CHRISTEN EAGLE II

OK-IGL

SER NO: 138-14627-1509

SDS ECU EM-5 ENGINE IGNITION

AIRCRAFT

FLIGHT MANUAL

ÚŘAD PRO CIVILNÍ LETECTVÍ
CIVIL AVIATION AUTHORITY

ČESKÁ REPUBLIKA **CZECH REPUBLIC**

PAGE OF ACCEPTANCE

CIVIL AVIATION AUTHORITY OF THE CZECH REPUBLIC ACCEPTS THIS AIRPLANE FLIGHT MANUAL DOC.No 924-AFM APPROVED ORIGINALLY BY CHRISTEN

FOR THE AIRCRAFT TYPE : Christen Eagle II
WITH THESE LIMITATIONS : No additional limitations to this Flight Manual

NATIONALITY OR COMMON MARK AND REGISTRATION MARK

OK-IGL

AIRCRAFT SERIAL NUMBER : 138-14627-1509

THIS MANUAL MUST BE MAINTAINED IN ACCORDANCE WITH
REVISION SERVICE OF THE MANUFACTURER

ÚŘAD PRO CIVILNÍ LETECTVÍ
108

04.09.2014
Datum vydání - Date of issue
(dd-mm-rrrr) - (dd-mm-yyyy)

Podpis / Signature

CAA/F-TI-003-1/98

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Seznam změn a oprav AFM

Změna číslo	Datum změny	Obsah změny	Čísla stran ovlivněných změnou	Provedl: datum, podpis.
Schválení AFM úřadem CAA CZ	04.09.2014	CNIL AVIATION AUTHORITY OF THE CZF.CH REPUBLIC ACCEPTS THIS AIRPLANE FLIGHT MANUAL DOC.NO 924-AFM APPROVED ORIGINALLY BY CHRISTEN	Všechny podle obsahu	CZ.MF.0042, 02.09.2014
TS 1/2026	26.01.2026	Instalace zařízení nízkotlaké distribuce paliva s elektronicky řízeným vstřikováním paliva a řízení zapalování SDS ECU EM-5 engine ignition kit, určené pro Lycoming 4 válcový motor s možností provozu na automobilové palivo BA 98 Natural u letounu CRISTEN EAGLE II r.z. OK-IGL, výr. číslo: 138-14627-1509	9 10-11 20 36 47-52 55-56 101-105	M. Bajzík 08.06. 2023 A. Baumrukr 26.01.2026 A. Baumrukr 26.01.2026 A. Baumrukr 26.01.2026 A. Baumrukr 26.01.2026 A. Baumrukr 26.01.2026 A. Baumrukr 26.01.2026

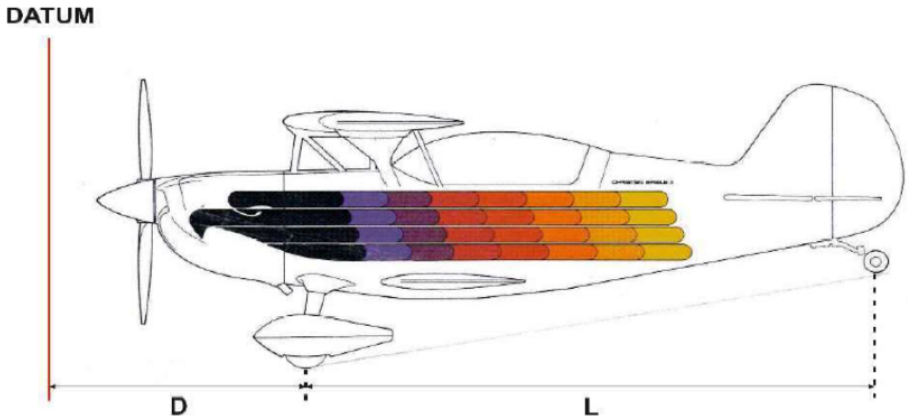
Ing. Pavel Síba

Podepsal Ing. Pavel Síba
DN: cn=Ing. Pavel Síba, c=CZ,
o=Úřad pro civilní letectví, ou=626,
email=pavel.siba@caa.gov.cz
Datum: 2026.02.12 09:33:58 +01'00'

PROTOKOL O VÁŽENÍ A URČENÍ POLOHY TĚŽIŠTĚ			
Typ letadla **Christen Eagle II**	Výrobní číslo **138-14627-1509**	Poznávací značka **OK-IGL**	Datum vážení **19/05/2023**

Vlastník / provozovatel
Aleš Baumrukr, Řevnická 26, 267 28 Svinaře

Letadlo vážené s maximálním množstvím oleje, bez paliva.



Left Wheel (Lbs)	499.60
Right Wheel (Lbs)	498.00
Tailwheel **R** (Lbs)	94.70
Total **W** (Lbs)	1092.30
Distance **D** (Inch)	79.57
Distance **L** (Inch)	141.89

Poloha těžiště: $Cg = D + \left(\frac{RxL}{W}\right)$

Hmotnost prázdneho letadla: 1092,3 Lbs
Poloha težiště prázdneho letadla od vztažného bodu: 91,87 Inch
Užitečná hmotnost: 507,7 Lbs

Hmotnost a Centráž vyhovují ANO - NE

Staré Město 19/05/2023

Zpracoval: Michal Bajzík

OK-IGL

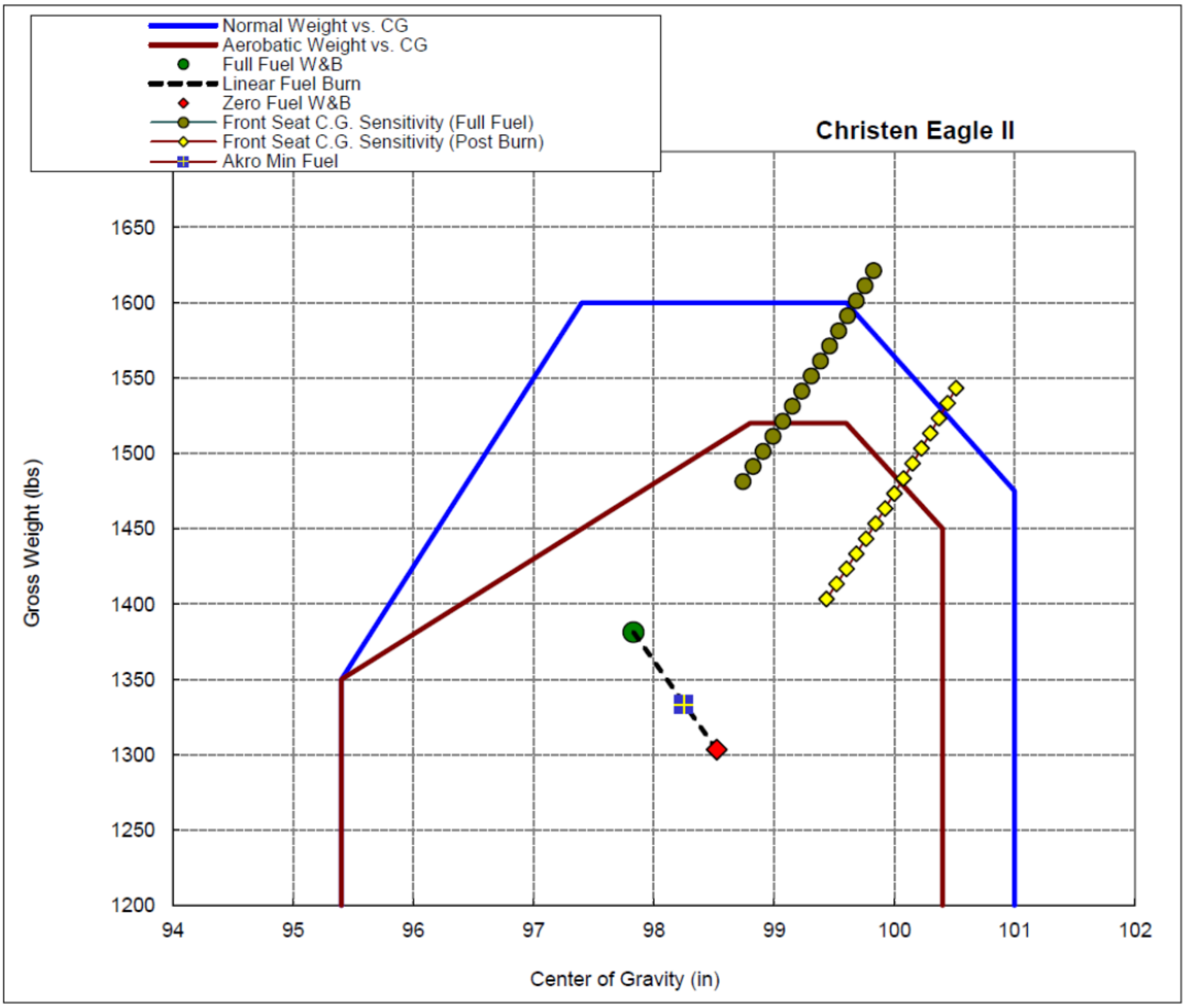
AEROBATIC FLIGHT

Christen Eagle II - Weight & Balance Calculations

Item	ARM	Weight	Moment	Fuel/Oil Quantity		
Empty Wt. & C.G.	92,60	1092,30	101146,98			
Fuel (Main)	86,25	78,00	6727,50	13	Gallons	50lt/82lb
Fuel (Main Unusable)	86,25	36,00	3105,00	6	Gallon	20lt/33lb
Fuel (Wing Tank)	85,75	0,00	0,00	0	Gallons	
Oil	49,70	10,00	497,00	8	Quarts	
Smoke Oil	87,20	0,00	0,00	0	Gallons	
Pilot (Front)	111,32	0	0,00	90kg/198lb		
Pilot (Rear)	143,37	165	23656,05	75kg/165lb		
Baggage - Turtledeck	168,00		0,00			
	97,83	1381,30	135132,53			
	98,52	1303,30	128405,03			
	98,25	1333,30	130992,53			

Note:
This W&B analysis assumes fuel burn is linear and complete!

	C.G.	Weight
Full Fuel	97,83	1381
Post Burn	98,52	1303
Akro Min	98,25	1333



OK-IGL

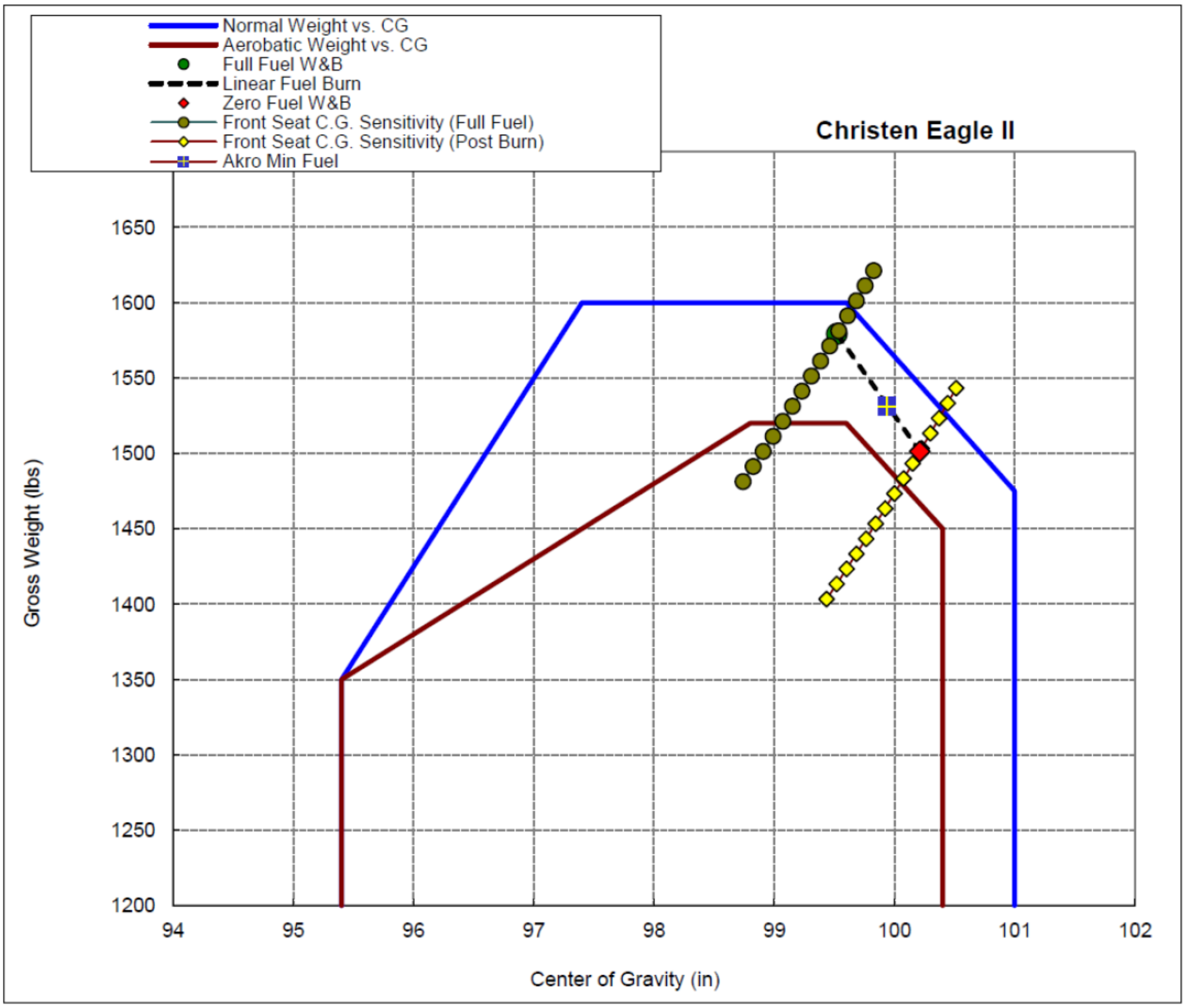
NORMAL FLIGHT

Christen Eagle II - Weight & Balance Calculations

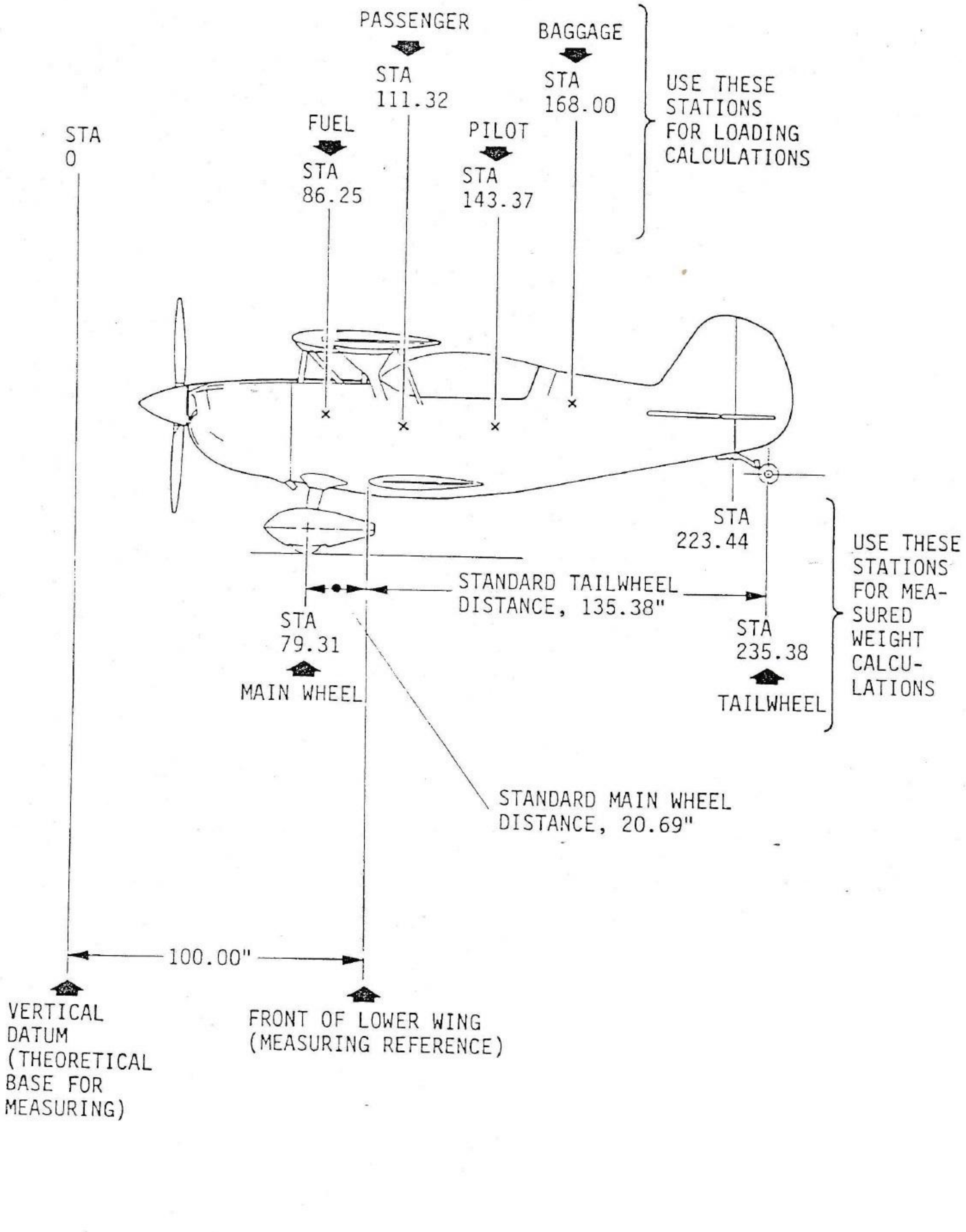
Item	ARM	Weight	Moment	Fuel/Oil Quantity		
Empty Wt. & C.G.	92,60	1092,30	101146,98			
Fuel (Main)	86,25	78,00	6727,50	13	Gallons	50lt/82lb
Fuel (Main Unusable)	86,25	36,00	3105,00	6	Gallon	20lt/33lb
Fuel (Wing Tank)	85,75	0,00	0,00	0	Gallons	
Oil	49,70	10,00	497,00	8	Quarts	
Smoke Oil	87,20	0,00	0,00	0	Gallons	
Pilot (Front)	111,32	198	22041,36	90kg/198lb		
Pilot (Rear)	143,37	165	23656,05	75kg/165lb		
Baggage - Turtledeck	168,00		0,00			
	99,52	1579,30	157173,89			
	100,21	1501,30	150446,39			
	99,94	1531,30	153033,89			

Note:
This W&B analysis assumes fuel burn is linear and complete!

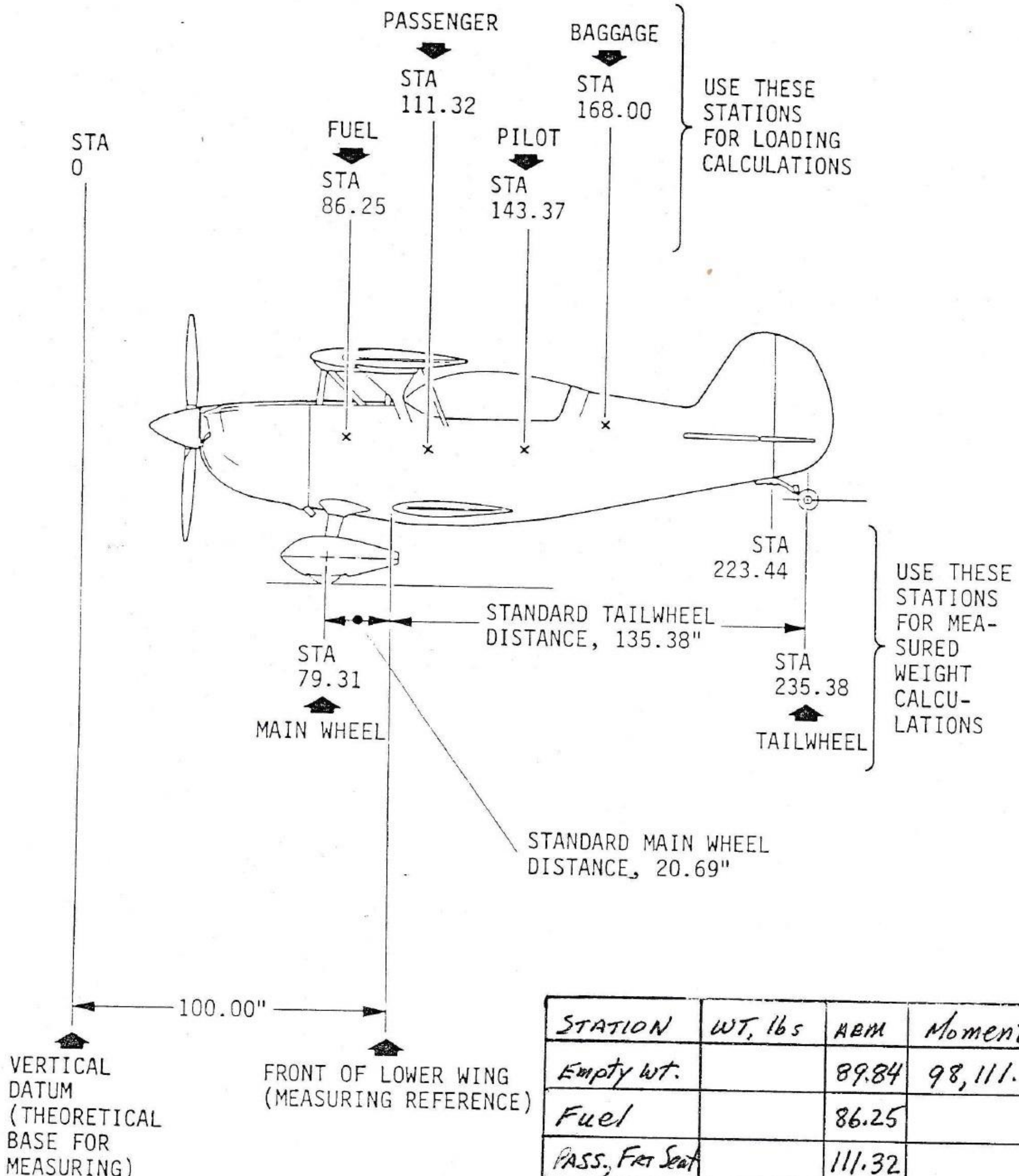
	C.G.	Weight
Full Fuel	99,52	1579
Post Burn	100,21	1501
Akro Min	99,94	1531



Station Locations



Station Locations



STATION	WT, lbs	ARM	Moment
Empty Wt.		89.84	98,111.00
Fuel		86.25	
PASS., Frt Seat		111.32	
PILOT, Rr. Seat		143.37	
Baggage		168.00	
TOTAL			

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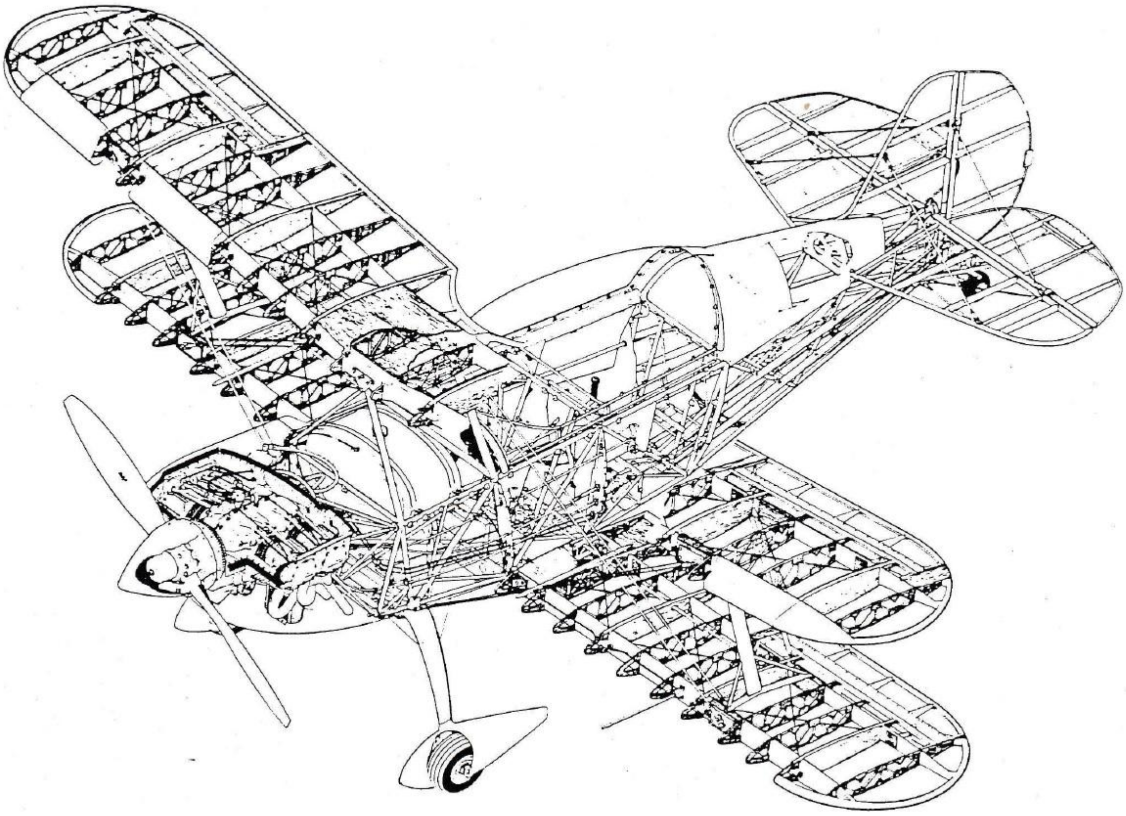
CHRISTEN EAGLE II AIRCRAFT

AIRPLANE FLIGHT MANUAL

924-AFM AUGUST 15, 1985

Airplane Flight Manual



Eagle II
Aircraft

PRODUCT MANUAL 924-AFM
(PAGE SET 70351-001)
(SERIES 01)

Aircraft Record Sheet number:..........

Aircraft Serial No. __________

Owner ______________________ Date __________

Weight-and-Balance Reference:

Weight empty (with oil), ________________ lb

Total moment empty (with oil), ____________ lb-in.

CG location empty (with oil), sta __________

Added equipment (excluded from empty data above)

Type	Weight (lb)	Station (in.)

Heavy-landing Reference:

Left gear leg to right gear leg, __________ in.

Tailwheel bolt to left gear leg, __________ in.

Tailwheel bolt to right gear leg, __________ in.

Aircraft Record Sheet number:..........

Aircraft Serial No. __________

Owner ______________________ Date __________

Weight-and-Balance Reference:

Weight empty (with oil), ______________ lb

Total moment empty (with oil), ____________ lb-in.

CG location empty (with oil), sta __________

Added equipment (excluded from empty data above)

Type	Weight (lb)	Station (in.)

Heavy-landing Reference:

Left gear leg to right gear leg, __________ in.

Tailwheel bolt to left gear leg, __________ in.

Tailwheel bolt to right gear leg, __________ in.

Section 1

GENERAL INFORMATION

1-1 Introduction

This manual is a selection and summary of essential procedures for flight operation of the Christen Eagle II, taken from the manual for the 924 Flight Kit.

This manual should be carried in the aircraft for reference when needed.

So that critical dimensional information will be available, record all basic weight-and-balance data and landing-gear dimensions in Table 1-1. Refer to the 924 manual, paragraph 8-15, for heavy-landing reference measurements.

Refer to the 924 manual for detailed weight-and-balance procedures and for all maintenance procedures.

WARNING

This manual only documents aircraft characteristics and operating procedures.

Refer to the separate 924 Flight Kit manual for essential information regarding pilot qualifications, legal requirements, aerobatic safety, and aircraft maintenance.

Do not attempt any aerobatic maneuvers without first studying and understanding all aerobatic safety information given in the separate 924 Flight Kit Manual. Never attempt any aerobatic maneuvers without first receiving COMPETENT DUAL INSTRUCTION IN AEROBATIC FLYING INCLUDING SPIN RECOVERY PROCEDURES FROM ALL SPIN TYPES.

1-2 Specifications

Type of operation	Day VFR
Engine	AVCO Lycoming AEIO-360-M1B 200 hp
Propeller	Hartzell HC-CZYK-4/C7666A-2, constant speed
Fuel capacity	25 gal. (24 usable), 150 lb
Fuel type, (min 95-100 octane)	95 octane automotive fuel, color yellow. 100 octane automotive fuel, colorloss or blue. 100 octane aviation fuel (100LL) color blue.
Oil capacity	8 qt, 15 lb

Oil type (straight mineral type recommended; see paragraph 8-10)	Avg Air Temp	Viscosity
	above 60°F	SAE 50
	30° to 90°F	SAE 40
	0 to 70°F	SAE 30
	below 10°F	SAE 20

Empty weight (typical)	1050 lb with electrical, radio, and canopy
Gross weight:	
Normal	1600 lb
Acrobatic	1520 lb
Useful load (typical)	550 lb
Baggage allowance	30 lb
Length	18 ft 6 in.
Wing span	19 ft 11 in.
Height	6 ft 6 in.
Wing area	125 sq ft
Wing loading at gross weight	12.80 lb/sq ft
Structural limits at acrobatic weight	+7g, -5g

Limits of travel of control surfaces:

Elevator (relative to horizontal stabilizer):

Up = +26°

Down = -28°

Rudder: 30° side-to-side deflection from the neutral position (60° total movement arc)

Ailerons (measured at lower aileron relative to neutral reference; upper and lower ailerons are parallel):

Up = +26°

Down = -22°

Selected Design Airspeeds	mph	knots
Maximum speed, V_H	184	160
Stall speed, V_S	58	50
Cruise speed, V_C	173	150
Maneuvering speed, V_A	155*	135*
Never exceed speed, V_{NE}	210	182

*Theoretical V_A at 1520 lb is 159 mph or 138 knots; at 1600 lb V_A is 163 mph or 142 knots.

(Continued on next page.)

1-2 Specifications (cont'd)

Summary of Instrument Color Marks

Airspeed Indicator
- Redline, 58 mph: Stall speed
- Green arc, 58-155 mph: Normal speed range below maneuvering speed
- Yellow arc, 155-210 mph: Caution speed range above maneuvering speed
- Redline, 210 mph (never exceed speed)

Oil Pressure
- Redline, 25 psi: Minimum safe limit
- Yellow arc, 25-60 psi: Precautionary range
- Green arc, 60-85 psi: Normal range
- Yellow arc, 85-100 psi: Precautionary range
- Redline, 100 psi: Maximum safe limit

Oil Temperature
- Redline, 40°F: Minimum safe limit
- Yellow arc, 40°-120°F: Precautionary range
- Green arc, 120°-245°F: Normal range
- Redline, 245°F: Maximum safe limit

Tachometer
- Green arc, 2000-2700 rpm: Normal engine speed range; however, propeller restrictions prohibit continuous operation between 2000 and 2350 rpm
- Redline, 2700 rpm: Maximum safe limit

1-3 Performance Data

Max rate of climb	2120 fpm
Best angle of climb speed, V_X	78 mph
Best rate of climb speed, V_Y	94 mph
Recommended climb speed	100 mph
Recommended engine-out glide speed	90 mph
Service ceiling	22,200 ft
Take-off distance (over 50 ft obstacle) at sea level and 75°F, zero wind)	900 ft
Landing distance (over 50 ft obstacle at sea level and 75°F, zero wind)	1,375 ft
Roll rate	187°/sec
Vertical penetration (entry at 180 mph)	1500 ft
Knife-edge endurance (180 mph)	approx 6000 ft
Inverted flight endurance	unlimited

1-3 Performance Data

Engine Data Summary:

Power	RPM	M.P. (in. Hg)	Fuel cons. (gph)
Full	2700	28.6	15.8
75%	2450	25.0	12.0
65%	2350	23.5	10.5
50%	2000	22.7	8.1

Cruise Speed Summary:

Power	TAS, Sea level (mph)	TAS, 5000 ft (mph)
75%	152	162
65%	146	151
50%	125	133

Cruise Range Summary (30 min reserve):

Power	Max Power Cruise (mi)	Economy Cruise (mi)
75%	243	-
65%	270	328
50%	328	390

Aerobatic Entry Speed Summary (in mph):

	Inside		Outside	
Maneuver	Max.	Min.	Max.	Min.
Loop (up)	180	130	180	130
Loop (down)	100	70	100	70
Slow roll	180	100	180	100
Barrel roll	180	130	180	130
Snap roll	140	90	110	90
Hammerhead	180	130	180	130
Lazy eight	180	140	180	140
Chandelle	180	140	180	140

1-4 Weight and Balance

1-4.1 Introduction

Determination that the aircraft flight CG location is within specified limits is particularly critical to flight safety. For safe flight the CG, or balance point of the aircraft, must fall within a relatively narrow zone.

If a particular aircraft has a CG forward of the allowable range, it would be considered noseheavy and unsafe. In such an aircraft, the elevator would be unable to produce sufficient force to hold the nose of the aircraft up, except at relatively high speeds. The ability to pull up would be limited and high takeoff and landing speeds would be required.

If a particular aircraft has a CG aft of the allowable range, it would be considered tailheavy and unsafe. In such an aircraft, the elevator would be unable to produce sufficient force to hold the nose of the aircraft down, except at relatively high speeds. In this case, the elevator would be unable to lower the nose following a stall. Recovery from a stall-spin situation would be impossible if the aircraft were loaded to produce a CG sufficiently aft of the allowable range.

The pitch maneuvering ability of an aerobatic aircraft is optimized when the aircraft flight CG is set relatively near the aft limit, but still within the allowable safe CG range. The Christen Eagle II was designed so that the flight CG of the aircraft falls near the aft limit. However, this characteristic places a stringent requirement on all owners and pilots: The aircraft CG must be accurately determined, and aircraft loading must be planned so that a safe CG location will always be maintained.

(Continued on next page.)

1-4.1 Introduction (cont'd)

Remember that most types of homebuilder modifications tend to increase weight and tend to shift the CG aft. If the actual CG location in a particular aircraft is beyond the allowable range, or if the aircraft CG appears to be located such that normal pilot-passenger-baggage loading, combined with low fuel quantities, will shift the CG beyond the aft limit, the aircraft must be considered unsafe. If such a condition is identified, the aircraft does not meet Christen design intentions and homebuilders should consider compensating modifications to shift weight forward to maintain an acceptable balance condition. For example, the non-Christen equipment which caused the condition could be moved forward under the fuel tank, the battery could be moved forward under the fuel tank or into the engine compartment, or ballast weight could be attached at a suitable location.

WARNING

Owners, pilots, and mechanics must take weight-and-balance responsibilities seriously. All aircraft must be loaded so that the aircraft CG will remain within safe limits at all times. All spin recovery procedures depend on having the CG within design limits. Remember that most added loading tends to shift the CG aft and that fuel burnoff tends to shift the CG aft.

1-4.2 CG Specifications

Significant specifications regarding weight and balance are given below.

All stations used for weight-and-balance calculations are referenced to an arbitrary vertical plane or "datum" located 100.00 inches forward of the leading edge of the lower wing. This datum is not the same as that used for identification of fuselage stations during construction (which were referenced to the center of the vertical members and crossmembers at the front of the fuselage). The use of a datum located well forward of the aircraft simplifies required arithmetic by eliminating negative station numbers.

For normal category operation at a gross weight of 1600 lb, the allowable CG range is from station 97.40 to 99.60. This represents a range of 21% MAC to 26.5% MAC. An absolute forward limit is set at station 95.40 (at 1350 lb), and an absolute aft limit is set at station 101.00 (at 1475 lb).

For acrobatic (or aerobatic) category operation at a gross weight of 1520 lb, the allowable CG range is from station 98.80 to 99.60. This represents a range of 24.5% MAC to 26.5% MAC. An absolute forward limit is set at station 95.40 (at 1350 lb), and an absolute aft limit is set at station 100.40 (at 1450 lb).

VERTICAL DATUM:	100.00 in. forward of leading edge of lower wing.

WEIGHING POSITIONS (standard landing gear):

Main wheels	79.31 in.
Tailwheel	235.38 in.

(Continued on next page.)

MEAN AERODYNAMIC CHORD (MAC): 40.00 in. with leading edge at station 89.00.

LOADING POSITIONS:

Pilot (aft seat)	143.37 in.
Passenger (fwd seat)	111.32 in.
Fuel	86.25 in.
Baggage	168.00 in.

NORMAL CATEGORY LIMITS:

Most forward	95.40 in. (16.0% MAC) at 1350 lb or less
Most forward at maximum gross weight	97.40 in. (21.0% MAC) at 1600 lb or less
Most rearward at maximum gross weight	99.60 in. (26.5% MAC) at 1600 lb
Most rearward	101.00 in. (30.0% MAC) at 1475 lb

ACROBATIC CATEGORY LIMITS:

Most forward	95.40 in. (16.0% MAC) at 1350 lb or less
Most forward at maximum gross weight	98.80 in. (24.5% MAC) at 1520 lb or less
Most rearward at maximum gross weight	99.60 in. (26.5% MAC) at 1520 lb
Most rearward	100.40 in. (28.5% MAC) at 1450 lb

1-4.3 Flight CG Calculation

The flight CG of the aircraft should be calculated for all anticipated extreme or "worst-case" loading conditions, for both full-fuel and minimum-fuel situations. Actual pilot and passenger weights (including parachutes, if used) should be used for calculation. Fuel weight is 6 lb per gal.

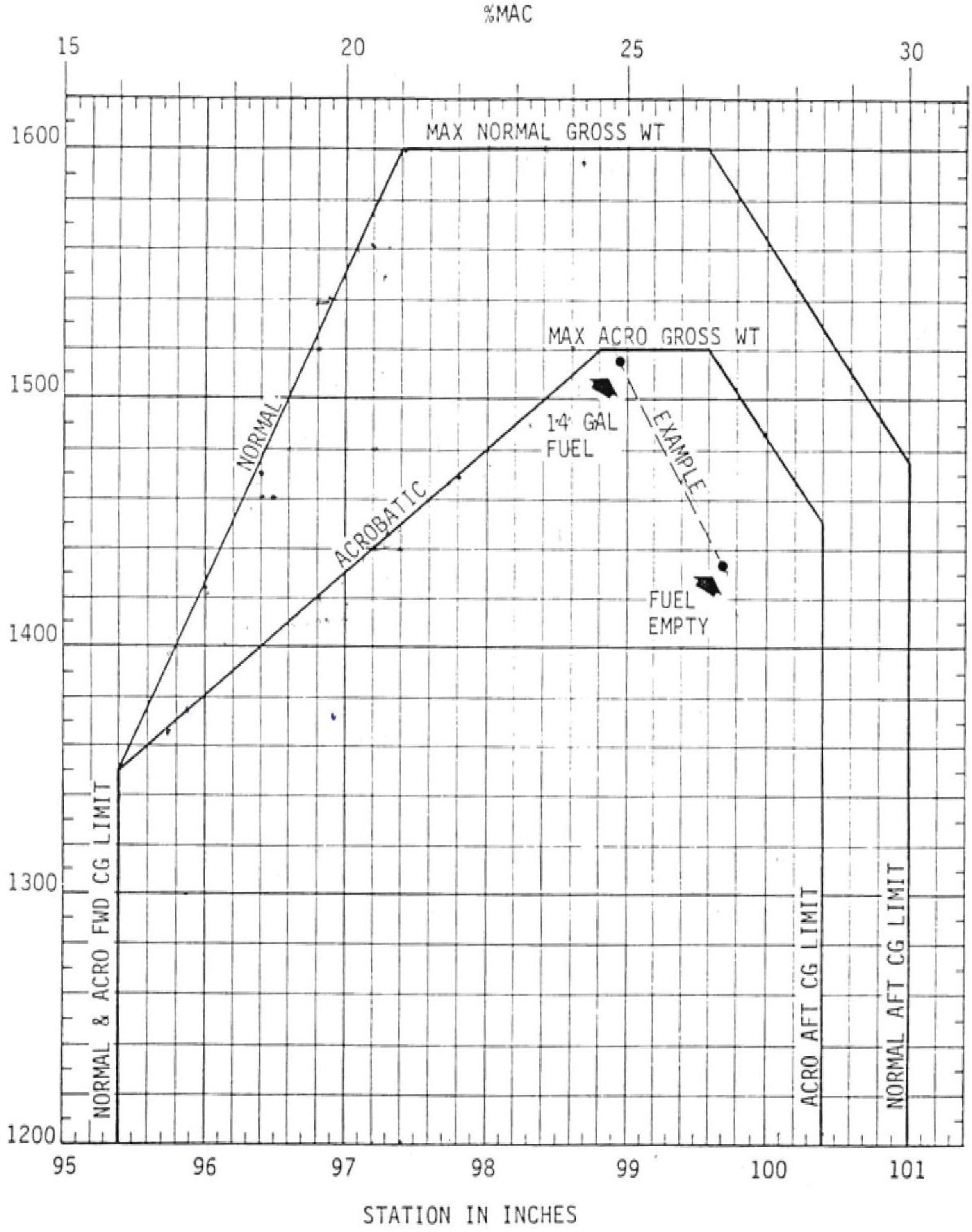
Use the worksheets at the end of this section for CG calculation. Results of calculations should be plotted on the allowable CG envelope diagram to verify that the aircraft will always be operated in a safe CG range (see Figure 1-1). An example calculation is given below for aerobatic flight with one passenger, and the extreme CG locations at maximum and minimum fuel are plotted on the CG envelope. Note that the example flight weight is always within the acrobatic gross weight of 1520 lb, and the CG is always within the acrobatic CG envelope.

To maintain a uniform format for tabulation, calculated CG locations are shown in the "station" column. These values are found by dividing the total moment by the total weight.

EXAMPLE: DESIGN ACROBATIC WEIGHT, PILOT PLUS PASSENGER

ITEM	WEIGHT (lb)		STATION (in.)		MOMENT (lb-in.)
EMPTY	1052.00	X	89.69	=	94353.88
PILOT (aft)	190.00	X	143.37	=	27240.30
PASSENGER (fwd)	190.00	X	111.32	=	21150.80
FUEL (14 gal)	84.00	X	86.25	=	7245.00
TOTAL:	1516.00	X	98.94	=	149989.98
FUEL BURN-OFF (14 gal)	-84.00	X	86.25	=	-7245.00
TOTAL:	1432.00	X	99.68	=	142744.98

Allowable CG Envelope



PRODUCT SERIES	PRODUCT NAME	CHRISTEN	
EAGLE AIRCRAFT	FLIGHT KIT		
PRODUCT NUMBER	MANUAL SECTION	REVISION	PAGE
924-AFM	AIRPLANE FLIGHT MANUAL	04-09-2014	

1,0 Lbs = 0,75 kg // kg : 2,206 = 1,0 Lbs

WORKSHEET DATE: ________

Flight Category: ____________________

Loading Condition: ____________________

ITEM	WEIGHT (lb)		STATION (in.)		MOMENT (lb-in.)
EMPTY	____	X	____	=	____
PILOT (aft)	____	X	143.37	=	____
PASSENGER (fwd)	____	X	111.32	=	____
FUEL	____	X	86.25	=	____
BAGGAGE	____	X	168.00		____
TOTAL:	____	X	____	=	____
FUEL BURN-OFF	- ____	X	86.25	=	- ____
TOTAL:	____	X	____	=	____

- -

WORKSHEET DATE: ________

Flight Category: ____________________

Loading Condition: ____________________

ITEM	WEIGHT (lb)		STATION (in.)		MOMENT (lb-in.)
EMPTY	____	X	____	=	
PILOT (aft)	____	X	143.37	=	____
PASSENGER (fwd)	____	X	111.32	=	____
FUEL	____	X	86.25	=	____
BAGGAGE	____	X	168.00		____
TOTAL:	____	X	____	=	____
FUEL BURN-OFF	- ____	X	86.25	=	- ____
TOTAL:	____	X	____	=	____

WORKSHEET DATE: ________

Flight Category: ____________________

Loading Condition: ____________________

ITEM	WEIGHT (lb)		STATION (in.)		MOMENT (lb-in.)
EMPTY	____	X	____	=	____
PILOT (aft)	____	X	143.37	=	____
PASSENGER (fwd)	____	X	111.32	=	____
FUEL	____	X	86.25	=	____
BAGGAGE	____	X	168.00		____
TOTAL:	____	X	____	=	____
FUEL BURN-OFF	-____	X	86.25	=	-____
TOTAL:	____	X	____	=	____

- -

WORKSHEET DATE: ________

Flight Category: ____________________

Loading Condition: ____________________

ITEM	WEIGHT (lb)		STATION (in.)		MOMENT (lb-in.)
EMPTY	____	X	____	=	
PILOT (aft)	____	X	143.37	=	____
PASSENGER (fwd)	____	X	111.32	=	____
FUEL	____	X	86.25	=	____
BAGGAGE	____	X	168.00		____
TOTAL:	____	X	____	=	____
FUEL BURN-OFF	-____	X	86.25	=	-____
TOTAL:	____	X	____	=	____

SECTION 2

NORMAL FLIGHT PROCEDURES

2-1 Introduction

This section summarizes basic procedures for aircraft operation. All pilots must thoroughly understand (a) procedures discussed in this section, (b) procedures discussed in Section 3, Spins, and (c) procedures discussed in Section 4, Emergency Procedures.

2-2 General Responsibilities

There are a number of general areas that both pilots and maintenance personnel should understand.

1. The flight CG of the aircraft must be within design limits. Never attempt flight if there is doubt regarding CG location.

2. When opening or closing the canopy, lift it either by the external handle or by the central crossmember. Never lean on the canopy for support. Refer to 915 manual for detailed procedures on correct canopy operation.

3. When entering or exiting the aircraft, (a) stand on the left wingwalk, (b) step first to the seat bottom, then to the floor, (c) use the upper wing handhold for support. Do not use the canopy for support.

(Continued on next page.)

2-2 General Responsibilities (cont'd)

4. Keep logbook entries current. The primary function of a logbook is to show equipment status. Enter any problems or "squawks", enter any corrective action taken, enter all maintenance inspections, and enter any repairs or modifications that are made to the airframe or engine.

5. FAR 91.42 specifies that experimental aircraft cannot carry passengers for hire, that a passenger must be advised of the experimental nature of the aircraft, that day VFR only is permitted unless there is a specific authorization otherwise, and that control towers must be advised of the experimental nature of the aircraft when operating into or out of an airport with a control tower.

6. FAR 91.71 defines aerobatic ("acrobatic") flight as "an intentional maneuver involving an abrupt change in an aircraft's attitude, or abnormal acceleration, not necessary for normal flight".

7. FAR 91.71 also prohibits aerobatic ("acrobatic") flight:

   (a) over a congested populated area

   (b) over an open-air assembly of persons

   (c) within a control zone or federal airway

   (d) below 1,500 ft agl

   (e) when visibility is less than 3 miles

8. FAR 91.15 specifies that chair-type parachutes (canopy in back) must have been packed by a certificated parachute rigger within the preceding 120 days.

9. FAR 91.15 also specifies that, if a passenger is carried and aerobatic manuevers are performed, parachutes are required by both pilot and passenger.

10. When taxiing, remember that clearance between the lower wings and the ground surface is limited. Always taxi the aircraft clear of any ground obstacles that could possibly cause damage.

2-3 Preflight Inspection Procedure

1. If the aircraft is operated by more than one person, check the aircraft log for any reported defects or problems. All safety-related problems must be corrected prior to operating the aircraft.

2. Inspect the aircraft exterior covering looking for cracks or peeling paint, which indicate possible interior damage. Pay particular attention to attachment and rigging stress points on the wing, tail section, and landing gear.

3. Open the canopy and unwrap the seat belts from the control sticks.

4. Check the ailerons for smooth and full travel from behind each wing. Verify that hinges appear secure without excessive play.

5. Check for play in the aileron slave tubes.

6. Check the elevator for smooth and full travel. Verify that hinges appear secure without excessive play.

7. Check the rudder for smooth and full travel. Verify that hinges appear secure without excessive play.

8. Inspect the entire tailwheel assembly for damage or distortion. Remove and dispose of the oil cup on the vent tube, if used.

9. Manually check the tension in all flying wires, landing wires, and tailbrace wires for normal tension; inspect all wires for evidence of nicks, cracks or wear. Verify that jam nuts are tight against their clevises and that cotter-pinned clevis pins on the tailbrace wires are secure.

(Continued on next page.)

2-3 Preflight Inspection Procedure (cont'd)

10. Inspect the javelins. Verify that attaching hardware is secure, that all parts are free from cracks, and that the rubber cushions at the clamping points prevent metal-to-metal contact with the flying wires and landing wires.

11. Inspect the tires for wear and tread damage; a significantly damaged tread requires tire replacement. Visually check for reasonable tire inflation.

NOTE

Tire pressure can be indirectly measured without removing the wheel pants. When the tires are inflated to 30 psi, measure the clearance between the bottom surface of the wheel pants immediately behind the tire and the ground. (This distance is typically about 1-1/4 inches.) Make a small wood block or other simple device for future reference to quickly measure this clearance.

12. Remove any mud from inside the wheel pants.

13. Check the pitot and static inlet holes for possible obstructions.

14. Remove both engine access panels and inspect the engine compartment. Look for oil, fuel, and exhaust leaks, loose or frayed wires, cracked or damaged insulation, and loose or missing bolts or fasteners. Be sure all wiring, hoses, harnesses, and control brackets are secure.

15. Inspect the alternator belt for tension and wear or damage.

(Continued on next page.)

2-3 Preflight Inspection Procedure (cont'd)

16. Inspect the engine baffles for cracks and loose or missing fasteners.

17. Check the cowling interior for possible chafing against adjacent parts.

18. Inspect the exhaust manifold and exhaust stacks for cracks.

19. Closely check the spark plug wires for evidence of shorting (black marks near a wire indicate electrical arcing to the engine, frame, other metal parts).

20. Check the engine oil level; 6 quarts is minimum. For aerobatic usage, oil level should be kept between 6 and 7 quarts. For normal non-aerobatic usage, oil capacity is 8 quarts. (Refer to the 924 manual, paragraph 8-10, for a discussion of engine oil requirements.)

21. Install both engine access panels on the cowling.

22. Inspect the propeller spinner for cracks, loose or missing bolts, and evidence of internal oil leaks in the hub area.

WARNING

Cracks or oil leaks in the propeller hub may indicate serious internal problems. Do not operate the aircraft until the cause of such problems has been determined and any deficiency has been corrected by a qualified propeller repair station.

(Continued on next page.)

23. Closely inspect the propeller blades for nicks and scratches. Even minor damage to the propeller blades is serious and should be corrected before operating the aircraft. Refer to paragraph 8-14, Propeller Repair, for minor repairs and servicing.

24. Inspect the induction air filter through its grille for possible obstructions.

25. Remove the rear seat back.

26. Inspect the area behind the rear seat for foreign objects and check the battery for possible leakage.

27. Install the rear seat back.

28. Drain and inspect a fuel sample for the proper color. Fuel must be green, blue, yellow or colerless only. Any other color indicates the wrong octane.

WARNING

Never operate the engine, even briefly with fuel rated below 95 - 100 octane or aviation 100LL fuel.

A fuel sample also indicates the presence of water and contamination. If water or contamination is found, continue draining until fuel samples are free from water and contamination.

Be sure to drain fuel from both drain valves (one below manual fuel pump, one slightly forward of the left gear strut).

(Continued on next page.)

29. Remove wheel chocks.

30. Remove pitot cover.

31. Remove or secure any loose articles in the cockpit; vacuum clean, if necessary.

32. If solo, secure front seat belt to prevent coming adrift.

33. Secure the front seat headset, if necessary.

34. Check for secure retention of the radio and transponder units by firmly pulling up and aft, grasping the edge of the panels. If safety screws have been installed for positive retention, verify that the safety screws are present.

35. Inspect the seat belts and shoulder harness for chafing and wear, and verify that attachment is secure. Check the buckles for smooth operation.

36. Verify that fuel quantity is adequate. (Never attempt aerobatic maneuvers with less than 6 gallons of fuel.)

NOTE

The fuel sight-gage at the rear of the fuel tank is intended for in-flight pilot reference during aerobatic flights (aircraft in normal upright flight) when the aircraft is lightly fueled. The fuel gage is not intended for measurement of fuel on the ground or for in-flight measurement of fuel quantities in excess of 10 or 12 gallons.

37. While seated in the cockpit, check the brakes by applying and holding them firmly for one minute. Verify that brake action is free from sponginess or fading.

38. Check the operation of the control surfaces by moving the control stick in all directions while observing the movement of the ailerons and elevator. Check the rudder controls by operating the rudder pedals while observing the rudder movement. All controls should move freely and smoothly throughout their range of travel.

39. Check the operation of the trimtab and its control for free and smooth travel.

2-4 Seat Belt Procedure

NOTE

For aerobatic flying, proper fastening of seat belts is essential. In general, belts must be comfortable, very tight across the lap and crotch, and snug but not tight on the shoulders.

If a parachute is regularly worn during normal operation of the aircraft, always exit the aircraft after completion of normal flights by unbuckling in the following sequence: First, release all seat belts. Second, release the parachute. This sequence avoids developing the potentially dangerous habit of releasing the parachute first when exiting the aircraft that might result in inadvertent unbuckling of the parachute harness in an emergency bail-out situation.

WARNING

The following points must be strictly observed during the harnessing procedure:

1. Always put on and secure the parachute before connecting the belts or shoulder harness.

2. Never tangle any straps with the parachute harness.

3. Check the belt buckles after latching to verify positive locking.

4. Arrange the secondary belt so that its webbing covers the buckle of the main belt.

5. The buckle of the secondary belt must be clear, permitting immediate emergency release.

(Continued on next page.)

WARNING (cont'd)

6. All straps and hardware must be clear of aircraft controls, both to permit unobstructed control functioning and to prevent wear on the system webbing.

2-4.1 Harnessing Procedure

1. If a parachute is used, remove the cushions and place the parachute in position on the seat. (Individuals of relatively light weight or short height may prefer to leave the seat cushions in the seat.)

2. Enter the cockpit and put on the parachute in the sequence recommended by the manufacturer.

3. Shift to several trial positions in the seat to determine the most comfortable posture. Sit centrally and squarely.

4. Loosen all straps at each roller adjuster. To release the roller adjusters, upset the adjuster by giving the pull tab on the adjuster a reverse pull. This includes both shoulder harness straps, each side of the main belt, the crotch strap, and the secondary belt.

5. Place the lap belts with lap pads approximately in place across lap.

6. Verify that the harness is not tangled with or threaded through the parachute harness.

7. Verify that the main belt is not tangled with the secondary belt.

(Continued on next page.)

2-4.1 Harnessing Procedure (cont'd)

8. Thread the main belt connector through the couplings on (a) the left-side shoulder strap, (b) the crotch strap, and (c) the right-side strap. Snap the connector into the main belt buckle. See Figure 2-1.

WARNING

Fittings on the main belt must not be accidently cross-connected with the secondary belt fittings.

9. Twist the main belt buckle over and visually inspect to verify that the buckle latch is positively engaged.

10. Center the lap pads and hold them in place. Tighten the main belt by removing slack symmetrically from each side to keep the main belt buckle and harness/crotch strap connectors centered.

11. With the object of securing the main belt as tightly as humanly possible, use the following technique for final tightening; (a) shift your weight and twist slightly toward the right, (b) push down on the right end of the lap pad using the left hand, (c) pull up and to the left on the free end of the left main belt strap using the right hand, (d) shift your weight and twist slightly toward the left and repeat the procedure, pushing down on the lap pad using the right hand and pulling up and to the right on the main belt strap using the left hand. To keep the main buckle and harness-crotch strap connections centered, this sequence should be repeated several times, increasing the tightening forces with each repetition. Figures 2-2A and 2-2B illustrate the proper tightening procedure.

(Continued on next page.)

12. Tighten the crotch strap firmly by pushing down on the top of the main belt buckle while pulling up on the free end of the crotch strap. Figure 4-2C illustrates this procedure.

13. Tighten the shoulder harness by pulling down on the free ends of each strap. The correct adjustment can be sensed by raising the shoulders slightly, at which time firm support should be felt. The preferred adjustment is such that most of the occupant's weight will be supported by the main belt during inverted flight. Figure 4-2D illustrates tightening of the shoulder harness.

14. Lay the secondary belt in position over the main belt. The secondary belt should be adjusted so that its buckle lies off-center and does not contact the buckle on the main belt.

15. Lay the free ends of the main belt and crotch strap neatly under the secondary belt.

16. Latch the connector and buckle of the secondary belt. Twist the buckle over and visually inspect to verify that the buckle latch is positively engaged.

17. Route the secondary belt across the top of the main belt so that the webbing of the secondary belt lies across the main belt buckle.

18. Tighten the secondary belt as firmly as possible.

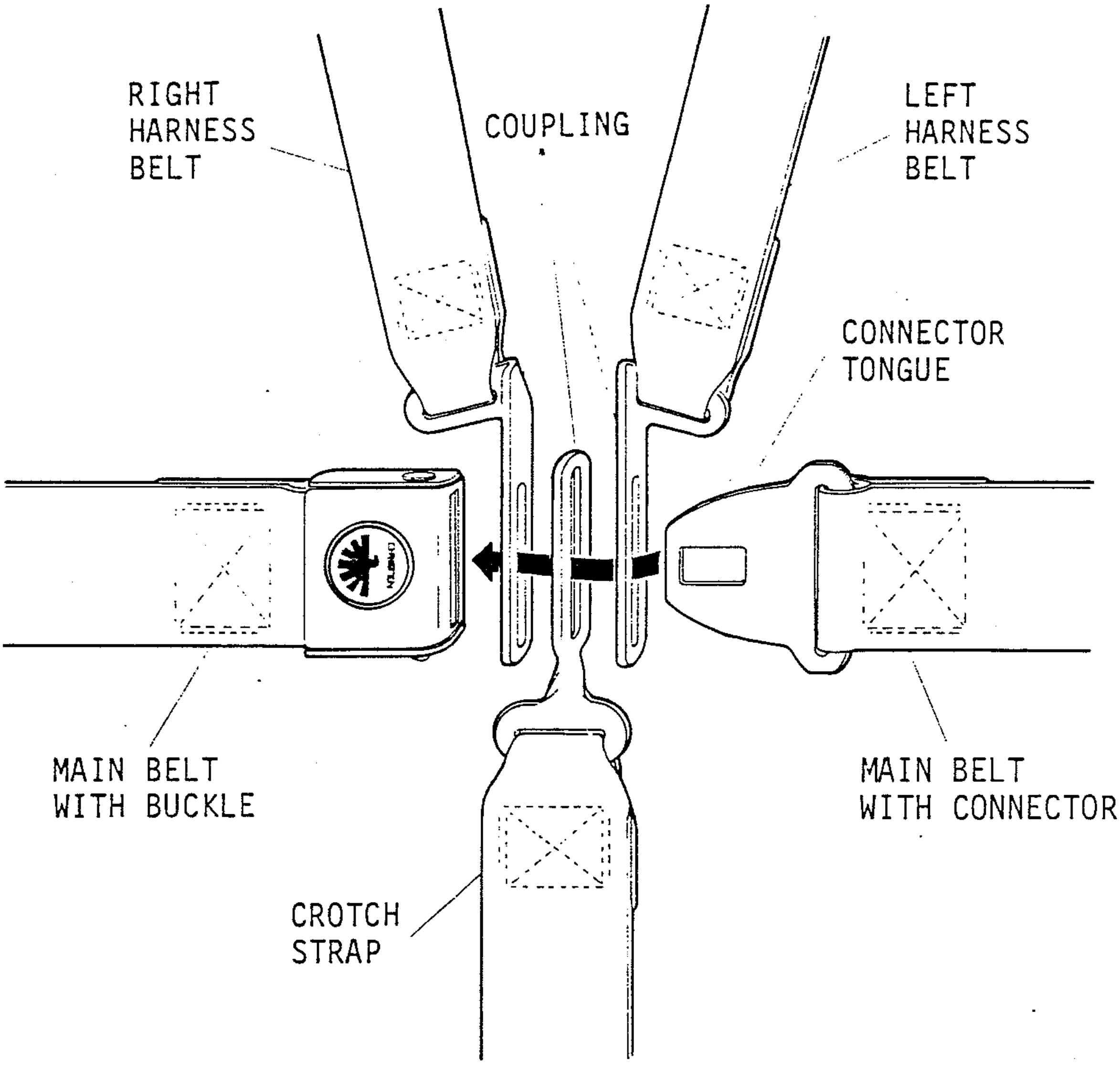
19. Tuck free ends of the straps on the secondary belt under the secondary belt.

WARNING

The buckle on the secondary belt must be clear and accessible for immediate emergency release.

(Continued on next page.)

FIGURE 2-1 Buckle Assembly

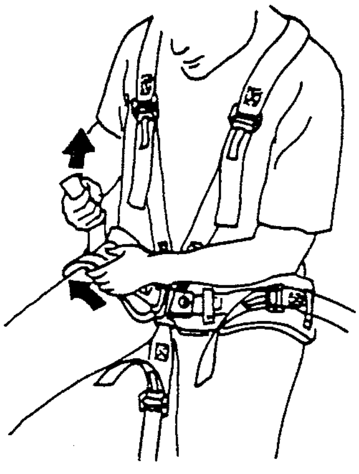


NOTE

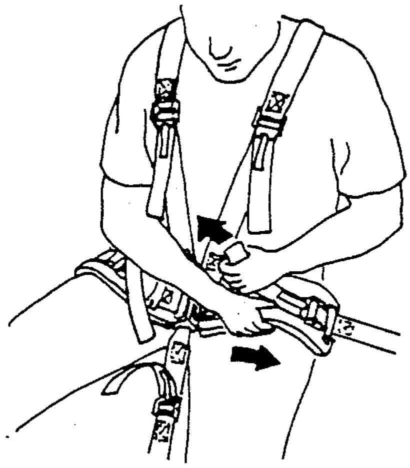
BUCKLE SHOWN ON RIGHT; BUCKLE POSITION IS OPTIONAL.

PRODUCT SERIES	PRODUCT NAME	CHRISTEN	
EAGLE AIRCRAFT	FLIGHT KIT		
PRODUCT NUMBER	MANUAL SECTION	REVISION	PAGE
924-AFM	AIRPLANE FLIGHT MANUAL	04-09-214	

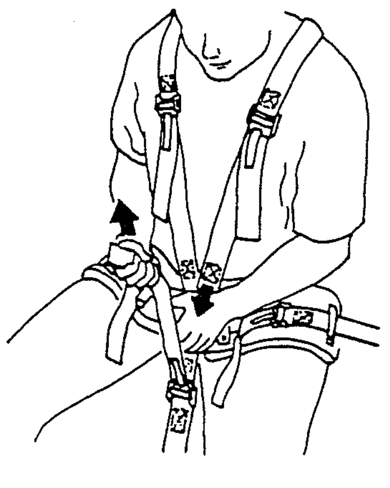
FIGURE 2-2 Harnessing Procedure



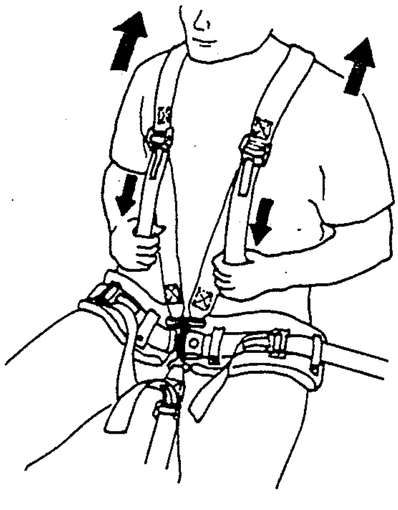
A. TIGHTEN RIGHT LAP BELT



B. TIGHTEN LEFT LAP BELT



C. TIGHTEN CROTCH STRAP



D. TIGHTEN SHOULDER HARNESS

2-4.1 Harnessing Procedure (cont'd)

20. Tuck free ends of the shoulder harness under the harness, making sure that shoulder harness straps are not tangled with the parachute harness.

21. Check all parts of the main belt system and secondary belt to verify that aircraft controls are clear. This check applies particularly to control cables which are routed alongside the seat.

2-4.2 Aerobatic Usage

For proper support during aerobatic flight, the seat belt/harness system must be properly tightened. This requires that (a) the main and secondary belts and crotch strap must be extremely tight over the lap pad and (b) the shoulder harness should be snug, without excessive tightness.

The roller adjusters on the belts are spring-loaded to grip system webbing in the adjusted position. This feature eliminates belt slippage and assures maintenance of the belt adjustment regardless of belt tension and particularly during sequences of alternating slack and tension as encountered during aerobatic flight.

The importance of extremely tight adjustment of the seat belts cannot be overemphasized, if comfortable and secure support is to be achieved during severe aerobatic maneuvers. If the seat belts are loose initially, or if they become loose due to seat cushion compression, negative-g maneuvers will be very uncomfortable. For example, if a severe negative-g maneuver such as an outside loop or an outside snap roll is performed with loose belts, the occupant may be drawn away from the seat and may be moved to one side. This displacement from the seat may be distressing, and the occupant may be held awkwardly in the side position when the belts become moderately tight again upon return to the normal positive-g condition.

2-4.3 Non-Aerobatic Usage

The restrictive tightness that is required for comfortable support during severe aerobatic maneuvers is excessive for normal, non-aerobatic flight. For such flights, follow the harnessing procedure given previously, but leave some slack in the main and secondary seat belts. Also, the lap pads may be omitted for non-aerobatic flight.

WARNING

> Maximum crash protection is provided when the harness is securely tightened. In an emergency, if a forced landing is anticipated, loosened belts should be tightened as much as possible.

2-4.4 Emergency Release Procedure

Emergency release from the seat belt/harness is simple and virtually foolproof. Nevertheless, all actions required for release and bailout must be committed to instinctive habit. Practice the following procedure until it can be performed instinctively at maximum speed:

1. Unlatch the secondary belt by lifting the edge of the buckle latch.

2. Unlatch the main belt by lifting the edge of the buckle latch.

3. Toss the shoulder harness straps forward and up and exit from the aircraft.

2-4.5 Safety Summary

The following points, noted in the harnessing procedure, must be carefully observed:

1. Always put on and secure the parachute before connecting belts or shoulder harness.

2. Never tangle any straps with the parachute harness.

3. Check the belt buckles after latching to verify positive locking.

4. Arrange the secondary belt so that its webbing covers the buckle of the main belt.

5. The buckle of the secondary belt must be clear, permitting immediate emergency release.

6. All straps and hardware must be clear of aircraft controls, both to permit unobstructed control functioning and to prevent wear on the system webbing.

2-5 Engine Starting Procedure

NOTE

The engine is described in the 917 product manual. Refer to the 917 manual for general engine operating procedures and to the AVCO/Lycoming engine manual for further information.

For basic cold-engine start, proceed as follows:

1. Set PROPELLER CONTROL to HIGH RPM (push full forward).

2. Set FUEL SELECTOR to FUEL ON.

3. Switch box, main switch, engine switch, pump switch - ON. The fuel pressure gauge indicates a pressure of 3.0 Bar.

4. Mixture knob 3 o'clock position (rich)

5. Fully open the throttle (for fuel injection) - return to idle position - closed.

6. 1st and 2nd ignition circuit - ON - start by turning the ignition key. (yellow ignition light is on)

7. After starting the engine - richness position 0 on the mixure knob - idling set 1000-1200rpm

8. Check Oil PRESSURE. Verifly that pressure rises to 60 to 85 psi within 30 seconds.If the pressure is not indicated, the fault must be removed before flight.

9. Warm up engine at 1000-1200rpm

For a warm engine start - do not apply procedures 4 and 5.

2-6 Takeoff Procedure

For basic checks immediately prior to takeoff and for takeoff and climb, proceed as follows:

1. Mixture - rotary knob position 0 (12 o'clock)

2. Check all instruments for normal indications; check radio and transponder.

3. Set ELEVATOR TRIM to NEUTRAL.

4. Check all flight controls for free movement (ailerons, elevators, rudder).

5. Verify that the canopy is closed and LOCKED.

WARNING

Verify that the canopy is secure by (a) checking the status placard at the back of the front seat and (b) making a final positive check by pulling aft firmly on the canopy crossmember.

6. Set engine speed to 2100 RPM using the THROTTLE. Check propeller operation by moving PROPELLER control through full range. Return PROPELLER control to HIGH RPM (push full forward).

(Continued on next page.)

2-6 Takeoff Procedure (cont'd)

7. Check the ignition sections - R right and L left side.

   a. Set engine speed to 2200 RPM using THROTTLE.

CAUTION

Light-weight pilots may experience a tail-lifting tendency at 2300 rpm. Always hold the stick aft during engine runup to eliminate any possibility of tail lifting. Do not intentionally set the throttle above 2200 rpm until ready for take-off.

   b. Set the ignition switch to R right and note the new tachometer RPM

   c. Set the ignition switch to L left and note the new tachometer RPM

   d. Ignition is acceptable if lowest tachometer reading on either LEFT or RIGHT is at least 2025 RPM (175 RPM maximum allowable reduction) and the difference between LEFT and RIGHT ignition (steps b and c above) does not exceed 50 RPM.

8. For takeoff, apply full power smoothly but briskly. As speed increases beyond 45 mph IAS, hold the stick forward to raise the tail slightly (about 8 inches) as speed increases. Sit up straight in the seat while looking straight forward; observe the edges of the runway and the runway surface in front of each lower wing using peripheral vision. Do not lean to one side or the other to increase view of the runway since this will cause disorientation and turning of the aircraft. After lift-off, allow the aircraft to accelerate to 90 to 100 mph IAS before climbing.

9. Climb at 90 to 100 mph IAS with full throttle and full rpm. Make continuous S-turns while climbing to allow observation of any aircraft ahead and to develop a feel for the aircraft controls. Observe all aircraft instruments to verify normal engine operation.

2-7 Cruise Procedure

The following procedure is used to set-up the aircraft for cruise:

1. Adjust THROTTLE to provide the required manifold pressure. For cruise at 75% power, manifold pressure should be as high as possible, but not above 25 in. Hg. For cruise at 65% power, manifold pressure should be as high as possible, but not above 23.5 in. Hg.

2. Adjust PROPELLER control to provide the required engine rpm. For cruise at 75% power, set engine speed to 2450 rpm. For cruise at 65% power, set engine speed to 2350 rpm.

WARNING

Propeller restrictions prohibit continuous operation between 2000 and 2350 rpm.

3. Set ELEVATOR TRIM for straight and level flight, "hands off".

NOTE

During level upright flight, the elevators will have a slight downward deflection (relative to horizontal stabilizer). During level inverted flight, the elevators will have a slight upward or canopy-side, deflection (relative to horizontal stabilizer). This is a normal condition which results from design optimumization of control forces in both upright and inverted flight.

4. Adjust MIXTURE control to offset the EGT reading the desired temperature difference from peak EGT.

For maximum power cruise (recommended), set EGT 150°F toward the rich side of peak EGT. (Slowly turn MIXTURE counter-clockwise while observing the EGT gage, note the MIXTURE position that produces the maximum EGT reading, then slowly turn MIXTURE clockwise until the EGT is reduced by 150°F (65°C)

(Continued on next page.)

2-7 Cruise Procedure (cont'd)

For best economy cruise (65% power only), set EGT at peak EGT or up to 50°F toward the lean side of peak EGT. (Slowly turn MIXTURE counter-clockwise while observing the EGT gage, then set MIXTURE at the position that produces maximum EGT indication or slowly turn the MIXTURE control counter-clockwise until the EGT indication is reduced by 65°F (10-15°C)

5. Verify correct cruise settings (steps 1 to 4) every 15 minutes.

WARNING

In case of any engine operating problem, immediately readjust MIXTURE control to FULL RICH (position 0, or fully rich - turn to the right) then attempt corrective action. In case of an emergency requiring engine shut down, a glide speed of 85 to 90 mph IAS is recommended.

2-8 Landing Procedure

The following basic checks should be made before landing:

1. MIXURE control to position 0 (12 o'clock)

2. Set PROPELLER control to HIGH RPM (push full forward).

3. Set ELEVATOR TRIM to NEUTRAL.

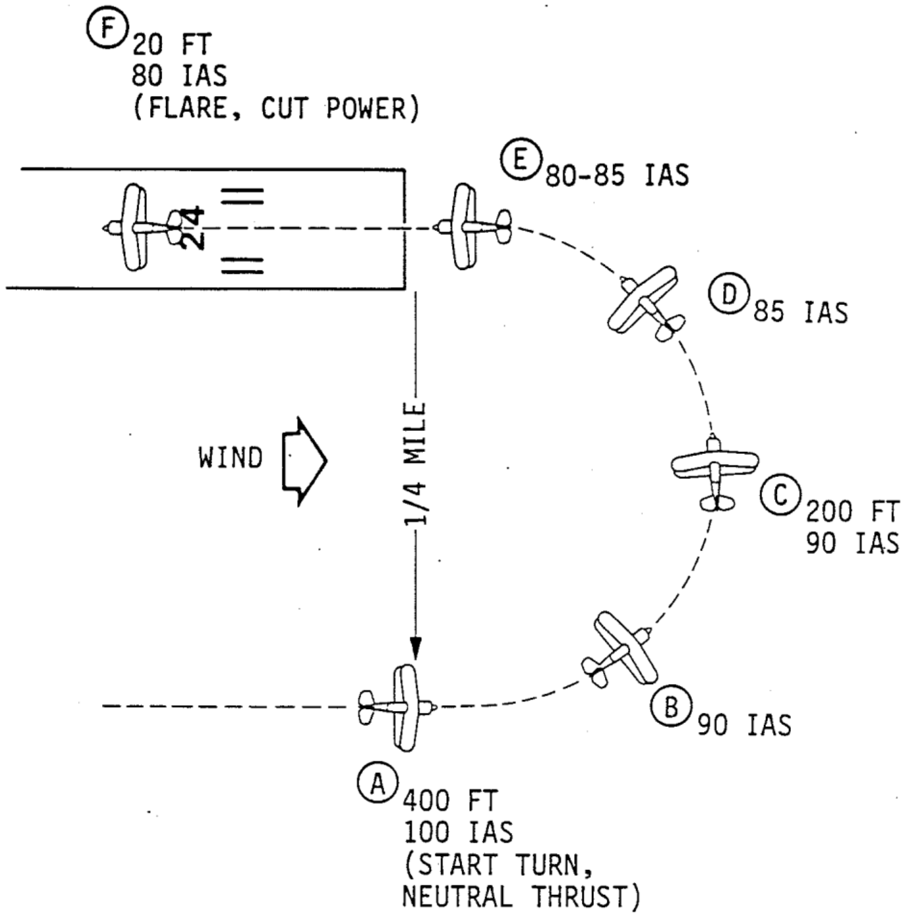
For landing, fly a close-in pattern at 90 to 100 mph IAS and 400 to 500 feet agl, as shown in Figure 2-3. Turn base abeam the end of the runway with power reduced to neutral thrust. Keep the end of the runway in sight during descent all the way to flare by adjusting the length of the base leg and final turn so that the aircraft is turning continuously until just before the flare. Maintain 80 to 90 mph IAS on base and final, and 80 mph IAS over the threshold when reducing power to idle. Hold the aircraft in three point attitude close to the runway surface and await stall and touchdown. The stick will be slightly aft of neutral at stall, not full aft as with some aircraft. After touchdown, with engine at idle, steer the aircraft with short, light oscillating rudder movements while applying brakes briskly to stop the aircraft.

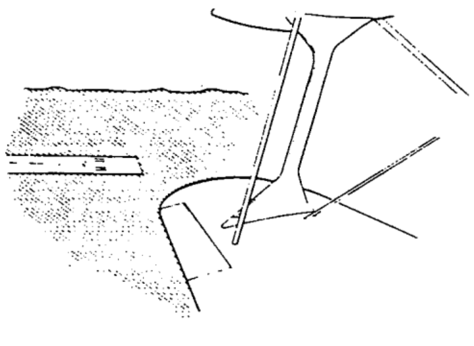
Although three-point landings are preferred, wheel landings can be made on runways having a very smooth surface. Because the Christen Eagle II uses 0° angle of incidence, wheel landings must be made at relatively high speed.

Cross-wind landings should be made using a modified three-point technique. Bank into the wind, set down on one main wheel and the tailwheel, then let the aircraft rock over to the other main wheel.

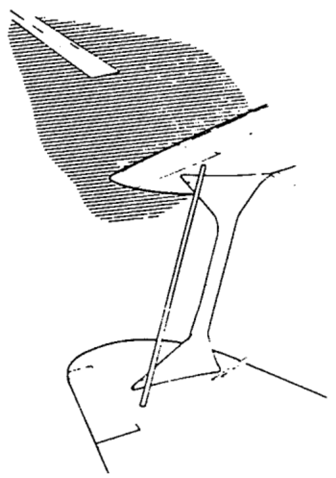
CAUTION

Cross-wind landings are hazardous and must not be attempted in winds above 20 knots at 45° to the runway, unless the pilot is very experienced.



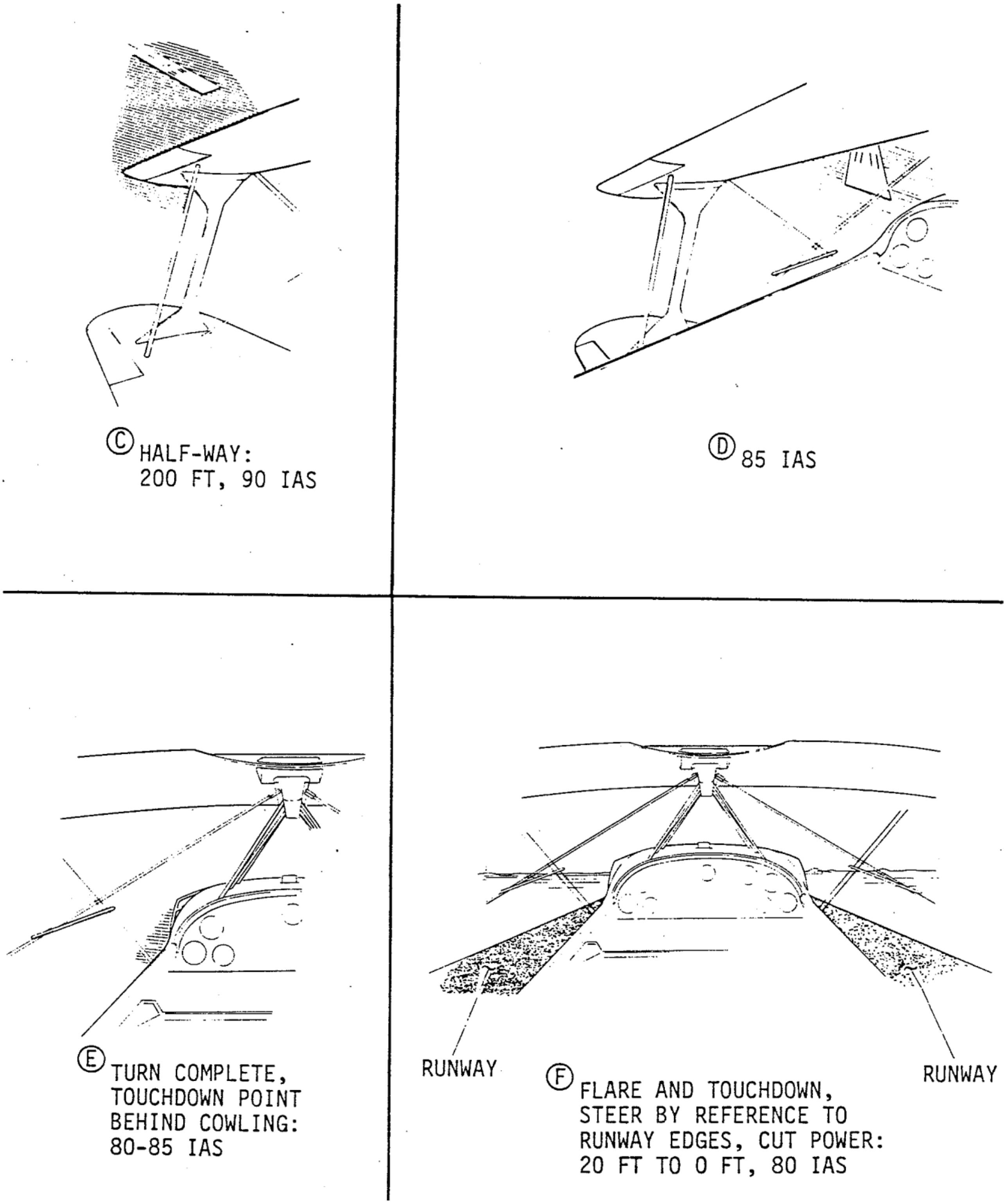


Ⓐ START TURN;
400 FT, 100 IAS



Ⓑ TURN ESTABLISHED:
UNIFORM DESCENT,
90 IAS

FIGURE 2-3 Close Approach Sequence (Part 2 of 2)



PRODUCT SERIES	PRODUCT NAME		
EAGLE AIRCRAFT	FLIGHT KIT	CHRISTEN	
PRODUCT NUMBER	MANUAL SECTION	REVISION	PAGE
924-AFM	AIRPLANE FLIGHT MANUAL	04-09-2014	

2-9 Shutdown Procedure

The following basic checks should be made when the aircraft is stopped and the engine is to be shut down:

1. Turn OFF instrument, avionics switch, turn OFF ALT (alternator)
2. Set Mixture position 0 (12 o'clock)
3. Turn OFF the fuel pump, turn OFF the L (left) and R (right) ignition switches.
4. Switch box OFF position, all switches OFF position.
5. Set FUEL SELECTOR to OFF.

2-10 Hand Propping

The engine should ordinarily be started using the electrical starter as described in paragraph 2-5.

Hand starting is not recommended.

2-11 Fuel Display Kit

The aircraft has an MGL FF-3 Stratomaster Maxi single-fuel flight computer. Before the flight, it is necessary to enter the amount of fuel in the tank into the computer.

SEE THE OPERATING MANUAL FOR THE PROCEDURE

2-12 Chronometer Kit

The aircraft is equipped with a quartz chronometer 0-24 hours with an internal battery.

The aircraft is equipped with a counter of flight hours connected to the 12V on-board network - they turn on automatically after take-off and do not require maintenance.

2-13 Inverted Oil System

The following information describes normal operating characteristics of the inverted oil system.

Oil Pressure During Warm-Up

In standard unmodified Lycoming aircraft engines, oil pressure is typically high while engine oil is cold, and the pressure drops to normal operating range after the engine warms up. In an engine modified to use the Christen 801 system, oil pressure characteristics are affected by the longer flow path of oil through the system hoses and oil valve.

Depending on the particular installation, oil pressure may be either (a) relatively low for a cold engine, rising to normal when hot, (b) constant at normal operating value when the engine is either cold or hot, or (c) high for a cold engine, falling to normal when hot. These effects may vary somewhat depending on the viscosity of oil used and the ambient temperature, but the changed oil pressure characteristics during warm-up should be considered normal.

Pressure Difference Inverted

In some installations, oil pressure during inverted flight may regularly be 5 to 10 pounds less than oil pressure during normal flight. This condition is caused by the larger oil pressure drop through the longer oil pickup flow path in inverted flight (i.e., breather line plus inverted oil pickup line).

Oil Pressure Indication Flicker

Engine oil pressure will normally be maintained during all positive-g and negative-g maneuvers. During the transition from normal to inverted flight, a slight variation in oil pressure indication usually occurs as the valve-balls operate in the oil valve. This pressure variation is indicated by a slight flicker in pressure indicated on the oil pressure gauge, usually from 10 to 30 psi. This flicker normally lasts about a second, after which the regular inverted flight oil pressure should be maintained.

(Continued on next page.)

2-13 Inverted Oil System (cont'd)

Some engines have a restricted orifice fitting at the oil pressure gauge port to prevent major loss of oil in the event of an oil pressure line failure. In some cases, this restrictor dampens the oil pressure gauge reaction to oil pressure change, and causes the gauge to substantially lag actual pressure. The normal flicker of oil pressure when transitioning from upright to inverted flight and vice versa may therefore appear as a prolonged pressure change indication lasting up to two or three seconds in engines which are equipped with the restricted orifice fitting. Such indications result from the operation of the oil pressure gauge connection, and are not an indication that the oil system is malfunctioning. (However, if no restrictor is used in the gauge line, slow changes in oil pressure indicate a possible malfunction which should be investigated.)

Cold Weather Operation

In very cold weather, it is important to use the proper viscosity engine oil (see 924 manual, paragraph 8-10.2) and to run the engine sufficiently long to bring the engine oil to the normal operating temperature. Cold oil will not circulate well in cold lines and other engine parts, so the flow of oil from the engine sump through the external hoses and components of the system will be severely impeded until the oil, the engine, and all external system parts are warmed up. Once the engine oil itself is warm, the aircraft should be flown inverted for an extended period to allow the oil to thoroughly warm up the oil separator and associated external lines. When all system components are warm, the system should function normally. It may be necessary when operating in extremely cold weather to modify or partially bypass the engine oil cooling system to keep the oil at normal operating temperature.

(Continued on next page.)

Momentary Loss of Oil Pressure

Oil pressure may be interrupted momentarily in certain aircraft attitudes or during certain combinations of maneuvers. These attitudes and maneuver combinations are generally of the type which can only be maintained for short periods of time, so there is no serious effect on engine performance. The effect is normal and should not be construed as a system malfunction.

The main cause of momentary loss of oil pressure is that in certain attitudes, the oil in the sump (or at the top of the crankcase during inverted flight) is placed so that it cannot be drawn into the oil pickup line (or breather line, for inverted flight). For example, during a vertical or steep inverted dive the engine will fall to the front or top-front of the engine so that neither the breather line nor the oil feed line at the sump has an available supply of oil.

A secondary cause of oil pressure loss is that conditions may occur which result in uncertain closure of the ball valves in the oil valve. For example, if an abrupt entry into knife-edge flight is made from a zero-g condition, it is possible for both balls in the oil valve to be jarred from their proper positions, with a resultant interruption in oil flow in the oil pickup line.

Oil pressure is usually maintained by the existing oil in the oil feed line for a short period of time after the oil supply is interrupted in some aerobatic attitudes.

Pressure loss as discussed above may be observed in the following circumstances:

1. Vertical flight, straight down.
2. Inverted flight, steep dive.
3. Zero-g periods.
4. Knife-edge flight.

(Continued on next page.)

2-13 Inverted Oil System (cont'd)

Oil Loss From Unusual Maneuvers

If the system is functioning properly, only very small losses from normal oil level will occur if oil level is kept between 6 and 7 quarts.

Certain uncommon aerobatic maneuvers, if performed for an extended period of time or in rapid repetitive sequences, may result in abnormal oil losses. For example, if an aircraft performs a lengthy series of vertical roll-type maneuvers in rapid succession, from inverted flight entry and with inverted recovery, oil which accumulates in the oil seoparator has no opportunity to return to the engine sump. As a result, the oil eventually flows overboard through the breather line. Such a series of maneuvers would be performed rarely, and then only in unusual competition practice and not in a competition sequence. The oil loss problem in such practice can be eliminated simply by bringing the aircraft to the normal upright attitude occasionally to allow oil which has accumulated in the oil separator to return to the engine sump.

Section 3

SPINS

SPECIAL NOTICE

THIS SECTION OF THE MANUAL IS VITALLY IMPORTANT. STUDY THIS SECTION CAREFULLY AND OBEY ALL WARNING NOTICES. YOUR LIFE DEPENDS ON STRICT OBEDIENCE TO ALL WARNINGS GIVEN HEREIN.

NOTE

Although the general principles involved in spin recovery are similar for all aerobatic aircraft, there may be significant differences in specific procedures for different aircraft types. Specific procedures in this manual apply only to the Christen Eagle II aircraft.

3-1 Introduction

This section of the manual contains vital flight safety information. Numerous fatal accidents have occurred as a result of faulty aerobatic flying techniques which have resulted in spins from which recovery attempts were unsuccessful. Except for rare cases of out-of-balance aircraft or in-flight structural failure, spin accidents always result either from (a) inadequate altitude at the time of spin entry or (b) erroneous application of control inputs during the spin. Study this material carefully to get an understanding of the causes of spins and various recovery concepts. Develop necessary new instincts to avoid wrong-reflex action. In particular, learn (a) how to avoid unwanted spins and (b) how to perform the simplified emergency recovery procedure as given in paragraph 3-6.

(Continued on next page.)

3-1 Introduction (cont'd)

Spins of all types are frequently experienced during aerobatic flight: Unintentional spins may occur after faulty performance of some aerobatic maneuvers, and intentional spins are required in competition aerobatic sequences. This section is designed to provide a broad background of safety information for pilots who will be encountering various types of spin situations for the first time.

This section is divided into three main areas:

1. Paragraphs 3-1 through 3-5 give background information and general concepts involving spin theory, traditional recovery procedures, and recovery problems.

2. Paragraph 3-6 describes a simplified emergency action procedure to avoid accidental spins, as well as a simplified emergency action procedure to recover from accidental spins.

3. Paragraphs 3-7 through 3-10 give controlled recovery procedures for known spin types, including information on specific recovery problems associated with each spin type.

Highly detailed explanations of spin mechanics and recovery procedures are given in this section. The purpose of the detailed discussion is to provide a strong theoretical basis for understanding spin problems. Important points are emphasized and are intentionally repeated throughout the section. Remember that in-flight spin situations must be handled using trained pilot responses. This means that memorized rules for spin recovery must be kept to a minimum (basic "rules" are given in paragraphs 3-4 and 3-6) and that flight responses for spin recognition and recovery must be learned during DUAL INSTRUCTION with a competent aerobatic instructor.

(Continued on next page.)

3-1 Introduction (cont'd)

The Eagle II aircraft has docile and controllable stall characteristics with no tendency to spin; however, the aircraft will spin immediately and well if the proper control inputs are made following stall. It has normal spin recovery characteristics in all four basic spin types. Because both intentional and unintentional spins will be encountered in aerobatic flying, it is essential that pilots understand the simplified emergency-action procedure (paragraph 3-6) as well as the four basic spin types and the correct recovery procedure for each spin type (paragraphs 3-7 through 3-10). Unintentional spins frequently result during aerobatic practice when certain maneuvers are poorly executed. Accidental spins resulting from maneuvering errors can be of any of the four possible spin types.

All theoretical explanations and all procedures in this section should be studied to develop thorough understanding. All procedures should be memorized and then rehearsed in the aircraft on the ground. Spin recovery procedures must be practiced in flight so that if and when any procedure is required, it can be performed instinctively and unerringly.

Inexperienced aerobatic pilots, in particular, must be extremely careful in learning spin recovery procedures. Although spin recovery procedures will become simple, automatic responses when mastered, do not assume that previous flying experience plus limited study will suffice. DUAL INSTRUCTION MUST BE CONSIDERED MANDATORY. Some pilot instincts must be relearned for safe spin recovery, since some control inputs that are instinctively used during normal flight are totally inappropriate for spin recovery.

(Continued on next page.)

3-1 Introduction (cont'd)

Experienced pilots who lack recent spin training in high-performance aerobatic aircraft must be particularly careful. The confidence produced by thousands of hours of flying can create unwarranted overconfidence in aerobatic flying, which can lead to fatal spin accidents. Most highly experienced pilots build their flight time in routine flying, frequently in large, highly stable aircraft. Such pilots often lack experience in flying highly responsive aircraft with frequent maneuvering involving intentional stalls. In this respect, HIGH-TIME PILOTS WITH FLIGHT TIME MOSTLY IN HEAVY AIRCRAFT MUST CONSIDER THEMSELVES BEGINNERS AT AEROBATICS. Self-discipline must be adequate to resist the temptation of attempting any maneuvers which could conceivably deteriorate into a spin until AFTER DUAL INSTRUCTION to develop competence in performing basic aerobatic maneuvers including spin recovery.

WARNING

> Before attempting any maneuvers that could conceivably deteriorate into a spin, all pilots must receive DUAL INSTRUCTION from a competent aerobatic instructor in spin recovery techniques including, as a minimum, both NORMAL UPRIGHT SPINS and NORMAL INVERTED SPINS (both directions).

All aerobatic maneuvers including spins should be performed at safe altitudes which ensure adequate time for recovery from unanticipated conditions. Minimum altitudes of 3000 to 5000 feet agl are recommended.

(Continued on next page.)

WARNING

Never attempt low-altitude aerobatic maneuvers. All aerobatic practice must be at a safe altitude to permit a wide safety margin for recovery from accidental spins. Safe maneuvering altitude for beginners: 5,000 feet agl. After competentence in basic aerobatic maneuvers and spin recovery: 3,000 to 5,000 feet agl.

WARNING

Until spin recovery from intentionally induced spins has been practiced so that recovery from all spin types can be performed with confidence, pilots must not attempt any aerobatic maneuver which, if poorly executed, could easily result in an unintentional spin. Do not attempt any maneuvers (a) in which low airspeeds are required, (b) which could easily deteriorate into low-airspeed conditions, or (c) which are intended to use stalling within the maneuver. Several commonly performed maneuvers must therefore be avoided until spin-recovery procedures have been mastered: Do not attempt (a) hammerhead turns, (b) tail slides or whip-stalls, (c) vertical rolls, and (d) snap rolls or flick rolls.

3-2 Terminology

Throughout the following text, relative directions are given from the pilot's viewpoint. For example, an inverted spin to the right is toward the pilot's right, even though an exterior observer might think of the spin as being a "left-hand spiral" or "toward the left".

Spin direction is always considered to be the direction of yaw, so a spin to the right can also be described as a right-rudder spin, and a spin to the left can be described as a left-rudder spin. Rudder input which tends to stop the yaw during a spin is called "opposite rudder". For example, during a spin to the right, opposite rudder would be a left-rudder input.

Aileron and elevator position are described in terms of control stick position, such as "stick forward", "stick back", "stick right", or "stick left".

The relative direction toward the spin axis is referred to as "inside", and the relative direction away from the spin axis is referred to as "outside". For example, in a normal upright spin to the left, the left wing (which is toward the spin axis) is referred to as the "inside" wing, and the right wing (which is away from the spin axis) is referred to as the "outside" wing.

NOTE

Because aircraft attitudes, relative directions, and control inputs can be confusing when studying spins, use a model airplane to represent spin conditions while reading the explanations of spin types and spin recovery procedures throughout this section.

3-3 Basic Spin Mechanics

All spin types include two essential and fundamental characteristics: (1) the wings are stalled and (2) the aircraft yaws continuously. For intentional entry into a normal spin, the pilot simply sets up a stall in level flight (upright or inverted) followed by firm rudder input; the spin starts immediately when the aircraft yaws.

During normal spins, the wings on the outside of the spin axis, although stalled, nevertheless produce a greater lifting force than the inside wings. That is, the outside wing is a smaller angle of attack compared with the inside wing; because both wings are above the critical angle of attack, the outside wing produces more lift. This causes the aircraft to roll as it spins. In addition, the inside wing experiences more drag than the outside wing, adding a force which tends to slow the inside wing, causing the aircraft to continue to yaw in the original yaw direction. Once established, this combination of yaw- and roll-producing forces stabilize and become self-perpetuating; the condition is called "autorotation", and is a characteristic of all stall-plus-yaw maneuvers, including both normal spins and snap rolls. When the spin becomes stabilized, usually after several turns, all forces acting on the aircraft reach an equilibrium state, and the aircraft yaws and rolls uniformly around the vertical spin axis as it descends, thus producing the "spiralling roll" that gives a normal spin its typical appearance.

The roll that occurs during a normal spin must be clearly understood to be a secondary effect of the spin, even though the roll is a prominent visual feature of normal spins both to ground observers and to the pilot. To avoid control-input errors in spin recovery procedures, always think of the spin as a yaw maneuver only; observed roll should be considered "apparent roll" and must be ignored to assure proper yaw correction using the rudder.

In a normal upright spin, yaw direction and roll direction are the same (that is, a right-rudder upright spin is accompanied by right roll, and a left-rudder spin is accompanied by left roll). However, in a normal inverted spin, yaw direction is opposite to roll direction (that is, a right-rudder inverted spin is accompanied by left roll, and a left-rudder spin is accompanied by right roll).

(Continued on next page.)

Flat spins result when forces are introduced both to lift the nose of the aircraft and to counteract the roll that occurs during a normal spin: (1) the nose is lifted by gyroscopic precession produced by the engine and propeller as a result of aircraft yaw and (2) the normal-spin roll is stopped by aileron forces. The essential characteristic of a flat spin is that there is no roll; that is, a flat spin is flat in roll and not necessarily flat in pitch. For intentional entry into a fully flat spin (fuselage horizontal, wings horizontal) from a normal spin, the pilot simply applies full power and full right stick. After several turns, gyroscopic precession will lift the nose of the aircraft and aileron forces will reduce roll to zero, resulting in a nose-high flat spin. (Gyroscopic precession produces nose-lifting forces only in upright spins to the left and in inverted spins to the right; in either case, right stick stops the roll to flatten the spin.)

Although a fully flat spin (wings horizontal, fuselage horizontal) must be made upright to the left or inverted to the right using full power with ailerons deflected to raise the inside wing, a partially flattened spin in either direction will result whenever aileron is applied to oppose normal-spin roll, raising the inside wing. In addition, slight flattening will tend to occur during all normal upright spins, particularly to the left, as the spin develops; that is, the spin will be steepest during the first turn or two; after three turns the nose will tend to lift. This slight flattening is caused by the lift characteristics of the large bubble canopy on the aircraft, and is normal. If it is desired to avoid any flattening tendency during normal upright spins, slight aileron can be used in the direction of yaw to enhance normal-spin roll to keep the spin as steep as possible.

3-4 Spin Recovery, General

By making use of inherent aerodynamic stability, the Christen Eagle II will recover from all spins by using the simplified emergency recovery porocedure, which is detailed in paragraph 3-6. This procedure requires only (a) cutting engine power, (b) release of the control stick, and (c) pressing on the stiff rudder pedal.

The recovery techniques described in paragraphs 3-7 through 3-10 are standard procedures which provide faster, controlled recovery with minimum altitude loss when the spin type is known.

(Continued on next page.)

3-4 Spin Recovery, General (cont'd)

All recovery procedures are based on removing or reversing the forces that originally produced the spin. To appreciate the fundamental principles that are involved, three main points must be understood:

POINT 1. Application of power increases the difficulty of spin recovery. During an inverted right-rudder spin or an upright left-rudder spin, gyroscopic precession tends to lift the aircraft nose, flattening the spin; continued application of full power may hold the nose of the aircraft up, making a normal diving recovery impossible. In a normal unflattened spin, excess power always increases descent rate, thus increasing the hazards of pull-out near the ground.

The first basic requirement for spin recovery is this:

CUT THE THROTTLE.

POINT 2. The spin is a yaw maneuver. Yaw-producing forces must be neutralized or reversed to stop the spin. Since the rudder controls yaw, it must be neutralized or reversed ("opposite rudder") to stop aircraft yaw. As soon as the yaw stops, the rudder must be immediately neutralized to prevent reversed yaw and entry into a new spin type.

The second basic requirement for spin recovery is this:

STOP THE YAW.

POINT 3. In all spins, the wings are stalled or partially stalled. Stall-producing forces must be neutralized or reversed to stop the spin. Since the elevator controls angle-of-attack and thus the stall condition of the wings, the elevator must be either released or neutralized or reversed to reduce the angle-of-attack and eliminate the stall condition. As soon as the stall stops, a reversed elevator must be immediately neutralized to prevent a reversed stall (from upright to inverted or inverted to upright) followed by entry into a new spin type.

The third basic requirement for spin recovery is this:

STOP THE STALL.

(Continued on next page.)

The traditional standard recovery procedure from a known spin type is this:

1. Pull the throttle aft to cut power.

2. Push the rudder pedal opposite to the spin yaw direction to stop the yaw (that is, push the left rudder pedal if spin yaw is to the right, or push the right rudder pedal if spin yaw is to the left). Neutralize the rudder when yaw stops.

3. Push the control stick in the direction opposite to that which produced the original stall to unstall the wings (that is, push the control stick forward in an upright spin, or pull the control stick aft for an inverted spin). Neutralize the elevator when the stall stops.

4. When airspeed is sufficient, pull up to a normal flight attitude.

5. Push the throttle forward to reapply power.

NOTE

The procedures given in this section are for spin training and assume that all maneuvering is performed at relatively high altitudes. In these procedures, power is reapplied after pullout and resumption of normal flight attitude. In the Christen Eagle II, a windmilling propeller tends to blanket the wings and reduces flight performance. This blanketing effect can be eliminated by setting the throttle for neutral thrust or for slight power application while diving before pullup. In competition and airshow demonstration flying, full power is normally applied as soon as the spin stops, while the aircraft is in a vertical dive. This provides maximum acceleration to reduce altitude loss and provides maximum control during and immediately following pullout.

3-5 Recovery Problems

3-5.1 Aircraft Loading

The Christen Eagle II aircraft will recover from any spin type with proper recovery techniques, provided that the aircraft is loaded within CG limits. In this regard, the spin-recovery characteristics are enhanced when the CG is in the mid-range; therefore pilots flying solo should fly with full fuel, if it is desired to simplify spin recovery. Never attempt aerobatic maneuvers with less than 6 gallons of fuel. Never carry anything in the baggage compartment when performing aerobatics. If there is any doubt about aircraft loading, calculate CG location and verify that the CG is within limits before flight.

WARNING

Any particular Christen Eagle II aircraft will recover from any spin type using standard recovery techniques ONLY IF THE AIRCRAFT IS PROPERLY BALANCED. The CG of the aircraft must be within design limits to ensure safe spin recovery. Any aircraft can be dangerously loaded (CG beyond design limits) making spin recovery extremely difficult or impossible. Weight-and-balance considerations must be taken seriously and pilots must be absolutely certain that the flight CG of their aircraft is within design limits.

(Continued on next page.)

3-5.2 Disorientation

Each level of pilot experience and training produces somewhat different problems in spin perception and in pilot reaction to his perception of the spin.

For inexperienced aerobatic pilots, as well as experienced pilots who are unfamiliar with the spin characteristics of the particular aircraft type, inadvertant and unanticipated spins may produce a dangerous sequence of events. Severe disorientation is frequently caused by the spin and by the previous maneuver which produced the spin. The spin type then becomes extremely difficult to identify and therefore produces uncertainty as to the correct recovery procedure. The pilot may then, in panic, conclude that the only approach is to experiment haphazardly with various control inputs, hoping to discover the correct combination for fast recovery.

(Continued on next page.)

3-5.3 Wrong Control Input

A primary problem in spin recovery, when using traditional spin recovery techniques for recovery from known spin types as described in paragraphs 3-7 through 3-10, is failure of the pilot to identify the true spin type followed by application of erroneous control forces which hold the aircraft in the spin. For example, if controls are set for recovery from a normal upright spin when the aircraft is actually in a normal inverted spin, the pilot will unwittingly hold the aircraft in the inverted spin, and recovery will be impossible.

All control inputs for recovery from a spin should be gentle but positive. Violent or extreme pressure on the controls must be avoided. For example, if violent control inputs for recovery from a normal upright spin are made (that is, violent forward stick and violent opposite rudder), the aircraft will recover from the first spin and immediately transition to a normal inverted spin with reversed rotation. Likewise, elevator pressure must be kept gentle during pullout until airspeed builds up, or a stalled or mushing pullout may result.

Control inputs should be held long enough for recovery to occur, but not so long as to produce entry into a new spin of opposite direction or type. For example, if correct rudder input is initially made for recovery from a spin (that is, firm application of opposite rudder), but the rudder is not neutralized when the original spin stops, the aircraft may transition to an opposite-direction spin. During the recovery procedure, the pilot must be alert to indications that the spin has stopped, so that recovery control pressures will not be held too long. That is, the rudder must be neutralized as soon as yaw stops, and the elevator should be neutralized as soon as the stall stops.

(Continued on next page.)

3-5.4 Attempted Roll-Out

Many pilots erroneously consider the spin to be a rolling maneuver. ALL SPINS ARE YAW MANEUVERS, AND RUDDER IS THE ESSENTIAL CONTROL. The spiralling-type roll associated with a spin is secondary, and pilots must guard against any temptation to "roll out" of a spin using ailerons.

If the spin is erroneously thought of as a rolling maneuver, there will be a compulsion to use ailerons in the direction opposite to the observed roll. Any aileron input that is opposite to the direction of spin yaw tends to flatten the spin and makes the spin worse (more difficult recovery). That is, during an upright spin the spin will tend to flatten with stick away from the spin axis and in an inverted spin the spin will tend to flatten with stick toward the spin axis.
For normal recovery, the ailerons must therefore be neutral or, for upright spins, slightly in the directior of spin yaw. For inverted spins, the ailerons should be slightly opposed to the direction of spin yaw.
Therefore, always use rudder to control the rotational yaw in the spin; NEVER USE AILERON IN AN ATTEMPT TO "ROLL OUT" OF A SPIN.

(Continued on next page.)

3-5.5 Roll Perception

A serious problem in perception of spin direction can result if pilot attention is directed, perhaps unconsciously, to roll direction. In most flight situations, the direction of roll and yaw are the same. That is, in a normal turn in upright flight for example, the aircraft is turned to the left by left roll plus left yaw. Also in normal upright spins, the direction of yaw and roll will be the same. For example, an upright spin to the left will be caused by left yaw and will be accompanied by left roll. The frequent correspondence of yaw and roll may cause the pilot to unwittingly equate yaw direction with roll direction. However, IN INVERTED SPINS, YAW AND ROLL DIRECTIONS ARE OPPOSITE. For example, an inverted spin to the left will be caused by left yaw and will be accompanied by right roll. Recovery will not occur during an inverted spin if the pilot observes direction of roll, assumes that yaw is in the same direction, and then uses the wrong rudder input for recovery. For visually determining yaw direction, use ground reference between the engine and upper wing. For tactile determination of yaw direction, check the feel of the rudder pedals; the slack pedal is the yaw direction, and the stiff pedal will be the opposite-rudder direction to oppose the spin.

(Continued on next page.)

3-5.6 Yaw Illusion

During many inverted flight situations, it is common for pilots to look "up" through the canopy top over the upper wing, to maintain visual contact with the ground. A serious problem in spin perception will develop during an inverted spin if the pilot attempts to sense yaw direction by looking up through the canopy top because visual ground reference is then made behind the spin axis, leading the pilot to misinterpret yaw direction and use the wrong rudder input for recovery. (This condition is discussed further in paragraph 3-9.) NEVER LOOK UP THROUGH THE CANOPY TOP DURING A SPIN; always concentrate on determining yaw direction by observing the ground between the engine and the upper wing.

3-5.7 Roll Illusion

During flat spins, ground or cloud reference points observed by looking "up" through the canopy will appear to rotate about the yaw axis. Because of the common normal-flight association of rotational movement with roll and linear movement with yaw, the observed rotation may be incorrectly perceived as roll. This misperception can lead to erroneous control inputs and further disorientation. Again, the problem can be avoided by making yaw observations by observing the ground between the engine and the upper wing; NEVER LOOK UP THROUGH THE CANOPY DURING A SPIN.

3-5.8 Problem Combination

Recovery problems are easily compounded by combinations of limited pilot experience, possible overconfidence, severe disorientation in the spin, reaction to sensory miscues, and failure to recognize recovery, followed by re-entry into another spin type.

(Continued on next page.)

3-5.9 Overcontrol Example

Figure 3-1 illustrates a spin sequence in which overcontrol causes the aircraft to transition to a new spin type. The sensations experienced by the pilot can be extremely disconcerting, and the pilot may conclude that the spin cannot be controlled. At the outset, the aircraft is in a normal inverted spin to the right (right rudder, stick forward). The pilot at this time could mistake the spin for a left spin, because the aircraft is rolling to the left and, if the pilot looks up through the canopy, visual miscues will suggest left yaw.

In this case, the pilot correctly interprets the spin type and direction, but then introduces recovery inputs (left rudder, stick back) violently or holds the inputs too long. The aircraft then stops spinning (no yaw, no stall) but immediately transitions to an upright spin to the left. The pilot has no feeling of abrupt stopping or restarting a spin in the opposite direction. The aircraft is unstalled momentarily, and yaw shifts to the left, but the transition is smooth and goes unnoticed by the pilot. Aircraft pitch also shifts, changing from inverted to upright. Although the aircraft is now upright, the total angular change in pitch is slight and goes unnoticed by the pilot.

Because roll direction is opposite to yaw direction when inverted but in the same direction when upright, the roll direction during the inverted right spin (left roll) is the same as the roll direction during the upright left spin (left roll). The pilot, failing to notice that yaw direction has reversed, while clearly perceiving that the roll condition has continued without change, can easily conclude that nothing has happened. Continued application of the original control inputs for attempted recovery will hold the aircraft in an upright left spin and recovery will be impossible.

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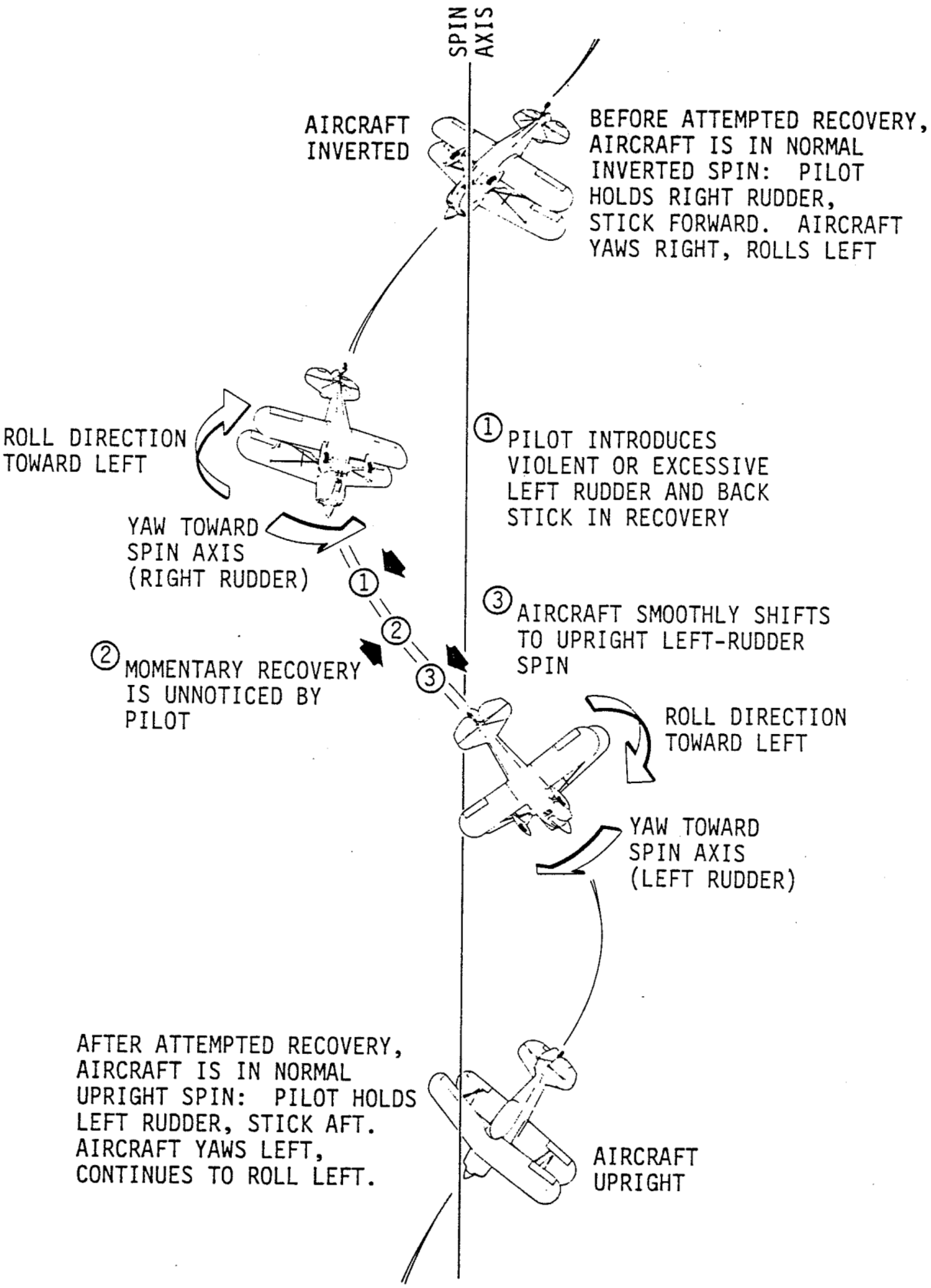
FIGURE 3-1 Example of Overcontrol Spin Reversal



3-5.10 Safety Summary

1. Be sure aircraft CG is safe before any flight.

2. Never attempt any maneuvers that could accidentally cause spins until spin recovery procedures are mastered.

3. Do not attempt any spins without first obtaining adequate dual instruction.

4. Be prepared to apply the emergency spin avoidance procedure and the emergency spin recovery procedure described in paragraph 3-6.

5. The first step in all recovery procedures is to cut power (throttle aft).

6. Observe yaw by looking straight ahead, through the cabane struts. Never look above the upper wing.

7. Ignore roll direction during spins.

8. Never use ailerons in an attempt to "roll out" of a spin. That is, never use stick opposed to yaw direction during upright spins, and never use stick with the yaw direction during inverted spins.

3-6 Simplified Emergency Procedures

The simplified emergency procedures given below should be practiced so that they can be applied instinctively, without any conscious analysis of the spin situation.

WARNING

All initial spin recovery practice, including these simplified emergency procedures, must be made during dual instruction.

3-6.1 Spin Avoidance

Spins can normally be prevented when falling out of poorly executed maneuvers by using the following procedure before a spin can develop:

1. CUT THE THROTTLE. Pull the throttle full aft immediately.

2. NEUTRALIZE THE CONTROLS. Look into the cockpit, and center both the stick and the rudder pedals in the position which would normally give straight-and-level flight.

3. DIVE AND RECOVER. Let the aircraft fall into a natural dive, then pull smoothly out of the dive and add power.

(Continued on next page.)

3-6.2 Spin Recovery

If a spin occurs, the following procedure will normally produce recovery, regardless of spin type:

1. Apply the following immediate-action procedure. These steps should be performed as quickly as possible without regard to sequence.

   A. CUT THE THROTTLE. Pull the throttle full aft immediately.

   B. LET GO OF THE STICK. Without pilot control, the ailerons and elevator will automatically stream to the position of least interference, avoiding any possibility of erroneous control input.

   C. PRESS THE STIFF RUDDER PEDAL. Fully depress whichever rudder pedal gives greater resistance to foot pressure. Regardless of spin type, this applies opposite rudder.

2. When the spin stops (the control stick will snap to the neutral position as aerodynamic forces on the wings and aileron become balanced, and yaw will stop, as determined by ground reference looking straight ahead, between the cabane struts), neutralize the rudder and grip the control stick.

(Continued on next page.)

3-6.2 Spin Recovery (cont'd)

3. Allow the aircraft to dive to build up airspeed, then pull out of the dive and reapply power.

WARNING

The aircraft should quickly recover using the above procedure, provided that the aircraft is aerodynamically similar to the Christen factory test aircraft. In case of out-of-limit CG conditions or non-standard aerodynamic conditions on a particular aircraft, recovery may not occur. Therefore, if recovery has not occurred and the aircraft has made at least three rotations, the specific recovery procedure for the actual spin type must be used.

(Continued on next page.)

3-7 Normal Upright Spins (Figure 3-2)

In a normal upright spin (a) the aircraft is nose down, yawing toward the spin axis, rotating with the inside wing distinctly lower than the outside wing and (b) the axis of rotation near the aircraft is above the aircraft centerline (that is, on the canopy-side). The aircraft rolls around the spin axis, with roll in the same direction as yaw. Usually, this type of spin is entered from an upright flight attitude, stalling with stick back while applying firm rudder input. The aircraft can rotate either to the right or left.

The spin axis intersects the ground below the aircraft (that is, belly-side). All visual cues permit accurate determination of yaw direction during any upright spin. Safe practice, however, requires that yaw direction be determined only by observation of ground reference cues between the engine and the upper wing.

If the spin is known to be a normal upright spin, the standard recovery procedure, which places the aircraft into a steep dive, is as follows:

1. Pull the throttle full aft to cut engine power.

2. Push the rudder pedal gently but firmly in the direction opposite the spin to stop yaw.

WARNING

Excess or violent rudder may cause the aircraft to recover from the original spin and transition to a spin in the reverse direction.

(Continued on next page.)

3-7 Normal Upright Spins (cont'd)

3. Push the control stick gently but firmly forward to unstall the wings.

WARNING

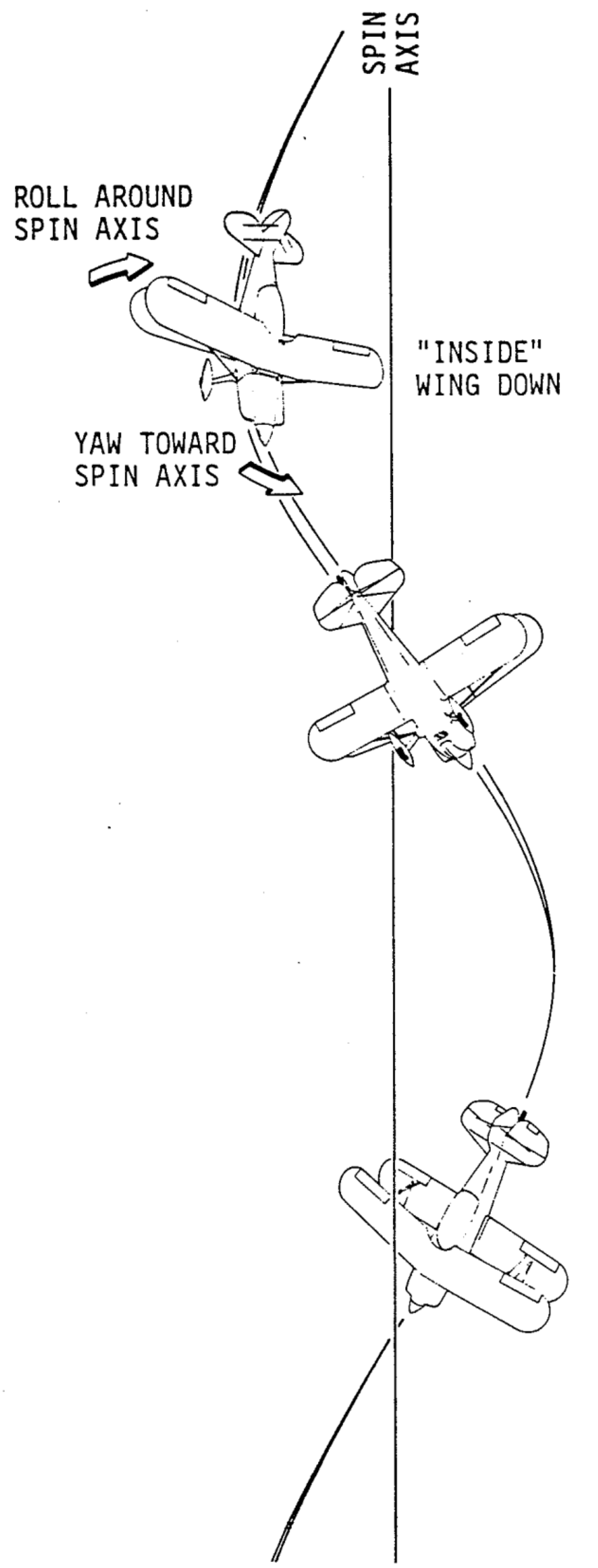
Excess or violent forward stick may cause the aircraft to transition to an inverted type spin.

4. When the spin stops (rapid build-up of airspeed), complete the recovery by pulling out of the dive, correcting aircraft attitude as required, and reapplying power. To prevent stalling during pullout, the pullout must be initiated using gentle elevator input until adequate airspeed develops (which can be sensed through control pressures).

NOTE

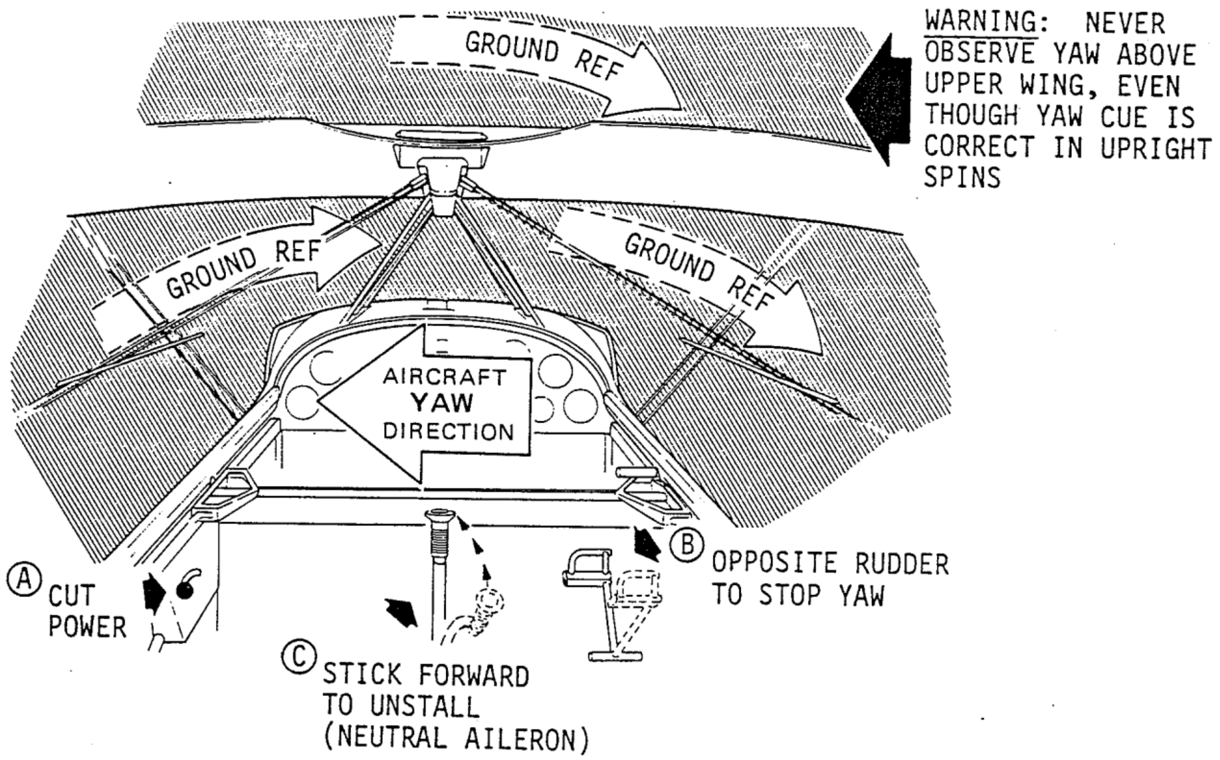
Moderate aileron in the direction of yaw will steepen the spin and usually will hasten spin recovery.

FIGURE 3-2 Normal Upright Spin (Part 1 of 2)



EXTERIOR VIEW: NORMAL UPRIGHT SPIN TO PILOT'S LEFT

FIGURE 3-2 Normal Upright Spin (Part 2 of 2)



PILOT'S VIEW: RECOVERY FROM NORMAL UPRIGHT SPIN TO PILOT'S LEFT

3-8 Flat Upright Spins (Figure 3-3)

In a flat upright spin (a) the aircraft rotates with the wings approximately level (that is, zero roll), usually with the aircraft nearly horizontal in pitch or slightly nose up and (b) the aircraft is upright. This type of spin is entered from a normal left-rudder upright spin by applying full power while holding right stick (that is, stick away from the spin axis). Gyroscopic precession lifts the nose only during left yaw; in an upright spin to the right, gyroscopic forces are in the wrong direction to lift the nose.

The spin axis intersects the ground under the aircraft (that is, belly-side). All visual cues permit accurate determination of yaw direction during any upright spin. Safe practice, however, requires that yaw direction be determined only by observation of ground reference cues between the engine and the upper wing.

If the spin is known to be a flat upright spin to the left, the standard recovery procedure, which basically places the aircraft into a normal upright spin, is as follows:

1. Pull the throttle full aft to cut engine power.

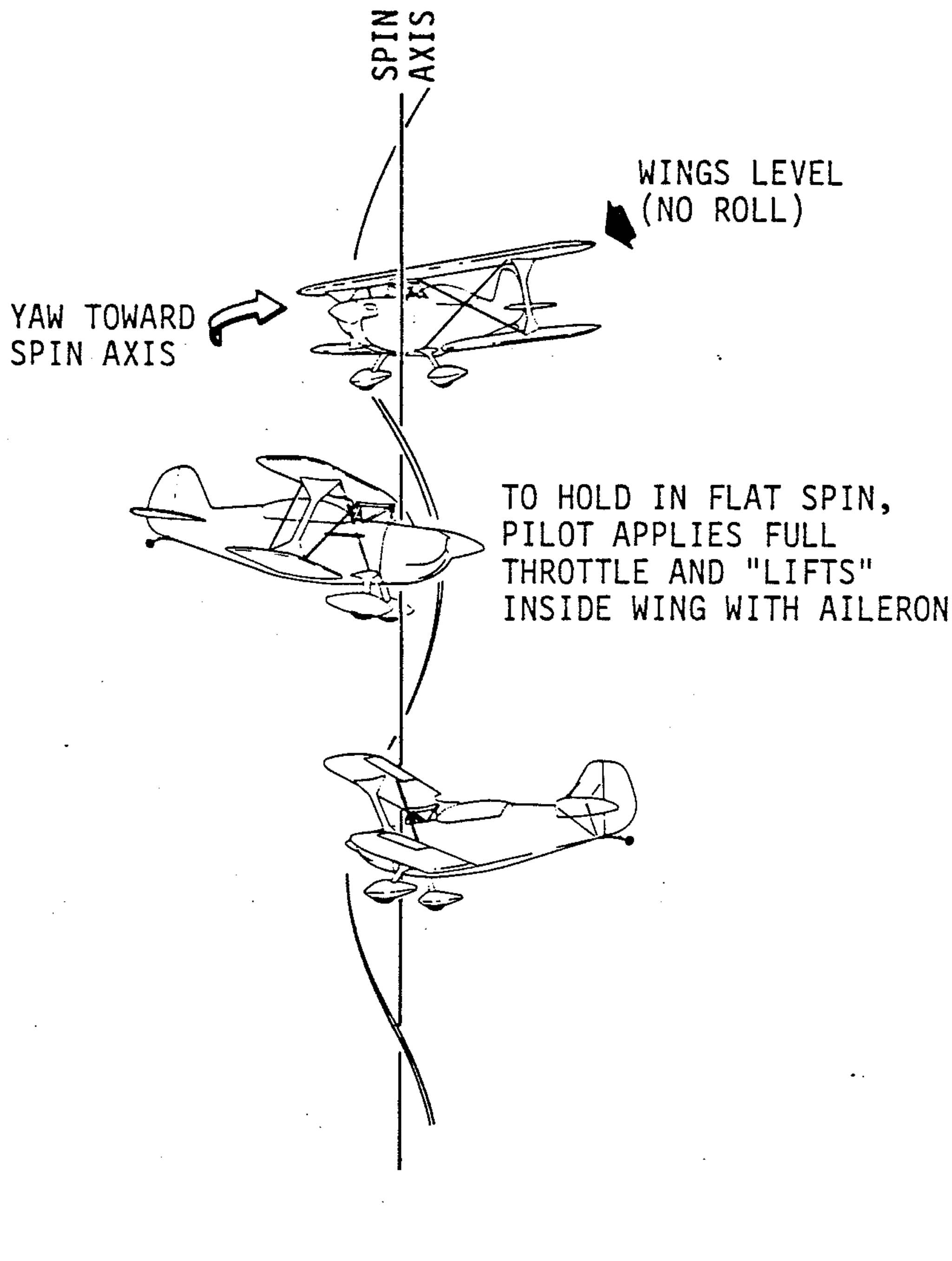
2. Move the stick full left (that is, toward the spin axis and in the yaw direction), to force the inside wing down.

3. Hold the controls until a normal upright spin has developed (1/2 to 3 turns, typically less than 1 turn), and then recover from a normal upright spin using moderate forward stick and moderate right rudder (paragraph 3-6). These control inputs are typically introduced at the same time as aileron deflection, producing a smooth single-motion recovery.

WARNING

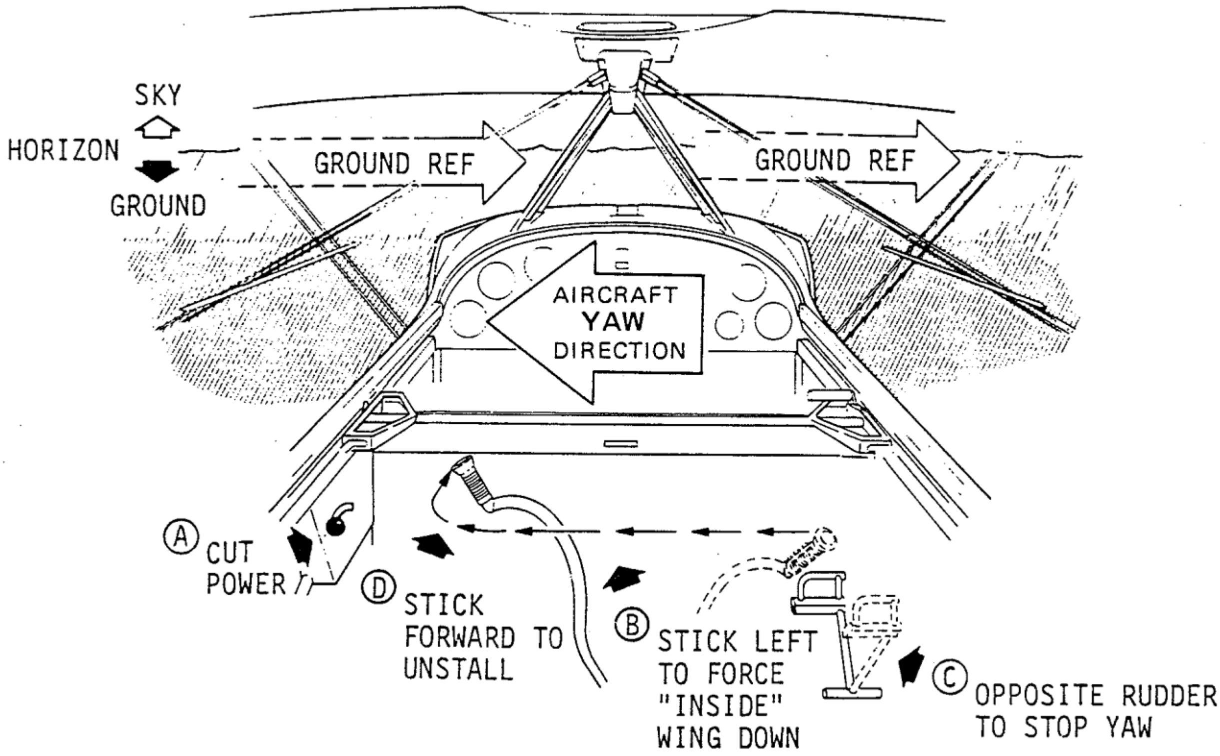
Recovery from flat spins must be initiated no lower than 2500 feet agl to allow for altitude loss during the pull-out phase of recovery.

FIGURE 3-3 Flat Upright Spin (Part 1 of 2)



EXTERIOR VIEW: FLAT UPRIGHT SPIN TO PILOT'S LEFT

FIGURE 3-3 Flat Upright Spin (Part 2 of 2)



PILOT'S VIEW: RECOVERY FROM FLAT UPRIGHT SPIN TO PILOT'S LEFT

3-9 Normal Inverted Spins (Figures 3-4, 3-5)

In a normal inverted spin (a) the aircraft is nose down, yawing toward the spin axis, rotating with the inside wing distinctly lower than the outside wing and (b) the axis of rotation near the aircraft is below the centerline of the aircraft (that is, on the belly-side). The aircraft rolls around the spin axis with the roll direction opposite to yaw direction. Usually, this type of spin is entered from an inverted flight attitude, stalling with the stick forward while holding firm rudder input. The aircraft can rotate either to the right or left.

The spin axis intersects the ground above the aircraft (that is, canopy-side). Usually the point of intersection is behind or slightly over the upper wing. Visual cues between the engine and the upper wing always permit accurate determination of yaw direction.

WARNING

> Visual cues above the upper wing (that is, canopy-side) are misleading, because the ground reference cues are behind the spin axis. Such miscues produce an illusion that can lead to the erroneous conclusion that the spin direction is opposite to the true direction. Always observe ground reference cues between the engine and the upper wing to provide unambiguous determination of yaw direction.

(Continued on next page.)

If the spin is known to be a normal inverted spin, the standard recovery procedure, which basically places the aircraft into an inverted dive, is as follows:

1. Pull the throttle full aft to cut engine power.

2. Push the rudder pedal gently but firmly in the direction opposite the spin.

WARNING

Excess or violent rudder may cause the aircraft to recover from the original spin and transition to a spin in the opposite direction.

3. Pull the control stick gently but firmly aft.

WARNING

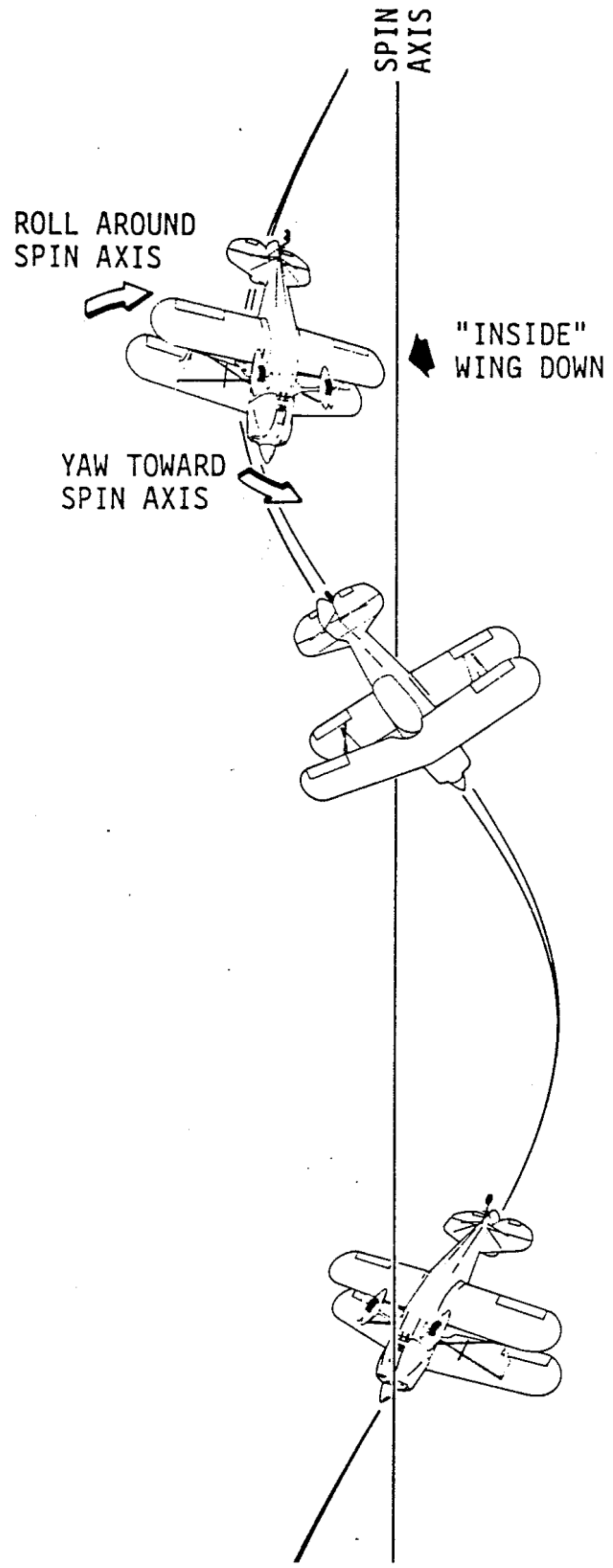
Excess or violent back stick may cause the aircraft to transition to an upright type spin.

4. When the spin stops (rapid build-up of airspeed), complete the recovery by pulling out of the dive, correcting aircraft attitude as required, and reapplying power. To prevent stalling during pullout, the pullout must be initiated using gentle elevator input until adequate airspeed develops (which can be sensed through control pressures).

NOTE

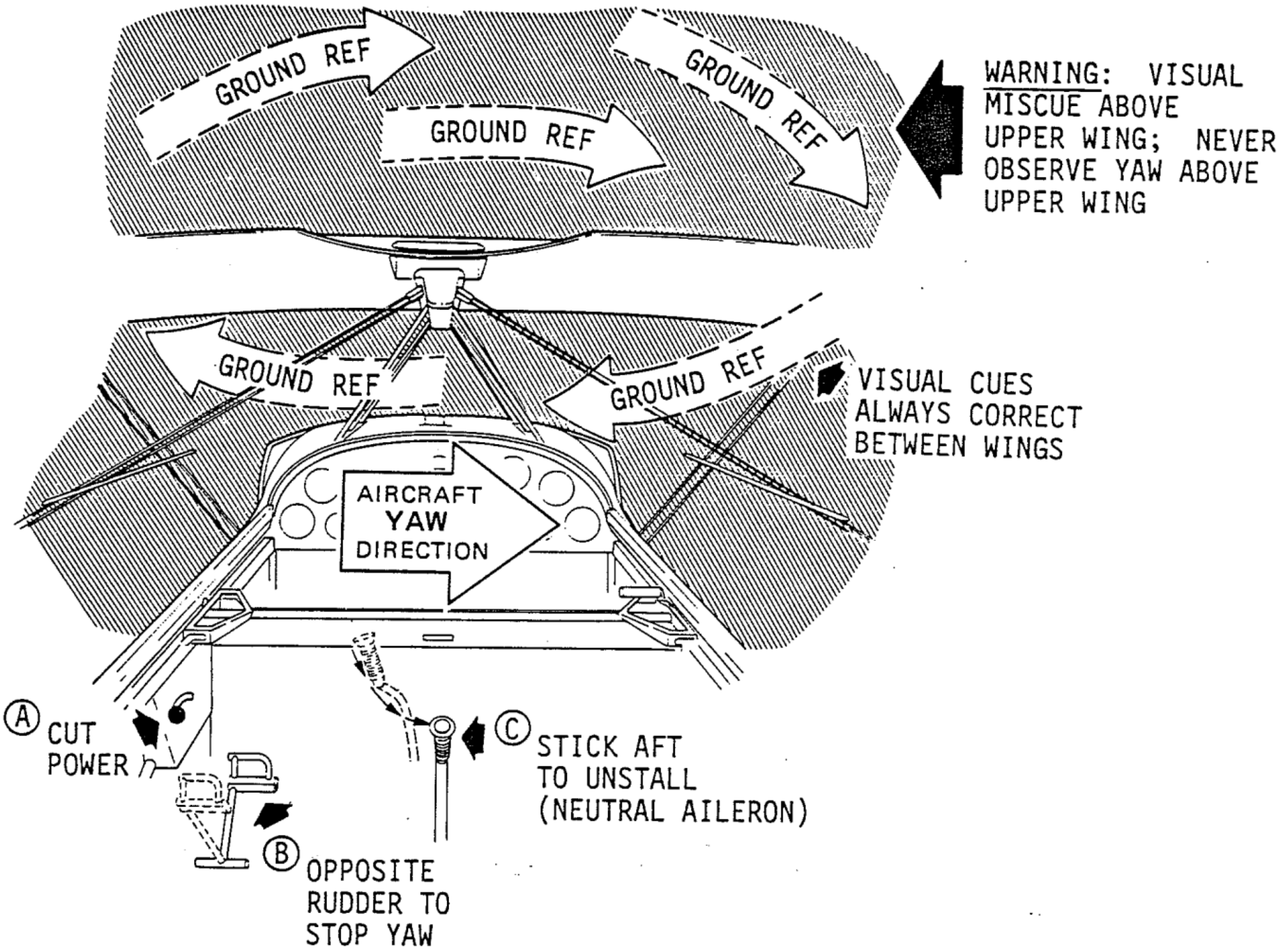
Moderate aileron opposite to the direction of yaw usually hastens spin recovery.

FIGURE 3-4 Normal Inverted Spin (Part 1 of 2)



EXTERIOR VIEW: NORMAL INVERTED SPIN TO PILOT'S RIGHT

FIGURE 3-4 Normal Inverted Spin (Part 2 of 2)



PILOT'S VIEW: RECOVERY FROM NORMAL INVERTED SPIN TO PILOT'S RIGHT

3-9 Normal Inverted Spins (cont'd)

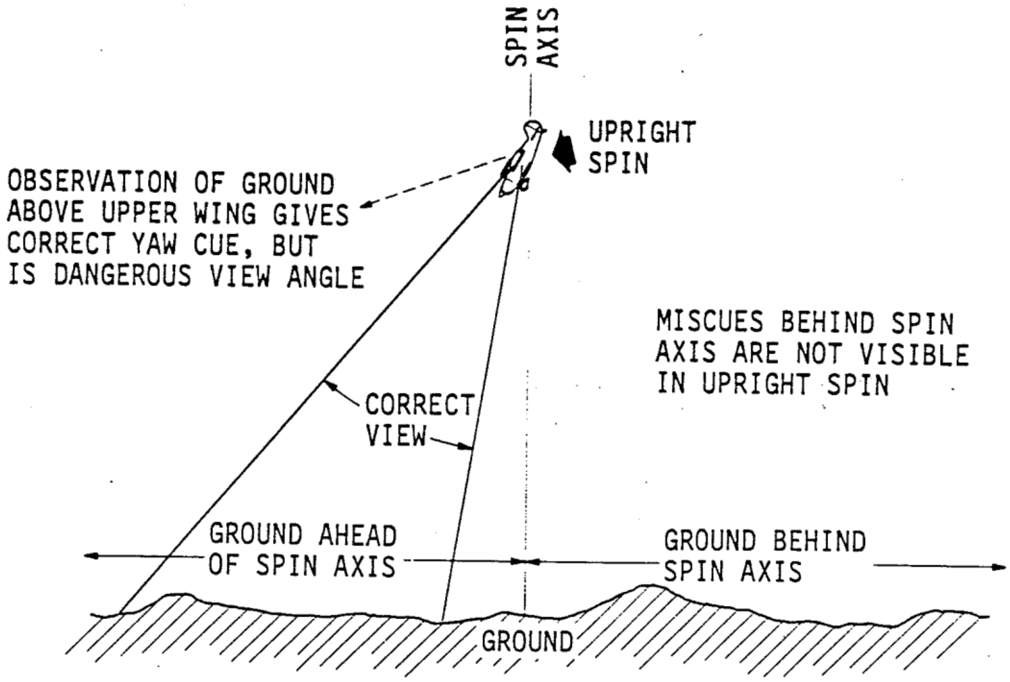
The condition that produces the illusion of yaw reversal to a pilot who looks up through the canopy is caused by observation of relative ground movement behind the spin axis, as shown in Figure 3-5.

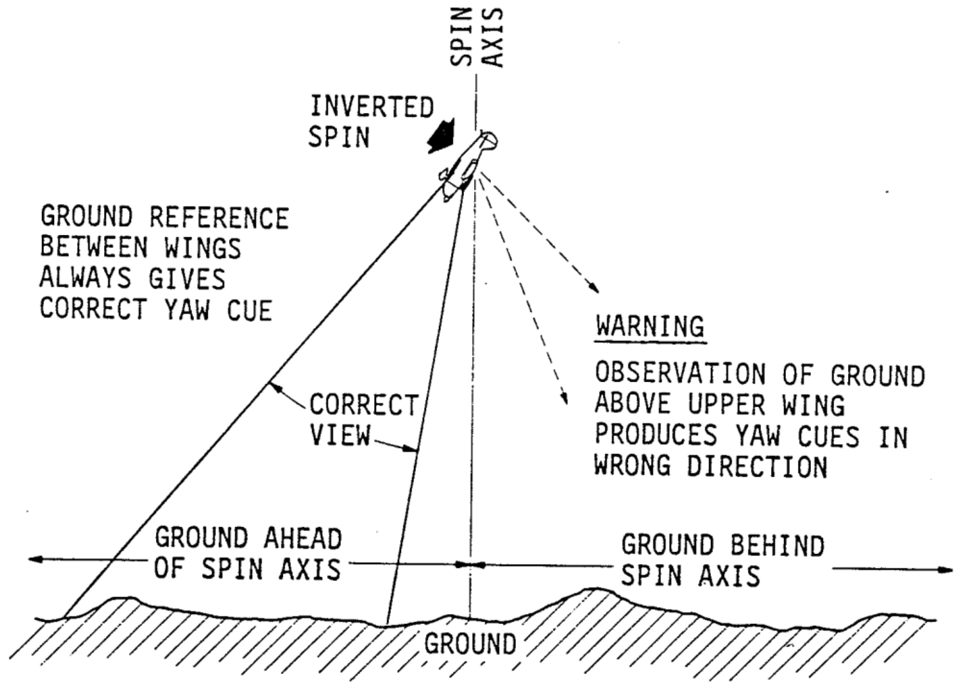
The tendency for a pilot to look up (canopy side) to maintain ground reference during many inverted maneuvers can produce a dangerous psychological trap that must be avoided during any spin. The relative movement of the ground behind the spin axis will be easily misinterpreted as yaw reference ahead of the spin axis, and the pilot will erroneously conclude that the spin yaw direction is the reverse of the true yaw direction. The resulting misapplication of rudder input will then hold the aircraft in the original spin, and recovery will be impossible.

Yaw cues must therefore always be taken ahead of the spin axis; this can be assured during all spin types only if ground reference for yaw determination is always made between the wings.

NEVER LOOK ABOVE THE UPPER WING (CANOPY SIDE) FOR GROUND REFERENCE DURING SPINS.

FIGURE 3-5 Yaw Reversal Illusion





3-10 Flat Inverted Spins (Figure 3-6)

In a flat inverted spin (a) the aircraft rotates with the wings approximately level (that is, zero roll), usually with the aircraft nearly horizontal in pitch or slightly nose up and (b) the aircraft is inverted. This type of spin is entered from a normal right-rudder inverted spin by applying full power while holding right stick (that is, stick torward the spin axis). Gyroscopic precession lifts the nose only during right yaw; in an inverted spin to the left, gyroscopic forces are in the wrong direction to lift the nose.

The spin axis intersects the ground well above the aircraft (that is, canopy-side). The point of intersection is normally beyond the pilot's visual scan during the flattened portion of the spin. However, the point of intersection moves to its normal position behind or near the upper wing during the recovery procedure, as the spin transitions to a normal inverted spin. This may create the illusion that the spin has reversed direction if ground reference cues are taken above the upper wing. Visual cues between the engine and the upper wing always permit accurate determination of yaw direction.

WARNING

Always observe ground reference cues between the engine and the upper wing to provide unambiguous determination of yaw direction.

(Continued on next page.)

3-10 Flat Inverted Spins (cont'd)

If the spin is known to be a flat inverted spin to the right, the standard recovery procedure, which basically places the aircraft into a normal inverted spin, is as follows:

1. Pull the throttle full aft to cut engine power.

2. Move the stick full left (that is, toward the outside of the spin, away from the spin axis and opposite to yaw direction), to force the inside wing down.

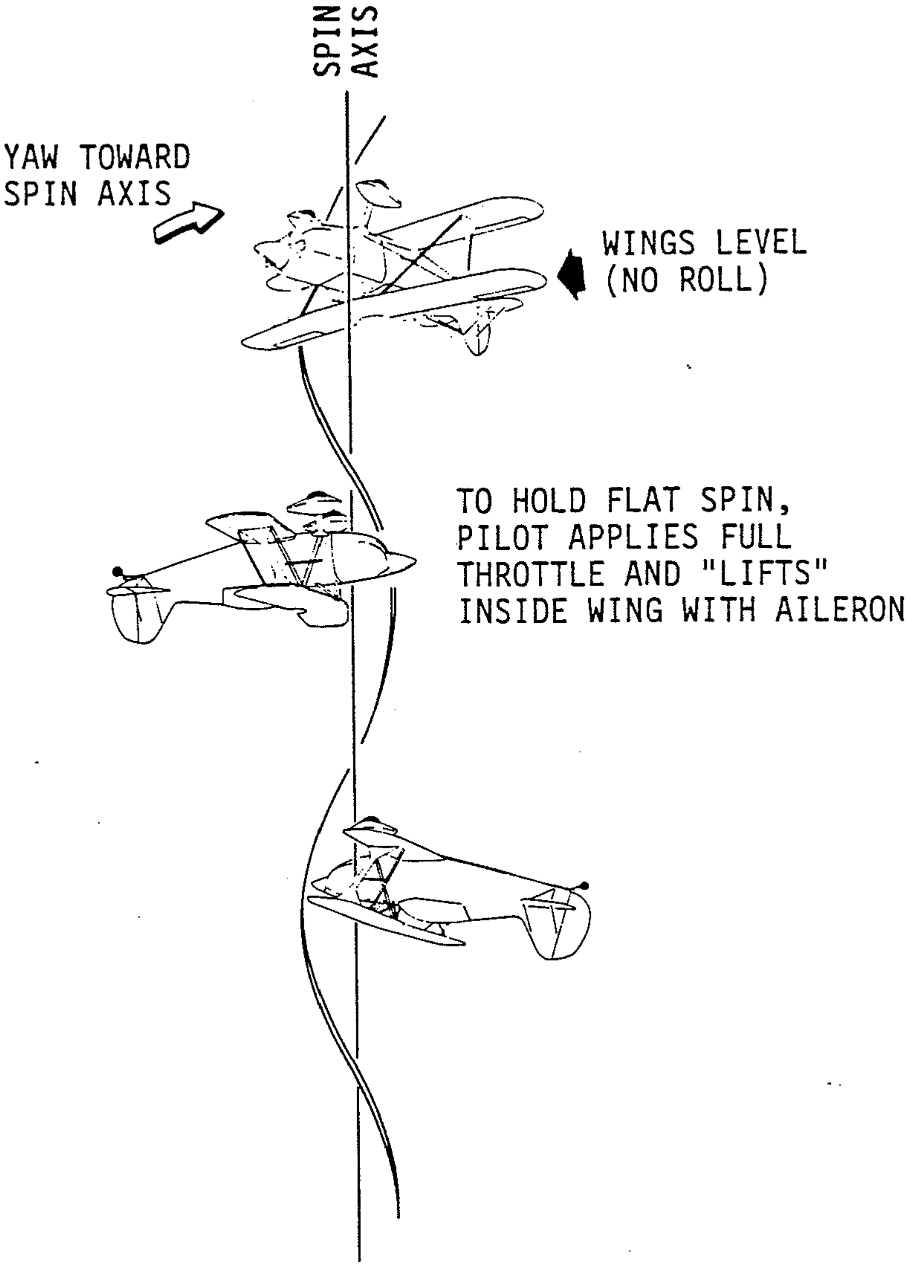
3. Hold the controls until a normal inverted spin has developed (1/2 to 3 turns, typically less than 1 turn), and then recover from a normal inverted spin using moderate back stick and moderate left rudder (paragraph 3-9). These control inputs are typically introduced at the same time as aileron deflection, producing a smooth single-motion recovery.

WARNING

Recovery from flat spins must be initiated no lower than 2500 feet agl to allow for altitude loss during the pull-out phase of recovery.

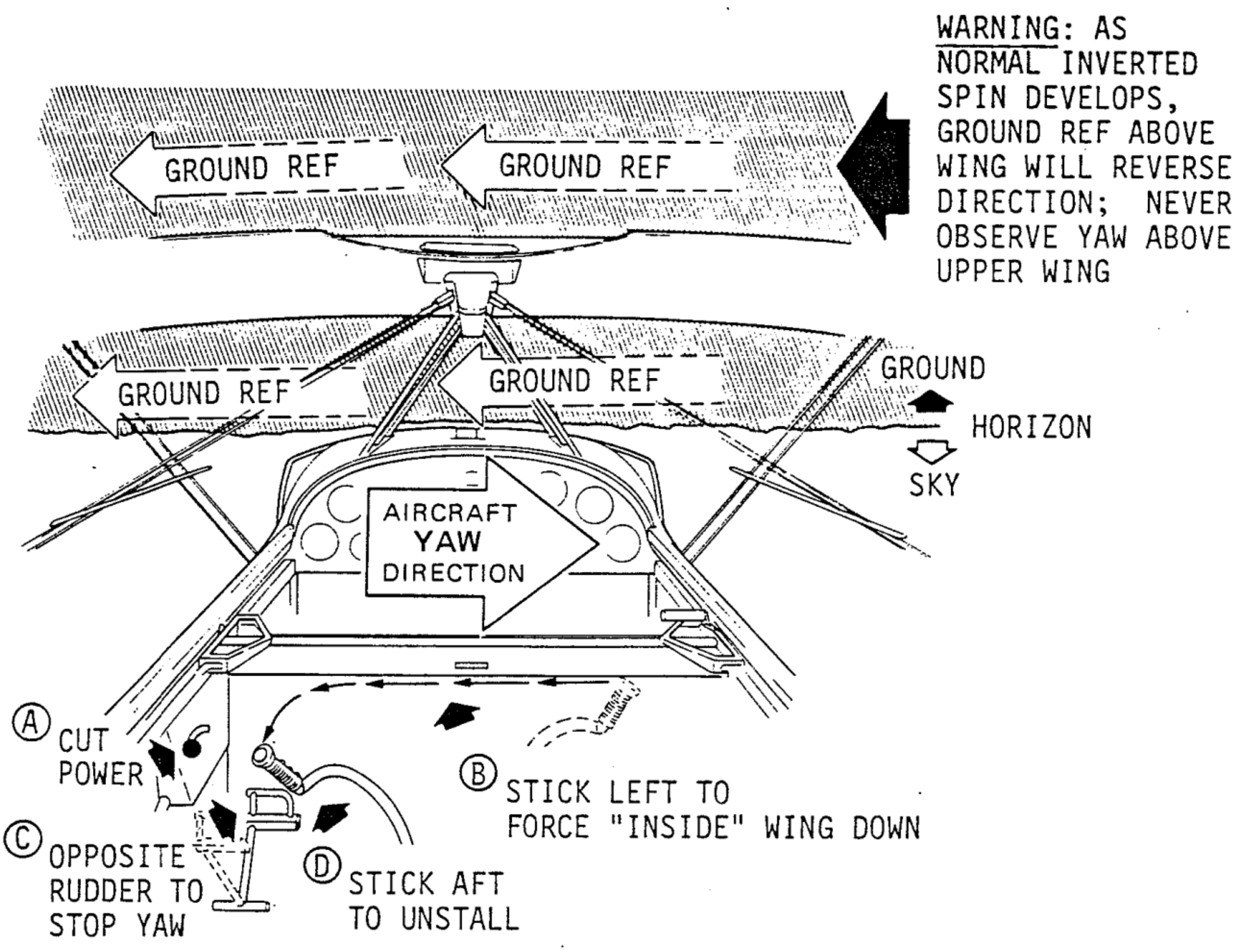
Because high negative-g forces (as great as 2 to 2-1/2 g) will be experienced during inverted flat spins, and because these forces may be experienced over a substantial period of time, final recovery should be inverted so as to avoid abrupt g-load reversal and the possibility of blackout near the ground.

FIGURE 3-6 Flat Inverted Spin (Part 1 of 2)



EXTERIOR VIEW: FLAT INVERTED SPIN TO PILOT'S RIGHT

FIGURE 3-6 Flat Inverted Spin (Part 2 of 2)



PILOT'S VIEW: RECOVERY FROM FLAT INVERTED SPIN TO PILOT'S RIGHT

Section 4

EMERGENCY PROCEDURES

4-1 Introduction

This section describes immediate-action procedures for selected malfunctions. All pilots should study and understand these procedures so that appropriate action can be taken quickly if an emergency arises.

4-2 Electrical Problems

NOTE

The electrical system and radio/intercom circuits are described in the product manual.

OVERVOLTAGE TRIP: Transient voltages may trip the overvoltage control and disable the alternator.
If you see low voltage on the Voltmeter, turn the Alternator section switch OFF and ON again.
Resetting the Alternator should restore Alternator function and recharge the battery.
If resetting the Alternator does not restore normal charging values (voltmeter readings), there is no immediate danger.
Turn off all unnecessary electrical equipment, especially the transponder and radio, for as long as necessary to save energy.
The battery capacity will allow another flight of at least 60 minutes. Therefore, proceed to the nearest suitable airport for landing.

Diagnose and correct the fault.

(Continued on next page.)

<u>LOW VOLTAGE:</u> yellow indicator light above the alternator switch lights upIf the on-board network voltage drops below 12.2V, the red low voltage indicator light on the front panel will then light up.(low voltage warning light of the SDS-EFI system on the left above the speedometer) <u>THERE IS NO IMMEDIATE DANGER</u> - abort the flight and land. <u>IF LANDING IS NOT IMMEDIATELY POSSIBLE:</u> Turn the SDS-EFI backup power supply switch (under the ignition section switches) and the Battery and Alternator switches to ON.
The backup power supply will allow another flight after a maximum of 27'min
<u>Take-off is only possible with a fully charged battery and if the voltmeter indicates a voltage of 13.8 - 14.2V after starting.</u>

<u>Alternator failure</u> (alternator bus circuit breaker suddenly tripped) Restart the bus by turning the alternator switch OFF and ON again
<u>Alternator restart failed:</u> Do not turn on the alternator circuit breaker. When indicated by the red light: Turn the SDS-EFI backup power supply switch (under the ignition section switches) to ON.
<u>This configuration will allow a flight of 27'min. Land within this time.</u>

4-3 Fire

4-3.1 Electrical

If an electrical short circuit occurs, circuit breakers should trip to disconnect the overloaded circuit. It is possible that some combination of failures could cause overheating and burning of some portion of the wire harness, requiring immediate action to stop accumulation of smoke and fumes and to prevent a more serious fire. IN CASE OF ELECTRICAL FIRE (ACRID SMOKE IN COCKPIT), DISCONNECT ALL POWER:

1) instrument and avionics switch OFF
2) Alternator switch OFF
3) Master- battery OFF
4) switch box OFF

4-3.2 Engine Fire, Starting

In case of an engine fire during starting, continue to crank the engine (hold Ignition switch to START position) in an attempt to start the engine and use any fuel in the lines.
Turn off the fuel pump. Set the mixture richness to the lean position. (by turning left 6 o'clock position)

4-3.3 Engine Fire, on Ground

In case of an engine fire or potential fire (in case of crash landing or ground collision while taxiing) turn OFF the electric fuel pump (OFF position down)
If possible, leave the engine running until the fuel in the line is depleted.

4-3.4 Engine Fire, at Takeoff

In case of engine fire during the takeoff roll or immediately after liftoff, land and stop the aircraft immediately. As soon as possible, cut power (THROTTLE full aft), turn the mixture control to the left (6 o'clock position), turn off the fuel pump - switch OFF

4-3.5 Engine Fire, in Flight

Turn OFF the fuel supply quickly - turn OFF the electric pump on block the flow of fuel to the engine. A bailout decision should be made based on apparent severity of the fire. Parachute-equipped pilots should commit to bailout when there is clear evidence of an out-of-control fire situation. Because of the likely swiftness of fire spreading, pilots who are not parachute-equipped must make a maximum-effort emergency landing in the shortest possible period of time.

4-4 Engine Roughness

4-4.1 Ignition Problems

Engine rough running or misfiring can be caused by ignition, spark plug, mixture adjustment or fuel supply failure.

Check the on-board network voltage (13.8-14.2V)

Check the correct operating values of the fuel pressure (2.9-3.4 Bar), in case of low values, switch to the backup pump.

Check the fuel mixture regulation: turn the potentiometer to the best operation (left-LEAK, right-RICH)

Check the left and right ignition circuits successively by turning them OFF and ON.

4-4.2 Fuel Pump Failure

Fuel pump failure in flight - zero fuel pressure indication (or low fuel pressure)
- Turn ON backup pump (on center panel in pilot's cockpit) check fuel pressure
- Turn OFF pump that was in operation (switch next to ignition circuit switches)

If incorrect (or no) fuel pressure is indicated, and engine is operating normally - FUEL PUMP IS NOT DEFECTIVE

4-5 Restarting Engine in Flight

4-5.1 With Electrical Starter

If the battery is charged and normal cranking with the starter is possible, in-flight restarting is the same as on-ground restarting. Because in-flight engine failure is likely caused by ignition or fuel-control problems, be sure to verify that controls are handled properly for optimum quick-start:

1. Electric pump on - fuel pressure indicated
2. THROTTLE open (forward)
3. Mixture Control-Position 0 (or richer 3 o'clock position)
4. Left and right ignition circuit ON, Battery Master ON - we start the ignition box by turning the key clockwise.

4-5.2 Without Electrical Starter

If the starter fails to crank the engine for any reason (such as discharged battery), verify that all controls are properly set, as listed in paragraph 4-5.1, to attempt starting.

If the propeller has stopped as a result of low airspeed, dive the aircraft to spin the propeller.

If the engine cannot be restarted at a safe altitude, prepare for a forced landing; do not continue restarting efforts unless a safe landing area is assured.

4-6 Forced Landings

Forced landings following engine failure should be made as follows:

1. Fly at minimum possible speed at moment of touchdown for 3-point touchdown attitude.

2. Turn off the fuel supply - turn OFF the electric fuel pumps. (switches down)

3. All electrical switches to the OFF (down) position. Turn the switch box counterclockwise.

4-7 Canopy Jettison and Bailout

The canopy is designed for instant release for emergency escape from the aircraft. In-flight emergency jettisoning would normally be done by a parachute-equipped pilot immediately after a decision to bail out.

In case of a serious ground accident involving fire, potential explosion, or pilot injury, the canopy could also be jettisoned for fast escape.

Each pilot must consider, in advance of any actual emergency, what conditions require a commitment to abandon the aircraft. The following emergency conditions represent extremely serious situations for which an immediate bailout decision must be made:

1. Clear evidence of an out-of-control engine fire.

2. Structural failure of the airframe.

3. Serious loss of control such that safe landing would be impossible.

4. When in any spin type following best-effort recovery procedures without success, and the aircraft passes through 1500 feet agl.

5. Engine failure over terrain which would make a forced landing extremely hazardous.

(Continued on next page.)

4-7 Canopy Jettison amd Bailout (cont'd)

NOTE

Additional details on the seat belt and canopy system are given in the 913 and 915 product manuals.

For emergency in-flight bailout, proceed as follows:

1. Either release the seat-belt system or, time permitting, loosen the shoulder harness to permit crouching to avoid being struck by the released canopy.

2. Grasp the red jettison handle.

3. Duck down behind the front seat for best protection of the head and upper body from the released canopy.

4. Pull the red jettison handle firmly aft to jettison the canopy. (The jettison tab which normally covers the lever on the jettison handle will bend clear as the handle is pulled.)

5. Release the seat belt system and exit the aircraft.

END OF SECTION 4

Section 5

COLD WEATHER OPERATION

5-1 Introduction

The Christen Eagle II is intended for day VFR in mild weather. Operation in extreme weather or extreme cold is not recommended. This section is included to highlight precautions that must be taken for operation in cold weather. In all cases, the precautions to be taken are related to (a) increased oil viscosity and problems caused by sluggish flow of engine oil, (b) moisture condensation in the breather tube with subsequent freezing and possible blockage of the breather, or (c) stiffness in the flop tube inside the fuel tank.

5-2 Moderately Cold Weather

When temperatures are between +15°F and +32°F, a few checks should be made to assure that operation will be satisfactory:

1. Verify that engine oil viscosity is appropriate for the average ambient air temperature. Refer to paragraph 8-10.2, in 924 manual.

2. Always fly with at least a half tank of fuel, if inverted flight or negative-g maneuvers are anticipated. (Cold weather may stiffen the flop tube, preventing inverted fuel pickup with lower fuel quantity.)

3. If there is snow on the runway remove the wheel pants.

(Continued on next page.)

5-2 Moderately Cold Weather (cont'd)

4. During preflight inspection, verify that fuel flows freely and normally at each fuel drain. Any water in the fuel lines may freeze, causing partial or complete fuel blockage.

5. Before starting, manually pull the propeller through four blades (two engine revolutions) to verify that the oil is thin enough to permit starting. It should be possible to move the propeller with reasonable smoothness. (If the propeller cannot be turned, preheating will be required.)

6. After running the engine for a few minutes, check the breather vent. Verify that crankcase blowby is capable of maintaining enough heat to prevent condensation and freezing in the breather line. (If there is evidence of freezing in the line, modification of the breather line will be required, see paragraph 5-3.)

WARNING

If the breather line is blocked by ice, backpressure in the engine crankcase may force engine oil past seals in the accessory housing. This could result in oil contamination of the magnetos and subsequent failure of the ignition system.

7. If negative-g aerobatic maneuvers are attempted, observe oil pressure carefully during a short trial while inverted. If oil pressure when inverted is abnormally low, roll to upright flight to restore oil pressure. Try several trial inverted periods to permit heated engine oil to flow into the inverted-oil-system components. A few trial inverted periods should be sufficient to produce normal oil pressure while inverted.

8. Fly the aircraft for at least 1/2 hour; avoid short operating periods after starting a cold engine.

5-3 Extremely Cold Weather

When temperatures are below +15°F, several specific modifications must be made to ensure safe engine operation. In addition, all procedures described in paragraph 5-2 must be observed.

1. Verify that engine oil viscosity is appropriate for the average ambient air temperature. Refer to paragraph 8-10.2, in 924 manual.

2. Do not operate the engine using the normal breather tube. Disconnect the original breather tube at the firewall and install a cold-weather breather tube leading down from the oil separator inside the engine compartment. The tube can be fabricated from a length of 3/4 inch diameter tubing with a formed bead at the top; mount the tube vertically on the engine mount near the oil separator using MS 21919-DF12 clamps.

3. Always preheat the engine before starting.

4. If the aircraft is equipped with a Christen supplied engine (917-A or 917-B), an internal thermal bypass shuts off oil flow to the oil cooler, so the oil cooler cannot be a source of excessive cooling. However, engines supplied from other sources may not be equipped with a thermal bypass; these engines will require a cover over the oil cooler to prevent excessive cooling.

5-4 Aircraft Storage

If the aircraft is to be stored during winter months, the following precautions should be observed:

1. Keep the aircraft in a dry, protected environment.

2. Start the engine at least once per month. Run the engine for 3 to 5 minutes at 800 to 1200 rpm. Watch engine instruments for normal indications. Let the engine run long enough for the oil temperature to reach the normal operating range.

3. If it is not possible to operate the engine for an extended period, preserve the engine for storage following AVCO/Lycoming recommendations.

4. Keep the battery charged during the storage period. Use an external charger, if required. (Refer to the 910 manual for details on suitable battery chargers.)

END OF SECTION 5