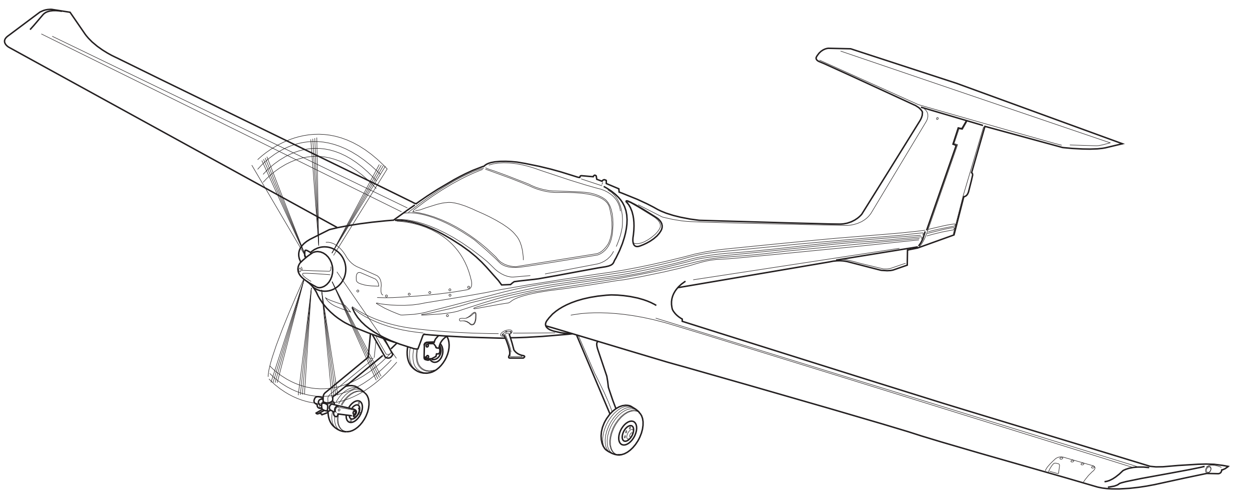
AIRPLANE FLIGHT MANUAL



DA20-C1

DOC # DA202-C1

DIAMOND AIRCRAFT INDUSTRIES INC.
1560 CRUMLIN SIDEROAD, LONDON, ONTARIO
CANADA N5V 1S2

This manual contains the information required by AWM 523-VLA.
Contents and revision status can be found in the
TABLE OF CONTENTS and the RECORD OF REVISIONS.

DIAMOND AIRCRAFT INDUSTRIES INC.
1560 CRUMLIN SIDEROAD
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AIRPLANE FLIGHT MANUAL

DA20-C1

Category of Airworthiness	**: UTILITY**
Applicable Airworthiness Requirements	**: AWM Chapter 523-VLA**
Serial Number	**: _____________**
Registration	**: _____________**
Doc. No.	**: DA202-C1**
Date of Issue	**: 19 December 1997**
Date of Re-issue	**: 15 May 2012 (Rev 26)**

Approved by	: Walter Istchenko
Authority	: Chief, Flight Test For Minister of Transport
Date of approval	: 03 July 2012

This manual must be carried in the aircraft at all times! Scope and revision status can be found in the List of Effective Pages and in the Record of Revisions.

The pages identified as “DOT-approved” in the List of Effective Pages are approved for the Minister of Transport.

This airplane is to be operated in compliance with the information and limitations contained herein.

DIAMOND AIRCRAFT INDUSTRIES INC.

1560 CRUMLIN SIDEROAD

London, Ontario, Canada N5V 1S2

PREFACE

Congratulations on your choice of the DA20-C1.

Safe handling of an airplane increases and ensures your safety and provides you with many hours of enjoyment. For this reason you should take the time to familiarize yourself with your new airplane.

We ask that you carefully read this Flight Manual and pay special attention to the recommendations given. A careful study of the manual will reward you with many hours of trouble-free flight operation of your airplane.

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LIST OF EFFECTIVE PAGES

NOTE

It is only necessary to maintain those Supplements which pertain to optional equipment that may be installed in your airplane.

Refer to Page 9-2 for the Index of Supplements.

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RECORD OF REVISIONS

Revisions and Temporary Revisions to this manual, with the exception of actual weighing data, are recorded in the following table. Revisions and Temporary Revisions of approved sections must be endorsed by the responsible airworthiness authority.

In the Manual Revision, new or amended text will be indicated by a bold black vertical line in the left hand margin of a revised page. The Manual Revision number and Document number will be shown on the bottom right hand corner of the page (footer) on even pages and will be shown on the bottom left hand corner of the page on odd pages. Page numbers will show on the opposite corner of the pages. Revision bars will show for pagination.

Temporary Revisions are used to provide information on systems or equipment until the next permanent Revision of the Airplane Flight Manual.

The airplane may only be operated if the Flight Manual is up to date.

		Approved	
Rev. No.	**Affected Pages**	**Date**	**Name**
Rev 17	0-4, 0-5, 0-6, 0-9, 2 -7, 2-17, 4-16, 7-12, 7-13, S2-1, S2-2, S2-3, S2-4, S4-4.	19 Mar 04	W. Jupp Chief, Flight Test for Director, Aircraft Certification Transport Canada
Rev 18	0-4, 0-5, 0-9 6-13, 6-14, 6-15, 6-16.	22 Mar 05	W. Jupp Chief, Flight Test for Director, Aircraft Certification Transport Canada
Rev 19	0-4, 0-5, 0-9, 2-5, 7-15, 7-16.	24 Jun 05	W. Jupp Chief, Flight Test for Director, Aircraft Certification Transport Canada
Rev 20	0-4, 0-6, 0-9, S4-1,S4-2, S4-3, S4-4, S4-5, S4-6, S4-7, S4-8, S4-9, S4-10, S4-11, S4-12, S4-13, S4-14, S4-15.	18 Aug 05	W. Jupp Chief, Flight Test for Director, Aircraft Certification Transport Canada

		Approved	
Rev. No.	Affected Pages	Date	Name
Rev 21	0-4, 0-5, 0-10 , 0-11, 0-12, 6-15, 6-16, 7-6.	05 Sep 06	W. Jupp Chief, Flight Test for Director, Aircraft Certification Transport Canada
TR-1	0-10, 2-5.	02 Oct 07	W. Jupp Chief, Flight Test for Director, Aircraft Certification Transport Canada
Rev 22	0-4, 0-5, 0-6, 0-10, 2-4, 2-7, 2-17, 4-14, 4-20, 5-20, S4-4, S4-12, S4-13.	02 Nov 07	W. Jupp Chief, Flight Test for Director, Aircraft Certification Transport Canada
Rev 23	0-4, 0-6, 0-10, 0-11, 2-1, 2-4, 2-7, 2-8,2-9,2-10, 2-11, 2-12, 2-13, 2-14, 2-15, 2-16, 2-17, 2-18, 2-19, 4-14, 4-20, S4-1, S4-4, S4-5, S4-6, S4-7, S4-8, S4-9, S4-10, S4-11, S4-12, S4-13, S4-14, S4-15, S4-16.	11 Dec 07	W. Jupp Chief, Flight Test for Director, Aircraft Certification Transport Canada
TR 08-01	0-10, 2-19, 4-5, 6-13, 6-14, 6-15, 6-16.	25 Aug 08	R. Walker A/Chief, Flight Test for Director, Aircraft Certification Transport Canada
Rev 24	All	30 Apr 09	R. Walker A/Chief, Flight Test for Director, Aircraft Certification Transport Canada

		Approved	
Rev. No.	Affected Pages	Date	Name
TR 09-02	4-10, 4-11, 4-12.	30 Jun 09	R. Walker A/Chief, Flight Test for Director, Aircraft Certification Transport Canada
TR 09-03	0-9, 0-10, 6-13 thru 6-20, 9-1, 9-2 and 9-S13-1 thru 9-S13-24.	12 Nov 09	D. Stephen A/Chief, Flight Test for Director, Aircraft Certification Transport Canada
TR 10-01	0-10, 6-3 and 6-5.	26 Feb 10	Jim Martin for Chief, Flight Test for Director, Aircraft Certification Transport Canada
TR 10-02	0-10, 4-9, 7-11.	28 Feb 10	Jim Martin for Chief, Flight Test for Director, Aircraft Certification Transport Canada
Rev 25	Cover Page, 0-1, 0-2, 0-5 thru 0-20, 1-1 thru 1-14, 2-1, 2-5, 2-10 thru 2-20, 4-9 thru 4-12, 4-14, 5-8, 5-10, 5-12, 6-3, 6-5, 6-16, 6-17, 7-1, 7-2, 7-9, 7-12 thru 7-24, 8-1 thru 8-10, 9-1, 9-2. S4-14, S4-16, S11-1 thru S11-6, S12-1 thru S12-8 S13-1 thru S13-22.	07 Apr 10	W. Istchenko Chief, Flight Test for Director, Aircraft Certification Transport Canada
TR 10-03	0-13, 2-19, 3-5, 4-10 thru 4-12A, 7-14, S1-8 thru S1-11.	20 Dec 10	W. Istchenko Chief, Flight Test for Director, Aircraft Certification Transport Canada

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Rev. No.	Affected Pages	Date	Name
TR 11-01	0-13, 2-10, S4-13.	01 Aug 11	W. Istchenko Chief, Flight Test for Director, Aircraft Certification Transport Canada
TR 11-02	0-13, 2-9, 2-10.	15 Aug 11	W. Istchenko Chief, Flight Test for Director, Aircraft Certification Transport Canada
TR 11-03	0-13, S4-16.	20 Dec 11	W. Istchenko Chief, Flight Test for Director, Aircraft Certification Transport Canada
Rev 26	ALL	03 Jul 12	W. Istchenko Chief, Flight Test for Director, National Aircraft Certification Transport Canada
TR12-01	0-20, 2-5, 2-12, 6-15, and 6-19.	14 Aug 12	W. Istchenko Chief, Flight Test for Director, National Aircraft Certification Transport Canada
TR12-02	0-20, 2-7 and 4-25.	23 Nov 12	W. Istchenko Chief, Flight Test for Director, National Aircraft Certification Transport Canada

		Approved	
Rev. No.	Affected Pages	Date	Name
Rev 27	Cover Pages. 0-5 thru 0-22, and 0-24 thru 0-28. 2-1, 2-2, 2-5, 2-7, 2-8 2-10 and 2-12 thru 2-32. 3-15, 4-4, 4-9, 4-25. 5-1 and 5-6 thru 5-18. 6-10 and 6-15 thru 6-20. 7-1, 7-2, 7-3 and 7-10 thru 7-32. 9-4, 9-5, 9-6. S1-16, S3-3, S5-10, S6-6, S7-7, S8-3, S9-4, S10-3, S11-7, S12-9, S13-19, S14-7, S15-1 thru S15-14. S16-1 thru S16-6. S17-1 thru S17-6.	4 Apr 13	W. Istchenko Chief, Flight Test for Director, National Aircraft Certification Transport Canada
Rev 28	Cover Pages 0-5 thru 0-10, 0-13, 0-15 thru 0-22 2-28 thru 2-34 5-9 6-15 thru 6-22 S13-4 and S13-10 thru s13-28	14 Mar 14	W. Istchenko Chief, Flight Test for Director, National Aircraft Certification Transport Canada
TR28-01	0-19, 9-5 and S18-1 to S18-6.	5 Jun 15	W. Istchenko Chief, Flight Test for Director, National Aircraft Certification Transport Canada

		Approved	
Rev. No.	**Affected Pages**	**Date**	**Name**
Rev 29	Cover Page (front and back). **Front Matter**: 0-1, 0-5 thru 0-11, 0-13, 0-14, 0-15 and 0-20 thru 0-30. **Chapter 1**: 1-2 and 1-7. **Chapter 2**: 2-1, 2-2, 2-6, 2-8, 2-12, 2-13, and 2-30. **Chapter 3**: 3-1, 3-4 and 3-12 thru 3-24. **Chapter 4**: 4-1, 4-2, 4-4, 4-18, 4-20, 4-21, 4-22, 4-23, 4-25 and 4-26. **Chapter 5**: 5-4, 5-8, 5-9 and 5-10. **Chapter 6**: 6-10, 6-11 and 6-15 to 6-21. **Chapter 7**: 7-31. **Chapter 8**: 8-1 and 8-10. **Chapter 9**: 9-4 and 9-5.		DocuSigned by: Jason Christopher Randall 043E458EB4D44B5... 10/25/2021 Chief, Flight Test for Director, National Aircraft Certification TRANSPORT CANADA

		Approved	
Rev. No.	**Affected Pages**	**Date**	**Name**
Rev 29	**Supplement 1**: S1-6. **Supplement 13**: S13-1, S13-4, S13-5, S13-15 and S13-17 thru S13-32. **Supplement 18**: S18-1 thru S18-8.		

REVISIONS LOG

This Revisions Log should be used to record all Permanent Revisions issued and inserted into this manual. The affected pages of any revision must be inserted into the manual as well as the Record of Revisions upon receipt. The pages superseded by the revision must be removed and destroyed. The Revisions Log should be updated by hand.
Changes are identified on those pages affected by a revision bar.

Rev. No.	Date Issued:	Inserted On:	Inserted By:
Issue 1	19 Dec 97	19 Dec 97	Diamond Aircraft
Rev 1	13 Aug 98	13 Aug 98	Diamond Aircraft
Rev 2	28 Aug 98	28 Aug 98	Diamond Aircraft
Rev 3	08 Dec 98	08 Dec 98	Diamond Aircraft
Rev 4	05 Jan 99	05 Jan 99	Diamond Aircraft
Rev 5	10 Mar 99	10 Mar 99	Diamond Aircraft
Rev 6	07 Apr 99	07 Apr 99	Diamond Aircraft
Rev 7	21 Jun 99	21 Jun 99	Diamond Aircraft
Rev 8	07 Dec 99	07 Dec 99	Diamond Aircraft
Rev 9	11 Apr 00	11 Apr 00	Diamond Aircraft
Rev 10	14 Aug 00	14 Aug 00	Diamond Aircraft
Rev 11	20 Mar 01	20 Mar 01	Diamond Aircraft
Rev 12	16 Apr 01	16 Apr 01	Diamond Aircraft
Rev 13	28 May 01	28 May 01	Diamond Aircraft
Rev 14	09 Aug 01	09 Aug 01	Diamond Aircraft
Rev 15	23 Apr 02	23 Apr 02	Diamond Aircraft
Rev 16	18 Oct 02	18 Oct 02	Diamond Aircraft
Rev 17	19 Mar 04	19 Mar 04	Diamond Aircraft
Rev 18	22 Mar 05	22 Mar 05	Diamond Aircraft

Rev. No.	Date Issued:	Inserted On:	Inserted By:
Rev 19	24 Jun 05	24 Jun 05	Diamond Aircraft
Rev 20	18 Aug 05	18 Aug 05	Diamond Aircraft
Rev 21	05 Sep 06	05 Sep 06	Diamond Aircraft
Rev 22	02 Nov 07	02 Nov 07	Diamond Aircraft
Rev 23	11 Dec 07	11 Dec 07	Diamond Aircraft
Rev 24	16 Apr 09	26 Jun 09	Diamond Aircraft
Rev 25	06 Apr 10	16 Apr 10	Diamond Aircraft
Rev 26	15 May 12	10 Jul 12	Diamond Aircraft
Rev 27	12 Feb 13	01 Apr 2013	Diamond Aircraft
Rev 28	28 Feb 14	28 Feb 14	Diamond Aircaft
Rev 29	30 Jun 21		

REVISION HIGHLIGHTS

GENERAL

The table below highlights the changes that have been incorporated into Revision 29.

CHAPTER	PAGES	HIGHLIGHTS
Cover Page	Cover Page	Cover Page (front and back) revised to show Revision 29, dated June 30, 2021. AWM 523-VLA added on back page. Web address changed on back of the page.
Front Matter	0-1	The format of the page has been revised.
	0-5 to 0-10, 0-11, 0-13 and 0-14	List of Effective Pages (LOEP) and Supplements LOEP revised. Rev bars inserted adjacent to the changed pages.
	0-15	Revised the second para to indicate that there will be rev bars in the footer of the manual to indicate pagination.
	0-19	New approval name added to lines Rev 28 and TR29-01.
	0-20 and 0-21	New Revision (29) information added on these two pages.
	0-22	Pagination because of pages added.
	0-23	Revision Log entry for Rev 29.
	0-24 to 0-27	Revision Highlights for Rev 29.
	0-28	Pagination because of pages added.
	0-29 and 0-30	0-29 New TRs entered. 0-30 New propeller info entered.
1	1-2	Page numbers revised in the Table of Contents.
	1-7	Added info for the Model W69EK7-63GM Propeller.
2	2-1 and 2-2	Table of Contents revised.
	2-6	Para 2.4.2 revised to “For the aircraft Fuel System”.

CHAPTER	PAGES	HIGHLIGHTS
	2-6	Added info for the Model W69EK7-63GM Propeller.
	2-8	Revised the Voltmeter markings.
	2-12	Revised/added data to Flight and Navigation Instruments. Revised/added data to Lighting.
	2-13	Pagination as the Note was moved to this page.
	2-30	Placards on right door frame revised.
3	3-1	TOC revised due to page numbering changes.
	3-4	Revised step 3.3.1 (b) (4).
	3-12	Revised step 3.3.4 (a) “if the Engine Starts”. Added step 3.3.4 (b) “if the Engine Fails to Start”.
	3-13	Para 3.3.4.(b) now becomes 3.3.4.(c).
	3-14	Para 3.3.4.(c) now becomes 3.3.4.(d). Added a note at the start of 3.3.4.(d), to prepare to land. Revised step (d) 6 to Pull all circuit breakers.
	3-15	Revised step (11). Para 3.3.4.(d) now becomes 3.3.4.(e).
	3-16	Para 3.3.4.(e) now becomes 3.3.4.(f). Added a note previous to 3.3.4.(f) Step (1).
	3-17 to 3-24	Rev Bars in the footer due to pagination.
4	4-1	Item 4.4.9 Cruise is now on Page 23.
	4-1 and 4-2	Third level of the TOC has been removed.
	4-4	Changed the page reference to Page 2-35 in the graphic.
	4-18	Revised Para 4.4.5 Taxing.
	4-20	Revised Paras 4.4.6. (t) and (u).
	4-21	Added a Warning after 4.4.7 (h) for Engine Performance
	4-22 and 4-23	Rev Bars in the footer due to pagination.

CHAPTER	PAGES	HIGHLIGHTS
	4-25 and 4-26	Revised Para 4.4.13 (b) and Para 4.4.14 (g). Paras 4.4.14 (h) through (j) changed with (g) added.
5	5-4	Revised chart to remove acronyms.
	5-8	Revised chart to correct wind component.
	5-9 and 5-10	Obstacle Height path revised.
6	6-10	Revised the fuel weight.
	6-11	Arranged to have Imperial then Metric in items 2 - 7. Revised the calculations for items 6, 7, 8 and 9.
	6-15	Added the Garmin GMA 345 Audio Panel. Re-numbered 23-013 thru 23-016.
	6-16 to 6-18 and 6-21, 6-22	Rev Bars in the footer due to pagination (larger table).
	6-19	Four Traffic Advisory Processors added. 34-037 to 43-050 renumbered through page 6-20.
	6-20	Added info for the Model W69EK7-63GM Propeller.
7	7-31	Added GMA 340/345 Audio Panel to the Caution.
8	8-1	Item 8.4.2 Parking is now on Page 5.
	8-10	Added info for the Model W69EK7-63GM Propeller. Corrected the identification of the aircraft engine.
9	9-4	Revised the number of pages for Supplement 13.
	9-5	Added Supplement 18 to the list.

CHAPTER	PAGES	HIGHLIGHTS
Supplement 1	S1-6	Revised step 3.3.4 (a) “if the Engine Starts (EPU power connected)”. Added step 3.3.4 (b) “if the Engine Fails to Start (EPU power connected)”.
Supplement 13	S13-1	Revised the Table of Contents.
	S13-4	Added new software version to components.
	S13-5	Added “For night VFR operation in EASA member countries”.
.	S13-15	Revised document numbers from Rev X to Current Revision.
	S13-17	Revised the function of the Barometer Bezel Key.
	S13-18	Revised the function of the BACK Soft Key.
	S13-19	New PFD Soft Key Map.
	S13-22	New MFD Soft Key Map.
	S13-25	Renumbered the Figure from S13-1 to S13-3.
	S13-26	Revised the reference to the Figure to S13-3.
	S13-27	Renumbered the Figure from S13-2 to S13-4.
	S13-28	Revised the reference to the Figure to S13-4.
	S13-31	Revised the G500 System Overview graphic.
	S13-20, 21, 23, 24, 29, 30 and S13-32	New date and rev due to pagination.
Supplement 18	S18-1 to S18-8	Incorporation of AFM-TR-28-01, dated April 22, 2015. GARMIN GTX330 with ADS-B OUT.

TEMPORARY REVISIONS LOG

All Temporary Revisions (TRs) to this manual must be inserted and signed as being inserted into the manual in the following table.

Temporary Revision Number	Date Issued	Inserted	
		Date	Name
TR-1	02 Oct 07	02 Oct 07	Diamond Aircraft
TR 08-01	25 Aug 08	25 Aug 08	Diamond Aircraft
TR 09-02	30 Jun 09	30 Jun 09	Diamond Aircraft
TR 09-03	12 Nov 09	12 Nov 09	Diamond Aircraft
TR 10-01	26 Feb 10	26 Feb 10	Diamond Aircraft
TR 10-02	28 Feb 10	28 Feb 10	Diamond Aircraft
TR 10-03	20 Dec 10	20 Dec 10	Diamond Aircraft
TR 11-01	01 Aug 11	01 Aug 11	Diamond Aircraft
TR 11-02	15 Aug 11	15 Aug 11	Diamond Aircraft
TR 11-03	20 Dec 11	20 Dec 11	Diamond Aircraft
NOTE: All the Temporary Revisions above have been incorporated into the AFM at Rev 26.			
TR 12-01	01 Aug 12	14 Aug 12	Diamond Aircraft
TR 12-02	09 Oct 12	23 Nov 12	Diamond Aircraft
NOTE: The Temporary Revisions above have been incorporated into the AFM at Rev 27.			

Temporary Revision Number	Date Issued	Inserted	
		Date	Name
TR 28-01	22 Apr 15	05 Jun 15	Diamond Aircraft
TR 61-01	28 Jun 19	28 Jun 19	Diamond Aircraft
TR 20-01	23 Jun 20	23 Jun 20	Diamond Aircraft
NOTE: The Temporary Revisions above have been incorporated into the AFM at Rev 29.			

SUBSCRIPTION SERVICE

Diamond Aircraft Publications Revision Subscription Contacts

To ensure safe operation and maintenance of the DA20-C1 aircraft, it is recommended that operators verify that their documentation is at the correct revision levels. For revision and subscription service please contact the following:

1. **DA20-C1 related manuals and publications.**

North America, Australia and Africa:

Diamond Aircraft Industries Inc.
Customer Support
1560 Crumlin Sideroad
London, Ontario
Canada.
N5V 1S2
Phone: 519-457-4041
Fax: 519-457-4060

Other:

Diamond Aircraft Industries GmbH
Customer Support
N.A. Otto-Strasse 5
A-2700 Wiener Neustadt
Austria

Phone: +43-(0) 2622-26700
Fax: +43-(0) 2622-26780

2. **Teledyne Continental Motors IO 240B related manuals and publications.**

North America:

Teledyne Continental Motors
P.O. Box 90
Mobile, Alabama
36601
Phone: 334-438-3411

Other:

Contact a Teledyne Continental Motors distributor.

3. **Sensenich Propeller**

Model W69EK7-63, W69EK7-63G, W69EK7-63GM and W69EK-63 related manuals and publications.

North America:

Sensenich Wood Propeller Company
2008 Wood Court
Plant City, Florida
USA
Phone: 813-752-3711
Fax: 813-752-2818

CHAPTER 1

GENERAL

TABLE OF CONTENTS

PAGE

PAGE

1.1 INTRODUCTION

The Airplane Flight Manual has been prepared to provide pilots and instructors with information for the safe and efficient operation of this airplane.

This Manual includes the material required by JAR-VLA and Transport Canada Airworthiness Manual (AWM) Chapter 523-VLA. It also contains supplemental data supplied by the airplane manufacturer which can be useful to the pilot.

The Flight Manual conforms to a standard equipped DA20-C1 airplane. Any optional equipment installed on request of the customer (COMM, NAV, etc.) is not considered.

For the operation of optional equipment the Operation Manual of the respective vendor must be used.

For permissible accessories refer to the Equipment List, Section 6.5.

1.2 CERTIFICATION BASIS

The DA20-C1 has been approved by Transport Canada in accordance with the Canadian Airworthiness Manual (AWM) Chapter 523-VLA., Type Certificate No. A-191.

Category of Airworthiness:	UTILITY
Noise Certification Basis:	(a) Canadian Airworthiness Manual Chapter 516
	(b) FAA Part 36
	(c) ICAO Annex 16.

1.3 WARNINGS, CAUTIONS AND NOTES

The following definitions apply to warnings, cautions, and notes used in the Flight Manual:

WARNING

A WARNING MEANS THAT THE NON-OBSERVATION OF THE CORRESPONDING PROCEDURE LEADS TO AN IMMEDIATE OR IMPORTANT DEGRADATION IN FLIGHT SAFETY.

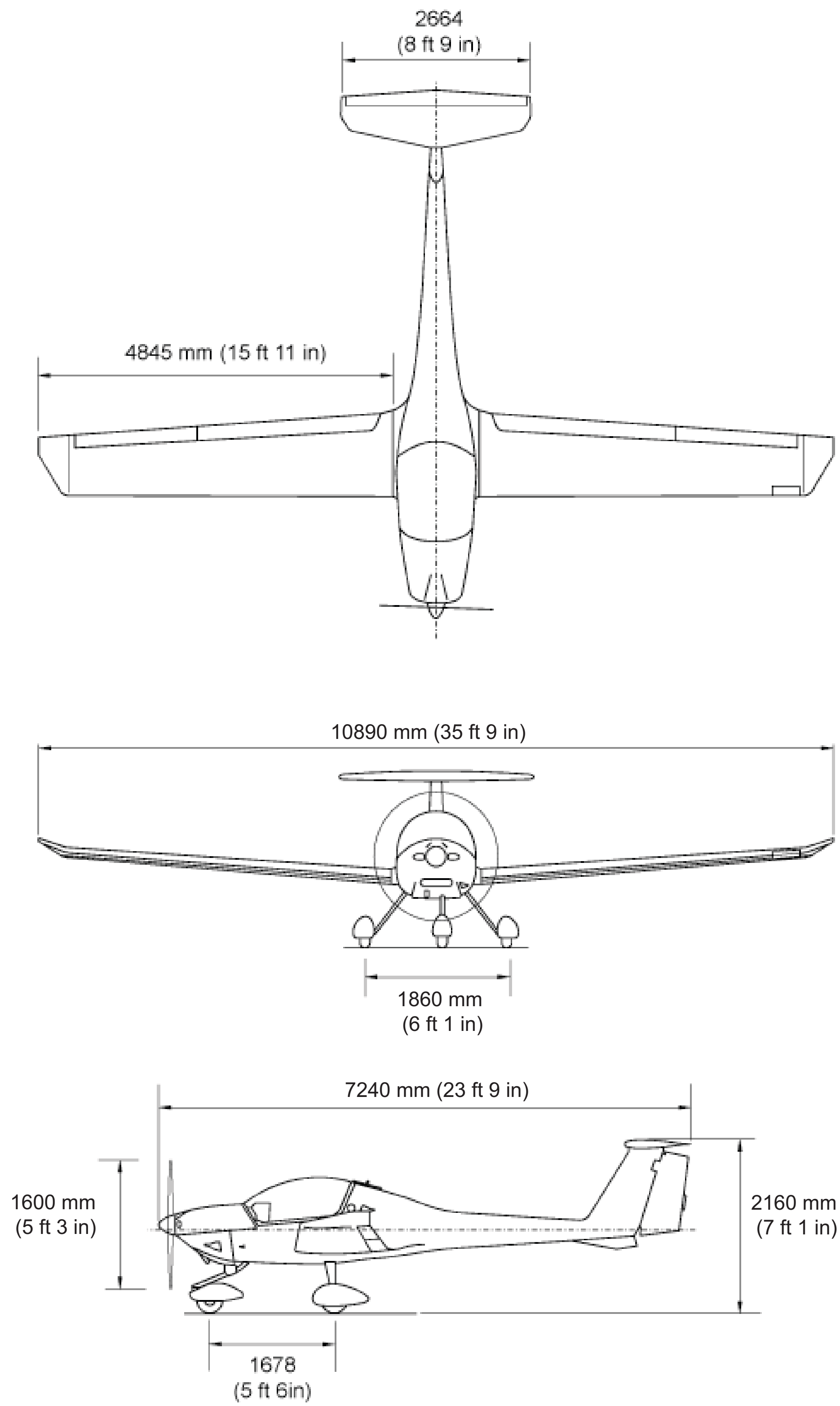
CAUTION

A CAUTION MEANS THAT THE NON-OBSERVATION OF THE CORRESPONDING PROCEDURE LEADS TO A MINOR OR TO A LONG TERM DEGRADATION IN FLIGHT SAFETY.

NOTE

A Note draws the attention to any special item not directly related to safety but which is important or unusual.

1.4 THREE-VIEW-DRAWING OF THE AIRPLANE



1.5 DIMENSIONS

1.5.1 Overall Dimensions

Span:	35 ft 9 in	(10.89 m)
Length:	23 ft 9 in	(7.24 m)
Height:	7 ft 1 in	(2.16 m)

1.5.2 WING

Airfoil:	Wortmann FX 63-137/20 HOAC
Wing Area:	125 sq ft (11.6 m2)
Mean Aerodynamic Chord (MAC):	3 ft 6.9 in (1.09 m)
Aspect Ratio:	10.0
Dihedral:	+4° nominal
Sweep of Leading Edge:	+1° nominal

1.5.3 HORIZONTAL STABILIZER

Angle of Incidence :	-4° ± 0.25°
Span:	8 ft 9 in (2.66 m)

1.5.4 LANDING GEAR

Track:		6 ft 1 in (1.86 m)
Wheel Base:		5 ft 6 in (1.67 m)
Tire Size:	Nose:	5.00-4, 6 ply
	Main:	5.00-5, 6 ply
Tire Pressure:	Nose:	26 psi (1.8 bar)
	Main:	33 psi (2.3 bar)

1.6 ENGINE

Continental IO-240-B, naturally aspirated, 4 cylinder, 4 stroke-engine, fuel injected, horizontally opposed, air cooled.

Propeller drive direct from engine crankshaft.

Displacement:	239.8 cu.in. (3.9 liters)
Output Power:	125 hp (93.2 kW)
At	2800 RPM

1.7 PROPELLER

Two-bladed fixed pitch propeller, manufactured by Sensenich:	Model W69EK7-63, W69EK7-63G, W69EK7-63GM, or W69EK-63
Diameter:	5 ft 9 in (1.752 m)

1.8 FUEL

Approved Fuel Grades:	AVGAS 100 or 100LL
Total Fuel Capacity:	24.5 US gal. (93 liters)
Usable Fuel:	24.0 US gal. (91 liters)
Unusable Fuel:	0.5 US gal. (2 liters)

1.9 LUBRICANT AND COOLANT

1.9.1 Lubricant

Use only the lubricating oils conforming to TCM specifications listed in Service Information Letter SIL99-2B. See Table 1 below for approved brands.

Table 1
Qualified Lubricating Oil – Ashless Dispersant (SAE J 1899)

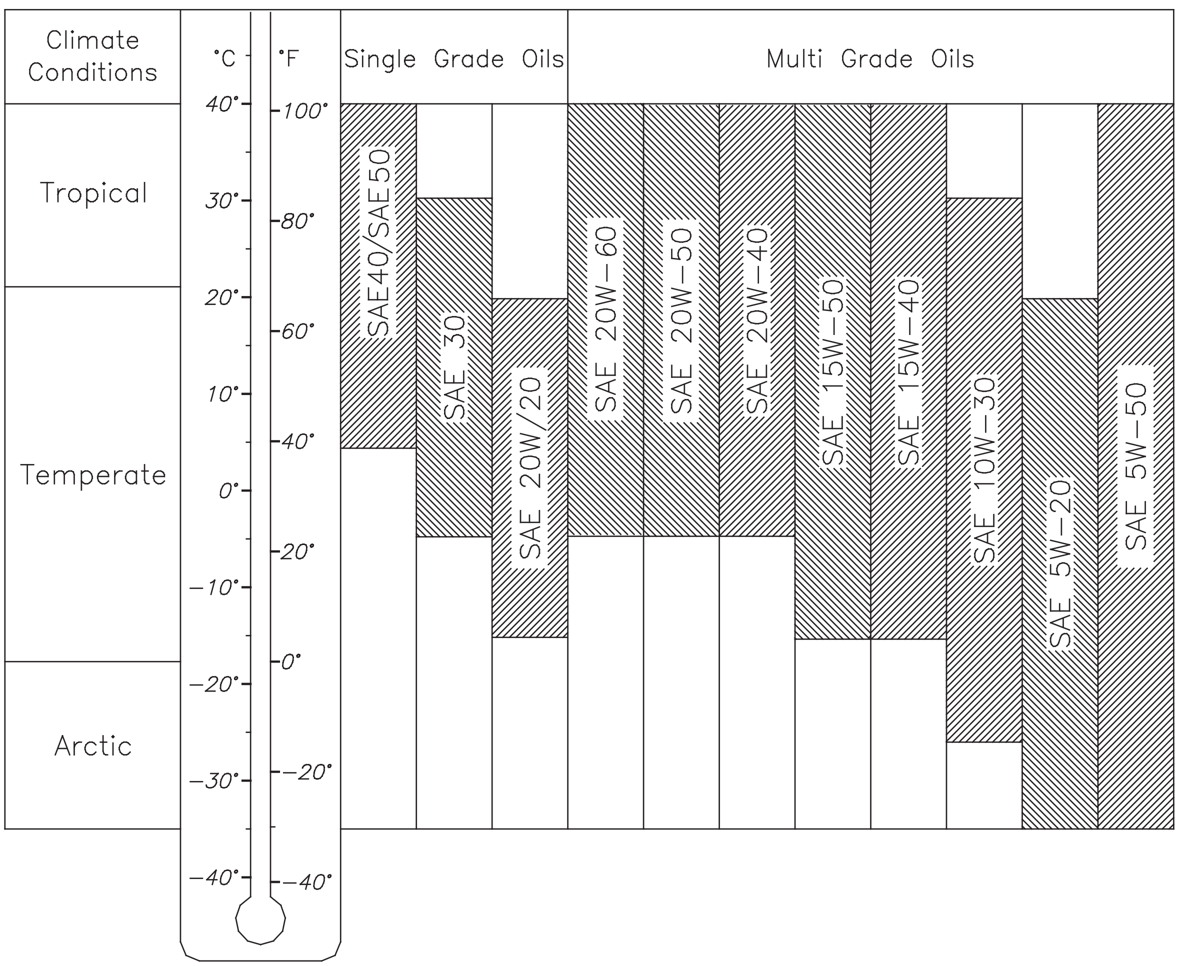
SUPPLIER	BRAND (if applicable)	TYPE (if applicable)
BP Oil Corporation	BP Aero Oil	--
Castrol	Castrol Aero AD Oil	--
Castrol Limited (Australia)	Castrol Aero AD Oil	--
Chevron U.S.A.	Chevron Aero Oil	--
Continental Oil	Conco Aero S	--
Delta Petroleum Company	Delta Avoil Oil	--
Exxon Company, U.S.A.	Exxon Elite	--
Exxon Company, U.S.A.	Exxon Aviation Oil EE	--
Gulf Oil Company	Gulfpride Aviation AD	--
Mobil Oil Company	Mobil Aero Oil	--
NYCO SA	Turbonycoil 3570	--
Pennzoil Company	Pennzoil Aircraft Engine Oil	--
Phillips Petroleum Company	Phillips 66 Aviation Oil	Type A 100AD, 120 AD
Phillips Petroleum Company	X/C Aviation Multiviscosity Oil	SAE 20W-50, SAE 20W-60
Quaker State Oil & Refining Co.	Quaker State AD Aviation OIL	--
Red Ram Limited (Canada)	Red Ram X/C Aviation Oil	20W-50
Shell Australia	Aeroshell (R) W	--
Shell Canada Limited	Aeroshell Oil W,	15W-50 Anti-Wear Formulation
Shell U.S.A.	Aeroshell Oil W,	15W-50 Anti-Wear Formulation
Shell U.S.A.	Aeroshell Oil W100 Plus, W80 Plus	--
Sinclair Oil Company	Sinclair Avoil	--
Texaco Inc.	Texaco Aircraft Engine Oil-Premium AD	--
Total France	Total Aero DM	15W-50
Union Oil Company of California	Union Aircraft Engine Oil HD	--

The viscosity should be selected according to the various climatic conditions using Table 2.

NOTE

When selecting oil, the supplier's documentation must be consulted to make sure that the oil is appropriate for the climactic conditions.

Table 2



Use only the oils specified in TCM SIL99-2B.

Oil Capacity: Maximum : 6.0 US qt (5.68 liters)
Minimum : 4.0 US qt (3.78 liters)

1.10 WEIGHT

Maximum Ramp Weight	: 1770 lbs (803 kg)
Maximum Take-off Weight	: 1764 lbs (800 kg)
Maximum Landing Weight	: 1764 lbs (800 kg)
Empty Weight	: See Chapter 6
Maximum Weight in Baggage Compartment	: 44 lbs (20 kg) only if restraining devices available
Wing Loading	
At Maximum Take-off Weight	: 14.11 lbs/sq.ft. (68.96 kg/m2)
Performance Load at Maximum Take-off Weight	: 14.11 lbs/hp (8.58 kg/kW)

1.11 LIST OF DEFINITIONS AND ABBREVIATIONS

1.11.1 Airspeeds

CAS:	Calibrated Airspeed. Indicated airspeed, corrected for installation and instrument errors. CAS equals TAS at standard atmospheric conditions (ISA) at MSL.
GS:	Ground Speed. Speed of the airplane relative to the ground.
IAS:	Indicated Airspeed as shown on an airspeed indicator.
KCAS:	CAS indicated in knots.
KIAS:	IAS indicated in knots.
TAS:	True Airspeed. The speed of the airplane relative to the air. TAS is CAS corrected for errors due to altitude and temperature.
V_A:	Maneuvering Speed. Maximum speed at which the airplane is not overstressed at full deflection of control surfaces. Full or abrupt control surface movement is not permissible above this speed.
V_{FE}:	Maximum Flaps Extended Speed. This speed must not be exceeded with the given flap setting.
V_{NE}:	Never Exceed Speed in smooth air. This speed must not be exceeded in any operation.
V_{NO}:	Maximum Structural Cruising Speed. This speed may be exceeded only in smooth air, and then only with caution.
V_R:	Rotation Speed or Takeoff Speed.
V_{REF}:	Reference Speed.
V_S:	The power-off stall speed with the airplane in its standard configuration.
V_{SO}:	The power-off stall speed with the airplane in landing configuration.
V_X:	Best Angle-of-Climb Speed.
V_Y:	Best Rate-of-Climb Speed.

1.11.2 Meteorological Terms

AGL:	Above Ground Level.
Indicated Pressure Altitude:	Altitude reading with altimeter set to 1013.25 hPa (29.92 inHg).
ISA:	International Standard Atmosphere at which air is identified as a dry gas. The temperature at mean sea level is 15° C (59° F), the air pressure at sea level is 1013.25 mbar (29.92 inHg), the temperature gradient up to the altitude at which the temperature reaches -56.5° C (-67.9° F) is -0.0065° C/m (-0.0036° F/ft) and 0° C/m (0° F/ft) above.
OAT:	Outside Air Temperature.
Pressure Altitude:	Altitude measured at standard pressure at MSL (1013.25 mbar / 29.92 inHg) using a barometric altimeter. Pressure altitude is the indicated altitude corrected for installation and instrument errors. Within this manual the instrument errors are assumed to be zero.
Aerodrome/Airport Pressure:	Actual atmospheric pressure at the aerodrome/ airport altitude.
Wind:	The wind speeds used in the diagrams in this manual should be referred to as headwind or tailwind components of the measured wind.

1.11.3 Powerplant

Take-off Power:	Maximum engine power for take-off.
Maximum Continuous Power:	Maximum permissible continuous engine output power during flight.

1.11.4 Flight Performance and Flight Planning

Demonstrated Crosswind Component:	The maximum speed of the crosswind component at which the manoeuvrability of the airplane during take-off and landing has been demonstrated during type certification test flights.
Service Ceiling:	The altitude at which the maximum rate of climb is 0.5 m/s (100 ft/min.).

1.11.5 Weight and Balance

Reference Datum (RD):	An imaginary vertical plane from which all horizontal distances for the center of gravity calculations are measured. It is the plane through the leading edge of the wing root rib, perpendicular to the longitudinal axis of the airplane.
Station:	A defined point along the longitudinal axis which is generally presented as a specific distance from the reference datum.
Lever Arm:	The horizontal distance from the reference datum to the center of gravity (of a component).
Moment:	The weight of a component multiplied by its lever arm.
Center of Gravity (CG):	Point of equilibrium for the airplane weight.
CG position:	Distance from the reference datum to the CG. It is determined by dividing the total moment (sum of the individual moments) by the total weight.
Center of Gravity Limits:	The CG range within which an airplane with a given weight must be operated.
Usable Fuel:	The amount of fuel available for the flight plan calculation.
Unusable Fuel:	The amount of fuel remaining in the tank, which cannot be safely used in flight.

Empty Weight:	Weight of the airplane including unusable fuel, all operating fluids and maximum amount of oil.
Useful Load:	The difference between take-off weight and empty weight.
Maximum Take-off Weight:	Maximum weight permissible for take-off.

1.11.6 Equipment

ACL: Anti collision light.

1.11.7 Miscellaneous

GFRP: Glass Fibre Reinforced Plastic.

CFRP: Carbon Fibre Reinforced Plastic.

1.12 CONVERSION FACTORS

1.12.1 Length or Altitude

1 [ft.] = 0.3048 [m]

1 [in.] = 25.4 [mm]

1.12.2 Speed

1 [kts] = 1.852 [km/h]

1 [mph] = 1.609 [km/h]

1.12.3 Pressure

1 [hPa] = 100 [N/m2] = 1 [mbar]

1 [in. Hg] = 33.865 [hPa]

1 [psi] = 68.97 [mbar]

1.12.4 Weight

1 [lbs] = 0.454 [kg]

1.12.5 Volume

1 [US gallon] = 3.785 [liters]

1 [Imperial gallon] = 4.546 [liters]

CONVERSION CHART - LITERS/US GALLONS

Liter	US Gallon	US Gallon	Liter
5	1.3	1	3.8
10	2.6	2	7.6
15	4.0	4	15.1
20	5.3	6	22.7
25	6.6	8	30.3
30	7.9	10	37.9
35	9.2	12	45.4
40	10.6	14	53.0
45	11.9	16	60.6
50	13.2	18	68.1
60	15.9	20	75.7
70	18.5	22	83.3
80	21.1	24	90.9
90	23.8	26	98.4
100	26.4	28	106.0

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CHAPTER 2

OPERATING LIMITATIONS

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PAGE

2.1 INTRODUCTION

Chapter 2 of this Flight Manual comprises of the operating limitations, instrument markings, airspeed indicator markings, and the limitation placards which are necessary for the safe operation of the airplane, its engine, and standard systems and equipment.

The operating limitations in this Chapter and Chapter 9 have been approved by the Department of Transport (DOT), and must be complied with for all operations.

.

WARNING

ALL LIMITATIONS GIVEN IN THIS CHAPTER MUST BE COMPLIED WITH FOR ALL OPERATIONS.

2.2 AIRSPEED LIMITATIONS

Speed	KIAS	Remarks
V_A Maneuvering Speed	106	Do not make full or abrupt control movement above this speed. Under certain conditions the airplane may be overstressed by full control movement.
V_{FE} Maximum Flap Extended Speed V_{FE} (Takeoff)	100	Do not exceed this speed with flaps in take-off position.
V_{FE} (Landing)	78	Do not exceed this speed with flaps in landing position.
V_{NO} Maximum Structural Cruising Speed	118	Do not exceed this speed except in smooth air, and then only with caution.
V_{NE} Never Exceed Speed	164	Do not exceed this speed in any operation

2.3 AIRSPEED INDICATOR MARKINGS

Marking	KIAS	Explanation
White Arc	34 - 78	Operating range with flaps fully extended.
Green Arc	42 - 118	Normal operating range.
Yellow Arc	118 - 164	Maneuvers must be conducted with caution and only in smooth air.
Red Line	164	Maximum permissable speed for all operating modes.

2.4 POWER-PLANT LIMITATIONS

2.4.1 Engine

(a) Engine Manufacturer : Continental Motors

(b) Engine Type Designation : IO-240-B

(c) Engine Operating Limitations

Max. T/O Power (5 min.)	: 125 BHP / 93.2 kW
Max. Permissible T/O RPM	: 2800 RPM
Max. Continuous Power	: 125 BHP / 93.2 kW
Max. Permissible Continuous RPM	: 2800 RPM

(d) Oil pressure

Minimum	: 10 psi (0.69 bar)
Maximum	: 100 psi (6.9 bar) Ambient temperature below 32°F (0°C), Full power operation oil pressure 70 psi max
Normal Operating	: 30 psi (2.1 bar) to 60 psi (4.1 bar)

(e) Oil temperature

Minimum	: 75°F (24°C) Full power operation, oil temperature normal 100°F (38°C)
Maximum :	: 240°F (115°C)

(f) Cylinder head temperature

Maximum	: 460°F (238°C)
Minimum	: 240°F (115°C) takeoff

(g) Fuel Specifications

Approved Fuel Grades	: AVGAS 100LL or 100
(h) Oil Grades	: Reference TCM IO-240-B operator and installation manual (form X30620) or TCM specification MHS-24. Refer to Chapter 1, Section 1.9.1. Lubricant, Table 1.

2.4.2 For the aircraft fuel system.

(a) Standard Mixture Rise : 50 - 75 RPM

NOTE

Less than 50 RPM Mixture Rise indicates an excessively lean idle mixture that can result in engine stoppage at idle.

(b) Minimum Ground Idle Speed : 975 RPM Minimum

NOTE

Recommended minimum flight idle speed 1400 RPM, during idle power flight conditions and maneuvers.

2.4.3 Propeller (SENSENICH)

(a) Propeller Manufacturer	: Sensenich Propeller, Plant City/Florida
(b) Propeller Type	: Fixed Pitch W69EK7-63, W69EK7-63G, W69EK7-63GM or W69EK-63
(c) Propeller Diameter	: 69.0 inches (1752mm)
(d) Propeller Pitch (at 3/4 radius)	: 62.8 inches (1595mm)

2.5 POWERPLANT INSTRUMENT MARKINGS

Powerplant instrument markings and their color code significance are shown below:

Instrument	Red Line/ Lower Limit	Green Arc/ Normal Operating Range	Yellow Arc/ Caution Range	Red Line/ Upper Limit
Tachometer	-	700 - 2800 RPM	-	2801 RPM
Oil Temperature Indicator	75° F	170 - 220° F	75 - 170° F 220 - 240° F	240° F
Cylinder Head Temperature Indicator	-	360 - 420° F	240 - 360° F 420 - 460° F	460° F
Oil Pressure Indicator	10 psi	30 - 60 psi RPM > 2100	10 - 30 psi 60 - 100 psi	100 psi
Fuel Pressure Indicator	3.5 psi	-	-	16.5 psi
	3.5 psi	-	-	Top of Red Line (See NOTE)

NOTE

The allowable operating fuel pressure is greater than 32.5 psi. Operation to the top of the Red Line is permitted. This change is temporary pending installation of modified fuel pressure gauge.

Powerplant instrument markings for instruments delivered after July 1999.

Instrument	Red Line/ Lower Limit	Green Arc/ Normal Operating Range	Yellow Arc/ Caution Range	Red Line/ Upper Limit
Oil Temperature Indicator	75° F	170 - 220° F	-	240° F
Cylinder Head Temperature Indicator	-	300 - 420° F	420 - 460° F	460° F
Oil Pressure Indicator	10 psi	30 - 60 psi RPM > 2100	-	100 psi

2.6 MISCELLANEOUS INSTRUMENT MARKINGS

Instrument	Red Arc/ = Lower Limit	Yellow Arc/ = Caution Range	Green Arc/ = Normal Operating Range	Red Line/ = Upper Limit
Voltmeter	8 - 12 Volts	11 - 12.5 Volts	12.5 - 16 Volts	16.1 Volts

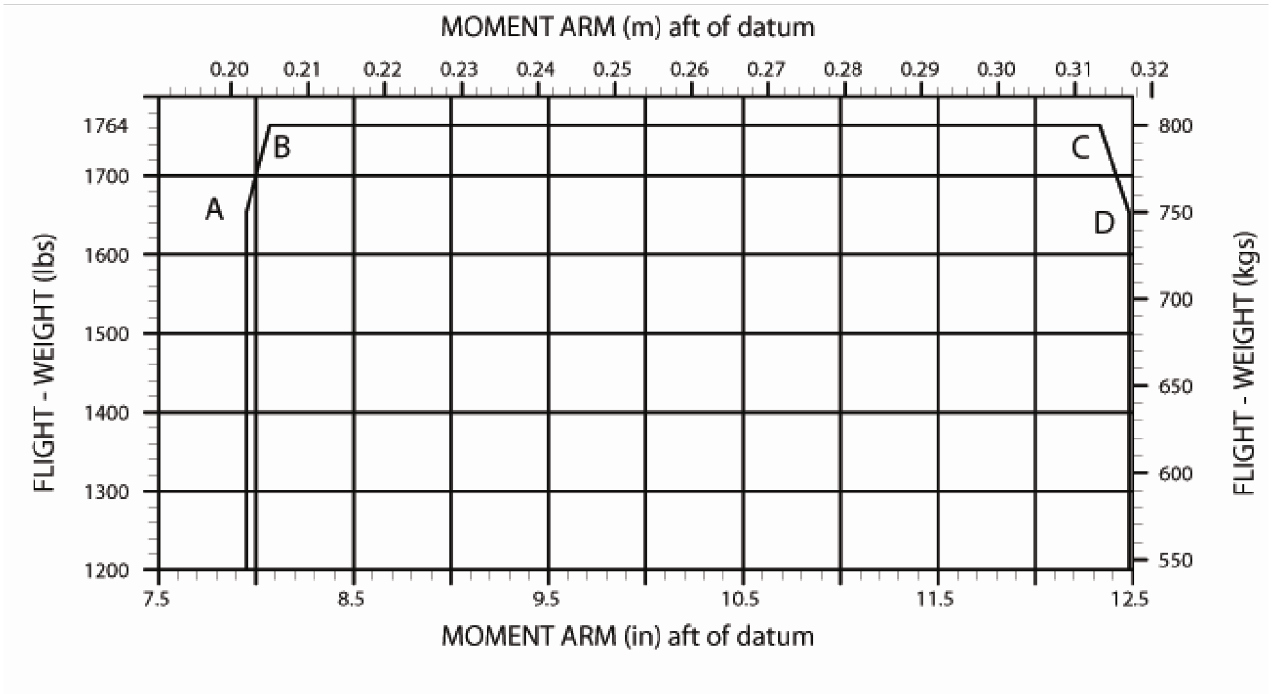
2.7 WEIGHT

Maximum ramp weight	: 1770 lbs (803 kg)
Maximum permissible weight	: 1764 lbs (800 kg)
Maximum permissible weight in the baggage compartment (including baggage extension)	: 44 lbs (20 kg) only permissable with baggage harness

WARNING

EXCEEDING WEIGHT LIMITATIONS MAY LEAD TO OVERLOADING OF THE AIRPLANE AND CAUSE LOSS OF CONTROL OF THE AIRPLANE AND/OR STRUCTURAL DAMAGE.

2.8 CENTER OF GRAVITY



Points	Gross Weight		Arm (aft of datum)	
	(lbs)	(kgs)	(in)	(m)
A	1653	750	7.95	.202
B	1764	800	8.07	.205
C	1764	800	12.16	.309
D	1653	750	12.48	.317

WARNING

EXCEEDING THE CENTER OF GRAVITY LIMITATIONS REDUCES THE MANEUVERABILITY AND STABILITY OF THE AIRPLANE.

The procedure used to determine the center of gravity is described in Chapter 6.

2.9 APPROVED MANEUVERS

This airplane is certified in the UTILITY Category in accordance with Canadian Airworthiness Manual Chapter 523-VLA.

Permissible Utility Category Maneuvers:

(a) All normal flight maneuvers.

(b) The following maneuvers in which the angle of bank is not more than 60°:

Lazy Eights	Entry speed	: 116 KIAS
Chandelles	Entry speed	: 116 KIAS
Steep turns		

(c) Spinning NOT approved for aircraft equipped with altitude compensating fuel system.

(d) Spinning (with Wing Flaps UP) approved for aircraft NOT equipped with altitude compensating fuel system.

Note removed.

(e) Stalls NOT approved for aircraft equipped with altitude compensating fuel system and not in compliance with MSB DAC1-73-05 latest approved revision.

(f) Stalls (except whip stalls) approved for aircraft NOT equipped with altitude compensating fuel system.

(g) Stalls (except whip stalls) approved for aircraft equipped with altitude compensating fuel system in compliance with MSB DAC1-73-05 latest approved revision.

(h) Intentional Side Slips, except as required for landings, NOT approved for aircraft equipped with altitude compensating fuel system and not in compliance with MSB DAC1-73-05 latest approved revision.

NOTE

Aerobatics are prohibited.

2.10 MANEUVERING LOAD FACTORS

Table of structural maximum permissible load factors:

	at V_A	V_{NE}	with flaps in T/O or LDG position
Positive	+ 4.4	+ 4.4	+ 2.0
Negative	- 2.2	- 2.2	0

WARNING

EXCEEDING THE MAXIMUM LOAD FACTORS WILL RESULT IN OVERSTRESSING OF THE AIRPLANE. SIMULTANEOUS FULL DEFLECTION OF MORE THAN ONE CONTROL SURFACE CAN RESULT IN OVERSTRESSING OF THE STRUCTURE, EVEN AT SPEEDS BELOW THE MANEUVERING SPEED.

2.11 MAXIMUM PASSENGER SEATING

Maximum Passenger Seating : one passenger.

2.12 FLIGHT CREW

Minimum Flight Crew : one pilot.

2.13 KINDS OF OPERATION

Flights are permissible in accordance with visual flight rules.

Minimum Equipment, Flight and Navigation Instruments:

Airspeed Indicator	
Altimeter	
Attitude Gyro (Artificial Horizon)	(mandatory for Night-VFR only)
Outside Air Temperature Indicator	(mandatory for Night-VFR only)
Vertical Speed Indicator	(mandatory for Night-VFR only)
Magnetic Compass	
Turn and Bank Indicator	(mandatory for Night-VFR only)
Directional Gyro	(mandatory for Night-VFR only)

Minimum Equipment, Powerplant Instruments:

- Fuel Quantity Indicator
- Fuel Pressure Indicator
- Oil Pressure Indicator
- Oil Temperature Indicator
- Cylinder Head Temperature Indicator
- Tachometer
- Voltmeter
- Ammeter
- Generator Warning Light

Minimum Equipment, Lighting:

Instrument Lighting	(mandatory for Night-VFR only)
Instrument Panel and Map Lighting	(mandatory for Night-VFR only)
Landing Light	(mandatory for Night-VFR only)
Position and Anti-Collision Lights	(mandatory for Night-VFR only)
Illuminated Placards	(mandatory for Night-VFR operations in EASA member countries)

NOTE

Additional equipment may be required for compliance with specific operational or specific national requirements. It is the operators responsibility to ensure compliance with any such specific equipment requirements.

2.14 FUEL

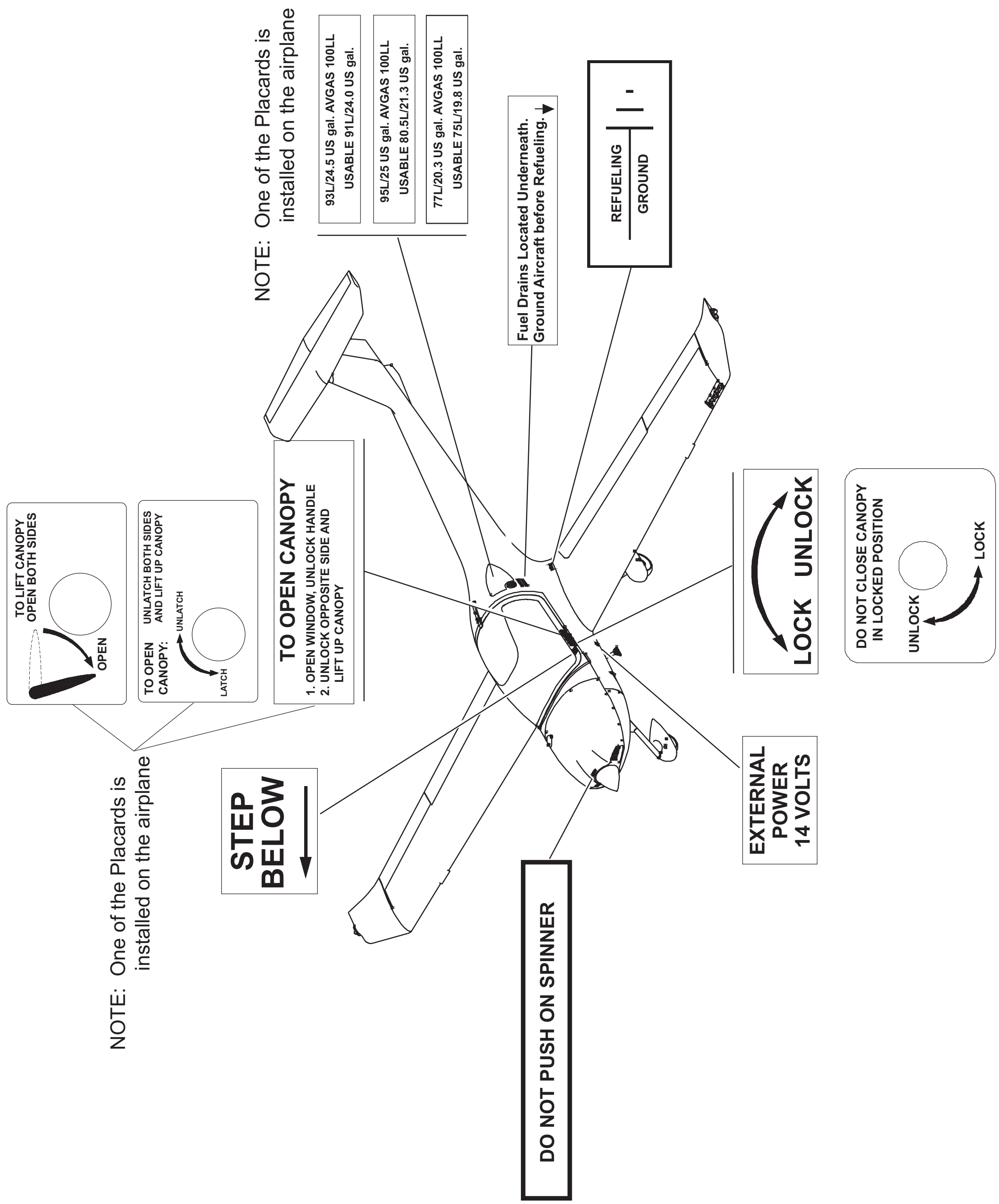
Fuel Capacity

Total Fuel Quantity	: 24.5 US gal. (93.0 liters)
Useable Fuel	: 24.0 US gal. (91.0 liters)
Unusable Fuel	: 0.5 US gal. (2.0 liters)

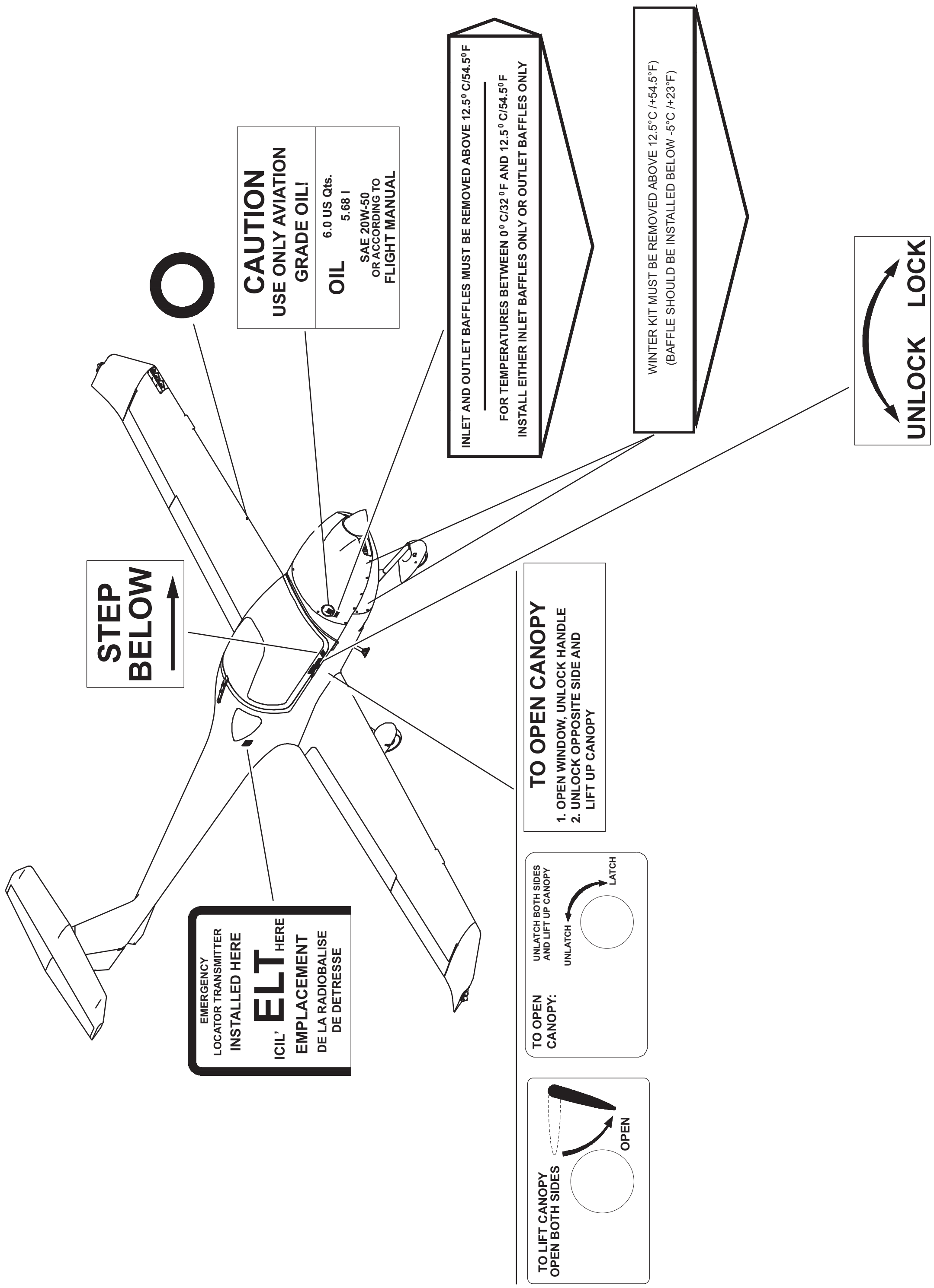
2.15 PLACARDS

The following placards must be installed on the airplane:

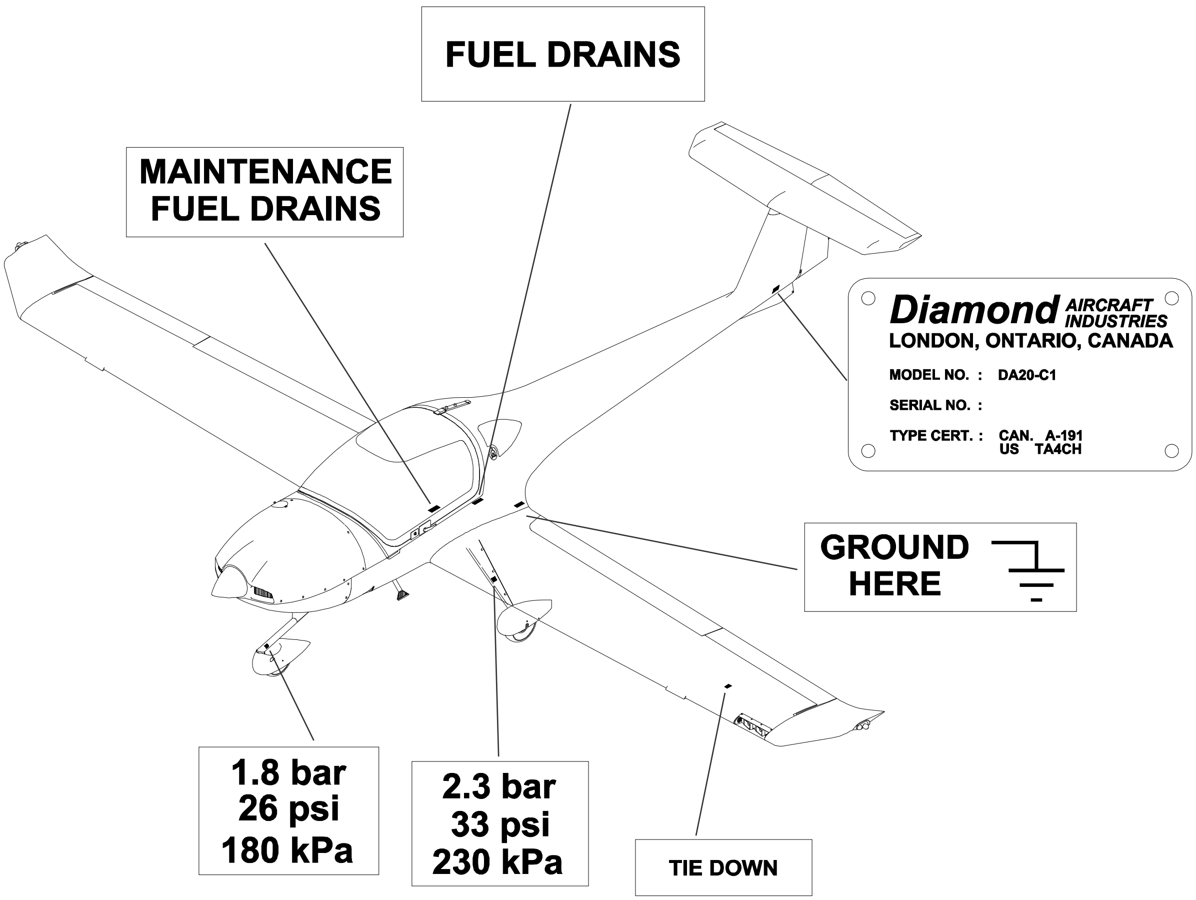
(a) On the exterior of the airplane - Upper surfaces placards and markings.



(b) On the exterior of the airplane - Upper surfaces placards and markings.

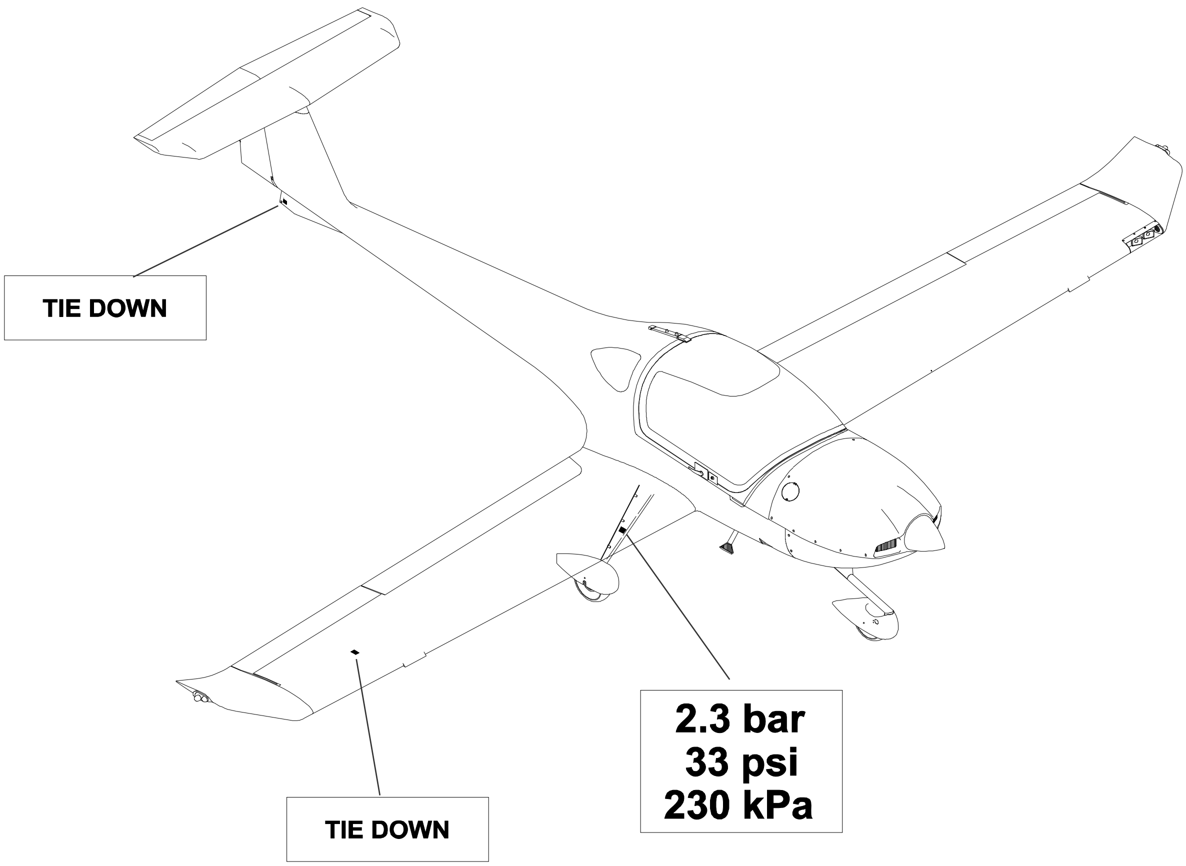


(c) On the exterior of the airplane - Lower surfaces placards and markings.



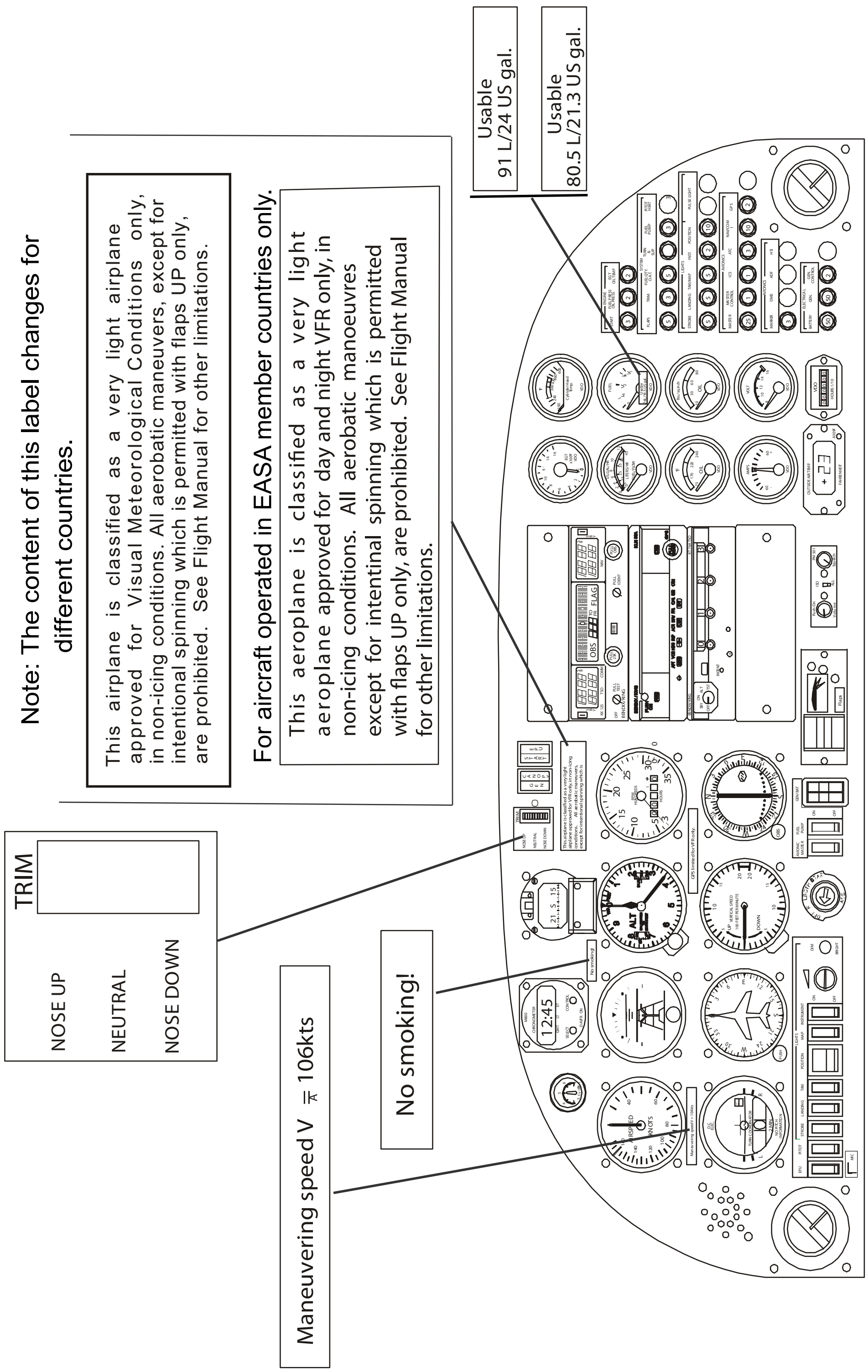
NOTE: The Placards and Markings shown are on the lower surfaces of the airplane.

(d) On the exterior of the airplane - Lower surfaces placards and markings.

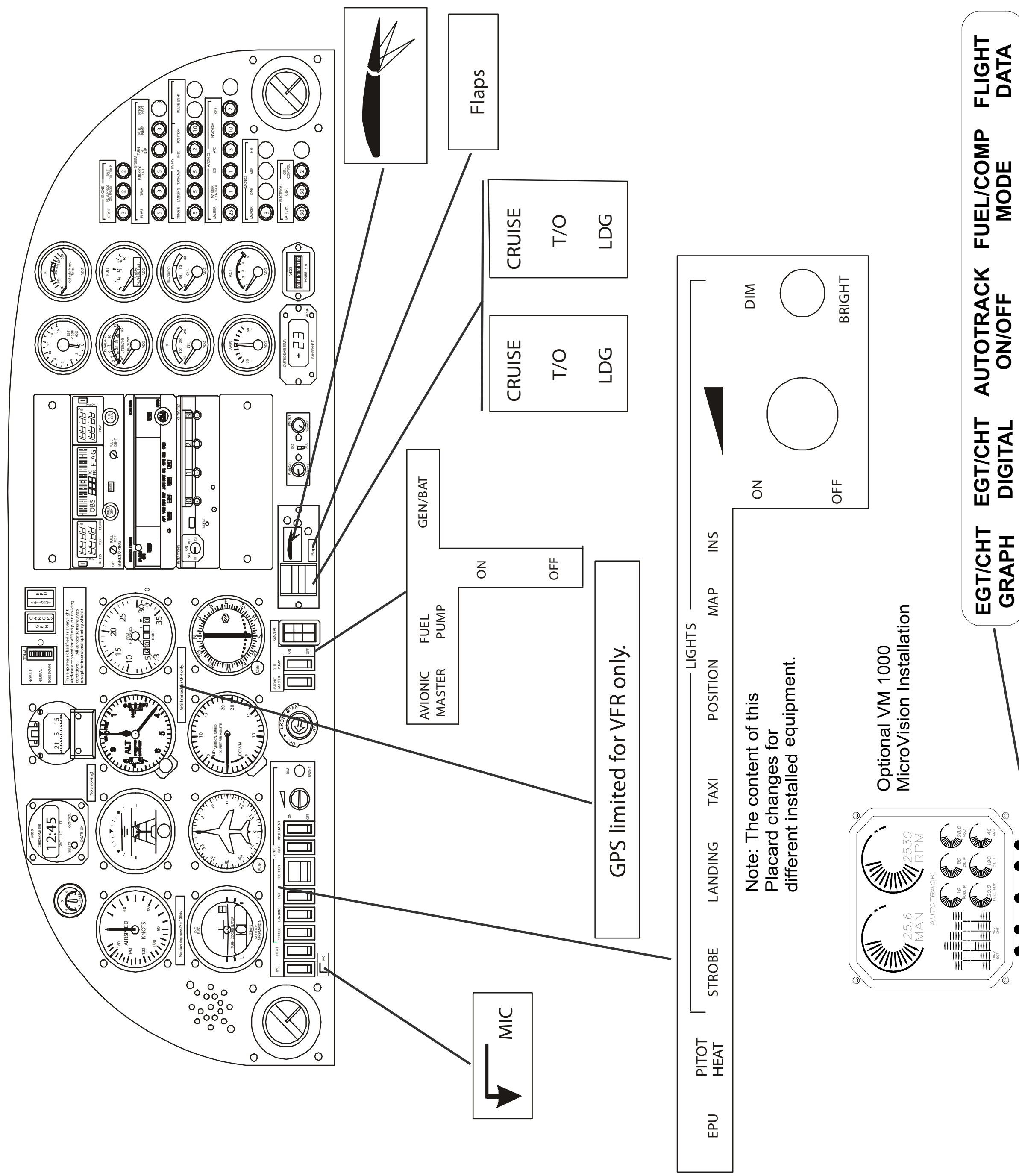


NOTE: The Placards and Markings shown are on the lower surfaces of the airplane.

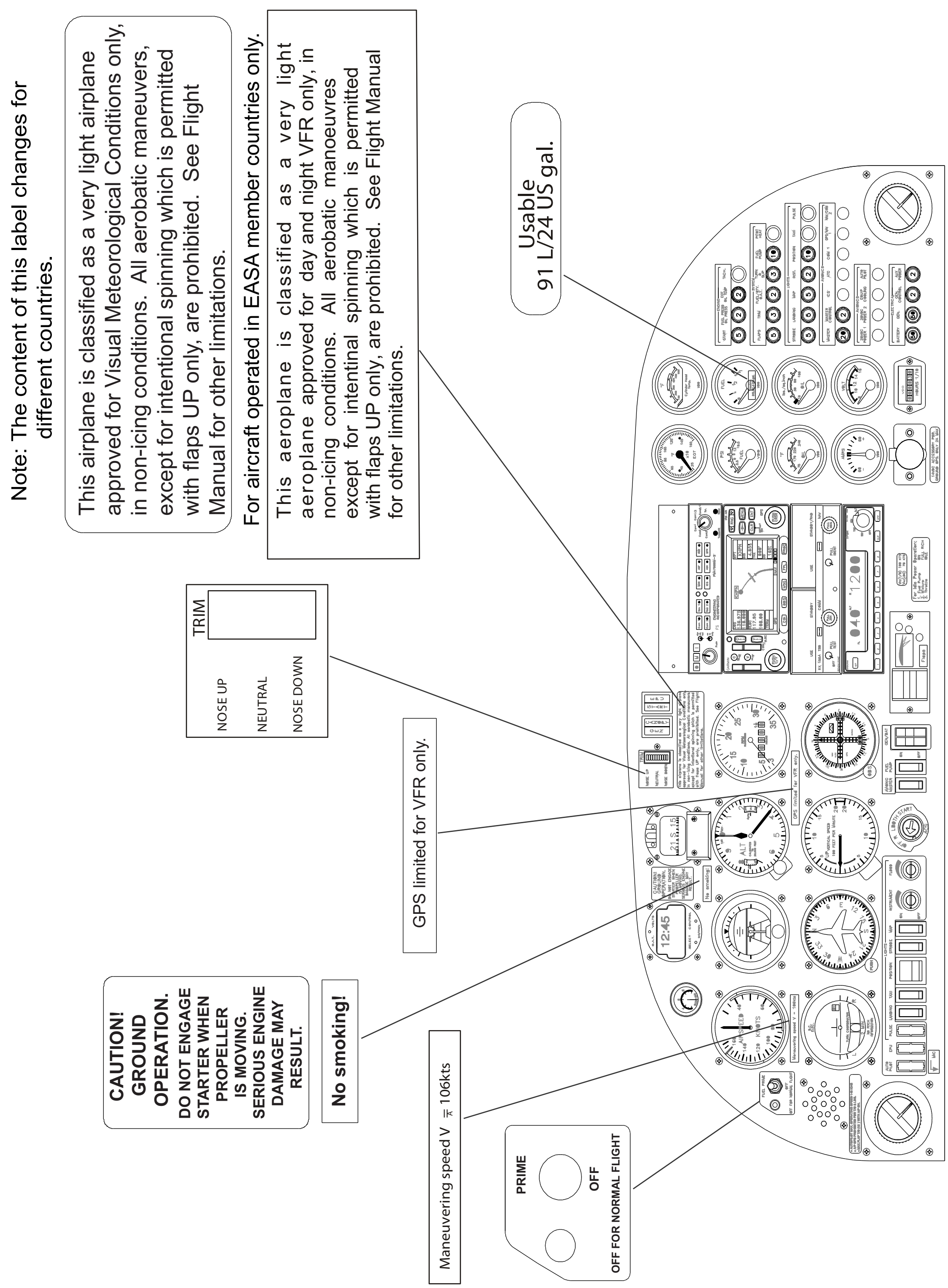
(e) On the instrument panel - Up to airplane serial number C0149.



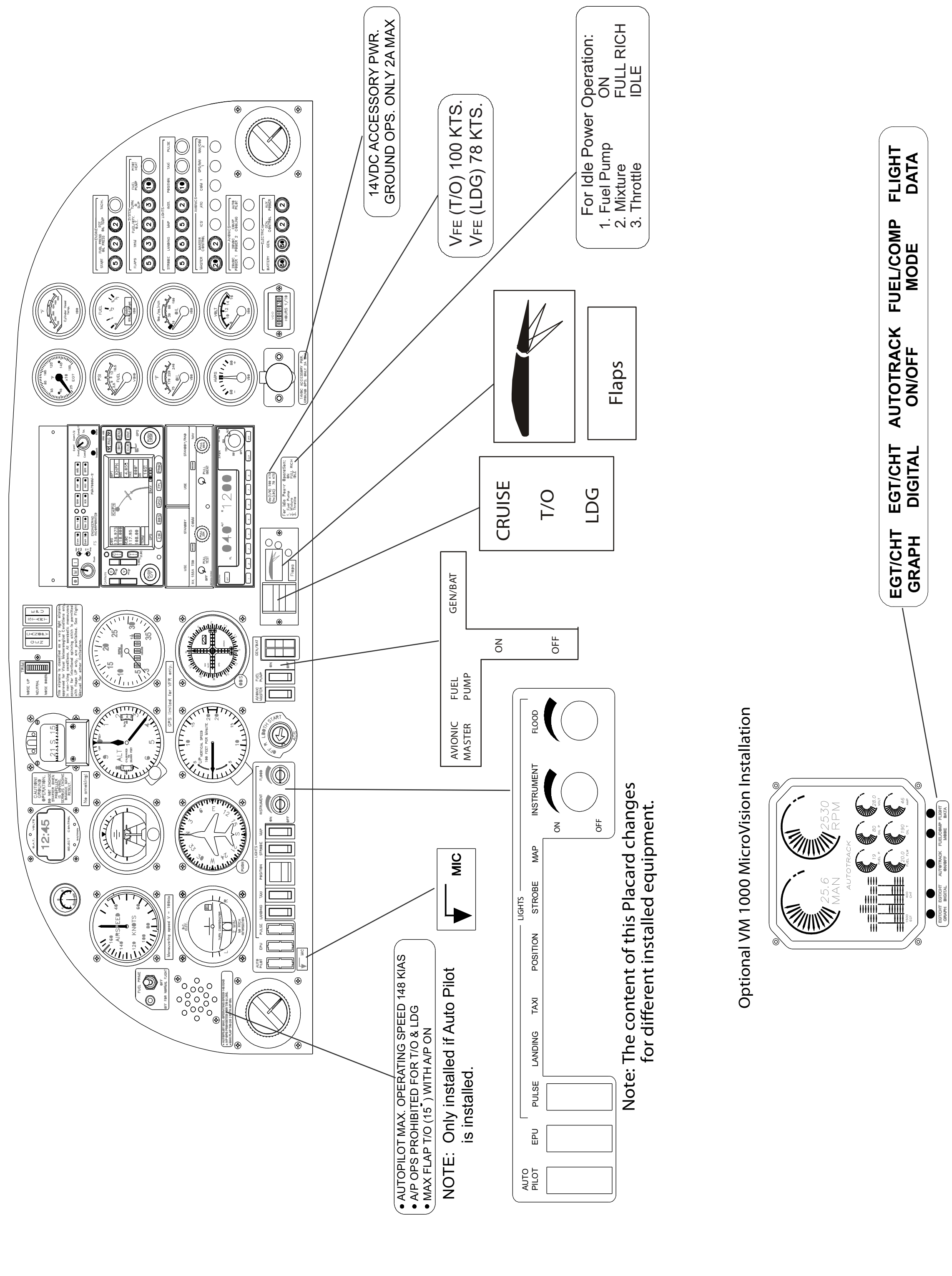
(f) On the instrument panel - Up to airplane serial number C0149.



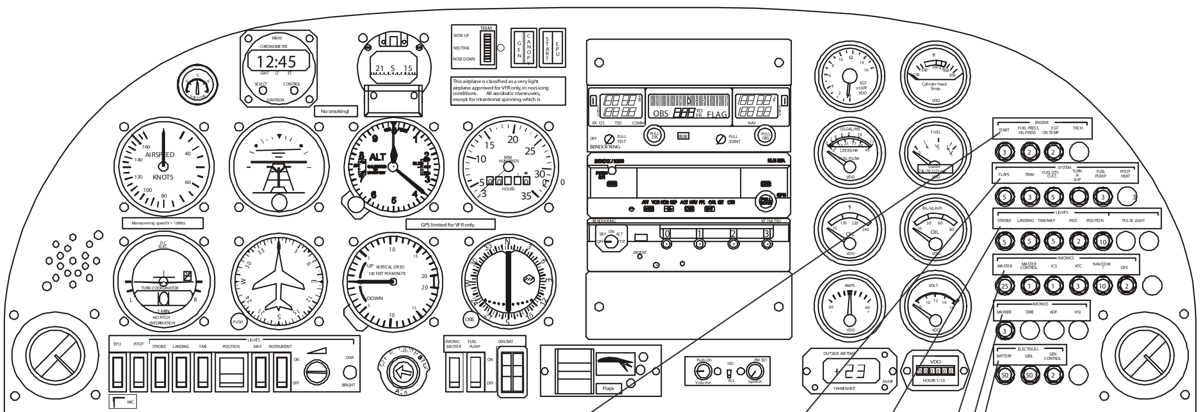
(g) On the instrument panel - Airplane serial number C0150 and subs.



(h) On the instrument panel - Airplane serial number C0150 and subs.



(i) On the instrument panel - Circuit Breakers.



ENGINE

START	FUEL PRESS OIL PRESS	EGT OIL TEMP	TACH.

SYSTEM

FLAPS	TRIM	FUEL/QTY. O.A.T.	TURN & SLIP	FUEL PUMP	PITOT HEAT

LIGHTS

STROBE	LANDING	MAP/TAXI	INST.	POSITION	PULSE LIGHT

Note: The content of the Avionics Placard changes depending on installed equipment.

Note: The content of the Avionics Placard changes depending on installed equipment.

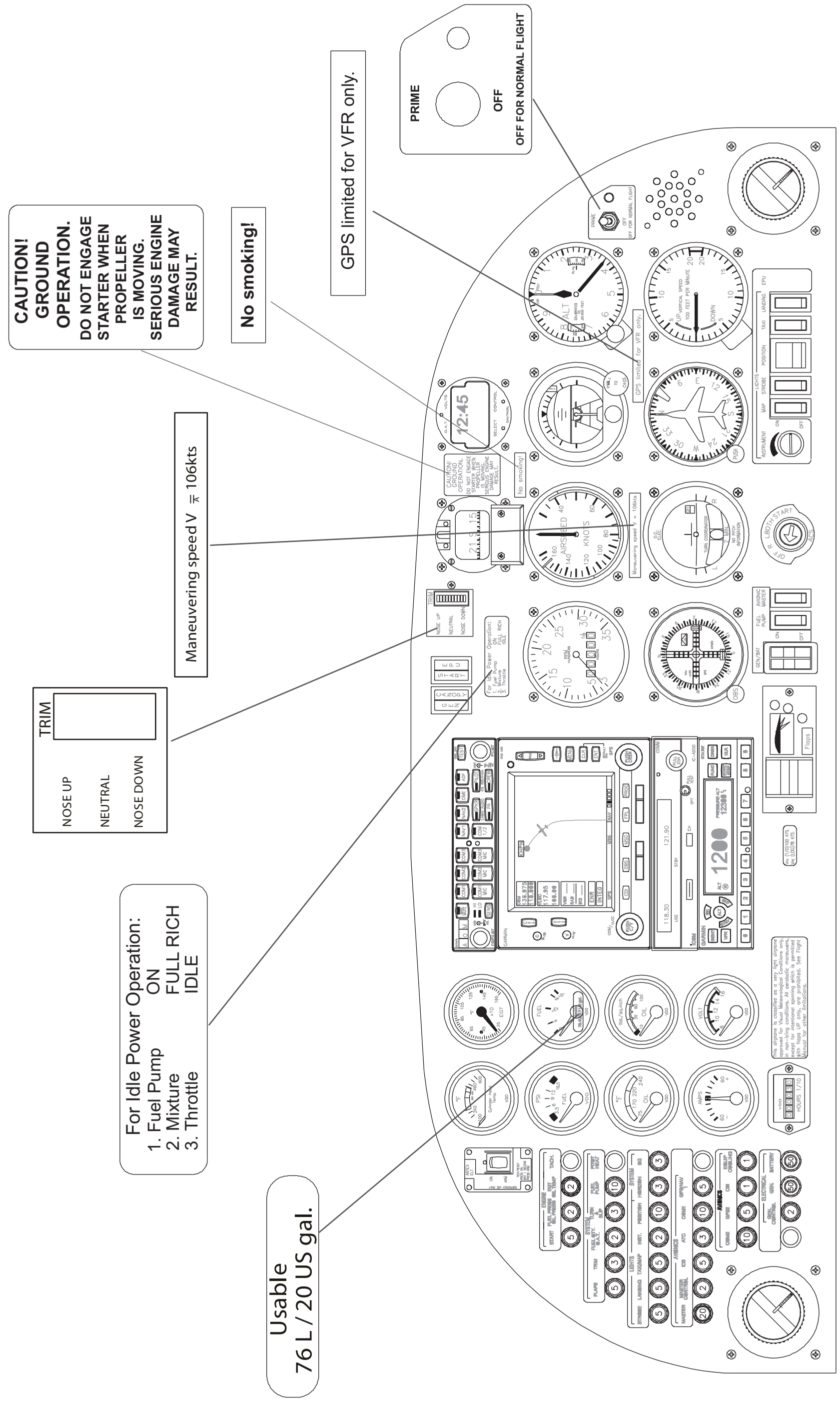
ELECTRICAL

BATTERY	GEN.	GEN. CONTROL

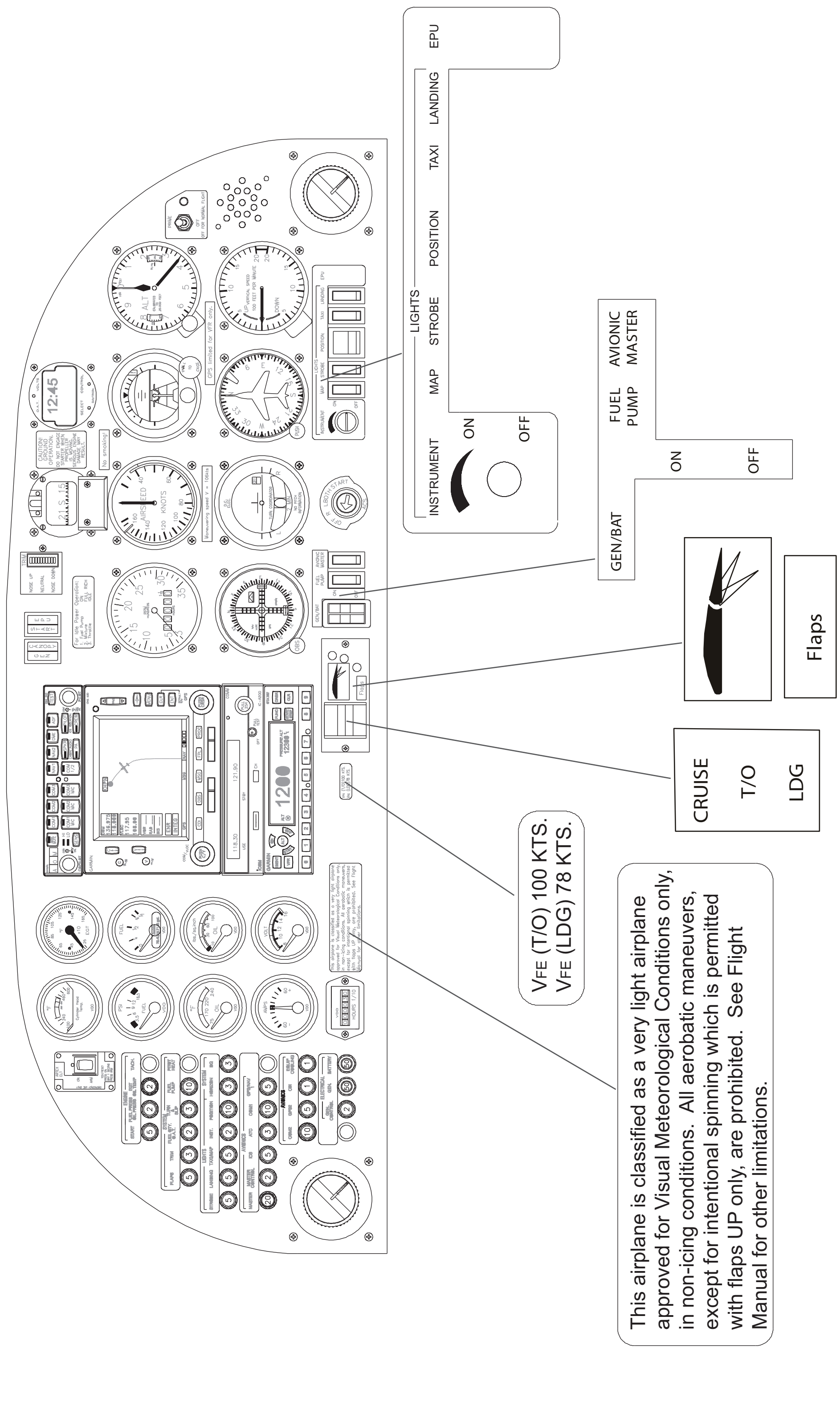
ELECTRICAL

BATTERY	GEN.	GEN. CONTROL	AUX POWER

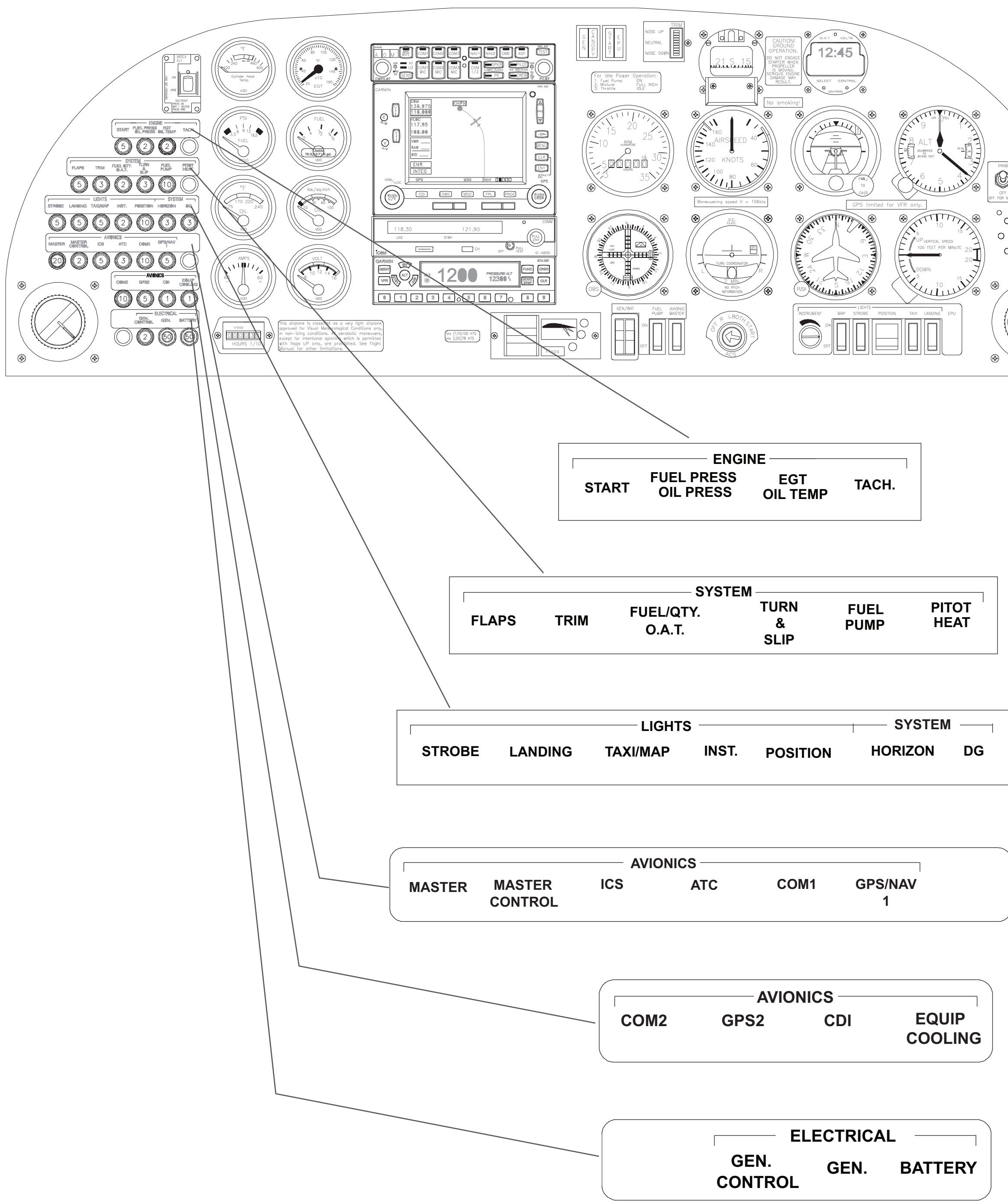
(j) Reversed instrument panel installation.



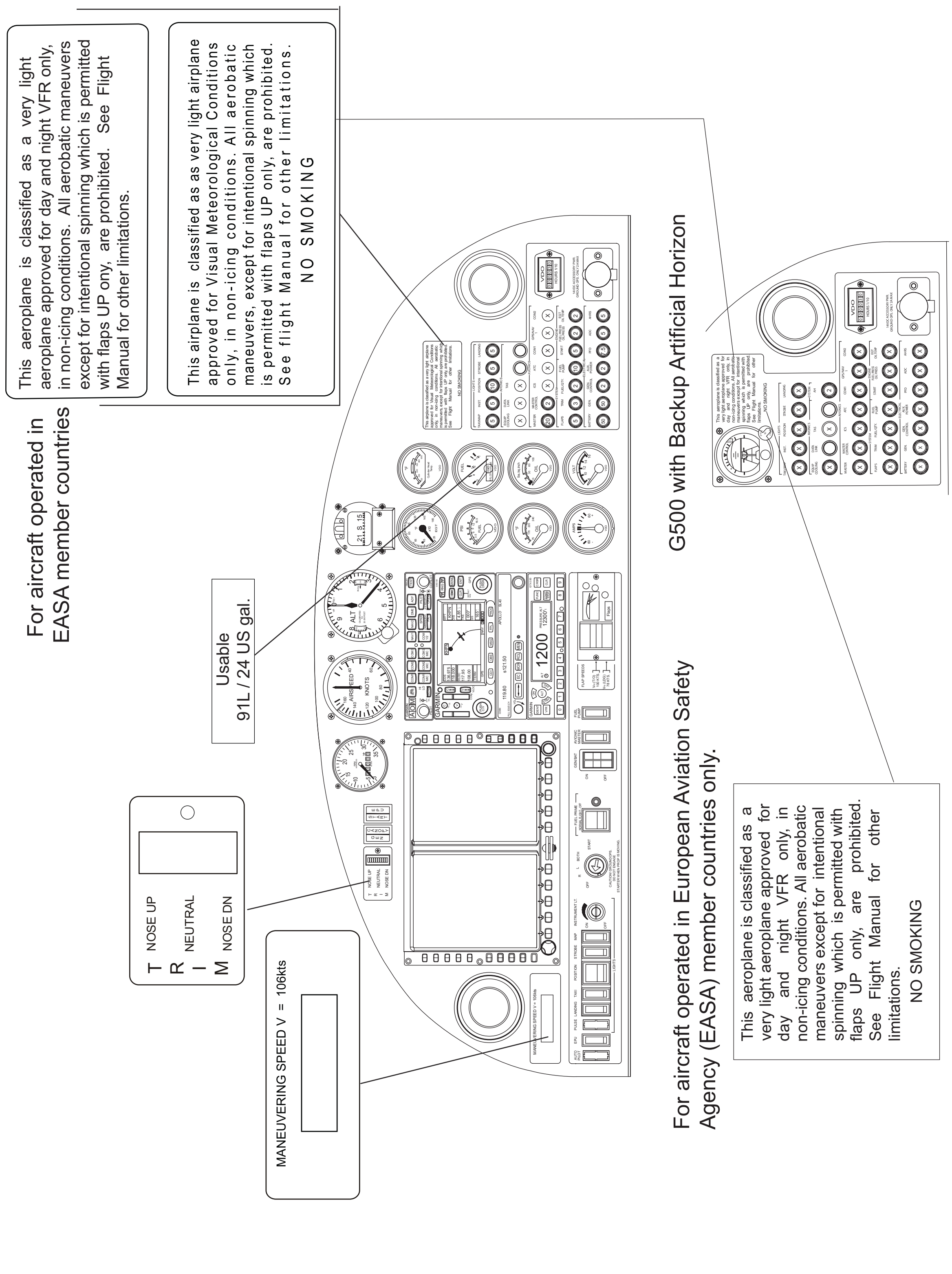
(k) Reversed instrument panel installation.



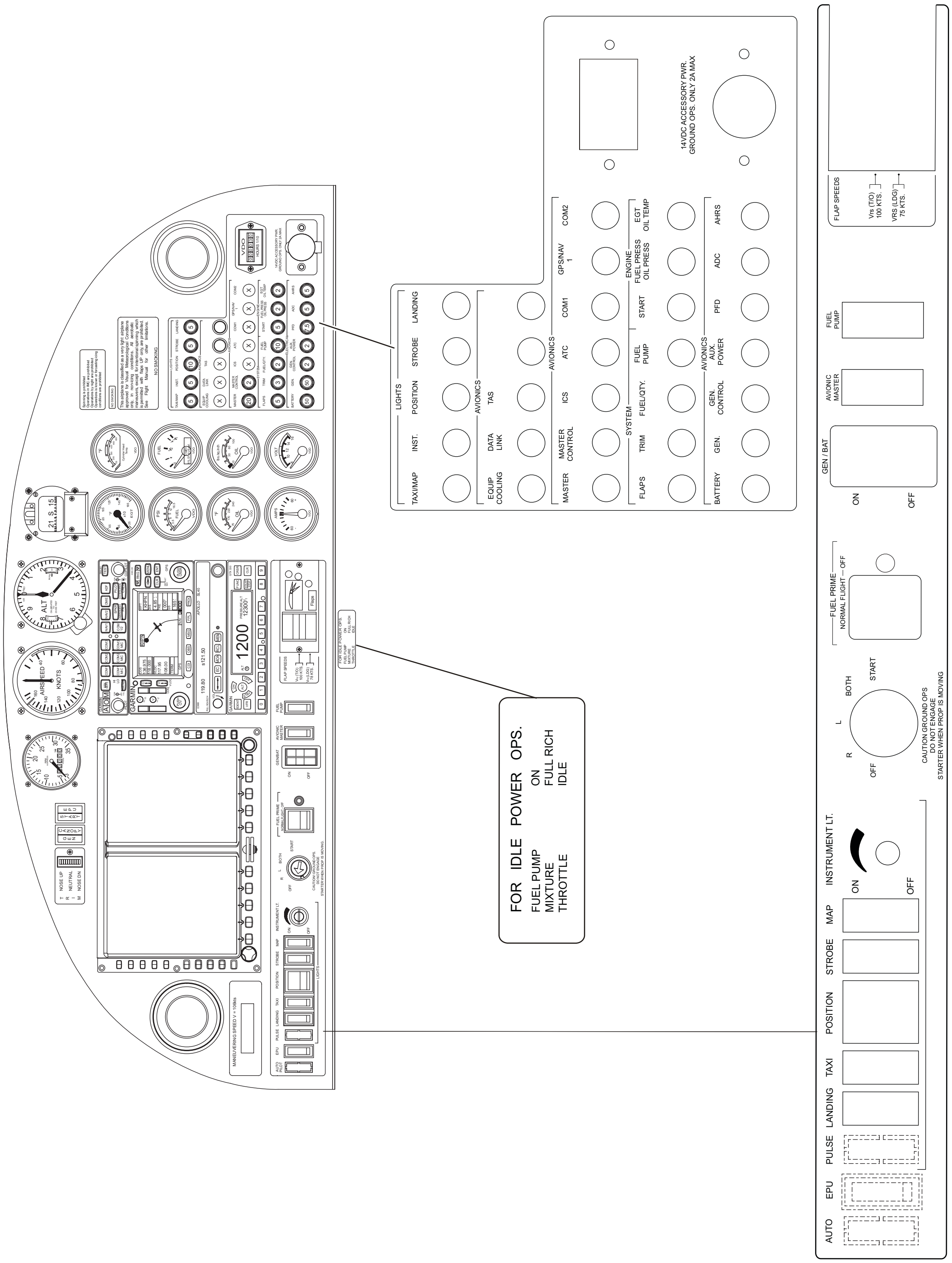
(l) Reversed instrument panel installation - Circuit Breakers.



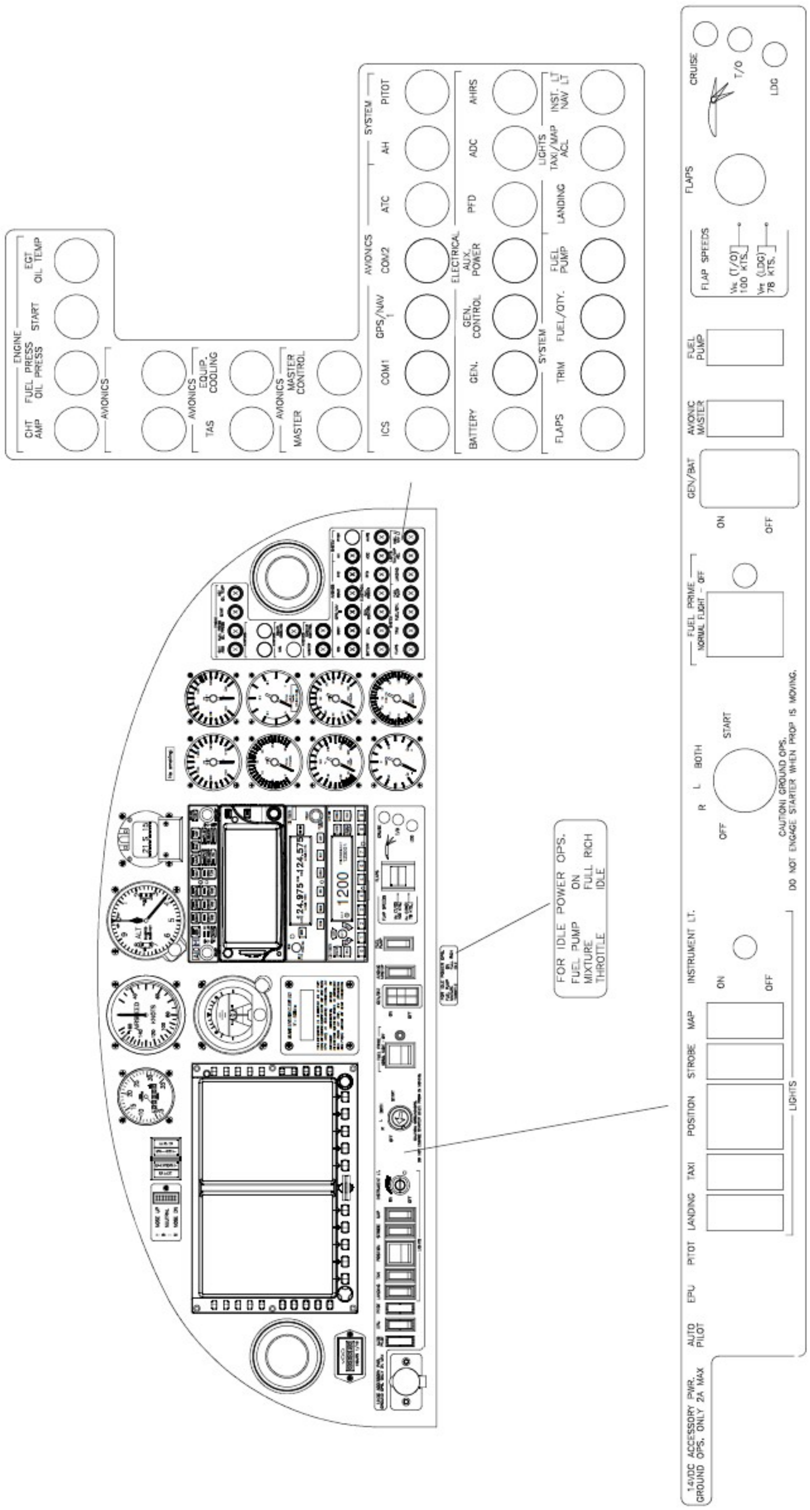
(m) Instrument panel with Garmin G500 installation. Refer to Supplement 13.



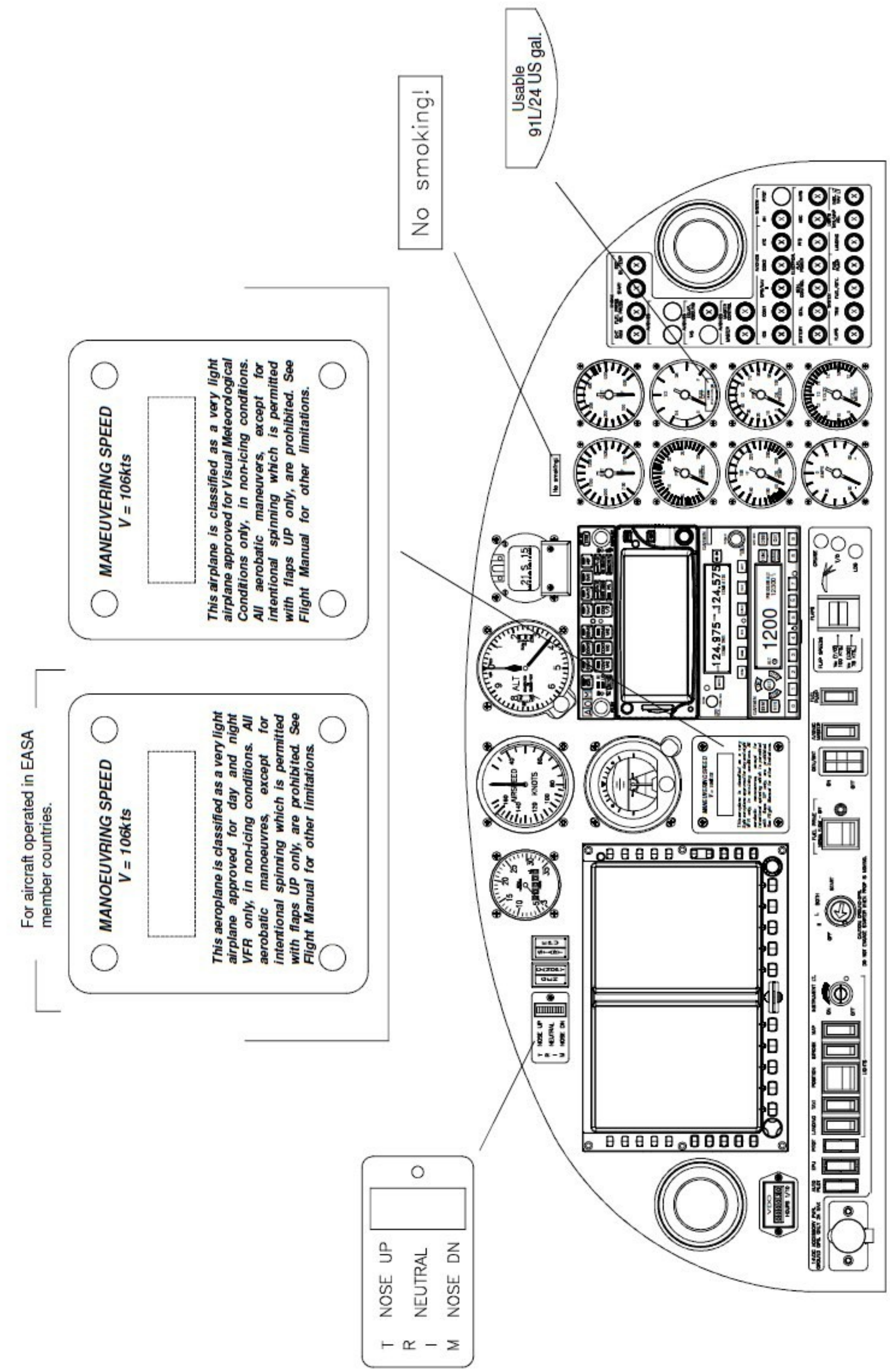
(n) Instrument panel with Garmin G500 installation. Refer to Supplement 13.



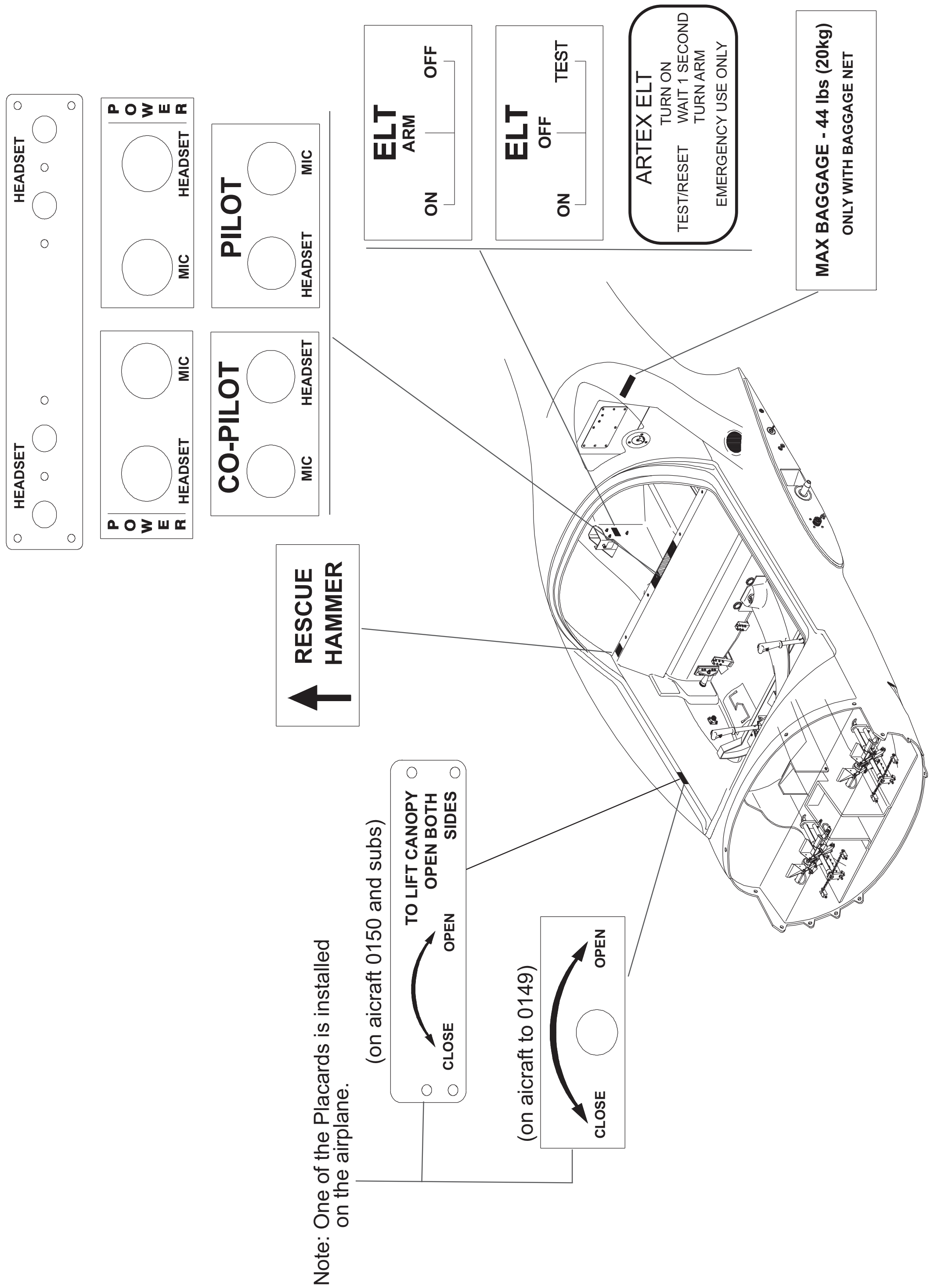
(o) Instrument panel with Garmin G500, UMA engine instruments and Garmin GTN 650/GTR 225 installed.



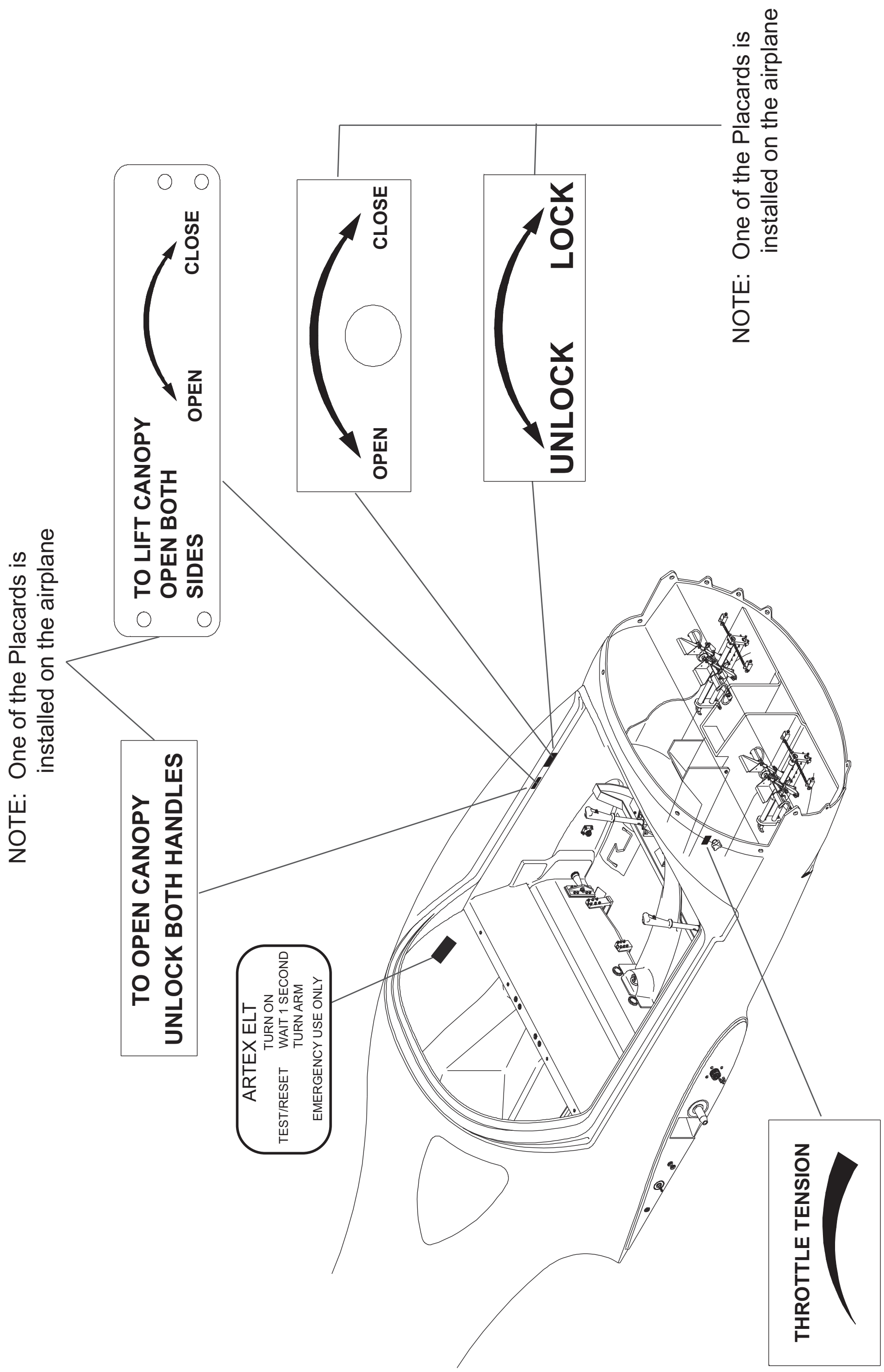
(p) Instrument panel with Garmin G500, UMA engine instruments and Garmin GTN 650/GTR 225 installed.



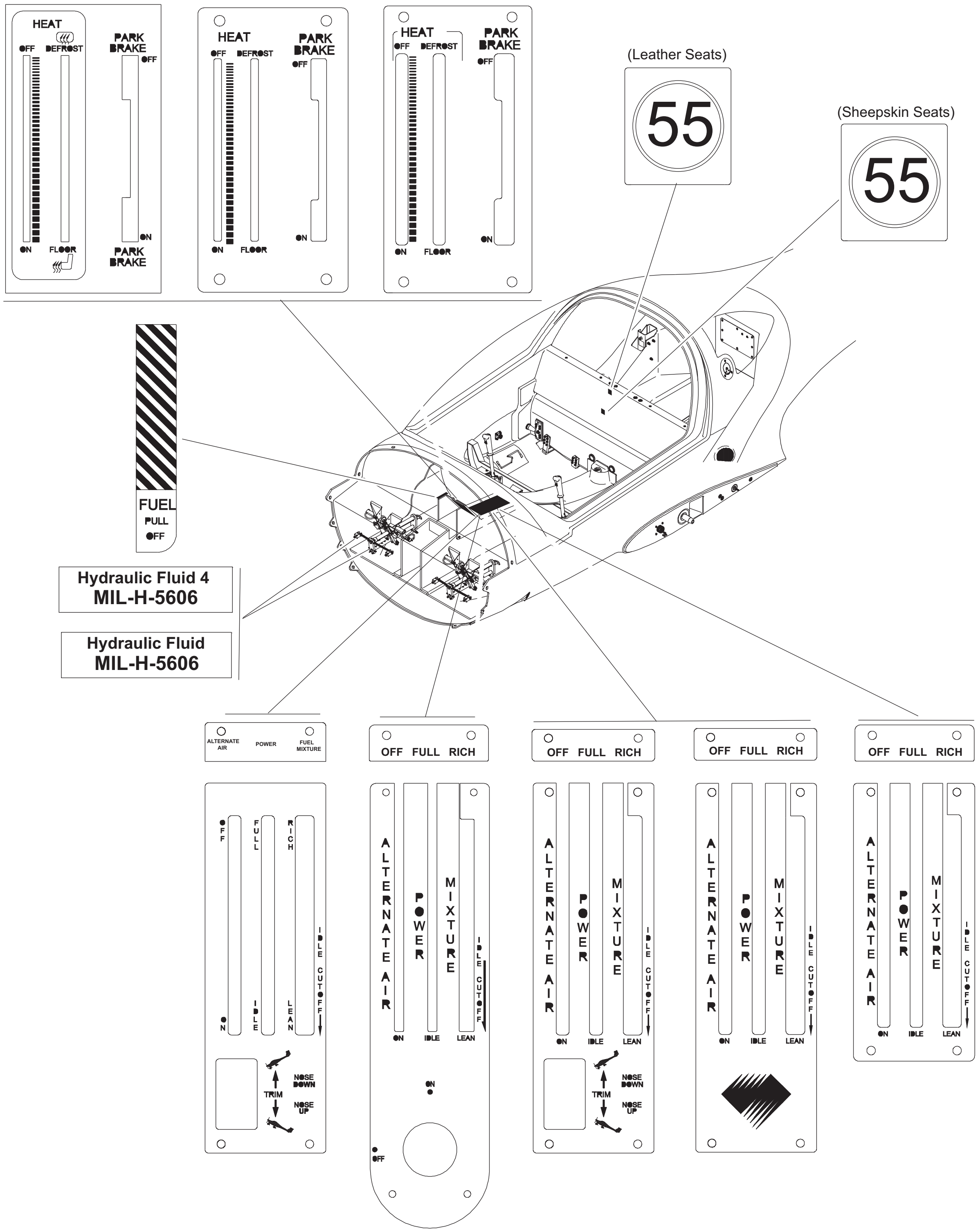
(q) Airplane interior - General placards and markings.



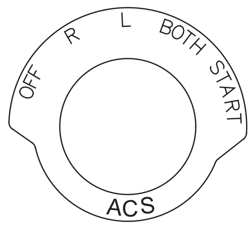
(r) Airplane interior - General placards and markings.



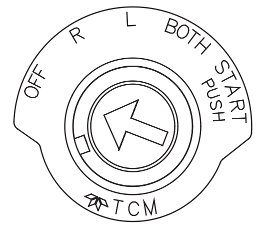
(s) Airplane interior - General placards and markings.



(t) Around the ignition switch on the instrument panel.



Optional Ignition Switch (Push-to-Start Feature).



(u) On the instrument panel. If equipped with an altitude compensating fuel pump.

This aircraft is equipped with an
altitude compensating fuel system.
See AFM Chapter 2, 4, & 7 for
limitation and operating instructions.

(v) On the instrument panel. If equipped with an altitude compensating fuel pump.

GROUND IDLE SPEED:
975 RPM MINIMUM

IDLE MIXTURE RISE:
50 RPM MINIMUM

RECOMMENDED MINIMUM FLIGHT
IDLE SPEED: 1400 RPM

(w) On the instrument panel. If equipped with an altitude compensating fuel pump.

This airplane is classified as a very light airplane
approved for Visual Meteorological Conditions only,
in non-icing conditions. All aerobatic maneuvers,
including intentional spinning are prohibited
See Flight Manual for other limitations.

2.16 DEMONSTRATED CROSSWIND COMPONENT

The maximum demonstrated crosswind component is 20 kts. (37 km/h).

2.17 TEMPERATURE LIMITS

CAUTION

FOR AIRCRAFT WITH OTHER THAN WHITE UNDERSIDES. PARKING THE AIRCRAFT OVER A LIGHT COLOURED OR REFLECTIVE SURFACE IN CONDITIONS OF BRIGHT SUNLIGHT, PARTICULARLY AT HIGH OAT, IS NOT RECOMMENDED.

Temperature limit of the structure for the operation of the airplane:

Maximum T/O Temperature	: 131°F (55°C) Structural Temperature

CHAPTER 3

EMERGENCY PROCEDURES

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3.1 INTRODUCTION

The following chapter contains check-lists as well as descriptions of the recommended procedures in case of an emergency. However, engine failure or other airplane related emergency situations will most likely never occur if the mandatory pre-flight check and maintenance are performed properly.

In the event that an emergency situation does appear, the procedures presented in this manual should be used to rectify such problems. Since it is impossible to present in the Flight Manual all emergency situations which may occur, knowledge of the airplane and experience of the pilot are essential in rectifying any problems.

3.2 AIRSPEEDS DURING EMERGENCY PROCEDURES

	KIAS
Engine failure after take-off with flaps in T/O position	60
Maneuvering Speed	106
Airspeed for best glide angle Maximum Gross Weight – 1764 lbs (800 kg) Wing Flaps in CRUISE position	73
Precautionary Landing (with power and Wing Flaps in landing position)	55
Emergency landing with engine off (Wing Flaps in T/O position)	60
Emergency landing with engine off (Wing Flaps in LDG position)	55
Emergency landing with engine off (Wing Flaps CRUISE)	64

3.3 EMERGENCY PROCEDURES - CHECKLISTS

3.3.1 Engine Failures

(a) Engine Failure during Take-off Run

(1) Throttle... IDLE

(2) Brakes ....as required

(3) Flaps ....CRUISE

(4) Mixture ....IDLE CUT-OFF

(5) Ignition Switch ....OFF

(6) GEN/BAT Master Switch ....OFF

(b) Engine Failure after Take-Off

INSUFFICIENT ENGINE POWER

(1) Airspeed .... 60 KIAS

(2) Throttle ....FULL

(3) Mixture ....FULL RICH

(4) Alternate Air ....ON

(5) Fuel Shut-off Valve ....OPEN

(6) Ignition Switch ....BOTH

(7) Fuel Pump ....ON

WARNING

IF ADEQUATE ENGINE PERFORMANCE CANNOT BE RESTORED IMMEDIATELY, PREPARE FOR AN EMERGENCY LANDING. IF POSSIBLE, LAND STRAIGHT AHEAD, AVOIDING OBSTACLES.

SHORTLY BEFORE LANDING

(8) Mixture .... IDLE CUTOFF

(9) Fuel Shut-off Valve .... CLOSED

(10) Ignition Switch .... OFF

(11) Flaps .... as required

(12) GEN/BAT Master Switch .... OFF

ENGINE INOPERATIVE

Perform emergency landing according to paragraph 3.3.3.

(c) Engine Failure during Flight

ENGINE RUNNING ROUGHLY

(1) Mixture .... FULL RICH

(2) Alternate Air .... OPEN

(3) Fuel Shut-off Valve...................................... OPEN

(4) Fuel Pump .... ON

(5) Ignition Switch .... cycle L - BOTH - R - BOTH

(6) Throttle .... at present position

(7) No Improvement .... reduce throttle to minimum required power, land as soon as possible.

LOSS OF OIL PRESSURE

(1) Oil Temperature .... check

(2) If Oil Pressure drops below ....land at the nearest suitable
Green Arc above 2100RPM. ....airport.

(3) If Oil Pressure drops below ....reduce throttle to minimum
Green Arc and oil temperature ....required power and land as
is rising ....soon as possible. Be prepared
....for engine failure and
....an emergency landing.

LOSS OF FUEL PRESSURE

(1) Fuel Pump .... ON, and land at the nearest suitable airport.

(2) If fuel pressure is not restored. ....Land at nearest suitable airport. Be prepared for engine failure and an emergency landing.

CAUTION

DO NOT ENGAGE STARTER IF PROPELLER IS WINDMILLING. ENGINE DAMAGE MAY RESULT.

The propeller will continue to windmill as long as the airspeed is at least 60 KIAS.

RESTARTING THE ENGINE WITH PROPELLER WINDMILLING

(1) Airspeed (KIAS) .... 73 kts

(2) Mixture .... FULL RICH

(3) Fuel Shut-off Valve .... OPEN

(4) Ignition Switch .... BOTH

(5) Fuel Pump .... ON

(6) Fuel Prime .... ON

(7) Throttle .... 3/4 in (2cm) forward

AFTER SUCCESSFUL RE-START:

(8) Oil Pressure .... check

(9) Oil Temperature .... check

(10) Fuel Prime .... OFF

(11) Electrically Powered Equipment .... ON if required

RESTARTING THE ENGINE WITH PROPELLER AT FULL STOP

(1) Airspeed .... 73 kts.

(2) Electrically Powered Equipment ....OFF

(3) GEN/BAT Master Switch ....ON

(4) Mixture ....FULL RICH

(5) Fuel shut off valve ....OPEN

(6) Fuel Pump ....ON

(7) Fuel Prime ....ON

(8) Throttle ....3/4 in (2 cm) forward

(9) Ignition Switch ....START

(10) Ignition Switch with Push-to-Start (Optional) START (TURN then PUSH)

NOTE

The engine may also be re-started by increasing the airspeed by pushing the airplane into a descent. A loss of 1000 ft/300 m altitude must be taken into account.

AN AIRSPEED OF 137 KIAS IS REQUIRED TO RESTART THE ENGINE.

AFTER SUCCESSFUL RE-START:

(11) Oil Pressure ....check

(12) Oil Temperature ....check

(13) Fuel Prime ....OFF

(14) Electrically Powered Equipment ....ON if required

3.3.2 Gliding

(a) Wing Flaps .... CRUISE

(b) Airspeed at 1764 lbs (800 kg) .... 73 KIAS

(c) Glide Ratio 11:1

Example: For every 1000 feet of altitude the aircraft can move forward 11,000 feet or 1.8 NM (3.4 km).

3.3.3 Emergency Landing

(a) Emergency Landing with Engine off

(1) Airspeed (Flaps in T/O position) .... 60 KIAS

(2) Airspeed (Flaps in LDG position) .... 55 KIAS

(3) Airspeed (Flaps CRUISE) .... 64 KIAS

(4) Fuel Shut-off Valve .... CLOSED

(5) Mixture .... IDLE CUTOFF

(6) Ignition Switch .... OFF

(7) Safety Belts .... secured

(8) Radio .... Transmit, 121.5 Mhz, giving location and intentions

(9) Flaps .... as required

(10) GEN/BAT Master Switch .... OFF

(11) After Touch – Down .... Apply brakes

(b) Precautionary Landing with Engine Power Available

NOTE

A precautionary landing would be required if continuing the flight would endanger the aircraft or its occupants. Circumstances, including mechanical defects, low fuel quantity or deteriorating weather conditions could require a precautionary landing.

(1) Search for a suitable place to land. Special attention must be given to wind direction and obstacles in the approach path.

(2) Safety Belts ....secured

(3) Initiate Descent

(4) Mixture ....FULL RICH

(5) Throttle ....as required

(6) Trim ....as required

(7) Wing Flaps ....as required
(observe permissible speed)

(8) Over fly selected landing area (not below 500 ft / 150 m above ground) to confirm suitability and that approach route is free of obstacles.

(9) Climb up to pattern altitude.

(10) Low pass over flight at a safe altitude to observe any possible obstacles, such as cables, fences, ditches.

(11) Climb up to pattern altitude.

(12) Radio ....Transmit, giving location and intentions.

(13) Final Approach:

(A) Mixture .... FULL RICH

(B) Throttle .... as required

(C) Fuel Pump .... ON

(D) Wing Flaps .... LDG

(E) Airspeed .... 55 KIAS

(14) Touch-down is to be made with minimum airspeed, nose wheel should be kept above ground as long as possible.

(15) After Touch-down:

(A) Brake .... as required

(B) Fuel Shut-off Valve .... CLOSED

(C) Mixture .... IDLE CUT-OFF

(D) Ignition Switch .... OFF

(E) GEN/BAT Master Switch .... OFF

NOTE

If no suitable level landing area can be found, an up-hill landing should be performed, if possible.

3.3.4 Fire

(a) Engine Fire during Engine-Start-Up on the Ground if the Engine Starts

(1) Throttle .... 1800 RPM for a few minutes

(2) Engine ....Shutdown and inspect

(b) Engine Fire during Engine-Start-Up on the Ground if the Engine Fails to Start

(1) Ignition Switch .... Continue cranking

(2) Throttle ....MAX PWR

(3) Mixture ....IDLE CUTOFF

(4) Fuel Shut-off Valve ....CLOSED

(5) Cabin Heat ....OFF

(6) Fuel Pump ....OFF

(7) GEN/BATT Master Switch ....OFF

(8) Ignition Switch ....OFF

(9) Airplane ....Evacuate

(10) Fire ....Extinguish

(11) Engine ....Inspect

(c) Engine Fire during Flight

(1) Fuel Shut-off Valve .... CLOSED

(2) Cabin Heat .... CLOSED

(3) Airspeed .... 73 KIAS

NOTE

Airspeed is for best glide with flaps in CRUISE position. If a suitable landing area is available and can be safely reached, airspeed can be increased in an attempt to extinguish the fire. Do not exceed airspeeds given for structural limitations.

(4) Fuel Pump .... OFF

(5) Perform emergency landing with engine off according to paragraph 3.3.3.

(d) Electrical Fire including Smoke during Flight

NOTE

In the event of smoke or fire, prepare to land the aircraft without delay while completing fire suppression and/or smoke evacuation procedures. If it cannot be visually verified that the fire has been completely extinguished, whether the smoke has cleared or not, land immediately at the nearest suitable airfield or landing site.

(1) GEN/BAT Master Switch .... OFF

(2) Cabin Air ....OPEN

(3) Fire Extinguisher ....use only if smoke development continues.

CAUTION

IF FIRE EXTINGUISHER IS USED, THE CABIN MUST BE VENTILATED.

In case the fire is extinguished and electric power is required for continuation of the flight:

(4) Avionics Master Switch ....OFF

(5) Electrically Powered Equipment ....OFF

(6) Circuit Breakers ....Pull all circuit breakers

NOTE

Restore electrical power systematically allowing time to monitor the system voltmeter and amp meter between the reconnection of loads. Watch carefully for smoke.

(7) Circuit Breakers ....Push BATTERY

(8) GEN/BAT Master Switch ....ON BAT 1/2 only

(9) Circuit Breakers .... Push GEN & GEN CONTROL

(10) GEN/BAT Master Switch .... ON

(11) Circuit Breakers .... On the AVIONICS panel push the MASTER and MASTER CONTROL circuit breakers

(12) Avionics Master Switch .... ON

(13) Circuit Breakers .... Push to activate systems as required.

(14) Radio .... ON

(15) Land as soon as possible.

(e) Electrical Fire including Smoke on the Ground

(1) GEN/BAT Master Switch .... OFF

IF ENGINE IS RUNNING:

(2) Throttle .... IDLE

(3) Mixture .... IDLE CUTOFF

(4) Fuel Shut-off Valve .... CLOSED

(5) Ignition Switch .... OFF

(6) Canopy .... open

(7) Fire Extinguisher .... discharge as required

(f) Cabin Fire during Flight

NOTE

In the event of smoke or fire, prepare to land the aircraft without delay while completing fire suppression and/or smoke evacuation procedures. If it cannot be visually verified that the fire has been completely extinguished, whether the smoke has cleared or not, land immediately at the nearest suitable airfield or landing site.

(1) GEN/BAT Master Switch .... OFF

(2) Cabin Air ....OPEN

(3) Cabin Heat ....CLOSED

(4) Fire Extinguisher ....discharge as required

(5) Land as soon as possible

CAUTION

IF THE FIRE EXTINGUISHER IS USED, THE CABIN MUST BE VENTILATED.

3.3.5 Icing

Unintentional Flight Into Icing Area

(a) Leave icing area (through change of altitude or change of flight direction to reach area with higher outside air temp).

(b) Continue to move control surfaces to maintain their moveability.

(c) Alternate Air .... ON

(d) Increase RPM to avoid icing of propeller blades (observe maximum RPM).

(e) Cabin Heat .... ON DEFROST

CAUTION

IN CASE OF ICING ON THE LEADING EDGE OF THE WING, THE STALL SPEED WILL INCREASE.

CAUTION

IN CASE OF ICING ON THE LEADING EDGE OF THE WING, ERRONEOUS INDICATING OF THE AIRSPEED, ALTIMETER, RATE OF CLIMB AND STALL WARNING SHOULD BE EXPECTED.

3.3.6 Recovery from Unintentional Spin

(a) Throttle .... IDLE

(b) Rudder .... fully applied opposite to direction of spin

(c) Control Stick .... ease forward

(d) Rudder .... neutral, after rotation has stopped

(e) Wing Flaps .... CRUISE

(f) Elevator .... pull cautiously. Bring airplane from descent into level flight position. Do not exceed maximum permissible speed (V_{NE}).

3.3.7 Landing with Defective Tire on Main Landing Gear

(a) Final approach with wing flaps in landing position.

(b) Land airplane on the side of runway opposite to the side with the defective tire to compensate for change in direction which is to be expected during final rolling.

(c) Land with wing slightly tipped in the direction of the non-defective tire. To increase the maneuverability during rolling, the nose-wheel should be brought to the ground as soon as possible after touch-down.

(d) To ease the load on the defective tire, the aileron should be fully applied in the direction of the non-defective tire.

3.3.8 Electrical Power Failure

(a) Total Electrical Power Failure

(1) Battery Circuit Breaker .... If tripped, reset

(2) GEN/BAT Master Switch .... check ON

(3) Master Switch .... OFF if power not restored

(4) If Unsuccessful .... Land at nearest suitable airport

(b) Generator Failure

GEN. ANNUNCIATOR ILLUMINATED

(1) GEN/BAT Master Switch .... Cycle Generator Master Switch OFF - ON

(2) Generator Circuit Breaker .... If tripped, reset

(3) Generator CONTROL Circuit Breaker .... If tripped, reset

(4) If Generator can not be brought on-line ..... Switch OFF all non-flight essential electrical consumers. Monitor Ammeter and Voltmeter. Land at nearest suitable airport.

NOTE

There is 30 minutes of battery power at a discharge load of 20 amperes when the battery is fully charged and properly maintained.

(c) Low Voltage Indication (needle in yellow arc)

LOW VOLTAGE INDICATION (NEEDLE IN YELLOW ARC) WHILE AIRPLANE IS ON THE GROUND

(1) Engine RPM .... Increase RPM until needle is in the Green Arc. This should occur before exceeding 1100 RPM.

(2) Non-flight essential electrical consumers ....Switch OFF consumers until needle is in the Green Arc.

(3) If needle remains in the yellow arc and the ammeter is indicating to the left of center (discharge). ....Discontinue any planned flight activity

LOW VOLTAGE INDICATION (NEEDLE IN YELLOW ARC) DURING FLIGHT

(1) All non-flight essential electrical consumers.................. Switch OFF

(2) If needle is remaining in the yellow arc and the ammeter is indicating to the left of center (Discharge). ....Generator Failure Refer to paragraph 3.3.8.C.

LOW VOLTAGE INDICATION (NEEDLE IN YELLOW ARC) DURING LANDING

(1) After landing .... proceed in accordance with paragraph 3.3.8.C.

WARNING

IF AT ANY TIME THE VOLTMETER NEEDLE INDICATES IN THE RED ARC, THE PILOT SHOULD LAND AT THE NEAREST SUITABLE AIRPORT AND SERVICE THE AIRCRAFT ACCORDINGLY BEFORE CONTINUING THE FLIGHT.

3.3.9 Flap System Failure

Flap Position Indicator Failure

(a) Visual check of the flap position

(b) Select airspeed within the range of the white arc marked on the airspeed indicator

(c) Check all positions of the flap toggle switch (flap stops are fail-safe)

(d) Modify approach and landing as follows:

(1) only CRUISE available: ....- raise approach speed by 10 kts
- throttle as required
- flat approach angle

(2) only T/O available: ....- normal approach speed
- throttle as required
- flat approach angle

(3) only LDG available: ....- normal landing

3.3.10 Starter Relay Failure

Starter does not disengage after starting the engine (start light remains illuminated).

(a) Throttle ....IDLE

(b) Mixture ....IDLE CUTOFF

(c) Ignition Switch ....OFF
discontinue any planned flight.
Maintenance action is required.

3.3.11 Avionics System Failure

TOTAL AVIONICS FAILURE:

(a) Check Avionics Master Circuit Breaker .... If popped, press and monitor status. If it pops again, land at the nearest suitable airport.

(b) Check Avionics Master Switch .... Toggle avionics master switch, if avionics system remains off-line, pull avionics master control circuit breaker. Land at the nearest suitable airport if operation is not restored.

RADIO SYSTEM OPERATIVE, NO RECEPTION:

(a) Microphone Key .... check for stuck Microphone Key on transceiver display.

(b) Headphones .... check, deactivate SQUELCH for a few moments,
if SQUELCH not heard, check headset connection.

RADIO SYSTEM OPERATIVE, TRANSMITTING NOT POSSIBLE:

(a) Selected Frequency .... check if correct

(b) Microphone .... Install handheld mike as follows:
- Unplug and remove headset.
- Plug handheld mike in.
- Turn up speaker volume on audio panel.

Check, if available use a different headset.

Problem cannot be resolved: ....
- switch transponder (if available) to "COMM FAILURE"
- code if required by the situation and permitted by applicable national regulations.

3.3.12 Trim System Failure

STUCK TRIM:

(a) Circuit breaker .... check, press if breaker is tripped

(b) Rocker switch .... depress in both directions, wait 5 minutes, try again

NOTE

Full range of travel is available for elevator, but expect higher forces on control stick.

(c) Land at the nearest suitable airport

RUNAWAY OF TRIM:

(a) Control Stick .... Grip stick and maintain control of the airplane.

(b) Trim motor circuit breaker .... Pull circuit breaker.

(c) Rocker Switch .... Check if depressed.

If the reason for the runaway condition is obvious and has been resolved, push in (engage) the circuit breaker.

NOTE

Full travel of the elevator trim system will take approximately 10 seconds.

3.3.13 Instrument Panel Lighting Failure

(a) Rocker Switch, map light .... ON

(b) Rocker Switch, I-panel lighting .... Cycle Rocker Switch OFF-ON

(c) Dimming Control .... Turn fully clockwise

(d) Internal Lighting Circuit Breaker .... If tripped, reset

(e) If NOT Successful .... Use flashlight

Expect an electrical power failure. Refer to paragraph 3.3.8.

CHAPTER 4

NORMAL OPERATING PROCEDURES

TABLE OF CONTENTS

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4.1 INTRODUCTION

Chapter 4 contains checklists and describes extended procedures for the normal operation of the airplane.

4.2 AIRSPEEDS FOR NORMAL FLIGHT OPERATION

Unless stated otherwise, the following table contains the applicable airspeeds for maximum take-off and landing weight. The airspeeds may also be used for lower flight weights.

TAKE-OFF	KIAS
Climb Speed during normal take-off for 50 ft (15 m) obstacle	58
Best Rate-of-Climb speed at sea level V_Y. Wing Flaps CRUISE	75
Best Angle-of-Climb speed at sea level V_X. Wing Flaps CRUISE	60
Best Rate-of-Climb speed at sea level V_Y. Wing Flaps T/O	68
Best Angle-of-Climb speed at sea level V_X. Wing Flaps T/O	57

LANDING	KIAS
Approach speed for normal landing. Wing Flaps LDG	55
Balked landing climb speed. Wing Flaps LDG	52
Maximum demonstrated crosswind speed during take-off and landing	20

CRUISE	KIAS
Maximum permissible speed in rough air V_{NO}	118
Maximum permissible speed with full control surface deflections V_A	106
Maximum permissible speed with Wing Flaps in T/O Position (V_{FE} T/O)	100
Maximum permissible speed with Wing Flaps in LDG Position (V_{FE} LDG)	78

4.3 STRUCTURAL TEMPERATURE INDICATOR

A structural temperature indicator, installed on the spar bridge, indicates when the structural temperature limitation is exceeded (refer to Section 2.17). The indicator need only be checked if the OAT exceeds 38º C (100º F).

The indicator is accessed by lifting the flap between the two seat-back cushions. The indicator is visible through the cut out in the seat shell backs (see Figure 4.2).

At temperatures below the 55º C (131º F) limit, the indicator appears all red with a faint indication of “55” (º C). At temperatures exceeding the 55º C (131º F) limit, the indicator displays a clearly contrasting red “55” (º C) on a black background (see Figure 4.1).

NOTE

At temperatures approaching the limit, the background will progressively darken prior to turning black; this indicates acceptable temperatures.

NOTE

Aircraft with other than white undersides have an additional structural temperature indicator installed adjacent to the fuel drains.

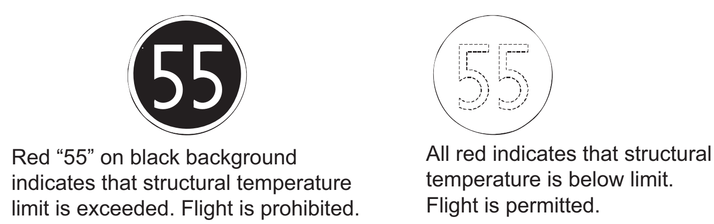


Figure 4.1

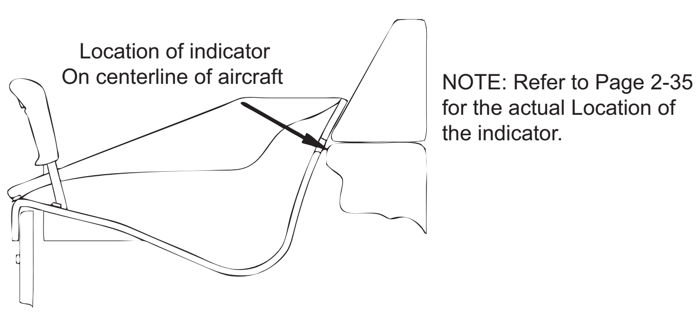


Figure 4.2

4.4 NORMAL OPERATION CHECKLIST

4.4.1 Preflight Inspection

(a) In-Cabin Check

(1) Structural Temperature Indicator (if OAT exceeds 38º C (100º F)) .... check that Structural Temperature does not exceed 55º C (131º F)

(2) Airplane Documents .... check

(3) Flight Control Lock .... removed

(4) Flight Controls .... check for proper direction of movement

(5) Ignition Key .... pulled out

(6) Cabin Heat .... free

(7) Parking Brake .... free

(8) Throttle .... free, IDLE

(9) Mixture .... free, IDLE CUTOFF

(10) GEN/BAT Master Switch .... ON

(11) Warning Lights (Gen. and Canopy) .... illuminated

(12) Fuel Quantity .... sufficient

(13) Engine Gauges, Ammeter and Voltmeter .... check

(14) Circuit Breakers .... pressed in

(15) Map Light .... operational

(16) Instrument Lights .... operational and dimmable

(17) Trim .... NEUTRAL

(18) Wing Flaps (Indicator- andflap Actuation) .... check, extend and retract fully

(19) Trim and Flap Indicator Lights .... operational and dimmable

(20) Exterior Lights .... operational as required

(21) GEN/BAT Master Switch .... OFF

(22) Foreign Object Inspection .... done

(23) Emergency Locator Transmitter (ELT):

ARTEX ELT-200.............................. ARM
EBC Model 502 -............................. ARM
EBC Model 102A - .... OFF
ARTEX ME 406 .... ARM

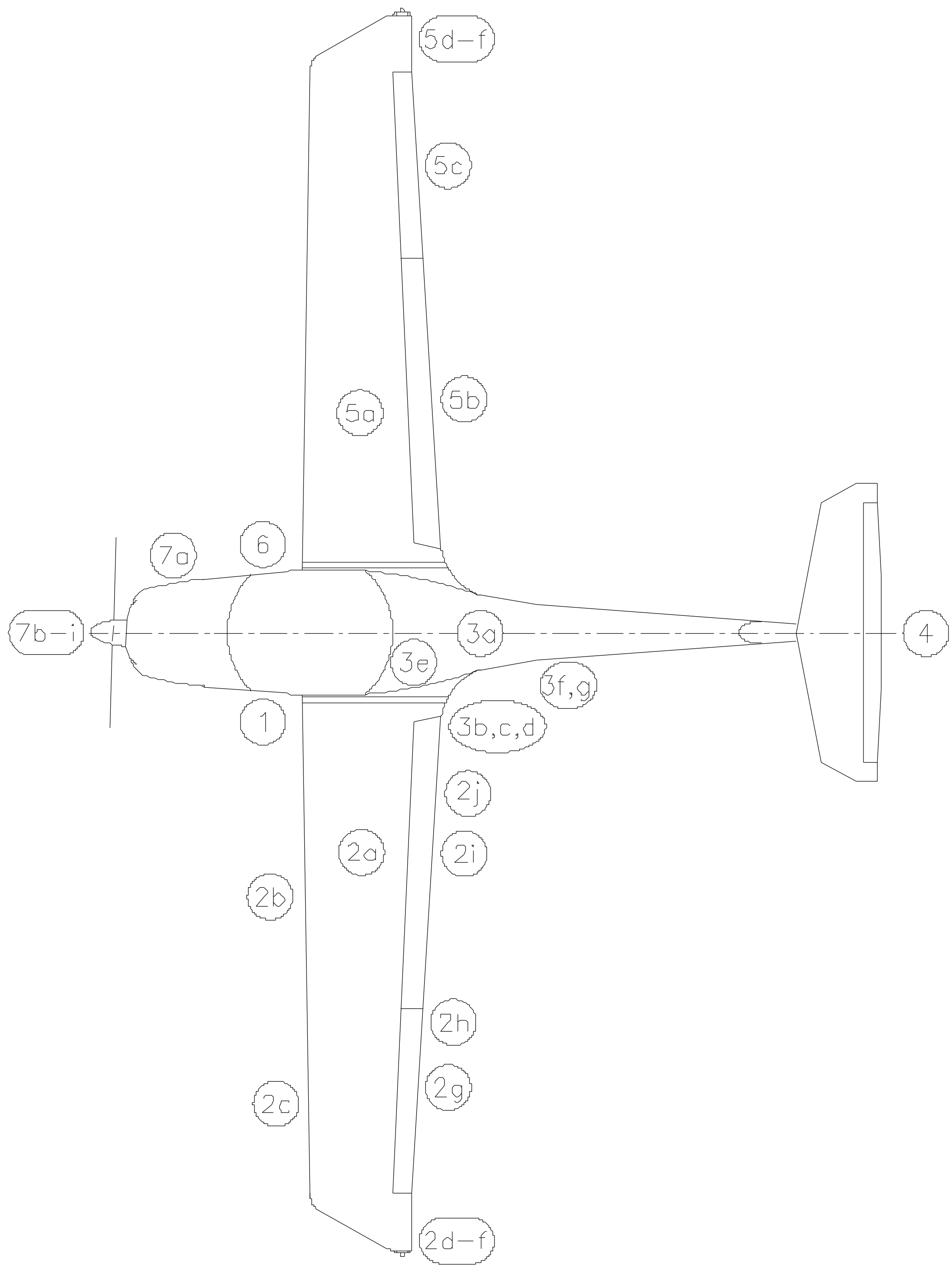
(24) Fire Extinguisher .... check

(25) Rescue Hammer .... check

(26) Baggage .... stowed, baggage net attached

(27) Canopy .... clean, undamaged

(b) Walk Around Check and Visual Inspection



CAUTION

VISUALLY INSPECT FOR THE FOLLOWING CONDITIONS: DEFECTS, CONTAMINATION, CRACKS, DELAMINATIONS, EXCESSIVE PLAY, INSECURE OR IMPROPER MOUNTING AND GENERAL CONDITION.

ADDITIONALLY, CHECK THE CONTROL SURFACES FOR FREEDOM OF MOVEMENT.

CAUTION

SET THE PARKING BRAKE PRIOR TO REMOVING THE WHEEL CHOCKS.

(1) Left Main Landing Gear

(A) Landing Gear Strut ....visual inspection

(B) Wheel Fairing ....visual inspection

(C) Tire Pressure (33 psi / 2.3 bar) ....check

(D) Tire, Wheel, Brake ....visual inspection

(E) Wheel Chocks ....remove

(2) Left Wing

(A) Entire Wing ....visual inspection

(B) Stall Warning ....check (suck on opening)

(C) Pitot-Static Probe ....clean, holes open

(D) Tie down ....remove

(E) Taxi and Landing Lights ....visual inspection

(F) Wing Tip, Position Lights and Strobe ....visual inspection

(G) Aileron Balancing Weight ....visual inspection

(H) Aileron including Inspection Panel ....visual inspection

(I) Wing Flap including Inspection Panel ......visual inspection

(3) Fuselage

(A) Skin ....visual inspection

(B) Fuel Tank Vent ....check

(C) Fuel Drains ....drain water

(D) Structural Temperature Indicator (for aircraft with other than white Undersides) ....check that the structural temperature does not exceed 55º C (131º F)

(E) Maintenance Fuel Drains ....no leaks

(F) Fuel Quantity ....visual inspection (use fuel dipstick)

(G) Antennas ....visual inspection

(4) Empennage

(A) Stabilizers and Control Surfaces ....visual inspection

(B) Tie down ....remove

(C) Fixed Tab on Rudder ....visual inspection

(5) Right Wing

(A) Entire Wing ....visual inspection

(B) Wing Flap including Inspection Panel ......visual inspection

(C) Aileron including Inspection Panel ....visual inspection

(D) Aileron Balancing Weight ....visual inspection

(E) Wing Tip, Position Lights and Strobe ....visual inspection

(F) Tie down ....remove

(6) Right Main Landing Gear

(A) Landing Gear Strut .... visual inspection

(B) Wheel Fairing .... visual inspection

(C) Tire Pressure (33 psi / 2.3 bar) .... check

(D) Tire, Wheel, Brake .... visual inspection

(E) Wheel Chocks .... remove

(7) Nose

(A) Oil .... check level by using dipstick.
Max level is 6 US quarts
Min level is 4 US quarts

(B) Cowling .... visual inspection

(C) Air Intakes .... clear

(D) Propeller .... visual inspection, Ground Clearance; minimum: approx. 25 cm (10 in.)

(E) Propeller Blades .... check for damage

(F) Spinner .... visual inspection

(G) Nose Gear .... visual inspection, towbar removed

(H) Wheel Fairing .... visual inspection

(I) Tire Pressure (26 psi / 1.8 bar) .... check

(J) Tire and Wheel .... visual inspection

(K) Wheel Chocks .... remove

4.4.2 Before Starting Engine

CAUTION

BEFORE STARTING THE ENGINE, THE CANOPY MUST BE CLOSED AND LATCHED. THE RED HANDLES MUST BE MOVED FULLY FORWARD.

AFTER STARTING THE ENGINE, THE CANOPY MUST STAY IN THE CLOSED AND LATCHED POSITION UNTIL THE ENGINE IS SHUT DOWN.

DURING ENGINE OPERATION IT IS PROHIBITED TO ENTER OR EXIT THE AIRPLANE.

(a) Preflight Inspection .... performed

(b) Pedals .... adjust, lock – pull T-grip straight back

(c) Passenger Briefing .... performed

(d) Safety Belts .... fastened

(e) Parking Brake .... set

(f) Flight Controls .... free

(g) Fuel Shut-off Valve .... OPEN

(h) Mixture .... FULL RICH

(i) Throttle .... IDLE

(j) Friction Device of Throttle Quadrant .... adjust

(k) Avionics Master Switch .... OFF

(l) GEN/BAT Master Switch .... ON

(m) Generator Warning Light .... illuminated

(n) Exterior Lights .... as required

(o) Instrument Panel Lighting .... as required

(p) Canopy .... Close and Secure

(q) Canopy Unlock Warning Light .... OFF

4.4.3 Starting Engine

(a) Starting Engine Cold

NOTE

It is recommended that the engine be preheated if it has been cold soaked for 2 hours or more at temperatures of -4º C (25º F) or less.

(1) Throttle .... IDLE

(2) Mixture .... FULL RICH

(3) Toe Brakes .... hold

(4) Propeller Area .... clear

WARNING

MAKE SURE THAT THE PROPELLER AREA IS CLEAR

CAUTION

DO NOT ENGAGE STARTER IF THE PROPELLER IS MOVING. SERIOUS ENGINE DAMAGE CAN RESULT.

NOTE

Steps (5), (6), (7), (8), (9), and (10) are to be performed without delay between the steps.

NOTE

Colder ambient temperatures require longer priming.

(5) Fuel Pump .... ON

(6) Fuel Prime .... ON

(7) Throttle .... FULL for prime prime for 5 -10 seconds minimum before starting)

(8) Throttle .... Full IDLE to ¼ inch OPEN (adjust as required)

(9) Ignition Switch .... START, hold until engine starts or for 10 seconds maximum (if engine does not start, release ignition key, push throttle to full power for 3 seconds minimum for more priming, then repeat from Step (8)

NOTE

If the optional Push-to-Start ignition switch is installed, then additional "PUSH" action is required after the ignition switch is turned to the START position when implementing start.

(10) Starter Warning Light .... illuminated while ignition is in the START position

NOTE

Activate the starter for a maximum of 30 seconds only, followed by a cooling period of 3-5 minutes.

(11) Throttle .... 1000 ± 25 RPM

CAUTION

DO NOT OPERATE ENGINE ABOVE 1000 RPM UNTIL AN OIL TEMPERATURE INDICATION IS REGISTERED.

(12) Fuel Prime .... OFF

(13) Engine Instruments .... check

NOTE

Excessive priming can result in a flooded engine. To clear a flooded engine, turn off the fuel pump and fuel prime, open the throttle 1/2 to 1 inch and engage the starter. The engine should start for a short period and then stop. Excess fuel has now been cleared and engine start from item (1) can be performed.

CAUTION

IF OIL PRESSURE IS BELOW 10 PSI, SHUT DOWN THE ENGINE IMMEDIATELY (MAXIMUM 30 SECONDS DELAY).

NOTE

Oil Pressure may advance above the green arc until Oil Temperature reaches normal operating temperatures.

Regulate warm up RPM to maintain pressure below 100 psi limit. At ambient temperatures below 32º F (0º C) DO NOT apply full power if oil pressure is above 70 psi.

(14)Starter Warning Light .... check OFF

(b) Starting Engine Warm

(1) Throttle .... IDLE

(2) Mixture .... FULL RICH

(3) Toe Brakes .... hold

(4) Propeller Area .... clear

WARNING

MAKE SURE THAT THE PROPELLER AREA IS CLEAR.

CAUTION

DO NOT ENGAGE THE STARTER IF THE PROPELLER IS MOVING. SERIOUS DAMAGE CAN RESULT.

NOTE

Steps (5), (6), (7), (8), (9), and (10) are to be performed without delay between the steps.

(5) Fuel Pump .... ON

(6) Fuel Prime .... ON

(7) Throttle .... FULL for prime (prime for 1 to 3 seconds before starting)

(8) Throttle .... ½ to 1 inch OPEN (approximately)

(9) Ignition Switch .... START, hold until the engine starts or for 10 seconds maximum (repeat from Step (7) if the engine does not start)

NOTE

If the optional Push-to-Start ignition switch is installed, then additional "PUSH" action is required after the ignition switch is turned to the START position when implementing start.

(10) Starter Warning Light .... illuminated while ignition is in the START position

NOTE

Activate the starter for a maximum of 30 seconds only, followed by a cooling period of 3-5 minutes.

(11) Throttle .... 1000 ± 25 RPM

(12) Fuel Prime .... OFF

(13) Engine Instruments .... check

NOTE

Excessive priming can result in a flooded engine. To clear a flooded engine, turn off the fuel pump and fuel prime, open the throttle 1/2 to 1 inch and engage the starter. The engine should start for a short period and then stop. Excess fuel has now been cleared and engine start from item (1) can be performed.

CAUTION

IF OIL PRESSURE IS BELOW 10 PSI, SHUT DOWN THE ENGINE IMMEDIATELY (MAXIMUM 30 SECONDS DELAY).

NOTE

Oil Pressure may advance above the green arc until Oil Temperature reaches normal operating temperatures.

Regulate warm up RPM to maintain pressure below 100 psi limit. At ambient temperatures below 32º F (0º C) DO NOT apply full power if oil pressure is above 70 psi.

(14) Starter Warning Light .... check OFF

4.4.4 Before Taxiing

(a) Avionics Master Switch .... ON

(b) Flight Instruments and Avionics .... set

(c) Engine Gauges .... check

(d) Voltmeter .... check, ensure needle is in the green arc. Increase RPM to achieve or turn OFF non-flight essential electrical consumers

(e) Warning Lights, Gen, Canopy, Start, EPU (if installed) .... push to test

(f) Fuel Prime check .... OFF

(g) Fuel Pump .... check ON

(h) Parking Brake .... release

CAUTION

WARM-UP ENGINE TO A MINIMUM OIL TEMPERATURE OF 75° F AT 1000 TO 1200 RPM (ALSO POSSIBLE DURING TAXI). DO NOT OPERATE ENGINE ABOVE 1000 RPM UNTIL AN OIL TEMPERATURE INDICATION IS REGISTERED.

4.4.5 Taxiing

(a) Brake .... check

(b) Mixture .... As required

(c) Throttle .... As required

(d) Direction Control .... check

(e) Flight Instruments and Avionics .... check

(f) Compass .... check

CAUTION

AT HIGH ENGINE RPM THE PROPELLER CAN BE DAMAGED BY LOOSE SAND, GRAVEL OR WATER.

WARNING

BEFORE TAKEOFF, THE MIXTURE MUST BE SET TO FULL RICH.

NOTE

Prolonged engine operation on the ground may cause lead build-up on the spark plugs, valves and valve guides. The mixture may be leaned for smooth engine operation to reduce the potential for lead build-up. Before takeoff, the mixture must be set to FULL RICH.

NOTE

Engine roughness may be experienced during ground operation in high ambient temperatures, or at fields at high elevations. The mixture may be leaned for smooth engine operation to reduce the potential for lead build-up. Before takeoff, the mixture must be set to FULL RICH.

4.4.6 Before Take-off (Engine Run-up)

NOTE

For OAT's less than -5º F (-20º C) turn cabin heat on for at least 10 minutes prior to take-off.

(a) Brakes .... apply

(b) Safety Belts .... fastened

(c) Canopy .... closed and locked

(d) Canopy Unlock Warning Light .... OFF

(e) Fuel Pressure .... check

(f) Fuel Shut-off Valve .... check OPEN

(g) Fuel Quantity Indicator .... check

(h) Fuel Prime check .... OFF

(i) Fuel Pump check .... ON

(j) Trim .... NEUTRAL

(k) Flight Controls .... free

(l) Oil Temp. .... 75º minimum

(m) Mixture .... FULL RICH

(n) Throttle .... 1700 RPM

(o) Magneto Check .... Cycle L - BOTH - R – BOTH (RPM drop: 25-150 RPM) (Max. RPM difference (L/R): 50 RPM)

(p) Mixture .... check

(q) Alt. Load .... check

(r) Oil Pressure .... 30-60 psi

(s) Vacuum Gauge (if installed) .... within green range

(t) Throttle .... IDLE (975 RPM Minimum)

(u) Mixture .... Move slowly toward lean cut off (RPM increase)

(v) Mixture .... FULL RICH

(w) Circuit Breakers .... check pressed IN

(x) Wing Flaps .... T/O

(y) Parking Brake .... release

CAUTION

SHUT THE VENT WINDOW SCOOP PRIOR TO TAKE-OFF. IF THE VENT WINDOW SCOOP IS LEFT OPEN DURING FLIGHT IT CAN BE BLOWN OFF AND CAUSE DAMAGE TO THE AIRCRAFT.

4.4.7 Take-off

(a) Fuel Prime .... check OFF

(b) Fuel Pump .... check ON

(c) Mixture .... check FULL RICH

(d) GEN/BAT Master Switch .... check ON

(e) Ignition Switch .... check BOTH

(f) Wing Flaps .... check T/O

(g) Trim .... NEUTRAL

(h) Throttle .... FULL
Check RPM min 2000 RPM

WARNING

THE PROPER PERFORMANCE OF THE ENGINE AT FULL THROTTLE SHOULD BE CHECKED EARLY IN THE TAKE-OFF PROCEDURE, SO THAT THE TAKE-OFF CAN BE ABORTED IF NECESSARY. A ROUGH ENGINE, SLUGGISH RPM INCREASE, OR FAILURE TO REACH TAKE-OFF RPM ARE REASONS FOR ABORTING THE TAKE-OFF.

(i) Elevator - at beginning of rolling .... NEUTRAL

(j) Directional Control .... maintain with rudder

NOTE

In crosswind conditions, directional control can be enhanced by using the single wheel brakes. Note that using the brakes for directional control increases the take-off roll distance.

(k) Rotate .... 44 KIAS

(l) Climb Speed to clear 50 ft. obstacle .... 58 KIAS

CAUTION

FOR THE SHORTEST POSSIBLE TAKE-OFF DISTANCE TO CLEAR A 15 M (50 FT) OBSTACLE:

Lift-off Speed...52 KIAS
Climb Speed to clear 50 ft. obstacle ....58 KIAS

4.4.8 Climb

(a) Mixture .... FULL RICH

NOTE

For aircraft without the altitude compensating fuel pump, at full throttle settings with power less than 75%, it is necessary to lean the engine with the mixture control. It should be noted that with the engine set to full throttle, it can produce less than 75% power, depending on pressure altitude.
Refer to the Section 5.3.2., Performance to determine the engine performance as a function of altitude and temperature. Expect engines without altitude compensating fuel pump to require leaning at full throttle above 5000 ft pressure altitude.

(b) Throttle .... FULL

(c) Engine Gauges .... within green range

(d) Wing Flaps (400 ft AGL) .... CRUISE

(e) Airspeed .... 75 KIAS

(f) Trim .... adjust

4.4.9 Cruise

(a) Fuel Pump .... OFF

(b) Throttle .... as required

(c) Mixture .... lean to 25º F rich of peak EGT. DO NOT lean by EGT above 75% power

(d) Wing Flaps .... CRUISE

(e) Trim .... as required

(f) Engine Gauges .... check

4.4.10 Descent

(a) Flight Instruments and Avionics .... adjust

(b) Fuel Pump .... ON

(c) Mixture .... FULL RICH

(d) Throttle .... as required

CAUTION

ADJUST DESCENT PROFILE (ANGLE, AIRSPEED, AND POWER) AS REQUIRED TO AVOID ENGINE SHOCK COOLING.

NOTE

To achieve a fast descent:

Throttle ....IDLE

Wing Flaps ....CRUISE

Airspeed ....118 KIAS

4.4.11 Landing Approach

(a) Seat Belts .... fastened

(b) Lights .... as required

(c) GEN/BAT Master Switch .... check ON

(d) Ignition Switch .... check BOTH

(e) Fuel Pump .... check ON

(f) Mixture .... FULL RICH

(g) Throttle .... as required

(h) Airspeed .... max. 78 KIAS

(i) Wing Flaps .... T/O

(j) Trim .... as required

(k) Wing Flaps .... LDG

(l) Approach Speed .... 55 KIAS

CAUTION

FOR STRONG HEADWIND, CROSSWIND, DANGER OF WINDSHEAR OR TURBULENCE, A HIGHER APPROACH SPEED SHOULD BE SELECTED.

4.4.12 Balked Landing

(a) Throttle .... FULL

(b) Mixture .... FULL RICH

(c) Wing Flaps .... T/O

(d) Airspeed .... 58 KIAS

4.4.13 After Landing

(a) Throttle .... as required

(b) Mixture .... as required

(c) Wing Flaps .... CRUISE

(d) Avionics .... as required

(e) Exterior Lights .... as required

4.4.14 Engine Shut-down

(a) Parking Brake .... set

(b) Throttle .... IDLE

(c) Fuel Pump .... OFF

(d) ELT .... Check (by listening to 121.5 MHz for signal)

(e) Avionics Master Switch .... OFF

(f) Electric Consumers .... OFF

(g) Magneto check.. OFF until the RPM drops noticeably then immediately BOTH again.

WARNING

ABSENCE OF RPM DROP DURING THE MAGNETO CHECK MAY BE AN INDICATION OF A FAULTY IGNITION CIRCUIT. SHOULD THE PROPELLER BE TURNED BY HAND, THE ENGINE MAY INADVERTENTLY START, AND CAUSE PERSONAL INJURY OR DEATH.

(h) Mixture .... IDLE CUT-OFF

(i) Ignition Switch .... OFF

(j) GEN/BAT Master Switch .... OFF

Tie Downs and Wheel Chocks as required

4.4.15 Flight in Rain

NOTE

Flight performance might be reduced, especially for the T/O distance and the maximum horizontal air speed. The influence on flight characteristics of the airplane is negligible. Flights through heavy rain should be avoided due to the reduced visibility.

4.4.16 Spinning

(a) Spin Entry

(1) Loose Items .... stowed

(2) Seat Belts .... fastened

(3) Altitude and Airspace .... check

(4) Fuel Pump .... ON

(5) Wing Flaps .... CRUISE

(6) Mixture .... FULL RICH

(7) Throttle .... IDLE

(8) Entry Speed .... trim to 58 KIAS

(9) Reduce speed with elevator .... speed reduction rate 2-3 kts per second

(10) When stall warning sounds .... apply simultaneously, full aft stick and full rudder

CAUTION

INTENTIONAL SPINNING IS ONLY PERMITTED WITH THE FLAPS IN CRUISE POSITION.

CAUTION

DEPENDING ON CG AND SPIN ENTRY TECHNIQUE, ATTEMPTS TO ENTER SPINS MAY DEVELOP INTO SPIRAL DIVES. MONITOR THE AIRSPEED DURING THE FIRST TURN AND RECOVER IMMEDIATELY IF IT INCREASES TO 65 KIAS.

NOTE

Spins with aft CG may oscillate in yaw rate and pitch attitude. This has no effect on recovery procedure or recovery time.

(b) Recovery from Spinning

(1) Throttle .... IDLE

(2) Rudder .... fully applied in opposite to direction of spin

(3) Control Stick .... ease stick forward until spinning stops

(4) Rudder .... neutral, immediately after rotation has stopped

(5) Wing Flaps .... check CRUISE

(6) Control Stick .... ease stick backward cautiously Bring airplane from descent into level flight position. Do not exceed maximum permissible speed (V_{NE}).

4.4.17 Idle Power Operations

NOTE

Turn the fuel pump on for all low throttle operations, including taxiing and all flight operations when engine speed could fall below 1400 RPM (eg. stalls, descents, spins, landings, etc.).

(a) Fuel Pump .... ON

(b) Mixture .... FULL RICH

(c) Throttle .... IDLE

NOTE

For aircraft with altitude compensating fuel system the minimum recommended flight idle is 1400 RPM, during idle power flight conditions and maneuvers.

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CHAPTER 5

PERFORMANCE

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5.1 INTRODUCTION

This chapter contains the performance data required by the basis of certification. This data which has been approved by Transport Canada is marked ‘DOT Approved’ in the footer of the page. Where additional performance data has been provided, beyond the basis for certification, it has not been reviewed or approved by Transport Canada.

The performance data contained in the following pages has been prepared to illustrate the performance you may expect from your airplane and to assist you in precise flight planning. The data presented has been derived from test-flights using an airplane and engine in good operating condition. The data is corrected to standard atmospheric conditions 59° F (15° C) and 29.92 in. Hg (1013.25 mbar) at sea level) except where noted.

The performance data do not take into account the expertise of the pilot or the maintenance condition of the airplane. The performance described can be achieved if the indicated procedures are followed and the airplane is maintained in good condition.

5.2 USE OF THE PERFORMANCE TABLES AND DIAGRAMS

The performance data is shown in the form of tables and diagrams to illustrate the influence of different variables. The tables contain sufficiently detailed information to plan flights with precision and safety. Where the performance differs due to the type of propeller that is installed, the table or graph is printed for each propeller and clearly identified.

5.3 PERFORMANCE TABLES AND DIAGRAMS

5.3.1 Airspeed System Calibration

Assumes zero indicator error.

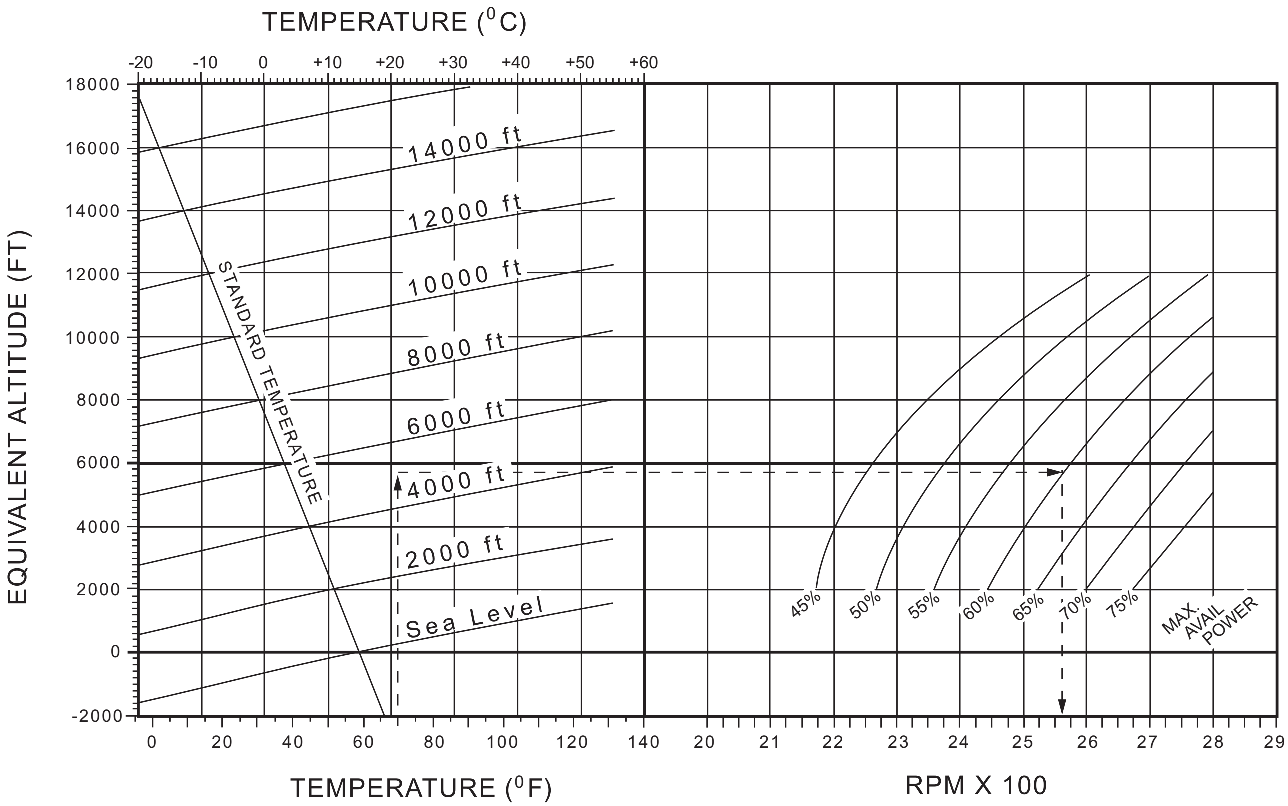
Table 1 - Airspeed System Calibration

Flaps Cruise																	
KIAS	44	50	55	60	65	70	75	80	90	100	110	120	130	140	150	160	164
KCAS	54	58	62	66	70	75	79	83	92	101	110	120	129	138	147	156	159
Flaps Take-Off (T/O)																	
KIAS	40	45	50	55	60	65	70	75	80	85	90	95	100	105	---	---	---
KCAS	50	53	57	61	65	69	73	77	81	85	89	93	96	100	---	---	---
Flaps Landing (LDG)																	
KIAS	36	40	45	50	55	60	65	70	75	82	---	---	---	---	---	---	---
KCAS	45	48	52	55	59	64	68	72	76	81	---	---	---	---	---	---	---

Example: CRUISE Flap KIAS = 90 kts, therefore KCAS = 92 kts from chart

5.3.2 Cruising Performance

Maximum RPM is 2800.



Example:	OAT:	70° F
	Pressure Altitude:...................	5000 ft
	Desired Power Setting:	60%
Result:	Set RPM:	2560

Figure 5.1 - Cruising Performance

5.3.3 Equivalent Altitude Chart

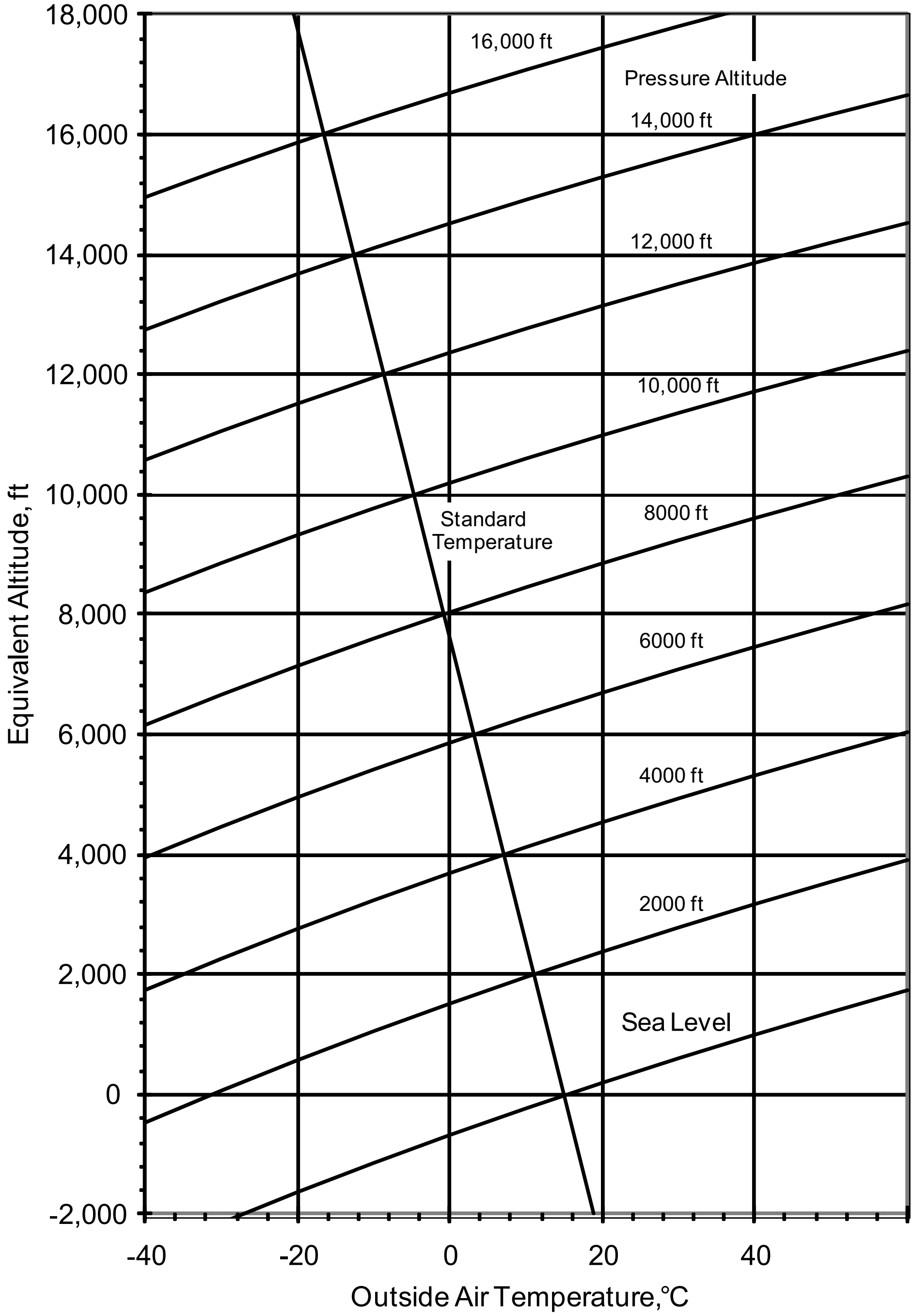


Figure 5.2 - Equivalent Altitude Chart

5.3.4 Stall Speeds

Configuration:

Idle, most forward center of gravity, max. weight of 1764 lbs (800 kg).

(This is the most adverse configuration)

Table 2 - Stall Speeds

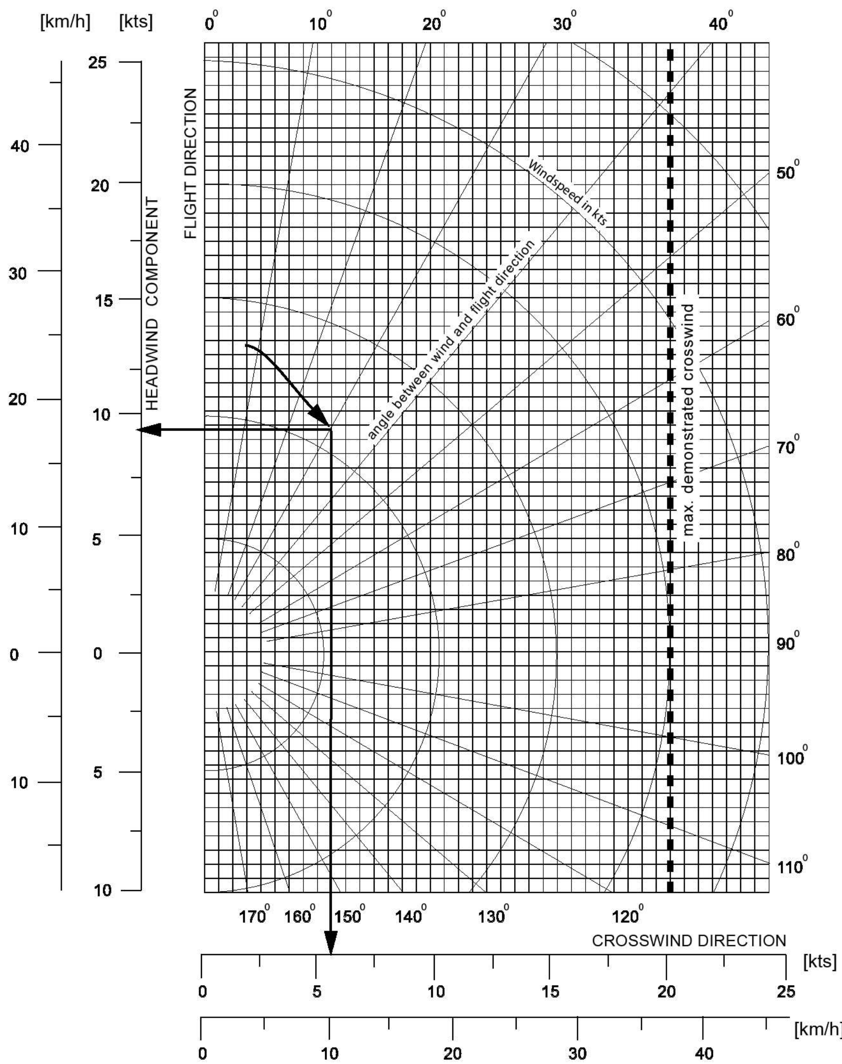
Most Forward Center of Gravity								
Flap Setting	Angle of Bank							
	0°		30°		45°		60°	
	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
Cruise	44	54	49	58	57	64	72	76
Take-off	40	50	46	53	53	59	66	70
Landing	36	45	41	49	48	54	61	64

NOTE

The Stall Speeds are in kts.

5.3.5 Wind Components

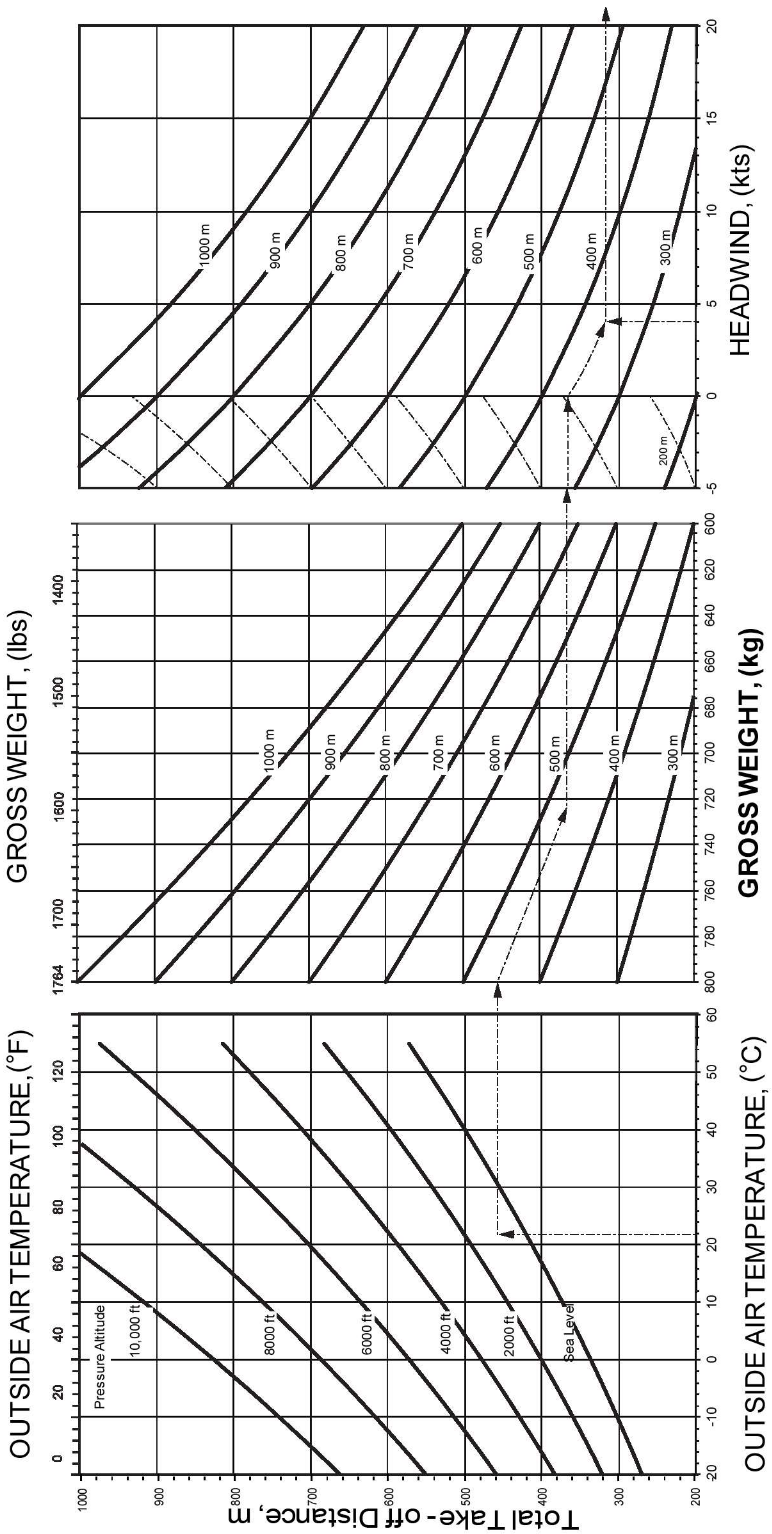
Maximum demonstrated crosswind component:...........20 kts (37 km/h)



Example: Wind Speed:.. 11 kts (20 km/h)
Angle between wind direction and flight direction: . 30 degrees
Headwind Component:.. 9.5 kts (18 km/h)
Crosswind Component:... 5.5 kts (10 km/h)

Figure 5.3 - Wind Components

5.3.6 Take-off Distance



CONDITIONS:
- Maximum take-off power
- Lift-off speed 52 KIAS and speed for climb over obstacle 58 KIAS
- Level runway, paved
- Wing flaps in T/O postition

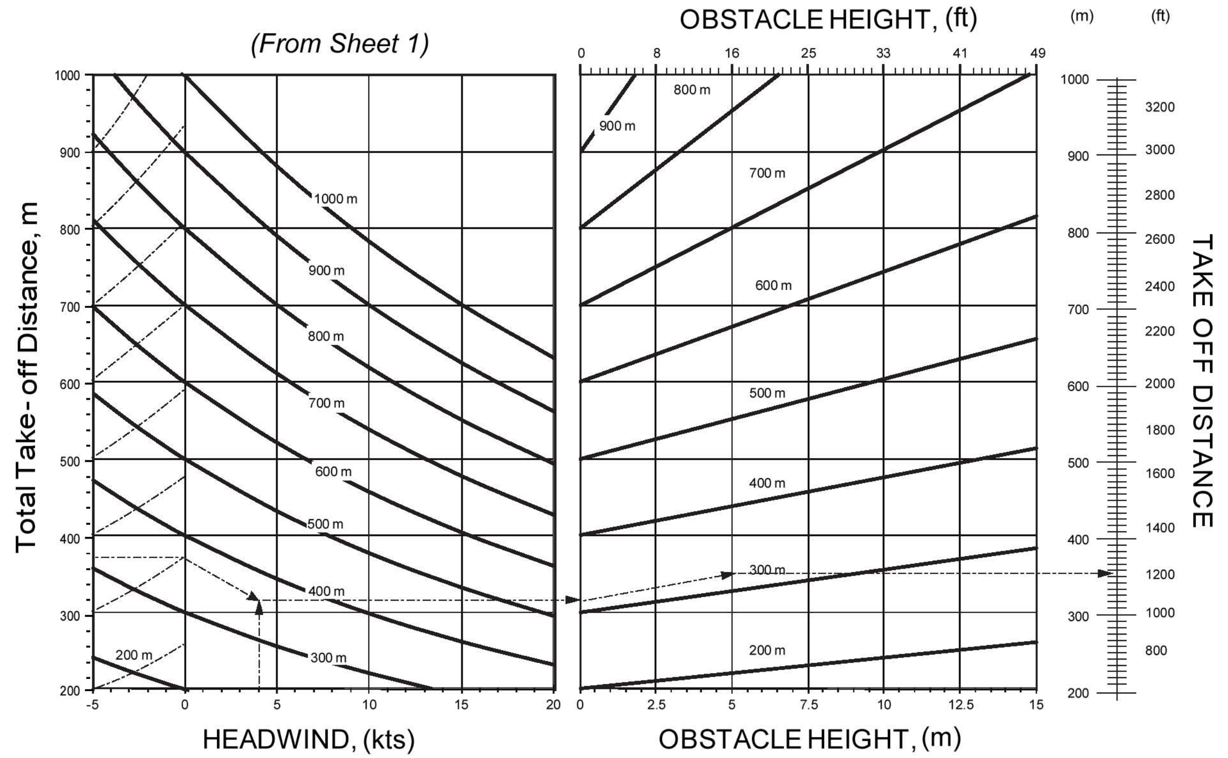
EXAMPLE:
- Pressure altitude ....1000 ft
- Outside air temperature ....72°F (21°C)
- Weight ....1600 lbs (725 kg)
- Wind ....4 kt headwind

RESULT:
- Take-off distance to clear a 16 ft (5 m) obstacle 1200 ft (365.76 m)

NOTE

Poor maintenance condition of the airplane, deviation from the given procedures as well as unfavorable conditions (i.e. high temperature, rain, unfavorable wind conditions, including cross wind) can increase the take-off distance considerably.

Figure 5.4 - Take-off Distance (Sheet 1 of 2)



CONDITIONS:	EXAMPLE:	RESULT:
- Maximum take-off power - Lift-off speed 52 KIAS and speed for climb over obstacle 58 KIAS - Level runway, paved - Wing flaps in T/O postition	- Pressure altitude ....1000 ft - Outside air temperature ....72°F (21°C) - Weight ....1600 lbs (725 kg) - Wind ....4 kt headwind	- Take-off distance to clear a 16 ft (5 m) obstacle 1200 ft (365.76 m)

NOTE

Poor maintenance condition of the airplane, deviation from the given procedures as well as unfavorable conditions (i.e. high temperature, rain, unfavorable wind conditions, including cross wind) can increase the take-off distance considerably.

Figure 5.4 - Take-off Distance (Sheet 2 of 2)

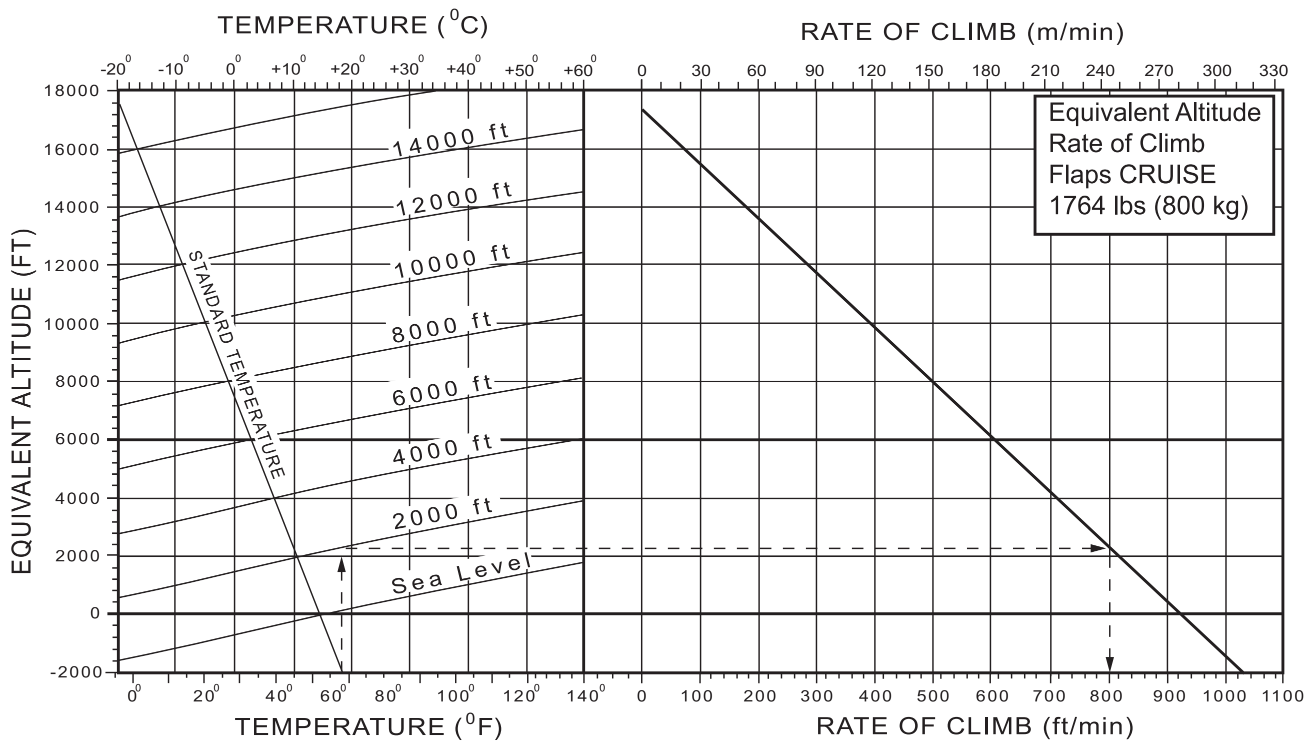
5.3.7 Climb Performance /Cruising Altitudes

Max. Cruising Altitude (in standard conditions): ....13120 ft (4000 m)

Best Rate-of-Climb Speed with Wing Flaps CRUISE ....75 KIAS

CAUTION

IN AIRPLANE OPERATIONS WITHOUT THE OPTIONAL WHEEL FAIRINGS INSTALLED, THE CLIMB PERFORMANCE IS REDUCED BY APPROXIMATELY 3%.

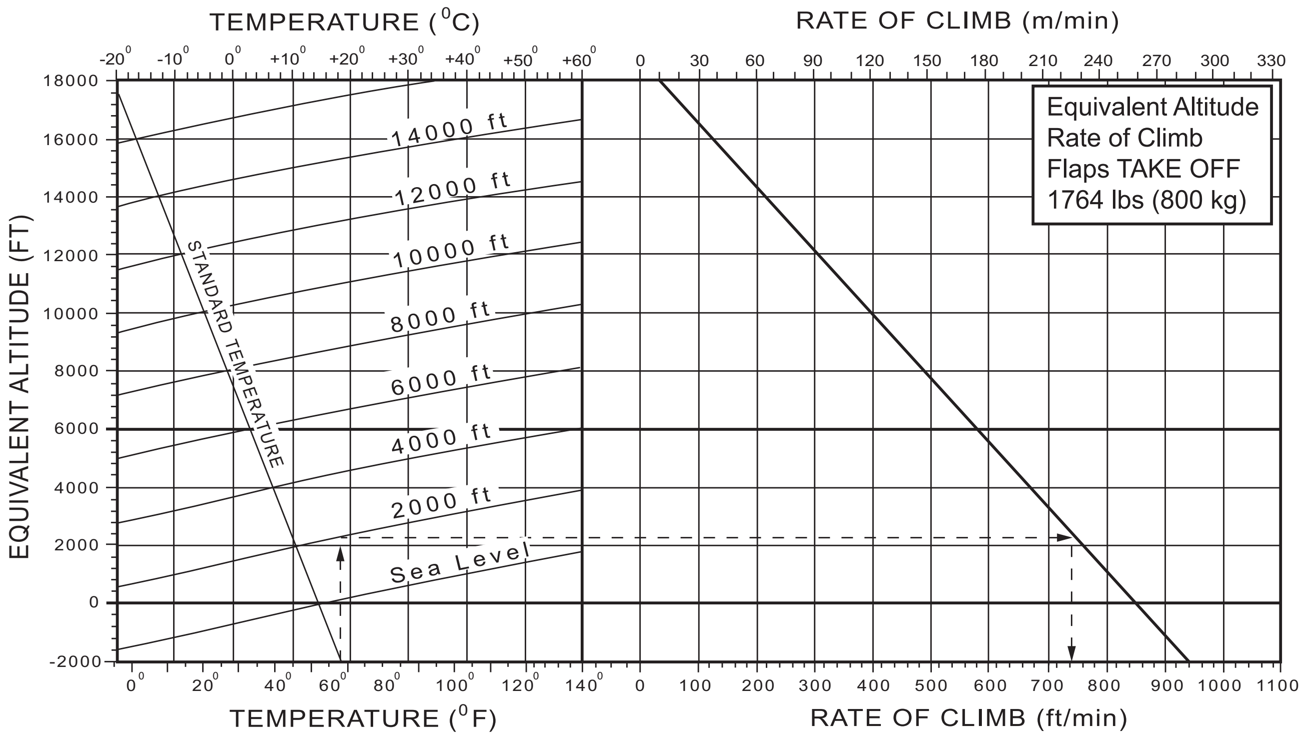


Example:	Pressure Altitude:	2000 ft
	OAT:	65º F
	Weight :	1764 lbs (800 kg)
Result:	Climb performance:	800 ft/min

Figure 5.5 - Climb Performance / Cruising Altitudes

5.3.8 Climb Performance / Take off

Best Rate-of-Climb Speed with Wing Flaps T/O: .... 68 KIAS



Example:	Pressure Altitude:	2000 ft
	OAT:	65° F
	Weight :	1764 lbs
Result:	Climb performance:	744 ft/min

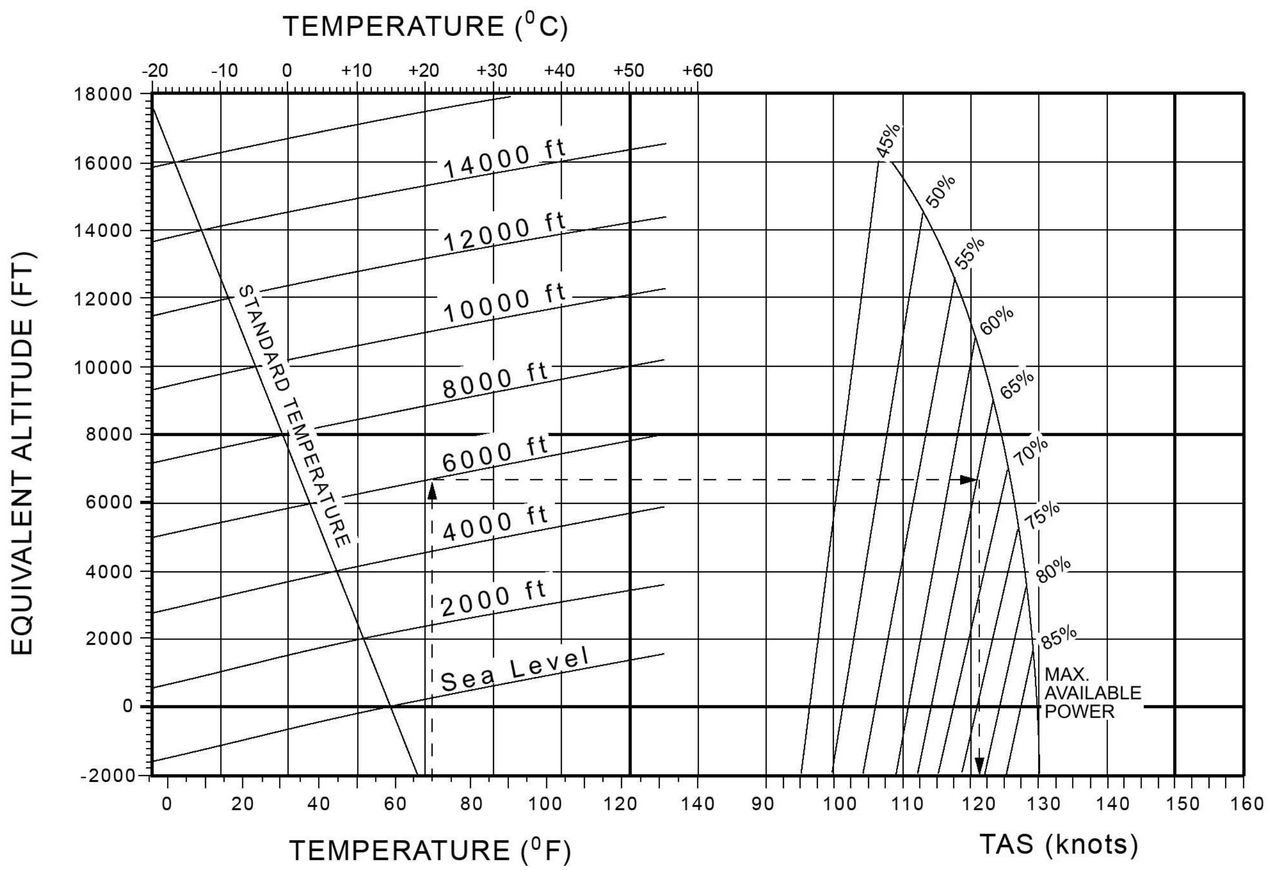
Figure 5.6 - Climb Performance / Take off

5.3.9 Cruising Speed (True Airspeed)

Diagram for true airspeed (TAS) calculation at selected power level.

CAUTION

IN AIRPLANE OPERATIONS WITHOUT THE OPTIONAL WHEEL FAIRINGS INSTALLED, THE MAXIMUM CRUISING SPEED IS REDUCED BY APPROXIMATELY 5%.



Example:	Pressure Altitude:	6000 ft
	OAT:	70º F
	Power Setting:	65%
Result:	True airspeed (TAS):	121 kts

Figure 5.7 - Cruising Speed (True Airspeed)

5.3.10 Maximum Flight Duration

Table for calculation of the **Maximum Flight Duration** depending on fuel availability.

Table 3 - Cruise Performance Table

Press Alt ft	RPM	20º C Below Standard Temp			Standard Temperature			10º C Above Standard Temp		
		%bhp	KTAS	GPH	%bhp	KTAS	GPH	%bhp	KTAS	GPH
2,000	2800	87	128	8.8	83	129	8.7	80	130	8.6
	2700	78	123	7.7	74	124	6.8	72	125	6.6
	2600	69	118	6.4	66	119	6.2	64	120	6.1
	2500	61	113	5.9	59	113	5.7	57	114	5.6
	2400	54	107	5.3	52	108	5.2	50	109	5.1
4,000	2800	79	126	8.6	76	127	8.6	74	129	6.8
	2700	71	121	6.6	68	122	6.4	66	123	6.2
	2600	63	116	6	61	117	5.9	59	118	5.7
	2500	56	111	5.5	55	112	5.4	53	113	5.3
	2450	53	108	5.3	51	109	5.1	50	110	5.1
6,000	2800	73	125	6.7	70	126	6.5	69	128	6.4
	2700	66	120	6.2	64	121	6	62	123	5.9
	2600	59	115	5.7	57	116	5.6	56	117	5.5
	2500	53	110	5.2	51	111	5.1	50	112	5
8,000	2800	68	124	6.4	66	125	6.2	65	127	6.1
	2700	61	119	5.9	60	121	5.8	59	122	5.7
	2600	55	114	5.4	54	116	5.3	53	117	5.3
	2550	53	112	5.2	51	113	5.1	50	114	5.1

Cruise Performance Table - Continued

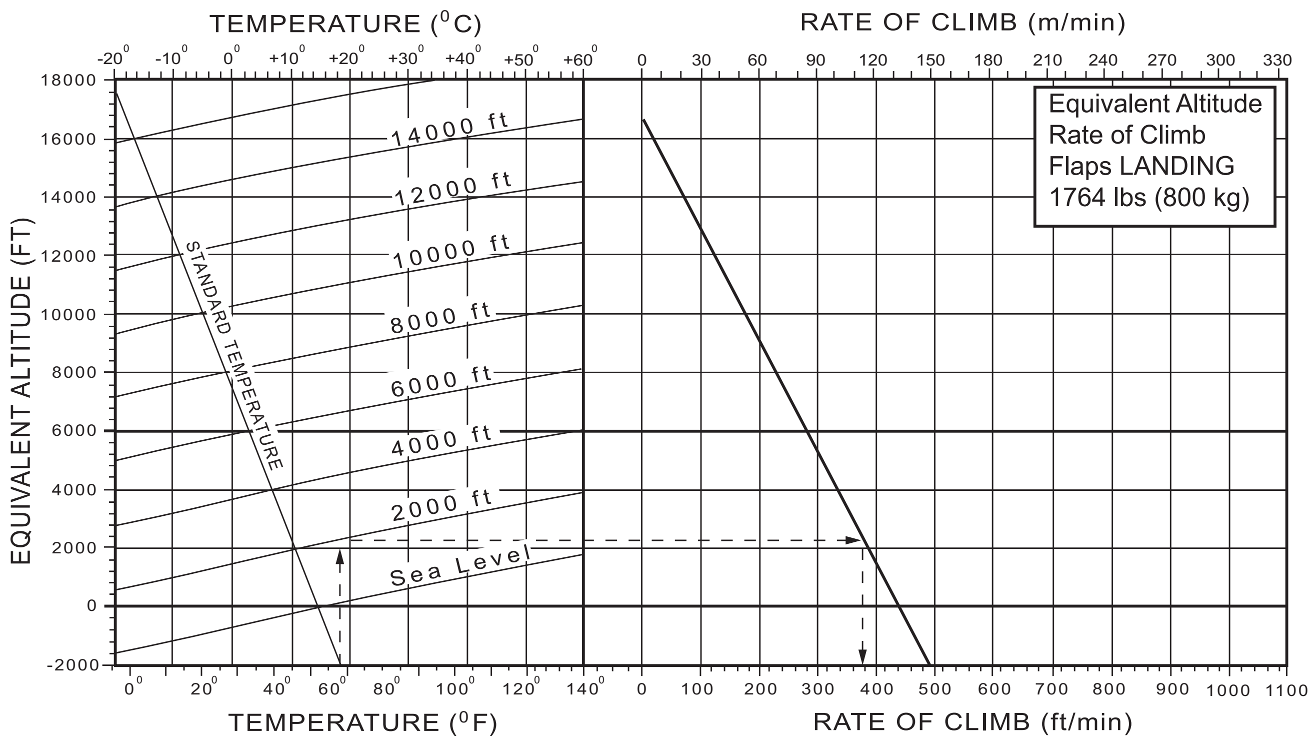
Press Alt ft	RPM	20º C Below Standard Temp			Standard Temperature			10º C Above Standard Temp		
		%bhp	KTAS	GPH	%bhp	KTAS	GPH	%bhp	KTAS	GPH
10,000	2800	64	123	6.1	63	125	6	61	127	5.9
	2750	61	121	5.9	60	123	5.8	59	124	5.7
	2700	58	119	5.6	57	120	5.5	56	122	5.5
	2650	55	116	5.4	54	118	5.3	53	119	5.3
	2600	53	114	5.2	51	115	5.1	51	117	5.1
12,000	2800	61	123	5.8	60	125	5.8	59	127	5.7
	2750	58	121	5.6	57	123	5.6	56	124	5.5
	2700	55	118	5.4	54	120	5.4	53	122	5.3
	2650	53	116	5.2	52	118	5.2	51	119	5.1

5.3.11 Climb Performance / Balked Landing

Conditions: Speed = 52 KIAS
Wing Flaps in Landing Position (LDG)
maximum take-off power

CAUTION

IN AIRPLANE OPERATIONS WITHOUT THE OPTIONAL WHEEL FAIRINGS INSTALLED, THE CLIMB PERFORMANCE IS REDUCED BY APPROXIMATELY 3%.



Example: Pressure altitude: .... 2000 ft
Outside temperature: .... 70º F

Result: Climb performance during balked landing: ...... 374 ft/min

Figure 5.8 - Climb Performance / Balked Landing

5.3.12 Landing Distance

Conditions:
- Throttle at Idle
- Maximum T/O Weight
- Approach Speed .... 55 KIAS
- Level Runway, paved
- Wing Flaps in Landing position (LDG)
- Standard Setting, MSL

Landing distance over a 50 ft (15 m) obstacle: .... approx. 1360 ft (414m)
Landing roll distance: .... approx. 661 ft (201m)

Table 4 - Landing and Rolling Distances for Heights Above MSL

Height above MSL	ft.	0	1000	2000	3000	4000	5000	6000	7000
	(m)	(0)	(305)	(610)	(914)	(1219)	(1524)	(1829)	(2134)
Landing Distance	ft.	1360	1387	1417	1447	1478	1511	1545	1580
	(m)	(415)	(423)	(432)	(441)	(450)	(461)	(471)	(482)
Landing Roll Distance	ft.	661	680	701	722	744	767	791	815
	(m)	(201)	(207)	(214)	(220)	(227)	(234)	(241)	(248)

NOTE

Poor maintenance condition of the airplane, deviation from the given procedures as well as unfavorable outside conditions (i. e. high temperature, rain, unfavorable wind conditions, slippery runway) could increase the landing distance considerably.

NOTE

Aircraft with ground idle speed set to 1000 RPM, landing distance increased approx. 5% and ground roll increased approx. 7%.

5.4 NOISE DATA

Table 5 - Noise Data

Noise Measurement Method	Noise Value	Maximum Allowable
FAR36 Appendix G	71.7 dBA	75.7 dBA
ICAO Annex 16, Appendix 6 Paragraph 10.4(a)	74.4 dBA	80.1 dBA
ICAO Annex 16, Appendix 6 Paragraph 10.4(b) (EASA Approval)	75.25 dBA	75.25 dBA

CHAPTER 6

WEIGHT AND BALANCE

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6.1 INTRODUCTION

To obtain the performance, flight characteristics and safe operation described in this Flight Manual, the airplane must be operated within the permissible weight and balance envelope as described in Chapter 2. It is the pilot's responsibility to adhere to the weight and balance limitations and to take into consideration the change of the center of gravity (CG) position due to fuel consumption.

The procedure for weighing the airplane and calculating the empty weight CG position are given in this Chapter.

The aircraft is weighed when new and should be weighed again in accordance with applicable air regulations. Empty weight and the center of gravity are recorded in a Weighing Report and in the Weight & Balance Report, included at the back of this manual.

In case of equipment changes, the new weight and empty weight CG position must be determined by calculation or by weighing and must be entered in the Weight & Balance Report. These sample forms are included in this manual and can be used for airplane weighing, calculation of the empty weight CG position, and for the determination of the useful load.

NOTE

After every repair, painting or change of equipment, the new empty weight must be determined as required by applicable air regulations. Weight, empty weight, CG position, and useful load must be entered in the Weight & Balance Report by an authorized personnel.

6.2 AIRPLANE WEIGHING

Pre-weighing conditions:

- equipment must be in accordance with the airplane equipment list
- brake fluid, lubricant (6 US qt / 5.7 liters) and
- unusable fuel, included (2 liters unusable, 3.18 lbs/1.44 Kg)

To determine the empty weight and the empty weight CG position, the airplane must be positioned in the above mentioned pre-weighing condition, with the nose gear and each main gear on a scale. Ensure that the aircraft is level longitudinally and laterally as illustrated in Figures 6.1 and 6.2.

With the airplane correctly positioned, a plumb line is dropped from the leading edge of each wing at the root rib to the floor; join these two points to determine the reference datum (RD). From this line use a suspended plumb line aligned with each landing axle gear to measure the distances X (nose gear), X_{2LH} (left main gear) and X_{2RH} (right main gear).

The following formulas apply:

Finding Empty - Center of Gravity (X_{CG})

Empty Weight: $G = G_1 + G_{2LH} + G_{2RH}$ lbs [kg]

Empty Weight CG Formula:

$$X_{CG} = \frac{(G_1 \times X_1)+(G_{2LH} \times X_{2LH})+(G_{2RH} \times X_{2RH})}{G_1 + G_{2LH} + G_{2RH}}$$

Finding Empty - Weight Moment

Empty-weight Moment: M = Empty Weight (G) x Empty-weight CG (X_{CG})

CAUTION

ITEMS FORWARD OF THE REFERENCE DATUM ARE CONSIDERED TO HAVE A NEGATIVE LEVER ARM. ITEMS AFT OF THE REFERENCE DATUM ARE CONSIDERED TO HAVE A POSITIVE LEVER ARM.

Record the data in the Weighing Report included at the back of this manual.
Figure 6.3, Sample Weighing Report is for reference only.

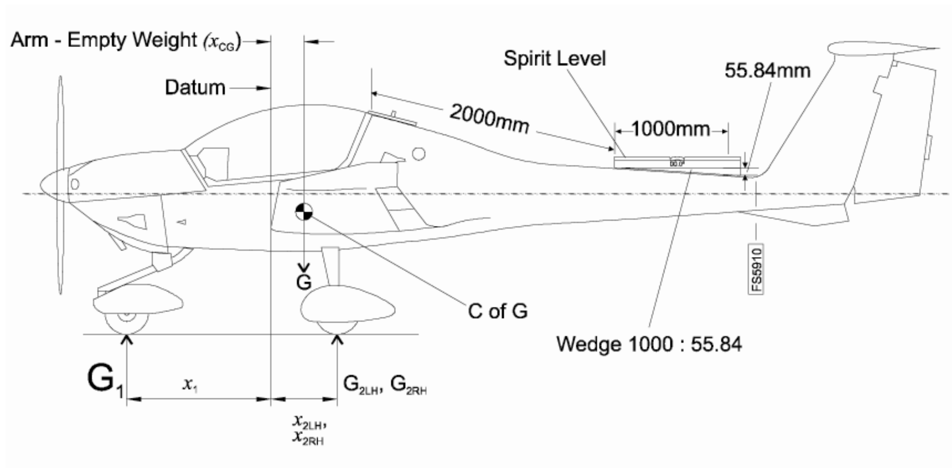


Figure 6.1 - Longitudinal Leveling Diagram

Legend:

X1	Arm - Datum to center line nose wheel
X2	Arm - Datum to C/L main wheels (LH and RH)
G1	Net weight - Nose wheel
G2	Net weight - Main wheels (LH and RH)
G	Empty weight
XCG	Arm - Empty - weight (Calculated)

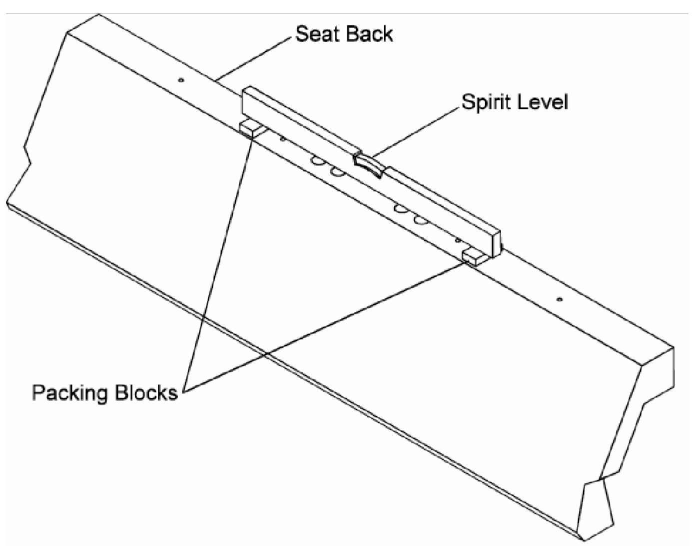


Figure 6.2 - Lateral Leveling Diagram

Model: DA20-C1 Serial Number ____________ Registration ____________

Data with reference to the Type Certificate Data Sheet and the Flight Manual

Reference Datum: Leading edge of wing at root rib.

Horizontal reference line: Wedge 1000:55.84, 2000mm (78.7 in) aft of the step in the fuselage at the canopy edge.

Equipment list - dated ________________ Cause for Weighing __________________________

Weight and Balance Calculations

Weight Condition:

Include brake fluid, engine oil and Unusable fuel (Type 2 system, 2 liters unusable, 3.18 lbs/1.44 Kg)

Finding Empty Weight:

Finding Arm: (Measured)

Support	Gross ([kg]) (lbs)	Tare ([kg]) (lbs)	Net Weight ([kg]) (lbs)
Front G_1			
Rear G_{2LH}			
Rear G_{2RH}			
		EMPTY WEIGHT (G)	

Lever Arm ([m]) (in)
X^1 =
X_{2LH} =
X_{2RH} =

Finding Empty - Center of Gravity (X_{CG})

Empty Weight CG Formula:

$$X_{CG} = \frac{(G_1 \times X_1)+(G_{2LH} \times X_{2LH})+(G_{2RH} \times X_{2RH})}{G_1 + G_{2LH} + G_{2RH}}$$

Finding Empty - Weight Moment

Empty-weight Moment: M = Empty Weight (G) x Empty-weight CG
(Positive results indicate, that CG is located aft of RD) ________________

Finding the Maximum Permitted Useful Load:

Maximum Weight [kg] (lbs)	800 kg/1764 lbs
Empty Weight [kg] (lbs)	
Maximum useful Load [kg] (lbs)	

Empty Weight (G): ([kg]) (lbs)		Empty-weight Moment (M): ([kg.m]) (in.lbs)
Place/Date	Authorizing Stamp	Authorizing Signature

Figure 6.3 - Weighing Report

6.3 WEIGHT AND BALANCE REPORT

The empty weight and Empty Weight CG position data determined prior to delivery of the airplane is the first entry in the Weight and Balance Report. Each change of the installed equipment as well as each repair affecting the empty weight, the CG position of the empty weight or the empty weight moment must be entered in the Weight and Balance Report included at the back of this manual. The following Sample Weight and Balance Report (see Figure 6.4) is for reference only.

Ensure that you are using the latest weight and balance information when performing a weight and balance calculation.

Continuous report of structural changes or change of equipment

DA 20-C1				Serial No.:			Registration:			Page No.:			
				Changes of Weight						Actual			Signature
Date	Entry No.		Description of Part or Modification	Addition (+)			Subtraction (-)			Empty Weight			
	IN	OUT		Weight lbs (kg)	Arm in (m)	Moment in.lbs (kg.m)	Weight lbs (kg)	Arm in (m)	Moment in.lbs (kg.m)	Weight lbs (kg)	Arm in (m)	Moment in.lbs (kg.m)	
			Original										

Figure 6.4 - Sample Weight and Balance Report

6.4 FLIGHT WEIGHT AND CENTER OF GRAVITY

The following data enables the pilot to operate the DA20-C1 within the required weight and center of gravity limitations.

The following diagrams,

Figure 6.5 Loading Plan

Figure 6.6 Weight & Balance Diagram

Figure 6.7 Calculation of Loading Condition

Figure 6.8 Permissible Center of Gravity Range and permissible Flight-Weight-Moment

are to be used for calculations of the flight-weight and the center of gravity as follows:

(a) The empty weight and the empty-weight-moment of the airplane should be taken from the weighing report or from the weight & balance report and entered into the form "Calculation of Loading Condition" (see Figure 6.7) in the columns identified with "Your DA20-C1".

(b) Using the Weight & Balance Diagram (see Figure 6.6) determine the moment for each part to be loaded, and enter it in the respective column in Figure 6.7.

(c) Add the weights and the moments of each column (point 4 and point 6 in Figure 6.7) and enter the sum in Figure 6.8 "Permissible CG Range and Permissible Flight-Weight-Moment" to check if the values are within the permissible limits of the loading range.

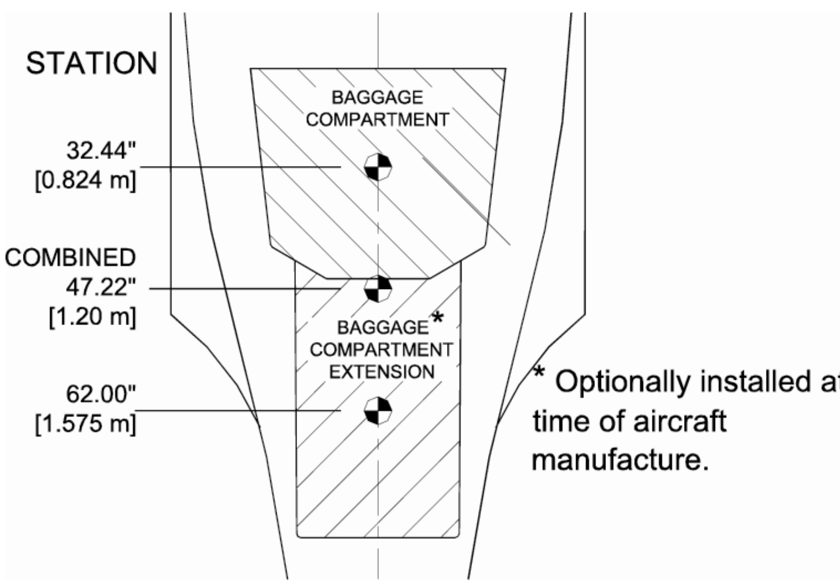
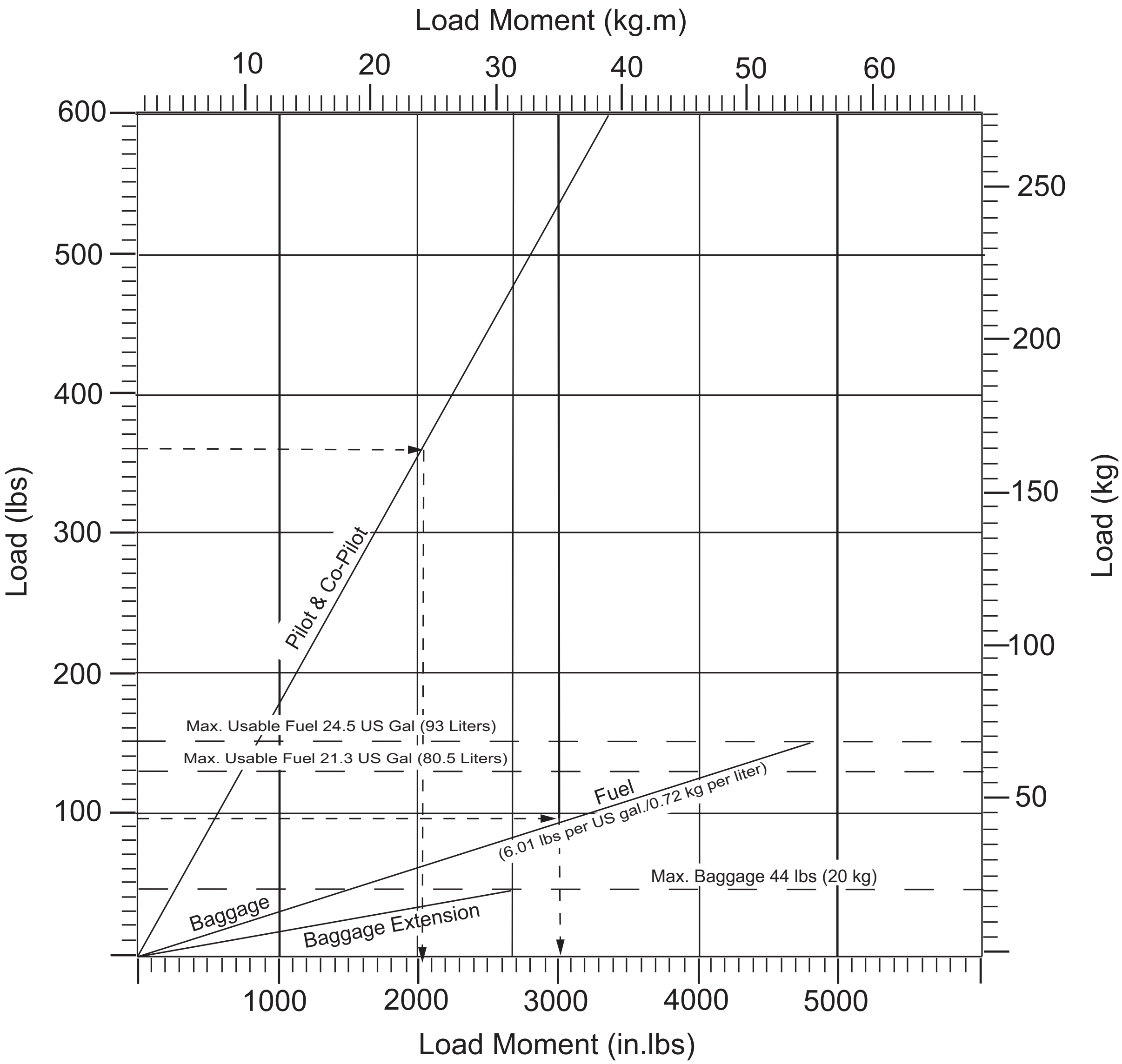


Figure 6.5 - Loading Plan

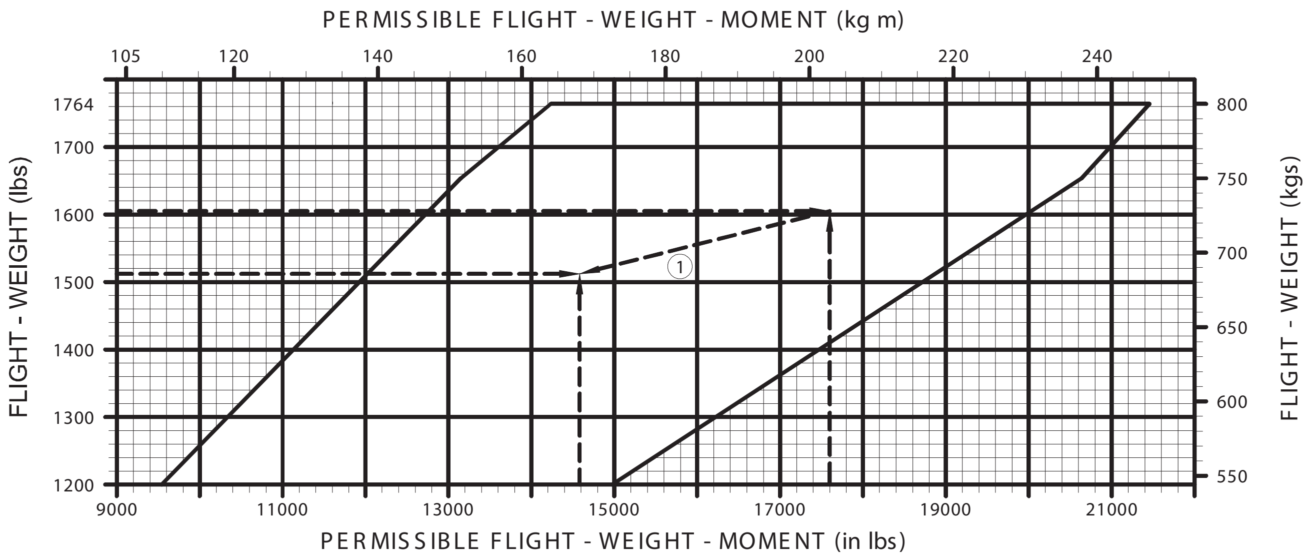


Example:	Pilot and Passenger:	359 lbs. (163 kg)
	Fuel 15.5 US gal. / 58.7 liters:	93 lbs. (42.2 kg)
	(6.01 lbs. per US gal./0.72 kg per liter)	
Result:	Moment of Pilot and Passenger:	2021 in. lbs. (24.4 kgm)
	Moment of Fuel:	3017 in. lbs. (34.8 kgm)

Figure 6.6 - Weight & Balance Diagram

	Calculation of the Load Limits	DA20-C1 (EXAMPLE)		YOUR DA20-C1	
		Weight [lbs] (Weight [kg])	Moment [in.lbs] ([kgm])	Weight [lbs] (Weight [kg])	Moment [in.lbs] ([kgm])
1.	Empty Weight (use the data for your airplane recorded in the equipment list, including unusable fuel and lubricant).	1153 (523)	12562 (144.740)		
2.	Pilot and Passenger: Lever Arm: 5.63 in. (0.143 m)	359 (163)	2021 (23.286)		
3.	Baggage: Max. Wt. 44 lbs (20 kg) Lever Arm: 32.44 in. (0.824 m)	-- (--)	-- (--)		
4.	Baggage Compartment Extension: Max. Wt. 44 lbs (20 kg) Lever Arm: 62.0 in. (1.575 m)	-- (--)	-- (--)		
5.	*Combined Baggage Max. Wt. 44 lbs (20 kg) Lever Arm: 47.22 in. (1.20 m)	-- (--)	-- (--)		
6.	Total Weight and Total Moment with empty fuel tank (sum of 1, 2 and 3), OR (sum of 1, 2 and 4), OR (sum of 1, 2 and 5*) *With the restriction that the total (if (5) is used) does not exceed 44 lbs (20 kg).	1512 (686)	14583 (168.026)		
7.	Usable Fuel Load (6.01 lbs. per US gal./0.72 kg per liter) Lever Arm 32.44 in. (0.824 m)	93 (42.2)	3017 (34.762)		
8.	Total Weight and Total Moment, taking fuel into account (sum of 6. and 7.)	1605 (728.2)	17600 (202.788)		
9.	Find the values for the total weight (1512 lbs and 1605 lbs) and the total moment (14583 in lbs and 17600 in. lbs) in the center of gravity diagram. Since they are within the limitation range, the loading is permissible.				

Figure 6.7 - Calculation of Loading Condition



See an example calculation of loading condition in Figure 6.7. Change in center of gravity is due to fuel consumption

Figure 6.8 - Permissible Center of Gravity Range and Permissible Flight-Weight-Moment

6.5 EQUIPMENT LIST

The following table lists all the equipment available for this airplane. An Equipment Record of items installed in your specific airplane is included in the back of this manual.

The equipment list comprises the following data:

- The item No. containing an ATA Specification 100 reference number for the equipment group and a sequential number.

- Abbreviations:

  A Avionics

  I Instruments

  M Miscellaneous (any equipment other than avionics or instruments)

Weight and lever arm of the equipment items are shown in the columns “Weight” and “Arm”.

NOTE

Additional installation of equipment must be carried out in compliance with the specifications in the Maintenance Manual. The columns “Weight” and “Arm” show the weight and the CG position of the equipment with respect to the reference datum.
A positive value shows the distance aft of the reference datum.
A negative value shows the distance forward of the reference datum.

Equipment List			
Item Number	**Part Description, Manufacturer Part/Model No.**	**Weight lbs (kg)**	**Arm in (m)**
22-001	Autopilot Turn Coordinator/Roll Computer S-TEC 01260-12-0-14	2.2 (1.0)	-16.4 (-0.42)
22-002	Autopilot Pitch Computer S-TEC 01261-54-14	1.1 (0.5)	-27.4 (-0.69)
22-003	Autopilot Roll Servo S-TEC 0105-R2	2.9 (1.3)	43.5 (1.11)
22-004	Autopilot Pitch Servo S-TEC 0107-P4	2.9 (1.3)	43.5 (1.11)
23-001	GPS Antenna King KA 92	0.4 (0.1)	64 (1.63)
23-002	Intercom PS Engineering PM501	0.5 (0.2)	-15.5 (-0.39)
23-003	Nav / Com Bendix/King KX 125	3.9 (1.8)	-20.5 (-0.52)
23-004	VHF Comm Antenna Comant CI 122	0.5 (0.2)	43.5 (1.11)
23-005	Audio Panel Bendix/King KA 134	0.8 (0.4)	-16.4 (-0.42)
23-006	Audio Panel w/ Marker Receiver Bendix/King KMA 24	1.7 (0.8)	-17.2 (-0.44)
23-007	Nav / Com w/ GS Bendix/King KX 155	5.5 (2.5)	-19.5 (-0.49)
23-008	GPS/Comm Bendix/King KLX 135A	4.4 (2.0)	-20.5 (-0.52)
23-009	GPS Antenna Garmin GA56	0.4 (0.1)	64 (1.6)
23-010	GPS Antenna Garmin GPS 150	0.2 (0.1)	-20.5 (-0.52)

Equipment List			
Item Number	**Part Description, Manufacturer Part/Model No.**	**Weight lbs (kg)**	**Arm in (m)**
23-011	Audio Panel w/Marker Receiver PMA 6000	0.8 (0.4)	-17.2 (-0.44)
23-012	Audio Panel Garmin GMA 340	1.0 (0.4)	-20.5 (-0.52)
23-013	Audio Panel Garmin GMA 345	1.0 (0.4)	-20.5 (-0.52)
23-014	Com Bendix/King KY97A	2.8 (1.3)	-20.5 (-0.52)
23-015	Com Icom IC A200 TSO	2.4 (1.1)	-20.5 (-0.52)
23-016	Com GARMIN AT SL 40	2.1 (0.95)	-20.5 (-0.52)
24-001	Ammeter VDO 190-031SB2	0.2 (0.1)	-16.4 (-0.42)
24-002	EPU Kit (S/N C0001-C0148, C0150) Diamond Service Bulletin # DAC1-24-02	4.5 (2.0)	45.6 (1.16)
24-003	Battery, GIL G-35M Diamond Service Bulletin # DAC1-24-03	26.3 (11.9)	57.5 (1.46)
24-004	Battery, standard C0001-C0148, C0150 Yuasa Y50N18L-A-CX	15.3 (6.9)	57.5 (1.46)
	Battery, standard (S/N C0149, C0151 onwards) Yuasa Y50N18L-A-CX	15.3 (6.9)	-35 (-0.89)
24-005	EPU Installation (S/N C0149, C0151 onwards) Diamond Service Bulletin # DAC1-24-06”	2.6 (1.2)	-23.6 (-0.6)
24-006	Battery, B&C Specialty Products BC100-1 (S/N C0001 to C0148, C0150)	22.5 (10.2)	56 (1.42)
24-007	Voltmeter VDO 332-041-SB2	0.3 (0.1)	-16.4 (-0.42)
24-008	Ammeter 22-2430-02-00	0.3 (0.14)	-17.4 (-0.44)

Equipment List			
Item Number	**Part Description, Manufacturer Part/Model No.**	**Weight lbs (kg)**	**Arm in (m)**
24-009	Voltemeter 22-2430-01-00	0.3 (0.14)	-17.4 (-0.44)
25-001	Emergency Locator Transmitter EBC 502	2.8 (1.3)	44.8 (1.14)
25-002	Seat Cushion, standard RH 22-2510-20-00 , LH 22-2510-19-00	4.5 (2.1)	12 (0.30)
25-003	Seat Cushion, leather RH 22-2510-10-00 , LH 22-2510-09-00	5.6 (2.6)	12 (0.30)
25-004	Fire Extinguisher AMEREX A620	2.3 (1.0)	28 (0.71)
25-005	ELT Installation Artex ELT-200 (Includes ELT, Antenna, Remote Switch and Harness)	3.2 (1.5)	158.0 (4.0)
25-006	ELT Installation Artex ME406 (Includes ELT, Antenna, Remote Switch and Harness)	3.7 (1.68)	40.3 (1.02)
27-001	Flap Control Module 22-2753-00-00	0.12 (0.05)	-19.4 (-0.49)
28-001	Fuel Quantity Indicator 22-2840-00-00	0.2 (0.1)	-16.4 (-0.42)
28-002	Auxiliary Fuel Quantity Indicator VDO 301-035	0.2 (0.1)	-16.4 (-0.42)
28-003	Fuel Quantity Indicator 22-2840-01-00	0.25 (0.11)	-17.4 (-0.44)
31-001	Hour Meter Hobbs 85000	0.5 (0.2)	-15.5 (-0.39)
31-002	Chronometer Davtron M800	0.2 (0.1)	-15.5 (-0.39)
31-003	Chronometer Davtron M803	0.3 (0.1)	-15.5 (-0.39)
32-001	Wheel Fairing, Main Gear RH 22-3210-06-00 tLH 22-3210-05-00	2.7 (1.2)	27.6 (0.70)

Equipment List			
Item Number	**Part Description, Manufacturer Part/Model No.**	**Weight lbs (kg)**	**Arm in (m)**
32-002	Wheel Fairing, Nose Gear 20-3220-13-00	2.7 (1.2)	-44.8 (-1.14)
33-001	Recognition Light Kit Diamond Service Bulletin # DAC1-33-01	2.5 (1.1)	0 0
33-002	Light Dimmer Module White Wire WW-LCM 001	0.6 (0.3)	16.4 (-0.42)
33-003	Flood Light Aero Enhancements	0.6 (0.3)	-16.4 (-0.42)
33.004	Light Dimmer Assembly 22-3313-00-00	0.15 (0.7)	-21.4 (-0.54)
34-001	Encoder SSD 120-20	0.8 (0.4)	-22.5 (-0.57)
34-002	Encoder SSD 120-30	0.6 (0.3)	-22.5 (-0.57)
34-002a	Encoder SSD 120-30N	0.4 (0.2)	-20.0 (-0.51)
34-003	Nav Indicator King KI 208	1.1 (0.5)	-16.4 (-0.42)
34-004	Outside Air Temperature Indicator (F) Davtron 301F	0.5 (0.2)	-15.5 (-0.39)
34-005	Outside Air Temperature Indicator (C) Davtron 301C	0.5 (0.2)	-15.5 (-0.39)
34-006	Transponder Bendix/King KT 76A	3.0 (1.4)	-20.5 (-0.52)
34-007	GPS Garmin GPS150	2.1 (1.0)	-20.5 (-0.52)
34-008	GPS Bendix/King KLN 35A	2.1 (1.0)	-20.5 (-0.52)
34-009	Nav Indicator King KI 209	1.2 (0.5)	-17.4 (-0.44)

Equipment List			
Item Number	**Part Description, Manufacturer Part/Model No.**	**Weight lbs (kg)**	**Arm in (m)**
34-010	Transponder Antenna KA 60	0.2 (0.1)	54.1 (1.37)
34-011	Altimeter United 5934PD3	0.9 (0.4)	-16.4 (-0.42)
34-012	Compass Airpath C2300L4	0.8 (0.3)	-15 (-0.38)
34-013	Turn Coordinator EGC 1394T100-7Z	1.2 (0.5)	-16.4 (-0.42)
34-013a	Turn Coordinator MCI 1394T100-7B	1.4 (0.6)	-16.4 (-0.42)
34-014	Airspeed Indicator United 8000B800	0.7 (0.3)	-16.4 (-0.42)
34-015	Vertical Speed Indicator United 7000	0.8 (0.4)	-16.4 (-0.42)
34-016	Artificial Horizon Sigma Tek 23-501-06-16	2.0 (0.9)	-16.4 (-0.42)
34-017	Artificial Horizon Sigma Tek 23-501-035-5	2.3 (1.0)	-16.4 (-0.42)
34-018	Directional Gyro Sigma Tek 1U262-001-39	2.6 (1.2)	-16.4 (-0.42)
34-019	Directional Gyro Sigma Tek 1U262-007-40	2.7 (1.2)	-16.4 (-0.42)
34-020	Vacuum Gauge Varga 5001	0.3 (0.1)	-16.4 (-0.42)
34-021	Chronometer Marker Beacon Antenna Davtron M800KA 26	0.25 (0.1)	-153.6 (-3.90)
34-022	Transponder Antenna Bendix/King KA60	0.2 (0.1)	-38.5 (-0.98)
34-023	Transponder Garmin GTX320	1.6 (0.7)	-18.0 (-0.46)

Equipment List			
Item Number	**Part Description, Manufacturer Part/Model No.**	**Weight lbs (kg)**	**Arm in (m)**
34-024	Transponder Bendix/King KT76C	3.0 (1.3)	-20.5 (-0.52)
34-025	Digital Transponder Garmin GTX 327	2.2 (1.0)	-20.5 (-0.52)
34-026	GPS/Nav/Com Garmin GNS 430	6.5 (3.0)	-20.5 (-0.42)
34-027	GPS/Com Garmin GNC 420	5.8 (2.6)	-20.5 (-0.42)
34-028	GPS/Com Garmin GNC 300XL	3.4 (1.5)	-20.5 (-0.42)
34-029	TCAD (Traffic Collision Alerting Device) Ryan 8800 Gold	3.6 (1.6)	-20.5 (-0.42)
34-030	CDI Garmin GI106A	1.4 (0.6)	-17.4 (-0.44)
34-031	GPS/Nav/Com Garmin GNS 530	8.5 (3.8)	20.5 (0.42)
34-032	Traffic Advisory System Processor Avidyne 70-2420-7 TAS600	6.8 (3.1)	55.5 (1.41)
34-033	Traffic Advisory System Processor Avidyne 700-00185-000 TAS600A	6.8 (3.1)	55.5 (1.41)
34-034	Traffic Advisory System Processor Avidyne 700-00185-001 TAS605A	6.8 (3.1)	55.5 (1.41)
34-035	Traffic Advisory System Processor Avidyne 700-00185-003 TAS615A	6.8 (3.1)	55.5 (1.41)
34-036	Traffic Advisory System Processor Avidyne 700-00185-004 TAS620A	6.8 (3.1)	55.5 (1.41)
34-037	Traffic Advisory System Antenna, Top Sensor Systems S72-1750-31L	0.66 (0.3)	64.6 (1.64)
34-038	Traffic Advisory System Antenna, Bottom Sensor Systems S72-1750-32L	0.75 (0.3)	7.9 (0.20)

Equipment List			
Item Number	**Part Description, Manufacturer Part/Model No.**	**Weight lbs (kg)**	**Arm in (m)**
34-039	Traffic Advisory System Transponder Coupler Avidyne 70-2040	0.5 (0.2)	56.7 (1.44)
34-040	Digital Transponder Garmin GTX 328	4.2GHreat (1.9)	-20.5 (-0.52)
34-041	Intercom System PS Engineering Incorporated PM 1000	0.75 (0.3)	-15.5 (-0.39)
34-042	Artificial Horizon Indicator Mid Continent	1.6 (0.7)	-20.5 (-0.52)
34-043	Garmin Display Unit (GDU) 620 (PFD/MFD) Garmin G500	6.4 (2.9)	-20.5 (-0.52)
34-044	Garmin Data Computer (GDC) 74A (Air Data Computer) Garmin G500	1.6 (0.7)	-15.0 (-0.38)
34-045	Garmin Reference System (GRS) 77 [(Attitude and Heading Reference System (AHRS)] Garmin G500	2.8 (1.27)	63.0 (1.6)
34-046	Garmin Magnetometer Unit (GMU) 44 Garmin G500	0.35 (0.2)	110.2 (2.8)
34-047	Outside Air Temperature (OAT) Probe Garmin GTP 59	0.05 (0.02)	-23.5 (-0.60)
34-048	GPS/Nav/Comm Garmin GTN 650	4.2 (1.9)	-21.5 (-0.54)
34-049	Comm Garmin GTR 225	2.36 (1.07)	-21.5 (-0.54)
34-050	Artificial Horizon Mid Continent 4300-206	2.5 (1.13)	-17.4 (-0.44)
61-002	Propeller and Spinner Sensenich W69EK-63	11.9 (5.4)	-60.8 (-1.54)
61-003	Propeller and Spinner Sensenich W69EK7-63 and W69EK7-63G	12.7 (5.7)	-60.8 (-1.54)
61-004	Propeller and Spinner Sensenich W69EK7-63GM	13.0 (5.9)	-60.8 (-1.54)

Equipment List			
Item Number	**Part Description, Manufacturer Part/Model No.**	**Weight lbs (kg)**	**Arm in (m)**
71-001	Heater Tanis TAS100-29	1.1 (0.5)	45.5 (1.16)
71-002	Winter Kit Diamond Service Bulletin # DAC1-71-01	0.4 (0.2)	-33.5 (-0.85)
73-001	Fuel Pressure Indicator 22-7330-00-01	0.3 (0.1)	-15.5 (-0.39)
73-002	Fuel Pressure Indicator 22-7330-03-00	0.3 (0.14)	-17.4 (-0.44)
77-001	Cylinder Head Temp. Indicator 22-7720-00-00	0.3 (0.1)	-16.4 (-0.42)
77-002	RPM Indicator 22-7710-20-00 or Mitchell CD-122-4020	0.8 (0.4)	-16.4 (-0.42)
77-003	RPM Indicator – Recording Superior Labs SL1010-55000-13-N00	0.8 (0.4)	-16.4 (-0.42)
77-004	Vision Microsystems VM-1000 4010050 Main Display	0.8 (0.4)	-16.4 (-0.42)
77-005	Vision Microsystems VM-1000 4010320 Fuel Display	0.2 (0.1)	-16.4 (-0.42)
77-006	Vision Microsystems VM-1000 4010055 EC 100	0.7 (0.3)	-16.4 (-0.42)
77-007	Vision Microsystems VM-1000 4010066 Data Processing Unit	1.3 (0.6)	-20 (-0.51)
77-008	Lighted RPM Indicator – Recording Superior Labs SL1010-5503-13-H03	0.7 (0.3)	-16.4 (-0.42)
78-001	EGT Indicator 22-7720-00-02	0.3 (0.1)	-15.5 (-0.39)
78-002	EGT Indicator 22-7720-04-00	0.25 (0.11)	-17.4 (-0.44)
78-003	CHT Indicator 22-7720-03-00	0.25 (0.11)	-17.4 (-0.44)

Equipment List			
Item Number	**Part Description, Manufacturer Part/Model No.**	**Weight lbs (kg)**	**Arm in (m)**
79-001	Oil Pressure Kit (Indicator only) 22-7930-10-00	0.3 (0.1)	-16.4 (-0.42)
79-002	Oil Temperature Indicator 22-7930-00-01	0.3 (0.1)	-16.4 (-0.42)
79-003	Oil Temperature Indicator 22-7931-02-00	0.25 (0.11)	-17.4 (-0.44)
79-004	Oil Pressure Indicator 22-7930-04-00	0.25 (0.11)	-17.4 (-0.44)

DA20-C1 List of Equipment

Original

Diamond

Aircraft Serial No.:	C0193
Registration:	N293DC
Issue date:	13 JULY 2002

Aircraft Specific Equipment Record

Item No.	Equipment List Description	Part/Model No.	Serial No.	Installd	Rmvd	Weight lbs	Weight kg	Arm in	Arm m
	Avionics			✔	✔				
	GPS Antenna	Garmin GA56		X		0.4	0.1	+64.0	+1.63
	Marker Beacon Antenna	CI 102		X		0.5	0.2	+13.6	+0.35
34-010	Transponder Antenna	KA60		X		0.2	0.1	+54.1	+1.37
34-001	Encoder	SSD 120-20	A51214	X		0.8	0.4	-22.5	-0.57
34-002	Encoder	SSD 120-30				0.6	0.3	-22.5	-0.57
34-003	Nav Indicator	King KI 208				1.1	0.5	-16.4	-0.42
34-009	Nav Indicator	King KI 209				1.2	0.5	-17.4	-0.44
34-004	Outside Air Temperature(F), Davtron	301F				0.5	0.2	-15.5	-0.39
34-005	Outside Air Temperature(C), Davtron	301C				0.5	0.2	-15.5	-0.39
31-002	Chronometer	Davtron M800				0.2	0.1	-15.5	-0.39
	Chronometer	Davtron M803	02647	X		0.3	0.1	-15.5	-0.39
23-002	Intercom	PS Engineering PM501				0.5	0.2	-15.5	-0.39
23-006	Audio Panel w/ Marker Receiver	Bendix/King PMA 6000				0.8	0.4	-17.2	-0.44
	Audio Panel	GMA 340	96261237	X		1.0	0.45	-20.5	-0.52
	Digital Transponder	GTX 327	83709968	X		2.24	1.02	-16.4	-0.42
34-007	GPS	Garmin GPS150				2.1	1.0	-20.5	-0.52
	GPS Nav/Com	Garmin GNS 430	97108974	X		6.5	3.0	-20.5	-0.52
25-001	Emergency Locator Transmitter	EBC 502	206789	X		2.8	1.3	+44.8	+1.14
23-004	VHF Comm Antenna	Comant CI 122		X		0.5	0.2	+43.5	+1.11
	TCAD	Ryan 8800 Gold				3.63	1.63	-20.50	-0.52
	Antenna	GTX340				0.2	0.1	+54.1	+1.37
	Instruments								
34-011	Altimeter	United 5934PD3		X		0.9	0.4	-16.4	-0.42
34-012	Compass	Airpath C2300L4		X		0.8	0.3	-15.0	-0.38
34-013	Turn Coordinator	EGC 1394T100-7Z		X		1.2	0.5	-16.4	-0.42
24-001	Ammeter	VDO 190-031SB		X		0.2	0.1	-16.4	-0.42
78-001	EGT Indicator	22-7720-00-02		X		0.3	0.1	-15.5	-0.39
73-001	Fuel Pressure Indicator	22-7330-00-01		X		0.3	0.1	-15.5	-0.39
77-001	Cylinder Head Temp. Indicator	22-7720-00-00		X		0.3	0.1	-16.4	-0.42
28-001	Fuel Quantity Indicator	22-2840-00-00		X		0.2	0.1	-16.4	-0.42
79-001	Oil Pressure Indicator	22-7930-00-03		X		0.3	0.1	-16.4	-0.42
79-002	Oil Temperature Indicator	22-7930-00-01		X		0.3	0.1	-16.4	-0.42
34-014	Airspeed Indicator	United 8000B800		X		0.7	0.3	-16.4	-0.42
34-015	Vertical Speed Indicator	United 7000		X		0.8	0.4	-16.4	-0.42
	RPM Lit Indicator - Recording	SL 1010-55003-13-H05	0108	X		0.7	0.3	-16.4	-0.42
31-001	Hour Meter	Hobbs 85000		X		0.5	0.2	-15.5	-0.39
34-016	Artificial Horizon, Sigma Tek	23-501-06-16	T80013N	X		2.0	0.9	-16.4	-0.42
34-018	Directional Gyro, Sigma Tek	1U262-001-39	T64244M	X		2.6	1.2	-16.4	-0.42
34-020	Vacuum Gauge	Varga 5001	13189	X		0.3	0.1	-16.4	-0.42
	CDI - Garmin	GI106A	E22475	X		1.4	0.63	-17.4	-0.44
	Optional								
32-001	Wheel Fairing, Main Gear	RH 22-3210-06-00		X		2.7	1.2	+27.6	+0.70
		LH 22-3210-05-00		X		2.7	1.2	+27.6	+0.70
	Wheel Fairing, Nose Gear	20-3220-13-00		X		2.7	1.2	-44.8	-1.14
25-003	Seat Cushion, Leather, 2 pieces	Leather		X		5.6	2.6	+12.0	+0.31
25-004	Fire Extinguisher	AMEREX A620		X		2.3	1.0	+32.3	+0.90
61-002	Propeller and Spinner, Sensenich	W69EK7-63G	AE 9172	X		12.7	5.8	-60.8	-1.54
24-002	EPU Kit, Diamond	S/B# DAC1-24-02		X		4.5	2.0	+45.6	+1.16
	Cooling Fan 14 Volt	Cyclone-21		X		0.8	0.36	-23.62	-17.72
24-004	Battery, standard	Yuasa Y50N18L-A-CX		X		15.3	6.9	+57.5	+1.46
71-001	Tanis Heater	TAS100-29				1.1	0.5	+45.5	+1.16
71-002	Winter Kit, Diamond	22-7130-61-00				0.4	0.2	-33.5	-0.85
	Large Oil Cooler	DAC1-79-01-AMKO		X		3.8	1.73	-38.4	-0.97
	Starter	BC 320-1		X		10.5	4.76	-32.0	-0.8
	Upper Glare Shield	20-3910-09-01		X		2.3	1.04	-20.5	-0.52
	Inertia Reels	504858-403-2251		X		4.5	2.0	+23.6	+0.60

Place:	Date:	Authorizing Stamp	Authorizing Signature
DAIC - CYXU	13 July 2002	DA Q 9	Mike Skoczen Mike Skoczen

DSC-EL-002
August 28th, 2001

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Model: DA20-C1 Katana

Original

Diamond

Aircraft Specific Weighing Report

Aircraft Serial No.:	C0193
Registration:	N293DC
Issue date:	13 July 2002

Data with reference to the Type Certificate Data Sheet and the Flight Manual.

Reference Datum: Leading edge of wing at root rib.
Horizontal reference line: Wedge 1000:55.84, 2000mm (78.7 in) aft of the step in the fuselage at the canopy edge.

Equipment list – Dated 13 July 2002 Cause for Weighing: Original

Weight and Balance Calculations

Weight Condition:

Include brake fluid, engine oil and Unusable fuel (Type 1 system, 14.5 liters unusable, 10.2 kg (22.5 lbs))
(Type 2 system, 2 liters unusable, 1.44 kg (3.18 lbs))

Finding Empty Weight:

Support	Gross lbs	Tare lbs	Net Weight lbs
Front G			284
Rear G_{LH}			466
Rear G_{RH}			460
		EMPTY WEIGHT (G)	1210

Finding Arm: (Measured)

Lever Arm m (in)
X = 42.5
X_{LH} = 23.0
X_{RH} = 23.25

Finding Empty - Weight Center of Gravity (X_{CG}):

Empty Weight CG Formula

$$X_{CG} = \frac{G_{LH}(X + X_{LH}) + G_{RH}(X + X_{RH})}{G + G_{LH} + G_{RH}} - X = 7.72$$

Finding Empty - Weight Moment

Empty-weight Moment (M) = Empty Weight (G) x Empty-weight CG (X_{CG}) = 9341.20

(Positive results indicate, that CG is located aft of RD)

Finding Maximum Permitted Useful Load:

Maximum Weight kg (lbs)	1720 lbs US, 1653 lbs CDN
Empty Weight kg (lbs)	1210 lbs
Maximum useful Load kg (lbs)	510 lbs

Empty Weight (G): **1210 lbs**		**Empty-weight Moment (M):** **9341.2 in lbs**
Place: D.A.I.C. – CYXU Date: 13 July, 2002	Authorizing Stamp DA Q 9	Authorizing Signature Mike Skoczen Mike Skoczen

DSC-W&B-002
October 2nd, 2001

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AlpineAviation

13310 Nevada City Ave.
Grass Valley, CA 95945
tel: 530-477-7701
fax: 530-477-7764

Aircraft weight & balance report

REGISTRATION: N293DC **DATE:** May 28, 2004

MAKE & MODEL: Diamond Aircraft, DA20-C1 **SERIAL #** C0193

WORK ORDER #: 922 **TACH:** 500.3

Previous Weight & Balance record:		
Date:	July 13, 2002	
EW:	1210	lbs.
EWCG:	7.72	inches aft
EW Moment:	9341.2	in lbs
Useful load:	560	lbs.

Max Ramp Weight	
1770	lbs

ITEM	item #	WEIGHT	ARM	MOMENT
Installed:				
Garmin GNC 420	34-027	5.80	-20.50	-118.90
TOTAL		5.80		-118.90

Superseded 12-18-15

Aircraft empty weight		1215.80		
Aircraft empty weight CG			7.59	
Aircraft moment				9222.30
Max takeoff weight		1770.00		
Useful load		554.20		

Weight & Balance computed by:

[signature]

Gordon K. Mills
May 28, 2004

Certificate No. 565905256 IA

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AlpineAviation

13310 Nevada City Ave.
Grass Valley, CA 95945
tel: 530-477-7701
fax: 530-477-7764

Aircraft Weight & Balance Report

REGISTRATION:	**M293DC**	**DATE:**	**December 18, 2015**
MAKE & MODEL:	**Diamond DA20 C1**	**SERIAL #:**	**C0193**
INVOICE #:	**24386**	**TACH:**	**3951.1**

Previous Weight & Balance record:	
Date:	May 28, 2004
EW:	1215.80
EWCG:	7.59
EW Moment:	9222.30
Useful load:	554.20

Max Takeoff Weight	
1770.0	lbs

ITEM	WEIGHT	ARM	MOMENT
Removed:			
Directional Gyro, Model 4000B	-2.70	-16.40	44.28
Vertical speed indicator, United Inst 7000	-0.80	-16.40	13.12
Installed:			
Aspen Avionics EFD1000 PFD	2.90	-16.40	-47.56
Remote Sensor Module	0.50	72.00	36.00
TOTAL	-0.10	22.80	45.84

Aircraft empty weight	1215.70		
Aircraft empty weight CG		7.62	
Aircraft moment			9268.14
Max takeoff weight	1770.00		
Useful load	554.30		

Weight & Balance computed by:
A&P 3050937
December 18, 2015

Superseded 2-13-18

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AlpineAviation

13310 Nevada City Ave.
Grass Valley, CA 95945
tel: 530-477-7701
fax: 530-477-7764

Aircraft Weight & Balance Report

REGISTRATION:	**N293DC**	**DATE:**	**February 13, 2018**
MAKE & MODEL:	**Diamond DA20-C1**	**SERIAL #:**	**C0193**
INVOICE #:	**26116**	**TACH:**	**4642.9**

Previous Weight & Balance record:	
Date:	December 18, 2015
EW:	1215.70
EWCG:	7.62
EW Moment:	9268.14
Useful load:	554.30

Max Takeoff Weight	
1770	lbs

ITEM	WEIGHT	ARM	MOMENT
Removed:			
Garmin GTX327 Transponder s/n 83709968.	-2.24	-16.40	36.74
Installed:			
L3 Lynx NGT-9000D ADS-B Transponder s/n LXE11593.	2.96	-18.60	-55.06
L3 PIM-9000 PED Wi-Fi Module s/n 1795	0.10	-15.00	-1.50
TOTAL	0.82		-19.82

REVISED 4-19-2022

Aircraft empty weight	1216.52		
Aircraft empty weight CG		7.60	
Aircraft moment			9248.32
Max takeoff weight	1770.00		
Useful load	553.48		

Weight & Balance computed by:
February 13, 2018

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13310 Nevada City Ave.
Grass Valley, CA 95945
tel: 530-477-7701
fax: 530-477-7764

ALPINE AVIATION

Aircraft Weight & Balance Report

REGISTRATION:	**N293DC**	**DATE:**	**April 19, 2023**
MAKE & MODEL:	**Diamond DA20 C1**	**SERIAL #:**	**C0193**
INVOICE #:	**23-2116**	**TACH:**	**5764.0**

Previous Weight & Balance record:	
Date:	February 13, 2018
EW:	1216.52
EWCG:	7.60
EW Moment:	9248.32
Useful load:	553.48

Max Takeoff Weight	
1770	lbs

ITEM	WEIGHT	ARM	MOMENT
Removed:			
Garmin GNS 430W, sn 97108974	-5.10	-20.50	104.55
Installed:			
Avidyne, IFD 440, sn M224561046	5.16	-20.50	-105.78
TOTAL	0.06		-1.23

Aircraft empty weight	1216.58		
Aircraft empty weight CG		7.60	
Aircraft moment			9247.09
Max takeoff weight	1770.00		
Useful load	553.42		

Weight & Balance computed by:
[signature]
April 19, 2023

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CHAPTER 7

DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

TABLE OF CONTENTS

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7.1 INTRODUCTION

Chapter 7 provides a description and operation of the airplane and its systems. Refer to Chapter 9, Supplements, for details of optional systems and equipment.

7.2 AIRFRAME

7.2.1 Fuselage

The GFRP-fuselage is of semi-monocoque construction. The fire protection cover on the fire wall is made from a special fire retarding ceramic fiber that is covered by a stainless steel plate on the engine side. The main bulkhead is of CFRP/GFRP construction.

The instrument panel is made of aluminum.

7.2.2 Wings

The GFRP-wings are of semi-monocoque sandwich construction, and contain a CFRP-spar. The ailerons and flaps are made from CFRP and are attached to the wings using stainless steel and aluminum hinges.

The wing-fuselage connection is made with three bolts each. The A- and B- bolts are fixed to the fuselage's root rib. The A-bolt is placed in front of the spar bridge; the B-bolt is near the trailing edge on each side of the fuselage. The two main bolts are placed in the middle of the spar bridge structure. They are accessible behind the seats and are inserted from the front side. A spring-loaded hook locks both bolt handles, securing them in place.

7.2.3 Empennage

The rudder and elevator units are of semi-monocoque sandwich construction. The vertical stabilizer contains a di-pole antenna for the VHF radio equipment. The horizontal stabilizer contains an antenna for the NAV equipment (VOR).

7.3 FLIGHT CONTROLS

The ailerons and elevator are actuated via push rods. The rudder is controlled using control cables. The flaps have three positions, CRUISE, T/O (take-off), LDG (landing), and are electrically operated. The switch is located on the instrument panel. The flap control circuit breaker can be manually ‘tripped’ to disable the flap system. Elevator forces may be balanced using the electric trim system.

7.3.1 Trim System

The Rocker switch is located on center console behind the throttle quadrant. The digital trim indicator is located in the upper instrument panel.

The switch controls an electrical actuator beside the vertical push rod in the vertical stabilizer. The actuator applies a load to compression springs on the elevator pushrod. The trim circuit breaker is located in the circuit breaker panel and can be tripped manually to disable the system.

switch forward = nose down

7.3.2 Flaps

The flaps are driven by an electric motor. The flaps are controlled by a three position flap operating switch on the instrument panel. The three positions of the switch correspond to the position of the flaps. The top position of the switch is used during cruise flight. When the switch is moved to a different position, the flaps move until the selected position is reached. The cruise (fully retracted) and landing (fully extended) positions are equipped with position switches to prevent over-traveling.

The electric flap actuator is protected by a circuit breaker (5 Amp), located on the right side of the instrument panel, which can be manually tripped to disable the system.

7.3.3 Flap Position Indicator

The current flap position is indicated by three control lights beside the flap operating switch.

Wing Flap Position	Light	Degrees
CRUISE	green	0 degrees
T/O	yellow	15 degrees
LDG	yellow	45 degrees

When two lights are illuminated at the same time, the flaps are in-between positions.

7.3.4 Pedal Adjustment

NOTE

The pedals can only be adjusted on the ground.

The pedals for rudder and brakes are unlocked by pulling the T-grip located in front of the rudder pedal sledge tubes.

NOTE

Pull the T-grip straight back. Do not pull upwards.

Forward adjustment: Push both pedals forward with your feet while pulling lightly on the T-grip to disengage the latch.

Backward adjustment: Pull pedals backward to desired position by pulling on the T-grip.

NOTE

After the T-grip is released, push the pedals forward with your feet until they lock in place.

7.3.5 Flight Control Lock

A flight control lock, P/N 20-2770-00-00_1, is provided with each aircraft and should be installed whenever the aircraft is parked. See Figure 1, Installation and Removal of the Control Stick.

CAUTION

FAILURE TO INSTALL THE FLIGHT CONTROL LOCK WHENEVER THE AIRCRAFT IS PARKED MAY RESULT IN CONTROL SYSTEM DAMAGE, DUE TO GUSTS OR TURBULENCE.

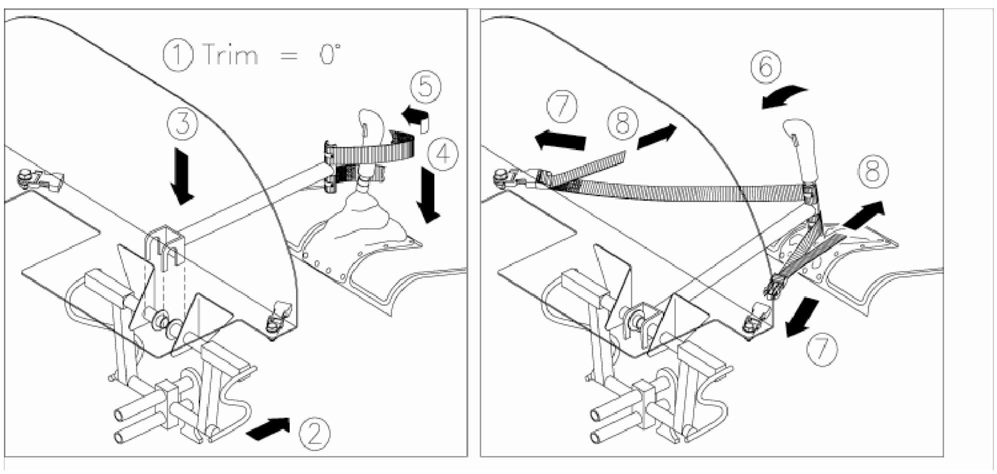


Figure 7.1 - Installation and Removal of the Control Lock

(a) Trim the aircraft to neutral.

(b) Pull the left rudder pedals fully aft and check that they are locked in position.

(c) Hook the Control Lock's forks over the rudder pedal tubes as shown above.

(d) Push down the Control Stick's leather boot to expose the Control Stick tube, and push the Control Stick forward against the Control Lock.

(e) Loop the straps around the Control Stick as shown, and push forward on the Control Stick.

(f) Clip the straps into the left and right buckle receptacles located under the instrument panel.

(g) Adjust the straps as required. Straps should be tight to secure the controls properly.

(h) TO REMOVE, push the Control Stick forward (to relieve strap tension). Unclip the straps and remove the Control Lock. Store in the aircraft's baggage compartment.

7.4 INSTRUMENT PANEL

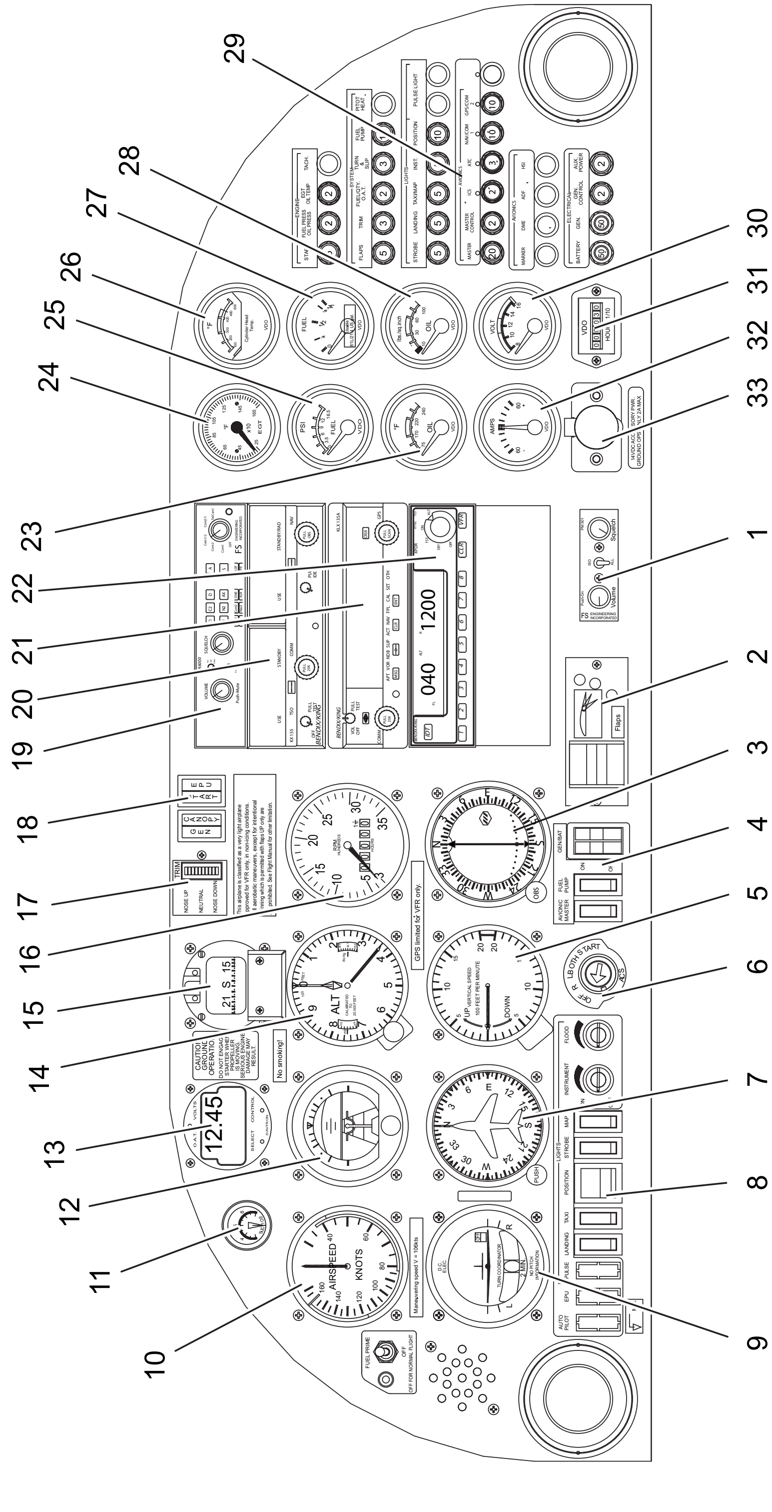


Figure 7.2 - Instrument Panel

Instrument Panel Components - For Figure 7.2

Legend:

1	Intercom	9	Turn Coordinator	22	Transponder
2	Flap Switch	10	Airspeed Indicator	23	Oil Temperature Indicator
3	NAV Indicator	11	Vacuum Gauge	24	Exhaust Gas Temperature
4	Master Switch Panel	12	Artificial Horizon Indicator	25	Fuel Pressure Indicator
	- AVIONICS MASTER	13	Clock	26	Cylinder Head Temperature
	- FUEL PUMP Switch	14	Altimeter	27	Fuel Contents Indicator
	- GEN/BAT Switch	15	Magnetic Compass	28	Oil Pressure Indicator
5	Vertical Speed Indicator	16	RPM Indicator	29	Circuit-Breaker Panel
6	Ignition Switch	17	Trim Indicator	30	Voltmeter
7	Directional Gyro	18	Annunciator Lights	31	Engine Operated Hour Meter
8	Light Switch Panel	19	Auto Selector	32	Ammeter
	- Optional Switch*	20	NAV/COM GPS	33	Accessory Jack
	- STROBE Light Switch	21	Transceiver		
	- LANDING Light Switch				
	- TAXI Light Switch				
	- POSITION Light Switch				

<u>NOTE:</u> Optional Switch* can be one of the following:

- Auto Pilot
- Pulse Lights
- EPU
- MAP Light
- INSTRUMENT Light
- FLOOD Light

7.4.1 Flight Instruments

The flight instruments are installed on the pilot's side of the instrument panel.

7.4.2 Cabin Heat

The cabin heat and defrost system, directs ram air through the exhaust heat shroud into the cabin heat valve. The warm air is then directed to the window defrosting vents and to the cabin floor as selected by the Floor/Defrost lever.

The cabin heat selector, located in the center console, is used to regulate the flow of heated air.
Lever down = cabin heat FULL ON

The Floor/Defrost lever directs the heated air to the defrost and floor vents.
Lever down = all cabin heat to Floor

7.4.3 Cabin Air

The cabin aeration is controlled by two adjustable air-vent nozzles. The two sliding windows in the canopy can be opened for additional ventilation.

7.5 LANDING GEAR SYSTEM

The landing gear system consists of the two main landing gear wheels mounted to aluminum spring struts and a 60° castering nose wheel. The suspension of the nose wheel is provided by an elastomer spring.

The wheel fairings for the landing gear are removable. When flying without wheel fairings, it should be noted that there is a reduction in some areas of performance (refer to Chapter 5).

7.5.1 Wheel Brakes

CAUTION

WHEN PLACING YOUR FEET ON THE BRAKE PEDALS, CARE SHOULD BE TAKEN TO USE ONLY THE TOE OF YOUR SHOE SO YOU DO NOT CONTACT THE STRUCTURE ABOVE THE PEDALS, WHICH COULD PREVENT EFFECTIVE APPLICATION OF THE BRAKE(S).

Hydraulically operated disc brakes act on the wheels of the main landing gear. The wheel brakes are operated individually using the toe-brake pedals either on the pilot's or on the copilot's side. If either the left or right wheel brake system on the pilot’s side fail, the co-pilot’s brakes fail too. If the co-pilots brake master cylinder or input lines to the pilots master cylinder fails the pilots brakes will still operate.
See Figure 7.3, Brake System Schematic Diagram.

7.5.2 Parking Brake

The Parking Brake knob is located on the center console in front of the throttle quadrant, and is pushed up when the brakes are to be released. To set the parking brake, pull the knob down to the stop. Repeated pushing of the toe-brake pedals will build up the required brake pressure, which will remain in effect until the parking brake is released.

To release the parking brake, push on the toe-brake pedals before releasing the parking brake knob.

NOTE

When parking the aircraft for longer than 12 hours place wheel chocks in front of and behind the main landing gear wheels. Tie down ropes should also be used if you are uncertain of favourable climatic conditions for the duration of the park.

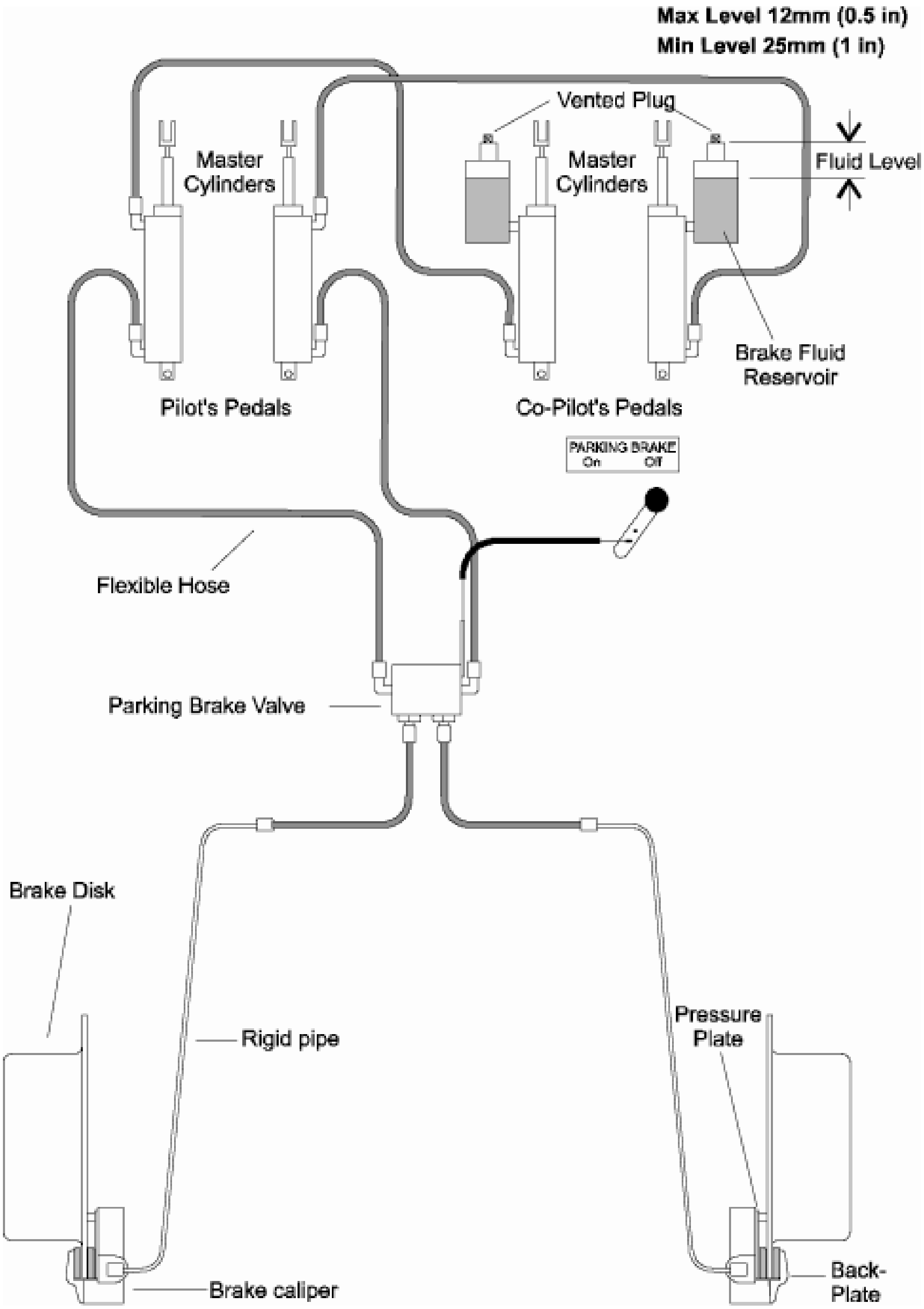


Figure 7.3 - Brake System Schematic Diagram

7.6 SEATS AND SAFETY BELTS

The seats are removable to facilitate the maintenance and inspection of the underlying controls. Covers on the control sticks prevent loose objects from entering the control area.

The seats have removable cushions.

Every seat is equipped with a four-point safety belt. To put on the safety belt, slip the lap belt through the shoulder belt-ends and insert the lap belt-end into the belt lock. Adjust the length of the belts so that the buckle is centered around your waist. Tighten the belts securely. The belt is opened by pulling the lock cover.

7.7 BAGGAGE COMPARTMENT

CAUTION

MAKE SURE THAT BAGGAGE COMPARTMENT LIMITATIONS (44 LBS/20 KG MAX.) AND AIRCRAFT WEIGHT AND BALANCE LIMITATIONS ARE NOT EXCEEDED.

The baggage compartment is located behind the seat above the fuel tank. Baggage should be distributed evenly in the baggage compartment. The baggage net must be secured.

7.8 CANOPY

CAUTION

BEFORE STARTING THE ENGINE, THE CANOPY MUST BE CLOSED AND LATCHED. THE RED HANDLES MUST BE MOVED FULLY FORWARD.

AFTER STARTING THE ENGINE, THE CANOPY MUST STAY IN THE CLOSED AND LATCHED POSITION UNTIL THE ENGINE IS SHUT DOWN.

DURING ENGINE OPERATION IT IS PROHIBITED TO ENTER OR EXIT THE AIRPLANE.

Closing the canopy - Close the canopy by pulling down on the canopy frame (see Figure 7.4). Latching the canopy is accomplished by moving the two latching handles on the left and right side of the frame to the CLOSE position.

Opening the canopy - To open the canopy, move the two latching handles on the left and right side of the frame to the OPEN position and push up on the canopy.

NOTE

The Master Switch must be ON for the Canopy Warning Light to be operational.

NOTE

Some aircraft are equipped with external canopy locking handles. These do not affect operation of the inside locking handles.

Closing the canopy from outside - Move both the LH and RH external latching handles in the Aft – Up direction to the closed position.

Opening the canopy from outside - Move both the LH and RH external latching handles in the Fwd – Down direction to the OPEN position and lift the canopy.

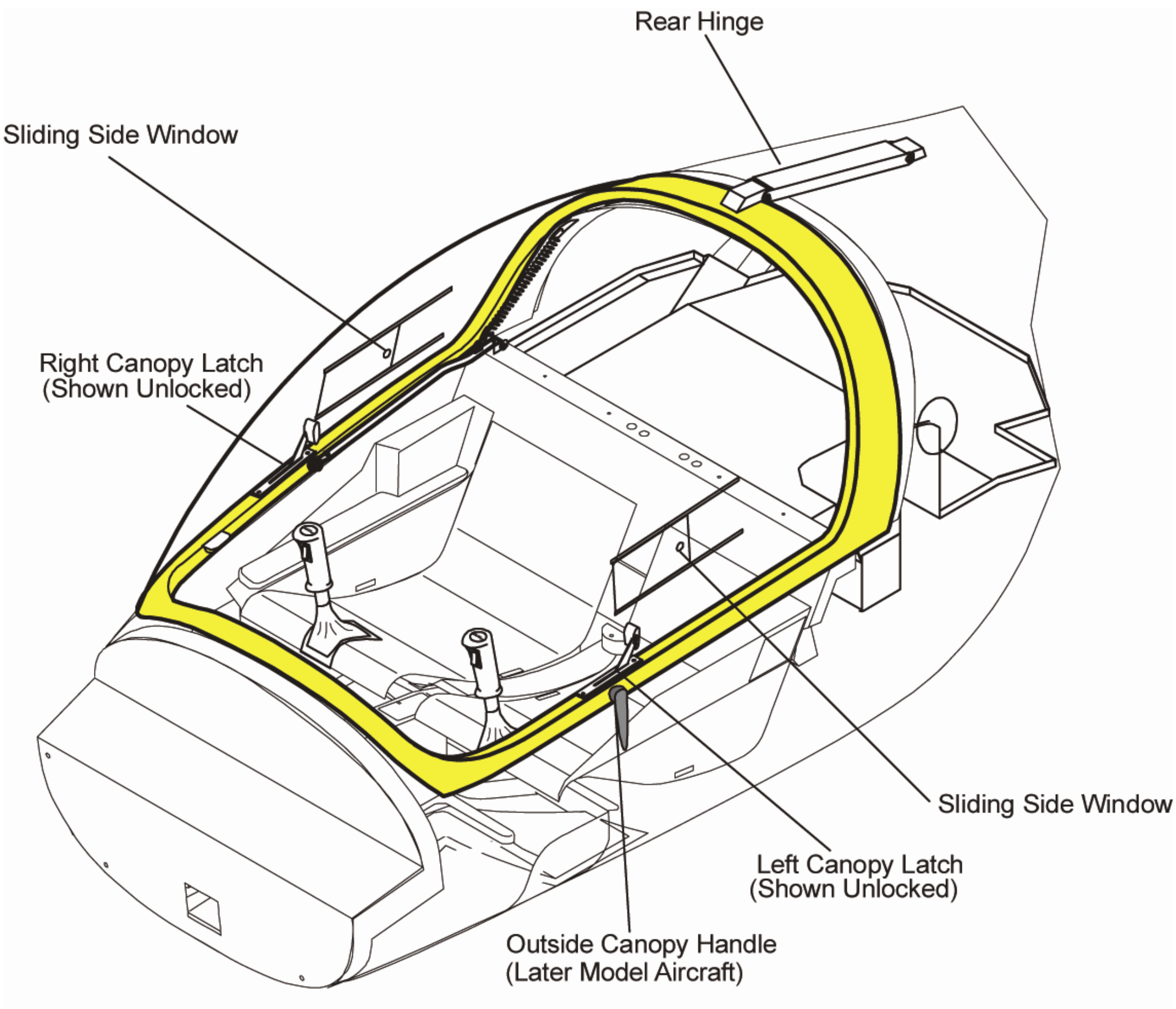


Figure 7.4 - Canopy

7.9 POWERPLANT

7.9.1 Engine

DA20-C1 aircraft are equipped with the Continental IO-240-B engine. The IO-240-B is a fuel injected, 4 cylinder, 4 stroke engine with horizontally opposed, air cooled cylinders and heads. The propeller drive is direct from the crankshaft.

Displacement:............................239.8 cu.in. (3.9 liters)

Max. Continuous Power: .... 125 HP / 93.25 kW at 2800 RPM

Additional information can be found in the Engine Operating Manual.

The power plant instruments are located on the instrument panel on the co-pilot's side. The ignition switch is a key switch located on the instrument panel in front of the pilot. The ignition is turned on by turning the key to position BOTH. The starter is operated by turning the switch against the spring loaded start position. If the optional Push-to-Start ignition switch is installed, then an additional “PUSH” action is required after the ignition switch is turned to the START position to start the aircraft. The engine is shut off by moving the mixture control to the idle cutoff position then turning the ignition switch to the off position.

The DA20-C1 may be equipped with an optional altitude compensating fuel pump. A placard on the instrument panel indicates if this system is installed. With this system it is not necessary to manually lean the mixture with altitude.

7.9.2 Engine Controls

The Mixture, Throttle, and Alternate Air Control levers are grouped together in the center console. The tension/friction for the controls can be adjusted using the friction knob located on the right side of the center console.

Mixture Lever: right lever with red cylindrical handle and integral lock out lever

lever full forward = Full Rich

lever full aft = Idle Cutoff

The mixture control lever features a safety lock which prevents inadvertent leaning of the mixture. To release, squeeze the safety lock lever and the control knob together.

Throttle: center lever with "T" handle

lever full forward = FULL throttle

lever full aft = IDLE

Alternate Air: left lever with square handle

lever full forward = Primary air intake

lever full aft = Alternate air intake

The alternate air control selects a second induction air intake in case of restriction of the primary air intake (filter).

7.9.3 Mixture Control

(a) Cruise

The mixture control allows leaning of the fuel mixture to maximize fuel economy during cruise conditions. Teledyne Continental Motors specifies that above 75% of maximum rated power, the mixture must be set at FULL RICH. It should be noted that even with the throttle set at the full power position, actual power may be less than 75% of maximum rated power and then leaning is required (reference Section 5.3.2, Cruise Performance).

(b) Reduced Throttle Settings

When operating at reduced throttle settings, other than steady state cruise, the mixture should always be set to FULL RICH. This applies to maneuvers (e.g.: stalls, spins, slow flight), descents, landing approaches, after landing and while taxiing.

The only exception to this is for engines without the altitude compensating fuel pump, operating at very high altitudes, where the low air density may require leaning to maintain satisfactory engine operation.

(c) Full Throttle

When operating at full throttle, the mixture must be set at FULL RICH. This applies to take-off, balked landings and climb.

The only exception is for engines without the altitude compensating fuel pump the mixture should be leaned as actual power falls below 75% of maximum rated power, as may be the case in an extended climb (reference Section 5.3.2, Cruise Performance).

NOTE

All adjustment of the mixture control should be done in small increments.

7.9.4 Propeller

The propeller is a fixed pitch Sensenich wood propeller.

7.9.5 Lubricating

CAUTION

NEVER OPERATE THE ENGINE WITH THE OIL FILLER CAP REMOVED. OBSERVE NORMAL PROCEDURES AND LIMITATIONS WHILE RUNNING ENGINE.

The engine has high pressure wet sump lubrication. The oil is pumped by a mechanical, engine driven pump. An oil dipstick indicates the level of oil in the tank. The dipstick is marked for US quarts.

With the engine stopped, check the oil level on the dipstick. The oil level must be between the 6 US quarts and 4 US quart level as indicated by the markings on the dip stick. See Figure 7.5, Oil System Schematic Diagram.

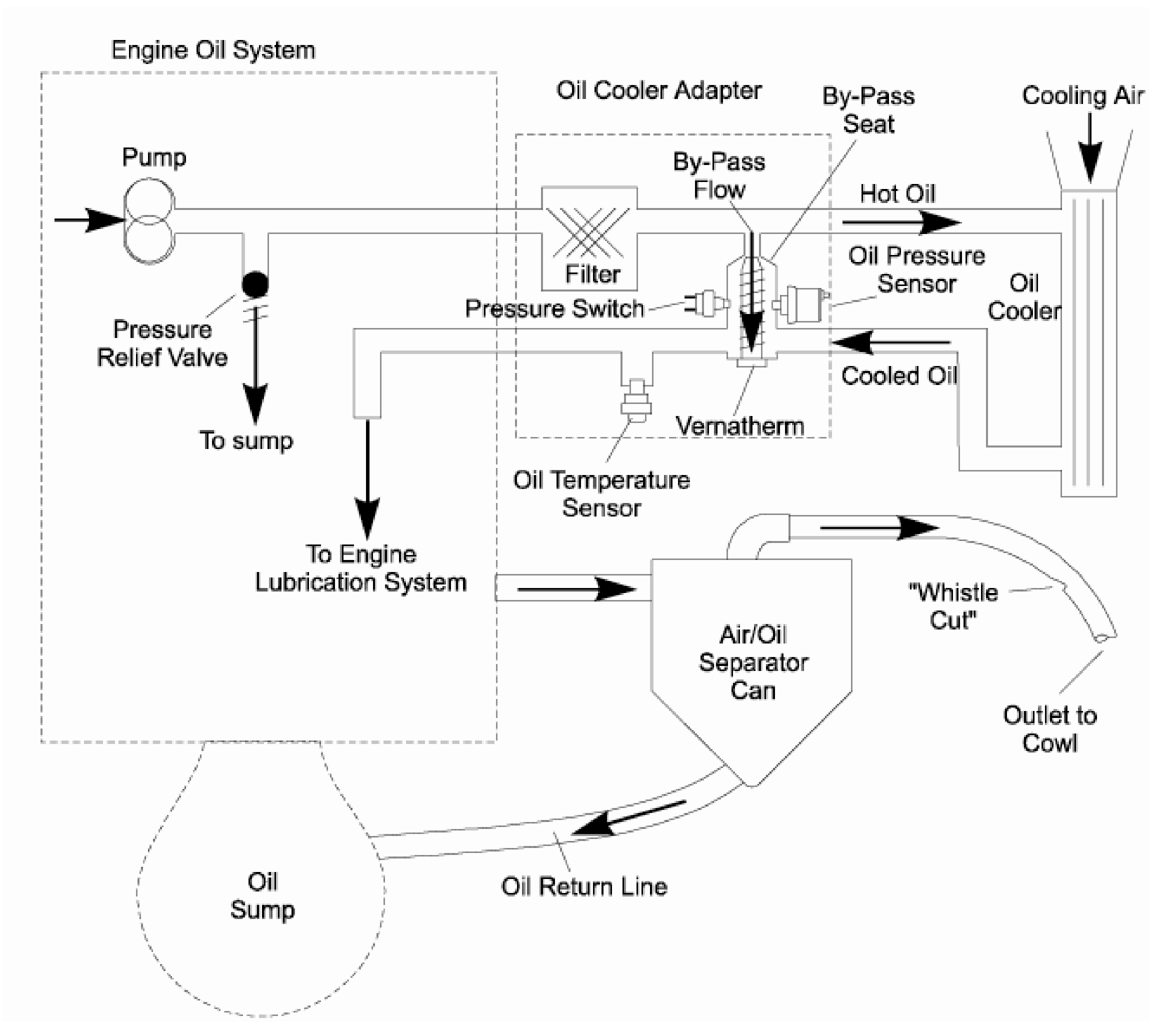


Figure 7.5 - Oil System Schematic Diagram

7.10 FUEL SYSTEM

The aluminum tank is located behind the seats, below the baggage compartment. The capacity is specified in Section 2 of this manual. The tank filler on the left side of the fuselage behind the canopy is connected to the tank with a rubber hose. A grounding stud is located on the under side of the fuselage near the trailing edge of the left hand wing. The aircraft must be grounded prior to any fueling operation.

The tank vent line runs from the filler neck through the fuselage bottom skin to the exterior of the airplane. The vent line is the translucent plastic hose adjacent to the left wing root. The vent line must be clear for proper fuel system operation. The tank has an integral sump which must be drained prior to each flight, by pushing up on the brass tube which protrudes through the underside of the fuselage, forward of the trailing edge of the left hand wing.

Two outlets with finger filters, one left and one right, are installed at the bottom of the tank (see Figure 7.6). Fuel is gravity fed from these outlets to a filter bowl (gascolator) and then to the electric fuel pump. The filter bowl must be drained prior to each flight, by pushing up on the black rubber tube that protrudes through the underside of the fuselage, adjacent to the fuel tank drain. The electric fuel pump primes the engine for engine starting (Prime ON) and is used for low throttle operations (Fuel Pump ON). When the pump is OFF, fuel flows through the pump's internal bypass. From the electric pump, fuel is delivered to the engine's mechanical fuel pump by the fuel supply line. Fuel is metered by the fuel control unit and flows via the fuel distribution manifold to the injector nozzles.

Closing the fuel shut-off valve, located either on the aft side of the firewall or at the maintenance drain manifold, will cause the engine to stop within a few seconds.

A return line from the mechanical pump's fuel vapor separator returns vapor and excess fuel to the tank.

Fuel pressure is measured at the fuel distribution manifold and displayed on the fuel pressure indicator, which is calibrated in PSI.

Some DA20-C1 aircraft also have a fuel vapor separator in the distribution manifold. These aircraft have a second vapor return line from the distribution manifold to the firewall.

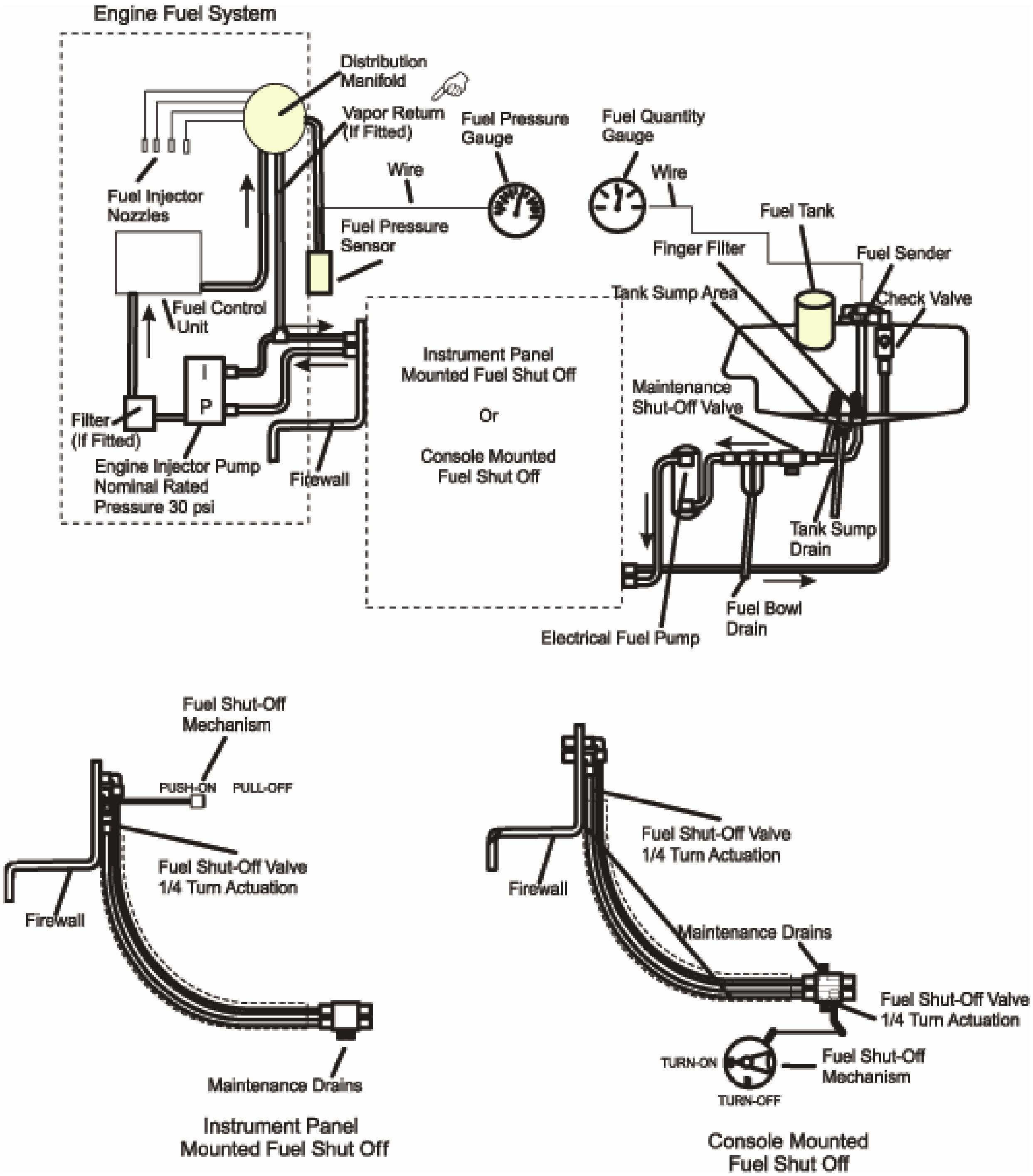


Figure 7.6 - Fuel System Schematic Diagram

7.10.1 Fuel Shut-off Valve

WARNING

THE FUEL SHUT-OFF VALVE SHOULD ONLY BE CLOSED FOR EMERGENCIES OR FUEL SYSTEM MAINTENANCE.

There are two different versions of fuel shut-off valves in the DA20-C1.

Version 1

The fuel shut-off valve is located on the cabin side of the firewall and is controlled by a handle on the right side center pedestal. To activate the fuel shutoff valve, lift the handle release lock and pull the handle out. In the open position the knob is in. In the closed position the knob is out.

Version 2

The fuel shut-off valve is integral to the maintenance drain manifold, located below the fuel tank. It is actuated by the center console mounted rotary lever, via a rigid pushrod. To activate the valve, rotate the lever clockwise from OFF to ON or lift the lockout knob and rotate the lever counterclockwise from ON to OFF. The safety lockout knob prevents accidental actuation of the valve.

7.10.2 TANK DRAIN

To drain the tank sump, activate the spring loaded drain by pushing the brass tube in with a drain container. The brass tube protrudes approximately 1 1/6 in (30 mm) from the fuselage contour and is located on the left side of the fuselage, approximately at the same station as the fuel filler cap.

7.10.3 FUEL FILTER BOWL

The fuel filter bowl is between the tank and the fuel pump. The bowl acts as a trap for sediment and water that has entered the fuel line from the tank.

7.10.4 FUEL FILTER BOWL DRAIN

The filter bowl drain is next to the fuel tank drain. It operates in the same manner as the fuel tank drain.

7.10.5 FUEL DIPSTICK

A fuel dipstick, P/N 22-2550-14-00, is supplied with all aircraft to permit direct measurement of fuel level during the preflight check. On serial numbers C0056, C0066, C0067 and C0069 use fuel dipstick P/N 22-2550-17-00.

NOTE

Electric fuel gauges may malfunction. Check fuel quantity with the fuel dipstick before each flight.

To check the fuel level:

(a) Insert the graduated end of the fuel dipstick into the tank through the fuel filler opening until the dipstick touches the bottom.

(b) Withdraw the dipstick from the fuel tank.

(c) Read the fuel quantity. The dipstick is calibrated in increments of 1/4 of useable fuel capacity. (21.3 US gallons/80.5 liters for Type 1 Fuel System or 24.0 US gallons/91 liters for Type 2 Fuel System).

NOTE

Several readings should be taken to confirm accuracy.

7.10.6 ELECTRIC FUEL PUMP (PRIMING PUMP) OPERATION

The DA20-C1 is equipped with a constant flow, vane type, two speed, and electric fuel pump. This pump emits an audible whine when it is switched on.

(a) Fuel Prime

The pump's high speed setting is used for priming the engine prior to engine start. The prime setting is selected by turning the FUEL PRIME switch ON. An amber annunciator indicates that FUEL PRIME ON is selected.

(b) Fuel Pump

The pump's low speed setting is required for maintaining positive fuel supply system pressures at low throttle settings. This setting is selected by turning the FUEL PUMP switch ON. This setting should be selected for any low throttle operations, including taxiing and any flight operations when engine speed may fall below 1000 RPM (e.g. stalls, spins, descents, landings, etc.).

The FUEL PUMP may also be selected ON to suppress suspected vapour formation in the fuel supply system. Smooth engine operation at high ambient temperatures with heat soaked fuel and up to and exceeding the service ceiling has been demonstrated without use of the electric pump.

NOTE

Turning the priming pump on while the engine is running, will enriches the mixture considerably. Although the effect is less noticeable at high power settings when the fuel flow rate is high, the effect at low and idle throttle settings is an over rich mixture, which may cause rough engine operation or engine stoppage. It is therefore recommended that for normal operations, the FUEL PRIME be turned OFF.

7.11 ELECTRICAL SYSTEM

Simplified Schematic (see Figure 7.7)

7.11.1 Power Supply

A 12 V battery is connected to the master bus via the battery circuit breaker (50 Amps). The 40 amp. generator is attached to the engine near the propeller hub. The generator feeds the main bus via the generator circuit breaker (50 Amps). Both circuit breakers can be triggered manually. The generator warning light is activated by an internal voltage regulator monitoring circuit and illuminates when a generator fault occurs.

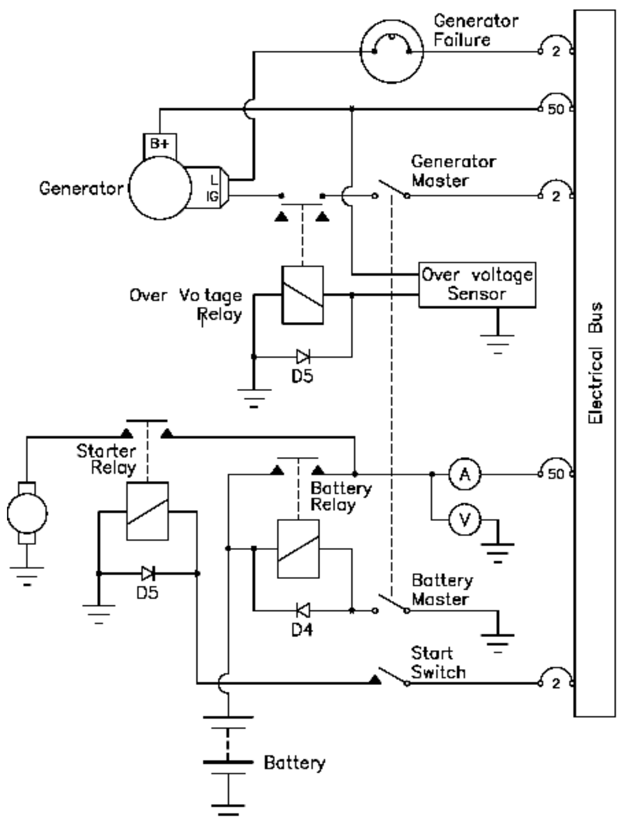


Figure 7.7 - Simplified Schematic

7.11.2 Ignition System

The engine is provided with two independent ignition systems. The two magnetos are independent from the power supply system, and are in operation as soon as the propeller is turning and the ignition switch is not off. This ensures safe engine operation even in case of an electrical power failure.

WARNING

IF THE IGNITION KEY IS TURNED TO L, R OR BOTH, THE RESPECTIVE MAGNETO IS "HOT". IF THE PROPELLER IS MOVED DURING THIS TIME THE ENGINE MAY START AND CAUSE SERIOUS OR FATAL INJURY TO PERSONNEL. THE POSSIBILITY OF A 'HOT' MAGNETO MAY EXIST DUE TO A FAULTY SWITCH OR AIRCRAFT WIRING. USE EXTREME CARE AND RESPECT WHEN IN THE VICINITY OF A PROPELLER!

7.11.3 Electrical Powered Equipment

The individual consumers (e.g. Radio, Fuel Pump, Position Lights, etc.) are connected in series with their respective circuit breakers. See Figure 7.2 for an illustration of the instrument panel.

7.11.4 Voltmeter

The voltmeter indicates the status of the electrical bus. It consists of a dial that is marked numerically from 8 - 16 volts in divisions of 2.

The scale is divided into three colored arcs to indicate the seriousness of the bus condition. These arcs are:

Red................for 8.0 - 11.0 volts,

Yellow............for 11.0 - 12.5 volts,

Green ....for 12.5 - 16.0 volts,

Redline ....at 16.1 volts.

7.11.5 Ammeter

The ammeter indicates the charging (+) and discharging (-) of the battery.
It consists of a dial, which is marked numerically from -60 to 60 amps.

7.11.6 Generator Warning Light

The generator warning light (red) illuminates during:

- Generator failure, no output from the generator

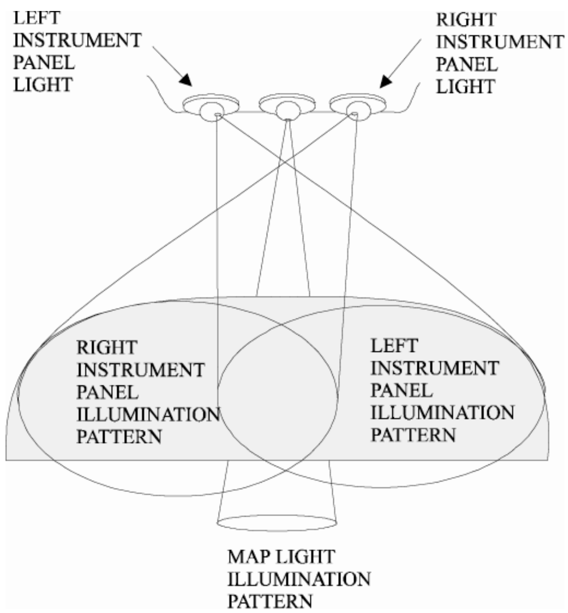
The only remaining power source is the battery (20 amps. for 30 minutes)

7.11.7 Instruments

The instruments for temperatures, pressures, and fuel quantity are connected to their respective sensors. When the electrical resistance of a sensor changes it causes a corresponding change (needle deflection) in its respective indicator.

7.11.8 Internal Lighting

The internal lighting of the DA20-C1 is provided by a lighting module located aft of the Pilot's head and on the centerline of the aircraft. Included in this module are two panel illumination lights and one map light. The switches for the lights are located on the instrument panel. There is a dimming control located on the left side of the instrument panel for adjusting the intensity of the lighting. There is a toggle switch located beside the dimming control that controls the intensity of the Wing Flap and Trim Annunciator. See Figure 7.8.



Care must be taken when adjusting the lights to maintain proper illumination. The Illumination Pattern and Adjustment shows how the lights are aimed in order to provide proper panel illumination.

Aircraft equipped with supplemental lighting (MOD 32) have a Light Dimmer Module and a Glare Shield mounted Flood Light. Control of the Dimmer for backlit instruments is through the Instrument lighting potentiometer. Control of the flood light is through a potentiometer marked FLOOD.

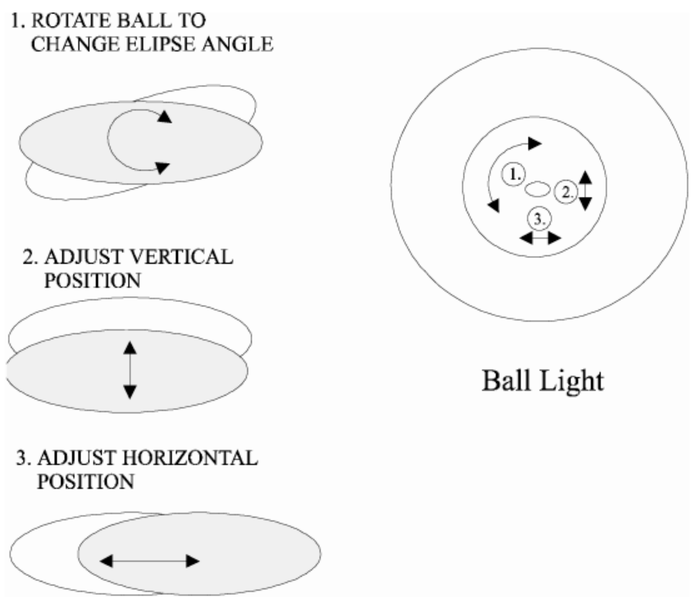


Figure 7.8 - Illumination Pattern and Adjustment

7.12 PITOT AND STATIC PRESSURE SYSTEMS

The pitot pressure is measured on the leading edge of a calibrated probe below the left wing. The static pressure is measured by the same probe. For protection against water and humidity, water sumps are installed within the line. These water sumps are accessible beneath the left seat shell.

The error in the static pressure system is negligible. For the error of the airspeed indicating system refer to Chapter 5.

The pitot static pressure probe should be protected whenever the aircraft is parked to prevent contamination and subsequent malfunction of the aircraft systems relying on its proper functioning.

NOTE

Use only the factory supplied pitot static probe cover, P/N G-659-200 with the “Remove before Flight” flag attached.

7.13 STALL WARNING SYSTEM

A stall warning horn, located in the left instrument panel, will operate at a minimum airspeed of 5 kts before a stall. The horn grows louder as the speed approaches the stall speed. The horn is activated by air from a suction hose that connects to a hole in the leading edge of the left wing. The hole has a red circle around it. The stall warning hole should be plugged whenever the aircraft is parked to prevent contamination and subsequent malfunction of the stall warning system.

NOTE

Use only the factory supplied stall warning plug, Part Number 22-1010-01-00 with the “Remove before Flight” flag attached.

7.14 AVIONICS

The center of the instrument panel contains the radio and navigation equipment. The microphone key for the radio is installed in the control stick. There are two connectors for headsets on the backrest of the seat.

CAUTION

HEADSETS WITH A PRESS TO TALK (PTT) SWITCH MUST NOT BE USED IN THE HAND HELD MICROPHONE JACK. IT CAN CAUSE DAMAGE TO EQUIPMENT.

HAND HELD MICROPHONES MUST NOT BE PLUGGED INTO CREW POSITION MICROPHONE JACKS. DAMAGE TO THE GMA 340/345 AUDIO PANEL CAN OCCUR.

There is a hand-held microphone jack installed on the pilot's side, on the seat bulkhead between the fuselage and the speaker.

Operating instructions for individual avionics equipment should be taken from the manuals of the respective manufacturers.

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CHAPTER 8

AIRPLANE HANDLING, CARE AND MAINTENANCE

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8.1 INTRODUCTION

This Chapter contains factory-recommended procedures for proper ground handling and servicing of the airplane. It also identifies certain inspection and maintenance requirements which must be followed if the airplane is to retain its' original performance and dependability. It is wise to follow a planned schedule of lubrication and preventive maintenance based on climatic and flying conditions encountered.

8.2 AIRPLANE INSPECTION PERIOD

Inspection intervals are every 50, 100 hrs, 200 hrs and 1000 hrs of flight time and a special 25 hour check on new airplanes. The respective maintenance procedure can be found in the Engine Manual or the Aircraft Maintenance Manual.

8.3 AIRPLANE ALTERATIONS OR REPAIRS

It is essential that the responsible airworthiness authority be contacted prior to any alterations on the airplane to ensure that the airworthiness of the airplane is not affected. For repairs and painting refer to the applicable Aircraft Maintenance Manual Doc. No. DA201-C1.

8.4 GROUND HANDLING / ROAD TRANSPORT

8.4.1 Ground Handling

(a) Towing Forward

The airplane is most easily and safely maneuvered by hand with the tow-bar attached to the nose wheel. See Figure 8.1 for installation of tow bar.

If the aircraft is towed forward without using the tow-bar, the nose-wheel will follow the movement of the airplane. It is recommended that the tow-bar be used to pull the aircraft forward. Towing the aircraft can be assisted by pulling on the propeller at the root just next to the propeller spinner. If any additional assistance is required, the aircraft may only be pushed on the trailing edge of the wing tip.

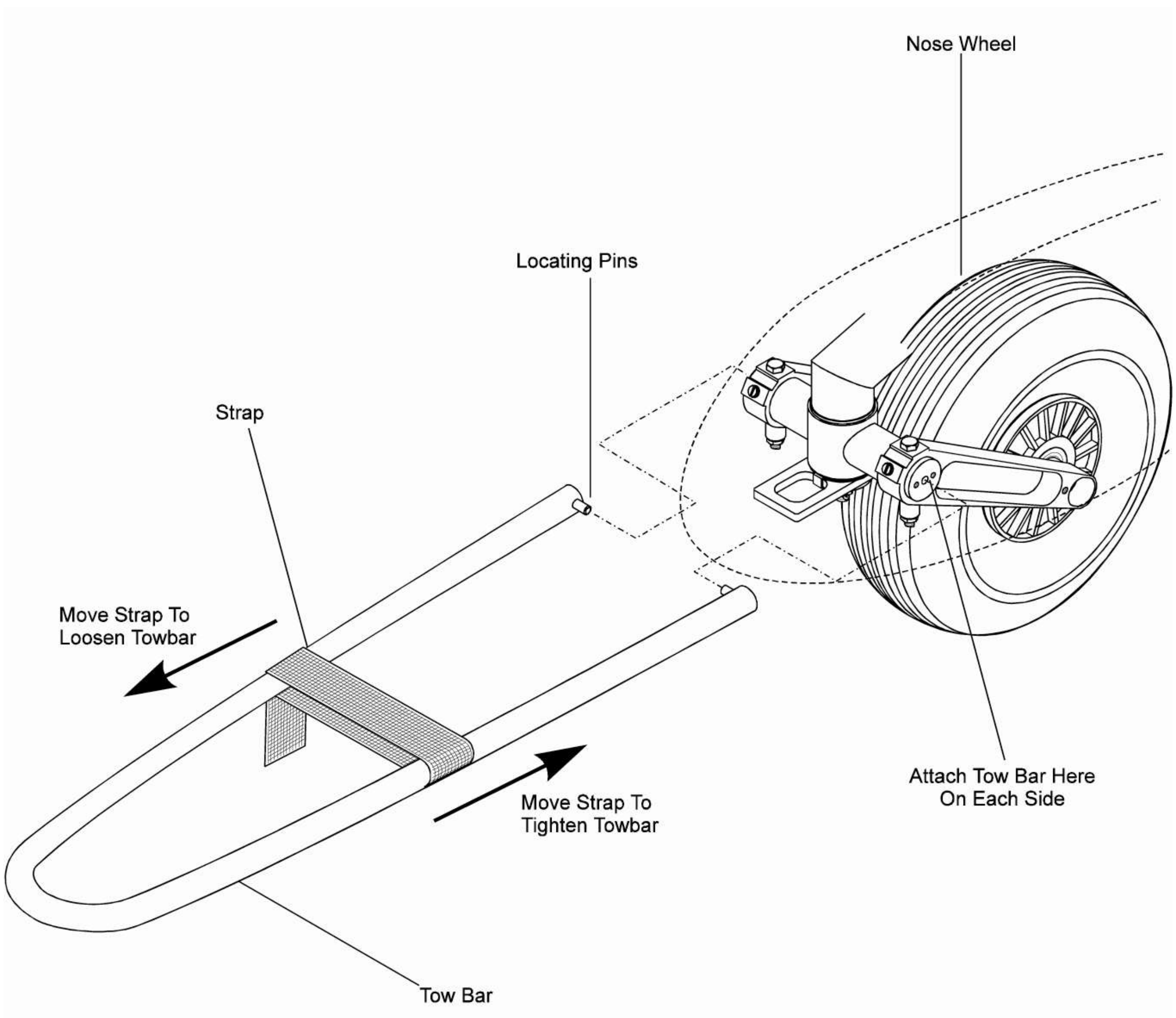

Figure 8.1 - Tow Bar Installation

(b) Moving Backward

By following a simple procedure it is very easy to move the airplane backwards.

CAUTION

DO NOT PUSH OR LIFT ON THE SPINNER!

CAUTION

DO NOT PUSH ON CONTROL SURFACES!

(1) Push down with one hand on the aft section of the fuselage near the vertical stabilizer, to lift the nose wheel.

(2) Push back on the leading edge of the horizontal stabilizer, close to its center.

(3) Using this technique the aircraft can easily be turned and pushed backward. If additional assistance is required, a second person may push on the leading edge of the wings.

8.4.2 Parking

For short time parking, the airplane must be positioned in a headwind direction, the parking brake must be engaged, the wing flaps must be in the retracted position and the wheels must be chocked.

For extended and unattended parking, as well as in unpredictable wind conditions, the airplane must be anchored to the ground or placed in a hangar.

When parking the airplane, the flight controls lock, P/N 20-1000-01-00 must be installed and pitot static probe cover and stall warning plug should be fitted (refer to Chapter 7, Aircraft Description).

NOTE

When adjusting the rudder pedals to install the Flight Controls Lock, pull straight back on the T-Grip. Do not pull up.

Parking in a hangar is recommended.

8.4.3 Mooring

The tail skid of the airplane has a tie down hole which can be used to moor airplane. Tie-down rings are also installed near the midpoint on each wing for tie-down mooring ropes. See Figure 8.2.

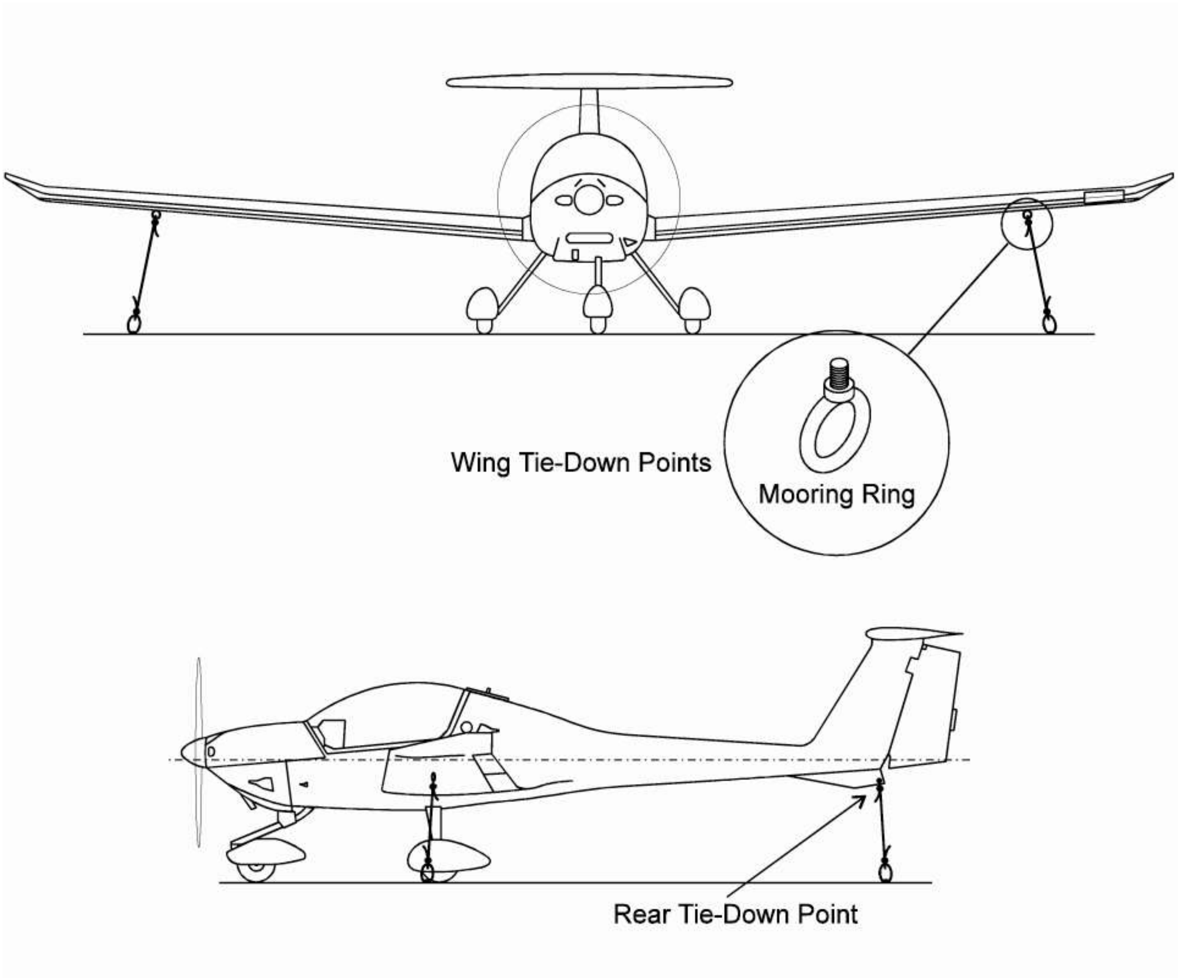

Figure 8.2 - Mooring Points Locations

8.4.4 Jacking

The DA20-C1 can be jacked at the two jack points located on the lower side of the fuselage's root ribs and at the tail fin. See Figure 8.3.

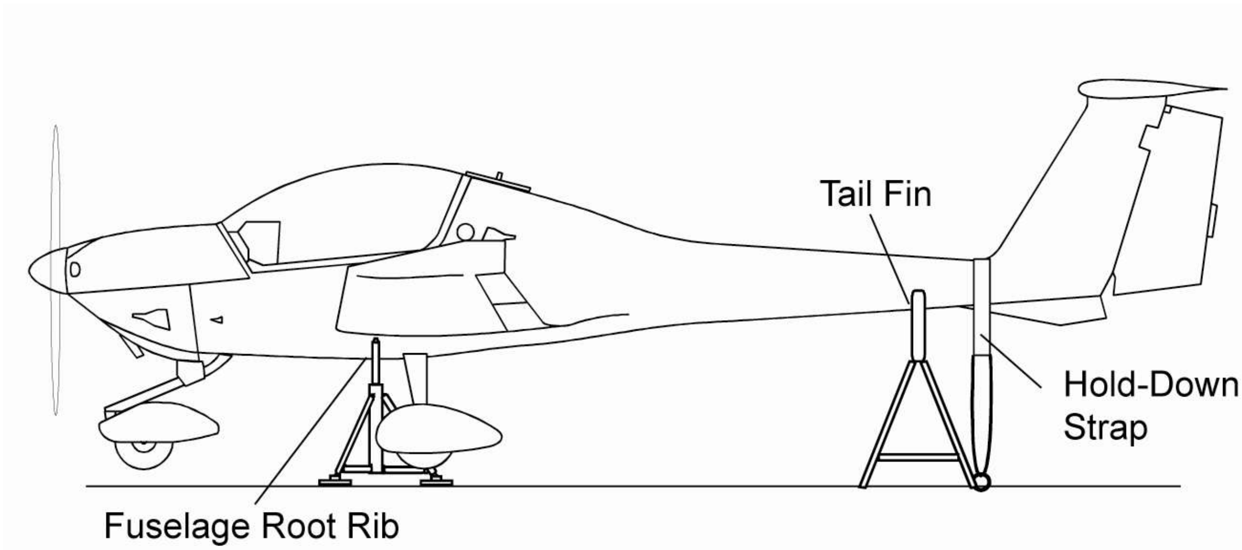

Figure 8.3 - Jacking Point Locations

8.4.5 Road Transport

When transporting the airplane on the road, it is recommended that you use an open trailer. All airplane components must be stored on a cushioned surface and secured to avoid any movement during transport.

(a) Fuselage

The fuselage should be secured on the trailer standing on its wheels. Ensure that the propeller has sufficient free space so it cannot be damaged if the fuselage were to move.

(b) Wings

For transportation, both wings must be removed from the fuselage.

To avoid any damage, the wings are stored in upright position on the leading edge with the root rib area positioned on an upholstered profiled surface of at least 1 ft. 4 in. (400 mm) width. The outside wing area (approximately 10 ft. (3 m) from the root rib area) is placed on an upholstered profiled surface of a minimum of 12 in. (305 mm) width.

The wings must be secured against movement rearward or forward.

(c) Horizontal Stabilizer

The horizontal stabilizer is stored flat on the trailer and secured, or in an upright position sitting on the leading edge on a profiled surface. All supports must be upholstered with felt or foam rubber.

8.5 CLEANING AND CARE

CAUTION

EXCESSIVE DIRT DETERIORATES THE FLIGHT PERFORMANCE.

8.5.1 Painted Surfaces

CAUTION

DO NOT USE ANY CLEANING AGENTS CONTAINING SILICON BASED MATERIALS. ONCE APPLIED, SILICONE IS DIFFICULT TO REMOVE. SILICONE CAN RESULT IN CONTAMINATED BONDING SURFACES IF THE AIRCRAFT, EVER IN FUTURE, IS IN NEED OF STRUCTURAL REPAIR.

To achieve the best flight characteristics for the DA20-C1, a clean external surface is most important. For this reason it is highly recommended that the airplane, especially the leading edge of the wings are kept clean at all times.

For best results, the cleaning is performed using a generous amount of water. If necessary, a mild cleaning agent can be added. Excessive dirt such as insects etc. are best cleaned off immediately after flight, because once dried they are difficult to remove.

Approximately once a year, the surface of the airplane should be treated and buffed using a silicon free automotive polish.

8.5.2 Canopy

The DA20-C1 offers excellent vision through a large plexiglass canopy. It is essential that care be taken while cleaning the canopy, as it is easily scratched. If scratched, the vision will be reduced.

In principal the same rules should be applied to clean the canopy as for the outside surface of the airplane. To remove excessive dirt, plenty of water should be used; make sure to use only clean sponges and chamois. Even the smallest dust particle can cause scratches.

In order to achieve clarity, plastic cleaners such as Permatex Part No. 403D® or Mirror Glaze® may be used according to the manufacturer's instructions. Do not wipe in circles, but only in one direction.

8.5.3 Propeller

Refer to the Sensenich Propeller, W69EK7-63, W69EK7-63G, W69EK7-63GM and W69EK-63 Instruction Manual.

8.5.4 Engine

See Operator's Manual for the Continental IO-240-B aircraft engine
Form # X30620.

8.5.5 Interior Surfaces, Seats and Carpets

The interior should be cleaned using a vacuum cleaner. All loose items (pens, bags etc.) should be properly stored and secured. All instruments must be cleaned using a soft dry cloth. Plastic surfaces should be wiped clean using a damp cloth without any cleaning agents.

8.6 GROUND DE-ICING

Approved de-icing fluids are:

Manufacturer	Name
Kilfrost	TKS 80
Aeroshell	Compound 07
Any Source	AL-5 (DTD 406B)

Remove the snow from the aircraft as follows:

(a) Remove any snow from the airplane using a soft brush.

(b) Spray de-icing fluid onto ice-covered surfaces using a suitable spray bottle.

(c) Use a soft piece of cloth to wipe the airplane dry.

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CHAPTER 9

SUPPLEMENTS

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9.1 GENERAL

This Chapter contains information regarding optional equipment which may be installed in your airplane.

Individual supplements address each optional equipment installation.

It is only necessary to maintain those supplements which pertain to your specific airplane's configuration.

9.2 INDEX OF SUPPLEMENTS

NOTE

It is only necessary to maintain those supplements which pertain to optional equipment that may be installed in your airplane.

Supplement No.	Title	Pages
1	External Power Operation	16
2	Winterization Kit	6
3	Recognition Lights	6
4	~~Gross Weight Increase (800 kg)~~ This Supplement has been incorporated into the AFM and is no longer required.	N/A
5	S-Tec Autopilot	14
6	VM1000 Engine Instruments	10
7	Auxiliary Fuel System	10
8	Stick Mounted Trim Switches	4
9	20 US Gallon Fuel Tank	4
10	Reversed Instrument Panel	4
11	Pitot Heat Operation	8
12	Brazilian Placards and Markings	10
13	Garmin G500 Integrated Display System	32
14	French Placards and Markings	8
15	German Placards and Markings	14
16	Spanish Placards and Markings	6

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CHAPTER 9

SUPPLEMENT 1

EXTERNAL POWER OPERATION

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1. GENERAL

This supplement addresses the operating procedure for a DA20-C1 aircraft equipped with an optional External Power Unit (EPU). The EPU receptacle and related circuits provide for the connection of an external power source for various ground operations, e.g. maintenance, battery charging, starting.

CAUTION

OVER-VOLTAGE PROTECTION DOES NOT EXIST. DO NOT CONNECT ANY POWER SOURCE OTHER THAN 12 VOLT DC BATTERY OR 14 VOLT (NOMINAL) DC GROUND POWER CART.

The circuit provides protection in the event that the external power source is connected in reverse polarity. A switch in the cockpit to the left of the light switches allows the EPU relay to close once the external power source is connected and power is available. A light in the cockpit indicates that power is available at the receptacle or that the EPU relay has remained closed following a disconnect (see normal procedures).

On aircraft C0001 through C0148 and C0150 with an EPU installed, a relay bypass circuit is provided to enable the battery relay to be closed if the battery has been discharged so much that it does not have enough power to close the relay by itself. Depending on the state of battery discharge, the battery relay may take several minutes to close. This circuit is not installed on aircraft C0149 and C0151 onwards. See Figure S1.1 for location and Figure S1.2 for a simplified schematic. EPU plug Cole Hersee P/N 11042 is required to connect to the receptacle. This receptacle is located in one of two locations. Aircraft serial numbers C0001 through C0148 and C0150 have this receptacle located on the fuselage at the rear portion of the wing root. Aircraft serial numbers C0149 and C0151 onwards have this receptacle located on the fuselage in front of the left-hand wing root

.

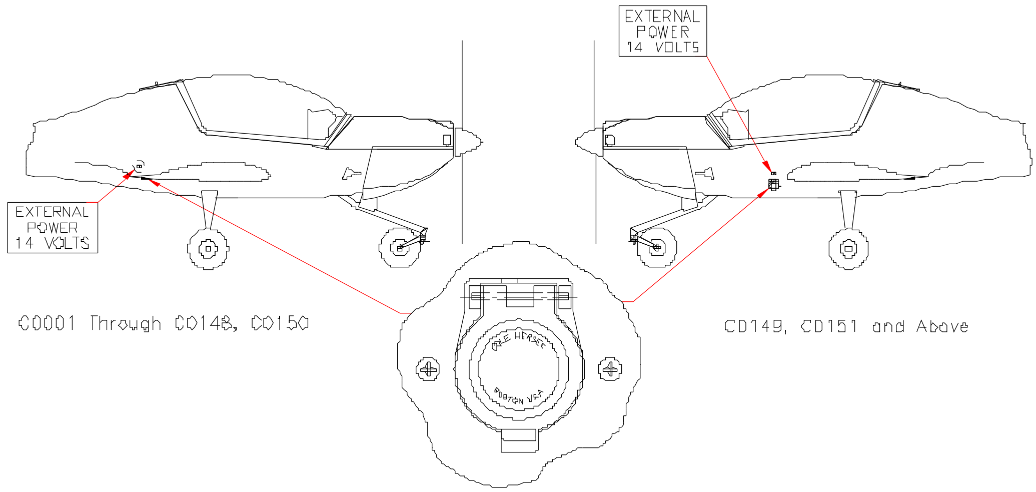


Figure S1-1 - Location of External Power Receptacle

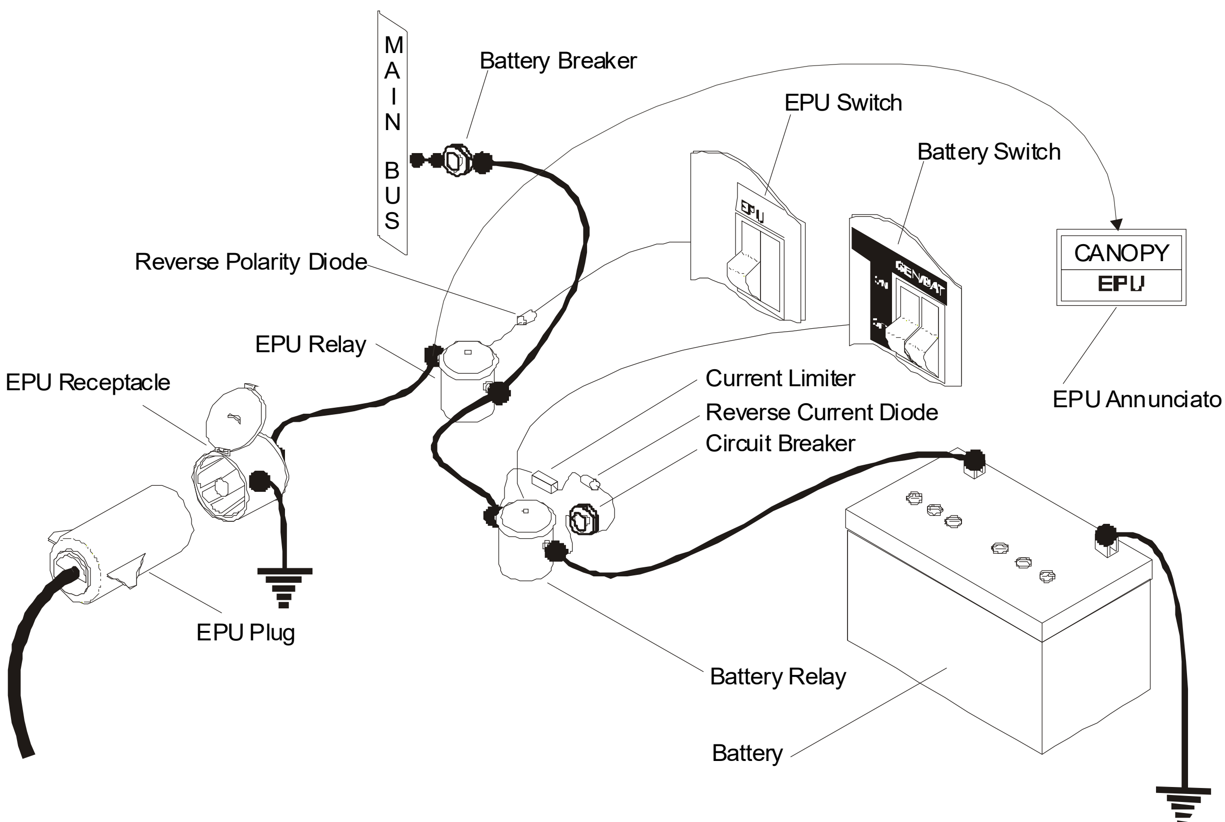


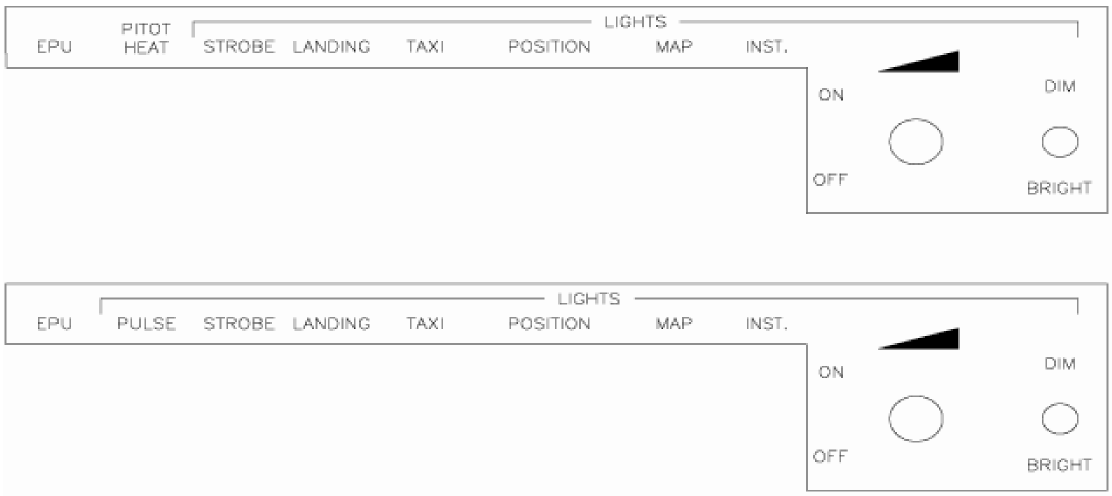
Figure S1-2 - Simplified Schematic

2. OPERATING LIMITATIONS

Voltage supplied to the EPU receptacle should be 12-14 volts nominal.

2.15 PLACARDS

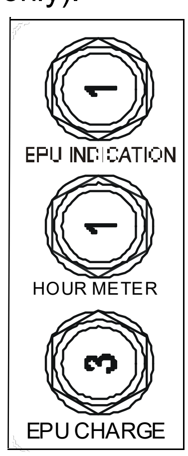
(a) On the lower left side of the instrument panel above the switches.



(b) On the right side of the aircraft above the EPU receptacle.

EXTERNAL
POWER
14 VOLTS

(c) On the EPU/FUSE mounting bracket in the Relay box. (Aircraft S/N C001 through C0148 and C0150 only).



3. EMERGENCY PROCEDURES

3.3.4 Fire

(a) Engine Fire during Engine-Start-Up on the Ground if the Engine Starts (EPU power connected)

(1) Throttle .... 1800 RPM for a few minutes

(2) Engine ....Shutdown and inspect

(b) Engine Fire during Engine-Start-Up on the Ground if the Engine Fails to Start (EPU power connected)

(1) Ignition Switch .... Continue cranking

(2) Throttle ....MAX PWR

(3) Mixture ....IDLE CUTOFF

(4) Fuel Shut-off Valve ....CLOSED

(5) Cabin Heat ....OFF

(6) Fuel Pump ....OFF

(7) GEN/BATT Master Switch ....OFF

(8) EPU Switch ....OFF

(9) Ignition Switch ....OFF

(10) Airplane ....Evacuate

(11) Fire ....Extinguish

(12) Engine ....Inspect

4. NORMAL PROCEDURES

4.1 GENERAL

The following general procedure should be used to supply External Power to the aircraft for purposes other than engine starting.

Power ON

(a) Connect external power source to the EPU receptacle. .... EPU light ON

(b) EPU switch .... ON

(c) GEN/BAT Master Switch (Battery only) .... ON if desired for charging

(d) Avionics Master Switch .... ON if desired

CAUTION

IF THE BATTERY HAS BEEN DISCHARGED, IT IS ADVISABLE TO LEAVE THE BATTERY ON CHARGE FOR A PERIOD OF TIME LONG ENOUGH TO CHARGE THE BATTERY. CONSULT MAINTENANCE PERSONNEL IF THE STATE OF CHARGE OF THE BATTERY IS IN QUESTION. DO NOT FLY THE AIRCRAFT WITH THE BATTERY IN A DISCHARGED STATE.

Power OFF

(a) Electrical loads .... OFF

(b) Avionics Master Switch .... OFF

(c) GEN/ BAT Master Switch .... OFF

(d) EPU switch .... OFF

(e) LIFT EPU receptacle cover, PULL external power plug. .... EPU light OFF

4.4 NORMAL OPERATION CHECKLIST

In addition to those items contained in Section 4, Normal Operating Procedures, Preflight Inspection, check the following items if this supplement is applicable to the aircraft you are operating:

(a) In-Cabin Check

Caution Lights (EPU) .... illuminated if EPU power available

(b) Walk Around Check and Visual Inspection

Right Wing (C0001 to C0148, C0150)

Left Side of Fuselage (C0149, C0151 and Above)

EPU Receptacle .... check EPU connector inserted and
(For EPU START) secure. Adequate power source available.

EPU Receptacle .... check EPU power cord
(EPU not required for starting) disconnected and power cart clear of aircraft.

Before Starting Engine

The Before Starting Engine checklist from Section 4.4.2 is repeated in this section and includes the steps for starting the engine with an external power source connected.

4.4.2 Before Starting Engine

(a) Preflight Inspection .... performed

(b) Pedals .... adjust, lock

(c) Passenger Briefing .... performed

(d) Safety Belts .... fasten

(e) Parking Brake .... set

(f) Flight Controls .... free

(g) Fuel Shut-off Valve .... OPEN

(h) Mixture .... FULL RICH

(i) Throttle .... IDLE

(j) Friction Device of Throttle Quadrant .... adjust

(k) Avionics Master Switch .... OFF

(l) EPU light .... check ON

(m) EPU Switch .... ON

(n) Voltmeter .... check 12-14 volts

(o) GEN/BAT Master Switch .... ON

(p) Generator Warning Light .... illuminated

(q) Exterior Lights .... as required

(r) Instrument Panel Lighting .... as required

(s) Canopy .... close and secure

(t) Canopy Unlocking Warning Light .... OFF

Starting Engine

The Starting Engine checklist from Section 4.4.3 is repeated in this section and includes the steps for starting the engine with an external power source connected.

4.4.3 Starting Engine

(a) Starting Engine Cold

NOTE

It is recommended that the engine be preheated if it has been cold soaked for 2 hours or more at temperatures of -4º C (25º F) or less.

(1) Throttle.. IDLE

(2) Mixture .... FULL RICH

(3) Toe Brakes.. hold

(4) Propeller Area .... clear

WARNING

MAKE SURE THAT PROPELLER AREA IS CLEAR!

CAUTION

DO NOT ENGAGE STARTER IF THE PROPELLER IS MOVING. SERIOUS ENGINE DAMAGE CAN RESULT

NOTE

Steps (5), (6), (7), (8) and (9) are to be performed without delay between steps.

NOTE

Colder ambient temperatures require longer priming.

(5) Fuel Pump.. ON

(6) Fuel Prime... ON

(7) Throttle... FULL for prime (prime for 3 seconds minimum before starting)

(8) Throttle... Full IDLE to 1/4 inch OPEN as required

(9) Ignition Switch.. START, hold until engine starts or for 10 seconds maximum (if engine does not start, release ignition key, then push throttle to full power for 3 seconds minimum for more priming, then repeat from Step (8))

NOTE

If the optional Push-to-Start ignition switch is installed, then an additional “PUSH” action is required after the ignition switch is turned to the START position when implementing start.

(10)Starter Warning Light .... illuminated while ignition is in START position

NOTE

Activate the starter for a maximum of 30 seconds only, followed by a cooling period of 3-5 minutes.

(11)Throttle... 800 to 1000 RPM

CAUTION

DO NOT OPERATE ENGINE ABOVE 1000 RPM UNTIL AN OIL TEMPERATURE INDICATION IS REGISTERED.

(12)Fuel Prime.. OFF

(13)Engine Instruments.................................... check

NOTE

Excessive priming can result in a flooded engine. To clear a flooded engine, turn off fuel pump and fuel prime, open throttle 1/2 - 1 inch and engage starter. The engine should start for a short period and then stop. Excess fuel has now been cleared and engine start from item (1) can be performed.

.

CAUTION

IF OIL PRESSURE IS BELOW 10 PSI, SHUT DOWN THE ENGINE IMMEDIATELY (MAXIMUM 30 SECONDS DELAY).

NOTE

Oil Pressure may advance above the green arc until the Oil Temp. reaches normal operating temperatures.

Regulate warm up RPM to maintain pressure below 100 psi limit. At ambient temperatures below 32º F (0º C) DO NOT apply full power if oil pressure is above 70 psi.

(14)Starter Warning Light.................................. check OFF

(b) Starting Engine Warm

(1) Throttle .... IDLE

(2) Mixture .... FULL RICH

(3) Toe Brakes .... hold

(4) Propeller Area .... clear

WARNING

MAKE SURE THAT PROPELLER AREA IS CLEAR!

CAUTION

DO NOT ENGAGE STARTER IF THE PROPELLER IS MOVING. SERIOUS ENGINE DAMAGE CAN RESULT

NOTE

Steps (5), (6), (7), (8) and (9) are to be performed without delay between steps.

(5) Fuel Pump.. ON

(6) Fuel Prime.. ON

(7) Throttle.. FULL for prime, 1 to 3 seconds before starting)

(8) Throttle.. 1/2 - 1 inch OPEN (approx.)

(9) Ignition Switch.. START, hold until engine starts or for 10 seconds maximum (repeat from Step (7) if engine does not start)

NOTE

If the optional Push-to-Start ignition switch is installed, then an additional “PUSH” action is required after the ignition switch is turned to the START position when implementing start.

(10) Starter Warning Light .... illuminated while ignition is in START position

NOTE

Activate starter for a maximum of 30 seconds only, followed by a cooling period of 3-5 minutes.

(11) Throttle .... 800 to 1000 RPM

(12) Fuel Prime .... OFF

(13) Engine Instruments .... check

NOTE

Excessive priming can result in a flooded engine. To clear a flooded engine, turn off the fuel pump and fuel prime, open throttle 1/2 - 1 inch and engage starter. The engine should start for a short period and then stop. Excess fuel has now been cleared and engine start from item (1) can be performed..

CAUTION

IF OIL PRESSURE IS BELOW 10 PSI, SHUT DOWN THE ENGINE IMMEDIATELY (MAXIMUM 30 SECONDS DELAY).

NOTE

Oil Pressure may advance above the green arc until the Oil Temp. reaches normal operating temperatures.

Regulate warm up RPM to maintain pressure below 100 psi limit. At ambient temperatures below 32º F (0º C) DO NOT apply full power if oil pressure is above 70 psi.

(c) After Engine has Started

CAUTION

IT IS DANGEROUS TO APPROACH AN AIRCRAFT WITH ITS ENGINE OPERATING. ONLY GROUND PERSONNEL PROPERLY TRAINED ON PROCEDURES FOR APPROACHING OPERATING AIRCRAFT SHOULD BE ALLOWED TO DISCONNECT EPU SOURCE. PRACTICE THE REMOVAL OF THE POWER CORD BEFORE ATTEMPTING WITH ENGINE OPERATING. NEVER APPROACH THE AIRCRAFT WITHOUT A SIGNAL FROM THE PILOT. ENSURE THE AIRCRAFT IS PARKED OVER AN AREA OF PAVEMENT WHERE THERE IS A SURE FOOTING. PROTECT EYES AND EARS WHEN NEAR THE OPERATING ENGINE.

(1) Select the EPU switch to OFF. .... EPU light ON

(2) Signal the ground crew to PULL the EPU cord. .... EPU light OFF

(3) Master Switch (GEN) .... OFF

(4) Battery Voltage... check approx. 12 volts

(5) Master Switch (GEN) .... ON, check approx. 14 volts

(6) GEN warning light .... check OFF

5. PERFORMANCE

There is no change in airplane performance associated with EPU operations.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

Refer to the Equipment List, Chapter 6.5,

- Item Number 24-002 (Aircraft S/N C0001 through C0148 and C0150)
- Item Number 24-005 (Aircraft S/N C0149 and C0151 onwards)

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

There is no change in description of the airplane and its systems.

8. HANDLING, PREVENTATIVE AND CORRECTIVE MAINTENANCE

There is no change in handling, preventave or corrective maintenance.

CHAPTER 9

SUPPLEMENT 2

WINTERIZATION KIT

TABLE OF CONTENTS

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1. GENERAL

The Winterization Kit consists of cowling inlet and outlet baffles. The inlet baffles are attached to the upper cowling with two winged 1/4-turn fasteners. The outlet baffles are attached to the lower cowling with screws. At take-off outside air temperatures below 14°F/-10°C it is recommended to use both inlet and outlet baffles together. At temperatures between 32°F/0°C and 54.5°F/12.5°C it is not permissible to use both inlet and outlet baffles together. Either the inlet baffles only or the outlet baffles only may be used in this temperature range.

At temperatures above 54°F (12.5°C) both inlet baffles and outlet baffles must be removed. These temperature ranges have been established by test to prevent the engine from overheating during a prolonged climb.

It is recommended to install the outlet baffles during periods when the take-off temperatures are consistently below 32°F/0°C. The inlet baffles can be installed or removed as required.

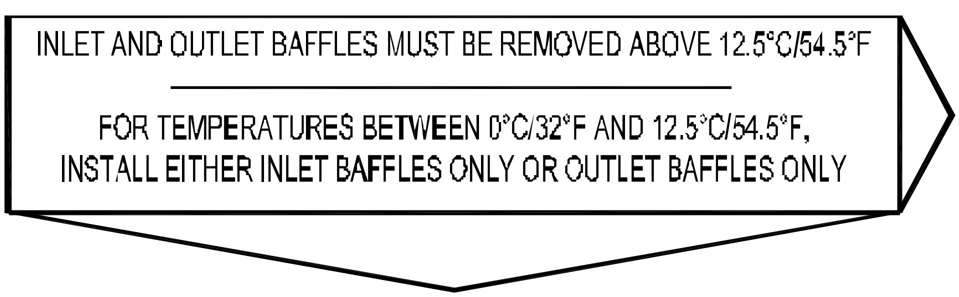
The installation is defined by Service Bulletin DAC1-71-03.

2. OPERATING LIMITATIONS

Maximum T/O outside air temperature with either inlet or outlet baffles installed is 54°F (12.5°C).

Maximum T/O outside air temperature with both inlet and outlet baffles installed is 32°F (0°C).

The following placard must be installed on the cowling, immediately below the oil filler door and on the removable baffles:



3. EMERGENCY PROCEDURES

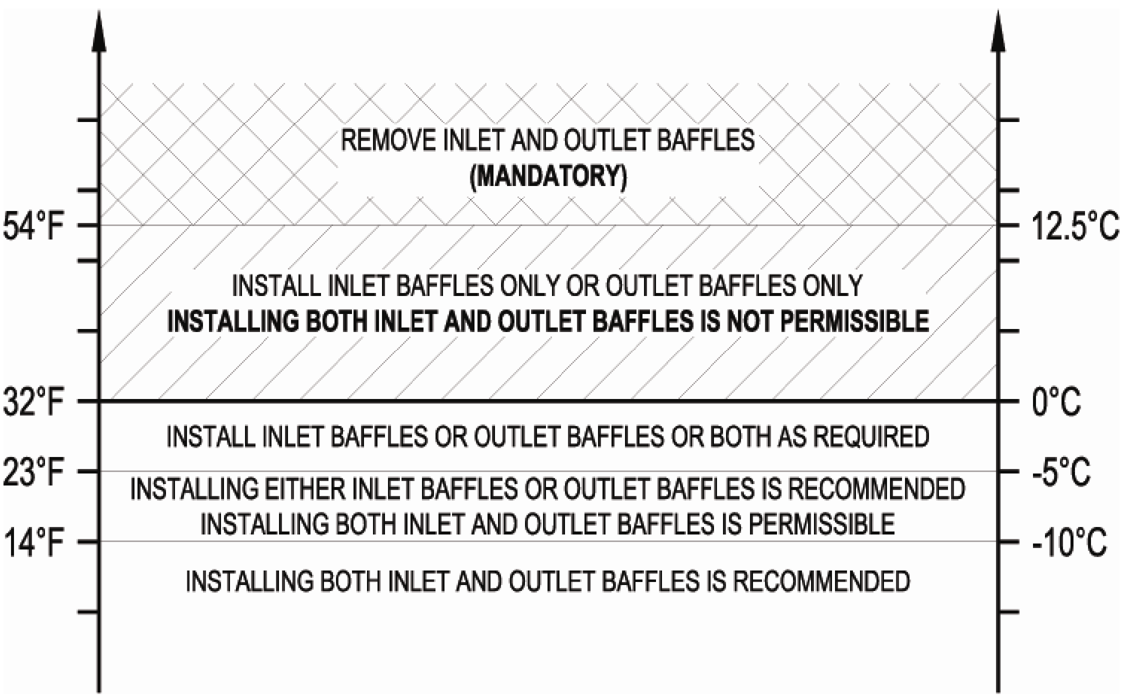
There is no change to the airplane emergency procedures when the Winterization Kit is installed.

4. NORMAL PROCEDURES

4.4.1 Preflight Inspection

Insert after Item (7) (c) of the Walk-around inspection (refer to section 4.4.1 of the Airplane Flight Manual)]

Install or remove winter kit baffles according to the following chart:



5. PERFORMANCE

There is no change in airplane performance when the Winterization Kit is installed.

6. WEIGHT AND BALANCE

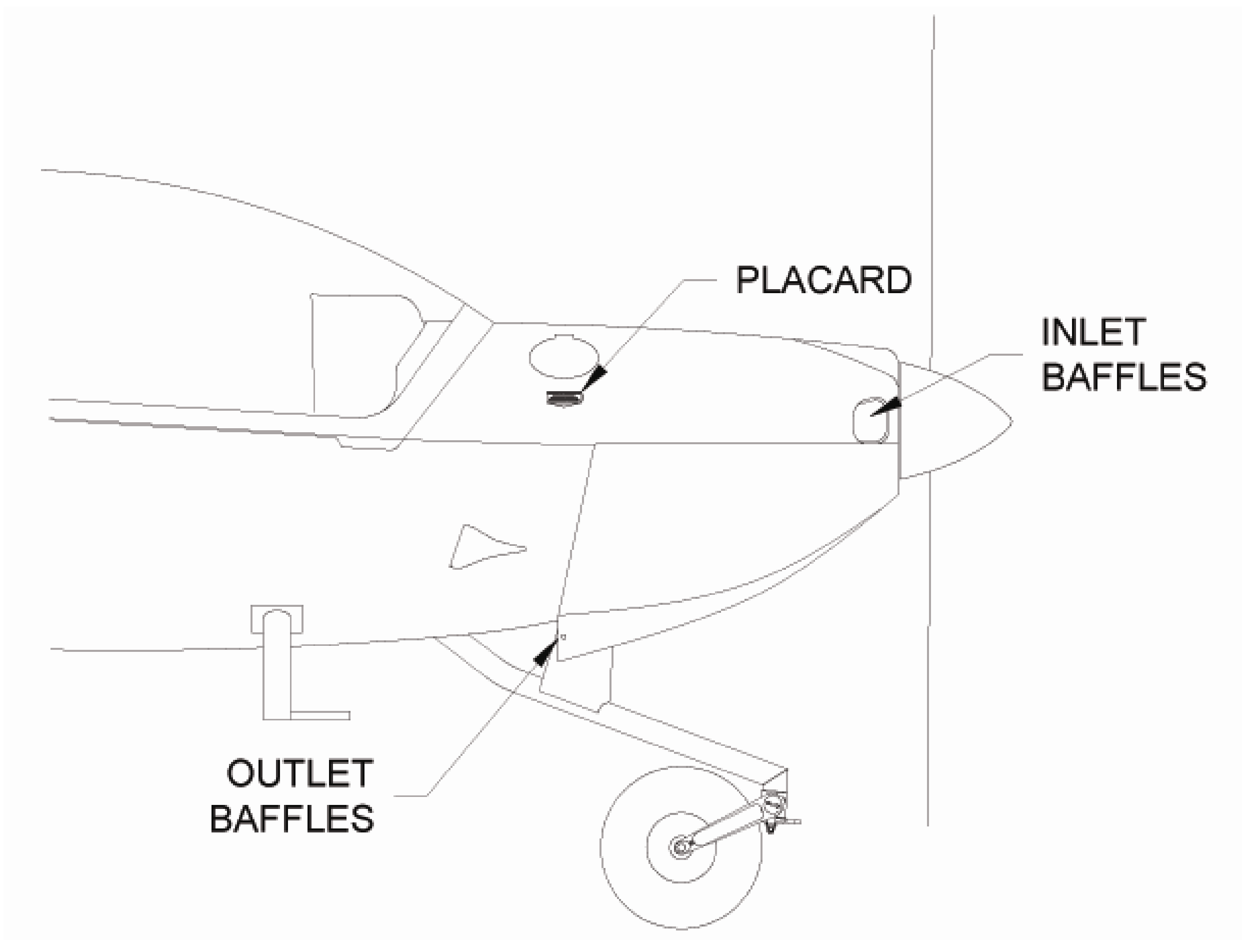
The effect of the Winterization Kit on weight and balance is negligible.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

The Winterization Kit consists of:

- left and right baffles installed in the forward cowling inlets,
- left and right baffles installed in the aft outlet opening of the lower cowling, and
- a placard located on the cowling below the oil door.

The baffles reduce the flow of cooling air through the cowling, thereby increasing the operating temperature of the engine. At moderate temperatures either the inlet or outlet baffles may be installed. At lower temperatures both inlet and outlet baffles should be installed.



8. HANDLING, PREVENTATIVE AND CORRECTIVE MAINTENANCE

The inlet baffles are removed by unfastening two 1/4-turn fasteners on each baffle. The outlet baffles are removed by unscrewing 5 attaching screws from the lower cowling. Store the screws and washers in the baffle rivnuts and store baffles in the baggage compartment.

CHAPTER 9

SUPPLEMENT 3

RECOGNITION LIGHTS

TABLE OF CONTENTS

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1. GENERAL

The installation is defined by Service Bulletin DAC1-33-01.

2. OPERATING LIMITATIONS

2.15 PLACARDS

(a) On the instrument panel above the individual circuit breakers.

Figure S3-1 - Breakers Identification

3. EMERGENCY PROCEDURES

There are no changes to the airplane emergency procedures when the Recognition Lights are installed.

4. NORMAL PROCEDURES

Pulsing the landing/taxi lights enhances the aircraft flight path recognition quality and may be used any time the pilot desires. It is recommended that the landing lights be turned on steady rate when the aircraft is within 200' AGL at night.

NOTE

Pulsing should not be used when operating near clouds or on the ground.

5. PERFORMANCE

There is no change in airplane performance with the Recognition Lights installed.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

The Recognition Lights installation adds 2.5 lbs (1.13 kg) of weight at a 0 in (0 m) moment arm.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

The Recognition Light System consists of 3, 35 watt lamps located in the left wing and the landing light. The lamps are aimed specifically to increase the aircraft's visibility on final approach and head on. One of the lamps is aimed to perform the function of the original taxi light. The 3 lamps and the original landing light are connected to a Pulselite power supply which allows one or more of the lights to be pulsed at approximately 46 times per minute. The instrument panel modifications include a Pulse Switch on the left side of the Lights switch panel and a Pulse System circuit breaker on the right side of the Lights panel (see Figure S3-2).

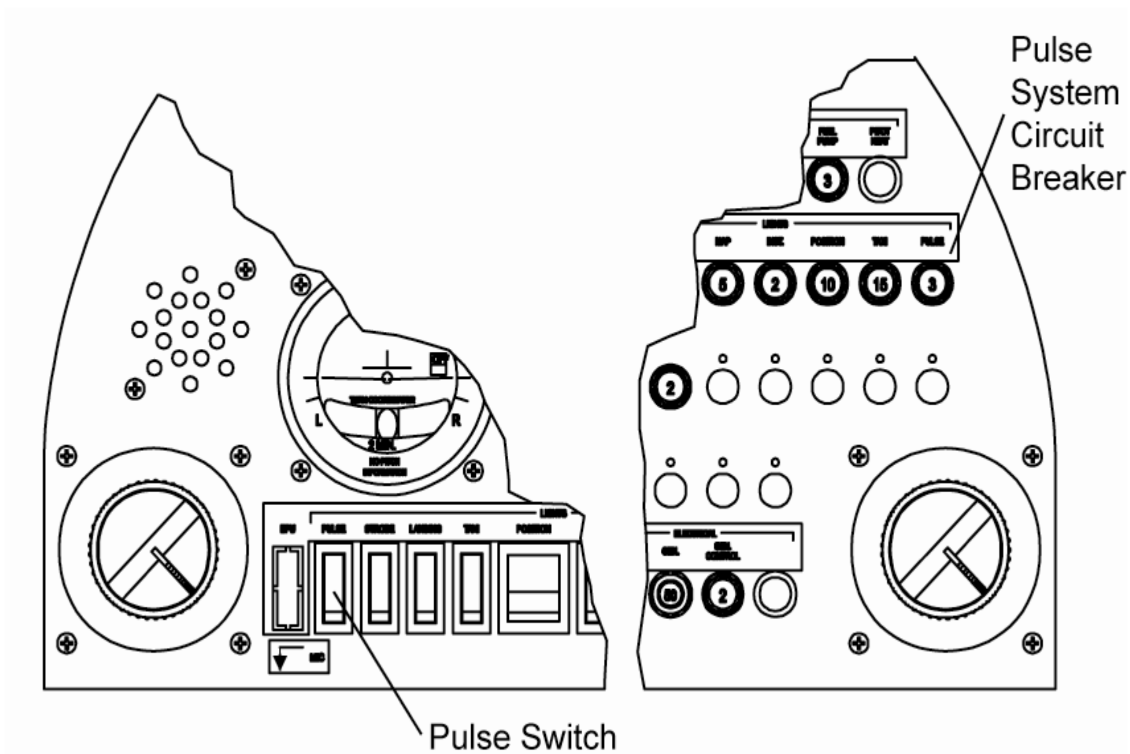

Figure S3-2 - Instrument Panel Modifications

With the Taxi and Landing switches in the OFF position, selecting the Pulse switch to ON causes the three lamps and the landing light to pulse simultaneously. Selecting either the Taxi light or the Landing light to ON while the Pulse switch is in the ON position causes the corresponding lamp(s) to remain on steady. With the Pulse switch in the off position the Taxi light and Landing light function as normal light circuits.

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

Service or replacement of bulbs shall be performed according to chapter 33-00 of your Diamond Aircraft Maintenance Manual (Document number DA201-C1).

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CHAPTER 9

SUPPLEMENT 4

GROSS WEIGHT INCREASE (800 KG)

Supplement 4 has been REMOVED - Pages S4-1 thru S4-16

The Supplement (Gross Weight Increase to 800 kg) has been incorporated into Revision 26 of the AFM and the Supplement is no longer required.

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CHAPTER 9

SUPPLEMENT 5

S-TEC AUTOPILOT

TABLE OF CONTENTS

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1. GENERAL

This supplement addresses the optional installation of an S-TEC System 30 autopilot (Mod No. 30). Only the portions of the flight manual affected by this installation are included in this supplement.

2. OPERATING LIMITATIONS

NOTE

Refer to all of the Operating Limitations with the following inserted into the appropriate place.

1. Autopilot operation is prohibited for airspeeds greater than 148 KIAS.
2. Autopilot operation is prohibited during Takeoff and Landing.
3. Maximum flap extension is T/O (15 Degrees) with the Autopilot operating.

2.15 PLACARDS

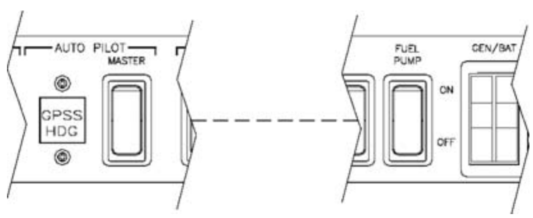
(a) Forward of the switch on the outboard side of the control stick.

**ALT
ENG/DISENG**

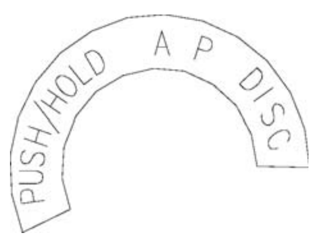
(b) Forward of the switch on the outboard side of the control stick.

AP DISC

(c) On the switch panel on the lower left side of the instrument panel. The placard is customized to the installation and may not exactly as shown.



(d) Around the “Mode Select / Disconnect Switch” switch of the autopilot.



(e) On the instrument panel near the autopilot.

- **AUTOPILOT MAX. OPERATING SPEED 148 KIAS.**
- **A/P OPS PROHIBITED FOR T/O & LDG.**
- **MAX FLAP T/O (15°) WITH A/P ON.**

3. EMERGENCY PROCEDURES

3.1 AUTOPILOT MALFUNCTION

CAUTION

IN THE EVENT OF AN AUTOPILOT MALFUNCTION, OR ANY TIME THE AUTOPILOT IS NOT PERFORMING AS EXPECTED OR COMMANDED, DO NOT ATTEMPT TO IDENTIFY THE SYSTEM PROBLEM.

IMMEDIATELY REGAIN CONTROL OF THE AIRCRAFT BY OVERPOWERING THE AUTOPILOT AS NECESSARY AND THEN DISCONNECT THE AUTOPILOT.

DO NOT REENGAGE THE AUTOPILOT UNTIL THE PROBLEM HAS BEEN IDENTIFIED AND CORRECTED.

(a) Autopilot may be disconnected by:

(1) Depressing the "AP Disconnect" Switch on the right side of the pilot's control grip.

(2) Pressing and holding the mode selector knob for approximately 2 seconds.

(3) Moving the autopilot master switch to "OFF" position.

(4) Pulling the autopilot circuit breaker.

(b) Altitude loss during a malfunction and recovery.

(1) The following altitude losses and bank angles were recorded after a malfunction with a 3 second recovery delay:

Configuration	Bank Angle/Altitude Loss
Climb / Descent / Cruise	55 Degrees/ -200'

(2) The following altitude losses and bank angles were recorded after a malfunction with a 1 second recovery delay:

Configuration	Bank Angle/Altitude Loss
Maneuvering	20 Degrees/ -20'
Approach (coupled or uncoupled)	15 Degrees/ -20'

4. NORMAL PROCEDURES

NOTE

Refer to all of the Normal Operating Procedures with the following inserted into the appropriate places.

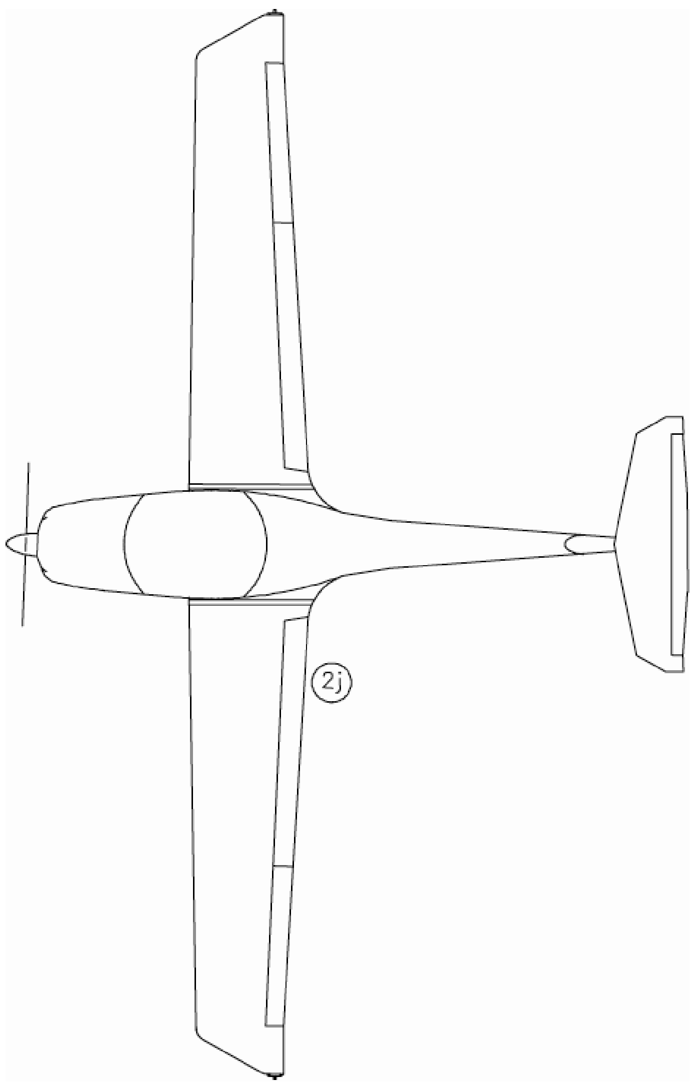
4.4 NORMAL OPERATION CHECKLIST

4.4.1 Preflight Inspection

(b) Walk Around Check and Visual Inspection

(2) Left Wing

(J) Autopilot Static Port ....check clear



4.4.4 Before Taxiing

(b) 1. AP Master Switch .... ON (if desired)

(b) 2. Autopilot Mandatory Pre-flight Test .... COMPLETE

Autopilot Mandatory Pre-flight Test

(a) Observe all lights and annunciators illuminate.

(b) Observe the following light sequence of the trim indicators:

(Sequence requires 9 seconds).

(1) Initially both trim UP and DN lights are illuminated.

(2) UP light extinguishes and remains off.

(3) DN light then extinguishes and remains off.

(4) All lights extinguish except for "RDY" light.

The autopilot can be engaged and disengaged repeatedly using the mode selector knob. The autopilot can be disengaged using the A/P disconnect switch. Once the A/P master is switched off, the test must be conducted again to get a ready indication. If the ready light does not illuminate after the test, a failure to pass the test is indicated and the system will require service.

Altitude mode cannot be engaged unless power is on for more than 15 seconds.

System Functional Test:

(1) Push Mode Switch – STB Annunciator illuminates. Rotate “Mode Select” knob left and right. Observe control stick moves in corresponding direction. Centre turn knob.

(2) Set D.G. and place heading bug under lubber line (if installed). Push “Mode Select” knob to engage HDG mode. Observe HDG annunciator. Move HDG bug left and right. Observe proper control stick motion.

(3) Overpower test – Grasp control stick and overpower roll servo left and right. Overpower action should be smooth with no noise or jerky feel. If unusual sound or excessive play is detected, have the servo installation inspected prior to flight.

(4) Radio Check

(A) Turn on NAV Radio, with valid NAV signal, engage LO TRK mode and move VOR OBS so that VOR needle moves left and right – control stick should follow the direction of needle movement.

(B) Select Hi TRK mode – the control stick should again follow radio needle movement and with more authority than produced by Lo TRK mode.

(5) Move control stick to level flight position – Engage ALT mode. Move control stick fore and aft to overpower pitch servo clutch. Overpower action should be smooth with no noise or jerky feel. If unusual sound or excessive play is detected, have the servo installation inspected prior to flight.

(6) Trim Check – Manually apply back pressure to control stick for 2-3 seconds. Observe the DN trim light illumination and the alert tone is heard. Apply forward pressure to the control stick for 2-3 seconds, observe the UP trim light illumination and the alert tone is heard. Move the control stick to centre. Observe both UP/DN lights extinguish.

(7) Hold control stick and push mode knob for 2 seconds or press the "AP DISC" on the control stick. Note that roll and pitch servos release. Move control stick to confirm roll and pitch motions are free, with no control restriction or binding.

4.4.6 Before Take-off

(w) 1. Autopilot .... Disengaged (AP DISC)

4.4.9 Cruise

(g) Autopilot Operation (if desired)

NOTE

A guide containing useful operating information is available from S-TEC Corporation, One S-TEC Way, Municipal Airport, Mineral Wells, Texas, 76067-9236, USA. The Guide, P/N 8777, is titled Pilots Operating Handbook, “System Twenty, System Thirty, System Thirty ALT, Autopilots”

ROLL MODE

(a) Check Autopilot Master .... ON

(b) Mode Select Switch .... Select desired roll mode

ALTITUDE HOLD MODE

(a) Check Autopilot Master .... ON

NOTE

The aircraft should be trimmed for level flight prior to “Altitude Hold Engagement”.

(b) ALT ENG / DISENG .... PRESS

(c) Trim “UP”, trim “DN” annunciators .... MONITOR

4.4.11 Landing Approach

(a) Autopilot .... Disengaged (AP DISC)

5. PERFORMANCE

There is no change in airplane performance with the autopilot system installed.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

The installation adds 11.1 lbs (5.0 kg) of weight at a –24.6 in (–.62 m) arm.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.15 SYSTEM DESCRIPTION

The System 30 is a pure rate autopilot which uses an inclined rate gyro in the Turn Coordinator instrument as the primary roll and turn rate sensor and an accelerometer and an absolute pressure transducer as pitch rate sensors. The turn coordinator includes an autopilot pick-off, a gyro RPM detector and an instrument power monitor. Low electrical power will cause the instrument "flag" to appear while low RPM will cause the autopilot to disconnect. The autopilot includes an automatic pre-flight test feature that allows a visual check of all the annunciator lamps and checks critical elements of the accelerometer system. The test feature will not enable autopilot function unless the automatic test sequence is satisfactorily completed.

When the pre-flight test is satisfactorily completed and when the rate gyro RPM is correct, the green "RDY" light will illuminate indicating the autopilot is ready for the functional check and operation. The autopilot cannot be engaged unless the "RDY" light is illuminated.

A Directional Gyro (DG) or compass system supplies heading information to the autopilot by a heading bug in the instrument.

Pitch axis control is provided for the altitude hold function by use of the accelerometer and the pressure transducer. When the altitude hold mode is engaged an elevator trim sensor in the pitch servo will detect the elevator trim condition. When elevator trim is necessary to re-establish a trimmed condition, trim indicator lights on the Turn Coordinator will illuminate to indicate the direction to trim to restore a trimmed condition. In addition to the indicator lights an audible tone will sound.

If the pilot ignores a trim light for more than five seconds, the light will begin to flash to get the pilot's attention.

The indicator and annunciator lamp brilliance is controlled through the aircraft instrument light rheostat, except for the "trim" indicators, which always illuminate at full intensity.

The following list describes the various features illustrated in Figure S5-1.

(1) Turn Coordinator – Provides basic flight information, autopilot mode switching and annunciation.

(2) Mode Annunciation window – displays mode in use.

(3) Green Ready (RDY) Light – Illuminates when autopilot is ready for engagement. When autopilot is disconnected, "RDY" will flash for five seconds accompanied by a beeping audio tone.

(4) Mode Select/Disconnect Switch – Each momentary push of this knob will select an autopilot mode, left to right, beginning with ST (Stabilizer) mode and ending with (Hi) TRK mode. Holding the knob in for more than 2 seconds will disconnect the autopilot. Turning the knob left or right in the stabilizer mode will provide left/right commands to the autopilot proportional to knob displacement up to a standard rate turn.

(5) Altitude Hold Engage/Disengage Switch – This control stick mounted switch will engage or disengage the Altitude Hold Mode as desired. The blue (ALT) light on the annunciator panel will illuminate when ALT. mode is engaged.

(6) Heading Mode – If the system is equipped with a D.G., this mode will permit preselected left/right turns using the D.G. heading bug.

(7) TRK (Track) – using the (Lo) mode of the tracking feature will provide low system gain for comfortable cross country tracking of VOR or GPS signals. Using the (Hi) mode of the tracking feature will provide a higher level of system gain for more active tracking of VOR, GPS or Localizer front course signals.

(8) Trim UP Light – Illuminates to indicate the need for nose UP trim.

(9) Trim DOWN Light – Illuminates to indicate the need for nose DOWN trim. When both lights are out, the aircraft is in trim longitudinally.

(10) Blue (ALT) light illuminates when altitude mode is engaged.

(11) Flag Window – Red flag visible indicates lack of electrical power to primary turn coordinator unit.

(12) Autopilot Master ON-OFF Switch – Refer to pre-flight procedures for operating details.

(13) Remote AP disconnect switch.

(14) GPSS Heading Switch / Annunciator. Works in conjunction with “HDG” mode. When the GPSS is activated the GPSS converter changes ARINC 429 steering data received from the GPS to heading signals.

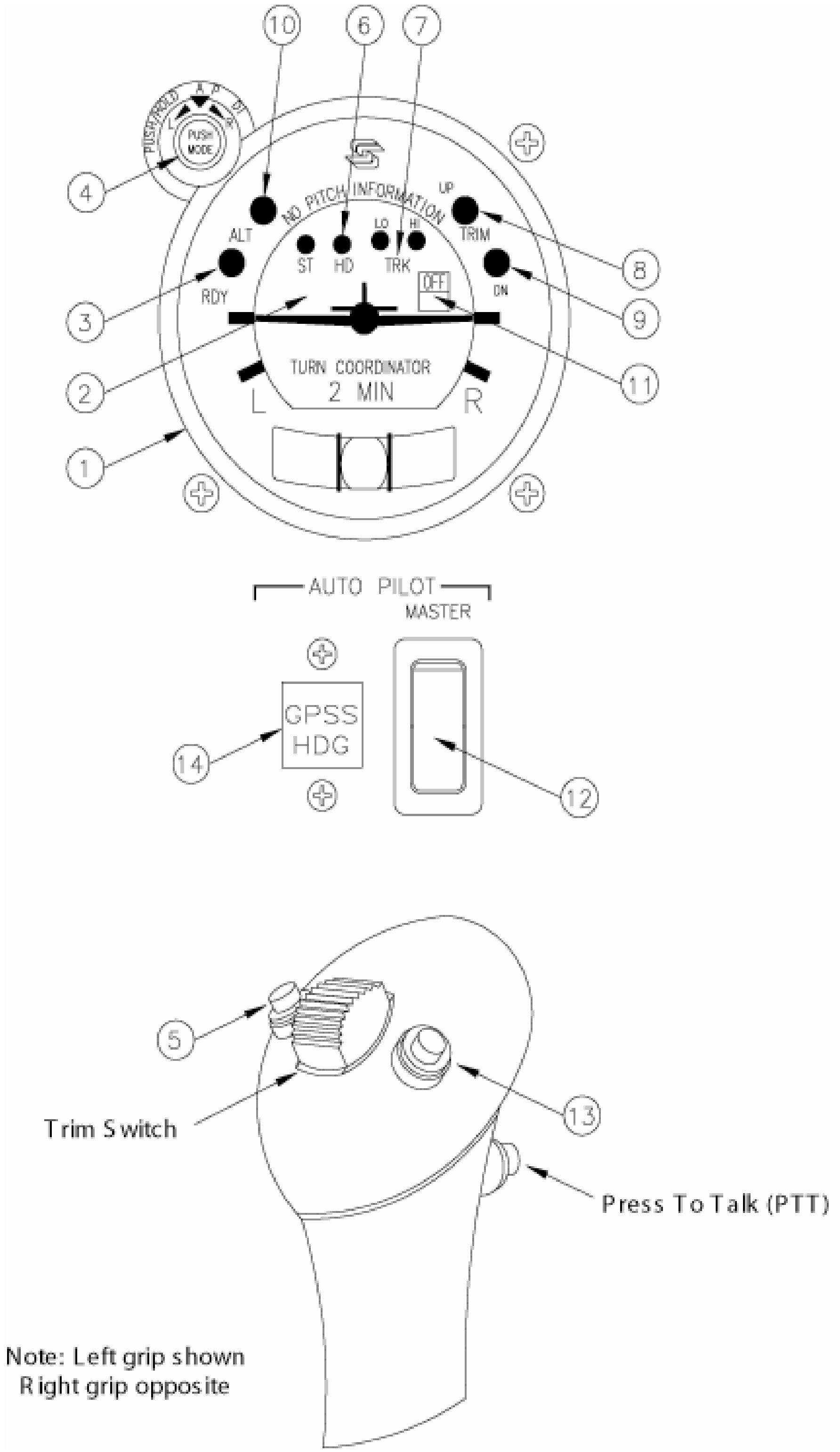


Figure S5-1 - Various Features of the System 30 Autopilot

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

There is no change in handling, preventative or corrective maintenance with the installation of S-TEC System 30 autopilot (Mod No. 30).

CHAPTER 9

SUPPLEMENT 6

VM1000 MONITORING SYSTEM

TABLE OF CONTENTS

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1. GENERAL

This supplement addresses the optional installation of the Vision Microsystems VM1000 engine instrument package (Mod 31). Only portions of the flight manual affected by the installation are included in this supplement.

2. OPERATING LIMITATIONS

2.15 PLACARDS

(a) Under the buttons of the VM 1000 main display.

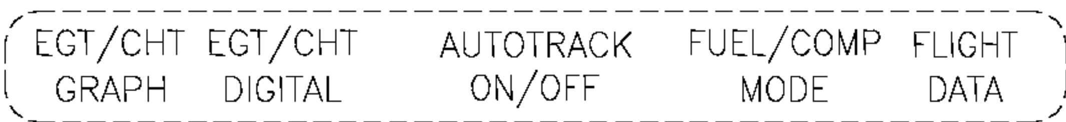

Figure S6-1 - Placard below the VM 1000 Main Display

3. EMERGENCY PROCEDURES

3.3 EMERGENCY PROCEDURES CHECKLIST

3.3.1 Engine Failures

(a) VM 1000 and EC 100 Display Malfunction

(1) Instrument Circuit Breaker .... PRESS IN or PULL and RESET

NOTE

If indication cannot be restored take care not to shock cool the engine during a descent. Electrical system voltage can be monitored on M803 Clock / OAT / Volt Meter if installed.

(2) Airspeed .... Do not exceed 115 KIAS

(3) If indication cannot be restored .... Land at suitable airport

3.3.8 Electrical Power Failure

(b) Generator Failure

GEN. ANNUNCIATOR ILLUMINATED

(1) GEN/BAT Master Switch .... Cycle Generator Master Switch OFF - ON

(2) Generator Circuit Breaker .... If tripped, reset

(3) Generator CONTROL Circuit Breaker .... If tripped, reset

(4) If Generator can not be brought on-line ..... Switch OFF all non-flight essential electrical consumers. Monitor Ammeter and Voltmeter. Land at nearest suitable airport.

NOTE

There is 30 minutes of battery power at a discharge load of 20 amperes when the battery is fully charged and properly maintained. The amp meter monitors generator load which will indicate low amps when the generator is off or has malfunctioned.

(c) Low Voltage Indication (needle in yellow Arc)

LOW VOLTAGE INDICATION (NEEDLE IN YELLOW ARC) WHILE AIRPLANE IS ON THE GROUND

(1) Engine RPM .... Increase RPM until needle is in the Green Arc. This should occur before exceeding 1100 RPM.

(2) Non-flight essential electrical consumers.... Switch OFF consumers until needle is in the Green Arc.

(3) If needle remains in the yellow arc and the ammeter is indicating to the left of center (discharge). ....Discontinue any planned flight activity

LOW VOLTAGE INDICATION (NEEDLE IN YELLOW ARC) DURING FLIGHT

(1) All non-flight essential electrical consumers .... Switch OFF

(2) If needle is remaining in the yellow arc and the ammeter is indicating to the left of center (Discharge). ....Generator Failure Refer to paragraph 3.3.8.C.

LOW VOLTAGE INDICATION (NEEDLE IN YELLOW ARC) DURING LANDING

(1) After landing .... proceed in accordance with paragraph 3.3.8.C.

WARNING

IF AT ANY TIME THE VOLTMETER NEEDLE INDICATES IN THE RED ARC, THE PILOT SHOULD LAND AT THE NEAREST SUITABLE AIRPORT AND SERVICE THE AIRCRAFT ACCORDINGLY BEFORE CONTINUING THE FLIGHT.

4. NORMAL PROCEDURES

NOTE

There is no change in the normal procedures with the VM 1000 and EC 100 monitoring system installed. Although there are no necessary changes to the normal procedures, Section 7 contains a description of some of the operating modes and functions that may be used, if desired by the pilot, as enhancements to the normal procedures.

5. PERFORMANCE

There is no change in airplane performance with the VM1000 installed.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

The installation adds 3.13 lbs (1.37 kg) of weight at a –34.3 in (-0.88 m) moment arm with the EC 100 option installed and the standard aircraft instruments removed.

The installation adds 2.44 lbs (1.06 kg) of weight at a –39.4 in (-1.01 m) moment arm without the EC 100 option installed and the standard aircraft instruments removed.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.1 VM 1000 System General

The following provides a general description for use of the VM 1000 as it pertains to the operation of the DA20-C1. Features such as “Autotrack” “Lean Mode” and “EC 100” are described in detail in the VISON MICRO SYSTEM owners manual P/N 5010002. Copies of the manual can be obtained through.

Vision Micro Systems Inc.
4071 Hannegan Suite T
Bellingham, Washington 98226
Phone (360) 714-8203 Fax (360) 714-8253

7.2 Tachometer

The tachometer system provides an analog display and a four place digital display. Color range marks provide a quick reference to monitor normal, and red line engine RPM.

RPM: The digital display resolution is 10 RPM.

Engine Hours: When the engine is off, the digital display shows the total accumulated engine hours to a maximum of 5999.9 hours. Engine hours are accumulated any time RPM is greater than 1500.

A warning alert activates when the RPM redline is reached. The VM 1000 display will flash, if installed, the EC100 displays the warning and an audible tone is heard.

7.3 Manifold Pressure

The manifold pressure system provides an analog display and a three place digital display. The full sweep analog display resolution is 1" Hg. The digital display resolution is 0.1" Hg.

A warning alert activates when the manifold pressure redline is reached. The VM 1000 display will flash, if installed, the EC100 displays the warning and an audible tone is heard.

7.4 Oil System

Oil temperature and oil pressure are displayed continuously on an analog and a digital display.

Oil Pressure: As oil pressure rises, the analog display increases proportionately. The digital display reads in increments of 1 PSI. A warning alert activates whenever the oil pressure redline is reached. The VM 1000 display will flash, if installed, the EC100 displays the warning and an audible tone is heard.

Oil Temperature: As oil temperature rises, the analog display increases proportionately. The digital display reads in increments of 1 degree Fahrenheit to a maximum of 300 degrees. A warning alert activates whenever the oil temperature rises above the redline. The VM 1000 display will flash, if installed, the EC100 displays the warning and an audible tone is heard.

7.5 Fuel Pressure

Fuel Pressure: As fuel pressure rises, the analog display increases proportionately. The digital display reads in increments of 1 PSI. A warning alert activates whenever the fuel pressure redline is reached. The VM 1000 display will flash, if installed, the EC100 displays the warning and an audible tone is heard.

7.6 Fuel Computer System

The fuel computer portion of the VM 1000 is not operational on the DA20-C1.

7.7 Electrical System

Voltage is displayed both analog and digitally. Full color range marks provide a quick reference for fast analysis of voltage levels. As voltage rises, the analog display increases proportionally. The digital readout is at 0.1 volt resolution. A warning alert activates whenever the voltage redline is reached. The VM 1000 display will flash, if installed, the EC100 displays the warning and an audible tone is heard.

Amperage is displayed both analog and digitally. The load being monitored is the electrical current the generator is supplying to the system. When the electrical load is increased by turning on equipment, the ammeter will show an increase. When the load being supplied by the generator drops below approximately 2 amps the VM 1000 display will flash, if installed, the EC100 displays the warning and an audible tone is heard.

7.8 Fuel Quantity

Fuel quantity is displayed on a separate indicator but is controlled by the VM 1000 Data Processing Unit and EC 100 remote display. Display resolution is 1 US gallon. When 5 US gallons remain in the main tank the fuel system display is flashed an audible tone is heard and the EC 100 displays the warning.

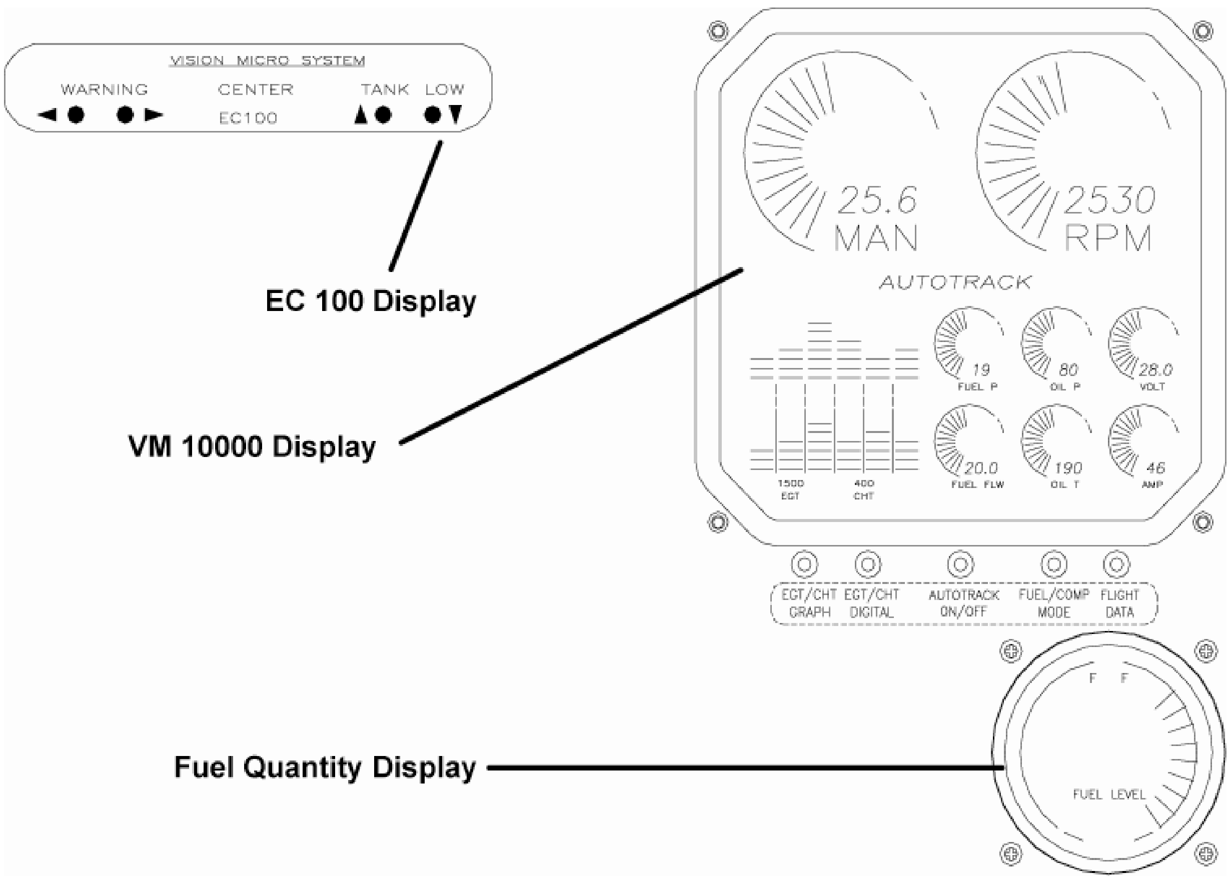

Figure S6-2 - Fuel Quantity

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

Service and maintenance of the VM 1000 / EC 100 system shall be performed according to the Aircraft Maintenance Manual (Document number DA201-C1).

CHAPTER 9

SUPPLEMENT 7

AUXILIARY FUEL SYSTEM

TABLE OF CONTENTS

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1. GENERAL

This supplement addresses the optional installation of an auxiliary fuel tank system (Mod No 60). The optional auxiliary fuel system installation provides extended range operation by increasing the total fuel capacity of the DA20-C1 by 5 US gallons.

Only portions of the flight manual affected by the installation are included in this supplement.

2. OPERATING LIMITATIONS

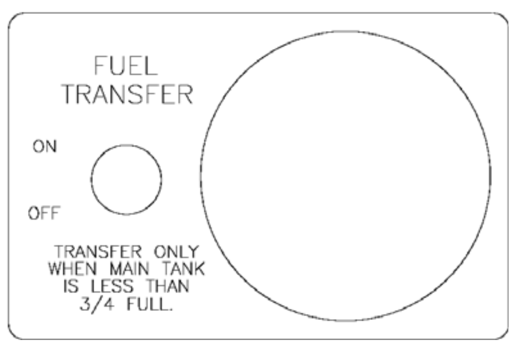
NOTE

Refer to all of the Operating Limitations with the following inserted into the appropriate place.

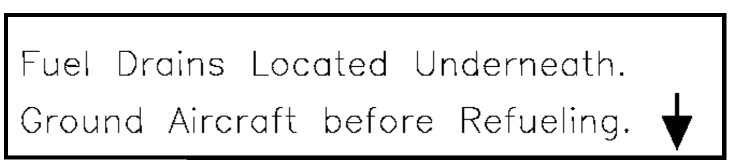
Initiate fuel transfer only when the main tank is less than 3/4 full.

2.15 PLACARDS

(a) On the lower right corner of the instrument panel.



(b) Above the auxiliary fuel filter cap on the R/H side of the fuselage.



(c) Above the auxiliary fuel filter cap on the R/H side of the fuselage.

USEABLE 19L/5.1 US gal.
AVGAS 100LL

(d) On the face of the auxiliary fuel tank gauge.

AUXILIARY TANK
USEABLE
19L/5.1 US gal.

(e) On the underside of the fuselage, to the right, just forward of the wing trailing edge.

FUEL DRAINS

3. EMERGENCY PROCEDURES

Emergency procedures are not affected by the Auxiliary Fuel Tank system.

4. NORMAL PROCEDURES

NOTE

Refer to all of the Normal Operating Procedures with the following inserted into the appropriate places.

CAUTION

THE AIRCRAFT MUST BE GROUNDED PRIOR TO AND DURING FUELING. USE THE GROUND STUD, LOCATED UNDER THE TRAILING EDGE OF THE LEFT WING.

NOTE

It is recommended to fill the main tank first and to full capacity before filling the auxiliary tank.

When using the auxiliary fuel tank, it is recommended to fill the tank to full capacity.

4.4 NORMAL OPERATION CHECKLIST

4.4.1 Preflight Inspection

(a) In-Cabin Check

Insert after Item (9).

(9)a. Fuel Transfer .... check OFF

(b) Walk Around Check and Visual Inspection

Insert after Item (3)(F)

If using auxiliary tank:

Auxiliary Fuel Tank Vent .... check clear

Auxiliary Fuel Tank Drain.......................... drain water

Auxiliary Fuel Tank Quantity..................... check Full

4.4.2 Before Starting Engine

Insert after Item (k).

(k)(1 Fuel Transfer .... check OFF

4.4.6 Before Take-off (Engine Run-up)

Insert after Item (g).

(g)(1 Auxiliary Fuel Tank Indicator .... check

4.4.18 Auxiliary Tank Fuel Transfer

NOTE

It is recommended to transfer fuel in level cruise flight.

(a) Main fuel tank... less than 3/4 full

(b) Auxiliary fuel tank indicator .... Full

(c) Fuel Transfer switch... ON

(d) Transfer time .... 10 minutes

(e) Auxiliary fuel tank indicator .... Empty

(f) Main fuel tank.. 1/5 capacity increase

(g) Fuel Transfer switch... OFF

5. PERFORMANCE

There is no change in airplane performance with the Auxiliary Fuel Tank system installed.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

The installation (including unusable fuel) adds 10.6 lbs (4.8 kg) of weight at 32.4 in (0.823 m) moment arm.

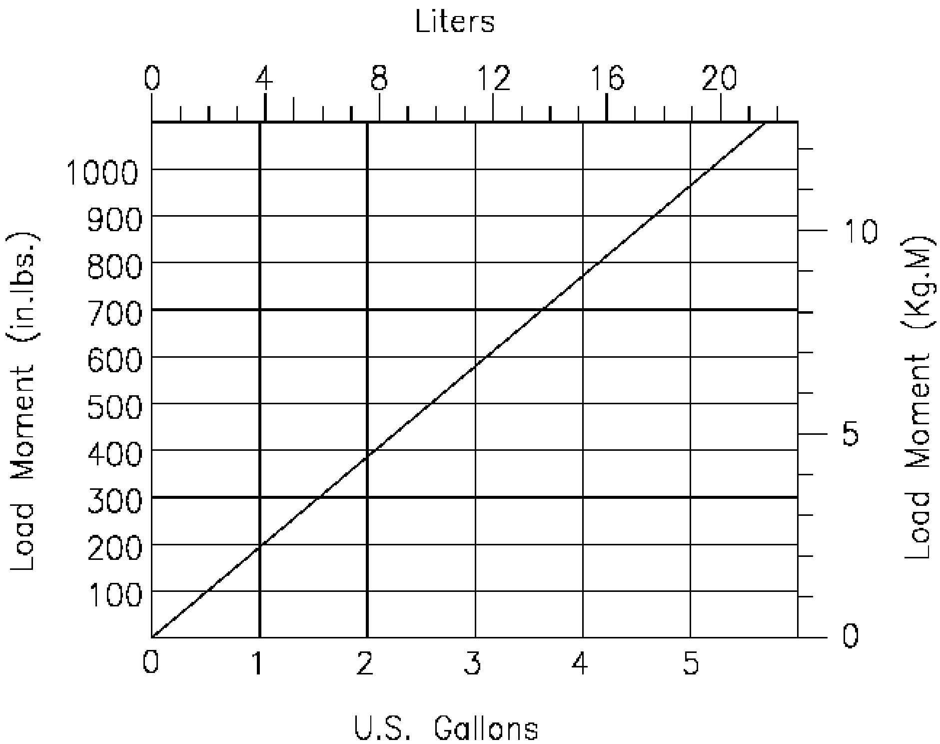


Figure S7-1 - Auxiliary Fuel Moment Chart

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

The auxiliary fuel tank is located in the fuselage, aft of the passenger compartment and underneath the baggage compartment floor, on the right hand side of the main fuel tank.

Fuel is gravity fed from the auxiliary tank to the electric transfer pump, which is used to pump fuel from the auxiliary fuel tank to the main fuel tank. From the pump, fuel flows through a check valve and into the top of the main fuel tank. The check valve is installed between the auxiliary tank and the main tank to prevent siphoning of fuel from the main tank back into the auxiliary tank. The only ports in the auxiliary fuel system are the auxiliary tank outlet and drain. All auxiliary fuel system components are grounded to each other and the external ground stud, located under the trailing edge of the left wing.

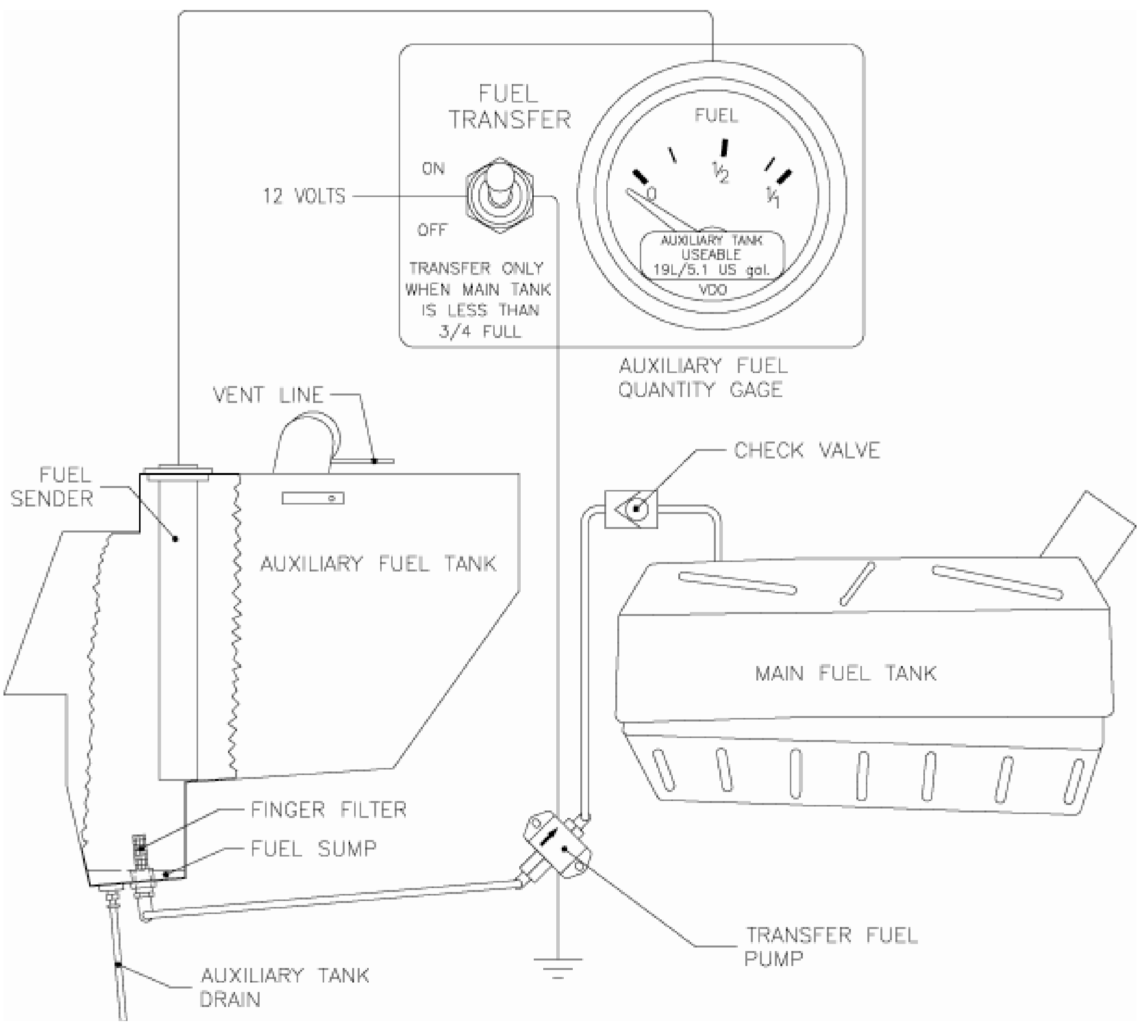


Figure S7-2 - Fuel System Schematic

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

Service and maintenance of the Auxiliary Fuel Tank system shall be performed according to the Aircraft Maintenance Manual (Document number DA201-C1).

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CHAPTER 9

SUPPLEMENT 8

STICK MOUNTED TRIM SWITCHES

TABLE OF CONTENTS

Page

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1. GENERAL

This supplement addresses the optional installation of a stick mounted trim switch system. Only portions of the flight manual affected by the installation are included in this supplement.

2. OPERATING LIMITATIONS

There is no change to the operating limitations with the stick mounted trim switch installed.

3. EMERGENCY PROCEDURES

There is no change to the emergency procedures with the stick mounted trim switch installed.

4. NORMAL PROCEDURES

There is no change to the normal procedures with the stick mounted trim switch installed.

5. PERFORMANCE

There is no change in airplane performance with the trim switch installed.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

The change in weight and balance is negligible with the installation of the stick mounted trim switches.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

Trim Switches are located on top of each Control Stick, aft of centre. The switches are positioned so that they can be easily operated by thumb. Forward movement of either switch gives nose down trimming and aft movement of the switch gives nose up trim. The trim switches control electrical relays that supply electrical power to the electric pitch trim motor. If the switches are operated in opposing directions at the same time, the trim motor will not operate. Operation of the trim switches in the same direction and at the same time will cause the trim motor to operate in that direction.

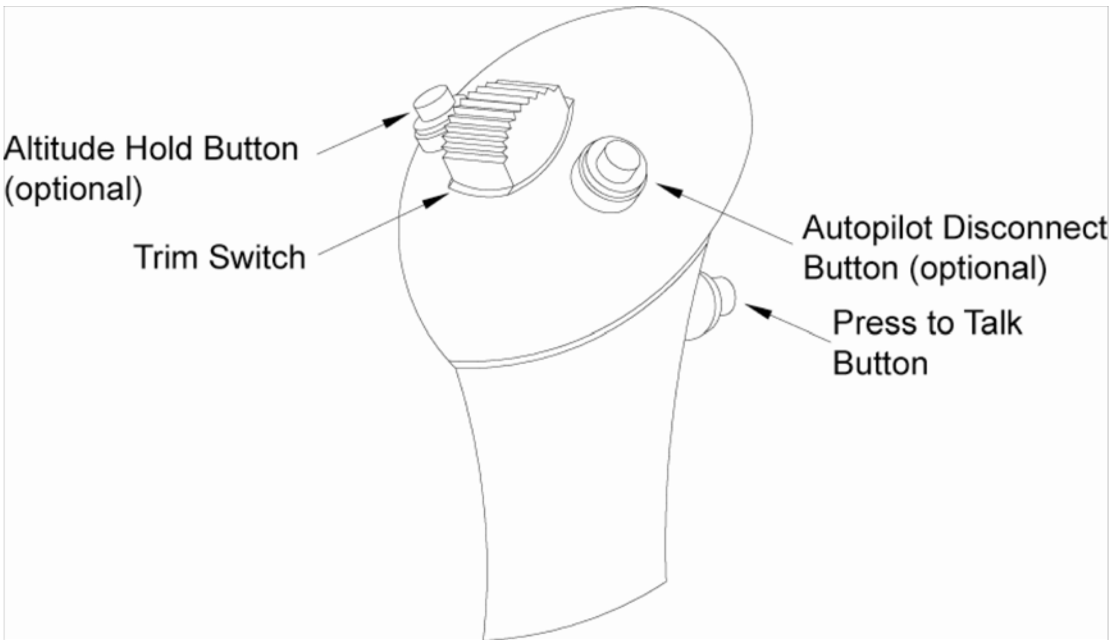

Figure S8-1 - Control Stick Grip (Left Hand Shown)

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

Service and maintenance of the Stick Mounted Trim Switches shall be performed according to the Aircraft Maintenance Manual (Document number DA201-C1).

CHAPTER 9

SUPPLEMENT 9

20 US GALLON FUEL TANK

TABLE OF CONTENTS

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1. GENERAL

This supplement addresses the optional installation of a smaller 20.5 US gallon fuel tank in place of the standard 24.5 US gallon fuel tank. Only portions of the flight manual affected by the installation are included in this supplement.

2. OPERATING LIMITATIONS

2.14 FUEL

Fuel Capacity:

Total Fuel Quantity ....:20.5 US gal. (78.0 liters)

Usable Fuel ....:20.0 US gal. (76.0 liters)

Unusable Fuel ....:0.5 US gal. (2.0 liters)2.15

2.15 PLACARDS

6. On the fuel quantity indicator.

Usable
76L/20 US gal.

26. Next to the fuel filler cap.

78L/20.5 US gal. AVGAS 100LL
USABLE 76L/20 US gal.

3. EMERGENCY PROCEDURES

There is no change to the emergency procedures.

4. NORMAL PROCEDURES

There is no change to the normal procedures.

5. PERFORMANCE

The range with 30 minute reserve fuel is reduced by approximately 19% with the 20.5 US gallon fuel tank installed in place of the 24.5 US gallon tank.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

Lever arm of fuel in the 20.5 US gallon tank: 30.08 in (0.764 m)

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.10 FUEL SYSTEM

A 20.5 US Gal total / 20.5 US Gal usable fuel tank replaces the standard 24.5 US Gal total / 24.0 US Gal usable fuel tank. There are no other changes to the fuel system.

7.10.5 Fuel Dipstick

A fuel dipstick P/N 22-2550-18-00, is supplied with all aircraft with the 20 US gallon fuel tank installed. This dipstick permits direct measurement of the fuel level during the pre-flight check.

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

There is no change in handling, preventative or corrective maintenance with the 20 US gallon fuel tank installed.

CHAPTER 9

SUPPLEMENT 10

REVERSED INSTRUMENT PANEL

TABLE OF CONTENTS

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1. GENERAL

This supplement addresses the optional installation of the navigation and powerplant instruments in a reversed configuration. The navigational instruments are located on the right hand side of the instrument panel. The powerplant instruments are located on the left hand side of the panel. Only portions of the flight manual affected by this installation are included in this supplement.

2. OPERATING LIMITATIONS

There is no change in the operating limitations.

3. EMERGENCY PROCEDURES

The ELT and Placard are located on the left side of the aircraft.

4. NORMAL PROCEDURES

There is no change in the normal procedures.

5. PERFORMANCE

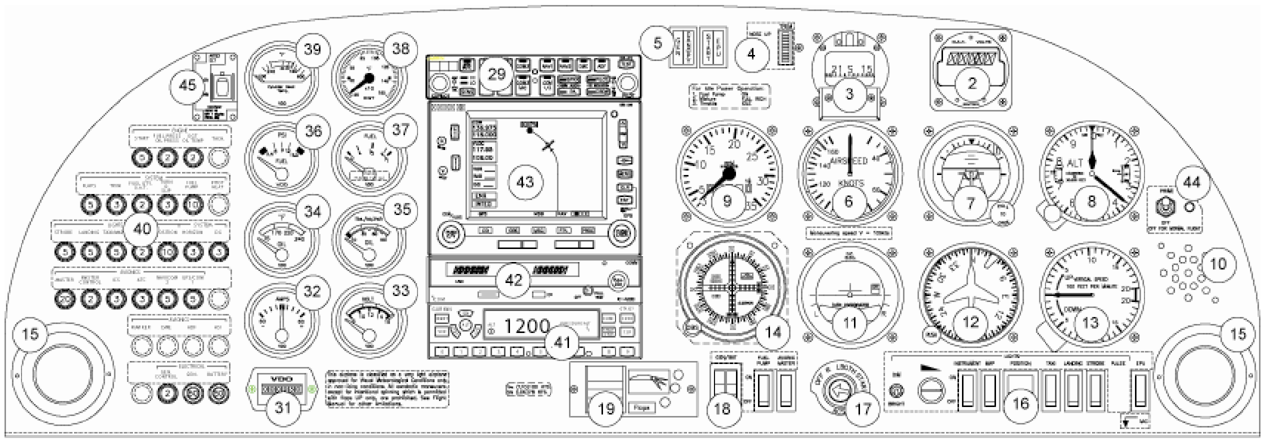
There is no change in the performance of the airplane.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

The weight and balance of the airplane is not affected.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.4 INSTRUMENT PANEL



Instrument Panel Components

Item	Description	Item	Description	Item	Description	Item	Description
1	--	13	Vertical Speed Ind.	25	--	37	Fuel Quantity Ind.
2	Clock/OAT	14	CDI	26	--	38	EGT Indicator
3	Magnetic Compass	15	Air Vent	27	--	39	CHT Indicator
4	Trim Position Display	16	Switch Panel	28	--	40	Circuit Breakers
5	Annunciator Lights	17	Ignition/Start Sw.	29	Marker/Audio Panel	41	Nav/Comm/GPS
6	Airspeed Indicator	18	Master Sw. Panel	30	--	42	Comm
7	Artificial Horizon Ind,	19	Flap Control	31	Hour Meter	43	Transponder
8	Altimeter	20	--	32	Ammeter	44	Fuel Prime Switch
9	Tachometer	21	--	33	Voltmeter	45	ELT Remote Switch
10	Stall Warning Horn	22	--	34	Oil Temp. Ind.		--
11	Turn Coordinator	23	--	35	Oil Pressure Ind.		--
12	Directional Gyro	24	--	36	Fuel Pressure Ind.		--

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

There is no change in handling, preventative or corrective maintenance with this instrument panel configuration.

CHAPTER 9

SUPPLEMENT 11

PITOT HEAT OPERATION

TABLE OF CONTENTS

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1. GENERAL

Ice build up on the Pitot Static Probe can cause the airspeed, altimeter and vertical speed indicators to display incorrect data. The “Pitot Heat” system provides protection against ice build up on the Pitot Static Probe.

Due to the increased electrical load when the “Pitot Heat” system is operating, the ammeter must be monitored. When engine power settings are below cruise power and/or combinations of electrical system users result in a higher than normal power consumption, it may be necessary to manage the electrical load by, turning off unnecessary electrical consumers.

CAUTION

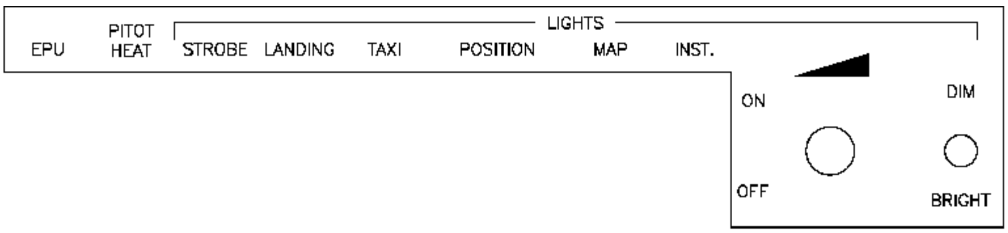
CHECKING OPERATION BY TOUCHING THE PROBE AFTER MOMENTARY APPLICATION OF POWER IS NOT SUFFICIENT IN DETERMINING PROPER SYSTEM OPERATION. THE GREEN PITOT CURRENT MONITOR LIGHT MUST ILLUMINATE DURING THE TEST TO CONFIRM PROPER HEATING.

2. OPERATING LIMITATIONS

2.15 PLACARDS

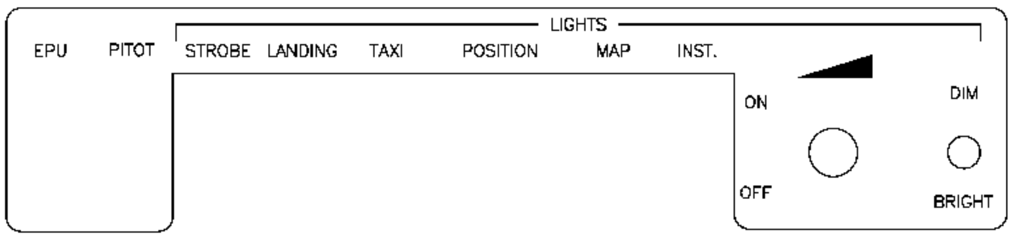
(a) On the lower left side of the instrument panel above the switches.

1.



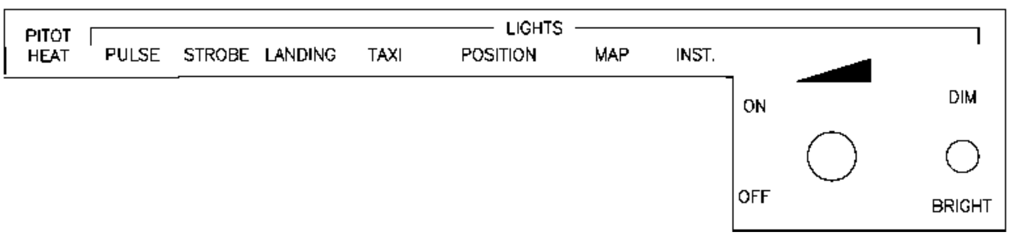
or

2.



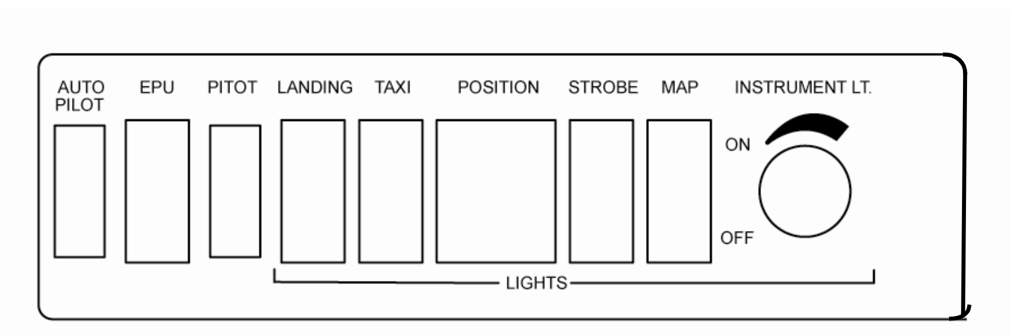
or

3.



or

4.



3. EMERGENCY PROCEDURES

Icing: Unintentional Flight into Icing Area Checklist has been repeated in this section to include operations with pitot heat system installed.

3.3.5 Icing

Unintentional Flight Into Icing Area

(a) Pitot Heat..ON

(b) Leave icing area (through change of altitude or change of flight direction to reach area with higher outside air temp).

(c) Continue to move control surfaces to maintain their moveability.

(d) Alternate Air ....ON

(e) Increase RPM to avoid icing of propeller blades (observe maximum RPM).

(f) Cabin Heat ....ON DEFROST

CAUTION

IN CASE OF ICING ON THE LEADING EDGE OF THE WING, THE STALL SPEED WILL INCREASE.

CAUTION

IN CASE OF ICING ON WING LEADING EDGE, ERRONEOUS INDICATING OF THE AIRSPEED, ALTIMETER, RATE OF CLIMB AND STALL WARNING SHOULD BE EXPECTED.

4. NORMAL PROCEDURES

4.4 NORMAL OPERATION CHECKLIST

4.4.0 General

The “Pitot Heat” system should be operated where meteorological conditions warrant its use and where government regulations require its operation.

As part of 4.4.1. Preflight Inspection: Walk Around, check the pitot probe insulating spacer for signs of charring near the pitot probe. If signs of overheating are present maintenance action will be required prior to flight.

4.4.4 Before Taxiing

(a) Avionics Master Switch .... ON

(b) Flight Instruments and Avionics .... set

(c) Engine Gauges .... check

(d) Voltmeter .... check, ensure needle is in the green arc. Increase RPM to achieve or turn OFF non-flight essential electrical consumers

(e) Warning Lights, Gen, Canopy, Start, EPU (if installed) .... push to test

(f) Fuel Prime .... Check OFF

(g) Fuel Pump .... Check ON

(h) Pitot Heat Switch... ON

(i) Pitot Heat Monitor Light.................................... ON, operational and dimmable

(j) Pitot Heat Switch... OFF

(k) Parking Brake .... release

NOTE

The ground test of the pitot heat should be kept to the minimum length of time required to verify normal operation (max. 10 seconds). Operation of the pitot heat system on the ground is unnecessary and will shorten the life of the heaters.

CAUTION

WARM-UP ENGINE TO A MINIMUM OIL TEMPERATURE OF 75° F AT 1000 TO 1200 RPM (ALSO POSSIBLE DURING TAXI). DO NOT OPERATE ENGINE ABOVE 1000 RPM UNTIL AN OIL TEMPERATURE INDICATION IS REGISTERED.

5. PERFORMANCE

There is no change in airplane performance associated with pitot heat operation.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

The weight and balance of the aircraft is not affected by pitot heat operation.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.12.1 Pitot Heat

The “Pitot Heat” system consists of heating elements imbedded in the Pitot Static Probe, a 15 amp circuit breaker, a control relay, thermal limit switches (HIGH and LOW), OFF/ON switch, and a GREEN LED monitor. The control relay closes and supplies electrical current to the Pitot Static Probe heaters when the PITOT SWITCH is set to ON and the LOW thermal limit switch is CLOSED. A current monitoring sensor confirms this by activating the GREEN LED monitor light.

The LOW thermal limit switch with automatic reset will cycle the control relay if the system is ON and an overheat condition exists. If the LOW temperature limit switch activates it will inhibit Pitot Static Probe heater operation and the GREEN LED monitor will go OFF until the Pitot Static Probe temperature drops below approximately 50 degrees Celsius.

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

To prevent premature failure of the heating elements the ground test of the pitot heat should be kept to the minimum length of time required to verify normal operation (max. 10 seconds). Operation of the pitot heat system on the ground is unnecessary and will shorten the life of the heaters.

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CHAPTER 9

SUPPLEMENT 12

BRAZILIAN PLACARDS AND MARKINGS

TABLE OF CONTENTS

Page

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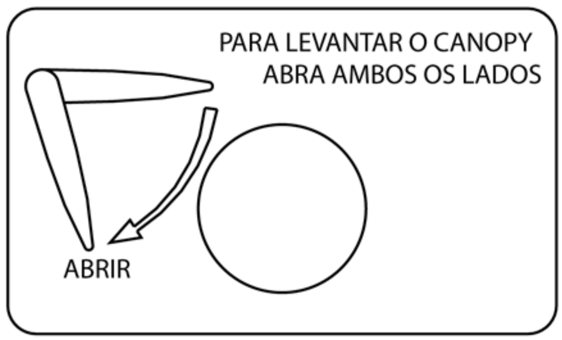
1. GENERAL

This supplement addresses the placards and markings for the Brazilian airplane. Only portions of the flight manual affected by the installation are included in this supplement.

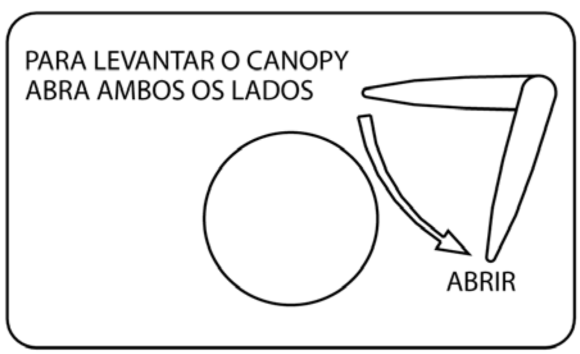
2. OPERATING LIMITATIONS

2.15 PLACARDS.

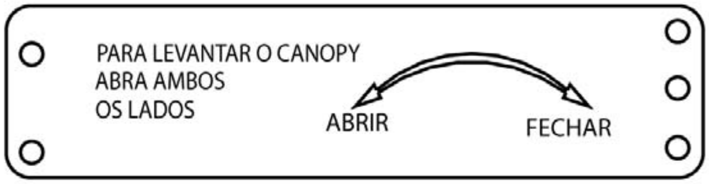
(a) On the exterior of the canopy frame on the L/H side (If equipped with an outside handle).



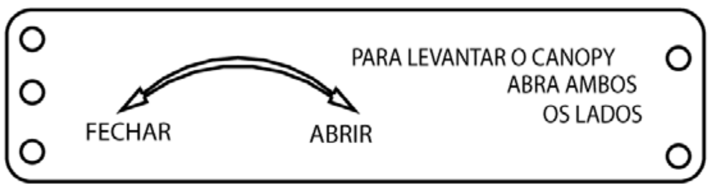
(b) On the exterior of the canopy frame on the R/H side (If equipped with an outside handle).



(c) On the interior of the canopy frame on the L/H side (If equipped with an outside handle).



(d) On the interior of the canopy frame on the R/H side (If equipped with an outside handle).



(e) On the exterior of the canopy frame on the L/H side (If equipped with a lock).

(f) On the L/H side of the canopy sill.

(g) On the R/H side of the canopy sill.

(h) On the R/H upper fuselage behind the canopy, if an ELT is installed.

(i) Next to the fuel filler cap.

93L/24.5 US gal. AVGAS 100LL
USAVEL 91L/24.0 US gal.

(j) Next to the fuel filler cap.

Os drenos de combustivel estão
localizados embaixo.
Aterre o avião antes de
reabastecer

(k) On the inside of the oil filler door.

CUIDADO
USE APENAS ÓLEO
DE AVIAÇÃO!

ÓLEO 6.0 US Qts.
5.68 l
SAE 20W-50
OU DE ACORDO COM
O MANUAL DE AVIAÇÃO

(l) On the upper L/H fuselage near the wing trailer edge.

ATERRAMENTO DE
REABASTECIMENTO

(m) Under each wing and on the tail skid.

AMARRAR

(n) On the underside of the fuselage (belly) near the L/H wing trailing edge.

ATERRE
AQUI

(o) On the upper engine cowling behind the propeller spinner.

NÃO EMPURRE NO SPINNER

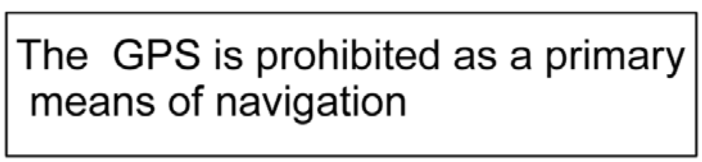
(p) On the L/H side of the baggage compartment.

BAGAGEM MAX - 20 Kg (44 lbs)
APENAS COM REDE DE BAGAGEM

(q) On the back-rest on the right side.

(r) On the right side of the aircraft above the EPU receptacle.

(s) On the instrument panel above the GPS.



3. EMERGENCY PROCEDURES

There is no change in the emergency procedures with the Brazilian placards and markings installed..

4. NORMAL PROCEDURES

There is no change in the normal procedures with the Brazilian placards and markings installed..

5. PERFORMANCE

There is no change in the performance of the airplane with the Brazilian placards and markings installed..

6. WEIGHT AND BALANCE / EQUIPMENT LIST

The change in weight and balance is negligible with the installation of the Brazilian placards and markings.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

The Brazilian placards and markings installed do not affect the description of the airplane and its systems.

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

The Brazilian placards and markings installed do not affect the handling, preventative and corrective maintenance.

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CHAPTER 9

SUPPLEMENT 13

GARMIN G500 INTEGRATED DISPLAY SYSTEM

TABLE OF CONTENTS

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1. GENERAL

This supplement supplies the information necessary for the efficient operation of the DA20-C1 airplane when the Garmin G500, Integrated Display System, is installed as an optional system. The information contained within this supplement is to be used in conjunction with the complete manual.

This Supplement to the AFM is provided to acquaint the pilot with the limitations as well as normal, abnormal and emergency operating procedures of the Garmin G500. The limitations presented are pertinent to the operation of the G500 System as installed in the DA20-C1 airplane. Garmin provides a detailed Pilot's Guide. Document Number 190-01102-02 (Current Revision). This reference material is not required to be on board the aircraft but does contain a more in depth description of all the G500 functions.

This supplement is a permanent part of this Manual and must remain in this Manual as long as the Garmin G500 is installed.

2. OPERATING LIMITATIONS

2.1 Cockpit Reference Guide

The Garmin G500 Cockpit Reference Guide, Document Number 190-01102-03, (Current Revision) must be immediately available to the flight crew.

2.2 System Software Requirements

The G500 must utilize the following or later TCCA/FAA approved software versions for safe operation:

Component	Identification	Software Version
GDU 620	PFD/MFD	7.00
GRS 77	AHRS	3.04
GDC 74	Air Data Computer	3.11
GMU 44	Magnetometer	2.01

In addition to the main components of the G500, Garmin GNS430W GPS navigator is interfaced to the G500. The GPS system connected to the G500 must utilize the following applicable software versions:

Component	Identification	Software Version
GNS 430W	GPS/WAAS NAV	3.20
GTN 650	GPS/WAAS	5.0
	Nav	6.02

2.3 AHRS Operational Area

The AHRS used in the G500 is limited in its operational area. Operations are prohibited north of 72 degrees North and south of 70 degrees South latitudes and in the following four regions:

(a) North of 65 degrees North latitude between longitude 75 degrees West and 120 degrees West

(b) North of 70 degrees North latitude between longitude 70 degrees West and 128 degrees West

(c) North of 70 degrees North latitude between longitude 85 degrees East and 114 degrees East

(d) South of 55 degrees South latitude between longitude 120 degrees East and 165 degrees East

Loss of G500 heading and attitude may occur beyond these regions, but this will not affect the GPS track.

2.4 Navigation Angle

The GDU 620 Navigation Angle can be set to either True or Magnetic on the AUX page. The Navigation Angle defines whether the GDU 620 headings are referenced to True or Magnetic North. The Navigation Angle set in the GDU 620 must match that which is set on the GNS navigator interfaced to the unit.

2.5 Aerobatic Maneuvers

Conducting aerobatic maneuvers may cause the attitude information displayed on the G500 to be incorrect or temporarily removed from the display.

2.6 Kinds of Operation

The aircraft with the Garmin G500 installed is limited to Day/Night VFR operations only.

The table below lists the minimum fully functional G500 system Elements required for VFR operations.

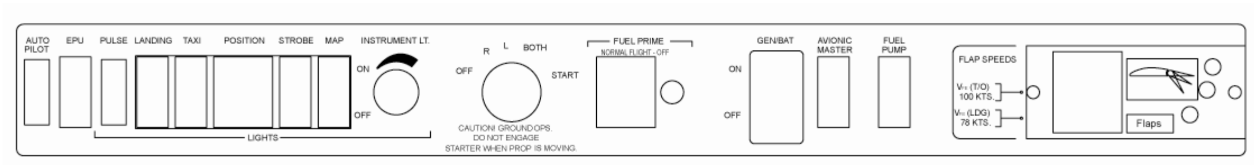
Equipment	Number Installed/ Required
Primary/Multi Flight Display	1 or 2
Air Data Computer (ADC)	1 or 2
Standby Airspeed Indicator	1
Standby Attitude Indicator (For night VFR operation in EASA member countries)	1
Standby Altimeter	1
Magnetic Compass	1

2.7 Placards

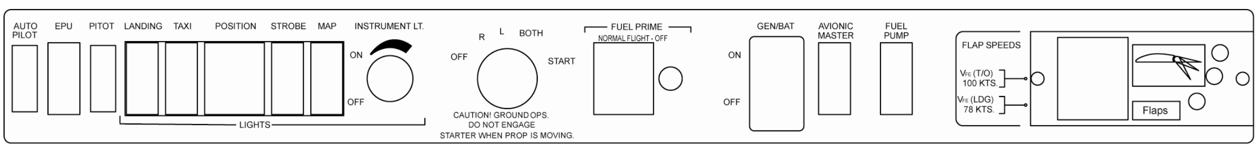
The placards that follow pertain only to the instrument panel with the Garmin G500 Integrated Display and must be installed:

(a) Switches on the instrument panel below the GDU 620 display

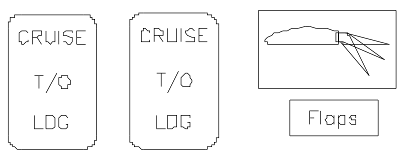
(1) PULSE switch included in with the lights.



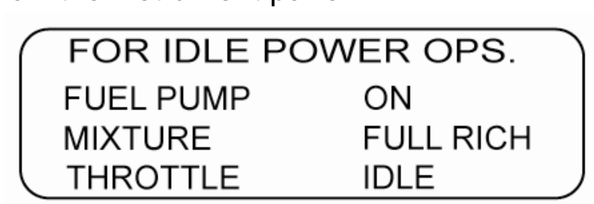
(2) PITOT switch replaces the PULSE switch



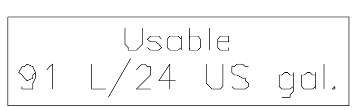
(b) On the flap controller



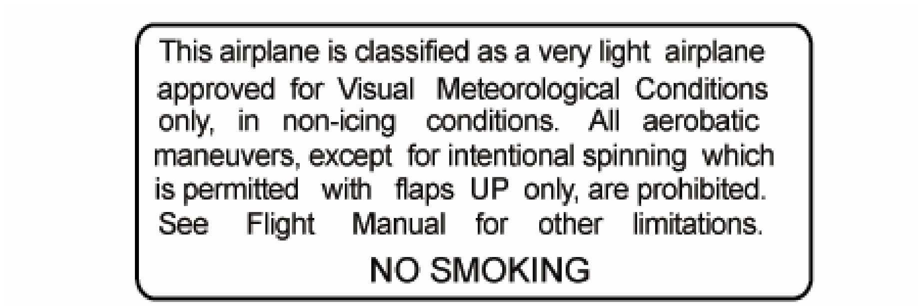
(c) Power setting below the instrument panel



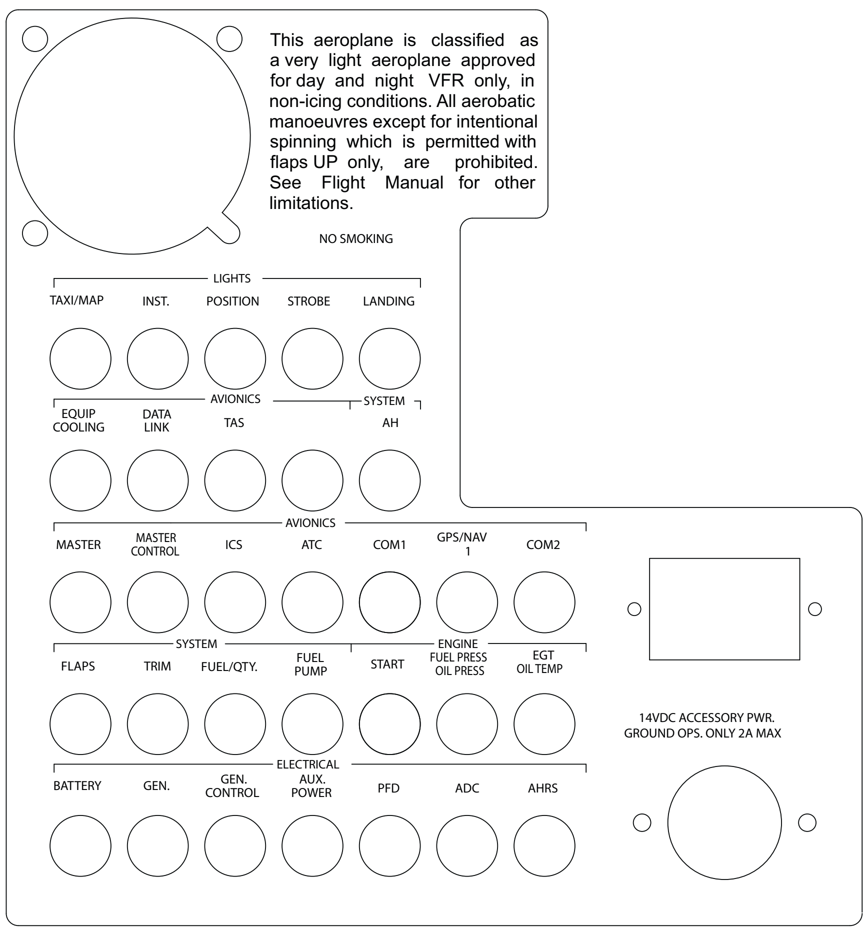
(d) On the fuel quantity indicator



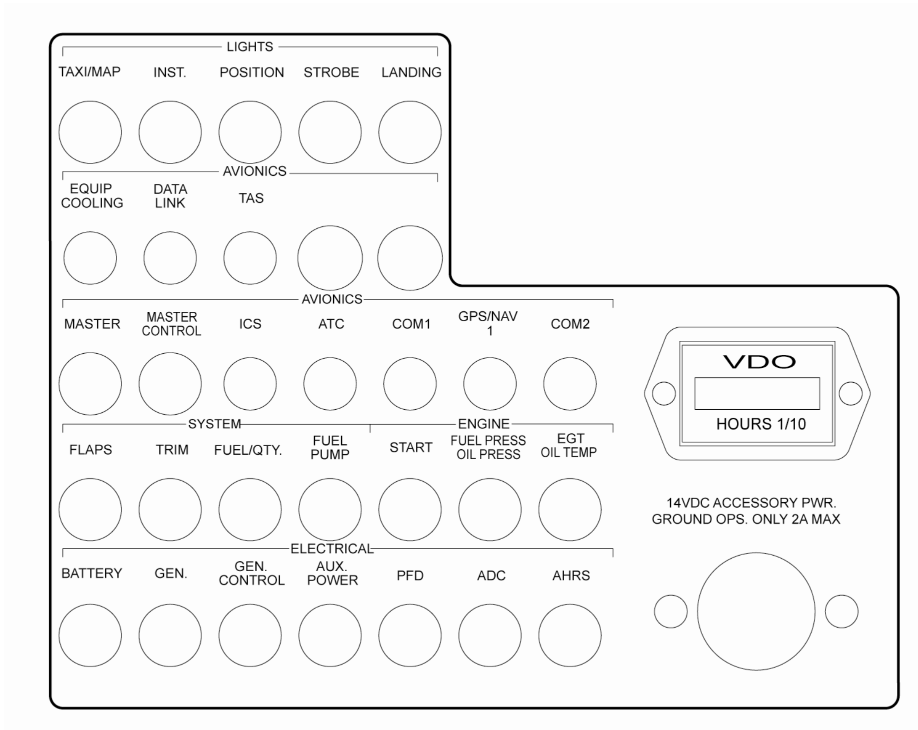
(e) Limitations on the right upper corner of the instrument panel



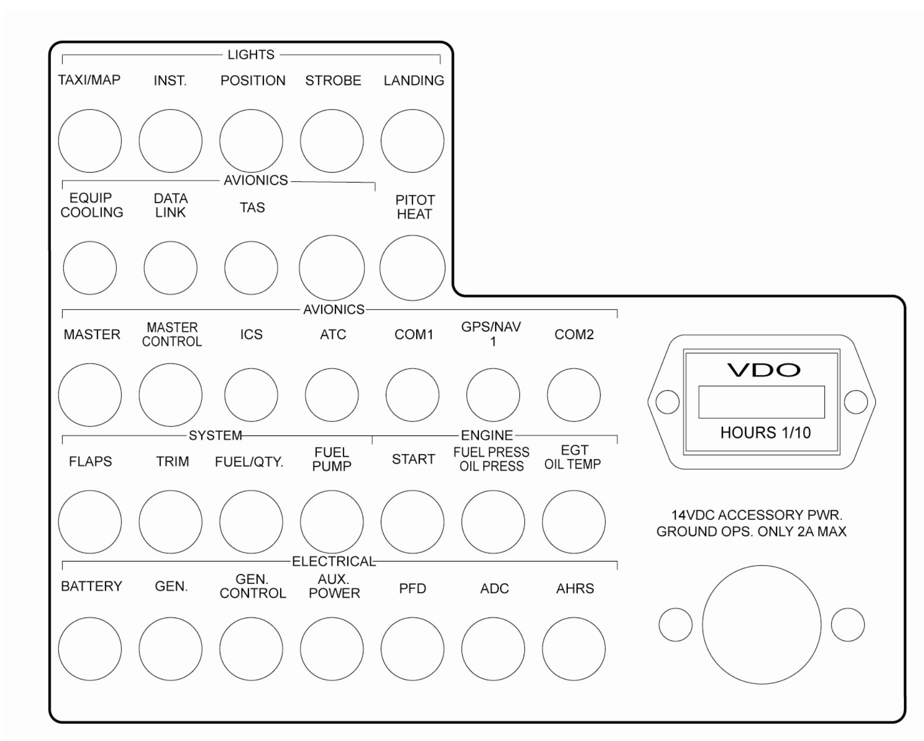
(f) Limitations, for aircraft operated in European Aviation Safety Agency (EASA) member countries only.



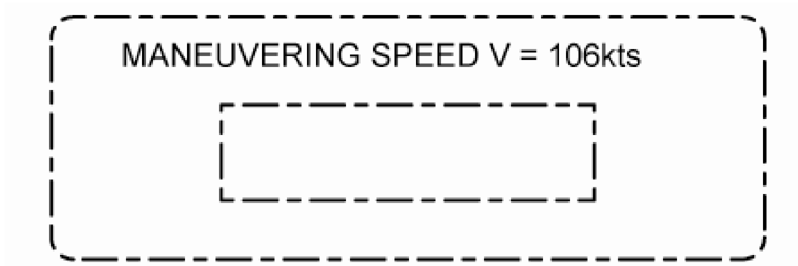
(g) Circuit breaker designations on the right side of the instrument panel



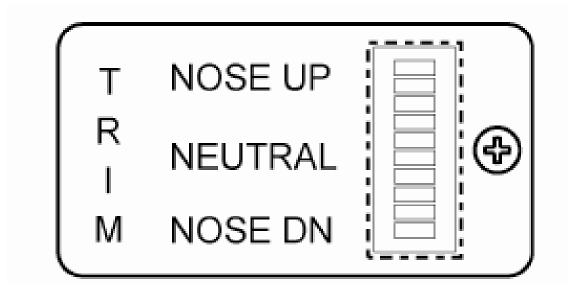
OR



(h) Maneuvering speed on the left side of the instrument panel

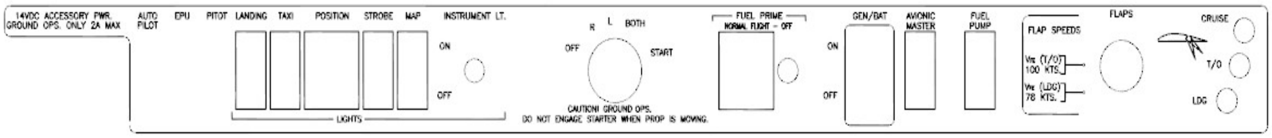


(i) Trim placard on the upper left corner of the instrument panel

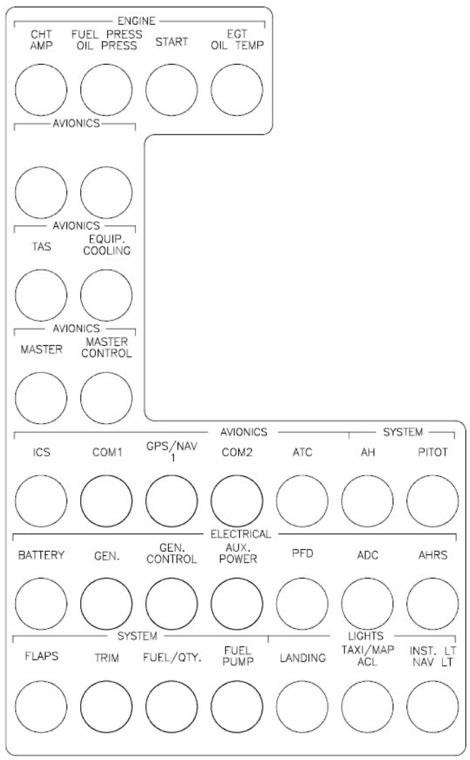


(j) The placards that follow pertain only when the UMA engine intruments and Garmin GTN 650/GTR 225 are installed with the G500

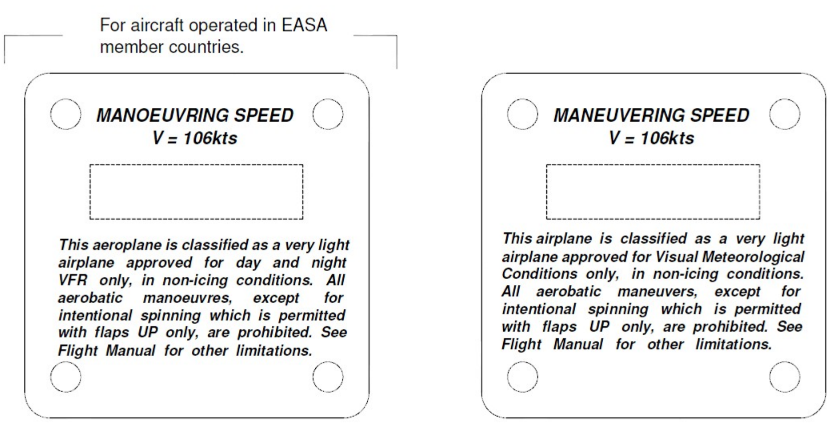
(1) Switches on the instrument panel below the GDU 620 display



(2) Circuit breaker designations on the right side of the instrument panel



(3) Maneuvering speed and limitations placard center panel



3. EMERGENCY PROCEDURES

3.1 Emergency Procedures

There is no change in the emergency procedures.

3.2 Abnormal Procedures

These procedures supersede those presented as markings or placards, or documented in the aircraft's TCCA/FAA approved AFM as a result of the installation of the G500 PFD/MFD system. All other emergency procedures remain in effect.

(a) If primary flight information (Heading, Altitude or Airspeed) on the PFD is not available or appears invalid, utilize the standby instruments installed around and adjacent to the G500, as required.

(b) The AHRS requires at least one GPS or air data input to function properly. In the unlikely event that GPS data or air data is not received by the AHRS, the system will subsequently lose attitude and heading and the pilot will be required to use the standby instrumentation. In this instance, the PFD will not provide Attitude, Heading, Altitude, or Airspeed information; however, if the PFD is receiving valid GPS information, the reversionary data on the PFD provides GPS track and GPS Altitude data along with course information and deviations which are still valid and may be used to navigate.

(c) If navigation information on the PFD/MFD (HSI, RMI, WPT bearing and distance information, or Moving Map Data) is not available or appears invalid, select an alternate source (via CDI key or 1-2 key) or utilize the data directly from the navigation equipment as required.

(d) If any of the data sources from SVT become unreliable or unavailable, the display of synthetic terrain will automatically revert to the non-SVT PFD display of blue over brown. Additionally, if during the course of normal operations there is any discrepancy between actual terrain around the aircraft and terrain shown on the SVT display, the display of synthetic vision should be manually turned off using the procedure in paragraph 4.3 of this supplement.

(e) If GPS position information from the GNS430W is not valid due to an inability to track GPS, the own-ship icon on the MFD is removed and "NO GPS POSITION" text is overlaid on the MFD moving map. The system will annunciate a loss of integrity, "LOI" on the HSI. The LOI annunciation will be colored yellow and the HSI needle will flag. The pilot should select an alternate navigation source (via CDI key or 1-2 key). Pressing the CDI soft key will change the HSI navigation source. If GPS navigation is subsequently restored, the MFD moving map will display the own-ship icon, and the HIS navigation source may be selected to GPS; at that time the LOI annunciation will be removed.

3.3 Abnormal Indications

3.3.1 Heading Failure

A magnetometer failure is indicated by a HDG with a red X over it just to the left of the heading display. If the GDU620 is still receiving valid GPS ground track from the GNS navigator, the heading will be replaced with GPS ground track in magenta. The aircraft can be flown by reference to GPS ground track instead of heading. In this case, the autopilot will continue to fly in HDG mode, but the course being sent to the autopilot will be based on ground track instead of magnetic heading.

A complete Heading Failure (magnetometer and GPS ground track failure) is indicated by the digital heading presentation being replaced with a red X and the compass rose digits being removed. The course pointer will indicate straight up and operate much like a traditional CDI with the Omni-Bearing Selector being adjusted by the PFD knob set to CRS.

Under this condition, the pilot must use an alternate source of heading such as the standby compass. If the installation includes an autopilot, the pilot workload may be reduced by operating that system in NAV mode.

3.3.2 AHRS Failure

A failure of the AHRS is indicated by a removal of the sky/ground presentation, a red X, and a yellow "AHRS FAILURE" shown on the PFD. A heading failure will also occur as described above in 3.3.1.

(a) Set course datum using CRS selection of the PFD knob

(b) Seek VFR conditions or land as soon as practical.

3.3.3 Air Data Computer (ADC) Failure

Complete loss of the Air Data Computer is indicated by a red X and yellow text over the airspeed, altimeter, vertical speed, TAS and OAT displays. Some derived functions, such as true airspeed and wind calculations, will also be lost.

(a) Use Standby Airspeed Indicator and Altimeter

(b) Seek VFR conditions or land as soon as practical.

3.4 Loss of Electrical Power

In the event of a total loss of electrical power, the G500 system will cease to operate and the pilot must utilize the standby instruments to fly the aircraft.

3.5 WARNINGS, CAUTIONS and Advisories

The following tables show the color and significance of the Warning, Caution, and Advisory messages which can appear on the G500 displays.

NOTE

The G500 cockpit reference guide and the G500 pilot's guide contain detailed descriptions of the annunciator system and all Warnings, Cautions and Advisories.

WARNING annunciations - Red		
Annunciation	**Pilot Action**	**Cause**
AIRSPEED FAIL	Use Standby Airspeed	Display system is not receiving airspeed input from the air data computer; accompanied by a red X through the airspeed display.
ALTITUDE FAIL	Use Standby Altitude.	Display system is not receiving altitude input from the air data computer; accompanied by a red X through the altimeter display.
VERT SPD FAIL	Cross check instruments.	Display system is not receiving vertical speed input from the air data computer; accompanied by a red X through the vertical speed display.
HDG	Use standby Magnetic Compass or GPS track information.	Display system is not receiving valid heading input from the AHRS; accompanied by a red X through the digital heading display.
Red X	Reference the data source or alternate equipment.	A red X through any display field, indicates that display field is not receiving data or is corrupted.

CAUTION annunciations - Yellow		
Annunciation	**Pilot Action**	**Cause**
AHRS Aligning – Keep wings level	Limit aircraft banking as AHRS aligns – OK to taxi.	AHRS is aligning. Keep wings level using reference or standby attitude indicator (if installed). AHRS will align even if you must bank, but the alignment time may be slightly longer if maneuvering.
NO GPS POSITION	If the system is configured with dual GPS, press the 1-2 button.	GPS data on the system is no longer valid. The Moving Map and associated data are not updating.
TRAFFIC	Visually acquire the traffic to see and avoid.	The configured traffic system has determined that nearby traffic may be a threat to the aircraft.
No Traffic Data	Use vigilance, as the traffic sensor is not able to detect traffic.	The configured traffic system is not able to detect traffic and/or provide the pilot with any traffic awareness.

Advisories - White	
Annunciation	**Pilot Action**
Various Alert Messages may appear under the MFD – ALERTS soft key.	View and understand all advisory messages. Typically, they indicate communication issues within the G500 system. Refer to the G500 Cockpit Reference for appropriate pilot or service action.

4. NORMAL PROCEDURES

Detailed operating procedures are described in the Garmin G500 Cockpit Reference Guide, Document No. 190-01102-03 (Current Revision) and in the Garmin G500 Pilot's Guide, Document No. 190-01102-02 (Current Revision).

4.1 Database Cards

WARNING

DO NOT OPERATE THE GARMIN G500 SYSTEM USING AN OUT-OF-DATE DATABASE. OUT-OF-DATE DATABASE INFORMATION CAN CAUSE A FLIGHT SAFETY HAZARD.

NOTE

The G500 utilizes several databases. Database titles display in yellow if expired or in question. The G500 receives the calendar data from the GPS, but only after acquiring a position fix. Database cycle information is displayed at power up on the MFD display, but more detailed information is available on the AUX pages. Internal database prevents incorrect data being displayed.

The upper Secure Digital (SD) data card slot is typically vacant as it is used for software maintenance and navigational database updates. The lower data card slot should contain a data card with the system's terrain/obstacle information and optional data including Safe Taxi, FliteCharts and ChartView electronic charts.

The terrain databases are updated periodically and have no expiration date. Coverage of the terrain database is between North 75º latitude and South 60º latitude in all longitudes. Coverage of the airport terrain database is worldwide.

The obstacle database contains data for obstacles, such as towers, that pose a potential hazard to aircraft. Obstacles, 200 feet and higher, are included in the obstacle database. It is very important to note that not all obstacles are necessarily charted and therefore may not be contained in the obstacle database. Coverage of the obstacle database includes the United States and Europe. This database is updated on a 56-day cycle.

The Garmin SafeTaxi database contains detailed airport diagrams for selected airports. These diagrams aid in following ground control instructions by accurately displaying the aircraft position on the map in relation to taxiways, ramps, runways, terminals, and services. This database is updated on a 56-day cycle.

The Garmin FliteCharts database contains procedure charts for the coverage area purchased. This database is updated on a 28-day cycle. If not updated within 180 days of the expiration date, FliteCharts will no longer function.

The Jeppesen ChartView electronic charts database contains procedure charts for the coverage area purchased. An own-ship position icon will be displayed on these charts. This database is updated on a 14-day cycle. If not updated within 70 days of the expiration date, ChartView will no longer function.

4.2 PFD Knob and Soft Keys

The basic PFD controls are on the left side of the GDU 620 unit, next to and beneath the PFD display. The rotary knob performs the function annunciated on the display just to the upper left of the HSI: HDG, CRS, ALT, V/S, or BARO. If no function is annunciated then the knob is providing a HDG function. Assigning the function of the knob is done by pressing/releasing one of the dedicated function buttons to the left of the display.

NOTE

After 10 seconds of inactivity in another mode, the PFD knob selected mode will revert to HEADING mode.

- Press the desired PFD mode selection key (HDG, CRS, ALT, V/S, or BARO). A window will be displayed near the upper right corner of the HSI showing the current value for that mode.

- Turn the PFD knob to select the desired value.

(a) PFD Bezel Keys

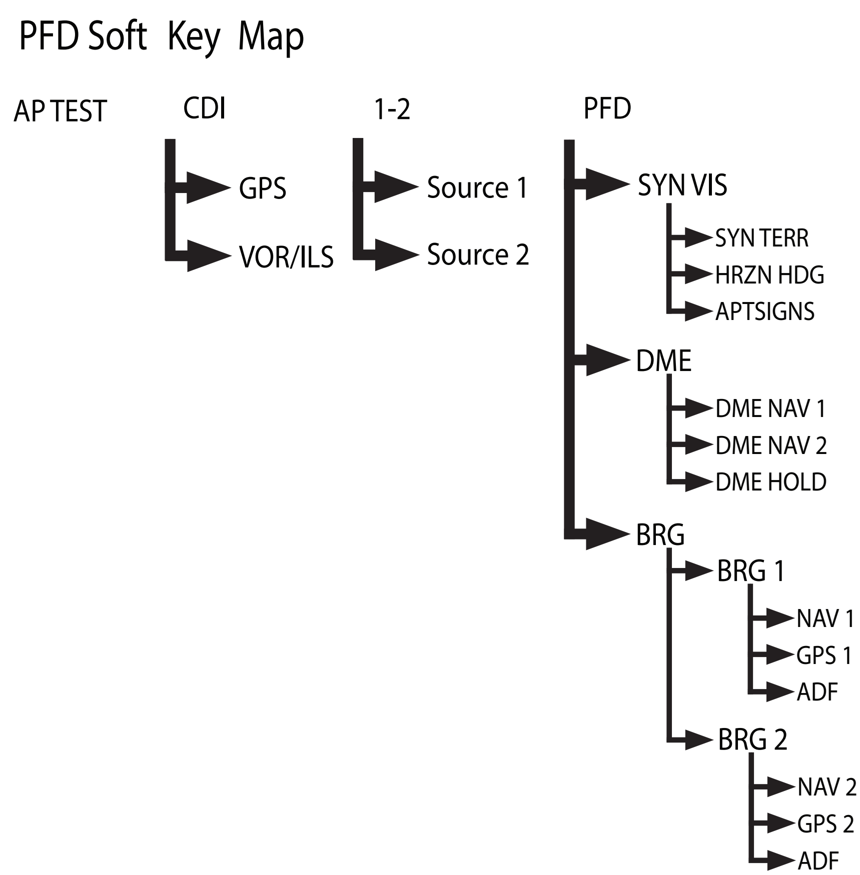
Heading (HDG)	Selects Heading Select mode. Pressing the PFD knob in Heading mode will center the Heading Bug on the current Heading. This is the default mode for the PFD knob. If the Heading is invalid, the PFD knob will revert to Course mode. Set the heading on the HSI by turning the PFD knob after pressing the HDG key.
Course (CRS)	Selects Course Select mode. Pressing the PFD knob in Course mode will center the CDI for a VOR or OBS mode course.
Altimeter (ALT)	Selects Altitude Select mode. Pressing the PFD knob in Altimeter mode will enter the current altitude in the Altitude Select window. Set the Altitude Bug by turning the PFD knob after pressing the ALT key.
Vertical Speed (V/S)	Selects Vertical Speed (V/S) mode. Pressing the PFD knob in V/S mode will synchronize the bug to the current vertical speed.
Barometer (BARO)	Selects Barometric Setting Select mode. Pressing the PFD knob in Baro mode toggles between standard pressure (29.92 in) and the previously selected value.

(b) PFD Soft Keys

The soft keys are located along the bottoms of the displays below the soft key labels. The soft key labels shown depend on the soft key level or page being displayed. The soft keys can be used to select the appropriate soft key function.

When a soft key is selected, its color changes to black text on gray background and remains this way until it is turned off, at which time it reverts to white text on black background. When a soft key function is disabled, the soft key label is subdued (dimmed). Soft keys revert to the previous level after 45 seconds of inactivity.

CDI	The CDI soft key toggles between the selection of GPS or VOR/ LOC as the active navigation source.
PFD	Pressing the PFD soft key displays the BRG and BACK soft keys.
BRG	The BRG soft key cycles through the available bearing indicator modes (NAV, GPS, ADF, or None).
SYN VIS	The SYN VIS soft key is available if Synthetic Vision Technology™ is installed. It enables Synthetic Vision and displays the associated soft keys.
SYN TERR	The SYN TERR soft key is available if Synthetic Vision Technology™ is installed and enables synthetic terrain depiction.
HRZN HDG	The HRZN HDG soft key is available if Synthetic Vision Technology™ is installed. Pressing this key enables horizon heading marks and digits.
APTSIGNS	The APTSIGNS soft key is available if Synthetic Vision Technology™ is installed and enables airport sign posts.
BACK	The BACK soft key returns to the previous soft key menu.



The soft keys are located along the bottom of the displays below the soft key labels. The soft key labels shown depend on the soft key level or page being displayed. The soft keys can be used to select the appropriate soft key function.

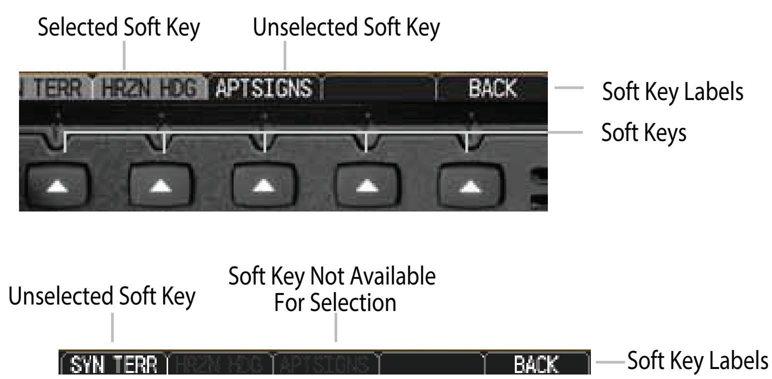


Figure S13-1 - PFD Soft Key Map

4.3 MFD Knobs and MFD Soft Keys

The MFD controls are on the right side of the GDU 620 unit, next to and beneath the MFD display. The rotary knobs scroll through various page groups and pages of the MFD and manipulate data and settings by pressing the knob to activate a cursor.

Soft keys at the bottom of the display allow for some quick functions to be performed on each page. The soft keys operate by press and release. More detailed configuration is typically available by pressing the MENU button, which is on the right side of the display.

Pressing and holding down the CLR key is a good way to get back to the main map page on the MFD. This can be used as a quick way back, or when the pilot has selected a submenu within the system.

(a) MFD Knobs

The MFD knobs are for navigating and selecting information on the MFD pages.

Small (Inner) Knob	Selects a specific page within a page group. Pressing the small MFD knob turns the selection cursor ON and OFF. When the cursor is ON, data may be entered in the applicable window by turning the small and large MFD knobs. In this case, the large MFD knob moves the cursor on the page and the small MFD knob selects individual characters or values for the highlighted cursor location.
Large (Outer) Knob	Selects the MFD page group. When the cursor is ON, the large MFD knob moves the cursor to highlight available fields.

(b) MFD Bezel Keys

Range (RNG)	Pressing the Range arrow keys changes the range on the Map pages. The Up arrow zooms out. The Down arrow zooms in. The keys also aid in scrolling up and down text pages.
Menu	Displays a context-sensitive list of options. This list allows the crew to access additional features or make setting changes that relate to particular pages.
Enter (ENT)	Validates or confirms a menu selection or data entry.
Clear (CLR)	Erases information, cancels entries, or removes page menus. Pressing and holding the CLR key displays the Navigation Map 1 page.

(c) MFD Soft Keys

MFD functions indicated by the soft key labels vary depending on the page selected and are located at the bottom of the MFD display. Press the soft key located directly below the soft key label. To select the function indicated on the soft key label, press the soft key directly below the label.

MFD Soft Key Map

The soft keys available depend on the page displayed and the features available.
The soft key "Alerts" is present on the far right position in all MFD displays.

Map

- NavMap1
  - Declutter
  - Map
    - Traffic
    - Topo
    - Terrain
- NavMap2
  - Declutter
  - Map
    - Traffic
    - Topo
    - Terrain
- Split Screen
- Traffic
  - Standby
  - Operate
  - Alt Mode
    - Standby
    - Operate
    - Alt Mode
    - Below
    - Normal
    - Above
    - Unrest
- Terrain
  - View
    - 360
    - Arc
  - Inhibit

Wx

- Wx Data Link 1
  - Legend
  - SRFC Time
  - Wind Down
  - Wind Up
- Wx Data Link 2
  - Legend
  - SRFC Time
  - Wind Down
  - Wind Up
- Wx Data Link 3
  - Legend
  - SRFC Time
  - Wind Down
  - Wind Up
- Wx Radar
  - Mode
  - Control
  - Horizon
  - Vertical
  - Back

Aux

- External Video
- System Setup
  - Default Unit
  - Default Speed
- XM Info
  - Lock
- XM Radio
  - Channel
    - CH -
    - CH +
    - DIR CH
  - Category
    - CAT -
    - CAT +
    - ALL
  - Volume
    - Mute
    - Vol -
    - Vol +
  - Presets
    - PS1
    - ...
    - PS15
- System Status
  - LRU
  - DBASE
- Position Reporting
  - Send
- Iridium Telephone
  - Dial
  - Answer
  - Hang Up
  - Vol
  - Keys

Fpl

- Active Fpl
  - Info
- Wpt Info
  - Rwy/Freq
  - Apt Dir
  - Wx
- Charts
  - NOTAM
  - Detail
    - Header
    - Plan
    - Profile
    - Minimums
  - Select

Alerts

- TRND/ACK
- CAPTURE
- BACK

Figure S13-2 - MFD Soft Key Map

4.4 AHRS Normal Operating Mode

The AHRS integrity monitoring features require the availability of GPS and Air Data. The G500 monitors these integrity systems automatically and will alert the pilot when the AHRS is not receiving GPS or Air Data.

4.5 Course Pointer Auto Slewing

The G500 HSI will auto slew, i.e. automatically rotate the GPS course pointer to the desired course defined by each GPS leg. The system will also auto slew the VHFNAV course pointer when the CDI transitions to a LOC setting if an ILS, LOC, LOC BC, LDA, or SDF approach is activated in the GPS/WAAS navigator.

The VHFNAV (green) course pointer will only auto slew if the approach is active in the navigator, the LOC frequency is loaded in the active NAV frequency, and then the HSI source is changed to the corresponding VHFNAV for the approach. Back Course approaches will auto slew to the reciprocal course.

The system is not capable of automatically setting the inbound VHFNAV course pointer if an approach is not active in the GNS Navigation System.

4.6 Terrain Display

The G500 terrain and obstacle information appears on the MFD display as red and yellow tiles or towers, and is depicted for advisory only. Aircraft maneuvers and navigation must not be predicated upon the use of the terrain display. Terrain unit alerts are advisory only and are not equivalent to warnings provided by TAWS.

4.7 Synthetic Vision Technology (SVT)

The SVT system may be turned on or off, as desired. To access the synthetic vision system soft key menu, press the PFD soft key on the GDU 620, followed by the SYN VIS soft key. Synthetic vision terrain, horizon headings, and airport signs can be toggled on and off from this menu. Press the BACK soft key to return to the root PFD menu.

4.8 Autopilot Operations

The G500 PFD/MFD System offers various integration capabilities dependent mainly upon the type of autopilot installed in a particular aircraft.

5. PERFORMANCE

There is no change in the performance of the airplane.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

Upon removal and installation of the Garmin G500, the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the AFM.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.1 Instrument Panel

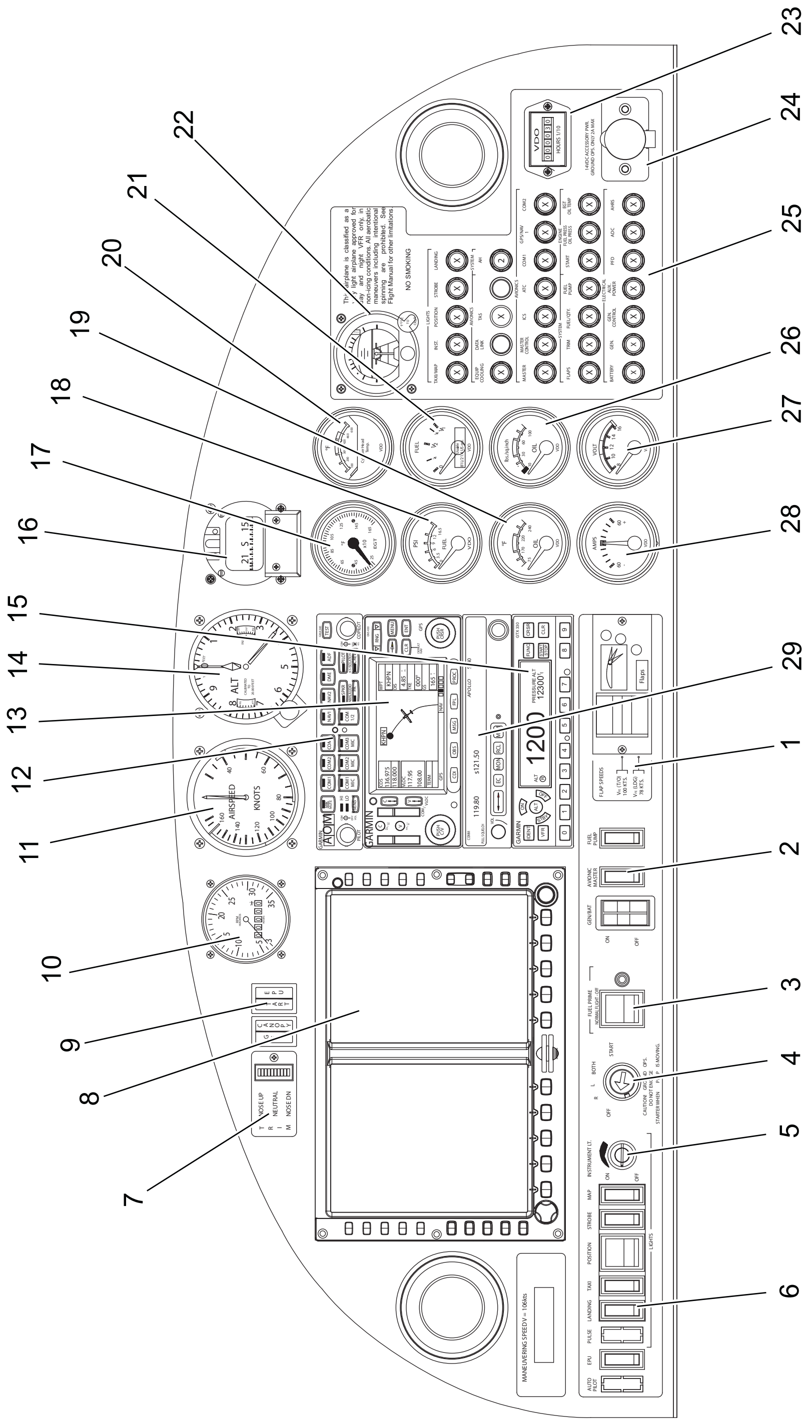


Figure S13-3 - Instrument Panel with Garmin G500 System Installed

Refer to Figure S13-3.

Instrument Panel - Major Instruments and Controls			
1.	Flap Speeds	11.	Air Speed Indicator
2.	Master Switch Panel	12.	Auto Selector
	- AVIONICS MASTER	13.	NAV/COM GPS
	- FUEL PUMP Switch	14.	Altimeter
	- GEN/BAT Switch	15.	VHF COM
3.	Fuel Prime	16.	Magnetic Compass
4.	Ignition Switch	17.	Exhaust Gas Temperature (EGT)
5.	Instrument Light Switch	18.	Fuel Pressure Indicator
6.	Light Switch Panel	19.	Cylinder Head Temperature (CHT)
	- MAP	20.	Oil Temperature Indicator
	- STROBE Light Switch	21.	Fuel Quantity Indicator
	- POSITION - TAXI Light Switch - LANDING Light Switch	22.	Articial Horizon Indicator (for EASA member countries and optional for Non-EASA member countries)
	- Optional Switch	23.	Hobbs Hourmeter
	- EPU*	24.	14 VDC Aux Power Outlet
	- PITOT*	25.	Circuit Breaker Panel
	- Auto Pilot*	26.	Oil Pressure Indicator
7.	Trim Indicator	27.	Voltmeter
8.	GDU 620 Display	28.	Ammeter
9.	Warning Lights	29.	SL40 (COM 2)
10.	Engine RPM		
Note: Items marked * are optional			
	- EPU		
	- Auto Pilot		

7.2 Instrument Panel with UMA Engine Instruments and Garmin GTN 650/GTR 225 installed.

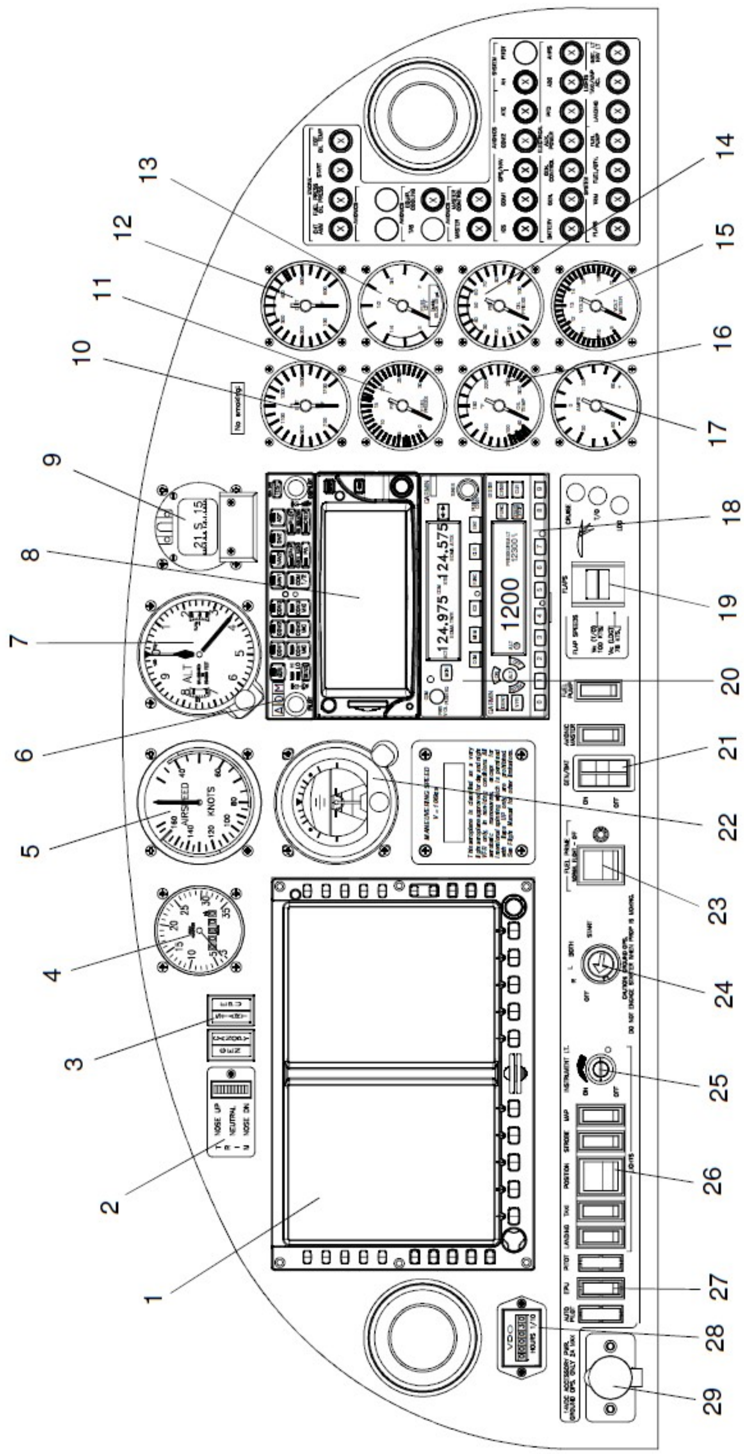


Figure S13-4 - Instrument Panel with UMA Engine Instruments and Garmin GTN 650/ GTR 225 Installed

Refer to Figure S13-4.

Instrument Panel - Major Instruments and Controls			
1.	GDU 620 Display	21.	GEN/BAT MASTER SWITCH
2.	Trim Indicator	22.	ARTIFCIAL HORIZON INDICATOR (FOR EASA MEMBER COUNTRIES AND OPTIONAL FOR NON EASA MEMBER COUNTRIES)
3.	Warning Lights		
4.	Engine RPM		
5.	Airspeed Indicator	23.	FUEL PRIME SWITCH
6.	Audio Panel	24.	IGNITION SWITCH
7.	Altimeter	25.	INSTRUMENT LIGHT SWITCH
8.	GPS/Nav/Com	26.	LIGHT SWITCH PANEL
9.	Magnetic Compass		-MAP SWITCH
10.	Exhaust Gas Temperature (EGT)		-STROBE SWITCH
11.	Fuel Pressure Indicator		-POSITION SWITCH
12.	Cylinder Head Temperature (CHT)		-TAXI SWITCH
13.	Fuel Quantity Indicator		-LANDING SWITCH
14.	Oil Pressure Indicator	27	OPERATIONAL SWITCHES
15.	Voltmeter		-PITOT SWITCH
16.	Oil Temperature Indicator		-EPU SWITCH
17.	Ammeter		-AUTOPILOT SWITCH
18.	Transponder	28.	HOURMETER
19.	Flap Controller	29	14 VDC AUX POWER OUTLET
20.	Comm (#2)		

7.2 Avionics - General

The G500 system consists of:

- Garmin Display Unit (GDU) 620 (PFD/MFD)
- Garmin data Computer (GDC) 74A [Air Data Computer (ADC)]
- Garmin Reference System (GRS) 77 [Attitude and Heading Reference System (AHRS)]
- Garmin Magnetometer Unit (GMU) 44
- Garmin Navigation System GNS 400 Series Radio’s or GTN 600 Series Radio’s
- Garmin Temperature Probe (GTP) 59.

The system presents primary flight instrumentation and navigation. It also provides a moving map to the pilot through large format displays.

(a) GDU 620 Display

This displays the real time True Airspeed calculations and selectable winds aloft data, as well as airplane ground speed, GPS active waypoint, distance-to-waypoint, desired/actual track, and more.

In normal operating mode, the Primary Flight Display (PFD) presents graphical flight instrumentation (attitude, heading, airspeed, vertical speed).
The Multi-Function Flight Display (MFD) normally displays a full color moving map with navigation and flight plan information, traffic, weather and terrain.

(b) GRS 77 AHRS

The GRS 77 is an attitude and heading reference unit that provides aircraft attitude and flight characteristics information to the GDU 620. The unit contains advanced tilt sensors, accelerometers, and rate sensors. In addition, the GRS 77 interfaces with both the GDC 74A air data computer and the GMU 44 magnetometer. The GRS 77 also utilizes GPS signals sent from the GPS/WAAS navigator. Actual attitude and heading information is sent using ARINC 429 digital interface to the GDU 620.

(c) GDC 74A ADC

The GDC 74A air data computer receives information from the pitot/static system and the GTP 59 outside air temperature (OAT) sensor. The GDC 74A is responsible for providing pressure altitude, airspeed, vertical speed, and OAT information to the G500 system. The GDC 74A provides data to the GDU 620 and GRS 77 using ARINC 429 digital interfaces. The GDC 74A also communicates maintenance and configuration information to the GDU 620 using an RS-232 interface.

(d) GMU 44 Magnetometer

The GMU 44 magnetometer senses magnetic field information. Data is sent to the GRS 77 AHRS for processing to determine aircraft magnetic heading. This unit receives power directly from the GRS 77 and communicates with the GRS 77 using an RS-485 digital interface.

(e) GNS 430W GPS (Optional)

The GNS 430W unit is a panel-mount GPS navigator with a color moving map. Position and flight plan data are displayed on the GDU 620 MFD via RS-232 and ARINC 429 interfaces. GPS position information is also forwarded to the GRS 77 AHRS in order to ensure normal AHRS operation. The GNS 430W also provides LOC/GS information for display on the GDU 620 HSI via an ARINC 429 interface.

(f) GTN 650 GPS (Optional)

The GTN 650 unit is a touch screen, panel-mount, GPS navigator with a colour moving map. Position and flight plan data are displayed on the GDU 620 MFD via RS-232 and ARINC 429 interfaces. GPS position information is also forwarded to the GRS 77 AHRS in order to ensure normal AHRS operation. The GTN 650 also provides LOC/GS information for display on the GDU 620 HSI via an ARINC 429 interface.

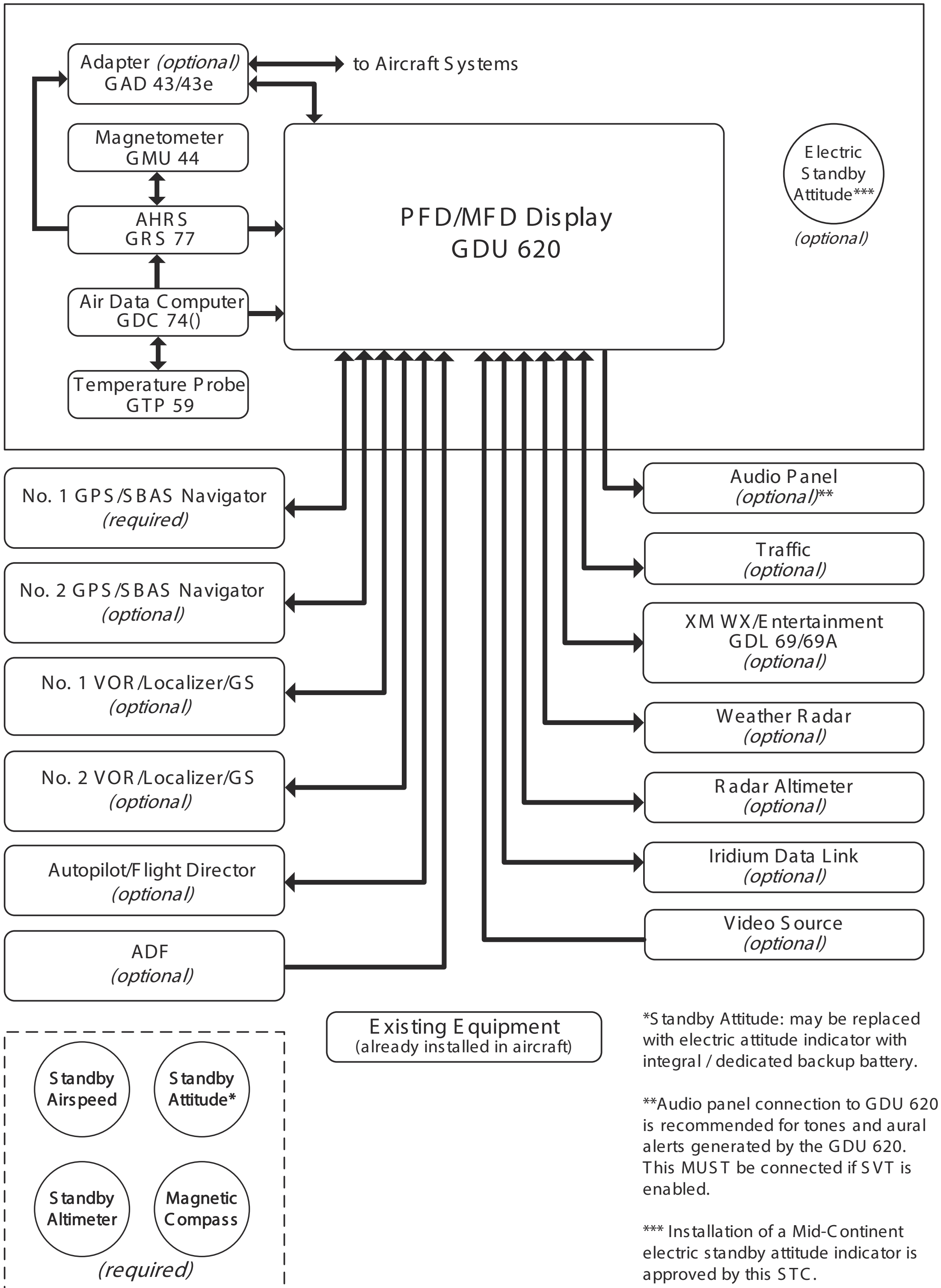


Figure S13-5 - G500 System Overview with Optional and Required Equipment

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

There is no change in the handling, preventive or corrective maintenance of the airplane.

CHAPTER 9

SUPPLEMENT 14

FRENCH PLACARDS AND MARKINGS

TABLE OF CONTENTS

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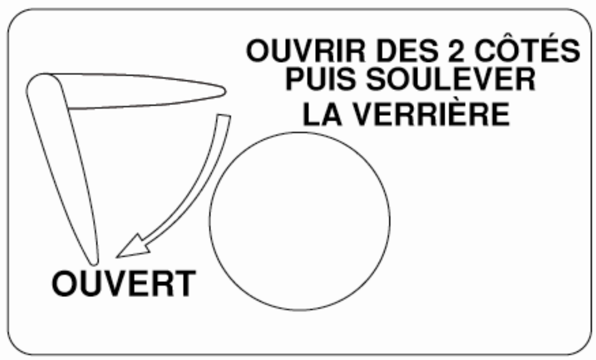
1. GENERAL

This supplement addresses the placards and markings for airplanes operating in France. Only portions of the flight manual affected by the installation are included in this supplement.

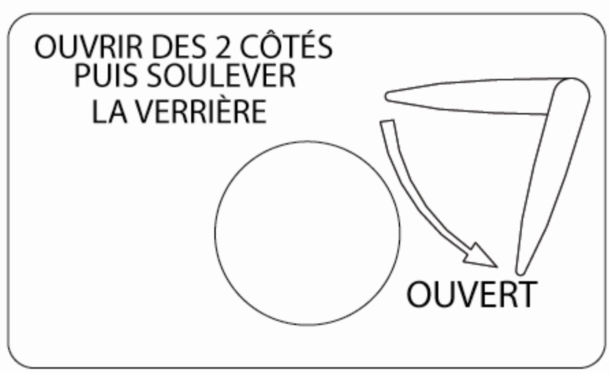
2. OPERATING LIMITATIONS

2.15 PLACARDS.

(a) On the exterior of the canopy frame, on the L/H side.

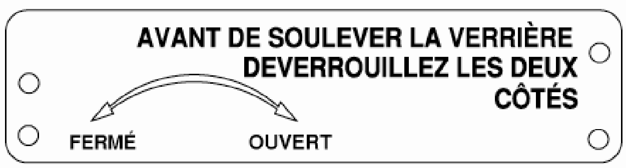


(b) On the exterior of the canopy frame, on the R/H side.

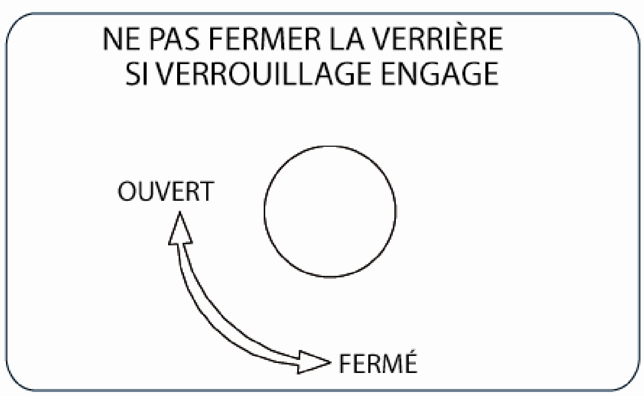


(c) On the interior of the canopy frame, on the L/H side.

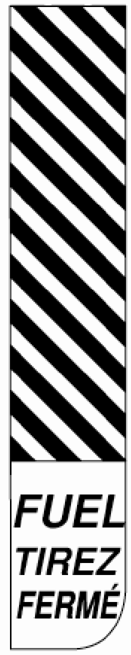
(d) On the interior of the canopy frame, on the R/H side.



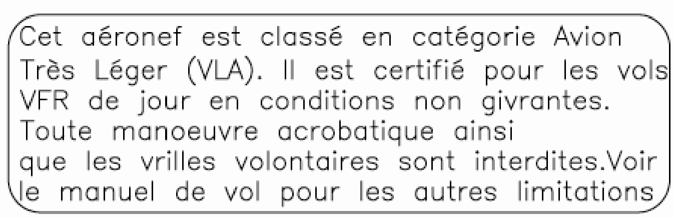
(e) On the exterior of the canopy frame, on the L/H side.



(f) Next to the PARK BRAKE lever.



(g) On the right upper corner of the instrument panel.



(h) On the left side of the instrument panel, near the top.

(i) On the instrument panel, below the airspeed indicator.

3. EMERGENCY PROCEDURES

There is no change in the emergency procedures with the French placards and markings installed.

4. NORMAL PROCEDURES

There is no change in the normal procedures with the French placards and markings installed.

5. PERFORMANCE

There is no change in the performance of the airplane with the French placards and markings installed.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

The change in weight and balance is negligible with the installation of the French placards and markings.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

The French placards and markings installed do not affect the description of the airplane and its systems.

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

The French placards and markings installed do not affect the handling, preventative and corrective maintenance.

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CHAPTER 9

SUPPLEMENT 15

GERMAN PLACARDS AND MARKINGS

TABLE OF CONTENTS

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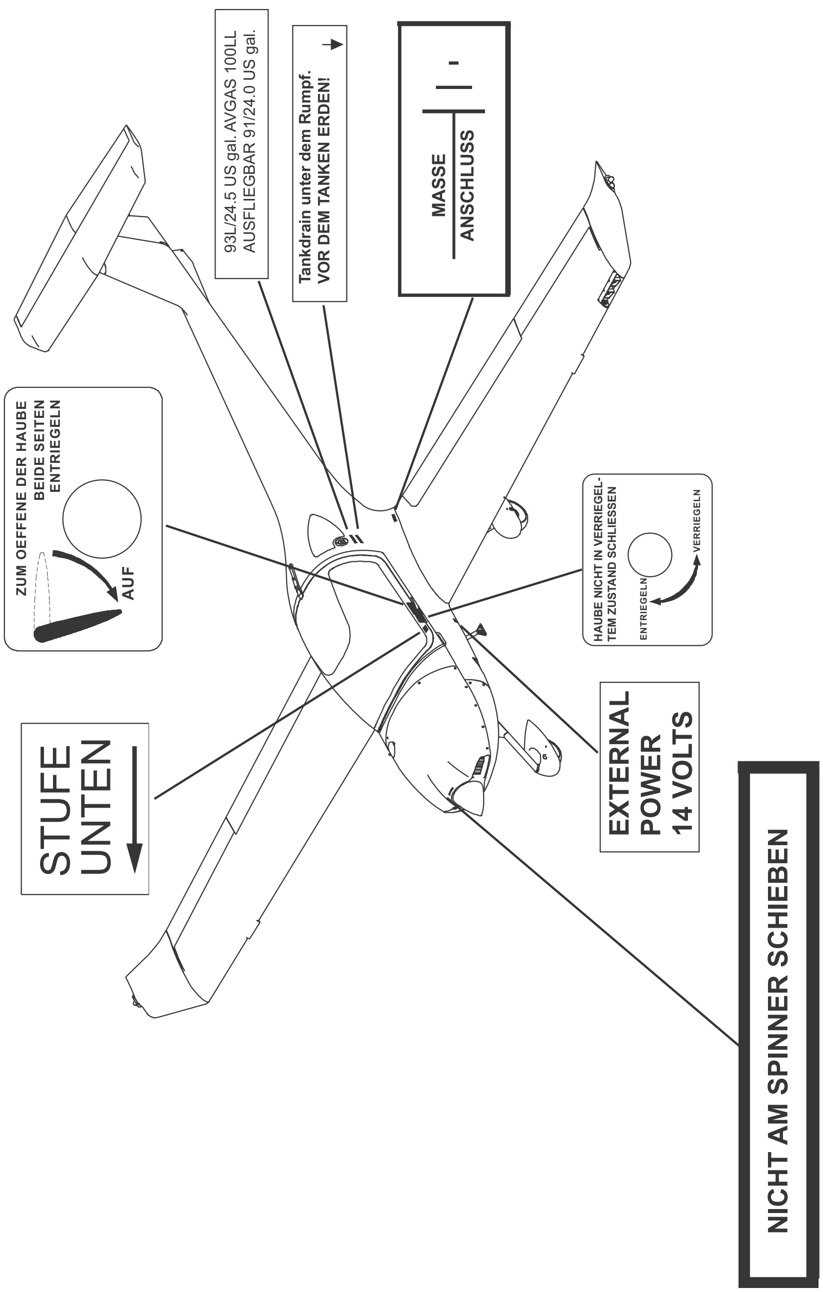
1. GENERAL

This supplement addresses the placards and markings for airplanes operating in Germany. Only portions of the flight manual affected by the installation are included in this supplement.

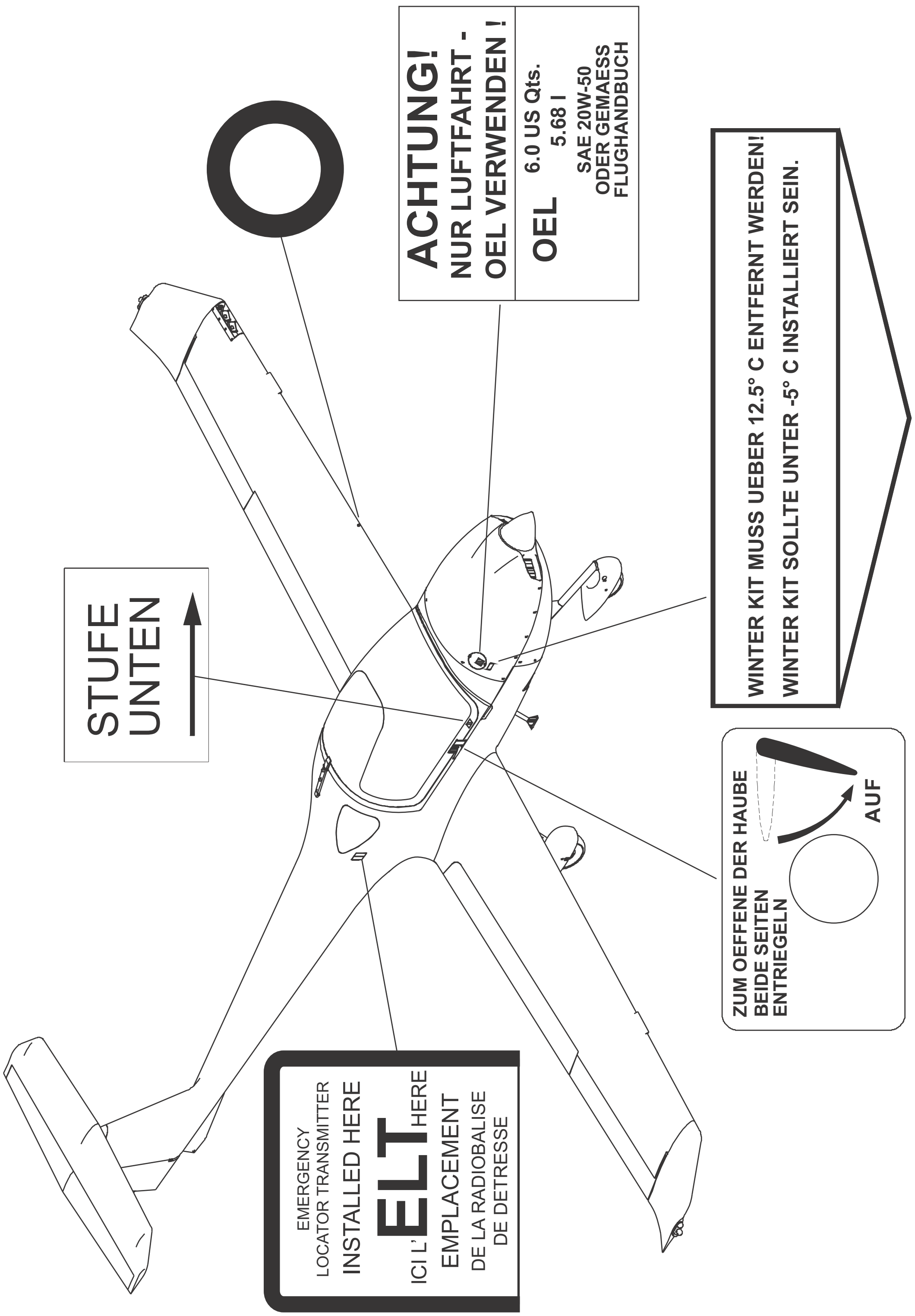
2. OPERATING LIMITATIONS

2.15 PLACARDS.

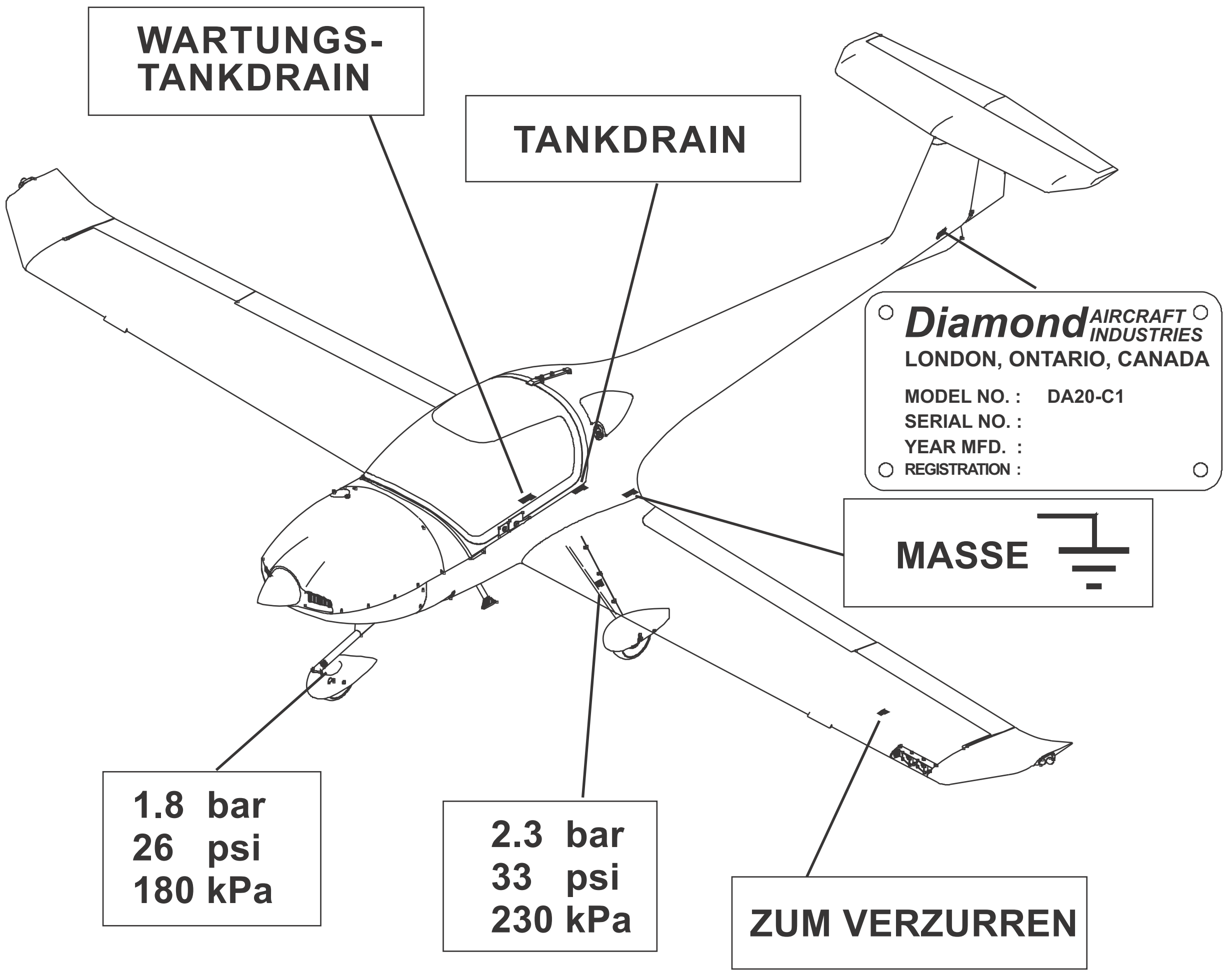
(a) On the exterior of the airplane, on the upper surfaces.



(b) On the exterior of the airplane, on the upper surfaces.

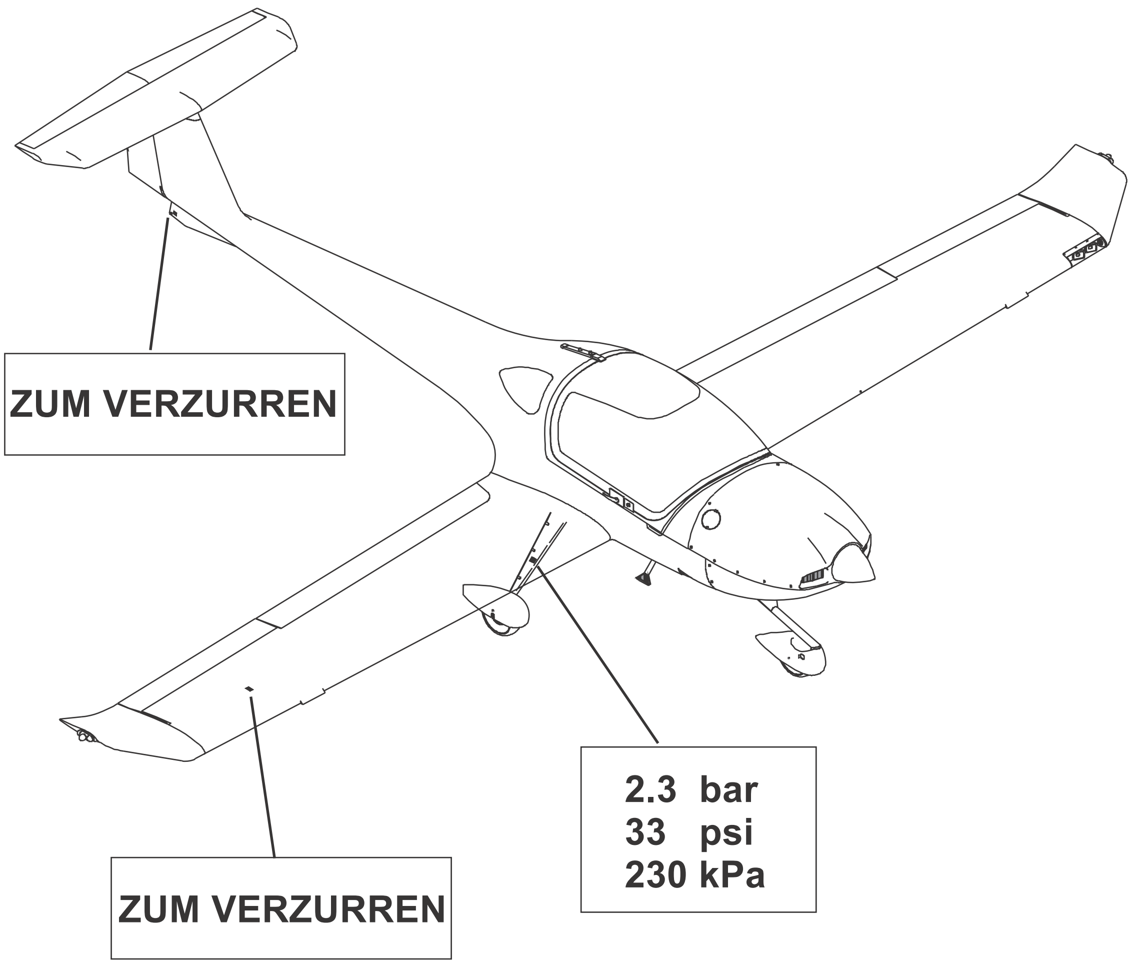


(c) On the exterior of the airplane, on the lower surfaces.

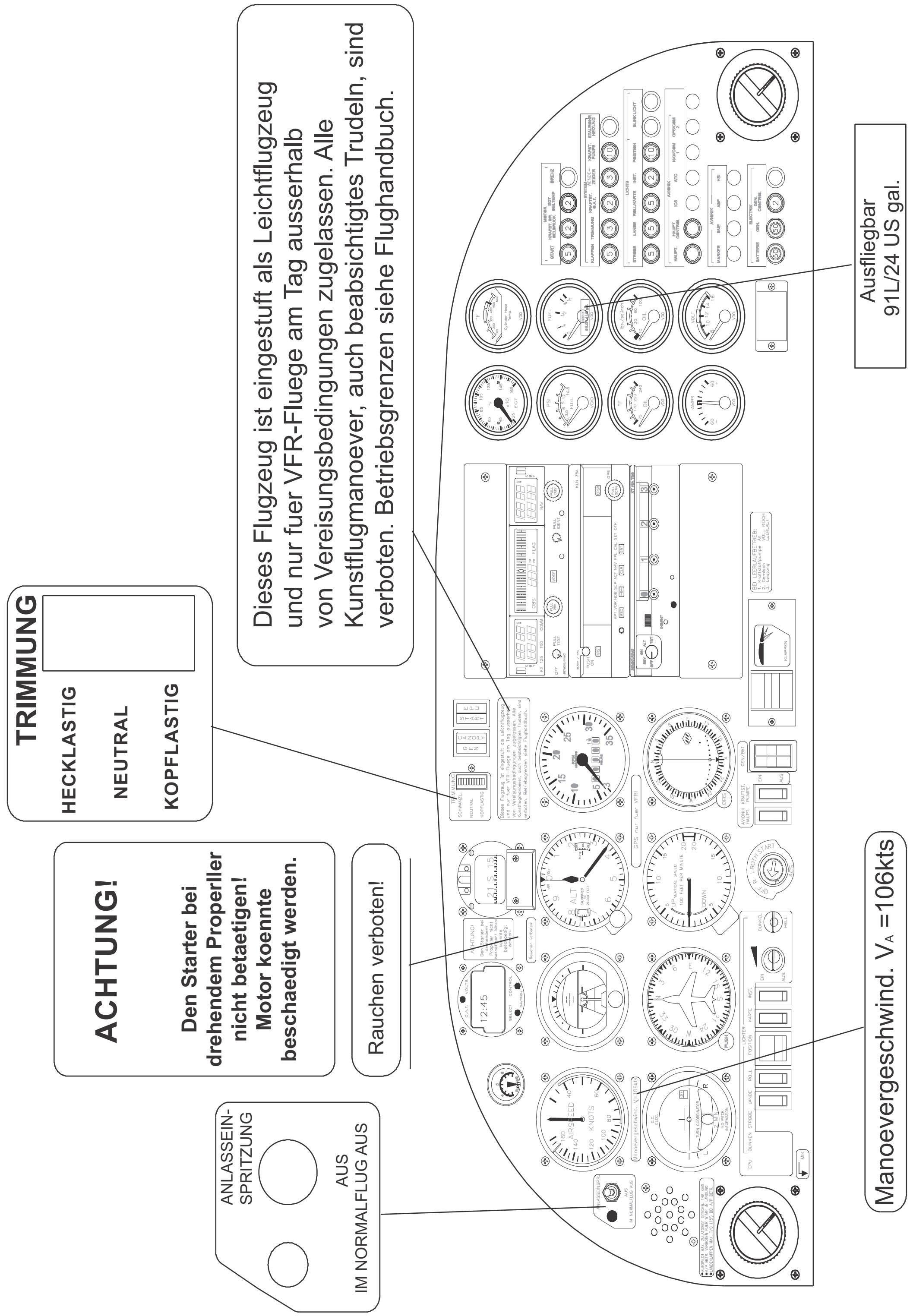


(d)

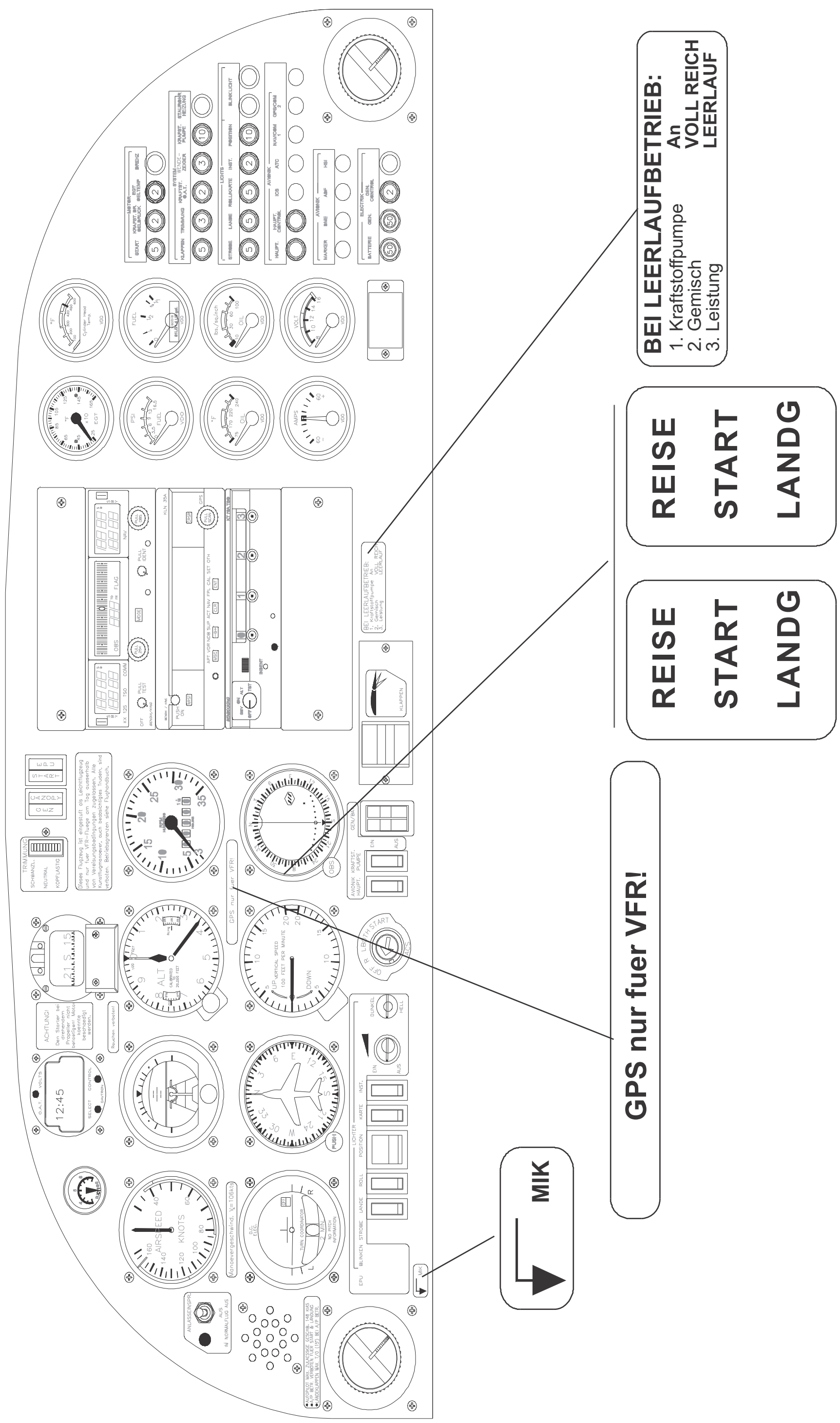
(e) On the exterior of the airplane, on the lower surfaces.



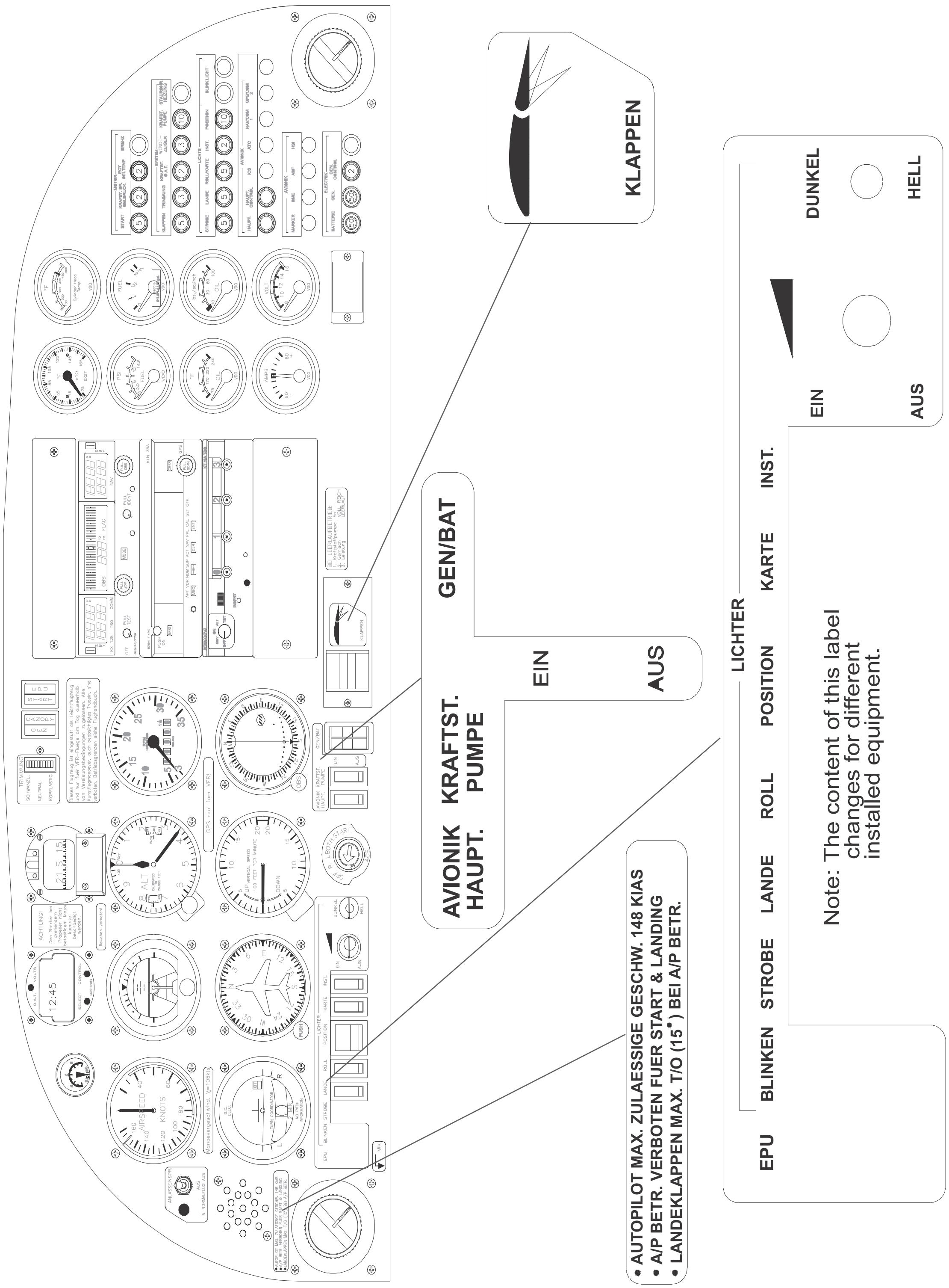
(f) On the interior of the airplane, on the instrument panel.



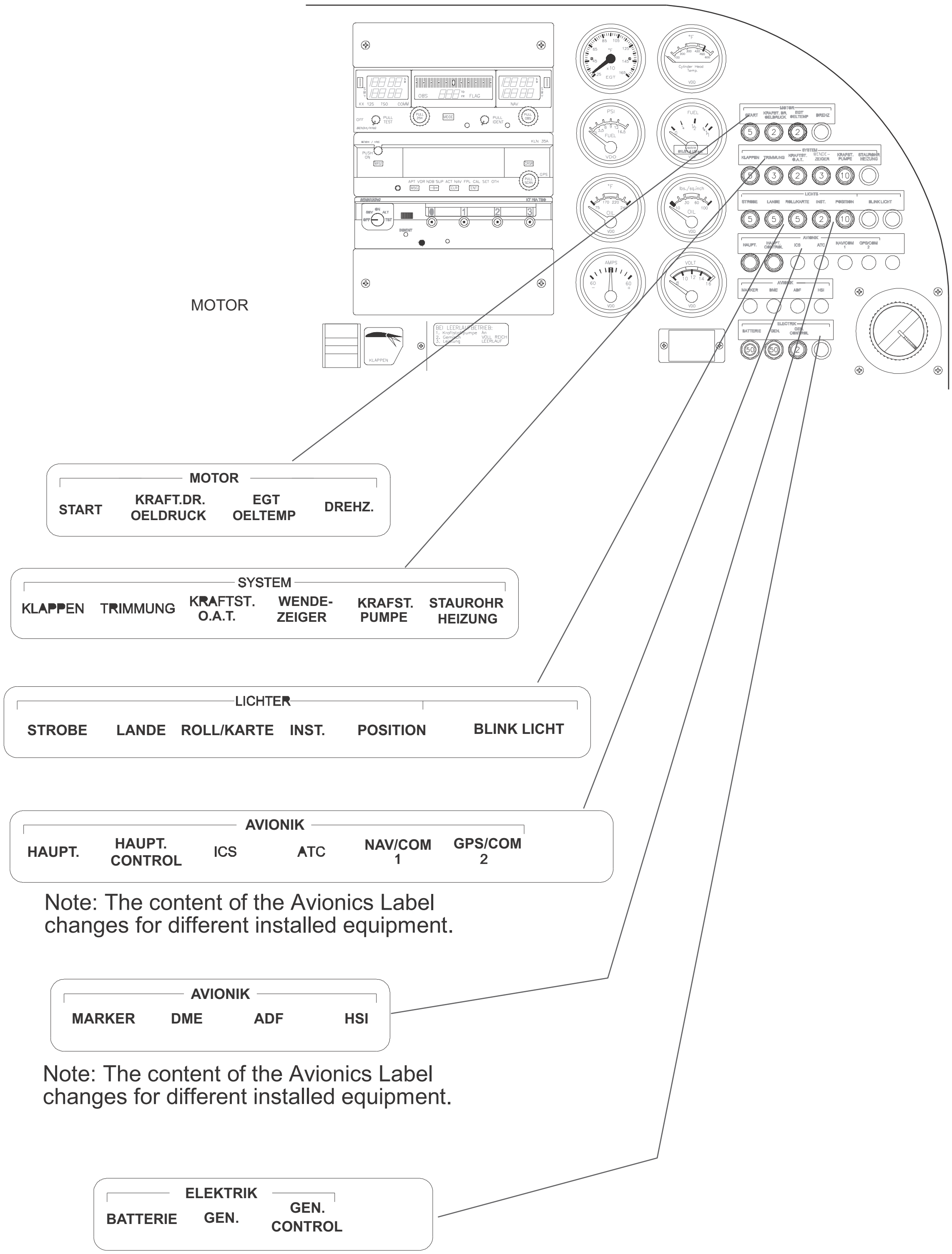
(g) On the interior of the airplane, on the instrument panel.



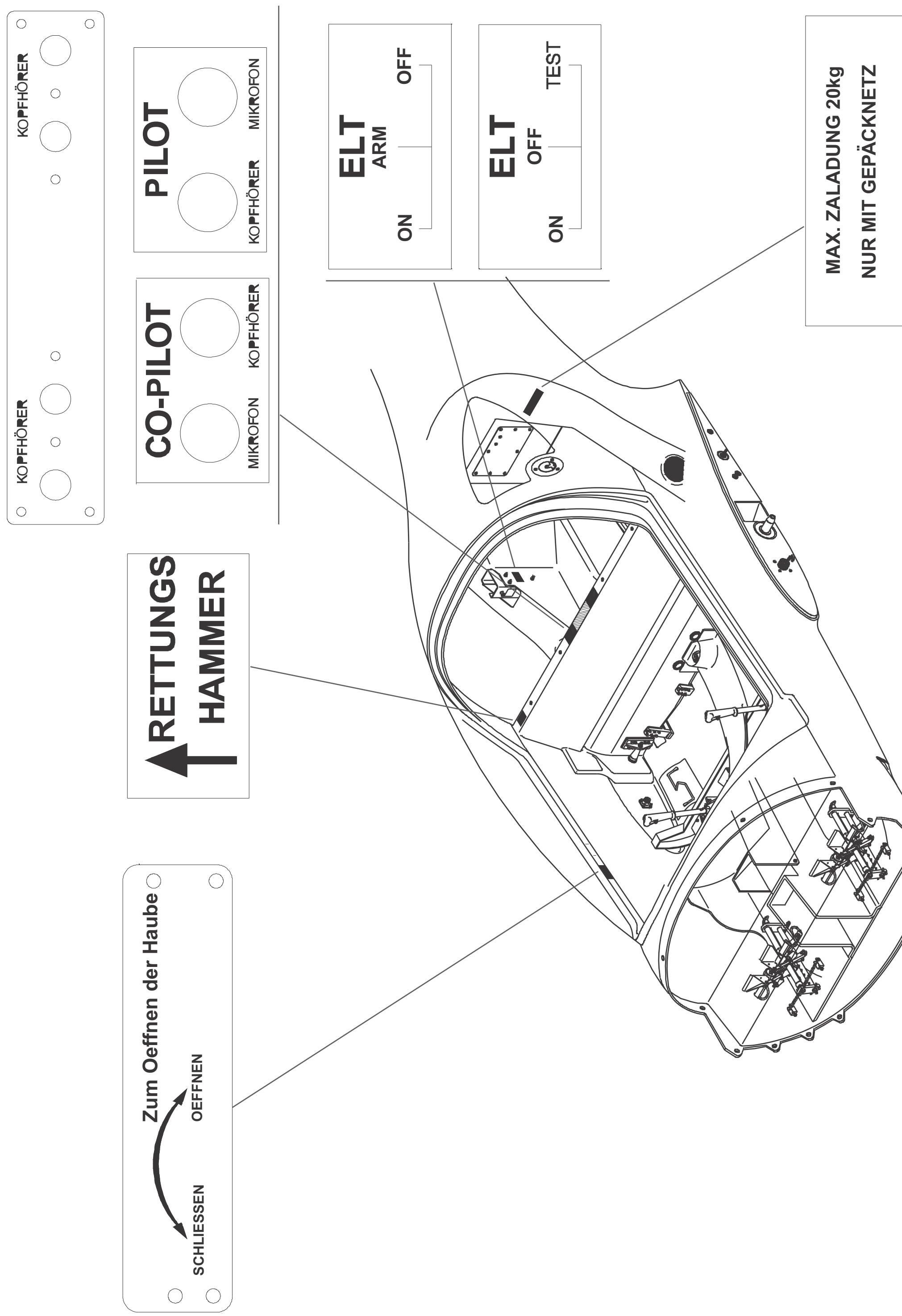
(h) On the interior of the airplane, on the instrument panel.



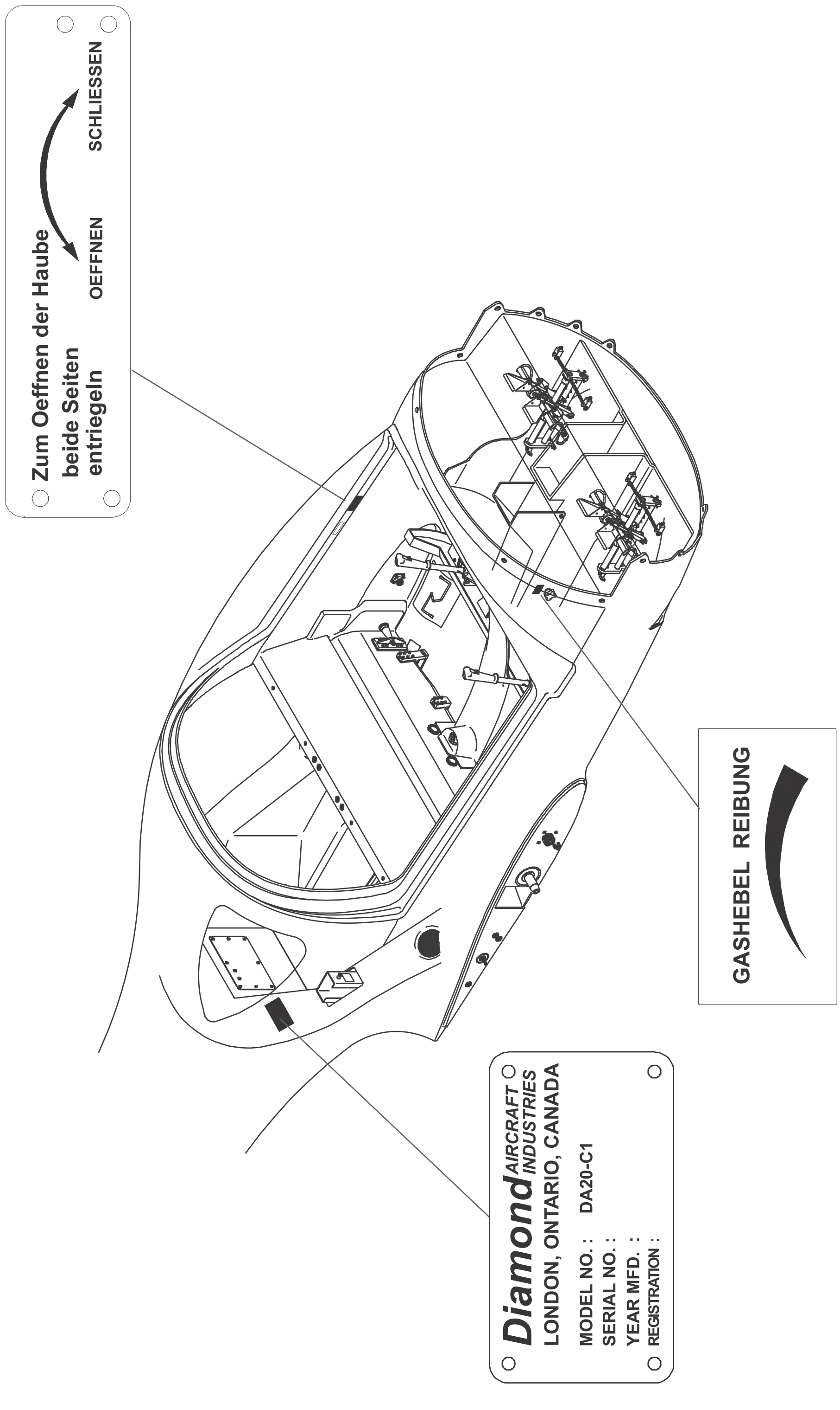
(i) On the interior of the airplane, Circuit Breakers on the instrument panel.



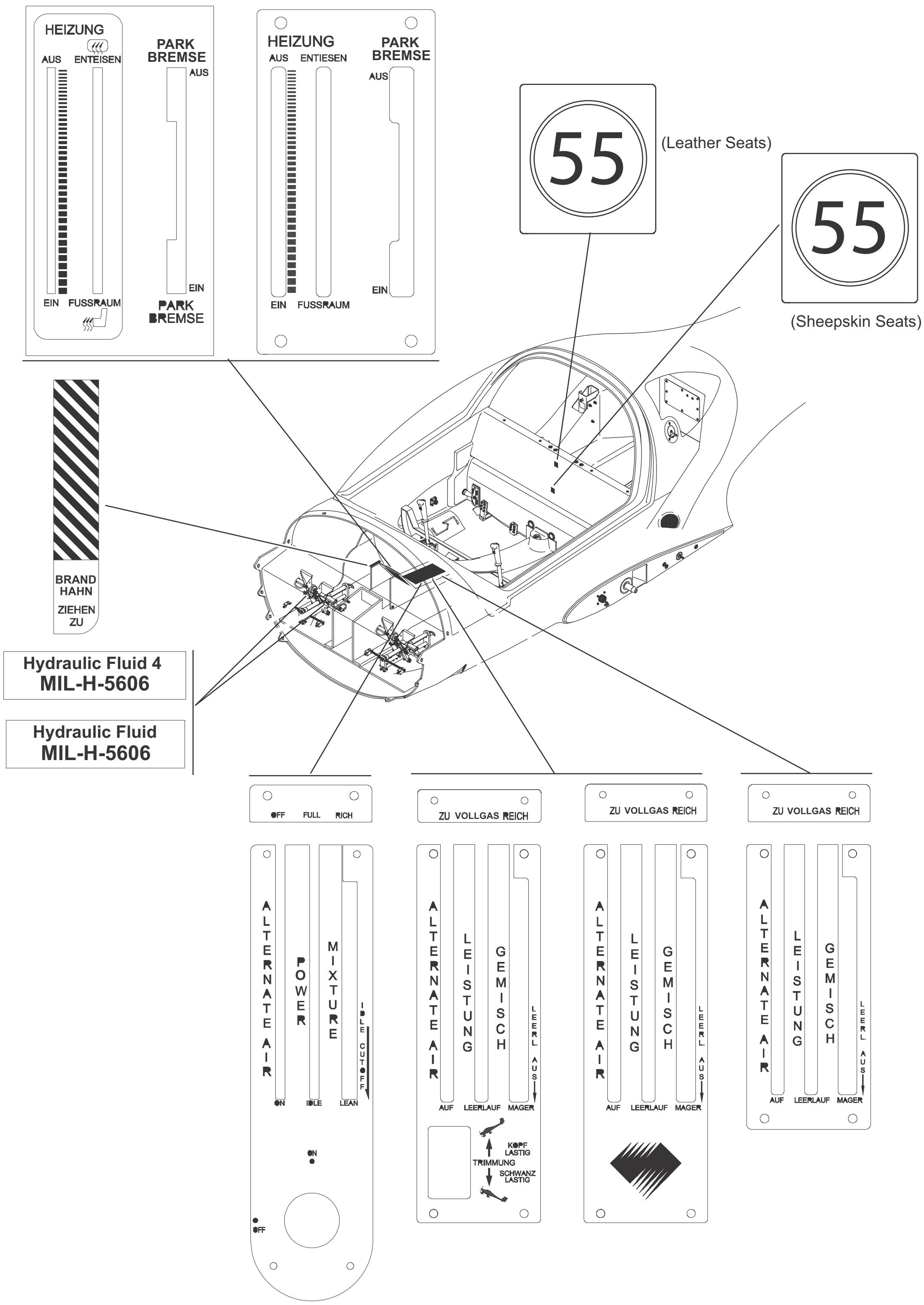
(j) On the interior of the airplane, general placards and markings.



(k) On the interior of the airplane, general placards and markings.



(l) On the interior of the airplane, general placards and markings.



3. EMERGENCY PROCEDURES

There is no change in the emergency procedures with the German placards and markings installed.

4. NORMAL PROCEDURES

There is no change in the normal procedures with the German placards and markings installed.

5. PERFORMANCE

There is no change in the performance of the airplane with the German placards and markings installed.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

The change in weight and balance is negligible with the installation of the German placards and markings.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

The German placards and markings installed do not affect the description of the airplane and its systems.

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

The German placards and markings installed do not affect the handling, preventative and corrective maintenance.

CHAPTER 9

SUPPLEMENT 16

SPANISH PLACARDS AND MARKINGS

TABLE OF CONTENTS

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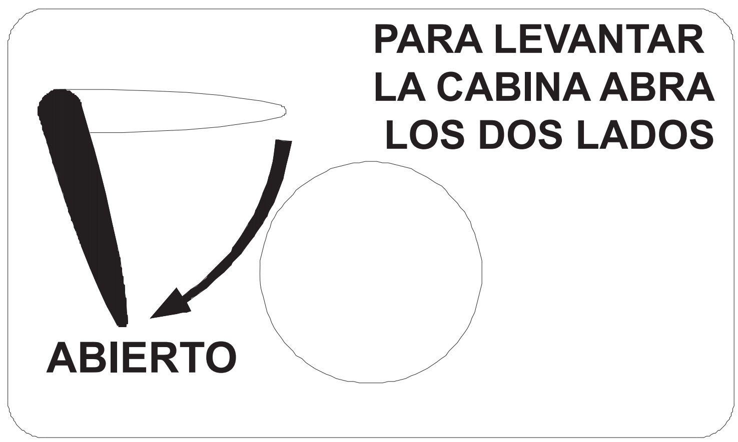
1. GENERAL

This supplement addresses the placards and markings for airplanes operating in Mexico. Only portions of the flight manual affected by the installation are included in this supplement.

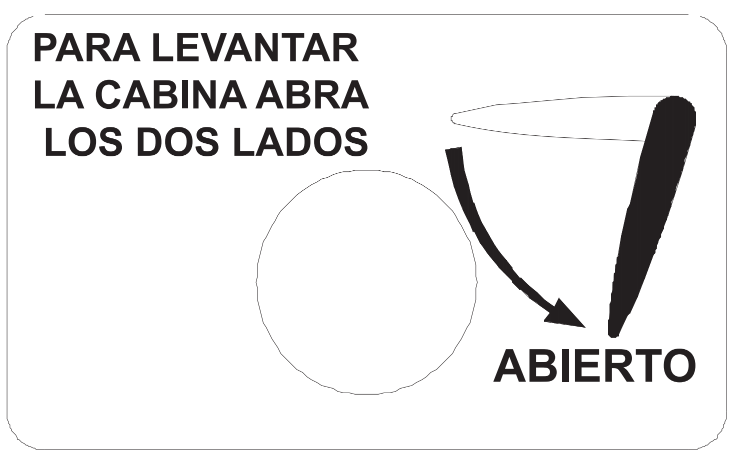
2. OPERATING LIMITATIONS

2.15 PLACARDS.

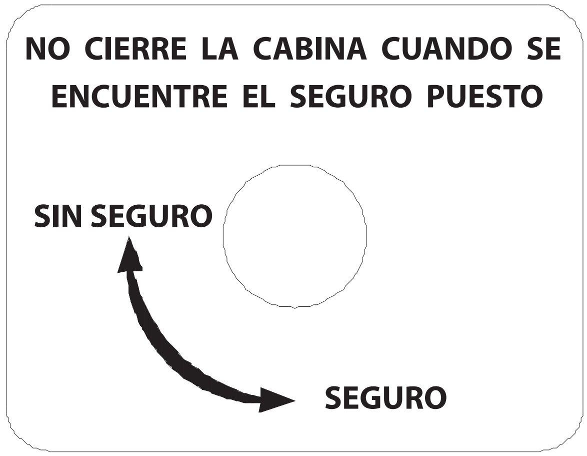
(a) Canopy Latching. On the exterior of the canopy frame, on the L/H side.



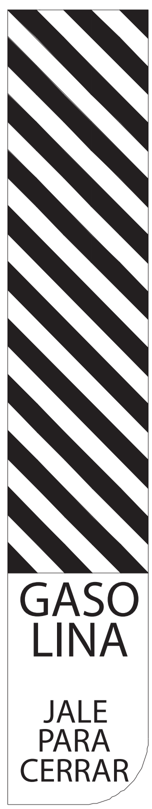
(b) Canopy Latching. On the exterior of the canopy frame, on the R/H side.



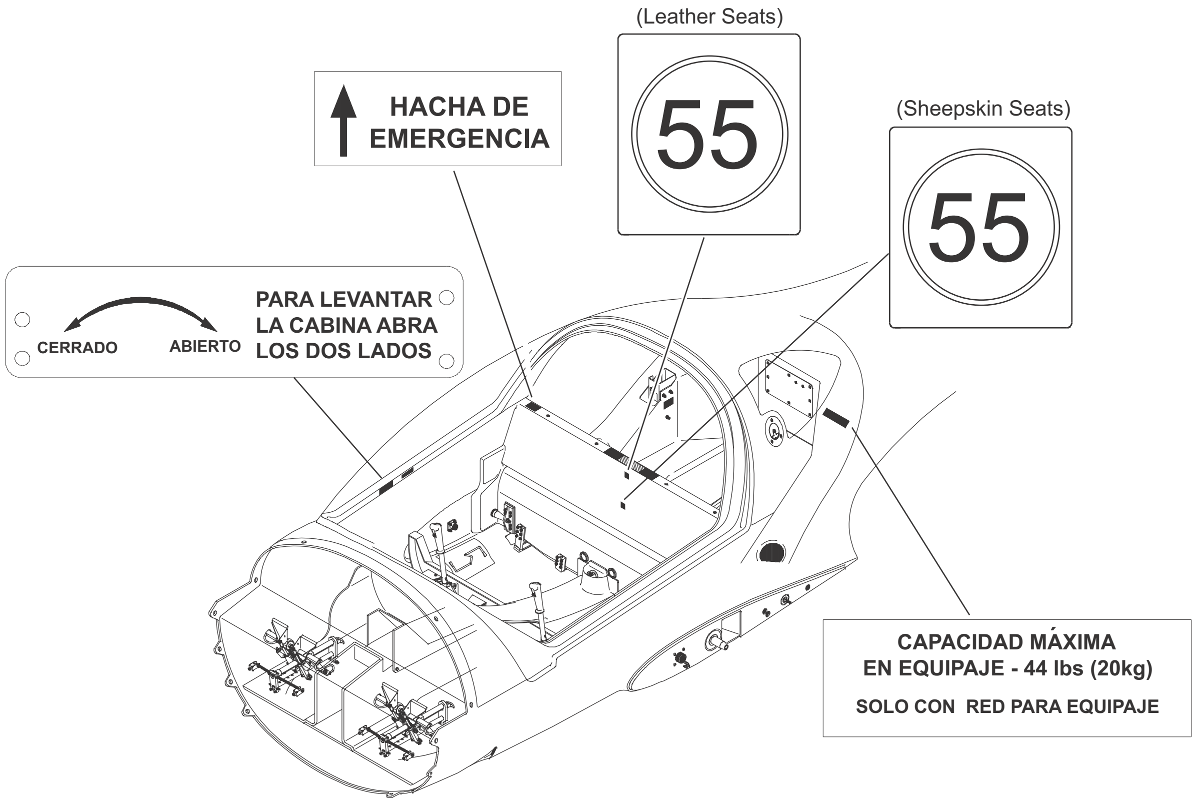
(c) Canopy Lock. On the exterior of the canopy frame, on the L/H side.

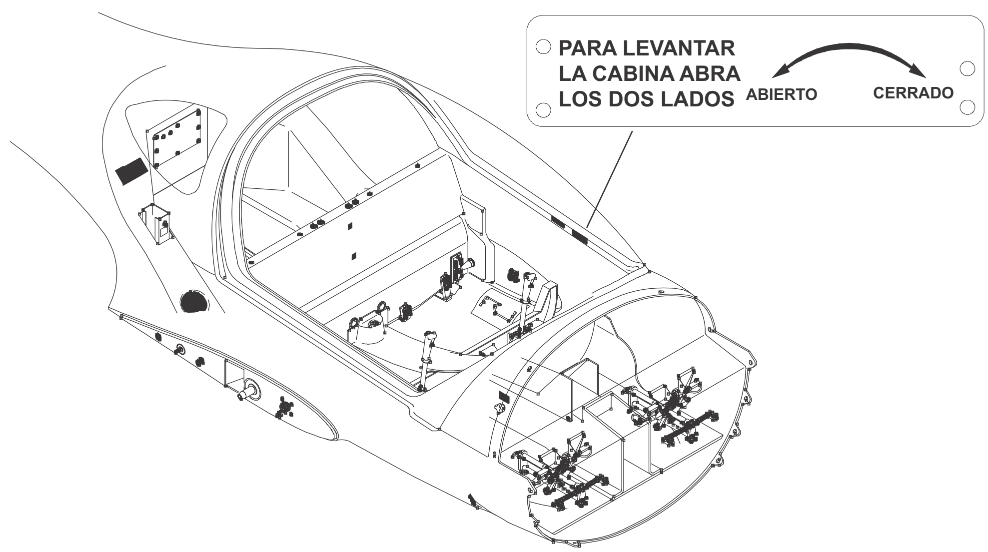


(d) Fuel Pull Off. Next to the PARK BRAKE lever.



(e) On the interior of the airplane, general placards and markings.





3. EMERGENCY PROCEDURES

There is no change in the emergency procedures with the Spanish placards and markings installed.

4. NORMAL OPERATING PROCEDURES

There is no change in the normal operating procedures with the Spanish placards and markings installed.

5. PERFORMANCE

There is no change in the performance of the airplane with the Spanish placards and markings installed.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

The change in weight and balance is negligible with the installation of the Spanish placards and markings.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

The Spanish placards and markings installed do not affect the description of the airplane and its systems.

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

The Spanish placards and markings installed do not affect the handling, preventative and corrective maintenance.

CHAPTER 9

SUPPLEMENT 17

CHINESE PLACARDS AND MARKINGS

TABLE OF CONTENTS

Page

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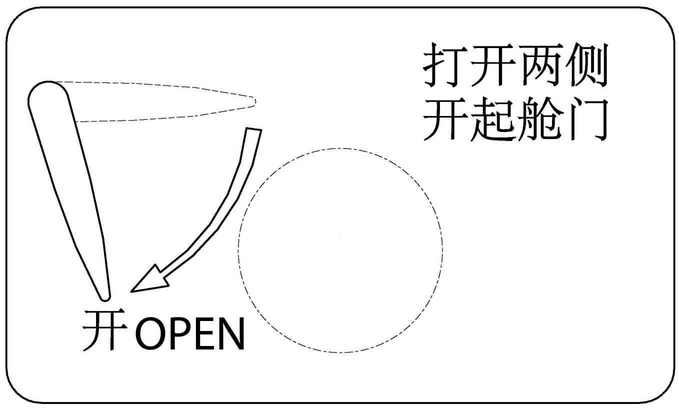
1. GENERAL

This supplement addresses the placards and markings for airplanes operating in China. Only portions of the flight manual affected by the installation are included in this supplement.

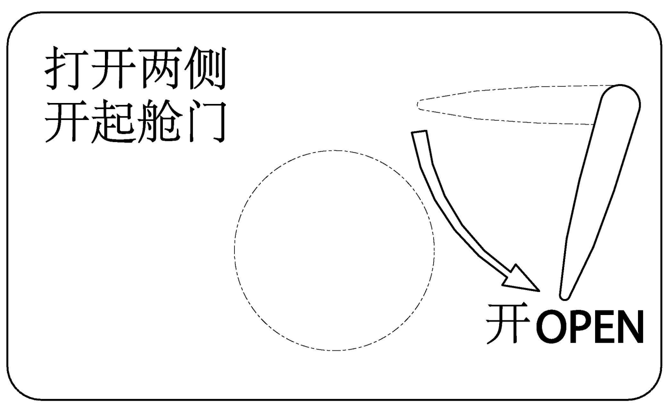
2. OPERATING LIMITATIONS

2.15 PLACARDS.

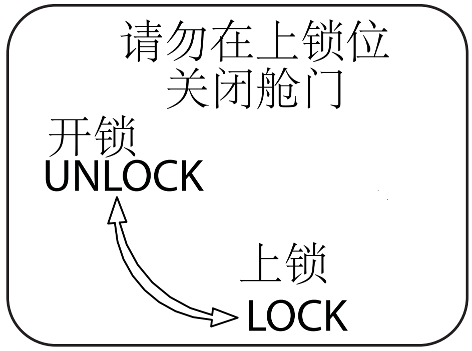
(a) Canopy Latching. On the exterior of the canopy frame, on the L/H side.



(b) Canopy Latching. On the exterior of the canopy frame, on the R/H side.



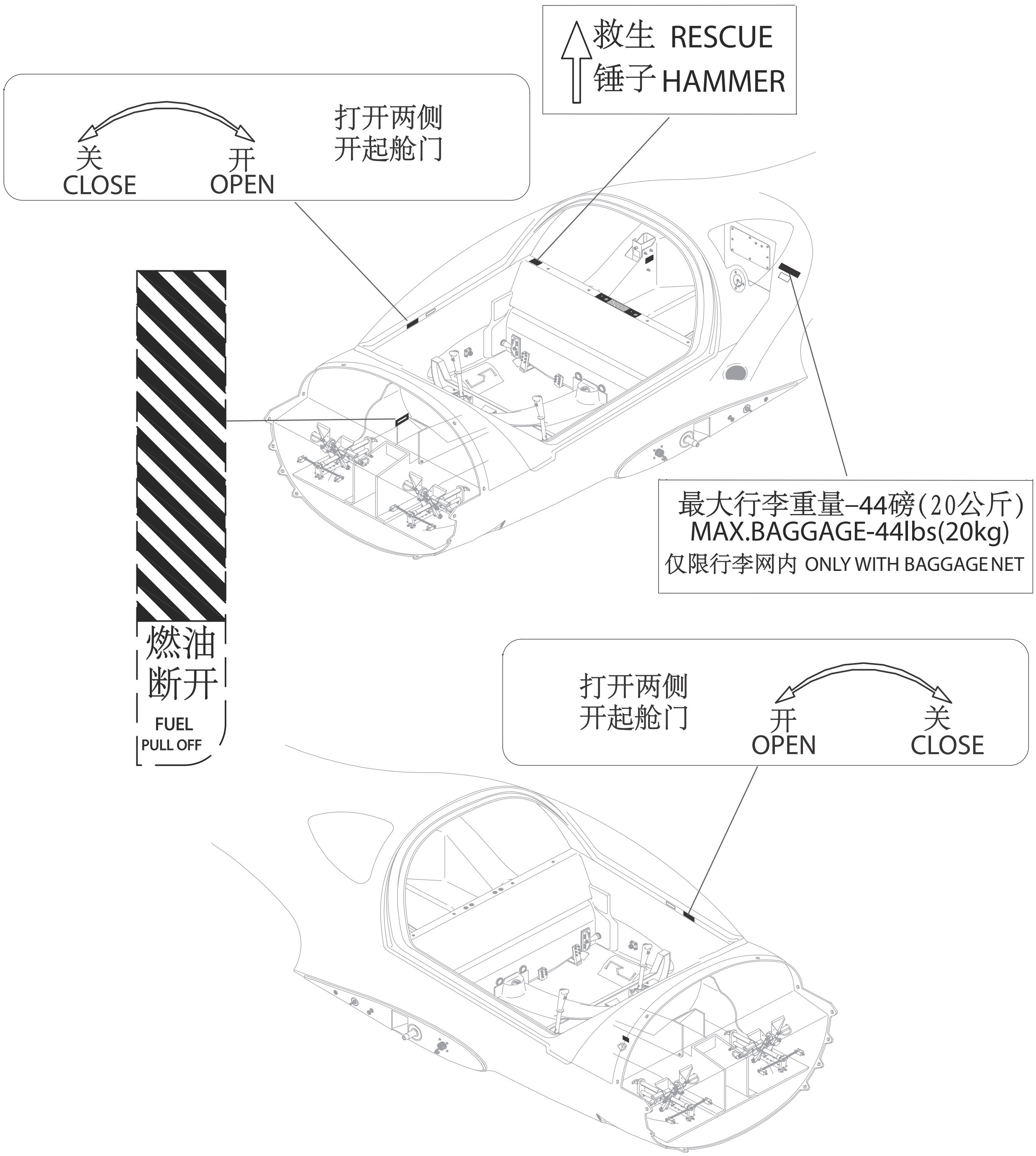
(c) Canopy Lock. On the exterior of the canopy frame, on the L/H side.



(d) VLA Limits. On the Instrument Panel..

这架飞机被列为超轻型飞机，仅批准在非结冰
条件下目视飞行。 禁止所有的特技飞行动作，
包括有意旋转。 有关其他限制， 请查看飞行
手册。

(e) On the interior of the airplane, general placards and markings.



3. EMERGENCY PROCEDURES

There is no change in the emergency procedures with the Chinese placards and markings installed.

4. NORMAL OPERATING PROCEDURES

There is no change in the normal operating procedures with the Chinese placards and markings installed

5. PERFORMANCE

There is no change in the performance of the airplane with the Chinese placards and markings installed.

6. WEIGHT AND BALANCE / EQUIPMENT LIST

The change in weight and balance is negligible with the installation of the Chinese placards and markings.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

The Chinese placards and markings installed do not affect the description of the airplane and its systems.

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

The Chinese placards and markings installed do not affect the handling, preventative and corrective maintenance.

CHAPTER 9

SUPPLEMENT 18

GARMIN GTX 330 WITH ADS-B OUT

TABLE OF CONTENTS

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1. GENERAL

The Garmin GTX 330 (Non-Diversity Mode S Transponders) and the GTX 330D (Diversity Mode S Transponders). The ES option of any of the transponders provides ADS-B extended Squitter functionality.

All Garmin GTX transponders are a radio transmitter/receiver that operates on radar frequencies, receiving ground radar or TCAS interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz. Each unit is equipped with IDENT capability and will reply to ATCRBS Mode A, Mode C and Mode S All-Call interrogation. Interfaces to the GTX 330 are shown in the following block diagram.

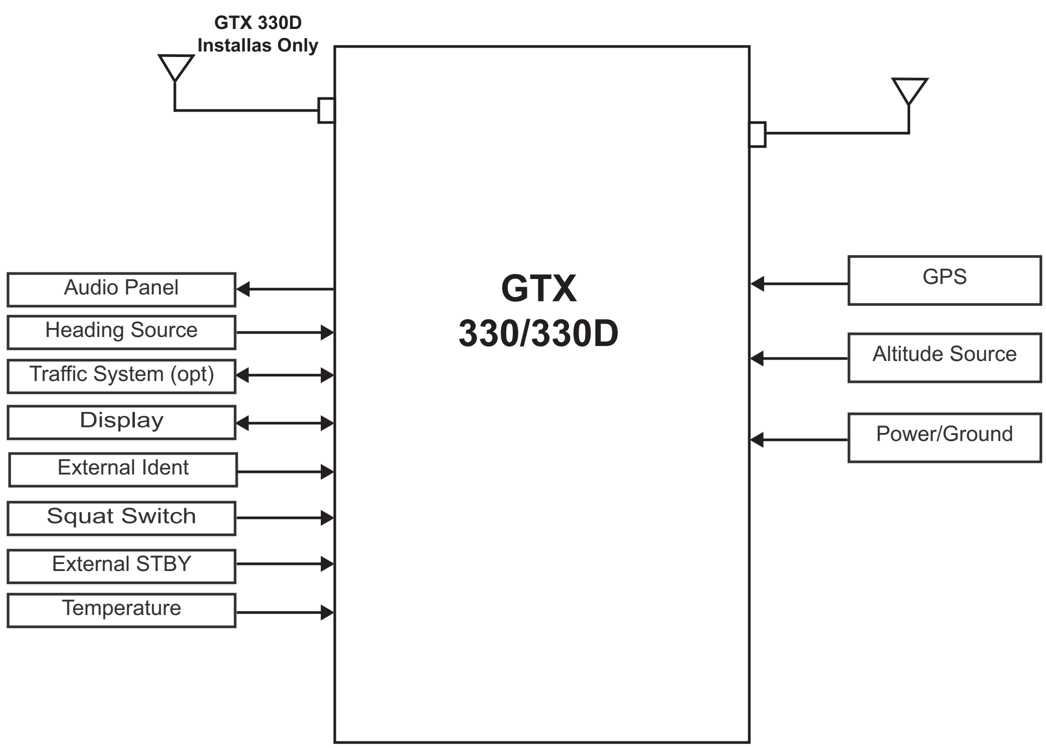


Figure S18-1 - GTX 330/330D Interface

The GTX 330 performs the following ADS-B Out functions:

- Transmission of ADS-B out data on 1090 extended squitter (1090ES) (1090 MHz)
- Integration of data from internal and external sources to transmit the following data:
  - GPS Position, Altitude, and Position Integrity
  - Ground Track and/or Heading, Ground Speed, and Velocity Integrity
  - Air Ground Status
  - Flight ID, Call Sign, ICAO Registration Number
  - Capability and Status Information
  - Transponder squawk code, IDENT, and emergency status
  - Pressure Altitude Broadcast Inhibit.

1.1 Capabilities

The Garmin GTX 330/33 with ADS-B Out functionality as installed in this aircraft has been shown to meet the equipment requirements of the following:

- CS-ACNS.D.ADSB. A detailed description of the system operation can be found in the Garmin GTX 330 Pilot's Guide, 190-00207-00, Rev G or later.

2. OPERATING LIMITATIONS

2.1 Minimum Equipment

In order provide the proper ADS-B data the GPS source and Altitude source must be fully functional.

ADS-B Out

The GTX 330 only complies with the integrity requirements for ADS-B Out when all required functions are operational. When the system is not operational, ADS-B Out transmit failure messages will be present on the GTX 330 display.

2.2 Applicable Software

This AFMS/AFM is applicable to the software versions 7.02 or later approved versions.

The Main GTX software version is displayed on the splash screen during start up, for the GTX 330.

2.3 Pressure Altitude Broadcast Inhibit

Pressure Altitude Broadcast Inhibit (PABI) shall only be enabled when requested by Air Traffic Control while operating within airspace requiring an ADS-B Out compliant transmitter. PABI is enabled by selecting the GTX to ON mode.

3. EMERGENCY PROCEDURES

3.1 Abnormal Indications

The loss of an interfaced input to the GTX 330 may cause the transponder to stop transmitting ADS-B Out data. Depending on the nature of the fault or failure, the GTX may no longer be transmitting all of the required data in the ADS-B Out messages.

If the GTX 330 detects any internal faults or failures with the ADS-B Out functionality, the GTX 330 will annunciate this event via the NO ADSB annunciator on the GTX 330 display screen. When the GTX 330 annunciates the NO ADSB annunciation, one of the following failures or faults have occurred:

- Loss of adequate GPS position data.

- ADS-B TX (transmit) is selected OFF.

When the GTX 330 annunciates FAIL to the flight crew, the GTX 330 has detected an internal failure and no transponder data is transmitted.

When a GTX 330 NO ADSB, or FAIL annunciation is received, verify proper operation of all interfaced equipment (refer to Section 1.) as the failure of one of these devices could be the cause of the abnormal indication.

3.2 Loss of GPS Navigation Data

When the GPS/SBAS receiver is inoperative or GPS position information is not available or invalid, the GTX will no longer be transmitting ADS-B Out data.

NO ADSB annunciator illuminated:

GPS ....VERIFY VALID POSITION

4. NORMAL PROCEDURES

NOTE

Cockpit Reference Guides for interfaced displays will provide additional operating information specific to the displays or other traffic systems.

ADS-B Out functionality resides within the GTX transponders thereby providing a single point of entry for Mode 3/A code, Flight ID, IDENT functionality and activating or deactivating emergency status for both transponder and ADS-B Out functions. Details on performing these procedures are located in the GTX 330/330D Pilot's Guide.

4.1 Unit Power On

NO ADSB.. CONSIDERED

NOTE

The NO ADS-B Annunciation (or associated display annunciations) may illuminate as the unit powers on and begins to receive input from external systems, to include the SBAS position source.

4.2 Before Takeoff

NO ADSB.. EXTINGUISHED

NOTE

The NO ADS-B Annunciation (or associated display annunciations) must be EXTINGUISHED for the system to broadcast the ADS-B Out signal.

5. PERFORMANCE

There is no change in the performance of the airplane.

6. WEIGHT AND BALANCE / EQIUPMENT LIST

The weight and balance of the airplane is not affected.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

The Garmin GTX 330 Pilot's Guide, 190-00207-00, Rev G or later contain additional information regarding GTX system description, control, and function. Also refer to the latest revision of the Garmin GPS (GNS430/530 or GTN 650) for further information.

8. HANDLING, PREVENTIVE AND CORRECTIVE MAINTENANCE

Other than periodic functional checks required by operational rules, maintenance of the GTX 330 is "on condition" only. Refer to the GTX 330 Maintenance Manual (Garmin P/N 190-00207-05).

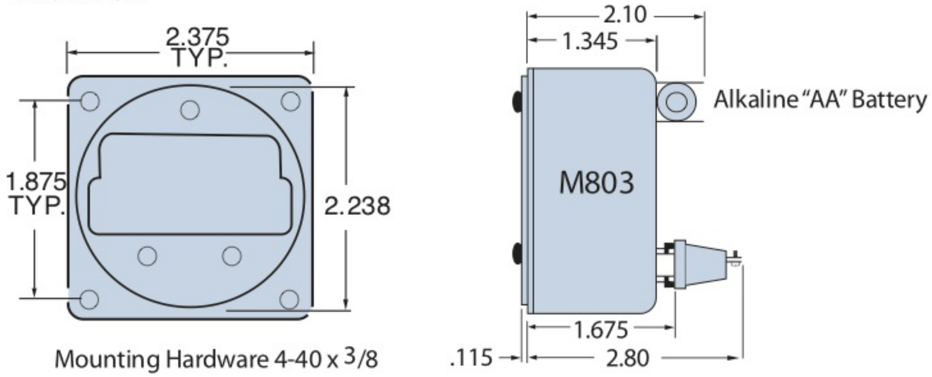
There is no change to the handling, preventive and corrective maintenance.

M803 DIGITAL CLOCK

GREENWICH MEAN TIME
LOCAL TIME
FLIGHT TIME - Flight Time Alarm
ELAPSED TIME - Count Up, Count Down, Alarm

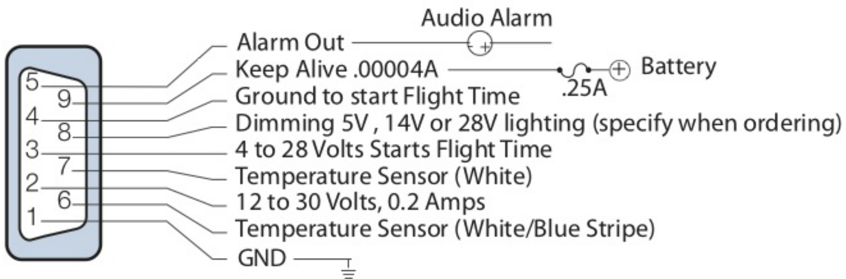
NVIS Green A Option

MECHANICAL



Mounting Hardware 4-40 x 3/8

ELECTRICAL



NOTE: Keep alive (Pin 9) is only required if alkaline AA size battery is removed.
Flight Time starts with either Pin 3 or Pin 4 - use only one pin.

SPECIFICATIONS

- Universal Time: 24 hour format.
- Local Time: 12 or 24 hour format.
- Flight Time: Records in hours and minutes, up to 99:59.
- Flight Time Alarm: Full set range flight time.
- Elapsed Time Count Up: Starts in minutes & seconds, then hours & minutes up to 99:59.
- Elapsed Time Count Down: Settable from one second to 59 minutes and 59 seconds.
- Elapsed Time Alarm: Activates at zero when counting down.
- LCD Display
- Battery Type: AA size alkaline.
- Keep Alive Current: .00004 Amps., 12 to 30v
- Input Current: .2 Amps.
- Input Voltage: 12 to 30 volts.
- Voltage Range: 8 volts to 32 volts ± .2 volts
- Temperature Range: -67° F to +302° F ± 2°F -55° C to +100° C
- NVIS Option: NVIS Green A Lighting.
- Weight: 5.02 ounces.
- Warranty: 1 year.

FEATURES - O.A.T. / VOLTS

- ONE button control steps sequentially through E, F, C:
  - E - Voltage
  - F - O.A.T. Fahrenheit
  - C - O.A.T. Centigrade
- Unit selects to read voltage on power up for battery status check
- Input voltage - 12 to 30 volts.
- Internal lighting 5v, 14v, or 28v (specify when ordering).
- 2.25" standard mount - wt. 5.02 oz

DAVTRON INC.

427 HILLCREST WAY
REDWOOD CITY (Emerald Hills) CA 94062
(650) 369-1188
www.davtron.com

DAVTRON INC

MODEL 803
CLOCK OPERATION

NORMAL OPERATION
The SEL button selects what is to be displayed and the CTL button controls what is being displayed. Pressing SEL sequentially selects Local Time, Flight Time, Elapsed Time, and back to UT. The CTL button resets Flight Time, FT, back to zero when held down for 3 seconds. The CTL button also starts and resets Elapsed Time when momentarily pushed. Normal operation of the 803 cannot accidentally reset time.

Setting Universal Time
Select UT for display with the SEL button. Simultaneously press both the SEL and CTL buttons to enter the set mode. The tens of hours digit will start flashing. The CTL button has full control of the flashing digit, and each button push increments the digit. Once the tens of hour is set, the SEL button selects the next digit to be set. After the last digit has been selected and set with the CTL button, a final push of the SEL button exits set mode. The lighted annunciator will resume its normal flashing, indicating the UT clock is running.

Setting Local Time
Select Local Time, LT, using the SEL button. Simultaneously push the SEL and CTL buttons to enter set mode. The tens of hours digit will start flashing. The set operation is the same as for UT, except that minutes are already synchro-nized with the UT clock and can only be changed in 15 minute increments for the special time zones.

Control/Select Disable
When there is no aircraft power applied to the clock the CTL and SEL buttons are disabled.

Setting Flight Time Alarm
When Flight Time, FT, is displayed, enter the set mode by pressing both buttons simultaneously. The alarm time is entered identically to UT setting. When the Flight Time equals the alarm time the display will flash and the alarm output is activated. If FT was not being displayed at the time the alarm becomes active, the clock automatically selects FT for display. Pressing either the SEL or CTL button turns off the alarm. Flight Time is unchanged and continues counting.

Flight Time Reset
FT must be displayed when resetting. Hold CTL down for 3 seconds, or until 99:59 appears on the display. Flight Time will be zeroed upon release of the CTL button.

Elapsed Time Count Up
Select ET for display. Pressing the CTL button will start ET counting. Elapsed Time counts up to 59 minutes, 59 seconds, and then switches to hours and minutes. It continues counting up to 99 hours and 59 minutes. Pressing the CTL button again stops ET. Next press of CTL resets ET to Zero.

Elapsed Time Count Down
Select ET for display and enter set mode by pressing both buttons simultaneously. A countdown from any time, a maximum 59 minutes, and 59 seconds, can be set. The time is entered the same as UT setting. Once the last digit is set, pressing the SEL button exits the set mode and the clock is ready to start the countdown. Pressing the CTL button starts the countdown. The alarm becomes active at zero, flashes the display, and enables the external alarm. Pressing either button, SEL or CTL, will stop the alarm. Another press of CTL will reset ET to zero. After reaching zero the ET counter will count up.

Test Mode
Hold the SEL button down for three seconds and the display will indicate 88:88 and activate all four annunciators.

Model 803
O.A.T. & Volts Operation
The one red button controls steps E, F, and C and then repeats. The initial power up will always select voltage. One press selects Outside Air Temp in Fahrenheit. The next button press selects Outside Air Temp in Celsius.

Universal Time

Local Time

Flight Time

Elapsed Time

Temperature Fahrenheit

Temperature Centigrade

Avidyne Corporation
4 Middlesex Green - Suite 221
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FAA Approved

Airplane Flight Manual Supplement

For

Diamond DA-20 C1

Make and Model Airplane

with

Avidyne Integrated Flight Displays 700-00182-XXX (IFD5XX), 700-00179-XXX (IFD4XX) and 700-00194-XXX (Atlas)

Registration No. N293DC

Serial No. C 0193

This supplement must be attached to the applicable FAA Approved Airplane Flight Manual when Avidyne 700-00182-XXX Integrated Flight Display (IFD), 700-00179-XXX and/or 700-00194-XXX Integrated Flight Display(s) installed in accordance with STC SA00343BO. The information contained herein supplements or supersedes the basic manual only in those areas listed. For limitations and procedures not contained in this supplement consult the basic Airplane Flight Manual.

FAA Approved ____________________________

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Northeast Flight Test Section
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LOG OF REVISIONS

Revision Number	*Revised Pages*	*Description of Revisions*	*FAA Approval*	*Date*
00	ALL	Initial Release	Robert Mann	Jul 24 2014
01	Pages 1,2, 3, 4, 5, 6, 7, 8, 9, 11, 15, 16, 17, 18, 21	Add IFD440 and Software Release 10.1.0.0	-	-
02	Pages 13, 14, 19	AEG comments	Robert Mann	Jun 18 2015
03	Pages 2, 3, 4, 7, 8. 9, 10, 11, 12, 13, 18, 19, 20, 21, 24	Add models IFD410, IFD510, IFD545, IFD550 and software version 10.2	-	-
04	Pages 4 - 24	Added 91.227 compliance statement	-	-
05	Pages 11, 13, 22	Added limitation regarding use of radar display, added EmProc for disabling wireless connectivity.ACO comments incorporated	Anthony Pigott	Mar 06 2017
06	Pages 13	Added note regarding IFD4XX FLTA aural alert conflicts with other sensors	Anthony Pigott	Mar 20 2017
07	Pages 4, 5, 8, 26	Added TDR ADS-B out compliance statement, BK pilot guide references, ADS-B in only limitations	W. Witzig	May 03 2019
08	Pages 4, 8, 26	Add ADS-B out configurations. Revise normal operations description	W. Witzig	Oct 01, 2019
09	Page 4	Add additional Transponders to ADS-B Out Compliance	W. Witzig	Feb 17, 2021
10	all	Added Rel 10.3 w/ TAWS-B and ADS-B in TSO C-157b	W. Witzig	Aug 26,2022
11	7-11,13,14,18,20,21,27,28,30,31	Added RF leg limitations; Added Atlas FMS Only units; Added clarification for TAWS-B		

Section 1 – General

This airplane is equipped with Avidyne p/n 700-00182-XXX (IFD5XX), p/n 700-00179-XXX (IFD4XX) and/or p/n 700-00194-XXX (Atlas) Integrated Flight Display(s). These part numbers may be referred to in this document as simply IFD.

The IFD contains a GPS (SBAS) receiver (all IFD models), VHF Nav/Com transceiver (IFD440, IFD540, IFD550 and Atlas) and processing to accomplish control, display, navigation and input/output to other avionic systems. The IFD 545 and IFD550 include an internal ARS and are capable of displaying attitude information and ego-centric synthetic vision (SVS). The IFD 545 and IFD550 include an internal ARS and are capable of displaying attitude information on ego-centric synthetic vision (SVS) display formats. All IFD models can be configured for Bluetooth and WiFi in/out communication (optional).

GPS/SBAS TSO-C146c Class 3 Operation

The IFD4XX, IFD5XX and Atlas are approved for navigation using GPS and SBAS (Satellite Based Augmentation System complying with ICAO Annex 10) for IFR en route, terminal area, and non-precision approach operations ("GPS", "or GPS", and "RNAV (GPS)" approaches). The IFD4XX, IFD5XX and Atlas are approved for approach procedures with vertical guidance including LPV and LNAV/VNAV and approaches without vertical guidance including LP and LNAV.

The IFD4XX, IFD5XX and Atlas comply with the requirements for GPS Class II oceanic and remote navigation (RNP-10) and (RNP-4) without time limitations. A second navigation source may be required for these operations to meet availability requirements.

Avidyne IFD Navigation Capabilities

	Note 5						Note 3	Note 4	Note 2	Note 1		
Spec	**RNP 10**	**RNAV 5 GNSS**	**RNAV5 DME/DME**	**RNAV 5 VOR/DME**	**RNAV 2 GNSS (note 1)**	**RNAV 1 GNSS**	**RNP 4**	**RNP 1 GNSS**	**RNP APCH**	**RNP APCH w/ Baro VNAV**	**RNP AR APCH w/ RF (note3)**	**RNP AR APCH w/o RF (note3)**
IFD4XX/5XX/	Oceanic	Enroute			Enroute	Terminal	Oceanic	Terminal	Approach			
Procedure type	N/A	N/A			Arrivals, Departures	Arrivals, Departures, Approaches	N/A	Arrival, Departures, Approaches	LNAV, LNAV/VNAV, LP, LPV			
ICAO Flight Plan Code	A1	B2	B3	B4	C2	D2	L1	O2	S1	S2	T1	T2
IFD4XX/5XX/Atlas Capability	**Yes**	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes** (Note 5)	No	No	No

Note 1 RNAV1 requires total system error of not more than 1NM for 95% of the total flight time
Note 2 RNAV2 requires total system error of not more than 2NM for 95% of the total flight time
Note 3 GNSS sensor complies with AC 20-138. GNSS accuracy better than 36m 95%, SBAS GNSS accuracy is better than 2m 95%
Note 4 This table is intended to show certifications of avionics equipment. Capabilities shown do not constitute operational approval.
Note 5 LP and LPV guidance require SBAS, IFD4XX/5XX/Atlas must be connected to an approved SBAS (e.g. WAAS) antenna.

ADS-B OUT TSO C-195b Operation

The IFD4XX, IFD5XX and Atlas installed per this STC in conjunction with the following transponders/ UAT transceivers have been shown to meet the equipment requirements of 14 CFR 91.227 for ADS-B OUT:

ACSS NXT-700
Avidyne AXP340, AXP322
Becker BXT6553
Bendix King KT74
Bendix King MST 70B
Collins TDR94(D)
Garmin GTX330ES
Garmin GTX335/345
Garmin GTX3000
L3Harris NGT9000
Trig TT31, TT22
Bendix King KXP80

IFD4XX, IFD5XX and/or Atlas have been approved for ADS-B Out compliance with other transponders under separate installation approvals (STCs). Check the aircraft's transponder or UAT transceiver AFMS for the statement above indicating ADS-B out compliance for the navigator and transmitter combination.

ADS-B In TSO-C157c Class 1 Operation

The IFD4XX, IFD5XX and/or Atlas IFD installed per this STC may be interfaced with an ADS-B UAT or 1090MHz (ADS-B In) TSO C-157b, Class 1 receiver to display ADS-B traffic and FIS-B weather products.

If no ADS-B out system is installed, this installation will not be able to receive TIS-B client status, and will not receive ADS-R or TIS-B broadcasts from ATC unless the aircraft is in the same area as a valid TIS-B client broadcasting that it has ADS-B In capability.

FIS-B information may be used for pilot planning decisions focused on updating the pilot's awareness of the dynamic flight environment; including avoiding areas of inclement weather that are beyond visual range and near-term decisions where poor visibility precludes visual acquisition of inclement weather.

FIS-B weather and NAS status information may be used as follows:

(a) To promote pilot awareness of ownship location with respect to reported weather, including hazardous meteorological conditions; NAS status indicators to enhance pilot planning decisions; and pilot near-term decision-making.

(b) To cue the pilot to communicate with Air Traffic Control, Flight Service Station specialist, operator dispatch, or airline operations control center for general and mission critical meteorological information, NAS status conditions, or both. FIS-B information, including weather information, NOTAMs, and TFR areas, are intended for the sole purpose of assisting in long-/near-term planning and decision making.
The system lacks sufficient resolution and updating capability necessary for aerial maneuvering associated with immediate decisions. In particular, in extreme scenarios, the oldest weather radar data on the display can be up to 15 to 20 minutes older than the display's age indication for that weather radar data. Therefore, do not attempt to use FIS-B weather information to maneuver the aircraft at minimum safe distances from hazardous weather. FIS-B information must not be used in lieu of a standard preflight briefing.

(c) FIS-B uplink is an FAA approved source for METAR , TAF, WINDS, PIREPs, NEXRAD, AIRMET, SIGMET, and TFR information subject to the range limits for the broadcast of these products. FIS-B uplink is not an FAA approved source for NOTAMs.

NOTE

When no traffic or datalink receiver is interfaced with the installed IFD series GPS/Nav/Com, a portable (unapproved) ADS-B receiver may be interfaced via WiFi and/or Bluetooth to provide traffic and FIS-B weather products for display on the IFD. Traffic aurals and TAs will not be issued when configured this way.

TAWS-B TSO C-151d Operation

The IFD5XX and/or Atlas IFD installed per this STC meets the minimum requirements of TSO-C151d when IFD software release 10.3 or later approved release, and the TAWS-B Unlock Enablement is installed. Fixed Wing TAWS-B is not available on IFD4xx units.

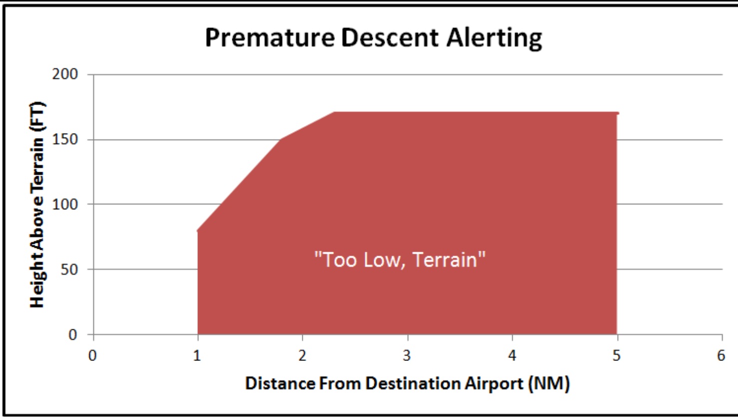
In addition to the FLTA Terrain Awareness features, TAWS-B contains the following sub-functions:

Premature Descent Alert (PDA) – this function is designed to alert when the aircraft is hazardously below the normal approach path for the nearest runway at either the origin or destination airport.

Premature Descent Alert (PDA)
The PDA function is operational only in the vicinity of the origin or the destination airport contained in the FMS flight plan. Specifically, considering all of the runways at the origin and destination airports, the aircraft must be between 1 and 5 nautical miles from the runway nearest to the aircraft position.

Using the threshold elevation of the nearest runway and the current aircraft altitude, the PDA function determines whether the aircraft is hazardously below the normal approach path for that runway, based on the criteria in the table below.

Range from nearest runway	AGL Altitude Range in Which a PDA Caution Alert is Generated
1 – 1.8 NM	80 to 150 feet (Linear)
1.8 – 2.3 NM	150 to 170 feet (Linear)
2.3 – 5 NM	170 feet

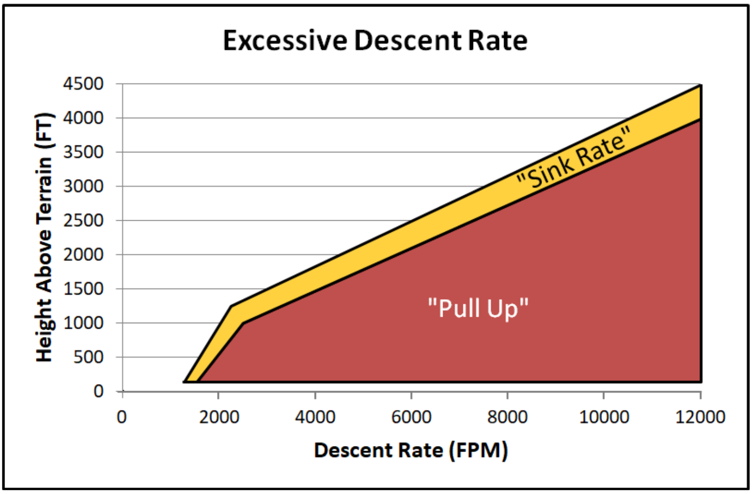


If a PDA alert has been triggered, a CAS message and aural alert "Too Low Terrain" will be issued and repeat every 6 seconds until it is acknowledged, or the condition is no longer true. For the condition to no longer be true, the aircraft must clear the alerting altitude by 100 feet. So, for example, if the aircraft is 4 NM away from the airport and descended to 150 feet AGL, a climb to 270 feet AGL must be completed to clear the condition.

Excessive Rates of Descent (EDR)
This function is designed to alert when the aircraft is experiencing excessive rates of descent given the current AGL altitude. The alert can be generated during any phase of flight.

Excessive Descent Rate (EDR)
The function that monitors for excessive rates of descent is always active, not just in the vicinity of an airport. There is a caution area for high rates of descent and a warning area for even higher rates of descent. The figure below depicts the yellow caution area in which a "Sink Rate" aural alert and associated yellow caution CAS message is issued and then a red warning area in which a "Pull Up" aural alert and associated red warning CAS message is issued.

The excessive rate of descent aural will continuously repeat every 6 seconds until either the message is acknowledged, or the condition is no longer valid.



The "Pull Up" warning will provide up to 24 seconds of protection, while the "Sink Rate" caution will provide up to 33 seconds of protection, based on aircraft altitude. Aircraft vertical speed and current terrain elevation below the aircraft are used to compute the alerting altitude thresholds. As a result, these protection times may not apply in rising terrain or when the aircraft's rate of descent is increasing.

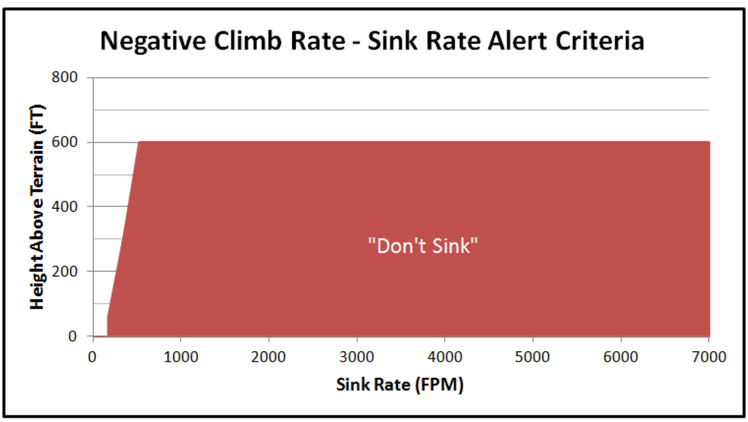
The EDR "Sink Rate" alert can trigger as low as -1250 fpm, while the "Pull Up" alert can trigger as low as -1500 fpm. EDR "Pull Up" warnings are the highest priority of all TAWS alerts, even higher than FLTA warnings.

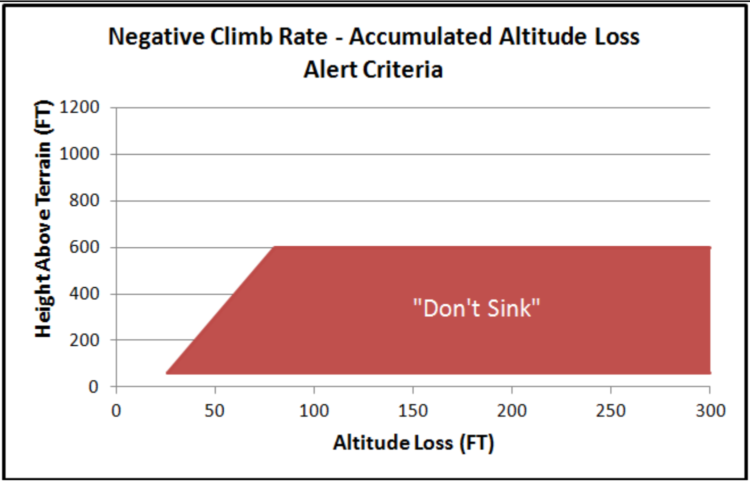
Negative Climb Rate (NCR) or Altitude Loss After Takeoff/Go-Around

This function is designed to alert when the aircraft develops a negative climb rate immediately after takeoff or go-around or when an altitude loss is detected in that phase.

Negative Climb Rate / Altitude Lost After Takeoff (NCR) - The final function of the TAWS system is the alert for a negative climb rate (NCR) or excessive altitude lost after takeoff/go-around. Therefore, NCR is enabled only between 50 and 600 feet AGL.

When enabled, this function triggers a "Don't Sink" caution with an associated aural message if there is excessive negative vertical speed or if there is excessive altitude loss (approximately 10% of altitude). The alerts will clear if the CAS message is acknowledged, the aircraft AGL altitude increases past the previous highest value, or the aircraft reaches 600 feet AGL.





TAWS-B has several associated aural alerts. Except for altitude callouts, the aural alerts are associated with CAS messages. The priority of TAWS-B alerts is illustrated below, prioritized from highest to lowest.

Function	CAS Alert	Aural Alert
EDR	Pull Up	Pull Up, Pull Up
FLTA	Terrain Pull Up	Per Setup Option
FLTA	Warning Obstacle	Warning, Obstacle
FLTA	Caution Terrain	Per Setup Option
FLTA	Caution Obstacle	Caution, Obstacle
PDA	Too Low, Terrain	Too Low Terrain
Altitude Callout	n/a	Five Hundred (others per configuration and setup option)
EDR	Sink Rate	Sink Rate
NCR	Don’t Sink	Don’t Sink

Database Accuracy and Completeness

The operator is responsible to ensure that the navigation data used in the unit has the accuracy, resolution, and timeliness appropriate for the purpose of the flight operation being conducted. Using navigation data from an Avidyne authorized supplier will ensure that the navigation data has the same accuracy and resolution provided by official sources, in a format compatible with the intended function of the unit.

Avidyne requests that any observed database discrepancies are reported. These discrepancies may be in the form of an incorrect procedure, incorrectly identified terrain, obstacles, navigation fixes, or any other displayed item used for navigation or communication in the air or on the ground. Use the Service Hotline listed on the back cover of the IFD4XX, IFD5XX and/or Atlas IFD Pilot Guides.

Avidyne accurately processes and validates the database data, but cannot guarantee the accuracy and completeness of the data provided by various state sources and their suppliers.

Avidyne Corporation holds a FAA Type 2 Letter of Acceptance (LOA) in accordance with AC 20-153 for database integrity, quality, and database management practices for the navigation database. Flight crew and operators can view the LOA at www.avidyne.com.

Section 2 – Limitations

1. The appropriate IFD4XX, IFD5XX and/or Atlas Integrated Flight Display Pilot Guides must be available to the pilot during all flight operations:
   - P/N 600-00300-001 for the IFD5XX Series
   - P/N 600-00304-000 for the IFD4XX Series
   - P/N 600-00300-002 for the Atlas Series
   - P/N 890-00039-010 Bendix King AeroNav 900 and 910
   - P/N 890-00041-008 Bendix King AeroNav 800
2. For Class I airplanes (single engine, piston, under 6,000# GTOW), a single IFD4XX, IFD5XX and/or Atlas is sufficient for flight under instrument flight rules (IFR). IFR is prohibited when the GPS or VHF navigation receiver is inoperable unless the airplane has an additional approved GPS and/or VHF receiver.

   For all other Airplanes (Class II, III and IV), dual VHF communications transceivers and dual GPS or VHF Navigation receivers are required for flight under instrument flight rules (IFR). One communication transceiver, or one GPS receiver, or one VHF navigation receiver may be inoperable for IFR flight.

   In all airplanes, an approved navigation display (external CDI, HSI, or EHSI) is required for flight under instrument flight rules (IFR).
3. The IFD4XX, IFD5XX and/or Atlas IFD installed with an SBAS approved antenna, provides pilot and automatic flight control guidance for the following operations conducted under instrument flight rules (IFR):

   Note: That models IFD410, IFD510, IFD545 and Atlas FMS Only units do not include VHF capabilities and VHF navigation and approaches are not applicable to these models.

- VOR, LOC, ILS instrument approach procedures (procedures using VHF radio guidance)
- RNP instrument approach procedures using the following lines of minima:
    - LNAV minima (including when using advisory vertical guidance from the system);
    - LNAV/VNAV minima;
    - LPV minima; and
    - LP minima.

  Note: The U.S. titles RNP instrument approach procedures "RNAV (GPS) Rwy XX". Other States may use similar titling or may title these procedures "RNAV (GNSS) Rwy XX".
- RNP terminal procedures, including RNP arrival procedures and RNP departure procedures.
- RNAV terminal procedures, including RNAV arrival procedures and RNAV departure procedures.

The IFD4XX, IFD5XX and Atlas when installed with a non-SBAS antenna, provide pilot and automatic flight control guidance for the following operations conducted under instrument flight rules (IFR):

- VOR, LOC, ILS procedures (procedures using VHF radio guidance) – IFD440, IFD540, IFD550, Atlas w/VHF only.
- RNP instrument approach procedures using the following lines of minima:
    - LNAV minima.
- RNP terminal procedures, including RNP arrival procedures and RNP departure procedures.
- RNAV terminal procedures, including RNAV arrival procedures and RNAV departure procedures.

4. When GPS is available, the IFD5XX and/or Atlas IFD, may serve as an RNAV alternate or substitute means of navigation for ground-based navigation aids that are out-of-service or unavailable.

5. GPS/SBAS based IFR enroute, oceanic, and terminal navigation is prohibited unless current Navigation and Procedure databases are installed.
6. In areas where SBAS coverage is not available, the pilot must check RAIM availability.
7. The Avidyne moving map display provides visual depiction of the aircraft's own-ship, GPS position on a moving map for situational awareness (SA) purposes only. The pilot shall not use the moving map display as a sole means of navigation. The external CDI, HSI, or EHSI display must be used as the primary navigation instrument.
8. The Avidyne electronic checklists display supplements the Pilot Operating Handbook checklists and are advisory only. The pilot shall not use the electronic checklists as the primary set of on-board aircraft checklists. FAA Approved Flight Manual paper checklist must be available to the pilot as the primary reference.
9. The IFD integrates with separately approved system installations such navigation indicators, remote annunciators. Adherence to limitations in installation AFM supplements for those systems is mandatory.
10. The use of datalink, traffic and lightning sensor information displayed on the IFD4XX, IFD5XX and Atlas must be in compliance with the approved AFM supplements for those systems.
11. Gloves may not be used to operate the IFD5XX and/or Atlas IFD touch functions unless the Glove Qualification Procedure located in the IFD4XX/IFD5XX/Atlas Pilot's Guides has been successfully completed.
12. The IFD545 and/or IFD550 may not be used for primary attitude information or standby attitude information (If required by type design). The IFD545 and/or IFD550 may only be used as a secondary (non-required) source for attitude information.

NOTE

The IFD545 and/or IFD550 may be used in conjunction with air data and turn rate indicators in determining if a primary or standby attitude source has failed e.g., in the case of primary/standby attitude indicator mis-compare. The IFD545 and/or IFD550 may not be used for primary navigation deviation information (horizontal of vertical). The IFD545 and/or IFD550 may only be used as a secondary (non-required) source for this information.

13. The Avidyne IFD4XX, IFD5XX and/or Atlas may only be operated in IMC conditions as a radar display when used in conjunction with an independent lightning detection and display system (Approved Thunderstorm Detection Equipment).
14. IFD Series Navigators are capable of providing guidance for procedures and approaches containing RF legs. This STC does not grant operational approval for RF leg navigation for those operations requiring approval (AR). FAA approval may be required for operators intending to use the IFD Series navigator for RNP-1 Procedures. For Procedures containing RF legs that are not AR (approval required) or RNP<1, the IFD Series Navigators provide approved guidance (hand-flown or coupled) with the following limitations:
    - Navigation guidance must be displayed on the Primary Navigation Instrument with Course Pointer Auto-Slew functioning.
    - RF legs must be flown at less than 180 KIAS.
    - Distance to Waypoint or Moving Map information must be available to the Pilot when hand-flying RF legs without Flight Director Guidance.

CAUTION

Terrain information shown on the MAP page display is provided to the pilot as an aid to situational awareness. The MAP page terrain color representations should not be used as a sole basis for terrain avoidance.

CAUTION

Traffic information shown on the Map page display is provided to the pilot as an aid to visually acquiring traffic. Pilots should maneuver their aircraft based only on ATC guidance or positive visual acquisition of the conflicting traffic. Avoidance maneuvers should not be made based only on a Traffic Advisory.

CAUTION

In IFD545 and IFD550 units the inertial reference accelerometers may be irreparably damaged by exposure to temperatures below -40°C. The units are capable of operating at -40°C, but exposure to temperatures below this, even when powered off, can stress the parts internally causing a detectable and annunciated failure of the sensors.

Section 3 – Emergency Procedures

Loss of GPS

In the event of the loss of the IFD4XX, IFD5XX and/or Atlas GPS receiver, the FMS will enter dead reckoning mode for 5 minutes, after that, all FMS functions are lost and the ownship is removed from map depictions. The pilot should revert to the remaining navigation receiver (required for IFR operations).

Loss of VHF Nav/Com

In the event of the loss of VHF Navigation on the IFD440, IFD540, IFD550 or Atlas w/VHF, the pilot should revert to remaining navigation receiver (required for IFR operations).

Warning Messages

Caution and warning messages provided by the IFD4XX, IFD5XX and/or Atlas are related to functions performed by the IFDs and are additional to the caution and warning annunciation system provided by the aircraft.

NOTE

The original caution and warning annunciator panel remains as the primary indication. POH/AFM Emergency procedures are not affected by this installation.

CAUTION

IFD4XX units lack an audio inhibit output to preclude other sensors aural alerts from sounding while IFD4XX forward looking terrain awareness (FLTA) aural alerts are issued. Simultaneous alerts are possible. Example: a TIS-B aural traffic alert could be issued at the same time as an FLTA terrain or obstacle aural caution or warning.

To Disable WiFi/Bluetooth Connectivity on IFD4XX/IFD5XX:

1. Press and hold the IFD4XX, IFD5XX and/or Atlas power button/knob for 1 second (upper left bezel).
2. ALLOW/IGNORE WiFi Bluetooth dropdown is presented. Press IGNORE Dropdown is removed.
3. Verify the WiFi and Bluetooth icons on the upper right of the display are removed.

Caution and Warning Messages

The Caution and Warning panel is not altered as part of this modification and remains the primary means of providing Caution and Warning messages.

Caution and Warning messages are provided in the following table:

EXCEEDANCES | WARNINGS RED

Short Text	Long Text	Comments
Pull Up	Excessive Descent Rate	The TAWS Excessive Descent Rate algorithm has detected a CFIT potential – initiate an immediate recovery maneuver.
Terrain Pull-Up*	Terrain Pull-Up	The FLTA algorithm has detected an imminent ground collision - Initiate an immediate recovery maneuver.
Warning Obstacle*	Warning Obstacle	The FLTA algorithm has detected an imminent obstacle collision. Initiate an immediate recovery maneuver.
Unit Overtemp – Unit Unreliable	Unit Overtemp: <internal component name> Unit reliability in question – Get IFD serviced	One or more of the internal components has exceeded its maximum design temperature and reliability cannot be ensured until the unit is tested by the Avidyne Service Center. Contact the Avidyne Service Center or a local dealer for service. This message will be present on every subsequent power cycle until reset by the Avidyne Service Center.
Low Volts – off in <countdown from 60> sec	Low Volts – IFD powers down in <countdown from 60> sec	Main supply voltage has fallen below 9 VDC. Contact a local dealer for service.

Terrain Alert Warning Maneuver

When a terrain alert warning occurs, immediately initiate, and continue a climb that will provide maximum terrain clearance, or any similar approved vertical terrain escape maneuver, until all alerts cease. Only vertical maneuvers are recommended, unless operating in visual meteorological conditions (VMC) and/or the pilot determines, based on all available information, that turning in addition to the vertical escape maneuver is the safest course of action.

EXCEEDANCES | CAUTIONS YELLOW

Short Text	Long Text	Comments
ADS-B Traffic Sensor Fault	No communication with traffic sensor	The IFD is not receiving messages from the ADS-B traffic sensor. Contact a local dealer for service. This message is local if independent traffic sensors are installed.
ADS-B Traffic Sensor Fault	Traffic sensor has failed	The ADS-B traffic sensor is reporting a failure or the IFD is receiving invalid messages from the sensor. Contact a local dealer for service. This message is local if independent traffic sensors are installed.
No ADS-B Position	AXP322 Lost GPS Position Data	ADS-B position data had previously been valid and then transitions to invalid. Check the ADS-B position source device.
Caution Terrain*	Caution Terrain	The FLTA algorithm is predicting a likely ground collision within approximately 60 seconds – initiate a proper recovery maneuver.
Caution Obstacle*	Caution Obstacle	The FLTA algorithm is predicting a likely obstacle collision with approximately 60 seconds – initiate a proper recovery maneuver.
No Position	No position available	The IFD cannot compute a navigation solution. IFD operation will be degraded (e.g. no map, no FMS guidance, etc.) Transition to alternative navigation sources.
GPS Integrity Lost	GPS Integrity Lost – Crosscheck Nav	This is alerting about imminent exceedence of horizontal fault detection limits or protection levels. Crosscheck the nav solution and determine the best course of action. If on a GPS based approach, Missed Approach is required.

Short Text	Long Text	Comments
GPS Fault	Position updated via dead reckoning	The GPS has stopped providing a navigation solution. If GPS is the only navigation solution source available, then expect degraded IFD operation (e.g. no map, no FMS guidance, etc.)
GPS Fault	No position available	The navigation solution cannot compute a position, typically after dead reckoning has expired. Execute a missed approach if this occurs while performing a GPS based approach. Use an alternate GPS or VHF navigation receiver.
Configuration Error	Configuration Error – IFD Requires Service	The configuration of the IFD or the devices to which it is communicating with has changed or experienced an error. Contact the Avidyne Service Center or a local dealer for service.
LPV Unavailable Use L/VNAV DA	GPS integrity is insufficient for LPV Approach	Transition to a non-LPV approach and the appropriate minima if possible. Otherwise execute a missed approach.
LPV Unavailable Use LNAV MDA	GPS integrity is insufficient for LPV Approach	Transition to a non-LPV approach and the appropriate minima if possible. Otherwise execute a missed approach.
LP Unavailable Use LNAV MDA	GPS integrity is insufficient for LP Approach	Transition to a non-LP approach and the appropriate minima.
L/VNAV Unavail. Use LNAV MDA	GPS integrity is insufficient for L/VNAV Approach	Transition to a non-L/VNAV approach and the appropriate minima.

Short Text	Long Text	Comments
Check Altitude Too Low	Aircraft is below the glide slope altitude at FAF	Correct aircraft altitude as required to safely conduct the approach or initiate a climb to a published safe altitude and abort the approach.
Traffic Sensor Fault*	No communication with traffic sensor (local) OR Traffic sensor has failed (global)	Contact a local dealer for service.
Traffic <Low | High> <Bearing in clock direction> <Distance in NM>*	Traffic [Brg (e.g. 1:00)] [dist (e.g. 2 NM)] [alt (e.g. 200 ft)]	Traffic advisories - Alert to be used to facilitate visual acquisition of traffic. Pilots should maneuver their aircraft based only on ATC guidance or positive visual acquisition of the conflicting traffic.
Traffic <Low | High> <Distance in NM>*	Traffic <Distance in NM> <Signed relative altitude in feet> FT	Traffic advisories with no bearing information – Alert to be used to facilitate visual acquisition of traffic. Pilots should maneuver their aircraft based only on ATC guidance or positive visual acquisition of the conflicting traffic.
Traffic <Bearing in clock direction> <distance in NM>*	Traffic <bearing in clock direction> <distance in NM>	Traffic advisories with no relative altitude information – Alert to be used to facilitate visual acquisition of traffic. Pilots should maneuver their aircraft based only on ATC guidance or positive visual acquisition of the conflicting traffic.
Traffic <distance in NM>*	Traffic <distance in NM>	Traffic advisories with no relative altitude information and no bearing – Alert to be used to facilitate visual acquisition of traffic. Pilots should maneuver their aircraft based only on ATC guidance or positive visual acquisition of the conflicting traffic.

Short Text	Long Text	Comments
COM TX Fault	Transmitter Fault, No TX Ability	Transition to a backup VHF com radio (if available) or initiate lost communication procedures. Contact the Avidyne Service Center or a dealer for service.
COM Stuck TX	Stuck Mic Timeout, Transmitter Disabled	Requires 35 seconds of continuous transmission. Verify the PTT is stuck and contact a dealer for service as required.
No Comm with VHF	No communication with the VHF radio	Transition to a backup VHF com radio (if available) or initiate lost communication procedures. Contact the Avidyne Service Center or a dealer for service.
Unit Overtemp – Check cooling	Unit Overtemp: <internal component identification>	One or more of the internal components has exceeded 80°C. Contact the Avidyne Service Center or a dealer for service – consider adding a source of cooling and/or improving air flow in/around the IFD.
Low Volts	Backlight reduced to 25%	Main supply voltage has fallen to approximately 11VDC. Check the aircraft alternators are on and functional. Consider load shedding the power bus that is powering the IFD.
Manual Sequence Req'd	Altitude invalid – leg will not auto sequence	In basic E-M aircraft where the IFD does not have altitude input, this message will appear when the FMS active leg is a Heading→Altitude leg. In this case, the FMS flight plan will need to be manually sequenced to the next leg. Failure to do so will keep the FMS flying the heading indefinitely.

Short Text	Long Text	Comments
Heading Lost	Using ground track for SVS	Indicates loss of the TVV and the aircraft reference symbol ("wedge") now points at ground track, not aircraft heading. "TRK" will also be displayed below the digital compass on the SVS page.
Xpdr Fault	Transponder Fault	Any fault other than loss of ADS-B GPS position. Contact the Avidyne Service Center if this persists across power cycles.
No Comm With Xpdr	No Communication with Remote Transponder	No data has been received from the remote transponder for greater than 2 seconds. Contact the Avidyne Service Center if this persists across power cycles.
Radar: Echoes Ahead	Radar: Heavy Echoes Ahead	Generated when a number of red and/or magenta echoes are present within the area ±22° off the nose of the aircraft at the current displayed radar range.
Radar: Target Alert	Radar: Target Alert Detected	Alerts the pilot to the presence of a significant weather cell that exists beyond the currently Selected display range.
Radar Sensor Fault	No Communication with Radar Sensor, or; Radar Data is Invalid, or; Sensor mode is [selected] Selected mode is [reported], or; Radar fault code: any active fault codes.	No data is received from the sensor for at least 2 seconds, or; The data stream from the radar contains information that the data stream should not be used, or; If the requested mode and the reported mode do not match, or; Any specific fault code is active from the sensor.

Short Text	Long Text	Comments
TIS Removed	TIS Traffic Removed	TIS traffic communications have ceased for >12 seconds
TIS Unavailable	TIS Traffic Unavailable	No TIS ground station is available or communications have ceased for >60 seconds
Too Low, Terrain	Premature Descent, below glide path	TAWS PDA algorithm has determined the aircraft is below glide path.
Sink Rate	Excessive Descent Rate	TAWS EDR algorithm has determined a potential CFIT scenario is developing – recover the aircraft
Don’t Sink	Negative climb rate or altitude loss	TAWS NCR algorithm has determined corrective action should be taken immediately.
TAWS Fail	Invalid GPS Position/Velocity	The GPS solution is lost or the GPS velocity quality parameters drop below required accuracy limits. A “bing-bong” chime is played if this condition occurs. Contact the Avidyne Service Center if this persists across power cycles.
TAWS System Failure	TAWS Failed Self-Test [reason why]	TAWS failed self-test for the reason provided and TAWS will be degraded or not available for the power cycle. Contact the Avidyne Service Center if this persists across power cycles.

The pilot should utilize available instruments/data displays to verify message(s) and take appropriate action(s) (ref POH/AFM) by selection of alternate systems or settings. Invalid messages generally indicate a failed sensor and that other messages associated with that system will be unavailable. Caution messages indicate the possibility of a pilot action.

Terrain Alert Caution Maneuver

When a terrain alert caution occurs, verify the aircraft flight path and correct it, if required. If in doubt, perform a climb until the caution alert ceases.

Section 4 – Normal Procedures

To Activate the IFD4XX/IFD5XX/Atlas:

1. Verify IFD circuit breakers (2) ------------------------------ IN
2. Verify Battery Master Switch ---------------------------------ON
3. Avionics or Radio Master (if equipped) ------------------ ON

To Deactivate the IFD4XX/IFD5XX/Atlas:

4. Avionics or Radio Master (if equipped) ------------------ OFF

   or
5. Press and hold the Power Knob----------------------------- OFF

IMC Operations with Weather Radar

1. While operating in IMC conditions with weather radar active, activate lightning detection system and monitor. Correlate lightning strike information with painted radar information to confirm proper system operation.
2. If radar data and lightning do not coincide, contact ATC for the latest severe weather information.

Autopilots

Reference autopilot Pilots Guide and AFMS.

The IFD4XX/IFD5XX/Atlas may be coupled to an autopilot. Autopilots coupled to the IFD in (NAV) mode will follow GPS or VHF navigation guidance as they would with any VOR/LOC receiver. Autopilots providing GPSS (GPS Roll Steering) course guidance will lead course changes (curved transition), fly arcs, holds and procedure turn/reversals.

Also see Avidyne IFD4XX/IFD5XX/Atlas Pilot's Guides for Normal operation procedures.

IFD 5XX and Atlas with TAWS Enabled

When the Terrain Awareness and Warning System (TAWS) option is enabled and the HELO option is not enabled, the IFD provides a TAWS-B function. TAWS-B does not require any external equipment, except for external annunciators when the IFD/Atlas installation location does not meet annunciation field of view requirements, and alert audio must be wired to the appropriate unswitched input to an audio panel.

When enabled, TAWS is always running in the background, and does not have a dedicated display page, although the Synthetic Vision tab will be relabeled “TAWS.”

TAWS Inhibit Control

The FLTA and PDA functions of TAWS can be inhibited by several means including the Setup Page, an external switch, and the TAWS page. Inhibiting these two functions can be useful in some scenarios like VFR flight in an area of significant terrain, VFR low altitude flight, and during operations at airfields that are not in the nav database or to user waypoints that have been designated as an airport.

TAWS Self-Test

TAWS self-test is conducted automatically at power up. While the self-test is running, external TAWS related annunciators are illuminated and the TAWS page will show “TAWS Self-Test In Progress”. Whether the self-test passed or failed will be annunciated using an aural message.

If TAWS had passed self-test and then fails at some point later in the power cycle, a “bing-bong” chime is issued along with a CAS message.

Degraded Or No TAWS Conditions

TAWS is degraded or not available when any of the following conditions exists:

- GPS is unavailable or in Dead Reckoning mode.
- GPS position accuracy is excessively low.
- Terrain database is invalid or not available.
- Obstacle database is invalid or not available.
- Nav database is invalid or not available.
- Aircraft is on the ground.
- The system is configured for an external TAWS system.
- The TAWS option is not enabled.

Section 5 – Performance

No change from basic Handbook.

Section 6 – Weight and Balance

No change from basic Handbook. See AFM/POH for current weight and balance for this aircraft.

Section 7 – Systems Description

See Avidyne IFD4XX and IFD5XX FMS/GPS/Nav/Com Pilot Guides:

- P/N 600-00300-001 for the IFD5XX Series
- P/N 600-00304-000 for the IFD4XX Series
- P/N 600-00300-002 for the Atlas Series
- P/N 890-00039-010 Bendix King AeroNav 900 and 910
- P/N 890-00041-008 Bendix King AeroNav 800

ASPEN AVIONICS

Aspen Avionics, Inc.
5001 Indian School NE
Albuquerque, NM 87110 USA

FAA APPROVED
AIRPLANE FLIGHT MANUAL SUPPLEMENT
or
SUPPLEMENTAL AIRPLANE FLIGHT MANUAL
for the
ASPEN AVIONICS
EFD1000 E5

The information contained in this Supplement must be attached to the FAA Approved Airplane Flight Manual or placed with the Pilot's Operating Handbook or other operating information when the Aspen Avionics EFD1000 E5 is installed in accordance with AML STC SA10822SC. This document must be carried in the aircraft at all times.

The information in this Supplement supplements or supersedes the information in the FAA Approved Airplane Flight Manual or other operating information only as set forth herein.

For limitations, procedures, and performance data not contained in this Supplement, consult the Airplane Flight Manual or other operating information.

Airplane Make:	Diamond
Airplane Model:	DA-20 C1
Airplane Registration Number:	N293DC
Airplane Serial Number:	C0193

FAA APPROVED Charles Wilcox for Monica Merritt,

Manager, Southwest Flight Test Section, AIR 713
Federal Aviation Administration
Fort Worth, TX

Date 11 Jan 2023

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LOG OF REVISIONS

Revision No.	Pages Affected	Description	FAA-Approved	Date	Aspen ECO
C	All	Initial Release	Not released		5523
D	All	Updated Section 3.2.8	Charles Wilcox	10 DEC 2018	5590
E	All	Added information for airplanes limited to VFR	Charles Wilcox	6 JUNE 2019	5720
F	All	Revision F supports upgrade to E5 2.11 Software that changes the NAV display from CDI to HSI format, adds BC function, and an optional GPS annunciations and Data Bar that includes True Airspeed, Wind Direction and Speed, and OAT. Updated Table 1 to specify the software version. Updated Table 5 to add the GPS and back course annunciations. Modified Sections 4.5 and 7.4 to describe back course logic. Added Section 7.9 for Data Bar system description.	Not released		5859
G	All	Added a note to the Attitude Degraded Abnormal Procedure. Updated Acronyms. Clarified Table 1. Added sentence in sections 3.2.2, 3.2.3, 3.3, 7.2.1 and 7.2 and 7.9 linking potential airspeed anomalies to TAS and Winds anomalies. Change marks are shown for Revisions F and G.	Charles Wilcox	18 DEC 2019	5896
H	All	Added the subsequent software version, 2.12	CMW	11 Jan 2023	

Prepared By:	W. Brodegard	*Reviewed By:*	David Bibby	**See ECO Record For Release Authorization**

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1 General

1.1 System Overview

The EFD1000 E5 is a flat-panel LCD that provides display of attitude, airspeed, altitude, vertical speed, turn rate, slip/skid and direction of flight. Depending on the optional navigation equipment connected, the EFD1000 E5 can also provide display of lateral and vertical navigation deviations. The internal battery provides 30 minutes of operation of the EFD1000 E5 in the event of loss of power to the system.

When interfaced with a compatible autopilot, the EFD1000 E5 provides heading and course information to the autopilot, which enables the autopilot to follow the Course and GPSS values set by the pilot on the display. When interfaced with an EA100 A/P AHRS, the EFD1000 E5 is the source for attitude input to the autopilot.

1.2 Installed Equipment List

Table 1 shows the list of Aspen Equipment installed in this aircraft. Use the table to determine the parts of the AFMS that are applicable to this aircraft.
This table is to be completed during installation by the installation facility.

Table 1 - Installed Equipment List

Available Equipment	Installed Equipment ✓	Remarks
EFD1000 E5 PMA with Internal High-Performance 30-minute Battery		
EFD1000 E5 TSO with Internal High Performance 30-minute Battery		
MAP Software Version		The EFD1000 E5 PMA with software version 2.10 features a CDI. The EFD1000 E5 PMA with software version 2.11, and the EFD1000 TSO with software version 2.12 and subsequent features an HSI.
Advanced Unlock.		GPS annunciations and optional Data Bar features enabled
EA100 A/P AHRS Software Version		
VLOC1 integrated with the EFD1000 E5 System		
GPS1 integrated with the EFD1000 E5 System		This must be an authorized GPS integration.

Table 2 is used to identify the backup instruments.
This table is to be completed during installation by the installation facility.

Table 2 - Backup Instruments Configuration for the EFD1000 E5

Standby Equipment	**Installed Equipment** ✓	**Remarks**
Electric Turn and Slip indicator or Turn Coordinator		
Standby Attitude Indicator		
Standby Altimeter	✓	This instrument is always required.
Standby Airspeed Indicator	✓	This instrument is always required.
Magnetic Compass	✓	This instrument is always required.

1.3 List of Acronyms and Abbreviations

A	Auto
A/P	Autopilot
ACU	Analog Converter Unit
ADAHRS	Air Data Attitude Heading Reference System
AHRS	Attitude Heading Reference System
AFM	Airplane Flight Manual
AFMS	Airplane Flight Manual Supplement
APPR	GPS Approach Mode
ALT	Altitude
AML	Approved Model List
ATC	Air Traffic Control
BARO	Barometric Pressure Setting
BAT	Battery
BC1	Back Course
C	Celsius or Centigrade
CDI	Course Deviation Indicator
CM	Configuration Module
Config.	Configuration
CRS	Course
ECO	Engineering Change Order
EFD	Evolution Flight Display
EXT PWR	External Power
FAA	Federal Aviation Administration
GPS	Global Positioning System
GPSS	GPS Steering
GS	Groundspeed
HDG	Heading
Hot Key	Any one of the five diagonal-marked buttons arranged on the right side of the E5
HSI	Horizontal Situation Indicator
IAS	Indicated Airspeed
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
In	Inches
Inc.	Incorporated
INIT	Initialization
INTEG	GPS Integrity Indication
IOP	Input-Output Processor
KIAS	Knots Indicated Airspeed
KOEL	Kinds of Operations Equipment List
KT	Knots
LCD	Liquid Crystal Display
LDI	Lateral Deviation Indicator
LOC	Localizer
MAP	Main Application Processor
MSG	GPS Message
N/A	Not Applicable
NAV	Navigation
NM	New Mexico
OAT	Outside Air Temperature
OPS	Operations
REM	Remaining
REV	Reversion
RSM	Remote Sensor Module
SAFM	Supplemental Airplane Flight Manual
STC	Supplemental Type Certificate
SW	Software
TAS	True Airspeed
UNAV	Unavailable
V	Volts
VDI	Vertical Deviation Indicator
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VOR	VHF Omni-directional Radio Range
VLOC1	VOR / Localizer
WPT	GPS Waypoint

2 Limitations

The following limitations pertain to the installed equipment in the aircraft. See Table 1 and Table 2 for the lists of installed equipment in this aircraft.

2.1 Kinds of Operation for the EFD1000 E5

The Aspen EFD1000 E5 may replace (or supplement, depending on installation) the attitude and heading/navigational instruments. Refer to the basic airplane KOEL for the required equipment for the planned flight operation. If the basic airplane does not have a KOEL, refer to the applicable flight regulations for the appropriate equipment requirements.

Use of the EFD1000 E5 display as required equipment is predicated on having all the operational equipment in column 1 or 2 of Table 3 for IFR flight, if the airplane is approved for IFR Flight. See the placard in the cockpit to determine if this airplane is approved for IFR flight.

Table 3 - Minimum Operational Equipment Required for IFR Flight

Equipment	Column 1 IFR* Minimum Equipment		Column 2 IFR* Minimum Equipment
EFD1000 E5 with Internal Battery	✓	Or	✓
Magnetic Compass	✓		✓
Electric Turn and Slip indicator or Turn Coordinator			✓
Standby Attitude Indicator	✓		
Standby Airspeed Indicator	✓		✓
Standby Altimeter	✓		✓
GPS1 integrated with the EFD1000 E5 System	✓		✓

For VFR, the minimum operational equipment for flight (in addition to the basic required equipment) is shown in column 1 of Table 4.

Table 4- Minimum Operational Equipment Required for VFR Flight

Equipment	Column 1 VFR* Minimum Equipment
EFD1000 E5 with Internal Battery	Optional
Magnetic Compass	✓
Electric Turn and Slip indicator or Turn Coordinator	
Standby Attitude Indicator	
Standby Airspeed Indicator	✓
Standby Altimeter	✓
GPS1 integrated with the EFD1000 E5 System	

* See the cockpit placard to determine if this aircraft is approved for IFR flight or is restricted to VFR.

2.2 EFD1000 E5 System Limitations

1. Use of the EFD1000 E5 for IFR flight in the region within 750 nautical miles of the magnetic North or South Pole, based solely upon the attitude and heading data provided by the EFD1000 E5, is NOT AUTHORIZED.

2. For seaplane operation, if the ADAHRS is unable to align due to wave action, departure under IMC or IFR is PROHIBITED.

3. Takeoff for IFR flight with aircraft voltage (as indicated on the EFD1000 E5) below 12.3V (14V electrical system) or 24.6V (28V electrical system) is NOT AUTHORIZED.

4. When the battery charge status on the EFD1000 E5 is less than 80% or has failed, takeoff for IFR flight is NOT AUTHORIZED.
5. When the cabin temperature is below -20C, takeoff for IFR flight is NOT AUTHORIZED.
6. When the "ON BAT" annunciation is shown on the EFD1000 E5 takeoff for IFR flight is NOT AUTHORIZED.
7. IFR flight is not authorized if the GPS that is integrated with the EFD1000 E5 is invalid as shown by an amber GPS1 indication and/or no groundspeed indication on the EFD1000 E5.
8. When IFR, do not power-cycle the EFD1000 E5 in flight.
9. For **ATTITUDE DEGRADED** mode operations in IMC, do not exceed a half standard rate turn or pitch more than $\pm 5^\circ$ relative to level flight.
10. For airplanes limited to VFR without GPS Integration: If airspeed fails to zero in flight the attitude and heading indications are unreliable.

2.3 Placard

1. The following placard is installed when IFR operation is authorized:

ON BAT Dispatch Limit is 80% See EFD1000 E5 AFMS

2. The following placard is installed if this airplane is limited to VFR:

Operation of This Aircraft is Limited to VFR Only

3 Emergency/Abnormal Procedures

3.1 Emergency Procedures: Electrical Fire or Smoke in the Cockpit

3.1.1 The EFD1000 E5 ***IS*** the Source of Electrical Fire or Smoke in the Cockpit (i.e. the EFD1000 is not operating)

1. EFD1000 E5 on/off Switch.........OFF

3.1.2 The EFD1000 E5 ***IS NOT*** the Source of Electrical Fire or Smoke in the Cockpit (i.e. the EFD1000 is operating)

1. Aircraft Electrical Power........Follow the AFM or Standard Operating Procedures.
2. The EFD1000.......................Automatically presents the "ON BAT" annunciation when the Master switch is turned off. See paragraph 3.2.5 below.

3.2 Abnormal Procedures

3.2.1 EFD1000 E5 Failure, IFR operation in IMC

1. ATTITUDE ....Fly by reference to turn and slip, altimeter and airspeed (partial panel techniques) or backup attitude indicator (if available).
2. GPS and Compass ....Refer to the GPS for positional awareness and the compass for navigation heading information.

3. AUTOPILOT.................. If the airplane is equipped with the EA100 A/P AHRS (see Table 1) the autopilot will automatically disconnect. If not equipped with an EA100, verify proper autopilot operation and cross-check against available attitude and navigation information.

4. Exit IMC

3.2.2 ATTITUDE DEGRADED Mode - Pitot Tube Blockage resulting in Erroneous Airspeed Indication (GPS Operational)

1. PITOT HEAT ....ON, in the event that the cause is Pitot Icing.
2. AUTOPILOT ....If the airplane is equipped with the EA100 A/P AHRS (see Table 1) the autopilot will automatically disconnect. If not equipped with an EA100, verify proper autopilot operation and cross-check against available attitude and navigation information.
3. ATTITUDE..................EFD1000 E5 attitude is presented. Follow the limitations for ATTITUDE DEGRADED mode operations. See Section 2.2 item 9.
4. Exit IMC unless the condition is corrected.

NOTE: When flying an instrument approach in Degraded Mode it is recommended to advise ATC that you are operating with limited bank and pitch capabilities. ATC coordination along with planning and anticipation can lessen rates of turn and intercept angles to comply with operational limitations. See Section 2.2 item 9.

CAUTION: If airspeed is in error due to, for example, a pitot or static system anomaly, then TAS and Wind data are unreliable and should not be used.

3.2.3 Pitot Tube Blockage resulting in Erroneous Airspeed Indication (Integrated GPS not Operational)

1. PITOT HEAT ....ON, in the event that the cause is Pitot Icing.
2. AUTOPILOT ....If the airplane is equipped with the EA100 A/P AHRS (see Table 1) the autopilot will automatically disconnect. If not equipped with an EA100, verify proper autopilot operation and cross-check against available attitude and navigation information.
3. ATTITUDE..................EFD1000 E5 presents a Red X. Fly by reference to turn and slip, altimeter and airspeed (partial panel techniques) or backup attitude indicator if available.
4. Exit IMC.

Operation under IFR without an operational GPS is not authorized. See Section 2.1. When the airspeed function is restored, the EFD1000 E5 will return to normal operation, but without the ATTITUDE DEGRADED Mode availability.

CAUTION: If airspeed is in error due to, for example, a pitot or static system anomaly, then TAS and Wind data are unreliable and should not be used.

3.2.4 Invalid GPS as shown by an amber “GPS1” indication and/or no groundspeed indication on the EFD1000 E5

1. Exit IMC.

Operation under IFR with an invalid GPS is not authorized. See Section 2.1.

3.2.5 Airplane Electrical Failure: "ON BAT" Annunciation

The "ON BAT annunciation is an indication that the airplane alternator or generator has failed and the E5 is operating on internal battery power.

1. Aircraft Electrical Power .... Follow AFM Procedures to restore power. If unable to restore power, proceed as follows:
2. EFD1000 E5 on/off Switch .... Turn Off to isolate the EFD1000 E5 from the rest of the electrical system.
3. MENU .... Press, then press and turn the left knob to manually reduce the Display brightness to 40 or less.
4. Exit IMC.

The EFD1000 E5 is designed to remain operational for at least 30 minutes when the battery level shows 80% remaining. If the battery level shows less than 80% then the remaining operational time may be less. Change the flight plan accordingly.

The Battery level indication decreases in increments of 5%.

3.2.6 Attitude and Heading Reference System (AHRS) Reset

1. AUTOPILOT .... MANUALLY DISCONNECT
2. MENU .... Select the first page, titled "GENERAL SETTINGS"
3. "AHRS: RESET?" LINE SELECT KEY .... Press
4. "AHRS: RESET?" LINE SELECT KEY .... Press again to confirm reset
5. MENU .... Press to return to normal operation

3.2.7 Turn Off the EFD1000 E5 in Flight

1. EFD1000 E5 on/off Switch .... OFF
2. REV Button .... Push and hold until the display turns off

3.2.8 Turn On the EFD1000 E5 in Flight (only permitted if airspeed and/or the integrated GPS is operational)

1. Verify that airspeed and/or the GPS that is integrated with the EFD1000 E5 is operational (See Table 1).
2. EFD1000 E5 on/off Switch .... ON

6. REV Button .... Push and hold for several seconds until the Aspen Avionics logo display appears, then release the button.

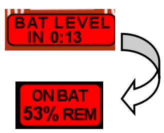
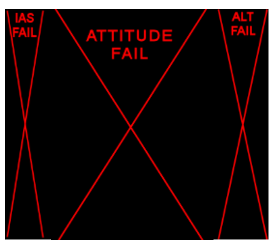
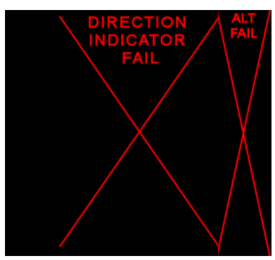
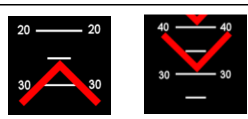
Turning on the EFD1000 E5 in flight with both a Pitot blockage and an invalid integrated GPS system will result in unannunciated erroneous attitude information.

3.3 Warnings, Cautions and Advisories

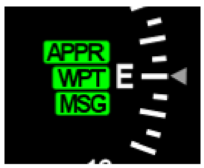
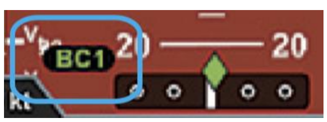
The following table shows the Warning, Caution and Advisory indications on the EFD1000 E5 and identifies the appropriate pilot action. Several Warning, Caution and Advisory messages are dependent on the options and equipment installed in the airplane. Refer to Table 1 to determine the options and equipment installed in this airplane.

Table 5 - Warning, Caution and Advisory Annunciations

Warning	W	Caution	C	Advisory	A

	Annunciation	Description	Pilot Action
W		Presented when the EFD1000 E5 is operating on the internal battery. The countdown timer appears first and is then replaced by the ON BAT and % charge remaining annunciation.	Reduce the screen brightness to maximize battery duration. See Section 3.2.5 Airplane Electrical Failure: "ON BAT" Annunciation.
W	 	The EFD1000 E5 is inoperative.	Use the standby instruments. Perform an AHRS Reset if practical.
W		Red chevrons displayed on the Attitude Indicator's pitch scale to indicate extreme pitch up and down attitudes.	Pitch the aircraft in the direction of the chevrons to restore level flight.
W		A red slash through any navigation source means the source is not available.	Activate a flight plan or tune an appropriate VOR.

	Annunciation	Description	Pilot Action
C	**Panel Mounted Indicator Lamp** **A/P AHRS Fail** or **A/P AHRS FAIL**	The attitude input provided to the autopilot is inoperative. This is a function of the EA100. See Table 1 to determine if this airplane has an EA100.	Fly manually. The autopilot will disconnect and cannot be re-engaged until the fault is cleared.
C	ATTITUDE DEGRADED	ATTITUDE DEGRADED mode. The Pitot input has failed (perhaps due to icing), and GPS aiding is used for the attitude indication. The attitude indication can be in error and maneuvering limitations are to be followed. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.	The autopilot will automatically disconnect. If IMC, fly within the limitations in Section 0 item 5. Turn on the Pitot Heat to clear the condition if icing is the cause.
C	CROSS CHECK ATTITUDE	The attitude indication could be in error. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.	Cross check attitude and heading indications against alternate sources.
C	CHECK PITOT HEAT	Possible Pitot Obstruction. The annunciation appears when the integrated GPS is invalid and the Pitot input has failed. Accompanied by Red X attitude and heading. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.	Use an alternate attitude and heading source. Turn on Pitot Heat to clear the condition if icing is the cause. If airspeed is in error due to, for example, a pitot or static system anomaly, then TAS and Wind data are unreliable and should not be used.
C	GPS1	GPS Invalid indications. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.	Select alternate navigation. Operation is not authorized with an invalid integrated GPS.
C	GPSS	Indicates the GPSS source is invalid (e.g. the flight plan was deleted). The autopilot will fly wings-level until valid GPSS signal is available and GPSS is re-engaged. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.	No immediate action. Activate a new flight plan to permit GPSS re-engagement. After activating a new flight plan, press the hotkey labeled GPSS to re-engage GPSS.
C	FREE GYRO MODE	Annunciation presented on the HSI when the magnetic heading cannot be resolved. After 4 minutes of free gyro operation the attitude and heading indications will be removed.	Cross check attitude and heading indications against alternate sources. Expect attitude and heading loss after six minutes.
C	BAT: FAILED	Annunciation presented in the menus when the EFD1000 E5 internal battery is inoperative.	Takeoff is not authorized when the EFD1000 E5 is required. See Section 2.2.

	Annunciation	Description	Pilot Action
C	MAP Software 2.11 or subsequent: INTEG	GPS Integrity indication. This indication is only available if an authorized GPS is integrated with the EFD1000 E5, the MAP software version is 2.11 or subsequent and the feature is enabled. See Table 1.	The GPS in use is degraded. See the applicable GPS AFMS for more information.
A		GPSS is operational. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.	No action. GPSS can be used if desired.
A	MAP Software E5 2.11 and subsequent: 	GPS annunciations that are provided by the GPS source. TERM can also be displayed in the same location as APPR. This indication is only available if an authorized GPS is integrated with the EFD1000 E5, the MAP software version is 2.11 or subsequent and the feature is enabled. See Table 1.	No action. See the GPS AFMS for additional information on the meaning of these annunciations.
A	MAP Software E5 2.11 and subsequent: 	“BC1” is presented as the nav annunciation when the airplane is established on the localizer back course and the HSI course needle is properly set to the front course. This indication is only available if the MAP software version is 2.11 or subsequent. See Table 1.	The LDI indications are normal and match the HSI left/right deviations. Fly the approach.

4 Normal Procedures

4.1 Exterior Inspection

1. RSM (when mounted externally) Check for condition and security, and the Vent Hole is clear of obstructions.
2. RSM Lightning Tape on the front of the RSM (when mounted on top of the airplane) .. Check for condition and security.

4.2 Taxi Checks Before IFR Departure

1. Electric Turn and Slip indicator or Turn Coordinator
   a. During taxi turns .... The slip ball must move freely to the outside of the turn and the turn indicator must show a smooth turn in the proper direction.
2. GPS1 Annunciation.................... Verify that groundspeed is displayed on the EFD1000 E5 when taxiing, and there is no Amber GPS1 Invalid indication.

4.3 Before Take-Off Checks Before IFR Departure

4.3.1 Check the Internal Battery Level Before Departure

1. MENU...Turn the right knob to select the POWER SETTINGS page.
2. Observe the “EXT PWR” line item ....Check that the input voltage is greater than 13 Volts and less than 14.6 volts for 14-volt airplane electrical systems, or greater than 26 Volts and less than 30 volts for 28-volt airplane electrical systems.
3. Observe the BAT line item ....Verify battery status is “CHARGING” or “READY”
4. Select “Battery” ....After a few seconds, verify the red “ON BAT indication is more than 80% REM.

   If the EFD1000 E5 internal temperature is low, the battery percentage may initially go below 80% and then increase and stabilize within approximately five minutes.
5. Select EXT PWR.................................To return the system to normal power.
6. MENU..Press to return to normal operation.
7. Verify ....The red “ON BAT” indication is not displayed.

Any condition other than that described above indicates an internal battery failure and dispatch is not authorized.

8. Heading...Compare against a known heading (runway heading).

4.4 Adjusting Screen Brightness

1. Press MENU .... To enable the left knob to control the display brightness
2. Push then twist the left knob.............. To brighten or darken the display.
3. MENU... Press to return to normal operation

4.5 Localizer Back Course Operation

For MAP software 2.10:
When operating on a Localizer Back Course approach, the Lateral Deviation Indicator (LDI) presents Back Course deviations (reverse sensing).

For MAP software 2.11 and subsequent:
When operating on a Localizer Back Course approach, the HSI course needle arrow must be set to the inbound localizer course (opposite the back course). "BC1" is presented adjacent to the LDI. When "BC1" is shown, the LDI presents deviations that are corrected for reverse sensing and match the left/right deviations on the HSI.

See Table 1 to determine the MAP software version in this airplane.

The LDI is the left/right deviation indicator that is presented on the PFD when inbound on most approaches. It is located below the attitude indicator and above the Data Bar.

4.6 Shutdown Checks

After conducting normal Shutdown checklist items, ensure the following:

1. EFD1000 E5 Switch................................OFF

5 Performance

NO CHANGE

6 Loading Information

NO CHANGE

7 Systems Description

The following paragraphs describe the EFD1000 E5 System.

7.1 EFD1000 E5 Supporting Documentation

The EFD1000 E5 Pilot's Guide, Aspen document 091-00086-001 Revision ( ) or subsequent revision, contains detailed information on the operation of the EFD1000 E5. The EFD1000 E5 Pilot's Guide should be carried in the aircraft and available to the pilot.

Go to aspenavionics.com/support for current Pilot Guides and Pilot Guides Errata and Addenda.

7.2 EFD1000 E5

7.2.1 ATTITUDE DEGRADED Mode

The attitude system in the EFD1000 E5 uses MEMS gyro technology. Airspeed aiding is used to support the attitude solution. If the airspeed fails from a blocked pitot tube (from icing, for example), the EFD1000 E5 will detect the condition by comparing the airspeed to the GPS groundspeed. In this condition, the EFD1000 E5 will automatically substitute GPS groundspeed aiding for the attitude solution, and the attitude indicator will be presented and can be used. The message, "ATTITUDE DEGRADED mode" will be displayed (see Section 3.3). Groundspeed is presented from the GPS.

CAUTION: If airspeed is in error due to, for example, a pitot or static system anomaly, then TAS and Wind data are unreliable and should not be used.

Errors in pitch and roll on the attitude indicator can be expected. Keeping the pitch and roll excursions from level flight to a minimum will keep the pitch and roll errors to a minimum. There are limits to the angle of pitch and bank that are permitted during the ATTITUDE DEGRADED Mode. See Section 2.2 item 9.

Limiting bank angle may reduce the aircraft's ability to maintain its desired track and could affect the ability to satisfy ATC path expectations, especially when executing large angle turns. If operating in degraded mode, advising ATC of the reduced turn capability is recommended.

This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.

7.2.2 Internal Battery

The EFD1000 E5 contains an internal battery which can provide continued operation of the EFD1000 E5 for 30 minutes. The red "ON BAT" indication (XX% REM) presents an estimate of the amount of battery charge remaining. As the battery depletes, this percentage will decrease.

Minimizing the brightness of the display will extend the time available on battery.

At a charge of 80% or more, the battery is designed to provide sufficient power for operation of the EFD1000 E5 for 30 minutes in the event of a complete loss of electrical power to the system.

In the event of loss of power generation or an overvoltage condition on the airplane, the EFD1000 E5 will revert to internal battery power. This will be indicated by a red "BAT LEVEL" indication followed by a % REM, or % remaining. To complete the isolation of the EFD1000 E5, it is necessary to use the EFD1000 E5 power switch as indicated in the "Abnormal Procedures" Section.

It is important to assure that the battery is operating, charging, and is at sufficient charge level before IFR flight. The Normal Procedures" section describes the appropriate procedure.

7.2.3 Remote Sensor Module (RSM)

The RSM provides magnetic heading information to the EFD1000 E5 and is powered by the EFD1000 E5.

7.2.4 Airplanes Limited to VFR without GPS Integration

An airplane limited to VFR without GPS integration is dependent on airspeed aiding for proper attitude performance. If the airspeed indication fails to zero in flight (such as due to a pitot tube blockage) the attitude and heading indications are unreliable. A “Crosscheck Attitude” indication may be presented momentarily.

7.3 EA100 A/P AHRS

The EA100 accepts input from the EFD1000 E5 and outputs pitch and roll signals to the autopilot.

7.4 VHF Interface

When installed and configured, VLOC 1 can be selected by pressing the lower center button on the EFD1000 E5. With MAP software E5 2.10, the EFD1000 E5 heading indicator is presented with a CDI. With MAP software 2.11 and subsequent, an HSI is presented. See Table 1 to determine the MAP software version in this airplane.

7.4.1 Localizer Back Course

For MAP software 2.10:
When operating on a Localizer Back Course approach, the LDI presents Back Course deviations (reverse sensing).

For MAP software 2.11 and subsequent:
When flying the final approach course of a Localizer Back Course approach, use the normal HSI back course procedure by setting the HSI course needle to the front (inbound localizer) course (opposite the back course). When on the back course, the airplane heading is opposite the front course, and “BC1” is presented adjacent to the Lateral Deviation Indicator. When “BC1” is shown, the LDI presents deviations that are corrected for reverse sensing and match the HSI left/right deviations.

See Table 1 to determine the MAP software version in this airplane.

The LDI is the left/right deviation indicator that is presented when inbound on most approaches. It is located below the attitude indicator and above the Data Bar.

7.5 GPS Interface

GPS1 can be selected using the lower center button on the EFD1000 E5. The GPS interface supports the Attitude Degraded Mode. This function is only available if an authorized GPS is integrated with the EFD1000 E5. See Table 1.

7.6 Altitude Bug

The altitude bug can be used as an altitude reminder. The control is accessed by pressing the right knob twice. No visual or aural alerting function is provided.

7.7 Magnetometer

Very strong magnetic disturbances can affect the Magnetometer and thus the heading and attitude of the EFD1000 E5. The EFD1000 E5 is designed to provide a Cross Check Attitude annunciation when a condition like this occurs. See Table 5 - Warning, Caution and Advisory Annunciations.

7.8 Heading, Course and Barometric Pressure Adjustment

When Heading, Course or Barometric Pressure is adjusted, the adjustment value is enlarged for quick view and will return to the normal size after ten seconds. Pressing the adjustment knob will immediately return the adjustment value to the original size.

7.9 Data Bar

The Data Bar presents True Airspeed (TAS), GPS Ground Speed (GS), Outside Air Temperature (OAT), Wind Direction and Speed, and Barometric Pressure Setting. OAT is obtained from the temperature sensor located in the RSM. The optional Data Bar features are only available when enabled during installation.

CAUTION: If airspeed is in error due to, for example, a pitot or static system anomaly, then TAS and Wind data are unreliable and should not be used.

See Table 1 to determine if the Data Bar is enabled on this airplane.

7.10 Hotkeys and Buttons

Hotkeys with no label are non-functional.

ADS-B Technologies, LLC
900 Merrill Field Drive
Anchorage, Alaska 99501, U.S.A

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

or

SUPPLEMENTAL FLIGHT MANUAL

For The

L3 Aviation Products
Lynx Multilink Surveillance System
Model NGT-9000
L3 Part Number 9029000-20000

This Airplane Flight Manual Supplement or Supplemental Flight Manual must be carried on board the aircraft when the NGT-9000 Multilink Surveillance System is installed in accordance with the AML Supplemental Type Certificate SA02444AK.

The information contained herein supplements the FAA approved Airplane Flight Manual or the type design data only in those areas listed herein. For limitations, procedures and performance information not contained in this document, refer to the FAA approved Airplane Flight Manual, manual material, markings, placards, or other information that was required by the applicable regulations under which the aircraft was type certificated.

Make and Model Airplane: Diamond DA-20 C1

Airplane Serial Number: C 0193

Airplane Registration Number: N293DC

FAA Approved:

For: Manager, Northwest Flight Test Section, AIR-715
Federal Aviation Administration
Seattle, WA

Date: 19 September, 2017

FAA APPROVED
AIRPLANE FLIGHT MANUAL SUPPLEMENT
or
SUPPLEMENTAL FLIGHT MANUAL
For The

L3 Aviation Products
Lynx Multilink Surveillance System
Models NGT-9000
L3 Part Number 9029000-20000

RECORD OF REVISIONS

Revision	Date of Revision	Description
Original	3/31/2015	Original Issue
1	6/19/2015	Typographical error corrections Corrections to Table 3-1 in section 3.2.1
2	3/27/2016	Incorporation of s/w Revision 2.0: ATAS and TAWS
3	2/24/2017	Updated for s/w Version 2.1
4	9/19/2017	Updated for s/w Version 3.x

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SECTION 1. GENERAL

1.1 Functional Description

The Lynx MultiLink Surveillance System (also referred to in this manual as the Lynx NGT-9000) is a Mode S Level 2 dens Class 1 Transponder with an integrated GPS receiver providing Automatic Dependent Surveillance-Broadcast (ADS-B) output using a 1090ES (Extended Squitter). The unit also receives ADS-B data via 1090ES and UAT (978 MHz Universal Access Transceiver). Figure 1-1 is a depiction of the NGT-9000.

The unit replies to Mode A, Mode C and Mode S interrogations receiving interrogations at 1030 MHz and transmitting responses at 1090 MHz. The unit is equipped with IDENT capability that activates the Special Identification (SPI) pulse for 18 seconds.

Ground stations can interrogate Mode S Transponders individually using a 24-bit ICAO Mode S address, which is unique to the particular aircraft. In addition, ground stations may interrogate the unit for its transponder data capability and the aircraft's Flight ID.

The ADS-B provides own aircraft data with Enhanced Visual Acquisition (EVAcq) traffic information that improves situational awareness and flight safety by providing aircraft position, velocity, and heading information that is automatically transmitted from other aircraft and ground stations providing immediate surveillance of air-to-air traffic.

In addition to ADS-B surveillance, the installed NGT-9000 includes an Active Traffic Awareness System (TAS/TCAS), ADS-B Traffic Advisory System (ATAS) and Terrain Awareness and Warning System (TAWS), as well as support for both top and bottom antenna diversity.

The 1090ES and UAT ADS-B data link have the following capabilities:

- 1030MHz/1090 MHz In – Receive ADS-R and TIS-B
- 1090ES OUT – Transmits 1090 MHz Extended Squitter ADS-B
- UAT IN – Receives 978 MHz ADS-B, ADS-R and TIS-B, FIS-B, NOTAMS, and TFR’s

Figure 1-1: Lynx NGT-9000

1.2 NGT-9000 ADS-B Traffic Advisory System (ATAS) [Optional]

The ADS-B Traffic Advisory System (ATAS) is a passive system that monitors ADS-B, ADS-R and TIS-B ADS-B IN data and alerts the flight crew via on-screen alerts aural traffic calls and an optional Traffic Alert lamp to nearby aircraft and assists the pilot in the visual acquisition of aircraft that may represent a danger. Refer to the Pilot's Guide, L3 p/n 0040-17000-01 Revision H or later, for examples of on-screen symbology and aural alerts.

- The tracking of other aircraft is in a cylindrical volume centered on own aircraft with a maximum radius of 20 nmi and extending 10,000 ft above and 10,000 ft below ownship.
- ATAS will track up to 60 intruders simultaneously.
- A Traffic Advisory (TA) is displayed when other aircraft are a potential threat.
- When ownship is in the airport environment, a Traffic Advisory (TA) is displayed 12.5 to 35 seconds prior to the CPA with another aircraft when the CPA is within 750 ft horizontally and 300 ft vertically.
- A TA symbol remains on the screen for at least 8 seconds unless the respective track is terminated.
- When the aircraft is outside the airport environment, aircraft that are within a range of 6 nmi of ownship with a vertical distance of +/- 1200 ft (if altitude is reporting) are classified as a Proximate Advisory (PA). A PA is displayed only for aircraft that are in air.
- ATAS and TAS/TCAS may operate at the same time with traffic information being correlated by the unit

When ATAS is installed, an Audio Acknowledge button will cancel the current aural announcement.

1.3 NGT-9000 Terrain Awareness and Warning System (TAWS) [Optional]

The Terrain Awareness and Warning System (TAWS) is an optional function that is set up during installation. The TAWS function continuously monitors the aircraft’s position, altitude, speed, track, and phase of flight and compares the information to the terrain database loaded during installation. Terrain and obstacle hazards are indicated by cautions and warnings using screen annunciators, aural terrain alerts, and Terrain Caution and Warning alert lamps. Refer to the Pilot's Guide, L3 p/n 0040-17000-01 Revision H, or later, for examples of on-screen symbology and aural alerts.

The TAWS function uses Forward Looking Terrain Avoidance (FLTA) and Ground Proximity Warning System (GPWS) functionality to determine when a terrain alert or altitude callout is triggered due based on the following conditions:

- Reduced required terrain or obstacle clearance (FLTA)
- Imminent terrain impact (FLTA)
- Premature descent
- Excessive descent rate (GPWS)
- Negative climb rate or altitude loss after takeoff (GPWS)
- Passing an altitude of 500 ft (GPWS)

There are four TAWS configurations available with the NGT-9000:

- Disabled
- TAWS B – Default Aural Phrases
- TAWS B – Alternate Aural Phrases
- Display Only – No Alerts

When a TAWS configuration is enabled with audio, an Audio Acknowledge button will cancel the current aural announcement.

1.4 NGT-9000+ Traffic Awareness Overview [Optional]

The NGT-9000+ (“9000 Plus”) supports optional active Traffic Awareness System (TAS) and Traffic Conflict Avoidance System (TCAS).
The TAS/TCAS options are active systems that operate as aircraft-to-aircraft interrogation devices. The unit interrogates transponders in the surrounding airspace similar to ground based radar. When replies to these active interrogations are received, the responding aircraft’s range, altitude, and closure rates are computed to plot traffic location and predict collision threats. The unit alerts the flight crew to nearby transponder equipped aircraft and assists the pilot in the visual acquisition of aircraft that may represent a danger. Traffic information, out to a selected range, is graphically displayed on the unit or alternate display. Refer to the Pilot's Guide, L3 p/n 0040-17000-01 Revision K or later, for examples of on-screen symbology and aural alerts for each system.

- The system display shows the relative position of traffic using text, shapes (i.e., Traffic Advisory = solid circle; Other Traffic = open diamond) and colors.
- The effective active-mode surveillance range is 35 nm and the system is capable of tracking 35 Intruders simultaneously with the target bearing relative to the nose of own aircraft.
- The tracking of targets is in a cylindrical volume centered on own aircraft that has, at a minimum, a radius of 35 nm and extends 10,000 ft above and 10,000 ft below own aircraft.
- The system uses a voice audio output that announces Traffic Advisory and relative altitude (with optional Extended Call-outs enabled).
- The TCAS option qualifies as a TCAS I system and as such, offers only Traffic Advisories (TA) (*“Traffic, traffic. 12-O’clock, one mile”*) but not Resolution Advisories (RA) such as *“Climb, climb”*.

1.5 NGT-9000D Antenna Diversity Overview [Optional]

The NGT-9000D has the same hardware and firmware/software as the basic NGT-9000, but is capable of supporting dual L-band antennas (one bottom and one top) to enhance system performance and prevent fuselage blanking of a single bottom antenna in tight turns into a ground station or UAT target. The upper L-band antenna may be a single blade antenna or the optional Directional Antenna.

1.6 Capabilities

The NGT-9000 transceiver can be software configured as either an NGT-9000, 9000+, or 9000D. It can also be installed with, or without TAWS and peripheral ARINC-429 or RS-422 panel mounted traffic and weather displays.

1.7 L-Band UAT Antenna

The L-Band antenna is used by the Lynx NGT-9000 to transmit and receive 1090 MHz ADS-B and receive 978MHz ADS-B (UAT). At least one L-band antenna must be located on the bottom of the aircraft.

1.8 GPS Antenna and the MSS Internal GPS Receiver

The GPS utilizes signals from Global Positioning System (GPS) satellite constellation and Satellite-Based Augmentation Systems (SBAS). The MSS has an internal GPS function that provides position, velocity, time and integrity (NIC, NAC, etc.) information to the ADS-B functions. It is located on the top of the aircraft.

> **NOTE**
>
> The NGT-9000's built-in GPS does not provide Ownship position for external moving map displays

1.9 Configuring the NGT-9000

The unit's configuration is preserved within the Data Configuration Module (DCM), which is permanently attached to the aircraft and communicates with the NGT-9000 via a serial connection. The configuration options are set up during installation and cannot be changed except by a licensed installer.

> **NOTE**
>
> The NGT-9000's configuration parameters can only be changed by a licensed installer

1.10 Personal Electronic Devices

The Lynx NGT-9000 supports the use of personal electronic devices (e.g., iPad) via a Wi-Fi connection. The PED must use approved applications that support the ADS-B broadcast services (i.e., ADS-B In, TIS-B, ADS-R, and FIS-B). Check with an L3 approved avionics dealer or contact L3 Aviation Products for a current list of approved applications.

1.11 Weather Displays

NEXRAD, METARS, TAFS, PIREPS, NOTAMS and temperatures and winds aloft are displayed on the NGT-9000 provided that the aircraft is within the service volume of a ground station. Additionally, the same information can be displayed on approved weather displays can interface with the NGT-9000 to provide FIS-B weather information using the ADS-B IN link. Screen information and controls may be different for each of the approved displays.

1.12 Lightning Detection (Optional)

The WX-500 Stormscope is a Weather Mapping System that provides lightning discharge information. This information is shown on the right application screen of the NGT-9000 Panel Mount unit. This function is available beginning with Software 2.1.

1.13 Traffic Displays

The NGT-9000 will provide, at a minimum, UAT, TIS-B and ADS-R traffic on the unit's built-in display and can repeat this traffic information on any approved ARINC-429 or RS-422 display. The NGT-9000+ can also display active Traffic Awareness System (TAS/TCAS) targets on the unit's built-in display and can repeat this traffic information on any approved ARINC-429 or RS-422 display. Figure 1-2 Illustrates a typical traffic display on the NGT-9000 screen. Table 1-1 illustrates typical target symbology.

Refer to the Pilot's Guide, L3 p/n 0040-17000-01 Revision K, or later, for details on operation and a description of how the information is depicted. Check with an L3 approved avionics dealer or contact L3 Aviation Products for a current list of approved traffic displays.

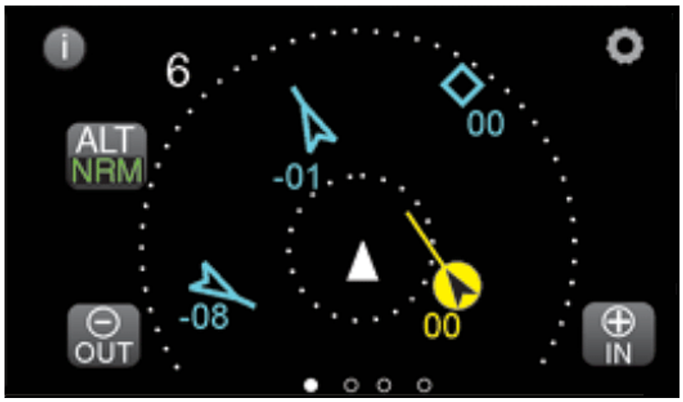

Figure 1-2: Typical NGT-9000 Traffic Screen

1.13.1 Traffic Priority

Traffic is displayed on the screen using the following priority scheme:

1. TAS/TCAS Traffic Advisories (TA's)
2. ATAS (ADS-B) Traffic Alerts
3. Selected Traffic
4. Proximate Advisories
5. Other Traffic

Traffic may also be prioritized according to phase of flight by using the ALT Mode toggle on the left of the screen with:

- Normal (NRM) displaying traffic ± 2,700 ft relative to Ownship
- Above (ABV), or Takeoff Mode, displaying traffic +9,000 and -2,700 ft relative to Ownship
- Below (BLW), or Landing Mode, displaying traffic +2,700 and -9,000 ft relative to Ownship
- Unrestricted (UNR) or Enroute Mode, displaying traffic +9,900 and -9,900 ft relative to Ownship

Table 1-1: Typical Target Symbology

SYMBOL	DESCRIPTION - EXAMPLE
	Airborne Directional Traffic Advisory (TA) (TAS or ATAS option only)
	Airborne Directional Proximity Advisory (PA) *
	Airborne Directional Other Traffic (OT) * (Panel mount only)
	Airborne Non-directional (TA) (TAS or ATAS option only)
	Airborne Non-directional (PA) *
	Airborne Non-directional (OT) *
	On Ground Directional (OT)
	Ground Vehicle Directional
	On Ground Non-directional (OT)
	Ground Vehicle Non-directional
	Airborne Directional TA Traffic symbol with a data tag indicating a relative altitude of 100ft below with a horizontal velocity vector. (Panel mount only)
	Airborne Directional Other Traffic symbol with a data tag indicating a relative altitude of 800ft below own aircraft descending with a horizontal velocity vector. (Panel mount only)

* To promote cockpit commonality, installation configuration options are available to set the airborne PA & OT traffic color to either cyan or white.

1.14 Interaction of Major Components

Figure 1-3 shows how the major components of the NGT-9000 connect to other aircraft systems.

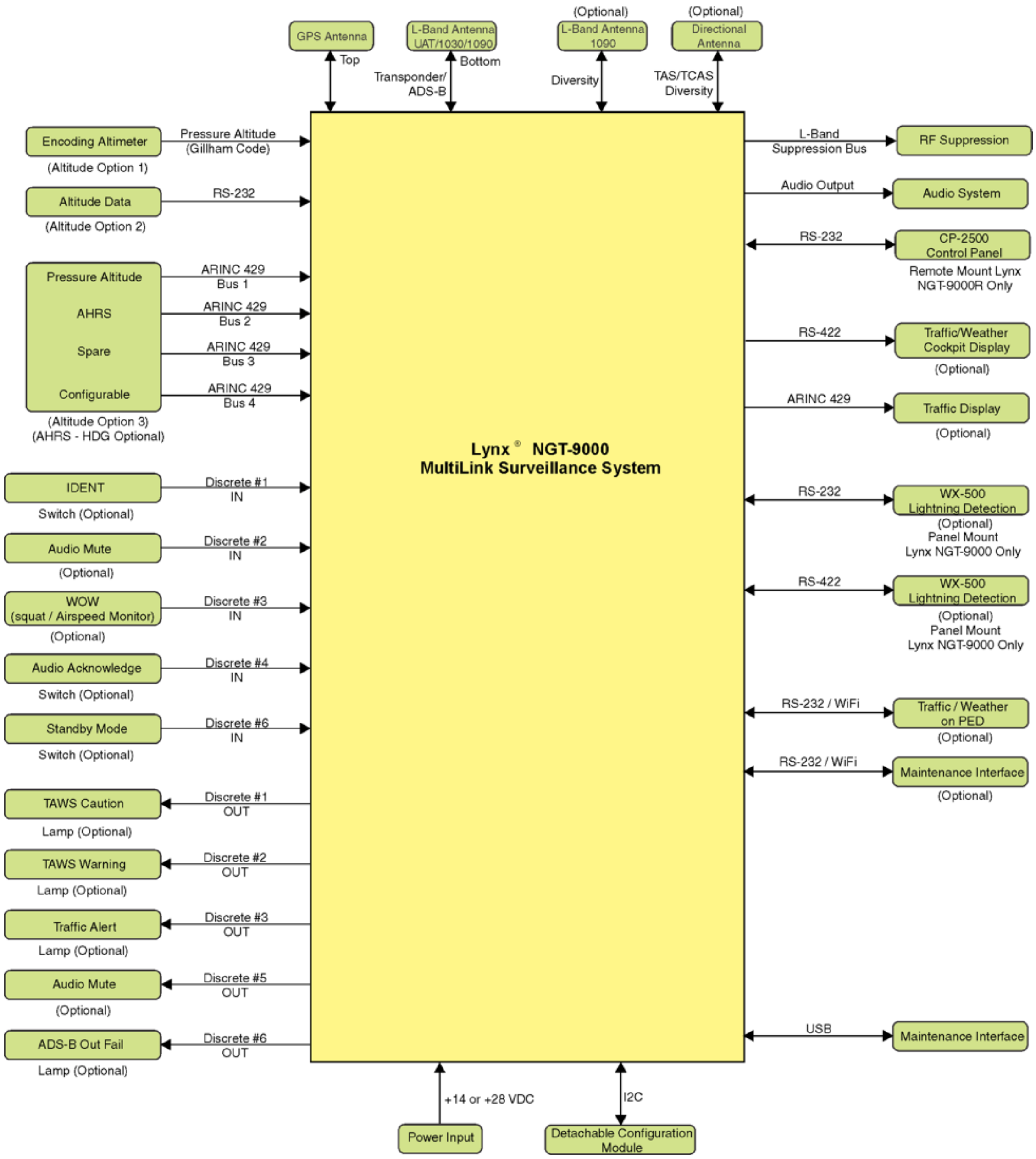

Figure 1-3: NGT-9000 Connections and Functions

1.15 Installation Configuration for This Aircraft

Figure 1-4 should be completed by a licensed installer.

☐ Model NGT-9000: P/N 9029000-20000
☐ Model NGT-9000+: P/N 9029000-20000
☐ Model NGT-9000D: P/N 9029000-20000
☐ Model NGT-9000D+: P/N 9029000-20000

Aircraft Specific

Tail Number: ______________________________

Mode S Identifier (Octal): ______________________________

Transponder Diversity: ☐ Disabled ☐ Enabled

TAS Enable: ☐ Disabled ☐ Enabled TCAS Enable: ☐ Disabled ☐ Enabled

TAS/TCAS Ground Filtering Altitude: ☐ Disabled ☐ Enabled

TAS/TCAS or ATAS Extended Callout Enable: ☐ Disabled ☐ Enabled

FIS-B Enable: ☐ Disabled ☐ Enabled ☐ Auto

TIS-B/ADS-R Service Status Indication Enable: ☐ Disabled ☐ Enabled

Normal (Prox/Other) Traffic Color: ☐ Cyan ☐ White

ATAS: ☐ Disabled ☐ Enabled

Terrain Display Enable:
☐ Disabled
☐ TAWS B – Default Aural Phrases
☐ TAWS B – Alternate Aural Phrases
☐ Display Only – No Alerts

WX-500 Enabled (Stormscope)
☐ Disabled
☐ Enabled – Bottom Antenna
☐ Enabled – Top Antenna

Heading Source: ☐ Disabled ☐ Enabled

On Ground Discrete Installed: ☐ Not Installed ☐ Open – In Air ☐ Open – On Ground

In Air/On Ground
On Ground Discrete Installed: ☐ Not Installed ☐ Open – In Air ☐ Open – On Ground

Standby Input
Standby Discrete Installed: ☐ Not Installed ☐ Ground-Standby

Input/Output Configuration
RS-422 #1: ☐ External Display ☐ WX-500 ☐ L3 Protocol 1
RS-232 #1: ☐ WX-500 ☐ L3 Protocol 1

Wi-Fi: ☐ Disabled ☐ Enabled

Figure 1-4: Installation Configuration Data

SECTION 2. LIMITATIONS

2.1 Minimum Documentation
The L3 Pilot's Guide for the NGT-9000 Part Number 0040-17000-01 (Rev K, or later revision) must be carried on board the aircraft at all times.

2.2 Minimum Equipment
The NGT-9000 must have the following system interfaces in Table 2-1 fully functional in order to be compliant with the requirements for 14 CFR 91.225 and 91.227 ADS-B OUT operations:

Table 2-1: Required Equipment

Interfaced Equipment	Number Required	Number Installed
NGT-9000, NGT-9000+, NGT-9000D, or NGT-9000D+ With operable SBAS position source	1	1

2.3 ADS-B OUT Compliance
The NGT-9000 only complies with 14 CFR 91.227 when all its required functions are operational as indicated by external annunciators not being illuminated and/or interfaced display ADS-B messages not being present.

2.4 IDENT Function
The system must be capable of squawking IDENT when requested by Air Traffic Control.

2.5 ALT Function
While operating within airspace requiring an ADS-B OUT compliant transmitter, Pressure Altitude Broadcast Inhibit (PABI), shall only be enabled when requested by Air Traffic Control.

2.6 Standby Function
The Standby Mode input is used to place the unit's transponder into Standby. It is intended for use when dual transponders are installed on the aircraft.

2.7 Traffic Awareness
Traffic Awareness and Traffic Alerting are intended as an aid to visual acquisition of conflicting traffic and may not be used as the sole basis for aircraft maneuvering.

NOTE

Information shown on the display is provided to the pilot as an aid to visually acquiring traffic. Pilots should maneuver their aircraft based only on ATC guidance or positive visual acquisition of the conflicting traffic. Maneuver should be consistent with ATC instructions. ATC should be contacted for resolution of the traffic conflict.

2.8 Terrain Awareness

a. Navigation must not be predicated on the use of TAWS;
b. To avoid giving unwanted alerts, the TAWS must be inhibited when landing at an airport that is not included in the airport database;
c. The use of the TAWS terrain warning and Terrain Display functions is prohibited during QFE operations.
d. TAWS must meet the requirements of TSO-151c for Class B.
e. If unit is configured for *Terrain Display Only (no aural alerts)*, then unit is <u>not</u> considered a Class B TAWS.

2.9 Applicable System Software

This AFMS/SFM is applicable to the software versions shown in Table 2-2 or later FAA approved version.

Table 2-2: Software Version

Software	Part No.	Version
NGT-9000 Ops s/w	9020010-( ) where 9020010-004 is the first in the series	Rev 3.x where Rev 3.0 is the first in the series
68DC Navigational Database North America (68.bin)	8010-22310-0001	Most current cycle[1, 2]
72DC Cultural Features Database North American Extended (72.bin)	8010-12004-0001	Most current cycle[2]
71DC World Terrain Database	8010-23010-0001	Most current cycle[2]

[1] *Available from Jeppesen on 28-day cycles*

[2] *There is no requirement to update this database because it is used only for informational purposes.*

SECTION 3. EMERGENCY PROCEDURES

3.1 Emergency Procedures

3.1.1 Terrain Warning Alert (Display Alert, Audio Alert, or Terrain Warning (Red) Lamp

TAWS Display **PULL UP**, Audio Alert of "***Terrain, Terrain; Pull Up, Pull UP"*** or ***"Obstacle, Obstacle; Pull Up, Pull Up***" and/or Red Terrain Warning Lamp……………..	IMMEDIATELY STOP DESCENT AND BEGIN MAXIMUM PERFORMANCE RATE OF CLIMB CONSISTENT WITH PHASE OF FLIGHT. CHECK TERRAIN CLEARANCE, OR ATTEMPT TO VISUALLY ACQUIRE OBSTACLE. CONTINUE CLIMB UNTIL CLEAR OF TERRAIN OR OBSTACLE

3.1.2 Terrain Caution Alert (Display Alert, Audio Alert, and/or Terrain Caution (Amber) Lamp)

TAWS Display **TERRAIN**, Audio Alert of "**Caution *Terrain, Caution Terrain"*** or ***"*Caution *Obstacle,* Caution *Obstacle***" and/or Amber Terrain Warning Lamp………..	IMMEDIATELY STOP DESCENT AND BEGIN A SAFE RATE OF CLIMB CONSISTENT WITH PHASE OF FLIGHT. CHECK TERRAIN CLEARANCE, OR ATTEMPT TO VISUALLY ACQUIRE OBSTACLE. CONTINUE CLIMB UNTIL CLEAR OF TERRAIN OR OBSTACLE

3.1.3 Loss Of Aircraft Electrical Power Generation (Loss of Generator)

Loss of electrical power generation .... REMOVE POWER FROM NGT-9000

If the NGT-9000 is shut down in order to shed load from the aircraft's electrical system, ADS-B OUT and ADS-B IN will no longer be available. If under ATC control, notify your Controller of loss of ADS-B OUT.

NOTE
This guidance is supplementary to any procedure provided in the AFM or POH for the aircraft in Loss of Power situations

3.1.4 Loss of GPS/SBAS Position Data

Loss of GPS/SBAS indicated by a GPS failure message on the NGT-9000/CP-2500 and a SLOW blinking ADS-B FAIL light (if installed) .... PULL NGT CIRCUIT BREAKER.

WAIT 5 SECONDS AND RESET. IF SLOW BLINKING ADS-B FAIL LIGHT CONTINUES, OR BECOMES STEADY, ASSUME AN ADS-B OUT FAILURE.

If under ATC control, notify your Controller of loss of ADS-B OUT.

3.1.5 Visual/Aural Traffic Alert From ATAS, TAS or TCAS

Traffic Alert .... VISUALLY ACQUIRE TRAFFIC

3.2 Abnormal Procedures

3.2.1 Abnormal Indications

Table 3-1: Troubleshooting for the Panel Mount NGT-9000

Symptom	Screen	Cause/Corrective Actions
• Blank display. • ADS-B Fail lamp is OFF	All	Loss of power or damaged unit. 1. Check power connections, breakers, and main avionics switch. 2. Verify Battery (BAT) Master switch is on. 3. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.
The unit has manual brightness adjustment only.	All	Loss of light sensor data. 1. Try clearing the failure by restarting the unit by tapping the Restart button. 2. Check System Status Messages. 3. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.
When touching the screen, the command function seems to be slightly off from the center of the screen symbol or area.	All	The screen calibration is out of tolerance. 1. Perform the Screen Calibration has described in the Installation Manual (L3-76AK-IM1). Contact L3 Field Service before removal of unit.
Internal fan is always active. MSG button on screen.	N/A	Loss of temperature sensor data. The message seen is “Unit Over Temp Service Soon”. 1. Try clearing the failure by restarting the unit by tapping the Restart button. 2. If in maintenance mode the fan remains active. This is normal. 3. Check System Status Messages. 4. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.

Table 3-1: Troubleshooting for the Panel Mount NGT-9000

Symptom	Screen	Cause/Corrective Actions
Message page contains messages that do not indicate a functional failure on the system status page.	N/A	The following internal tests do not create a fail message in the system status page. • Configuration Module Test • Configuration Module Configuration Validity • Mutual Suppression Bus Self-Test • Over-Temperature Monitor (in air) • Power Fail Monitor Although no immediate loss of function is occurring, an undesired condition is taking place. At the earliest convenience, perform the following action: 1. Try clearing the failure by restarting the unit by tapping the Restart button (or cycling power). Contact L3 Field Service before removal of unit.
Unit does not operate in normal mode and starts in Bootloader or maintenance mode. MSG button on screen.	N/A	The following internal hardware test failures cause the unit to automatically reset. This happens without cycling power to the unit. If the hardware failure being detected does not clear, a system fail message is sent. • ARINC 429 Receiver Loop Back Self-Test • Panel Mount Refresh Display Test • Panel Mount Frozen Display Test • SDRAM Self-Test • Persistent Memory Self-Test • FPGA CBIT Test/Monitor • System Clock Test/Monitor • RAM Continuous Monitor • NVM Copy Test • Flash Copy OPS Test • Flash Copy Airport DB Test • Flash Copy Map DB Test • SW Exception Interrupt Monitor 1. Cycle power to the unit. Contact L3 Field Service before removal of unit.
Display indicator GROUND TEST	Traffic	This indication is shown in the upper right hand corner of the traffic screen. It is shown when the unit is connected to the MPC and the Lynx MAT is active with the ground test function started.
Display indicator TRK (Track)	Traffic	Indicates that the traffic display orientation is true track. 1. This is a normal condition used for pilot information.

Table 3-1: Troubleshooting for the Panel Mount NGT-9000

Symptom	Screen	Cause/Corrective Actions
• Display indicator ADS ONLY (Models with TAS/TCAS only) showing on traffic screen. • MSG button on screen.	Traffic	A traffic mode indicator that is shown when TAS/TCAS is failed (or not available) and ADS-B is operating. 1. Possible problem with directional antenna or internal hardware. 2. Cycle power to the unit. 3. Check System Status Messages. 4. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.
• Display indicator TAS/TCAS ONLY (Models with TAS/TCAS) showing on traffic screen. • MSG button on screen.	Traffic	A traffic mode indicator that is shown when TAS/TCAS is in operation but ADS-B traffic information is not available 1. The TAS/TCAS is operational on the ground but there is no heading input and ground speed is < 7kts. 2. The GPS is failed (GPS has not acquired). 3. Possible problem with L-Band antenna or internal hardware. 4. Cycle power to the unit. 5. Check System Status Messages. 6. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.
Display indicator TAS/TCAS STBY (Models with TAS/TCAS) showing on traffic screen.	Traffic	A traffic mode indicator that is shown when the Traffic Awareness (TAS/TCAS) system is in standby. 1. This is a normal condition when the aircraft is on ground. 2. If the indication is seen during flight. Contact L3 Field Service before removal of unit.
• Display indicator TRAFFIC FAILED (Amber text) showing on traffic screen. • MSG button on screen.	Traffic	Displayed if both ADS-B and TAS/TCAS (optional) have failed. 1. Cycle power to the unit. 2. Check the secondary equipment (antenna) for problems. 3. Check System Status Messages. 4. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.

Table 3-1: Troubleshooting for the Panel Mount NGT-9000

Symptom	Screen	Cause/Corrective Actions
Display indicator TRAFFIC UNAVAILABLE (Amber text) showing on traffic screen. • Indicates both TAS/TCAS and ADS-B traffic sources are not available for a variety of reasons: However, both are not failed. If all available traffic sources are unavailable due to failure, 'Traffic Failed' will be indicated. This will be the normal indication for units on the ground with no heading input. (TAS/TCAS in standby).	Traffic	ADS-B is operational but heading and track are invalid or GPS is failed. TAS/TCAS is in Standby. Transponder Mode Control is "ON" which inhibits the display of relative altitude so traffic is unavailable. 1. View the GPS page under the information button and verify GPS is operational. If not, check the GPS antenna location and ensure that the aircraft is not inside the hangar or repeater is on if inside the hangar, GPS antenna is exposed to clear sky. 2. Cycle power to the unit. 3. Check the GPS antenna for problems. 4. Check System Status Messages. 5. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.
• Other aircraft are not shown on the traffic screen. • Ownship data is displayed. • Alternate display shows normal operation. • ADS-B Out Fail lamp is OFF. • No Coverage Indicator is showing on the display.	Traffic	The aircraft is not in an ADS-B (UAT / 1090ES) coverage area, or the targets are not transmitting ADS-B data, or the ground station is not transmitting TIS-B data. 1. The symptoms are normal if the target or ground station is not transmitting TIS-B data. 2. The target or ground station needs to be within line-of-site range. Contact L3 Field Service before removal of unit.
• Other aircraft are not shown on the traffic screen. • Ownship data may or may not be displayed on the weather screen. • MSG button on screen.	Traffic	Possible hardware problem with the unit. 1. Cycle power to the unit. 2. Check System Status Messages. 3. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.
• Ownship is shown, but no traffic is being displayed. • ADS-B Out Fail lamp (if installed) is OFF.	Traffic	Possible problem with the UAT/1090 antenna or RF cables. 1. Cycle power to the unit. 2. Check cable connections. 3. Check System Status Messages. 4. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.

Table 3-1: Troubleshooting for the Panel Mount NGT-9000

Symptom	Screen	Cause/Corrective Actions
The traffic symbols on the traffic display are non-directional (diamond shape).	Traffic	Non-directional traffic symbols on the traffic display is due to one of the following reasons: 1. The traffic information that is being received by the unit does not have directional data. The unit continues to transmit non-directional data to the traffic display. 2. Note - TAS/TCAS traffic is not displayed as directional. A TAS/TCAS or ADS-B correlated target will use the ADS-B/TIS-B directional information. 3. An alternate (secondary) traffic display does not support the STIF data format necessary to show directional data provided by ADS-B.
Traffic display is working correctly, but some aircraft are not showing up on the display.	Traffic	Lack of data as described below: 1. The ADS-B In requires other aircraft to be equipped with ADS-B Out. 2. The TIS-B and ADS-R services are supported when in range of ground stations and are providing the service. 3. If receiving the TIS-B service, but the Mode C and Mode S transponder equipped aircraft that do not provide altitude information are not seen on the traffic display. 4. If receiving the TIS-B service, but aircraft not equipped with a transponder, or equipped with a Mode A transponder are not part of the TISB data and will not be seen on the traffic display. Refer to the NGT-9000 Pilot's guide for more information regarding what traffic can be displayed.
Traffic display is working correctly, but TAS/TCAS targets are not showing up on the display.	Traffic	Lack of data as described below: 1. Aircraft is out of the selected TAS/TCAS altitude range (Above/Below/Unrestricted) 2. The installed Lynx NGT-9000 does not have TAS/TCAS functionality. 3. The TAS/TCAS Configuration option was not enabled during installation. 4. The TAS/TCAS requires other aircraft to be equipped with equipped with an active ATCRABS transponder.

Table 3-1: Troubleshooting for the Panel Mount NGT-9000

Symptom	Screen	Cause/Corrective Actions
No TIS-B Coverage Indicator  It is located on the traffic screen next to the Zoom Out button. **NOTE**: The indicator is suppressed when TAS/TCAS is operational (i.e. installed, not failed, not in standby).	Traffic	The No Coverage Indicator is shown on the traffic display for the following reasons: 1. No TIS-B / ADS-R data available in the area 2. Aircraft is not within range of an ADS-B ground station. Move aircraft in location where information can be received. 3. UAT-In test failed (indicator seen after 60 seconds of test failure) 4. 1090 Receiver failed • Try clearing the failure by cycling power to the unit. • Check the L-Band antenna or cables for possible errors. • If the problem continues, replacement of the L-Band antenna or the unit may be required. Contact L3 Field Service before removal.
Display indicator ON-GND showing on transponder screen.	Transponder	Transponder is operating in the on-ground mode. 1. This is a normal condition when the aircraft is on ground. 2. If the indication is seen during flight. Contact L3 Field Service.
• Display indicator XPDR FAIL (Amber text) showing on transponder screen. • MSG button on screen.	Transponder	Transponder data is invalid. This indication is shown on the transponder screen and alternate traffic screen. 1. Possible problem with internal hardware. 2. Cycle power to the unit. 3. Check System Status Messages. 4. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.
Pressure Altitude digits replaced with amber dashes.	Transponder	Invalid Pressure Altitude. Note: Some altitude encoders may not provide pressure altitude until after 1-3 minutes of operation. 1. Cycle power to the unit. 2. Check System Status Messages. 3. Check the Lynx MAT fault log. 4. Check the wiring between the unit and the secondary equipment supplying the pressure altitude. 5. Check the secondary equipment for problems. Contact L3 Field Service before removal of unit.
• No data on the weather display. • ADS-B Out Fail lamp is OFF.	Weather	The FIS-B data is not being transmitted to the weather display. Note: NEXRAD data is only transmitted every 5 minutes. CONUS data is only transmitted every 15 minutes. 1. No ground station is in range. 2. The ground station may not provide FIS-B service.

Table 3-1: Troubleshooting for the Panel Mount NGT-9000

Symptom	Screen	Cause/Corrective Actions
No FIS-B Coverage Indicator  It is located on the Weather screens at the bottom center.	Weather	The No Coverage Indicator is shown on the weather display for the following reasons: 1. No FIS-B data available in the area • Aircraft is not within range of an ADS-B ground station. Move aircraft in location where information can be received. 2. UAT-In test fails (indicator seen after 15 minutes of test failure) • Try clearing the failure performing a warm startup by tapping the Restart button or cycling power to the unit. • Check the L-Band antenna or cables for possible errors. • If the problem continues, replacement of the L-Band antenna or the unit may be required. Contact L3 Field Service before removal.
• Display indicator INITIALIZING (white text) showing on FIS-B application screen. • ADS-B Out Fail lamp is Off for 2 minutes and then flashes (1 second On/Off) indefinitely until a GPS position is acquired. • Compatible displays may indicate "STANDBY" or "DATA-FAIL" and Wi-Fi information is not available	Weather	The indication is shown on the weather map indicating that GPS is Acquiring (On Ground – no previous position fix). 1. This is a normal condition. It continues to be shown until internal operations have completed. The GPS requires approximately 60 to 90 seconds to provide a position after power is applied to the unit. 2. The GPS signal may be weak. Move the aircraft into an area where the unit can acquire the GPS signal. 3. Make sure nothing is covering or blocking the GPS antenna. 4. Cycle power to the unit. 5. Check System Status Messages. 6. Check the Lynx MAT fault log. 7. Check that GPS Antenna Short pin doesn't get grounded. 8. Observe the GPS Receiver Information MPC (Service – GPS) for correct signal strength (C/No) of the GPS satellites. This has a range from 30 dB to 50 dB. If this is not the case, then check if the antenna cable loss is more than 10 dB. 9. Check if 12V power is available at GPS antenna port, when the unit is powered on. Contact L3 Field Service before removal of unit.

Table 3-1: Troubleshooting for the Panel Mount NGT-9000

Symptom	Screen	Cause/Corrective Actions
• ADS-B Out Fail lamp flashes (1 second On/Off) for 2 minutes, and then remains ON indefinitely until a GPS position is acquired. • Compatible displays may indicate "STANDBY" or "DATA-FAIL" and WI-FI information is not available.	Weather	GPS is Acquiring (In Air – no previous position fix). 1. The GPS may need up to 4 minutes to provide a position after power is applied to the unit. 2. The GPS signal may be weak. Move the aircraft into an area where the unit can acquire the GPS signal. 3. Cycle power to the unit. Contact L3 Field Service before removal of unit.
• Display indicator MAP FAIL (red text) showing on FIS-B application screen. • ADS-B Out Fail lamp is Flashing (1 second On/Off) for 2 minutes and then remains ON. • Compatible displays may indicate "STANDBY" or "DATA-FAIL" and Wi-Fi information is not available..	Weather	GPS-Acquiring previous (position fix – On Ground or In Air) This means only GPS data is not available however, the GPS position was available once during this power ON or it is shown when a fault is detected that prevents the FIS-B data from showing on the screen. 1. The GPS signal may be weak. Move the aircraft into an area where the unit can reacquire the GPS signal. 2. Cycle power to the unit. 3. Possible problem with L-Band antenna or internal hardware. 4. Check System Status Messages. 5. Check the Lynx MAT fault log. 6. Observe the GPS Receiver Information using the Lynx MAT (Service – GPS) for correct signal strength. Verify that the signal bars are showing at least 40 -50% in the GPS Receiver Information Packet. If this is not the case, then check if the antenna cable loss is more than 10 dB. 7. Check if 12V power is available at GPS antenna port, when the unit is powered ON. Contact L3 Field Service before removal of unit.
• Display indicator TAWS UNAVAILABLE (White text) showing on TAWS screen. • MSG button on screen.	TAWS	Displayed when TAWS is not available. 1. Cycle power to the unit. 2. Check System Status Messages. 3. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.
• Display indicator TAWS FAILED (Amber text) showing on TAWS screen. • MSG button on screen.	TAWS	Displayed when TAWS is Failed. 1. Cycle power to the unit. 2. Check System Status Messages. 3. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.

Table 3-1: Troubleshooting for the Panel Mount NGT-9000

Symptom	Screen	Cause/Corrective Actions
• Display indicator TERRAIN DISPLAY FAILED (Amber text) showing on TAWS screen. • MSG button on screen.	TAWS	Displayed when an alert fault causing loss of terrain display. Alerting is still operational. 1. Cycle power to the unit. 2. Check System Status Messages. 3. Check the Lynx MAT fault log. Contact L3 Field Service before removal of unit.
• Display indicator Lightning Failed (amber text) showing on Lightning screen.	Lightning	Displayed when Lightning detection is not available. 1. Cycle power to the unit. 2. Cycle power to the WX-500. 3. Check System Status Messages. 4. Check the MPC (MAT) fault log. Contact L3 Field Service before removal of unit.
• Heading shows "- - -" on Lightning screen.	Lightning	Heading input is missing. Cycle power to the unit. 1. Verify "STAB" is set to "ON" (See lightning setting page) 2. Cycle power to the WX-500. 3. Check System Status Messages. 4. Check heading source for failure. Contact L3 Field Service before removal of unit.

SECTION 4. NORMAL PROCEDURES

The procedures described below are specific only to the NGT-9000. Reference the Pilot's Operating Handbooks and AFM Supplements for operating instructions specific to any installed displays or peripheral devices.

4.1 Normal Power ON

The NGT-9000 is self-starting and self-tests once avionics power has been applied to the system

NGT Power.. ON

SELF TEST .... PASS. Audio “Self Test Pass”

> **NOTE**
>
> GPS alignment may take 2 – 3 minutes depending on the aircraft location. An ADS-B OUT OF RANGE icon is normal until the aircraft is airborne and within the service volume of an ADS-B Ground Station (GBT).

SECTION 5. PERFORMANCE

No change

SECTION 6. WEIGHT AND BALANCE

See current weight and balance data

SECTION 7. SYSTEM DESCRIPTIONS

7.1 Pilot’s Guide

THE L3 LYNX, Models NGT-9000, NGT-9000D and NGT-9000+ Pilot’s Guide, Document Part Number 0040-17000-01, Revision K and later, contains additional information regarding the system’s description, function and control. The Pilot should become familiar with the contents of this Guide and keep it available for reference.

7.2 Traffic Sources

The NGT-9000 is capable of receiving ADS-B IN traffic advisories and displaying them on the Main Display, PED’s such as the Apple iPad and on panel mounted RS-422 capable display such as the Garmin GMX 200. Refer to the appropriate installed display manual for information on target symbology and optional alerting functions.

7.3 Weather Sources

The NGT-9000 is capable of receiving ADS-B IN Flight Information System (FIS) weather and airspace information on the Main Display, PED’s such as the Apple iPad, and on panel mounted RS-422 capable display such as the Garmin GMX 200.

METAR, TAF, SIGMET and PIREP data is normally displayed in text format, while NEXRAD weather radar images are available graphically. Refer to the appropriate installed display manual for information on the type of information available and display options.

7.4 Lightning Detection Sources [Optional]

The WX-500 Stormscope is required for installation configured for lightning detection. The WX-500 detects electrical discharges from thunderstorms within a 200 nmi radius of the aircraft. This information plots the location of the thunderstorms and is shown on the right application screen of the NGT-9000.

7.5 Power

Power for the NGT-9000 is provided through a circuit breaker labeled “NGT”.

7.6 External Switches, Lights and Controls [Optional]

The following external lights listed in Table 7-1 are supported by the NGT-9000.

Table 7-1: Light and Switch Functions

Switch or Light	Function
ADS-B FAIL lamp [optional] (amber)	Out – Normal operation
	Steady – ADS-B Failure
	Slow Flashing – GPS aligning
TRAFFIC Caution lamp (amber) [optional]	Out – No traffic of concern detected
	Steady – Traffic detected
TERRAIN Caution lamp (amber) [TAWS installed] [optional]	Out – No terrain of concern
	Steady – Terrain hazard detected
TERRAIN Warning lamp (red) [TAWS installed] [optional]	Out – No immediate terrain avoidance required
	Steady – Immediate terrain avoidance required