

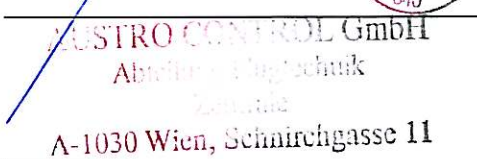

AIRPLANE FLIGHT MANUAL

DA 40

Airworthiness Category : Normal, Utility
Requirement : JAR-23
Serial Number : 40053
Registration : F-HXAF
Doc. No. : 6.01.01-E
Date of Issue : 26 June 2000

Signature : 
Authority : 
Stamp : 
Date of approval : 09. DEZ. 2004

- | This Flight Manual has been verified for EASA by the Austrian Civil Aviation Authority
- | Austro Control (ACG) as Primary Certification Authority (PCA) in accordance with the
- | valid Certification Procedures and approved by EASA with approval no. 2004-12326
- | This Flight Manual has been approved by EASA on behalf of CAAC-AAD.

DIAMOND AIRCRAFT INDUSTRIES GMBH
N.A. OTTO-STR. 5
A-2700 WIENER NEUSTADT
AUSTRIA

TEMPORARY REVISION

TR-MÄM 40-766

Entering and Exiting the Airplane

This Temporary Revision TR-MÄM 40-766 is approved in conjunction with the Mandatory Design Change Advisory MÄM 40-766 and is valid in conjunction with the latest revision of the DA 40 Airplane Flight Manual until this Temporary Revision has been incorporated into the Airplane Flight Manual.

The limitations and information contained herein either supplement or, in the case of conflict, override those in the Airplane Flight Manual or its previous Temporary Revisions.

The technical information contained in this document has been approved under the authority of DOA No. EASA.21J.052.

| Doc. No. | Chapter | Affected Page |
|-----------|---------|---------------|
| 6.01.01-E | 4A | 4A-13a |

Instruction

- Print this document on yellow paper (single-sided).
- Insert this cover page as the first page of the AFM.
- Insert the other pages of this TR in front of the corresponding AFM pages.

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| Doc. # 6.01.01-E | TR-MÄM 40-766 | 05-Jul-2014 | Cover Page |
|------------------|---------------|-------------|------------|

FOREWORD

We congratulate you on the acquisition of your new DIAMOND STAR.

Skillful operation of an airplane increases both safety and the enjoyment of flying. Please take the time therefore, to familiarize yourself with your new DIAMOND STAR.

This airplane may only be operated in accordance with the procedures and operating limitations of this Airplane Flight Manual.

Before this airplane is operated for the first time, the pilot must familiarize himself with the complete contents of this Airplane Flight Manual.

In the event that you have obtained your DIAMOND STAR second-hand, please let us know your address, so that we can supply you with the publications necessary for the safe operation of your airplane.

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0.1 APPROVAL

- The content of approved chapters is approved by EASA. All other content is approved by DAI under the authority of EASA DOA No. EASA.21J.052 in accordance with Part 21.

0.2 RECORD OF REVISIONS

All revisions of this manual, with the exception of -

- Temporary Revisions,
- updates of the modification level (Section 1.1),
- updated mass and balance information (Section 6.3),
- updates of the Equipment Inventory (Section 6.5), and
- updates of the List of Supplements (Section 9.2)

- must be recorded in the following table.

The new or amended text is indicated by a vertical black line at the left hand side of the revised page, with the revision number and date appearing at the bottom of the page.

NOTE

If pages are revised which contain information valid for your particular serial number (modification level of the airplane, weighing data, Equipment Inventory, List of Supplements), then this information must be transferred to the new pages in hand-writing.

Temporary Revisions, if applicable, are inserted into this manual. Temporary Revisions are used to provide information on systems or equipment until the next 'permanent' Revision of the Airplane Flight Manual. When a 'permanent' Revision covers a Mandatory or Optional Design Change Advisory (MÄM or OÄM), then the corresponding Temporary Revision is superseded. For example: Revision 5 covers OÄM-40-061, therefore the Temporary Revision TR-OÄM-40-061 is superseded by the 'permanent' Revision 5.

| | | | |
|------------------|--------|-------------|------------|
| Doc. # 6.01.01-E | Rev. 8 | 01-Dec-2010 | Page 0 - 1 |
|------------------|--------|-------------|------------|

| Rev. No. | Reason | Chapter | Page(s) | Date of Revision | Approval | Date of Approval | Date Inserted | Signature |
|----------|--------------------------------------|---------|-------------------------------------|------------------|--|------------------|---------------|-----------|
| 1 | corrections | all | all | 26-Sep-2000 | [approved by Ing. Andreas Winkler for ACG] | 09-Oct-2000 | | |
| 2 | OÄM 40-060 (White Wire optional) | 0 | 0-2, 0-4 thru 0-7 | 19-Dec-2000 | approved by Ing. Andreas Winkler for ACG] | 25-Jan-2001 | | |
| | | 1 | 1-16 | | | | | |
| | | 2 | 2-1, 2-7 thru 2-9, 2-13 thru 2-19 | | | | | |
| | OÄM 40-068 (Essential Bus) | 3 | 3-7, 3-8, 3-19, 3-20, 3-25, 3-26 | | | | | |
| | OÄM 40-073 (LASAR optional) | 4A | 4A-3 thru 4A-8, 4A-14, 4A-15 | | | | | |
| | | 4B | 4B-4 thru 4B-6 | | | | | |
| | corrections | 6 | 6-1, 6-2, 6-12 thru 6-14 | | | | | |
| | | 7 | 7-1, 7-8, 7-14, 7-28 thru 7-38 | | | | | |
| 3 | OÄM 40-064 (Night VFR) | 0 | 0-2 thru 0-7 | 05-Feb-2001 | [approved by Ing. Andreas Winkler for ACG] | 02 Jul 2001 | | |
| | | 1 | 1-2 | | | | | |
| | | 2 | 2-1, 2-8, 2-9, 2-12, 2-15 thru 2-20 | | | | | |
| | OÄM 40-069 (control surf. gust lock) | 3 | 3-1, 3-25 thru 3-27 | | | | | |
| | | 4A | 4A-1, 4A-8 thru 4A-31 | | | | | |
| | OÄM 40-070 (tow bar) | 5 | 5-7, 5-14, 5-16 | | | | | |
| | | 6 | 6-7, 6-9, 6-12 thru 6-14 | | | | | |
| | corrections | 7 | 7-32, 7-35, 7-36 | | | | | |
| | | 8 | 8-1 thru 8-9 | | | | | |

| Rev. No. | Reason | Chapter | Page(s) | Date of Revision | Approval | Date of Approval | Date Inserted | Signature |
|----------|--|---------|--|------------------|--|------------------|---------------|-----------|
| 4 | OÄM 40-067 (IFR) corrections | all | all | 09 Apr 2001 | [approved by Ing. Andreas Winkler for ACG] | 02 Jul 2001 | | |
| 5 | OÄM 40-061 (KAP 140 autopilot) | 0 | 0-1 thru 0-8 | 09 Sep 2001 | [approved by Ing. Andreas Winkler for ACG] | 09 Sep 2001 | | |
| | OÄM 40-073 (SlickSTART) | 1 | 1-2, 1-5, 1-14 | | | | | |
| | OÄM 40-081 (door lock) | 2 | 2-1, 2-16, 2-22, 2-23, 2-24 | | | | | |
| | OÄM 40-085 (KX 155A as COM 1) | 3 | 3-13, 3-18, 3-22, 3-23, 3-24, 3-31, 3-36 | | | | | |
| | OÄM's 40-092 thru 40-094 (Mikrotechna ASI, altimeter, VSI) | 4A | 4A-8, 4A-10, 4A-22, 4A-23, 4A-26 | | | | | |
| | | 4B | 4B-1, 4B-8 | | | | | |
| | | 6 | 6-5, 6-8 thru 6-17 | | | | | |
| | MÄM 40-039/a (VM 1000) | 7 | 7-13, 7-14, 7-33, 7-35 | | | | | |
| | MÄM 40-048 (RH emerg. window) | 8 | 8-10 | | | | | |
| | corrections | 9 | 9-3, 9-4, 9-5 | | | | | |

| Rev. No. | Reason | Chapter | Page(s) | Date of Revision | EASA Approval No. | ACG Compliance | Date Inserted | Signature |
|----------|--|---------|-----------------------|------------------|--|---|---------------|-----------|
| 6 | type certification in China | 0 | 0-0, 0-5, 0-6 | 15 Sep 2004 | 2004-12326 | [Ing. Andreas Winkler for ACG] | | |
| 7 | MÄM-40- -047, -069, -075, -078, -096, -099, -123e, -133, -141, -174, -175; OÄM-40- -063/b, -071/c, -077, -078, -080, -083/a, -090, -091, -097, -098, -103, -104, -105, -106, -111, -112, -114, -115, -117, -117/a, -119, -120, -121, -122, -124, -127, -128, -138, -140, -154, -165, -167, -168, -179, -181, -183, -185, -186, -190, -198, -200, -206, -237, 250/a; RÄM-40- -014; corrections; double-sided layout | all | all except cover page | 15 Jul 2006 | Revision No. 7 of the AFM Doc. No. 6.01.01-E is approved under the authority of DOA No. EASA.21J.052 | [11 Aug 2006 Dipl.-Ing. (FH) Manfred Reichel for DAI] | | |

| Rev. No. | Reason | Chapter | Page(s) | Date of Revision | EASA Approval No. | ACG Compliance | Date Inserted | Signature |
|----------|--|----------------------------|---|------------------|--|----------------|---------------|-----------|
| 8 | MÄM-40- -176, -227/a, -313, -344, -360/a, -378, -401, -415, -428, -446; OÄM-40- -217, -251, -253/b, 258, -267, -277/a, -279, 283/a, -284, -289, -326, -327; corrections | all | all except cover page | 01 Dec 2010 | Revision No. 8 of the AFM Doc. No. 6.01.01-E is approved under the authority of DOA No. EASA.21J.052 | | | |
| 9 | MÄM 40- -580, -617, OÄM 40- -252, -362, -369, -371 | 0, 1, 2, 3, 4A, 6, 7 | 0-5, 0-6, 0-7, 0-8, 0-9, 0-11, 0-12, 0-13, 1-3, 1-7, 2-22, 2-25, 3-29, 4A-11, 4A-12, 4A-22 thru 4A-24, 4A-34, 4A-35, 6-17 thru 6-34, 7-1, 7.2, 7-15 thru 7-58 | 31 Jan 2014 | Revision No. 9 of the AFM Doc. No. 6.01.01-E is approved under the authority of DOA No. EASA.21J.052 | | | |
| | | | | | | | | |

0.3 LIST OF EFFECTIVE PAGES

| Ch. | Page | Date |
|-----|------|-------------|
| 0 | 0-0 | 15-Sep-2004 |
| | 0-0a | 15-Sep-2004 |
| | 0-1 | 01-Dec-2010 |
| | 0-2 | 01-Dec-2010 |
| | 0-3 | 01-Dec-2010 |
| | 0-4 | 01-Dec-2010 |
| | 0-5 | 31-Jan-2014 |
| | 0-6 | 31-Jan-2014 |
| | 0-7 | 31-Jan-2014 |
| | 0-8 | 31-Jan-2014 |
| | 0-9 | 31-Jan-2014 |
| | 0-10 | 01-Dec-2010 |
| | 0-11 | 31-Jan-2014 |
| | 0-12 | 31-Jan-2014 |
| | 0-13 | 31-Jan-2014 |
| | 0-14 | 01-Dec-2010 |

| Ch. | Page | Date |
|-----|------|-------------|
| 1 | 1-1 | 01-Dec-2010 |
| | 1-2 | 01-Dec-2010 |
| | 1-3 | 31-Jan-2014 |
| | 1-4 | 01-Dec-2010 |
| | 1-5 | 01-Dec-2010 |
| | 1-6 | 01-Dec-2010 |
| | 1-7 | 31-Jan-2014 |
| | 1-8 | 01-Dec-2010 |
| | 1-9 | 01-Dec-2010 |
| | 1-10 | 01-Dec-2010 |
| | 1-11 | 01-Dec-2010 |
| | 1-12 | 01-Dec-2010 |
| | 1-13 | 01-Dec-2010 |
| | 1-14 | 01-Dec-2010 |
| | 1-15 | 01-Dec-2010 |
| | 1-16 | 01-Dec-2010 |
| | 1-17 | 01-Dec-2010 |
| | 1-18 | 01-Dec-2010 |
| | 1-19 | 01-Dec-2010 |
| | 1-20 | 01-Dec-2010 |
| | 1-21 | 01-Dec-2010 |
| | 1-22 | 01-Dec-2010 |
| | 1-23 | 01-Dec-2010 |
| | 1-24 | 01-Dec-2010 |

| Ch. | Page | Date |
|-----|------------|-------------|
| 2 | appr. 2-1 | 01-Dec-2010 |
| | appr. 2-2 | 01-Dec-2010 |
| | appr. 2-3 | 01-Dec-2010 |
| | appr. 2-4 | 01-Dec-2010 |
| | appr. 2-5 | 01-Dec-2010 |
| | appr. 2-6 | 01-Dec-2010 |
| | appr. 2-7 | 01-Dec-2010 |
| | appr. 2-8 | 01-Dec-2010 |
| | appr. 2-9 | 01-Dec-2010 |
| | appr. 2-10 | 01-Dec-2010 |
| | appr. 2-11 | 01-Dec-2010 |
| | appr. 2-12 | 01-Dec-2010 |
| | appr. 2-13 | 01-Dec-2010 |
| | appr. 2-14 | 01-Dec-2010 |
| | appr. 2-15 | 01-Dec-2010 |
| | appr. 2-16 | 01-Dec-2010 |
| | appr. 2-17 | 01-Dec-2010 |
| | appr. 2-18 | 01-Dec-2010 |
| | appr. 2-19 | 01-Dec-2010 |
| | appr. 2-20 | 01-Dec-2010 |
| | appr. 2-21 | 01-Dec-2010 |
| | appr. 2-22 | 31-Jan-2014 |
| | appr. 2-23 | 01-Dec-2010 |
| | appr. 2-24 | 01-Dec-2010 |
| | appr. 2-25 | 31-Jan-2014 |
| | appr. 2-26 | 01-Dec-2010 |
| | appr. 2-27 | 01-Dec-2010 |

| Ch. | Page | Date |
|-----|------------|-------------|
| 2 | appr. 2-28 | 01-Dec-2010 |
| | appr. 2-29 | 01-Dec-2010 |
| | appr. 2-30 | 01-Dec-2010 |
| | appr. 2-31 | 01-Dec-2010 |
| | appr. 2-32 | 01-Dec-2010 |
| | appr. 2-33 | 01-Dec-2010 |
| | appr. 2-34 | 01-Dec-2010 |

| Ch. | Page | Date |
|-----|------|-------------|
| 3 | 3-1 | 01-Dec-2010 |
| | 3-2 | 01-Dec-2010 |
| | 3-3 | 01-Dec-2010 |
| | 3-4 | 01-Dec-2010 |
| | 3-5 | 01-Dec-2010 |
| | 3-6 | 01-Dec-2010 |
| | 3-7 | 01-Dec-2010 |
| | 3-8 | 01-Dec-2010 |
| | 3-9 | 01-Dec-2010 |
| | 3-10 | 01-Dec-2010 |
| | 3-11 | 01-Dec-2010 |
| | 3-12 | 01-Dec-2010 |
| | 3-13 | 01-Dec-2010 |
| | 3-14 | 01-Dec-2010 |
| | 3-15 | 01-Dec-2010 |
| | 3-16 | 01-Dec-2010 |
| | 3-17 | 01-Dec-2010 |
| | 3-18 | 01-Dec-2010 |
| | 3-19 | 01-Dec-2010 |
| | 3-20 | 01-Dec-2010 |
| | 3-21 | 01-Dec-2010 |
| | 3-22 | 01-Dec-2010 |
| | 3-23 | 01-Dec-2010 |
| | 3-24 | 01-Dec-2010 |
| | 3-25 | 01-Dec-2010 |
| | 3-26 | 01-Dec-2010 |
| | 3-27 | 01-Dec-2010 |
| | 3-28 | 01-Dec-2010 |

|
 |

| Ch. | Page | Date |
|-----|------|-------------|
| 3 | 3-29 | 31-Jan-2014 |
| | 3-30 | 31-Jan-2014 |
| | 3-31 | 01-Dec-2010 |
| | 3-32 | 01-Dec-2010 |
| | 3-33 | 01-Dec-2010 |
| | 3-34 | 01-Dec-2010 |
| | 3-35 | 01-Dec-2010 |
| | 3-36 | 01-Dec-2010 |
| | 3-37 | 01-Dec-2010 |
| | 3-38 | 01-Dec-2010 |
| | 3-39 | 01-Dec-2010 |
| | 3-40 | 01-Dec-2010 |
| | 3-41 | 01-Dec-2010 |
| | 3-42 | 01-Dec-2010 |

| Ch. | Page | Date |
|-----|-------|-------------|
| 4A | 4A-1 | 01-Dec-2010 |
| | 4A-2 | 01-Dec-2010 |
| | 4A-3 | 01-Dec-2010 |
| | 4A-4 | 01-Dec-2010 |
| | 4A-5 | 01-Dec-2010 |
| | 4A-6 | 01-Dec-2010 |
| | 4A-7 | 01-Dec-2010 |
| | 4A-8 | 01-Dec-2010 |
| | 4A-9 | 01-Dec-2010 |
| | 4A-10 | 01-Dec-2010 |
| | 4A-11 | 31-Jan-2014 |
| | 4A-12 | 31-Jan-2014 |
| | 4A-13 | 01-Dec-2010 |
| | 4A-14 | 01-Dec-2010 |
| | 4A-15 | 01-Dec-2010 |
| | 4A-16 | 01-Dec-2010 |
| | 4A-17 | 01-Dec-2010 |
| | 4A-18 | 01-Dec-2010 |
| | 4A-19 | 01-Dec-2010 |
| | 4A-20 | 01-Dec-2010 |
| | 4A-21 | 01-Dec-2010 |
| | 4A-22 | 31-Jan-2014 |
| | 4A-23 | 31-Jan-2014 |
| | 4A-24 | 31-Jan-2014 |
| | 4A-25 | 01-Dec-2010 |
| | 4A-26 | 01-Dec-2010 |
| | 4A-27 | 01-Dec-2010 |

| Ch. | Page | Date |
|-----|-------|-------------|
| 4A | 4A-28 | 01-Dec-2010 |
| | 4A-29 | 01-Dec-2010 |
| | 4A-30 | 01-Dec-2010 |
| | 4A-31 | 01-Dec-2010 |
| | 4A-32 | 01-Dec-2010 |
| | 4A-33 | 01-Dec-2010 |
| | 4A-34 | 31-Jan-2014 |
| | 4A-35 | 31-Jan-2014 |
| | 4A-36 | 01-Dec-2010 |
| | 4A-37 | 01-Dec-2010 |
| | 4A-38 | 01-Dec-2010 |
| | 4A-39 | 01-Dec-2010 |
| | 4A-40 | 01-Dec-2010 |

| Ch. | Page | Date |
|-----|-------|-------------|
| 4B | 4B-1 | 01-Dec-2010 |
| | 4B-2 | 01-Dec-2010 |
| | 4B-3 | 01-Dec-2010 |
| | 4B-4 | 01-Dec-2010 |
| | 4B-5 | 01-Dec-2010 |
| | 4B-6 | 01-Dec-2010 |
| | 4B-7 | 01-Dec-2010 |
| | 4B-8 | 01-Dec-2010 |
| | 4B-9 | 01-Dec-2010 |
| | 4B-10 | 01-Dec-2010 |
| | 4B-11 | 01-Dec-2010 |
| | 4B-12 | 01-Dec-2010 |

| Ch. | Page | Date |
|-----|------|-------------|
| 5 | 5-1 | 01-Dec-2010 |
| | 5-2 | 01-Dec-2010 |
| | 5-3 | 01-Dec-2010 |
| | 5-4 | 01-Dec-2010 |
| | 5-5 | 01-Dec-2010 |
| | 5-6 | 01-Dec-2010 |
| | 5-7 | 01-Dec-2010 |
| | 5-8 | 01-Dec-2010 |
| | 5-9 | 01-Dec-2010 |
| | 5-10 | 01-Dec-2010 |
| | 5-11 | 01-Dec-2010 |
| | 5-12 | 01-Dec-2010 |
| | 5-13 | 01-Dec-2010 |
| | 5-14 | 01-Dec-2010 |
| | 5-15 | 01-Dec-2010 |
| | 5-16 | 01-Dec-2010 |
| | 5-17 | 01-Dec-2010 |
| | 5-18 | 01-Dec-2010 |
| | 5-19 | 01-Dec-2010 |
| | 5-20 | 01-Dec-2010 |
| | 5-21 | 01-Dec-2010 |
| | 5-22 | 01-Dec-2010 |
| | 5-23 | 01-Dec-2010 |
| | 5-24 | 01-Dec-2010 |

| Ch. | Page | Date |
|-----|------|-------------|
| 6 | 6-1 | 01-Dec-2010 |
| | 6-2 | 01-Dec-2010 |
| | 6-3 | 01-Dec-2010 |
| | 6-4 | 01-Dec-2010 |
| | 6-5 | 01-Dec-2010 |
| | 6-6 | 01-Dec-2010 |
| | 6-7 | 01-Dec-2010 |
| | 6-8 | 01-Dec-2010 |
| | 6-9 | 01-Dec-2010 |
| | 6-10 | 01-Dec-2010 |
| | 6-11 | 01-Dec-2010 |
| | 6-12 | 01-Dec-2010 |
| | 6-13 | 01-Dec-2010 |
| | 6-14 | 01-Dec-2010 |
| | 6-15 | 01-Dec-2010 |
| | 6-16 | 01-Dec-2010 |
| | 6-17 | 31-Jan-2014 |
| | 6-18 | 31-Jan-2014 |
| | 6-19 | 31-Jan-2014 |
| | 6-20 | 31-Jan-2014 |
| | 6-21 | 31-Jan-2014 |
| | 6-22 | 31-Jan-2014 |
| | 6-23 | 31-Jan-2014 |
| | 6-24 | 31-Jan-2014 |
| | 6-25 | 31-Jan-2014 |
| | 6-26 | 31-Jan-2014 |
| | 6-27 | 31-Jan-2014 |

| Ch. | Page | Date |
|-----|------|-------------|
| 6 | 6-28 | 31-Jan-2014 |
| | 6-29 | 31-Jan-2014 |
| | 6-30 | 31-Jan-2014 |
| | 6-31 | 31-Jan-2014 |
| | 6-32 | 31-Jan-2014 |
| | 6-33 | 31-Jan-2014 |
| | 6-34 | 31-Jan-2014 |

| Ch. | Page | Date |
|-----|------|-------------|
| 7 | 7-1 | 31-Jan-2014 |
| | 7-2 | 31-Jan-2014 |
| | 7-3 | 01-Dec-2010 |
| | 7-4 | 01-Dec-2010 |
| | 7-5 | 01-Dec-2010 |
| | 7-6 | 01-Dec-2010 |
| | 7-7 | 01-Dec-2010 |
| | 7-8 | 01-Dec-2010 |
| | 7-9 | 01-Dec-2010 |
| | 7-10 | 01-Dec-2010 |
| | 7-11 | 01-Dec-2010 |
| | 7-12 | 01-Dec-2010 |
| | 7-13 | 01-Dec-2010 |
| | 7-14 | 01-Dec-2010 |
| | 7-15 | 31-Jan-2014 |
| | 7-16 | 31-Jan-2014 |
| | 7-17 | 31-Jan-2014 |
| | 7-18 | 31-Jan-2014 |
| | 7-19 | 31-Jan-2014 |
| | 7-20 | 31-Jan-2014 |
| | 7-21 | 31-Jan-2014 |
| | 7-22 | 31-Jan-2014 |
| | 7-23 | 31-Jan-2014 |
| | 7-24 | 31-Jan-2014 |
| | 7-25 | 31-Jan-2014 |
| | 7-26 | 31-Jan-2014 |
| | 7-27 | 31-Jan-2014 |

| Ch. | Page | Date |
|-----|------|-------------|
| 7 | 7-28 | 31-Jan-2014 |
| | 7-29 | 31-Jan-2014 |
| | 7-30 | 31-Jan-2014 |
| | 7-31 | 31-Jan-2014 |
| | 7-32 | 31-Jan-2014 |
| | 7-33 | 31-Jan-2014 |
| | 7-34 | 31-Jan-2014 |
| | 7-35 | 31-Jan-2014 |
| | 7-36 | 31-Jan-2014 |
| | 7-37 | 31-Jan-2014 |
| | 7-38 | 31-Jan-2014 |
| | 7-39 | 31-Jan-2014 |
| | 7-40 | 31-Jan-2014 |
| | 7-41 | 31-Jan-2014 |
| | 7-42 | 31-Jan-2014 |
| | 7-43 | 31-Jan-2014 |
| | 7-44 | 31-Jan-2014 |
| | 7-45 | 31-Jan-2014 |
| | 7-46 | 31-Jan-2014 |
| | 7-47 | 31-Jan-2014 |
| | 7-48 | 31-Jan-2014 |
| | 7-49 | 31-Jan-2014 |
| | 7-50 | 31-Jan-2014 |
| | 7-51 | 31-Jan-2014 |
| | 7-52 | 31-Jan-2014 |
| | 7-53 | 31-Jan-2014 |
| | 7-54 | 31-Jan-2014 |

| Ch. | Page | Date |
|-----|------|-------------|
| 7 | 7-55 | 31-Jan-2014 |
| | 7-56 | 31-Jan-2014 |
| | 7-57 | 31-Jan-2014 |
| | 7-58 | 31-Jan-2014 |

| Ch. | Page | Date |
|-----|------|-------------|
| 9 | 9-1 | 01-Dec-2010 |
| | 9-2 | 01-Dec-2010 |
| | 9-3 | 01-Dec-2010 |
| | 9-4 | 01-Dec-2010 |
| | 9-5 | 01-Dec-2010 |
| | 9-6 | 01-Dec-2010 |

| Ch. | Page | Date |
|-----|------|-------------|
| 8 | 8-1 | 01-Dec-2010 |
| | 8-2 | 01-Dec-2010 |
| | 8-3 | 01-Dec-2010 |
| | 8-4 | 01-Dec-2010 |
| | 8-5 | 01-Dec-2010 |
| | 8-6 | 01-Dec-2010 |
| | 8-7 | 01-Dec-2010 |
| | 8-8 | 01-Dec-2010 |
| | 8-9 | 01-Dec-2010 |
| | 8-10 | 01-Dec-2010 |
| | 8-11 | 01-Dec-2010 |
| | 8-12 | 01-Dec-2010 |

0.4 TABLE OF CONTENTS

| | Chapter |
|--|---------|
| GENERAL | |
| (a non-approved chapter) | 1 |
| OPERATING LIMITATIONS | |
| (an approved chapter) | 2 |
| EMERGENCY PROCEDURES | |
| (a non-approved chapter) | 3 |
| NORMAL OPERATING PROCEDURES | |
| (a non-approved chapter) | 4A |
| ABNORMAL OPERATING PROCEDURES | |
| (a non-approved chapter) | 4B |
| PERFORMANCE | |
| (a non-approved chapter) | 5 |
| MASS AND BALANCE / EQUIPMENT LIST | |
| (a non-approved chapter) | 6 |
| DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS | |
| (a non-approved chapter) | 7 |
| AIRPLANE HANDLING, CARE AND MAINTENANCE | |
| (a non-approved chapter) | 8 |
| SUPPLEMENTS | 9 |

CHAPTER 1

GENERAL

| | Page |
|--|------|
| 1.1 INTRODUCTION | 1-2 |
| 1.2 CERTIFICATION BASIS | 1-5 |
| 1.3 WARNINGS, CAUTIONS AND NOTES | 1-5 |
| 1.4 DIMENSIONS | 1-6 |
| 1.5 DEFINITIONS AND ABBREVIATIONS | 1-8 |
| 1.6 UNITS OF MEASUREMENT | 1-18 |
| 1.6.1 CONVERSION FACTORS | 1-18 |
| 1.6.2 CONVERSION CHART LITERS / US GALLONS | 1-20 |
| 1.7 THREE-VIEW DRAWING | 1-21 |
| 1.8 SOURCE DOCUMENTATION | 1-22 |
| 1.8.1 ENGINE | 1-22 |
| 1.8.2 PROPELLER | 1-23 |
| 1.8.3 ENGINE INSTRUMENTS | 1-23 |
| 1.8.4 IGNITION CONTROL UNIT | 1-24 |

1.1 INTRODUCTION

This Airplane Flight Manual has been prepared in order to provide pilots and instructors with all the information required for the safe and efficient operation of the airplane.

The Airplane Flight Manual includes all the data which must be made available to the pilot according to the JAR-23 requirement. Beyond this, it contains further data and operating instructions which, in the manufacturer's opinion, could be of value to the pilot.

This Airplane Flight Manual is valid for all serial numbers. Equipment and modification level (design details) of the airplane may vary from serial number to serial number. Therefore, some of the information contained in this manual is applicable depending on the respective equipment and modification level. The exact equipment of your serial number is recorded in the Equipment Inventory in Section 6.5. The modification level is recorded in the following table (as far as necessary for this manual).

| Modification | Source | Installed | |
|-------------------------------|--------------|------------------------------|-----------------------------|
| RH Emergency Window | MÄM 40-048 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Modified MLG Strut | MÄM 40-123/e | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| 1200 kg Maximum Take-Off Mass | MÄM 40-227 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Autopilot | OÄM 40-061 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Tow-Plane Operation | OÄM 40-063/b | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Emergency Switch | OÄM 40-067 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Essential Bus | OÄM 40-068 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Long Range Tank | OÄM 40-071/b | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Alternate Static Valve | OÄM 40-072 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| SlickSTART Ignition System | OÄM 40-073 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| MT P-420-10 Governor | OÄM 40-077 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Operation with Winter Kit | OÄM 40-078 | <input type="checkbox"/> yes | <input type="checkbox"/> no |

| Modification | Source | Installed | |
|--------------------------------------|------------|------------------------------|-----------------------------|
| Door Locking System | OÄM 40-081 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| NLG Speedkit | OÄM 40-105 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| MLG Speedkit | OÄM 40-106 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Essential Tie Relay Bypass | OÄM 40-126 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Baggage Extension | OÄM 40-163 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Baggage Tray* | OÄM 40-164 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Winter Baffle Fresh Air Inlet | OÄM 40-183 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Nose Landing Gear Tie-Down | OÄM 40-200 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Electrical Rudder Pedal Adjustment | OÄM 40-251 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Front Seats with Adjustable Backrest | OÄM 40-252 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| CO Monitor | OÄM 40-253 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Autopilot Static Source | OÄM 40-267 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Tall Main Landing Gear | OÄM 40-283 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| ELT Artex ME 406 'ACE' | OÄM 40-284 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| MT P-860-23 Governor | OÄM 40-289 | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Emergency Axe | OÄM 40-326 | <input type="checkbox"/> yes | <input type="checkbox"/> no |

*For installation of the Baggage Tray the Baggage Extension must be installed.

This Airplane Flight Manual must be kept on board the airplane at all times. Its designated place is the side bag of the forward left seat.

This Airplane Flight Manual constitutes an FAA Approved Airplane Flight Manual for US registered airplanes in accordance with FAA regulation 14 CFR, Part 21.29.

CAUTION

The DA 40 is a single engine airplane. When the operating limitations and maintenance requirements are complied with, it has the high degree of reliability which is required by the certification basis. Nevertheless, an engine failure is not completely impossible. For this reason, flights during the night, on top, under instrument meteorological conditions (IMC), or above terrain which is unsuitable for a landing, constitute a risk. It is therefore highly recommended to select flight times and flight routes such that this risk is minimized.

1.2 CERTIFICATION BASIS

This airplane has been type certified in accordance with the JAA JC/VP procedure. The certification basis is JAR-23, published on 11-Mar-1994.

1.3 WARNINGS, CAUTIONS AND NOTES

Special statements in the Airplane Flight Manual concerning the safety or operation of the airplane are highlighted by being prefixed by one of the following terms:

WARNING

means that the non-observation of the corresponding procedure leads to an immediate or important degradation in flight safety.

CAUTION

means that the non-observation of the corresponding procedure leads to a minor or to a more or less long term degradation in flight safety.

NOTE

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

1.4 DIMENSIONS

Overall Dimensions

| | | | |
|--------|---|---------------|------------------|
| Span | : | appr. 11.94 m | appr. 39 ft 2 in |
| Length | : | appr. 8.01 m | appr. 26 ft 3 in |
| Height | : | appr. 1.97 m | appr. 6 ft 6 in |

Wing

| | | | |
|------------------------------|---|----------------------------|--------------------|
| Airfoil | : | Wortmann FX 63-137/20 - W4 | |
| Wing Area | : | appr. 13.54 m ² | appr. 145.7 sq.ft. |
| Mean aerodynamic chord (MAC) | : | appr. 1.121 m | appr. 3 ft 8.1 in |
| Aspect ratio | : | appr. 10.53 | |
| Dihedral | : | appr. 5° | |
| Leading edge sweep | : | appr. 1° | |

Aileron

| | | | |
|----------------------------|---|----------------------------|------------------|
| Area (total, left + right) | : | appr. 0.654 m ² | appr. 7.0 sq.ft. |
|----------------------------|---|----------------------------|------------------|

Wing Flaps

| | | | |
|----------------------------|---|---------------------------|-------------------|
| Area (total, left + right) | : | appr. 1.56 m ² | appr. 16.8 sq.ft. |
|----------------------------|---|---------------------------|-------------------|

Horizontal Tail

| | | | |
|--------------------|---|---|-------------------|
| Area | : | appr. 2.34 m ² | appr. 25.2 sq.ft. |
| Elevator area | : | appr. 0.665 m ² | appr. 7.2 sq.ft. |
| Angle of incidence | : | appr. -3.0° relative to longitudinal axis of airplane | |

Vertical Tail

| | | | |
|-------------|---|---------------------------|-------------------|
| Area | : | appr. 1.60 m ² | appr. 17.2 sq.ft. |
| Rudder area | : | appr. 0.47 m ² | appr. 5.1 sq.ft. |

Landing Gear

| | | | |
|-----------|---|--------------|-----------------|
| Track | : | appr. 2.97 m | appr. 9 ft 9 in |
| Wheelbase | : | appr. 1.68 m | appr. 5 ft 6 in |

Nose wheel : 5.00-5; 6 PR, 120 mph

Main wheel : (a) 6.00-6; 6 PR, 120 mph in combination with any
MLG strut

|
 | (b) 6.00-6; 8 PR, 120 mph in combination with any
 | MLG strut

|
 | (c) 15 x 6.0-6; 6 PR, 160 mph
 | (OÄM 40-124; only in combination with the
 | “thin”/”18 mm” [MÄM 40-123] or the “tall”
 | [OÄM 40-283] MLG strut)

1.5 DEFINITIONS AND ABBREVIATIONS

(a) Airspeeds

CAS: Calibrated Airspeed. Indicated airspeed, corrected for installation and instrument errors. CAS equals TAS at standard atmospheric conditions at MSL.

IAS: Indicated Airspeed as shown on an airspeed indicator.

KCAS: CAS in knots.

KIAS: IAS 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. Full or abrupt control surface movement is not permissible above this speed.

V_{FE} : Max. 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_S : Stalling Speed, or the minimum continuous speed at which the airplane is still controllable in the given configuration.

V_{S0} : Stalling Speed, or the minimum continuous speed at which the airplane is still controllable in the landing configuration.

V_x : Best Angle-of-Climb Speed.

V_y : Best Rate-of-Climb Speed.

(b) Meteorological Terms

ISA: International Standard Atmosphere. Conditions at which air is identified as an ideal dry gas. The temperature at mean sea level is 15 °C (59 °F), air pressure at MSL is 1013.25 hPa (29.92 inHg); the temperature gradient up to the altitude at which the temperature reaches -56.5 °C (-69.7 °F) is -0.0065 °C/m (-0.00357 °F/ft), and above this 0 °C/m (0 °F/ft).

MSL: Mean Sea Level.

OAT: Outside Air Temperature.

QNH: Theoretical atmospheric pressure at MSL, calculated from the elevation of the measuring point above MSL and the actual atmospheric pressure at the measuring point.

Indicated Pressure Altitude:

Altitude reading with altimeter set to 1013.25 hPa (29.92 inHg).

Pressure Altitude: Altitude above MSL, indicated by a barometric altimeter which is set to 1013.25 hPa (29.92 inHg). The Pressure Altitude is the Indicated Pressure Altitude corrected for installation and instrument errors.

In this Airplane Flight Manual altimeter instrument errors are regarded as zero.

Density Altitude: Altitude in ISA conditions at which the air density is equal to the current air density.

Wind: The wind speeds which are shown as variables in the diagrams in this manual should be regarded as headwind or downwind components of the measured wind.

(c) Flight Performance and Flight Planning

Demonstrated Crosswind Component:

The speed of the crosswind component at which adequate maneuverability for take-off and landing has been demonstrated during type certification.

MET: Weather, weather advice.

NAV: Navigation, route planning.

(d) Mass and Balance (M&B, W&B)

DP: Datum Plane; an imaginary vertical plane from which all horizontal distances for center of gravity calculations are measured.

Moment Arm: The horizontal distance from the Datum Plane to the Center of Gravity of a component.

Moment: The mass of a component multiplied by its moment arm.

CG: Center of Gravity, also called 'center of mass'. Imaginary point in which the airplane mass is assumed to be concentrated for mass and balance calculations. Its distance from the Datum Plane is equal to the Center of Gravity Moment Arm.

Center of Gravity Moment Arm:

The Moment Arm which is obtained if one divides the sum of the individual moments of the airplane by its total mass.

Center of Gravity Limits:

The Center of Gravity range within which the airplane, at a given mass, must be operated.

Usable Fuel: The quantity of fuel available for flight planning.

Unusable Fuel: The quantity of fuel remaining in the tank which cannot be used for flight.

Empty Mass: The mass of the airplane including unusable fuel, all operating consumables and the maximum quantity of oil.

Useful Load: The difference between take-off mass and empty mass.

Maximum Take-off Mass:

The maximum permissible mass for take-off.

Maximum Landing Mass:

The highest mass for landing conditions at the maximum descent velocity. This velocity was used in the strength calculations to determine the landing gear loads during a particularly hard landing.

(e) Engine

Take-off Power:

Maximum permissible engine output power for take-off.

Maximum Continuous Power:

Maximum permissible engine output power used continuously during flight.

CHT: Cylinder Head Temperature.

EGT: Exhaust Gas Temperature.

(f) Designation of the Circuit Breakers on the Instrument Panel*Asymmetric Instrument Panel (Circuit Breakers Right Hand)***AVIONICS:**

| | |
|-------------------|------------------------------|
| ADF | Automatic Direction Finder |
| AUDIO | Audio Panel / Intercom |
| AUTOPILOT | Autopilot |
| AVIONIC BUS | Avionic Bus |
| DME | Distance Measuring Equipment |
| ESSENTIAL AVIONIC | Essential Avionic Bus |
| GPS | Global Positioning System |
| GPS2 | Global Positioning System #2 |
| NAV/COM1 | Navigation/Communication #1 |
| NAV/COM2 | Navigation/Communication #2 |
| STRIKE | Strike Finder |
| XPDR | Transponder |

ENGINE:

| | |
|----------|---------------------------|
| IGNITION | Ignition |
| INST. 1 | Engine Instrument VM 1000 |
| START | Starter |

LIGHTING:

| | |
|----------|--|
| FLOOD | Flood Light |
| INST. | Instrument Lights |
| LANDING | Landing Light |
| POSITION | Position Lights |
| STROBE | Strobe Light (=Anti Collision Light = ACL) |
| TAXI/MAP | Taxi Light/Map Light |

SYSTEMS:

| | |
|------------|---------------------------------------|
| ANNUN. | Annunciator Panel |
| DG | Directional Gyro |
| FAN/OAT | Fan/Outside Air Temperature Indicator |
| FLAPS | Flaps |
| FUEL PUMP | Fuel Pump |
| HORIZON | Artificial Horizon (Attitude Gyro) |
| PITOT HEAT | Pitot Heating System |
| T&B | Turn & Bank Indicator |

ELECTRICAL:

| | |
|----------------|--|
| ALT. | Alternator |
| ALT. CONT. | Alternator Control |
| ALT. PROT. | Alternator Protection |
| BATT. | Battery |
| ESSENTIAL TIE | Bus Interconnection |
| MAIN TIE | Bus Interconnection |
| MASTER CONTROL | Master Control (avionic master switch, essential bus switch, essential avionics relay, bus interconnection relay, avionics master relay) |

*Symmetric Instrument Panel (Circuit Breakers Bottom Side)***MAIN BUS:**

| | |
|------------|---|
| ALT. | Alternator |
| ALT. CONT. | Alternator Control |
| ALT. PROT. | Alternator Protection |
| AV. BUS | Avionic Bus |
| DG | Directional Gyro |
| FAN/OAT | Fan/Outside Air Temperature Indicator |
| FUEL PUMP | Fuel Pump |
| IGNITION | Ignition |
| INST. | Instrument Lights |
| MAIN TIE | Bus Interconnection |
| POSITION | Position Lights |
| START | Starter |
| STROBE | Strobe Lights (Anti Collision Lights, ACLs) |
| T & B | Turn & Bank Indicator |
| TAXI/MAP | Taxi Light/Map Light |

MAIN AV. BUS (Main Avionic Bus):

| | |
|------------|---|
| ADF | Automatic Direction Finder |
| AUDIO | Audio Panel / Intercom |
| AUTO PILOT | Autopilot |
| COM2 | Communication #2 |
| COM/NAV2 | Communication / Navigation #2 |
| DME | Distance Measuring Equipment |
| GPS2 | Global Positioning System #2 |
| GPS/NAV2 | Global Positioning System/Navigation #2 |
| STRIKE | Strike Finder |
| Wx 500 | Stormscope |
| TAS | Traffic Advisory System |

ESS. AV. BUS (Essential Avionic-Bus):

| | |
|----------|---|
| COM1 | Communication #1 |
| COM/NAV1 | Communication/Navigation #1 |
| GPS1 | Global Positioning System #1 |
| GPS/NAV1 | Global Positioning System/Navigation #1 |
| XPDR | Transponder |

ESSENTIAL BUS:

| | |
|----------------|--|
| ANNUN. | Annunciator Panel |
| BATT. | Battery |
| ESS. AV. | Essential Avionic-Bus |
| ESS TIE | Bus Interconnection |
| FLAPS | Flaps |
| FLOOD | Flood Light |
| HORIZON | Artificial Horizon (Attitude Gyro) |
| INST. 1 | Engine Instrument VM 1000 |
| LANDING | Landing Light |
| MASTER CONTROL | Master Control (avionic master switch, essential bus switch, essential avionics relay, bus interconnection relay, avionics master relay) |
| PITOT | Pitot Heating System |

(g) Equipment

ELT: Emergency Locator Transmitter.

(h) Design Change Advisories

MÄM: Mandatory Design Change Advisory.

OÄM: Optional Design Change Advisory.

(i) Miscellaneous

ACG: Austro Control GmbH (formerly BAZ, Federal Office of Civil Aviation).

ATC: Air Traffic Control.

CFRP: Carbon Fiber Reinforced Plastic.

GFRP: Glass Fiber Reinforced Plastic.

JAR: Joint Aviation Requirements.

JC/VP: Joint Certification/Validation Procedure.

PCA: Primary Certification Authority.

1.6 UNITS OF MEASUREMENT

1.6.1 CONVERSION FACTORS

| Dimension | SI-Units | US Units | Conversion |
|-------------------|---|--|--|
| Length | [mm] millimeters [m] meters [km] kilometers | [in] inches [ft] feet [NM] nautical miles | [mm] / 25.4 = [in] [m] / 0.3048 = [ft] [km] / 1.852 = [NM] |
| Volume | [l] liters | [US gal] US gallons [qts] US quarts | [l] / 3.7854 = [US gal] [l] / 0.9464 = [qts] |
| Speed | [km/h] kilometers per hour [m/s] meters per second | [kts] knots [mph] miles per hour [fpm] feet per minute | [km/h] / 1.852 = [kts] [km/h] / 1.609 = [mph] [m/s] x 196.85 = [fpm] |
| Speed of rotation | [RPM] revolutions per minute | | -- |
| Mass | [kg] kilograms | [lb] pounds | [kg] x 2.2046 = [lb] |
| Force, weight | [N] newtons | [lbf] pounds force | [N] x 0.2248 = [lbf] |
| Pressure | [hPa] hecto-pascals [mbar] millibars [bar] bars | [inHg] inches of mercury [psi] pounds per square inch | [hPa] = [mbar] [hPa] / 33.86 = [inHg] [bar] x 14.504 = [psi] |
| Temperature | [°C] degrees Celsius | [°F] degrees Fahrenheit | [°C] x 1.8 + 32 = [°F] ([°F] - 32) / 1.8 = [°C] |

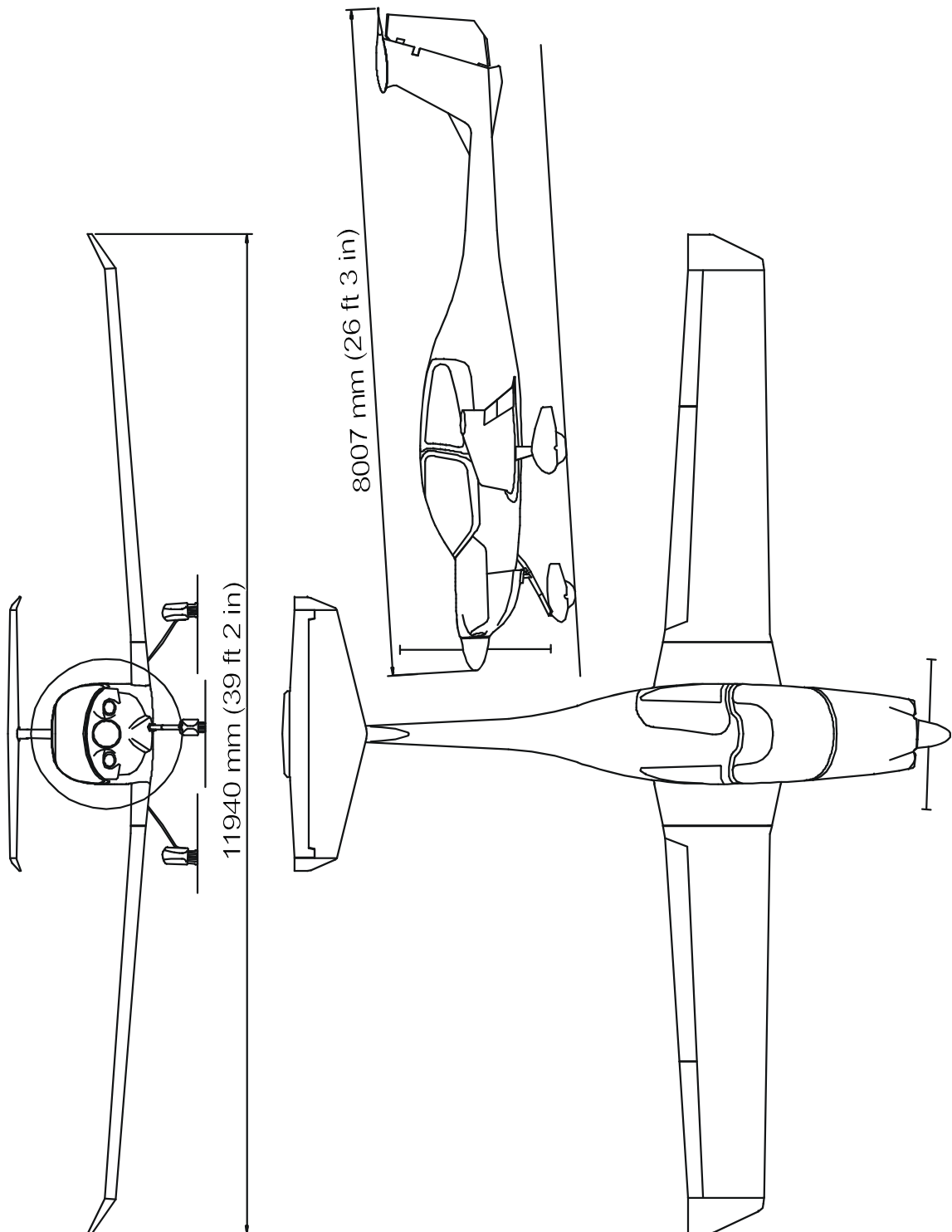
| Dimension | SI-Units | US Units | Conversion |
|------------------------------------|-------------------|----------|------------|
| Intensity of electric current | [A] ampères | | -- |
| Electric charge (battery capacity) | [Ah] ampère-hours | | -- |
| Electric potential | [V] volts | | -- |
| Time | [sec] seconds | | -- |

1.6.2 CONVERSION CHART LITERS / US GALLONS

| Liters | US Gallons |
|--------|------------|
| 5 | 1.3 |
| 10 | 2.6 |
| 15 | 4.0 |
| 20 | 5.3 |
| 25 | 6.6 |
| 30 | 7.9 |
| 35 | 9.2 |
| 40 | 10.6 |
| 45 | 11.9 |
| 50 | 13.2 |
| 60 | 15.9 |
| 70 | 18.5 |
| 80 | 21.1 |
| 90 | 23.8 |
| 100 | 26.4 |
| 110 | 29.1 |
| 120 | 31.7 |
| 130 | 34.3 |
| 140 | 37.0 |
| 150 | 39.6 |
| 160 | 42.3 |
| 170 | 44.9 |
| 180 | 47.6 |

| US Gallons | Liters |
|------------|--------|
| 1 | 3.8 |
| 2 | 7.6 |
| 4 | 15.1 |
| 6 | 22.7 |
| 8 | 30.3 |
| 10 | 37.9 |
| 12 | 45.4 |
| 14 | 53.0 |
| 16 | 60.6 |
| 18 | 68.1 |
| 20 | 75.7 |
| 22 | 83.3 |
| 24 | 90.9 |
| 26 | 98.4 |
| 28 | 106.0 |
| 30 | 113.6 |
| 32 | 121.1 |
| 34 | 128.7 |
| 36 | 136.3 |
| 38 | 143.8 |
| 40 | 151.4 |
| 45 | 170.3 |
| 50 | 189.3 |

1.7 THREE-VIEW DRAWING



1.8 SOURCE DOCUMENTATION

This Section lists documents, manuals and other literature that were used as sources for the Airplane Flight Manual, and indicates the respective publisher. However, only the information given in the Airplane Flight Manual is valid.

1.8.1 ENGINE

Address: Textron Lycoming
652 Oliver Street
WILLIAMSPORT, PA 17701
USA

Phone: +1-570-323-6181

Webpage: www.lycoming.textron.com

Documents: a) Textron Lycoming Operator's Manual, Aircraft Engines
60297-12 (Part No.)

b) Service Bulletins (SB)
Service Instructions (SI); (e.g. SI 1014, SI 1070)
Service Letters (SL); (e.g. SL114 (subscriptions))

1.8.2 PROPELLER

Address: mt-Propeller
Airport Straubing Wallmühle
D-94348 ATTING
GERMANY

Phone: +49-9429-9409-0
E-mail: sales@mt-propeller.com
Webpage: www.mt-propeller.de

Documents: E-124, Operation and Installation Manual
Hydraulically controlled variable pitch propeller
MTV -5, -6, -9, -11, -12, -14, -15, -16, -21, -22, -25

1.8.3 ENGINE INSTRUMENTS

Address: VISION MICROSYSTEMS, INC.
ADVANCED ELECTRONIC INSTRUMENTATION
4071 Hannegan Road, Suite T
BELLINGHAM, WA 98226
USA

Phone: +1-360-714-8203

Documents: 5010002 REV F, VM 1000 Owner's Manual

1.8.4 IGNITION CONTROL UNIT

The electronic ignition control unit LASAR is optional equipment.

Address: UNISON Industries
7575 Baymeadows Way
JACKSONVILLE, FL 32256
USA

Phone: +1-904-739-4066

Webpage: www.unisonindustries.com

Documents: L-1502
LASAR Installation, Operation, and Troubleshooting Manual

CHAPTER 2

OPERATING LIMITATIONS

Page

| | | |
|--------|--|------|
| 2.1 | INTRODUCTION | 2-2 |
| 2.2 | AIRSPPEED | 2-3 |
| 2.3 | AIRSPPEED INDICATOR MARKINGS | 2-4 |
| 2.4 | POWER-PLANT LIMITATIONS | 2-5 |
| 2.5 | ENGINE INSTRUMENT MARKINGS | 2-7 |
| 2.6 | WARNING, CAUTION AND STATUS LIGHTS | 2-9 |
| 2.7 | MASS (WEIGHT) | 2-11 |
| 2.8 | CENTER OF GRAVITY | 2-13 |
| 2.9 | APPROVED MANEUVERS | 2-14 |
| 2.10 | MANEUVERING LOAD FACTORS | 2-16 |
| 2.11 | OPERATING ALTITUDE | 2-17 |
| 2.12 | FLIGHT CREW | 2-17 |
| 2.13 | KINDS OF OPERATION | 2-18 |
| 2.14 | FUEL | 2-22 |
| 2.15 | LIMITATION PLACARDS | 2-24 |
| 2.16 | OTHER LIMITATIONS | 2-32 |
| 2.16.1 | TEMPERATURE | 2-32 |
| 2.16.2 | BATTERY CHARGE | 2-32 |
| 2.16.3 | EMERGENCY SWITCH | 2-32 |
| 2.16.4 | OPERATION TIME OF ELECTRICAL EQUIPMENT | 2-32 |
| 2.16.5 | DOOR LOCKING DEVICE | 2-33 |
| 2.16.6 | ELECTRONIC EQUIPMENT | 2-33 |
| 2.16.7 | USE OF THE SUN VISORS | 2-33 |

2.1 INTRODUCTION

Chapter 2 of this Airplane Flight Manual includes operating limitations, instrument markings, and placards necessary for safe operation of the airplane, its power-plant, standard systems and standard equipment.

The limitations included in this Chapter are approved.

WARNING

Operation of the airplane outside of the approved operating limitations is not permissible.

2.2 AIRSPEED

| | Airspeed | IAS | Remarks |
|------------------------|----------------------------------|--|--|
| V_A | Maneuvering speed | 108 KIAS (above 980 kg / 2161 lb up to 1150 kg / 2535 lb) 94 KIAS (780 kg / 1720 lb up to 980 kg / 2161 lb) If MÄM 40-227 is carried out: 111 KIAS (above 1036 kg / 2284 lb up to 1200 kg / 2646 lb) 94 KIAS (780 kg / 1720 lb up to 1036 kg / 2284 lb) | Do not make full or abrupt control surface movement above this speed. |
| V_{FE} | Max. flaps extended speed | LDG: 91 KIAS T/O: 108 KIAS | Do not exceed these speeds with the given flap setting. |
| V_{NO} = V_C | Max. structural cruising speed | 129 KIAS | Do not exceed this speed except in smooth air, and then only with caution. |
| V_{NE} | Never exceed speed in smooth air | 178 KIAS | Do not exceed this speed in any operation. |

2.3 AIRSPEED INDICATOR MARKINGS

| Marking | IAS | Significance |
|------------|---------------------|---|
| White arc | 49 KIAS - 91 KIAS | Operating range with flaps fully extended. |
| Green arc | 52 KIAS - 129 KIAS | Normal operating range. |
| Yellow arc | 129 KIAS - 178 KIAS | 'Caution' range - "Only in smooth air". |
| Red line | 178 KIAS | Maximum speed for all operations - V_{NE} . |

2.4 POWER-PLANT LIMITATIONS

- a) Engine manufacturer : Textron Lycoming
- b) Engine designation : IO-360 M1-A
- c) RPM limitations
- Max. take-off RPM : 2700 RPM
 - Max. continuous RPM : 2400 RPM
- d) Manifold pressure limitations
- Maximum : FULL throttle
- e) Oil pressure
- Minimum (IDLE) : 25 PSI / 1.72 bar
 - Maximum : 98 PSI / 6.76 bar
 - Normal operating range : 55 to 95 PSI / 3.8 to 6.55 bar
- f) Oil quantity
- Minimum : 4 qts
 - Maximum : 8 qts
- g) Oil temperature
- Maximum : 245 °F (118 °C)
- h) Fuel pressure
- Minimum : 14 PSI / 0.97 bar
 - Maximum : 35 PSI / 2.4 bar
- i) Cylinder head temperature
- Maximum : 500 °F (260 °C)
- j) Propeller manufacturer : mt-Propeller

- k) Propeller designation : MTV-12-B/180-17 or
MTV-12-B/180-17f
- l) Propeller diameter : 1.80 m (+ 0 mm, - 50 mm)
5 ft 10.9 in (+ 0.0 in, - 2.0 in)
- m) Propeller pitch angle (0.75 R) : 10.5° to 30°
- n) Oil specification:

Airplane engine oil should be used which meets SAEJ1899 (MIL-L-22851) Standard (ashless dispersant type). During the first 50 hours of operation of a new or newly overhauled engine, or after replacement of a cylinder, airplane engine oil should be used which meets SAEJ1966 (MIL-L-6082) Standard (straight mineral type). The viscosity should be selected according to the recommendation given in the following table:

| OAT at Ground Level | <i>During the first 50 hours:</i> SAEJ1966 / MIL-L-6082 Mineral Oil | <i>After 50 hours:</i> SAEJ1899 / MIL-L-22851 Ashless Dispersant Oil |
|------------------------------------|--|---|
| All temperatures | --- | SAE 15-W50, SAE 20-W50 |
| above 80 °F (above 27 °C) | SAE 60 | SAE 60 |
| above 60 °F (above 16 °C) | SAE 50 | SAE 40 or SAE 50 |
| 30 °F to 90 °F (-1 °C to 32 °C) | SAE 40 | SAE 40 |
| 0 °F to 90 °F (-18 °C to 32 °C) | SAE 20-W50 | SAE 20-W50 or SAE 15-W50 |
| 0 °F to 70 °F (-18 °C to 21 °C) | SAE 30 | SAE 30, SAE 40, or SAE 20-W40 |
| below 10 °F (below -12 °C) | SAE 20 | SAE 30 or SAE 20-W30 |

2.5 ENGINE INSTRUMENT MARKINGS

Engine instrument markings and their color code significance are shown in the table below:

NOTE

When an indication lies in the upper or lower prohibited range, the numerical indication will begin flashing as well.

| Indi- cation | Red arc/bar = lower prohibited range | Yellow arc/bar = caution range | Green arc/bar = normal operating range | Yellow arc/bar = caution range | Red arc/bar = upper prohibited range |
|---------------------------|---|--|---|--|---|
| Manifold pressure | -- | -- | 13 - 30 inHg | -- | -- |
| RPM | -- | -- | 500 - 2400 RPM | 2400 - 2700 RPM | above 2700 RPM |
| Oil temp. | -- | -- | 149 - 230 °F | 231 - 245 °F | above 245 °F |
| Cylinder head temp. | -- | -- | 150 - 475 °F | 476 - 500 °F | above 500 °F |
| Oil pressure | below 25 PSI | 25 - 55 PSI | 56 - 95 PSI | 96 - 97 PSI | above 97 PSI |
| Fuel pressure | below 14 PSI | -- | 14 - 35 PSI | -- | above 35 PSI |
| Fuel flow | -- | -- | 1 - 20 US gal/hr | -- | above 20 US gal/hr |
| Voltage | below 24.1 V | 24.1 - 25 V | 25.1 - 30 V | 30.1 - 32 V | above 32 V |
| Ammeter | -- | -- | 2 - 75 A | -- | -- |

| Indi- cation | Red arc/bar = lower prohibited range | Yellow arc/bar = caution range | Green arc/bar = normal operating range | Yellow arc/bar = caution range | Red arc/bar = upper prohibited range |
|--|---|--|--|--|---|
| Fuel quantity, Standard Tank | 0 US gal | -- | 0 - 15 US gal ¹ 0 - 17 US gal ² | -- | -- |
| Fuel quantity, Long Range Tank | 0 US gal | -- | 0 - 16 US gal + 0 - 9 US gal ³ | -- | -- |

¹ up to and including serial number 40.054

² serial number 40.055 and subsequent

³ numerical indication of the *additional* (auxiliary) fuel quantity, for a total fuel quantity on one side in the range between 16 and 25 US gal

2.6 WARNING, CAUTION AND STATUS LIGHTS

The following tables show the color and significance of the warning, caution and status lights on the annunciator panel. There are two variants of the annunciator panel, 'DAI' and 'White Wire' (see Section 7.11).

NOTE

Section 7.11 includes a detailed description of the lights on the annunciator panel.

Color and Significance of the Warning Lights (Red)

| Warning Lights (Red) | | | Cause |
|----------------------|----------------------|------------------------|---|
| Variant 'DAI' | Variant 'White Wire' | Meaning | |
| OIL PR | OIL PRESS | Oil pressure | Oil pressure below 25 PSI |
| FUEL PR | FUEL PRESS | Fuel pressure | Fuel pressure below 14 PSI |
| ALT | ALTERNATOR | Alternator (Generator) | Alternator failure |
| START | START | Starter | Operation of starter, or failure of the starter motor to disengage from the engine after starting |
| DOOR | DOORS | Doors | Front canopy and/or rear door not completely closed and locked |
| | TRIM FAIL | Trim failure | Failure in the automatic trim system of the autopilot (if installed) |

Color and Significance of the Caution Lights (Amber)

| Caution Lights (Amber) | | | Cause |
|------------------------|----------------------|--------------------------|---|
| Variant 'DAI' | Variant 'White Wire' | Meaning | |
| L FUEL | | Fuel quantity left tank | Fuel quantity in the left tank less than 3 US gal (± 1 US gal) |
| R FUEL | | Fuel quantity right tank | Fuel quantity in the right tank less than 3 US gal (± 1 US gal) |
| | LOW FUEL | Fuel quantity | 1 st caution: fuel quantity in one tank less than 3 US gal (± 1 US gal) 2 nd caution: fuel quantity in second tank less than 3 US gal (± 1 US gal) |
| VOLT | LOW VOLTS | Voltage | On-board voltage below 24 V |
| PITOT | PITOT | Pitot heating | Pitot heating not switched ON, or fault in the Pitot heating system |

Color and Significance of the Status Light (White)

| Status Light (White) | | | Cause |
|----------------------|----------------------|----------|--|
| Variant 'DAI' | Variant 'White Wire' | Meaning | |
| IGN | IGNITION | Ignition | Electronic ignition control unit (if installed) not in operation |

2.7 MASS (WEIGHT)

| | | |
|--|------------------------|-------------------------|
| Maximum take-off mass (Normal Category) | : 1150 kg | 2535 lb |
| if MÄM 40-227 is carried out | : 1200 kg | 2646 lb |
| Maximum take-off mass (Utility Category) | : 980 kg | 2161 lb |
| Maximum landing mass | | |
| Original MLG strut | : 1092 kg | 2407 lb |
| Modified MLG strut | | |
| (MÄM 40-123/e or OÄM 40-283) | : 1150 kg | 2535 lb |
| Maximum zero fuel mass | : 1150 kg | 2535 lb |
| Max. load in standard baggage compartment | : 30 kg | 66 lb |
| Max. load in baggage tube | : 5 kg | 11 lb |
| Max. load in extended baggage compartment (OÄM 40-163) | | |
| Max. load in forward part | : 45 kg | 100 lb |
| Max. load in aft part | : 18 kg | 40 lb |
| Max. total load forward + aft | : 45 kg | 100 lb |
| Max. surface load for baggage compartments | : 75 kg/m ² | 15.3 lb/ft ² |

WARNING

Exceeding the mass limits will lead to an overstressing of the airplane as well as to a degradation of flight characteristics and flight performance.

NOTE

The maximum landing mass is the highest mass for landing conditions at the maximum descent velocity. This velocity was used in the strength calculations to determine the landing gear loads during a particularly hard landing.

NOTE

In some countries the beginning of a flight is defined by starting the engine. In those countries a maximum ramp mass 4 kg (9 lb) above the maximum take-off mass is approved. At the time of lift-off the maximum permitted take-off mass must not be exceeded.

2.8 CENTER OF GRAVITY

Datum Plane

The Datum Plane (DP) is a plane which is normal to the airplane's longitudinal axis and in front of the airplane as seen from the direction of flight. The airplane's longitudinal axis is parallel with the upper surface of a 600:31 wedge which is placed on top of the rear fuselage in front of the vertical stabilizer. When the upper surface of the wedge is aligned horizontally, the Datum Plane is vertical. The Datum Plane is located 2.194 meters (86.38 in) forward of the most forward point of the root rib on the stub wing.

Center of Gravity Limitations

The center of gravity (CG) for flight conditions must lie between the following limits:

Most forward CG:

- 2.40 m (94.5 in) aft of DP from 780 kg to 980 kg (1720 lb to 2161 lb)
- 2.46 m (96.9 in) aft of DP at 1150 kg (2535 lb)
- linear variation between these values

■ If MÄM 40-227 is carried out:

- 2.40 m (94.5 in) aft of DP from 780 kg to 980 kg (1720 lb to 2161 lb)
- 2.48 m (97.6 in) aft of DP at 1200 kg (2646 lb)
- linear variation between these values

Most rearward CG:

- a) Standard Tank : 2.59 m (102.0 in) aft of DP
- b) Long Range Tank : 2.55 m (100.4 in) aft of DP

WARNING

Exceeding the center of gravity limitations reduces the controllability and stability of the airplane.

2.9 APPROVED MANEUVERS

The airplane is certified in the Normal Category and in the Utility Category in accordance with JAR-23.

Approved Maneuvers

a) Normal Category:

- 1) All normal flight maneuvers;
- 2) Stalling (with the exception of dynamic stalling); and
- 3) Lazy Eights, Chandelles, as well as steep turns and similar maneuvers, in which an angle of bank of not more than 60° is attained.

CAUTION

Aerobatics, spinning, and flight maneuvers with more than 60° of bank are not permitted in the Normal Category.

b) Utility Category:

- 1) All normal flight maneuvers;
- 2) Stalling (with the exception of dynamic stalling); and
- 3) Lazy Eights, Chandelles, as well as steep turns and similar maneuvers, in which an angle of bank of not more than 90° is attained.

CAUTION

Aerobatics, spinning, and flight maneuvers with more than 90° of bank are not permitted in the Utility Category.

CAUTION

The accuracy of the attitude gyro (artificial horizon) and the directional gyro is affected by the maneuvers approved under item 3 if the bank angle exceeds 60°. Such maneuvers may therefore only be flown when the above mentioned instruments are not required for the present kind of operation.

2.10 MANEUVERING LOAD FACTORS

Table of maximum structural load factors:

Normal Category

| | at v_A | at v_{NE} | With Flaps in T/O or LDG Position |
|----------|----------|-------------|--------------------------------------|
| Positive | 3.8 | 3.8 | 2.0 |
| Negative | -1.52 | 0 | |

Utility Category

| | at v_A | at v_{NE} | With Flaps in T/O or LDG Position |
|----------|----------|-------------|--------------------------------------|
| Positive | 4.4 | 4.4 | 2.0 |
| Negative | -1.76 | -1 | |

WARNING

Exceeding the maximum load factors will lead to an overstressing of the airplane.

2.11 OPERATING ALTITUDE

The maximum demonstrated operating altitude is 16,400 ft (5,000 m).

The maximum approved operating altitude for US registered airplanes is 14,000 ft MSL unless an approved supplemental oxygen system is installed.

2.12 FLIGHT CREW

Minimum crew number : 1 (one person)

Maximum number of occupants:

Normal Category : 4 (four persons)

Utility Category : 2 (two persons), both of whom must sit in front

2.13 KINDS OF OPERATION

Provided that national operational requirements are met, the following kinds of operation are approved:

- * Daytime flights according to Visual Flight Rules (VFR).
- * With the appropriate equipment: night flights according to Visual Flight Rules (NVFR).
- * With the appropriate equipment: flights according to Instrument Flight Rules (IFR).

Flights into known or forecast icing conditions are prohibited.

Flights into known thunderstorms are prohibited.

Minimum Operational Equipment (Serviceable)

The following table lists the minimum serviceable equipment required by JAR-23. Additional minimum equipment for the intended operation may be required by national operating rules and also depends on the route to be flown.

| | | | | |
|-------------|--------|-------------|------------------|------------------|
| Page 2 - 18 | Rev. 8 | 01-Dec-2010 | EASA approved | Doc. # 6.01.01-E |
|-------------|--------|-------------|------------------|------------------|

| Minimum Operational Equipment (Serviceable) | | | |
|---|--|---|---|
| | For Daytime VFR Flights | In Addition for Night VFR Flights | In addition for IFR Flights |
| Flight and Navigation Instruments | <ul style="list-style-type: none"> * Airspeed indicator * Altimeter * Magnetic compass | <ul style="list-style-type: none"> * Vertical speed indicator (VSI) * Attitude gyro (artificial horizon) * Turn & bank indicator * Directional gyro * OAT indicator * Chronometer with indication of hours, minutes, and seconds * VHF radio (COM) with speaker and microphone * VOR receiver * Transponder (XPDR), Mode A and Mode C * 1 headset | <ul style="list-style-type: none"> * Second VHF radio (COM) * VOR-LOC-GP receiver * Marker beacon receiver |
| Engine Instruments | <ul style="list-style-type: none"> * Fuel indicators * Integrated engine instrument * Annunciator panel (all lights, see 2.6) | <ul style="list-style-type: none"> * Ammeter (included in VM 1000) * Voltmeter (included in VM 1000) | |

| Minimum Operational Equipment (Serviceable) | | | |
|--|--|---|---|
| | For Daytime VFR Flights | In Addition for Night VFR Flights | In addition for IFR Flights |
| Lighting | | <ul style="list-style-type: none"> * Position lights * Strobe lights (anti collision lights) * Landing light * Instrument lighting * Flood light * Flashlight | |
| Other Operational Minimum Equipment | <ul style="list-style-type: none"> * Stall warning system * Fuel quantity measuring device (see 7.10) * Safety belts for each occupied seat * Airplane flight manual | <ul style="list-style-type: none"> * Pitot heating system * Alternate static valve * Essential bus | <ul style="list-style-type: none"> * Emergency battery |

NOTE

A list of approved equipment can be found in Chapter 6.

NOTE

For the upgrade of an airplane for Night VFR or IFR operation it is not sufficient to install the required equipment. The retrofit must be carried out in accordance with the requirements of the manufacturer (see Service Bulletins) and the national Airworthiness Authority. Any additional equipment (equipment which is not listed in the Equipment List in Section 6.5) must also be approved for the intended kind of operation by the national Airworthiness Authority.

2.14 FUEL

I Fuel Grade AVGAS 100LL / AVGAS 100/130LL (ASTM D910)

I AVGAS 100 / AVGAS 100/130 (ASTM D910)

Fuel Quantity

a) Standard Tank:

Total fuel quantity : 2 x 20.6 US gal (app. 2 x 78 liter)

Unusable fuel : 2 x 0.5 US gal (app. 2 x 2 liter)

Max. indicated fuel quantity:

up to and incl. serial no. 40.054 : 15 US gal (app. 57 liter) per tank

serial no. 40.055 & subsequent : 17 US gal (app. 64 liter) per tank

Max. permissible difference

between right and left tank : 10 US gal (app. 38 liter)

b) Long Range Tank (if installed):

| | |
|---|---|
| Total fuel quantity | : 2 x 25.5 US gal (app. 2 x 96.5 liter) |
| Unusable fuel | : 2 x 0.5 US gal (app. 2 x 2 liter) |
| Max. indicated fuel quantity | : 16 US gal (app. 61 liter) per tank |
| Indicated quantity auxiliary fuel tank | : 0 to 9 US gal (app. 0 to 34 liter) per tank |
| Max. permissible difference between right and left tank | : 8 US gal (app. 30 liter) |

CAUTION

If a fuel indicator shows 16 US gal and the aux. fuel indicator reads 0 US gal on the same side, then 19 US gal must be assumed for the calculation of the difference between right and left tank.

2.15 LIMITATION PLACARDS

All *limitation* placards are shown below. A list of *all* placards is included in the Airplane Maintenance Manual (Doc. No. 6.02.01), Chapter 11.

On the Instrument Panel:

■ If MÄM 40-227 is not carried out:

Maneuvering speed:

$v_A = 108$ KIAS (above 980 up to 1150 kg / above 2161 up to 2535 lb)

$v_A = 94$ KIAS (780 to 980 kg / 1720 to 2161 lb)

This airplane may only be operated in accordance with the Airplane Flight Manual. It can be operated in the “Normal” and “Utility” categories in non-icing conditions. Provided that national operational requirements are met and the appropriate equipment is installed, this airplane is approved for the following kinds of operation: day VFR, night VFR and IFR. All aerobatic maneuvers including spinning are prohibited.

For further operational limitations refer to the Airplane Flight Manual.

No smoking.

If MÄM 40-227 is carried out:

Maneuvering Speed:

$v_A = 111$ KIAS (above 1036 up to 1200 kg, above 2284 up to 2646 lb)

$v_A = 94$ KIAS (780 to 1036 kg, 1720 to 2284 lb)

The airplane may only be operated in accordance with the Airplane Flight Manual. It can be operated in the „Normal“ and the „Utility“ categories in non-icing conditions. Provided that national operational requirements are met and the appropriate equipment is installed, this airplane is approved for the following kinds of operation: day VFR, night VFR and IFR. All aerobatic maneuvers including spinning are prohibited.

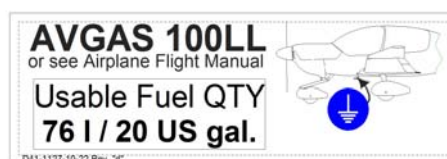
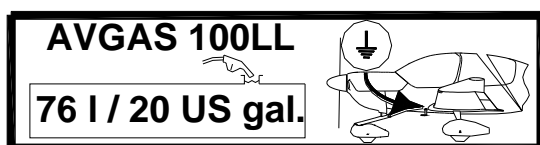
For further operational limitations refer to the Airplane Flight Manual.

No smoking.

Next to Each of the Two Fuel Filler Necks:

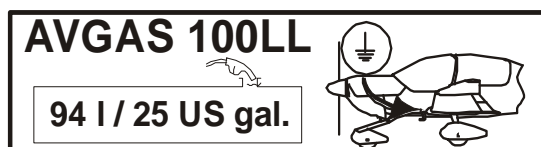
a) *Standard Tank:*

If MÄM 40-617 is installed:



b) *Long Range Tank (if installed):*

If MÄM 40-617 is installed:



Next to the Fuel Quantity Indication:

a) Standard Tank:

Up to serial number 40.054:

max. indicated fuel quantity: 15 US gal

left and right tank max. 10 US gal difference

For use of max. tank capacity see AFM

Serial number 40.055 and subsequent:

max. indicated fuel quantity: 17 US gal

left and right tank max. 10 US gal difference

For use of max. tank capacity see AFM

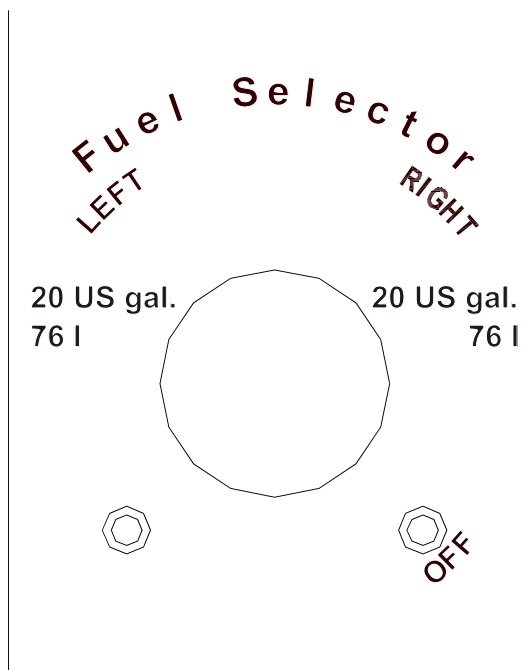
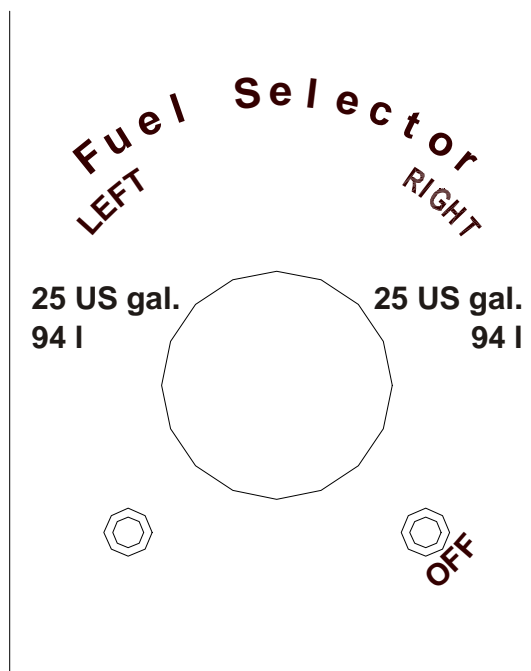
b) Long Range Tank (if installed):

Fuel qty. indication: 16 + 9 US gal

max. difference LH/RH tank: 8 US gal

AUX FUEL QTY switch for LH/RH auxiliary fuel quantity

NOTE: See AFM for more information on AUX FUEL

On the Fuel Tank Selector:*a) Standard Tank:**b) Long Range Tank (if installed):*

In the Cowling, on the Door for the Oil Filler Neck:

OIL 1 qt = 0.95 liters

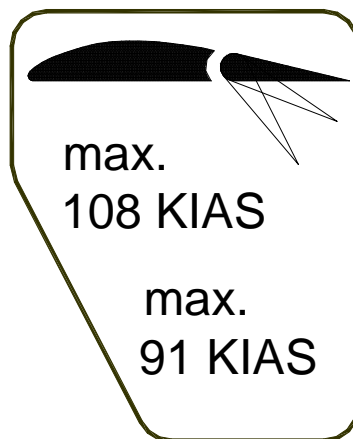
SAE 15W50

ashless dispersant aviation
grade oil (SAE Standard J-1899)
or see AFM Chapter 2

VFR Min./Max.: 4/8 qts

IFR Min./Max.: 6/8 qts

Next to the Flap Selector Switch:

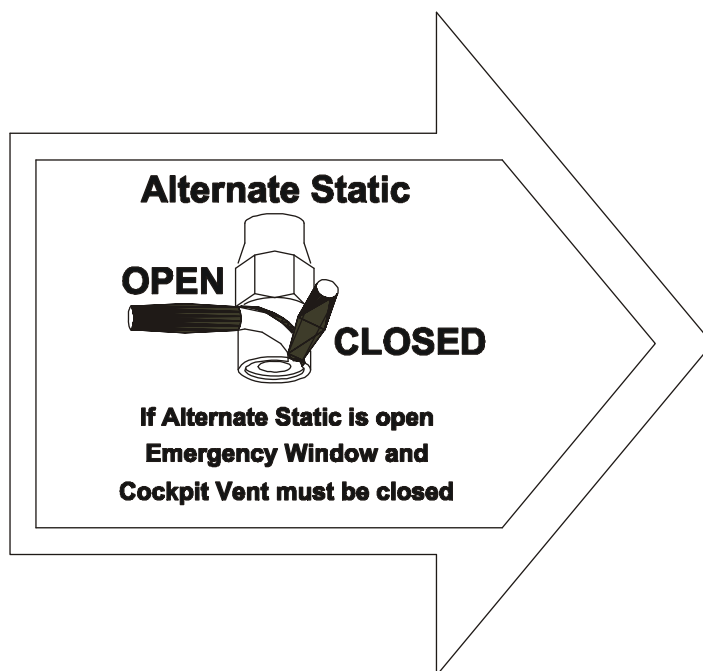


Next to the Essential Bus Switch (if installed):

Ess. Bus NOT for normal operation. See AFM.

In the Cockpit, on the Left Fuselage Sidewall:

(if alternate static valve is installed):

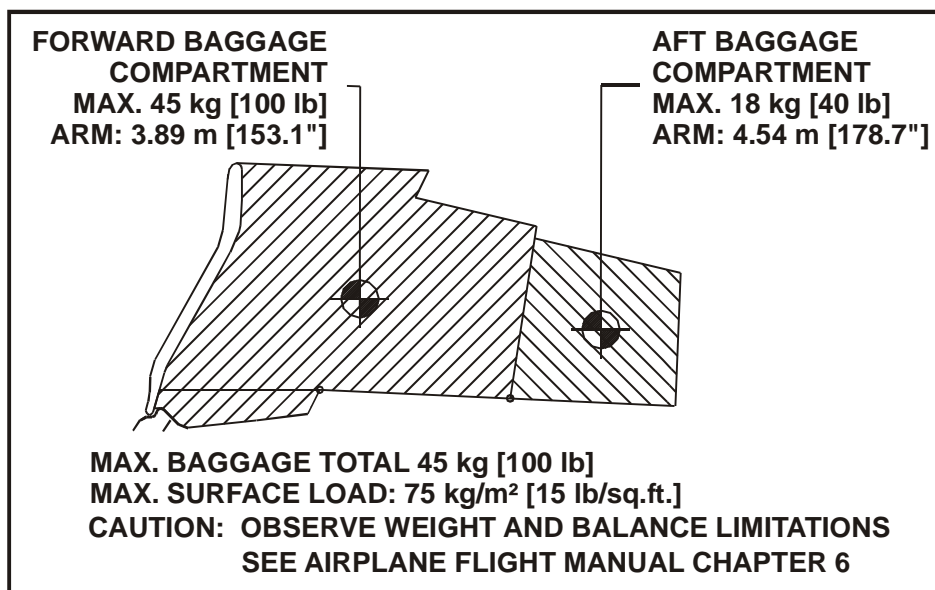


Next to the Baggage Compartment:

a) Standard Baggage Compartment:



b) *Extended Baggage Compartment (OÄM 40-163, if installed):*



Beside the Door Locking Device (OÄM 40-081, if installed):

EMERGENCY EXIT:

The keylock must be
unlocked during flight!

Above the NAV #2 CDI (OÄM 40-206, if installed):

**NAV No. 2 not approved
for precision approaches**

2.16 OTHER LIMITATIONS

2.16.1 TEMPERATURE

- The airplane may only be operated when its temperature prior to operation is not less
- than -40 °C (-40 °F) and not higher than 54 °C (129 °F).

CAUTION

For cold weather starting of the engine refer to the latest instructions given by the engine manufacturer.

2.16.2 BATTERY CHARGE

Taking off for a Night VFR or IFR flight with an empty battery is not permitted.

The use of an external power supply for engine starting with an empty airplane battery is not permitted if the subsequent flight is intended to be an IFR flight. In this case the airplane battery must first be charged.

2.16.3 EMERGENCY SWITCH

IFR flights are not permitted when the seal on the emergency switch is broken.

2.16.4 OPERATION TIME OF ELECTRICAL EQUIPMENT

Following an alternator failure and with the essential bus (if installed) switched ON, it can be expected that the systems listed under 3.7.2 - FAILURES IN THE ELECTRICAL SYSTEM are supplied with power for half an hour. After this, electrical power is available

for the attitude gyro (artificial horizon) and flood light for another 1.5 hours when the emergency power pack (if installed) is used.

2.16.5 DOOR LOCKING DEVICE

The canopy and the passenger door must not be blocked by the door locking device during operation of the airplane.

2.16.6 ELECTRONIC EQUIPMENT

The use and switching on of electronic equipment other than that which is part of the equipment of the airplane is not permitted, as it could lead to interference with the airplane's avionics.

Examples of undesirable items of equipment are:

- Mobile telephones.
- Remote radio controls.
- Video screens employing CRTs.
- MiniDisc recorders when in the record mode.

This list is not exhaustive.

The use of laptop computers, including those with CD-ROM drives, CD and minidisc players in the replay mode, cassette players and video cameras is permitted. All this equipment however should be switched off for take-off and landing.

| 2.16.7 USE OF THE SUN VISORS

- |** The sun visors (if installed, OÄM 40-327) may only be used during cruise. During all other
- |** phases of flight the sun visors must be locked in the fully upward position.

Intentionally left blank.

| | Page |
|-------|--|
| 3.1 | INTRODUCTION 3-3 |
| 3.1.1 | GENERAL 3-3 |
| 3.1.2 | CERTAIN AIRSPEEDS IN EMERGENCIES 3-4 |
| 3.2 | ENGINE PROBLEMS 3-5 |
| 3.2.1 | ENGINE PROBLEMS ON THE GROUND 3-5 |
| 3.2.2 | ENGINE PROBLEMS DURING TAKE-OFF 3-6 |
| 3.2.3 | ENGINE PROBLEMS IN FLIGHT 3-8 |
| 3.2.4 | RESTARTING THE ENGINE WITH WINDMILLING PROPELLER 3-17 |
| 3.2.5 | DEFECTIVE ENGINE CONTROLS 3-18 |
| 3.2.6 | RESTARTING THE ENGINE WITH STATIONARY PROPELLER 3-20 |
| 3.3 | SMOKE AND FIRE 3-22 |
| 3.3.1 | SMOKE AND FIRE ON THE GROUND 3-22 |
| 3.3.2 | SMOKE AND FIRE DURING TAKE-OFF 3-24 |
| 3.3.3 | SMOKE AND FIRE IN FLIGHT 3-26 |
| 3.4 | GLIDING 3-28 |
| 3.5 | EMERGENCY LANDINGS 3-29 |
| 3.5.1 | EMERGENCY LANDING WITH ENGINE OFF 3-29 |
| 3.5.2 | LANDING WITH A DEFECTIVE TIRE ON THE MAIN LANDING GEAR 3-31 |
| 3.5.3 | LANDING WITH DEFECTIVE BRAKES 3-32 |
| 3.6 | RECOVERY FROM AN UNINTENTIONAL SPIN 3-33 |

| | | |
|-------|--|------|
| 3.7 | OTHER EMERGENCIES | 3-34 |
| 3.7.1 | ICING | 3-34 |
| 3.7.2 | FAILURES IN THE ELECTRICAL SYSTEM | 3-35 |
| 3.7.3 | SUSPICION OF CARBON MONOXIDE CONTAMINATION IN THE CABIN | 3-39 |
| 3.7.4 | 'DOOR'-WARNING LIGHT ON | 3-40 |
| 3.7.5 | EMERGENCY EXIT | 3-41 |

NOTE

Procedures for uncritical system faults are given in Chapter
4B - ABNORMAL OPERATING PROCEDURES.

3.1 INTRODUCTION

3.1.1 GENERAL

This Chapter contains checklists as well as the description of recommended procedures to be followed in the event of an emergency. Engine failure or other airplane-related emergencies are most unlikely to occur if the prescribed procedures for pre-flight checks and airplane maintenance are followed.

If, nonetheless, an emergency does arise, the guidelines given here should be followed and applied in order to clear the problem.

As it is impossible to foresee all kinds of emergencies and cover them in this Airplane Flight Manual, a thorough understanding of the airplane by the pilot is, in addition to his knowledge and experience, an essential factor in the solution of any problems which may arise.

WARNING

In each emergency, control over the flight attitude and the preparation of a possible emergency landing have priority over attempts to solve the current problem ("first fly the aircraft"). Prior to the flight the pilot must consider the suitability of the terrain for an emergency landing for each phase of the flight. For a safe flight the pilot must constantly keep a safe minimum flight altitude. Solutions for various adverse scenarios should be thought over in advance. Thus it should be guaranteed that the pilot is at no time shocked by an engine failure and that he can act calmly and with determination.

3.1.2 CERTAIN AIRSPEEDS IN EMERGENCIES

| Flight Mass | | 850 kg 1874 lb | 1000 kg 2205 lb | 1150 kg 2535 lb | 1200 kg 2646 lb |
|--|-----------|-------------------|--------------------|--------------------|--------------------|
| Event | | | | | |
| Engine failure after take-off (Flaps T/O) | | 59 KIAS | 66 KIAS | 72 KIAS | 74 KIAS |
| Airspeed for best glide angle (Flaps UP) | | 60 KIAS | 68 KIAS | 73 KIAS | 76 KIAS |
| Emergency landing with engine off | Flaps UP | 60 KIAS | 68 KIAS | 73 KIAS | 76 KIAS |
| | Flaps T/O | 59 KIAS | 66 KIAS | 72 KIAS | 74 KIAS |
| | Flaps LDG | 58 KIAS | 63 KIAS | 71 KIAS | 73 KIAS |

3.2 ENGINE PROBLEMS

3.2.1 ENGINE PROBLEMS ON THE GROUND

1. Throttle IDLE
2. Brakes as required
3. Engine switch off, if considered
necessary; otherwise
establish the cause of the
problem and re-establish
engine performance

CAUTION

If the oil pressure is below the green sector, the engine must be switched off immediately.

WARNING

If the problem cannot be cleared, the airplane must not be flown.

END OF CHECKLIST

3.2.2 ENGINE PROBLEMS DURING TAKE-OFF

(a) Take-Off Can Still Be Aborted (Sufficient Runway Length Available)

Land Straight Ahead:

1. Throttle IDLE

On the Ground:

2. Brakes as required

CAUTION

If sufficient time is remaining, the risk of fire in the event of a collision can be reduced as follows:

- Fuel tank selector OFF
- Mixture control lever LEAN - shut engine off
- Ignition switch OFF
- Master switch (ALT/BAT) OFF

CONTINUED

(b) Take-Off Can No Longer Be Aborted

- | | |
|-------------------|----------------------------|
| 1. Airspeed | 74 KIAS (1200 kg, 2646 lb) |
| | 72 KIAS (1150 kg, 2535 lb) |
| | 66 KIAS (1000 kg, 2205 lb) |
| | 59 KIAS (850 kg, 1874 lb) |

WARNING

If, in the event of an engine problem occurring during take-off, the take-off can no longer be aborted and a safe height has not been reached, then a straight-ahead emergency landing should be carried out. Turning back can be fatal.

If Time Allows:

- | | |
|--------------------------------|--------------------------------------|
| 2. Fuel tank selector | check selected tank |
| 3. Electrical fuel pump | check ON |
| 4. Ignition switch | check BOTH |
| 5. Throttle | check MAX PWR |
| 6. RPM lever | check HIGH RPM |
| 7. Mixture control lever | check RICH (leaner above 5000 ft) |
| 8. Alternate Air | OPEN |

WARNING

If the problem does not clear itself immediately, and the engine is no longer producing sufficient power, then an emergency landing must be carried out.

END OF CHECKLIST

3.2.3 ENGINE PROBLEMS IN FLIGHT

(a) Engine Running Roughly

WARNING

An engine which is running very roughly can lead to the loss of the propeller. If the engine is running roughly operation should only be continued if there is no other alternative.

1. Airspeed 76 KIAS (1200 kg, 2646 lb)
73 KIAS (1150 kg, 2535 lb)
68 KIAS (1000 kg, 2205 lb)
60 KIAS (850 kg, 1874 lb)
2. Electrical fuel pump check ON
3. Fuel tank selector check selected tank
4. Engine instruments check
5. Throttle check
6. RPM lever check
7. Mixture control lever set for smooth running
8. Alternate Air OPEN
9. Ignition status light check (only if the electronic
ignition control unit is
installed)
10. Ignition switch check BOTH

CONTINUED

11. Ignition circuit breaker (IGN) pull (only if the electronic ignition control unit is installed); if rough running is cleared by doing this, the circuit breaker should remain open
12. Throttle/RPM/Mixture try various settings

WARNING

If the problem does not clear itself immediately, and the engine is no longer producing sufficient power, then an emergency landing should be carried out.

END OF CHECKLIST

(b) Loss of Oil Pressure

1. Check oil pressure warning light and oil pressure indicator.
2. Check oil temperature.
 - 2a. If the oil pressure indication drops below the green sector and the oil temperature is normal (oil pressure warning light does not illuminate or flash):
 - * Monitor the oil pressure warning light: it is probable that the oil pressure indication is defective.
 - * Monitor the oil and cylinder head temperatures.
 - 2b. If the oil pressure indication drops below the green sector while the oil or cylinder head temperature is rising, or

If the oil pressure warning light illuminates or flashes, or

If both of these occur together:
 - * Reduce engine power to the minimum required.
 - * Land as soon as possible.
 - * Be prepared for engine failure and emergency landing.
 - 2c. Oil pressure tending to zero combined with:

Vibration, loss of oil, possibly unusual metallic noise and smoke:
 - * A mechanical failure in the engine is apparent.
 - * Shut off engine immediately and
 - * Carry out emergency landing in accordance with 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

END OF CHECKLIST

| | | | |
|-------------|--------|-------------|------------------|
| Page 3 - 10 | Rev. 8 | 01-Dec-2010 | Doc. # 6.01.01-E |
|-------------|--------|-------------|------------------|

(c) High Oil Pressure

Check oil temperature.

- * If the oil temperature is normal, it is probable that the fault lies in the oil pressure indication, which should thus be ignored (the airplane should be serviced).

END OF CHECKLIST(d) High Oil Temperature

Check cylinder head and exhaust gas temperature.

- * If neither of these is high, it is probable that the fault lies in the oil temperature indication. The airplane should be serviced. A stable oil temperature indication of 26 °F (-3 °C) or 317 °F (158 °C) suggests a failure of the oil temperature sensor.
- * If the cylinder head temperature or exhaust gas temperature is also high:
 - Check oil pressure. If the oil pressure is low, proceed as in 3.2.3 (b) - LOSS OF OIL PRESSURE.
 - If the oil pressure is in the green sector:
 - Check mixture setting, enrich mixture if necessary.
 - Reduce power; if this produces no improvement, land at the nearest appropriate airfield.

END OF CHECKLIST

(e) High Cylinder Head Temperature

Cylinder head temperature in yellow sector or above:

1. Check mixture setting, enrich mixture if necessary.
2. Check oil temperature.

* If the oil temperature is also high:

- Check oil pressure. If the oil pressure is low, proceed as in 3.2.3 (b) - LOSS OF OIL PRESSURE.
- If the oil pressure is in the green sector:
 - Reduce power; if this produces no improvement, land at the nearest appropriate airfield.
 - Be prepared for possible emergency landing.

END OF CHECKLIST

(f) High RPM

RPM moves on its own into the yellow sector, or is in the red sector:

1. Check friction adjuster for throttle quadrant.
2. Check oil pressure: Following a loss of oil or oil pressure, the propeller governor sets a high RPM. In this case the RPM should be regulated using the throttle. Proceed as in 3.2.3 (b) - LOSS OF OIL PRESSURE.
3. If oil pressure is normal:
 - * Pull RPM lever back and listen for an associated drop in RPM:
 - If the indication does not change in spite of an audible drop in RPM, it is probable that the RPM indication is defective, which should thus be ignored (the airplane should be serviced).
 - If there is no audible drop in RPM, it is probable that the governor system is defective. In this case the RPM should be regulated using the throttle.

END OF CHECKLIST

(g) Loss of RPM

1. Electrical fuel pump check ON
 2. Fuel tank selector check
 3. Friction adjuster for throttle quadrant check sufficiently tight
 4. RPM lever HIGH RPM
- * Listen for rise in RPM.
- If there is no audible rise in RPM, it is probable that the governor system is defective. In this case the RPM can be regulated within certain limits using the throttle.
 - Land at the nearest appropriate airfield.
 - Be prepared for possible emergency landing.
 - If the indication does not change in spite of an audible rise in RPM, it is probable that the RPM indication is defective, which should thus be ignored (the airplane should be serviced).

END OF CHECKLIST

(h) High Fuel Flow

Fuel flow in the red sector:

1. Electrical fuel pump ON
2. Fuel pressure check after 10 - 15 sec:
 - * If the fuel pressure is low, refer to 3.2.3 (i) - LOW FUEL PRESSURE WITH THE ELECTRICAL FUEL PUMP SET TO ON.
 - * If the fuel pressure is in the green sector, or the fuel pressure warning light is not illuminated, the likely cause is a defective fuel flow indication, which should thus be ignored (the airplane should be serviced). Fuel flow data should be taken from the engine performance table in Chapter 5.
3. Check fuel quantity. A rapid reduction in fuel quantity confirms a high fuel flow.

END OF CHECKLIST

(i) Low Fuel Pressure with the Electrical Fuel Pump Set to ON

Fuel pressure warning light illuminates, or fuel pressure indication below the green sector:

1. Fuel flow check:

- * If the fuel flow is high, there is possibly a leak (between the injection system and the injectors). Land on the nearest suitable airfield.
- * If the fuel flow is in the green sector and the engine is running smoothly, the likely cause is a defective fuel pressure indication, which should thus be ignored (the airplane should be serviced).

Monitor engine for power loss and rough operation that could indicate fuel starvation. If the engine is no longer producing sufficient power, then an emergency landing should be carried out.

END OF CHECKLIST

3.2.4 RESTARTING THE ENGINE WITH WINDMILLING PROPELLER

NOTE

Restarting the engine is possible at all airspeeds above 70 KIAS up to v_{NE} and up to the maximum demonstrated operating altitude.

NOTE

As long as an airspeed of at least 65 KIAS is maintained, and there is no major engine failure, the propeller will continue to windmill.

1. Airspeed 80 KIAS
2. Fuel tank selector fullest tank
3. Ignition switch check BOTH
4. Mixture control lever check appropriate position
5. Electrical fuel pump check ON
6. Alternate air OPEN

If Engine Does Not Start:

7. Mixture control lever LEAN
8. Mixture control lever push forward slowly until engine starts

NOTE

If it is not possible to start the engine:

- Adopt glide configuration as in 3.4 - GLIDING.
- Carry out emergency landing as in 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

END OF CHECKLIST

3.2.5 DEFECTIVE ENGINE CONTROLS

Defective Mixture Control Cable

(a) Flight and Landing:

1. Maintain altitude to the nearest airfield.
2. During descent, test the reaction of the engine to a higher power setting. A lean mixture can lead to engine roughness and a loss of power. The landing approach must be planned accordingly.

WARNING

Go-around may become impossible with the remaining power.

(b) Engine Shut-Down:

1. Parking brake set
2. Engine instruments check
3. Avionics master switch OFF
4. All electrical equipment OFF
5. Throttle IDLE
6. Ignition switch OFF
7. Master switch (ALT/BAT) OFF

END OF CHECKLIST

Defective Throttle Control Cable*(a) Sufficient Engine Power Available to Continue Flight:*

1. Approach nearest airfield, control engine power with RPM lever.
2. Perform landing with shut-down engine.

(b) No Sufficient Engine Power Available to Continue Flight:

1. Carry out emergency landing as in 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

END OF CHECKLISTDefective RPM Lever Control Cable*(a) Sufficient Engine Power Available to Continue Flight:*

1. Approach nearest airfield, control engine power with throttle.
2. Perform normal landing.

WARNING

Go-around may become impossible with the remaining power.

(b) No Sufficient Engine Power Available to Continue Flight:

1. Carry out emergency landing as in 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

END OF CHECKLIST

3.2.6 RESTARTING THE ENGINE WITH STATIONARY PROPELLER

NOTE

Restarting the engine is possible at all airspeeds above 80 KIAS up to v_{NE} and up to the maximum demonstrated operating altitude.

1. Airspeed 80 KIAS
2. Electrical equipment OFF
3. Avionics master switch OFF
4. Master switch (BAT) check ON
5. Mixture control lever check
6. Fuel tank selector check
7. Electrical fuel pump check ON
8. Alternate air OPEN
9. Ignition switch START

NOTE

By increasing the airspeed above approximately 130 KIAS, the propeller will begin to rotate and the engine can thus be started. For this, the Ignition switch should be set at BOTH (see 3.2.4 - RESTARTING THE ENGINE WITH WINDMILLING PROPELLER). An altitude loss of at least 1000 ft (300 meter) must be allowed for.

if it is not possible to start the engine:

- Adopt glide configuration as in 3.4 - GLIDING
- Carry out emergency landing as in 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

CONTINUED

CAUTION

Engine restart following an engine fire should only be attempted if it is unlikely that a safe emergency landing can be made. It must be expected that engine restart is impossible after an engine fire.

END OF CHECKLIST

3.3 SMOKE AND FIRE

3.3.1 SMOKE AND FIRE ON THE GROUND

(a) Engine Fire When Starting on the Ground

1. Fuel tank selector OFF
2. Cabin heat OFF
3. Brakes apply

After Standstill:

4. Throttle MAX PWR
5. Master switch (ALT/BAT) OFF

When the Engine Has Stopped:

6. Ignition switch OFF
7. Canopy open
8. Airplane evacuate immediately

END OF CHECKLIST

(b) Electrical Fire with Smoke on the Ground

1. Master switch (ALT/BAT) OFF

If the Engine is Running:

2. Throttle IDLE
3. Mixture control lever LEAN - shut off engine

When the Engine Has Stopped:

4. Ignition switch OFF
5. Canopy open
6. Airplane evacuate immediately

END OF CHECKLIST

3.3.2 SMOKE AND FIRE DURING TAKE-OFF

(a) If Take-Off Can Still Be Aborted

1. Throttle IDLE
2. Cabin heat OFF
3. Brakes apply - bring the airplane to
a stop
4. After stopping proceed as in 3.3.1 -
SMOKE AND FIRE ON THE
GROUND

END OF CHECKLIST

(b) If Take-Off Cannot Be Aborted

1. Cabin heat OFF
2. If possible, fly along a short-cut traffic circuit and land on the airfield.

WARNING

If, in the event of an engine problem occurring during take-off,
the take-off can no longer be aborted and a safe height has
not been reached, then a straight-ahead emergency landing
should be carried out. Turning back can be fatal.

3. Airspeed 74 KIAS (1200 kg, 2646 lb)
72 KIAS (1150 kg, 2235 lb)
66 KIAS (1000 kg, 2205 lb)
59 KIAS (850 kg, 1874 lb)

CONTINUED

After Climbing to a Height From Which the Selected Landing Area Can Be Reached Safely:

- 4. Fuel tank selector OFF
- 5. Electrical fuel pump OFF
- 6. Cabin heat OFF
- 7. Master switch (ALT/BAT) OFF
- 8. Emergency window(s) open if required
- 9. Carry out emergency landing with engine off. Allow for increased landing distance due to the flap position.

CAUTION

In case of extreme smoke development, the front canopy may be unlatched during flight. This allows it to partially open, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

END OF CHECKLIST

3.3.3 SMOKE AND FIRE IN FLIGHT

CAUTION

In the event of smoke or fire, prepare to land the airplane 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.

(a) Engine Fire in Flight

1. Cabin heat OFF
2. Select appropriate emergency landing field.

When it Seems Certain that the Landing Field Will Be Reached:

3. Fuel tank selector OFF
4. Throttle MAX PWR
5. Electrical fuel pump OFF
6. Master switch (ALT/BAT) ON
7. Emergency window(s) open if required
8. Carry out emergency landing with engine off.

CAUTION

In case of extreme smoke development, the front canopy may be unlatched during flight. This allows it to partially open, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

END OF CHECKLIST

(b) Electrical Fire with Smoke in Flight

1. Emergency switch ON if installed
2. Master switch (ALT/BAT) OFF
3. Cabin heat OFF
4. Emergency window(s) open if required
5. Land at an appropriate airfield as soon as possible.

CAUTION

Switching OFF the Master switch (ALT/BAT) will lead to total failure of all electronic and electric equipment. Also affected from this are - if installed - the attitude gyro (artificial horizon) and the directional gyro.

However, by switching the Emergency switch ON (only installed in the IFR model), the emergency battery will supply power to the attitude gyro (artificial horizon) and the flood light.

CAUTION

In case of extreme smoke development, the front canopy may be unlatched during flight. This allows it to partially open, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

END OF CHECKLIST

3.4 GLIDING

1. Flaps UP
2. Airspeed 76 KIAS (1200 kg, 2646 lb)
73 KIAS (1150 kg, 2535 lb)
68 KIAS (1000 kg, 2205 lb)
60 KIAS (850 kg, 1874 lb)

NOTE

The glide ratio is 8.8; i.e., for every 1000 ft (305 meter) of altitude loss the maximum horizontal distance traveled in still air is 1.45 NM (2.68 km). During this the propeller will continue to windmill.

With a stationary propeller the glide ratio is 10.3; this corresponds to a maximum horizontal distance of 1.70 NM (3.14 km) for every 1000 ft altitude. In consideration of a safe airspeed however, this configuration may not be attainable.

END OF CHECKLIST

3.5 EMERGENCY LANDINGS

3.5.1 EMERGENCY LANDING WITH ENGINE OFF

CAUTION

For emergency landing the adjustable backrests (if installed) must be fixed in the upright position.

1. Adjustable backrests (if installed) adjust to the upright position described by a placard on the roll-over bar and verify proper fixation.
2. Select suitable landing area. If no level landing area is available, a landing on an upward slope should be sought.
3. Consider wind.
4. Approach: If possible, fly along a short-cut rectangular circuit. On the downwind leg of the circuit the landing area should be inspected for obstacles from a suitable height. The degree of offset at each part of the circuit will allow the wind speed and direction to be assessed.
5. Airspeed 76 KIAS (1200 kg, 2646 lb)
73 KIAS (1150 kg, 2535 lb)
68 KIAS (1000 kg, 2205 lb)
60 KIAS (850 kg, 1874 lb)
6. If time allows advise ATC
7. Fuel tank selector OFF

CONTINUED

When It Is Certain That the Landing Field Will Be Reached:

- 8. Flaps LDG
- 9. Safety harnesses tighten

CAUTION

If sufficient time is remaining, the risk of fire in the event of a collision with obstacles can be reduced as follows:

- Ignition switch OFF
- Master switch (ALT/BAT) OFF

- 10. Touchdown with the lowest possible airspeed

END OF CHECKLIST

3.5.2 LANDING WITH A DEFECTIVE TIRE ON THE MAIN LANDING GEAR**CAUTION**

A defective (e.g. burst) tire is not usually easy to detect. The damage normally occurs during take-off or landing, and is hardly noticeable during fast taxiing. It is only during the roll-out after landing or at lower taxiing speeds that a tendency to swerve occurs. Rapid and determined action is then required.

1. Advise ATC.
2. Land the airplane at the edge of the runway that is located on the side of the intact tire, so that changes in direction which must be expected during roll-out due to the braking action of the defective tire can be corrected on the runway.
3. Land with one wing low. The wing on the side of the intact tire should be held low.
4. Direction should be maintained using the rudder. This should be supported by use of the brake. It is possible that the brake must be applied strongly - if necessary to the point where the wheel locks. The wide track of the landing gear will prevent the airplane from tipping over a wide speed range. There is no pronounced tendency to tip even when skidding.

END OF CHECKLIST

3.5.3 LANDING WITH DEFECTIVE BRAKES

In general, a landing on grass is recommended in order to reduce the landing run by virtue of the greater rolling resistance.

CAUTION

If sufficient time is remaining, the risk of fire in the event of a collision can be reduced as follows:

- Fuel tank selector OFF
- Mixture control lever LEAN - shut off engine
- Ignition switch OFF
- Master switch (ALT/BAT) OFF

END OF CHECKLIST

3.6 RECOVERY FROM AN UNINTENTIONAL SPIN

CAUTION

Steps 1 to 4 must be carried out **immediately** and **simultaneously**.

1. Throttle IDLE
2. Rudder full deflection against
direction of spin
3. Elevator (control stick) fully forward
4. Ailerons neutral
5. Flaps UP

When Rotation Has Stopped:

6. Rudder neutral
7. Elevator (control stick) pull carefully
8. Return the airplane from a descending into a normal flight attitude. In so doing do not exceed the 'never exceed speed', v_{NE} .

END OF CHECKLIST

3.7 OTHER EMERGENCIES

3.7.1 ICING

Unintentional Flight Into Icing Conditions

1. Leave the icing area (by changing altitude or turning back, in order to reach zones with a higher ambient temperature).
2. Pitot heating ON
3. Cabin heat ON
4. Air distributor lever ▲ (up)
5. RPM increase, in order to prevent
ice build-up on the propeller
blades
6. Alternate air OPEN
7. Emergency window(s) open if required

CAUTION

Ice build-up increases the stalling speed. If required for safety reasons, engine speeds up to 2700 RPM are admissible without time limit.

8. ATC advise if an emergency is
expected

CAUTION

When the Pitot heating fails, and the alternate static valve is installed:

- Alternate static valve OPEN
- Emergency window(s) close

END OF CHECKLIST

3.7.2 FAILURES IN THE ELECTRICAL SYSTEM**(a) Complete Failure of the Electrical System**

Due to the strong mechanical design as well as due to the required check of the system during scheduled inspections, a total failure of the electrical system is extremely unlikely. If, nevertheless, a total failure should occur, all circuit breakers should be checked, pulled and re-set. If this does not help:

- Set Emergency switch to ON (if installed).
- When necessary, use the flood light for lighting the instruments as well as levers and switches, etc.
- Set power based on lever positions and engine noise.
- Prepare landing with flaps in the given position.
- Land on the nearest appropriate airfield.

END OF CHECKLIST

(b) Alternator Failure

An alternator failure is indicated by an illuminated or flashing alternator warning light (ALT or ALTERNATOR) on the annunciator panel and a flashing ammeter on the Vision Microsystems VM 1000 engine instrument.

I (i) *Alternator Failure During Flight*

1. Circuit breakers check; if all are OK, proceed with step 2
2. Electrical equipment switch OFF all equipment which is not needed
3. Voltmeter check regularly

CAUTION

Those items of equipment which are not needed for the safe operation and secure landing of the airplane can be switched off with the Essential Bus switch (if installed). When the essential bus is switched ON, only the following items of equipment are supplied with power:

- NAV/COM 1.
- Transponder (XPDR).
- Flood light.
- Attitude gyro (artificial horizon).
- VM 1000 engine instrument.
- Annunciator panel.
- GPS (if installed).
- Landing light.
- Pitot heating system.
- Flaps.

CONTINUED

These items of equipment can be supplied with power by the battery for at least 30 minutes. Economical use, in particular of the Pitot heating, and switching off equipment that is not needed extends the time during which the other equipment remains available. During the 30 minutes period, the airplane must be landed at a suitable airfield.

For cases in which the battery capacity is not sufficient to reach a suitable airfield, an emergency battery is installed in the IFR model, serving as an additional back-up system for the attitude gyro (artificial horizon) and flood light. This battery is switched on with the Emergency switch. It lasts for 1 hour and 30 minutes when the flood light is switched on.

(ii) Alternator Failure on the Ground

NOTE

An alternator failure may also be indicted on ground with the engine running on IDLE.

1. Engine speed 1200 RPM
2. Electrical equipment OFF
3. Ammeter check

If the caution light does not extinguish, and the ammeter flashes and reads zero:

- Terminate flight preparation.

END OF CHECKLIST

(c) Starter Malfunction

If the starter does not disengage from the engine after starting (starter warning light (START) on the annunciator panel remains illuminated or flashing after the engine has started):

1. Throttle IDLE
2. Mixture control lever LEAN - shut off engine
3. Ignition switch OFF
4. Master switch (ALT/BAT) OFF

Terminate flight preparation!

END OF CHECKLIST

(d) Overvoltage

If a voltage in the upper red sector (above 32 Volts) is indicated:

1. Essential bus ON, if installed
2. Master switch (ALT) OFF

WARNING

Leave Master switch (BAT) ON!

3. Equipment that is not needed,
in particular Pitot heating OFF
4. Land on the nearest appropriate airfield.

END OF CHECKLIST

3.7.3 SUSPICION OF CARBON MONOXIDE CONTAMINATION IN THE CABIN

Carbon monoxide (CO) is a gas which is developed during the combustion process. It is poisonous and without smell. Since it occurs however usually together with fuel gases, it can be detected. Increased concentration of carbon monoxide in closed spaces can be fatal. The occurrence of CO in the cabin is possible only due to a defect. If a smell similar to exhaust gases is noticed in the cabin, the measures in the checklist below should be taken:

The DA 40 may be equipped with a CO detector (optional equipment, OÄM 40-253). If the visual alert annunciator illuminates in flight, press the TEST/RESET button. If the alert continues with the remote light staying ON or a smell similar to exhaust gases is noticed in the cabin, the following measures should be taken:

1. Cabin heat OFF
2. Ventilation open
3. Emergency window(s) open
4. Forward canopy open

CAUTION

In case of suspicion of carbon monoxide contamination in the cabin, the front canopy may be unlatched during flight. This allows it to partially open, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

NOTE

The presence of carbon monoxide is indicated by a visual alarm if OÄM 40-253 is carried out.

END OF CHECKLIST

3.7.4 'DOOR'-WARNING LIGHT ON

1. Airspeed reduce immediately
2. Canopy check visually if closed
3. Rear passenger door check visually if closed

Canopy Unlocked

4. Airspeed below 140 KIAS
5. Land at the next suitable airfield.

Rear Door Unlocked

4. Airspeed below 140 KIAS
5. Land at the next suitable airfield.

WARNING

Do not try to lock the rear door in flight. The safety latch may disengage and the door opens. Usually this results in a separation of the door from the airplane.

NOTE

If the rear door has been lost the airplane can be safely flown to the next suitable airfield.

END OF CHECKLIST

3.7.5 EMERGENCY EXIT

In case of a roll-over of the airplane on ground, it can be evacuated through the rear door. For this purpose release the front hinge of the rear door. The function is displayed on a placard next to the hinge.

END OF CHECKLIST

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CHAPTER 4A

NORMAL OPERATING PROCEDURES

| | Page |
|---|-------|
| 4A.1 INTRODUCTION | 4A-2 |
| 4A.2 AIRSPEEDS FOR NORMAL OPERATING PROCEDURES | 4A-2 |
| 4A.3 CHECKLISTS FOR NORMAL OPERATING PROCEDURES ... | 4A-3 |
| 4A.3.1 PRE-FLIGHT INSPECTION | 4A-3 |
| 4A.3.2 BEFORE STARTING ENGINE | 4A-11 |
| 4A.3.3 STARTING ENGINE | 4A-13 |
| 4A.3.4 BEFORE TAXIING | 4A-19 |
| 4A.3.5 TAXIING | 4A-20 |
| 4A.3.6 BEFORE TAKE-OFF | 4A-22 |
| 4A.3.7 TAKE-OFF | 4A-25 |
| 4A.3.8 CLIMB | 4A-27 |
| 4A.3.9 CRUISE | 4A-29 |
| 4A.3.10 MIXTURE ADJUSTMENT | 4A-31 |
| 4A.3.11 DESCENT | 4A-33 |
| 4A.3.12 LANDING APPROACH | 4A-34 |
| 4A.3.13 GO-AROUND | 4A-36 |
| 4A.3.14 AFTER LANDING | 4A-37 |
| 4A.3.15 ENGINE SHUT-DOWN | 4A-38 |
| 4A.3.16 POST-FLIGHT INSPECTION | 4A-39 |
| 4A.3.17 FLIGHT IN RAIN | 4A-40 |
| 4A.3.18 REFUELING | 4A-40 |
| 4A.3.19 FLIGHT AT HIGH ALTITUDE | 4A-40 |

4A.1 INTRODUCTION

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

4A.2 AIRSPEEDS FOR NORMAL OPERATING PROCEDURES

| Event | Flight Mass | 850 kg 1874 lb | 1000 kg 2205 lb | 1150 kg 2535 lb | 1200 kg 2646 lb |
|---|-------------|-------------------|--------------------|--------------------|--------------------|
| | | | | | |
| Airspeed for take-off climb (best rate-of-climb speed v_Y) (Flaps T/O) | | 54 KIAS | 60 KIAS | 66 KIAS | 67 KIAS |
| Airspeed for cruise climb (Flaps UP) | | 60 KIAS | 68 KIAS | 73 KIAS | 76 KIAS |
| Approach speed for normal landing (Flaps LDG) | | 58 KIAS | 63 KIAS | 71 KIAS | 73 KIAS |
| Minimum speed during touch & go (Flaps T/O) | | 54 KIAS | 60 KIAS | 66 KIAS | 67 KIAS |

4A.3 CHECKLISTS FOR NORMAL OPERATING PROCEDURES

4A.3.1 PRE-FLIGHT INSPECTION

I. Cabin Check

- a) MET, NAV, mass & CG flight planning completed
- b) Airplane documents complete and up-to-date
- c) Ignition key pulled out
- d) Front canopy and rear door clean, undamaged, check
locking mechanism function

- e) All electrical equipment OFF
- f) Circuit breakers set in (if one has been
pulled, check reason)

- g) Engine control levers check condition, freedom of
movement and full travel of
throttle, RPM and mixture
levers

- h) Throttle IDLE
- i) Mixture control lever LEAN
- j) RPM lever HIGH RPM
- k) Master switch (BAT) ON
- l) Annunciator panel check function (see 7.11)
- m) Fuel quantity check

CONTINUED

NOTE

Standard Tank:

Depending on the type of fuel probes installed, the indicator can read a maximum of 15 US gal or 17 US gal (refer to Section 7.10 for details). When the fuel quantity indicator reads the maximum amount of fuel detectable, the correct fuel quantity must be determined with the fuel quantity measuring device. If this measurement is not carried out, the fuel quantity available for flight planning is the indicated amount.

Long Range Tank:

At an indication of 16 US gal the quantity of auxiliary fuel can be determined by switching the AUX FUEL QTY switch to the respective position (LH or RH). The auxiliary fuel quantity is added to the 16 US gal.

An auxiliary fuel quantity of less than 3 US gal cannot be indicated by the system. In this case the quantity must be determined by means of the fuel quantity measuring device (see Section 7.10 - FUEL SYSTEM).

CAUTION

Long Range Tank:

The correct indication of the fuel quantity takes 2 minutes after actuation of the switch.

CONTINUED

| | | | |
|-------------|--------|-------------|------------------|
| Page 4A - 4 | Rev. 8 | 01-Dec-2010 | Doc. # 6.01.01-E |
|-------------|--------|-------------|------------------|

- n) Position lights, strobe lights (ACLs) check
- o) Master switch (BAT) OFF
- p) Check for loose items complete
- q) Flight controls and trim free to move and correct
- r) Baggage stowed and secure
- s) Emergency axe (if OAM 40-326 installed) . . . stowed and secure

END OF CHECKLIST**II. Walk-around check, visual inspection****CAUTION**

A visual inspection means: examination for damage, cracks, delamination, excessive play, load transmission, correct attachment and general condition. In addition control surfaces should be checked for freedom of movement.

CAUTION

In low ambient temperatures the airplane must be completely cleared of ice, snow and similar accumulations. For approved de-icing fluids refer to Section 8.6 - DE-ICING ON THE GROUND.

CAUTION

Prior to flight, remove such items as control surfaces gust lock, Pitot cover, tow bar, etc.

CONTINUED

1. *Left Main Landing Gear:*

- a) Landing gear strut visual inspection
- b) Strut fairing (if installed) visual inspection
- c) Wheel fairing visual inspection
- d) Tire inflation pressure (2.5 bar/36 PSI) check
- e) Wear, tread depth of tire check
- f) Tire, wheel, brake visual inspection
- g) Brake line connection check for leaks
- h) Slip marks visual inspection
- i) Chocks remove

2. *Left Wing:*

- a) Entire wing surface visual inspection
- b) Step visual inspection
- c) Air intake on lower surface visual inspection
- d) Openings on lower surface check for traces of fuel (if
tank is full, fuel may spill
over through the tank vent)
- e) Tank drain drain off a small quantity,
check for water and
sediment
- f) Stall warning check (suck on opening)
- g) Tank filler visual inspection, fuel
quantity must agree with
indicator
- h) Tank air outlet in lower surface visual inspection

CONTINUED

- i) 2 stall strips on wing visual inspection
- j) Pitot probe clean, orifices open
- k) Landing/taxi light visual inspection
- l) Wing tip visual inspection
- m) Position light, strobe light (ACL) visual inspection
- n) Mooring check, clear
- o) Aileron and linkage visual inspection
- p) Aileron hinges and safety pin visual inspection
- q) Foreign objects in aileron paddle visual inspection
- r) Flap and linkage visual inspection
- s) Flap hinges and safety pin visual inspection

3. Fuselage, Left Side:

- a) Canopy, left side visual inspection
- b) Rear cabin door & window visual inspection
- c) Fuselage skin visual inspection
- d) Antennas visual inspection
- e) Autopilot static source (if OÄM 40-267
installed) check for blockage

4. Empennage:

- a) Stabilizers and control surfaces visual inspection
- b) Hinges visual inspection
- c) Elevator trim tab visual inspection, check
locking wire
- d) Rudder trim tab visual inspection
- e) Mooring on fin check, clear
- f) Tail skid and lower fin visual inspection
- g) Towing assembly, if fitted visual inspection

CONTINUED

5. Fuselage, Right Side:

- a) Fuselage skin visual inspection
- b) Window visual inspection
- c) Canopy, right side visual inspection
- d) Autopilot static source (if OÄM 40-267
installed) check for blockage

6. Right Wing:

- a) Flap and linkage visual inspection
- b) Flap hinges and safety pin visual inspection
- c) Aileron and linkage visual inspection
- d) Aileron hinges and safety pin visual inspection
- e) Foreign objects in aileron paddle visual inspection
- f) Wing tip visual inspection
- g) Position light, strobe light (ACL) visual inspection
- h) Mooring check, clear
- i) Entire wing surface visual inspection
- j) 2 stall strips on wing visual inspection
- k) Tank air outlet in lower surface visual inspection
- l) Tank filler visual check, fuel quantity
must agree with indicator
- m) Openings on lower surface check for traces of fuel (if
tank is full, fuel may spill
over through the tank vent)
- n) Tank drain drain off a small quantity,
check for water and
sediment
- o) Step visual inspection

CONTINUED

| | | | |
|-------------|--------|-------------|------------------|
| Page 4A - 8 | Rev. 8 | 01-Dec-2010 | Doc. # 6.01.01-E |
|-------------|--------|-------------|------------------|

7. Right Main Landing Gear:

- a) Landing gear strut visual inspection
- b) Strut fairing (if installed) visual inspection
- c) Wheel fairing visual inspection
- d) Tire inflation pressure (2.5 bar/36 PSI) check
- e) Wear, tread depth of tires check
- f) Tire, wheel, brake visual inspection
- g) Brake line connection check for leaks
- h) Slip marks visual inspection
- i) Chocks remove

8. Front Fuselage:

- a) Oil level check dipstick,
min. 4 qts for VFR operation
min. 6 qts for IFR operation
- b) Cowling visual inspection
- c) 3 air intakes clear
- d) Propeller visual inspection; blade
shake: max. 3 mm (1/8 in);
angular play of blade:
max. 2°

WARNING

Never move the propeller by hand while the ignition is switched on, as it may result in serious personal injury.

- e) Spinner including attachment screws visual inspection

CONTINUED

- f) Nose landing gear visual inspection
- g) Tire and wheel visual inspection
- h) Slip marks visual inspection
- i) Nose landing gear strut fairing (if installed) . . visual inspection
- j) Nose landing gear tie-down (if installed) check, clear
- k) Wear, tread depth of tire check
- l) Wheel fairing visual inspection
- m) Tow bar removed
- n) Tire inflation pressure (2.0 bar/29 PSI) check
- o) Chocks remove
- p) Exhaust visual inspection
- q) Forward cabin air inlets (if installed) clear
- r) Winter baffle for fresh air inlet (if installed) . . visual inspection

WARNING

The exhaust can cause burns when it is hot.

Underside:

- s) Antennas (if fitted) visual inspection
- t) Gascolator drain off a small quantity of
fuel, check for water and
sediment
- u) Venting pipes check for blockage
- v) Fuselage underside check for excessive
contamination particularly by
oil, fuel, and other fluids

END OF CHECKLIST

4A.3.2 BEFORE STARTING ENGINE

CAUTION

For take-off the adjustable backrests (if installed) must be fixed in the upright position.

NOTE

The pilot must ensure that a passenger sitting on a front seat is instructed in the operation of the adjustable backrest (if installed).

1. Pre-flight inspection complete
2. Rudder pedals adjusted
3. Passengers instructed
4. Adjustable backrests (if installed) adjust to the upright position described by a placard on the roll-over bar and verify proper fixation.
5. Safety harnesses all on and fastened
6. Baggage check, secured
7. Rear door closed and locked
8. Door lock (if installed) unblocked, key removed

CAUTION

When operating the canopy, ensure that there are no obstructions between the canopy and the mating frame, for example seat belts, clothing, etc. When operating the locking handle do NOT apply undue force.

A slight downward pressure on the canopy may be required to ease handle operation.

CONTINUED

- 9. Front canopy Position 1 or 2 ("Cooling Gap")
- 10. Canopy lock (if installed) unblocked, key removed
- 11. Parking brake set
- 12. Flight controls free movement
- 13. Trim wheel T/O
- 14. Throttle IDLE
- 15. RPM lever HIGH RPM
- 16. Mixture control lever LEAN
- 17. Friction device, throttle quadrant adjusted
- 18. Alternate air CLOSED
- 19. Alternate static valve CLOSED, if installed
- 20. Avionics Master switch OFF
- 21. Essential Bus switch OFF, if installed

CAUTION

When the essential bus is switched ON, the battery will not be charged unless the essential tie relay bypass (OÄM 40-126) is installed.

- 22. Master switch (BAT) ON
- 23. Annunciator panel test (see Section 7.11)
- 24. Fuel tank selector on full tank

WARNING

Never move the propeller by hand while the ignition is switched on, as it may result in serious personal injury.

Never try to start the engine by hand.

END OF CHECKLIST

Affected Chapter:

4A.3 CHECKLISTS FOR NORMAL OPERATING PROCEDURES

4A.3.3 STARTING ENGINE

The CAUTION is added:

CAUTION

Before starting the engine and until the engine is shut down, the canopy must be closed and latched in position 1 or 2 ('cooling gap') and the door must be closed and latched.

During engine operation it is prohibited to enter or exit the airplane.

4A.3.3 STARTING ENGINE**(a) Cold Engine**

1. Strobe light (ACL) ON
2. Electrical fuel pump ON, note pump noise
(= functional check of pump)
3. Throttle 3 cm (1.2 in) forward from
IDLE (measured from rear of
slot)
4. Mixture control lever RICH for 3 - 5 sec, then
LEAN
5. Throttle 1 cm (0.4 in) forward from
IDLE (measured from rear of
slot)

WARNING

Before starting the engine the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool off for half an hour.

CONTINUED

CAUTION

The use of an external pre-heater and external power source is recommended whenever possible, in particular at ambient temperatures below 0 °C (32 °F), to reduce wear and abuse to the engine and electrical system. Refer to Section 4B.8 - STARTING THE ENGINE WITH EXTERNAL POWER. Pre-heat will thaw the oil trapped in the oil cooler, which can be congealed in extremely cold temperatures. After a warm-up period of approximately 2 to 5 minutes (depending on the ambient temperature) at 1500 RPM, the engine is ready for take-off if it accelerates smoothly and the oil pressure is normal and steady.

6. Ignition switch START

When Engine Fires:

7. Mixture control lever rapidly move to RICH
8. Oil pressure green sector within 15 sec
9. Electrical fuel pump OFF

WARNING

If the oil pressure has not moved into the green sector within 15 seconds after starting, SWITCH OFF ENGINE and investigate problem.

10. Master switch (ALT) ON
11. Ammeter check
12. Fuel pressure check (14 PSI to 35 PSI)
13. Annunciator panel check

END OF CHECKLIST

(b) Warm Engine

1. Strobe light (ACL) ON
2. Electrical fuel pump ON, note pump noise and
fuel pressure increase
3. Throttle 3 cm (1.2 in) forward from
IDLE (measured from rear of
slot)
4. Mixture control lever RICH for 1 - 3 sec, then
LEAN

WARNING

Before starting the engine the pilot must ensure that the propeller area is free and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool off for half an hour.

5. Ignition switch START

CONTINUED

When Engine Fires:

6. Mixture control lever rapidly move to RICH
7. Oil pressure green sector within 15 sec

WARNING

If the oil pressure has not moved into the green sector within 15 seconds after starting, SWITCH OFF ENGINE and investigate problem.

8. Electrical fuel pump OFF
9. Master switch (ALT) ON
10. Ammeter check
11. Fuel pressure check (14 PSI to 35 PSI)
12. Annunciator panel check

END OF CHECKLIST

(c) Engine Will Not Start After Injection ("Flooded Engine")

1. Strobe light (ACL) ON
2. Electrical fuel pump OFF
3. Mixture control lever LEAN, fully aft
4. Throttle at mid position

WARNING

Before starting the engine the pilot must ensure that the propeller area is free and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool off for half an hour.

5. Ignition switch START
6. Throttle pull back towards IDLE
when engine fires

CONTINUED

When Engine Fires:

7. Mixture control lever rapidly move to RICH
8. Oil pressure green sector within 15 sec

WARNING

If the oil pressure has not moved into the green sector within 15 seconds after starting, SWITCH OFF ENGINE and investigate problem.

9. Master switch (ALT) ON
10. Ammeter check
11. Fuel pressure check (14 PSI to 35 PSI)
12. Annunciator panel check

END OF CHECKLIST

4A.3.4 BEFORE TAXIING

1. Avionics Master switch ON
2. Electrical equipment ON as required
3. Flaps UP - T/O - LDG - T/O
(indicator and visual check)
4. Flight instruments and avionics set, test function, as
required
5. Flood light ON, test function, as
required
6. Ammeter check, if required increase
RPM
7. Fuel tank selector change tanks, confirm that
engine also runs on other
tank (at least 1 minute at
1500 RPM)
8. Pitot heating ON, test function;
ammeter must show rise
9. Pitot heating OFF
10. Strobe lights (ACLs) check ON, as required
11. Position lights, landing and taxi lights ON, as required

CAUTION

When taxiing at close range to other aircraft, or during night flight in clouds, fog or haze, the strobe lights should be switched OFF. The position lights must always be switched ON during night flight.

12. Idle RPM check, 600 to 800 RPM

END OF CHECKLIST

4A.3.5 TAXIING

1. Parking brake release
2. Brakes test on moving off
3. Flight instrumentation and avionics
(particularly directional gyro and
turn and bank indicator) check for correct indications

CAUTION

When taxiing on a poor surface select the lowest possible RPM to avoid damage to the propeller from stones or similar items.

CAUTION

Following extended operation on the ground, or at high ambient temperatures, the following indications of fuel vapor lock may appear:

- Arbitrary changes in idle RPM and fuel flow.
- Slow reaction of the engine to operation of throttle.
- Engine will not run with throttle in IDLE position.

CONTINUED

Remedy:

1. For about 1 to 2 minutes, or until the engine settles, run at a speed of 1800 to 2000 RPM. Oil and cylinder head temperatures must stay within limits.
2. Pull throttle back to IDLE to confirm smooth running.
3. Set throttle to 1200 RPM and mixture for taxiing, i.e., use mixture control lever to set the maximum RPM attainable.
4. Immediately before the take-off run set the mixture for take-off, apply full throttle and hold this position for 10 seconds.

NOTE

Vapor lock can be avoided if the engine is run at speeds of 1800 RPM or more. This results in lower fuel temperatures.

END OF CHECKLIST

4A.3.6 BEFORE TAKE-OFF

CAUTION

Before take-off, the engine must run on each tank for at least 1 minute at 1500 RPM.

CAUTION

For take-off the adjustable backrests (if installed) must be fixed in the upright position.

1. Position airplane into wind if possible
2. Parking brake set
3. Adjustable backrests (if installed) verify upright position
And proper fixation
4. Safety harnesses on and fastened
5. Rear door check closed and locked
6. Front canopy closed and locked

CAUTION

When operating the canopy, ensure that there are no obstructions in between the canopy and the mating frame, for example seat belts, clothing, etc. When operating the locking handle do NOT apply undue force.

A slight downward pressure on the canopy may be required to ease handle operation.

7. Door warning light (DOOR or DOORS) check OFF
8. Fuel tank selector fullest tank

CONTINUED

- | 9. Engine instruments in green sector
- | 10. Circuit breakers pressed in
- | 11. Fuel pressure indicator check (approx. 14 - 35 PSI)
- | 12. Electrical fuel pump ON
- | 13. Mixture control lever RICH (below 5000 ft)

NOTE

At a density altitude of 5000 ft or above or at high ambient temperatures a fully rich mixture can cause rough running of the engine or a loss of performance. The mixture should be set for smooth running of the engine.

- | 14. Flaps check T/O
- | 15. Trim check T/O
- | 16. Flight controls free movement, correct sense
- | 17. Throttle 2000 RPM
- | 18. RPM lever pull back until a drop of 250 to 500 RPM is reached - HIGH RPM; cycle 3 times
- | 19. Magneto check L - BOTH - R - BOTH
 Max. RPM drop . . 175 RPM
 Max. difference . . . 50 RPM
 If the electronic ignition control unit is installed, the ignition status light must illuminate and extinguish after approximately 20 to 30 sec

CONTINUED

CAUTION

The lack of an RPM drop suggests a faulty grounding or incorrect ignition timing. In case of doubt the magneto check can be repeated with a leaner mixture, in order to confirm a problem. Even when running on only one magneto the engine should not run unduly roughly.

- I 20. Circuit breaker check in
- I 21. Voltmeter check in green range
- I 22. Throttle IDLE
- I 23. Parking brake release
- I 24. Alternate air check CLOSED
- I 25. Landing light ON as required
- I 26. Pitot heating ON as required

END OF CHECKLIST

4A.3.7 TAKE-OFF

Normal Take-Off Procedure

1. Transponder ON/ALT
2. RPM lever check HIGH RPM
3. Throttle MAX PWR (not abruptly)

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 (2680 ± 20 RPM) are reasons for aborting the take-off. If the engine oil is cold, an oil pressure in the yellow sector is permissible.

4. Elevator neutral
5. Rudder maintain direction

NOTE

In strong crosswinds steering can be augmented by use of the toe brakes. It should be noted, however, that this method increases the take-off roll, and should not generally be used.

6. Nose wheel lift-off at $v_R = 59$ KIAS

CONTINUED

- I 7. Airspeed 67 KIAS (1200 kg, 2646 lb)
66 KIAS (1150 kg, 2535 lb)
60 KIAS (below 1000 kg,
2205 lb)

Above a Safe Height:

8. RPM lever 2400 RPM
9. Electrical fuel pump OFF
10. Landing light OFF

END OF CHECKLIST

4A.3.8 CLIMB

Procedure for Best Rate of Climb

- | | |
|--------------------------------|--|
| 1. Flaps | T/O |
| 2. Airspeed | 67 KIAS (1200 kg, 2646 lb) |
| | 66 KIAS (1150 kg, 2535 lb) |
| | 60 KIAS (1000 kg, 2205 lb) |
| | 54 KIAS (850 kg, 1874 lb) |
| 3. RPM lever | 2400 RPM |
| 4. Throttle | MAX PWR |
| 5. Mixture control lever | RICH, above 5000 ft hold EGT constant |
| 6. Engine instruments | in green sector |
| 7. Trim | as required |
| 8. Electrical fuel pump | ON at high altitudes |

CAUTION

Operation at high altitudes with the electrical fuel pump OFF may cause vapor bubbles, resulting in intermittent low fuel pressure indications, sometimes followed by high fuel flow indications.

END OF CHECKLIST

Cruise Climb

1. Flaps UP
2. Airspeed 76 KIAS (1200 kg, 2646 lb)
73 KIAS (1150 kg, 2535 lb)
68 KIAS (1000 kg, 2205 lb)
60 KIAS (850 kg, 1874 lb)
3. RPM lever 2400 RPM
4. Throttle MAX PWR
5. Mixture control lever RICH, above 5000 ft hold
EGT constant
6. Engine instruments in green sector
7. Trim as required
8. Electrical fuel pump ON at high altitudes

CAUTION

Operation at high altitudes with the electrical fuel pump OFF may cause vapor bubbles, resulting in intermittent low fuel pressure indications, sometimes followed by high fuel flow indications.

END OF CHECKLIST

4A.3.9 CRUISE

1. Flaps UP
2. Throttle set performance according
to table
3. RPM lever 1800 - 2400 RPM

NOTE

Favorable combinations of manifold pressure and RPM are given in Chapter 5.

NOTE

To optimize engine life the cylinder head temperature (CHT) should lie between 150 °F (66 °C) and 400 °F (204 °C) in continuous operation, and not rise above 435 °F (224 °C) in fast cruise.

NOTE

The oil temperature in continuous operation should lie between 165 °F (74 °C) and 220 °F (104 °C). If possible, the oil temperature should not remain under 180 °F (82 °C) for long periods, so as to avoid accumulation of condensation water.

4. Mixture set in accordance with
4A.3.10 - MIXTURE
ADJUSTMENT

CONTINUED

5. Trim as required
6. Fuel tank selector as required
(max. difference 10 US gal
with Standard Tank,
8 US gal with Long Range
Tank)
7. Electrical fuel pump ON at high altitudes

CAUTION

Operation at high altitudes with the electrical fuel pump OFF may cause vapor bubbles, resulting in intermittent low fuel pressure indications, sometimes followed by high fuel flow indications.

NOTE

While switching from one tank to the other, the electrical fuel pump should be switched ON.

END OF CHECKLIST

4A.3.10 MIXTURE ADJUSTMENT**CAUTION**

1. The maximum permissible cylinder head temperature (500 °F (260 °C)) must never be exceeded.
2. The mixture control lever should always be moved slowly.
3. Before selecting a higher power setting the mixture control lever should, on each occasion, be moved slowly to fully RICH.
4. Care should always be taken that the cylinders do not cool down too quickly. The cooling rate should not exceed 50 °F (22.8 °C) per minute.

Best Economy Mixture

The best economy mixture setting may only be used up to a power setting of 75 %. In order to obtain the lowest specific fuel consumption at a particular power setting proceed as follows: Slowly pull the mixture control lever back towards LEAN until the engine starts to run roughly. Then push the mixture control lever forward just far enough to restore smooth running. At the same time the exhaust gas temperature (EGT) should reach a maximum.

The exact value of EGT can be obtained by pressing the far left button on the engine instrument unit VM 1000. In the Lean mode one bar represents 10 °F (4.6 °C).

CONTINUED

Best Power Mixture

The mixture can be set for maximum performance at all power settings. The mixture should first be set as for 'best economy'. The mixture should then be enriched until the exhaust gas temperature is approximately 100 °F (55 °C) lower.

This mixture setting produces the maximum performance for a given manifold pressure and is mainly used for high power settings (approximately 75 %).

END OF CHECKLIST

4A.3.11 DESCENT

1. Mixture control lever adjust as required for the
altitude, operate slowly
2. RPM lever 1800 - 2400 RPM
3. Throttle as required
4. Electrical fuel pump ON at high altitudes

CAUTION

When reducing power, the change in cylinder head temperature should not exceed 50 °F (22.8 °C) per minute. This is normally guaranteed by the 'self adapting inlet'. An excessive cooling rate may occur however, when the engine is very hot and the throttle is reduced abruptly in a fast descent. This will be indicated by a flashing cylinder head temperature indication.

CAUTION

Operation at high altitudes with the electrical fuel pump OFF may cause vapor bubbles, resulting in intermittent low fuel pressure indications, sometimes followed by high fuel flow indications.

END OF CHECKLIST

4A.3.12 LANDING APPROACH

CAUTION

For landing the adjustable backrests (if installed) must be fixed in the upright position.

1. Adjustable backrests (if installed) adjust to the upright position described by a placard on the roll-over bar and verify proper fixation.
2. Fuel selector fullest tank
3. Electrical fuel pump ON
4. Safety harnesses fastened
5. Airspeed reduce to operate flaps (108 KIAS)
6. Flaps T/O
7. Trim as required
8. Landing light as required

Before Landing:

9. Mixture control lever RICH
10. RPM lever HIGH RPM
11. Throttle as required
12. Airspeed reduce to operate flaps (91 KIAS)
13. Flaps LDG

CONTINUED

14. Approach speed 73 KIAS (1200 kg, 2646 lb)
71 KIAS (1150 kg, 2535 lb)
67 KIAS (1092 kg, 2407 lb)
63 KIAS (1000 kg, 2205 lb)
58 KIAS (850 kg, 1874 lb)

CAUTION

In conditions such as (e.g.) strong wind, danger of wind shear or turbulence a higher approach speed should be selected.

NOTE

In case of airplanes with a maximum landing mass less than the maximum permitted flight mass, a landing with a higher mass constitutes an abnormal operating procedure. Refer to Sections 2.7 - MASS (WEIGHT) and 4B.7 - LANDING WITH HIGH LANDING MASS.

END OF CHECKLIST

4A.3.13 GO-AROUND

1. Throttle MAX PWR
2. Airspeed 67 KIAS (1200 kg, 2646 lb)
66 KIAS (1150 kg, 2535 lb)
60 KIAS (1000 kg, 2205 lb)
54 KIAS (850 kg, 1874 lb)
3. Flaps T/O

Above a Safe Height:

4. RPM lever 2400 RPM
5. Airspeed 76 KIAS (1200 kg, 2646 lb)
73 KIAS (1150 kg, 2535 lb)
68 KIAS (1000 kg, 2205 lb)
60 KIAS (850 kg, 1874 lb)
6. Flaps UP
7. Electrical fuel pump OFF

END OF CHECKLIST

4A.3.14 AFTER LANDING

1. Throttle IDLE
2. Brakes as required
3. Electrical fuel pump OFF
4. Transponder OFF / STBY
5. Pitot heating OFF
6. Avionics as required
7. Lights as required
8. Flaps UP

END OF CHECKLIST

4A.3.15 ENGINE SHUT-DOWN

1. Parking brake set
2. Engine instruments check
3. Avionics Master switch OFF
4. All electrical equipment OFF
5. Throttle 1000 RPM
6. Ignition check OFF until RPM drops
noticeably, then immediately
BOTH again
7. Mixture control lever LEAN - shut engine off
8. Ignition switch OFF
9. Master switch (ALT/BAT) OFF

END OF CHECKLIST

4A.3.16 POST-FLIGHT INSPECTION

- | | | |
|---|-------------------------------------|--|
| I | 1. Ignition switch | OFF, remove key |
| | 2. Master switch (BAT) | ON |
| | 3. Avionics Master switch | ON |
| | 4. ELT | check activated: listen on 121.5 MHz |
| I | 5. Avionics Master switch | OFF |
| | 6. Master switch (BAT) | OFF |
| | 7. Parking brake | release, use chocks |
| | 8. Airplane | moor, if unsupervised for extended period |

NOTE

If the airplane is not operated for more than 5 days, the long-term parking procedure should be applied. If the airplane is not operated for more than 30 days, the storage procedure should be applied. Both procedures are described in the Airplane Maintenance Manual (Doc. No. 6.02.01) in Chapter 10.

END OF CHECKLIST

4A.3.17 FLIGHT IN RAIN

NOTE

Performance deteriorates in rain; this applies particularly to the take-off distance and to the maximum horizontal speed. The effect on the flight characteristics is minimal. Flight through very heavy rain should be avoided because of the associated visibility problems.

4A.3.18 REFUELING

CAUTION

Before refueling, the airplane must be connected to electrical ground. Grounding points: unpainted areas (latches) on steps, left and right.

4A.3.19 FLIGHT AT HIGH ALTITUDE

At high altitudes the provision of oxygen for the occupants is necessary. Legal requirements for the provision of oxygen should be adhered to.

Also see Section 2.11 - OPERATING ALTITUDE.

CHAPTER 4B

ABNORMAL OPERATING PROCEDURES

Page

| | | |
|------|--|-------|
| 4B.1 | PRECAUTIONARY LANDING | 4B-2 |
| 4B.2 | INSTRUMENT INDICATIONS OUTSIDE OF GREEN RANGE .. | 4B-4 |
| 4B.3 | FAILURES IN THE ELECTRICAL SYSTEM | 4B-5 |
| 4B.4 | TAKE-OFF FROM A SHORT GRASS STRIP | 4B-7 |
| 4B.5 | FAILURES IN FLAP OPERATING SYSTEM | 4B-9 |
| 4B.6 | FAILURES IN ELECTRICAL RUDDER PEDAL ADJUSTMENT . | 4B-10 |
| 4B.7 | LANDING WITH HIGH LANDING MASS | 4B-11 |
| 4B.8 | STARTING THE ENGINE WITH EXTERNAL POWER | 4B-12 |

4B.1 PRECAUTIONARY LANDING

NOTE

A landing of this type is only necessary when there is a reasonable suspicion that due to fuel shortage, weather conditions, or at nightfall the possibility of endangering the airplane and its occupants by continuing the flight cannot be excluded. The pilot is required to decide whether or not a controlled landing in a field represents a lower risk than the attempt to reach the target airfield under all circumstances.

NOTE

If no level landing area is available, a landing on an upward slope should be sought.

1. Select appropriate landing area.
2. Consider wind.
3. Approach: If possible, the landing area should be overflown at a suitable height in order to recognize obstacles. The degree of offset at each part of the circuit will allow the wind speed and direction to be assessed.

- I 4. Airspeed 76 KIAS (1200 kg, 2646 lb)
73 KIAS (1150 kg, 2535 lb)
68 KIAS (1000 kg, 2205 lb)
60 KIAS (850 kg, 1874 lb)

5. ATC advise

CONTINUED

On Final Approach:

6. Flaps LDG
7. Safety harnesses tighten
8. Touchdown with the lowest possible
airspeed

CAUTION

If sufficient time is remaining, the risk in the event of a collision with obstacles can be reduced as follows:

- Fuel tank selector OFF
- Ignition switch OFF
- Master switch (ALT/BAT) OFF

END OF CHECKLIST

4B.2 INSTRUMENT INDICATIONS OUTSIDE OF GREEN RANGE

(a) High Oil Pressure When Starting in Low Ambient Temperatures

- Reduce RPM and re-check oil pressure at a higher oil temperature.
- If on reducing the RPM the indicated oil pressure does not change, it is probable that the fault lies in the oil pressure indication. Terminate flight preparation.

(b) High Manifold Pressure

If the manifold pressure indicator is clearly above the green range, the reading is faulty. In this case the performance settings should be undertaken by means of the lever settings. The airplane should be serviced.

(c) Oil Temperature

- A constant reading of the oil temperature of 26 °F (-3 °C) or 317 °F (158 °C) suggests a faulty oil temperature sensor. The airplane should be serviced.

(d) Cylinder Head Temperature and Exhaust Gas Temperature

A very low reading of CHT or EGT for a single cylinder may be the result of a loose sensor. In this case the reading will indicate the temperature of the engine compartment. The airplane should be serviced.

END OF CHECKLIST

4B.3 FAILURES IN THE ELECTRICAL SYSTEM**(a) 'Low Voltage' Caution (VOLT or LOW VOLTS)**

This caution is indicated when the normal on-board voltage (28 V) drops below 24 V.

Possible reasons are:

- A fault in the power supply.
- RPM too low.

(i) 'Low Voltage' Caution on the Ground:

1. Engine speed 1200 RPM
2. Electrical equipment OFF
3. Ammeter check

If the caution light does not go out, and the ammeter flashes and reads zero:

- Terminate flight preparation.

(ii) 'Low Voltage' Caution During Flight:

1. Electrical equipment OFF if not needed
2. Ammeter check

If the caution light does not go out, and the ammeter flashes and reads zero:

- Follow procedure in 3.7.2 (b) - ALTERNATOR FAILURE.

(iii) 'Low Voltage' Caution During Landing:

- Follow (i) after landing.

END OF CHECKLIST

(b) Electronic Ignition Control Unit

If the electronic ignition control unit is installed but inoperative, the white status light for the ignition (IGN or IGNITION) will be illuminated, and the conventional magneto ignition will take over the ignition control.

The flight can be continued normally. However, fuel consumption will slightly increase, and engine starting will become difficult.

END OF CHECKLIST

4B.4 TAKE-OFF FROM A SHORT GRASS STRIP

1. Brakes apply
2. Flaps T/O
3. Throttle MAX PWR
4. Elevator (control stick) fully aft
5. Brakes release
6. Hold direction using rudder

NOTE

In strong crosswinds steering can be augmented by use of the toe brakes. It should be noted, however, that this method increases the take-off roll, and should not generally be used.

7. Elevator (control stick) release slowly, when nose wheel has lifted
 Allow airplane to lift off as soon as possible and increase speed at low level

- | | |
|---|---|
| I | <ol style="list-style-type: none"> 8. Airspeed 67 KIAS (1200 kg, 2646 lb) 66 KIAS (1150 kg, 2535 lb) 60 KIAS (1000 kg, 2205 lb) 54 KIAS (850 kg, 1874 lb) 9. RPM lever 2400 RPM, above safe altitude |
|---|---|

CONTINUED

10. Flaps UP, above safe altitude
11. Electrical fuel pump OFF, above safe altitude
12. Landing light as required

END OF CHECKLIST

4B.5 FAILURES IN FLAP OPERATING SYSTEM

Failure in Position Indication or Function

- Check flap position visually.
- Keep airspeed in white sector.
- Re-check all positions of the flap switch.

Modified Approach Procedure Depending on the Available Flap Setting

I (a) *Only UP or T/O Available:*

| | | |
|----------|----------------|----------------------------|
| I | Airspeed | 76 KIAS (1200 kg, 2646 lb) |
| | | 73 KIAS (1150 kg, 2535 lb) |
| | | 68 KIAS (1000 kg, 2205 lb) |
| | | 60 KIAS (850 kg, 1874 lb) |

Land at a flat approach angle, use throttle to control airplane speed and rate of descent.

(b) *Only LDG Available:*

Perform normal landing.

END OF CHECKLIST

4B.6 FAILURES IN ELECTRICAL RUDDER PEDAL ADJUSTMENT

Runaway of Electrical Rudder Pedal Adjustment (Optional Equipment, OÄM 40-251)

NOTE

The circuit breaker for the rudder pedal adjustment is located
below the related switch, on the rear wall of the leg room.

1. Circuit breaker pull

END OF CHECKLIST

4B.7 LANDING WITH HIGH LANDING MASS

NOTE

This Section only applies to airplanes with a maximum landing mass less than the maximum flight mass. All landings with a current flight mass not exceeding the maximum permissible landing mass constitutes a normal operating procedure. Refer to Sections 2.7 - MASS (WEIGHT) and 4A.3.12 - LANDING APPROACH.

NOTE

The maximum landing mass given in Chapter 2 is the highest mass for landing conditions at the maximum descent velocity. This velocity was used in the strength calculations to determine the landing gear loads during a particularly hard landing.

Perform landing approach and landing according to Chapter 4A, but maintain an increased airspeed during landing approach.

Approach speed 73 KIAS (1200 kg, 2646 lb)
71 KIAS (1150 kg, 2535 lb)

WARNING

Damage of the landing gear can result from a hard landing with a flight mass above the maximum landing mass.

END OF CHECKLIST

4B.8 STARTING THE ENGINE WITH EXTERNAL POWER

WARNING

The use of an external power supply for engine starting with an empty airplane battery is not permitted if the subsequent flight is intended to be an IFR flight. In this case the airplane battery must be charged first.

WARNING

The external power supply must be operated by a person made aware of the associated procedures. Special care is required due to the proximity of the propeller area.

NOTE

Starting the engine with external power is recommended in particular at ambient temperatures below 0 °C (32 °F), to reduce wear and abuse to the engine and electrical system.

1. Pre-flight inspection complete
2. Rudder pedals adjusted
3. Passengers instructed
4. Safety harnesses all on and fastened
5. Baggage check, secured
6. Rear door closed and locked
7. Door lock (if installed) unblocked, key removed

CONTINUED

CAUTION

When operating the canopy, ensure that there are no obstructions between the canopy and the mating frame, for example seat belts, clothing, etc. When operating the locking handle do NOT apply undue force.

A slight downward pressure on the canopy may be required to ease handle operation.

- | | |
|--|---------------------------------|
| 8. Front canopy | Position 1 or 2 ("Cooling gap") |
| 9. Canopy lock (if installed) | unblocked, key removed |
| 10. Parking brake | set |
| 11. Flight controls | free movement |
| 12. Trim wheel | T/O |
| 13. Throttle | IDLE |
| 14. RPM lever | HIGH RPM |
| 15. Mixture control lever | LEAN |
| 16. Friction device, throttle quadrant | adjusted |
| 17. Alternate air | CLOSED |
| 18. Alternate static valve | CLOSED, if installed |
| 19. Avionics Master switch | OFF |
| 20. Essential Bus switch | OFF, if installed |

CAUTION

When the essential bus is switched ON, the battery will not be charged unless the essential tie relay bypass (OÄM 40-126) is installed.

CONTINUED

- 21. External power connect
- 22. Master switch (BAT) ON
- 23. Annunciator panel test (see Section 7.11)
- 24. Fuel tank selector on full tank

WARNING

Never move the propeller by hand while the ignition is
switched on, as it may result in serious personal injury.

Never try to start the engine by hand.

- 25. Starting engine procedure refer to 4A.3.3 . . execute
- 26. External power disconnect, close access
panel
- 27. Ammeter check
- 28. Master switch (ALT) OFF, note decrease of
ammeter reading
- 29. Master switch (ALT) ON

END OF CHECKLIST

CHAPTER 5

PERFORMANCE

| | Page |
|--|------|
| 5.1 INTRODUCTION | 5-2 |
| 5.2 USE OF THE PERFORMANCE TABLES AND DIAGRAMS | 5-2 |
| 5.3 PERFORMANCE TABLES AND DIAGRAMS | 5-3 |
| 5.3.1 AIRSPEED CALIBRATION | 5-3 |
| 5.3.2 TABLE FOR SETTING ENGINE PERFORMANCE | 5-4 |
| 5.3.3 PRESSURE ALTITUDE - DENSITY ALTITUDE | 5-7 |
| 5.3.4 STALLING SPEEDS | 5-8 |
| 5.3.5 WIND COMPONENTS | 5-9 |
| 5.3.6 TAKE-OFF DISTANCE | 5-10 |
| 5.3.7 CLIMB PERFORMANCE - TAKE-OFF CLIMB | 5-13 |
| 5.3.8 CLIMB PERFORMANCE - CRUISE CLIMB | 5-15 |
| 5.3.9 CRUISING (TRUE AIRSPEED TAS) | 5-17 |
| 5.3.10 LANDING DISTANCE - FLAPS LDG | 5-18 |
| 5.3.11 LANDING DISTANCE - FLAPS UP | 5-21 |
| 5.3.12 GRADIENT OF CLIMB ON GO-AROUND | 5-24 |
| 5.3.13 APPROVED NOISE DATA | 5-24 |

5.1 INTRODUCTION

The performance tables and diagrams on the following pages are presented so that, on the one hand, you can see what performance you can expect from your airplane, while on the other they allow comprehensive and sufficiently accurate flight planning. The values in the tables and the diagrams were obtained in the framework of the flight trials using an airplane and power-plant in good condition, and corrected to the conditions of the International Standard Atmosphere (ISA = 15 °C / 59 °F and 1013.25 hPa / 29.92 inHg at sea level).

The performance diagrams do not take into account variations in pilot experience or a poorly maintained airplane. The performances given can be attained if the procedures quoted in this manual are applied, and the airplane has been well maintained.

5.2 USE OF THE PERFORMANCE TABLES AND DIAGRAMS

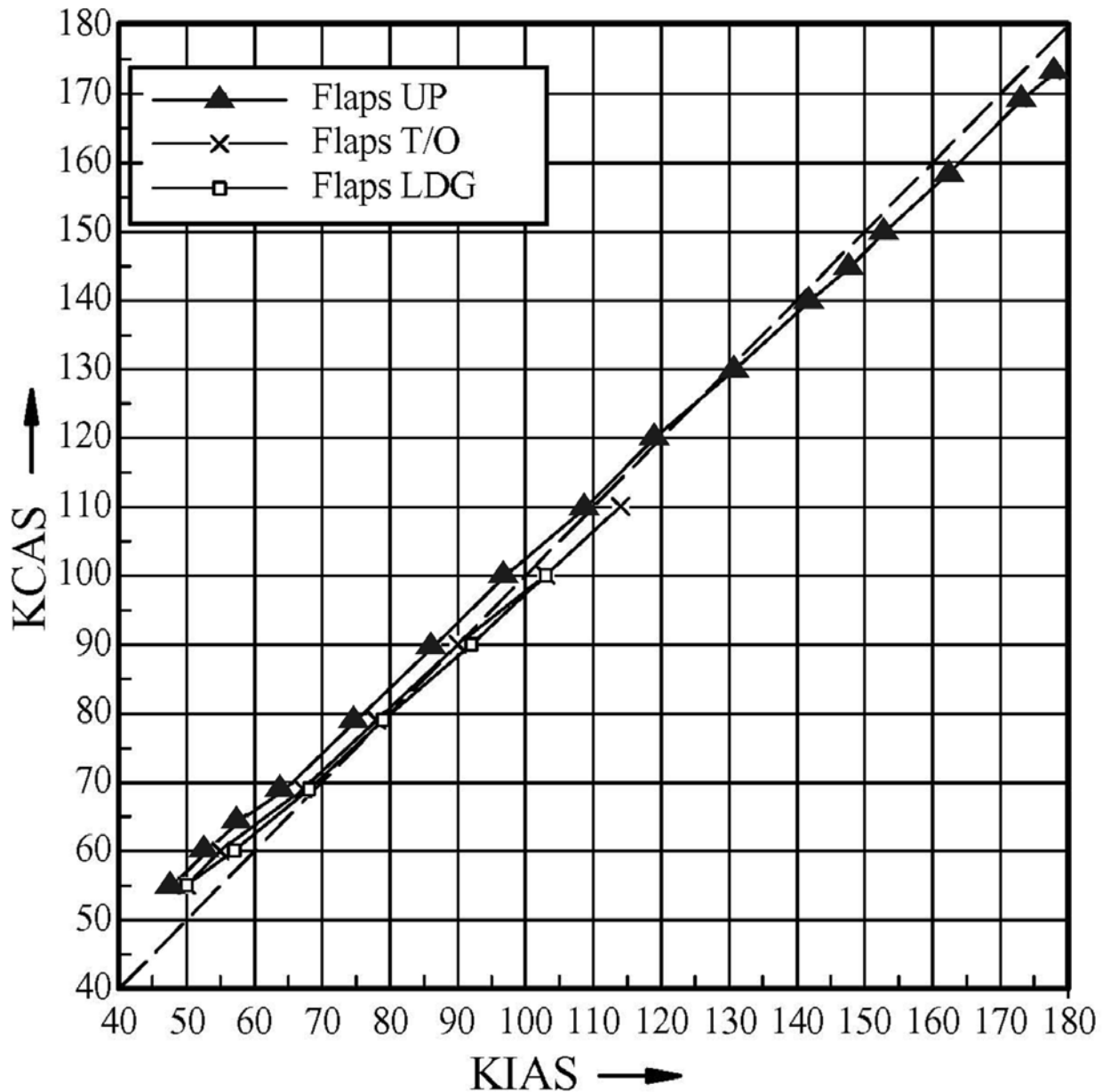
In order to illustrate the influence of a number of different variables, the performance data is reproduced in the form of tables or diagrams. These contain sufficiently detailed information so that conservative values can be selected and used for the determination of adequate performance data for the planned flight.

Where appropriate, any flight performance degradation resulting from the absence of wheel fairings is given as a percentage.

The installation of the optional fairings on the main landing gear struts and/or nose landing gear strut has only minor effects on the flight performance of the DA 40. Therefore, no change applies to the performance tables and diagrams.

5.3 PERFORMANCE TABLES AND DIAGRAMS

5.3.1 AIRSPEED CALIBRATION



5.3.2 TABLE FOR SETTING ENGINE PERFORMANCE**NOTE**

If the Long Range Tank is installed:

Auxiliary fuel below 3 US gal cannot be indicated by the system. If a fuel indicator shows 16 US gal and the auxiliary fuel indicator reads 0 US gal on the same side, for in-flight fuel consumption / flight planning a fuel quantity available of 16 US gal must be assumed.

| | | | Engine Power as % of Max. Take-Off Power | | | | | | |
|-------------------------|--------------|------|--|------|------|------|------|------|------|
| | | | 45 % | | | | 55 % | | |
| | RPM | | 1800 | 2000 | 2200 | 2400 | 2000 | 2200 | 2400 |
| Fuel Flow [US gal/h] | Best Economy | | 5.8 | 6 | 6.3 | 6.6 | 7 | 7.2 | 7.5 |
| | Best Power | | - | - | 7.3 | 7.7 | - | 8.5 | 8.7 |
| ISA | [°C] | [°F] | Manifold Pressure (MP) [inHg] | | | | | | |
| MSL | 15 | 59 | 22.7 | 21.3 | 20.2 | 19.0 | 23.9 | 22.4 | 21.2 |
| 1000 | 13 | 55 | 22.4 | 21.0 | 19.9 | 18.7 | 23.6 | 22.2 | 21.0 |
| 2000 | 11 | 52 | 22.1 | 20.7 | 19.6 | 18.4 | 23.3 | 21.9 | 20.7 |
| 3000 | 9 | 48 | 21.8 | 20.4 | 19.3 | 18.2 | 23.0 | 21.6 | 20.4 |
| 4000 | 7 | 45 | 21.5 | 20.2 | 19.0 | 17.9 | 22.7 | 21.2 | 20.1 |
| 5000 | 5 | 41 | 21.2 | 19.9 | 18.7 | 17.6 | 22.3 | 20.9 | 19.8 |
| 6000 | 3 | 38 | 20.9 | 19.6 | 18.4 | 17.4 | 22.0 | 20.6 | 19.5 |
| 7000 | 1 | 34 | 20.5 | 19.3 | 18.2 | 17.1 | 21.7 | 20.3 | 19.3 |
| 8000 | -1 | 31 | 20.2 | 19.0 | 17.9 | 16.9 | 21.3 | 20.0 | 19.0 |
| 9000 | -3 | 27 | 19.9 | 18.7 | 17.6 | 16.6 | 21.1 | 19.7 | 18.7 |
| 10000 | -5 | 23 | 19.6 | 18.4 | 17.3 | 16.3 | - | 19.4 | 18.4 |
| 11000 | -7 | 19 | 19.3 | 18.2 | 17.0 | 16.1 | | 19.1 | 18.1 |
| 12000 | -9 | 16 | - | 17.9 | 16.7 | 15.8 | | - | 17.8 |
| 13000 | -11 | 12 | | 17.6 | 16.4 | 15.5 | | | 17.6 |
| 14000 | -13 | 9 | | - | 16.1 | 15.3 | | | - |
| 15000 | -15 | 6 | | | 15.8 | 15.0 | | | |
| 16000 | -17 | 2 | | | 15.5 | 14.7 | | | |
| 17000 | -19 | -2 | | | - | 14.5 | | | |

| | | | Engine Power as % of Max. Take-Off Power | | | | |
|-------------------------|--------------|------|--|------|------|------|------|
| | | | 65 % | | | 75 % | |
| | RPM | | 2000 | 2200 | 2400 | 2200 | 2400 |
| Fuel Flow [US gal/h] | Best Economy | | 7.9 | 8.2 | 8.5 | 9.2 | 9.5 |
| | Best Power | | - | 9.5 | 9.8 | 10.7 | 11 |
| ISA | [°C] | [°F] | Manifold Pressure (MP) [inHg] | | | | |
| MSL | 15 | 59 | 26.8 | 24.9 | 23.4 | 27.3 | 25.8 |
| 1000 | 13 | 55 | 26.4 | 24.5 | 23.2 | 26.8 | 25.5 |
| 2000 | 11 | 52 | 26.0 | 24.2 | 22.9 | 26.5 | 25.2 |
| 3000 | 9 | 48 | 25.7 | 23.8 | 22.6 | 26.1 | 24.8 |
| 4000 | 7 | 45 | 25.4 | 23.5 | 22.3 | - | 24.5 |
| 5000 | 5 | 41 | - | 23.1 | 22.0 | | 24.1 |
| 6000 | 3 | 38 | | 22.8 | 21.7 | | - |
| 7000 | 1 | 34 | | 22.4 | 21.4 | | |
| 8000 | -1 | 31 | | - | 21.0 | | |
| 9000 | -3 | 27 | | | 20.7 | | |
| 10000 | -5 | 23 | | | - | | |

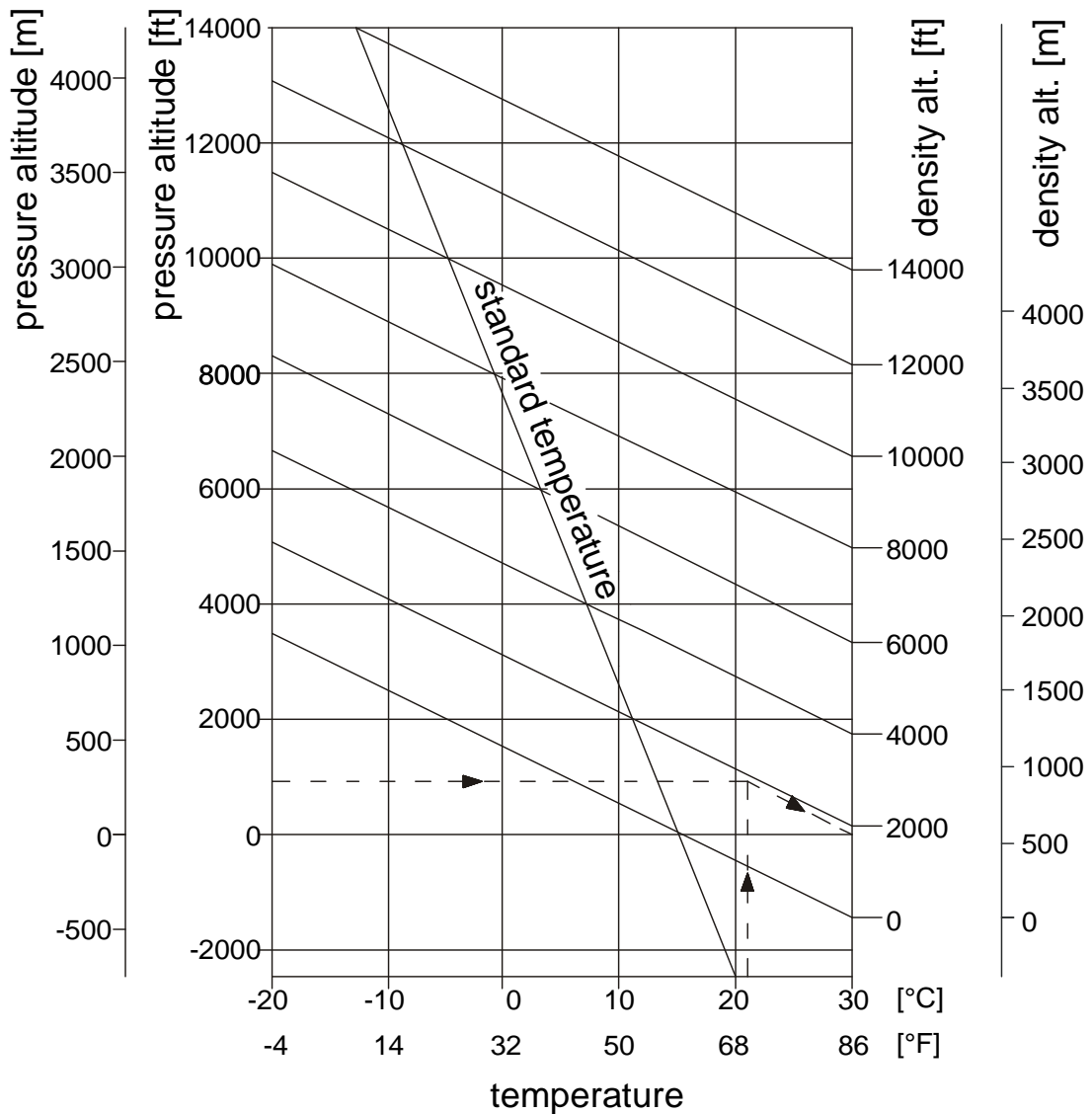
The areas shaded grey under each RPM heading are the recommended bands.

Correcting the Table for Variation from Standard Temperature

- At ISA + 15 °C (ISA + 27 °F) the performance values fall by approx. 3 % of the power selected according to the above table.
- At ISA - 15 °C (ISA - 27 °F) the performance values rise by approx. 3 % of the power selected according to the above table.

5.3.3 PRESSURE ALTITUDE - DENSITY ALTITUDE

Conversion from pressure altitude to density altitude.



- Example:
1. Set 1013.25 hPa on altimeter and read pressure altitude (900 ft).
 2. Establish ambient temperature (+21 °C (70 °F)).
 3. Read off density altitude (1800 ft).

Result: From a performance calculation standpoint the airplane is at 1800 ft.

5.3.4 STALLING SPEEDS

Airspeeds in KIAS

Mass: 980 kg (2161 lb)

| 980 kg | | Bank Angle | | | |
|--------|-----|------------|-----|-----|-----|
| | | 0° | 30° | 45° | 60° |
| Flaps | UP | 47 | 52 | 58 | 73 |
| | T/O | 44 | 51 | 58 | 72 |
| | LDG | 42 | 49 | 57 | 71 |

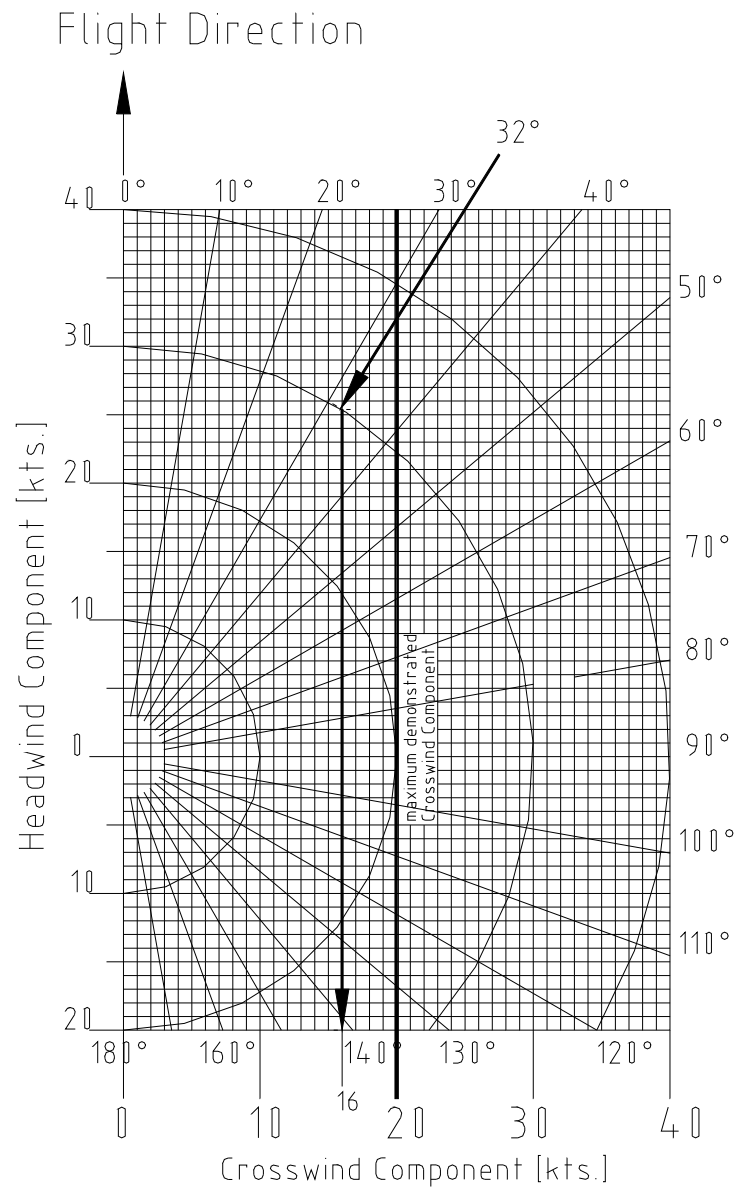
Mass: 1150 kg (2535 lb)

| 1150 kg | | Bank Angle | | | |
|---------|-----|------------|-----|-----|-----|
| | | 0° | 30° | 45° | 60° |
| Flaps | UP | 52 | 57 | 66 | 79 |
| | T/O | 51 | 55 | 64 | 78 |
| | LDG | 49 | 55 | 62 | 76 |

Mass: 1200 kg (2646 lb) (if MÄM 40-227 is carried out)

| 1200 kg | | Bank Angle | | | |
|---------|-----|------------|-----|-----|-----|
| | | 0° | 30° | 45° | 60° |
| Flaps | UP | 53 | 58 | 68 | 83 |
| | T/O | 52 | 57 | 67 | 81 |
| | LDG | 52 | 57 | 66 | 80 |

5.3.5 WIND COMPONENTS



Example: Flight direction : 360°
 Wind : 32°/30 kts
 Result: Crosswind component : 16 kts
 Max. demonstrated crosswind component : 20 kts

5.3.6 TAKE-OFF DISTANCE

- Conditions:
- Throttle MAX PWR
 - RPM lever 2700 RPM
 - Flaps T/O
 - Lift-off speed approx. 59 KIAS
 - Climb-out speed 67 KIAS (1200 kg, 2646 lb)
66 KIAS (1150 kg, 2535 lb)
60 KIAS (below 1000 kg,
2205 lb)
 - Runway level, asphalt surface

WARNING

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

CAUTION

For a safe take-off the take-off run available (TORA) should be at least equal to the take-off distance over a 50 ft (15 m) obstacle.

CAUTION

The figures in the following NOTE are typical values. On wet ground or wet soft grass covered runways the take-off roll may become significantly longer than stated below. In any case the pilot must allow for the condition of the runway to ensure a safe take-off.

NOTE

For take-off from dry, short-cut grass covered runways, the following corrections must be taken into account, compared to paved runways (typical values, see CAUTION above):

- Grass up to 5 cm (2 in) long: 10 % increase in take-off roll.
- Grass 5 to 10 cm (2 to 4 in) long: 15 % increase in take-off roll.
- Grass longer than 10 cm (4 in): at least 25 % increase in take-off roll.
- Grass longer than 25 cm (10 in): take-off should not be attempted.

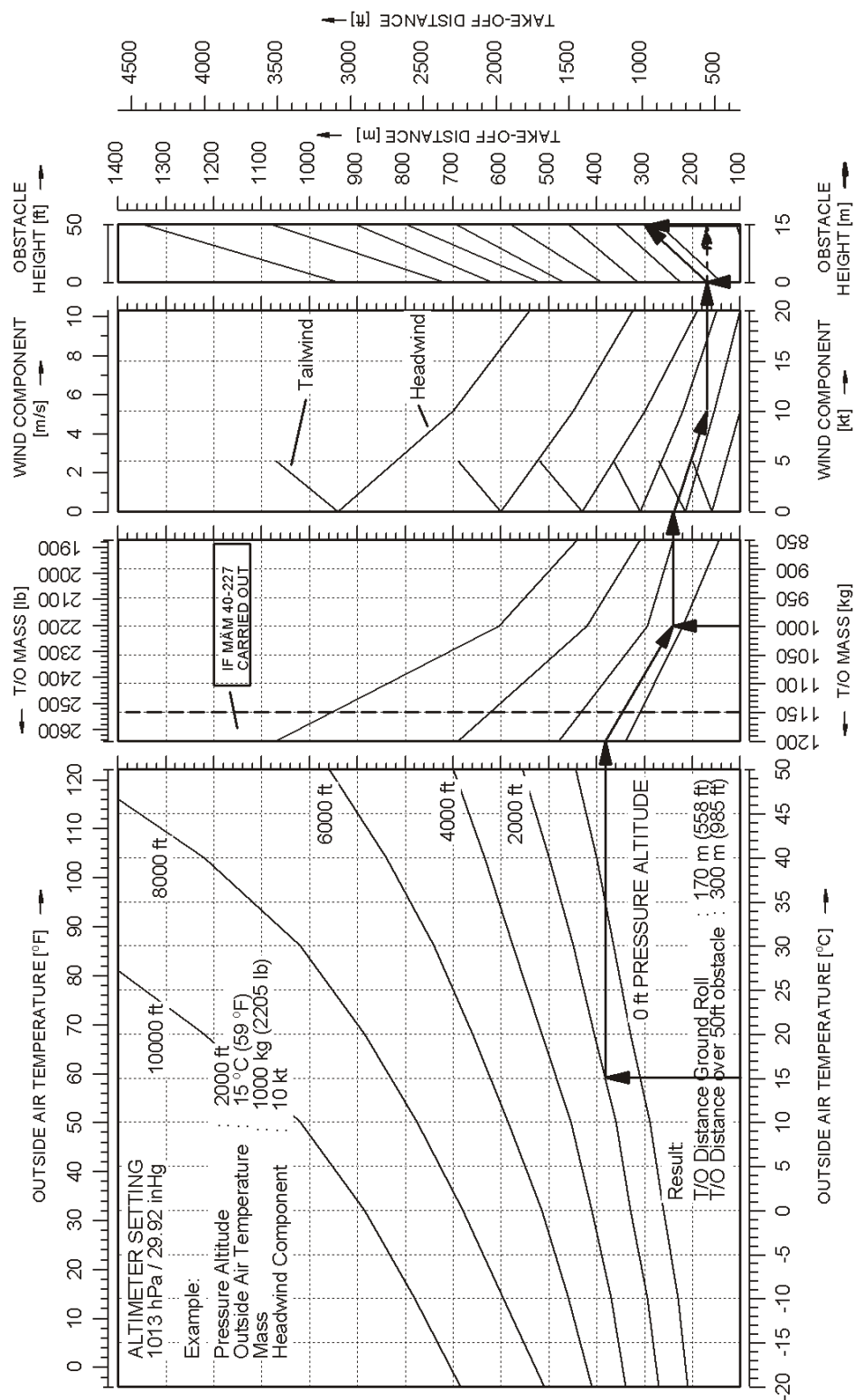
NOTE

On wet grass, a further 10 % increase in take-off roll must be expected.

NOTE

An uphill slope of 2 % (2 m per 100 m, or 2 ft per 100 ft) results in an increase in the take-off distance of approximately 10 %. The effect on the take-off roll can be greater.

DA 40 - TAKE-OFF DISTANCES



5.3.7 CLIMB PERFORMANCE - TAKE-OFF CLIMB

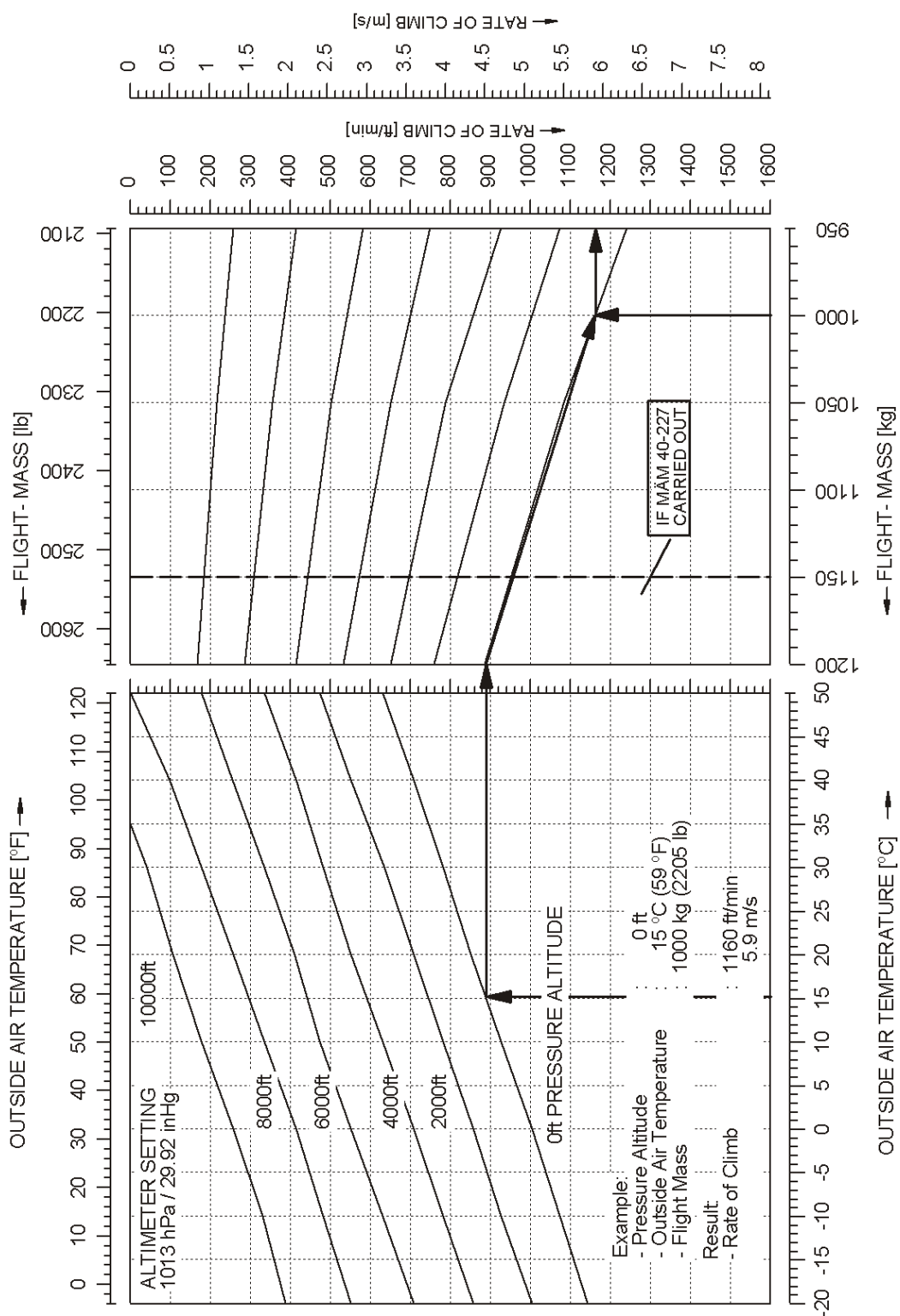
Conditions:

- Throttle MAX PWR
- RPM lever 2400 RPM
- Flaps T/O

I

- Airspeed 67 KIAS (1200 kg, 2646 lb)
66 KIAS (1150 kg, 2535 lb)
60 KIAS (1000 kg, 2205 lb)
54 KIAS (850 kg, 1874 lb)

DA 40 - CLIMB PERFORMANCE - TAKE OFF CLIMB



5.3.8 CLIMB PERFORMANCE - CRUISE CLIMB

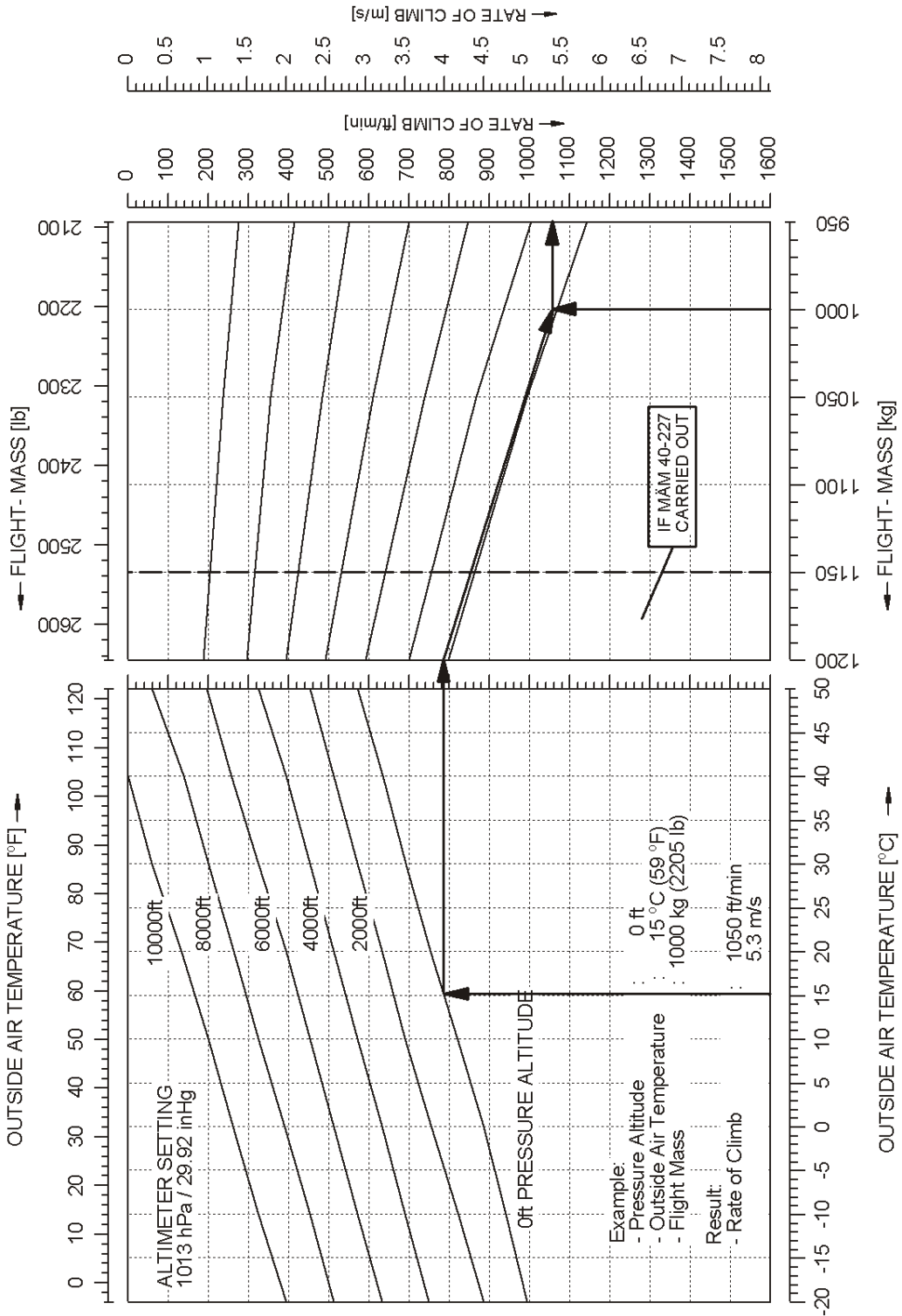
Conditions:

- Throttle MAX PWR
- RPM lever 2400 RPM
- Flaps UP

I

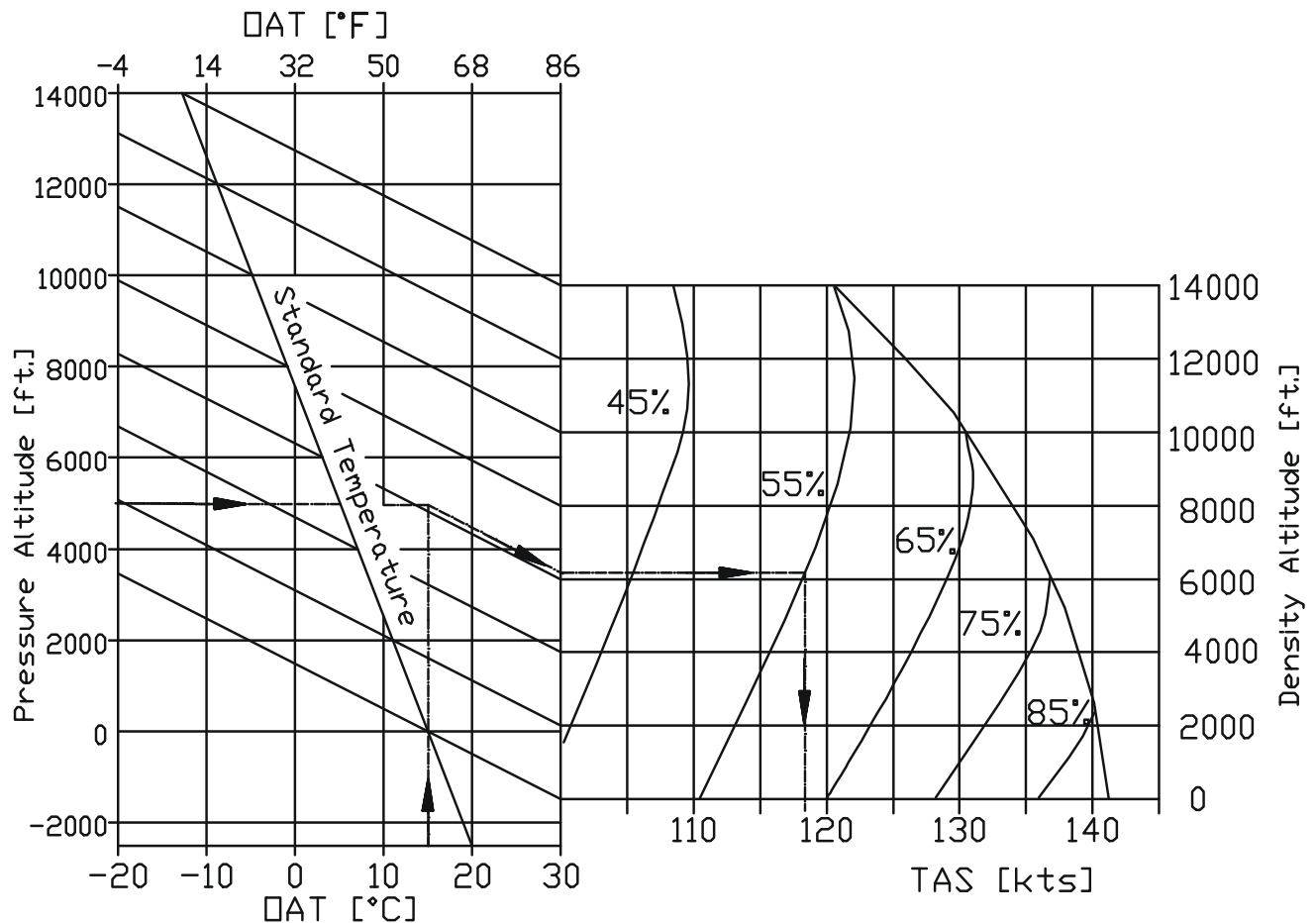
- Airspeed 76 KIAS (1200 kg, 2646 lb)
73 KIAS (1150 kg, 2535 lb)
68 KIAS (1000 kg, 2205 lb)
60 KIAS (850 kg, 1874 lb)

DA 40 - CLIMB PERFORMANCE - CRUISE CLIMB



5.3.9 CRUISING (TRUE AIRSPEED TAS)

Diagram to establish true airspeed (TAS) at a given power setting.



Example: Pressure altitude 5000 ft
 Temperature 15 °C (59 °F)
 Power setting 55 %

Result: True Airspeed (TAS) 118 kts

CAUTION

In case of operation without wheel fairings the cruising speed reduces by approximately 5 %.

5.3.10 LANDING DISTANCE - FLAPS LDG

Conditions:

- Throttle IDLE
- RPM lever HIGH RPM
- Flaps LDG
- Approach speed 73 KIAS (1200 kg, 2646 lb)
71 KIAS (1150 kg, 2535 lb)
63 KIAS (1000 kg, 2205 lb)
58 KIAS (850 kg, 1874 lb)
- Runway level, asphalt surface

NOTE

A landing mass above 1150 kg (2535 lb) up to 1200 kg (2646 lb) will increase the landing distance over a 50 ft (15 m) obstacle and the landing ground roll distance up to 6%.

| Values for ISA and MSL, at 1150 kg (2535 lb) | |
|---|-------------------------|
| Landing distance over a 50 ft (15 m) obstacle | approx. 638 m (2093 ft) |
| Ground roll | approx. 352 m (1155 ft) |

WARNING

Poor maintenance condition of the airplane, deviation from the given procedures as well as unfavorable external factors (high temperature, rain, unfavorable wind conditions, including cross-wind, etc.) will increase the landing distance.

CAUTION

For a safe landing the landing distance available (LDA) should be at least equal to the landing distance over a 50 ft (15 m) obstacle.

CAUTION

The figures in the following NOTE are typical values. On wet ground or wet soft grass covered runways the landing distance may become significantly longer than stated below. In any case the pilot must allow for the condition of the runway to ensure a safe landing.

NOTE

For landings on dry, short-cut grass covered runways, the following corrections must be taken into account, compared to paved runways (typical values, see CAUTION above):

- Grass up to 5 cm (2 in) long: 5 % increase in landing roll.
- Grass 5 to 10 cm (2 to 4 in) long: 15 % increase in landing roll.
- Grass longer than 10 cm (4 in): at least 25 % increase in landing roll.

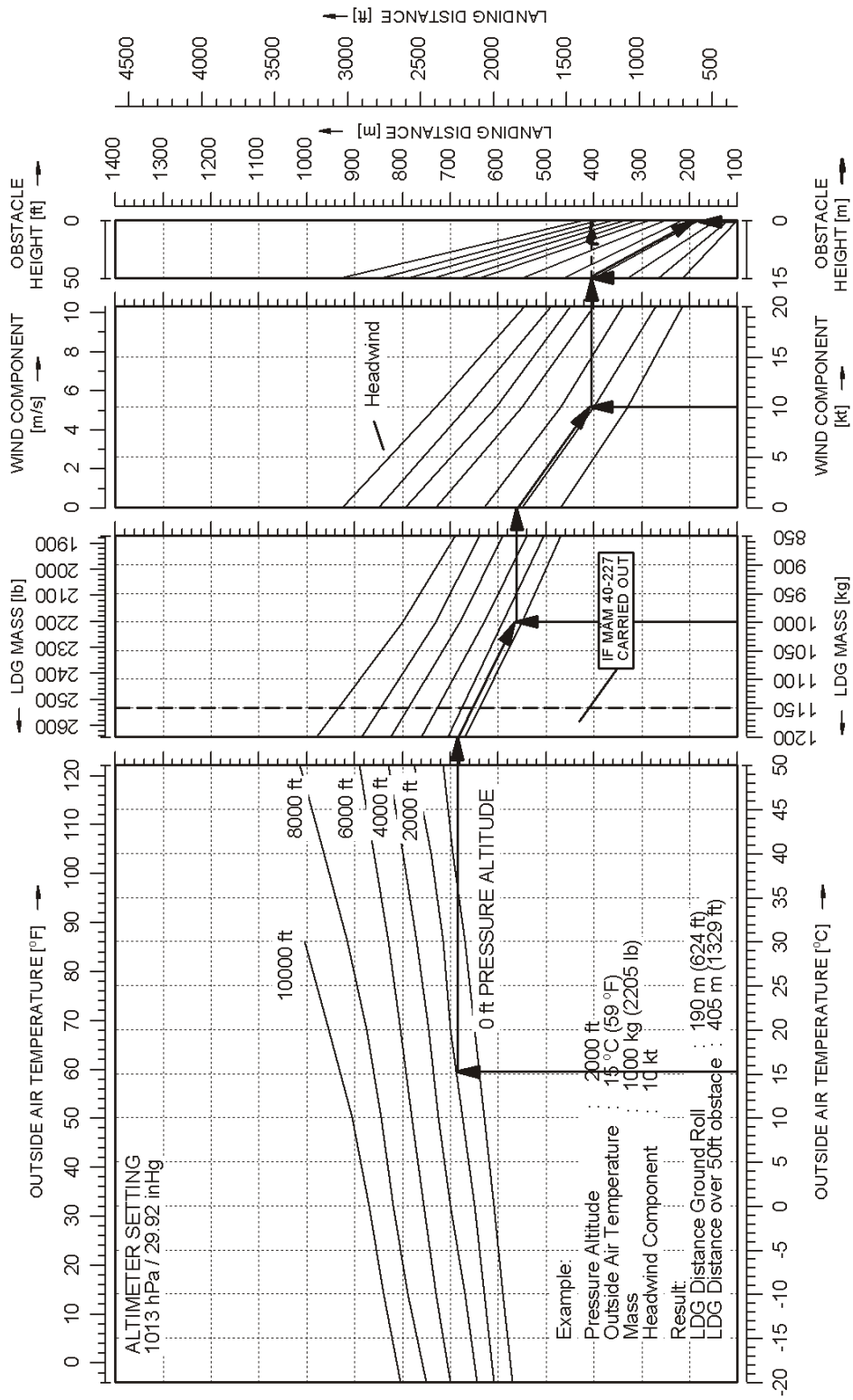
NOTE

On wet grass, a further 10 % increase in landing roll must be expected.

NOTE

A downhill slope of 2 % (2 m per 100 m, or 2 ft per 100 ft) results in an increase in the landing distance of approximately 10 %. The effect on the landing roll can be greater.

DA 40 - LANDING DISTANCES - FLAPS LDG



5.3.11 LANDING DISTANCE - FLAPS UP

- Conditions:
- Throttle IDLE
 - RPM lever HIGH RPM
 - Flaps UP
 - Approach speed 73 KIAS (1200 kg, 2646 lb)
 71 KIAS (1150 kg, 2535 lb)
 63 KIAS (1000 kg, 2205 lb)
 58 KIAS (850 kg, 1874 lb)
 - Runway level, asphalt surface

NOTE

A landing mass above 1150 kg (2535 lb) up to 1200 kg (2646 lb) will increase the landing distance over a 50 ft (15 m) obstacle and the landing ground roll distance up to 6%.

Values for ISA and MSL, at 1150 kg (2535 lb)

| Values for ISA and MSL, at 1150 kg (2535 lb) | |
|---|-------------------------|
| Landing distance over a 50 ft (15 m) obstacle | approx. 775 m (2543 ft) |
| Ground roll | approx. 471 m (1545 ft) |

WARNING

Poor maintenance condition of the airplane, deviation from the given procedures as well as unfavorable external factors (high temperature, rain, unfavorable wind conditions, including cross-wind) will increase the landing distance.

CAUTION

For a safe landing the landing distance available (LDA) should be at least equal to the landing distance over a 50 ft (15 m) obstacle.

CAUTION

The figures in the following NOTE are typical values. On wet ground or wet soft grass covered runways the landing distance may become significantly longer than stated below. In any case the pilot must allow for the condition of the runway to ensure a safe landing.

NOTE

For landings on dry, short-cut grass covered runways, the following corrections must be taken into account, compared to paved runways (typical values, see CAUTION above):

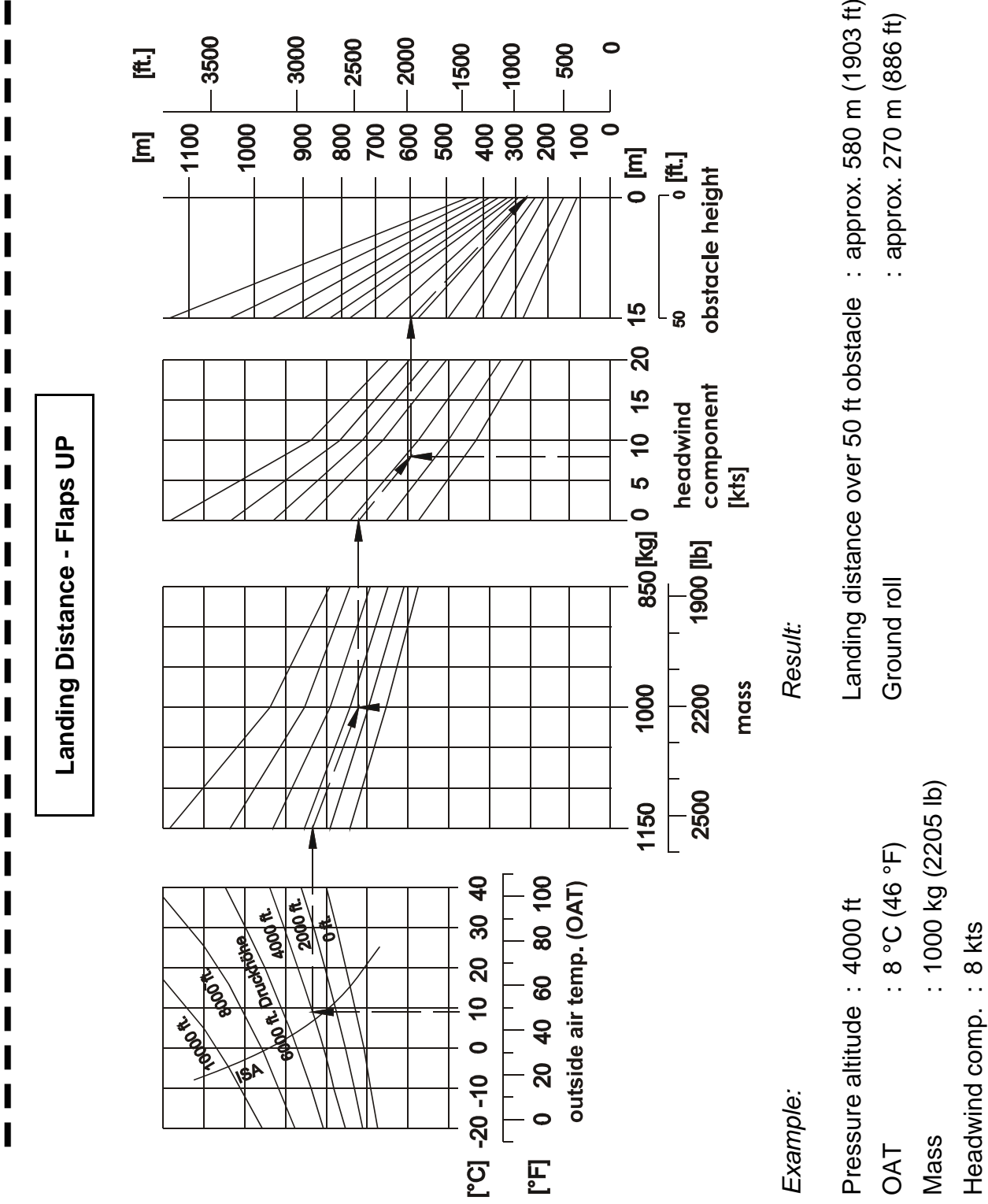
- Grass up to 5 cm (2 in) long: 5 % increase in landing roll.
- Grass 5 to 10 cm (2 to 4 in) long: 15 % increase in landing roll.
- Grass longer than 10 cm (4 in): at least 25 % increase in landing roll.

NOTE

On wet grass, a further 10 % increase in landing roll must be expected.

NOTE

A downhill slope of 2 % (2 m per 100 m or 2 ft per 100 ft) results in an increase in the landing distance of approximately 10 %. The effect on the landing roll can be greater.



5.3.12 GRADIENT OF CLIMB ON GO-AROUND

The DA 40 reaches a constant gradient of climb of 7.0 % in the following condition:

- Mass max. flight mass (1150 kg,
2535 lb)
- Power setting Take-off
- Flaps LDG
- Airspeed 70 KIAS
- ISA, MSL

■ If MÄM 40-227 is carried out:

■ The DA 40 reaches a constant gradient of climb of 7.0 % in the following condition:

- - Mass max. flight mass (1200 kg,
2646 lb)
- - Power setting Take-off
- - Flaps LDG
- - Airspeed 73 KIAS
- - ISA, MSL

5.3.13 APPROVED NOISE DATA

ICAO Annex 16 Chapter X : 69.28 dB(A)

JAR-36 Subpart C : 69.28 dB(A)

■ If MÄM 40-227 is carried out:

■ ICAO Annex 16 Chapter X : 78.4 dB(A)

■ JAR-36 Subpart C : 78.4 dB(A)

CHAPTER 6

MASS AND BALANCE

| | Page |
|--|------|
| 6.1 INTRODUCTION | 6-2 |
| 6.2 DATUM PLANE | 6-3 |
| 6.3 MASS AND BALANCE REPORT | 6-3 |
| 6.4 FLIGHT MASS AND CENTER OF GRAVITY | 6-5 |
| 6.4.1 MOMENT ARMS | 6-9 |
| 6.4.2 LOADING DIAGRAM | 6-10 |
| 6.4.3 CALCULATION OF LOADING CONDITION | 6-11 |
| 6.4.4 PERMISSIBLE CENTER OF GRAVITY RANGE | 6-13 |
| 6.4.5 PERMISSIBLE MOMENT RANGE | 6-15 |
| 6.5 EQUIPMENT LIST AND EQUIPMENT INVENTORY | 6-16 |

6.1 INTRODUCTION

In order to achieve the performance and flight characteristics described in this Airplane Flight Manual and for safe flight operation, the airplane must be operated within the permissible mass and balance envelope.

The pilot is responsible for adhering to the permissible values for loading and center of gravity (CG). In this, he should note the movement of the CG due to fuel consumption. The permissible CG range during flight is given in Chapter 2.

The procedure for determining the flight mass CG position at any point in time is described in this Chapter. Over and above this there is a comprehensive list of the equipment approved for this airplane (Equipment List), as also a list of that equipment installed when the airplane was weighed (Equipment Inventory).

Before the airplane is delivered the empty mass and the corresponding CG position are determined, and entered in Section 6.3 - MASS AND BALANCE REPORT.

NOTE

Following equipment changes the new empty mass and the corresponding CG position must be determined by calculation or by weighing.

Following repairs or repainting the new empty mass and the corresponding CG position must be determined by weighing.

Empty mass, empty mass CG position, and the empty mass moment must be certified in the Mass and Balance Report by an authorized person.

NOTE

Refer to Section 1.6 - UNITS OF MEASUREMENT for conversion of SI units to US units and vice versa.

6.2 DATUM PLANE

The Datum Plane (DP) is a plane which is normal to the airplane's longitudinal axis and in front of the airplane as seen from the direction of flight. The airplane's longitudinal axis is parallel with the upper surface of a 600:31 wedge which is placed on top of the rear fuselage in front of the vertical stabilizer. When the upper surface of the wedge is aligned horizontally, the Datum Plane is vertical. The Datum Plane is located 2.194 meter (86.38 in) forward of the most forward point of the root rib on the stub wing.

6.3 MASS AND BALANCE REPORT

The empty mass and the corresponding CG position established before delivery are the first entries in the Mass and Balance Report. Every change in permanently installed equipment, and every repair to the airplane which affects the empty mass or the empty mass CG must be recorded in the Mass and Balance Report.

For the calculation of flight mass and corresponding CG position (or moment), the *current* empty mass and the corresponding CG position (or moment) in accordance with the Mass and Balance Report must always be used.

Condition of the airplane for establishing the empty mass:

- Equipment as per Equipment Inventory (see Section 6.5)
- Including brake fluid, lubricant (7.6 liter = 8 qts), plus unusable fuel (4 liter = approx. 1 US gal).

MASS AND BALANCE REPORT

(Continuous report on structural or equipment changes)

| Serial No.: | | Registration: | | Page: | | | |
|-----------------|-------------------------------------|---------------|-------------|-------------------|--------------|--------------------|-------------------|
| Changes in mass | | Addition (+) | | Subtraction (-) | | Current Empty Mass | |
| | | Mass | Moment Arm | Moment | Mass | Moment Arm | Moment |
| | | [kg] [lb] | [m] [in] | [kg m] [in lb] | [kg] [lb] | [m] [in] | [kg m] [in lb] |
| DA 40 | Entry No. | IN | | | | | |
| | | OUT | | | | | |
| | Description of Part or Modification | | | | | | |
| | Date | | | | | | |
| | Upon delivery | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

6.4 FLIGHT MASS AND CENTER OF GRAVITY

The following information enables you to operate your DA 40 within the permissible mass and balance limits. For the calculation of the flight mass and the corresponding CG position the following tables and diagrams are required:

6.4.1 - MOMENT ARMS

6.4.2 - LOADING DIAGRAM

6.4.3 - CALCULATION OF LOADING CONDITION

6.4.4 - PERMISSIBLE CENTER OF GRAVITY RANGE

6.4.5 - PERMISSIBLE MOMENT RANGE

The diagrams should be used as follows, taking the fuel tank size into account:

Empty Mass

Take the empty mass and the empty mass moment of your airplane from the Mass and Balance Report, and enter the figures in the appropriate boxes under the column marked 'Your DA 40' in Table 6.4.3 - CALCULATION OF LOADING CONDITION.

Oil

The difference between the actual amount of oil in the engine (check with dipstick) and the maximum oil quantity is called 'Oil not added'; this mass and its related moment are counted as negative. The empty mass of the airplane is established with the maximum amount of oil in the engine, thus the 'missing' oil must be subtracted. If the airplane is flown with maximum oil, the 'Oil not added' entry should be zero.

In our example 6.0 qts have been measured on the dip-stick. We are thus 2.0 qts short of the maximum, which equates to 1.9 liter. Multiplying this quantity by the mass density of 0.89 kilograms per liter gives a mass of 'Oil not added' of 1.7 kg. (in US units: 2.0 qts multiplied by the mass density of 1.86 lb/qts gives a mass of 3.7 lb).

Baggage

The DA 40 may be equipped with one of the following baggage compartment variants:

- (a) Standard baggage compartment.
- (b) Standard baggage compartment with 'baggage tube'.
- (c) Extended baggage compartment (OÄM 40-163). It consists of a forward and an aft part.

Depending on the baggage compartment variant installed in your DA 40 the following calculations must be done in Table 6.4.3 - CALCULATION OF LOADING CONDITION:

For variants (a) and (b) use row 5 of the table; row 6 is filled with '0'

For variant (c) use row 6 of the table; row 5 is filled with '0'

Fuel

a) Standard Tank:

The fuel quantity can be read on the fuel indicators.

NOTE

Depending on the type of fuel probes installed, the indicator can read a maximum of 15 US gal or 17 US gal (refer to Section 7.10 for details). When the fuel quantity indicator reads the maximum amount of fuel detectable, a fuel quantity up to 20 US gal can be in the fuel tank. In this case the fuel quantity must be measured with the fuel quantity measuring device (see Section 7.10 - FUEL SYSTEM).

b) Long Range Tank:

Read the fuel quantity indicated on the fuel quantity indicators.

NOTE

At an indication of 16 US gal the amount of auxiliary fuel can be determined by switching the AUX FUEL QTY switch to the respective position (LH or RH). The indicated auxiliary fuel quantity is added to the 16 US gal.

An auxiliary fuel quantity of less than 3 US gal cannot be indicated by the system. In this case the quantity must be determined by means of the fuel quantity measuring device (see Section 7.10 - FUEL SYSTEM).

CAUTION

The correct indication of the fuel quantity takes 2 minutes after actuation of the switch.

Moments

Multiply the individual masses by the moment arms quoted to obtain the moment for every item of loading, and enter these moments in the appropriate boxes in Table 6.4.3 - CALCULATION OF LOADING CONDITION.

Total Mass and CG

Add up the masses and moments in the respective columns. The CG position is calculated by dividing the total moment by the total mass (using row 7 for the condition with empty fuel tanks, and row 9 for the pre take-off condition). The resulting CG position must be within the limits.

CAUTION

For airplanes equipped with the optional Long Range Tank,
a restricted range of permitted CG positions applies.

As an illustration the total mass and the CG position are entered on Diagram 6.4.4 - PERMISSIBLE CENTER OF GRAVITY RANGE. This checks graphically that the current configuration of the airplane is within the permissible range.

Graphical Method

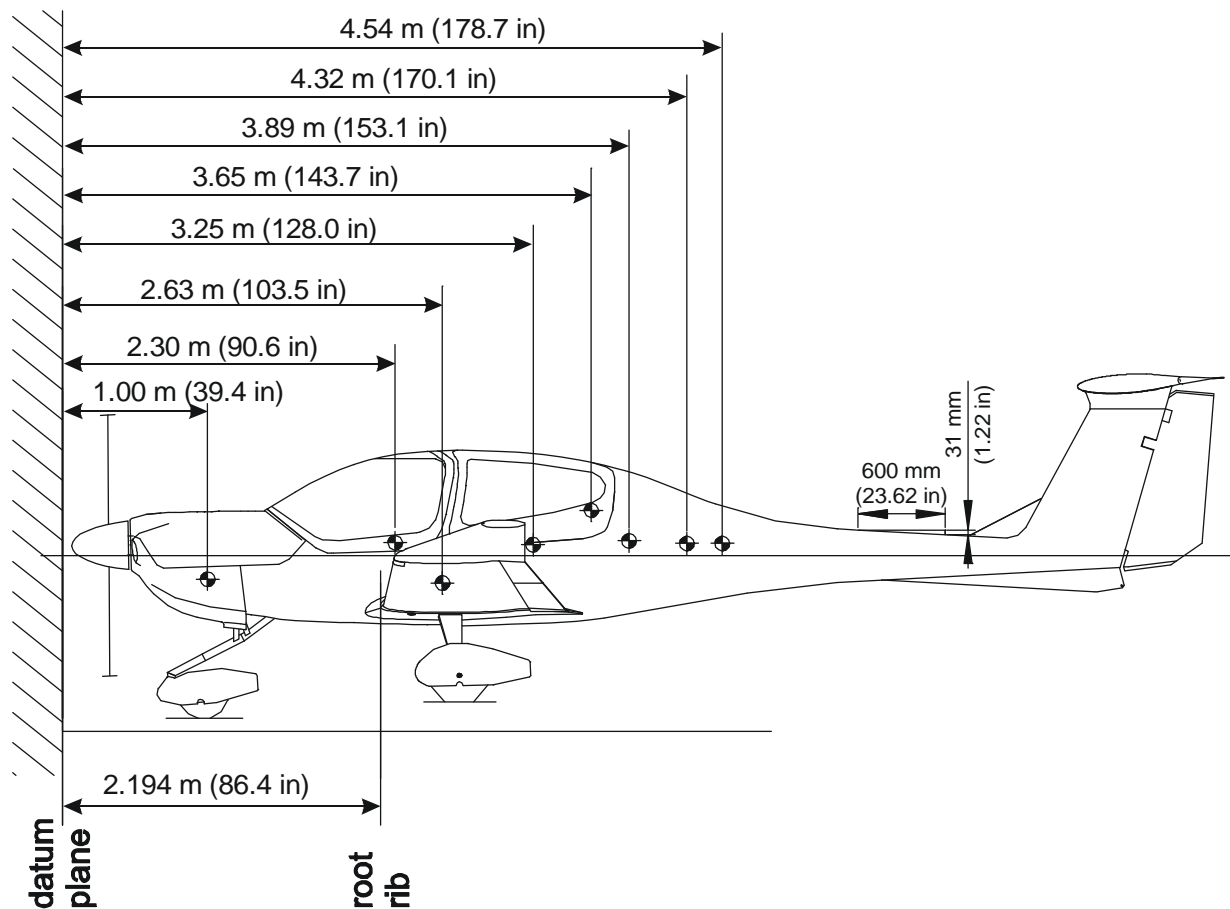
Diagram 6.4.2 - LOADING DIAGRAM is used to determine the moments. The masses and moments for the individual items of loading are added. Then Diagram 6.4.5 - PERMISSIBLE MOMENT RANGE is used to check whether the total moment associated with the total mass is in the admissible range.

The result found with the graphical method is however inaccurate. In doubtful cases the result must be verified using the exact method given above.

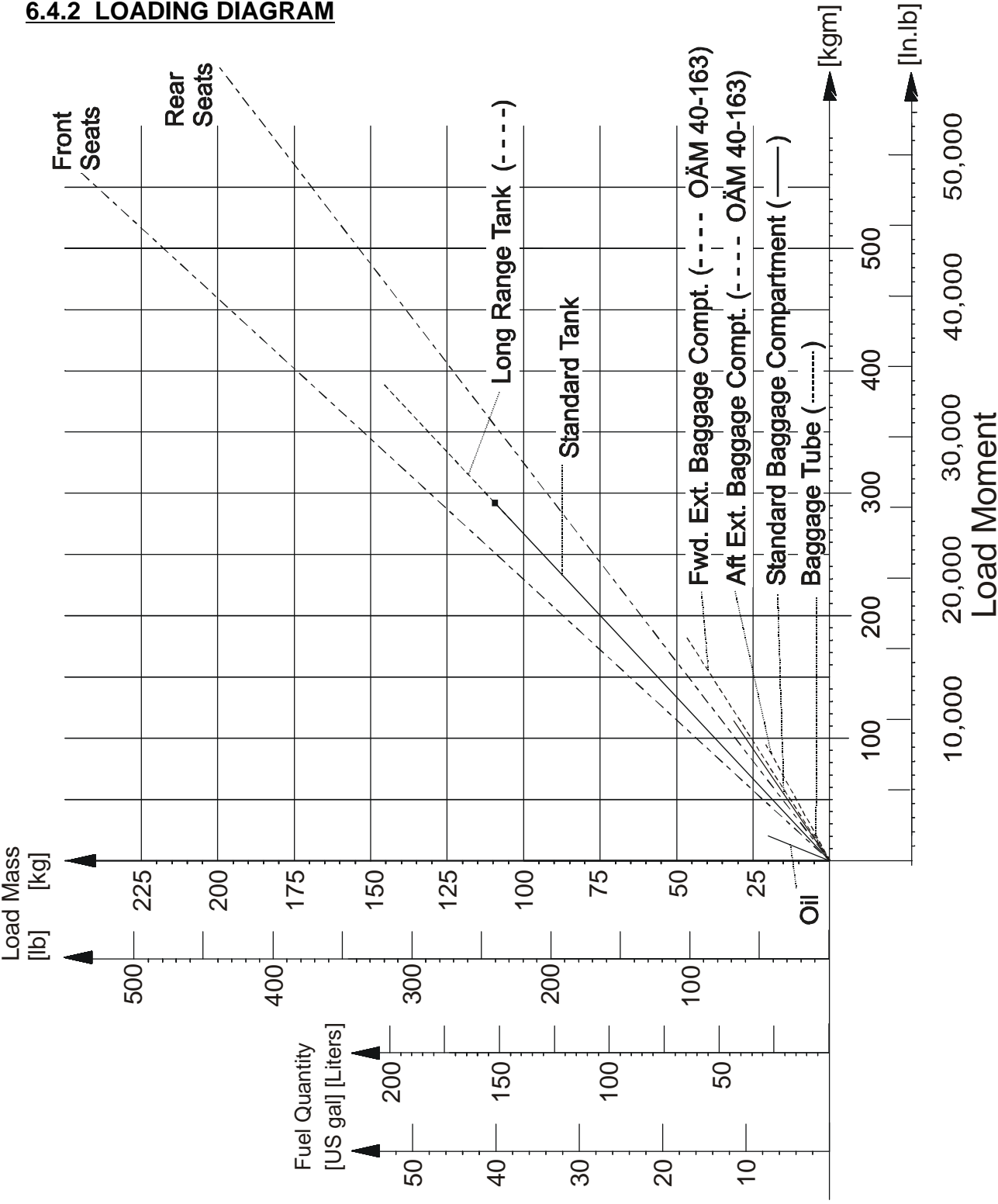
6.4.1 MOMENT ARMS

The most important lever arms aft of the Datum Plane:

| | | | |
|---|---|--------|----------|
| - Oil | : | 1.00 m | 39.4 in |
| - Front seats | : | 2.30 m | 90.6 in |
| - Rear seats | : | 3.25 m | 128.0 in |
| - Wing tanks (Standard & Long Range) | : | 2.63 m | 103.5 in |
| - Baggage in standard baggage compartment | : | 3.65 m | 143.7 in |
| baggage in baggage tube | : | 4.32 m | 170.1 in |
| - Baggage in extended baggage compartment | | | |
| forward part | : | 3.89 m | 153.1 in |
| aft part | : | 4.54 m | 178.7 in |



6.4.2 LOADING DIAGRAM



6.4.3 CALCULATION OF LOADING CONDITION**CAUTION**

For airplanes equipped with the optional Long Range Tank, a restricted range of permitted CG positions applies.

NOTE

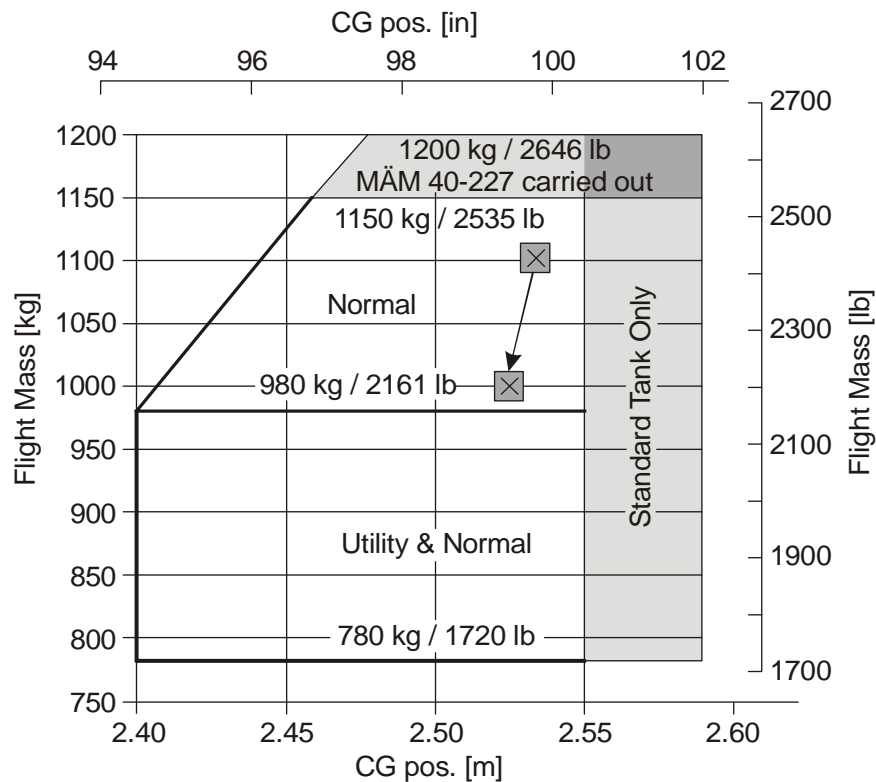
For the mass (weight) of the fuel, a density of 0.72 kg/liter (6.01 lb/US gal) is assumed. For the mass (weight) of the engine oil, a density of 0.89 kg/liter (1.86 lb/US qt, 0.84 kg/US qt) is assumed.

NOTE

In the following example it is assumed that the fuel tank is not full at take-off.

| | | DA 40 (Example) | | Your DA 40 | |
|----|---|-----------------------------|------------------------------------|-----------------------------|------------------------------------|
| | | Mass [kg] <i>[lb]</i> | Moment [kg m] <i>[in lb]</i> | Mass [kg] <i>[lb]</i> | Moment [kg m] <i>[in lb]</i> |
| 1 | Empty mass (from Mass and Balance Report) | 735 <i>1620</i> | 1760 <i>152,762</i> | | |
| 2 | Oil not added Lever arm: 1.00 m <i>(39.4 in)</i> | -1.7 <i>-4</i> | -1.7 <i>-158</i> | | |
| 3 | Front seats Lever arm: 2.30 m <i>(90.6 in)</i> | 150 <i>331</i> | 345 <i>29,989</i> | | |
| 4 | Rear seats Lever arm: 3.25 m <i>(128.0 in)</i> | 75 <i>165</i> | 243.8 <i>21,120</i> | | |
| 5 | Standard baggage compt. Lever arm: 3.65 m <i>(143.7 in)</i> | 0 <i>0</i> | 0 <i>0</i> | | |
| | Baggage tube Lever arm: 4.32 m <i>(170.1 in)</i> | 0 <i>0</i> | 0 <i>0</i> | | |
| 6 | Fwd. extended baggage compartment Lever arm: 3.89 m <i>(153.1 in)</i> | 27 <i>60</i> | 105 <i>9,186</i> | | |
| | Aft extended baggage compartment Lever arm: 4.54 m <i>(178.7 in)</i> | 18 <i>40</i> | 81.7 <i>7,148</i> | | |
| 7 | Total mass & total moment with empty fuel tanks (Total of 1.-6.) | 1003.3 <i>2212</i> | 2533.8 <i>220,047</i> | | |
| 8 | Usable fuel Lever arm: 2.63 m <i>(103.5 in)</i> | 99.4 <i>219</i> | 261.4 <i>22,667</i> | | |
| 9 | Total mass & total moment including fuel (7. plus 8.) | 1102.7 <i>2431</i> | 2795.2 <i>242,714</i> | | |
| 10 | <p>The total moments from rows 7 and 9 (2533.8 and 2795.2 kgm) <i>(220,047 and 242,714 in.lb)</i> must be divided by the related total mass (1003.3 and 1102.7 kg respectively) <i>(2212 and 2431 lb)</i> and then located in Diagram 6.4.4 - PERMISSIBLE CENTER OF GRAVITY RANGE.</p> <p>As in our example CG positions (2.525 m and 2.535 m respectively) <i>(99.48 and 99.84 in)</i> and masses fall into the permitted area, this loading condition is allowable.</p> | | | | |

6.4.4 PERMISSIBLE CENTER OF GRAVITY RANGE



The CG's shown in the diagram are those that from the example in Table 6.4.3 - CALCULATION OF LOADING CONDITION.

Forward Flight CG Limit:

2.40 m (94.5 in) aft of Datum Plane at 780 to 980 kg (1720 to 2161 lb)

2.46 m (96.9 in) aft of Datum Plane at 1150 kg (2535 lb)

linear variation between these values

If MÄM 40-227 is carried out:

2.40 m (94.5 in) aft of Datum Plane at 780 kg to 980 kg (1720 lb to 2161 lb)

2.48 m (97.6 in) aft of Datum Plane at 1200 kg (2646 lb)

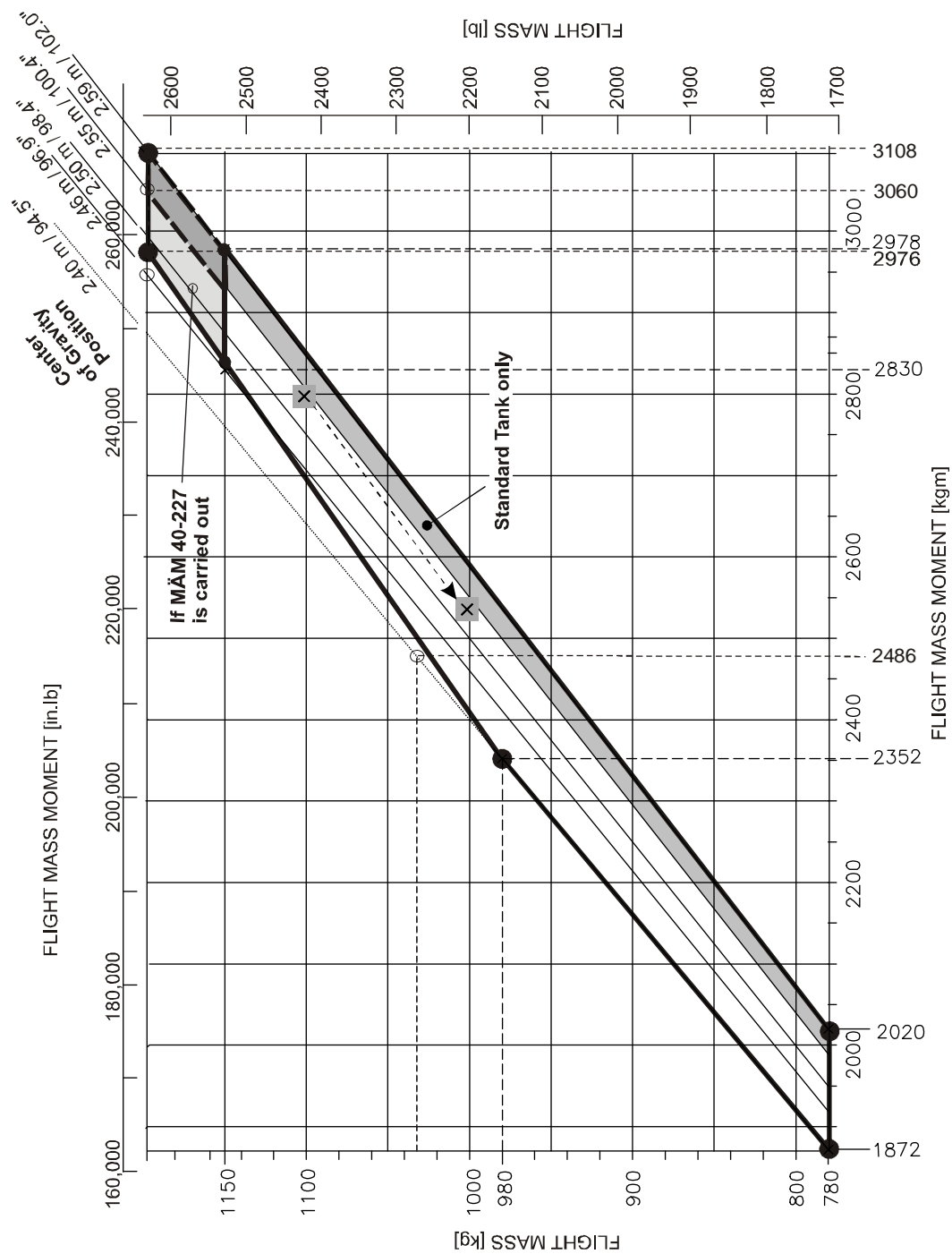
linear variation between these values

Rearward Flight CG Limit:

2.59 m (102.0 in) aft of Datum Plane (Standard Tank)

2.55 m (100.4 in) aft of Datum Plane (with Long Range Tank installed)

6.4.5 PERMISSIBLE MOMENT RANGE



6.5 EQUIPMENT LIST AND EQUIPMENT INVENTORY

All equipment that is approved for installation in the DA 40 is shown in the *Equipment List* below.

The items of equipment installed in your particular airplane are indicated in the appropriate column. The set of items marked as 'installed' constitutes the *Equipment Inventory*.

NOTE

The equipment listed below cannot be installed in any arbitrary combination. The airplane manufacturer must be contacted before removing or installing equipment, with the exception of replacing a unit by an identical unit.

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|----------------------|-------------------|----------------|--------------------|-------|-----------|-------|-------|-----------|-------|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| AVIONICS COOLING | | | | | | | | | |
| Cooling fan | Cyclone 21-3 Port | CRB122253 | Lone Star Aviation | | | | | | |
| Cooling fan | ACF 328 | ACF 328 | Sandia Aerospace | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| COMMUNICATION | | | | | | | | | |
| COMM #1 antenna | CI 291 | | Comant | | | 0.5 | 0.227 | 177.16 | 4.500 |
| COMM #2 antenna | CI 292-2 | | Comant | | | 0.5 | 0.227 | 161.42 | 4.100 |
| COMM #1 antenna | DMC63-1/A | | DM | | | | | | |
| COMM #2 antenna | DMC63-2 | | DM | | | | | | |
| COMM #1 | KX 125 | 069-01028-1101 | Bendix/King | | | 11.46 | 5.2 | 70.08 | 1.78 |
| COMM #1 | KX 155A | 069-01032-0201 | Bendix/King | | | 3.7 | 1.68 | 70.08 | 1.78 |
| COMM #1 | KX 165 | 069-01025-0025 | Bendix/King | | | 5.65 | 2.56 | 70.08 | 1.78 |
| COMM #1 | KX 165A | 069-01033-0101 | Bendix/King | | | 4.0 | 1.81 | 70.08 | 1.78 |
| COMM #1 | KX 165A/ 8.33 kHz | 069-01033-0201 | Bendix/King | | | 4.0 | 1.81 | 70.08 | 1.78 |
| COMM #1 | GNS 430 | 011-00280-00 | Garmin | | | 5.1 | 2.31 | 70.08 | 1.78 |
| COMM #1 | GNS 430 | 011-00280-10 | Garmin | | | 5.1 | 2.31 | 70.08 | 1.78 |
| COMM #1 | GNS 530 | 011-00550-00 | Garmin | | | 6.8 | 3.08 | 70.08 | 1.78 |
| COMM #1 | GNS 530 | 011-00550-10 | Garmin | | | 6.8 | 3.08 | 70.08 | 1.78 |
| COMM #2 | KX 155A | 069-01032-0201 | Bendix/King | | | 3.7 | 1.68 | 70.08 | 1.78 |
| COMM #2 | GNS 430 | 011-00280-00 | Garmin | | | 5.1 | 2.31 | 70.08 | 1.78 |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|---------------------------------------|---------------|---|----------------|-------|-----------|------|-------|-----------|------|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| COMM #2 | GNS 430 | 011-00280-10 | Garmin | | | 5.1 | 2.31 | 70.08 | 1.78 |
| Audio Panel / Marker / ICS | KMA 28 | 066-01176-0101 | Bendix/King | | | 1.5 | 0.68 | 70.08 | 1.78 |
| Audio Panel / Marker / ICS | GMA 340 | 011-00401-10 | Garmin | | | 1.2 | 0.54 | 70.08 | 1.78 |
| ICS | PM1000 II | 11922 | PS Engineering | | | 0.75 | 0.34 | 70.08 | 1.78 |
| Headset, pilot | Echelon 100 | | Telex | | | | | | |
| Headset, co-pilot | Echelon 100 | | Telex | | | | | | |
| Headset, LH pax | Echelon 100 | | Telex | | | | | | |
| Headset, RH pax | Echelon 100 | | Telex | | | | | | |
| Speaker | FRS8 / 4 Ohms | | Visaton | | | | | | |
| Handmic | 100TRA | 62800-001 | Telex | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| AUTOPILOT SYSTEM | | | | | | | | | |
| Autopilot system | KAP 140 | | Bendix/King | | | | | | |
| Flight computer (w/o alt. preselect) | KC 140 | 065-00176-5402 (without MAM 40-099 or MSB 40-018) | Bendix/King | | | 2.02 | 0.918 | 70.08 | 1.78 |
| Flight computer (with alt. preselect) | KC 140 | 065-00176-7702 (without MAM 40-099 or MSB 40-018) | Bendix/King | | | 2.02 | 0.918 | 70.08 | 1.78 |
| Flight computer (w/o alt. preselect) | KC 140 | 065-00176-5403 (with MAM 40-099 or MSB 40-018) | Bendix/King | | | 2.02 | 0.918 | 70.08 | 1.78 |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|---------------------------------------|-----------------|--|-----------------|-------|-----------|------|-------|-----------|------|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| Flight computer (with alt. preselect) | KC 140 | 065-00176-7703 (with MAM 40-099 or MSB 40-018) | Bendix/King | | | 2.02 | 0.918 | 70.08 | 1.78 |
| Flight computer | KC 140 | 065-00176-7904 | Bendix/King | | | 2.02 | 0.918 | 70.08 | 1.78 |
| Pitch servo | KS 270 C | 065-00178-2500 | Bendix/King | | | 2.7 | 1.224 | 154.0 | 3.93 |
| Pitch servo mount | KM 275 | 065-00030-0000 | Bendix/King | | | 1.08 | 0.488 | 154.0 | 3.93 |
| Roll servo | KS 271 C | 065-00179-0300 | Bendix/King | | | 2.3 | 1.044 | 120.0 | 3.06 |
| Roll servo mount | KM 275 | 065-00030-0000 | Bendix/King | | | 2.7 | 1.224 | 120.0 | 3.06 |
| Trim servo | KS 272 C | 065-00180-3500 | Bendix/King | | | 2.22 | 1.005 | 87.2 | 2.21 |
| Trim servo mount | KM 277 | 065-00041-0000 | Bendix/King | | | 1.09 | 0.494 | 87.2 | 2.21 |
| Configuration module | KCM 100 | 071-00073-5000 | Bendix/King | | | 0.06 | 0.026 | 70.08 | 1.78 |
| Sonalert | SC | SC 628 | Mallory | | | | | | |
| Control stick | | DA4-2213-12-90 | Diamond | | | | | | |
| CWS stick | | 031-00514-0000 | Bendix/King | | | | | | |
| AP-disc switch | | 031-00428-0000 | Bendix/King | | | | | | |
| Trim switch assy | | 200-09187-0000 | Bendix/King | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| ELECTRICAL POWER | | | | | | | | | |
| Battery | CB24-11M (G243) | | Concorde (Gill) | | | 28.0 | 12.7 | 47.0 | 1.19 |
| Battery | RG24-11M | | Concorde | | | 26.4 | 11.97 | 47.0 | 1.19 |
| Battery | RG24-15M | | Concorde | | | 29.5 | 13.38 | 47.0 | 1.19 |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|----------------------------------|----------------|-----------------|--------------------|-------|-----------|-------|-------|-----------|------|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| Emergency battery (28 pcs.) | MN 1500 AA | | Duracell | | | 1.52 | 0.69 | 70.08 | 1.78 |
| Emergency battery (Lithium) | | D41-2560-93-00 | Excell | | | 0.564 | 0.256 | 66.5 | 1.69 |
| Ammeter | VM1000 | 4010050 | Vision Microsyst. | | | | | | |
| Ammeter current sensor | VM1000 | 3010022 | Vision Microsyst. | | | | | | |
| Voltmeter | VM1000 | 4010050 | Vision Microsyst. | | | | | | |
| Voltage regulator | | VR2000-28-1 (D) | Electrosyst., Inc. | | | | | | |
| External power connector | | | Diamond | | | | | | |
| Alternator | ALU-8521LS | ALU-8521LS | Electrosyst., Inc. | | | | | | |
| DC-AC Inverter | MD 26 | MD 26-28 | Mid Continent | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| EQUIPMENT | | | | | | | | | |
| Safety belt, pilot | 5-01-() Series | 5-01-1C0701 | Schroth | | | 3.36 | 1.524 | 92.52 | 2.35 |
| Safety belt, co-pilot | 5-01-() Series | 5-01-1C5701 | Schroth | | | 3.36 | 1.524 | 92.52 | 2.35 |
| Safety belt, LH pax | 5-01-() Series | 5-01-1B5701 | Schroth | | | 3.0 | 1.36 | 126.7 | 3.22 |
| Safety belt, RH pax | 5-01-() Series | 5-01-1B0701 | Schroth | | | 3.0 | 1.36 | 126.7 | 3.22 |
| Safety belt receptacle, pilot | | | Schroth | | | 0.54 | 0.245 | 92.52 | 2.35 |
| Safety belt receptacle, co-pilot | | | Schroth | | | 0.54 | 0.245 | 92.52 | 2.35 |
| Safety belt receptacle, LH pax | | | Schroth | | | 0.54 | 0.245 | 126.7 | 3.22 |
| Safety belt receptacle, RH pax | | | Schroth | | | 0.54 | 0.245 | 126.7 | 3.22 |
| ELT unit | | E-01 | ACK | | | 3 | 1.36 | 173.2 | 4.40 |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|-----------------------------------|--------|----------------|--------------|-------|-----------|------|------|-----------|------|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| ELT remote switch | | E0105 | ACK | | | | | | |
| ELT antenna | | E0109 | ACK | | | | | | |
| ELT unit | JE2-NG | JE-1978-1NG | Joliet | | | 2.43 | 1.1 | 173.2 | 4.40 |
| ELT remote switch | | JE-1978-16 | Joliet | | | | | | |
| ELT antenna | | JE-1978-73 | Joliet | | | | | | |
| ELT unit | ME 406 | 453-6603 | Artex | | | 2 | 0.91 | 173.2 | 4.40 |
| ELT buzzer | | 452-6505 | Artex | | | | | | |
| ELT antenna | WHIP | 110-773 | Artex | | | | | | |
| ELT remote switch (ACE) | | 453-0023 | Artex | | | | | | |
| ELT module interface | | 453-1101 | Artex | | | | | | |
| Winter baffle | | DA4-2157-00-00 | Diamond | | | | | | |
| Armrest | | DA4-5210-50-91 | Diamond | | | | | | |
| Baggage extension (OÄM 40-163) | | | | | | | | | |
| Baggage net (OÄM 40-163) | | | | | | | | | |
| Baggage tray (OÄM 40-164) | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| FLIGHT CONTROLS | | | | | | | | | |
| Flaps control unit (instr. panel) | | 430550 | Diamond | | | | | | |
| Flaps actuator assy | | 430555 | Diamond | | | | | | |
| Stall warning horn assy | "A" | DA4-2739-10-00 | Diamond | | | | | | |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|---|--------|-------------------|-------------------|-------|-----------|------|-------|-----------|-------|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| Stall warning horn assy | "B" | DA4-2739-10-00X01 | Diamond | | | | | | |
| Stall warning horn assy | "C" | DA4-2739-10-00X02 | Diamond | | | | | | |
| Stall warning horn assy | "D" | DA4-2739-10-00X03 | Diamond | | | | | | |
| Stall warning horn assy | "E" | DA4-2739-10-00X04 | Diamond | | | | | | |
| Stall warning horn assy | "F" | DA4-2739-10-00X05 | Diamond | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| SAFETY EQUIPMENT | | | | | | | | | |
| Fire extinguisher, portable | | HAL 1 | AIR Total | | | 4.85 | 2.2 | 110.0 | 2.794 |
| Fire extinguisher, portable ¹⁾ | | A 620 T | Amerex | | | 2.43 | 1.1 | 110.0 | 2.794 |
| First aid kit | | | | | | | | | |
| Emergency axe | | G45912 | Fiskars | | | 1.23 | 0.558 | 78.74 | 2.00 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| FUEL | | | | | | | | | |
| Fuel qty indicator | VM1000 | 4010028 | Vision Microsyst. | | | | | | |
| Fuel qty sensor LH | VM1000 | 30100-11 | Vision Microsyst. | | | | | | |
| Fuel qty sensor RH | VM1000 | 30100-11 | Vision Microsyst. | | | | | | |
| Fuel qty sensor LH (auxiliary fuel) | VM1000 | 30100-50 | Vision Microsyst. | | | | | | |
| Fuel qty sensor RH (auxiliary fuel) | VM1000 | 30100-50 | Vision Microsyst. | | | | | | |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|--------------------------------|---------------|------------------|------------------|-------|-----------|------|----|-----------|---|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| HYDRAULIC | | | | | | | | | |
| Master cylinder | | 10-54 A | Cleveland | | | | | | |
| Parking valve | | 60-5D | Cleveland | | | | | | |
| Brake assembly | | 30-239 B | Cleveland | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| INDICATING / REC. SYSTEM | | | | | | | | | |
| Digital chronometer | LC-2 | AT420100 | Astro Tech | | | | | | |
| Digital chronometer | Model 803 | | Davtron | | | | | | |
| Flight timer | | 85000-12 | Hobbs | | | | | | |
| Flight timer | | 85094-12 | Hobbs | | | | | | |
| Annunciator panel (system) | | | Diamond | | | | | | |
| Annunciator panel | WW-IDC 001 | | White Wire | | | | | | |
| CO detector | Model 452-201 | | CO Guardian LLC | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| LANDING GEAR | | | | | | | | | |
| LANDING GEAR STANDARD FAIRINGS | | | | | | | | | |
| MLG wheel fairing LH | | D41-3213-91-00 | Diamond Aircraft | | | | | | |
| MLG wheel fairing RH | | D41-3213-92-00 | Diamond Aircraft | | | | | | |
| NLG wheel pant shell LH | | D41-3223-91-00_1 | Diamond Aircraft | | | | | | |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|-------------------------|------|------------------|------------------|-------|-----------|------|----|-----------|---|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| NLG wheel pant shell RH | | D41-3223-92-00_1 | Diamond Aircraft | | | | | | |
| NLG strut fairing assy | | DA4-3227-90-00 | Diamond Aircraft | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| LANDING GEAR SPEEDKIT | | | | | | | | | |
| MLG speed cover LH | | DA4-3219-27-00_1 | Diamond Aircraft | | | | | | |
| MLG speed cover RH | | DA4-3219-28-00_1 | Diamond Aircraft | | | | | | |
| MLG sheet cover LH | | DA4-3219-25-00 | Diamond Aircraft | | | | | | |
| MLG sheet cover RH | | DA4-3219-26-00 | Diamond Aircraft | | | | | | |
| MLG cover speed LH | | DA4-3219-21-00 | Diamond Aircraft | | | | | | |
| MLG cover speed RH | | DA4-3219-22-00 | Diamond Aircraft | | | | | | |
| MLG strut cover LH | | DA4-3219-23-00 | Diamond Aircraft | | | | | | |
| MLG strut cover RH | | DA4-3219-24-00 | Diamond Aircraft | | | | | | |
| NLG wheel pant shell LH | | D41-3223-91-00_1 | Diamond Aircraft | | | | | | |
| NLG wheel pant shell RH | | D41-3223-92-00_1 | Diamond Aircraft | | | | | | |
| NLG strut cover | | DA4-3229-29-00 | Diamond Aircraft | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |



Mass and Balance

[illegible]

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|---|------|-------------------|------------------|-------|-----------|------|----|-----------|---|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| LANDING GEAR SMALL TIRES AND FAIRINGS WITH MAINTENANCE ACCESS or LANDING GEAR TALL MLG WITH FAIRINGS FOR SMALL TIRES WITH MAINTENANCE ACCESS | | | | | | | | | |
| MLG wheel fairing assy access door LH | | DA4-3215-91-00X01 | Diamond Aircraft | | | | | | |
| MLG wheel fairing assy access door RH | | DA4-3215-92-00X01 | Diamond Aircraft | | | | | | |
| NLG wheel fairing shell LH | | DA4-3225-91-00X01 | Diamond Aircraft | | | | | | |
| NLG wheel fairing shell RH | | DA4-3225-92-00 | Diamond Aircraft | | | | | | |
| Bracket assy LH MLG wheel fairing | | DA4-3215-31-00 | Diamond Aircraft | | | | | | |
| Bracket assy RH MLG wheel fairing | | DA4-3215-32-00 | Diamond Aircraft | | | | | | |
| Brake cover MLG wheel frame LH | | DA4-3215-93-00 | Diamond Aircraft | | | | | | |
| Brake cover MLG wheel frame RH | | DA4-3215-94-00 | Diamond Aircraft | | | | | | |
| NLG strut fairing assy | | DA4-3227-90-00 | Diamond Aircraft | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| LIGHTS | | | | | | | | | |
| Map / Reading light assy crew | | W1461.0.010 | Rivoret | | | | | | |
| Cabin Light | | W1461.0.010 | Rivoret | | | | | | |
| Instr./radio lights dimmer assy | | WW-LCM-002 | White Wire | | | | | | |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|---------------------------------|------------------|--------------------|------------------|-------|-----------|-------|-------|-----------|-------|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| Glareshield lamp assy | | DA4-3311-10-01 | Diamond Aircraft | | | | | | |
| Glareshield light inverter | | APVL328-8-3-L-18QF | Quantaflex | | | | | | |
| Strobe / Pos. light assy LH | A600-PR-D-28 | 01-0790006-05 | Whelen | | | | | | |
| Strobe / Pos. light assy RH | A600-PG-D-28 | 01-0790006-07 | Whelen | | | | | | |
| Strobe / Pos. light assy LH | OR6002R | 01-0771733-12 | Whelen | | | | | | |
| Strobe / Pos. light assy RH | OR6002G | 01-0771733-11 | Whelen | | | | | | |
| Strobe light power supply LH/RH | A490ATS-CF-14/28 | 01-0770062-05 | Whelen | | | 1.592 | 0.722 | 101.0 | 2.566 |
| Halogen Taxi light | 70346-01 | 01-0770346-05 | Whelen | | | 0.28 | 0.13 | 79.920 | 2.030 |
| Halogen Landing light | 70346-01 | 01-0770346-03 | Whelen | | | 0.28 | 0.13 | 79.920 | 2.030 |
| Electro luminescent lamps | Quantaflex 1600 | | Quantaflex | | | | | | |
| Ballast | GENS D1,24V | 37776 | Newark | | | | | | |
| Ballast | GENS D1,24V | 37776 | Newark | | | | | | |
| Taxi light | HID LAMP D15 | 39663 | Newark | | | | | | |
| Landing light | HID LAMP D15 | 39663 | Newark | | | | | | |
| LED Taxi light | 71125 | 01-0771125-23 | Whelen | | | 0.3 | 0.14 | 79.920 | 2.030 |
| LED Landing light | 71125 | 01-0771125-20 | Whelen | | | 0.3 | 0.14 | 79.920 | 2.030 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|--------------------------------|------------|----------------|--------------------|-------|-----------|------|-------|-----------|-------|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| NAVIGATION | | | | | | | | | |
| Pitot/static probe, heated | | DAI-9034-57-00 | Diamond | | | | | | |
| P/S probe HTR fail sensor | | DA4-3031-01-00 | Diamond | | | | | | |
| Altimeter inHg/mbar, primary | | 5934PD-3 | United Instruments | | | 1.9 | 0.86 | 70.08 | 1.78 |
| Altimeter inHg/mbar, primary | LUN 1128 | 1128-14B6 | Mikrotechna | | | 1.39 | 0.63 | 70.08 | 1.78 |
| Altimeter inHg/mbar, secondary | | 5934PD-3 | United Instruments | | | 1.9 | 0.86 | 70.08 | 1.78 |
| Altimeter inHg/mbar, secondary | LUN 1128 | 1128-14B6 | Mikrotechna | | | 1.39 | 0.63 | 70.08 | 1.78 |
| Vertical speed indicator | | 7000 | United Instruments | | | 1.2 | 0.54 | 70.08 | 1.78 |
| Vertical speed indicator | LUN 1144 | 1144-A4B4 | Mikrotechna | | | 0.9 | 0.4 | 70.08 | 1.78 |
| Airspeed indicator | | 8025 | United Instruments | | | 0.7 | 0.32 | 70.08 | 1.78 |
| Airspeed indicator | LUN 1116 | 1116-B4B3 | Mikrotechna | | | 0.77 | 0.35 | 70.08 | 1.78 |
| Outside air temp. indication | | 301F(C) | Davtron | | | 0.27 | 0.124 | 70.08 | 1.78 |
| Magnetic compass | | C2400L4P | Airpath | | | 0.65 | 0.293 | 70.08 | 1.78 |
| Compass system C/O | KCS 55A | | Bendix/King | | | | | | |
| Slaved gyro | KG 102 A | 060-00015-0000 | Bendix/King | | | 4.3 | 1.95 | 70.08 | 1.78 |
| HSI | KI 525A | 066-03046-0007 | Bendix/King | | | 3.38 | 1.53 | 70.08 | 1.78 |
| Slaving unit (vertical) | KA 51B | 071-01242-0001 | Bendix/King | | | 0.2 | 0.91 | 70.08 | 1.78 |
| Slaving unit (horizontal) | KA 51B | 071-01242-06 | Bendix/King | | | 0.2 | 0.91 | 70.08 | 1.78 |
| Flux valve | KMT 112 | 071-01052-0000 | Bendix/King | | | 0.3 | 0.14 | 101.0 | 2.566 |
| Directional gyro, free | AIM2051BLD | 505-0031-931 | BF-Goodrich | | | 2.6 | 1.18 | 70.08 | 1.78 |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|--------------------------------|------------------|----------------|----------------------|-------|-----------|-------|-------|-----------|------|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| Altitude indicator | AIM1100-28L(0F) | 504-0111-936 | BF-Goodrich | | | 2.20 | 1.0 | 70.08 | 1.78 |
| Altitude indicator | AIM1100-28LK(0F) | 504-0111-938 | BF-Goodrich | | | 2.20 | 1.0 | 70.08 | 1.78 |
| Altitude indicator | AIM1100-28LK(2F) | 504-0111-941 | BF-Goodrich | | | 2.20 | 1.0 | 70.08 | 1.78 |
| Turn coordinator w/o AP pickup | 1394T100-(3Z) | | Mid Continent Instr. | | | 0.822 | 0.373 | 70.08 | 1.78 |
| Turn coordinator | 1394T100-(12RZ) | | Mid Continent Instr. | | | 1.41 | 0.64 | 70.08 | 1.78 |
| Turn coordinator | 1394T100-(12RA) | | Mid Continent Instr. | | | 1.41 | 0.64 | 70.08 | 1.78 |
| Turn coordinator | 1394T100-(12RB) | | Mid Continent Instr. | | | 1.41 | 0.64 | 70.08 | 1.78 |
| Marker antenna | CI102 | | Comant | | | | | | |
| DME | KN 62A | 066-01068-0004 | Bendix/King | | | 2.6 | 1.18 | 70.08 | 1.78 |
| DME antenna | KA60 | 071-01174-0000 | Bendix/King | | | | | | |
| DME antenna | KA60 | 071-01591-0001 | Bendix/King | | | | | | |
| DME antenna | KA61 | 071-00221-0010 | Bendix/King | | | | | | |
| Transponder | KT 76A | 066-1062-10 | Bendix/King | | | 0.85 | 0.39 | 70.08 | 1.78 |
| Transponder | KT 76C | 066-01156-0101 | Bendix/King | | | 0.2 | 0.09 | 70.08 | 1.78 |
| Transponder | GTX 327 | 011-00490-00 | Garmin | | | 2.4 | 1.09 | 70.08 | 1.78 |
| Transponder | GTX 330 | 011-00455-00 | Garmin | | | 3.4 | 1.54 | 70.08 | 1.78 |
| XPDR antenna | KA60 | 071-01174-0000 | Bendix/King | | | | | | |
| XPDR antenna | KA60 | 071-01591-0001 | Bendix/King | | | | | | |
| XPDR antenna | KA61 | 071-00221-0010 | Bendix/King | | | | | | |
| Altitude digitizer | | D120-P2-T | TCI | | | | | | |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|----------------------------------|-------------------|----------------|------------------|-------|-----------|-------|-------|-----------|-------|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| Altitude data system | SAE5-35 | 305154-00 | Sandia Aerospace | | | | | | |
| ADF | KR87 | 066-01072-0004 | Bendix/King | | | 2.9 | 1.32 | 70.08 | 1.78 |
| ADF antenna | KA44B | 071-01234-0000 | Bendix/King | | | | | | |
| ADF Indicator | KI227 | 066-03063-0001 | Bendix/King | | | 0.7 | 0.32 | 70.08 | 1.78 |
| ADF Indicator | KI227 | 066-03063-00 | Bendix/King | | | 0.7 | 0.32 | 70.08 | 1.78 |
| NAV antenna coupler | CI505 | | Comant | | | | | | |
| NAV/GS antenna coupler | CI507 | | Comant | | | 0.20 | 0.089 | 106.1 | 2.685 |
| dual NAV/dual GS antenna coupler | CI 1125 | | Comant | | | | | | |
| VOR/LOC/GS antenna | CI157P | | Comant | | | | | | |
| NAV/COM #1 | KX 125 | 069-01028-1101 | Bendix/King | | | 11.46 | 5.2 | 70.08 | 1.78 |
| NAV/COM #1 volt conv. | KA39 | 071-01041-001 | Bendix/King | | | | | | |
| NAV/COM #1 | KX155A | 069-01032-0201 | Bendix/King | | | 3.7 | 1.68 | 70.08 | 1.78 |
| NAV/COM #1 | KX 165 | 069-01025-0025 | Bendix/King | | | 5.65 | 2.56 | 70.08 | 1.78 |
| NAV/COM #1 | KX 165A | 069-01033-0101 | Bendix/King | | | 4.0 | 1.81 | 70.08 | 1.78 |
| NAV/COM #1 | KX 165A, 8.33 kHz | 069-01033-0201 | Bendix/King | | | 4.0 | 1.81 | 70.08 | 1.78 |
| NAV/COM #2 | KX155A | 069-01032-0201 | Bendix/King | | | 3.7 | 1.68 | 70.08 | 1.78 |
| NAVCOM/GPS #1 | GNS 430 | 011-00280-00 | Garmin | | | 6.5 | 2.95 | 70.08 | 1.78 |
| NAVCOM/GPS #1 | GNS 430 | 011-00280-10 | Garmin | | | 6.5 | 2.95 | 70.08 | 1.78 |
| NAVCOM/GPS #1 | GNS 530 | 011-00550-00 | Garmin | | | 8.5 | 3.86 | 70.08 | 1.78 |
| NAVCOM/GPS #1 | GNS 530 | 011-00550-0 | Garmin | | | 8.5 | 3.86 | 70.08 | 1.78 |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|-----------------------------|-----------|------------------|---------------|-------|-----------|------|------|-----------|------|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| NAVCOM/GPS #2 | GNS 430 | 011-00280-00 | Garmin | | | 6.5 | 2.95 | 70.08 | 1.78 |
| NAVCOM/GPS #2 | GNS 430 | 011-00280-10 | Garmin | | | 6.5 | 2.95 | 70.08 | 1.78 |
| CDI, VOR/LOC #1 | KI 208 | 066-03056-0000 | Bendix/King | | | 1 | 0.45 | 70.08 | 1.78 |
| CDI, VOR/LOC #2 | KI 208 | 066-03056-0000 | Bendix/King | | | 1 | 0.45 | 70.08 | 1.78 |
| CDI, VOR/LOC/GS #1 | GI 106A | 013-00049-01 | Garmin | | | 1.4 | 0.64 | 70.08 | 1.78 |
| CDI, VOR/LOC/GS #2 | GI 106A | 013-00049-01 | Garmin | | | 1.4 | 0.64 | 70.08 | 1.78 |
| GPS | KLN 89 B | 066-01148-0102 | Bendix/King | | | 3 | 1.36 | 70.08 | 1.78 |
| GPS | KLN 94 | 069-01034-0101 | Bendix/King | | | 3 | 1.36 | 70.08 | 1.78 |
| GPS antenna | KA 92 | 071-01553-0200 | Bendix/King | | | | | | |
| GPS antenna #1 | GA 56 | 011-00134-00 | Garmin | | | | | | |
| GPS antenna #2 | GA 56 | 011-00134-00 | Garmin | | | | | | |
| GPS annunciation unit | MD41-1488 | | Mid Continent | | | | | | |
| GPS / AP switch assy | MD41-528 | | Mid Continent | | | | | | |
| Multifunction display / GPS | KMD 150 | 066-01174-0101 | Bendix/King | | | 3.3 | 1.5 | 70.08 | 1.78 |
| Stormscope | WX-500 | 805-11500-001 | Goodrich | | | | | | |
| Stormscope antenna | NY-163 | 805-10930-001 | Goodrich | | | | | | |
| Strike finder display | SF 2000 | 2000-009 | Insight | | | | | | |
| Strike finder sensor | SF 2000 | 2000-022 | Insight | | | | | | |
| TAS processor | TAS 600 | 70-2420-x TAS600 | Avidyne/Ryan | | | | | | |
| TAS processor | TAS 610 | 70-2420-x TAS610 | Avidyne/Ryan | | | | | | |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|---------------------------|------------|------------------|-------------------|-------|-----------|------|----|-----------|---|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| TAS processor | TAS 620 | 70-2420-x TAS620 | Avidyne/Ryan | | | | | | |
| Transponder coupler | | 70-2040 | Avidyne/Ryan | | | | | | |
| TAS antenna, top | | S72-1750-31L | Sensor Systems | | | | | | |
| TAS antenna, bottom | | S72-1750-32L | Sensor Systems | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| ENGINE | | | | | | | | | |
| ENGINE INDICATING | | | | | | | | | |
| Engine | IO-360-M1A | | Textron Lycoming | | | | | | |
| | | | | | | | | | |
| ENGINE FUEL CONTROL | | | | | | | | | |
| Fuel flow transmitter | VM1000 | 3010032 | Vision Microsyst. | | | | | | |
| Fuel pressure transmitter | VM1000 | 3010017 | Vision Microsyst. | | | | | | |
| | | | | | | | | | |
| ENGINE IGNITION SYSTEM | | | | | | | | | |
| SlickSTART booster | SS1001 | | Unison | | | | | | |
| Laser ignition controller | LC-1002-03 | LC-1002-03 | Unison | | | | | | |
| Laser ignition harnedd | LH-1004-43 | | Unison | | | | | | |
| Magneto RH/LH | 4370/4347 | | Slick | | | | | | |
| Magneto RH/LH | 4770/4771 | | Slick | | | | | | |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|---------------------------------|----------|---------------|-------------------|-------|-----------|------|----|-----------|---|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| RPM sensor | VM1000 | 3010005 | Vision Microsyst. | | | | | | |
| Manifold pressure sensor | VM1000 | 3010016 | Vision Microsyst. | | | | | | |
| Cyl. head temp. probes (4 each) | VM1000 | 1020061 | Vision Microsyst. | | | | | | |
| EGT probes | VM1000 | 1020060 | Vision Microsyst. | | | | | | |
| Data processing unit | DPU | 4010067 | Vision Microsyst. | | | | | | |
| Data processing unit | DPU | 4010081 | Vision Microsyst. | | | | | | |
| Integr. engine data display | VM1000 | 4010050 | Vision Microsyst. | | | | | | |
| I/O board assy | | 3020003 | Vision Microsyst. | | | | | | |
| I/O board assy | | 3020018 | Vision Microsyst. | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| ENGINE OIL | | | | | | | | | |
| Oil temperature sensor | VM1000 | 3010021 | Vision Microsyst. | | | | | | |
| Oil pressure transducer | VM1000 | 3010018 | Vision Microsyst. | | | | | | |
| | | | | | | | | | |
| ENGINE STARTING | | | | | | | | | |
| Starter | 149-24LS | | Skytec | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

| Airplane Serial No.: | | Registration: | | Date: | | Mass | | Lever Arm | |
|-------------------------|------------------|---------------------|--------------|-------|-----------|------|-------|-----------|-------|
| Description | Type | Part No. | Manufacturer | S/N | installed | lb | kg | in | m |
| PROPELLER SYSTEM | | | | | | | | | |
| Propeller | MTV-12-B/180-17 | | mt-Propeller | | | 47.0 | 21.32 | 15.0 | 0.381 |
| Propeller | MTV-12-B/180-17f | | mt-Propeller | | | 47.0 | 21.32 | 15.0 | 0.381 |
| Propeller governor | C-210776 | | Woodward | | | 3.05 | 1.385 | 29.4 | 0.747 |
| Propeller governor | MT-P-420-10 | | mt-Propeller | | | 2.0 | 0.907 | 29.4 | 0.747 |
| Propeller governor | MT-P860-23 | P-860-23 | mt-Propeller | | | 2.05 | 0.93 | 29.4 | 0.747 |
| | | | | | | | | | |
| | | | | | | | | | |
| AIRPLANE FLIGHT MANUAL | | Doc.No. 6.01.01(-E) | Diamond | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

¹⁾ The Amerex A 620 T fire extinguisher is UL approved and can be used in airplanes registered in Canada and the USA. For airplanes registered in other countries, refer to the national Airworthiness Authority.

Place: _____

Date: _____

Signature: _____

CHAPTER 7

DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

| | Page |
|--|------|
| 7.1 INTRODUCTION | 7-3 |
| 7.2 AIRFRAME | 7-3 |
| 7.3 FLIGHT CONTROLS | 7-4 |
| 7.4 INSTRUMENT PANEL | 7-10 |
| 7.5 LANDING GEAR | 7-13 |
| 7.6 SEATS AND SAFETY HARNESSSES | 7-15 |
| 7.7 BAGGAGE COMPARTMENT | 7-17 |
| 7.8 CANOPY, REAR DOOR, AND CABIN INTERIOR | 7-18 |
| 7.9 POWER PLANT | 7-21 |
| 7.9.1 ENGINE, GENERAL | 7-21 |
| 7.9.2 OPERATING CONTROLS | 7-22 |
| 7.9.3 PROPELLER | 7-25 |
| 7.9.4 ENGINE INSTRUMENTS | 7-26 |
| 7.10 FUEL SYSTEM | 7-32 |
| 7.11 ELECTRICAL SYSTEM | 7-41 |
| 7.11.1 GENERAL | 7-43 |
| 7.11.2 DAI ANNUNCIATOR PANEL(WARNING, CAUTION AND STATUS LIGHTS) | 7-47 |
| 7.11.3 WHITE WIRE ANNUNCIATOR PANEL(WARNING, CAUTION AND STATUS LIGHTS) | 7-50 |
| 7.12 PITOT-STATIC SYSTEM | 7-55 |
| 7.13 STALL WARNING | 7-55 |
| 7.14 AVIONICS | 7-55 |

| | | | |
|--|--------|---------------------------------|------|
| | 7.15 | CO-MONITOR (IF INSTALLED) | 7-56 |
| | 7.15.1 | SELF TEST SEQUENCE | 7-56 |
| | 7.15.2 | IN-FLIGHT CO ALARM | 7-56 |
| | 7.15.3 | UNIT FAILURE INDICATION | 7-57 |

7.1 INTRODUCTION

Chapter 7 contains a description of the airplane and its systems, together with operating instructions.

For details about optional equipment see Chapter 9.

7.2 AIRFRAME

Fuselage

The GFRP fuselage is of semi monocoque molded construction. The fire protection on the firewall is of a special fire-resistant matting, which is covered on the engine side by stainless steel cladding. The two main bulkheads are GFRP/CFRP items.

Wings

The wings have a front and rear spar; each wing has a top shell and a bottom shell - a 'fail safe' concept. The wings, as well as the aileron and flaps, are made of GFRP/CFRP, and are principally of sandwich construction. An aluminum fuel tank is installed in each of the wings.

Empennage

The airplane has a 'T' tail of GFRP semi monocoque construction. Both the stabilizers have twin spars and a skin with no sandwich. Rudder and elevator are of sandwich construction.

7.3 FLIGHT CONTROLS

The ailerons, elevator and wing flaps are operated through control rods, while the rudder is controlled by cable. The flaps are electrically operated. Elevator forces can be balanced by a trim tab on the elevator, which is operated by a Bowden cable.

Ailerons

Construction: GFRP/CFRP composite sandwich

Hinges: There are 4 hinges, which are hinge pins mounted in an aluminum bracket. They are secured in position by a roll pin. The absence of this roll pin can lead to the loss of the hinge pin and a consequent loss of flight safety.

Operation: A rod-end bearing is screwed into a steel push rod and locked by means of a nut which has locking varnish applied to it. Damage to this varnish can indicate a twisting and thus a change to the adjustment. The connection between the rod-end bearing and the control horn is a bolt, the nut of which is likewise sealed with locking varnish.

The aluminum control horn is attached to the aileron with 3 screws.

Flaps

Construction: GFRP/CFRP composite sandwich

Hinges: There are 6 hinges, which are hinge pins mounted in an aluminum bracket. They are secured in position by a roll pin. The absence of this roll pin can lead to the loss of the hinge pin and a consequent loss of flight safety. Another aluminum fitting is located at the fuselage and is attached to a torsion tube. The torsion tube is located in the fuselage, creating a connection between the left and right flaps.

Operation: A rod-end bearing is screwed into a steel push rod and locked by means of a nut which has locking varnish applied to it. Damage to this varnish can indicate a twisting and thus a change to the adjustment. The connection between the rod-end bearing and the control horn is a bolt, the nut of which is likewise sealed with locking varnish.

The flap control horn is attached to the flap with 3 screws.

The flaps are driven by an electric motor and have 3 settings:

- Cruise (UP), totally retracted
- Take-off (T/O), and
- Landing (LDG).

The flaps are operated by means of a 3-position flap selector switch on the instrument panel. The positions of the switch correspond to the positions of the flaps, the Cruise position of the switch being at the top. If the switch is moved to another position, the flaps continue to travel automatically until they have reached the position selected on the switch. The UP and LDG positions are additionally protected by a limit switch to guard against over-running the end positions.

The electrical flap drive has an automatic circuit breaker which can also be operated manually.

Flap Position Indicator:

The current flap position is indicated by means of three lights beside the flap selector switch.

When the upper light (green) is illuminated, the flaps are in the Cruise position (UP);

When the center light (white) is illuminated, the flaps are in Take-off position (T/O);

When the lower light (white) is illuminated, the flaps are in Landing position (LDG).

When two lights are illuminated simultaneously, the flaps are between the two indicated positions. This is the case only when the flaps are traveling.

Elevator

Construction: GFRP sandwich

Hinges: 5 hinges

Operation Steel push-rods;

Two of the bellcrank bearings are accessible to visual inspection next to the lower hinge of the rudder. The elevator horn and its bearing, as well as the connection to the push-rod, can be visually inspected at the upper end of the rudder.

Rudder

Construction: GFRP sandwich

Hinges: Upper hinge: One bolt.

Lower hinge: Bearing bracket including rudder stops, held by 4 screws to the rear web of the vertical stabilizer. The mating part on the rudder is a bracket which is attached to the rudder by 2 bolts. The bolts and nuts are accessible to visual inspection.

Operation: Steel cables, the eyes of which are connected to the bolts on the bracket.

Elevator Trim

The trim control is a black wheel in the center console to the rear of the engine controls. To guard against over-rotating, the trim wheel incorporates a friction device. A mark on the wheel shows the take-off (T/O) position.

Turn wheel to the front = nose down

Turn wheel to the rear = nose up

Pedal Adjustment

NOTE

The pedals may only be adjusted on the ground!

- The pedals are unlocked by pulling the black T-grip handle, which is located behind the rear attachment, straight back .

NOTE

- When adjusting rudder pedals to install the control surfaces
- must lock pull straight back on T-grip, do not pull up.

Forward Adjustment:

Whilst keeping the handle pulled, push the pedals forward with your feet. Release the handle and allow the pedals to lock into place.

Rearward Adjustment:

Using the unlocking handle, pull the pedals back to the desired position. Release the handle and push the pedals forward with your feet until they lock into place.

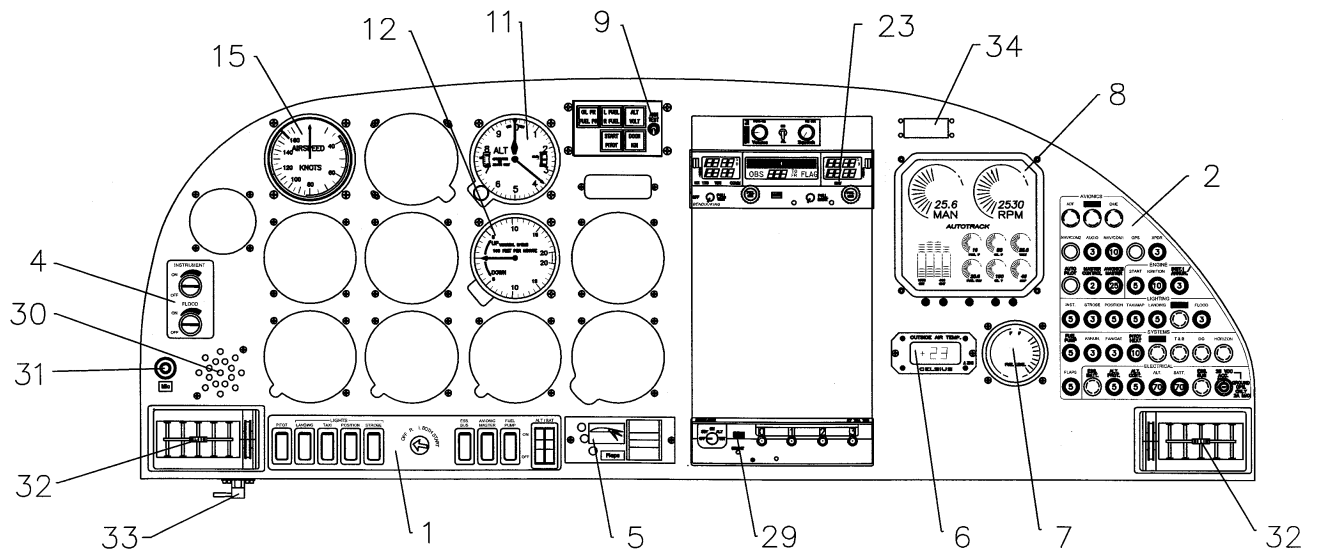
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| Page 7 - 8 | Rev. 8 01-Dec-2010 | Doc. # 6.01.01-E |
|------------|-------------------------|------------------|

| Electrical Pedal Adjustment (Optional Equipment, OÄM 40-251)**|** **NOTE****|** The pedals may only be adjusted on the ground!**|** The pedals are adjusted using a rocker switch, located on the rear wall of the leg room.**|** The related circuit breaker is located below the switch.**|** *Forward Adjustment***|** To move the pedals forward, depress lower side of switch. When pedals are in correct position, release switch.**|** *Rearward Adjustment***|** To move the pedals in the rearward direction, depress upper side of switch. When pedals are in correct position, release switch.**|** *Locking***|** Upon release the switch moves automatically to the 'power off' position, so locking the pedals in the present position.

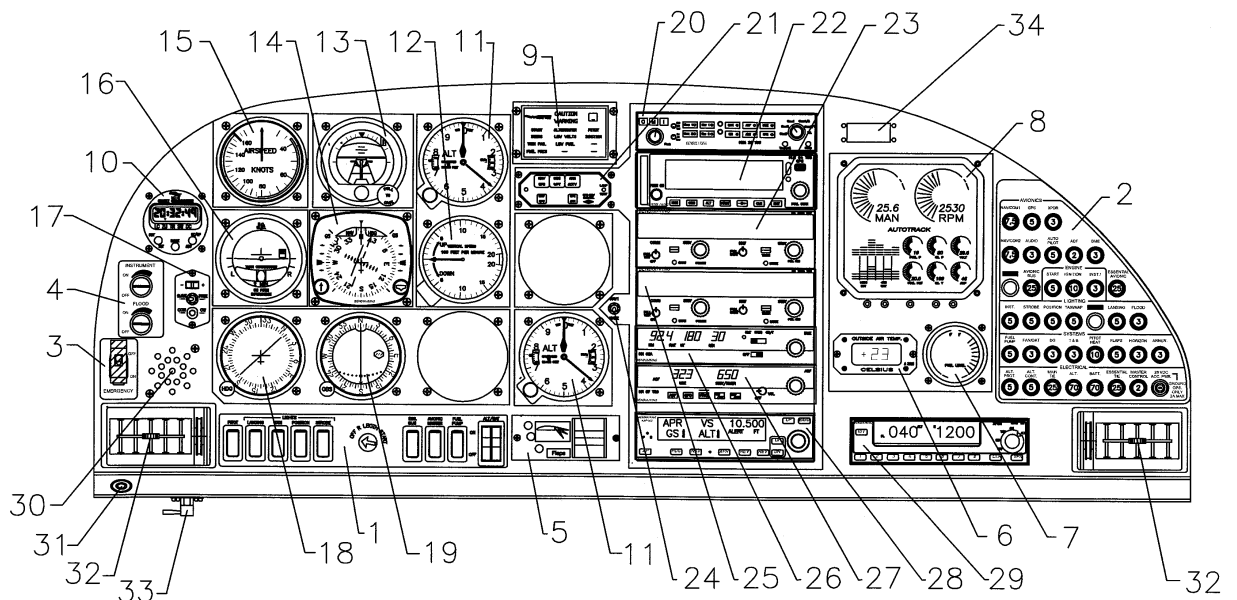
7.4 INSTRUMENT PANEL

Instrument Panel Variants

The DA 40 can be equipped with one of numerous instrument panel variants. Therefore only two example variants (VFR and IFR) are described in this section. The equipment that is actually installed in a particular airplane is listed in the Equipment Inventory in Section 6.5. The airplane manufacturer must be contacted before removing or installing equipment, with the exception of replacing a unit by an identical unit.



VFR instrument panel (example)



IFR instrument panel (example)

| Major Instruments and Controls | |
|--|--|
| 1 Electrical switches, ignition switch | 18 ADF indicator |
| 2 Circuit breakers* | 19 Course deviation indicator (CDI) |
| 3 Emergency switch | 20 Audio amplifier / intercom / marker beacon receiver |
| 4 Rotary buttons for instrument lighting and flood light | 21 GPS Annunciation Control Unit |
| 5 Flap selector switch | 22 GPS |
| 6 OAT indicator | 23 Radio / VOR, No. 1 |
| 7 Fuel quantity indicator | 24 Remote DME switch |
| 8 Engine instruments | 25 Radio / VOR, No. 2 |
| 9 Lights (Annunciator Panel) | 26 DME |
| 10 Chronometer | 27 ADF receiver |
| 11 Altimeter | 28 Autopilot control unit (optional) |
| 12 Vertical speed indicator (VSI) | 29 Transponder |
| 13 Attitude gyro (artificial horizon) | 30 Stall warning horn |
| 14 Horizontal situation indicator (HSI) | 31 Microphone socket |
| 15 Airspeed indicator | 32 Ventilation nozzles |
| 16 Turn & bank indicator | 33 Alternate Static Valve (optional for VFR version) |
| 17 Slaving meter | 34 ELT operating unit (RCPI) |

*) Designations and abbreviations used to identify the circuit breakers are explained in Section 1.5 - DEFINITIONS AND ABBREVIATIONS.

Cockpit Ventilation

Ventilation in the front is provided by the movable ventilation nozzles (17) in the instrument panel. Furthermore there are spherical nozzles in the roll bar on the left and right side next to the front seats as well as on the central console above the passengers' heads. The spherical nozzles are opened and closed by twisting.

7.5 LANDING GEAR

The landing gear consists of a main landing gear of sprung steel struts, and a free-castering nose wheel which is sprung by an elastomer package.

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

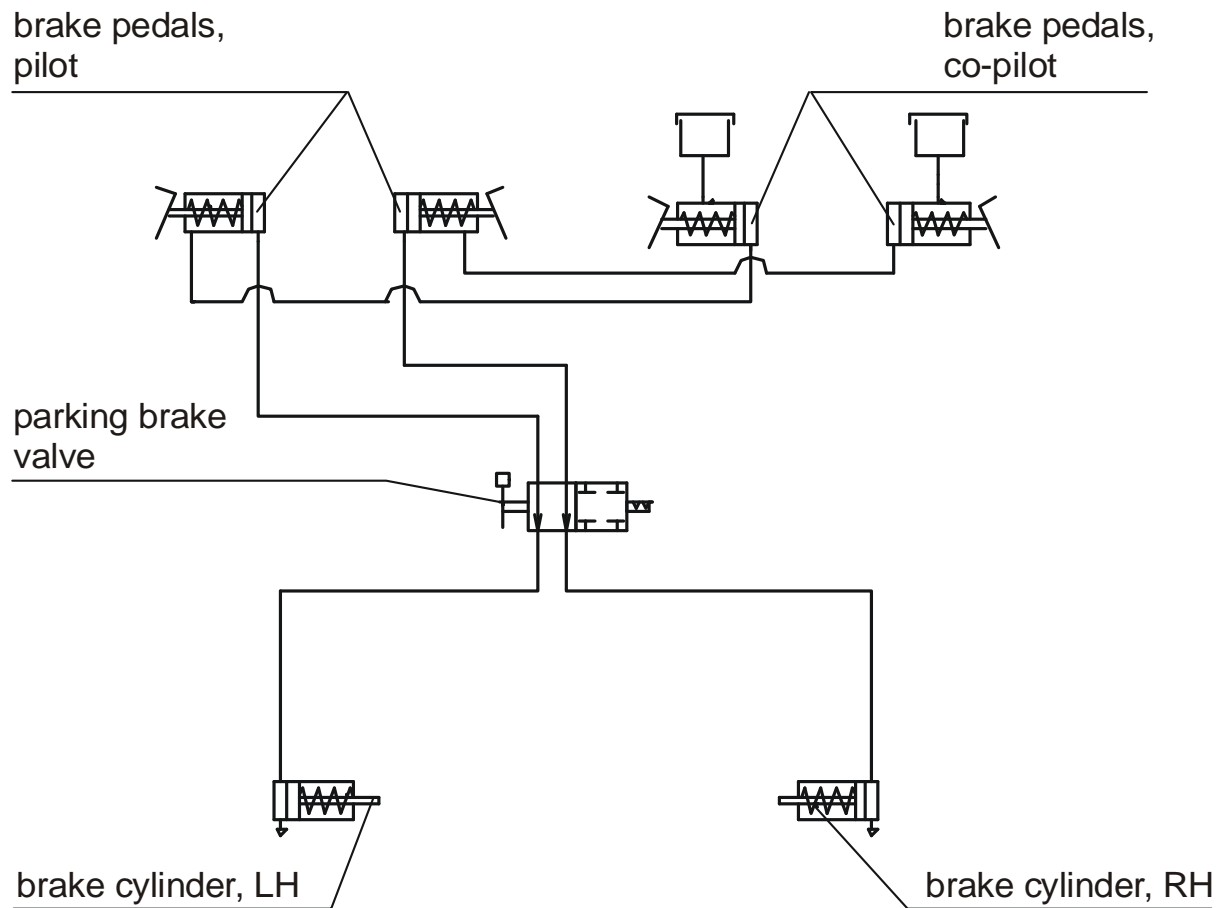
Wheel Brakes

Hydraulically operating disk brakes act on the wheels of the main landing gear. The wheel brakes are individually operated by means of toe pedals.

Parking Brake

The lever is located on the small center console under the instrument panel, and is in the upper position when the brakes are released. To operate the parking brake pull the lever downwards until it catches. Brake pressure is built up by multiple operation of the toe brake pedals, and is maintained until the parking brake is released. To release, the lever is pushed upwards.

Hydraulic System Schematic



7.6 SEATS AND SAFETY HARNESSSES

To increase passive safety, the seats are constructed using a carbon fiber/Kevlar hybrid material and GFRP. The seats are removable to facilitate the maintenance and inspection of the underlying controls. Covers on the control sticks prevent loose objects from falling into the area of the controls.

If front seats with adjustable backrests are installed (OÄM 40-252), the angle of the backrests can be adjusted for best comfort. The backrest lever is situated on the outboard side of the backrest. However, during take-off, landing and emergency landing the backrests must be fixed in the upright position designated by a placard on the roll-over bar.

CAUTION

Before the backrest lever is lifted in order to unlock the backrest, lean back towards the backrest to counteract the spring load; otherwise the backrest may snap forward.

For adjustment lift the backrest lever and bend forward or backward to the desired backrest angle. Then release and press down the backrest lever.

In case of a defective adjustment mechanism the outboard friction adjustment screw can be tightened with a 10 mm hexagon nut in clockwise direction in order to fix the backrest in the upright position.

If possible, set the backrest lever to the „locked" position. The mechanism must be repaired at the next scheduled inspection.

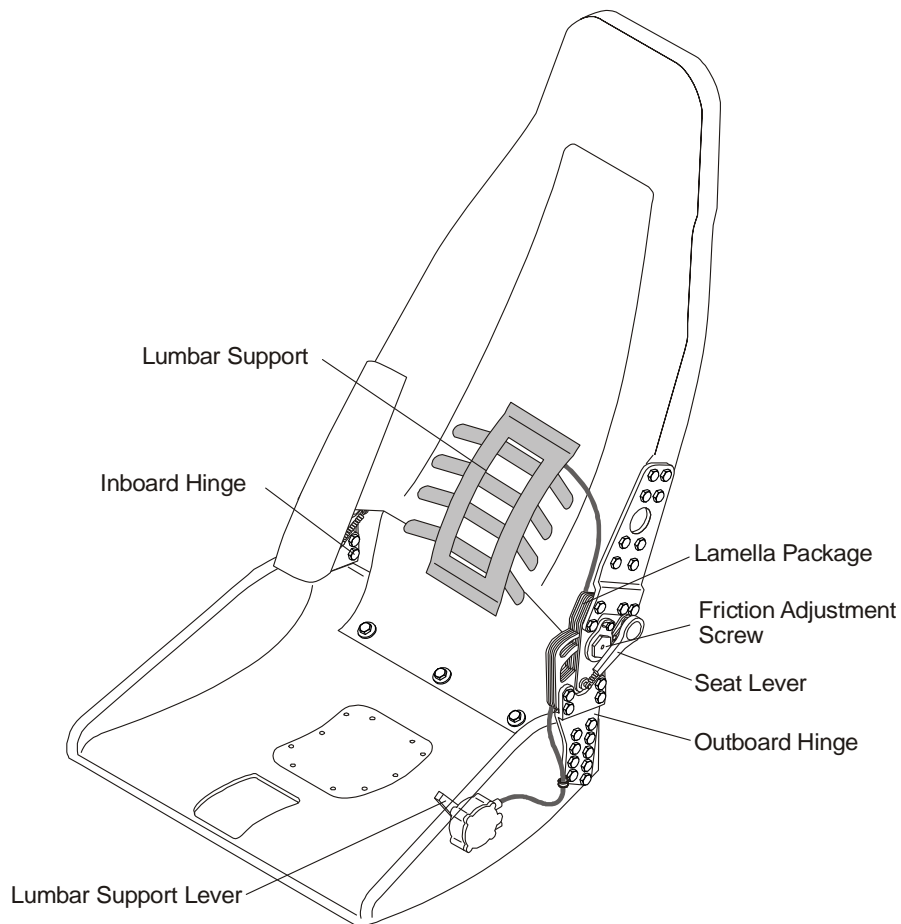
The lumbar support can be adjusted by operating the lumbar support lever mounted on the outboard side of the seat pan.

The seats have removable furnishings and are equipped with energy-absorbing foam elements.

The seats are fitted with three-point safety harnesses. The harnesses are fastened by inserting the end of the belts in the belt lock, and are opened by pressing the release on the belt lock.

The backs of the rear seats can be laid forward after pulling upwards on the knob of the locking bolt.

If seats with adjustable backrests are installed (OÄM-40-252):



7.7 BAGGAGE COMPARTMENT

The DA 40 may be equipped with one of the following baggage compartment variants:

- (a) Standard baggage compartment.
- (b) Standard baggage compartment with 'baggage tube'.
- (c) Extended baggage compartment (OÄM 40-163). It consists of a forward and an aft part.

Without a baggage net, no baggage may be loaded.

Standard Baggage Compartment

The baggage compartment is located behind the rear seats.

Baggage Tube (if installed)

On the back side of the standard baggage compartment the baggage tube may be installed. It is separated by a cloth cover.

Extended Baggage Compartment (OÄM 40-163 and OÄM 40-164, if installed)

The extended baggage compartment consists of the standard baggage compartment behind the rear seats and the baggage extension mounted between the baggage compartment frame and ring frame No. 1.

The baggage extension has a door that may be hinged up to keep items from sliding aft or hinged down to carry long items.

The baggage tray may be installed in the bottom of the standard baggage compartment. The lid of the baggage tray and the bottom of the baggage extension form a flat loading surface. The lid has mounting provisions for the tow bar. The space under the lid may be used to carry small items such as the gust lock and the fuel quantity measuring device.

7.8 CANOPY, REAR DOOR, AND CABIN INTERIOR

Front Canopy

The front canopy is closed by pulling down on the canopy frame, following which it is locked by means of a handle on the left hand side of the frame. On locking, steel bolts lock into mating holes in polyethylene blocks.

“Cooling gap” position: A second setting allows the bolts to lock in, leaving a gap under the front canopy.

The front canopy can be blocked by a locking device (optional) on the left side near the canopy opening lever by turning the key clockwise. The closed and blocked canopy can be opened from inside by pulling the lever inside the opening handle.

WARNING

The airplane may be operated with the front canopy in the “cooling gap” position on the ground only. Before take-off the front canopy must be completely closed and locked, but not blocked with the locking device.

A window on the left hand side of the canopy can be opened for additional ventilation or as an emergency window. Some serial numbers have another window on the right hand side of the canopy.

Emergency Axe

If OÄM 40-326 is incorporated an emergency axe is installed on the floor panel under the pilot's seat (see Figure below).

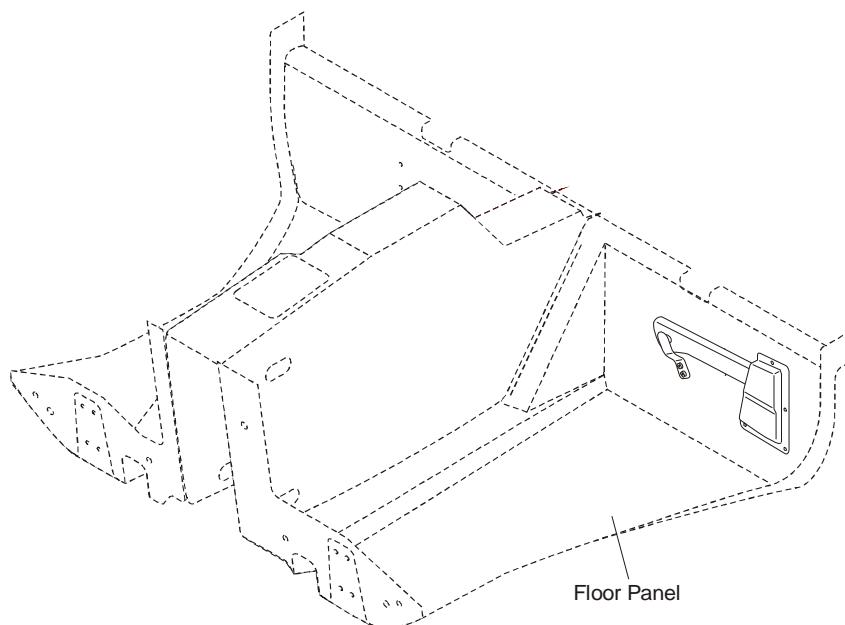
If the canopy can not be opened in case of an emergency use the emergency axe to break through the canopy.

WARNING

Make sure not to harm other persons by using the emergency axe.

WARNING

Beware of sharp edges and fragments of the broken canopy.



7.9 POWER PLANT

7.9.1 ENGINE, GENERAL

Lycoming IO-360-M1A: Air-cooled four-cylinder four-stroke engine. Horizontally-opposed direct-drive engine with fuel injection and underslung exhaust.

Displacement: 5916 cm³ (361 in³).

Max. power: 180 HP (134.2 kW) at 2700 RPM at sea level and ISA.

Max. continuous power: 160 HP (119.3 kW) at 2400 RPM at sea level and ISA.

The principal engine accessories at the front of the engine are the propeller governor, the starter motor, and the alternator. The ignition (optionally controlled by an electronic control unit), the twin magneto system and the mechanical fuel pump are at the rear of the engine. Fuel is supplied via a fuel injection system.

Further information should be obtained from the engine operating manual.

The engine instruments are on the right hand side of the instrument panel.

The ignition switch is designed as a key-operated lock. The ignition is switched on by moving the switch to the right from the OFF position to the L-R-BOTH positions. A further turn to the right to the START position will operate the starter motor.

7.9.2 OPERATING CONTROLS

The engine performance is controlled by means of three levers: throttle, RPM lever and mixture control lever, situated together as a group on the large center console (also referred to as the throttle quadrant). Front and rear are defined in relation to the direction of flight.

Throttle

- Left hand lever with large, black knob.

This lever is used to set the manifold pressure (MP). When the throttle is furthest forward, the engine is being provided with extra fuel for high performance settings.

Lever forward (MAX PWR) = Full throttle, higher MP

Lever to rear (IDLE) = Idle, low MP

High manifold pressure means that a large quantity of fuel-air mixture is being supplied to the engine, while low manifold pressure means a lesser quantity of fuel-air mixture is being supplied.

RPM Lever

- Central lever with blue handle.

Lever forward (HIGH RPM) = High RPM, fine pitch

Lever to rear (LOW RPM) = Low RPM, coarse pitch

By means of this lever the propeller governor controls the propeller pitch and thus engine RPM (= propeller RPM). A selected RPM is held constant by the governor independent of the airspeed and the throttle setting ('Constant Speed').

The propeller governor is flanged onto the front of the engine. It regulates the supply of engine oil to the propeller. The propeller governor oil circulation is an integral part of the engine oil circulation system. Following a defect in governor or oil system, the blades go the finest possible pitch (maximum RPM), thus allowing continuation of the flight.

CAUTION

Following failure of the governor or a serious drop in oil pressure, the RPM should be adjusted using the throttle. Every effort should be made not to exceed 2700 RPM.

CAUTION

The throttle and RPM lever should be moved slowly, in order to avoid over-speeding and excessively rapid RPM changes. The light wooden propeller blades produce more rapid RPM changes than metal blades.

Mixture Control Lever

- Right hand lever with red handle and lock to avoid inadvertent operation.

This lever is used to set the proportions in the fuel-air mixture which is supplied to the engine.

Lever forward (RICH) = Mixture rich (in fuel)

Lever to rear (LEAN) = Mixture lean (in fuel)

If the lever is at the forward stop, extra fuel is being supplied to the engine which at higher performance settings contributes to engine cooling.

In cruise, the mixture should be made leaner in order to reach the appropriate fuel-air mixture. The leaning procedure is given in Chapter 4.

To shut off the engine the mixture control lever is pulled to the rear stop. Air without fuel is thus drawn into the cylinders and the engine dies. When the engine is stationary there is thus no fuel in the cylinders.

Alternate Air

In the event of the loss of manifold pressure because of icing or blocking of the air filter, there is the possibility of drawing air from the engine compartment. The operating lever for alternate air is located under the instrument panel to the left of the center console. To open alternate air the lever is pulled to the rear. Normally, alternate air is closed, with the lever in the forward position.

Placard on the lever, forward position:

ALTERNATE AIR

Placard on the lever, visible when lever is in the rearward position:

**ALTERNATE AIR
ON**

7.9.3 PROPELLER

A mt-Propeller MTV-12-B/180-17 type or MTV-12-B/180-17f type, hydraulically-regulated 3-bladed constant speed propeller is installed. It has wood-composite blades with fiber-reinforced plastic coating and stainless steel edge cladding; in the region of the propeller hub the leading edge is coated with adhesive PU foil. These blades combine the lowest weight whilst minimizing the chance of vibration.

CAUTION

Operation on the ground at high RPM should be avoided as far as possible, as the blades could suffer stone damage. For this reason a suitable site for engine runs (magneto and propeller checks) should be selected, where there are no loose stones or similar items.

WARNING

Never move the propeller by hand while the ignition is switched ON, as it may result in serious personal injury.

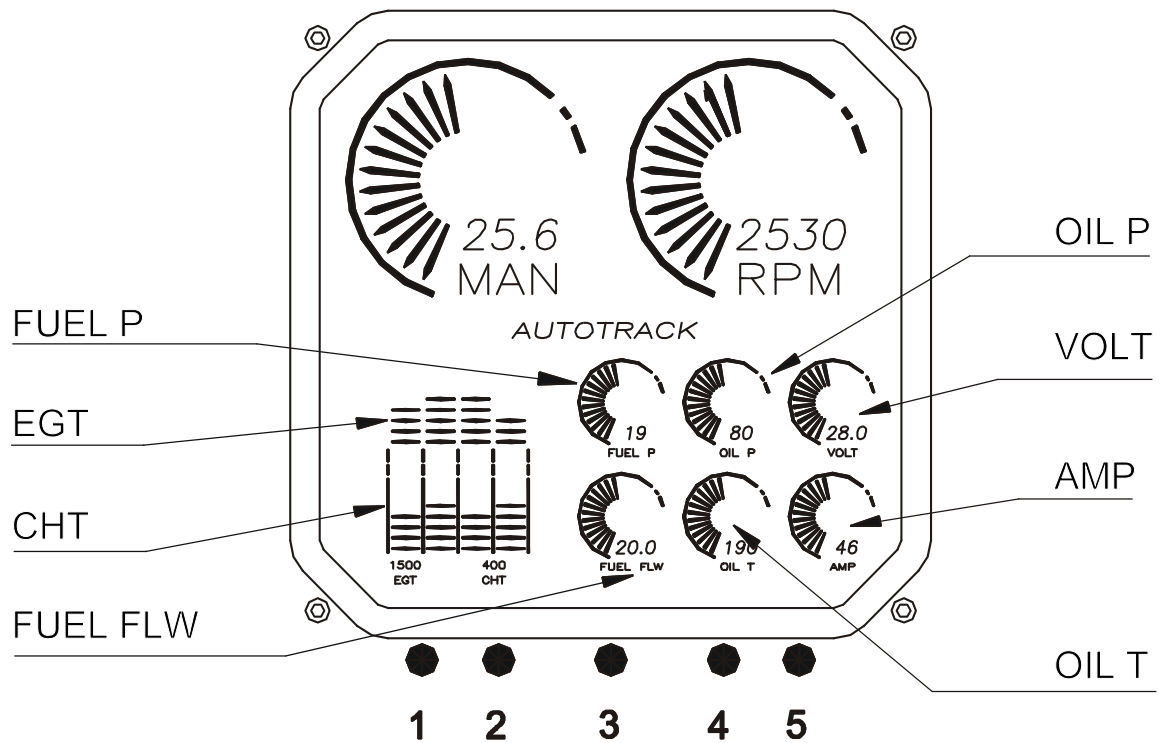
Never try to start the engine by hand.

Governor

One of the following governors may be installed:

Woodward C-210776 Governor, MT P-420-10 Governor (OÄM 40-077) or MT P-860-23 Governor (OÄM 40-289).

7.9.4 ENGINE INSTRUMENTS



Button 1: Lean mode

Button 2: Digital exhaust gas / cylinder head temperature mode

Button 3: Switch in autotrack

Button 4: Fuel computer mode

Button 5: Engine data recorder

Button 3 has an additional function on switch-on: Display mode

Sweep Mode or Pointer Mode

If the switch-on button 3 is kept pressed until the display transfers from activating all bars/pointers to indicating the actual values, the type of presentation can be selected. In one case the circular instruments show the values with a pointer as in conventional analog instruments, whilst in the other case the circular instruments fill with pointers/bars up to the current value. It remains for the pilot to select his preferred presentation.

Indications on the Vision Microsystems VM 1000 Engine Instrument

| Designation | Indication | Unit |
|-------------|---------------------------|-----------|
| MAN | Manifold pressure | inHg |
| RPM | RPM | RPM |
| EGT | Exhaust gas temperature | °F |
| CHT | Cylinder head temperature | °F |
| FUEL P | Fuel pressure | PSI |
| FUEL FLW | Fuel flow | US gal/hr |
| OIL P | Oil pressure | PSI |
| OIL T | Oil temperature | °F |
| VOLT | Voltage | V |
| AMP | Intensity of current | A |

Button 1 - Lean Mode

Upon powering up the unit the Normal mode is shown. Between the colored sector markings the cylinder head temperatures of the individual cylinders are shown by bars. Above those are bars showing the exhaust gas temperatures of the individual cylinders.

In the event of the failure of a sensor the relevant indication remains empty. A flashing cylinder head temperature indication means either that the cylinder is too hot, or that it is being cooled too rapidly (shock-cooling).

The operation of button 1 causes the display to move to Lean mode. This is confirmed by two half-bars appearing to the left and right of the bar blocks. In this mode all bars which previously showed cylinder head and exhaust gas temperature are used for exhaust gas temperature only. One bar represents 10 °F (4.6 °C). If the columns are completely filled with bars before the mixture is lean, button 1 should be pressed twice so that the bars start again at the base of the indicator.

A flashing bar column indicates that the relevant cylinder has reached the hottest exhaust gas temperature. This point will be marked with a single bar, which can be used as a reference for enriching the mixture. As an option, the numerical indication can be used additionally for this purpose.

Button 2: Digital Exhaust Gas / Cylinder Head Temperature Mode

Using this button, the numerical indication for exhaust gas and cylinder head temperature underneath the graphical representation of these figures is set. Following each sequential operation of the button the exhaust gas and cylinder head temperatures of an individual cylinder are displayed. In this, the display jumps automatically from the number of the current cylinder to its current temperature. After the fourth cylinder the display switches to the Automatic mode, which gives both the number of the cylinder with the highest exhaust gas temperature as well as (beside it) the number of the hottest cylinder. Alternating with this, the associated temperatures are displayed.

Button 3: Switch in Autotrack

In the Autotrack mode changes in the engine values are shown. If button 3 is operated in flight, variations from the current values will be displayed, in that the relevant circular instrument and the annotation AUTOTRACK will start to flash.

In order to leave the mode, button 3 must be operated. The mode is left automatically if there is a critical value to be indicated.

Button 4 - Fuel Computer Mode

By operating button 4 the display is switched from fuel flow (FUEL FLW) to a numerical indication underneath it. There are 4 modes, which are called up by pressing button 4 in sequence. The modes are:

REM: The remaining fuel is shown in US gal. The steps in this are 0.1 US gal. This mode is only available if the ADD mode - add up fuel - has previously been activated.

HRS: This mode shows the remaining flight time (in hours) on the basis of the current fuel flow. The steps in this indication are tenths of hours. This mode is also only available if the ADD mode - add up fuel - has previously been activated.

BRN: This mode shows the amount of fuel used (in US gal) since the equipment was switched on. The steps in this are 0.1 US gal.

ADD: This mode can be used after refueling to bring the fuel quantity, which the equipment uses for its calculations, up to date. In order to utilize the REM and HRS modes, the computer needs to be told how much fuel has been taken on. 10 US gal are added by pressing button 3, while pressing button 5 adds one US gal to the total. The quantity is confirmed by pressing button 4. In doing this, the quantity which has been entered in ADD is added to the previous total under REM. To check the fuel quantity button 4 should be pressed until REM is shown.

If too much has been added, button 4 should not be pressed for confirmation. After approx. 20 seconds the computer automatically leaves the ADD mode.

CAUTION

Incorrect use of the computer in the fuel-computer mode will result in false statements in the “REM - remaining fuel” and the “HRS - remaining flight time” modes. Before using the fuel computer mode in flight the pilot must be certain that he has understood the operation and use of the equipment. Beyond this, use of the fuel computer must not be regarded as a substitute for fuel planning for a flight.

Button 5 - Engine Data Recorder

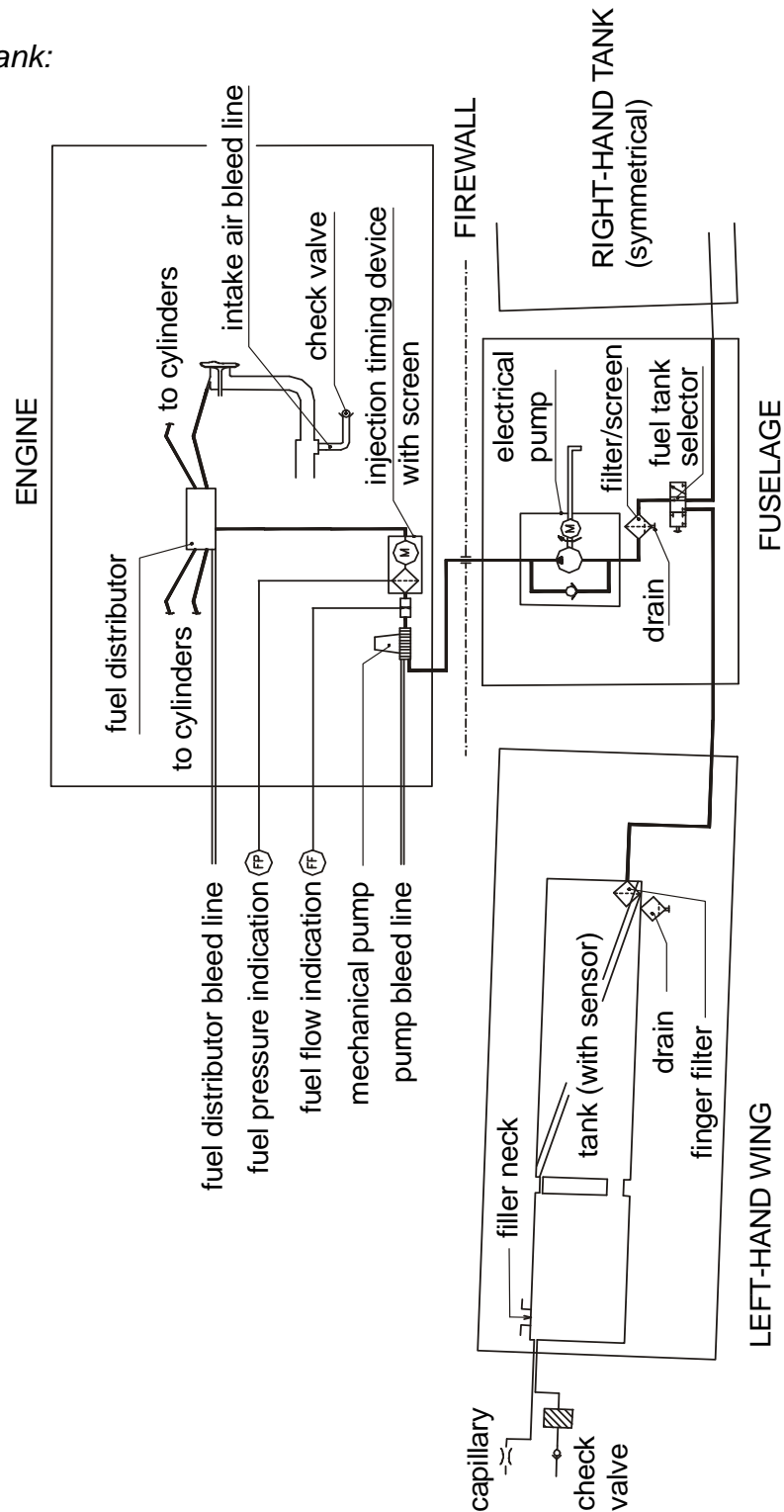
Operating button 5 will activate the engine data recorder. The digital values shown are the minimum values recorded by the engine instrument unit during operation, such as lowest voltage, lowest fuel pressure, etc. The numerical RPM indicator will indicate the total operating hours.

Pressing button 5 again will show the maximum values encountered. Pressing button 5 still another time will turn off the engine data recorder and the display will return to the original mode. If button 5 is not pressed for approximately 20 seconds, the display will automatically return to the original mode.

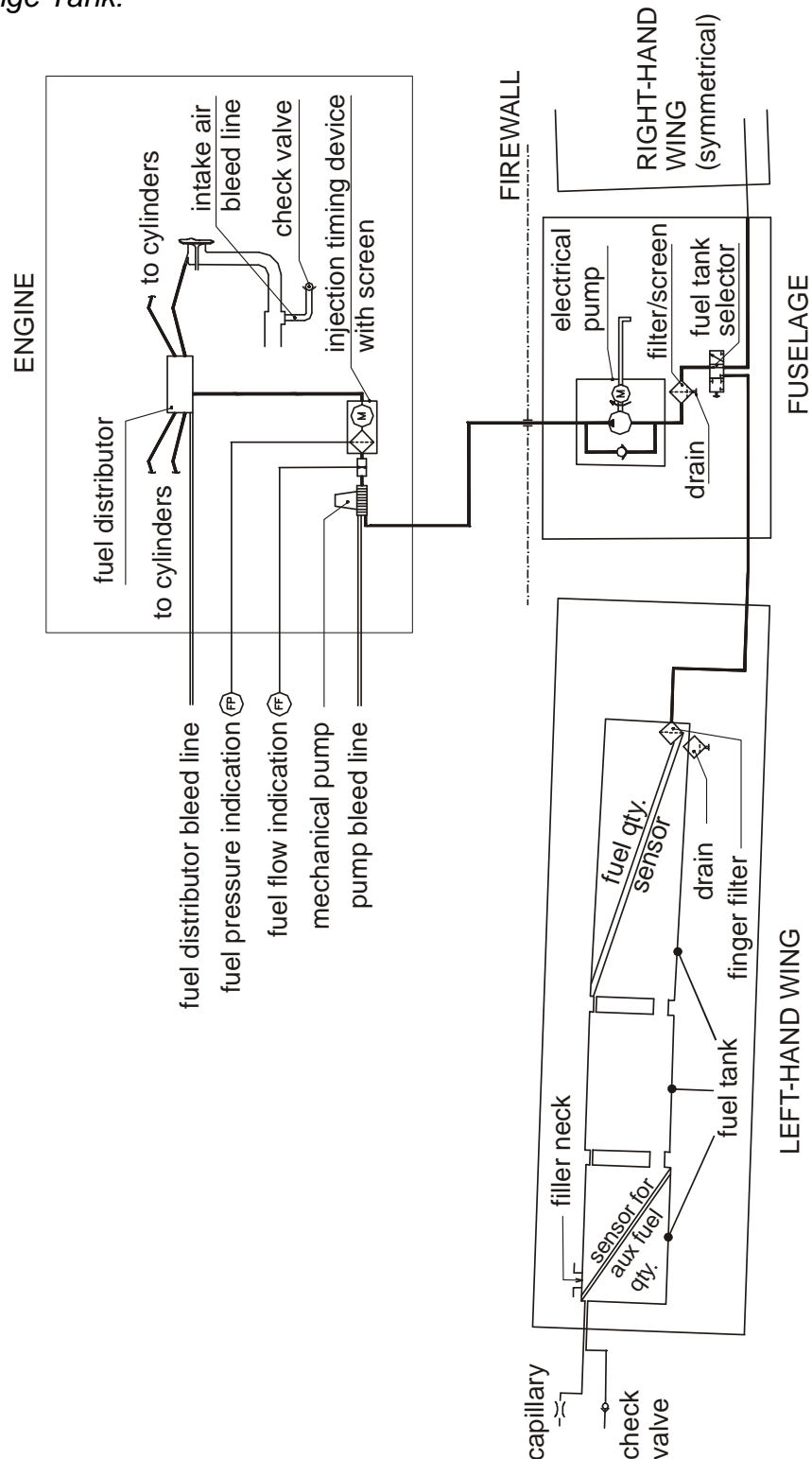
Data of the engine data recorder can be called during or immediately after flight only. With each new flight the old data will be overwritten.

7.10 FUEL SYSTEM

a) *Standard Tank:*



b) Long Range Tank:



Fuel Pumps

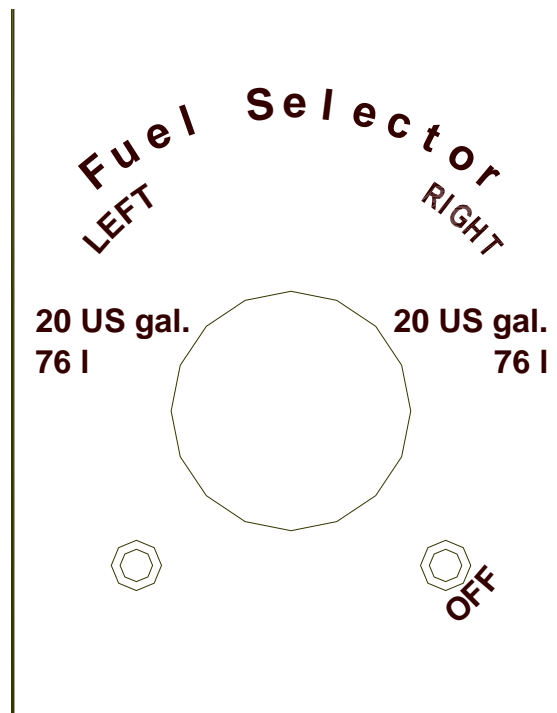
The fuel system is equipped with a mechanical and an electrical fuel pump. The mechanical pump provides for the normal fuel supply.

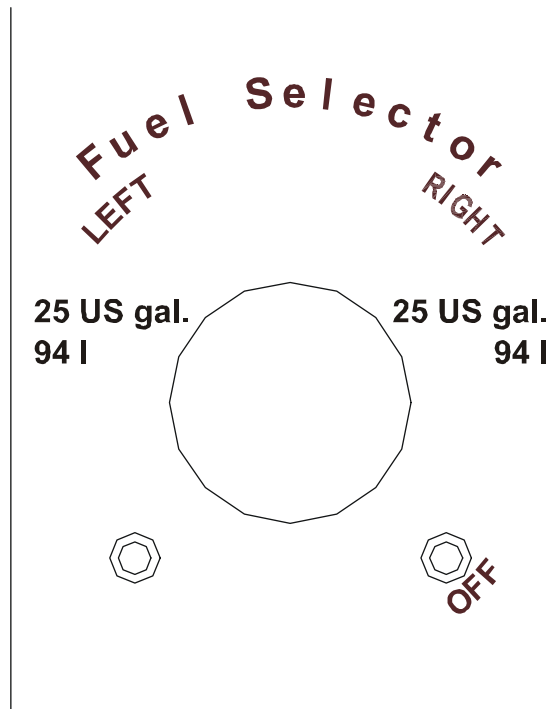
The electrical fuel pump is provided as an auxiliary and emergency pump, which does not operate under normal circumstances. It is operated with the FUEL PUMP switch on the row of switches on the instrument panel. It is checked during engine start, and is used as a safety back-up during take-off and landing, as well as when switching fuel tanks. It is also switched on for safety in the event of a decrease in fuel pressure.

Fuel Tank Selector

The fuel tank selector is situated on the center console. Its positions are LEFT (tank), RIGHT (tank) and OFF. The OFF position is reached by turning the selector to the right while pulling up the safety catch of the fuel tank selector. This is to ensure that an OFF selection is not made unintentionally.

a) Standard Tank



b) Long Range TankFuel Tanks

Each of the two wing tanks consists of two (standard tank) or three (long range tank) aluminum chambers which are joined by a piece of flexible hose and two independent vent hoses. There are two separate vents per tank. The hose terminations are situated on the underside of the wing, approx. 2 meter (7 ft) from the wing tip. One vent acts as a capillary, both to equalize the air pressure, and to provide a safety factor in the event of a failure of the other vent. The second vent is a check valve, to allow air to enter the tank, but prevent flow to the outside.

A coarse filter (finger filter) is fitted before the outlet. To allow draining of the tank, there is an outlet valve at its lowest point. A gascolator sits at the lowest point in the fuel system. A drain valve is fitted to the gascolator, which can be used to remove water and sediment which has collected in the fuel system. This valve is fitted centrally on the underside of the fuselage, approximately 30 cm (1 ft) forward of the wing leading edge.

Fuel Quantity Indication

a) Standard Tank

A capacity probe ascertains fuel quantity in the tank. When the fuel quantity indicator reads zero, only the unusable fuel remains in the tank. The total capacity of each tank is 20 US gal (approximately 76 liter). The maximum quantity that can be indicated is either 15 US gal (up to serial number 40.054) or 17 US gal (serial number 40.055 and subsequent). The indication up to this quantity is correct. At an actual quantity above 15 US gal / 17 US gal the indication remains at 15 US gal / 17 US gal.

NOTE

When the fuel quantity indicator reads 15 US gal / 17 US gal, the correct fuel quantity must be determined with the fuel quantity measuring device. If this measurement is not carried out, the fuel quantity available for flight planning is 15 US gal / 17 US gal.

b) Long Range Tank

For ascertaining fuel quantity in the enlarged tanks an additional capacitive probe is used on each side (LH/RH). When the fuel quantity indicator reads zero, only the unusable fuel remains in the tank. The usable capacity of each tank is 25 US gal (approximately 94 liter).

Up to an actual fuel quantity of 16 US gal the fuel quantity is measured by the standard probes and is brought to indication on the left and right side of the instrument in increments of 1 US gal.

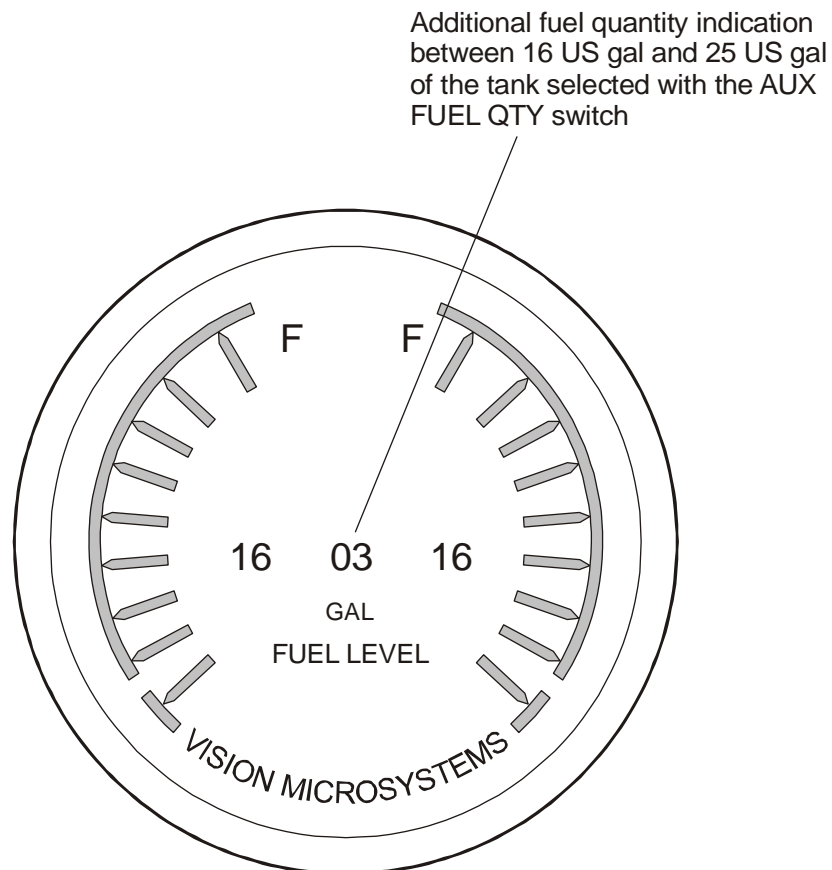
A fuel quantity between 16 US gal and 25 US gal is ascertained by the additional probes and is brought to indication in the central area of the fuel quantity indicator. The indication is numerical in 3 US gal steps (in the range from 0 to 3 US gal) and 1 US gal steps (in the range above 3 US gal up to max. 9 US gal). The side to be indicated can be selected by the AUX FUEL QTY switch (see figure below) which is located next to the indicator. The indication on the left and right side of the instrument (0 US gal to max. 16 US gal) is not affected by the switch.



The actual fuel quantity in the respective tank (LH/RH) is the sum of the central indication and the corresponding indication on the left or right side.

CAUTION

The correct indication of the fuel quantity takes 2 minutes after actuation of the AUX FUEL QTY switch.



Fuel Quantity Measuring Device

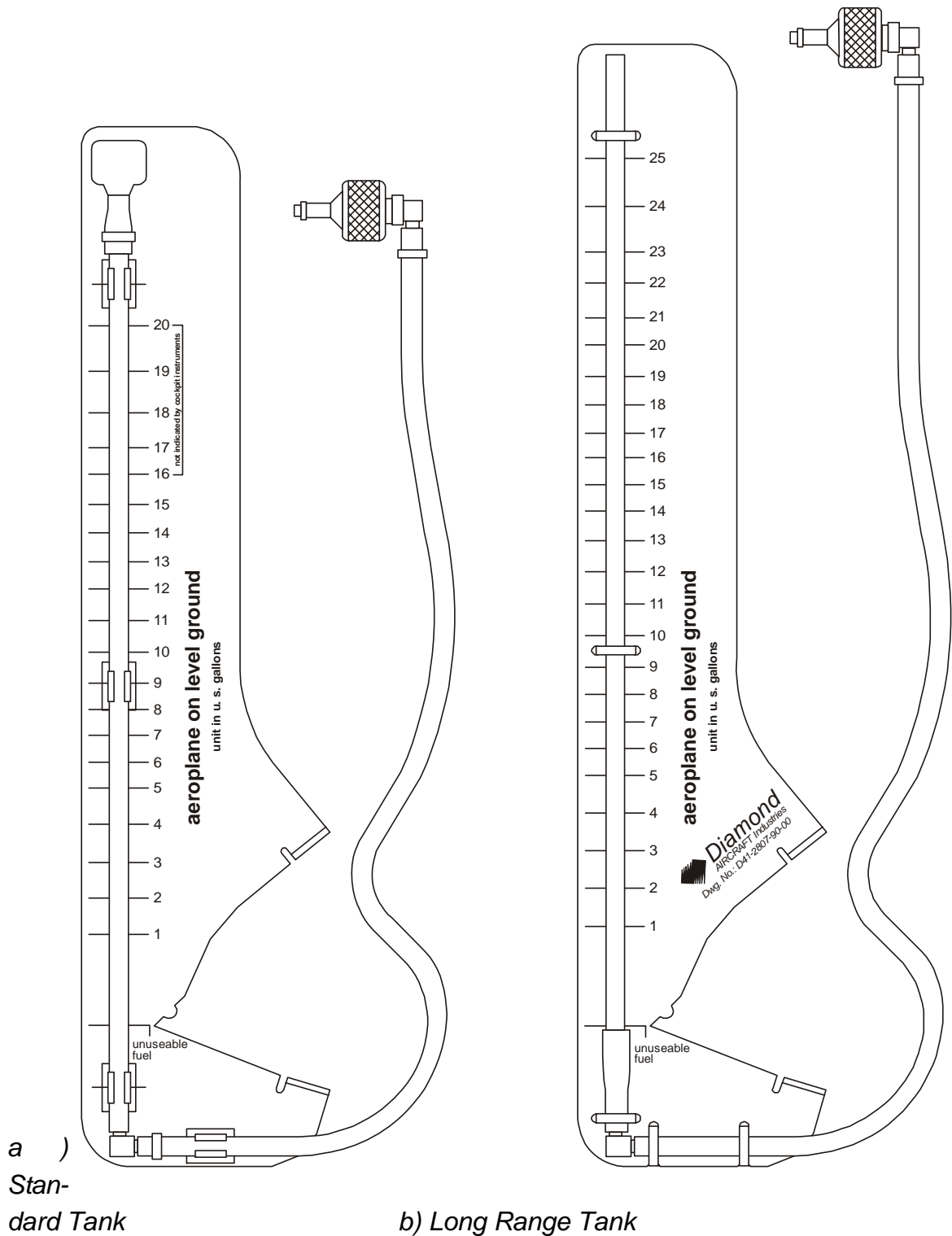
The fuel quantity measuring device allows the fuel quantity in the tank to be determined during the pre-flight inspection. It functions according to the principle of communicating containers. The fuel quantity measuring device has a recess which fits the airfoil of the wing. With this recess the device is held against the stall strip at the leading edge of the wing. The exact position is marked by a bore in the stall strip. Then the metal connector is pressed against the drain of the tank. The amount of fuel in the tank can now be read off from the vertical ascending pipe.

For a correct indication the airplane must be placed on a horizontal ground and the fuel filler must have been opened before.

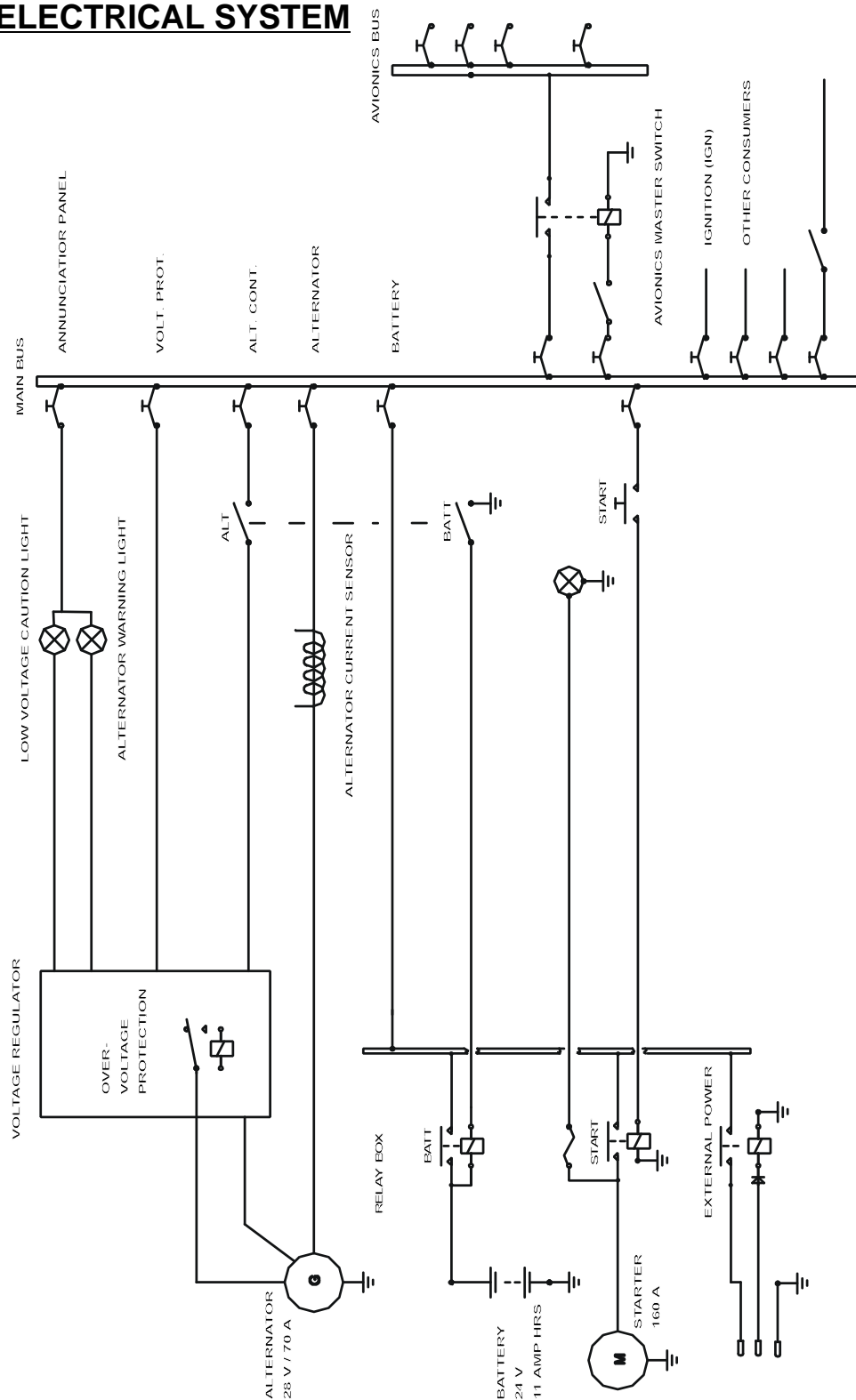
The designated place for the fuel quantity measuring device is the bag on the rear side of the pilot's seat.

CAUTION

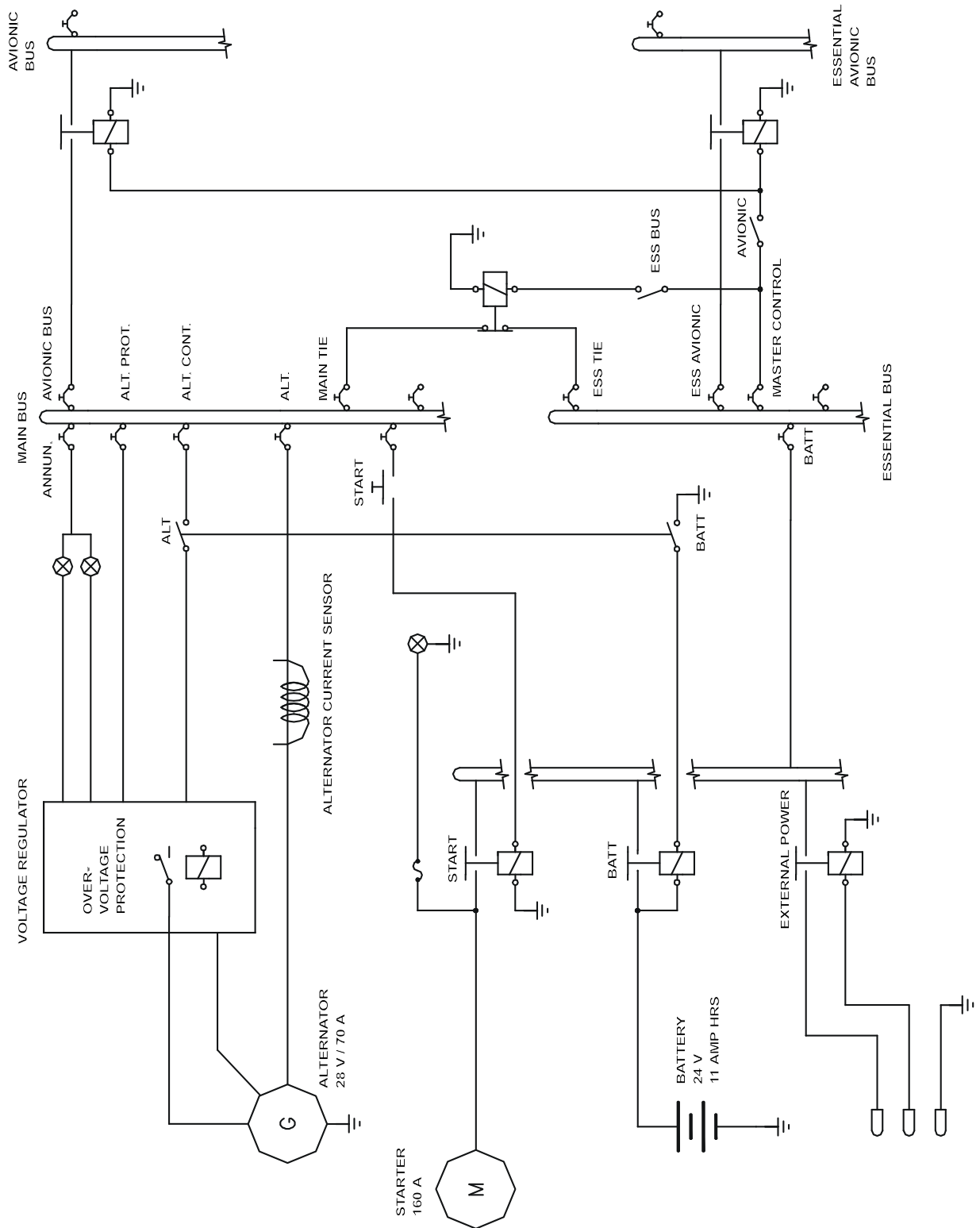
Different fuel measuring devices are used for the standard tank and the long range tank. The use of the wrong device results in a wrong indication.



7.11 ELECTRICAL SYSTEM



Simplified wiring diagram for serial numbers without Essential Bus



Simplified wiring diagram for serial numbers with Essential Bus

7.11.1 GENERAL

The DA 40 has 28 Volt DC system, which can be sub-divided into:

- Power generation
- Storage
- Distribution
- Consumers

Power Generation

The 70 Ampère alternator (generator) is mounted on the front of the engine. It is driven by a V-belt, and charges the battery. In the event of alternator failure, the battery provides the system with electrical energy. Given the provision of these two independent sources of electrical power, the complete failure of the electrical system is extremely unlikely.

Storage

Power is stored in a lead-acid battery which is mounted in the right-hand side of the engine compartment. It has a capacity of 10 Ampère-hour or more, depending on the battery type. The battery is connected to the airplane electrical system via the main (70 Ampère) circuit breaker.

In addition, a non-rechargeable dry battery or a lithium battery pack is installed in the IFR model as a further source of power for the attitude gyro (artificial horizon) and the flood light. When the emergency switch is set to ON, these two systems are supplied with power for 1 hour and 30 minutes, independent of all other electrical consumers.

Distribution

Electrical power is distributed via the main bus and, if installed, the essential bus.

Master Switch (ALT/BAT)

The Master switch is divided into a Master switch (ALT) on the left and a Master switch (BAT) on the right. Both switches together are known as the Master switch (ALT/BAT).

Consumers

The individual consumers (e.g. radio, electrical fuel pump, position lights, etc.) are connected to the main bus via automatic circuit breakers.

Designations and abbreviations used to identify the circuit breakers are explained in Section 1.5 - DEFINITIONS AND ABBREVIATIONS.

Ignition

The basic version of the DA 40 is equipped with the electric start boost system SlickSTART. This system improves the start characteristics by delivering more spark energy during the engine start sequence. After engine starting the ignition is controlled by the conventional retard breaker magneto system.

As an option, the LASAR electronic ignition control unit can be installed instead of the SlickSTART system. This unit measures manifold pressure and RPM and uses these parameters to optimize the ignition timing. This provides for smooth engine running and improved starting behavior. If the electronic ignition control is not in operation, the status light for the ignition illuminates and the conventional magneto ignition takes over the ignition control. Also, during operation of the engine on only one magneto, for example during the magneto check, the ignition is not controlled electronically and the status light for the ignition should illuminate. For engine restart in flight without the electronic ignition control being operative an engine speed of more than 500 RPM is necessary. The magneto ignition is independent of the electrical network, therefore providing safe engine operation even in the event of a power failure.

Voltmeter

The voltmeter displays the potential on the main bus. If the alternator is operating, the alternator voltage is shown, otherwise it is that provided by the battery.

Ammeter

The ammeter displays the current with which the alternator is being loaded.

Landing and Taxi Lights

Landing and taxi lights are built into the left wing, and are each operated by means of a switch (LANDING, TAXI) on the row of switches on the instrument panel.

Position and Strobe Lights

Combined position and strobe lights (anti collision lights) are installed on both wing tips. Each system is operated by a switch (POSITION, STROBE) on the row of switches on the instrument panel.

Flood Light

A two-dimensional light emitter is mounted above the instrument panel. It illuminates the instrument panel as well as all levers, switches, etc. With a rotary button (FLOOD) in the left-hand section of the instrument panel the flood light is switched on and its brightness is adjusted.

Instrument Lighting

With a rotary button (INSTRUMENT) in the left-hand section of the instrument panel the internal lighting of the instruments is switched on and its brightness is adjusted.

Pitot Heating

The Pitot probe, which provides measurement for the Pitot-static system, is electrically heated. The heating is activated with a switch (PITOT) on the row of switches on the instrument panel. The temperature is automatically kept constant by means of a thermal switch on the Pitot probe, and as an additional safety measure a thermal fuse is built in. If this thermal fuse is activated, the Pitot heating can no longer be switched on, and the Pitot heating caution will be displayed. In this case the system should be serviced.

NOTE

The Pitot heating caution will also be displayed whenever the Pitot heating system is switched OFF.

7.11.2 DAI ANNUNCIATOR PANEL **(WARNING, CAUTION AND STATUS LIGHTS)**

There are two variants of the annunciator panel ('DAI' and 'White Wire'). The 'DAI' variant, which is described below, can be identified by the lights in the shape of a square.

Testing the Annunciator Panel

In the process of the pre-flight check the lights of the annunciator panel must be checked by operating the test switch. This is to check that the lights have not failed. All lights must be serviceable.

Alternator Warning Light (ALT)

The alternator warning light illuminates on alternator failure. The only remaining source of electrical power is the battery. The color is red.

The procedure to be followed upon alternator warning is given in 3.7.2 - FAILURES IN THE ELECTRICAL SYSTEM.

Low Voltage Caution Light (VOLT)

This caution light illuminates when the on-board voltage drops below 24 Volts. It goes out again when the voltage exceeds 25 Volts. The color is amber.

The procedure to be followed upon low voltage caution is given in 4B.3 - FAILURES IN THE ELECTRICAL SYSTEM.

Fuel Pressure Warning Light (FUEL PR)

The fuel pressure warning light illuminates when the fuel pressure drops below 14 PSI. The color is red.

Low Fuel Caution Lights (L FUEL and R FUEL)

Each tank has its own caution light. It starts to flash when the fuel quantity becomes low, and illuminates permanently when the quantity of usable fuel in the respective tank drops below 3 US gal (± 1 US gal). The indication is calibrated for straight and level flight. The light may illuminate during turns which are flown with slip, or while taxiing in curves. The color is amber.

Oil Pressure Warning Light (OIL PR)

The oil pressure warning light illuminates when the oil pressure drops below 25 PSI. The color is red.

The procedure to be followed upon oil pressure warning is given in 3.2.3 - ENGINE PROBLEMS IN FLIGHT.

Door Warning Light (DOOR)

The door warning light illuminates when the front canopy and/or the rear door is not closed and locked. The color is red.

The procedure to be followed upon door warning is given in 3.7.4 - DOOR-WARNING LIGHT ON.

Status Light for the Ignition (IGN)

This light is only used when the electronic ignition control unit is installed.

The status light for the ignition illuminates when the electronic ignition control is not operating. In this case the conventional magneto ignition will be in use. The color is white.

The procedure to be followed upon illumination of the ignition status light is given in 4B.3 - FAILURES IN THE ELECTRICAL SYSTEM.

Starter Warning Light (START)

The starter warning light illuminates when the starter is being operated or when the connection between the starter motor and the engine has not been broken. This occurs when the pinion of the starter motor remains engaged with the propeller flywheel. The color is red.

The procedure to be followed upon starter warning is given in 3.7.2 - FAILURES IN THE ELECTRICAL SYSTEM.

Pitot Heating Caution Light (PITOT)

The Pitot heating caution light is illuminated when the Pitot heating is not switched on, or when there is a failure of the Pitot heating system. The color is amber.

Prolonged operation of the Pitot heating on the ground can also cause the Pitot heating caution light to illuminate. In this case it indicates the activation of the thermal switch, which prevents overheating of the Pitot heating system on the ground. This is a normal function of the system. After a cooling period, the heating system will be switched on again automatically.

7.11.3 WHITE WIRE ANNUNCIATOR PANEL **(WARNING, CAUTION AND STATUS LIGHTS)**

There are two variants of the annunciator panel ('DAI' and 'White Wire'). The 'White Wire' variant, which is described below, can be identified by the flat front panel and the 'White Wire' logo on the display in the upper left corner.

Testing the Annunciator Panel

In the process of the pre-flight check, proper functioning of the annunciator panel must be verified. This functional check is automatically started after switching the battery master switch ON. All lights are flashed, and the aural alert is muted. By pressing the 'acknowledge' button, the lights are extinguished, and a momentary aural alert is sounded. This test verifies functionality of the microprocessor, the lights, and the aural signal.

The pilot may initiate additional system tests by holding the 'acknowledge' button for 2 seconds. All lights will begin flashing, and the aural alert will sound continuously.

Warning Messages

A warning is indicated by a continuous aural alert (sounded in the airplane's intercom system), flashing of the red WARNING light, and flashing of the red warning light associated with the affected system.

By pressing the 'acknowledge' button, which is now illuminated green, the aural alert will be terminated, and the WARNING light will be extinguished. The warning light associated with the affected system will change from flashing to solid illumination.

Caution Messages

A caution is indicated by a momentary aural alert (sounded in the airplane's intercom system), flashing of the amber CAUTION light, and flashing of the amber caution light associated with the affected system.

By pressing the 'acknowledge' button, which is now illuminated green, the CAUTION light will be extinguished. The caution light associated with the affected system will change from flashing to solid illumination.

The LOW FUEL caution message is displayed in a slightly different manner (extended functionality), which is described below.

Alternator Warning Message (ALTERNATOR)

The alternator warning message is displayed on alternator failure. The only remaining source of electrical power is the battery.

The procedure to be followed upon alternator warning is given in 3.7.2 - FAILURES IN THE ELECTRICAL SYSTEM.

Low Voltage Caution Message (LOW VOLTS)

The low voltage caution message is displayed when the on-board voltage drops below 24 Volts. It is terminated when the voltage exceeds 25 Volts again.

The procedure to be followed upon low voltage caution is given in 4B.3 - FAILURES IN THE ELECTRICAL SYSTEM.

Fuel Pressure Warning Message (FUEL PRESS)

The fuel pressure warning message is displayed when the fuel pressure drops below 14 PSI.

Low Fuel Caution Message (LOW FUEL)

As soon as the amount of usable fuel *in one tank* is less than 3 US gal (± 1 US gal), a caution message is displayed in the usual manner (momentary aural alert, flashing CAUTION light, flashing LOW FUEL caution light). Termination of the message is also done as usual ('acknowledge', CAUTION light is extinguished, LOW FUEL caution light changes to solid illumination).

As soon as the amount of usable fuel *in the second tank* is also less than 3 US gal (± 1 US gal), a caution message is displayed in a different manner. A *continuous* aural alert is sounded in the airplane's intercom system, the amber CAUTION light is flashed, and the amber LOW FUEL caution light is flashed.

By pressing the 'acknowledge' button, which is now illuminated green, the aural alert will be terminated, and the CAUTION light will be extinguished. The LOW FUEL caution light will continue to be flashed.

The indication is calibrated for straight and level flight. The caution message may be triggered during turns which are flown with slip, or while taxiing in curves.

Oil Pressure Warning Message (OIL PRESS)

The oil pressure warning message is displayed when the oil pressure drops below 25 PSI.

The procedure to be followed upon oil pressure warning is given in 3.2.3 - ENGINE PROBLEMS IN FLIGHT.

Door Warning Message (DOORS)

The door warning message is displayed when the front canopy and/or the rear door is not closed and locked.

The procedure to be followed upon door warning is given in 3.7.4 - DOOR-WARNING LIGHT ON.

Status Light for the Ignition (IGN)

This light is only used when the electronic ignition control unit is installed.

The status light for the ignition is illuminated when the electronic ignition control is not operating. In this case the conventional magneto ignition will be in use. The color is white.

The WARNING light, the CAUTION light, and the aural alert will *not* be activated.

The procedure to be followed upon illumination of the ignition status light is given in 4B.3 - FAILURES IN THE ELECTRICAL SYSTEM.

Starter Warning Message (START)

The starter warning message is displayed when the connection between the starter motor and the engine has not been broken. This occurs when the pinion of the starter motor remains engaged with the propeller flywheel.

Furthermore, the START warning light is illuminated continuously as long as the starter is being operated. In this case the WARNING light and the aural alert will not be activated.

The procedure to be followed upon starter warning is given in 3.7.2 - FAILURES IN THE ELECTRICAL SYSTEM.

Pitot Heating Caution Message (PITOT)

The Pitot heating caution message is displayed when the Pitot heating is not switched on, or when there is a failure of the Pitot heating system.

Prolonged operation of the Pitot heating on the ground can also cause the Pitot heating caution message to be displayed. In this case it indicates the activation of the thermal switch, which prevents overheating of the Pitot heating system on the ground. This is a normal function of the system. After a cooling period, the heating system will be switched on again automatically.

Trim Failure Warning Message (TRIM FAIL)

The White Wire annunciator panel is prepared for the installation of an autopilot in the DA 40. When the autopilot is installed and ready for operation, this warning message indicates a failure of the automatic trim system of the autopilot. For further details, refer to the Supplement to the AFM for the autopilot (if installed).

Unused Lights

The White Wire annunciator panel has two lights for possible future use. These lights are currently unused.

7.12 PITOT-STATIC SYSTEM

Total pressure is measured at the leading edge of a Pitot probe under the left wing. Static pressure is measured at two orifices at lower and rear edges of the same probe. To protect against dirt and condensation there are filters in the system, which are accessible from the wing root. The Pitot probe is electrically heated.

In addition, some serial numbers have an alternate static valve installed on the underside of the instrument panel. With this valve, the static pressure in the cabin can be used as static pressure source in the event of a failure of the Pitot-static system.

If an autopilot system is installed, additional static sources may be installed (OÄM 40-267).

7.13 STALL WARNING

If airspeed drops below approximately 10 to minimum 5 knots above the stalling speed, the stall warning horn, located in the instrument panel, will sound. The horn becomes progressively louder the closer one gets to stalling speed. Suction at an orifice on the left wing leading edge activates the horn via a hose. The orifice for the stall warning in the left wing is marked by a red ring.

7.14 AVIONICS

The radio and navigation equipment is located in the central part of the instrument panel. A transmit switch for the radio is mounted on the end of each control stick. There are connection facilities for up to 4 headsets between the front seats.

7.15 CO-MONITOR (IF INSTALLED)

The airplane may be equipped with a CO detector (OÄM 40-253).

7.15.1 SELF TEST SEQUENCE

When power is applied to the CO detector, a self-test routine begins. The test checks for functionality of the critical components such as the CO sensor, temperature sensor, and the integrity of the total CO detector system.

The remote alert light will flash twice. Then the remote light will remain OFF until there is another CO alert or until a failure of the unit occurs.

7.15.2 IN-FLIGHT CO ALARM

If the CO detector visual alert annunciator illuminates in flight, press the TEST/RESET button.

If the alert continues with the remote light staying ON, proceed with the emergency procedure 3.7.3 - SUSPICION OF CARBON MONOXIDE CONTAMINATION IN THE CABIN.

NOTE

The remote light will stay on until the CO level goes below 50 PPM.

7.15.3 UNIT FAILURE INDICATION

A failure of the CO sensor, temperature sensor, or the micro-controller will result in the following failure indications:

The remote light will flash at an approximately rate of one flash each four seconds until the failure is cleared or power is removed from the unit.

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CHAPTER 8

AIRPLANE HANDLING, CARE AND MAINTENANCE

| | Page |
|---|------|
| 8.1 INTRODUCTION | 8-2 |
| 8.2 AIRPLANE INSPECTION INTERVALS | 8-2 |
| 8.3 AIRPLANE ALTERATIONS OR REPAIRS | 8-3 |
| 8.4 GROUND HANDLING / ROAD TRANSPORT | 8-3 |
| 8.4.1 GROUND HANDLING WITHOUT TOW BAR | 8-3 |
| 8.4.2 GROUND HANDLING WITH TOW BAR | 8-3 |
| 8.4.3 PARKING | 8-5 |
| 8.4.4 MOORING | 8-7 |
| 8.4.5 JACKING | 8-7 |
| 8.4.6 ALIGNMENT | 8-7 |
| 8.4.7 ROAD TRANSPORT | 8-8 |
| 8.5 CLEANING AND CARE | 8-9 |
| 8.5.1 PAINTED SURFACES | 8-9 |
| 8.5.2 CANOPY AND REAR DOOR | 8-10 |
| 8.5.3 PROPELLER | 8-10 |
| 8.5.4 ENGINE | 8-10 |
| 8.5.5 INTERIOR SURFACES | 8-11 |
| 8.6 DE-ICING ON THE GROUND | 8-12 |

8.1 INTRODUCTION

Chapter 8 contains the manufacturer's recommended procedures for proper ground handling and servicing of the airplane. The Airplane Maintenance Manual (Doc. No. 6.02.01) lists certain inspection and maintenance requirements which must be followed if the airplane is to retain a new plane performance and reliability.

8.2 AIRPLANE INSPECTION INTERVALS

For maintenance work on engine and propeller, the currently effective Operator's Manuals, Service Instructions, Service Letters and Service Bulletins of Lycoming and mt-Propeller must be followed. For airframe inspections, the currently effective checklists/manuals of the manufacturer must be followed.

CAUTION

Unscheduled maintenance checks are required after:

- Hard landings.
- Propeller strike.
- Engine fire.
- Lighting strike.
- Occurrence of other malfunctions and damage.

Unscheduled maintenance checks are described in the Airplane Maintenance Manual (Doc. No. 6.02.01; Section 05-50).

8.3 AIRPLANE ALTERATIONS OR REPAIRS

Alterations or repairs of the airplane may be carried out only according to the Airplane Maintenance Manual, Doc. No. 6.02.01, and only by authorized personnel.

8.4 GROUND HANDLING / ROAD TRANSPORT

8.4.1 GROUND HANDLING WITHOUT TOW BAR

During forward traversing the nose wheel will follow the movement of the airplane. Change in direction is achieved by pulling on the propeller near the spinner. To traverse in the rear direction, the tail section of the airplane should be pushed down until the nose wheel is clear of the ground. This method can also be used to turn the airplane around its main landing gear.

8.4.2 GROUND HANDLING WITH TOW BAR

For pushing or pulling the airplane on the ground, it is recommended to use the tow bar which is available from the manufacturer. The tow bar is bent apart and engaged in the appropriate holes in the nose wheel fairing as shown on the picture below. The arresting knob must be fully engaged.

WARNING

The tow bar must be removed before starting the engine.

CAUTION

The tow bar may only be used for moving the airplane on the ground by hand. After moving the airplane, the tow bar must be removed.

NOTE

When moving the airplane rearward, the tow bar must be held firmly to prevent abrupt sideward deflection of the nose wheel.



8.4.3 PARKING

For short term parking, the airplane must be positioned into the wind, the parking brake must be engaged and the wing flaps must be in the retracted position. 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. Parking in a hangar is recommended.

Control Surfaces Gust Lock

The manufacturer offers a control surfaces gust lock which can be used to block the primary controls. It is recommended that the control surfaces gust lock be used when parking outdoors, because otherwise the control surfaces can hit the stops in strong tail wind. This can lead to excessive wear or damage.

WARNING

The control surfaces gust lock must be removed before flight.

The control surfaces gust lock is installed as follows:

1. Move the rudder pedals fully rearward.
2. Engage the control surfaces gust lock with the pedals.
3. Engage the stick, wrap straps around stick once.
4. Attach the locks and tighten the straps.

For removal, reverse the sequence.



8.4.4 MOORING

The tail fin of the airplane has a hole which can be used to tie-down the airplane to the ground. Also on each wing near the wing tip, an eyelet with a metric M8 thread can be installed and used as tie-down points.

8.4.5 JACKING

The DA 40 can be jacked at the two jackpoints located on the lower side of the fuselage's LH and RH root ribs as well as at the tail fin.

8.4.6 ALIGNMENT

For alignment push down on the tail section at the fuselage/vertical tail junction until the nose wheel is clear of the ground. With the nose wheel free, the DA 40 can be turned around the main landing gear. After turning the airplane into the correct position, release the tail section until the nose wheel is back on the ground.

8.4.7 ROAD TRANSPORT

For transporting the airplane on the road it is recommended that an open trailer be used. All airplane components must be stored on a cushioned surface and secured to avoid any movement during transportation.

1. Fuselage:

The fuselage should stand on the main and nose landing gear. It must be ensured that the fuselage will not move in a forward, backward or upward direction. Furthermore, it must be ensured that the propeller has sufficient clearance so that it cannot be damaged due to fuselage movement during transportation.

2. Wings:

For transportation, both wings must be removed from the fuselage. To avoid any damage, the wings are stored in an upright position on the leading edge with the root rib area positioned on an upholstered profiled surface with a width of at least 400 mm (1.3 ft). The outside wing area (approximately 3 m (10 ft) from the root rib area) is placed on an upholstered profiled surface with a minimum width of 300 mm (1 ft).

The wings must be secured to avoid any sliding movement to the rear.

3. Horizontal Stabilizer:

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

8.5 CLEANING AND CARE

CAUTION

The airplane must be kept clean. The bright surface prevents the structure from overheating.

CAUTION

Excessive dirt deteriorates the flight performance.

8.5.1 PAINTED SURFACES

The entire surface of the airplane is painted with a white weatherproof two component paint. Nevertheless, it is advantageous to protect the airplane against moisture and dampness. It is recommended to park the airplane in a hangar for prolonged storage. Moisture that has penetrated must be removed by storing the affected parts in a dry place and turning them over several times.

Dirt, insects, etc. can be removed with water alone and if necessary with a mild detergent. An automotive paint cleaner can be used for stubborn spots. For best results, clean the airplane after the day's flying is ended, so that the dirt will not become ingrained.

Oil stains, exhaust stains, etc. on the lower fuselage skin can be removed with a cold detergent. Before starting, ensure that the detergent does not affect the surface finish. Use commercial automotive preservatives without silicone additives to conserve the paint finish.

8.5.2 CANOPY AND REAR DOOR

The canopy and rear door should be cleaned with 'Plexiklar' or any other acrylic glass detergent if available; otherwise use lukewarm water. Final cleaning should be done with a clean piece of chamois-leather or soft cloth. Never rub or polish dry acrylic glass.

8.5.3 PROPELLER

Damage and malfunctions during operation must be inspected by authorized personnel.

Surface

The manufacturer uses PU paint or acrylic paint which is resistant to almost any solvent. The blades may be treated with commercial automotive cleaning agents or preservatives. The penetration of moisture into the wooden core must be avoided by all means. Should doubts arise, an appropriately rated inspector must be consulted.

8.5.4 ENGINE

Engine cleaning is part of the scheduled inspections.

CAUTION

Do not use acidic detergents (e.g. automotive wheel cleaners)
for cleaning the exhaust system.

8.5.5 INTERIOR SURFACES

The interior should be cleaned using a vacuum cleaner. All loose items (pens, bags etc.) should be removed or properly stored and secured.

All instruments can be cleaned using a soft dry cloth, plastic surfaces should be wiped clean using a damp cloth without any cleaning agents.

The leather interior should be treated with leather sealer within 3 months since new, and then at intervals of 3 to 6 months. Clean the leather interior with an appropriate mild leather cleaning agent and a soft cleaning brush for leather.

Note that the acrylic glass windows transmit the ultraviolet radiation from the sun.

8.6 DE-ICING ON THE GROUND

Approved De-Icing Fluids

| Manufacturer | Product |
|--------------|-----------------|
| Kilfrost | TKS 80 |
| Aeroshell | Compound 07 |
| Any source | AL-5 (DTD 406B) |

De-Icing Procedure

1. Remove any snow from the airplane using a soft brush.
2. Spray de-icing fluid onto ice-covered surfaces using a suitable spray bottle.
3. Use a soft piece of cloth to wipe the airplane dry.

CHAPTER 9

SUPPLEMENTS

Page

| | | |
|-----|---------------------------|-----|
| 9.1 | INTRODUCTION | 9-2 |
| 9.2 | LIST OF SUPPLEMENTS | 9-3 |

9.1 INTRODUCTION

Chapter 9 contains information concerning additional (optional) equipment of the DA 40.

Unless otherwise stated, the procedures given in the Supplements must be applied in addition to the procedures given in the main part of the Airplane Flight Manual.

All approved supplements are listed in the List of Supplements in this Chapter.

The Airplane Flight Manual contains exactly those Supplements which correspond to the installed equipment according to the Equipment Inventory of Section 6.5.

9.2 LIST OF SUPPLEMENTS

| Airplane S/N: | | Registration: | | Date: | |
|---------------|---|---------------|-------------|--------------------------|--------------------------|
| Sup. No. | Title | Rev. No. | Date | applicable | |
| | | | | YES | NO |
| A1 | COMM/NAV, KX 125 Bendix/King | 1 | 20-Apr-2001 | <input type="checkbox"/> | <input type="checkbox"/> |
| A2 | Intercom System, Model PM 1000 II PS Engineering, Inc. | 2 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| A3 | Transponder, KT 76A Bendix/King | 1 | 20-Apr-2001 | <input type="checkbox"/> | <input type="checkbox"/> |
| A4 | GPS, KLN 89B Bendix/King | 1 | 20-Apr-2001 | <input type="checkbox"/> | <input type="checkbox"/> |
| A5 | Course Deviation Indicator, KI 208 Bendix/King | 1 | 20-Apr-2001 | <input type="checkbox"/> | <input type="checkbox"/> |
| A6 | GPS, KLN 94 (VFR Operation) Bendix/King | 2 | 09-Sep-2001 | <input type="checkbox"/> | <input type="checkbox"/> |
| A7 | Audio Amplifier / Intercom / Marker Beacon Receiver, KMA 28 Bendix/King | 1 | 20-Apr-2001 | <input type="checkbox"/> | <input type="checkbox"/> |
| A8 | VHF Communication/Navigation Transceivers, KX 155A and KX 165A Bendix/King | 2 | 03-Oct-2001 | <input type="checkbox"/> | <input type="checkbox"/> |

| Airplane S/N: | | Registration: | | Date: | |
|---------------|--|---------------|-------------|--------------------------|--------------------------|
| Sup. No. | Title | Rev. No. | Date | applicable | |
| | | | | YES | NO |
| A9 | Automatic Direction Finder, KR 87 Bendix/King | 2 | 17-Feb-2003 | <input type="checkbox"/> | <input type="checkbox"/> |
| A10 | Distance Measuring Equipment, KN 62A Bendix/King | 2 | 17-Feb-2003 | <input type="checkbox"/> | <input type="checkbox"/> |
| A11 | Compass System, KCS 55A Bendix/King | 4 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| A12 | Transponder, KT 76C Bendix/King | 2 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| A13 | Autopilot System, KAP 140 Bendix/King | 2 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| A14 | GPS, KLN 94 (IFR Operation) Bendix/King | 3 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| A15 | GPS Annunciation Control Unit, MD 41 Mid-Continent | 2 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| A16 | Multifunction Display / GPS KMD 150, Bendix/King | 0 | 20-Sep-2001 | <input type="checkbox"/> | <input type="checkbox"/> |
| A17 | COM / NAV / GPS GNS 430, Garmin | 3 | 22-Jun-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| A18 | Audio Panel, GMA 340, Garmin | 2 | 22-Jun-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| A19 | Transponder, GTX 327, Garmin | 1 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |

Airplane S/N:

Registration:

Date:

| Sup. No. | Title | Rev. No. | Date | applicable | |
|-------------|--|-------------|-------------|--------------------------|--------------------------|
| | | | | YES | NO |
| A20 | Course Deviation Indicator, GI 106A, Garmin | 1 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| A21 | COM / NAV / GPS, GNS 530, Garmin | 1 | 15-Mar-2002 | <input type="checkbox"/> | <input type="checkbox"/> |
| A22 | Strike Finder, SF 2000, Insight | 0 | 10-Oct-2001 | <input type="checkbox"/> | <input type="checkbox"/> |
| A23 | GPS Annunciation Unit, MD 41-1488/1484, MID Continent | 1 | 20-Dec-2002 | <input type="checkbox"/> | <input type="checkbox"/> |
| A24 | Stormscope, WX-500, Goodrich | 2 | 28-Feb-2003 | <input type="checkbox"/> | <input type="checkbox"/> |
| A25 | Audio Panel, GMA 340, Garmin, VFR | 2 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| A26 | COM / NAV / GPS, GNS 430, Garmin, VFR | 0 | 02-Aug-2002 | <input type="checkbox"/> | <input type="checkbox"/> |
| A27 | Ground Com #2 Switch | 0 | 05-Apr-2002 | <input type="checkbox"/> | <input type="checkbox"/> |
| A29 | Transponder, GTX 330, Garmin | 0 | 25-Jun-2003 | <input type="checkbox"/> | <input type="checkbox"/> |
| E1 | Digital Chronometer, LC-2 AstroTech | 1 | 20-Apr-2001 | <input type="checkbox"/> | <input type="checkbox"/> |
| E2 | Attitude Indicator, AIM 1100-28L(0F) BF Goodrich | 2 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |

Airplane S/N:

Registration:

Date:

| Sup. No. | Title | Rev. No. | Date | applicable | |
|-------------|---|-------------|-------------|--------------------------|--------------------------|
| | | | | YES | NO |
| E3 | Attitude Indicator, AIM 1100-28LK(0F) DIA BF Goodrich | 2 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| E4 | Digital Chronometer, Model 803, Davtron | 1 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| E7 | Ventilation Inlet Baffle | 1 | 27-Apr-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| O1 | Use of the DA 40 as Tow-Plane | 1 | 28-Nov-2001 | <input type="checkbox"/> | <input type="checkbox"/> |
| O2 | Operation of the DA 40 with Winter Kit | 0 | 26-Nov-2001 | <input type="checkbox"/> | <input type="checkbox"/> |
| S1 | Emergency Locator Transmitter, Model E-01, ACK | 2 | 15-Mar-2005 | <input type="checkbox"/> | <input type="checkbox"/> |
| S2 | Emergency Locator Transmitter, JE2-NG, Jolliet | 0 | 01-Jun-2001 | <input type="checkbox"/> | <input type="checkbox"/> |
| S4 | ELT Artex ME 406 'ACE' | 1 | 10-Apr-2007 | <input type="checkbox"/> | <input type="checkbox"/> |

SUPPLEMENT A5
TO THE AIRPLANE FLIGHT MANUAL DA 40
COURSE DEVIATION INDICATOR
KI 208
BENDIX/KING

Doc. No. : 6.01.01-E
Date of Issue of the Supplement : 26 Sep 2000
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02. JULI 2001

This Supplement has been approved for the Joint Aviation Authorities (JAA) by the Austrian Civil Aviation Authority Austro Control (ACG) as Primary Certification Authority (PCA) in accordance with the JAA Certification Procedures of the Joint Aviation Authorities (JAA JC/VP).

DIAMOND AIRCRAFT INDUSTRIES GMBH
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0.2 LIST OF EFFECTIVE PAGES

| Chapter | Page | Date |
|-----------------------|--------|-------------|
| 0 | 9-A5-1 | 20 Apr 2001 |
| | 9-A5-2 | 20 Apr 2001 |
| | 9-A5-3 | 20 Apr 2001 |
| 1, 2, 3, 4A, 4B, 5 | 9-A5-4 | 20 Apr 2001 |
| 6 | 9-A5-5 | 20 Apr 2001 |
| 7 | 9-A5-5 | 20 Apr 2001 |
| | 9-A5-6 | 20 Apr 2001 |
| | 9-A5-7 | 20 Apr 2001 |
| 8 | 9-A5-8 | 20 Apr 2001 |

0.3 TABLE OF CONTENTS

| | Page |
|--|--------|
| 1. GENERAL | 9-A5-4 |
| 2. OPERATING LIMITATIONS | 9-A5-4 |
| 3. EMERGENCY PROCEDURES | 9-A5-4 |
| 4A. NORMAL OPERATING PROCEDURES | 9-A5-4 |
| 4B. ABNORMAL OPERATING PROCEDURES | 9-A5-4 |
| 5. PERFORMANCE | 9-A5-4 |
| 6. MASS AND BALANCE | 9-A5-5 |
| 7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS | 9-A5-5 |
| 8. AIRPLANE HANDLING, CARE AND MAINTENANCE | 9-A5-8 |

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the CDI KI 208 is installed. The information contained within this Supplement is to be used in conjunction with the complete Manual.

This Supplement is a permanent part of this Manual and must remain in this Manual as long as the CDI KI 208 is installed.

2. OPERATING LIMITATIONS

| No change.

3. EMERGENCY PROCEDURES

No change.

4A. NORMAL OPERATING PROCEDURES

No change.

4B. ABNORMAL OPERATING PROCEDURES

No change.

5. PERFORMANCE

No change.

6. MASS AND BALANCE

Upon removal or installation of the CDI the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.14 AVIONICS

GENERAL

INDICATOR CONTROL FUNCTIONS

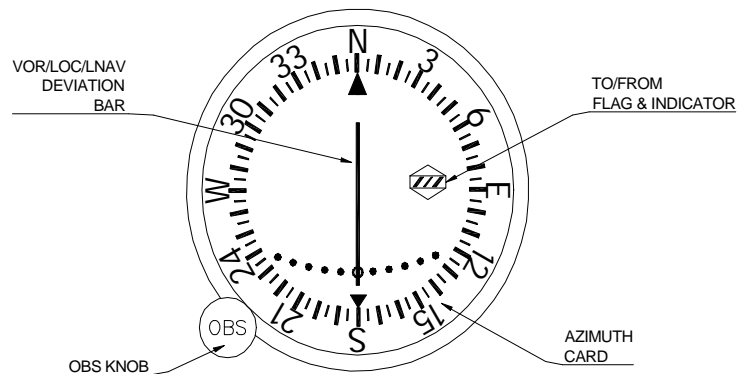
OMNI BEARING SELECTOR (OBS)

The OMNI Bearing Selector knob rotates the azimuth card on which the desired course is selected. The reciprocal course is identified under the bottom course index.

VOR/LOC/LNAV DEVIATION INDICATOR

The VOR/LOC/LNAV needle deflection indicates the amount of deviation from the selected VOR/LNAV course or localizer path. The indicated deviation is toward the proper flight path in normal operation. Crosstrack deviation is linear during LNAV operation, not angular as in VOR operation.

The VOR/LOC/LNAV warning flag is fully visible when the VOR, LNAV or LOC signal is unreliable. The VOR/LNAV TO/FROM flag indicates the direction 'To' or 'From' the VOR station or LNAV waypoint.



VOR OPERATION

Select the desired VOR station frequency with the NAV frequency controls. The NAV receiver volume control can then be adjusted to positively identify the station or listen to FSS reports.

To intercept a selected VOR radial (from the station) and fly outbound, turn the OBS control to set the desired radial under the top indicator index. Maneuver the airplane to fly the selected radial magnetic heading plus a 45° intercept angle which will provide a sufficient intercept angle. The intercept angle should be reduced as the deviation needle approaches an on course condition (center) to prevent excessive course bracketing.

To determine the bearing and fly 'to' a selected VOR station, turn the OBS control until the 'To-From' flag resembles a white arrow pointing up and the deviation needle is centered. Read the 'To' bearing under the top indicator index and maneuver the airplane to approximately fly the magnetic course 'To' the station. If the deviation needle moves to the right, the airplane course must be adjusted 5 or 10 degrees to the right. Similarly, if the deviation needle goes to the left, the airplane course must be adjusted to the left. Maintaining a centered deviation needle will provide automatic course compensation for wind drift.

LNAV OPERATION

If the KI 208 OBS lines are connected to the LNAV the course to the active waypoint is selected using the OBS knob on the KI 208. When the LNAV is in LEG mode, course selection is automatically done by the LNAV. To intercept a LNAV course, maneuver the airplane to fly a course heading which establishes a 45° intercept angle to the LNAV course. The intercept angle should be reduced as the deviation needle approaches an on course condition (center) to prevent excessive course bracketing. The deviation scale depends on the present LNAV mode. Crosstrack deviation is linear during LNAV operation rather than angular as in VOR operation.

LOCALIZER OPERATION

Localizer circuits are automatically energized when an ILS frequency is selected on the NAV. By adjusting the NAV volume level, the localizer station can be identified and in some cases, ATIS information received. The localizer flag should disappear from view into the 'To' condition, indicating the signal is reliable.

Maneuver the airplane to fly on course (centered needle). While flying a front course approach or outbound on the back course approach, magnetic heading corrections are made toward the needle deflection. Similarly, while flying the back course approach or outbound on the front course approach, corrections are made away from the needle deflection.

The localizer course width is narrow compared to VOR course width and requires much smaller course corrections to center the deviation needle. When intercepting the localizer course, the airplane turn into the localizer course should be started when the needle moves off the meter stop.

A helpful quick reference reminder of the localizer course is to set the course on the Omni bearing readout.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change.

SUPPLEMENT A8 TO THE AIRPLANE FLIGHT MANUAL DA 40

VHF COMMUNICATION/NAVIGATION TRANSCEIVERS

KX 155A and KX 165A

BENDIX/KING

Doc. No. : 6.01.01-E
Date of Issue of the Supplement : 01 Mar 2001
Design Change Advisory : OÄM 40-067 (KX 155A)
OÄM 40-083 (KX 165A)

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Date of approval :



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02. JULI 2001

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0.2 LIST OF EFFECTIVE PAGES

| Chapter | Page | Date |
|--------------------------|---------|-------------|
| 0 | 9-A8-0 | 20 Apr 2001 |
| | 9-A8-1 | 03 Oct 2001 |
| | 9-A8-2 | 03 Oct 2001 |
| | 9-A8-3 | 03 Oct 2001 |
| 1, 2, 3, 4A, 4B, 5, 6 | 9-A8-4 | 03 Oct 2001 |
| 7 | 9-A8-5 | 03 Oct 2001 |
| | 9-A8-6 | 03 Oct 2001 |
| | 9-A8-7 | 03 Oct 2001 |
| | 9-A8-8 | 20 Apr 2001 |
| | 9-A8-9 | 20 Apr 2001 |
| | 9-A8-10 | 20 Apr 2001 |
| | 9-A8-11 | 20 Apr 2001 |
| 8 | 9-A8-12 | 20 Apr 2001 |

0.3 TABLE OF CONTENTS

| | Page |
|--|---------|
| 1. GENERAL | 9-A8-4 |
| 2. OPERATING LIMITATIONS | 9-A8-4 |
| 3. EMERGENCY PROCEDURES | 9-A8-4 |
| 4A. NORMAL OPERATING PROCEDURES | 9-A8-4 |
| 4B. ABNORMAL OPERATING PROCEDURES | 9-A8-4 |
| 5. PERFORMANCE | 9-A8-4 |
| 6. MASS AND BALANCE | 9-A8-4 |
| 7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS | 9-A8-5 |
| 8. AIRPLANE HANDLING, CARE AND MAINTENANCE | 9-A8-12 |

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the COM/NAV #1 KX165A and COM/NAV #2 KX155A are installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM all times when the KX155A and KX165A are installed.

2. LIMITATIONS

No change.

3. EMERGENCY PROCEDURES

DEFAULT MODE

Turning on the KX 155A or KX 165A while pressing either the COMM or NAV frequency transfer button will bring the unit up in the Direct Tune Mode.

120.00 MHz will be the active COMM frequency and 110.00 MHz will be the active NAV frequency. This will aid the pilot in blind tuning the radio in the unlikely event of display failure.

4A. NORMAL OPERATING PROCEDURES

No change.

4B. ABNORMAL OPERATING PROCEDURES

No change.

5. PERFORMANCE

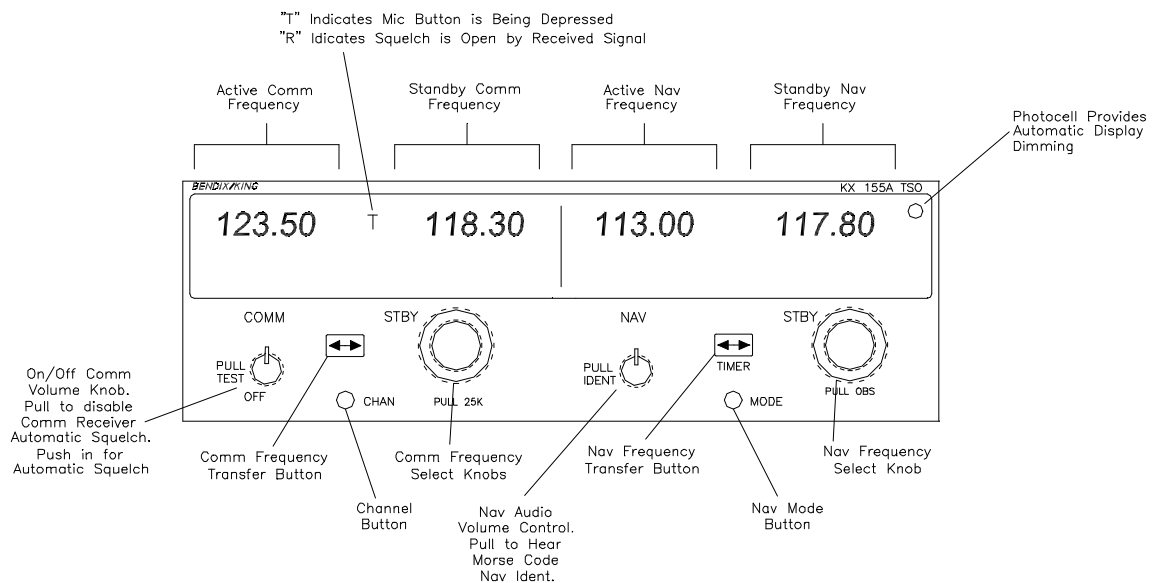
No change.

6. MASS AND BALANCE

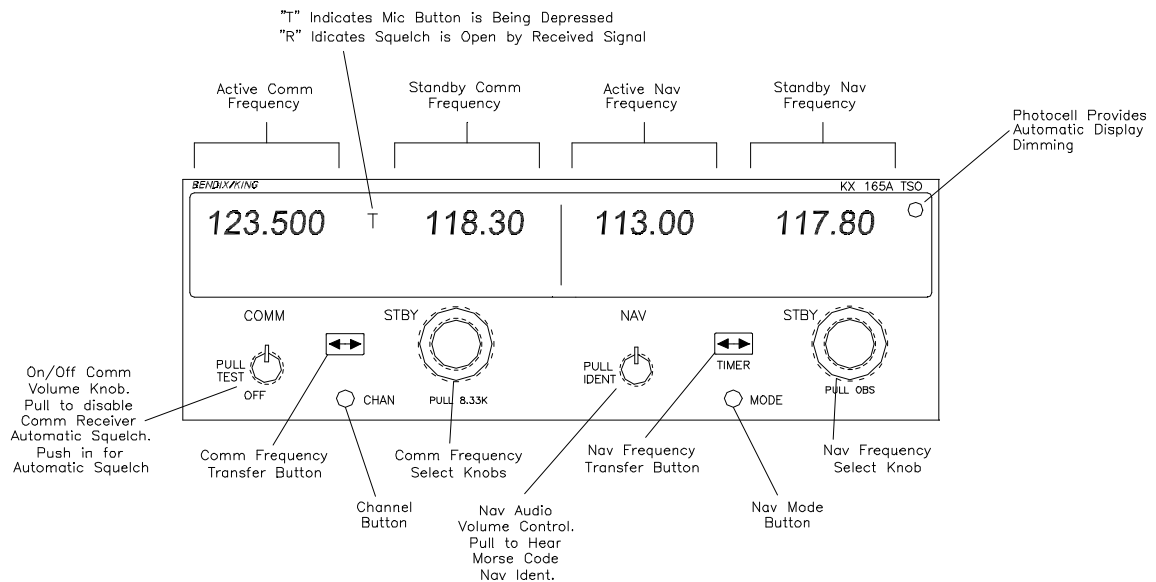
Upon removal or installation of the COM/NAV's the change of the empty mass and the corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.14 AVIONICS



KX 155A and KX 165A (25 kHz Versions) CONTROL FUNCTION



KX 165A (8.33 kHz Version) CONTROL FUNCTION

NOTE

The 25 kHz and 8.33 kHz versions of the KX 165A are distinguishable from one another in two ways. The 25 kHz version has 'PULL 25K' nomenclature below the COMM FREQUENCY SELECT knobs while the 8.33 kHz version has 'PULL 8.33K'. In addition, the 25 kHz version has two digits to the right of the decimal in the COMM frequency while the 8.33 kHz version has three digits to the right of the decimal. The 8.33 kHz channel spacing is required for flight in certain European (ICAO EUR Region) airspaces.

OPERATION**COM TRANSCEIVER**

Rotate the VOL knob clockwise from the OFF position. Pull the VOL knob out and adjust for desired listening level. Push the VOL knob back in to actuate the automatic squelch.

The left portion of the digital display readout is allocated for COMM ACTIVE and COMM STANDBY frequencies with a 'T' between them to indicate TRANSMIT and a 'R' to indicate RECEIVE modes of operation.

Select the desired operating frequency in the standby display by rotating the Frequency Select Knobs either clockwise or counterclockwise. A clockwise rotation will increment the previous frequency while a counterclockwise rotation will decrement the previous frequency.

The outer knob will change the MHz portion of the standby display. At one band-edge (118 or 136 MHz) the following 1 MHz will wrap around to the other band-edge.

KX 155A and KX 165A 25 kHz Versions

The inner knob will change the kHz portion of the standby display. It will change in increments of 50 kHz when the knob is pushed in and 25 kHz when the knob is pulled out. The frequency wrap around at the edge of the band is also utilized when incrementing or decrementing the kHz portion of the standby display.

KX 165A 8.33 kHz Version

The inner knob will change the kHz portion of the standby display. It allows selection of 25 kHz frequencies only when the knob is pushed in and both 8.33 kHz and 25 kHz frequencies when the knob is pulled out. The frequency wrap around at the edge of the band is also utilized when incrementing or decrementing the kHz portion of the standby display.

To tune the radio to the desired operating frequency, the desired frequency must be entered into the standby display and then the transfer button must be pushed. This will trade the contents of the active and standby displays.

The operating frequency can also be entered by accessing the ACTIVE ENTRY (direct tune) mode which is done by pushing and holding the COMM TRANSFER button for 2 or more seconds. In the direct tune mode, only the active part of the display is visible. The desired frequency can be directly entered into the display. Push the COMM TRANSFER button again to return to the active/standby display.

The transceiver is always tuned to the frequency appearing in the ACTIVE display. It is therefore possible to have two different frequencies stored in the ACTIVE and STANDBY displays and to change back and forth between them at the simple push of the transfer button.

During the transmit mode of operation, a 'T' will appear between the ACTIVE and STANDBY displays. AN 'R' will appear between the ACTIVE and STANDBY displays if a detected signal is strong enough to open the squelch, signifying that the transceiver is in the receive mode of operation.

A non-volatile memory stores the comm ACTIVE and STANDBY frequencies on power down. When the unit is turned on again, the COMM ACTIVE and STANDBY windows will display the same ACTIVE and STANDBY frequencies that were displayed before power down.

The KX 155A and KX 165A also have provisions to program 32 channels. Pressing the CHAN button for 2 or more seconds will cause the unit to enter the channel program mode. Upon entering the channel program mode, 'PG' is displayed next to the channel number and the channel number will flash indicating that it can be programmed.

The desired channel can be selected by turning the comm kHz knob. The channel frequency can be entered by pushing the COMM TRANSFER button which will cause the standby frequency to flash. The comm frequency knobs are then used to enter the desired frequency. If dashes (displayed when rotating the outer knob between 136 MHz and 118 MHz) are entered instead of a frequency, the corresponding channel is skipped in channel selection mode. Additional channels may be programmed by pressing the COMM TRANSFER button and using the same procedure. To exit the program mode and save the channel information, momentarily push the CHAN button.

This will cause the unit to return to the previous frequency entry mode. The unit will also exit the channel program mode if there is no button or knob activity for 20 seconds.

The channel selection mode can then be entered by momentarily pushing the CHAN button. 'CH' is displayed next to the last used channel number.

NOTE

If no channels have been programmed, channel 1 appears with dashes displayed.

The comm frequency knobs can be used to select the desired channel. The unit will automatically exit the channel mode, with the channel frequency remaining in the STANDBY window, if no channel is selected within 5 seconds after entering the channel selection mode. The channel frequency is then made the ACTIVE frequency in the normal manner by pressing the COMM TRANSFER button.

The unit is placed in the transmit mode by depressing the MIC KEY button. The unit has a stuck microphone alert feature. If the microphone is keyed continuously for greater than 33 seconds, the transmitter stops transmitting and the active COMM frequency flashes to alert the pilot of the stuck microphone condition.

NAV RECEIVER

The right portion of the display is allocated to NAV receiver information. The frequency channeling is similar to the COMM when operating in the frequency mode. The NAV increment/decrement knobs are located on the right-hand side of the front panel. The outer knob operates in 1 MHz steps and increments/decrements the STANDBY frequency display.

The inner knob operates in 50 kHz steps. The NAV receiver's lower and upper frequency limits are 108.00 MHz and 117.95 MHz. Exceeding the upper limit of the frequency band will automatically return to the lower limit and vice versa.

Depressing the NAV frequency transfer button for 2 seconds or more will cause the display to go into the ACTIVE ENTRY mode. Only the ACTIVE frequency will be displayed and it can be directly changed by using the NAV inc/dec knobs. The display will return to the ACTIVE/STANDBY mode when the NAV frequency transfer button is pushed.

Depressing the mode button will cause the NAV display to change from the ACTIVE/STANDBY format to the ACTIVE/CDI (Course Deviation Indicator) format. The vertical 'needle' moves side to side similar to mechanical CDI. When the needle is centered, the airplane is on the selected OBS course. When the active frequency is tuned to a VOR frequency, the center of the CDI scale displays the 'TO' or 'FROM' indicator.

In the CDI mode, the increment/decrement knob (pushed in) channels the ACTIVE frequency window and depressing the frequency transfer button will cause the ACTIVE frequency to be placed in blind storage and the STANDBY frequency (in blind storage) to be displayed in the ACTIVE window display.

When the ACTIVE window is tuned to a VOR frequency, the standby frequency area is replaced by a three digit OBS (Omni Bearing Selector) display. The desired OBS course can be selected by pulling out the inner NAV frequency knob and turning it. The CDI needle may be automatically centered with a 'TO' indication by depressing the mode button for 2 seconds. This OBS display is independent of any OBS course selected on an external CDI or HSI. An 'OBS' in the middle of the NAV display will flash while the inner NAV frequency knob is pulled out. The CDI is displayed on the line below the frequency/OBS.

When the ACTIVE window is tuned to a localizer frequency, the standby frequency area is replaced by 'LOC'.

When the received signal is too weak to ensure accuracy the display will 'flag'.

Depressing the mode button will cause the NAV display to go from the ACTIVE/CDI format to the ACTIVE/BEARING format.

In the BEARING mode, the increment/decrement knob channels the ACTIVE frequency window and depressing the frequency transfer button will cause the ACTIVE frequency to be placed in blind storage and the STANDBY frequency (in blind storage) to be displayed in the ACTIVE window display. In bearing mode of operation, the right-hand window of NAV display shows the bearing TO the station.

When a too weak or invalid VOR signal is received the display will flag.

Another push of the mode button will cause the NAV display to go from the ACTIVE/BEARING format to the ACTIVE/RADIAL format. In the RADIAL mode, the increment/decrement knob channels the ACTIVE frequency window and depressing the frequency transfer button will cause the ACTIVE frequency to be placed in blind storage and the STANDBY frequency (in blind storage) to be displayed in the ACTIVE window display. In radial mode of operation, the right-hand window of NAV display shows the radial FROM the station.

When a too weak or invalid VOR signal is received the display will flag.

Another push of the mode button will cause the unit to go into the TIMER mode. When the unit is turned on, the elapsed timer begins counting upwards from zero. The timer can be stopped and reset to zero by pushing the NAV frequency transfer button for 2 seconds or more causing the ET on the display to flash. In this state the timer can be set as a countdown timer or the elapsed timer can be restarted. The countdown timer is set by using the NAV inc/dec knobs to set the desired time and then pushing the NAV frequency transfer button to start the timer. The outer knob selects minutes, the inner knob in the 'in' position selects ten second intervals, and the inner knob in the 'out' position selects individual seconds.

After the countdown timer reaches zero, the counter will begin to count upwards indefinitely while flashing for the first 15 seconds. Or the elapsed timer can also be reset to zero and started again after it has been stopped and reset to zero by pushing the NAV frequency transfer button. The Audio Alert is then sounded.

The NAV ACTIVE and STANDBY frequencies are stored in the memory on power down and return on power up.

When the smaller increment/decrement knob is pushed in, depressing the NAV TRANSFER button will interchange the ACTIVE and STANDBY frequencies. The NAV IDENT knob is active in the pulled out position so that both voice and ident can be heard. When this knob is pushed in, the ident tone is attenuated. The volume of voice/ident can be adjusted by turning this knob.

PILOT CONFIGURATION

This mode can be accessed by pressing and holding the Nav Mode Button for more than 2 seconds and then pressing the Nav Frequency Transfer Button for an additional 2 seconds, while continuing to hold the Nav Mode Button. When the Pilot Config Mode is entered, the unit will show the 'SWRV' mnemonic which is the unit software revision level. Adjustment pages can be accessed by MODE button presses.

The pilot may adjust two parameters in the pilot configuration, the display minimum brightness and sidetone volume level.

Minimum Brightness (BRIM) will have a range of 0 - 255. The dimmest is 0 and the brightest is 255.

Sidetone volume level is adjusted when SIDE is displayed. Values from 0 - 255 may be selected with 0 being least volume, 255 being the greatest.

Subsequent presses of the MODE button sequences through SWRV, BRIM, SIDE, and then back to SWRV.

Momentarily pressing the Nav Transfer Button exits the Pilot configuration mode. The Nav returns to its pre-Pilot Config state with the new brightness and sidetone levels stored in non-volatile memory.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change.

SUPPLEMENT A10
TO THE AIRPLANE FLIGHT MANUAL DA 40 (D)
DISTANCE MEASURING EQUIPMENT
KN 62A
BENDIX/KING

Doc. No. : 6.01.01-E (DA 40)
6.01.05-E (DA 40 D)
Date of Issue of the Supplement : 01 Mar 2001
Design Change Advisory : OÄM 40-067 (DA 40)
OÄM 40-136 (DA 40 D)

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18. JUNI 2003

This Supplement has been approved for the Joint Aviation Authorities (JAA) by the Austrian Civil Aviation Authority Austro Control (ACG) as Primary Certification Authority (PCA) in accordance with the JAA Certification Procedures of the Joint Aviation Authorities (JAA JC/VP).

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|-------------|---------|-------|---------------------|------------------|-----------|
| 1 | all | all | 20 Apr 2001 | | |
| 2 | all | all | 17 Feb 2003 | | |
| | | | | | |

0.2 LIST OF EFFECTIVE PAGES

| Chapter | Page | Date |
|-----------------------|---------|-------------|
| 0 | 9-A10-1 | 17 Feb 2003 |
| | 9-A10-2 | 17 Feb 2003 |
| | 9-A10-3 | 17 Feb 2003 |
| 1, 2, 3, 4A, 4B, 5 | 9-A10-4 | 17 Feb 2003 |
| 6 | 9-A10-5 | 17 Feb 2003 |
| 7 | 9-A10-5 | 17 Feb 2003 |
| | 9-A10-6 | 17 Feb 2003 |
| | 9-A10-7 | 17 Feb 2003 |
| | 9-A10-8 | 17 Feb 2003 |
| 8 | 9-A10-8 | 17 Feb 2003 |

0.3 TABLE OF CONTENTS

| | Page |
|--|---------|
| 1. GENERAL | 9-A10-4 |
| 2. OPERATING LIMITATIONS | 9-A10-4 |
| 3. EMERGENCY PROCEDURES | 9-A10-4 |
| 4A. NORMAL OPERATING PROCEDURES | 9-A10-4 |
| 4B. ABNORMAL OPERATING PROCEDURES | 9-A10-4 |
| 5. PERFORMANCE | 9-A10-4 |
| 6. MASS AND BALANCE | 9-A10-5 |
| 7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS | 9-A10-5 |
| 8. AIRPLANE HANDLING, CARE AND MAINTENANCE | 9-A10-8 |

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the DME KN 62A is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM at all times when the DME KN 62A is installed.

2. LIMITATIONS

No change.

3. EMERGENCY PROCEDURES

No change.

4A. NORMAL OPERATING PROCEDURES

No change.

4B. ABNORMAL OPERATING PROCEDURES

No change.

5. PERFORMANCE

No change.

6. MASS AND BALANCE

Upon removal or installation of the DME KN 62A the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

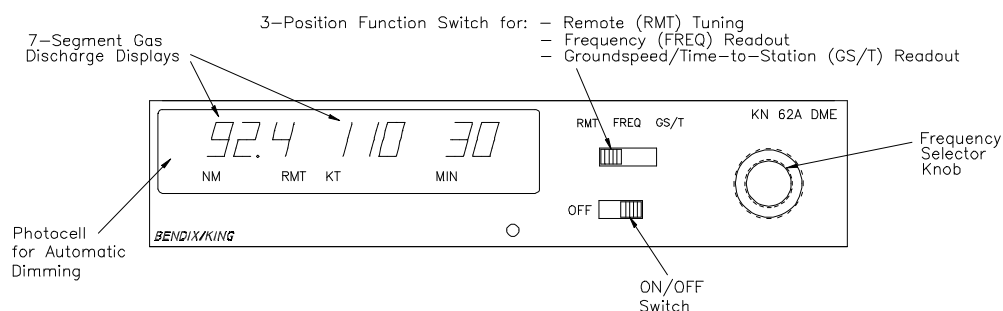
7.14 AVIONICS

The KN 62A front panel controls consists of an ON/OFF switch, a function switch, and frequency selector knobs. The function switch determines both the information displayed and the channeling source for the KN 62A. In Remote (RMT) mode, the KN 62A is channeled from an external control head, and the display shows range, speed, and time-to-station. In Frequency (FREQ) mode, the KN 62A is channeled from its own frequency selection knobs, and the display shows range and frequency. In Ground Speed/Time-to-Station (GS/T) mode, the KN 62A holds the last internally selected frequency and displays range, speed, and time-to-station.

The frequency hold feature in GS/T mode is necessary to prevent accidental rechanneling of the DME when frequency is not being displayed. To prevent the unit from displaying false information, the KN 62A will display dashes and stay in 'search' whenever power is turned on or momentarily interrupted in GS/T mode. Normal operation is re-established by switching to FREQ or RMT mode.

When the KN 62A is locked to a ground station, range is displayed to the nearest 0.1 nautical mile from 0 to 99.9 nautical miles and to the nearest 1 nautical mile from 100 to 389 nautical miles. Ground speed is displayed to the nearest knot from 0 to 999 knots. Time-to-station is displayed to the nearest minute from 0 to 99 minutes.

The display also indicates 99 minutes for any computes time-to-station greater than 99 minutes. When the KN 62A is in search mode, dashes are displayed instead of range, speed and time-to-station. An automatic dimming circuit adjusts the brightness of the display to compensate for changes in ambient light level. The dimming is controlled by a photocell mounted behind the front panel to the left of the display. Backlighting is connected and controlled directly by the airplane's instrument light dimmer.



OPERATION

The 3-position function switch determines both the information displayed and the channeling source.

Place the function switch on Frequency (FREQ). The unit is channeled internally with its own two concentric frequency selection knobs. The smaller of the two knobs has an 'in' and an 'out' position. When in the 'in' position, this smaller knob changes the 0.1 MHz digit (0.0, 0.1, 0.2, etc.). When pulled 'out', it adds 0.05 MHz to the frequency and tunes in 0.1 MHz steps (0.05, 0.15, 0.25, etc.). Pushing the smaller knob 'in' subtracts 0.05 MHz from the displayed frequency. The outer, larger knob changes the larger digits (1 MHz, 10 MHz). In FREQ mode, the unit will display distance and the selected frequency.

Now move the function switch to the Groundspeed/Time-to-Station (GS/T) position. The unit will hold the internally selected frequency and will display distance, ground speed and time-to-station.

Rotating the frequency selector will have no effect on the display, because the DME is in 'Frequency Hold'. This frequency hold feature in the GS/T mode prevents accidental rechanneling of the DME when the frequency is not displayed.

Place the function switch in the Remote (RMT) position, and your DME will be channeled when you select your NAV frequency on the NAV #1 receiver or NAV #2 receiver depending on the position of the 'Remote DME Switch'. Search time is usually about one second. When the unit locks on a ground station, it will display distance, ground speed and time-to-station.

Prior to lock on, 'dashes' will be displayed.

Note that you may have two frequencies available at all times (one remotely selected on the NAV receiver and one internally selected with the unit's controls).

OPERATIONAL NOTES

The KN 62A has an audio output for use in identifying the DME ground station being received. The audio level is preset at the factory, but may be easily adjusted through the top cover.

The unit electronically converts to distance the elapsed time required for signals to travel to and from the ground station. This distance is then indicated in nautical miles on the Distance/Time-to-Station display. This distance, commonly referred to as slant range distance, should not be confused with actual along-the-ground distance. The difference between actual ground distance and slant range is least at low altitude and/or long range. If the range is three times the altitude or greater, error is negligible.

The effective range of DME depends on many factors, most important being the altitude of the airplane. Other contributing factors are the location and elevation of the station, DME transmitter power output, and receiver sensitivity.

The ground speed feature incorporated in the unit measures the rate of change in DME slant range distance with time. This speed is then read from 0 to 999 knots in 1 knot increments. To obtain accurate ground speed, the airplane must be tracking directly to or from the station. To obtain accurate time to station, the airplane must be tracking directly to the station.

8. HANDLING, SERVICING AND MAINTENANCE

No change.

DA 40 AFM
DA 40 D AFM
DA 40 F AFM

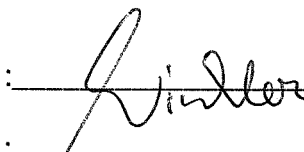



Supplement A11
KCS 55A

**SUPPLEMENT A11
TO THE AIRPLANE FLIGHT MANUAL
DA 40, DA 40 D, DA 40 F
COMPASS SYSTEM KCS 55A
BENDIX/KING**

Doc. No. : 6.01.01-E (DA 40)
6.01.05-E (DA 40 D)
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DIAMOND AIRCRAFT INDUSTRIES GMBH
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0.1 RECORD OF REVISIONS

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0.2 LIST OF EFFECTIVE PAGES

| Chapter | Page | Date |
|-----------------------|----------|-------------|
| 0 | 9-A11-1 | 15 Mar 2005 |
| | 9-A11-2 | 15 Mar 2005 |
| | 9-A11-3 | 15 Mar 2005 |
| 1, 2, 3, 4A, 4B, 5 | 9-A11-4 | 15 Mar 2005 |
| 6 | 9-A11-5 | 15 Mar 2005 |
| 7 | 9-A11-5 | 15 Mar 2005 |
| | 9-A11-6 | 15 Mar 2005 |
| | 9-A11-7 | 15 Mar 2005 |
| | 9-A11-8 | 15 Mar 2005 |
| | 9-A11-9 | 15 Mar 2005 |
| | 9-A11-10 | 15 Mar 2005 |
| | 9-A11-11 | 15 Mar 2005 |
| | 9-A11-12 | 15 Mar 2005 |
| | 9-A11-13 | 15 Mar 2005 |
| | 9-A11-14 | 15 Mar 2005 |
| 8 | 9-A11-14 | 15 Mar 2005 |

0.3 TABLE OF CONTENTS

| | Page |
|--|----------|
| 1. GENERAL | 9-A11-4 |
| 2. OPERATING LIMITATIONS | 9-A11-4 |
| 3. EMERGENCY PROCEDURES | 9-A11-4 |
| 4A. NORMAL OPERATING PROCEDURES | 9-A11-4 |
| 4B. ABNORMAL OPERATING PROCEDURES | 9-A11-4 |
| 5. PERFORMANCE | 9-A11-4 |
| 6. MASS AND BALANCE | 9-A11-5 |
| 7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS | 9-A11-5 |
| 8. AIRPLANE HANDLING, CARE AND MAINTENANCE | 9-A11-14 |

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the Compass System KCS 55A is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM at all times when the Compass System KCS 55A is installed.

2. LIMITATIONS

No change.

3. EMERGENCY PROCEDURES

No change.

4A. NORMAL OPERATING PROCEDURES

No change.

4B. ABNORMAL OPERATING PROCEDURES

No change.

5. PERFORMANCE

No change.

6. MASS AND BALANCE

Upon removal or installation of the KCS 55A Compass System the change of the empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.14 AVIONICS

GENERAL

The KCS 55A Compass System includes the KA 51B Slaving Control and Compensator Unit, the KMT 112 Magnetic Slaving Transmitter and the KG 102 Directional Gyro as well as the KI 525A Pictorial Navigation Indicator.

The panel-mounted KI 525A HSI combines the display functions of both the standard Directional Gyro and the Course Deviation Indicator's VOR/LOC/Glideslope information to provide the pilot with a single presentation of the complete horizontal navigation situation. This greatly simplifies course orientation, interception and tracking, while eliminating the need for scan coordination between two separate indicators.

The KCS 55A Compass System has the feature to indicate alternatively information of the NAV #1 or information of the GPS. This is arranged with the GPS annunciation control unit MD 41 (see DA 40 Supplement A15). This switching unit allows to switch either NAV #1 information or GPS information to the KCS 55 A. For immediate crosscheck of the navigation information displayed on the KCS55A the navigation data must also be displayed directly on the NAV #1 or GPS receiver.

If the GNS 430 or 530 is installed, the indication of this information is controlled directly by the GNS 430 or 530 and displayed on the GPS annunciation unit MD 41-1488/1484 (see Supplement A23).

DESCRIPTION OF INDICATOR AND DISPLAY FUNCTIONS

Compass Card

Responding to the input from the slaved directional gyro, this card rotates within the display so that the airplane heading is always at the top, under lubber line.

Lubber Line

The lubber line is a fixed white marker at the top of the display that indicates the airplane magnetic heading on the compass card.

Symbolic Airplane

The symbolic airplane is a fixed representation of the actual airplane. This miniature airplane always points toward the top of the display and the lubber line.

Selected Course Pointer

On this two-part arrow, the 'head' indicates the desired VOR or Localizer course and the 'tail' indicates the reciprocal. This pointer is set by rotating the course select knob.

Course Select Knob

The course select knob is used to rotate the course pointer to the desired course on the compass card. This knob corresponds to the Omni Bearing Selector (OBS) on standard NAV indicators.

VOR/RNAV and LOC Deviation

be positioned This bar corresponds to the 'left/right' needle on standard course deviation indicators. When the airplane is precisely on the VOR radial or Localizer course, it forms the center section of the selected course pointer and will under the symbolic airplane. When off course or approaching a new course, it will move to one side or the other. Since the entire VOR and Localizer display rotates with the compass

card, the angular relationship between the deviation bar and the symbolic airplane provides a pictorial symbolic display of the airplane's position with respect to the selected course.

Deviation Scale

When tuned to a VOR frequency, each white dot represents two degrees of deviation left or right of course. When tuned to a Localizer, the deviation is 1/2 degree per dot. (When GPS data is selected for presentation, refer to the Pilot's Guide for the GPS receiver.)

Heading Select Bug

A moveable orange marker on the outer perimeter of the display, used primarily to select the desired heading you wish to fly. This desired heading is coupled to the KAP 140 Autopilot to provide the 'Heading Select' function.

Heading Select Knob

Used to rotate the heading select bug to a desired point on the compass card.

To-From Indicator

A white triangle near the center of the display that indicates, with reference to the OBS setting, whether the course selected is 'to' or 'from' the selected VOR station and/or RNAV waypoint.

Dual Glideslope Pointers

Chartreuse triangular pointers on either side of the display drop into view when a useable glideslope signal is received and retract out of view when the glideslope signal becomes marginal. During an ILS approach, these pointers indicate the relative position of the glideslope path with respect to the airplane. (In other words, if the pointers are above the center marker, the airplane is below the glideslope.) When on glideslope, the pointer will align with the center markers on the glideslope scale.

Glideslope Deviation Scale

White dots on each side of the display which, in conjunction with the glideslope pointers, indicate either 'above', 'below' or 'on glideslope' during an ILS approach.

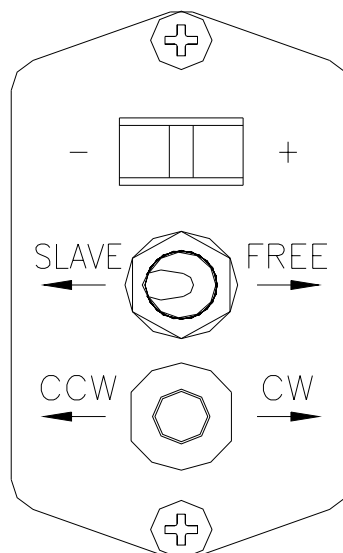
Compass Warning Flag

A red flag labeled 'HDG' becomes visible in the upper right quadrant of the display whenever the electrical power is inadequate or the directional gyro is not up to speed. Compass failures can occur which will not be annunciated by the 'HDG' flag. Therefore, periodic comparison with the standby compass is advised.

NAV Warning Flag

A red flag labeled 'NAV' becomes visible in the upper left quadrant of the display whenever a useable signal is not being received.

SLAVING METER (KA 51B)



This meter indicates any difference between the displayed heading and the magnetic heading. Right or up deflection indicates a clockwise error of the compass card. Left or down deflection indicates a counterclockwise error of the compass card. Whenever the airplane is in a turn and the card rotates, it is normal for this meter to show a full deflection to one side or another.

NOTE

During level flight it is normal for the meter needle to continuously move from side to side and to be fully deflected during a turn. If the needle stays fully deflected, left or right, during level flight, the free gyro mode can be used to center it as follows:

- *Slave and Free Gyro Switch* - When the switch is in the SLAVE position, the system is in the slaved gyro mode. When the switch is in the FREE position, the system is in the free gyro mode.
- *Clockwise Adjustment* - When the system is in the free gyro mode, holding the manual heading switch to the CW position will rotate the compass card to the right to eliminate left compass card error.
- *Counterclockwise Adjustment* - When the system is in the free gyro mode, holding the manual heading switch to the CCW position will rotate the compass card to the left to eliminate right compass card error.

KMT 112 MAGNETIC SLAVING TRANSMITTER

The unit senses the direction of the earth's magnetic field and continuously transmits this information through the slaving circuitry to the directional gyro which is automatically corrected for precession or 'drift'. This sensor is mounted in the right wing to eliminate the possibility of magnetic interference.

KG 102A DIRECTIONAL GYRO

The directional gyro provides gyro stabilization for the system and contains the slaving circuitry necessary for operation of the system. This sensor is also remote mounted.

OPERATING INSTRUCTIONS

Until power is applied to the KCS 55A System, and the directional gyro is up to speed, a red flag labeled 'HDG' will be visible in the upper right quadrant of the KI 525A Indicator. In operation, this warning flag will be visible whenever the power being supplied is inadequate or the gyro is not up to speed.

With the application of the power to the KCS 55A System, and gyro up to operating speed, the red 'HDG' flag should disappear from view.

If the KCS 55A System is in the slaved gyro mode, the compass card will automatically fast slave at the rate of 180 degrees per minute toward the airplane's magnetic heading. (Immediately after applying power, this compass card movement should be quite visible.) It will continue to fast slave until the proper magnetic heading is indicated, after which it will slave at a constant rate of three degrees per minute to keep the system aligned with the earth's magnetic field. Under some conditions it is possible for the system to stop slaving exactly 180 degrees from the correct heading. If this should occur, move the 'Slave' switch on the KA 51B to the unslaved (free) position. Rotate the compass card ± 10 degrees from the incorrect

heading by using the manual rotation switch and then return the system to slaved operation. The system will then slave to the correct heading.

For the free gyro operation, check the magnetic compass to determine the correct magnetic heading. Then use the manual slave switch to align the system with the earth's magnetic field. Periodic checks with the standby compass are recommended to check and correct for gyro precession.

Until a useable navigation signal is being received by the NAV system, a red flag labeled 'NAV' will be visible in the upper left quadrant of the KI 525A Indicator. In operation, this warning flag should be visible whenever an inadequate navigation signal is being received.

For normal navigation to or from a VOR or VORTAC, set the NAV receiver to the desired VOR or VORTAC frequency and the red navigation flag (NAV) should disappear from view if a usable signal is being received.

Rotate the course select knob to position the course pointer to the desired VOR course.

The VOR deviation bar represents the selected course, and the relationship of this bar to the symbolic airplane in the center of the instrument visually presents the actual relationship of the selected course to your airplane heading. (In other words, if the symbolic airplane on the display indicates approaching the deviation bar at 45 degrees, that is the angle at which your airplane is actually approaching the selected course.)

To prepare for an ILS approach, tune the NAV receiver to the desired Localizer frequency. If a usable Localizer signal is being received, the NAV warning flag will disappear.

For a front or back course approach, rotate the course select knob to set the course pointer on the inbound Localizer course. As with normal navigation (#6 above), the

LOC deviation bar represents the desired course. The relationship between this bar and the symbolic airplane gives a true picture of your airplane's position with respect to the Localizer course. Always setting the course pointer to the inbound Localizer course provides the correct deviation bar sensing whether flying a front or back course approach.

The glideslope deviation pointers should become visible on both sides of the display when a useable glideslope signal is received. If they do not come into view, a useable glideslope signal is not being received.

The glideslope pointers indicate the relative position of the glideslope path with respect to the airplane. (In other words, if the pointers are above the center marker, the airplane is below the glideslope.)

ABNORMAL CIRCUMSTANCES

If the Warning Flag (HDG) appears during operation, the compass card indications will be in error. Power may be removed from the KG 102A Directional Gyro by pulling the circuit breaker labeled DG. The Selected Course, VOR/LOC Deviation Bar, the NAV flag, and the To/From Indicator will remain in operation.

If the Navigation Warning Flag (NAV) appears during operation, there are several possibilities:

- (1) the NAV receiver is not turned on,
- (2) the NAV receiver is improperly turned,
- (3) the ground VOR or LOC station is malfunctioning,
- (4) the airplane is out of range of the selected ground station, or
- (5) the airplane NAV receiver has malfunctioned. (The compass card will continue to display the airplane heading even if a useable NAV signal is not being received.)

If the glideslope pointers remain out of view during a front course ILS approach, either the airplane glideslope receiver or the ground station glideslope transmitter is malfunctioning. Glideslope is usually not available during a back course approach. (The VOR and LOC course display will continue to function normally even if a useable glideslope signal is not being received.)

A continuous large deflection of the slaving meter or large discrepancies between the magnetic compass and the KI 525A compass card may indicate a failure in the slaving system.

If a slaving failure should occur, the Slave/Free Switch should be moved to select the free gyro mode. Then, by using manual clockwise or counterclockwise corrections, the compass can be rotated to the corrected heading as indicated on the standby compass. The KCS 55A system should continue to function normally except the heading information will be solely derived from the KG 102 A Directional Gyro. There will be no automatic heading correction and periodic adjustments must be made manually to correct for precession by reference to the standby magnetic compass, as with any directional gyro.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change.


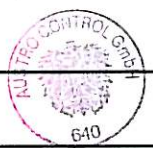
DA 40 AFM
DA 40 D AFM
DA 40 F AFM



Supplement A18
Audio Panel, GMA 340

SUPPLEMENT A18 TO THE AIRPLANE FLIGHT MANUAL DA 40, DA 40 D, DA 40 F

AUDIO PANEL GMA 340 GARMIN

| | | |
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0.2 LIST OF EFFECTIVE PAGES

| Chapter | Page | Date |
|-----------------|----------|-------------|
| 0 | 9-A18-0 | 22 Jun 2005 |
| | 9-A18-1 | 22 Jun 2005 |
| | 9-A18-2 | 22 Jun 2005 |
| | 9-A18-3 | 22 Jun 2005 |
| 1, 2, 3, 4A, 4B | 9-A18-4 | 22 Jun 2005 |
| 5, 6 | 9-A18-5 | 22 Jun 2005 |
| 7 | 9-A18-5 | 22 Jun 2005 |
| | 9-A18-6 | 22 Jun 2005 |
| | 9-A18-7 | 22 Jun 2005 |
| | 9-A18-8 | 22 Jun 2005 |
| | 9-A18-9 | 22 Jun 2005 |
| | 9-A18-10 | 22 Jun 2005 |
| | 9-A18-11 | 22 Jun 2005 |
| | 9-A18-12 | 22 Jun 2005 |
| | 9-A18-13 | 22 Jun 2005 |
| 8 | 9-A18-13 | 22 Jun 2005 |

0.3 TABLE OF CONTENTS

| | Page |
|--|----------|
| 1. GENERAL | 9-A18-4 |
| 2. OPERATING LIMITATIONS | 9-A18-4 |
| 3. EMERGENCY PROCEDURES | 9-A18-4 |
| 4A. NORMAL OPERATING PROCEDURES | 9-A18-4 |
| 4B. ABNORMAL OPERATING PROCEDURES | 9-A18-4 |
| 5. PERFORMANCE | 9-A18-5 |
| 6. MASS AND BALANCE | 9-A18-5 |
| 7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS | 9-A18-5 |
| 8. AIRPLANE HANDLING, CARE AND MAINTENANCE | 9-A18-13 |

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the Audio Panel GMA 340 is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM at all times when the GMA 340 is installed.

2. LIMITATIONS

No change.

3. EMERGENCY PROCEDURES

A failsafe circuit connects the pilot's headset and microphone directly to COM 1 in case the power is interrupted or the unit is turned off.

4A. NORMAL PROCEDURES

No change.

4B. ABNORMAL PROCEDURES

No change.

5. PERFORMANCE

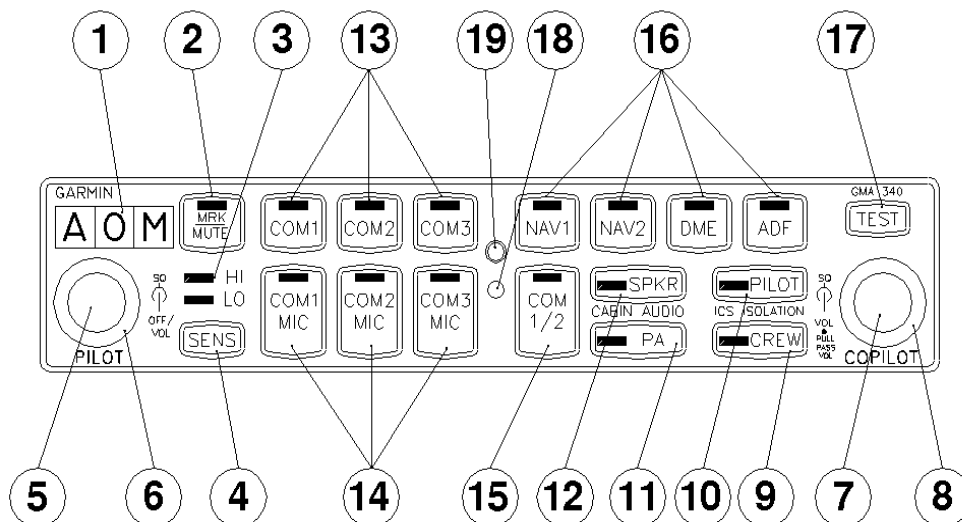
No change.

6. MASS AND BALANCE

Upon removal or installation of the GMA 340 the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.14 AVIONICS



OPERATION

FRONT PANEL CONTROLS

1. Marker Beacon Lamps
2. Marker Beacon Receiver Audio Select/Mute Button
3. Marker Beacon Receiver Sensitivity Indicator LED's
4. Marker Beacon Receiver Sensitivity Selection Button
5. Unit On/Off, Pilot Intercom System (ICS) Volume
6. Pilot ICS Voice Activated (VOX) Intercom Squelch Level
7. Copilot and Passenger ICS Volume Control (Pull out for Passenger Volume)
8. Copilot and Passenger VOX Intercom Squelch Level
9. Crew Isolation Intercom Mode Button
10. Pilot Isolation Intercom Mode Button
11. Passenger Address (PA) Function Button
12. Speaker Function Button
13. Transceiver Audio Selector Buttons (COM 1, COM 2, COM 3)
14. Transmitter (Audio/Mic) Selection Buttons
15. Split COM Button
16. Airplane Radio Audio Selection Buttons (NAV 1, NAV 2, DME, ADF)
17. Annunciator Test Button
18. Locking Screw Access
19. Photocell - Automatic Annunciator Dimming

ON, OFF, AND FAILSAFE OPERATION

The GMA 340 is powered off when the left small knob (item 5) is rotated fully counter-clockwise into the detent. To turn the unit on rotate the knob clockwise past the click. The knob then functions as the pilot's ICS volume control. A failsafe circuit connects the pilot's headset and microphone directly to COM 1 in case the power is interrupted or the unit is turned off.

LIGHTING

The intensity of the LED button annunciator and marker beacon lamps are controlled automatically by a built-in photocell (19) on the front panel. Nomenclature backlighting is controlled by the airplane instrument light dimmer.

TRANSCEIVERS

NOTE

Audio level is controlled by the selected COM radio volume control.

NOTE

COM 3 is not used in the DA 40 installation.

Selection of either COM 1 or COM 2 (13) for both MIC and audio source is accomplished by pressing either COM 1 MIC or COM 2 MIC (14). The active com audio is always heard on the headphones.

Each audio source can be selected independently by pressing COM 1 or COM 2 (13). When selected in this way, they remain active as audio sources independently of which transceiver has been selected as the active microphone source.

When a microphone is keyed, the active transceiver's MIC button LED blinks approximately once per second to indicate the transmitter is active.

When no airplane radio activity is detected by the GMA 340, the amount of ambient background noise from the radios is further reduced by the **MASQ™** circuit. This processing is also applied to the Nav radios.

| SPLIT COM

Pressing the COM 1/2 button (15) activates the split com function. While this mode is active, COM 2 is dedicated solely to the copilot as a MIC/audio source while COM 1 is dedicated to the pilot as a MIC/audio source. The pilot can still listen to NAV 1, NAV 2, DME, ADF, and MKR. The pilot and copilot can simultaneously transmit in this mode, the pilot transmitting over COM 1 and the copilot transmitting over COM 2. The SPLIT COM mode is canceled by pressing the COM 1/2 button a second time.

AIRPLANE RADIOS & NAVIGATION

NOTE

Audio level is controlled by the selected nav radio volume control.

Pressing NAV 1, NAV 2, DME, ADF (16), or MKR (2) (see MARKER BEACON RECEIVER) selects that audio source. A second button press deselects the audio source.

SPEAKER OUTPUT

Pressing the SPKR button (12) selects the airplane radios over the cabin speaker. The speaker output is muted when a COM microphone is keyed.

INTERCOM SYSTEM (ICS)

Intercom volume and squelch (VOX) are adjusted using the following front panel knobs:

- **LEFT SMALL KNOB** - Unit on/off power control and Pilot ICS volume (5). Full counter-clockwise DETENT position OFF.
- **LEFT LARGE KNOB** - Pilot squelch level (6). Clockwise rotation increases the amount of mic audio required to break squelch. Full counter-clockwise is the 'hot mic' position.
- **RIGHT SMALL KNOB** - IN position: Copilot ICS volume. OUT position: Passenger ICS volume (7).
- **RIGHT LARGE KNOB** - Copilot and passenger squelch level (8): clockwise rotation increases the amount of mic audio required to break squelch. Fully counter-clockwise is the 'hot mic' position.

Each microphone input has dedicated VOX circuit to ensure that only the active microphone(s) is/are heard when squelch is broken. This represents a vast improvement over single gate systems and reduces the amount of background noise in the headphones during cockpit communications. After the operator has stopped talking, the intercom channel remains momentarily open to avoid closure between words or during normal pauses.

The GMA 340 provides three intercom modes: PILOT, CREW and ALL. The mode selection is accomplished using the PILOT (10) and CREW (9) buttons.

Pressing a button activates the corresponding ICS mode. Pressing again deactivates the mode. The operator can switch directly from PILOT to CREW or from CREW to PILOT by pressing the other mode button. ALL mode is active when neither PILOT or CREW mode is selected.

These modes allow different degrees of interaction between the crew and passengers:

- PILOT mode isolates the pilot from everyone else and dedicates the airplane radios to the pilot exclusively. The copilot and passengers share communication between themselves but cannot communicate with the pilot or hear the airplane radios.
- CREW mode places the pilot and copilot on a common ICS communication channel. The passengers are on their own intercom channel and can communicate with each other, but cannot communicate with the crew or hear the airplane radios.
- ALL mode allows full intercom communication between everyone plugged into the GMA 340. Airplane radios are heard by all.

The following table summarizes the different modes supported by the GMA 340.

| MODE | PILOT HEARS | COPILOT HEARS | PASSENGERS HEAR |
|-----------------------|--|--|--|
| PILOT (LED LIT) | Selected Radios. Pilot. | Copilot. Passengers. | Passengers. Copilot. |
| CREW (LED LIT) | Selected Radios. Pilot. Copilot. | Selected Radios. Copilot. Pilot. | Passengers. |
| ALL (LED's OFF) | Selected Radios. Pilot. Copilot. Passengers. | Selected Radios. Pilot. Copilot. Passengers. | Selected Radios. Pilot. Copilot. Passengers. |

MONO/STEREO HEADSETS

If monaural headsets are plugged into stereo jacks that do not have a switch installed, the unit will not be damaged.

One of the headset channel outputs will be shorted to ground under these conditions. The person plugging in the mono headset will hear only one channel from the GMA 340, but in both ears. However, anyone else plugging in a stereo headset at a different passenger position will have audio in one ear only unless his or her headset has a stereo/mono switch. Note that a stereo/mono switch on the headset does not prevent the mono headset from shorting one of the channels to ground. That headset only routes its tip audio to both ears.

MARKER BEACON RECEIVER

The marker beacon is used as part of an ILS approach, and in certain instances, to identify an airway. In addition to the normal marker beacon functions, the GMA 340 provides an audio muting function. The lamps illuminate, and an associated keyed-tone is heard (when MKR audio is selected), when the airplane passes over a 75 MHz marker beacon transmitter.

The lamp and audio keying for ILS approach operation are summarized below.

| Audio Frequency | Audio Keying | Lamp Actuated |
|-----------------|--------------|-------------------------|
| 400 Hz | / / / / / / | Blue (Outer) |
| 1300 Hz | • / • / • / | Amber (Middle) |
| 3000 Hz | • • • • • • | White (Airway/Inner) |

The GMA 340's marker beacon receiver controls are located on the left side of the front panel [(1) through (4)]. The SENS button (4) selects either high or low sensitivity as indicated by the HI or LO LED being lit. Low sensitivity is used on ILS approaches while high sensitivity allows operation over airway markers or to get an earlier indication of nearing the outer marker during an approach.

The marker audio is selected initially by pressing the MKR/MUTE button (2). If no marker beacon signal is being received, then pressing again will deselect the marker audio. This operation is similar to selecting any other source on the GMA 340. However, if the second button press occurs while a marker beacon signal is being received, then the marker audio is muted but not deselected.

The button's LED will remain lit to indicate that the source is still selected.

The GMA 340's **SmartMute™** function then monitors the marker signal and automatically unmutes the audio when the current marker signal is no longer being received.

In all cases, the marker beacon lamps operate independently of any audio selection and cannot be turned off.

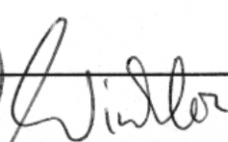

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change.

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COM / NAV / GPS GNS 530 GARMIN

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0.2 LIST OF EFFECTIVE PAGES

| Chapter | Page | Date |
|---------|----------|-------------|
| 0 | 9-A21-0 | 01 Dec 2001 |
| | 9-A21-1 | 15 Mar 2002 |
| | 9-A21-2 | 15 Mar 2002 |
| | 9-A21-3 | 15 Mar 2002 |
| | 9-A21-4 | 15 Mar 2002 |
| 1 | 9-A21-5 | 01 Dec 2001 |
| 2 | 9-A21-5 | 01 Dec 2001 |
| | 9-A21-6 | 01 Dec 2001 |
| | 9-A21-7 | 01 Dec 2001 |
| | 9-A21-8 | 01 Dec 2001 |
| 3 | 9-A21-8 | 01 Dec 2001 |
| | 9-A21-9 | 01 Dec 2001 |
| 4A | 9-A21-9 | 01 Dec 2001 |
| | 9-A21-10 | 01 Dec 2001 |
| 4B | 9-A21-10 | 01 Dec 2001 |
| 5, 6 | 9-A21-11 | 01 Dec 2001 |

| | | |
|---|----------|-------------|
| 7 | 9-A21-11 | 01 Dec 2001 |
| | 9-A21-12 | 01 Dec 2001 |
| | 9-A21-13 | 01 Dec 2001 |
| | 9-A21-14 | 01 Dec 2001 |
| | 9-A21-15 | 01 Dec 2001 |
| | 9-A21-16 | 01 Dec 2001 |
| | 9-A21-17 | 01 Dec 2001 |
| | 9-A21-18 | 01 Dec 2001 |
| | 9-A21-19 | 01 Dec 2001 |
| | 9-A21-20 | 01 Dec 2001 |
| | 9-A21-21 | 01 Dec 2001 |
| | 9-A21-22 | 01 Dec 2001 |
| | 9-A21-23 | 01 Dec 2001 |
| | 9-A21-24 | 01 Dec 2001 |
| | 9-A21-25 | 01 Dec 2001 |
| | 9-A21-26 | 01 Dec 2001 |
| | 9-A21-27 | 01 Dec 2001 |
| | 9-A21-28 | 01 Dec 2001 |
| | 9-A21-29 | 01 Dec 2001 |
| | 9-A21-30 | 01 Dec 2001 |
| | 9-A21-31 | 01 Dec 2001 |
| | 9-A21-32 | 01 Dec 2001 |
| | 9-A21-33 | 15 Mar 2002 |
| | 9-A21-34 | 15 Mar 2002 |
| 8 | 9-A21-34 | 15 Mar 2002 |

0.3 TABLE OF CONTENTS

| | Page |
|--|----------|
| 1. GENERAL | 9-A21-5 |
| 2. OPERATING LIMITATIONS | 9-A21-5 |
| 3. EMERGENCY PROCEDURES | 9-A21-8 |
| 4A. NORMAL OPERATING PROCEDURES | 9-A21-9 |
| 4B. ABNORMAL OPERATING PROCEDURES | 9-A21-10 |
| 5. PERFORMANCE | 9-A21-11 |
| 6. MASS AND BALANCE | 9-A21-11 |
| 7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS | 9-A21-11 |
| 8. AIRPLANE HANDLING, CARE AND MAINTENANCE | 9-A21-34 |

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the COM/NAV/GPS GNS 530 is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM at all times when the GNS 530 is installed.

Refer to Section 7.14 for approved modes of operation (i. e. BRNAV, MNPS) of the GNS 530's GPS receiver.

2. LIMITATIONS

- A. The GNS 530 Pilot's Guide, dated April 2000 or later appropriate revision must be immediately available to the flight crew whenever navigation is predicated on the use of the system.
- B. The GNS 530 must utilize the following or later approved software versions:

| Sub-System | Software Version |
|------------|------------------|
| Main | 2.00 |
| GPS | 2.00 |
| COMM | 1.22 |
| VOR/LOC | 1.25 |
| G/S | 2.00 |

The Main software version is displayed on the GNS 530 self test page immediately after turn-on for 5 seconds. The remaining system software versions can be verified on the AUX group sub-page 2, 'SOFTWARE/DATABASE VER'.

- C. IFR en route and terminal navigation predicated upon the GNS 530's GPS Receiver is prohibited unless the pilot verifies the currency of the data base or verifies each selected waypoint for accuracy by reference to current approved data.
- D. Instrument approach navigation predicated upon the GNS 530's GPS Receiver must be accomplished in accordance with approved instrument approach procedures that are retrieved from the GPS equipment data base. The GPS equipment database must incorporate the current update cycle.
 - (1) Instrument approaches utilizing the GPS receiver must be conducted in the approach mode and Receiver Autonomous Integrity Monitoring (RAIM) must be available at the Final Approach Fix.
 - (2) Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, MLS or any other type of approach not approved for GPS overlay with the GNS 530's GPS receiver is not authorized.
 - (3) Use of the GNS 530 VOR/ILS receiver to fly approaches not approved for GPS requires VOR/ILS navigation data to be present on the external indicator.

- (4) When an alternate airport is required by the applicable operating rules, it must be served by an approach based on other than GPS or Loran-C navigation, the aircraft must have the operational equipment capable of using that navigation aid, and the required navigation aid must be operational.
 - (5) VNAV information may be utilized for advisory information only. Use of VNAV information for Instrument Approach Procedures does not guarantee Step-Down Fix altitude protection, or arrival at approach minimums in normal position to land.
- E. If not previously defined, the following default settings must be made in the 'SETUP 1' menu of the GNS 530 prior to operation (refer to Pilot's Guide for procedure if necessary):
- (1) **dis, spd:** nm, kt (sets navigation units to 'nautical miles' and 'knots')
 - (2) **alt, vs:** ft, fpm (sets altitude units to 'feet' and 'feet per minute')
 - (3) **map datum:** WGS 84 (sets map datum to WGS-84, see note below)
 - (4) **posn:** hddd°mm.mmm' (sets navigation grid units to decimal minutes)
 - (5) **fuel:** gal (sets fuel units to gallons)

NOTE

In some areas datums other than WGS-84 may be used. If the GNS 530 is authorized for use by the appropriate Airworthiness authority, the required geodetic datum must be set in the GNS 530 prior to its use for navigation.

- F. The accuracy of the data base information is only assured if it is used before the end of the effectivity period. Use of out of date data base information is done entirely at the user's own risk.

3. EMERGENCY PROCEDURES

- A. If GNS 530 navigation information is not available or invalid, utilize remaining operational navigation equipment as required.
- B. If 'RAIM POSITION WARNING' message is displayed the system will flag and no longer provide GPS based navigational guidance. The crew should revert to the GNS 530 VOR/ILS receiver or an alternate means of navigation other than the GNS 530's GPS Receiver.
- C. If 'RAIM IS NOT AVAILABLE' message is displayed in the en route, terminal, or initial approach phase of flight, continue to navigate using the GPS equipment or revert to an alternate means of navigation other than the GNS 530's GPS receiver appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using the GNS 530's VOR/ILS receiver or another IFR-approved navigation system.

- D. If 'RAIM IS NOT AVAILABLE' message is displayed while on the final approach segment, GPS based navigation will continue for up to 5 minutes with approach CDI sensitivity (0.3 nautical miles). After 5 minutes the system will flag and no longer provide course guidance with approach sensitivity. Missed approach course guidance may still be available with 1 nautical mile CDI sensitivity by executing the missed approach.
- E. In an in-flight emergency, depressing and holding the Comm transfer button for 2 seconds will select the emergency frequency of 121.500 MHz into the 'Active' frequency window.
- F. If GNS 530 Communication is inoperative, utilize remaining operational COMM equipment (if installed) or follow standard communication failure procedure by using Transponder Code 7600 and appropriate flight procedures.

4A. NORMAL PROCEDURES

DETAILED OPERATING PROCEDURES

Normal operating procedures are described in the GNS 530 Pilot's Guide, dated April 2000 or later appropriate revision.

PILOT'S DISPLAY

The GNS 530 System data will appear on the Pilot's HSI. The source of data is either GPS or VLOC as annunciated on the display above the CDI-key.

AUTOPILOT COUPLED OPERATION

Coupling of the GNS 530 System steering information to the autopilot can be accomplished by engaging the autopilot in the NAV or APR mode. When the autopilot system is using course information supplied by the GNS 530 System, the course pointer on the HSI must be manually set to the desired track (DTK) indicated by the GNS 530. For detailed autopilot operational instructions, refer to the JAA Approved Flight Manual Supplement for the autopilot.

CROSSFILL OPERATIONS

For dual GNC 500 Product Series or GNC 500/GNC 400 Product Series installations, crossfill capabilities exist between the number one and number two Systems. Refer to the GNS 530 Pilot's Guide for detailed crossfill operating instructions.

AUTOMATIC LOCALIZER COURSE CAPTURE

By default, the GNS 530 automatic localizer course capture feature is enabled. This feature provides a method for system navigation data present on the external indicators to be switched automatically from GPS guidance to localizer / glide slope guidance as the aircraft approaches the localizer course inbound to the final approach fix. If an offset from the final approach course is being flown, it is possible that the automatic switch from GPS course guidance to localizer / glide slope course guidance will not occur. It is the pilot's responsibility to ensure correct system navigation data is present on the external indicator before continuing a localizer based approach beyond the final approach fix. Refer to the GNS 530 Pilot's Guide for detailed operating instructions.

4B. ABNORMAL PROCEDURES

No change.

5. PERFORMANCE

No change.

6. MASS AND BALANCE

Upon removal or installation of the GNS 530 the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

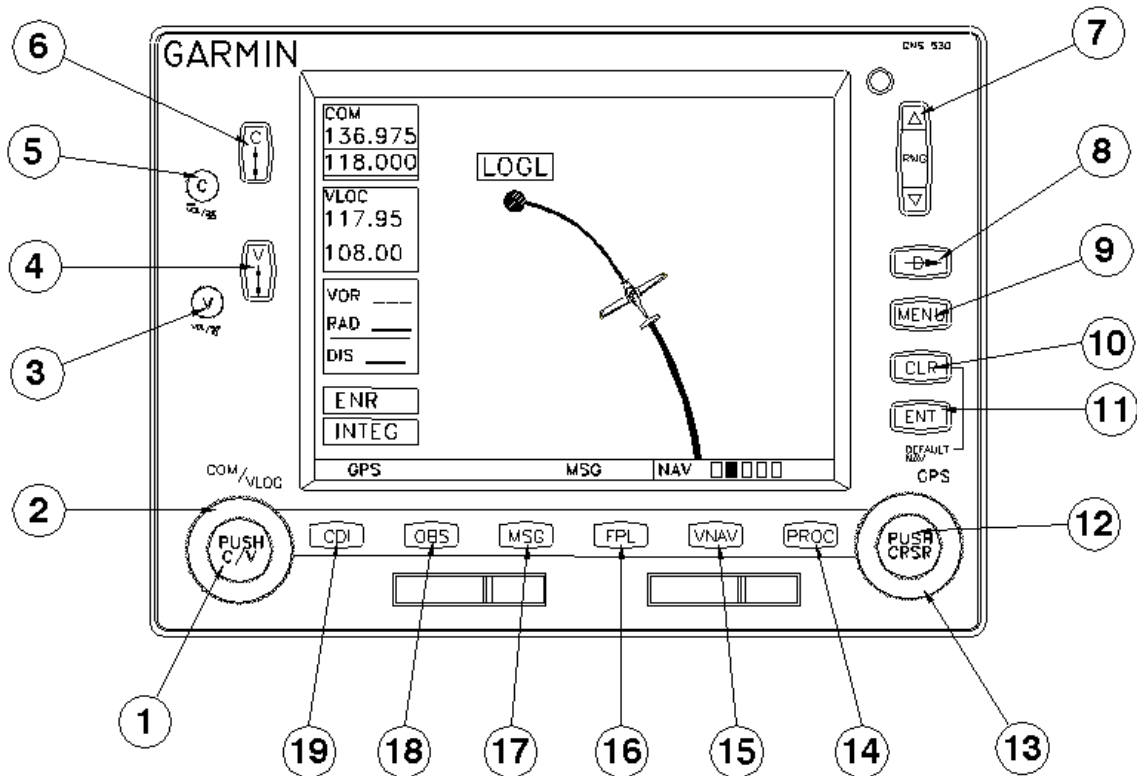
7.14 AVIONICS

The GNS 530 System is a fully integrated, panel mounted instrument, which contains a VHF Communications Transceiver, a VOR/ILS receiver, and a Global Positioning System (GPS) Navigation computer. The system consists of a GPS antenna, GPS Receiver, VHF VOR/LOC/GS antenna, VOR/ILS receiver, VHF COMM antenna and a VHF Communications Transceiver. The primary function of the VHF Communication portion of the equipment is to facilitate communication with Air Traffic Control. The primary function of the VOR/ILS Receiver portion of the equipment is to receive and demodulate VOR, Localizer, and Glide Slope signals. The primary function of the GPS portion of the system is to acquire signals from the GPS system satellites, recover orbital data, make range and Doppler measurements, and process this information in real-time to obtain the user's position, velocity, and time.

Provided the GNS 530's GPS receiver is receiving adequate usable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications for:

- VFR/IFR enroute, terminal, and non-precision instrument approach (GPS, Loran-C, VOR, VOR-DME, TACAN, NDB, NDB-DME, RNAV) operation in accordance with AC 20-138.
- One of the approved sensors, for a single or dual GNS 530 installation, for North Atlantic Minimum Navigation Performance Specification (MNPS) Airspace in accordance with AC 91-49 and AC 120-33.
- The system meets RNP5 airspace (BRNAV) requirements of AC 90-96 and in accordance with AC 20-138, and JAA AMJ 20X2 Leaflet 2 Revision 1, provided it is receiving usable navigation information from the GPS receiver.

Navigation is accomplished using the WGS-84 (NAD-83) coordinate reference datum. Navigation data is based upon use of only the Global Positioning System (GPS) operated by the United States of America.



KEY AND KNOB FUNCTIONS

The key and knob descriptions on the next pages provide a general overview of the primary function(s) for each knob.

LEFT-HAND KEYS AND KNOBS

1. The small left knob (PUSH C/V) is used to tune the kilohertz (kHz) value of the standby frequency for the communications transceiver (COM) or the VLOC receiver, whichever is currently selected by the tuning cursor. Press this knob momentarily to toggle the tuning cursor between the COM and VLOC frequency fields.

2. The large left knob (COM/VLOC) is used to tune the megahertz (MHz) value of the standby frequency for the communications transceiver (COM) or the VOR/Localizer receiver, whichever is currently selected by the tuning cursor.
3. The VLOC volume knob controls audio volume for the selected VOR/Localizer frequency. Press momentarily to enable/disable the ident tone.
4. The VLOC flip-flop key is used to swap the active and standby VLOC frequencies (i.e., make the selected standby frequency active).
5. The COM power/volume knob controls unit power and communications radio volume. Press momentarily to disable automatic squelch control.
6. The COM flip-flop key is used to swap the active and standby COM frequencies. Press and hold to select emergency channel (121.500 MHz).

RIGHT-HAND KEYS AND KNOBS

7. The range key allows you to select the desired map scale. Use the up arrow side of the key to zoom out to a larger area, or the down arrow side to zoom in to a smaller area.
8. The direct-to key provides access to the direct-to function, which allows you to enter a destination waypoint and establishes a direct course to the selected destination.

9. The menu key displays a context-sensitivity list of options. This options list allows you to access additional features or make settings changes which relate to the currently displayed page.
10. The clear key is used to erase information or cancel an entry. Press and hold this key to immediately display the Default Navigation Page, regardless of which page is currently being displayed.
11. The enter key is used to approve an operation or complete data entry. It is also used to confirm information, such as the Database Page during power on.
12. The small right knob (PUSH CRSR) is used to select between the various pages within one of the groups listed below. Press this knob momentarily to display the on-screen cursor. The cursor allows you to enter data and/or make a selection from a list of options.
13. The large right knob (GPS) is used to select between the various page groups: NAV, WPT, AUX, or NRST. With the on-screen cursor enabled, the large right knob allows you to move the cursor about the page.

BOTTOM ROW KEYS

14. The procedures key allows you to select approaches, departures and arrivals from your flight plan. When using a flight plan, available procedures for your departure and/or arrival airport are offered automatically. Otherwise, you may select the desired airport, then the desired procedure.

15. The vertical navigation key allows you to create a three-dimensional profile which guides you to a final (target) altitude at a specified location.
16. The flight plan key allows you to create, edit, activate and invert flight plans, as well as access approaches, departures and arrivals. A closest point to flight plan feature is also available from the flight plan key.
17. The message key is used to view system messages and to alert you to important warnings and requirements.
18. The OBS key is used to select manual or automatic sequencing of waypoints. Pressing this key selects OBS mode, which will retain the current 'active to' waypoint as your navigation reference even after passing the waypoint (i.e., prevents sequencing to the next waypoint). Pressing the OBS key again will return to normal operation, with automatic sequencing of waypoints. Whenever OBS mode is selected, you may set the desired course to/from a waypoint using the OBS Page, or an external OBS selector on your HSI.
19. The CDI key is used to toggle which navigation source (GPS or VLOC) provides output to the HSI.

OPERATION

POWERING UP THE GNS 530

The GNS 530's power and COM volume are controlled using the COM power/volume knob (5) at the top left corner of the unit. Rotating it clockwise will turn unit power on and increase the COM radio volume. After turning the unit on, a 'welcome page' will be displayed while the unit performs a self test, followed by a 'land data page'.

The database confirmation page will appear next, which shows the current database information on the NavData card (with the valid operating dates, cycle number and database type indicated). The database is updated every 28 days, and must be current for approved instrument approach operations. Information on database subscriptions is available inside your GNS 530 package.

To acknowledge the database information, press the ENT-key.

Once the database has been acknowledged, the instrument panel self-test page will appear. To ensure that the GNS 530 and any connected instruments are working properly, check for the following indications on your HSI and external annunciators:

- Course deviation - half left / no flag
- TO/FROM flag - TO
- All external annunciators - on
- Glideslope - half up / no flag

The instrument panel self-test page indicates the currently selected OBS course, fuel capacity ('CAP'), fuel on board ('FOB') and fuel flow ('FF'). The fuel capacity, fuel on board and fuel flow are entered manually.

To enter fuel capacity, fuel on board and fuel flow figures:

1. Rotate the large right knob (13) to select the 'CAP'-, 'FOB'- or 'FF'-field
2. Rotate the small (12) and large (13) right knobs to enter the desired figure, then press ENT.

The instrument panel self-test page includes selections to set fuel on board ('FOB') to full capacity and access the checklist page. This allows you to quickly set fuel to full limits and display any checklists you have entered, such as start up or takeoff checklists.

To set fuel on board to full:

1. Rotate the large right knob (13) to highlight 'Set Full Fuel?'.
2. Press ENT and verify that fuel on board ('FOB') now matches the fuel capacity ('CAP') figure. Fuel on board will now be reduced, over time, based on the fuel flow ('FF') figure.

To view the checklists page:

1. Rotate the large right knob (13) to highlight 'Go To Checklists?' and press ENT.
2. Rotate the large right knob (13) to select the desired checklist, then follow the steps on page 142 of the GNS 530 Pilot's Guide to execute each step in the selected checklist.

3. Once you complete the desired checklist(s), press the small right knob (12) to return to the checklists page. Press the small right knob (12) again to return to normal operation on the satellite status or map pages.

Once you have verified instrument operation with the instrument panel self-test page displayed, rotate the large right knob (13) to highlight 'OK?' and press the ENT key.

ACQUIRING SATELLITES & VIEWING MESSAGES

The satellite status page will appear as the GNS 530 will begin to collect satellite information. An 'Acquiring' status will be displayed on the satellite status page, and the signal strength of any satellites received will appear as 'bar graph' readings. This is a good indication that you are receiving signals and a position fix will be determined. Following the first-time use of your GNS 530, the time required for a position fix will vary - usually from one to two minutes.

If the unit can only obtain enough satellites for 2D navigation (no altitude), the unit will use the altitude provided by the altitude encoder.

If the GNS 530 has not been operated for a period of six months or more, it may have to 'Search the Sky' to collect new data. This means the unit is acquiring satellite data to establish almanac and satellite orbit information, which can take 5 to 10 minutes. The satellite status page will display a 'Searching Sky' status, and the message annunciator (MSG), above the MSG key, will also flash to alert you of a system message, 'Searching the Sky'.

To view a system message, press MSG.

The message page will appear and display the status or warning information applicable to the receiver's current operating condition.

To return to the previous page after viewing a message, press MSG again.

SELECTING COM/NAV FREQUENCIES

The GNS 530's display is divided into separate 'windows' (or screen areas), including a COM window, VLOC window and the GPS window (the right 3/4 of the display).

Pushing the small left knob (1) moves the tuning cursor back-and-forth between the COM and VLOC frequency window. To select the active frequency, you must first enter the frequency in the standby field, and use the COM flip-flop (6) (or the VLOC flip-flop (4)) key to move it to the active field.

To change the standby communication frequency:

1. Press the small left knob (1) if needed, to move the tuning cursor to the COM window
2. Rotate the large left knob (2) to select the MHz, and the small left knob (1) to select the kHz of the desired frequency

To place the standby communication frequency in the active field, press the COM flip-flop key (6).

Once you have entered the active frequency, simply repeat steps 1 and 2, above, to enter the standby frequency. After both communication frequencies have been entered, you may select to keep the COM window 'hot' by leaving the cursor on the standby frequency, or move the cursor to the VLOC window by pressing the small left knob (1).

NOTE

When selecting VLOC frequencies, the tuning cursor will automatically return to the COM window after 30 seconds of inactivity.

To change the standby VLOC frequency:

1. Press the small left knob (1), if needed, to activate the tuning cursor in the VLOC window.
2. Rotate the large left knob (2) to select the MHz, and the small left knob (1) to select the kHz of the desired frequency.

To place the standby frequency in the active field, press the VLOC flip-flop key (4).

MAP PAGE

After the GNS 530 acquires satellites and computes a position, the map page will appear automatically.

The map page displays your present position (using an airplane symbol) relative to nearby airports, VORs, NDBs, intersections, user waypoints and airspace boundaries - and your route displayed as a solid line. The current map scale is indicated in the lower left corner and adjustable using the RNG-key (7).

To adjust the map scale:

1. Press the up arrow on the RNG-key to zoom out to a larger area or,
2. Press the down arrow on the RNG-key to zoom on to a smaller area.

PAGE GROUPS

The map page is one of four pages available under the NAV group:

- Default NAV page
- NAVCOM page
- Map page
- Satellite status page

To select the desired NAV page, rotate the small right knob (12) until the desired page is displayed.

If you are currently viewing a page which is not part of the NAV group, you can quickly return to the NAV group using the CLR-key.

To select the NAV group and display the default NAV page, press and hold the CLR-key (10).

In addition to the NAV group of pages, additional groups of pages are available for waypoint information (WPT), auxiliary (AUX) functions such as flight planning or unit settings, and listings for nearest (NRST) airports or other facilities.

To select the desired page group, rotate the large right knob (13) until a page from the desired group is displayed

To select the desired page within the group, rotate the small right knob (12) until the desired page is displayed.

Additionally, page groups for flight plans, procedures and vertical navigation are available by pressing the key corresponding to the desired function (FPL, PROC or VNAV). Selecting one of these stand-alone page groups, in effect, exits the main page groups and displays a page for the desired function. By pressing the same function key a second time, the GNS 530 will return to the main page group and the previously displayed page.

To select a stand-alone page group, press the corresponding key (FPL, PROC or VNAV).

To return to the previous page from the main page groups, press the same stand-alone page group key (FPL, PROC or VNAV) a second time.

DIRECT-TO NAVIGATION

The GNS 530 can use direct point-to-point navigation to guide you from takeoff to touchdown, even in the IFR environment. Once a destination is selected, the unit will provide speed, course and distance data based upon a direct course from your present position to your destination. A destination can be selected from any page with the direct-to-key (8).

To select a direct-to destination:

1. Press the direct-to-key. The select direct-to waypoint page will appear with the destination field highlighted.
2. Rotate the small right knob (12) to enter the first letter of the destination waypoint identifier. The destination waypoint may be an airport, VOR, NDB, intersection or user waypoint, as long as it is in the database or stored in memory as a user waypoint.
3. Rotate the large right knob (13) to the right to move the cursor to the next character position.
4. Repeat steps 2 and 3 to spell out the rest of the waypoint identifier.
5. Press ENT to confirm the identifier. The 'Activate?' function field will be highlighted.
6. Press ENT to activate a direct-to course to the selected destination.

DEFAULT NAV PAGE

During most flights, the default NAV, map and NAVCOM pages will be the primary pages used for navigation. The default NAV page displays a 'look ahead' map, a graphic course deviation indicator (CDI), the active leg of your flight plan (as defined by the current 'from' and 'to' waypoints), and four user-selectable data fields. The default settings for these fields are distance to waypoint (DIS), desired track (DTK), ground speed (GS) and estimated time en route (ETE).

From the default NAV page, simply rotate the small right knob (12) to display the map page and again to display the NAVCOM page. The NAVCOM page displays the available frequencies (communications and navigation) for the departure airport, any en route airports which are included in your flight plan, and the final destination airport. When using the direct-to function, frequencies will be listed for the airport nearest to your starting position and the destination airport.

To display the frequency list for the desired flight plan or direct-to airport:

1. Push the small right knob (12) to activate the cursor on the airport identifier field (in the GPS window).
2. Rotate the small right knob (12) to display the list of airports (departure, arrival and en route) for your flight plan or direct-to. Continue to rotate the small right knob (12) until the desired airport is selected.
3. Press ENT to display the frequency list for the selected airport.

NAVCOM PAGE

A frequency listed on the NAVCOM page can be quickly transferred to the standby field of the COM or VLOC windows. This time saving process prevents having to 're-key' a frequency already displayed elsewhere on the screen.

To select a communication or navigation frequency:

1. Push the small right knob (12) to activate the cursor in the GPS window.
2. Rotate the large right knob (13) to select the desired frequency from the list.
3. Press ENT to transfer the selected frequency to the standby field in the COM or VLOC window. COM frequencies will automatically go to the standby field of the COM window and navigation frequencies will automatically go to the standby field of the VLOC window, regardless of which window is currently being highlighted by the cursor.
4. To activate the selected frequency, press the COM flip-flop-key (6) or the VLOC flip-flop-key (4).

IFR PROCEDURES

Once the direct-to or flight plan is confirmed, the whole range of instrument procedures is available to you. Departures (SIDs), arrivals (STARs), non-precision and precision approaches are stored within the NavData card and available using the PROC (procedures) key.

To display the procedures page, press PROC.

The steps required to select and activate an approach, departure or arrival are identical. In this Supplement, examples of the steps required to select an approach are shown, but keep in mind the same process also applies to departures and arrivals.

To select an approach, departure or arrival:

1. Rotate the large right knob (13) to highlight the 'Select Approach?' option (or 'Select Arrival?' / 'Select Departure?') from the procedures page.
2. Press ENT to display a list of available procedures for the arrival (when using approach or STARs) or departure (when using SIDs) airport.
3. Rotate the small right knob (12) to select the desired procedure and press ENT.
4. For approaches, a window appears to select the desired initial approach fix (IAF) or a 'vectors' option to select just the final course segment of the approach. Rotate the small right knob (12) to select the desired option and press ENT. (The 'vectors' option extends the final inbound course beyond the final approach fix, allowing you to intercept the final course segment beyond its normal limits.)

5. For departures and arrivals, pop-up windows appear to select the desired transition and runway(s). Rotate the small right knob (12) to select the desired option and press ENT.
6. With 'Load?' highlighted, press ENT to add the procedure to the flight plan or direct-to.

The selected procedure for the departure or arrival airport is added to the sequence of waypoints in the flight plan or direct-to. You can later 'activate' the selected procedure from the procedures page or the active flight plan page. See GNS 530 Pilot's Guide for additional information.

NEAREST AIRPORT EMERGENCY SEARCH

The NRST group provides detailed information on the nine nearest airports, VORs, NDBs, intersections and user-created waypoints within 200 nautical miles of your current position. In addition, pages are also provided to display the five nearest center (ARTCC/FIR) and Flight Service Station (FSS) points of communication, plus alert you to any special-use or controlled airspace you may be in or near.

To display the NRST pages:

1. If necessary, press the small right knob (12) to remove the cursor from the page.
2. Rotate the large right knob (13) to select the NRST page group, as indicated by 'NRST' appearing in the lower right corner of the screen.
3. Rotate the small right knob (12) to select the desired NRST page.

The nearest airport page is one of eight pages available under the NRST group:

- Nearest airport page
- Nearest intersection page
- Nearest NDB page
- Nearest VOR page
- Nearest user waypoints page
- Nearest ARTCC page
- Nearest FSS page
- Nearest airspace page

You may examine both the communication frequencies and runway information directly from the nearest airport page. As discussed earlier for the NAVCOM page, you may also place any displayed frequency into the standby COM or VLOC field by highlighting the frequency with the cursor and pressing ENT.

NEAREST AIRPORTS: ADDITIONAL INFORMATION AND DIRECT-TO

To view additional information for a nearby airport:

1. Press the small right knob (12) to activate the cursor.
2. Rotate the large right knob (13) to select the desired airport from the list.
3. Press ENT to display waypoint (WPT) information pages for the selected airport.
4. To display runway and frequency information, press the small right knob (12) to remove the cursor and rotate the small right knob (12) to display the desired information page.

The nearest airport page may be used in conjunction with the direct-to (8) key to quickly set a course to a nearby facility in an in-flight emergency. Selecting a nearby airport as a direct-to destination will override your flight plan or cancel a previously selected direct-to destination. (You'll still have the option of returning to your flight plan by canceling the direct-to.)

To select a nearby airport as a direct-to destination:

From the nearest airport page:

1. Press the small right knob (12) to activate the cursor.
2. Rotate the large right knob (12) to select the desired airport from the list.
3. Press direct-to (8), ENT and ENT (again) to navigate to the nearby airport.

From an airport information page:

1. Press direct-to (8), ENT and ENT (again) to navigate to the nearby airport.

SPECIAL USE AND CONTROLLED AIRSPACE

The last page in the NRST group, the nearest airspace page, provides information for up to nine controlled or special-use airspaces near or in your flight path. Airspace information appears on this page based upon the same criteria used for airspace alert messages. Nearby airspace information and airspace alert messages are provided according to the following conditions:

- If your projected course will take you inside an airspace within the next ten minutes, the message 'Airspace ahead - - less than 10 minutes' will appear.
- If you are within two nautical miles of an airspace and your current course will take you inside, the message 'Airspace near and ahead' will appear.
- If you are within two nautical miles of an airspace and your current course will not take you inside, the message 'Near airspace less than 2 nm' will appear.
- If you have entered an airspace, the message 'Inside Airspace' will appear.

By default, airspace alert messages are turned off. When turned on, the message (MSG) annunciator located directly above the MSG-key will flash to alert you to the airspace message.

To view an airspace alert message:

1. Press the MSG-key. The message page appears with the alert message.
2. Press MSG again to return to the previous display.

Note that airspace alerts are based upon three-dimensional data (latitude, longitude and altitude) to avoid nuisance alerts. The alert boundaries for controlled airspace are also sectorized to provide complete information on any nearby airspace. Additional information about a nearby airspace - such as controlling agency, frequency and floor/ceiling limits - is available from the nearest airspace page.

FLIGHT PLANS

The GNS 530 lets you create up to 20 flight plans, with up to thirty-one waypoints in each flight plan. Flight plans are created, edited and activated using the FPL-key. The FPL group includes two pages: the active flight plan page and the flight plan catalog. The active flight plan provides information and editing features for the flight plan currently in use (referred to as 'flight plan 00'). The flight plan catalog serves as the main page for creating new flight plans, as well as editing or activating previously created flight plans.

Since using flight plans is arguably one of the more complex features of the GNS 530, we'll only discuss it briefly here - focusing on creating a new flight plan and activating it to use for navigation. After reading through this brief introduction, answers to additional questions you may have about flight plans can be found in the Pilot's Guide.

To create a new flight plan:

1. Press the FPL-key and rotate the small right knob (12) to select the flight plan catalog.
2. Press the MENU-key to display the flight plan catalog options.

3. Rotate the large right knob (13) to select 'Create New Flight Plan?' and press ENT.
4. The cursor will appear on the first waypoint identifier field (located directly below 'WAYPOINT'). Use the large (13) and small (12) right knobs to enter the identifier of the first waypoint in the flight plan. (The small knob is used to select the desired letter or number and the large knob is used to move to the next character space.)
5. Press ENT once the identifier has been selected. The cursor will move to the next blank waypoint identifier field.
6. Repeat steps 4 and 5, above, until all waypoints for the flight plan have been entered.

Once the flight plan is created, it may be activated from an options window. Activating the flight plan will place it into 'flight plan 00' (a copy of it will still reside in the original catalog location) and replaces any flight plan which currently exists in 'flight plan 00'.

To activate the new flight plan:

1. Press the MENU-key to display the flight plan catalog options.
2. Rotate the small right knob (12) to select 'Activate Flight Plan?' and press ENT.

STORMSCOPE INTERFACE

The GNS 530 provides the display interface for the Goodrich Stormscope WX-500 Weather Mapping Sensor. The interface capability allows weather data to be shown on the color display which gives you the ability to look at your display and quickly identify weather hazards relative to your airplane.

NOTE

Refer to the WX-500 Supplement A24 to the AFM and to the WX-500 Pilot's Guide for a detailed description of the WX-500 Stormscope.

NOTE

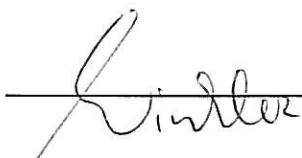

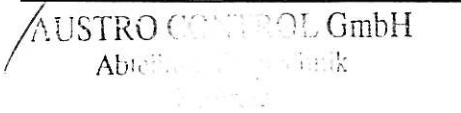
Refer to the Pilot's Guide Section 11 of the GNS 530 for detailed operating procedures of the GNS 530 when the WX-500 Stormscope is installed.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change.

SUPPLEMENT E7
TO THE AIRPLANE FLIGHT MANUAL
DA 40 & DA 40D
OPERATION WITH
VENTILATION INLET BAFFLE

Doc. Nos. : 6.01.01-E
: 6.01.05-E
Date of Issue of the Supplement :
Design Change Advisory : OÄM 40-183

Signature : 
ACG Project Manager : 
Stamp : 
Date of Approval : 12 JAN. 2005

This Supplement has been verified for EASA by the Austrian Civil Aviation Authority Austro Control (ACG) as Primary Certification Authority (PCA) in accordance with the valid Certification Procedures and approved by EASA with approval no. 2005-760.

DIAMOND AIRCRAFT INDUSTRIES GMBH
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0.1 RECORD OF REVISIONS

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0.2 LIST OF EFFECTIVE PAGES

| Chapter | Page | Date |
|--------------|--------|-------------|
| 0 | 9-E7-0 | 04-Nov-2004 |
| | 9-E7-1 | 27-Apr-2005 |
| | 9-E7-2 | 27-Apr-2005 |
| | 9-E7-3 | 04-Nov-2004 |
| 1 | 9-E7-4 | 04-Nov-2004 |
| 2 | 9-E7-5 | 27-Apr-2005 |
| 3, 4A, 4B, 5 | 9-E7-6 | 04-Nov-2004 |
| 6, 7, 8 | 9-E7-7 | 04-Nov-2004 |

0.3 TABLE OF CONTENTS

| | Page |
|--|--------|
| 1. GENERAL | 9-E7-4 |
| 2. OPERATING LIMITATIONS | 9-E7-5 |
| 3. EMERGENCY PROCEDURES | 9-E7-6 |
| 4A. NORMAL OPERATING PROCEDURES | 9-E7-6 |
| 4B. ABNORMAL OPERATING PROCEDURES | 9-E7-6 |
| 5. PERFORMANCE | 9-E7-6 |
| 6. MASS AND BALANCE | 9-E7-7 |
| 7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS | 9-E7-7 |
| 8. AIRPLANE HANDLING; CARE AND MAINTENANCE | 9-E7-7 |

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the Ventilation Inlet Baffle is installed in the wing. The Ventilation Inlet Baffle reduces the amount of cooling air entering the cabin. It is recommended for use when operating at low outside air temperatures. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement to the “Airplane Flight Manual DA 40 & DA 40D” is a permanent part of the AFM and must remain in the AFM at all times when the Winter Baffle is installed.

The implementation of the design change advisory OÄM 40-183 is prerequisite for the use of the DA 40 or DA 40 D with the Ventilation Inlet Baffle.

2. OPERATING LIMITATIONS

2.15 LIMITATION PLACARDS

| On ventilation inlet baffle:

Remove at Outside
Temperatures above
15 °C / 59 °F

2.16 OTHER LIMITATIONS

2.16.1 TEMPERATURE

The airplane may only be operated with the ventilation inlet baffle installed when the outside air temperature at take-off is does not exceed 15 °C (59 °F).

3. EMERGENCY PROCEDURES

No change.

4A. NORMAL OPERATING PROCEDURES

4A.3 CHECKLISTS FOR NORMAL OPERATING PROCEDURES

4A.3.1 PRE-FLIGHT INSPECTION

Walk-around visual inspection

Left Wing:

- Verify that the outside air temperature permits the use of the ventilation inlet baffle.
- Check ventilation inlet baffle for improper mounting or obvious damage.

4B. ABNORMAL OPERATING PROCEDURES

No change.

5. PERFORMANCE

No change.

6. MASS AND BALANCE

The mass of the ventilation inlet baffle is negligible. The mass and balance data of the airplane therefore remain unchanged.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.4 INSTRUMENT PANEL

Cockpit Ventilation

Unconditioned ambient air is supplied to the interior through an inlet on the bottom surface of the left wing. To increase cabin temperatures when operating at low outside air temperatures, a ventilation inlet baffle may be installed at the inlet. With the baffle installed, the rear cabin ventilation nozzles on the left and right hand side and in the central console above the passengers' heads will be inoperative.

The ventilation inlet baffle consists of a metal plate with rubber edging and is attached to the bottom LH wing by a camloc.

8. AIRPLANE HANDLING; CARE AND MAINTENANCE

No change.

SUPPLEMENT O2
TO THE AIRPLANE FLIGHT MANUAL DA 40

OPERATION OF THE
DA 40
WITH WINTER KIT

Doc. No. : 6.01.01-E
Date of Issue of the Supplement : 26 Nov 2001
Design Change Advisory : OÄM 40-078

Signature :

Authority :

Stamp :

Date of Approval :









This Supplement has been approved for the Joint Aviation Authorities (JAA) by the Austrian Civil Aviation Authority Austro Control (ACG) as Primary Certification Authority (PCA) in accordance with the JAA Certification Procedures of the Joint Aviation Authorities (JAA JC/VP).

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0.1 RECORD OF REVISIONS

| Rev. No. | Reason | Chapter | Page(s) | Date of Revision | Approval | Date of Approval | Date Inserted | Signature |
|----------|--------|---------|---------|------------------|----------|------------------|---------------|-----------|
| | | | | | | | | |

0.2 LIST OF EFFECTIVE PAGES

| Chapter | Page | Date |
|---------|---------|-------------|
| 0 | 9-O2-0 | 26 Nov 2001 |
| | 9-O2-1 | 26 Nov 2001 |
| | 9-O2-2 | 26 Nov 2001 |
| | 9-O2-3 | 26 Nov 2001 |
| 1 | 9-O2-4 | 26 Nov 2001 |
| 2 | 9-O2-5 | 26 Nov 2001 |
| 3 | 9-O2-5 | 26 Nov 2001 |
| 4A | 9-O2-6 | 26 Nov 2001 |
| 4B | 9-O2-6 | 26 Nov 2001 |
| 5 | 9-O2-6 | 26 Nov 2001 |
| 6 | 9-O2-7 | 26 Nov 2001 |
| 7 | 9-O2-8 | 26 Nov 2001 |
| | 9-O2-9 | 26 Nov 2001 |
| 8 | 9-O2-10 | 26 Nov 2001 |

0.3 TABLE OF CONTENTS

| | Page |
|--|---------|
| 1. GENERAL | 9-O2-4 |
| 2. OPERATING LIMITATIONS | 9-O2-5 |
| 3. EMERGENCY PROCEDURES | 9-O2-5 |
| 4A. NORMAL OPERATING PROCEDURES | 9-O2-6 |
| 4B. ABNORMAL OPERATING PROCEDURES | 9-O2-6 |
| 5. PERFORMANCE | 9-O2-6 |
| 6. MASS AND BALANCE | 9-O2-7 |
| 7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS | 9-O2-8 |
| 8. AIRPLANE HANDLING, CARE AND MAINTENANCE | 9-O2-10 |

1. GENERAL

1.1 INTRODUCTION

This Supplement supplies the information necessary for the efficient operation of the airplane when the winter kit is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement to the "Airplane Flight Manual DA 40" is a permanent part of the AFM and must remain in the AFM at all times when the winter kit is installed.

The implementation of the design change advisory OÄM 40-078 is prerequisite for the use of the DA 40 with winter kit.

2. OPERATING LIMITATIONS

2.15 LIMITATION PLACARD

The following placard is attached to the winter kit:

**Remove at Outside
Temperatures above
15 °C / 59 °F**

2.16 OTHER LIMITATIONS

The winter kit should only be used at outside temperatures on ground below 15 °C / 59 °F, since engine temperatures below the limit engine temperatures cannot be guaranteed otherwise.

3. EMERGENCY PROCEDURES

No change.

4A. NORMAL OPERATING PROCEDURES

Proceed according to the normal operating procedures given in the main part of the Airplane Flight Manual.

In addition:

4A.3 CHECKLISTS FOR NORMAL OPERATING PROCEDURES

4A.3.1 PRE-FLIGHT INSPECTION

II. Walk-around check, visual inspection

* *Front fuselage:*

- Verify that the outside air temperature permits the use of the winter kit.
- Check winter kit for improper mounting or obvious damage.

4B. ABNORMAL OPERATING PROCEDURES

No change.

5. PERFORMANCE

No change.

6. MASS AND BALANCE

6.1 INTRODUCTION

The mass of the winter kit is negligible. The mass and balance data of the airplane therefore remain unchanged.

6.5 EQUIPMENT LIST

Additional equipment required for the operation with winter kit:

- * 1 winter kit for the oil cooler air duct
- * 1 camloc for attachment

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.9 POWER PLANT

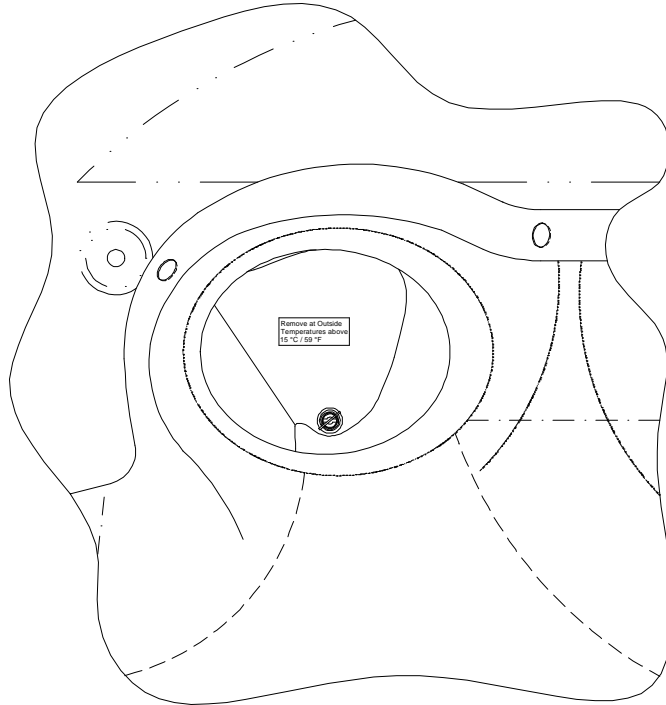
7.9.1 ENGINE, GENERAL

The winter kit consists of a protective yellow metal plate (winter kit) which restricts the flow of cooling air and is attached in the air duct by a camloc.

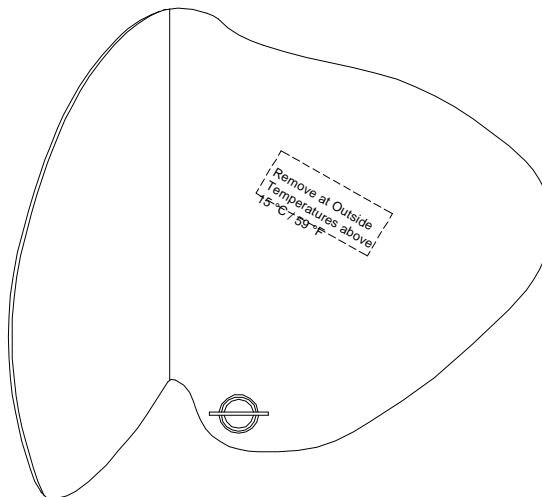
For installation, twist winter kit into the RH cowling inlet to the left and close camloc. For removal, reverse the sequence.

By using the winter kit at low outside air temperatures, the oil temperature increases by up to 20 °C (36 °F).

Due to the raised oil temperature, the water condenses out of the oil more easily.



Cowling Installation



Winter Kit

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

8.2 WINTER KIT INSPECTION INTERVALS

At every 100 hour inspection, the winter kit should be checked for improper mounting and obvious damage.

DA 40 AFM
DA 40 D AFM
DA 40 F AFM



Supplement S4
ELT, ME 406
and ME 406 'ACE'

SUPPLEMENT S4
| TO THE AIRPLANE FLIGHT MANUAL DA 40, DA 40 D
| and DA 40 F
| 406 MHz EMERGENCY LOCATOR TRANSMITTER
| ARTEX ME 406 and ME 406 'ACE'

Doc. No. : 6.01.01-E, 6.01.02-E, 6.01.05-E

Date of Issue of the Supplement : 9 Feb 2006

| Design Change Advisories : OÄM 40-284 (DA 40, DA 40 F)
| OÄM 40-247 (DA 40 D)

Signature : 

DAI DO Representative : T. Krassnitzer

Stamp : 

Date of approval : 25-May-2007

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DIAMOND AIRCRAFT INDUSTRIES GMBH
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Supplement S4
ELT, ME 406
and ME 406 'ACE'

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DA 40 AFM
DA 40 D AFM
DA 40 F AFM



Supplement S4
ELT, ME 406
and ME 406 'ACE'

0.2 LIST OF EFFECTIVE PAGES

| Chapter | Page | Date |
|--------------|---------|-------------|
| 0 | 9-S4-0 | 10 Apr 2007 |
| | 9-S4-1 | 10 Apr 2007 |
| | 9-S4-2 | 10 Apr 2007 |
| | 9-S4-3 | 10 Apr 2007 |
| 1, 2 | 9-S4-4 | 10 Apr 2007 |
| 3 | 9-S4-4 | 10 Apr 2007 |
| | 9-S4-5 | 10 Apr 2007 |
| | 9-S4-6 | 10 Apr 2007 |
| 4A, 4B, 5, 6 | 9-S4-6 | 10 Apr 2007 |
| 7 | 9-S4-7 | 10 Apr 2007 |
| | 9-S4-8 | 10 Apr 2007 |
| | 9-S4-9 | 10 Apr 2007 |
| | 9-S4-10 | 10 Apr 2007 |
| | 9-S4-11 | 10 Apr 2007 |
| 8 | 9-S4-11 | 10 Apr 2007 |

Doc. No. 6.01.01-E
Doc. No. 6.01.02-E
Doc. No. 6.01.05-E

Rev. 1

10 Apr 2007

OÄM 40-284
OÄM 40-247

Page 9 - S4 - 2

0.3 TABLE OF CONTENTS

| | Page |
|--|---------|
| 1. GENERAL | 9-S4-4 |
| 2. OPERATING LIMITATIONS | 9-S4-4 |
| 3. EMERGENCY PROCEDURES | 9-S4-4 |
| 4A. NORMAL OPERATING PROCEDURES | 9-S4-6 |
| 4B. ABNORMAL OPERATING PROCEDURES | 9-S4-6 |
| 5. PERFORMANCE | 9-S4-6 |
| 6. MASS AND BALANCE | 9-S4-6 |
| 7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS | 9-S4-7 |
| 8. AIRPLANE HANDLING, CARE AND MAINTENANCE | 9-S4-11 |

| | | | |
|--|-------------------------|--------------------------|-----------------|
| Doc. No. 6.01.01-E Doc. No. 6.01.02-E Doc. No. 6.01.05-E | Rev. 1 10 Apr 2007 | OÄM 40-284 OÄM 40-247 | Page 9 - S4 - 3 |
|--|-------------------------|--------------------------|-----------------|

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the ELT (Emergency Locator Transmitter) ARTEX ME 406 is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM at all times when the ELT ARTEX ME 406 is installed.

2. LIMITATIONS

No change.

3. EMERGENCY PROCEDURES

Before performing a forced landing, especially in remote and mountainous areas, the ELT transmitter should be activated manually by switching the panel mounted switch to the 'ON'-position. The red LED on the panel mounted switch should flash.

Immediately after a forced landing where emergency assistance is required, the ELT should be utilized as follows:

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|--|-------------------------|--------------------------|-----------------|
| Doc. No. 6.01.01-E Doc. No. 6.01.02-E Doc. No. 6.01.05-E | Rev. 1 10 Apr 2007 | OÄM 40-284 OÄM 40-247 | Page 9 - S4 - 4 |
|--|-------------------------|--------------------------|-----------------|

CAUTION

The panel mounted switch could be inoperative if damaged during a forced landing. In this case the ELT can be switched ON or OFF with the main switch which is located on the ELT unit. The following points must then be executed directly on the ELT-unit.

1. ENSURE ELT ACTIVATION:

- Switch the panel mounted switch to the 'ON'-position, even if the LED flashes.

If the airplane's radio is operable and can be safely used (no threat of fire or explosion), turn ON and select 121.5 MHz. If the ELT can be heard transmitting, it is working properly.

2. PRIOR TO SIGHTING RESCUE AIRCRAFT:

- Conserve airplane battery. Do not activate radio transceiver.

3. AFTER SIGHTING RESCUE AIRCRAFT:

- Switch the panel mounted switch to the 'ARM'-position to prevent radio interference. Attempt contact with rescue aircraft with the radio transceiver set to a frequency of 121.5 MHz. If no contact is established, switch the panel mounted switch to the 'ON'-position immediately.

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|--|-------------------------|--------------------------|-----------------|
| Doc. No. 6.01.01-E Doc. No. 6.01.02-E Doc. No. 6.01.05-E | Rev. 1 10 Apr 2007 | OÄM 40-284 OÄM 40-247 | Page 9 - S4 - 5 |
|--|-------------------------|--------------------------|-----------------|

4. FOLLOWING RESCUE

- Switch the panel mounted switch to the 'ARM'-position, terminating emergency transmissions.

The ELT may be activated by hard landings or in heavy turbulence. The ELT should then be reset by toggling the panel mounted switch from the 'ARM'-position to the 'ON'-position and then back to the 'ARM'-position, or if the panel mounted switch is already in the 'ON'-position, it must be placed into the 'ARM'-position. Ensure that the ELT does not transmit.

4A. NORMAL OPERATING PROCEDURES

No change.

4B. ABNORMAL OPERATING PROCEDURES

No change.

5. PERFORMANCE

No change.

6. MASS AND BALANCE

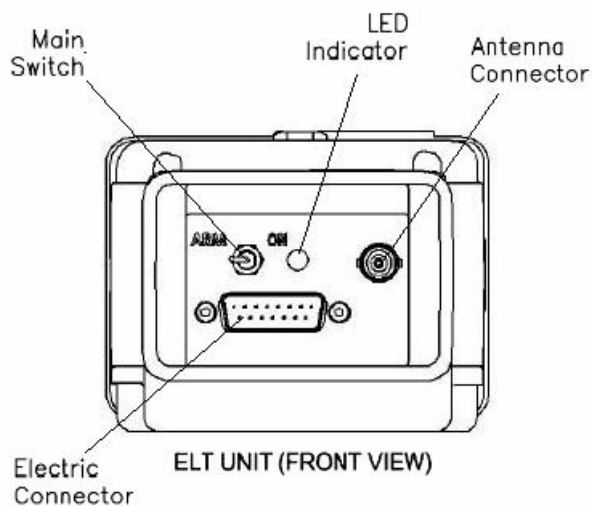
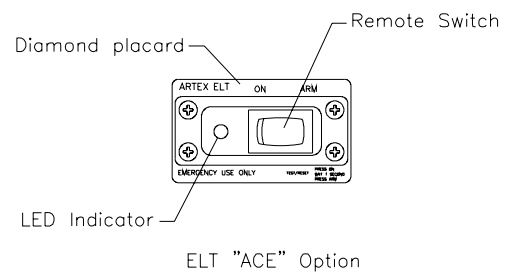
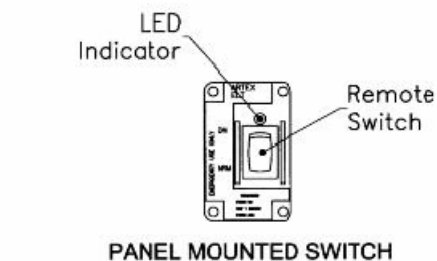
Upon removal or installation of the ELT the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

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|--|-------------------------|--------------------------|-----------------|
| Doc. No. 6.01.01-E Doc. No. 6.01.02-E Doc. No. 6.01.05-E | Rev. 1 10 Apr 2007 | OÄM 40-284 OÄM 40-247 | Page 9 - S4 - 6 |
|--|-------------------------|--------------------------|-----------------|

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

GENERAL

The ARTEX ME 406 ELT is an automatically activated Emergency Locator Transmitter. It may also be manually activated via the 'Main'-switch on the unit, or via the panel mounted switch, which is installed on the right side of the instrument panel of the DA 40, DA 40 D or DA 40 F.



When the ELT is switched on, the ELT broadcasts a standard swept tone on the international distress frequency 121.5 MHz. Additionally, the 406.025 MHz transmitter turns on every 50 seconds for 520 milliseconds. During that time an encoded digital message is sent to a satellite. The information contained in that message is:

- Serial number of the transmitter or Airplane I.D.
- Country Code
- I.D. Code

One advantage of the 406.025 MHz transmitter is that it will produce a much more accurate position, typically 1 to 2 kilometers as compared to 15 to 20 kilometers for 121.5 MHz transmitter. The ELT also transmits a digital message which allows the search and rescue authorities to contact the owner/operator of the airplane through a database. The information contained in the database, that may be useful in the event of a crash, is:

- Type of Airplane
- Address of Owner
- Telephone Number of Owner
- Airplane Registration Number
- Alternate Emergency Contact

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|--|-------------------------|--------------------------|-----------------|
| Doc. No. 6.01.01-E Doc. No. 6.01.02-E Doc. No. 6.01.05-E | Rev. 1 10 Apr 2007 | OÄM 40-284 OÄM 40-247 | Page 9 - S4 - 8 |
|--|-------------------------|--------------------------|-----------------|

Once the ELT is activated and the 406.025 MHz signal is detected from the satellite and a position is calculated, the 121.5 MHz transmission is used to home in on the crash site. Because airplane communication radios are not capable of receiving 406.025 MHz transmissions, the only method of monitoring the ELT is the flashing cockpit light or the flashing light on the ELT unit, the buzzer or the 121.5 MHz transmission which may be monitored on the airplane's communication transceivers.

DESCRIPTION

The system consists of a panel mounted switch, installed on the instrument panel, the Emergency Locator Transmitter-Unit (ELT-Unit), installed behind the baggage compartment frame, a buzzer, installed next to the ELT unit and an antenna which is installed behind the ring frame.

An acceleration indicator ('g'-switch) activates the ELT upon sensing a sudden change of velocity, along the airplane's longitudinal axis. As long as the ELT is locked into its mounting tray, it will activate in a crash. Neither the cockpit switch nor the ELT unit switch can be positioned to prevent automatic activation once the unit is mounted correctly.

When the ELT is activated, the presence of the emergency swept tone and a flashing front panel light indicate a normal function of the unit. The front panel light must immediately begin to continuously flash upon ELT activation.

The ELT can also be manually activated, for example for testing or after an emergency landing. It can be activated either by positioning the panel mounted switch to the 'ON'-position or by positioning the main switch of the ELT unit to the 'ON'-position.

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|--|-------------------------|--------------------------|-----------------|
| Doc. No. 6.01.01-E Doc. No. 6.01.02-E Doc. No. 6.01.05-E | Rev. 1 10 Apr 2007 | OÄM 40-284 OÄM 40-247 | Page 9 - S4 - 9 |
|--|-------------------------|--------------------------|-----------------|

FLIGHT OPERATION

■ The main switch of the ELT unit must be in the 'ARM'-position and the panel mounted switch must be in the 'ARM'-position during flight. The ELT is in standby-mode, that means, the ELT can now be activated by the 'g'-Switch. The function test (only during the first five minutes of each hour) gives the pilot the possibility to verify that the ELT is in the 'ARMED'-mode.

The ELT may be activated by hard landings or in heavy turbulence. The ELT should then be reset by toggling the panel mounted switch from the 'ARM'-position to the 'ON'-position and then back to the 'ARM'-position, or if the panel mounted switch is already in the 'ON'-position, it must be placed into the 'ARM'-position. Ensure that the ELT does not transmit. It should be remembered that the ELT cannot be reset if either the panel mounted switch or the unit switch is in the 'ON'-position.

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|--|-------------------------|--------------------------|------------------|
| Doc. No. 6.01.01-E Doc. No. 6.01.02-E Doc. No. 6.01.05-E | Rev. 1 10 Apr 2007 | OÄM 40-284 OÄM 40-247 | Page 9 - S4 - 10 |
|--|-------------------------|--------------------------|------------------|

FUNCTION TEST

The following function test is recommended to be performed once a month to verify that the ELT is operating properly. Regulations require that transmitter tests only be done during the first 5 minutes of each hour and must not last for more than 3 audio sweeps (approx. 1 second).

Note that the batteries must be replaced when the transmitter has been in use for more than 1 cumulative hour (including tests).

Performing the Test:

- Monitor 121.50 MHz using the airplane's COM receiver. Turn the squelch off.
- Switch the panel mounted switch to 'ON', wait for 3 sweeps on the COM receiver, which takes about 1 second. Verify that the LED flashes. Then turn the switch back to the 'ARM'-position. If the LED doesn't stop flashing or the audio sweep tone can still be heard, the main switch on the ELT unit should be set to the 'ON' position and back to the 'ARM'-position. Verify that the LED does not flash and the audio sweep tone is off.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change.

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|--|-------------------------|--------------------------|------------------|
| Doc. No. 6.01.01-E Doc. No. 6.01.02-E Doc. No. 6.01.05-E | Rev. 1 10 Apr 2007 | OÄM 40-284 OÄM 40-247 | Page 9 - S4 - 11 |
|--|-------------------------|--------------------------|------------------|