. The desired idle setting is a compromise between one that is rich enough to provide acceleration under all conditions and lean enough to prevent spark plug fouling or rough operation. A rise of 25-50 RPM will satisfies both of these conditions.
5. If step 3 indicates that the idle adjustment is too rich or too lean, turn the idle mixture adjustment tone or two notches in the direction required for correction and check this new position by repeating step 3. Make additional adjustments if necessary.
6. After each adjustment clear the engine by running at approximately 2100 RPM before making mixture checks.
7. The idle mixture adjustment is made by the lengthening (richening) or shortening (leaning) of the linkage between the throttle level an idle valve lever. The center screw assembly has right hand threads on both ends but one end has a No. 10-24 thread and the other end has a No. 10-32 thread.

For easy reference, consider only the coarse thread end. When it is turned out of its block, the linkage becomes longer and a richer mixture is provided. When it is turned into its block, the linkage is shortened a leaner mixture is provided.

8. A major adjustment is available for use when the center screw bottoms out on either of the blocks. If the idle adjustment is almost satisfactory, measure the distance between the two blocks. Disconnect the spring from the most accessible linkage pin and remove the pin. Turn the block and the adjustment screw until the adjusting wheel is centered and the distance between blocks is as previously measured. There is now additional adjustment range and the reference point is retained.
9. Make the final idle speed adjustment to obtain the desired idling RPM with closed throttle.
10. If the idle speed is not stable, check the idle linkage; any looseness in this linkage will cause erratic idling. Allowance should be made for the effect of weather conditions upon idling adjustment. The relationship of the aircraft to the direction of the prevailing wind will have an effect on the propeller load and its RPM; hence, it is advisable to make the idle setting with the aircraft crosswind.

9.13 Adjustment of Engine Idling Speed

To adjust the engine idling speed:

1. Pull back the cockpit throttle control lever until it is fully aft and in the closed position. Observe the engine speed on the tachometer.
2. Adjust the idle adjustment screw to obtain from 600 to 700 RPM. Rotate screw clockwise to increase engine speed. The screw is located on the throttle arm.

9.14 Exhaust System (AEIO-360)

The exhaust system should be checked prior to each flight and a thorough inspection at each 50 and 100 hour inspections. Check the exhaust system for the following:

1. Determine the condition of the flange gaskets, and that the flange nuts are tight (80-90 in lbs).
2. Check exhaust stacks for cracks that might have developed at the exhaust flange and stack joints or around any welded and stressed areas.
3. Remove the heat shrouds from around exhaust heater to determine the condition of shroud and heater.
4. Tap the muffler enough to listen for any loose or broken interior parts. If there is a reason to believe that the interior of the muffler might be damaged, remove from stacks and inspect through the inlet and outlet holes. Using a flashlight, view up the interior of exhaust stack. Observe if flame tube of muffler is missing or damaged, overhaul muffler if core is missing.

9.15 Exhaust System (AEIO-390)

To remove exhaust:

1. Remove lower cowling
2. Remove EGT probes and clamps if installed
3. Loosen scat tubing clamps. Disconnect scat tubing from the exhaust shroud and remove clamps
4. Remove lower collector hanger bolt and hardware
5. Remove eight engine exhaust riser nuts and hardware
6. Remove exhaust and exhaust gaskets from engine

To install exhaust:

1. Lift exhaust into position over exhaust riser studs. Position exhaust gaskets between riser flanges and the engine exhaust ports.
2. Loosely install eight exhaust riser nuts, washers, and lock washers
3. Position exhaust such that the shroud opening is centered on the airbox alternate air flange.
4. Tighten exhaust riser nuts; torque to 80-90 in-lb
5. Secure collector hanger bolt using high temperature nut

6. Remove ten lower shroud screws. Verify that there is .060 in or greater clearance between exhaust shroud and alternate air flange. Reinstall ten shroud screws.
7. Install scat tubing to exhaust shroud flanges; secure with clamps
8. Install EGT probes and clamps if equipped
9. Verify 1.50 inch clearance is maintained between exhaust and all fuel and oil lines
10. Install lower cowling

To disassemble exhaust:

1. Remove exhaust from engine
2. Remove exhaust shroud cover, twenty screws
3. Mark tubes, collector, and shroud panels for orientation during reassembly with permanent marker. It is recommended to label each tube with the cylinder number and arrow showing the flow direction.
4. Remove six slip joint bolts and disassemble exhaust.

To assemble exhaust:

The standard slip joint connection is shown in Figure 9-6. Exhaust tubes should insert 1.81 inches into all slip joints. The distance between tabs and slip joint tubes is 0.19 inches. Do not over tighten bolts.

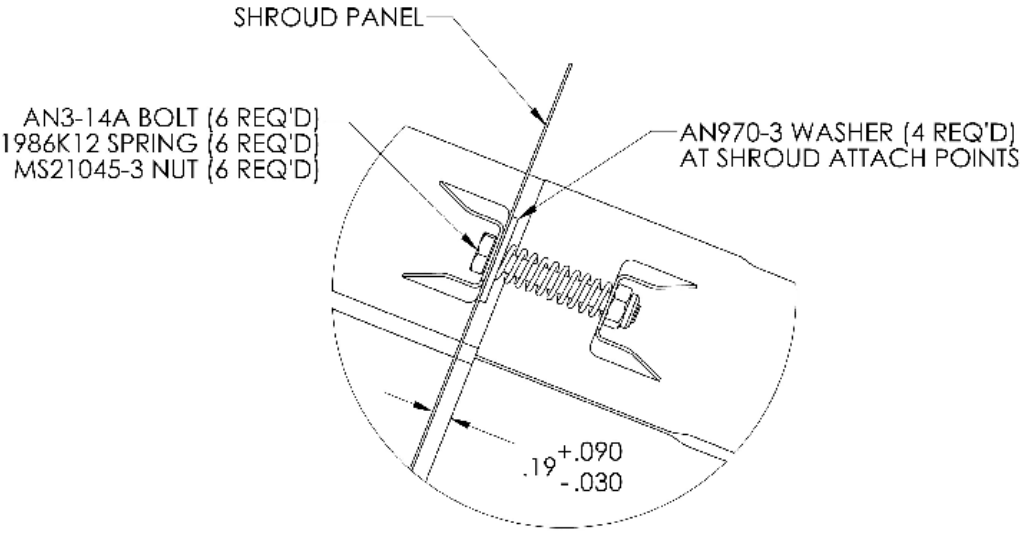

Figure 9-5, Exhaust Slip Joint

1. Lubricate all slip joints with Nickel based anti-seize MIL-A-907 or equivalent.
2. Working from the collector forward, insert exhaust tubes into collector. Shroud panels should be installed concurrently with this step. The #3 and #4 cylinder tubes must be inserted through the shroud openings. The #1 and #2 cylinder tubes may be oriented later.
3. Secure #1 and #2 exhaust tubes to the collector as shown in Figure 9-6.
4. Insert exhaust risers into left and right side slip joints.
5. Secure #1, #2, #3, and #4 cylinder risers as shown in Figure 9-6.

9.16 Spark Plugs

To remove spark plugs:

1. Loosen the coupling nut on the ignition cable and remove the terminal insulator from the spark plug barrel well.

CAUTION

Use a 7/16" wrench to prevent spark plug lead from twisting. When removing the terminal insulator from the spark plug, use extreme care to withdraw the terminal straight from the spark plug barrel. Any misalignment could break the insulator or spring or scratch the insulator or ceramic insulation in the spark plug, necessitating replacement.

2. Remove the spark plugs, do not allow foreign objects to enter the spark plug holes. Visually inspect each plug for the following non-repairable defects:
    a. Severely damaged shell or shield threads nicked up, stripped or cross-threaded.
    b. Badly battered or rounded shell hexagons.
    c. Out-of-round or damaged shielding barrel.
    d. Chipped, cracked or broken ceramic insulator portions.
    e. Badly eroded electrodes worn to approximately 50% of original size.
3. Clean the spark plugs, removing carbon and foreign deposits.
4. Test the spark plugs both electrically and for resistance. Set the electrode gap at manufacturers specifications.

NOTE

Before reinstalling spark plugs ascertain that the threads within the cylinder are clean and not damaged.

5. Apply anti-seize compound sparingly on the threads, install gasket and spark plugs. Torque to 35 ft. lbs. per Lycoming SI-1042 and carefully install leads.

9.17 Air Filter

To remove air filter:

1. Remove four allen screws securing air filter housing.
2. Remove air filter housing.

To install air filter:

1. Inspect condition housing gasket and filter screen
2. Place air filter housing over opening, housing angles to be positioned upward.
3. Secure air filter housing with four allen screws. Tighten until gasket is seated and approximately 50% compressed

To remove air filter element:

1. Remove four screws securing grill to housing, lift grill from housing.
2. Lift filter element from housing

To install air filter element:

1. Inspect condition of filter screen
2. Place filter in housing. Engine side of the filter is marked and can be identified by fine cell foam.
3. Assure element and element corners are fully seated in housing
4. Install grill with four screws

9.18 Oil Pressure Relief Valve

The function of the oil pressure relief valve, which is located just forward of the upper right engine mounting lug is to maintain engine oil pressure within specified limits by withdrawing a portion of the oil from the circulating system and returning the oil to the sump should the pressure become excessive. This valve is adjustable. Turn clockwise to increase pressure, turn counter clockwise to decrease pressure

Particles of metal or other foreign matter lodged between ball and seat will result in a drop in oil pressure. Disassemble, inspect and clean the relief valve if excessive pressure fluctuations are noted.

NOTE

The oil pressure relief valve should not be confused with the oil cooler by-pass valve, which is located on the oil pressure screen housing mounting pad. The sole purpose of the by-pass valve is to serve as a safety measure, permitting pressure oil to by-pass the oil cooler entirely in case of an obstruction within the cooler.

9.19 Oil Screen (AEIO-360)

One of the oil screens is located in the dome shaped housing with oil temperature above and between the magnetos; the other screen is located in the lower aft oil sump. These screens should be cleaned at each oil change to remove any accumulation of sludge and to examine for metal fillings or chips. If metal particles are found in the oil screen, the engine should be examined for internal damage.

To remove the oil screen:

1. Remove the pressure screen, carefully remove the oil temperature bulb and the cap screws securing the housing.
2. With the housing and screen removed, clean and inspect both items, check the mating surface of the housing and accessory case for gasket particles.
3. Insert the screw into the housing so that the screw fits flush with the housing base. Using a new gasket, secure the housing to its mounting pad and torque cap screws to 75 in lb.

9.20 Oil Filter

The oil filter is located remotely on the firewall (AEIO-360) or on the rear of the engine (AEIO-390). The oil filter should be replaced at each oil change to remove any accumulation of sludge and to examine for metal fillings or chips. If metal particles are found in the oil filter, the engine should be examined for internal damage.

If equipped with an optional remote oil filter use only a Champion CH480109-1, CH48108-1, or equivalent filter with an internal bypass (AEIO-360).

Use only a Champion CH48108-1 or equivalent filter with an internal bypass. (AEIO-390)

To remove the oil filter:

1. Remove safety wire securing filter
2. Puncture upper filter to allow oil to drain prior to removal of filter (AEIO-390)
3. Remove and inspect filter.

To install the oil filter:

1. Lubricate oil filter base gasket with clean engine oil
2. Install filter on adapter assembly, torque to 16-18 ft-lb.
3. Safety filter to adapter assembly

9.21 Oil Cooler

During each engine overhaul, at indications of high oil temperatures or during a 500 hour inspection, the oil cooler should be removed, cleaned and checked for damaged fins and cells. When replacing the cooler, properly align mounting bolts and oil line connections such that cooler will not be damaged. While the oil cooler is removed, the oil lines should be disconnected and flushed.

NOTE

The AEIO-360 has a single oil cooler which is mounted to the left rear engine baffle. The AEIO-390 has two oil coolers, one mounted to each of the rear engine baffles.

When conducting a routine engine inspection, the oil cooler, lines and fittings should be checked for the following:

1. Oil cooler line attachments should be examined to be certain that all are tight and there is no indication of leakage.
2. Oil lines must have adequate clearance to adjacent parts and be properly aligned.
3. Oil cooler should be visually checked for leakage, distorted cells or blockage.
4. Cooling fins should be clean and undamaged.

To remove the oil cooler:

1. Disconnect inlet and outlet hoses from oil cooler
2. Remove the four bolts and spacers fastening the cooler to the engine baffle
3. Remove oil cooler.

To install the oil cooler:

1. Attach oil cooler to engine baffle with four bolts (spacers installed between flanges of cooler)
2. Connect inlet and outlet hoses.

9.22 Recommendations for Changing Oil

If an additive oil is used in a new engine, or a newly overhauled engine, high oil consumption might possibly be experienced. The anti-friction additives of some of these oils will retard the break-in of the piston rings and cylinder walls. This condition is easily corrected by the use of straight mineral oil until normal oil consumption is obtained, then change to the additive type.

In engines that have been operating on straight mineral oil for more than 100 hours, a change to detergent oil should be made with a degree of caution, the cleaning action of a detergent oil will tend to loosen sludge deposits and cause plugged oil passages. If an engine has been operating on straight mineral oil and is known to be in excessively dirty condition, the switch to detergent oil should be deferred until after the engine is overhauled.

When changing from straight mineral oil to detergent oil, the following precautionary steps should be taken:

1. Do not add detergent oil to straight mineral oil. Drain the straight mineral oil from the engine and fill with detergent oil.
2. Do not operate the engine longer than five hours before the first oil change.
3. Check all oil screens for evidence of sludge or plugging. Change oil every ten hours if sludge conditions are evident. Resume normal oil drain periods after sludge conditions improve.

9.23 Engine Breather System

The engine breather system is equipped with Lycoming/Christen oil system. Figure 9-6 and Figure 9-7 shows schematics of oil routing and breather system for normal and inverted flight. Refer to Lycoming/Christen operating manuals for operating, maintenance, and trouble shooting instructions.

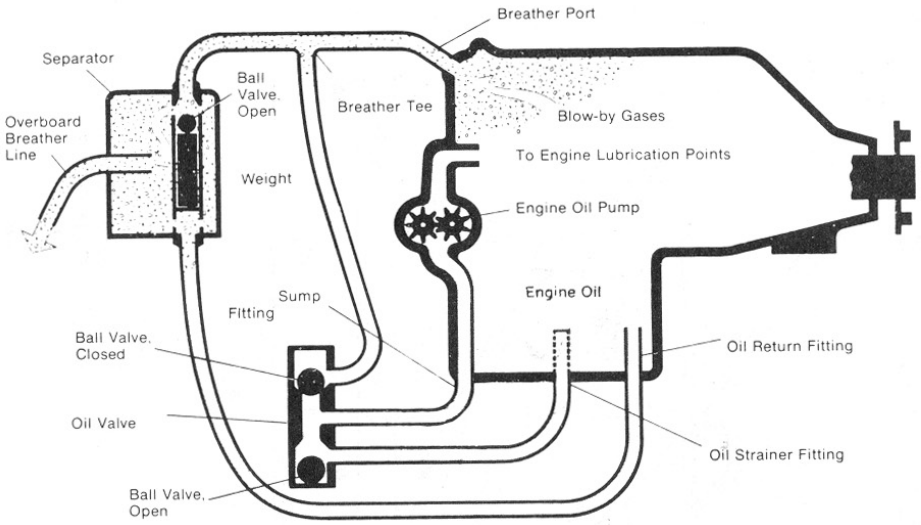

Figure 9-6, Schematic Breather System – Normal

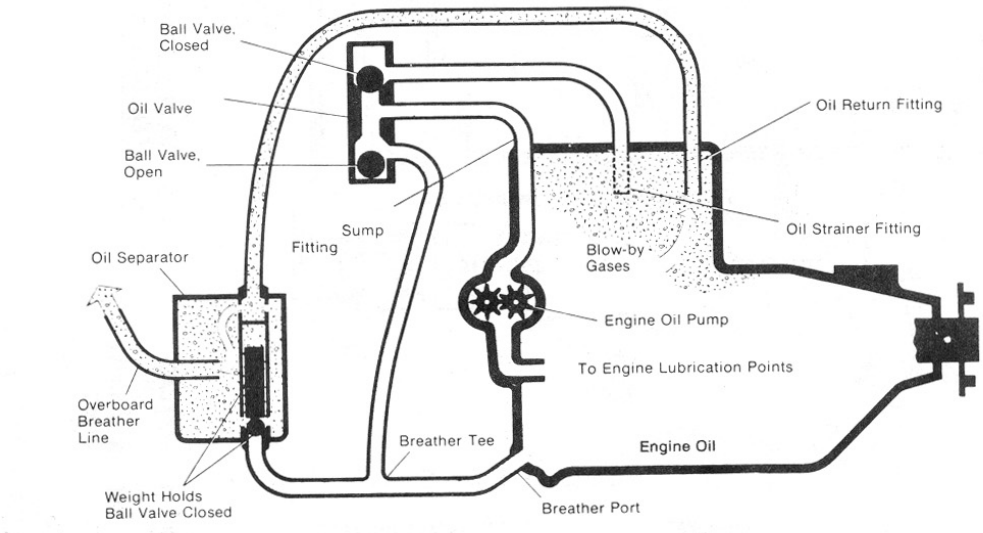

Figure 9-7, Schematic Breather System – Inverted

9.24 Troubleshooting

Powerplant troubles, causes and suggested remedies are listed in Table 9-3. When trouble shooting the engine, ground the magneto primary circuit before performing any checks on the ignition system.

Table 9-3: Engine Troubleshooting

Trouble	Cause	Remedy
Failure of engine to start	Lack of fuel.	Check fuel system for leaks. Fill fuel tank. Clean dirty lines, strainers or fuel cocks.
	Incorrect throttle setting.	Open throttle to one-tenth of its range.
	Defective spark plugs.	Clean, adjust, or replace spark plugs.
	Defective ignition wire.	Replace defective harness.
	Improper operation of magneto.	Check internal timing of magnetos. Check points.
	Internal failure.	Check oil sump screen for metal particles. If found, complete overhaul of the engine may be indicated.
	Magnetized impulse coupling left magneto only.	Demagnetize impulse couplings.
	Frozen spark plug electrodes.	Replace spark plugs or dry out removed plugs.
	Mixture control in idle cutoff.	Open mixture control.
	Shorted ignition switch or loose ground.	Check and replace or repair.
	Incorrect idle adjustment.	Adjust throttle stop to obtain correct idle.
	Idle mixture.	Refer to the Engine Manufacturer's Handbook for proper adjustments.
Failure of engine to idle properly.	Leak in the induction system. (Usually able to adjust initial idle but rough in 1000-1500 rpm range.)	Tighten all connections in the induction system. Replace any parts that are defective.
	Plugged nozzles	Clean nozzles
	Low cylinder compression.	Check cylinder compression.
	Faulty ignition system.	Check entire ignition system.
	Improper spark plug gap.	Check spark plug gap.
	Dirty air filter.	Clean air filter
	Mixture to rich; indicated by sluggish engine operation, red exhaust flame and black smoke.	See mixture adjustment above.
	Mixture to lean; indicated by overheating or backfiring.	Check fuel lines for dirt or other restrictions. Check fuel supply. Adjust mixture.
Low power and uneven running engine.	Leaks in induction system.	Tighten all connections. Replace defective parts.
	Defective spark plug.	Clean or replace spark plug.
	Improper grade of fuel.	Fill tank with recommended grade.
	Magneto breaker points not working properly.	Clean points. Check internal timing of magneto.

Table 9-3: Engine Troubleshooting (continued)

Trouble	Cause	Remedy
Low power and uneven running engine (continued).	Defective spark plug lead.	Check lead with electric tester. Replace defective lead.
	Defective spark plug terminal connectors.	Replace connectors on spark plug wire.
	Restriction in exhaust system Blocking exhaust pipe.	Check for loose muffler baffles.
	Improper ignition timing.	Check magnetos for timing and synchronization.
	Injector out of adjustment.	Replace injector
	Flow divider obstructed.	Clean flow divider
	Throttle lever out of adjustment.	Adjust throttle lever travel.
Failure of engine to develop full power.	Leak in induction system.	Tighten all connections, and replace defective parts.
	Restriction in injector or air scoop.	Examine air scoop and remove restrictions.
	Improper fuel.	Fill tank with recommended fuel.
	Faulty ignition.	Tighten all connections. Check system. Check ignition timing.
	Injector out of adjustment.	Replace injector.
	Flow divider obstructed.	Clean flow divider.
	Cracked engine mounts.	Repair or replace engine mount.
Rough running engine	Unbalanced propeller.	Remove propeller and have it checked for balance.
	Bent propeller blades.	Check propeller for track. Maximum 1/8".
	Defective mounting.	Install new mounting bushing.
	Lead deposit on spark plug.	Clean or replace plugs.
	Malfunctioning engine.	Check entire engine.
	Insufficient oil.	Check oil supply.
Low oil pressure	Dirty oil screen.	Remove and clean oil screen.
	Defective pressure gauge.	Replace gauge.
	Dirt in relief valve	Remove and clean oil pressure relief valve.
	Leak in suction line or pressure line.	Check gasket between accessory housing crankcase.
	High oil temperature.	See "High Oil Temperature" in Trouble Column.
	Restriction in the oil pumps intake passage.	Check line for obstruction. Clean suction screen.
	Worn or scored bearings.	Overhaul.

Table 9-3: Engine Troubleshooting (continued)

Trouble	Cause	Effect
Excessive oil consumption	Failing or failed bearing.	Check sump for metal particles and if found, overhaul of engine is indicated
	Worn or broken piston rings.	Install new rings.
	Incorrect installation of piston rings.	Install new rings.
	External oil leakage.	Check engine carefully for leaking gaskets, o-rings or sand holes.
	Leakage through engine fuel pump vent.	Replace fuel pump.
	Engine breather or vacuum pump breather.	Check engine and overhaul or replace pump.
Inaccurate pressure readings.	Cold weather.	High or low pressure readings due to extremely cold weather are not necessarily a malfunction. Small and long oil lines will not transfer pressure readings accurately until engine is quite warm
Cold weather difficulties.	Cold oil.	Move aircraft into heated hangar. Heat oil.
	Inaccurate pressure readings.	In extreme cold weather, oil pressure readings up to approximately 100 lbs. do not necessarily mean malfunctioning.
	Over-priming.	Rotate crankshaft in direction of normal rotation with throttle "full open" and mixture idle cut-off and ignition switch off.
	Weak battery.	Install fully charged battery.
	Faulty ignition switch.	Check ground wires.
Poor cut-off.	Mixture control valve scored or not seating properly.	Eliminate cause of scoring (usually burr or dirt) and lap mixture control valve and plug on surface plate.
Carbon monoxide or exhaust odor in cockpit	Exhaust leak inside shroud or airframe leak	Conduct 100hr / annual exhaust inspection immediately. Inspect firewall, belly pan, belly and fuselage for openings that may allow exhaust gas to enter the cabin
Excessive noise	Broken or cracked exhaust component	Repair or replace exhaust component
Change in cabin noise level	Broken or cracked exhaust component	Repair or replace exhaust component
Exhaust sooting or staining	Exhaust slip joint leak, anti-seize stain, broken or cracked exhaust component	Mild sooting of the slip joints is acceptable; anti-seize may flow from the slip joint and appear as a white discoloration, this is normal. If excessive sooting is found repair or replace exhaust components

10.0 Fuel System

The fuel system consists of two 20 gallon tanks, one in the root end of each wing. Fuel is taken from front and rear fuel outlets on inboard end of tanks. Tanks have inter-connected supply lines thru front and rear manifolds.

A 1.5 gallon (0.75 gallon useable) header tank located beneath the instrument panel receives all fuel from main tanks by gravity and serves as fuel supply for limited inverted operation. Fuel is pumped from the center of the header tank to the shut off valve. Fuel flows thru the shut off valve to fuel strainer and then to electric fuel pump, engine driven fuel pump and to injector.

NOTE

Fuel caps are of the non-vented type and at no time should the vented type be substituted.

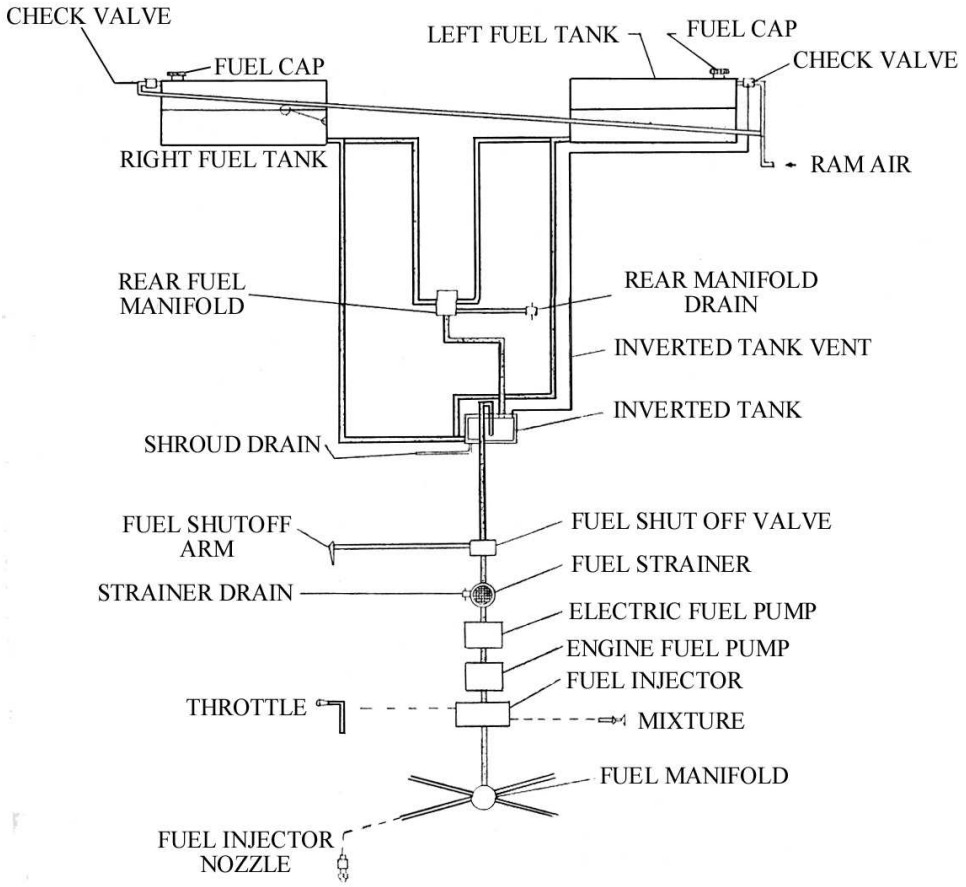

Figure 10-1, Schematic Fuel System

10.1 Removal of Fuel Tank

To remove the fuel tank:

1. Drain fuel system, at front and rear fuel manifolds.
2. Remove fuselage-wing gap covers.
3. Remove fabric from top of wing completely, starting at the wing butt to inboard edge of outboard tank rib and from wing trailing edge forward to spar.

CAUTION

Before removing fabric, remove tapes over the three ribs above tank. Drill out rivets (#30 drill). Be careful not to drill thru rib into tank or to elongate hole in rib. Tank is .38 in. below rib flange. Use a drill stop.

4. Disconnect front and rear fuel lines in gap area.
5. Disconnect vent line and check valve block thru lower inspection cover outboard of tank.
6. Remove drag wires.
7. Remove tank.

10.2 Installation of Fuel Tank

To install the fuel tank:

1. Inspect fuel tank for shipping or storage damage.
2. Install fuel tank in reverse order of removal. Tension drag wires evenly as to not affect wing tram. Reconnect fuel lines using new interconnect hoses.
3. Check all fabric attach holes size for elongation.
4. Repair fabric in accordance with Section 14.2
5. Finish fabric in accordance with Section 14.0
6. Install gap covers.

NOTE

Maximum hole diameter is .147 in. If hole is oversize, re-drill #30 (.128) in rib either side of oversize hole 1/2 inch away.

10.3 Fuel Vent System

The fuel vent system consists of interconnect lines between tanks. Check valves are located at outboard ends of each tank. The ram air pressure is obtained from the forward pointing vent below the left wing. Maintenance of the system is unnecessary except to check for leaks, plugged lines, or inoperative check valve. See Figure 10-2 for reference.

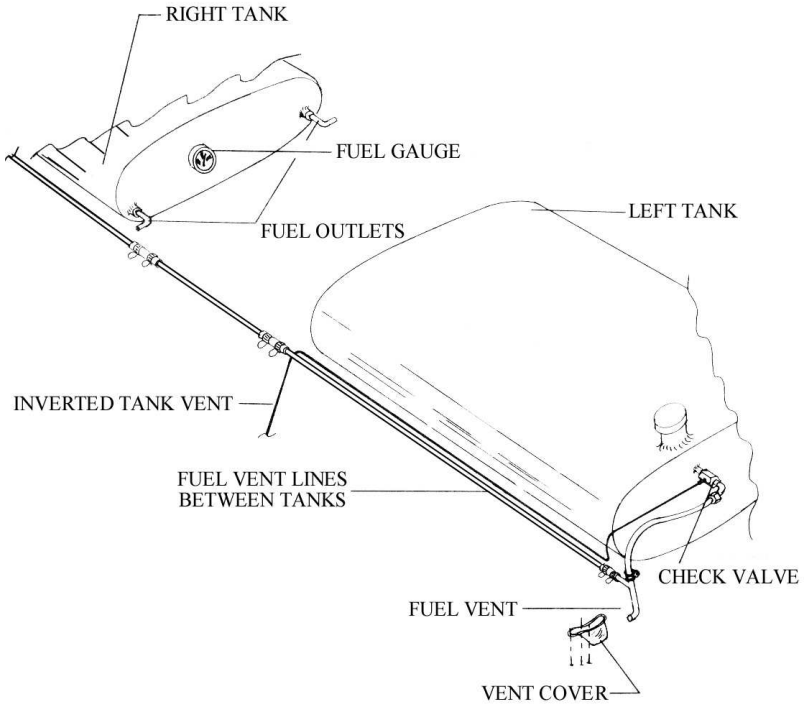

Figure 10-2, Fuel Vent System

10.4 Electric Fuel Pump

The electric fuel pump is located on the right forward side of the firewall. This pump is connected in series with the engine driven pump. When the engine pump is operating normally, the electric pump is off and fuel is drawn through the electric pump. The electric pump is used for takeoff and landing operation and also as an emergency pump. With the engine stopped, the electric pump should deliver approximately 20 psi of pressure.

To remove the electric fuel pump:

1. Disconnect inlet and outlet fuel lines.
2. Disconnect drain line.
3. Remove butt splices from the two connecting wires.
4. Loosen clamp securing fuel pump.
5. Remove fuel pump.

To install the electric fuel pump:

1. Install fuel pump against bracket and tighten clamp.
2. Install two butt splices to connect electrical wires.
3. Connect drain line.
4. Connect inlet and outlet fuel lines.
5. Conduct leak check of by operating the electric fuel pump for 15 seconds

10.5 Engine Driven Fuel Pump

The engine driven fuel pump is a high-pressure dual diaphragm type, Lycoming P/N LW-15473 and should not be replaced with any other model. Normal operating pressure is 23 psi; the acceptable operating range is 14 to 45 psi.

10.6 Fuel Gauge

A float type fuel gauge is located in the inboard end of each fuel tank. Each gauge is mounted to the tank with a gasket and 4 mounting screws with lock washers. Clear plastic tunnels fuel tunnels are mounted in the fuselage to view the gauge.

To remove the fuel gauge:

1. Remove fuel tunnel and the lower wing root gap cover.
2. Drain the fuel tank.
3. Remove the four mounting screws and pull gauge from tanks.

To install the fuel gauge:

1. Install in reverse order of removal. Dip each screw in fuel lube before installation.
2. Gauge to be installed parallel with tank and to read slightly less than “0” when empty.

10.7 Calibrating the Fuel System

To calibrate the fuel system:

1. Airplane must be level longitudinally and laterally (refer to Section 3.4).
2. Record total gallons at each mark.
    a. Fill right tank to E.
    b. Fill left tank with like amount.
    c. Fill right tank to 1/4.
    d. Fill left tank with like amount.
    e. Fill right tank to 1/2.
    f. Fill left tank with like amount.
    g. Fill right tank to F.

h. Fill left tank with like amount.

3. When calibrating fuel system, gauge should indicate within plus or minus 10% of tank capacity at 1/2, 3/4 and full readings, plus or minus 5% at 1/4 and no less 1 gallon at "E" reading.

10.8 Flushing the Fuel System

To flush the fuel system:

1. Remove wing tank drains or drain plugs, flush until tanks are clear. Reinstall plugs.
2. Open rear manifold drain, flush until clear. Close rear manifold drain
3. Open front drain valve on sediment bow, flush until clear. Close front drain.

10.9 Draining the Fuel Strainer

To drain the fuel strainer:

1. Remove cowl
2. Close fuel shut-off valve.
3. To remove sediment bowl and screen, remove safety wire and loosen screw securing bowl clamp; remove the clamp, bowl and rubber gasket.
4. Remove and clean screen and rubber gasket (be careful not to damage), check screen for damage. Check gasket for condition.
5. Reinstall gasket and screen. Install bowl, clamp and safety.
6. Turn on fuel shut-off valve to determine that bowl seal is not leaking.

CAUTION

Do not over tighten the bowl retainer nut, bale clamp might pop out of housing. Safety wire bale to bowl with .041 safety wire. Safety wire nut to bale.

10.10 Fuel Inlet Screen

To remove the fuel inlet screen:

1. Close fuel shut off valve.
2. Remove inlet fuel line from fuel servo.
3. Remove inlet screen located under inlet fitting.
4. Clean and inspect for holes, tears, etc.

10.11 Header Tank

The header tank fuel pickup tube should extend into the tank from top of tightened attach nut 5.31 inches. A vent line is connected to the tank top and routed back to the left main tank.

If the entire fuel system is drained and a small amount of fuel is then added, some time will be necessary before the header tank will fill. Set the aircraft in level attitude or add more fuel before attempting an engine start. The header tank vent line should be checked for opening if fuel pressure is lost upon initial inverted operations.

10.12 Fuel System Troubleshooting

For troubleshooting the fuel system see Table 10-1.

Table 10-1: Fuel System Troubleshooting

Trouble	Cause	Remedy
Fuel gauge fails to indicate.	Out of gas.	Fill tanks.
	Gauge not operating.	Replace fuel gauge.
Float has come off of the float arm.	Float operation partially or completely blocked.	Replace gauge or determine cause of blockage.
Fuel differential from tank to tank.	Loose cap, poor seal.	Tighten caps or replace caps.
	Check valve inoperative.	Replace or service valve.
	Vent line plugged.	Clear vent line.
	Aircraft out of rig directionally.	Correct rigging.
	Vent line leakage.	Correct leakage.
Unidentified leaks.	Fuel lines damaged or improperly installed.	Locate & repair or tighten.
Gas stains on bottom of trailing edge of wing.	Leaking tank.	Remove & replace or repair.
	Cap seal leaking.	Replace cap.
Fuel fails to drain from gascolator.	Moisture frozen in gascolator or fuel lines.	Place in heated hangar until fuel flows. Drain until all evidence of moisture is gone.
	Stoppage of fuel strainer at gascolator.	Clean fuel strainer.
Fuel is the wrong color.	Tanks filled with the wrong type of fuel.	Drain the fuel system and fill with proper octane fuel.
Fuel pressure low	Faulty fuel pump.	Replace pump.
	Obstructions in fuel system	Locate and remove obstruction

Intentionally Blank

11.0 Electrical System

Electrical power is supplied by a 12-volt, direct current, single wire, negative ground electrical system. A 12-volt battery is incorporated to furnish power for starting and reserve power in case of alternator failure.

The system is powered by a 60 or 70 ampere alternator. Charging and over-voltage protection is controlled by a voltage regulator in the field circuit.

The alternator is located on the front right side of the engine and utilizes a belt drive from the engine crankshaft. The voltage regulator is located on the cabin side of the engine firewall. Electrical switches and circuit breakers are located on the upper left hand side of the cabin, above the left window.

Figure 11-1 shows a schematic diagram of the electrical system for Serial Numbers 1-70 thru 859-2000.

Figure 11-2 shows a schematic diagram of the electrical system for Serial Numbers 860-2000 & up. This electrical system and aircraft modified in accordance with SL418 adds the following circuit protection:

1. 5-amp fuse, located behind the electrical panel
2. 60-amp circuit breaker, located behind the instrument panel on the lower left side
3. 70-amp circuit breaker, located aft of the baggage compartment near the battery

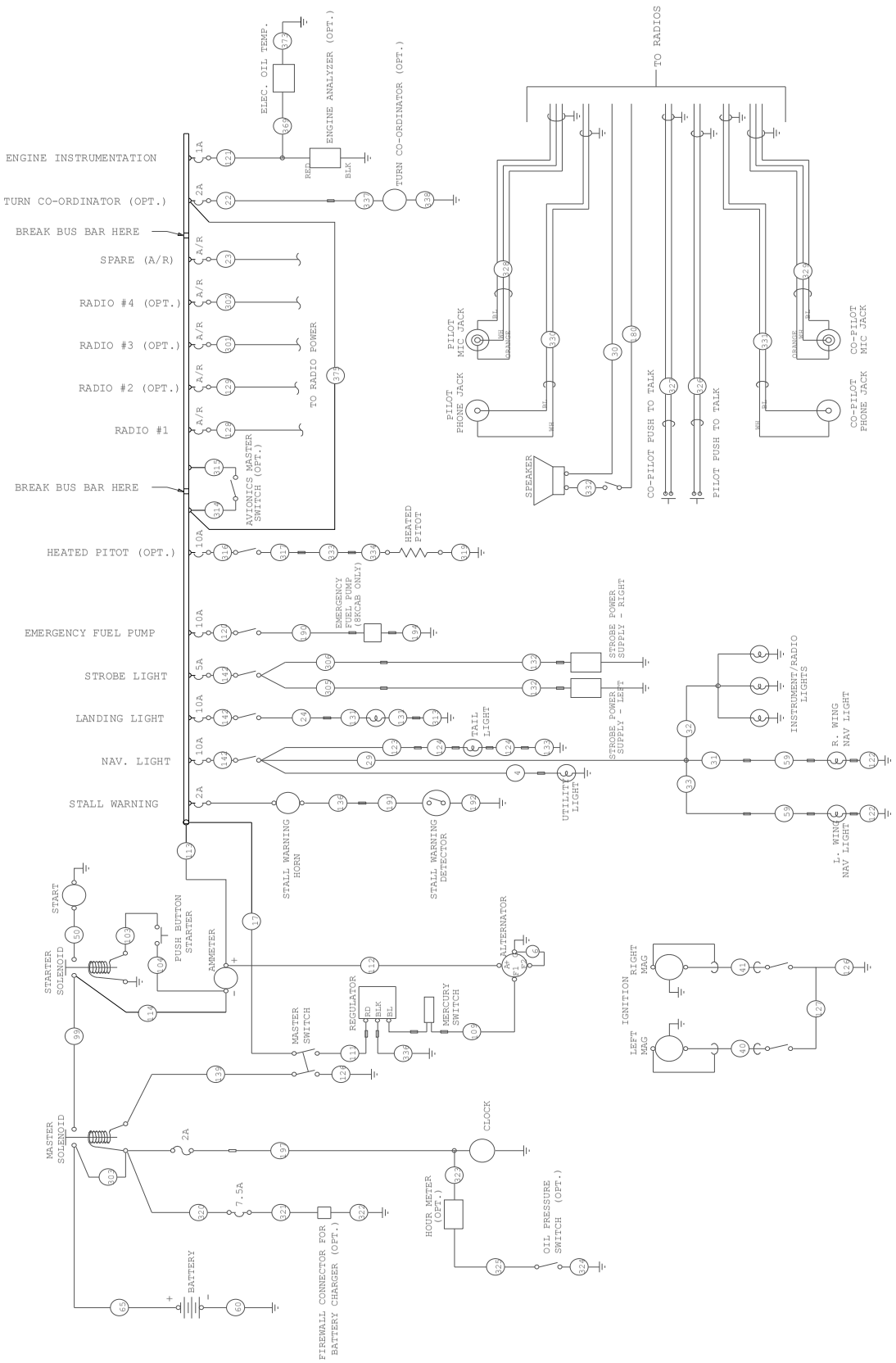

Figure 11-1, Electrical Schematic, Serial Numbers 1-70 thru 859-2000

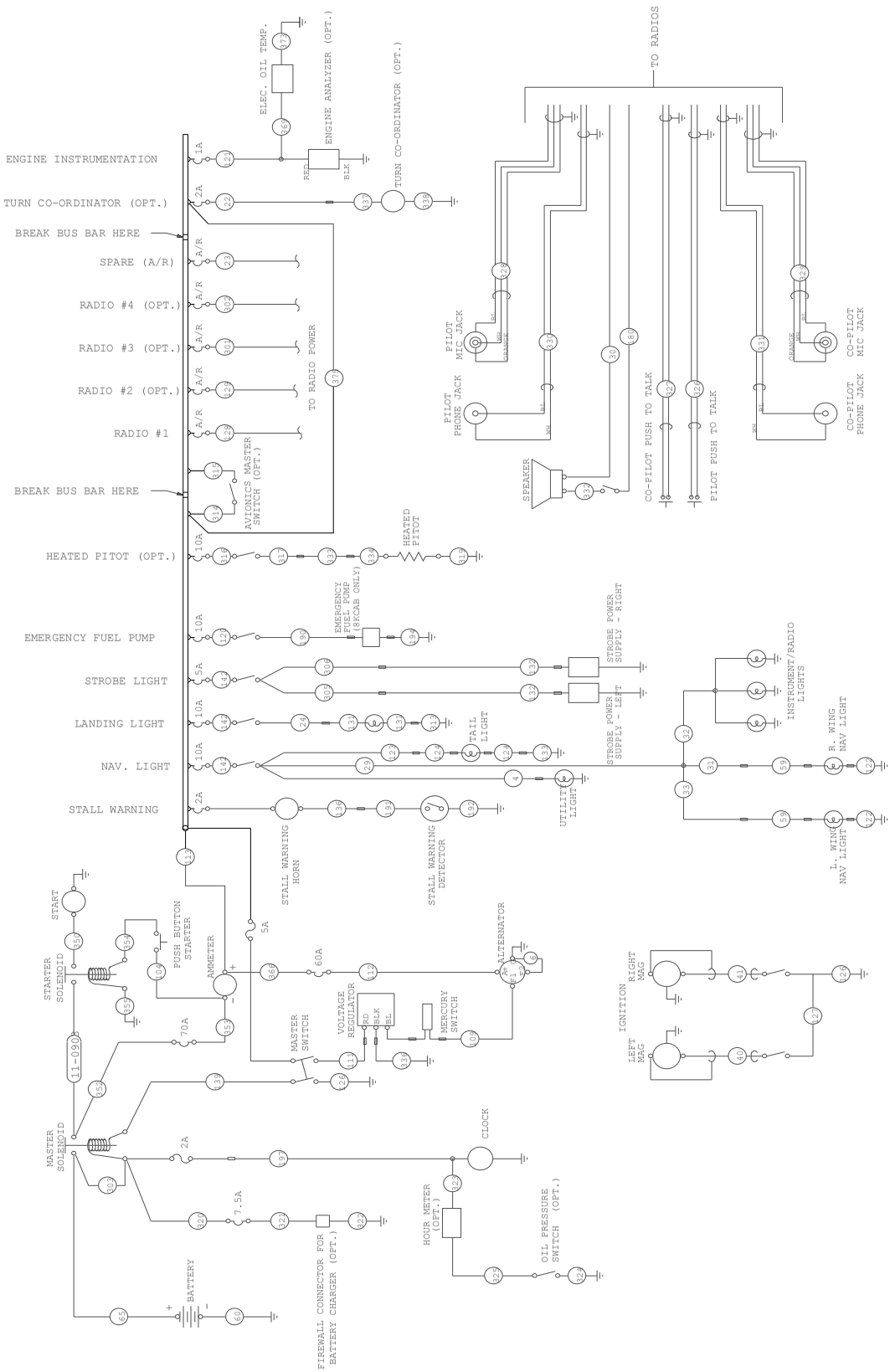

Figure 11-2, Electrical Schematic, Serial Numbers 860-2000 and Up

Table 11-1, Electrical System Components

ALTERNATOR:	Kelly ALY8520 LS or Plane Power AL12-P70
VOLTAGE REGULATOR:	Zeftronics R15VOL or Lamar B-00371-14
BATTERY	Concorde RG-25 or Enersys SBS J16

11.1 Alternator

The alternator is located on the front right side of the engine and utilizes a belt drive from the engine crankshaft. When servicing the alternator or associated components:

1. Do not connect battery into the system with polarity reversed.
2. Do not attempt to polarize alternator.
3. Do not connect ground the regulator or alternator field terminals.
4. Do not interchange the "I" and "F" leads to regulator.
5. Do not connect the "I" and "F" regulator terminals together.
6. Do not attempt to operate the alternator unless it is well grounded. Ground return is accomplished through the engine ground strap and firewall mounting.

Turn master switch off:

1. When repairs are being made to the alternator or regulator.
2. Before connecting or disconnecting test equipment.
3. When changing or charging batteries.

Inspection of alternator:

1. Inspect the battery cable connections.
2. Check all connectors in the system to be sure they are clean and tight.
3. Inspect the alternator, regulator, and wiring for physical damage.

To remove the alternator:

1. Remove safety wire from tension arm bolt.
2. Disconnect blast tube from alternator.
3. Disconnect output wire and field wire from alternator.
4. Remove tension arm attach bolt.
5. Remove bracket attach bolt and spacers.
6. Remove alternator.

To install the alternator:

1. Mount alternator to engine with bracket attach bolt and spacers.
2. Install tension arm bolt and washer.
3. Tension drive belt per Lycoming Service Instruction No. 1129; tighten and safety tension arm bolt.
4. Connect output wire and field wire to alternator terminals.
5. Connect blast tube to back of alternator.

11.2 Voltage Regulator and Over-voltage Control

The combined regulator and over-voltage control is located on the cabin side of the firewall. If buss voltage is not within limits, adjust to desired value. Turn regulator adjustment clockwise to increase output. To adjust the regulator voltage:

1. Connect voltmeter between main buss and ground buss.
2. Start the engine and run at 1100 to 1200 rpm.
3. Turn on accessories as needed to establish 15 to 25A load.
4. After 1 minute operating time, check the buss voltage.
5. Buss voltage to be 13.8 to 14.3V.

To remove the voltage regulator:

1. Disconnect wiring at molex connector.
2. Remove two screws securing regulator to firewall.
3. Remove voltage regulator.

To install the voltage regulator:

1. Secure voltage regulator to firewall with two screws.
2. Connect wiring at molex connector.

11.3 Battery

The battery is sealed and does not require servicing. It is located aft of the baggage compartment behind the lower interior panel.

To inspect or replace the battery:

1. Remove lower interior panel
2. Remove battery box cover.
3. Disconnect power and ground leads
4. Remove the battery hold down rod.
5. Lift battery from box or lift battery and box from aircraft.
6. Inspect box and all areas adjacent to battery for indications of acid leakage.
7. If leakage is present, neutralize acid, repair damage, and replace battery.
8. Check battery for condition and charge. Charge or replace as necessary.
9. Install battery and battery box in reverse order of removal.

11.4 Master Switch

The master switch is located on the electrical panel and engages both the master solenoid and charging circuit. To verify function, turn master switch on and off; the master switch solenoid should click on and off. If defective:

1. Check for defective master switch.
2. Check for defective master switch solenoid.
3. Check condition of battery, battery may be excessively discharged.
4. Check wiring and connectors.

To remove master switch:

1. Remove 2 screws from bottom of electrical panel and tilt panel up.
2. Disconnect wires at master switch, two screws.
3. Remove nut from face of panel and remove switch out the back.

To install master switch:

1. Place master switch in hole in electrical panel.
2. Secure with nut on face of panel.
3. Connect wires to master switch, two screws.
4. Lower electrical panel and secure with 2 screws.

11.5 Landing Light

To remove landing light:

4. Remove cowling.
5. Disconnect wires at landing light, two screws
6. Remove landing light retainer and light, three screws

To install landing light:

5. Place light in cowl opening. Light to be positioned inside of the cowling.
6. Secure light with retainer and three screws; tighten screws until snug. Route wire harness through cushioned clamp located on outboard screw.
7. Secure wires to landing light terminals, two screws.
8. Install cowling.

11.6 Electrical System Troubleshooting

Troubleshoot type B alternator system in accordance with Zeftronics document 14V ALT Piper-TSN.pub.

Table 11-2: Battery Troubleshooting

Trouble	Cause	Remedy
Discharged battery.	Battery worn out.	Replace battery.
	Charging rate not set right.	Adjust voltage regulator.
	Discharging rate too great.	Remove load when alternator is not charging and reduce use of equipment on ground.
	Standing too long.	Remove and recharge battery if left in unused airplane 3 weeks or more.
	Equipment left on accidentally.	Remove and recharge or replace.
	Short circuit (ground) in wiring.	Check wiring.
Battery life is short.	Battery's worn out.	Replace battery.
	Low charging rate.	Adjust voltage regulator.
Battery freezes.	Discharged battery.	Replace battery.
Battery polarity reversed.	Connected backwards on airplane or charger.	Replace battery.
No output from alternator.	Malfunction of alternator, alternator output circuit or field circuit.	Check alternator output and field circuits. Refer to Section 11.1.
Reduced output from alternator.	Open diode.	Check alternator. Refer to Section 11.1.

Table 11-3: Starter Troubleshooting

Trouble	Cause	Remedy
Motor fails to operate.	Low battery charge.	Check and recharge if necessary.
	Defective or improper wiring or loose connections.	Refer to electrical wiring diagram and check all wiring.
	Defective starter solenoid or control switch.	Replace faulty unit.
	Dirty commutator.	If commutator is rough or dirty, smooth and polish with number 0000 sandpaper. If too rough and pitted, remove and turn down. Blow out all particles.
	Shorted, grounded, or open armature.	Remove and replace with an armature known to be in good condition.
	Grounded or open field circuit.	Test, repair if possible or replace with a new part.
	Binding, worn or improperly seated brushes with excessive side play.	Brushes should be free fit in the brush boxes without excessive side play. Binding brushes and brush boxes should be wiped clean with a gasoline (unglued) moistened cloth. A new brush should be run in until at least 50 percent seated; however, if facilities are not available for running in brushes, then the brush should be properly seated by inserting a strip of number 0000 sand-paper between the brush and commutator, with the sanded side next to the brush. Pull sandpaper in the direction of rotation, being careful to keep it in the same contour as the commutator. **CAUTION** Do not use coarse sandpaper or emery cloth. After seating, clean thoroughly to remove all sand and metal particles to prevent excessive wear. Keep motor bearing free from sand or metal particles.
Low motor and cranking speed.	Worn, rough, or improperly lubricated motor or starter gearing.	Disassembly, clean inspects, and relubricate, replacing bearings if worn.
	Same electrical causes as listed under "Motor fails to operate."	Same remedies listed for these troubles.
Excessive arcing of motor brushes.	Binding, worn, or improperly seated brush or brushes with excessive side play.	See information above dealing with this trouble.
	Dirty commutator, rough, pitted or scored.	Clean as outlined above.
Excessive wear and arcing of motor brushes.	Rough, or scored commutator.	Remove and turn commutator down on a lathe.
	Armature assembly not concentric.	Reface commutator.

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12.0 Instruments

The instrument panel accommodates the instruments and avionics. This section pertains to the maintenance and troubleshooting of the primary instruments and their systems.

12.1 Removal and Installation of Instruments

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

To remove instrument:

1. Remove the glare shield by removing the five retaining screws, two cable ties, disconnect the compass light wires and lift off the panel.
2. Remove the vacuum, pitot-static, and electric connections to the instrument. Tag instrument connections for ease of installation.
3. Remove mounting screws and remove instrument.

To install instrument:

1. Install instrument in panel opening. Secure with nylon washers , lock nuts and four brass screws.
2. Connect vacuum, pitot-static, and electrical to instrument.
3. Install glareshield with five brass screws, two cable ties.
4. Connect compass light wires at molex connector.

12.2 Panel Mounting

The instrument panel is shock mounted to the aircraft frame to dampen out engine vibration and prolong the life of the instruments. Should any instrument have an erroneous indication or excessive vibration, replace panel shock mounts.

12.3 Vacuum System

The vacuum system employed to operate the gyroscopic instruments is comprised of an engine driven dry vacuum pump, vacuum regulator valve, a central vacuum filter, a vacuum gauge, and the necessary tubing to complete the system.

12.3.1 Suction Gauge

The suction gauge, which is mounted on the instrument panel, is calibrated in inches of mercury (in-Hg) and indicates the amount of vacuum created by the engine driven vacuum pump.

12.3.2 Vacuum Regulator Valve

A vacuum regulator valve is incorporated in the system to control vacuum pressure to the gyroscopic instruments. The regulator is mounted on top of the inside firewall.

To adjust the vacuum regulator:

1. Loosen the locking nut.
2. Check the suction gauge with the engine running a medium RPM to see if the suction gauge reports between 3.5 and 5.0 inches of mercury. If the pressure reading fails to fall within this range, shut down the engine and adjust the regulator valve by moving the adjustment screw clockwise to increase the pressure, and counter-clockwise to decrease the pressure.
3. Start the engine and check again.
4. After the valve has been adjusted within the proper range, retighten the lock nut.

To remove vacuum regulator valve:

1. Disconnect the two lines.
2. Remove the mounting screws and valve.

To install vacuum regulator valve:

1. Install in reverse order given for removal.
2. Check the complete system for proper operation.

12.3.3 Vacuum Pump

The pump is mounted on the accessory section of the engine and is driven by means of a coupling mated to the engine drive gear assembly. Applicable vacuum pumps and their manufacturers are listed in Table 12-1.

Table 12-1: Vacuum Pumps

Model	Manufacturer
RA215CC	Rapco
1U478-003	Sigmatek

To remove the vacuum pump:

1. Remove top portion of cowling.
2. Loosen the two hose clamps and remove the two hoses from the pump fittings. Take note of the location of hoses for reinstallation.
3. Remove the pump by removal of the four retaining nuts, lock washer and plain washers.

To install the vacuum pump:

1. Install pump in reverse order of removal, noting alignment of spline on the pump drive with the spline on the engine drive assembly.
2. Install a new gasket.
3. Protect pump from foreign objects on inlet side of pump.

12.3.4 Vacuum System Troubleshooting

Use Table 12-2 to troubleshoot any problems with the vacuum system.

Table 12-2: Vacuum System Troubleshooting

Trouble	Cause	Remedy
No vacuum pressure gauge indication	Pump inoperative. Disconnected, broken or restricted lines	Replace pump. Locate trouble and correct
No vacuum pressure gauge indication at instrument	Hose from instrument to gauge leaking or restricted	Check all lines and connections
No vacuum suction gauge indication at either instrument or source	Faulty gauge. Malfunctioning regulator valve or vacuum pump	Check operation of instruments. If operation is normal, replace gauge. If instruments are inoperative, check operation of vacuum pump or regulator valve
Low vacuum system pressure	Vacuum regulator valve incorrectly adjusted	Adjust regulator valve in accordance with Section 12.3.2
	Leaking of the system lines or fittings	Check lines and fittings
Normal pressure indication, but sluggish operation of instruments	Instruments air filter elements dirty	Remove and clean or replace
High system pressure	Vacuum regulator valve incorrectly adjusted	Adjust regulator valve in accordance with Section 12.3.2
	Vacuum regulator valve sticking or dirty screen	Clean and check operation of regulator valve

12.4 Pitot and Static Leak Check

Figure 12-1 indicates the location of the pitot and static ports. When a pitot or static instrument is replaced or line disturbed a leak check must be conducted. Leak check shall be performed by an appropriately rated repair facility in accordance requirements of FAR23.1323 and 23.1325. The following procedure and limits should be utilized with a calibrated test apparatus.

To perform leak check:

1. Attach static test line to aircraft static port sealing directly to the aluminum face of the static port. Seal opposite static port with tape.
2. Attach pitot test line to pitot.
3. Set Kollsman indicator to 29.92 in-hg.
4. Pressurize the pitot system until the airspeed indicates 100mph. Open static vent on control.
5. No leakage is permitted. After the static vent is opened; ensure no needle movement.
6. Open pitot vent until airspeed indicates 0mph. Close pitot and static vents.
7. Evacuate the static system to a pressure to 1000ft above the initial value; do not exceed 3000fpm.
8. Close vacuum control, the loss of indicated altitude must not exceed 100 feet as indicated by the altimeter over one minute.
9. Vent static system at a rate not to exceed 3000fpm.
10. Remove test apparatus and static port tape.
11. Verify static ports and pitot are not obstructed.

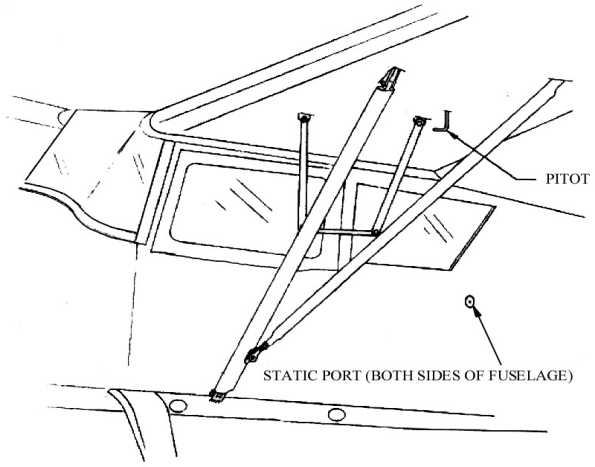

Figure 12-1, Pitot and Static Port Locations

12.5 Instrument Troubleshooting

Use Table 12-3 through Table 12-10 to troubleshoot any problems with the applicable instrument.

Table 12-3: Airspeed Indicator

Trouble	Cause	Remedy
Indicator inoperable	Stoppage of pitot and/or static tube	Disconnect pitot and static line from all instruments and blow out tubes with air pressure
Instrument indicating too slow	Stoppage of pitot and/or static tube	Disconnect pitot and static line from all instruments and blow out tubes with air pressure
Instrument indicating too fast	Leak in static system	Correct leak.
	Water in pitot tube	Disconnect pitot line from instrument and blow out line
Pointer of instrument oscillates	Excessive vibration	Check shock mounts, replace if necessary
	Leak in instrument case	Replace instrument

Table 12-4: Vertical Speed Indicator

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

Table 12-5: Altimeter

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

Table 12-6: Directional Gyro

Trouble	Cause	Remedy
Excess drift	Excessive vibration	Check panel shock mounts
	Insufficient vacuum	Adjust and troubleshoot vacuum system per Section 12.3
	Defective instrument	Replace instrument
Dial spins continuously	Defective mechanism	Replace instrument

Table 12-7: Attitude Indicator

Trouble	Cause	Remedy
Bar fails to respond	Insufficient vacuum	Check pump and tubing
Bar does not settle or oscillates continuously	Excessive vibration	Check shock mounts, replace if necessary
	Insufficient vacuum	Check line and pump, adjust valve.
	Vacuum too high	Adjust valve
	Defective instrument	Replace instrument

Table 12-8: Turn Coordinator

Trouble	Cause	Remedy
Pointer fails to respond	Foreign matter lodged in instrument	Replace instrument
	No electrical circuit	Check for voltage at instrument
Incorrect sensitivity	Incorrect adjustment of sensitivity spring	Adjust by means of sensitivity spring screw. If this pulls the pointer from zero, replace instrument
Pointer does not set on zero	Gimbal and rotor assembly out of balance	Replace instrument
	Pointer incorrectly set on its staff	Replace instrument
	Sensitivity adjustment pulls pointer off zero	Replace instrument
Vibrating pointer	Gimbal and rotor assembly out of balance	Replace instrument
	Pitted or worn pivots or bearings	Replace instrument
In low temperature pointer fails to respond or does so sluggishly and with insufficient deflection	Oil has become too thick	Replace instrument
	Insufficient bearing clearance	Replace instrument
Pointer sluggish in returning to zero and does not set on zero when stationary	Oil or dirt between damping pistons and cylinder	Replace instrument
	Excessive clearance between rotor and rotor pivots	Replace instrument
Ball in inclinometer does not center	Instrument out of alignment on panel	Correct alignment

Table 12-9: Tachometer

Trouble	Cause	Remedy
No reading on indicator, either permanent or intermittent	Broken shaft	Replace shaft
	Springs weak	Replace instrument
Pointer oscillates excessively	Rough spot on, or sharp bend in shaft	Repair or replace
	Excess friction in instrument	Replace instrument

Table 12-10: Magnetic Compass

Trouble	Cause	Remedy
Excessive card error	Compass not properly compensated	Swing compass per Airpath Compensation Instructions dated 10-16-2008 or later revision (permissible to swing compass in 3-point ground attitude)
	External magnetic interference	Locate magnetic interference and eliminate if possible
Excessive card oscillation	Improper mounting on instrument panel	Align instrument
	Insufficient liquid	Replace instrument
Card sluggish.	Weak card magnet.	Replace instrument
	Excessive pivot friction or broken jewel	Replace instrument
	Instrument too heavily compensated	Remove excess compensation
Liquid leakage.	Loose bezel screws	Replace instruments
	Broken cover glass	Replace instrument
	Defective sealing gaskets	Replace instrument
Discolored luminous markings	Age.	Replace instrument
Defective light	Burned out lamp or circuit	Check lamp or continuity of wiring

12.6 EDM-930 Engine Data

The EDM-930 provides a digital display for engine rpm, manifold pressure, oil pressure, oil temperature, fuel quantity, fuel remaining, fuel flow, cylinder head temperature, exhaust gas temperature, voltage, rate of charge, and outside air temperature.

12.6.1 Maintenance and Repair

The EDM-930 installation should be visually inspected at every 100 hour / annual inspection. Wires should be inspected for chaffing. Hoses, fittings and senders should be inspected for leakage and security. Wires may be spliced in accordance with JP Instruments Report No. 908, FAA Approved Installation Manual for the EDM-900 and EDM-930. Additional maintenance is limited to removal and replacement of EDM-930 system components. The EDM-930 system consists of a primary display, remote alarm display, harnesses, hoses, and sensors. JP Instruments Report No. 908 should be consulted for diagnosing instrument malfunction. Remove and install Table 12-11 components per American Champion Aircraft drawing 7-1580, revision B, dated 11-17-10. Remove and install Table 12-12 components per American Champion Aircraft drawing 7-1580, revision C, dated 4-1-14 or later revision.

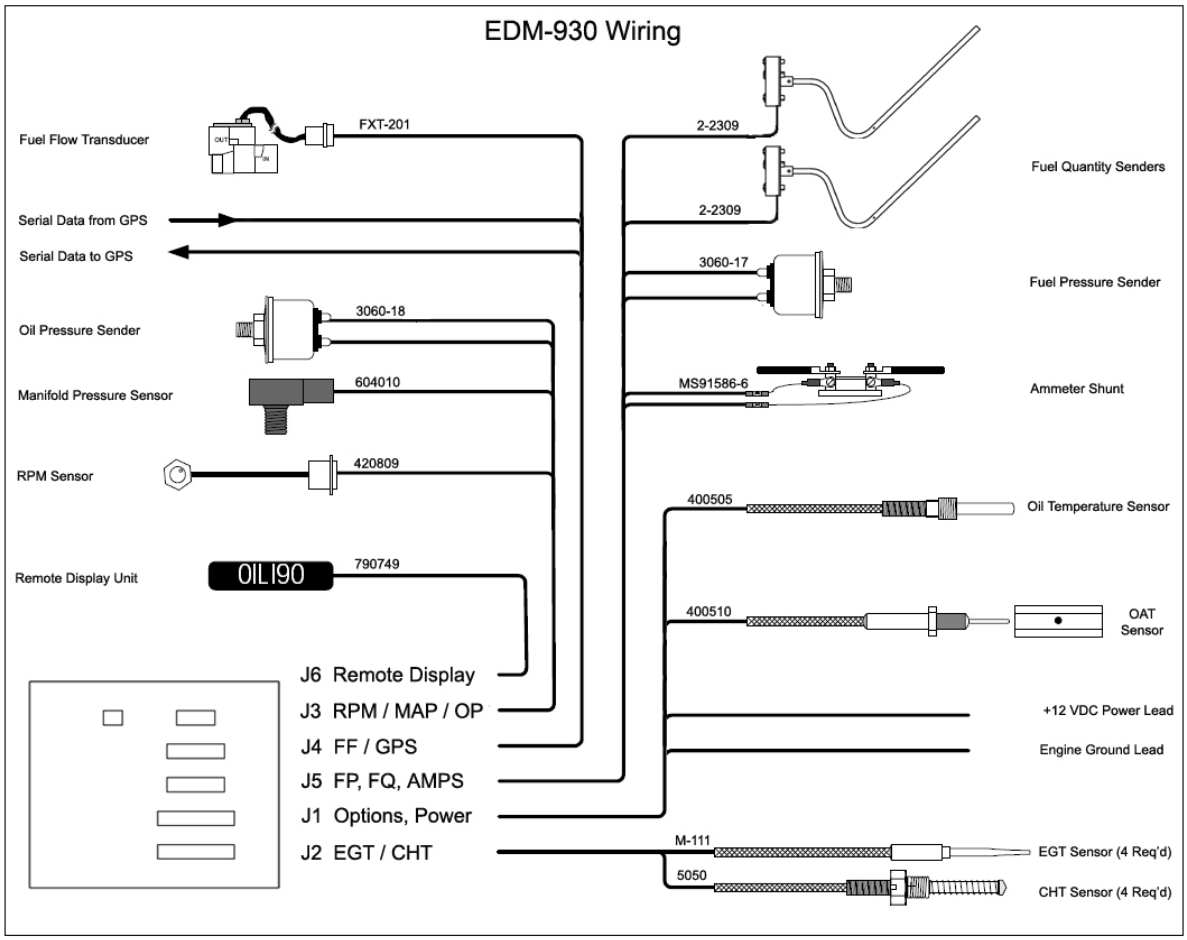

Figure 12-2, EDM-930 System and Wiring Diagram for Serial No. 1134-2013 and Prior

Table 12-11: Replaceable System Components for Serial No. 1134-2013 and Prior

Part Number	Description	Supplier	Quantity
790000-C-030	Primary Display	JP Instruments	1 (Hartzell 2-Blade, AEIO-360)
790000-C-031	Primary Display	JP Instruments	1 (MT Propeller, AEIO-360)
790000-C-032	Primary Display	JP Instruments	1 (MT Propeller, AEIO-390)
790200	J1 Harness	JP Instruments	1
700702	J2 Harness	JP Instruments	1
790420	J3 Harness	JP Instruments	1
700709	J4 Harness	JP Instruments	1
700719-3	J5 Harness	JP Instruments	1
790749	J6 Remote Display	JP Instruments	1
FXT-201	Fuel Flow Transducer	JP Instruments	1
3060-18	Fuel Pressure Sensor	JP Instruments	1
2-2309	Fuel Quantity Sender	American Champion	2
3060-18	Oil Pressure Sensor	JP Instruments	1
400505	Oil Temperature Probe	JP Instruments	1
400510	OAT Probe	JP Instruments	1
5050	CHT Probe	JP Instruments	4
M-111	EGT Probe	JP Instruments	4
MS91586-6	Ammeter Shunt	JP Instruments	1
604010	Manifold Pr. Sensor	JP Instruments	1

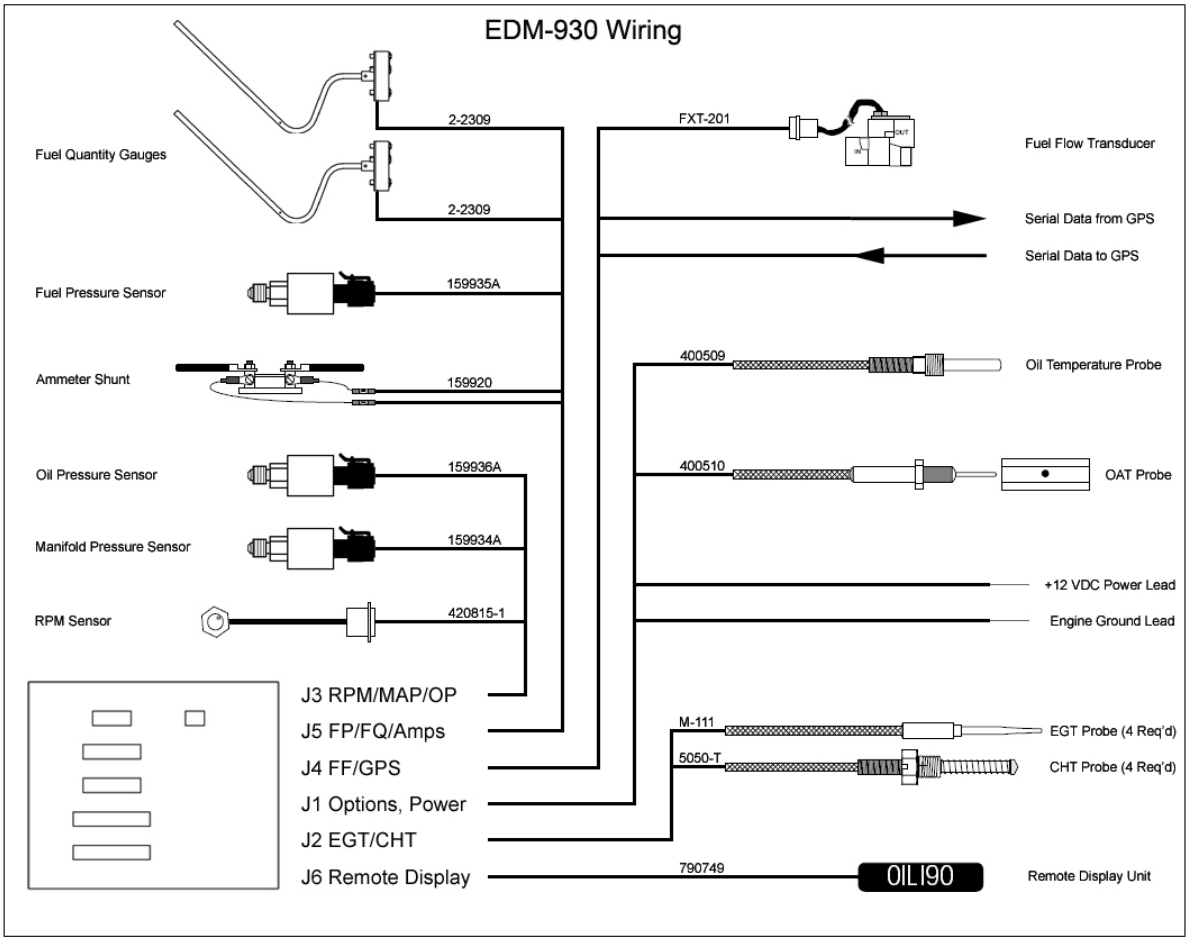

Figure 12-3, EDM-930 System and Wiring Diagram for Serial No. 1135-2013 and Later

Table 12-12: Replaceable System Components for Serial No. 1135-2013 and Later

Part Number	Description	Supplier	Quantity
790000-C-030	Primary Display	JP Instruments	1 (Hartzell 2-Blade, AEIO-360)
790000-C-031	Primary Display	JP Instruments	1 (MT Propeller, AEIO-360)
790000-C-032	Primary Display	JP Instruments	1 (MT Propeller, AEIO-390)
790200	J1 Harness	JP Instruments	1
700702-8	J2 Harness	JP Instruments	1
790422	J3 Harness	JP Instruments	1
700708	J4 Harness	JP Instruments	1
790723	J5 Harness	JP Instruments	1
790749	J6 Remote Display	JP Instruments	1
FXT-201	Fuel Flow Transducer	JP Instruments	1
159935A	Fuel Pressure Sensor	JP Instruments	1
2-2309	Fuel Quantity Sender	American Champion	2 (Optional)
159936A	Oil Pressure Sensor	JP Instruments	1
400509	Oil Temperature Sensor	JP Instruments	1
400510	OAT Probe	JP Instruments	1
5050-T	CHT Probe	JP Instruments	4
M-111	EGT Probe	JP Instruments	4
159920	Ammeter Shunt	JP Instruments	1
159934A	Manifold Pr. Sensor	JP Instruments	1

12.6.2 Calibration

Replacement of the manifold pressure transducer requires calibration verification. Determine ambient pressure in accordance with JP Instruments Report No. 908, section 24. This value should match the value displayed with a tolerance of ±0.5 In-Hg.

Replacement of fuel quantity senders requires a verification of correct calibration. Conduct a five-point calibration check in accordance with JP Instruments Report No. 908, section 21.4. Position the aircraft in a level attitude with approximately one gallon per tank. Drain all fuel from the gascolator fitting; this is the empty fuel level. Add fuel alternately to the left and right tanks. The total fuel quantity for each calibration point is shown in Table 12-13.

Table 12-13: Fuel Level Calibration

Calibration Point	Total Quantity Added (Gallons)		Displayed Value (± 0.6 Gallon)	
Empty	0	0	0	0
¼	5.0	10.0	5.0	5.0
½	15.0	20.0	10.0	10.0
¾	25.0	30.0	15.0	15.0
Full	35.0	40.0	20.0	20.0

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13.0 Equipment and Furnishings

The 8KCAB has required, standard, and optional equipment as denoted by the aircraft equipment list. The maintenance of these items is described within this section.

13.1 Communication and Navigation Equipment

Radio packages are specific to each aircraft. Use troubleshooting and maintenance instructions for radios and transponders that are provided in the manual supplied by the component manufacturer. Avionics are wired utilizing Approach System Harness. Maintenance or repair of avionics wiring is limited to the replacement of the harness and or components.

To remove harness:

1. Remove glare shield by removing the five retaining screws, two cable ties, disconnect the compass light and lift off the panel.
2. Disconnect harness at avionics hub.
3. Disconnect harness at component.
4. Disconnect harness at aircraft intercom connector.
5. Disconnect harness at power connector.
6. Remove power pin from power connector using extraction tool 305183 (AMP).
7. Disconnect ground at ground buss.

To install harness:

1. Connect harness at component.
2. Connect harness at hub.
3. Connect harness at aircraft intercom connecter.
4. Insert power pin in power connector.
5. Connect power connector.
6. Connect ground at ground buss.
7. Install glare shield with five brass screws, two cable ties.
8. Connect compass light wiring at connector.
9. Verify operation and test avionics component per the component manufacturer's instructions.

To remove avionics hub:

1. Disconnect harnesses from hub.
2. Remove two lock nuts securing hub to mounting plate, lift hub from mounting plate.

To install avionics hub:

1. Place hub in mounting plate, secure to mounting plate with two lock nuts.
2. Connect harnesses to labeled connectors.
3. Verify operation and test all avionics per the component manufacturer's instructions.

To remove tray mounted component:

1. Turn locking mechanism counterclockwise until it the mechanism disengages from the rack.
2. Slide avionics component from rack.

To install tray mounted component:

1. Verify the front lobe of the locking mechanism is in a vertical position.
2. Slide component into rack until the front lobe of the locking mechanism touches the rack.
3. Turn locking mechanism clockwise until the component is secured in the rack, continue turning until tight. Do not over tighten; verify unit is secure in rack.
4. Verify operation and test avionics component per the component manufacturer's instructions.

13.2 Lighting

Navigation, strobe, and landing lights are standard equipment. Navigation lights use a 10 amp breaker, strobe lights use a 5 amp breaker, and the landing light uses a 10 amp breaker. Dedicated switches supply power. Verify light operation during preflight, 100-hour, and annual inspections. Replace components bulbs as necessary.

A cabin light is installed in the upper left of the cabin; although the cabin light is standard equipment it may be removed if all the instruments are lighted by other means. The cabin light power is supplied by the 2 amp stall warning breaker, instrument lighting is supplied by the navigation light switch and 10 amp breaker. Verify light operation during preflight, 100-hour, and annual inspections. Replace components bulbs as necessary.

To remove navigation bulb:

1. Remove screw and cover.
2. Remove colored lens.
3. Remove bulb by twisting counterclockwise.

To install navigation bulb:

1. Insert bulb by twisting clockwise.
2. Replace colored lens.
3. Attach cover with screw.

To remove strobe bulb:

1. Remove screw and cover.
2. Remove lens.
3. Remove strobe bulb and disconnect wires using extraction tool W-HT-2038 (Waldom).

To install strobe bulb:

1. Insert strobe bulb and connect wires by inserting pins into connector.
2. Replace lens over strobe bulb.
3. Attach cover with screw.

To remove cabin bulb:

1. Unthread light receptacle at power cord and remove from housing.
2. Remove bulb from light receptacle.

To install cabin bulb:

1. Insert bulb into light receptacle
2. Thread light receptacle into cabin light housing.

13.2.1 AeroLEDs NSP Lights

LED navigation and strobe lights may replace standard lights. Navigation lights use a 5 amp breaker and strobe lights use a 10 amp breaker. Lights are located on wing tips only. Verify light operation during preflight, 100-hour, and annual inspections. The navigation and strobe light assembly is designed with 4 forward navigation LEDs, 2 rear position LEDs, and 18 strobe LEDs. Should any one LED fail, the unit must be replaced. View LEDs with welding goggles for eye safety.

To remove light:

1. Remove 32 screws securing wing tip to wing.
2. Disconnect wiring at filter to wing connector.
3. Loosen set screw at rear of light housing.
4. Slide light aft to disengage from mounting bracket.
5. Remove chassis ground wire by removing mounting bracket screw.
6. Disconnect wiring at light to filter connector and remove light.

To replace light:

1. Route wire connector thru wing tip.
2. Route wire connector thru wingtip.
3. Connect chassis ground wire with mounting bracket attach screw.
4. Place light housing on mounting bracket and slide forward, secure with set screw.
5. Connect wiring at light to filter connector.
6. Connect wiring at filter to wing connector.
7. Secure wing tip to wing with 32 screws.
8. Verify navigation, position, and strobe light function by viewing with welding goggles.
9. Verify navigation light color, left wing - red, right wing – green.

13.3 Stall Warning

The stall warning system consists of a switch mounted on the left wing that activates a buzzer inside the cabin when the aircraft is approaching stall. The buzzer should sound 5-10 MPH prior to the stall break:

To check operation:

1. Verify the stall switch is free to move when lifted.
2. Turn master switch on.
3. Buzzer should sound when lifted.
4. Buzzer should not sound using light pressure in other directions.

Reposition switch as needed to achieve the required activation speed. Remove the two PK screws that prevent switch movement. Lower activation speed by sliding the switch down; raise activating speed by sliding switch up. Test buzzer activation speed; warning should occur 5-10 MPH prior to the stall break for all flight configurations. When adjustment has been achieved, drill new holes and install locating screws.

13.4 Hour Meter

An optional hour meter may be installed in the instrument panel. Engine oil pressure activates the hour meter. If hour meter is not running while engine is running verify that pressure switch is working correctly. Replace switch or meter as necessary.

13.5 Seats

If front adjustable seat is installed lubricate as necessary for ease of adjustment. The seat cushions should be inspected for rips and tears before each flight. Cushions should also be checked to ensure that they are properly attached to the seat frame with snap rings and fabric loops.

The seats may be removed for maintenance by removing the four bolts that attach the seat legs to the fuselage at the floor. To remove the front seat from the aircraft, the front seat shoulder harness must disconnected from the seat or fuselage. Install seats in reverse of removal.

The rear seat and control stick may be fitted with optional quick release pins. When the rear seat and control stick are removed; relocate the baggage net to the aft of the front seat, install control stick and throttle quadrant covers. The weight and balance calculation for the flight should include removal of the rear seat.

13.6 Seatbelts

The seatbelts in the aircraft are maintenance free. They should be inspected periodically for tears or chaffing in the fabric. The seatbelts can be removed for maintenance by removing the attachment bolts at the fuselage lugs. Install seatbelts in reverse of removal.

13.7 Heated Pitot

An optional heated pitot probe may be installed; the heated pitot is required IFR equipment. The installation consists a probe, bracket, wiring, switch, and 10 amp circuit breaker. Function of the heating element should be verified during preflight, 100 hour, and annual inspections.

To remove the heated pitot:

1. Remove screws securing heated pitot tube to bracket.
2. Pull heated pitot from bracket to expose electrical wiring and tube.
3. Disconnect wires and tubing from heated pitot.
4. Remove heated pitot.

To install the heated pitot:

1. Connect pitot tubing from inside the wing to heated pitot and secure with safety wire.
2. Connect the two electrical wires from inside the wing to heated pitot assembly.
3. Insert heated pitot tube into bracket and secure with four screws.
4. Conduct pitot leak check per Section 12.4.

13.8 Electronic Fight Instrument System

The optional Aspen Avionics EFD1000 consists of a primary flight display, remote sensor module, and a pilot or pro configuration module. The EFD1000 provides the pilot with a display of attitude, airspeed, altitude, vertical speed, magnetic heading, turn quality, and rate of turn information. Refer to STC SA10822SC documentation for instructions for continued airworthiness.

13.9 Tow Hook

An optional tow hook may be fitted for glider tow operations. The installation consists of a cable actuated hitch assembly and release lever. The release lever is located on the cabin floor, left of centerline, forward of the front seat. Towline breaking strength must not exceed to 1200lb. Inspect condition of lever, cable, swivel block, hitch, and mounting hardware during 100-hour and annual inspections.

To remove tow hook:

1. Disconnect tailwheel steering springs.
2. Remove tailwheel from leaf spring.
3. Disconnect release cable from hitch.
4. Remove hitch from swivel block.
5. Remove hitch from leaf spring.
6. Install tailwheel and steering springs per Section 8.16.
7. Disconnect release cable at cockpit release lever.
8. Cut release cable and remove from fairlead.
9. Remove cockpit release lever, bracket, and operating placard.
10. The fairlead and swivel block may remain for future installations.

To install tow hook:

1. Install cabin release lever, operating placard, release cable, and hitch per ACAC drawing 7-1143, revision J, dated 11-17-04 or later revision.
2. Swedge release cable with cabin lever in forward position and towhook in closed position.
3. Verify proper towhook release operation.
4. Verify rudder travel per Table 7-1.

13.10 Emergency Locator Transmitter

The ELT is located on the right side of the baggage area behind the rear seat. Refer to the manufactures' installation and operation manual for instructions for continued airworthiness. In addition to the service requirements of the ELT, the instrument panel mounted remote may also require periodic maintenance.

To remove ELT:

1. Switch ELT from ARM to OFF.
2. Disconnect antenna coax and remote switch wire at ELT.
3. Remove velcro straps and mounting bracket bale.
4. Lift ELT from bracket.

To install ELT:

1. Verify correct orientation and place ELT in mounting bracket.
2. Secure with Velcro straps and mounting bracket bale.
3. Connect antenna coax and remote switch wire to ELT.
4. Switch ELT from OFF to ARM.

13.11 Fire Extinguisher

Optional fire extinguisher may be mounted under front seat. Approved models are Amerex A344T and Amerex A384T.

To remove fire extinguisher:

1. Release retention strap.
2. Remove fire extinguisher from bracket.

To install fire extinguisher:

1. Place fire extinguisher in bracket.
2. Secure fire extinguisher with retention strap.

13.12 Outside Air Temperature

An optional outside air temperature gauge may be installed; the OAT gauge is required IFR equipment. A mechanical OAT may be fitted in the upper left windscreen or an electric probe may be installed left side of the fuselage wraparound.

To remove OAT gauge:

1. Unthread sunshield from gauge stem and remove.
2. Remove rubber washer and concave washer from gauge stem.
3. Remove gauge stem from hole in windshield.

To install OAT gauge:

1. Insert gauge stem through hole in windshield.
2. Place rubber washer and concave washer on gauge stem extending outside of windshield.
3. Thread sunshield on to exposed gauge stem and tighten, not exceeding 20 in lb.

13.13 Brackett Air Filter

A Brackett BA-8110 air filter is installed. Replace filter element BA-8103-1 every 200 hours or 12 months or when 50% covered with foreign material. Reference Section 9.17 for installation and removal.

13.14 Portable Electronic Devices

Optional portable electronics devices may be installed using a dock in the instrument panel. Devices are listed in Table 13-1.

13.14.1 Maintenance and Repair

The installation should be visually inspected at every 100 hour / annual inspection. Inspect for mount security, dock integrity, release mechanism function, and wiring harness security and chaffing. Additional maintenance is limited to removal and replacement of components in Table 13-2. Remove and install components per listed ACAC drawing. The applicable owner's manual should be consulted for diagnosing device malfunction.

Table 13-1: Portable Electronic Devices

Device	Supplier	Part Number	Owner's Manual	Installation Drawing
GPSMAP 496	Garmin	010-00667-40	190-00693-00	4-2036 (Rev. D or later)
GPSMAP 696	Garmin	010-00667-40	190-00919-00	4-2108 (No rev. or later)
Aera 796	Garmin	010-00967-10	190-01194-00	4-2108 (No rev. or later)

Table 13-2: Replaceable Components

Part Number	Description	Supplier	Quantity
90020129-001	Panel Dock	Airgizmos	1 (GPSMAP 696)
50020316-00	Panel Dock	Airgizmos	1 (GPSMAP 496)
11023009-005	Panel Dock	Airgizmos	1 (Aera 796)
010-11206-15	Harness	Garmin	1 (GPSMAP 696)
010-10513-00	Harness	Garmin	1 (GPSMAP 496)
010-11756-01	Harness	Garmin	1 (Aera 796)
010-00730-00	GXM40 Antenna	Garmin	1 (Optional)
010-00202-00	GA25 MCX Antenna	Garmin	1 (Optional)
010-10617-02	XM Extension Cable	Garmin	1 (Optional)
W58XC412A-5	Circuit Breaker	Potter & Brumfield	1
11-1085	Placard	ACAC	1

To remove dock:

1. Remove glare shield by removing the five retaining screws, disconnect the compass light and lift off the panel.
2. Remove electrical harness from panel dock.
3. Remove screws, nuts, and washers attaching panel dock to instrument panel.
4. Remove panel dock from instrument panel.

To install dock:

1. Attach panel dock to instrument panel with four screws, nuts, and washers.
2. Install harness in panel dock.
3. Install glare shield with five brass screws, connect compass light.

To remove harness:

1. Remove glare shield by removing the five retaining screws, disconnect the compass light and lift off the panel.
2. Disconnect harness at device and/or panel dock.
3. Disconnect harness from music input (if applicable).
4. Disconnect power connector, remove pin from power connector using extraction tool 305183 (AMP).
5. Disconnect harness from transponder and communication unit, remove pins from connectors using extraction tool M81969/1-02 (AMP).
6. Disconnect ground at ground buss.

To install harness:

1. Connect harness at device and/or panel dock.
2. Connect harness at music input (if applicable).
3. Insert pin in power connector, connect.
4. Insert pin in transponder connector, connect.
5. Insert pin in communication unit connector, connect.
6. Connect ground at ground buss.
7. Secure wiring harness to intercom/radio bundle with lacing every 8 inches.
8. Install glare shield with five brass screws, connect compass light wiring at connector.

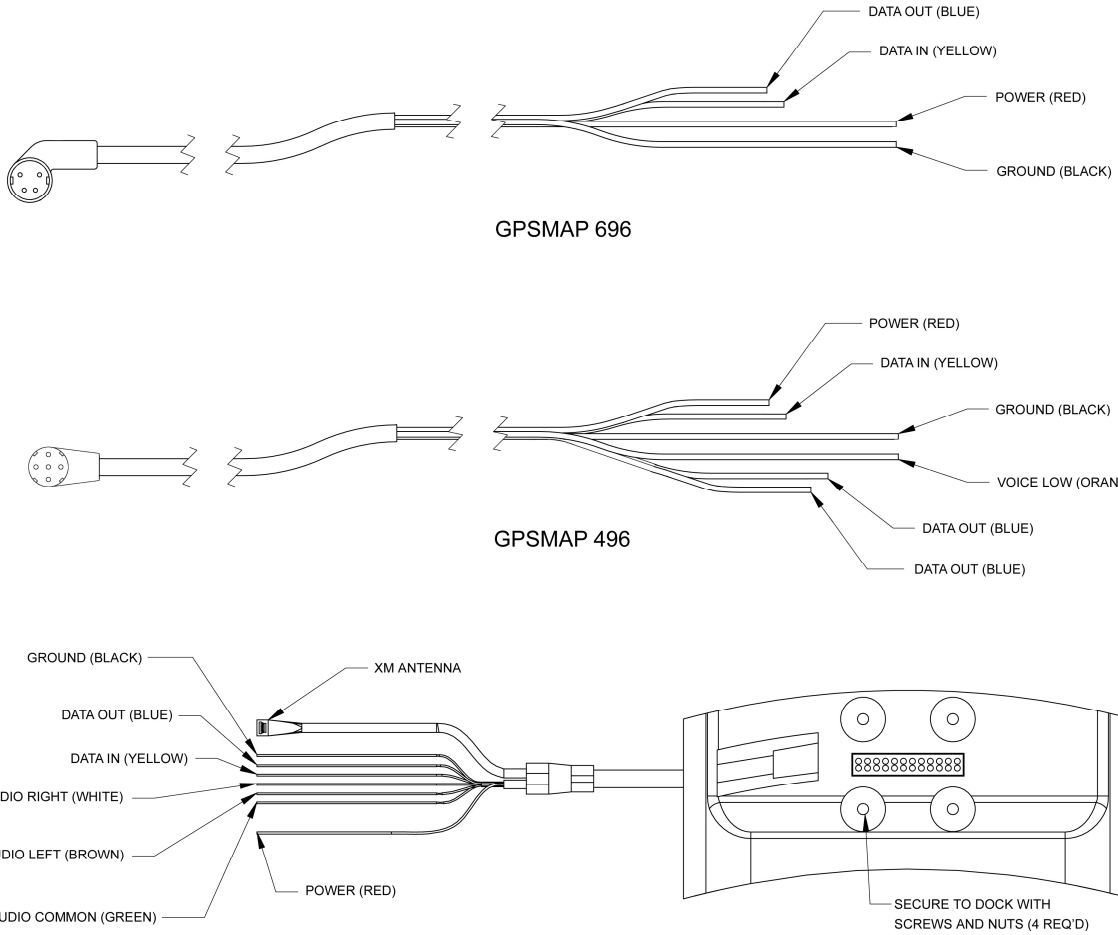

Figure 13-1, Portable Electronic Devices Wiring Diagrams

Intentionally Blank

14.0 Fabric Covering

This section provides the general procedures for the application and repair of Dacron fabric. When recovering the aircraft or one of its components, it is recommended that the old covering envelope be saved for use as a pattern to aid in locating inspection holes, tapes and patches. Component specific fabric installation prints are available from the ACAC part department. When removing old fabric take special note of the methods used to attach fabric around doorframe, window frame, longerons, and fairings.

Table 14-1: Fabric and Finish Materials

FABRIC	Dacron 102 fabric per ACAC specification CFI-1
TAPE	Dacron or alternate tape per ACA specification CFI-1
CEMENT	3M Fastbond 30-NF or alternate cement per ACAC specification CFI-I
PAINT	PPG Polyurethane per ACAC specification CF-4

14.1 Fabric Installation Procedures

Fabric Installation Process:

1. Fabric cement to be applied to underlining structure around perimeter of fabric panel and allowed to dry. This generally corresponds to the entirety of leading edge skins, trailing edges, lower fuselage longerons, wing tips and other perimeter structure. Fabric is then applied. Cement is applied over the fabric layer to allow for the opposing fabric to overlap. The overlapping fabric is then applied and cement again applied at lap locations and all perimeter structure. When cement has dried, taunt fabric. Cement should be between and over all tape and patch layers.
2. The application of fabric to the fuselage consists of two sections. The bottom fuselage and a fin and fuselage envelope with a sewn top center seam. Either the envelope or belly fabric may be installed depending on desired lap location at the lower longeron. Lap fabric approximately 1.0 inch beyond supporting structure. Shrink fabric and install reinforcement tapes, fabric rivets and finishing tapes to fin and fuselage.
3. The application of fabric to the wing consists of an upper and lower fabric section. The lower fabric surface should be applied first such that fabric is lapped to bottom surface of wing. The fabric should be lapped approximately 1in beyond the leading and trailing edges and over the entirety of the aileron bay. Shrink fabric and install reinforcement tapes, fabric rivets and finishing tapes to wing.
4. The application of fabric to the control surfaces consists of an upper and lower fabric section. The lower fabric surface should be applied first such that fabric is lapped to bottom surface. The fabric should be lapped approximately 1in beyond the leading, trailing, root and tip edges. Shrink fabric and install reinforcement tapes, fabric rivets and finishing tapes to the surface.
5. After installing fabric to airframe according to the above, the heat tautening procedures must conform to the following:
    a. Apply heat to the fabric using a household electric iron set on wool temperature. The heat range for shrinking must be more than 250ºF but not over 400ºF. The iron must be kept in motion with a rate of approximately 5 inches per second. Two or three applications of heat are recommended.
    b. Wrinkles and sags can be removed without temperature increase by momentarily pausing over the wrinkled area.
    c. Do not over tighten; when complete the fabric should have a wrinkle free drum-like tautness. Avoid heating the fabric in excess of 450º. If overheated the fabric will melt, this is indicated by lose its weave and a deteriorated texture. The damaged area must be patched or replaced in accordance with Section 14.2.
6. After the heat tautening process the surface or part must be finished as per American Champion Aircraft Specification CF-4.

14.2 Repair Guidelines

The following guidance is provided for fabric repairs. FAA AC 43.13-1( ), Chapter 2 "Fabric Covering" should be consulted for additional guidance.

If the damaged is confined to an area smaller than 6.0 inches in diameter, prepare a circular area at least 2.5 inches beyond edge of damage. Scuff paint with 320 grit sandpaper and apply layer of fabric cement. Apply circular fabric patch that allows for 2.0 inches of overlap beyond damaged area. Apply cement over patch. Tauten patch and surrounding fabric with 250ºF iron. Finish area in accordance with CF-4.

For larger areas the same method is used with the following additions. Fabric patch should allow for 12.0 inches or more of overlap and edges of patch should terminate under finish tapes. In example, a large rectangular wing patch would run from the leading to trailing edge and extend to one rib bay either side of damage. This requires removal and replacement of the affected finish tapes.

14.3 Inspection Procedure

The fabric covering should be inspected for general condition per FAA AC 43.13-1( ) Chapter 2, Section 3. Inspect for excess tension, loose fabric, coating cracks, and lifting patches or finish tapes. Fabric covering may deteriorate in areas of coating cracks, along the edges of finish tapes and patches, and at the edge of underlying structure. In areas where the fabric strength is in question, press firmly with a thumb to verify strength (approximately 20 lb of pressure).