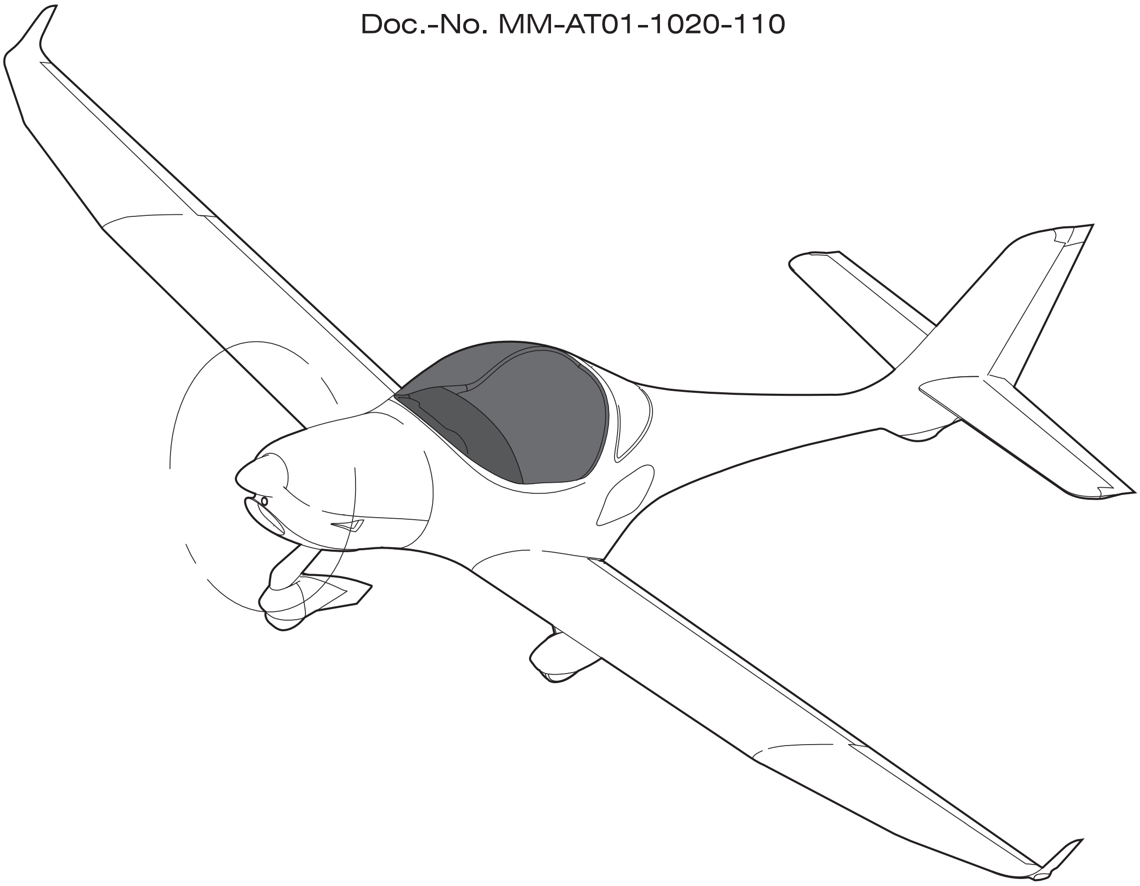
MAINTENANCE MANUAL

AQUILA AT01-100 (A211)
AQUILA AT01-200 (A212)

Doc.-No. MM-AT01-1020-110



The technical content of this document is approved under the authority of the DOA ref. EASA.21J.025.

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1) Depending on effectivity.

RECORD OF REVISIONS

Revision Number	Date of Revision	Date Inserted	By	Revision Number	Date of Revision	Date Inserted	By
A.01	30.04.13						
A.02	26.08.13						
A.03	24.10.13						
A.04	02.03.15						
A.05	20.08.15						
A.06	29.02.16						
A.07	10.06.16						
A.08	09.10.18						
A.09	28.02.20						
A.10	05.03.21						
A.11	01.06.22						
A.12	01.02.23						

RECORD OF TEMPORARY REVISIONS

Temp. Revision Number	Page	Date of Revision	By	Date Removed	By
01	05-10-00 p.1 & 3	11.06.14		20.08.15	
02	05-20-00 p.7 76-00-00 p.203 & 204	14.08.14		20.08.15	

HIGHLIGHTS OF REVISIONS

Revision Number	Date of Revision	Reason for Revision	Revision Number	Date of Revision	Reason for Revision
A.01	30.04.13	Initial issue.	A.11	01.06.22	New Beringer and Rotax manuals; Whelen Orion 660
A.02	26.08.13	SB-AT01-027	A.12	01.02.23	New variant AT01-200A; Garmin G3X autopilot
A.03	24.10.13	FAA validation (airworthiness limitations, wire routing diagrams); lubrication revised; standard torque ROTAX engine mount revised			
A.04	02.03.15	Life time limit, 6000 hour inspection			
A.05	20.08.15	Fuel quantity indicating system calibration procedures added; TBO's and maintenance checklist revised; Temporary revisons 1 & 2 incorporated			
A.06	29.02.16	Control surface ply lay-up added; repair procedures revised			
A.07	10.06.16	6000h check & TBOs added; battery check; wing bolts safetying			
A.08	09.10.18	Beringer: new axle and new wheels; Rotax: new spark plugs			
A.09	28.02.20	New model AT01-200			
A.10	05.03.21	Garmin GFC 500 autopilot			

INTRODUCTION

1. General

This maintenance manual provides to maintenance personnel all information necessary for the maintenance of the aircraft. It contains detailed descriptions of the systems, troubleshooting and maintenance practices. This handbook only contains maintenance practices to be carried out on the aircraft, e.g. removal and installation of components.
Maintenance, repairs and inspections must be accomplished in accordance with the instructions given in this maintenance manual (MM).

2. List of Technical Publications

A. Use the MM in conjunction with the latest revisions of the technical publications listed in table 1.

NOTE: Due to the multiplicity of equipment coming onto the market the following list may be incomplete. If there is no information given on a certain component, use the documentation provided by the manufacturer of this component.

Table 1 - List of Technical Publications

No.	Title	Manual No. / Part No.	Supplier
1.	AQUILA AT01-100A/B/C Airplane Flight Manual	FM-AT01-1010-101/102/103	AQUILA Aviation International GmbH
2.	AQUILA AT01-200A/C Airplane Flight Manual	FM-AT01-1010-104/106	AQUILA Aviation International GmbH
3.	AQUILA AT01-100/200 Illustrated Parts Catalog	PC-AT01-1030-110	AQUILA Aviation International GmbH
4.	Maintenance Manual (Line) for ROTAX 912 Series	MML-912 899196	BRP-Powertrain GmbH & Co KG
5.	Maintenance Manual (Line) for ROTAX 914 Series	MML-914 899608	BRP-Powertrain GmbH & Co KG
6.	Maintenance Manual (Heavy) for ROTAX 912 and 914 Series	MMH-912 / MMH-914 899603	BRP-Powertrain GmbH & Co KG
7.	Operator's Manual for ROTAX 912 Series	OM-912 899700	BRP-Powertrain GmbH & Co KG
8.	Operator's Manual for ROTAX 914 Series	OM-914 899706	BRP-Powertrain GmbH & Co KG
9.	Illustrated Parts Catalog for ROTAX 912 and 914 Series	IPC-912 / IPC-914 899473	BRP-Powertrain GmbH & Co KG
10.	Hydraulically Controlled Variable Pitch Prop. Operation & Installation Manual	E-124	MT-Propeller Entwicklung GmbH

Table 1 - List of Technical Publications (Cont.)

No.	Title	Manual No. / Part No.	Supplier
11.	Operation & Installation Manual Hydraulic Constant Speed Governor P-8()()-()	E-1048	MT-Propeller Entwicklung GmbH
12.	Beringer Products - Maintenance Guide Beringer Brake - Servicing Manual Beringer Wheels - Servicing Manual	SM-00 SM-01 SM-02	Beringer Aero
13.	Cleveland Wheels and Brakes Maintenance Manual	AWBCMM0001	Parker Hannifin Corp.
14.	Garmin G500 PFD/MFD System AML STC Installation Manual Instructions for Continued Airworthiness	 190-01102-06 190-01102-00	Garmin International Inc.
15.	Garmin G500/G600 TXi Part 23 AML STC Installation Manual Part 23 AML STC Maintenance Manual	 190-01717-B3 190-01717-B1	Garmin International Inc.
16.	EFD1000 and EFD500 Installation Manual Instructions for Continued Airworthiness	 900-00003-001 900-00012-001	Aspen Avionics Inc.
17.	Garmin GMA 340 Audio Panel Installation Manual Pilot's Guide	 190-00149-01 190-00149-10	Garmin International Inc.
18.	Garmin GMA 350/350H Installation Manual Pilot's Guide	 190-01134-11 190-01134-12	Garmin International Inc.
19.	Garmin GTX 328 Transponder Installation Manual	190-00420-04	Garmin International Inc.
20.	Garmin GTX 330 Transponder Installation Manual	190-00207-02	Garmin International Inc.
21.	Garmin 400W Series Installation Manual	190-00356-02	Garmin International Inc.
22.	Garmin GTN 6xx/7xx (Xi) GTN 6XX/7XX System Maintenance Manual GTN Xi Series Maintenance Manual	 190-01007-A1 190-02327-01	Garmin International Inc.
23.	Flymap L Installation Manual	500-301	Stauff Systec GmbH
24.	Model SL30 NAV/COMM Installation Manual Pilot's Guide	 560-0404-03 560-0403-01	Garmin AT Inc.
25.	Model SL40 VHF COMM Installation Manual Pilot's Guide	 560-0956-03 560-0954-02	Garmin AT Inc.
26.	Kannad 406 AF Compact Installation Manual / Operation Manual	DOC 08038 Ref. 0145599	Kannad Aviation Enquiries Orolia SAS

Table 1 - List of Technical Publications (Cont.)

No.	Title	Manual No. / Part No.	Supplier
27.	Kannad AF Integra Operation Manual	DOC 09078 Ref. 0146257	Kannad Aviation Enquiries Orolia SAS
28.	VT-01 Transponder Installation Manual	01.0200.11E	Garrecht Avionik GmbH
29.	VT-02 Transponder Installation Manual	02.0200.11E	Garrecht Avionik GmbH
30.	Glass Panel Engine Monitor MVP-50P-AQ Operating Instructions Component Replacement Considerations	OI 06031301 06201301	Electronics International Inc.
31.	Acceptable Methods, Techniques and Practices - Aircraft Inspection and Repair	AC 43.13-1B	Federal Aviation Administration (FAA)
32.	Garmin GTR 225 / GNC 255 TSO Installation Manual	190-01182-02	Garmin International Inc.
33.	Garmin GTR 225/225A/225B Pilot's Guide	190-01182-00	Garmin International Inc.
34.	Garmin GNC 255A/255B Pilot's Guide	190-01182-01	Garmin International Inc.
35.	Restraint Systems Model 1-10-() Component Maintenance Manual	CMM 25-22-13	Schroth Safety Products GmbH
36.	Garmin G5 Pilot's Guide Part 23 AML STC Maintenance Manual	190-01112-12 190-01112-11	Garmin International Inc.
37.	Garmin G3X Touch Pilot's Guide Part 23 AML STC Maintenance Manual	190-02472-00 190-02472-02	Garmin International Inc.
38.	Sandia SAI-340 Installation Manual	306181-00	Sandia Aerospace Inc.
39.	Bendix King KI 300 Electronic Attitude Indicator Installation Manual	89000004-101	Bendix King Honeywell International Inc.
40.	Andromeda Aurora Installation Manual		Aveo Engineering
41.	Ultra Galactica Installation Manual	AVE-WPST-54G-IM	Aveo Engineering
42.	Parmetheus PAR-36 Plus LED Landing Light STC Manual	14793	Whelen Engineering Company
43.	Garmin GFC500 Autopilot Part 23 AML STC Maintenance Manual	190-02291-01	Garmin International Inc.
44.	Garmin GTX 33X and GTX 3X5 ADS-B Maintenance Manual	190-00734-11	Garmin International Inc.

3. Structure of the Maintenance Manual

The MM has been prepared in accordance with the Air Transport Association (ATA) Specification Number 100 for Manufacturer's Technical Data.

A. Classification of Subject Matter

The MM is divided into 5 major sections. Each of these sections is sub-divided into chapters. A table of contents is provided at the beginning of each MM chapter.

(1)	General	Ch. 05 - 12
(2)	Airframe Systems	Ch. 20 - 37
(3)	Structures	Ch. 51 - 57
(4)	Propeller	Ch. 61
(5)	Power Plant	Ch. 71 - 80

Each chapter is identified by a separator sheet with the chapter number and the title.

B. Page Numbering System

(1) The page numbering system consists of three-element numbers separated by dashes.

The first element identifies a system:
e.g. 27 Flight Controls (a chapter)

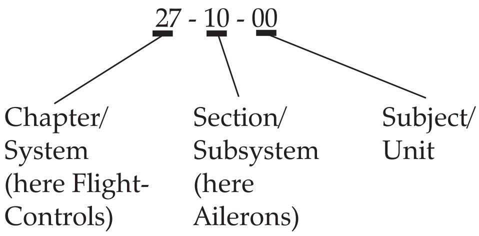
The second element identifis a subsystem in the system:

e.g. 27-30 Elevator (a section)

If the system comprises several subsystems, further sections are added:
e.g. 27 - 31 Elevator Trim Control (a further section)

The last number permits the identification of the individual units in a system or subsystem. However, this number is only used when detailed description of such individual units is required.

Example:



(2) When the chapter/system element number is followed by zeros in the section/subsystem and subject/unit element number (28-00-00), the information is applicable to the entire system.

(3) When the section/subsystem element number is followed by zeros in the subject/unit element number (28-20-00), the information is applicable to subsystem within the system.

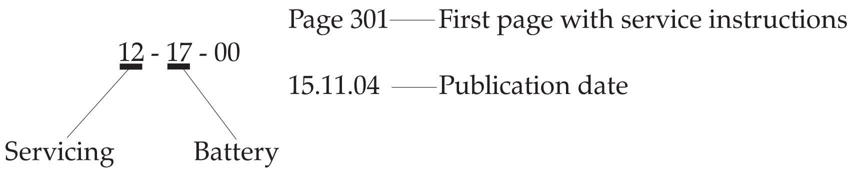
(4) The subject/unit element number is used to identify information applicable to units within the subsystems.

This breakdown of the chapters provides a good overview and facilitates the exchange of revised pages. Since most of the systems are relatively simple, the third element is used only in the more complex systems, i.e. if it appears necessary to describe a unit or device in greater detail.

(5) All maintenance data given in the MM is divided into specific types of information. This facilitates work with the manual. For this purpose, page number blocks are reserved depending on type of information.

Page 1 - 99	Description and Operation
Page 101 - 199	Troubleshooting
Page 201 - 299	Maintenance Practices
Page 301 - 399	Servicing
Page 401 - 499	Removal/Installation
Page 501 - 599	Adjustment/Test
Page 601 - 699	Inspection/Check
Page 701 - 799	Cleaning/Painting
Page 801 - 899	Repairs

Example page number:



(6) Figures are numbered consecutively within each topic.

Example: Fig. 201 1. Illustration for maintenance
Fig. 202 2. Illustration for maintenance etc.

C. Page Order

(1) In the front of the manual:

Title
Table of Contents
Record of Revisions

Record of Temporary Revisions
Highlights of Revisions
Introduction
List of Effective Chapters

(2) Each chapter begins with:

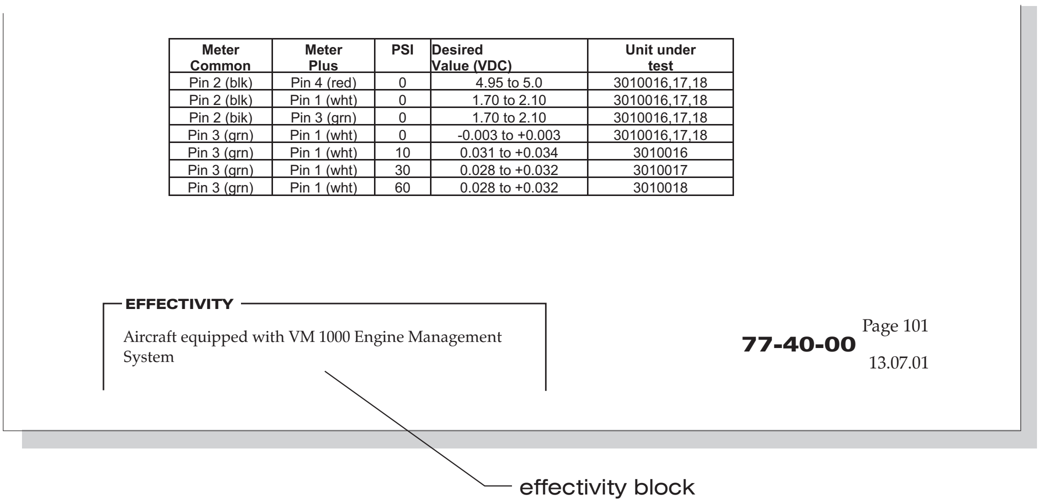
Title
Table of Contents

D. Figures

The figures within the sections of a chapter are numbered in accordance with the appropriate page number block. Numbering begins with one (1) and is continuous.

4. <u>Using the Maintenance Manual</u>

A. To obtain information about a specific system, refer to the list of effective chapters in the front of the manual to find the corresponding chapter number.
In the table of contents of the respective chapter, one then finds more detailed information about the arrangement of material.



Meter Common	Meter Plus	PSI	Desired Value (VDC)	Unit under test
Pin 2 (blk)	Pin 4 (red)	0	4.95 to 5.0	3010016,17,18
Pin 2 (blk)	Pin 1 (wht)	0	1.70 to 2.10	3010016,17,18
Pin 2 (bik)	Pin 3 (grn)	0	1.70 to 2.10	3010016,17,18
Pin 3 (grn)	Pin 1 (wht)	0	-0.003 to +0.003	3010016,17,18
Pin 3 (grn)	Pin 1 (wht)	10	0.031 to +0.034	3010016
Pin 3 (grn)	Pin 1 (wht)	30	0.028 to +0.032	3010017
Pin 3 (grn)	Pin 1 (wht)	60	0.028 to +0.032	3010018

EFFECTIVITY

Aircraft equipped with VM 1000 Engine Management System

77-40-00 Page 101
13.07.01

Effectivity Block
Figure 1

B. Effectivity

This maintenance manual is "customized". It includes the following effectivity identification system to show modification and/or configuration differences.

(1) The MM starts with a list of effective chapters. Each chapter is listed with date of issue or revision.

(2) To identify the aircraft an effectivity statement (i.e. Garmin Avionics) or a six-digit numeric indicator is shown in the effectivity column in the table of contents if applicable.
   (a) The six-digit numeric indicator begins with the last three digits of the lowest assigned number, to indicate first effectivity, and ends with the last three digits of the highest assigned number, to indicate last effectivity, of an unbroken sequence of assigned numbers. A hyphen is shown between the numbers. Open ended effectivity is indicated by "999" in the last effectivity if applicable. For example: 023-999 indicates aircraft 023 and subsequent.

(3) Effectivity Block
The system provides further direct annotation of applicability on the pages. On pages not applicable for all aircraft, an effectivity block appears at the bottom left-hand corner. Effectivity identification may be a six-digit numeric indicator (ref. to (2)(a)) or an effectivity statement (refer to figure 1).
The information on that page applies only to the aircraft noted in the effectivity block.

<u>NOTE:</u> Pages with no effectivity block may be followed by pages with effectivity blocks and vice versa and have identical page numbers.

C. Revisions

(1) Maintenance manual revisions, caused by variety of reasons (regulation changes, technical changes, typographical errors, etc.), will be published regularly.

Revision notification contains a note explaining the revision along with:

- the revised manual chapters
- the reason of revision
- the affected aircraft serial numbers

(2) Should a revision be urgently required between regular updating, a temporary revision will be issued. The relevant pages are yellow and will usually be incorporated in the next scheduled revision of the maintenance manual.

(3) Identifying revised material
   (a) Revisions and/or additions will be identified by a vertical black line (revision bar) in the outer margin of the page opposite the text/illustration that has been changed.
   (b) When technical changes result in unaltered texts slipping on to a different page, a revision bar will be placed in the outside margin, opposite the chapter/section/subject, page number and date of all affected pages, providing no other revision bar appears on the page.

(4) Incorporating revisions into the manual
  (a) In order to keep track of revisions and to facilitate the use of the manual, a revision always affects the entire chapter, i.e. all pages of a chapter have the same date of issue or revision and the entire chapter is replaced during a revision.
  (b) MM revisions contain an effectivity page. Chapters to be removed or inserted are listed in sequence and assigned with the respective action.
  Incorporation of revisions into the manual must be documented in the record of revisions at the front of the MM.
  (c) Temporary revisions are issued as single pages and must be incorporated according to the notes on the effectivity page delivered with the revision. They become invalid and must be removed when the corresponding permanent revision is issued.

D. WARNINGS, CAUTIONS and NOTES

When carrying out maintenance on the aircraft, general safety and maintenance rules should always be observed.
In addition, the MM contains warnings, cautions and notes to highlight or emphasize important and critical instructions.

WARNING:

Hazard for maintenance personnel!

CAUTION:

Hazard for systems and equipment!

NOTE:

Specific information

E. Abbreviations

Where it appears reasonable, abbreviations are used. They conform to recognized standards.

LIST OF EFFECTIVE CHAPTERS

Chapter Title		Date*
GENERAL		
	Table of Contents	01.02.23
	Introduction	01.02.23
04	Airworthiness Limitations	28.02.20
05	Time Limits / Maintenance Checks	01.02.23
06	Dimensions and Areas	05.03.21
07	Lifting & Shoring	28.02.20
08	Leveling and Weighing	28.02.20
09	Towing and Taxiing	28.02.20
10	Parking, Mooring, Storage & Return to Service	30.04.13
11	Placards and Markings	01.02.23
12	Servicing	01.06.22
AIRFRAME SYSTEMS		
20	Standard Practices Airframe	09.10.18
21	Ventilation and Heating	30.04.13
22	Auto Flight	01.02.23
23	Communications	30.04.13
24	Electrical Power	01.02.23
25	Equipment and Furnishings	28.02.20
27	Flight Controls	05.03.21
28	Fuel	01.02.23
31	Indicating/Recording Systems	01.02.23
32	Landing Gear	01.06.22
33	Lights	01.06.22
34	Navigation	01.02.23
STRUCTURES		
51	Structures	29.02.16
52	Doors	30.04.13
53	Fuselage	30.04.13
55	Stabilizers	30.04.13
56	Windows	30.04.13
57	Wings	10.06.16
PROPELLER		
61	Propeller	28.02.20

LIST OF EFFECTIVE CHAPTERS

Chapter Title		Date*
POWER PLANT		
71	Power Plant	28.02.20
74	Ignition	09.10.18
75	Cooling System	28.02.20
76	Engine Controls	28.02.20
77	Engine Indicating	01.02.23
78	Exhaust	28.02.20
79	Oil	28.02.20
80	Starting	30.04.13
91	Charts and Wiring Diagrams	24.10.13

* The date refers to the issue / revision date of the respective chapter.

The technical content of this document (revision A.12) is approved under the authority of the DOA ref. EASA.21J.025.

01.02.23

AQUILA Head of Airworthiness

Date, Signature Office of Airworthiness

CHAPTER 4

AIRWORTHINESS LIMITATIONS

RECORD OF REVISIONS - CHAPTER 4

Revision Number	Date of Revision	Reason for Revision	Approval Reference
A.01	30.04.13	Initial issue	EASA Major Change Approval 10045112
A.02	24.10.13	FAA validation	
A.03	02.03.15	Life time limit / 6000h inspection	EASA Major Change Approval 10052527
A.04	28.02.20	New model AT01-200	EASA Major Change Approval 10072382

TABLE OF CONTENTS

AIRWORTHINESS LIMITATIONS - GENERAL

1. Introduction

This chapter gives information on mandatory replacement times of structural parts and components and on inspection periods for the airframe structure of the aircraft.
All mandatory limitations listed have been determined by the airframe manufacturer.
Compliance with the specified times and intervals is mandatory for maintaining the airworthiness of the aircraft.

THE AIRWORTHINESS LIMITATIONS CHAPTER IS APPROVED AND VARIATIONS MUST ALSO BE APPROVED BY EUROPEAN AVIATION SAFETY AGENCY (EASA) IN ACCORDANCE WITH THE APPLICABLE CERTIFICATION PROCEDURES AND THE TYPE CERTIFICATION BASIS.

AT01-100 ONLY: THE AIRWORTHINESS LIMITATIONS CHAPTER IS FAA APPROVED AND SPECIFIES MAINTENANCE REQUIRED UNDER SECS. 43.16 AND 91.403 OF THE FEDERAL AVIATION REGULATIONS UNLESS AN ALTERNATIVE PROGRAM HAS BEEN FAA APPROVED.

For possible airworthiness limitations of engine, propeller, components and vendor equipment refer to the applicable maintenance data as listed in the “Introduction” chapter of this manual.

2. Airworthiness Limitations

A. Life Time Limit

The airframe of the AQUILA AT01 is limited to **6000 h** of flight time.

An inspection program to reach an extension of replacement time can be obtained from AQUILA Aviation.

NOTE: The life time limit of 6000 h of flight time will be kept for all models listed in the data sheet. For all S/N’s having performed the 6000 h inspection program and possible maintenance actions resulting thereof, no further life time limit beyond 6000 operating hours will be established. The aircraft is then considered to have “Safe Life”.

B. Component and System Checks

The following table lists maintenance and checks that have to be carried out at the specified intervals. Where an interval is given in both flight time and calendar time, the limit which is reached first must be applied.

No.	Component / Maintenance Requirement	Reference	Interval		Initials
			100h	other	
1.	Battery BAT 2 - Replace additional alternator 2 battery (BAT 2).			annual[1]	

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[1] AT01-200 only.

C. Replacement Requirements
The aircraft components listed below are life limited and must be replaced/overhauled at a specific time. Where an interval is given in both flight time and calendar time, the limit which is reached first must be applied.

Chapter	Component / Part	Replacement Time	Overhaul
24	Battery BAT 2[1)]	1 year	no

D. Outside Painting of the Airframe
All structural parts which are exposed to direct vertical sunlight and listed in the table below have to be painted WHITE, excepting areas provided for registration marks, warnings and approved designs. This will prevent the temperature of the structure from becoming too high.

P/N	Component / Part
AT01-2100-001	Fuselage AT01-100 (incl. vertical stabilizer and rudder)
AT01-2100-031	Fuselage AT01-200 (incl. vertical stabilizer and rudder)
AT01-2130-001	Upper cowling AT01-100
AT01-2130-017	Upper cowling AT01-200
AT01-3000-001	Horizontal stabilizer (incl. elevator)
AT01-4000-001	Wing (incl. flaps and ailerons)

For aircraft registered in the USA or countries where the FAA-TC has been accepted, the approved coating / shade is Cromax Imron Fleet Line Elite Topcoat / RAL 9016 (PT101).
Before painting the aircraft with a different coating AQUILA Aviation must be contacted.

For aircraft registered in Europe or countries where the EASA-TC has been accepted, the approved shade is RAL 9016.

[1)] AT01-200 only.

CHAPTER 5

TIME LIMITS / MAINTENANCE CHECKS

TABLE OF CONTENTS

TIME LIMITS / MAINTENANCE CHECKS - GENERAL

1. Introduction

A. This chapter provides scheduled and unscheduled maintenance checks and inspections, recommended by the type certificate holder as well as the time limits for service life limited components and parts.

2. General Description

In the following, a brief description and intended purpose of each section of this chapter is given.

A. Section 05-00-00 - Time limits / Maintenance Checks - General. This section provides a general overview of the content and purpose of this chapter.

B. Section 05-10-00 – Component Time Limits. This section contains the time limits of all service life limited components and parts and recommended time between overhaul (TBO) for components.

C. Section 05-20-00 - Scheduled Maintenance Checks. This section contains information about recommended scheduled maintenance and inspections. The recommended maintenance and inspection program for the systems and components as well as the relevant intervals are embodied in a checklist included in this section.

D. Section 05-30-00 - Daily Inspections. In this section pre-flight and post-flight checks are described, that have to be carried out every day the aircraft is in operation.

E. Section 05-50-00 - Unscheduled Maintenance Checks. This section specifies checks, which have to be conducted after unusual events and incidences such as hard landings.

COMPONENT TIME LIMITS

1. General

   A. Different components and parts of the aircraft are certified for specific service life. When reaching this time limit, the respective item must be replaced or overhauled.
   In order to monitor permissible service life the installation or removal of each item must be recorded in the aircraft logbook.
   Where an interval is given in both flight time and calendar time, the limit which is reached first must be applied.

2. Component Time Limits

   A. Under certain circumstances the replacement or overhaul of components may be required before the time limits listed below are reached.

   B. Replacement or overhaul time limits, recommended by the type certificate holder:

Chapter	**Component / Part**	**Replacement Time**	**Overhaul**
24	Ignition lock	6000 h	no
24	Starter relais	2000 h	no
24	Battery BAT 2[4]	1 year	no
27	Elevator control rods incl. rod ends	6000 h	no
27	Rudder control cables	6000 h	no
27	Control surface plain bearing bushings	6000 h	no
28	Electrical AUX fuel pump	3000 h or 10 years	no
28	Flexible rubber hoses of the fuel pump assembly[4]	5 years	no
32	Nose landing gear spring package rubber elements	5 years	no
32	Main landing gear struts	no	6000h
32	Flexible teflon hoses of the brake system[1]	2000 h or 15 years	no

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[1] Beringer wheel and brake system only
[4] AT01-200 only

Chapter	Component / Part	Replacement Time	Overhaul
32	Flexible rubber hoses of the brake system[2)]	10 years	no
55	Lower rudder hinge bracket	6000 h	no
57	Wing attachment bolts	6000 h	no
71	Flexible teflon hoses of the oil / fuel system[5)]	2000 h or 15 years	no
71	Flexible hoses of the cooling system	5 years	no
71	Flexible silicone hoses of the air intake system[4)]	2000 h or 15 years	no
71	AQUILA engine mount and attachment bolts	6000 h	no
71	Engine shock mounts and attachment bolts	with engine overhaul	no
76	Wastegate control Bowden cable wire[4)]	2000 h	no
76	Engine / propeller control Bowden cable wires	2000 h	no

C. Vendor Established Component Time Limits

Chapter	Component / Part	Replacement Time	Overhaul
25	ELT battery	Note 1	no
25	Fire extinguisher Air Total	10 years	Note 4
25	Fire extinguisher H3R	12 years	no
32	Brake caliper pistons and rubber seals[1)]	3000 h or 5 years	no
34	WINTER instruments	no	Note 5
34	ASPEN internal battery	2200 h or 4 years	no

[1)] Beringer wheel and brake system only
[2)] Cleveland / Grove wheel and brake system only
[4)] AT01-200 only
[5)] Hoses that are not covered by the engine type certificate (TC)

Chapter	Component / Part	Replacement Time	Overhaul
61	Propeller MTV-21-A/170-05[3)] MTV-21-A/175-05[4)]	no	2000 h or 6 years Note 2
61	Propeller governor P-850-12	no	2400 h or 6 years Note 2
71	Engine ROTAX 912S[3)]	no	2000 h or 15 years Note 3
71	Engine ROTAX 914F[4)] (incl. TCU, wiring harness, wastegate motor)	no	2000 h or 15 years Note 3
71	ROTAX 912S mechanical MAIN fuel pump[3)]	5 years Note 3	no
71	ROTAX 914F electrical MAIN fuel pump[4)]	1000 h or 5 years	no
71	ROTAX flexible teflon hoses of the fuel system	with engine overhaul Note 3	no
71	ROTAX rubber parts of the engine (V-belt, hoses, carburetor parts)	5 years Note 3	no
71	Spark plugs	400 h[3)] / 200 h[4)] Note 3	no

NOTES:

Note 1: Refer to manufacturer instructions for battery replacement time limits.

Note 2: Refer to latest issue of the mt-propeller Service Bulletin No. 1.-( ), and to the mt-Propeller E-124 Operation and Installation Manual.

Note 3: Refer to the latest issues of BRP-Rotax, i.e. Service Bulletins, Service Information and to the ROTAX Aircraft Engines Maintenance Manual for ROTAX Engine Type 912 Series respectively Type 914 Series.

Note 4: Refer to manufacturer instruction for overhauling.

Note 5: Though there is no TBO for these instruments, the manufacturer Gebr. Winter GmbH & Co. KG recommends that airspeed indicators and altimeters are subjected to retesting after 5 years.

[3)] AT01-100 only
[4)] AT01-200 only

SCHEDULED MAINTENANCE CHECKS

1. General

A. The inspection time intervals chart contained in this chapter shows the recommended intervals at which maintenance and maintenance checks should be carried out on the aircraft.

Annual inspections and 100 hour inspections on the AQUILA AT01 must include all inspection items as required by FAR 43, Appendix D, "Scope and detail of annual/100h inspections". Chapter 4 "Airworthiness Limitations" of this manual defines the inspection intervals for continued airworthiness.

B. If an aircraft is being operated under unusual environmental conditions, maintenance intervals may be reduced.

2. Inspection Time Intervals Chart

A. The maintenance and checks listed are to be carried out at the specified intervals and documented appropriately.

NOTE: For new aircraft and new engines the first check is carried out after 25 hours and should be of the extent of a 100-hour inspection. For new engines only an engine ground run and the checks listed in the "Engine" section have to be carried out.

NOTE: If more than 30% of operation hours have been flown with leaded fuel (e.g. AVGAS 100LL), an additional 50-hour inspection is necessary (refer to ROTAX Aircraft Engines SI-912-016 respectively SI-914-019).

NOTE: Where an interval is given in both flight time and calendar time, the limit which is reached first must be applied. The next interval starts with the flight time and calendar time of the latest performed maintenance check.

B. For intervals between maintenance work, the following tolerances must not be exceeded:

Interval	**Tolerance**
up to and including 100 h	10% of interval
>100 h up to and including 1000 h	5% of interval
>1000 h	50 h
calendar time limits	30 days

These tolerances must not be added up. For example: if the 100-hour inspection was done at 107 h, the next inspection must be done at 200±10 h, not 207±10 h.

If an inspection is carried out earlier than allowed by the specified tolerance, all subsequent inspection intervals are counted from that inspection. For example: If the 100 h inspection was done at 87 h, the next inspection must be done at 187±10 h.

C. Due to recent ROTAX publications the maintenance checks given for the ROTAX engine may not be up to date. Refer to the latest revisions of ROTAX Engine Type 912 Series respectively Type 914 Series Maintenance Manual and Service Bulletins.

D. Due to the multiplicity of equipment coming onto the market, no maintenance instructions are given for electronic equipment. For information on a certain component use the documentation provided by the manufacturer of this component.

NOTES:		
	R912*	Maintenance Manual for ROTAX Engine Type 912 Series
	R914*	Maintenance Manual for ROTAX Engine Type 914 Series
	MT*	mt-Propeller E-124 Operation and Installation Manual
	TTSN	Total Time Since New
	TTSO	Total Time Since Overhaul

E. Inspection Time Intervals Chart:

Aircraft S/N		Operating Hours		Registration Number	
Engine S/N		Operating Hours TTSN / TTSO:		Date	
Propeller S/N		Operating Hours TTSN / TTSO:		Type of Inspection	

No.	Pre-Inspection / Engine Ground Test	Reference	Interval		Initials
			100h	other	
1.	Check that the following documents are up-to-date and available upon request: - AT01-100/200 Maintenance Manual - AT01-100/200 Airplane Flight Manual - Aircraft Log Book and required certificates - Engine and Propeller Log Books - Equipment List and Weight and Balance Record - Airworthiness Directives - Service Bulletins and Service Information - Services Time Record	AT01-100/200 Maintenance Manual, AT01-100/200 Airplane Flight Manual	X		
2.	Airworthiness Directives - Verify all Airworthiness Directives have been complied with.		X		
3.	Service Letters, Service Bulletins, and Service Information - Verify all AQUILA GmbH and suppliers Service Letters, Service Bulletins and Service Information have been complied with.		X		
4.	Service time records, equipment list and weight and balance records - Check. Update if necessary.		X		
5.	Aircraft file and technical documentation - Verify complete and in proper order.		X		

No.	Pre-Inspection / Engine Ground Test (Cont.)	Reference	Interval		Initials
			100h	other	
6.	Engine and engine compartment - Clean for leakage check.	R912* 12-20-00 R914* 12-20-00	x6)		
7.	Perform an engine test run as follows: Start engine and warm-up at 820 RPM for approx. 2 minutes, continue at 1030 RPM, duration depends on ambient temperature until oil temperature reaches 50° C.	R912* 12-20-00 R914* 12-20-00	x6)		
	Rudder pedal brakes and parking brake - Check for proper operation.	32-40-00			
	Propeller governor - Set 1700 RPM and monitor manifold pressure. Reduce engine speed by moving the propeller control by 200 RPM. Note the RPM drop and manifold pressure. Increase RPM to 1700 RPM. Repeat three times.	MT*			
	RPM drop: _______RPM / Man. press :_______in. Hg				
	Engine instruments - Check engine parameters.				
	Magneto RPM drop - Set 1700 RPM. Check that RPM drop is less than 120 RPM3) / 210 RPM4) while operating on one magneto and no more than a 50 RPM3) / 65 RPM4) drop difference between left and right magnetos.	SI-914-034			
	RPM drop left magneto :_______RPM RPM drop right magneto:_______RPM				
	Carburetor heat - Pull knob at 1700 RPM. Engine RPM should show a drop of at least 20 RPM3). Carburetor temperature should show a rise of at least 2 °C4).				
	RPM drop3):_______RPM / Temperature rise4):_______°C				
	Alternator ALT2 check4) - Switch ALT1 OFF. Ammeter ALT2 should show more than 5A.				
	Battery BAT2 check4) - Switch ALT1/BAT OFF. Voltmeter should be stable at 13,0 - 13,9V.				
	Alternator ALT1 check4) - Switch ALT1/BAT ON again. Ammeter ALT1 should show more than 5A. Ammeter ALT2 should show 0A.				
	Engine full power - Advance throttle to full forward. Tachometer should read 2350 ±15 RPM.				
	Full power RPM:_______RPM				
	Engine idle - Move throttle control lever to full aft. Tachometer should read 750 +50 RPM.				
	Idle RPM:_______RPM				
	Cool down engine below 1000 RPM (at least 2 min4)). Shut down engine, set the ignition switch and the master switch to the OFF position. Remove ignition key from aircraft.				

3) AT01-100 only
4) AT01-200 only
6) Check has to be carried out every 100 hours of operation or 12 month, whichever comes first.

No.	Pre-Inspection / Engine Ground Test (Cont.)	Reference	Interval		Initials
			100h	other	
8.	Airframe, power plant, propeller - Do a walk around to detect damages, fluid leaks or other abnormalities.		X6)		
9.	Fuselage and empennage - Clean.		X		
10.	Aircraft interior - Clean and vacuum.		X		
11.	Record all malfunctions and abnormalities.		X		
12.	TCU protocol - Read out TCU via Rotax communication program. Check alarm records. TCU S/N:_____________Hours of Operation:___________	76-00-00 Rotax Heavy MM 76-00-00 3.1.1)	X4)		

4) AT01-200 only

6) Check has to be carried out every 100 hours of operation or 12 month, whichever comes first.

No.	Engine	Reference	Interval 100h	 other	Initials
1.	Engine cowling - Remove engine cowling. Check for cracks, overheated areas, deformation, loose or missing fasteners. Check condition of fire protect paint and heat resistance shielding.		X		
2.	Engine oil change - Remove oil drain screw from oil tank. Drain old oil and dispose in accordance with environmental regulations.	12-12-00 R912* 12-20-00 R914* 12-20-00	X[6]	50 h[7]	
3.	Oil tank - Check oil tank and clean if contaminated.	R912* 12-20-00 R914* 12-20-00	X[6]	50 h[7]	
4.	Oil filter - Remove old oil filter from engine and install new oil filter. Lubricate mating sealing ring of new oil filter with engine oil. Tighten new oil filter by hand. Cut open old oil filter without producing any metal chips and inspect filter mat, filter cover, sealing lip, spring of bypass valve (small) and positioning spring (large) for particles, wear and missing material. Findings:____________________	12-12-00 R912* 12-20-00 R914* 12-20-00	X[6]	50 h[7]	
5.	Turbocharger oil sump - If SI-914-039 / SB-AT01-043 has been carried out: Inspect and clean screen in turbo oil sump. Else: Remove turbocharger oil return line and oil sump. Check for build-up of oil carbon. Clean if necessary. Reinstall oil line and sump.	R914* 12-20-00 SI-914-039 SB-AT01-043 Rotax Heavy MM 78-00-00 / 79-00-00	X[4,6]	50 h[4,7]	
6.	Oil change - Renew gasket ring of drain screw on oil tank. Tighten drain screw to 25 Nm (221 in.lbs). Refill oil tank with approx. 3 liters of oil. For oil quality, see Operators Manual and SI-912-016 respectively SI-914-019. Refilled:_____________Quantity:_______L CAUTION: DO NOT USE AIRCRAFT ENGINE OIL. Due to the friction clutch and the high stresses in the reduction gear 4-stroke motor cycle oils are recommended. For suitable lubricants and oil change intervals, see ROTAX Operators Manual and latest appropriate ROTAX publications.	12-12-00 R912* 12-10-00 R914* 12-10-00 R912* 12-20-00 R914* 12-20-00 SI-912-010 SI-914-011 SB-912-040 SB-914-026	X[6]	50 h[7]	
7.	Visual inspection of the magnetic plug for accumulation of chips	R912* 12-20-00 R914* 12-20-00	X[6]		
8.	Check compression by differential pressure method. Test pressure: 6 bar (appr. 6000 hPa / 87 psi) Pressure drop: max. 25% Cyl. 1 2 3 4 Pressure drop: _____ _____ _____ _____	R912* 12-20-00 R914* 12-20-00	X[7]	200 h	

[4] AT01-200 only
[6] Check has to be carried out every 100 hours of operation or 12 month, whichever comes first.
[7] If more than 30% of operation hours have been flown with leaded fuel e.g.: AVGAS 100LL

No.	Engine (Cont.)	Reference	Interval		Initials
			100h	other	
9.	Cooling air ducts, engine baffling and cylinder cooling fins - Check for obstructions, cracks, wear and general condition. Check for signs of abnormal temperatures. Check crankcase for cracks.	R912* 12-20-00 R914* 12-20-00 SB-912-029 SB-914-018	x 6)		
10.	Leakage bore at the base of the water pump - Check for signs of leakage.	R912* 12-20-00 R914* 12-20-00	x 6)		
11.	Cooling system - Renew coolant. Flush the cooling system.	12-14-00 R912* 12-20-00 R914* 12-20-00		3 years	
12.	Coolant hoses and lines - Check for damage, leakage, hardening due to heat, porosity, loose connections and secure attachments. Check routing for kinks and narrow bends.	75-00-00 R912* 12-20-00 R914* 12-20-00	x 6)		
13.	Coolant expansion tank - Check for damage and abnormalities. Inspect rubber protection plate on tank base for secure fit. Check coolant level, replenish as necessary. Check gasket of tank cap, inspect pressure control valve, and return valve. The pressure control valve opens at 1,2 bar (18 psi). Check coolant with densimeter or glycol tester.	75-00-00 R912* 12-10-00 R914* 12-10-00 R912* 12-20-00 R914* 12-20-00 SB-912-043 SB-914-029	x 6)		
14.	Overflow bottle - Inspect for damage and abnormalities. Verify coolant level, replenish as necessary. Inspect venting bore in cap of overflow bottle for clear passage. Check line from exp. tank to overflow bottle for damage, leakage and clear passage.	75-00-00 R912* 12-10-00 R914* 12-10-00 R912* 12-20-00 R914* 12-20-00	x 6)		
15.	Oil and coolant radiator - Check for obstructions, leaks and security of attachment. If necessary, clean cooling fins and do a pressure leakage test.	75-00-00 79-20-00	x 6)		
16.	Oil lines - Inspect for damage, leakage, hardening due to heat, porosity, security of connections and attachments. Check routing for kinks or narrow bends. Check fire protection shielding. Check steel oil lines for cracks and scuffing marks.	R912* 12-20-00 R914* 12-20-00	x 6)		
17.	Oil tank vent line - Check for proper routing, for obstructions and clear passage		x 6)		
18.	Fuel lines - Check for damage, leakage, hardening due to heat, porosity, secure connections and attachments. Check routing for kinks or narrow bends. Check metal fuel lines for cracks and scuffing marks.	R912* 12-20-00 R914* 12-20-00	x 6)		
19.	Fuel selector / shut-off valve - Check for security of attachment. Check that the valve engages noticeable into the positions LEFT, RIGHT and OFF.		x 6)		
20.	Fuel filter - Inspect and clean.	28-20-00	x 6)		
21.	Electric fuel pumps - Check the electric fuel pumps. Replace MAIN fuel pump.	28-20-00 Rotax Heavy MM 73-00-00 3.4.6)		1000 h 4) 5 years 4)	

4) AT01-200 only
6) Check has to be carried out every 100 hours of operation or 12 month, whichever comes first.

No.	Engine (Cont.)	Reference	Interval		Initials
			100h	other	
22.	Battery - Clean. Check charge. Measure residual capacity. Residual capacity (C10) must be at least 19,2 Ah 3,8) / 25,6 Ah 4). If necessary, charge/replace battery.	12-17-00 24-30-00	x6)		
23.	Battery BAT 2 - Replace additional alternator 2 battery (BAT 2).	SI-AT01-018		annual4)	
24.	Battery BAT 2 - Check fuses of rectifier-regulator installation.	24-20-00	x4)		
25.	Battery tray, terminals and cables - Check for security, corrosion and general condition. Grease battery terminals.	12-22-00	x6)		
26.	Starter - Check security of attachment and electrical connections.		x6)		
27.	Alternator - Check attachment and V-belt tension. Inspect electrical connections.	R912* 12-20-00 R914* 12-20-00	x6)		
28.	Spark plugs - Remove all spark plugs, check for spark plug defects (deposits, excessive wear, melting). Clean spark plugs and check electrode gap. Replace as required.	R912* 12-20-00 R914* 12-20-00 SI-912-027 SI-914-028	x6)		
29.	Spark plug connectors - Check that resistance spark plug connectors fit tightly on the spark plugs. Minimum pull-off force is 30 N (7 lb).	R912* 12-20-00 R914* 12-20-00 SI-912-027 SI-914-028		200h	
30.	Spark plugs - Replace spark plugs	Rotax 912: 200h7) / 400h Rotax 914: 100h7) / 200h			
31.	Sensors - Check for tight fit, condition and security of attachment.		x6)		
32.	Exhaust system - Check attachment screws and springs for security and fit. Inspect system for damage and missing parts. Visual inspection of the muffler, turbo charger4), exaust pipes and mounting flanges for cracks, corrosion and leakage. Check heat shielding for condition.		x6)		
33.	Cabin heat - Check heat shroud and heat ducts for damage and security of attachment. Check heat control function.		x6)		
34.	Exhaust muffler - Remove heat shroud from muffler and inspect muffler for condition, corrosion and leakage. WARNING: FAILURE TO INSPECT MUFFLER FOR LEAKS COULD RESULT IN CARBON MONOXIDE ENTERING THE CABIN, LEADING TO SERIOUS INJURY OR DEATH!	78-10-00		200h	
35.	Wastegate flap - Check the wastegate flap for free running and correct position. Check wastegate Bowden cable for free movement and damage. Lubricate wastegate flap axle.	R914* 12-20-00	x4,6)		

3) AT01-100 only
4) AT01-200 only
6) Check has to be carried out every 100 hours of operation or 12 month, whichever comes first.
7) If more than 30% of operation hours have been flown with leaded fuel e.g.: AVGAS 100LL
8) N/VFR equipped aircraft only

No.	Engine (Cont.)	Reference	Interval		Initials
			100h	other	
36.	Propeller gear box - Check the friction torque in free rotation. Actual friction torque is measured: _________Nm	R912* 12-20-00 R914* 12-20-00	x[6]		
37.	Propeller gear box - Inspect overload clutch.	R912* 05-50-00 R914* 05-50-00		600h[7,13] 1000h	
38.	Propeller gear box - Check the propeller gearbox. Check gear set (pittings). Check wear on tooth of overload clutch.	R912* 12-20-00 R914* 12-20-00 Rotax Heavy MM 72-00-00		1000h	
39.	Carburetors - Check carburetor synchronization. Mechanical and pneumatic synchronization.	R912* 12-20-00 R914* 12-20-00	x[6]		
40.	Carburetors - Inspect the float chamber assy for contamination and corrosion. Check float weight. CAUTION (Rotax 914 only): High torques on the float chamber attachment screw may damage the float chamber gasket and cause rough engine run.	R912* 12-20-00 R914* 12-20-00 SI-912-021 SI-914-023		200h annual	
41.	Carburetors - Check the ventilation of the float chambers. Any trouble with float chamber ventilation impairs engine and carburetor function and must therefore be avoided. Check that the passage of the ventilation lines is free and that no kinks can arise.			200h	
42.	Carburetors - Removal/assembly of the two carburetors for carburetor inspection.	Rotax Heavy MM 73-00-00 3.1)		200h	
43.	Carburetors - Check the free movement of the carburetor actuation (throttle lever and starting carburetor). Check that the Bowden cable allows full travel of the throttle lever from stop to stop. Check Bowden cables for bulging with control lever in the full throttle position. Adjust throttle control if necessary. Lubricate carburetor throttle shaft.	R912* 12-20-00 R914* 12-20-00 76-00-00 12-22-00	x[6]		
44.	Carburetor sockets and drip tray - Inspect the carburetor sockets for damage and abnormalities, check for cracks, wear and good condition. Take note of any changes caused by temperature.	Rotax Heavy MM 73-00-00 3.4.3) SB-912-030 SB-914-019		200h	
45.	Airbox assy - Check for damage, security of attachment and condition. Inspect connected air hoses for condition and leakage. Check that the flaps can be moved through their full arc of travel for hot and filtered ram air.[3]		x[6]		
46.	Air filter - Inspect and clean. Renew if necessary. Clean air filter casing. Check the drain hole at the bottom of casing for obstructions or blockage.	R912* 12-20-00 R914* 12-20-00	x[6]		

[3] AT01-100 only

[6] Check has to be carried out every 100 hours of operation or 12 month, whichever comes first.

[7] If more than 30% of operation hours have been flown with leaded fuel e.g.: AVGAS 100LL

[13] Overload clutch without lead drain holes (P/N 996886) only

No.	Engine (Cont.)	Reference	Interval		Initials
			100h	other	
47.	Intercooler and turbo-charging system - Check intercooler for condition, obstructions, leaks and security of attachment. Check hoses and lines for damage, leakage, hardening due to heat, porosity, loose connections and secure attachments. Check drain line for clear passage, kinks and narrow bends.		X4,6)		
48.	Carburetor heat valve and intercooler cover - Check valve and intercooler cover for correct function and condition.		X4,6)		
49.	Other external engine accessories - Inspect screws and nuts of all other external engine parts and accessories for tight fit. Inspect safety wiring if applicable, replace as necessary.		X6)		
50.	Engine mounts (manufactured by ROTAX and AQUILA) - Check mounts for deformation, cracks, corrosion, security and damage from heat. Check mounting bolts for condition and correct torque value. At shock mounts (4 bolts M10): 25 Nm (221 in.lbs) At firewall (4 bolts M10): 30 Nm (266 in.lbs) Inspect shock mounts for deterioration.	R912* 12-20-00 R914* 12-20-00 SB-912-028 SB-914-016 SB-AT01-022	X6)		
51.	Engine test run - Attach cowling and perform an engine test run as described above. After engine test run, re-tighten oil filter by hand and examine engine and engine compartment for signs of leakage. Compare results with first engine test run. Check oil level, replenish as necessary.	05-20-00 R912* 12-20-00 R914* 12-20-00	X6)	50h7)	

4) AT01-200 only
6) Check has to be carried out every 100 hours of operation or 12 month, whichever comes first.
7) If more than 30% of operation hours have been flown with leaded fuel e.g.: AVGAS 100LL

No.	Propeller	Reference	Interval 100h	 other	Initials
1.	Spinner - Remove from aircraft and check for delamination and cracks.	61-10-00	X		
2.	Spinner plate - Check for cracks and fit.		X		
3.	Blade root and hub area - Examine for oil and grease leaks.		X		
4.	Propeller blades - Check blade play (up to 3 mm [1/8 in.] allowed).		X		
5.	Propeller blades - Check blade angle play. (max. 2°)		X		
6.	Hub - Inspect outside condition of the hub and parts for cracks, corrosion and deterioration.		X		
7.	Check nuts for low pitch - Inspect for tightness and safety wire.		X		
8.	Propeller assy - Check safetying.		X		
9.	Propeller flange stop nuts - Check correct torque value (45 - 47 Nm [398 - 416 in.lbs]).		X		
10.	Propeller blades - Visual inspection for damage, repair if necessary. Attach spinner.	MT* 6.2) - 6.10)	X		
11.	Propeller governor - Visually inspect for signs of oil leakage. Check bolts and nuts are tightened properly and safety wired. Check governor actuation for free movement and bulging.	61-20-00	X		

No.	Fuselage / Cabin	Reference	Interval		Initials
			100h	other	
1.	Prepare aircraft for visual checks: Remove cabin carpets and floorboards; Remove glare shield; Remove baggage compartment floorboard; Remove access panel of the baggage compartment bulkhead; Remove access panels 210AB and 210BB[4].	06-30-00	X		
2.	Fuselage shell / structure - Visual inspection for paint coat damage, dents, cracks, holes, distortion and other evidence of failure. All unpainted parts for delamination (white spots). Check frames for delamination, cracks and disbonding.	SB-AT01-038	X		
3.	Lower fin - Inspect fin and lower rudder for signs of breakage. Check skid plate for wear.		X		
4.	Canopy - Examine the acrylic glass for cracking, crazing and general condition. Inspect tubular canopy hinge frame and brackets for cracks, distortion, corrosion, wear, and security of attachment. Check the gas spring strut for sufficient power and evidence of leakage.		X		
5.	Canopy locking - Check the canopy locking mechanism operates correctly. Check wear of parts. Check existence of the locking pin. The pin has to protrude the cover by approx. 2 mm. Cases of lacking locking pins have to be reported to the type certificate holder (contact information: see cover sheet). Check function of the locking pin. The canopy locking mechanism must not be too smooth-running. In the locked position of the latch, a smooth running release of the latch due to in-flight vibrations must not be possible. If necessary, readjust locking pin.	52-10-00	X		
6.	Lubricate canopy lock assembly.	12-22-00		annual	
7.	Baggage door - Check door seal, door latching mechanism, and door hinge for defects and condition. Lubricate if needed. Inspect door structure for cracks or other damage.	12-22-00	X		
8.	ELT - Perform ELT inspection. Check ELT mount and Velcro strap for security of attachment. Replace strap if necessary.	25-62-00		annual	
9.	Seat belts/harnesses for pilot / co-pilot - Check components for completeness of the label, deformation, cracks, fractures, functioning of moveable parts, corrosion, surface finish condition and security of attachment. Check textile components for damaged stitching, injurious marks, broken fabric threads, chafe marks and fusing. Perform functional check of buckle and inertia reel.		X		
10.	Seats - Check security of attachment of the seat assy to aircraft structure. Check operation of seat adjustment mechanism and seat stops. Inspect gas spring struts for oil leakage or other damage.		X		
11.	Seats - Check ease of movement - if required remove seats, clean and lubricate seat rails.	25-10-00		annual	

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[4] AT01-200 only

No.	Fuselage / Cabin (Cont.)	Reference	Interval		Initials
			100h	other	
12.	Center Console - Visually examine the parts of the engine controls, lines and cables, located in the center console.			annual	
13.	Engine and propeller controls - Check for proper function, security of attachment and for evidence of wear. Check Bowden cables for bulging with control levers in the full throttle / high RPM position. Check Bowden cable clamp screws on control levers are freely rotatable.		X		
14.	Throttle control - Check displayed throttle valve position via Rotax communication program. Indication should be linear over the complete range (0-115%). Detent for max. continuous power should be noticeable at 100% (max. 103%). Adjust if necessary.	76-00-00	X4)		
15.	Parking brake valve - Check for evidence of leakage especially at the brake line connections. Check control assy for damage.		X		
16.	Rudder pedal bearing and Beringer brake master cylinder rod ends - Lubricate.	12-22-00		annual	
17.	Brake master cylinders and brake lines in the cabin area - Check for security, condition and signs of leakage.		X		
18.	Fuel lines - Check for leakage and security.		X		
19.	Main landing gear - Inspect fuselage structure at such points and areas where the main landing gear is attached. Check for stress marks, distortion, disbonding, and delamination. Inspect main landing gear strut brackets for distortion, cracks, corrosion, and security of attachment. Check wear and condition of the polyamide inserts. Check bolts for correct torque.		X		
20.	Flap actuator - Check for wear and damage, for secure mechanical connections and loose or missing lock devices. Check electrical wiring for wear, damage, and proper routing. Inspect electrical connections and switches for security, corrosion and poor condition. Check function of the limit switches and position indicator.		X		
21.	Elevator trim system - Check the actuator and the springs for security, wear and damage. Check safetying. Check electrical wiring for wear, insulation damage, and proper routing. Inspect electrical connections and switches for security, corrosion and poor condition. Perform system test and check the correct function of the position indicator.		X		
22.	Aileron and elevator control - Check the control sticks, the brackets and the control rods for distortion, cracks, chafing, corrosion and security. Examine all bearings for condition and secure fit. Check safetying. Check travel of control surfaces if the control stick is in the full forward /neutral/ aft, and full left /neutral/ right positions. Verify no binding or jumpy movement of the control sticks through their full range of travel.		X		

4) AT01-200 only

No.	Fuselage / Cabin (Cont.)	Reference	Interval		Initials
			100h	other	
23.	Rudder control - Check rudder control weldment and rudder bellcrank for cracks, distortion, chafing and security. Examine rudder control support brackets, rudder pedal pivot brackets and connection of the rudder controls with the nose gear steering tubes for security, condition and correct splintering. Check centering of springs and cables. Inspect control cables, control cable guides, cable connections, turnbuckles and hardware for correct installation, corrosion, wear, safetying and proper operation.		X		
24.	Rudder / aileron control interconnection - Check condition and correct function.		X		
25.	Autopilot - Inspect all installed autopilot components. Check roll / pitch / yaw servo assembly for proper fastening and tightness.	22-10-00		annual12)	
26.	Brake reservoir - Check for leakage and system for trapped air. Inspect the vent valve in the filler cap of the brake reservoir for obstruction and blockage. Make sure the hydraulic brake fluid level is correct and replenish, if necessary. Only use hydraulic brake fluid of the required grade.		X		
27.	Hydraulic brake fluid - Renew.	32-40-00		3000h 5 years	
28.	Wing main bolts - Inspect for proper fit, condition and correct safetying.	57-10-00	X		
29.	Wing main bolts - Remove for visual inspection and lubrication. Lube type used: ___________________	57-10-00 12-22-00		500h9) 5years9) or annual9)	
30.	Exterior / interior placards and markings - Check presence, legibility, and security.	11-20-00 11-30-00	X		
31.	Fire extinguisher - Check for physical damage, corrosion, leakage or clogged nozzle. Weigh unit to determine fullness. Check for obstructions to access or visibility, safety seal is not broken or missing, HMIS label in place, instructions are legible.			annual	
32.	Elevator control cover - Check that edge protection profile is installed in the baggage compartment.	SB-AT01-039	X		

9) Interval depends on lube type. Refer to 12-22-00.
12) if installed

No.	Wings, Ailerons, Flaps	Reference	Interval		Initials
			100h	other	
1.	Wings with winglets, ailerons, and flaps - Visual inspection for paint coat damage, dents, cracks, holes, distortion and other evidence of failure. Examine all unpainted parts for delamination (white spots).		X		
2.	Wing spars in the fuselage belly - Remove spar covering and perform visual inspection of spar web, the bonding between spar web and carbon fiber spar cap strip, as well as the attachment of the root ribs to the spars. Check security and function of control system brackets attached to the spars.			annual	
3.	Drain and vent holes - Check for blockage and suspect appearance of any liquid.		X		
4.	Ailerons - Check aileron hinges, bearings, and hinge brackets for security and excessive play. Check hinge bushings and replace if necessary. Check bolts and nuts for proper safetying. Examine aileron pushrod for correct installation with stop nuts. Check actuation assembly for suspect binding, excessive play.		X		
5.	Aileron hinges - Check play. Maximum play approx.: - Axial ± 1,00 mm (± 0.04 in.) - Radial ± 0,30 mm (± 0.01 in.)		X		
6.	Aileron control system - Measure the play in the aileron control system with the control surface locked. Apply a lateral force of 30 N (6.7 lb) to the control stick - the maximum play allowed on the top of the stick is 10 mm (0.4 in.) for both sides. The play should be measured for both control sticks. If excessive play is detected, investigate cause.		X		
7.	Flaps - Check hinge brackets for damaged paint, cracks and delamination. Check bearings for correct fit and excessive play. Check hinge bushings and replace if necessary. Check correct safetying of all hinge bolts and castle nuts with cotter pins.		X		
8.	Flap hinges - Check play. Maximum play approx.: - Axial ± 0,30 mm (± 0.01 in.) - Radial ± 0,30 mm (± 0.01 in.) Measure the play in the flap control system at the flap trailing edge, at the inboard flap end. Max. play allowed with flaps in take-off and landing positions: ± 5 mm (0.2 in.). No play with flaps retracted.		X		
9.	Flaps and ailerons - Check that the gap between fuselage and flaps, between flaps and ailerons, and at the outboard end of the ailerons is at least 2 mm (0.08 in.).		X		
10.	Stall warning system - Check for condition and proper operation.		X		
11.	Navigation / strobe lights - Check operation, condition of glass, and security of attachments.	33-40-00	X		
12.	Inner fuel tank ribs - Check connection of fuel and vent lines to the fuel tank and the flange gasket of the fuel level sensors for signs of leakage.	28-10-00 28-20-00 28-40-00		annual	

No.	Wings, Ailerons, Flaps (Cont.)	Reference	Interval 100h	other	Initials
13.	Fuel vent lines - Check for blockage.		X		
14.	Fuel tank drain valves - Check for correct function and leakage.		X		
15.	Fuel tank outlet strainer - Check for damage. Clean if necessary.			1000h	
16.	Fuel filler caps - Check for proper function and leakage.		X		
17.	Upper wing shell in the fuel tank area - Check wing skin for bubble formation or bulging. Contact AQUILA Aviation if there are any findings.			annual	
18.	Tank inlet - Check sealing of the bore hole in the tank inlet.	SB-AT01-027		annual(10)	
19.	Tie-down points - Check thread and structure around the tie-down attach points for any damage.	10-20-00	X		

10) AT01-100A/B/C-300 up to AT01-100A/B/C-312 only. Refer to SB-AT01-027, latest revision.

No.	Empennage, Elevator, Rudder	Reference	Interval		Initials
			100h	other	
1.	Empennage - Inspect complete surface of the vertical and horizontal stabilizers, the elevator and the rudder for dents, cracks, holes and delamination.		X		
2.	Rudder hinge, elevator hinge and bellcranks - Check brackets and bellcranks for security of attachment and corrosion. Examine bearings for binding and excessive play. Check hinge bushings and replace if necessary. Check correct safetying of the lower rudder pivot pin with castellated nut and cotter pin.		X		
3.	Hinge play and control surface positioning - Verify clearance between horizontal stabilizer and elevator horns and clearance between vertical stabilizer and rudder horn is at least 1 mm (0.04 in.). Check elevator hinge and rudder hinge play. Maximum play approx.: - Axial ± 0,30 mm (± 0.01 in.) - Radial ± 0,30 mm (± 0.01 in.)			annual	
4.	Elevator control system - Measure the play in the elevator control system with the control surface locked. Apply a force of 50 N (11.2 lb) forwards and then backwards to the control stick - the maximum play allowed on the top of the stick is 10 mm (0.4 in.) for both sides.			annual	
5.	Rudder - Remove rudder if there is noticeable play. Examine the elevator actuation assembly inside the vertical stabilizer. Check for any damage, for correct installation and function and for security and wear. Inspect rudder hinge brackets, rudder yoke and control cable thimble-eyes for security, conditions and wear. Lubricate control cable thimble-eyes as required.	55-40-00		annual	
6.	Rudder rigging - Set rudder pedals in neutral position. Verify the rudder and the nose landing gear are also in neutral position. Set rudder pedals to fully left and then to full right. The rudder must hit the rudder travel stops and the distance from rudder pedal to firewall must be sufficient to apply the pedal brake. Adjust position of the rudder pedals by varying the length of nose wheel steering tubes. Adjust rudder neutral position and control cable tension by means of the turnbuckles in the cabin area.	27-20-00	X		
7.	Yaw damper - Check rudder control cable and servo bridle cable for correct pretension. Adjust pretension if necessary. Ensure integrity of PTFE tube around rudder control cable and that cable runs over the capstan cage, not beside it. Verify bridle cable ball is in the capstan groove on the opposite side of the rudder control cable.	22-10-00 27-20-00	X[12]		

[12] if installed

No.	Nose and Main Landing Gear	Reference	Interval		Initials
			100h	other	
1.	Wheel fairings - Check condition and correct fit. Remove and clean. Check for paint coat damage, cracks, dents and delamination.		x6)		
2.	Fairing mounts - Inspect for cracks, distortion or other damage.		x6)		
3.	Wheel brakes - Apply brakes, examine system for leaks. Inspect brake fluid carrying lines at the main landing gear for condition, leakage and security of attachment.		x6)		
4.	Wheels - Remove and clean. Check tires for wear, cuts, foreign matter and deterioration. Check tire pressure and proper location of the red slide marks. Inspect rims for deformation, cracks, scratches, corrosion and other damage. Examine bearings for excessive play, corrosion and irregular operation.	32-40-00	x6)		
5.	Wheel halves - Disassemble. Visually inspect wheel flanges (and central spacer) for cracks, nicks, scratches, corrosion or other damage. Replace O-ring.	32-40-00		every1) tire change	
6.	Wheel bearings - Clean and lubricate.	12-22-00		500h2) annual2)	
7.	Brake disc clips - Check play between disc and wheel clips. Change clips and screws if play is above 0.5mm (0.02 in.).	32-40-00	x1,6)		
8.	Wheel axles - Clean. Visually inspect for cracks, nicks, scratches, corrosion or other damage.		x6)		
9.	Wheel brakes - Clean brake caliper housing and backplate. Visually inspect for cracks, nicks, corrosion or other damage. Check freedom of movement of pistons and pressure plates.		x6)		
10.	Wheel brakes - Replace brake caliper pistons and rubber seals.	32-40-00		3000h1) 5 years1)	
11.	Wheel brakes - Inspect brake discs for crazing, coning, corrosion and wear. Inspect brake pads for condition and wear. Replace brake discs if worn below: Beringer: 3.8mm (0.15 in.) Cleveland / Grove: 4.3mm (0.17 in.) Replace linings when worn to: Beringer: wear indicator groove nearly invisible Cleveland / Grove: 2.6mm (0.10 in.)	32-40-00	x6)		
12.	Main landing gear - Check main gear struts for deformation, cracks, damage to the paint coat, and corrosion. Inspect attachment of wheel axle for any damage.		x6)		
13.	Nose gear strut mount and wheel fork - Check for deformation, cracks and corrosion. Check nose gear strut journal bearing for proper operation, play and correct safetying.		x6)		

1) Beringer wheel and brake system only
2) Cleveland / Grove wheel and brake system only
6) Check has to be carried out every 100 hours of operation or 12 month, whichever comes first.

No.	Nose and Main Landing Gear (Cont.)	Reference	Interval 100h	 other	Initials
14.	Nose gear strut and elastomer package - Check strut for deformation, stress marks, and cracks. Inspect correct installation of the nose wheel fork. Inspect elastomer package for wear, deterioration, cracks, correct fit and security. Check journal bearings of the elastomer package for play and condition.		x6)		
15.	Nose wheel steering - Inspect nose wheel steering tubes for condition, excessive play and correct safetying. Check return springs at nose gear strut for security and verify they are tension-free, when the nose wheel is in neutral position.		x6)		

6) Check has to be carried out every 100 hours of operation or 12 month, whichever comes first.

No.	Electrical System / Avionics	Reference	Interval		Initials
			100h	other	
1.	Electrical wiring system - Check the complete electrical wiring system for security, damage, wear and secure fit. Check all cable connections for tight fit, good contact, corrosion and condition.	R912* 12-20-00 R914* 12-20-00	X6)		
2.	Tank inlet bonding wires - Check bonding between electric ground (exhaust port) and tank inlet (max. 1Ω).			annual	
3.	Instruments - Check instrument panel mounting brackets for security and condition. Examine instruments for security of attachment. Check electrical cables, hoses and lines for correct installation, condition and proper routing.			annual	
4.	Pitot / static system - Perform pitot / static system leak test.	34-11-00		2 years	
5.	Pitot / static system - Check pitot tube for security of attachment, condition and obstructions. Check pitot and static pressure lines for correct installation, condition, water and proper routing. Check water traps for water.	34-11-00	X		
6.	Pitot heating system - Carefully check pitot tube for heating up with pitot heating switched ON. <u>WARNING:</u> RISK OF SKIN BURNS! DO NOT TOUCH PITOT TUBE WHEN HEATING IS SWITCHED ON!		X12)		
7.	Engine monitoring system - Check transducers and lines for leakage, loose fittings and proper installation. Check fittings for corrosion. Check electrical wires for chafing, breakage and loose connections. Check system for proper operation.		X6,12)		
8.	Integrated flight system - Check all components and wiring for damage, corrosion, proper operation and security of attachment.	34-25-00		annual12)	
9.	Integrated flight system - Check bonding.	34-25-00		2000h12) 10years12)	
10.	Aspen EFD1000 system - Perform bonding check.	34-25-00		annual12)	
11.	Aspen EFD1000 system / Garmin G5 - Perform capacity check of the internal back-up battery.	34-25-00		annual12,14)	
12.	Tank inlet bonding wires - Check bonding wires at the airframe ground tube for yellow discoloration.	SB-AT01-027		annual11)	
13.	Autopilot - Check bonding.	22-10-00		2000h12) 10years12)	
14.	Autopilot - Perform functional test of disconnect tone audio output (both disconnect switches).	22-10-00		annual12)	

6) Check has to be carried out every 100 hours of operation or 12 month, whichever comes first.
11) AT01-100A/B/C-300 up to AT01-100A/B/C-312 only. Refer to SB-AT01-027, latest revision.
12) if installed
14) Interval is reduced to 6 months after 3 years from date of battery installation (Aspen only).

No.	Return to Service	Reference	Interval		Initials
			100h	other	
1.	Install wheels and wheel fairings. Install seats (if removed). Install cabin floor boards. Install baggage compartment floorboard. Install access panel of the baggage compartment bulkhead. Install access panel 210AB and 210BB[4].	32-40-00 06-30-00	X		
2.	Flight controls - Check for full range of travel and excessive friction.		X		
3.	Flaps - Operate through full extension and retraction for steady and complete deployment. Check correct limit switches operation at CRUISE, T/O and LDG flap positions. Verify the corresponding flap switch position and the corresponding flap position indicator reading.		X		
4.	Elevator trim - Check for full range of travel and excessive friction. Inspect proper operation of the trim control switch, limit switches, and the trim position indicator. Verify that elevator control forces decrease or increase when operating elevator trim. Measure control force to move stick rearward with full nose-down trim (40 ±5 N).	27-31-00	X		
5.	Engine and propeller controls - Check full range of motion without any obstruction or excessive friction to travel. Check throttle and propeller control levers friction lock.		X		
6.	Foreign items - Remove any foreign items from the aircraft.		X		

[4] AT01-200 only

The aircraft is airworthy and meets the condition specified in the aircraft data sheet. All maintenance required by Service Information and Airworthiness Directives and all prescribed scheduled maintenance checks have been carried out.

Service Station:

Next inspection when _______ hours of operation have been reached.

Place, Date

Name, Signature of Mechanic

Name, Signature of Inspector

Stamp

3. 6000-Hour Inspection

A. The airframe of the type AQUILA AT01 is limited to 6.000 hours of flight time (refer to 04-00-00). An inspection program to reach an extension of replacement time can be obtained from the type certificate holder on request.
For all S/N`s having performed the 6000-hour inspection and possible maintenance actions resulting thereof no further life time limit beyond 6000 operating hours will be established and the composite structure is then considered to have "Safe Life".

B. All inspection items listed in the following table ″6000-Hour Inspection Checklist″ must be performed within **every 6000 hours of flight time**. The inspection **must be performed in conjunction with a 100-hour inspection including all annual inspection items** listed for the airframe (refer to “Inspection Time Intervals Chart″ above).
All items performed, all findings discovered and their follow up corrections have to be recorded in acc. with an approved quality procedures manual.

NOTE: The first 6000-hour inspection is replaced by an inspection program to reach an extension of life time (refer to 04-00-00). It can be obtained from the type certificate holder on request.

C. The inspection table shows three different types of inspections listed in the column “Method/Inspection″:

V	Visual inspection
T	Tap test
F	Functional / fit check

Refer to 51-10-00 for a description of visual inspection and tap test methods.

D. Prior to inspection all aircraft log-books have to be checked to establish the aircraft data set and the repair history of the aircraft.

Before starting the 6000-hour inspection the following actions are required:
(1) Fix the fuselage on jacks (refer to 07-10-00).
(2) Remove wing (refer to 57-00-00).
(3) Remove rudder (refer to 55-40-00).
(4) Remove elevator (refer to 55-20-00).
(5) Remove ailerons (refer to 57-50-00).
(6) Remove flaps (refer to 57-50-00).
(7) Remove cowling (refer to 71-10-00).

E. 6000-Hour Inspection Checklist

Aircraft S/N		Operating Hours TTSN		Registration Number	
Engine S/N		Operating Hours TTSN / TTSO		Date	
Propeller S/N		Operating Hours TTSN / TTSO		Date	

No.	Inspection Items Left Wing	Inspection Method	Finding / Condition	Initials
Root Ribs (in front of and behind wing spar)				
1.	Bonding area of ribs to the wing shell - delamination, cracks.	V, T		
2.	Condition of rib laminate, delamination, cracks.	V, T		
3.	Bonding area at the main wing spar web.	V		
4.	Wing attachment bolt bushing - bonding in the rib.	V		
5.	Condition of bushing, wear of bearing area, corrosion.	V		
Inner Flap Hinge Support Rib				
6.	Bonding area of rib to the wing shell - delamination, cracks.	V, T		
7.	Condition of rib laminate, delamination, cracks.	V, T		
8.	Bonding area at the main wing spar web.	V		
9.	Areas around bushing - delamination, cracks.	V		
10.	Condition of ball bearing, wear, corrosion.	V		
Wing Main Spar				
11.	Spar cap between root ribs - bonding to shear web, cracks.	V		
12.	Shear web between root ribs - condition, cracks, delamination.	V		
13.	Spar cap - inspection through openings in root rib and inspection opening in lower wing shell. Bonding to the wing shell (cracks), condition of the main shear web (delamination).	V		
Upper and Lower Wing Shell				
14.	Wing shell - delamination, cracks, scratches in shell surfaces, chipping of paint, UV damage.	V, T		
15.	Wing shell - core damage and dents in sandwich, disbond of shell laminate from core material.	V, T		

No.	Inspection Items Left Wing (Cont.)	Inspection Method	Finding / Condition	Initials
16.	Areas around inspection openings - delamination, cracks.	V		
17.	Wing leading edge bonding area - disbonds, cracks.	V, T		
18.	Area around pitot-static tube opening - delamination, cracks.	V, T		
19.	Area around tie-down fixation point - delamination, cracks.	V, T		
20.	Area around NAV-light opening - delamination, cracks.	V		
21.	Area around winglet root upper wing shell - cracks.	V, T		
22.	Area around ring insert of the tank filler - cracks, disbonding.	V, T		
Trailing Edge Shear Web				
23.	Wing trailing edge, flap area - bonding lower to upper shell, disbond, cracks.	V, T		
24.	Wing trailing edge, flap area - laminate condition, cracks.	V		
25.	Wing trailing edge, aileron area - bonding area shear web to wing shell, disbonds, cracks.	V, T		
26.	Wing trailing edge, aileron area - laminate condition, cracks.	V		
27.	Bonding left an right of hinge levers for flap and aileron.	V, T		
28.	Aileron hinge levers - delamination at bolt area, bolt corrosion.	V		
29.	Flap hinge levers - delamination at bolt area, bolt corrosion.	V		
Tank Rib				
30.	Bonding area of rib to the wing shell - delamination, cracks.	V, T		
31.	Condition of rib laminate, delamination, cracks.	V, T		
32.	Bonding area at the main wing spar web.	V		

No.	Inspection Items Right Wing	Inspection Method	Finding / Condition	Initials
Root Ribs (in front of and behind wing spar)				
1.	Bonding area of ribs to the wing shell - delamination, cracks.	V, T		
2.	Condition of rib laminate, delamination, cracks.	V, T		
3.	Bonding area at the main wing spar web.	V		
4.	Wing attachment bolt bushing - bonding in the rib.	V		
5.	Condition of bushing, wear of bearing area, corrosion.	V		

No.	Inspection Items Right Wing (Cont.)	Inspection Method	Finding / Condition	Initials
Inner Flap Hinge Support Rib				
6.	Bonding area of rib to the wing shell - delamination, cracks.	V, T		
7.	Condition of rib laminate, delamination, cracks.	V, T		
8.	Bonding area at the main wing spar web.	V		
9.	Areas around bushing - delamination, cracks.	V		
10.	Condition of ball bearing, wear, corrosion.	V		
Wing Main Spar				
11.	Spar cap between root ribs - bonding to shear web, cracks.	V		
12.	Shear web between root ribs - condition, cracks, delamination.	V		
13.	Spar cap - inspection through openings in root rib and inspection opening in lower wing shell. Bonding to the wing shell (cracks), condition of the main shear web (delamination).	V		
Upper and Lower Wing Shell				
14.	Wing shell - delamination, cracks, scratches in shell surfaces, chipping of paint, UV damage.	V, T		
15.	Wing shell - core damage and dents in sandwich, disbond of shell laminate from core material.	V, T		
16.	Areas around inspection openings - delamination, cracks.	V		
17.	Wing leading edge bonding area - disbonds, cracks.	V, T		
18.	Area around tie-down fixation point - delamination, cracks.	V, T		
19.	Area around NAV-light opening - delamination, cracks.	V		
20.	Area around winglet root upper wing shell - cracks.	V, T		
21.	Area around ring insert of the tank filler - cracks, disbonding.	V, T		
Trailing Edge Shear Web				
22.	Wing trailing edge, flap area - bonding lower to upper shell, disbond, cracks.	V, T		
23.	Wing trailing edge, flap area - laminate condition, cracks.	V		
24.	Wing trailing edge, aileron area - bonding area shear web to wing shell, disbonds, cracks.	V, T		
25.	Wing trailing edge, aileron area - laminate condition, cracks.	V		
26.	Bonding left an right of hinge levers for flap and aileron.	V, T		
27.	Aileron hinge levers - delamination at bolt area, bolt corrosion.	V		

No.	Inspection Items Right Wing (Cont.)	Inspection Method	Finding / Condition	Initials
28.	Flap hinge levers - delamination at bolt area, bolt corrosion.	V		
Tank Rib				
29.	Bonding area of rib to the wing shell - delamination, cracks.	V, T		
30.	Condition of rib laminate - delamination, cracks.	V, T		
31.	Bonding area at the main wing spar web.	V		

No.	Inspection Items Control Surfaces	Inspection Method	Finding / Condition	Initials
Ailerons				
1.	Aileron surfaces - Check for delamination of shells, scratches.	V, T		
2.	Paint surfaces - Check for condition, scratches, UV damage, chipping of paint.	V		
3.	Damage of core, dents to core, disbond between core and skin.	V, T		
4.	Aileron trailing and leading edges - bonding delamination.	V, T		
5.	Inner and outer aileron ribs - bonding delamination with skin.	V, T		
6.	Check condition of drain holes in inner and outer ribs.	V		
7.	Areas around hinges and aileron control horn fasteners - delamination from skin, cracks.	V		
8.	Condition of control horn bearing, corrosion, play.	V		
9.	Condition of hinges (bushings), corrosion, play.	V		
10.	Inspect for previously performed repairs and repaintings. If so, check aileron mass and static moment to be within specified limits (refer to 57-50-00).	V		
Flaps				
11.	Flap surfaces - Check for delamination of shells, scratches.	V, T		
12.	Paint surfaces - Check for condition, scratches, UV damage, chipping of paint.	V		
13.	Damage of core, dents to core, disbond between core and skin.	V, T		
14.	Flap trailing and leading edges - bonding delamination.	V, T		
15.	Inner and outer flap ribs - bonding delamination with skin.	V, T		
16.	Check condition of drain holes in inner and outer ribs.	V		

No.	Inspection Items Control Surfaces (Cont.)	Inspection Method	Finding / Condition	Initials
17.	Areas around hinge fasteners - delamination from skin, cracks.	V		
18.	Condition of control horn bearing, corrosion, play.	V		
19.	Condition of hinges (bushings), corrosion, play.	V		
20.	Inspect for previously performed repairs and repaintings. If so, check flap mass and static moment to be within specified limits (refer to 57-50-00).	V		
Rudder				
21.	Rudder surfaces - Check for delamination of shells, scratches.	V, T		
22.	Paint surfaces - Check for condition, scratches, UV damage, chipping of paint.	V		
23.	Damage of core, dents to core, disbond between core and skin.	V, T		
24.	Rudder trailing and leading edges - bonding delamination.	V, T		
25.	Lower rudder hinge rib - bonding delamination with skin.	V, T		
26.	Check condition of drain hole in lower hinge rib.	V		
27.	Area around upper hinge - delamination from skin, cracks.	V		
28.	Mass balance horn - Check for cracks and delamination.	V, T		
29.	Condition of hinge (bushing), corrosion, play.	V		
30.	Inspect for previously performed repairs and repaintings. If so, check rudder mass and static moment to be within specified limits (refer to 55-40-00).	V		
31.	Bolts at lower hinge - Check for condition, cracks, corrosion, thread.	V		
Elevator				
32.	Elevator surfaces - Check for delamination of shells, scratches.	V, T		
33.	Paint surfaces - Check for condition, scratches, UV damage, chipping of paint.	V		
34.	Damage of core, dents in core, disbond between core and skin.	V, T		
35.	Elevator trailing and leading edges - bonding delamination.	V, T		
36.	Inner elevator ribs - bonding delamination with skin.	V, T		
37.	Check condition of drain holes in inner ribs.	V		
38.	Areas around hinges - delamination from skin, cracks.	V		
39.	Mass balance horn - Check for cracks and delamination.	V, T		

No.	Inspection Items Control Surfaces (Cont.)	Inspection Method	Finding / Condition	Initials
40.	Condition of hinges (bushings), corrosion, play.	V		
41.	Inspect for previously performed repairs and repaintings. If so, check elevator mass and static moment to be within specified limits (refer to 55-20-00).	V		
42.	Bolts at inner hinge - Check for condition, cracks, corrosion, thread.	V		

No.	Inspection Items Horizontal Stabilizer	Inspection Method	Finding / Condition	Initials
1.	Stabilizer surfaces - Check for delamination of shells, scratches.	V, T		
2.	Paint surfaces - Check for condition, scratches, UV damage, chipping of paint.	V		
3.	Damage of core, dents in core, disbond between core and skin.	V, T		
4.	Stabilizer leading edges - Check for bonding delamination.	V, T		
5.	Trailing edge spar - Check for cracks and bonding delamination with skin.	V, T		
6.	Areas around hinge supports in trailing edge spar - Check for cracks and delamination.	V		
7.	Condition of hinges (bushings), corrosion, play.	V		

No.	Inspection Items Fuselage	Inspection Method	Finding / Condition	Initials
	Fuselage Skin Structure and Vertical Stabilizer Skin			
1.	Skin surfaces - Check for delamination of shells, scratches.	V, T		
2.	Paint surfaces - Check for condition, scratches, UV damage, chipping of paint.	V		
3.	Damage of core, dents in core, disbond between core and skin.	V, T		
4.	Areas near bonding seam at centerline on upper and lower fuselage surfaces - Inspect for cracks in paint.	V, T		
5.	Check condition of drain holes in lower fuselage.	V		
6.	Inspect for previously performed repairs and repaintings.	V		
7.	Areas near bonding seam at connection between horizontal and vertical stabilizer on upper and lower horizontal surfaces - Inspect for cracks in paint.	V		

No.	Inspection Items Fuselage (Cont.)	Inspection Method	Finding / Condition	Initials
Fuselage / Wing Interconnection				
8.	Root ribs and intersection to fuselage - Check for cracks in paint and structure.	V		
9.	Area around wing attachment bolt bushings - Check for cracks and disbonding.	V		
10.	Wing attachment bolt bushings - Check for wear, scratches, corrosion and tightness of fit with the bolt.	V		
11.	Seat bulkhead and forward landing gear bulkhead in spar bridge - Check condition of laminate and bonding areas with the fuselage shell.	V, T		
12.	Forward landing gear bulkhead - Check laminate around fasteners of landing gear supports for cracks and delamination.	V, T		
Bulkheads, Ribs and Hinges in Vertical Stabilizer				
13.	Upper and lower shear web in vertical stabilizer - Check for delamination and cracks.	V		
14.	Upper and lower shear web in vertical stabilizer - Check bonding to the stabilizer shell.	V, T		
15.	Upper hinge plate - check for delamination and cracks.	V		
16.	Bushing in upper hinge plate - wear, corrosion, fit/play.	V		
17.	Lower shear web around fasteners for lower hinge bracket - Check laminate.	V		
18.	Bushing in lower hinge bracket - wear, corrosion, fit/play.	V		
19.	Lower end of the stabilizer (bumper) - delamination, cracks.	V		
20.	Bumper plate at lower end of the stabilizer - Check fixation and condition.	V		
Firewall				
21.	Check firewall bulkhead (from cockpit side) for cracks in the laminate (around cut outs).	V		
22.	Firewall bulkhead - Check bonding to the fuselage skin.	V, T		
23.	Areas around engine brackets - delamination, cracks.	V, T		
24.	Firewall metal shield - condition, wear, corrosion.	V		
25.	Fire resistant firewall sealer around the fire shield - condition, corrosion.	V		
26.	Areas around Camloc fasteners at fuselage cowling support - Check laminate for cracks and delamination.	V		

No.	Inspection Items Fuselage (Cont.)	Inspection Method	Finding / Condition	Initials
27.	Area around pedal control brackets - delamination, cracks.	V		
Cockpit Area and Baggage Compartment				
28.	Front cockpit floor - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V, T		
29.	Front shear bulkhead - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V, T		
30.	Front seat bulkhead - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V, T		
31.	Seat elements and attachments - delamination, cracks.	V, T		
32.	Rear seat bulkhead - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V, T		
33.	Front landing gear bulkhead - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V, T		
34.	Rear landing gear bulkhead - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V, T		
35.	Baggage bulkhead - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V, T		
36.	Lower lap belt attachments - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V		
37.	Lower lap belt fitting - Check for wear and corrosion.	V		
38.	Upper lap belt attachments - Check for delamination and cracks at the baggage bulkhead.	V, T		
39.	Baggage compartment floor supports - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V		
40.	Gas spring supports - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V		
41.	Composite tube stiffener and attachments - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V		
42.	Baggage compartment door, doorframe and supports - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V		
43.	Tailboom bulkheads - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V		

No.	Inspection Items Fuselage (Cont.)	Inspection Method	Finding / Condition	Initials
44.	Elevator control lever mounting supports on baggage bulkhead - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V		
45.	Flap actuator mounting supports in middle tunnel - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V		
46.	Canopy frame (at the fuselage) - Check for delamination and cracks.	V, T		
47.	Step supports - Check for delamination and cracks. Check bonding area to the fuselage structure for disbonding.	V		
48.	Check step component for wear and corrosion.	V		
Canopy				
49.	Canopy frame - Check for delamination and cracks. Check bonding area of Plexiglas to the canopy frame structure for disbonding.	V		
50.	Canopy latching components - corrosion, wear, damage.	V		
51.	Canopy pin and bushing components - Check for corrosion, wear and fit/play.	V		
52.	Canopy Plexiglas including side windows - cracks, damage.	V		

No.	Inspection Items Landing Gear	Inspection Method	Finding / Condition	Initials
Main Landing Gear				
1.	Main landing gear struts - Check condition (distortion, corrosion, wear and paint damages).	V		
2.	Remove main wheels from axles and check axles for distortion, corrosion, wear and damages.	V		
3.	Check inner and outer main brackets for fit of shims, cracks and wear.	V		
Nose Landing Gear and Engine Mount				
4.	Nose landing gear main strut and wheel fork - Check condition (cracks, distortion, corrosion, wear and paint damages).	V		
5.	Nose wheel steering tubes - Check condition (cracks and distortion).	V		
6.	Engine mount - Check the entire tube frame and all welded joints, in particular at the firewall and nose gear suspension, for distortion, wear and cracks.	V		

No.	Inspection Items Landing Gear (Cont.)	Inspection Method	Finding / Condition	Initials
7.	Engine mount attachment bolts - Check for cracks and wear.	V		
8.	Nose wheel axle - Check for cracks and distortion.	V		

The aircraft is airworthy and meets the condition specified in the aircraft data sheet.
All prescribed 6000-hour inspection items and maintenance actions resulting thereof have been carried out.

Service Station:

Place, Date

Name, Signature of Mechanic

Name, Signature of Inspector

Stamp

DAILY INSPECTIONS

1. General

A. Pre-flight and post-flight checks must be carried out daily when the aircraft is in operation.

2. Pre-Flight Check

A. This check must be carried out before the first flight of the day. In this way, the general condition of the aircraft and its engine can be ascertained. Pre-flight checks are essential for flight safety as numerous accidents can be traced back to inadequate pre-flight checks.

The scope of the pre-flight check is listed in the AQUILA AT01-100/200 Airplane Flight Manual, section 4.

3. Post-Flight Check

A. This check should be carried out after the final flight of the day. For the most part, it is a visual inspection.

B. The check should contain all points of the pre-flight check.
   (1) Supplementary measures:
      (a) Re-fuel.
      (b) Check that the aircraft is properly parked (refer to 10-10-00).
      (c) Check the logbook entries for remarks about faults or defects, and for correct number of landings and flight hours.
      (d) If necessary, moor the aircraft (refer to 10-20-00).

UNSCHEDULED MAINTENANCE CHECKS

1. General

A. Special checks are to be carried out when an incident has occurred that may have caused damage to the aircraft or impaired airworthiness.

In addition, a 25-hour inspection must be carried out on new aircraft and its engine, on overhauled engines and after extensive airframe repairs.

2. Special Checks

A. 25-Hour Inspection
After the first 25 hours of operation of a new aircraft and its engine or an overhauled engine or after extensive airframe repairs, an inspection of the extent of a 100-hour inspection must be carried out (refer to 05-20-00).

After the first 25 hours of operation of a new or overhauled engine, the engine and the propeller must be inspected. Refer to ROTAX Aircraft Engines Maintenance Manual for ROTAX Engines Type 912 Series respectively Type 914 Series for detailed information on this inspection.

B. Hard Landing
After an excessively hard landing or other unusual loading of the landing gear a thorough inspection of the affected components and their attachments is required. Even if no obvious defects are detectable, a visual inspection must be carried out. Perform the following:

(1) Prepare aircraft for visual checks as follows:
  (a) Remove engine cowling (refer to 71-10-00).
  (b) Remove landing gear fairings.
  (c) Inside the cabin and baggage compartment - remove carpets and floorboards as required to gain access to the landing gear mounting brackets (refer to 25-12-00).
(2) Inspect main landing gear.
  (a) Check wheel fairings for cracks, dents and delamination.
  (b) Check fairing mounts for cracks, distortion and other damage.
  (c) Check fuselage structure visually at such points and areas where the main landing gear is attached. Check for stress marks, distortion, disbonding, and delamination. Check main landing gear strut brackets for distortion, cracks and security of attachment. Check condition of the polyamide inserts. Check bolts for correct torque.
  (d) Check main gear struts for deformation and cracks. Examine wheel axles for security of attachment to struts and for any damage.
  (e) Inspect tires for integrity and proper location of the red slide marks.
  (f) Inspect brake fluid carrying lines at the main landing gear for condition, leakage, and security of attachment.

(3) Inspect nose landing gear.
   (a) Check wheel fairing for cracks, dents and delamination.
   (b) Inspect fairing mounts for cracks, distortion and other damage.
   (c) Check nose gear strut mount for deformation and cracks. Check nose gear strut journal bearing for proper operation and play.
   (d) Check strut for deformation, stress marks, and cracks. Check elastomer package for deterioration, cracks, correct fit and security. Check journal bearings of the elastomer package for play and condition.
   (e) Inspect nose wheel steering tubes for condition and excessive play.
   (f) Inspect tire for integrity and proper location of the red slide marks.
(4) Re-mount all items removed during the inspection.
(5) Perform a brake and steering system operational test (refer to 32-40-00).

C. Engine Fire

After an engine fire, carry out the following:

WARNING: IF IT IS SUSPECTED THAT PARTS OF THE STRUCTURE OR COWLING COULD HAVE BEEN DAMAGED BY HIGH TEMPERATURES (INDICATED BY BLISTERING ON THE PROTECTIVE COATING), THE MANUFACTURER MUST BE CONTACTED FOR DEFECT APPRAISAL BEFORE THE AIRCRAFT IS FLOWN AGAIN.

(1) Remove engine cowling (refer to 71-10-00).
(2) Examine engine cowling. Check for signs of fire damage.
(3) Disconnect battery (refer to 24-30-00).
(4) Examine electrical cables for damaged insulation.
(5) Examine fuel lines for damage of the fire-protection sleeves.
(6) Check oil lines for damage of the fire-protection sleeves.
(7) Check air filter element for fire damage.
(8) Examine engine mount and shock mounts for any fire damage.
(9) Check all other hoses and pipes, as well as all gaskets and seals for fire damage.
(10) Replace damaged items.
(11) Re-mount engine cowling (refer to 71-10-00).
(12) Perform an engine test run (refer to 05-20-00).

D. Violent Stop of the Engine

In event that the propeller has touched the ground or the engine has been inadvertently stopped violently (shock loading), the propeller gear box must be disassembled and inspected by an authorized workshop. For further information on engine inspections necessary after a propeller ground strike and for more general information, refer to the relevant technical documents and the ROTAX Maintenance Manual.

CAUTION: ONLY QUALIFIED TECHNICIANS (AUTHORIZED BY THE NATIONAL AVIATION AUTHORITY AND AFTER SUCCESSFULLY COMPLETING THE RELEVANT ROTAX TRAINING COURSE) ARE AUTHORIZED TO PERFORM THIS WORK.

Check additional equipment (external alternator, hydraulic governor, ignition unit, coolant and oil hoses) for damage.

CHAPTER 06

DIMENSIONS AND AREAS

TABLE OF CONTENTS

DIMENSIONS AND AREAS - GENERAL

1. Introduction

A. This chapter provides information about dimensions and control surface travel and tolerances. Furthermore, this chapter contains information about aircraft zoning and access and inspection plates.

B. Dimensions are presented to aid the operator and/or maintenance personnel in the ground handling of the aircraft, e.g. in full hangars.
Information concerning aircraft zoning and the position of access / inspection plates helps to locate and access aircraft components.

2. General Description

The following sets out a brief description and intended purpose of each section of this chapter:

A. Section 6-00-00 - Dimensions and Areas - General. This section provides a general overview of content and purpose of the chapter.

B. Section 6-10-00 - Aircraft Dimensions and Areas. This section provides aircraft dimensions and identifies areas of the aircraft.

C. Section 6-20-00 - Aircraft Zoning. This section shows illustrations of all aircraft zones.

D. Section 6-30-00 - Access and Inspection Plates. This section contains the position and numbering of all access and inspection plates.

AIRCRAFT DIMENSIONS AND AREAS

1. General

A. The wing and tail spans are measured parallel to the relevant reference level.

B. Refer to figure 1 for an illustration of aircraft dimensions.

2. Dimensions and Areas

Aircraft overall:

Wing span	10,3 m	33.8 ft
Overall length	7,4 m	24.2 ft
Height max.	2,4 m	7.9 ft

Wing:

Wing profile	HQ 42 mod.	
Wing area	10,5 m²	113.6 ft²
Dihedral angle	+4,5 ° ± 0 °	
Mounting angle	+2,5 ° ± 0 °	
MAC	1,07 m	3.52 ft
Max. load	71,4 kg/m²	

Ailerons (both):

Area	0,65 m²	7.0 ft²
Up travel	16 ° + 1,5 °	
Down travel	11 ° + 1,0 °	
Neutral position	0 ° up	

Flaps (both):

Area	1,23 m²	13.31 ft²

Flap setting (ground)		Tolerance Left	Right
Up	0 °	0 °	0 °
Take-off	17 °	± 1,5 °	± 1,5 °
Landing	35 °	± 1,5 °	± 1,5 °

Horizontal Stabilizer and Elevator:

Profile	FX 71/L150-30	
Area (entire)	2,0 m²	21.64 ft²
MAC	0,68 m	2.24 ft
Elevator area	0,58 m²	6.28 ft²
Up travel	23 ° ±1,5 °	
Down travel	24 ° ±1,5 °	
Span	3,0 m	9.87 ft

Vertical Stabilizer and Rudder:

Profile	FX 71/L150-30	
Area	1,45 m²	15.67 ft²
Rudder area	0,44 m²	4.76 ft²
Travel	29 ° ±1,5 °	

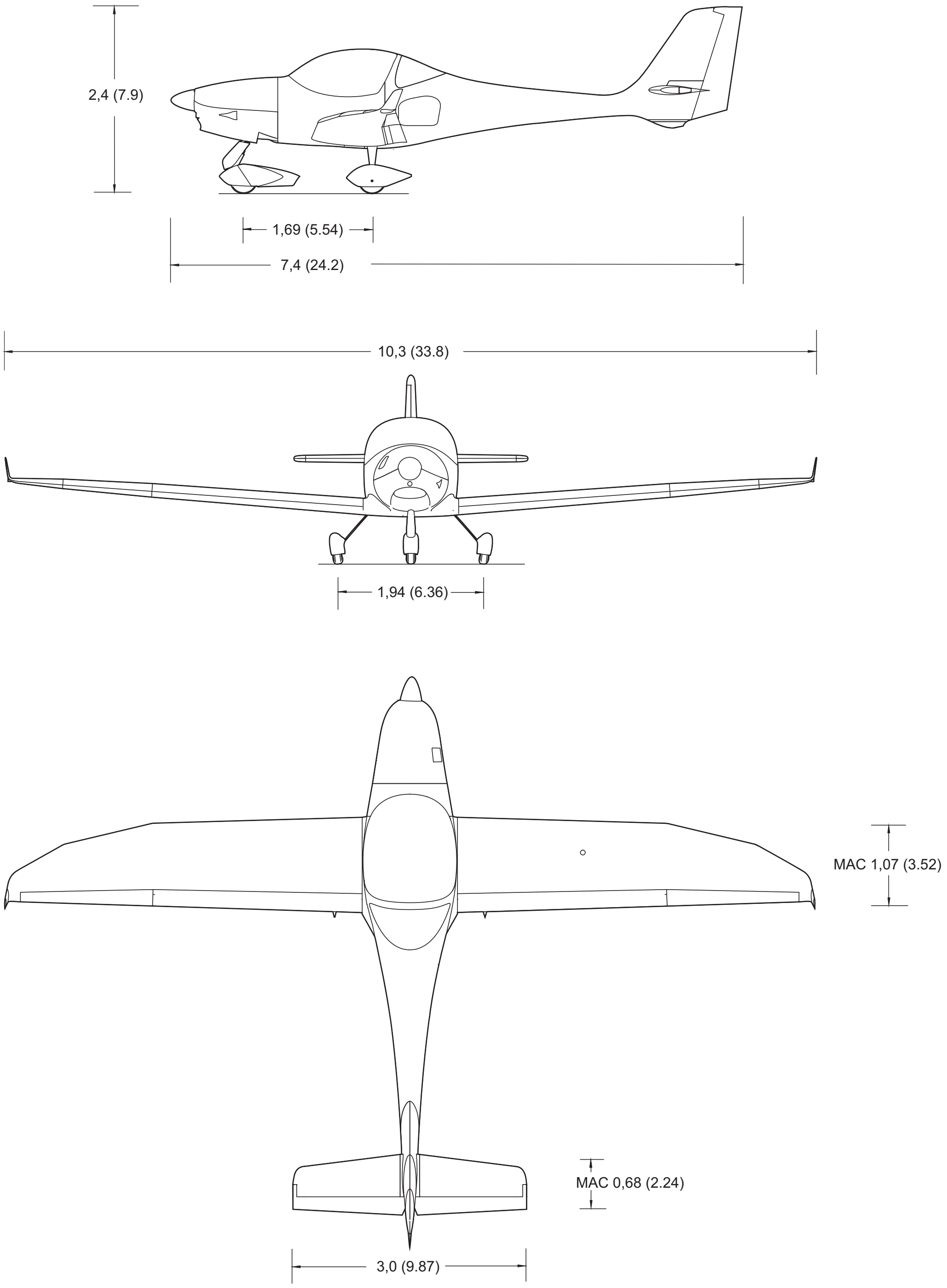
Landing Gear:

Wheel track	1,94 m	6.36 ft
Wheel base	1,69 m	5.54 ft
Nose gear wheel size	5.00-5	
Main gear wheel size	5.00-5	

3. Weight and Static Moments of Control Surfaces

	Control surface weight kg	Control surface static moment Ncm
Aileron	1,35 - 2,0	20 - 90
Fowler flap[1)]	2,7 - 3,4	500 - 660
Elevator[2)]	4,3 - 5,4	-30 - +40
Rudder	3,5 - 4,5	20 - 80

1) Weights are given for one flap. The moment is given for both flaps in the 35° position, flap actuator disconnected.
2) Weights are given for elevator assembly including both elevator halves.



Aircraft Dimensions [m (ft.)]
Figure 1

AIRCRAFT ZONING

1. General

A. The aircraft is divided into numbered zones to facilitate the location of aircraft components and parts. The zoning used here is standard.

B. The zones are identified by a three-digit number. The first digit in the sequence denotes the major zone:

Major zones:
(1) 100 - Forward side of firewall and forward.
(2) 200 - Aft side of firewall to rear door post of the baggage door.
(3) 300 - Rear door post of the baggage door to end of aircraft.
(4) 500 - Left wing.
(5) 600 - Right wing.
(6) 700 - Landing gear.

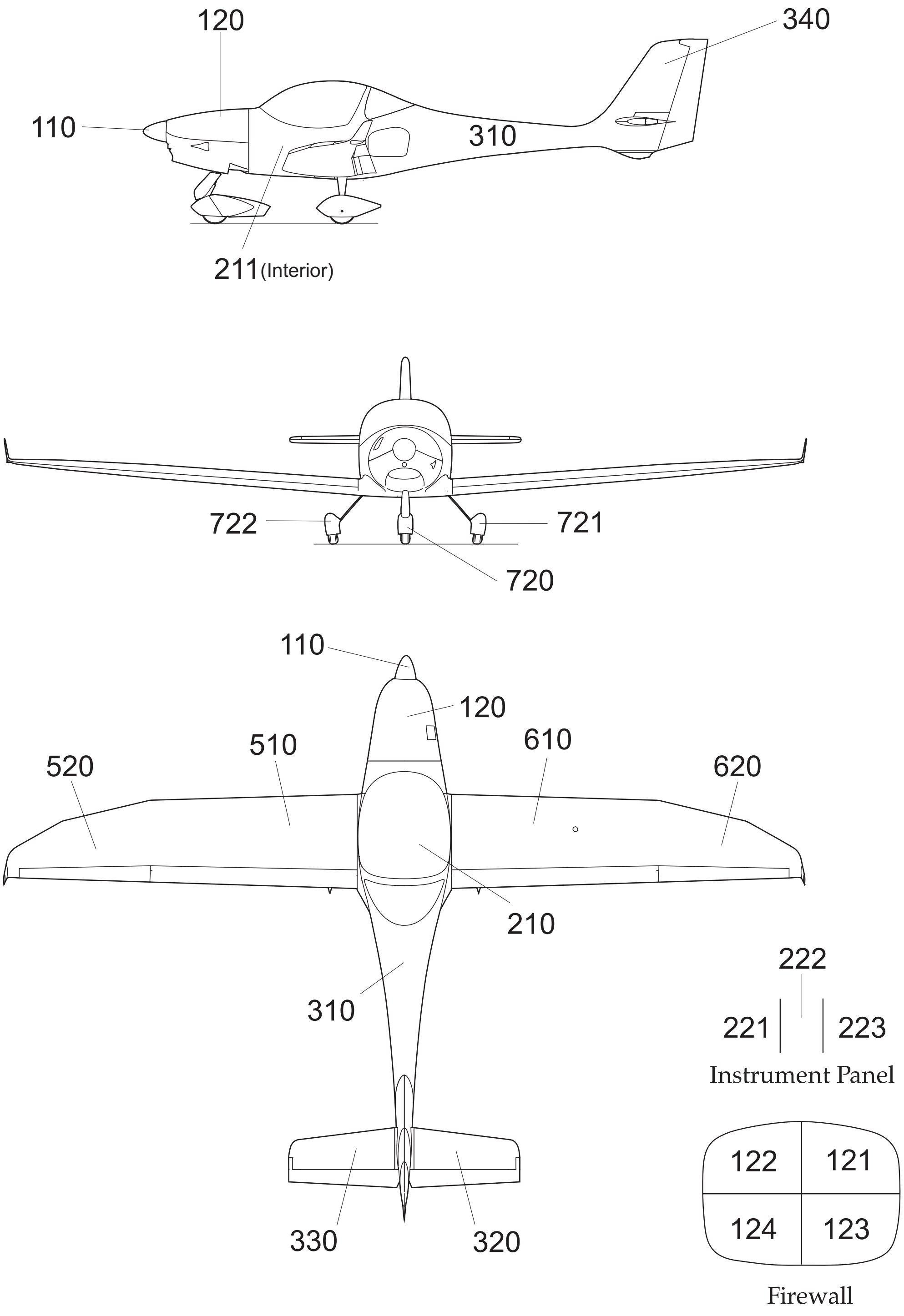
The second digit in the sequence divides the zones into sub-zones (zone 110 - propeller and spinner, zone 120 - upper and lower cowling). The third digit (if needed) divides the sub-zone into smaller subdivisions.

Example:

124
major zone
sub-zone
further division

2. Description

A. For a classification of the aircraft zones, refer to figure 1.



Instrument Panel

Firewall

Aircraft Zones
Figure 1

ACCESS & INSPECTION PLATES

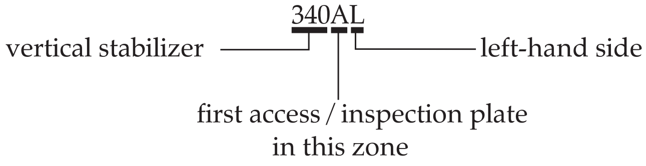
1. General

A. Access / inspection plates are used to gain access to various systems, components and parts of structure during maintenance and for inspection.

B. The access and inspection plates are designated logically.

(1) Access / inspection plates numbering system:
All access / inspection plates are identified using a series of numbers and letters which specify the aircraft zone (see section 6-20-00) and location within this zone. Primary identifiers follow the three-number sequence, with the first plate identified as "A", the second as "B" and so on. Locators follow the primary identifier and denote top, left, right or internal orientation of the plate.

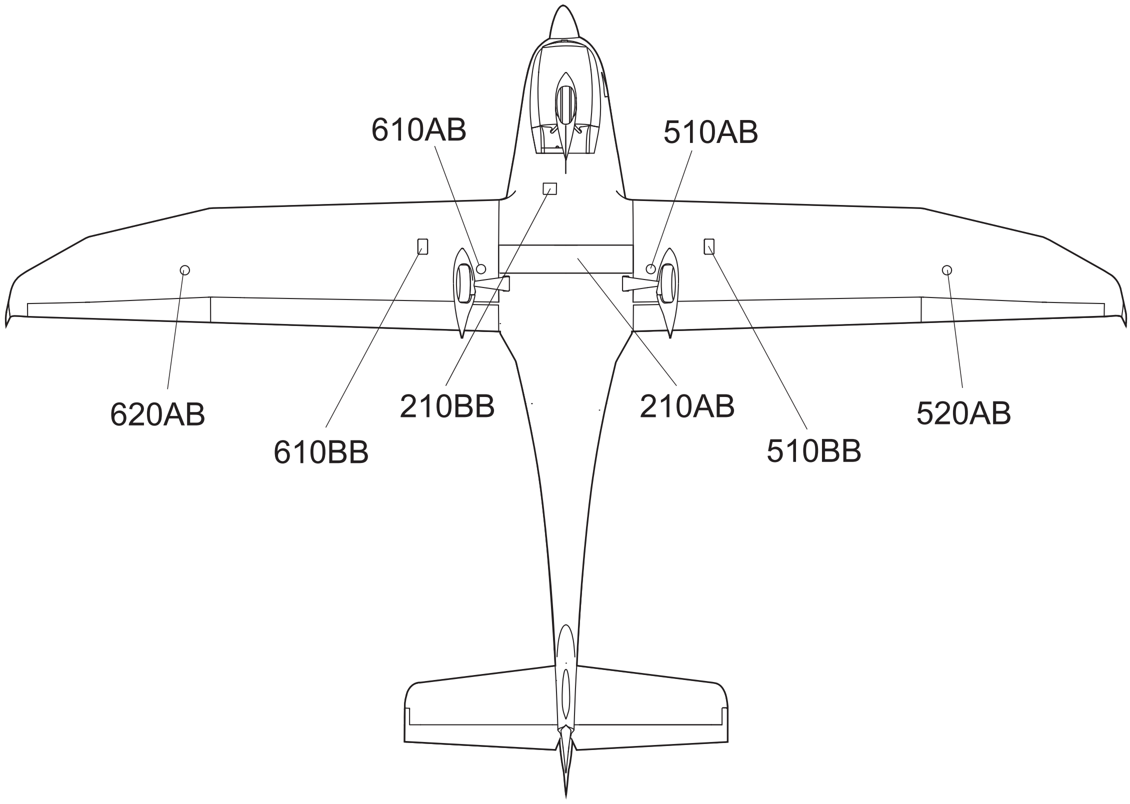
Example:



2. Description

A. For an illustration of the various access / inspection plates used on the aircraft, refer to figure 1.

210AB	Wing removal /installation, aileron / flap control systems, fuel system, wing structure (masked with cloth tape, e.g. Tesa 4651, to prevent intrusion of exhaust gases)
210BB	Gascolator, drainer, fuel pump package connections (Rotax 914 only)
510AB	Left flap actuation lever
610AB	Right flap actuation lever
510BB	Left inboard fuel tank rib, fuel / vent lines, fuel lever sender
610BB	Right inboard fuel tank rib, fuel / vent lines, fuel lever sender
520AB	Left aileron bellcrank
620AB	Right aileron bellcrank



Access / Inspection Plates
Figure 1

CHAPTER 07

LIFTING AND SHORING

TABLE OF CONTENTS

LIFTING AND SHORING - GENERAL

1. Introduction

A. This chapter describes procedures used to jack the aircraft. The equipment required to jack the aircraft and the procedures to be followed are described.

2. General Description

In the following, a brief description and intended purpose of each section of this chapter is given.

A. Section 7-00-00 - Lifting and Shoring - General. This section provides a general overview of content and purpose of the chapter.

B. Section 7-10-00 - Jacking. This section contains procedures, supplementary information and required equipment for jacking the aircraft.

JACKING

1. General

A. The aircraft is jacked at two points and supported at the tail. The jack points are located at the bottom of the fuselage root ribs (see figure 201). Special adapters must be installed prior to jacking.

B. If necessary, the aircraft may be lifted on a hoist.

2. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
3.A	2	Jack	-	commercially available
3.A	2	Adapter		AQUILA Aviation
3.A	1	Tail stand	-	commercially available
3.A	2	Wing trestles	-	commercially available

3. Jacking

A. Jacking the Aircraft

CAUTION: DO NOT JACK THE AIRCRAFT IN THE OPEN IF WIND VELOCITY EXCEEDS 6 KNOTS.

(1) Position the aircraft on a hard, flat, level surface. In the open, postion the aircraft with the nose into the wind.

CAUTION: ONLY USE JACKS IN COMBINATION WITH ADAPTERS DELIVERED BY AQUILA.

(2) Install adapters to jack points (marked red).
(3) Place jacks at the correct positions under the fuselage (see figure 201) and extend to engage with the jacking points.
(4) Remove wheel chocks.
(5) Place the tail stand with adapter under the lower fin and extend to engage with the lower fin skid plate. Secure tail stand lock.
(6) Raise jacks simultaneously, keeping the aircraft as level as possible.
(7) Secure jack locks.
(8) Place the wing trestles in position under each wing (zone 530 /630).

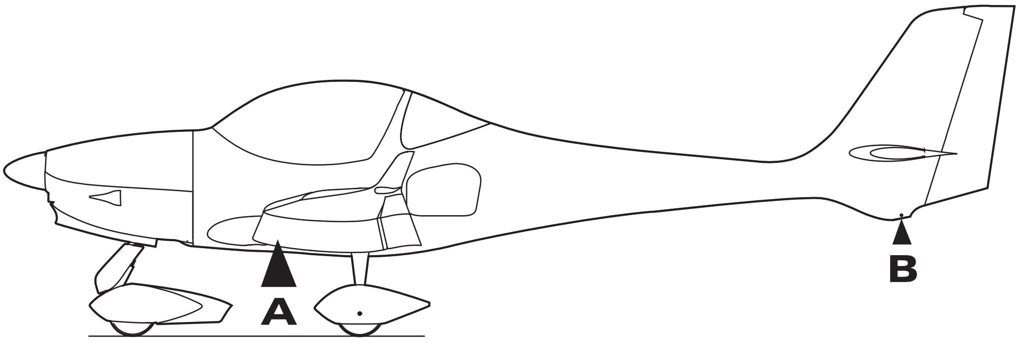
B. Lowering the Aircraft
(1) Remove the wing trestles from under the wings.
(2) Check that the areas immediately under and over the aircraft are clear.
(3) Slowly lower the jacks simultaneously, keeping the aircraft as level as possible.
(4) When the main tires are resting on the ground, lower the jacks completely and remove them.

(5) Remove tail stand.
(6) Remove adapters from jack points.

4. Hoisting

A. Hoisting Procedure

(1) The aircraft may be lifted with a one metric ton (2205 lbs) hoist for maintenance purposes. The front sling is hooked to the two upper engine mount bars. The aft sling is positioned around the aft fuselage forward the vertical stabilizer.



A - jack points (right / left hand)

B - tail stand positioning zone

Aircraft Jack Points
Figure 201

CHAPTER 08

LEVELING AND WEIGHING

TABLE OF CONTENTS

LEVELING AND WEIGHING - GENERAL

1. Introduction

   A. This chapter provides all the necessary information to properly level the aircraft and prepare it for weighing.

2. General Description

   In the following, a brief description and intended purpose of each section of this chapter is given.

   A. Section 8-00-00 - Leveling and Weighing - General. This section provides a general overview of content and purpose of the chapter.

   B. Section 8-10-00 - Weighing. This section contains maintenance practices, supplementary information and equipment required for weighing the aircraft.

   C. Section 8-20-00 Leveling. This section provides maintenance practices and equipment required for longitudinal and lateral leveling of the aircraft.

WEIGHING

1. General

A. For reasons of safety and in order to achieve optimal performance and flying characteristics, it should be flown with a weight and center of gravity (C.G.) position within the approved operating range.

Whenever new equipment is installed or any modification work is done, which may affect empty weight or C.G. position, the empty weight and center of gravity position must be redefined.

B. To stay within the approved C.G. range in flight (31% MAC to 40% MAC) under loaded conditions, the empty C.G. of the aircraft D_{CG} has to be within the limits $D_{CG,min}$ = 437 mm and $D_{CG,max}$ = 498 mm.

C. The engine monitoring system MVP-50 (optional) provides an easy and comfortable tool for the estimation of the C.G. position in flight. Essential condition for a correct function is the input of the latest weighing data. Refer to Electronics International MVP-50 operating instructions for the appropriate procedures. The necessary password can be obtained from AQUILA on request.

2. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
3.A.	3	Industry scales 500 kg (approx. 1100 lbs) scale capacity	-	commercially available

3. Weighing Procedure

A. Weighing can be carried out using mechanical or electrical scales. The instructions of the scale manufacturer must be followed.

Preparation:

(1) Be certain that all items checked in the aircraft equipment list are installed in the proper location in the aircraft.
(2) Clean and dry the aircraft, remove all foreign objects such as bags, rags, tools, etc.
(3) De-fuel the aircraft except for unusable fuel (refer to 12-11-00).
(4) Fill engine operating fluids (oil, coolant) and brake fluid up to the maximum markings (refer to 12-12-00, 12-14-00, 12-15-00).
(5) Move sliding seats to the most forward position.
(6) Retract flaps completely.
(7) Place all control surfaces in neutral position.

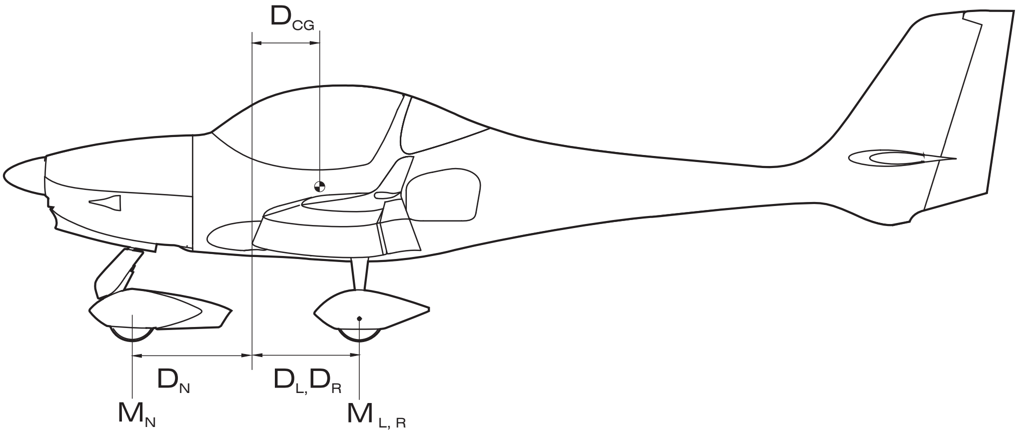
AIRCRAFT WEIGHING REPORT

MODEL:	SERIAL NUMBER:	REGISTRATION NUMBER:	DATE:

Data in accordance with airplane flight manual

Reference datum: Leading edge of wing root rib.
Horizontal reference line: Refer to 08-20-00 for information on longitudinal leveling.
Weighing conditions: Including brake fluid, eng. oil and coolant, unusable fuel.

Equipment list - dated: ________________



Position	Gross ~ kg (lbs)	Tare ~ kg (lbs)	Net weight ~ kg (lbs)	Lever arm ~ m (in.)
Nose wheel			M_N =	D_N = −
Right main wheel			M_L =	D_L = +
Left main wheel			M_R =	D_R = +
Empty mass (weight) M_{Empty}= M_N + M_L + M_R = Kg (lbs)				

Empty weight moment: MO_{Empty}=M_N x D_N + M_L x D_L + M_R x D_R = kgm (in.lbs)

CG position for empty weight: D_{CG} = MO_{Empty} / M_{Empty} = m (in.)

Maximum useful load	+ MTOW − empty weight	+ −
	= max. useful load	=

Data to be entered into the airplane flight manual, section 6:

Empty weight ~ kg (lbs)	Empty weight moment ~ kgm (in.lbs)	
Location / Date	Stamp	Signature

Aircraft Weighing Form
Figure 201

After these preparations have been completed, place scales under each wheel. Be sure that no side forces act on the scales to avoid incorrect readings.
Once the scales are in place, level the aircraft as described in section 08-20-00 "Leveling".

NOTE: Weigh the aircraft inside a closed building to prevent errors in the scale readings due to wind.

Close the canopy and then weigh the aircraft. The weight shown on each scale can now be entered into the weight data form (see fig. 201). Deduct the non-aircraft parts, if any (e.g. wheel chocks) from each reading.

Obtain measurement „D_N“ and „D_L / D_R“ (refer to fig. 201) by dropping a plumb bob from the leading edge of the wing at the root rib to a flat surface (floor).

NOTE: The distances „D_N“ and „D_L / D_R“ must be measured during every weighing!

Further information on how to calculate the C.G. are contained in the airplane flight manual, section 6.

LEVELING

1. General

A. Before every weighing process, the aircraft has to be leveled.

2. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
3.	1	Spirit level at least 1 m (3.28 ft) length	-	commercially available
3.	1	Straight edge	-	commercially available

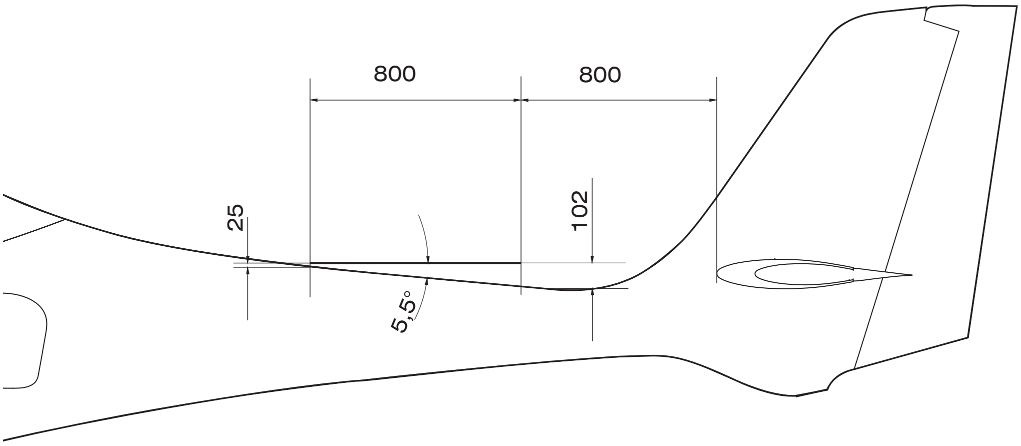
3. Leveling Procedure

CAUTION: AFTER WEIGHING HAS BEEN COMPLETED, INFLATE TIRES TO RECOMMENDED OPERATING PRESSURES (REFER TO 12-16-00).

A. Longitudinal Leveling
- (1) Place a wedge on the fuselage tube (refer to figure 201).
- (2) Place a spirit level on top of the wedge.
- (3) To level the aircraft longitudinally, deflate nose gear tire to center bubble in level.

B. Lateral Leveling
- (1) Open the canopy.
- (2) Place a straight edge on top and perpendicular to cabin sidewalls, centered.
- (3) Place level on top and parallel to straight edge, centered.
- (4) To level aircraft laterally, deflate main gear tire to center bubble in level.

Longitudinal Leveling



Wedge Positioning
Figure 201

CHAPTER 09

TOWING AND TAXIING

TABLE OF CONTENTS

TOWING AND TAXIING - GENERAL

1. Introduction

A. This chapter describes towing and taxiing procedures. It contains instructions as to how the aircraft can be moved without a tow bar.

2. General Description

In the following, a brief description and intended purpose of each section of this chapter is given.

A. Section 09-00-00 - Towing and Taxiing - General. This section provides a general overview of content and purpose of the chapter.

B. Section 09-10-00 - Towing. This section contains procedures, supplementary information and equipment required for towing the aircraft.

C. Section 09-20-00 - Taxiing. This section contains taxiing procedures.

TOWING

1. General

   A. The aircraft may be moved by hand with or without a tow bar.
   The towing procedure is described below.

2. Tools, Equipment and Materials

	Quantity	Equipment	Parts No.	Manufacturer
3.A.	1	Tow bar	-	AQUILA Aviation

3. Towing Procedure

   A. Towing by Tow Bar
   The aircraft is usually moved manually by means of a tow bar.
   The following technique should be used:
   (1) Insert tow bar into nose wheel towing lugs.
   (2) Remove wheel chocks.
   (3) Tow the aircraft to desired location.
   (4) Chock the main wheels fore/aft as required.
   (5) Remove tow bar.

   B. Moving Aircraft Without Tow Bar

   CAUTION: DO NOT PUSH OR PULL AT THE CONTROL SURFACES, THE PROPELLER TIPS OR PROPELLER SPINNER.

   (1) Turn aircraft around main wheels
   Press down on the fuselage in front of the vertical stabilizer to raise the nose wheel off the ground. With the nose wheel clear of the ground, the aircraft can be turned by pivoting about the main wheels.

TAXIING

1. General

The aircraft is directionally controlled during taxiing by the steerable nose wheel linked through the rudder pedals and toe operated brakes. During taxiing the engine should be operated as described in section 4 of the airplane flight manual.

2. Taxiing Procedure

A. To move the aircraft on ground by means of its engine consider the following:

WARNING: THE AIRCRAFT MAY BE TAXIED BY AUTHORIZED PERSONNEL ONLY.

(1) Remove all items (workshop trolley, GPU etc) in the vicinity of the aircraft.
(2) Remove any control locks, wheel chocks, tow bar and tie-downs.

WARNING: CHECK ONCE MORE THAT NO MAINTENANCE PERSONNEL OR OTHER OBSTACLES ARE IN THE VICINITY OF THE AIRCRAFT.

(3) Start the engine (refer to airplane flight manual, section 4).
(4) Release parking brake.
(5) Power should be applied slowly to start the taxi roll. Taxi a few feet forward and apply brakes to determine their full effectiveness.
(6) While taxiing, use the steerable nose wheel to change direction..

WARNING: ALWAYS SELECT THE TAXI SPEED TO ENSURE THAT, IN THE EVENT OF BRAKE FAILURE, PERSONS OR STATIONARY OBJECTS CANNOT BE HIT.

CAUTION: DO NOT OPERATE THE ENGINE AT HIGH RPM WHILE RUNNING UP OR TAXIING OVER GRAVEL, LOOSE STONES OR ANY LOOSE MATERIAL TO PREVENT ABRASION AND STONE DAMAGE TO THE PROPELLER BLADES.

(7) Taxi aircraft to the desired parking area.
(8) Shut down the engine (refer to airplane flight manual, section 4).
(9) Park and secure the aircraft (refer to 10-00-00).

CHAPTER 10
PARKING, MOORING, STORAGE AND RETURN TO SERVICE

TABLE OF CONTENTS

PARKING, MOORING, STORAGE AND RETURN TO SERVICE - GENERAL

1. Introduction

This chapter provides instructions on how to park, moor, store and transport the aircraft.

2. General description

The chapter is divided into different sections to help maintenance personnel to find any information required more easily.

A. Section 10-00-00 - Parking, Mooring, Storage and Return to Service - General. This section gives a general overview of content and purpose of the chapter.

B. Section 10-10-00 - Parking. This section contains information on how the airplane is to be parked.

C. Section 10-11-00 - Storage. The section provides instructions for proper storage of the aircraft.

D. Section 10-20-00 - Mooring. This section contains procedures, supplementary information and equipment required to moor the aircraft.

E. Section 10-30-00 - Return to Service. This section provides information about servicing required after storage, depending on storage duration.

F. Section 10-40-00 - Transport. This section provides instructions for proper transport of the aircraft.

PARKING

1. General

   A. In order to protect the aircraft when it is parked in the open, the following parking instructions should be followed. The extent of the measures depends on park duration and weather conditions.

2. Parking

   A. If the aircraft is parked for a short time, the following should be undertaken:

      (1) Taxi or tow aircraft into parking position (refer to 09-00-00).
      (2) Head the aircraft into the wind if possible.
      (3) Retract flaps.
      (4) Set parking brake.
      (5) Chock main gear wheels.
      (6) If necessary install rudder locks.
      (7) Install pitot head cover.
      (8) Close and lock canopy.

      NOTE: When parking the aircraft in adverse weather conditions such as gusty or strong winds, it is recommended that the aircraft is stored indoors or secured outside more securely (refer to 10-20-00).

STORAGE

1. Storage with a Duration up to 30 Days

A. The following procedures should be followed if the aircraft is be stored for 7 to 30 days to prevent deterioration during periods of non-use.

(1) To prepare the engine for storage, check for correct oil level and add oil if necessary to bring the level to the full mark. Run the engine for at least five minutes at 1200 to 1500 rpm with oil and cylinder head temperatures in the normal operating range. Shut down the engine.
(2) Top up the fuel tanks to prevent condensation of water in the tanks.
(3) Install covers over the cabin area to keep out moisture and sunlight. Put on the pitot tube cover. To prevent oxidation of the finish, it is recommended to cover the composite fuselage during extended periods of outdoor tie-down, especially in summer time.

WARNING: BEFORE ROTATING THE PROPELLER BLADES, MAKE SURE THAT THE IGNITION SWITCH IS IN THE OFF-POSITION AND THE THROTTLE IS CLOSED.

CAUTION: DO NOT ROTATE THE PROPELLER CLOCKWISE.

(4) Rotate the propeller manually every 7 days. After rotating the engine through six revolutions, stop the propeller 60° to 120° from its initial position.
(5) If, after the 30 day period, the aircraft is to remain in storage, the engine should be started and allowed to run. The preferred method is to fly the aircraft for at least 30 minutes.

2. Storage with a Duration up to 90 Days

A. For storage periods not exceeding 90 days, the following guidelines are given:

(1). Fuel system
  (a) The fuel tanks should be filled completely with correct grade fuel.

(2) Engine
  (a) Consult the ROTAX aircraft engines operator’s manual for engine preservation recommendations for the installed engine.

(3) Electrical system
  (a) Remove battery and store in a cool, dry room. Perform service as described in chapter 12 "Servicing".
  (b) Cover or mask any disconnected electrical leads to protect against corrosion.
  (c) It is recommended to charge the battery every 90 days.

(4) Airframe
  (a) Clean aircraft inside and outside. Remove any oil or grease from surfaces.
  (b) Wax aircraft thoroughly.

(5) Brakes
  (a) Apply brakes at least once a week.

(6) Pitot tube
  (a) Put on a pitot tube cover.

(7) Ventilation of the aircraft
  (a) Ventilate aircraft well before storage.
  (b) In the open, depending on external conditions (high humidity, high temperatures etc.) ventilate the aircraft several times during storage.

(8) Landing gear, wheels and tires
  (a) Landing gear:
  It is recommended to jack up the aircraft to relieve load of the landing gear.

  (b) Wheels:
  Rotate wheels at least once a week (3 - 4 revolutions) to avoid brake/disc corrosion.

  (c) Tire:
  1 Clean any oil or grease from tires and treat with a tire protective.

  The aircraft cannot be blocked up:
  2 Rotate wheels. Mark position of the tire and date with chalk.

  3 Tyre pressure: Visual check daily, weekly check by means of an air pressure gauge.

MOORING

1. General

A. If the airplane is temporary stored in the open, it should always be moored. Strong and/or gusting winds can cause great damage to an aircraft which is not securely anchored.

2. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
3.B.	3	Ropes	-	AQUILA Aviation GmbH
3.B.	2	Tie-down rings	-	AQUILA Aviation GmbH

3. Mooring

A. The aircraft has three tie-down points; two are located on the underside of the wings and the third is located on the lower fin.

B. Tie-down the aircraft as follows:
(1) Park aircraft (refer to 10-10-00).
(2) Secure the ailerons and elevator by looping the seat belt around the control stick and pulling it tight.
(3) Chock the main gear wheels fore and aft.
(4) Screw tie-down ring into the adapter at the underside of each wing (red marked).
(5) Secure tie-down ropes to the wing tie-down rings and to the lower fin. Secure at an angle of approximately 45-degrees to the ground and secure each rope to a ramp tie-down point.
(6) Put on pitot cover.
(7) Remove all loose parts and foreign objects which could cause damage to the aircraft.

WARNING: REMOVE TIE-DOWN RINGS BEFORE FLIGHT. FLIGHT WITH INSERTED TIE-DOWN RINGS HAS NOT BEEN TESTED.

RETURN TO SERVICE

1. Storage between 5 and 30 Days

   A. After storage lasting between 5 and 30 days, the following should be carried out before returning to service:
      (1) Perform a thorough pre-flight check

2. Storage between 30 and 90 Days

   A. After storage lasting between 30 and 90 days, the following should be carried out before returning to service:

      (1) Remove aircraft from blocks (refer to 07-00-00).

      (2) Engine
         (a) In accordance with the preserving measures undertaken, return engine to service as described in the ROTAX aircraft engines operator's manual for installed engine model.
         (b) After removing the spark plugs, rotate the propeller several times counterclockwise. Then re-install spark plugs.
         (c) Check oil level and grade.

      (3) Fuel system
         (a) Check fuel filter and clean it if necessary
         (b) Check fuel tanks and lines for water and sediment. Drain fuel into clear cup and check for water and sediment. Drain until water or sediment is gone.

      (4) Electrical system
         (a) Check battery. Charge and install.
         (b) Remove all covers installed against corrosion at separated connections and restore connection.

      (5) Airframe
         (a) Remove any installed locks and all covers.

      (6) Perform a thorough pre-flight check.

TRANSPORT

1. General

A. The aircraft may be transported in open or closed trailers.
It is recommended to use a standard semi-trailer container or an ISO container for transportation over greater distances.
Container dimensions have to be at least: length = 12 000 mm, width = 2300 mm, height = 2350 mm.

B. For transportation of the aircraft the wings have to be removed.
When dismantling the aircraft the appropriate procedures defined in this manual have to be followed precisely.

C. Special transportation jigs are required for safe transportation of the aircraft.
Furthermore, additional strapping and stowing means are necessary to brace and secure the fuselage and wings during transportation, for example ratchet and suitable tie-down lashing straps, fastening and padding material.

D. Technical drawings of the loading equipment used by the manufacturer, a loading plan, transportation jigs and a special trailer can be provided on request.

2. Transport

A. Loading the Wings

NOTE: The unsupported main wing spar is able to withstand only limited bending loads in chord line direction and limited torsional loads. For this reason, the aircraft manufacturer transports the wing bolted at the shear bolt attachment bushings to a support frame in the same configuration as it is attached to the fuselage. The support frame should also be used for vertical wing storage.

NOTE: A suitable transportation jig is required to prevent damage to the wing.
The jig should include two padded stands (at least 100 mm wide at the contact area) to support each wing half near the kink.

CAUTION: LOADS ON CONTROL SURFACES, FLAPS AND PARTS PROTRUDING FROM THE WING HAVE TO BE AVOIDED AT ALL TIMES. UNDER NO CIRCUMSTANCES MAY LOADS BE APPLIED TO THE ATTACHMENT FITTINGS OR BRACKETS INSTALLED ON THE WING.

CAUTION: TIE-DOWN STRAPS HAVE TO BE SUITABLY PADDED TO PREVENT DAMAGE TO THE SURFACE OF THE AIRCRAFT.

(1) Remove wing from aircraft (refer to 57-10-00).
(2) Carefully stow and secure the wing standing on its leading edge in an appropriate transportation jig.

NOTE: Stow wing close to the container sidewall in order to have the entire diagonal of the container cross-section available to store the fuselage.

NOTE: If sufficient space is available, the wing may also be transported lying on pads and a pallet-like support to match or compensate wing dihedral.

NOTE: If the wing is loaded by crane, it has to be secured in a support frame in the same manner as it is attached to the airframe.
When appropriately secured, the wing can be lifted by the support frame or by a suitably padded hoisting strap, looped around the main spar center section.

(3) Fix control surfaces and flaps using suitable tape or fixation clamps, if they are not already secured by the transportation jig.

B. Loading the Fuselage

NOTE: With respect to container dimensions and the span of the horizontal stabilizer, the fuselage has to be loaded and secured with a lateral inclination (bank) angle of 45 degrees or in accordance with the direction of the diagonal of the container cross-section.

NOTE: A suitable transportation jig is required to prevent damage to the airframe.
The base of the airframe transportation jig has to be at least 1200 mm wide and should be located in front of the forward wing attachment point to prevent horizontal tilting of the fuselage and damage to the airframe.

NOTE: If the fuselage is loaded by crane, suitably padded hoisting straps have to be used and placed around the front section of the airframe at the firewall flange and in front of the horizontal stabilizer. The hoisting straps must be attached so that they cannot slip during hoisting and the airframe cannot tilt or shift.

(1) Carefully stow and secure the fuselage unit, including the engine, propeller, landing gear and canopy at an inclination angle of 45 degrees or in accordance with the direction of the diagonal of the container cross-section.

NOTE: The fuselage has to be supported in front of the vertical stabilizer and at the wing attachment points.

(2) Suitably cover mounting bolts at the wing attachment points to protect the fitting surfaces of the wing attachment points.
(3) Remove or properly secure all loose items from fuselage to prevent damage to the structure and the systems.
(4) Remove battery.
(5) Cover or plug all vents of the coolant expansion tank and the brake hydraulic fluid reservoir to avoid leaking fluids that may erode surface finishes.
(6) Suitably protect and position propeller blades.

CHAPTER 11

PLACARDS AND MARKINGS

TABLE OF CONTENTS

PLACARDS AND MARKINGS - GENERAL

1. Introduction

   A. This chapter provides information about interior and exterior graphics, placards, labels and interior markings, their maintenance and repair.

2. General Description

   Below a brief description and intended purpose of each section of this chapter is given.

   A. Section 11-00-00 - Placards and Markings - General. This section provides a general overview of content and purpose of the chapter.

   B. Section 11-20-00 - Exterior Placards and Markings. This section gives maintenance and care instructions for external placards, graphics, markings etc. and contains information about the equipment and material required.

   C. Section 11-30-00 - Interior Placards and Markings. This section gives maintenance and care instructions for internal placards, graphics, markings etc. and contains information about the equipment and material required.

EXTERIOR PLACARDS AND MARKINGS

1. General

A. This section gives maintenance and care instructions for exterior graphics, markings, etc.. Figure 201 shows the locations of the exterior placards and markings.

2. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
3.A. and B.	1	heat gun	-	commercially available
3.A. and B.	as required	isopropyl alcohol	-	commercially available
3.B.	1	needle	-	commercially available
3.B.	1	handy, dense, closed cell foam block	-	commercially available

3. Removal/Installation

A. Remove Self-Adhesive Placards

NOTE: Reference marks should be made on aircraft before removing old graphics.

(1) Warm the placard a little using a heat gun (approx. 40-50°C).
(2) Carefully separate a corner of the placard from the aircraft and then pull off parallel to the surface to remove it.
(3) Remove all traces of old adhesive by using a cloth with isopropyl alcohol as required.

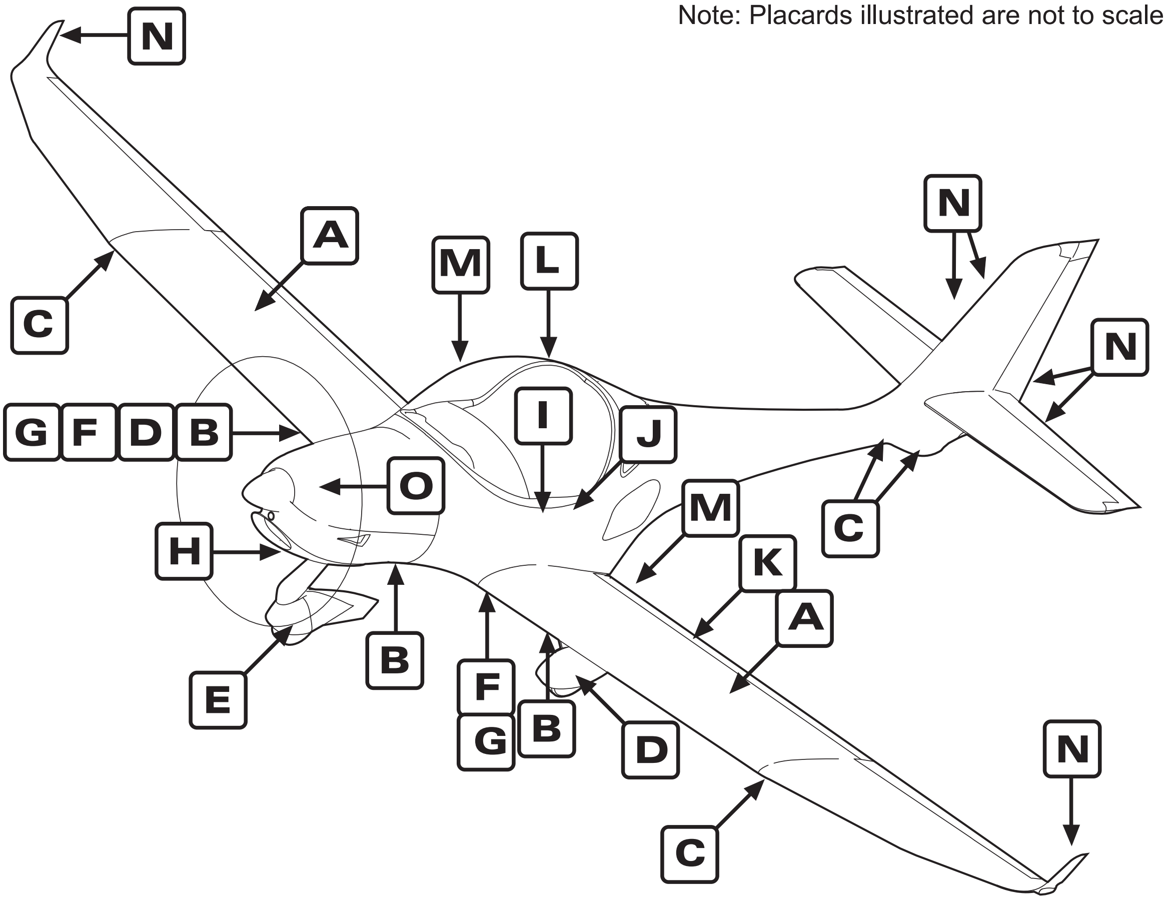
B. Placing Self-Adhesive Placards
(1) Clean aircraft surface carefully. Remove all old adhesive traces using isopropyl alcohol.
(2) Remove paperliner from backside of placard to expose adhesive.
(3) Position top edge of the placard precisely.
(4) Work uniformly downward and apply placard to aircraft with a dry, clean cloth.
(5) Remove the premask (outer protective film) from the placard.
(6) Remove air bubbles by perforating bubble with a small needle and then flattening.

4. Maintenance/Care

A. The following instructions should be followed to guarantee a maximum service life for the graphics:
(1) Clean aircraft exterior surface (refer to 12-23-00).
(2) Do not use any solvents to clean the graphics.
(3) Test other cleaning agents on a small inconspicuous part of the graphic.

(4) Do not allow fuel to spill on to graphics. If fuel spills on to graphics, wipe off with a cloth and rinse with water thoroughly.
(5) Do not remove snow and ice from surfaces using sharp-edged instruments.
(6) If a high-pressure washer is used, keep nozzle at least 0,5 m (approx. 1.6 ft) from edge of graphic.

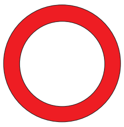
Note: Placards illustrated are not to scale.

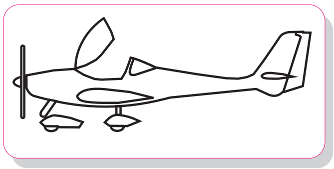


Detail-**A**

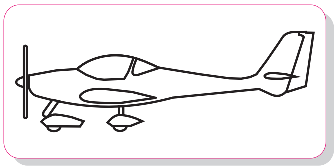
Exterior Placards and Markings
Figure 201 (1)

Note: Placards illustrated are not to scale.

KRAFTSTOFF ABLASS	Detail- **B**	**FUEL DRAIN**
VERZURRPUNKT	Detail- **C**	**TIE DOWN**
2,5 bar	Detail- **D**	36 psi
2,5 bar	Detail- **E**1)	36 psi
2,0 bar	Detail- **E**2)	29 psi
(red jack point markings)		Detail- **F**
Aufbockpunkt	Detail- **G**	Jack Point
⏚ Erdungspunkt Auspuffendrohr	Detail- **H**	⏚ Electric Ground Exhaust Port



Detail- **I**



Detail-**J**

Exterior Placards and Markings
Figure 201 (2)

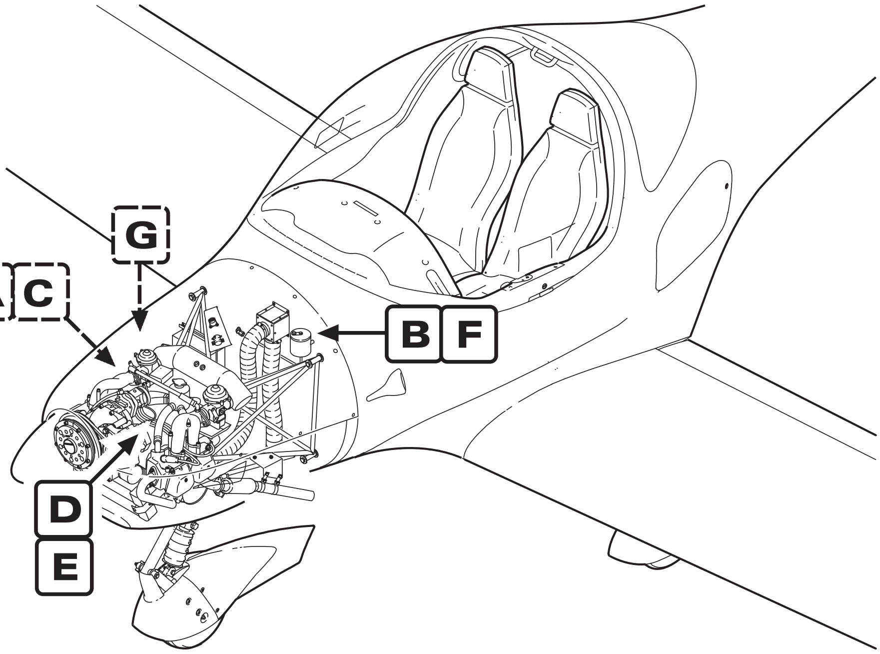
---

1) Aircraft equipped with Beringer wheel/brake system only.
2) Aircraft equipped with Cleveland/Grove wheel/brake system only.

Note: Placards illustrated are not to scale.

Exterior Placards and Markings
Figure 201 (3)

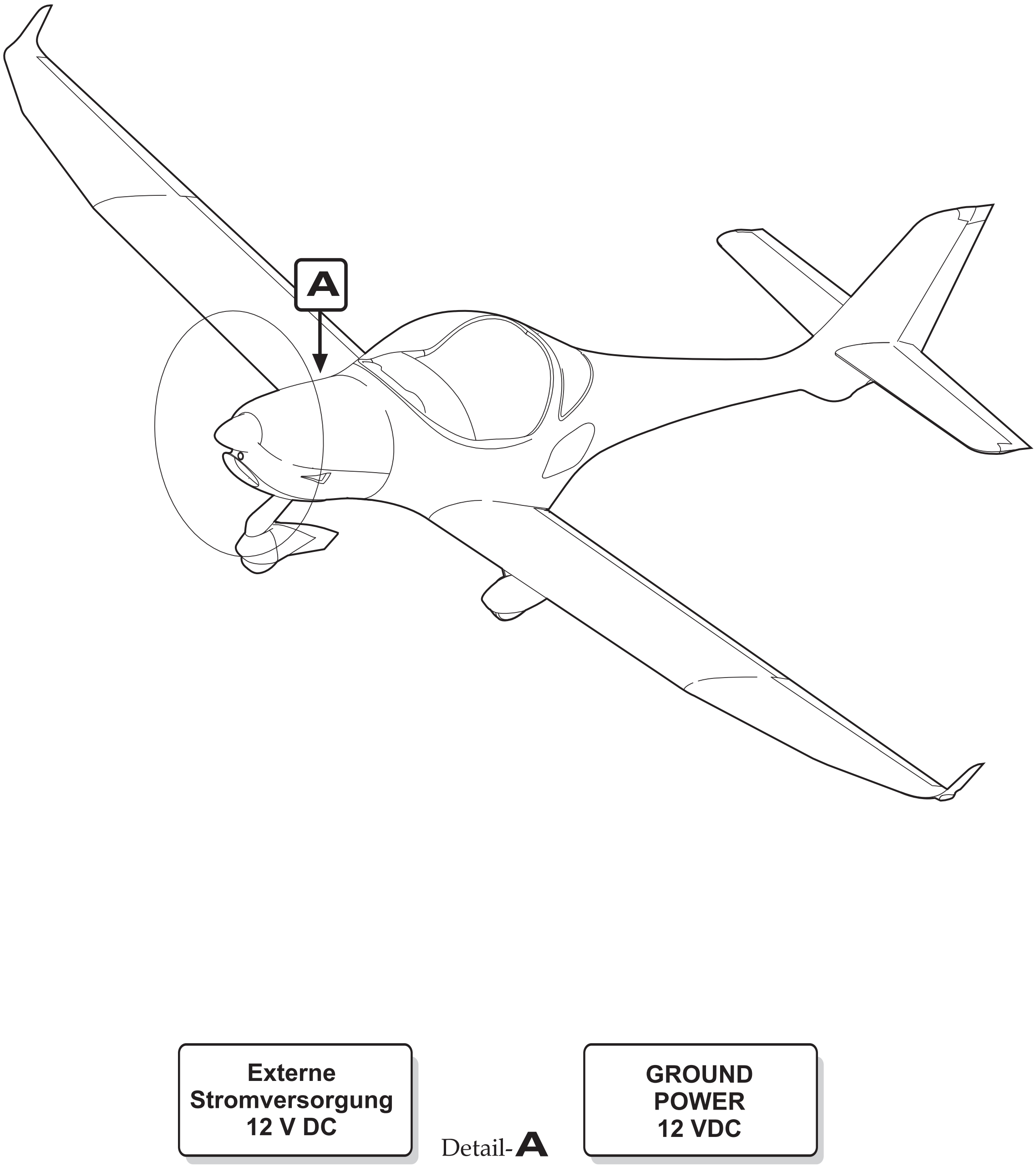
Note: Placards illustrated not in scale.



! ACHTUNG ! Kein Flugmotorenöl einfüllen. Siehe Flughandbuch	Detail-**A**	**! CAUTION !** DO NOT use aviation grade oil Refer to POH
! ACHTUNG ! Keine Automobilbremsflüssigkeit verwenden. Siehe Flughandbuch	Detail-**B**	**! CAUTION !** DO NOT use automotive brake fluid Refer to POH
ÖLFÜLLUNG 3,0 Liter **SIEHE FLUGHANDBUCH**	Detail-**C**	**OIL CAPACITY** **3.17 US quarts, 3,0 Liter** **REFER to POH**
KÜHLMITTEL- AUSGLEICHSGEFÄSS **BEI HEISSEM TRIEBWERK** **NICHT ÖFFNEN!**	Detail-**D**	COOLANT **DO NOT OPEN** **IF ENGINE IS HOT!**
KÜHLWASSERFÜLLUNG 2,3 Liter **SIEHE FLUGHANDBUCH**	Detail-**E**	**COOLANT CAPACITY** **2.43 US quarts, 2,3 Liter** **REFER to POH**
HYDRAULIKÖL FLUID 4	Detail-**F**	HYD. BRAKE FLUID (FLUID 4)
KÜHLMITTEL	Detail-**G**	COOLANT

Exterior Placards and Markings
Figure 201 (4)

Note: Placards illustrated are not to scale.



Exterior Placards and Markings
Figure 201 (5)

EFFECTIVITY

Aircraft equipped with external power receptacle

INTERIOR PLACARDS AND MAKINGS

1. General

   A. This section gives information about removal and installation of interior placards, markings etc.. Figure 201 shows the aircraft interior placards and markings.

   B. If the information on the placard is no longer legible or the placard is partially destroyed or is no longer in place, it must be replaced.

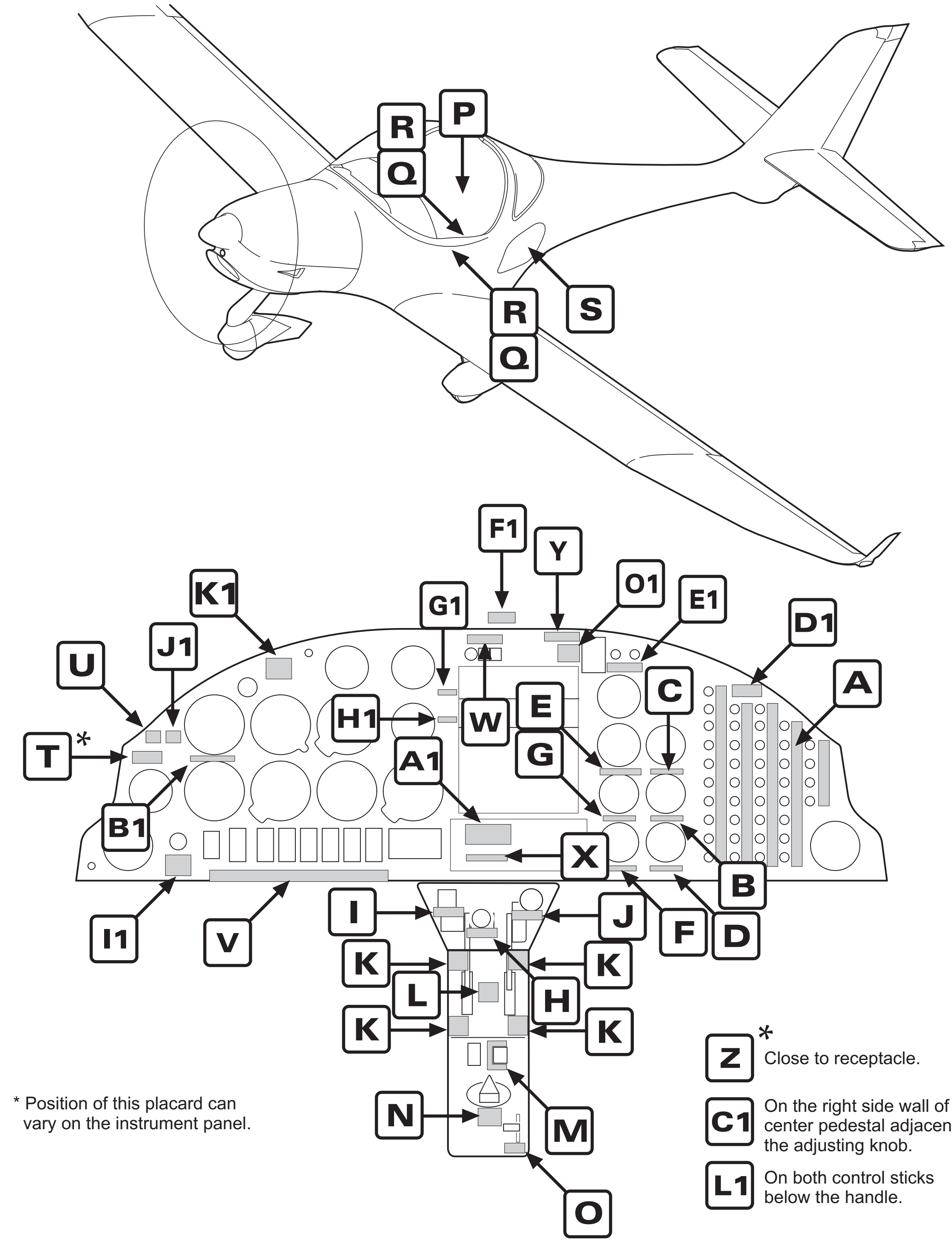
2. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
3.A	1	heat gun	-	commercially available
3.A	as required	isopropyl alcohol	-	commercially available
3.B	1	needle	-	commercially available

3. Removal/Installation

   A. Remove Self-Adhesive Placards
      (1) Warm the placard a little using a heat gun (approx. 40-50°C).
      (2) Carefully separate a corner of the placard from the aircraft and then pull off parallel to the surface to remove it.
      (3) Remove all traces of old adhesive by using a cloth with isopropyl alcohol as required.

   B. Placing Self-Adhesive Placards
      (1) Remove protective film from backside of placard to expose adhesive.
      (2) Position top edge of the placard precisely.
      (3) Apply placard by rubbing with a dry, clean cloth.
      (4) Remove air bubbles by perforating bubble with a small needle and then flattening.

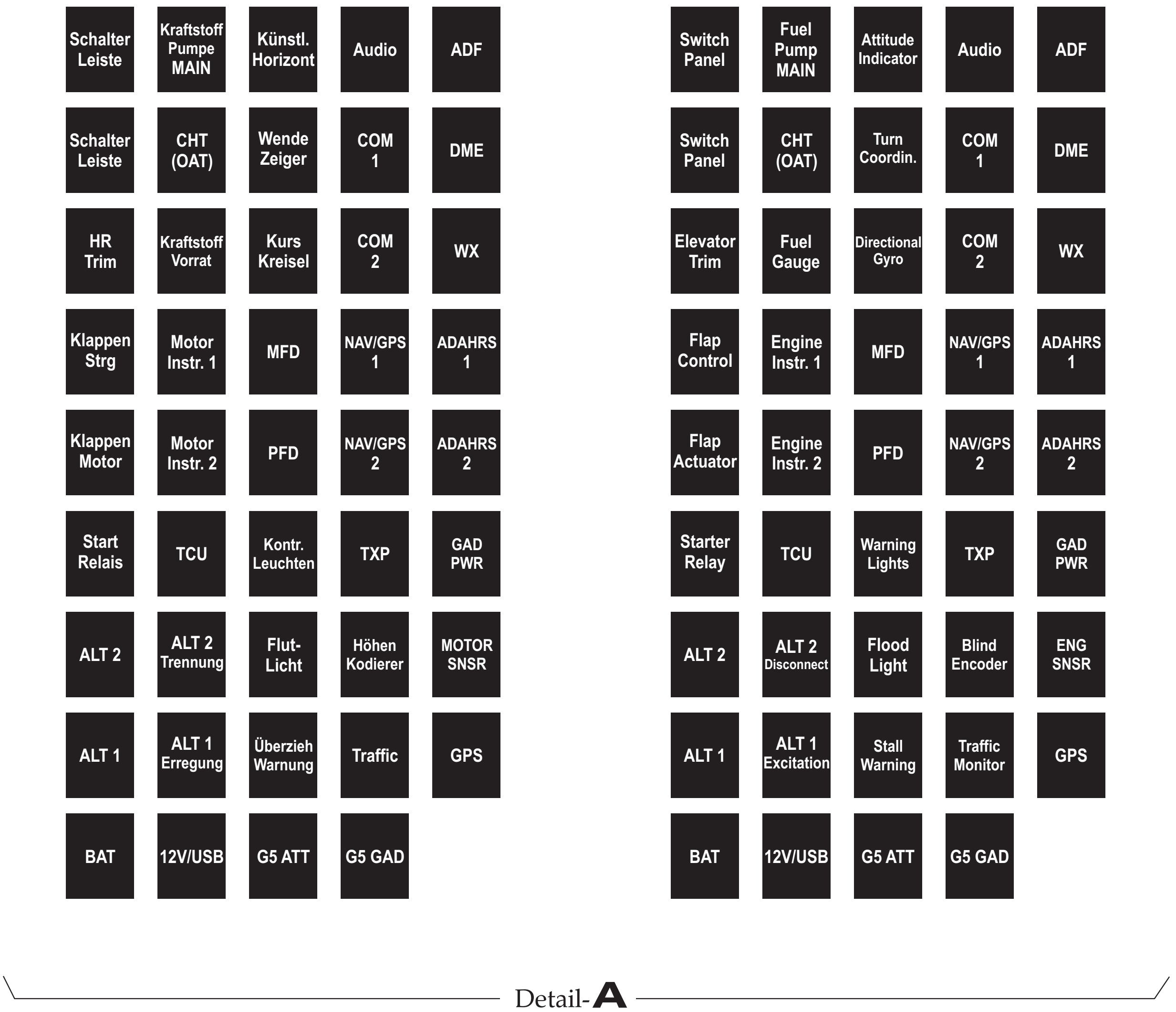


* Position of this placard can vary on the instrument panel.

Z *	Close to receptacle.
C1	On the right side wall of the center pedestal adjacent to the adjusting knob.
L1	On both control sticks below the handle.

Interior Placards and Markings
Figure 201 (1)

Note: Placards illustrated are not to scale.



Schalter Leiste	Kraftstoff Pumpe MAIN	Künstl. Horizont	Audio	ADF
Schalter Leiste	CHT (OAT)	Wende Zeiger	COM 1	DME
HR Trim	Kraftstoff Vorrat	Kurs Kreisel	COM 2	WX
Klappen Strg	Motor Instr. 1	MFD	NAV/GPS 1	ADAHRS 1
Klappen Motor	Motor Instr. 2	PFD	NAV/GPS 2	ADAHRS 2
Start Relais	TCU	Kontr. Leuchten	TXP	GAD PWR
ALT 2	ALT 2 Trennung	Flut-Licht	Höhen Kodierer	MOTOR SNSR
ALT 1	ALT 1 Erregung	Überzieh Warnung	Traffic	GPS
BAT	12V/USB	G5 ATT	G5 GAD	

Switch Panel	Fuel Pump MAIN	Attitude Indicator	Audio	ADF
Switch Panel	CHT (OAT)	Turn Coordin.	COM 1	DME
Elevator Trim	Fuel Gauge	Directional Gyro	COM 2	WX
Flap Control	Engine Instr. 1	MFD	NAV/GPS 1	ADAHRS 1
Flap Actuator	Engine Instr. 2	PFD	NAV/GPS 2	ADAHRS 2
Starter Relay	TCU	Warning Lights	TXP	GAD PWR
ALT 2	ALT 2 Disconnect	Flood Light	Blind Encoder	ENG SNSR
ALT 1	ALT 1 Excitation	Stall Warning	Traffic Monitor	GPS
BAT	12V/USB	G5 ATT	G5 GAD	

NOTE: Depending on equipment and serial number of the aircraft the placards shown may vary in presence and arrangement.

Interior Placards and Markings
Figure 201 (2)

Note: Placards illustrated are not to scale.

ÖLTEMPERATUR	Detail- **B** 1)	**OIL TEMP.**
ZYL. KOPF TEMP.	Detail- **C** 1)	**CYL. HEAD TEMP.**
ÖLDRUCK	Detail- **D** 1)	**OIL PRESS.**
KRAFTSTOFF 109,6 LITER AUSFLIEGBAR	Detail- **E** 1)	**FUEL CAPACITY** 28.9 GAL / 109.6 LITER USABLE
AMPEREMETER	Detail- **F** 1)	**AMMETER**
VOLTMETER	Detail- **G** 1)	**VOLTMETER**
HEIZUNG ZIEHEN EIN	Detail- **H**	**CABIN HEAT** PULL ON
ALTERNATE AIR / **VERGASERVORW.** ZIEHEN EIN	Detail- **I**	**ALTERNATE AIR /** **CARB. HEAT** PULL ON
CHOKE ZIEHEN EIN	Detail- **J**	**CHOKE** PULL ON
VOLLGAS · **START** Max. RPM	Detail- **K**	**OPEN** · **HIGH RPM**
LEERLAUF · Min. RPM **REISE**		**IDLE** · **LOW RPM**

MCP Detail- **L** 2) Placard located at propeller position for max. continuous RPM.

Detail- **M**

Interior Placards and Markings
Figure 201 (3)

---

1) Aircraft equipped with analog engine instruments only.
2) Aircraft equipped with MVP-50 or Garmin G3X Touch only.

Note: Placards illustrated are not to scale.

KRAFTSTOFF
AUSFLIEGBAR
109,6 LITER

TANKWECHSEL
ALLE 60 MIN
VORNEHMEN

Detail-**N**

FUEL
USABLE
109.6 LTR
28.9 GAL
SWITCH TANKS
EVERY 60 MIN

PARKBREMSE
ZIEHEN EIN

Detail-**O**

PARKING BRAKE
PULL SET

PILOT

KOPFHÖRER

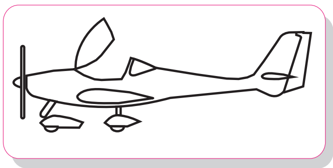
COPILOT

Detail-**P**

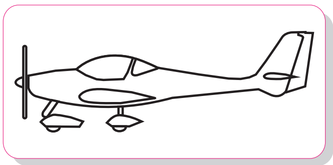
PILOT

HEADPHONES

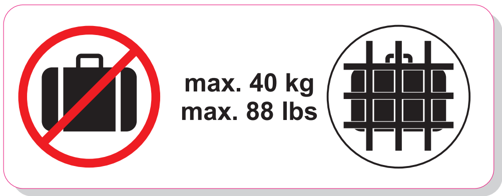
COPILOT



Detail-**Q**



Detail-**R**



Detail-**S**

Detail-**T**

Interior Placards and Markings
Figure 201 (4)

Note: Placards illustrated are not to scale.

TCU Detail-**U** 2)

ALT1 / BAT	ALT2 / BAT2	Kraftst.-Pumpe AUX	PFD	Avionik	Positions-lichter	ACL	Lande-licht	Instrumenten-beleuchtung	P/S Heat	AP
ALT1 / BAT	ALT2 / BAT2	Fuel Pump AUX	PFD	Avionics	Nav Lights	ACL	Landing Light	Instrument Lights	P/S Heat	AP
	2)		8)						4)	7)

Detail-**V**

ALT1	ALT2	BOOST	TCU	KRAFTSTOFF-DRUCK	SPANNUNG	P/S HEAT
ALT1	ALT2	BOOST	TCU	FUEL	VOLT	P/S HEAT
		2)	2)	1)	1)	4)

Detail-**W** 3)

GPS NUR ZUR INFORMATION Detail-**X** 5) **GPS FOR INFORMATION ONLY**

ELT-FERNBEDIENUNG
ELT Hauptschalter
auf ARMED stellen!

Detail-**Y**

ELT-REMOTE CONTROL
Switch ELT-transmitter
to ARM !

STECKDOSE
12 - 14 V
max. 5 A

Detail-**Z**

RECEPTACLE
12 - 14 V DC
MAX: 5 A

Dieses Flugzeug ist in der Kategorie VLA zertifiziert und nur für den Betrieb VFR-Tag ohne Vereisungsbedingungen zugelassen. Alle Kunstflugmanöver, einschließlich beabsichtigtem Trudeln, sind verboten. Weitere Betriebsgrenzen stehen im Flughandbuch.

Detail-**A1**

This aeroplane is classified as a very light aeroplane approved for day VFR only in non-icing conditions. All aerobatic manoeuvres, including intentional spinning are prohibited. See Flight Manual for other limitations.

Dieses Flugzeug ist in der Kategorie VLA zertifiziert und für den Betrieb VFR-Tag und VFR-Nacht ohne Vereisungsbedingungen zugelassen. Alle Kunstflugmanöver, einschließlich beabsichtigtem Trudeln, sind verboten. Weitere Betriebsgrenzen stehen im Flughandbuch.

Detail-**A1** 6)

This aeroplane is classified as a very light aeroplane for day VFR and night VFR in non-icing conditions. All aerobatic manoeuvers including intentional spinning are prohibited. See Flight Manual for other limitations.

Interior Placards and Markings
Figure 201 (5)

1) AT01-100 only.
2) AT01-200 only.
3) Aircraft equipped with analog engine instruments or Garmin G3X Touch only.
4) Aircraft equipped with pitot heating system only.
5) Aircraft equipped with non-(E)TSO'd GPS-receiver only.
6) Aircraft equipped for Night-VFR only.
7) Aircraft equipped with autopilot only.
8) Aircraft equipped with Aspen avionics only.

Note: Placards illustrated are not to scale.

Manövergeschwindigkeit
VA = 112 kts

Detail-**B1**

Maneuvering Speed
VA = 112 kts

REIBVERSTELLUNG
Leistung / Propeller

Detail-**C1**

FRICTION LOCK
Power / Prop

ELT und Feuerlöscher
hinter dem Copilotensitz

Detail-**D1**

ELT and Fire-Extinguisher
behind Copilot seat

0
I-BRETT-
BELEUCHTUNG
DIMM
POSTLIGHTS
INSTRUMENTE

Detail-**E1**

0
PANEL
LIGHT
DIM
POSTLIGHTS
INSTRUMENTS

DIMM
I-BRETT-BELEUCHTUNG
INSTRUMENTE /
POSTLIGHTS

Detail-**E1** 2)

DIM
PANEL LIGHT
INSTRUMENTS /
POSTLIGHTS

FOR	N	30	60	E	120	150
STEER						
FOR	S	210	240	W	300	330
STEER						
DATE:				AIRPATH C2300		

Detail-**F1**

COM/NAV 1

Detail-**G1**

COM/NAV 2

Detail-**H1**

VORSICHT
Elektrische Hauptkraft-stoffpumpe
BAT2 AN im Flug
AUS am Boden

Detail-**I1** 1)

CAUTION
Electric Main Fuel Pump
BAT2 ON for Flight
OFF for Parking

ALT1 AMPS ALT2

Detail-**J1** 1,2)

Interior Placards and Markings
Figure 201 (6)

---

1) AT01-200 only.
2) Aircraft equipped with Garmin G3X Touch only.

Detail-**K1** 1)

AP operation restricted to ≥ 2000ft AGL

Speed range 60 KIAS to 150 KIAS with Flaps up (cruise) only

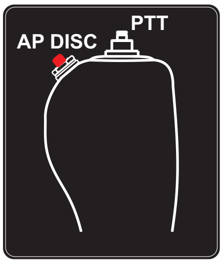
if indicated	↓ Trim ELE DN / FWD ↑ Trim ELE UP / AFT	in intervals of max. 2 sec.

AP-Betrieb beschränkt auf ≥ 2000ft AGL

**Geschwindigkeitsbereich 60 - 150 KIAS,
ausschließlich mit Klappen in Reisestellung**

wenn angezeigt	↓ ELE DN / VORNE trimmen ↑ ELE UP / HINTEN trimmen	in Intervallen von max. 2 Sek.

Detail-**L1** 1)



Placard located on both control sticks.

Detail-**M1** 1)

ROLL
PITCH

Placard located on roll / pitch servo pushrod.

Detail-**N1** 1)

YAW SERVO
ROLL SERVO
PITCH SERVO

Placard located on yaw / roll / pitch servo.

Detail-**O1** 2)

"Direct-to"-Knopf auf NAV/GPS 1 drücken und halten um Smart Glide zu aktivieren

Press & hold "Direct-to" button on NAV/GPS 1 to activate Smart Glide

Interior Placards and Markings
Figure 201 (7)

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1) Aircraft equipped with autopilot only.
2) Aircraft equipped with Garmin GTN 650 Xi only.

CHAPTER 12

SERVICING

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

SERVICING - GENERAL

1. Introduction

A. This chapter gives information on the replenishment of fluids and the lubrication of components. The chapter also contains instructions required to carry out scheduled servicing.

2. General Description

The chapter is designed to help authorized personnel to correctly service the aircraft.
Below a brief description and intended purpose of each section of this chapter is given.

A. Section 12-00-00 - Servicing - General. This section provides a general overview of content and purpose of the chapter.

B. The subsequent sections are divided into 3 groups.

(1) Replenishment Fluids
Provides information for the maintenance personnel to help them to correctly perform the necessary servicing during daily aircraft operation. This group begins with section 12-10-00 - Replenishing - Description. The section includes approved fluids specifications and information about tank and reservoir capacities.

(2) Scheduled Servicing
Provides information for the maintenance personnel to help them to correctly perform periodic servicing, such as lubricating components or cleaning the aircraft. This group begins with section 12-20-00 Scheduled Servicing Description.

(3) Unscheduled Servicing
Provides information for the maintenance personnel to help them to correctly perform servicing, which is carried out at irregular intervals, for example removing ice and snow.

REPLENISHING - DESCRIPTION

1. General

A. This chapter provides information about fluids which must be replenished during operation.

2. Fuel

A. Fuel Capacity

	Liters	U.S. Gallons
Total Capacity	120,0	31.7
Usable Fuel	109,6	29.0
Unusable Fuel	10,4	2.7

B. Fuel Specification
The following fuel is approved for use in the AQUILA AT01-100/200.
The minimum RON should be 95.

EN 228 Super (Premium)
EN 228 Super plus (Premium plus)
AVGAS 100 LL (Grade ASTM-D910, blue color)
AVGAS UL 91 (Grade ASTM-D7547)

WARNING: ONLY USE FUEL SUITABLE FOR THE RESPECTIVE CLIMATIC ZONE.

NOTES: For fuel specifications set down by the FAA, refer to standard spec. for automotive spark-ignition engine fuel ASTM D 4814.

There is a risk of vapor formation if winter fuel is used for summer operation.

Due to the higher lead content in AVGAS, wear of the valve sets and deposits in combustion chamber and lead sediments in the lubrication system will increase. It is, therefore, recommended to use AVGAS only if problems with vapor lock are experienced or if the other fuel types are not available.

3. Engine Oil

A. Engine Oil Capacity

	Liters	U.S. Quarts
Engine oil capacity	3,0	3.17
Initial filling	3,5	3.70
Minimum	2,5	2.64

B. Oil Specification

CAUTION: DO NOT USE AVIATION GRADE ENGINE OIL.

IF MORE THAN 30% OF OPERATION HOURS HAVE BEEN FLOWN WITH LEADED FUEL (E.G. AVGAS 100LL), AN OIL CHANGE SHOULD BE UNDERTAKEN EVERY 50 H (REFER TO ROTAX AIRCRAFT ENGINES SERVICE INFORMATION SI-912-016 / SI-914-019).

(1) Only use oil with ROTAX Norm (RON) 424 classification.
(2) Due to the high stresses in the reduction gears, oils with gear additives such as high performance motor cycle oils must be used.
(3) Because of the incorporated friction clutch, oils with friction modifier additives are unsuitable as this could result in a slipping clutch during normal operation.
(4) Heavy duty 4-stroke motor cycle oils meet all requirements. These oils are normally not mineral oils but semi- or full synthetic oils.
(5) Diesel engine oils are generally unsuitable due to temperature properties and additives which favor clutch slipping.

NOTE: For more information on the necessary lubricants, refer to Rotax Aircraft Engines Service Information SI-912-016 / SI-914-019.

C. Recommended Oil Viscosity for various Air Temperatures:

Mean ambient temperature	Multi grade oils	
0°C (32 °F) to 40°C (104 °F)	SAE 20W-50	SAE 20W-40
-10°C (14 °F) to 40°C (104 °F)	SAE 15W-50	SAE 15W-40
-20°C (-4 °F) to 40°C (104 °F)	SAE 10W-40	SAE 10W-30
-30°C (-22 °F) to 40°C (104 °F)	SAE 5W-50	SAE 5W-40

4. Hydraulic Fluid

A. Only hydraulic fluid fulfilling the MIL-H-5606 specification should be used.

FUEL - SERVICING

1. General

A. Fuel Tanks

(1) The aircraft is equipped with two integral wing fuel tanks.
The fuel tanks are located inside each wing between the front and rear spars. Each fuel tank has a filler cap on the top wing surface.

B. Drain System

(1) The fuel system is equipped with drain valves to allow examination for contamination, water and for de-fueling. Each wing fuel tank has a drain valve at the bottom, inboard rear corner. A further drain valve is located at the lowest point of the fuel system; at the base of the electrical fuel pump (AT01-100) / at the base of the gascolator close to the electrical fuel pumps (AT01-200). The drain is accessible from outside the nose section.
The center of the fuel drains can be pushed inward with the fuel sampler to inspect for water and contamination.

NOTE: Chapter 28 (Fuel) contains more detailed information about the fuel system.

2. Safety and Maintenance Precautions

A. Safety Precautions

WARNING: SERVICEABLE FIRE FIGHTING EQUIPMENT MUST BE AVAILABLE DURING ALL FUEL SYSTEM SERVICING PROCEDURES.

AIRCRAFT AND FILLING FITTINGS MUST BE GROUNDED.

ALL ELECTRICAL EQUIPMENT IN THE AIRCRAFT SHOULD BE TURNED OFF. THE ALT1/BAT AND ALT2/BAT2 (AT01-200 ONLY) SWITCHES SHOULD BE IN THE "OFF" POSITION AND THE IGNITION KEY REMOVED FROM THE AIRCRAFT.

NO SMOKING!

(1) Before beginning maintenance, a serviceable fire extinguisher (at least foam extinguisher) must be positioned within easy access.
(2) Do not wear clothing that has a tendency to generate static electricity (i.e. synthetic fabrics).
(3) No metal tabs on footwear.
(4) Carry out fuel system servicing procedures only in a designated fuel loading/unloading area.
(5) Ground equipment near the aircraft must be turned off.
(6) While filling do not turn on any electrical device.
(7) Make sure that the aircraft and filling fittings are properly grounded:
    (a) First ground the aircraft;
    (b) If a mobile filling device is being used, ground the filling device (same potential as aircraft);
    (c) Ground the mobile filling device with the aircraft.

B. Maintenance Precautions
- (1) Use designated equipment for fuel loading / unloading to prevent contamination.
- (2) Only use approved anti-icing additive.
- (3) Blend fuel in accordance with prescribed procedures.
- (4) Document all fuel blending.

3. Fueling and Defueling

A. Fueling
- (1) Move aircraft to a designated fuel loading / fuel unloading area.
- (2) Make sure that the ALT1/BAT and ALT2/BAT2 (AT01-200) switches are in the OFF position.
- (3) Ground aircraft and filling device as described above.
- (4) Position a fire extinguisher near to the fuel tank to be serviced.
- (5) Remove fuel filler cap and fill fuel tank to desired level.
- (6) Remove fuel service nozzle and install fuel cap.
- (7) Move fire extinguisher and the fuel service nozzle to the other tank to be filled.
- (8) Remove fuel filler cap and fill fuel tank to desired level.
- (9) Remove fuel service nozzle and install fuel cap.
- (10) Check correct lock of both fuel filler caps. Remove excess fuel from the wing area using a cloth.
- (11) Remove ground cables.
- (12) Compare reading of fueled amount on filling device with readings on the fuel indicators in the aircraft.

B. Defueling
- (1) Move aircraft to a designated fuel loading / fuel unloading area.
- (2) Make sure you have enough fuel collectors.
- (3) Make sure that the ALT1/BAT and ALT2/BAT2 (AT01-200) switches are in the OFF position.
- (4) Ground aircraft and filling device as described above.
- (5) Position a fire extinguisher near to the fuel tank to be defueled.
- (6) Remove fuel cap and remove as much fuel as possible using a defueling nozzle.
- (7) Install fuel cap.
- (8) Move fire extinguisher and the defueling nozzle to the other tank to be defueled.
- (9) Remove fuel cap and remove as much fuel as possible using a defueling nozzle.
- (10) Install fuel cap.
- (11) Drain remaining fuel from each wing fuel tank.
- (12) Drain remaining fuel from the drain valve located at the base of the electrical fuel pump with the fuel selector valve in the position LEFT and then in the position RIGHT.
- (13) Make sure all drain valves are closed securely.
- (14) Remove ground cables.

ENGINE OIL - SERVICING

1. General

A. This chapter provides information for checking and changing engine oil.

B. The oil filler cap of the oil tank is located on the right side of the engine behind cylinder no. 3 (AT01-100) / on the left side of the engine behind cylinder no. 4 (AT01-200). It is accessible by opening the oil access plate on the upper cowling. The oil filler cap has a dipstick with min - max markings to check oil level.

WARNING: AVOID SKIN CONTACT WITH ENGINE OIL. USED OIL IN PARTICULAR CONTAINS MATERIALS DETRIMENTAL TO HEALTH.

WARNING: BEFORE ROTATING THE PROPELLER BY HAND, ENSURE IGNITION SWITCH IS OFF AND THE THROTTLE IS CLOSED.

CAUTION: DO NOT ROTATE THE PROPELLER CLOCKWISE.

2. Checking Engine Oil

A. Oil Checking Procedure

(1) Turn the propeller several times by hand to transfer all the oil from the engine to the tank.

NOTE: The process is completed when air flows back to the oil tank. This flow of air can be perceived as gurgling sound when the cover of the tank is removed.

(2) Open oil access plate on upper cowling.
(3) Remove oil filler cap and withdraw dipstick.
(4) Wipe oil dipstick dry with a cloth.
(5) Reinsert dipstick.
(6) Withdraw dipstick and read oil level on dipstick.
(7) If necessary, refill engine oil with correct grade and viscosity (refer to 12-10-00).

NOTE: For normal engine operation maintain the oil level between the two marks as an excessive oil level will allow oil to escape via the venting line.
For longer flights replenish oil to max. mark to warrant more oil reserve.

(8) Reinsert oil dipstick, close filler cap, check for proper seating.
(9) Close oil access plate.

3. Oil Change Intervals

CAUTION: FOR ENGINE OPERATION WITH AVGAS, OIL SHOULD BE CHANGED EVERY 50 HOURS (REFER TO ROTAX AIRCRAFT ENGINES SI-912-016 / SI-914-019).

CAUTION: UNDER SEVERE OPERATING CONDITIONS, THE FREQUENCY OF OIL CHANGES MUST BE INCREASED REGARDLESS OF THE TYPE OF FUEL USED (MOGAS OR AVGAS).

A. Oil Change Intervals
   (1) Under normal operating conditions, oil must be changed every 100 hours.
   (2) For oil specifications, refer to 12-10-00 and to ROTAX Aircraft Engines SI-912-016 / SI-914-019, which contains further operating information for ROTAX engines.

4. Oil Changing

CAUTION: DRAINING THE OIL LINES AND OIL COOLER IS NOT NECESSARY AND MUST BE AVOIDED, AS IT RESULTS IN AIR ENTERING THE OIL SYSTEM. (REFER TO ROTAX AIRCRAFT ENGINES SI-912-018 / SI-914-020).

A. Oil Changing Procedure
   (1) Run engine until operating temperature is reached.
   (2) Shut down engine.

WARNING: HOT ENGINE COMPONENTS MAY CAUSE SKIN BURNS!

   (3) Turn the propeller several times by hand to transfer all the oil from the engine to the tank.

NOTE: The process is completed when air flows back to the oil tank. This flow of air can be perceived as gurgling sound when the cover of the tank is removed.

   (4) Remove engine cowling (refer to 71-10-00).
   (5) Cut safety wire on drain screw at oil tank base. Remove drain screw.
   (6) Drain oil and dispose of it as per environmental regulations.
   (7) Remove oil filter from engine.
   (8) Lubricate mating sealing ring of new oil filter with engine oil.
   (9) Install new oil filter. Screw on new oil filter by hand.
   (10) Cut oil filter out of its casing (without producing any metal chips) and inspect filter material.
   (11) Renew gasket ring of drain screw on oil tank. Fit drain screw and tighten to 25 Nm (220 in.lbs). Secure drain screw with safety wire.
   (12) Refill oil tank with approx. 3 liters (3.17 quarts) of oil. For oil specification, refer to 12-10-00 and to ROTAX Aircraft Engines SI-912-016 / SI-914-019.
   (13) Reinsert oil dipstick, close filler cap, check for proper seating.
   (14) Run engine until normal operating temperature is reached. Shut down engine.

WARNING: HOT ENGINE COMPONENTS MAY CAUSE SKIN BURNS!

   (15) Check oil system for leaks.
   (16) Tighten oil filter again by hand.
   (17) Reinstall cowling (refer to 71-10-00).
   (18) Document oil change as prescribed.

INDUCTION AIR FILTER - SERVICING

1. General

A. The air filter in the air induction system keeps dust and dirt particles from entering the system. It is located in the air filter box on the left (AT01-100) / right (AT01-200) inside of the lower cowling. To increase its effectiveness, the filter element should be treated with filter oil.

B. The condition of the air filter element will be determined primarily by engine operating conditions. Therefore, it should be regularly inspected, cleaned and replaced, if necessary, at least every 100 hours or once a year, whichever comes first.

2. Air Filter Changing

A. Air Filter Changing Procedure
(1) Remove cowling (AT01-100: upper cowling only / refer to 71-10-00).
(2) AT01-100 only: Remove the cover of the air filter box.
(3) Remove air filter element from air filter box and replace by a new one.
(4) AT01-100 only: Install the cover of the air filter box.
(5) Reinstall cowling (refer to 71-10-00).

3. Air Filter Cleaning

A. Cleaning Procedures
(1) Remove air filter element as described above.
(2) Inspect air filter element for damage. If necessary renew filter element.

CAUTION: NEVER USE GASOLINE, STEAM, CAUSTIC LIQUIDS, DETERGENTS OR HIGH PRESSURE CLEANING.

(3) Lightly tap and brush off surface dirt.
(4) Spray filter cleaner on to entire element and let it soak for approx. 10 min.

WARNING: DO NOT DRY OVER NAKED FLAME OR WITH HOT AIR GUN. EXCESSIVE HEAT WILL SHRINK THE PORES OF THE FILTER MATERIAL RESTRICTING ENGINE AIR FLOW.

(5) Rinse filter element with water from the inside out and let it dry naturally.

CAUTION: NEVER USE GEAR OIL, DIESEL OIL OR MOTOR OIL AS THEY ATTRACT WATER.

(6) After cleaning, lubricate filter element evenly with filter oil spray or filter oil according to the manufacturer’s instructions.
(7) Ensure air filter box is clean and free of debris.
(8) Install air filter as described above, pay attention to correct fit.

COOLING SYSTEM - SERVICING

1. General

A. The cooling system of the engine is designed for liquid cooling of the cylinder heads and ram air cooling of the cylinders. The cooling system of the cylinder heads is a closed circuit with an expansion tank. For a more detailed description and related maintenance procedures of the cooling system, refer to 75-20-00.

B. Coolant

(1) 50% antifreeze concentrate with additives against corrosion and 50 % pure water, or use of an equivalent premixed coolant. Refer to the ROTAX Service Instruction SI-912-016 / SI-914-019, latest revision, for further information on suitable coolants.
The maximum coolant quantity is 2,5 liters (2.6 U.S. quarts).

<u>CAUTION:</u> ENSURE THAT ONLY ANTIFREEZE CONCENTRATE CONTAINING ADDITIVES AGAINST CORROSION FOR LIGHT METAL ENGINES IS USED.

USE ANTIFREEZE CONCENTRATE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

(2) The coolant must be renewed every three years.

<u>WARNING:</u> NEVER OPEN PRESSURE CAP OR RADIATOR CAP WHEN THE COOLING SYSTEM IS HOT. FOR SAFETY REASONS, COVER CAP WITH A CLOTH AND OPEN SLOWLY. SUDDEN OPENING OF THE CAP COULD PROVOKE THE EXIT OF BOILING COOLANT AND RESULT IN SEVERE SCALDING.

2. Adding Coolant

A. Prior to adding coolant, the reason for the loss of the liquid must be investigated and corrected.

B. Servicing Procedure
(1) Remove engine cowling (refer to 71-10-00).
(2) When engine is cold, open pressure cap of the expansion tank and fill up the expansion tank completely.
(3) Run engine to operating temperature and allow engine to cool down before checking coolant level again. Replenish as necessary.
(4) Close pressure cap, check the condition of the rubber sealing rings.
(5) Install engine cowling (refer to 71-10-00).

3. Renewal of the Coolant

A. Servicing Procedure

(1) When engine is cold, open pressure cap of the expansion tank and lowest coolant hose on the radiator and drain the coolant.
(2) Reconnect coolant hose.
(3) Refill freshly mixed coolant into expansion tank (highest point of the cooling system).
(4) Install radiator tester and apply air pressure of 2 bar (30 psi). After 30 minutes there should be no noticeable pressure drop.
(5) Reinstall pressure cap of the expansion tank.
(6) Run engine to operating temperature and allow engine to cool down. Check system for leaks. Check coolant level and replenish as necessary.

4. Flushing the Cooling System

A. Servicing Procedure

(1) When engine is cold, open pressure cap of the expansion tank and lowest coolant hose on the radiator and drain the coolant.
(2) Flush system with a water hose at a max. pressure of 2 bar (30 psi).
(3) Reconnect coolant hose.
(4) Refill freshly mixed coolant into expansion tank (highest point of the cooling system).
(5) Install radiator tester and apply air pressure of 2 bar (30 psi). After 30 minutes there should be no noticeable pressure drop.
(6) Reinstall pressure cap of the expansion tank.
(7) Run engine to operating temperature and allow engine to cool down. Check system for leaks. Check coolant level and replenish as necessary.

BRAKE SYSTEM - SERVICING

1. General

A. Ground service for the brake system is limited to the replenishment of brake fluid. The brake fluid reservoir is located at the upper left firewall in the engine compartment.

B. Refer to 32-40-00 for brake system bleeding / brake fluid change procedures.

2. Replenishing Hydraulic Fluid

A. Hydraulic Fluid Replenishing

CAUTION: ONLY USE HYDRAULIC FLUID WHICH CONFORMS TO MIL-H-5606 SPECIFICATION.

(1) Remove upper cowling (refer to 71-10-00).
(2) Remove filler plug from hydraulic fluid reservoir.

CAUTION: REMOVE EXCESSIVE HYDRAULIC FLUID IMMEDIATELY FROM PAINT SURFACES TO PREVENT CHEMICAL ATTACK.

(3) Refill hydraulic fluid.
(4) Install filler plug.
(5) Install upper cowling (refer to 71-10-00).

TIRES - SERVICING

1. General

A. The landing gear is equipped with 5.00-5 tires. Depending on the wheel/brake system installed, either 8 or 10 PLY rated tubeless tires (Beringer wheels) or 6 PLY rated tube-type tires (Cleveland / Grove wheels) are mounted. Required tire pressure is:

(a) Main gear tire: 2,5 bar (36 psi)
(b) Nose gear tire: 2,5 bar (36 psi) (Beringer)
2,0 bar (29 psi) (Cleveland/Grove)

Checking tire pressure regularly is the most important preventive measure in tire service. Improper tire pressure causes deterioration in the ground handling behavior of the aircraft and reduces the service life of the tire. For tubeless tires there is a risk of bed blow out at under-pressure. Under-pressure is indicated by excessive wear in the tire shoulder area, over-pressure by excessive wear in the center of tire.

2. Tire Servicing

WARNING: WHILE SERVICING, DO NOT STAND IN FRONT OF EITHER BEAD AREA OF THE TIRE BECAUSE BURSTING TIRES HAVE THE TENDENCY TO RUPTURE ALONG THE BEAD. ALWAYS STAND AT A 90° ANGLE TO THE AXLE ALONG THE TIRE CENTERLINE.

A. Service Notes
(1) If possible, do not expose the tires permanently to intensive solar radiation.
(2) Ensure tire pressure gauges used are accurate.
(3) While checking tire pressure, the aircraft should be on level ground and the tire cold.
(4) A freshly mounted and installed tube-type tire should be closely monitored during the first hours of operation. Air trapped between the tire and the tube at the time of mounting could seep out, resulting in under pressure in the tire.

B. Tire servicing comprises the following items:
(1) Check tire pressure regularly. If necessary inflate or drain air.
(2) Examine tires for wear, cuts, bruises, and foreign bodies in the tread.
(3) Check proper location of the red slide marks.
(4) Always remove oil, grease and mud from tires with soap and water.

BATTERY - SERVICING

1. General

A. The battery should be serviced every 100 hours. In the case of heavy-duty operation or operation in cold regions, service intervals should be shorter.

B. On aircraft equipped with Rotax 914F engine, an additional battery (BAT2) is installed. This battery has to be replaced annually.

C. For installation/removal procedures and a capacity check of the battery, refer to 24-30-00.

2. Battery Servicing

NOTE: The battery should be serviced only after it has been removed from the aircraft.

A. Battery servicing involves the following:
   (1) Check battery and battery tray for any corrosion and dirt. Clean with clear water and dry.
   (2) Check battery charging using a battery tester. Recharge battery if required.
   (3) Clean and grease battery terminals (refer to 12-22-00).
   (4) If existent, test ventilation tube for condition and obstructions.

SCHEDULED SERVICING - DESCRIPTION

1. General

A. This section provides instructions necessary to carry out scheduled servicing, such as the periodic lubrication of aircraft components; external and internal cleaning. Service intervals are also provided. This section does not include lubrication procedures required to complete maintenance measures.

LUBRICANTS - DESCRIPTION

1. General

A. This section assists with the selection of proper lubricants used to maintain the aircraft.
To ensure a long service life of the lubricated components, it is recommended to always use pure and authorized lubricants.

2. Service Notes

A. Use of the lubricants
- (1) Cleanliness is essential to good lubrication. Lubricants and required equipment must be kept clean.
- (2) Store the lubricants in a secure place and in accordance with the manufacturer's specifications.
- (3) Wipe grease fittings and areas to be lubricated with clean dry cloths before lubricating.
- (4) When lubricating bearings which are vented, force grease into fitting until old grease is expelled. Remove old grease.
- (5) Control cables should not be lubricated, unless to prevent corrosion.

3. Definition of "As Needed"

A. In the following sections, time requirements for lubrication are shown either by a specific time interval or by „as needed“. The latter means that no interval is determined for this item. The mechanic decides when lubrication is required.

B. If one or several of the following conditions occurs simultaneously, the component must be lubricated:
- (1) The old lubricant has been removed.
- (2) Dirt or wear residue are visible near the movement contact area.
- (3) While moving squeaks, grinding or other abnormal sounds are audible.
- (4) During movement by the hand, jerky or restricted movement occurs throughout portions of travel range.

4. Recommended Lubricants:

A. Categories of lubricants, their specifications and typical areas of application are provided below.

Abbreviation	Specification	Description
GR	MIL-PRF-81322	Grease, wide temperature range
GH	MIL-PRF-23827	Grease, aircraft and instrument, Gear and actuator screw
OG	MIL-L-7870	Oil, general purpose
PL	VV-P-236	Technical petrolatum
PG	SS-G-659	Powdered graphite
GL	MIL-G-21164	Grease, molybdenum disulfide, for high and low temperatures
OL	VV-L-800	Light oil
SG	MIL-S-8660 or SAE AS 8660	Thick silicone grease (-50°C to 200°C), (liquid grease in spray is not allowed)
CP	MIL-C81309E Type II & III	Corrosion preventive compound (corrosion protection of metal parts)

B. Recommended Lubricants

Abbrevation	Product	Manufacturer
GR	AeroShell Grease 22	Shell Oil Company
GL	AeroShell Grease 64	Shell Oil Company
PL	Royco 1 DC 4	Royal Lubricants Co. Inc. Dow Corning

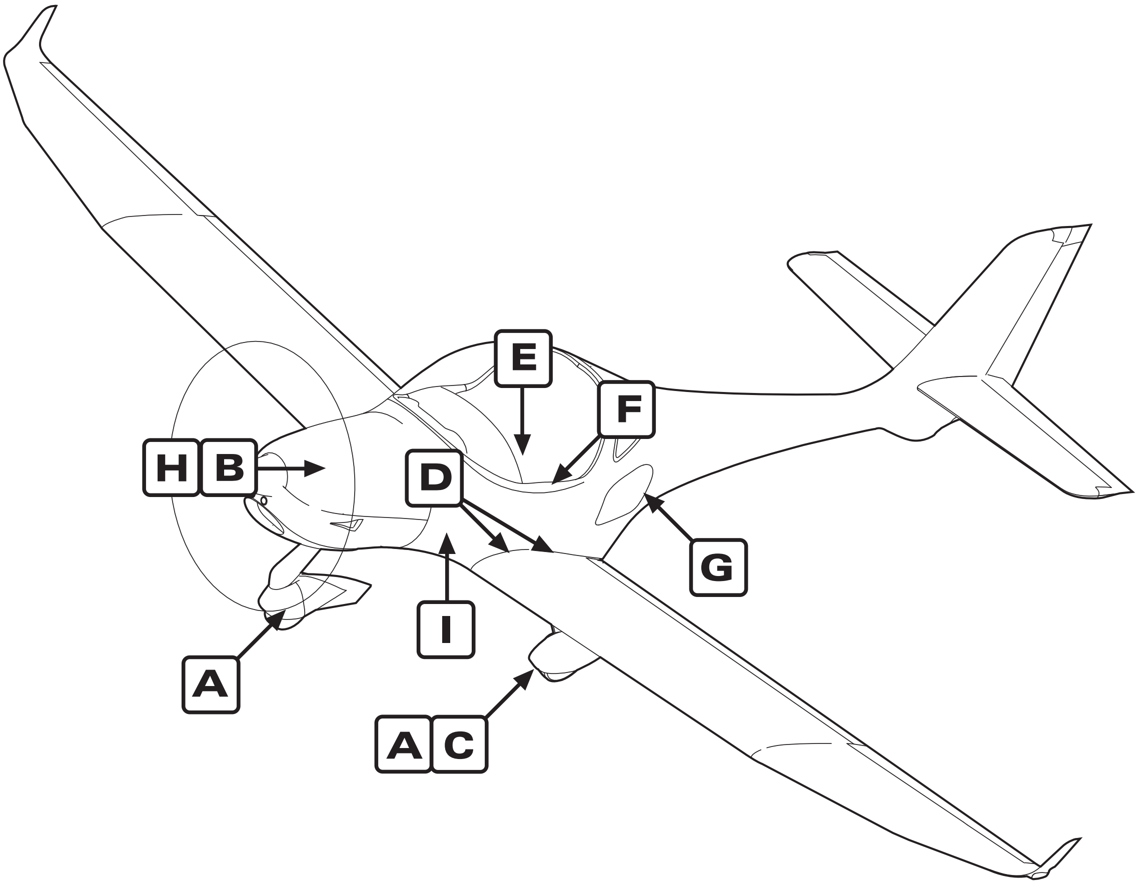
LUBRICATION - SERVICING

1. General

A. This section contains information on lubrication intervals for components or parts.

2. Lubrication Chart

A. Figure 201 shows the location of components or parts to be regularly lubricated. The following chart contains detailed information about the lubrication interval, the recommended lubricant and the dispensing equipment.



Lubrication Chart
Figure 301 (1)

INDEX	ZONE	ACCESS PLATE	ITEM	LUBE TYPE (APPL.)	INTERVAL
A	721, 722 720		Cleveland / Grove: Main wheel bearings Nose wheel bearings	GR (Hand) GR (Hand)	500 h or annual
B	120		Battery terminals	PL (Hand)	100 h
C	721 722		Cleveland / Grove: Brake anchor bolts Beringer: Brake caliper cylinder, seal groove, piston, piston seal	SG SG	annual or on assembly on assembly
D	510 610		Wing attachment bolts	GL (Hand) or GR[1] (Hand)	500 h / 5 years or on assembly
E	211		Seat tracks	Grease	annual
F	211		Canopy lock assembly	GR (Hand)	annual
G	211		Cargo door lock	GR (Hand)	as needed
H	120		Carburetor throttle shaft Engine / propeller control cables	Eng. oil (Oil can) OL, OG or Eng. oil	100 h on assembly
I	211		Rudder pedal bearing Beringer: Brake master cylinder rod ends	GR (Hand) GR (Grease gun)	annual annual

[1] If this type of lubricant is used the lubrication interval is reduced to annual.

Lubrication Chart
Figure 301 (2)

AIRCRAFT EXTERIOR - CLEANING AND CARE

1. General

A. The good flight performance of the aircraft is achieved due to the modern construction and the use of specific materials. For efficient laminar flow, a clean surface is very important. Therefore, one should always keep the entire aircraft clean, but especially the leading edges of the wing.

B. Information on preventive and protection measures, such as waxing specific surfaces, is also given.

2. Safety Precautions

A. Read and adhere to all manufacturer's instructions, warnings and cautions on cleaning/solvent compounds used.
B. Do not use silicone-based wax to polish the aircraft exterior.
C. Do not clean the aircraft at ambient temperatures close to 0°C with water.
D. Cover all lubricated parts during any cleaning process.
E. During the application of cleaners containing solvents (e.g. cleaning the engine), the other surfaces must be covered carefully or otherwise protected.

3. Cleaning and Care of the Canopy

CAUTION: NEVER USE GASOLINE, BENZENE, ALCOHOL, ACETONE, CARBON TETRACHLORIDE, LACQUER THINNER OR GLASS CLEANER. THESE MATERIALS WILL SOFTEN THE PLASTIC AND MAY CAUSE IT TO CRAZE.

CAUTION: DO NOT USE CLEANERS WITH CHEMICAL SUPPLEMENTS WHOSE EFFECT ON THE ACRYLIC SURFACE IS UNKNOWN.

A. Cleaning Canopy
  (1) Park the aircraft in a hangar or in the shadows, avoid places with a lot of dust caused by wind or vehicles.
  (2) To prevent scratches, wash the canopy carefully with plenty of mild soap and water, using the palm of the hand to feel and dislodge dirt and mud. A soft cloth, chamois leather or sponge should be used.
  (3) Rinse thoroughly and then dry with a clean moist chamois.

B. Care of the Canopy
  (1) As a protection from mechanical and chemical actions and to cover slight cuts in the canopy, a polish or a wax for acrylic glass can be applied in accordance with the manufacturer's specifications.

  NOTE: Clean surfaces before applying polish or wax.

4. Cleaning and Care of the Aircraft Exterior Surfaces

A. Procedure for cleaning the exterior surface of the aircraft
   (1) Park the aircraft in a hangar or in the shadows, avoid places with a lot of dust caused by wind or vehicles.
   (2) Close the canopy, close access / inspection doors.

CAUTION KEEP WATER AWAY FROM PITOT AND STATIC PORTS AND ELECTRICAL AND AVIONIC EQUIPMENT.

   (3) Flush away loose dirt with water.

CAUTION: DO NOT USE HARSH ABRASIVES, ALKALINE SOAPS OR DETERGENTS.

DO NOT USE CLEANING OR POLISHING AGENTS WHICH CONTAIN SILICONE.

   (4) Using a soft cleaning cloth or a sponge, wash with a mild, non-alkaline soap and water solution.
   (5) Rinse thoroughly with clean water and then dry with a soft cloth or chamois.

B. Care of the Aircraft Exterior Surface
   (1) To protect against corrosion, mechanical and chemical actions during operation, the exterior surfaces can be waxed with a good polish or aircraft wax in accordance with the manufacturer´s instructions.

NOTE: Clean aircraft exterior before applying polish or wax.

   (2) After using cleaners containing any solvent or chemical, the relevant surfaces should always be waxed.
   (3) If the aircraft is operated in a coastal or other salt-water environment, it must be washed and waxed more frequently.
   (4) A heavier wax layer on the leading edges of the wings and tail and on the cowl nose and propeller spinner will reduce abrasion in these areas.

5. Cleaning and Care of Navigation / Position / Anti-Collision Lights

A. Lights can be polished with a good wax and/or a liquid polishing compound. Refresh polish and hand buff once or twice a month.

B. After using a polishing compound, the lights should be waxed.

CAUTION: UNDER NO CIRCUMSTANCES USE ANY PETROLEUM BASED PRODUCT TO CLEAN THE LIGHTS.

6. Cleaning the Engine

A. Safety and Maintenance Precautions

(1) The engine should be cleaned during every 100-hour inspection.
(2) Handle chemical cleaners and solvents with caution. Always read the manufacturer's instruction and follow them carefully.
(3) Cleaning should be performed in the open air or in a well ventilated hangar.
(4) Suitable fire fighting and safety equipment should be available.
(5) If compressed air is used to apply solvents or to dry components, the lowest practical pressure level should be used.

B. Engine Cleaning Procedures

WARNING: DO NOT SMOKE OR EXPOSE A FLAME WITHIN 100 FEET OF THE CLEANING AREA.

(1) Remove cowling (refer to 71-10-00).

WARNING: DO NOT USE GASOLINE OR OTHER HIGHLY FLAMMABLE SUBSTANCES.

DO NOT ATTEMPT TO WASH AN ENGINE WHEN IT IS STILL HOT OR RUNNING.

CAUTION: DO NOT DIRECT CLEANING SOLVENTS OR WATER STREAMS AT OPENINGS OF THE ALTERNATOR OR THE STARTER.

(2) Carefully cover the openings of the alternator and the starter.
(3) If the engine is contaminated with salt or corrosive chemicals, first flush engine compartment with water.
(4) Apply a suitable solvent or cleaning agent to the engine compartment in accordance with the manufacturer's instructions.
(5) Leave the solvent on the engine for approx. ten minutes.

CAUTION: CLEANING AGENTS SHOULD NEVER BE LEFT IN ENGINE COMPARTMENT. CLEANER OR SOLVENT RESIDUE MAY CAUSE DAMAGE TO COMPONENTS SUCH AS NEOPRENE SEALS AND SILICONE FIRE SLEEVES.

(6) Rinse thoroughly with clean warm water.
(7) Allow engine to dry or dry it using compressed air.
(8) Remove all protection coverings.
(9) Re-lubricate all control arms and moving parts as required.
(10) Reinstall cowling (refer to 71-10-00).

WARNING: DO NOT OPERATE THE ENGINE UNTIL EXCESS SOLVENT HAS EVAPORATED OR OTHERWISE BEEN REMOVED.

BEFORE ROTATING THE PROPELLER BY HAND, ENSURE IGNITION SWITCH IS OFF AND THE THROTTLE IS CLOSED.

CAUTION: DO NOT ROTATE THE PROPELLER CLOCKWISE.

(11) Before starting the engine, rotate the propeller by hand no less than five complete revolutions.

7. Cleaning and Care of the Propeller

A. Clean propeller if necessary with any car wash solution or equivalent. This should be done at least every 50 hours.
Remove grease and dirt with a commercial detergent, which is suitable for polyurethane-lacquers.

CAUTION: IT IS IMPORTANT TO AVOID MOISTURE PENETRATING INTO THE WOODEN CORE.

Small scratches and nicks should be dealt with during routine maintenance applying a coating of water-resistant varnish, preferably Polyurethane.
Replace damaged or missing PU strips on the propeller leading edge as soon as possible.

8. Cleaning the Landing Gear

A. The landing gear struts and wheel fairings should be washed with clear water or with a mild detergent and water.

B. Wheels, axles, spacers and brake parts are protected from corrosion with an anodizing coating. This thin coating does not protect against basic agent with pH > 9.

CAUTION: CLEANING THE WHEEL AND BRAKE PARTS WITH BASIC AGENT MAY REMOVE TOTALLY THE ANODIZING COATING. ACID AGENT MAY ALSO ATTACK THE ANODIZING.

Wheel and brake parts should be cleaned using water and soap or dry clothes only.

C. After cleaning, the tires can be treated with standard tire protection.

D. Protect the disc and pads from brake fluid contamination. Brake pads are porous and cannot be cleaned if contaminated by brake fluid, they must be replaced by new ones. Clean the disc separately from the brake calipers, using thinner directly on the brake caliper may cause damage to the seals.

E. Depending on operating conditions, additional corrosion protection of wheels and brakes is reommended. Refer to Beringer Aero maintenance working card MM-00-004 for further information.

AIRCRAFT INTERIOR - CLEANING AND CARE

1. General

A. This section provides the information required to clean the aircraft interior properly. Several recommended types of cleaning agents for different materials and the relevant cleaning and care procedures are also described below.

2. Aircraft Interior Cleaning

A. Interior panels such as sidewalls, door panels etc. may be cleaned using a mild detergent solution. Stubborn deposits may be removed using a suitable material cleaner in accordance with manufacturer's instructions. If in doubt, apply a small amount of cleaner to a small unobtrusive part and test it for reaction.

3. Cleaning the Instrument Panel

A. The instrument panel, center pedestal and instruments/displays can be cleaned with a soft cotton cloth dampened with clean water. Ensure that the ALT1/BAT switch is in OFF position. Switch on the electrical systems and components of the aircraft only after the instrument panel has dried completely.

CAUTION: DO NOT USE ANY CHEMICAL CLEANING AGENTS. CARE SHOULD BE TAKEN TO AVOID SCRATCHING THE SURFACE OF DISPLAYS.

4. Cleaning the Cabin Floor

A. The floor area, the area under the seats and the baggage compartment should be cleaned regularly with a vacuum.

B. The carpet is made of high-quality, dirt repellant material and usually requires only a minimum of maintenance. If it becomes soiled, a standard carpet cleaner can be used.

5. Cleaning the Seats

A. Seat upholstery is made of a dirt repellant, hardwearing material. They should, however, be cleaned regularly to keep them in good condition. The following recommendations should be followed.

B. To remove dust and loose dirt from the seats, first clean with a vacuum.

For cleaning and care use a foam type detergent, such as is available for car seats. Follow the manufacturer´s instructions.

C. Blot up any liquid spilled promptly with an absorbent tissue or cloth. Press the blotting material firmly against the upholstery and hold for several seconds. Continue blotting until no more liquid is absorbed.

Scrape off sticky materials cautiously with a dull knife, then clean area as required.

Oil spots may be removed with household spot removers. Before using, read the instructions, test it on an obscure place on the seat and use it sparingly.

UNSCHEDULED SERVICING

1. General

A. This section contains those instructions necessary to carry out unscheduled servicing for example: removing ice and snow from a parked aircraft.

2. Removing Snow and Ice

CAUTION: DO NOT REMOVE SNOW AND ICE FROM SURFACES USING SHARP-EDGED INSTRUMENTS.

NEVER USE DE-ICING FLUIDS TO REMOVE SNOW OR ICE DEPOSITS FROM AIRCRAFT SURFACES.
HEATED DE-ICING FLUIDS CAN DAMAGE COMPOSITE STRUCTURES DUE TO EXTREME TEMPERATURE CHANGE. SOME DE-ICING FLUIDS MAY ALSO DAMAGE THE ACRYLIC GLASS OF THE CANOPY.

A. After snowfall, the snow should be removed immediately from the surface of the aircraft to prevent it from refreezing on the surface and/or in slits and gaps after it has started to thaw.

B. Procedure
(1) Remove loose snow from the wing surface with a broom, working outwards from the wing root.

NOTE: The areas between wings and ailerons and stabilizers and rudders must be treated particularly carefully.

CAUTION: DO NOT DAMAGE THE ANTENNAE.

(2) Free canopy of snow.
(3) Remove snow from cowling, fuselage and empennage.

C. In the case of ice, it is recommended to defrost the aircraft in a heated hangar. Allow all aircraft surfaces to completely dry prior to flight to prevent control surfaces from freezing.

CHAPTER 20

STANDARD PRACTICES - AIRFRAME

TABLE OF CONTENTS

STANDARD PRACTICES AIRFRAME - GENERAL

1. Introduction

A. This chapter describes standard maintenance practices applicable to the entire airframe and related systems. Maintenance procedures which are unique to a specific system / component / part are described in the corresponding chapter.

B. As far as the maintenance of the AQUILA AT01 is concerned, there are no standard practices or relevant safety regulations, which require special knowledge other than that which is commonly expected for the maintenance of small aircraft. Therefore, this chapter should serve basically as a source for conversion data.

2. General Description

Below a brief description and intended purpose of each section of this chapter is given.

A. Section 20-00-00 - Standard Practices Airframe - General. This section provides a general overview of content and purpose of the chapter.

B. Section 20-10-00 - Conversion Data. This section provides various formulae for converting metric, Imperial and US measurements.

FASTENER IDENTIFICATION AND TORQUE DATA

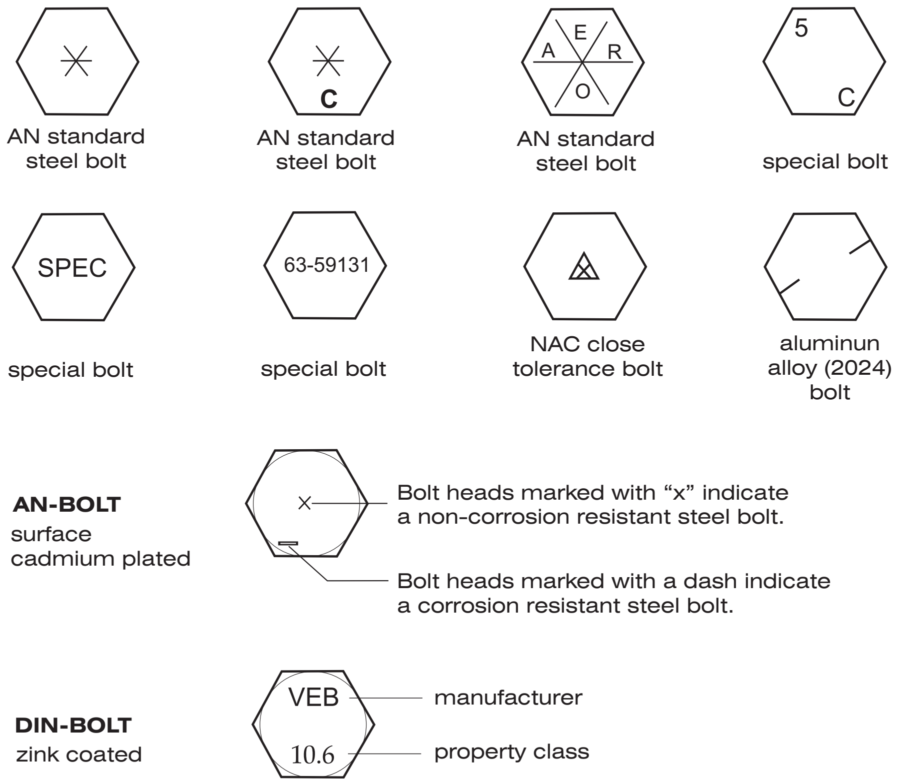
1. General

A. This section contains information concerning the identification of bolts, the correct usage of bolts and nuts and torque data.

CAUTION: OBSERVE STANDARD OR TORQUE VALUES RECOMMENDED BY THE MANUFACTURER AND MAKE SURE THE RECOMMENDED SAFETYING DEVICE FOR EVERY FASTENER IS APPLIED.

2. Bolt Types

A. The bolts used fulfill AN, MS, LN and DIN specifications. They can be identified by code marking(s) on the bolt heads. These markings generally denote the material of which the bolt is made, whether the bolt is a standard type or a special purpose bolt and sometimes include the manufacturer.



Typical Aircraft Bolt Markings
Figure 1

3. Torques

NOTE: When a specific torque is not provided in the maintenance instructions contained in this maintenance manual, use the standard torque patterns shown in table 201 respectively the special torques in table 202.

A. A correct torque application is very important. Undertorque can result in unnecessary wear of nuts and bolts, as well as the parts they secure. Overtorque can cause failure of a bolt or nut due to the overstressing of the threaded areas. Uneven or additional loads that are applied to the assembly may result in wear or premature failure. To ensure that correct torque is applied, observe the following:

(1) Be sure that the torque applied is for the size of the bolt shank and not the wrench size.

(2) Calibrate the torque wrench at least once a year, or immediately after it has been misused or dropped, to ensure continued accuracy.

(3) Be sure that bolt and nut threads are clean and dry, unless otherwise specified by the manufacturer.

(4) Run the nut down to near contact with the washer or bearing surface and check the friction drag torque required to turn the nut. Whenever possible, apply the torque to the nut and not the bolt. This will reduce rotation of the bolt in the hole and reduce wear.

(5) Add the friction drag torque to the desired torque. This is referred to as "final torque," which should register on the indicator or setting for a snap-over type torque wrench.

(6) Apply a smooth even pull when applying torque pressure. If rattling or a jerking motion occurs during final torque, turn back the nut and retorque.

(7) Many uses of bolts in aircraft/engines require stretch checks prior to reuse. This requirement is due primarily to bolt stretching caused by overtorquing.

(8) When installing a castle nut, start alignment with the cotter pin hole at the minimum recommended torque plus friction drag torque.

(9) Do not exceed the maximum torque plus the friction drag. If the hole and nut castellation do not align, change washer or nut and try again. Exceeding the maximum recommended torque is not recommended.

(10) When torque is applied to bolt heads or cap screws, apply the recommended torque plus friction drag torque.

(11) If special adapters are used which will change the effective length of the torque wrench, the final torque indication or wrench setting must be adjusted accordingly. Determine the torque wrench indication or setting with adapter installed as shown in figure 2.

B. Table 201/202 shows the recommended torque to be used when the manufacturer does not supply a specific torque for maintenance procedures.

Table 201: Standard Torques

	DIN and LN specifications	
Thread size	Torque values Nm	Torque values in.lbs
M4	1.8	15.9
M5	3.6	31.9
M6	6.4	56.6
M8	16	141.6
M10	32	283.2
M12	60	531.1

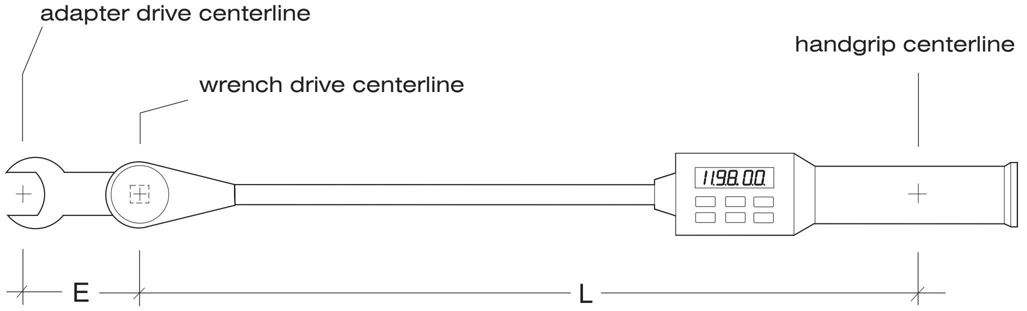
NOTE: Castellated nuts (DIN 935, 937) should be finger tightened.

Table 202: Special Torques[1)]

Part	Torque (Nm / in.lbs)	Remarks
Bolts attaching inertia reel retractor of shoulder harness to fuselage structure	4 / 35	
Bolts attaching lap belts to fuselage structure	8 / 71	
Bolts attaching engine to ROTAX engine mount	40 / 354	
Oil drain screw	25 / 221	
Old spark plugs (P/N 297940) New spark plugs (P/N 297656)	20 / 177 16 / 142	refer to Rotax SI-912-027 / SI-914-028
Main gear spring leaf attachment bolts to inner bracket	45 / 398	
Fuel drainer	- -	tighten until the outer o-ring is snug against the mating surface
Banjo bolts of the Beringer brake system	17 / 150	

1) Refer to the appropriate ROTAX publications for engine parts.

1. Variant - The adapter increases the effective length of the torque wrench.



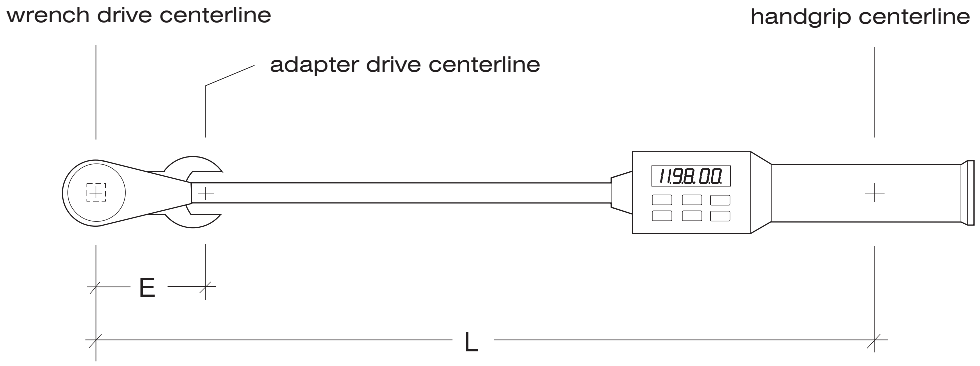
Y = apparent (indicated) torque
T = actual (desired) torque
L = effective length lever
E = effective length of extension

formula: $$\frac{T \times L}{L + E} = Y$$

example:
T = 14 Nm
L = 30 cm
Y = ?
E = 8 cm

$$Y = \frac{14\ Nm \times 0{,}3\ m}{0{,}3\ m + 0{,}08\ m} = \frac{4{,}2\ Nm}{0{,}38} = 11{,}05\ Nm$$

2. Variant - The adapter decreases the effective length of the torque wrench.



formula: $$\frac{T \times L}{L - E} = Y$$

example:
T = 14 Nm
L = 30 cm
Y = ?
E = 8 cm

$$Y = \frac{14\ Nm \times 0{,}3\ m}{0{,}3\ m - 0{,}08\ m} = \frac{4{,}2\ Nm}{0{,}22} = 19{,}09\ Nm$$

Torque Wrench with Adapters
Figure 2

CONVERSION DATA

1. General

A. This chapter is designed to assist the operator with the conversion of commonly used measuring units found in this manual from Imperial, US and metric measuring systems.

2. Conversion Factors

A. Subsequent conversion factors of units of measurement are given from the metric system to the US / Imperial systems and vice versa.

(1) Distance and length

Table 1 - Conversion of Distances and Lengths

Unit:	m	in.	ft.	yd
1 meter; m	1	39,37	3,281	1,09
1 inch; in. (")	0,0254	1	0,083	0,02
1 foot; ft. (')	0,3048	12	1	0,33
1 yard; yd.	0,914	36	3	1

statute mile = 1.609 kilometers, nautical mile=1.852 kilometers

(2) Square measures

Table 2 - Conversion of Square Measures

Unit	cm²	m²	Sq. in.	Sq. ft.	Sq. yd.
1 cm²	1	0,0001	0,155	0,00108	0,0001196
1 m²	10000	1	1550	10,764	1,196
1 sq. in.	6,452	0,00064516	1	0,006944	0,0007716
1 sq. ft.	929	0,092903	144	1	0,111111
1 sq. yd.	8361	0,836127	1296	9	1

(3) Cubic measures

Table 3 - Conversion of Cubic Measures

Unit	l	m^3	Cu. in.	Cu. ft.	Imp.-Gallons	U.S.-Gallons
1 Liter	1	0,001	61,03	0,05332	0,22	0,2642
1 m^3	1000	1	61023	35,315	219,97	264,175
1 cu. in.	0,01639	0,00001639	1	0,0005787	0,003601	0,004329
1 cu. ft.	28,32	0,028317	1728	1	6,228783	7,480519
1 Imp.-Gallon	4,546	0,004546	277,4	0,160545	1	1,20096
1 U.S.-Gallon*	3,785	0,003785	231	0,133183	0,832667	1
1 U.S.-Quart	0,9463					4

*= liquid

(4) Surface loads

1 pound by square inch = 1 psi = 1 lb/in.^{2} = 0,0703 kp/cm^2 = 0,6896 N/cm^2

1 kilopound by square inch = 1 kipsi = 1 kip/in.^{2} = 70,3100 kp/cm^2 = 689,7411 N/cm^2

1 AT = 14,7 lbs./in.^{2} = 1,0335 kp/cm^2 = 10,1386 N/cm^2

(5) Weights

1 ounce = 1 octane number = 28,3495g
1 pound = 1 lb. = 16 octane numbers = 453,5920g

(6) Moments

1 pound inch = 1 in.lbs = 0,01152 kpm = 0,11301 Nm
1 pound foot = 1 lb.ft. = 12 in.lbs = 0,13825 kpm = 1,35623 Nm

(7) Temperature

1. Temp. Centigrade = 5/9 (Temp. Fahrenheit -32)
2. Temp. Fahrenheit = 9/5 (Temp. Centigrade +32)

3. Equivalents for Standard Values

A. For conversion data to convert standard drill sizes to inch and millimeter equivalents refer to figure 1.

mm	Drill	in.	mm	Drill	in.	mm	Drill	in.
0,34	80	0,0135	1,85	49	0,0730	4,09	20	0,1610
0,37	79	0,0145	1,93	48	0,0760	4,22	19	0,1660
0,40	1/64	0,0156	1,98	5/64	0,0781	4,31	18	0,1695
0,41	78	0,0160	1,99	47	0,0785	4,37	11/64	0,1719
0,46	77	0,0180	2,06	46	0,0810	4,39	17	0,1730
	- -	- -					- -	- -
0,51	76	0,0200	2,08	45	0,0820	4,50	16	0,1770
0,53	75	0,0210	2,18	44	0,0860	4,57	15	0,1800
0,57	74	0,0225	2,26	43	0,0890	4,62	14	0,1820
0,61	73	0,0240	2,37	42	0,0935	4,70	13	0,1850
0,64	72	0,0250	2,38	3/32	0,0937	4,76	3/16	0,1875
	- -	- -		- -	- -			
0,66	71	0,0260	2,44	41	0,0960	4,80	12	0,1890
0,71	70	0,0280	2,49	40	0,0980	4,85	11	0,1910
0,74	69	0,0292	2,53	39	0,0995	4,91	10	0,1935
0,79	68	0,0310	2,58	38	0,1015	4,98	9	0,1960
0,80	1/32	0,0313	2,64	37	0,1040	5,05	8	0,1990
	- -	- -		- -	- -		- -	- -
0,81	67	0,0320	2,71	36	0,1065	5,11	7	0,2010
0,84	66	0,0330	2,78	7/64	0,1093	5,16	13/64	0,2031
0,89	65	0,0350	2,79	35	0,1100	5,18	6	0,2040
0,91	64	0,0360	2,82	34	0,1110	5,22	5	0,2055
0,94	63	0,0370	2,87	33	0,1130	5,31	4	0,2090
	- -	- -		- -	- -		- -	- -
0,97	62	0,0380	2,95	32	0,1160	5,41	3	0,2130
0,99	61	0,0390	3,05	31	0,1200	5,55	7/32	0,2187
1,02	60	0,0400	3,18	1/8	0,1250	5,61	2	0,2210
1,04	59	0,0410	3,26	30	0,1285	5,79	1	0,2280
1,07	58	0,0420	3,45	29	0,1360	5,94	A	0,2340
	- -	- -		- -	- -		- -	- -
1,09	57	0,0430	3,57	28	0,1405	5,95	15/64	0,2344
1,18	56	0,0465	3,57	9/64	0,1406	6,05	B	0,2380
1,19	3/64	0,0469	3,66	27	0,1440	6,15	C	0,2420
1,32	55	0,0520	3,73	26	0,1470	6,25	D	0,2460
1,40	54	0,0550	3,80	25	0,1495	6,35	E	0,2500
	- -	- -		- -	- -		- -	- -
1,51	53	0,0595	3,86	24	0,1520	6,35	1/4	0,2500
1,59	1/16	0,0625	3,91	23	0,1540	6,99	F	0,2750
1,61	52	0,0635	3,97	5/32	0,1562	6,63	G	0,2610
1,70	51	0,0670	3,99	22	0,1570	6,75	17/64	0,2656
1,78	50	0,0700	4,04	21	0,1590	6,76	H	0,2660

Equivalents for Drill Sizes
Figure 1

CHAPTER 21

VENTILATION AND HEATING

TABLE OF CONTENTS

VENTILATION AND HEATING - GENERAL

1. Introduction

A. This chapter describes those systems and components used to heat and ventilate the cabin.

B. Fresh air for ventilation (outside air temperature) and heated fresh air for heating and windshield defrosting is supplied to the cabin. The amount of fresh air can be regulated.

2. General Description

A. Direct Fresh Air Supply

(1) Fresh air is supplied to the cabin via two adjustable eyeball ventilators which are located on the far left and right of the instrument panel.
The ram air reaches the cabin via a NACA air intake located outside on either side of the cabin and a duct to the eyeball ventilator.

(2) The amount of fresh air can be adjusted by pivot tabs inside the eyeball ventilators.

B. Supply of Heated Fresh Air

(1) Ram air flows through a shroud attached to the exhaust and a duct to the heat relief valve.
The heat relief valve is located on the firewall in the engine compartment and is used to regulate the amount of heated air. It is actuated by a control CABIN HEAT, located on the center pedestal below the instrument panel, via a control cable.
Passing the firewall the hot air travels through the heated air distributor that is located at the firewall in the cabin. The heated air is then distributed to the pilot’s and co-pilot's feet and to the canopy.

(2) With the CABIN HEAT knob full forward, the heat relief valve is closed and heated air cannot enter the cabin. When the knob is pulled out, the heat relief valve is open.
Additional heat is available by pulling the knob out further. Maximum heat is available with the cabin heat knob in the most rearward position.
For maximum effect, the fresh air nozzles should be closed.

FRESH AIR DISTRIBUTION - MAINTENANCE

1. General

   A. Maintenance is limited to the removal and installation of the components.

2. Eyeball Ventilator Removal/Installation (Ref. Fig. 201)

   NOTE: Removal/installation of the left and right eyeball ventilator is analogous.

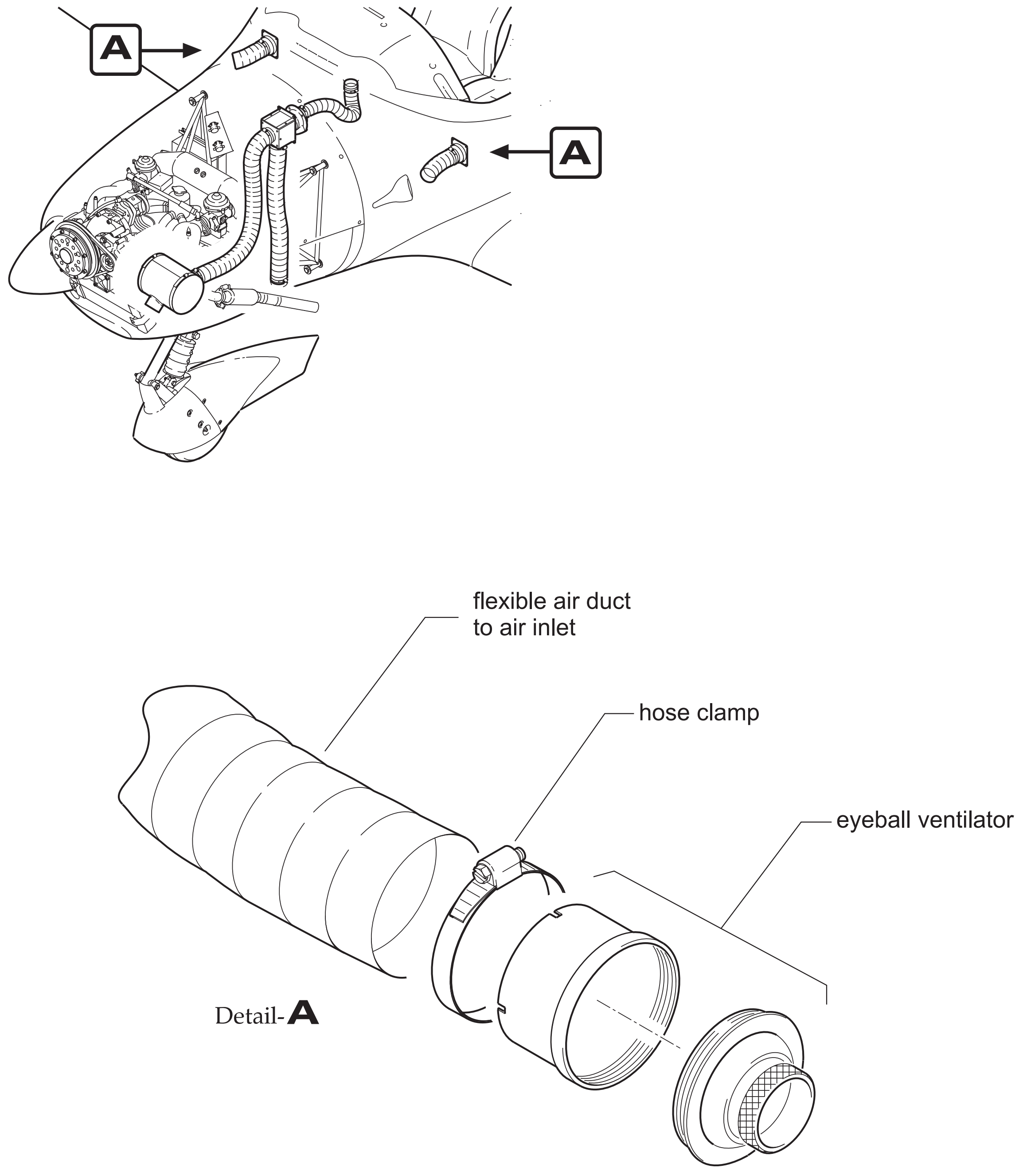
   A. Remove Eyeball Ventilator
      (1) Disconnect flexible air duct from eyeball ventilator.
      (2) Unscrew the two pieces of the eyeball ventilator and remove eyeball ventilator from instrument panel.

   B. Install Eyeball Ventilator
      (1) Position eyeball ventilator in the instrument panel and secure by screwing its two pieces together.
      (2) Connect flexible air duct to eyeball ventilator.

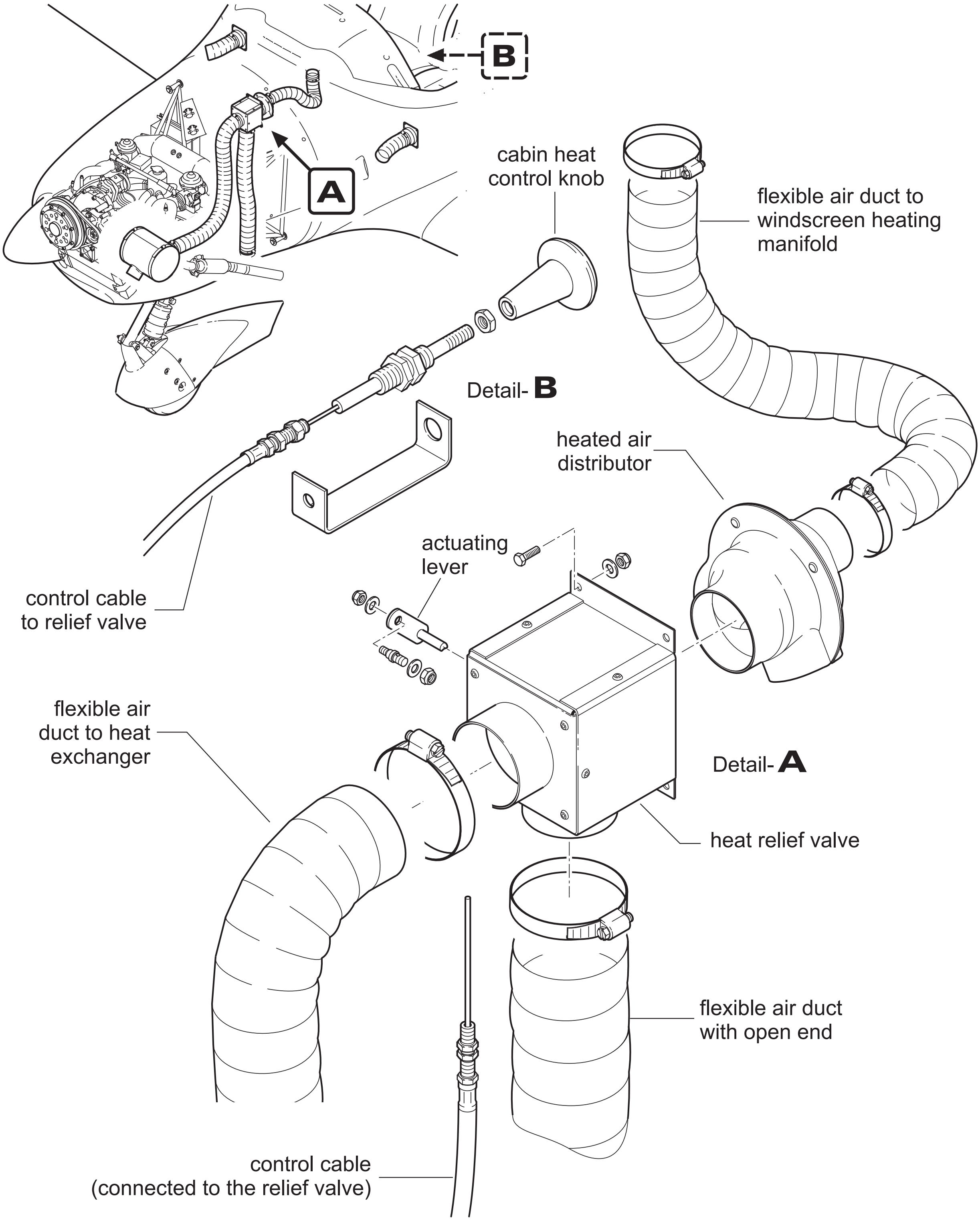
3. Heat Relief Valve Removal/Installation (Ref. Fig. 202)

   A. Remove Heat Relief Valve
      (1) Remove upper cowling (refer to 71-10-00).
      (2) Remove clamp securing flexible air duct to heat relief valve. Remove flexible air duct.
      (3) Disconnect control cable from heat relief valve control arm.
      (4) Remove bolts securing heat relief valve to firewall.
      (5) Remove heat relief valve from aircraft.

   B. Install Heat Relief Valve
      (1) Attach heat relief valve to fire wall using bolts.
      (2) Close valve plate, leave in this position.
      (3) In the cabin move heat control HEATING full forward.
      (4) Reconnect control cable to the control arm of the heat relief valve.
      (5) Install flexible air duct to heat relief valve and secure with clamps.
      (6) Install upper cowling (refer to 71-10-00).



Eyeball Ventilator Installation
Figure 201



Heat Relief Valve Installation
Figure 202

HEATING - MAINTENANCE

1. General

A. Fresh air is heated when it passes through the heat exchanger at the engine.
The heat exchanger consists of a shroud, which is set around the exhaust muffler. Flexible ducts are connected to the heat exchanger through which the air enters and exits. Ram air enters the engine via an inlet located on the lower engine cowling and is then directed to the heat exchange section of the exhaust muffler. As air passes around the exhaust muffler, it absorbs heat from the engine exhaust.

B. Maintenance is limited to inspection and removal/installation of the heat exchanger.

2. Heat Exchanger Removal/Installation

A. Remove Heat Exchanger
(1) Remove engine cowling (refer to 71-10-00).
(2) Remove clamps securing flexible ducts to heat exchanger. Disconnect ducts from heat exchanger.
(3) Remove clamps securing heat exchanger to exhaust muffler.
(4) Carefully remove exchanger from muffler.

B. Install Heat Exchanger
(1) Wrap heat exchanger around muffler and secure with clamps.
(2) Reconnect flexible ducts to heat exchanger and secure using clamps.
(3) Install cowling (refer to 71-10-00).

CHAPTER 22

AUTO FLIGHT

TABLE OF CONTENTS

AUTO FLIGHT - GENERAL

1. Introduction

A. This chapter contains information on the Garmin GFC 500 autopilot system available for the AQUILA AT01-100 and AT01-200.

The GFC 500 autopilot system consists of the following major components:
- G5 (autopilot computer; refer to 34-25-00 for inspection/maintenance)
- GMC 507 mode controller
- 2x (or 3x) GSA 28 servos (roll, pitch and optionally yaw control)
- 2x disconnect buttons (one on each control stick)

For further information refer to the applicable Garmin manuals.

2. General Description

A. The GMC 507 mode controller is the main interface of the GFC 500 autopilot. The switches allow controlling all available autopilot functions.

B. The G5 instrument is the main autopilot computer and furthermore displays active and preselected modes as well as trim requests and warnings. Software updates of the GSA 28 servos, the GMC 507 and the G5 itself are conducted via the G5.

C. Two AP disconnect switches (one on each control stick) disconnect the autopilot system.

D. Two Garmin GSA 28 servos drive the aileron and pitch control, respectively. Optionally, a third servo drives the rudder control for yaw damper function.

E. Autopilot operation requires manual actuation of the trim switch in accordance with trim advices.

F. Aural warnings are issued via the intercom. Visual annunciations are displayed on the G5 and on the G500 TXi.

EFFECTIVITY

Aircraft equipped with Garmin GFC 500 autopilot

AUTO FLIGHT - GENERAL

1. Introduction

A. This chapter contains information on the Garmin G3X autopilot system available for the AQUILA AT01-100 and AT01-200.

The G3X autopilot system consists of the following major components:
- G3X Touch (autopilot computer; refer to 34-25-00 for inspection/maintenance)
- GMC 507 (certified version) mode controller
- 2x (or 3x) GSA 28 servos (certified version; roll, pitch and optionally yaw control)
- 2x disconnect buttons (one on each control stick)

For further information refer to the applicable Garmin manuals.

2. General Description

A. The GMC 507 mode controller is the main interface of the G3X autopilot. The switches allow controlling all available autopilot functions.

B. The G3X Touch is the main autopilot computer and furthermore displays active and preselected modes as well as trim requests and warnings. Software updates of the GSA 28 servos and the GMC 507 are conducted via the G3X Touch.

C. Two AP disconnect switches (one on each control stick) disconnect the autopilot system.

D. Two Garmin GSA 28 servos drive the aileron and pitch control, respectively. Optionally, a third servo drives the rudder control for yaw damper function.

E. Autopilot operation requires manual actuation of the trim switch in accordance with trim advices.

F. Aural warnings are issued via the intercom. Visual annunciations are displayed on the G3X Touch and on the G5.

EFFECTIVITY

Aircraft equipped with Garmin G3X autopilot

AUTOPILOT - MAINTENANCE

1. General

   A. This section provides instructions necessary for authorized personnel to inspect and maintain the Garmin GFC 500 / G3X autopilot system. The system consists of the following major components:
   - G5 / G3X Touch (autopilot computer; refer to 34-25-00 for inspection/maintenance)
   - GMC 507 mode controller
   - 2x (or 3x) GSA 28 servos (roll, pitch and optionally yaw control)
   - 2x disconnect buttons (one on each control stick)

   B. Maintenance of the GFC 500 / G3X autopilot system has to be carried out in accordance with the Garmin GFC 500 Part 23 AML STC Maintenance Manual (P/N 190-02291-01).

   C. The operation of the GFC 500 / G3X autopilot requires the software versions given in the corresponding AQUILA Flight Manual Supplement.

   The actual software version is documented in the aircraft equipment list, located in chapter 6 of the airplane flight manual.

   All service information released from AQUILA and related to software versions has to be attached to this maintenance manual for continuing airworthiness!

   D. For bonding checks on the AQUILA AT01-100/200 no procedures or equipment are necessary other than that which are commonly expected for bonding measurements on small aircraft.
   Refer to AC 43.13-1B, chapter 11, section 15 “Grounding and Bonding” for further information on bonding check procedures and equipment.

   E. Following any removal, repair or exchange of equipment, perform the return to service procedure per GFC 500 maintenance manual, section 9.

2. Inspection/Check

A. Servicing of the GFC 500 / G3X autopilot equipment is ‘on condition’ only. ’On condition’ replacement and/or servicing should occur when an item exhibits conditions, symptoms, and/or abnormalities defined in section 5 of the Garmin GFC 500 Part 23 AML STC Maintenance Manual.

B. See the following table for necessary tests or checks and the specific intervals for the GFC 500 / G3X autopilot:

No.	Garmin GFC 500	Reference	Interval	Initials
1.	Visual inspection - Complete visual inspection of all installed GFC 500 / G3X autopilot components and wiring harnesses must be performed.		12 months	
2.	Electrical bonding check - Perform an electrical bonding check for each component of the GFC 500 / G3X autopilot system in accordance with the GFC 500 maintenance manual.	GFC 500 MM	2000h 10 years	
3.	Disconnect tone - Functional test of audio output has to be performed (both disconnect switches).	GFC 500 MM	12 months	

3. GMC 507 Removal/Installation

A. Remove GMC 507
(1) Ensure electrical power to aircraft and AP main switch are OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glare shield (refer to 31-10-00).
(4) Disconnect electrical connector from GMC 507.
(5) Use a 3/32” hex drive tool to loosen left and right mounting screw.
(6) Pull the unit from the instrument panel.

B. Install GMC 507
(1) Position the unit on the instrument panel.
(2) Tighten the mounting screws with a 3/32” hex drive tool (max. 2,3Nm / 20 in.lbs).
(3) Reconnect electrical connector to GMC 507.
(4) Install glare shield (refer to 31-10-00).
(5) Reconnect battery (refer to 24-30-00).
(6) Perform a functional check and further procedures per GFC 500 MM, section 7.1.

EFFECTIVITY

Aircraft equipped with Garmin GFC 500 or G3X autopilot

4. Roll Servo Removal/Installation/Inspection (Ref. Fig. 201)

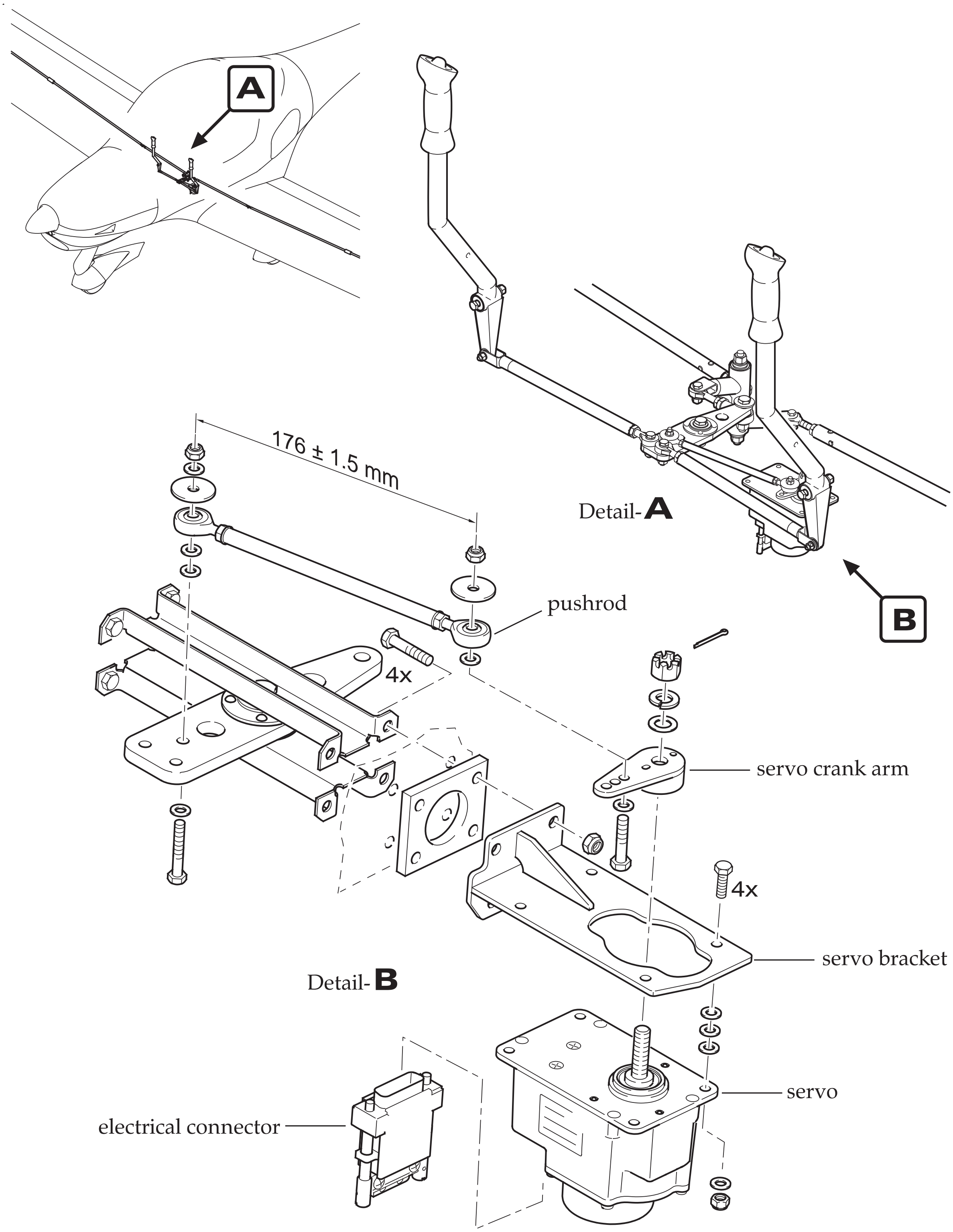
A. Remove Roll Servo
(1) Ensure electrical power to aircraft and AP main switch are OFF.
(2) Remove access panel 210 AB (refer to 06-30-00).
(3) Remove access panels 211BB, 211HL and 211HR (refer to 25-12-00).
(4) Disconnect pushrod at bell crank.
(5) Disconnect electrical connector from servo.
(6) Remove the 4 nuts holding the servo bracket in place and detach the servo bracket.
(7) Disconnect servo crank arm from servo.
(8) Disconnect pushrod from servo crank arm.
(9) Detach servo from servo bracket.

B. Install Roll Servo
(1) Mount servo to servo bracket.
(2) Verify length of pushrod (refer to “Roll Servo Inspection/Check” below).
(3) Connect pushrod to servo crank arm. Verify placard “ROLL” on pushrod.
(4) Mount servo crank arm onto servo. Tighten castle nut until lock washer is fully compressed, but do not exceed 2,2 Nm (20 in.lbs). Then loosen until adjacent castellation lines up with hole in output shaft and install cotter pin.
(5) Position and connect servo bracket to the 4 bolts.
(6) Reconnect electrical connector to servo.
(7) Connect pushrod to bell crank.
(8) Perform a functional check of the aileron control system and verify free movement from stop to stop.
(9) In case new servo has been installed and software is not updated automatically load correct software to the servo (via G5 / G3X update).
(10) Perform a functional check and further procedures per GFC 500 MM, section 7.2.
(11) Reinstall access panel 210 AB (refer to 06-30-00).
(12) Reinstall access panels 211BB, 211HL and 211HR (refer to 25-12-00).

C. Roll Servo Inspection/Check
(1) Perform visual inspection of the roll servo assembly. Check all components for proper fastening and tightness.

NOTE: In case of excessive play of the hinges replace joint heads.

(2) Verify correct length of pushrod (measure from joint head centre to joint head centre: 176 ± 1.5 mm; refer to fig. 201).
(3) Verify similar rod end thread engagement on both sides.
(4) Verify the aileron control can be manually moved smoothly from stop to stop.
No grinding audible.
(5) Reinstall all items removed for access.



Roll Servo Installation
Figure 201

EFFECTIVITY

Aircraft equipped with Garmin GFC 500 or G3X autopilot

5. Pitch Servo Removal/Installation/Inspection (Ref. Fig. 202)

A. Remove Pitch Servo
(1) Ensure electrical power to aircraft and AP main switch are OFF.
(2) Remove access panel 211KC (refer to 25-12-00).
(3) Disconnect pushrod at bell crank.
(4) Disconnect electrical connector from servo.
(5) Detach servo from servo bracket.
(6) Disconnect servo crank arm from servo.
(7) Disconnect pushrod from servo crank arm.

B. Install Pitch Servo
(1) Verify length of pushrod (refer to “Pitch Servo Inspection/Check” below).
(2) Connect pushrod to servo crank arm. Verify placard “PITCH” on pushrod.
(3) Mount servo crank arm onto servo. Tighten castle nut until lock washer is fully compressed, but do not exceed 2,2 Nm (20 in.lbs). Then loosen until adjacent castellation lines up with hole in output shaft and install cotter pin.
(4) Mount servo to servo bracket.
(5) Reconnect the electrical connector to the servo.
(6) Connect pushrod to bell crank.
(7) Perform a functional check of the elevator control system and verify free movement from stop to stop.
(8) In case new servo has been installed and software is not updated automatically load correct software to the servo (via G5 / G3X update).
(9) Perform a functional check and further procedures per GFC 500 MM, section 7.2.
(10) Reinstall access panel 211 KC (refer to 25-12-00).

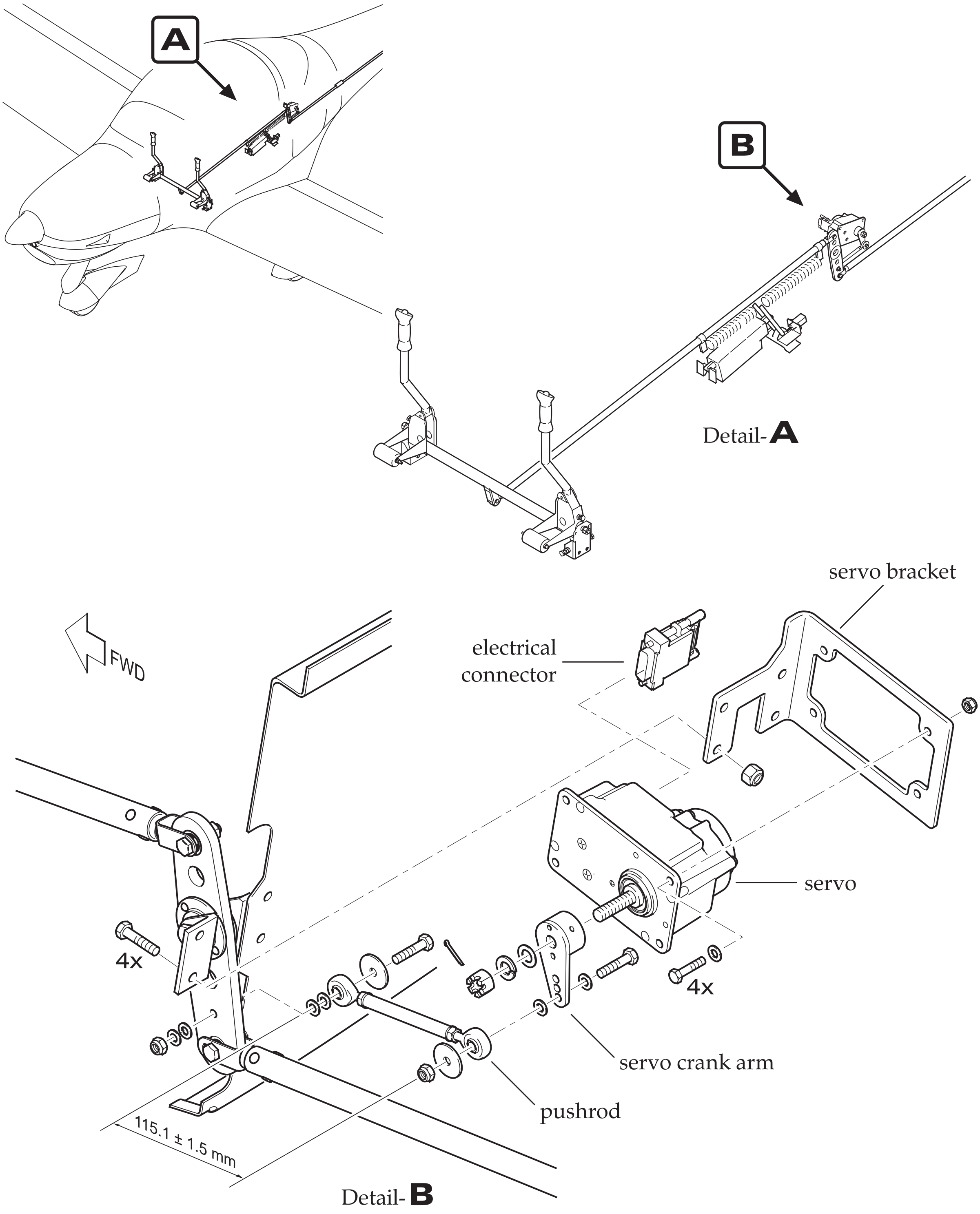
C. Pitch Servo Inspection/Check
(1) Perform visual inspection of the pitch servo assembly. Check all components for proper fastening and tightness.

NOTE: In case of excessive play of the hinges replace joint heads.

(2) Verify correct length of pushrod (measure from joint head centre to joint head centre: 115.1 ± 1.5 mm; refer to fig. 202).
(3) Verify similar rod end thread engagement on both sides.
(4) Verify the elevator control can be manually moved smoothly from stop to stop.
No grinding audible.
(5) Reinstall all items removed for access.

EFFECTIVITY

Aircraft equipped with Garmin GFC 500 or G3X autopilot



Pitch Servo Installation
Figure 202

EFFECTIVITY

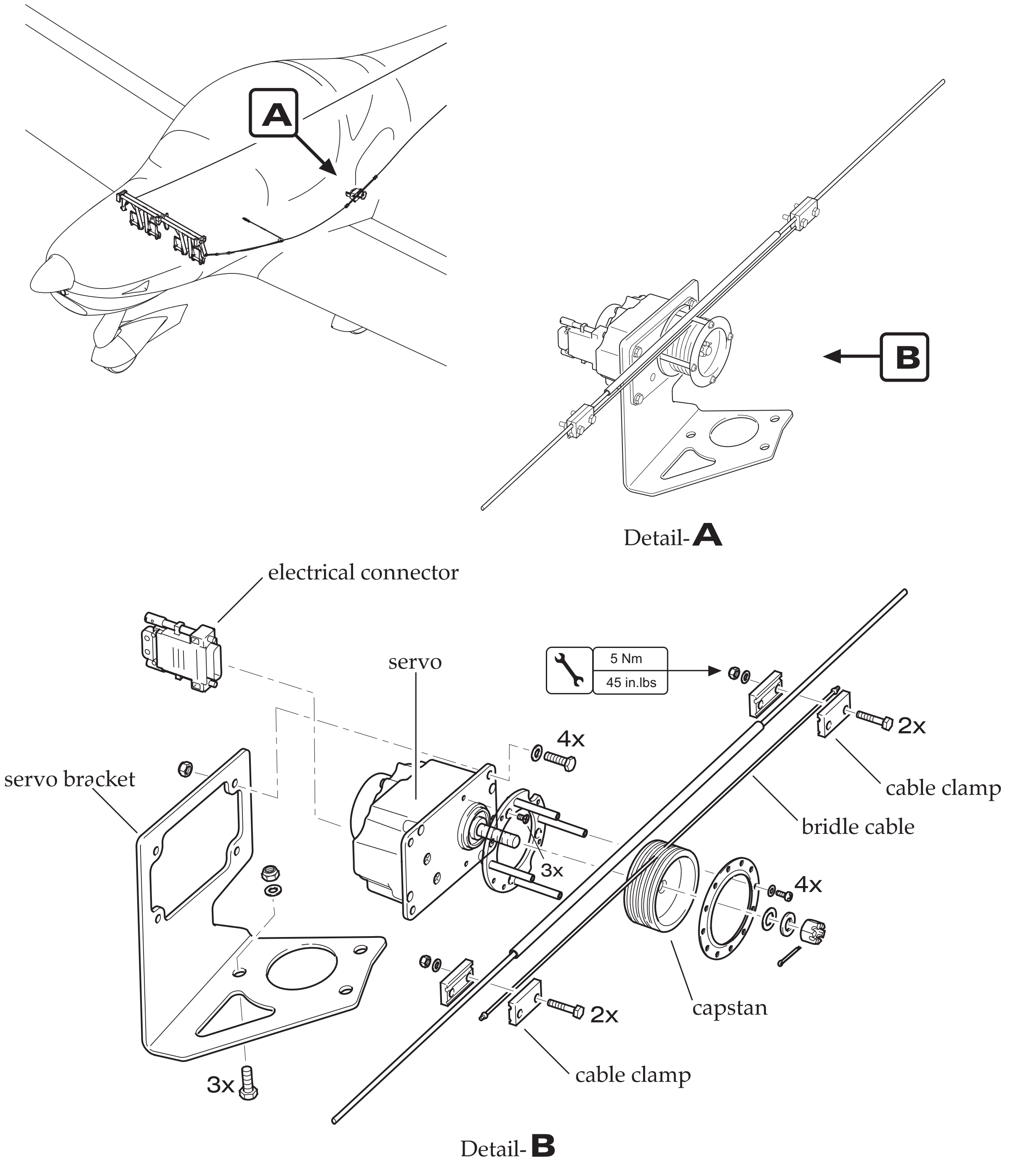
Aircraft equipped with Garmin GFC 500 or G3X autopilot

6. Yaw Servo Removal/Installation/Inspection (Ref. Fig. 203 / Optional)

A. Remove Yaw Servo
   (1) Ensure electrical power to aircraft and AP main switch are OFF.
   (2) Remove access panel 211 JB (refer to 25-12-00).
   (3) Remove 2x cable clamps.
   (4) Pull out cable from capstan.
   (5) Disconnect electrical connector from servo.
   (6) Detach servo from servo bracket.

B. Install Yaw Servo
   (1) Mount servo to servo bracket.
   (2) Reconnect the electrical connector to the servo.
   (3) Ensure pre-tension of rudder control cable is 95 ± 3 N (21.4 ± 0.7 lbs). Adjust if necessary.
   (4) Wrap bridle cable around capstan; one full wrap is required.
   Ball should be on opposite side of rudder flight control cable in the capstan groove.
   (5) Pre-position cable clamps and bridle cable.
   (6) Pre-tension bridle cable to 85 ± 3 N (19.1 ± 0.7 lbs).
   (7) Tighten clamp-kit nuts to 5,1 Nm (45 in.lbs)
   (8) Perform a functional check of the rudder control system and verify free movement from stop to stop.
   (9) In case new servo has been installed and software is not updated automatically load correct software to the servo (via G5 / G3X update).
   (10) Perform a functional check and further procedures per GFC 500 MM, section 7.2.
   (11) Reinstall access panel 211 JB (refer to 25-12-00).

C. Yaw Servo Inspection/Check
   (1) Perform visual inspection of the yaw servo assembly. Check all components for proper fastening and tightness.
   (2) Ensure the integrity of the PTFE tube around the rudder flight control cable.
   (3) Ensure the PTFE enclosed rudder control cable runs over the capstan cage, not beside it.
   (4) Check bridle cable and rudder primary control cable for fraying, corrosion or other damage.
   (5) Verify a rudder flight control cable tension of 95 ± 3 N (21.4 ± 0.7 lbs); lift nose wheel off the ground for measurement.
   (6) Verify a bridle cable tension of 85 ± 3 N (19.1 ± 0.7 lbs).
   (7) Verify ball on the cable centre is on the opposite side of the rudder flight control cable.
   (8) Move rudder control from stop to stop and ensure the bridle cable moves properly on the capstan.
   (9) Reinstall all items removed for access.



Yaw Servo Installation
Figure 203

CHAPTER 23

COMMUNICATIONS

TABLE OF CONTENTS

COMMUNICATIONS - GENERAL

1. Introduction

A. This chapter describes and provides maintenance instructions for components and systems used to communicate between occupants of the aircraft and between the aircraft and other aircraft or ground stations.

B. Technical publications available from the manufacturer or vendor of the various components and systems, which are not covered in this manual, must be utilized as necessary for the maintenance of those components and systems.

2. General Description

A. The equipment includes a VHF COM transceiver and an intercom system.

(1) The COM is for radio communication with ground control or other aircraft.
(2) Crew member headsets are connected to the COM radio and controlled by the internal or external intercom system. It facilitates external and internal communication of the crew members.

14 VDC power for the transceiver is controlled by the AVIONICS switch. The radio and the intercom system are protected by the circuit breakers labeled “COM”, “NAV” and “Audio”.

B. The following NAV/COM equipment and audio panel combinations may be installed:

(1) Garmin SL40 VHF communications transceiver with an integrated intercom.
(2) Garmin SL30 VHF communications transceiver / VOR/ILS receiver with an integrated intercom. This NAV/COM equipment may be combined with a FLYMAP L multifunctional display and a Garmin GI 106A CDI.
(3) Garmin GNS 430W or GTN 650 VHF communications transceiver / VOR/ILS receiver / GPS receiver in combination with a Garmin GMA 340 or GMA 350 audio panel.

All devices listed are mounted in the center of the instrument panel in the avionics column.

The 14 VDC power supply for the listed devices is controlled via the AVIONICS switch. The COM section of the GNS 430W, GTN 650, SL30 or SL40, whichever is installed, is supplied via a circuit breaker labelled “COM1” or ”COM2”, the NAV section via a circuit braker “NAV1” or “NAV2” and the GMA 340/350 audio panel via a circuit breaker labelled “Audio”.

SPEECH COMMUNICATION – DESCRIPTION

1. Introduction

A. This section covers the portion of the system which utilizes voice communication from air-to-air or air-to-ground installations. It includes the VHF speech communications portion of the NAV/COM radio Garmin GNS 430W or GTN 650.
The GNS 430W / GTN 650 is a combination of a VHF communications transceiver and a navigation management system which includes a GPS sensor and VOR, localizer and glideslope receivers. For information on the navigation management system of the GNS 430W / GTN 650, refer to 34-00-00 and the applicable user manuals.

B. For a complete description of the GNS 430W / GTN 650, refer to the Garmin GNS 430W pilot's guide and reference, P/N 190-00356-00, latest revision or to the Garmin GTN 650 pilot's guide and reference, P/N 190-01004-00, latest revision, respectively.

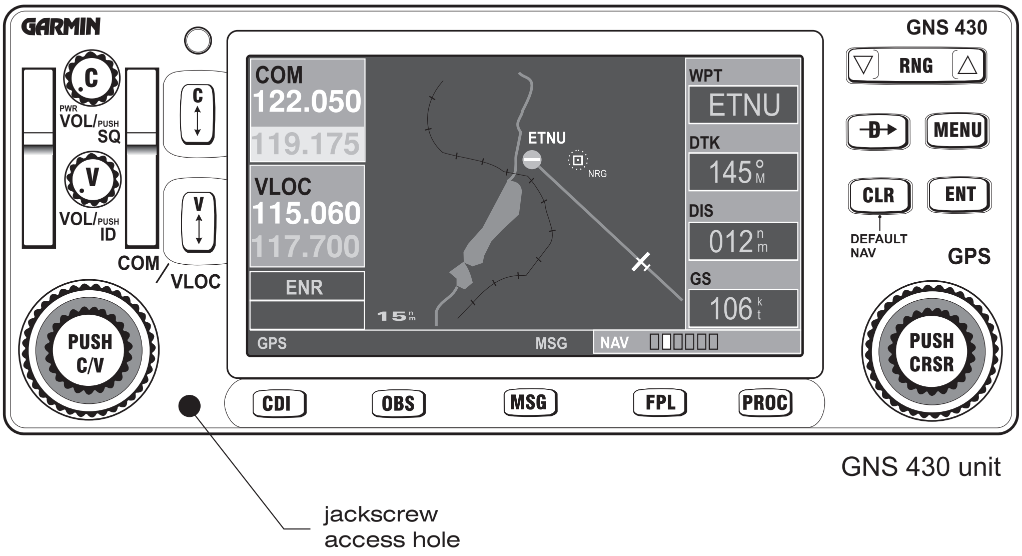
2. Description and Operation

A. Fig. 1 shows the GNS 430W / GTN 650 front view.

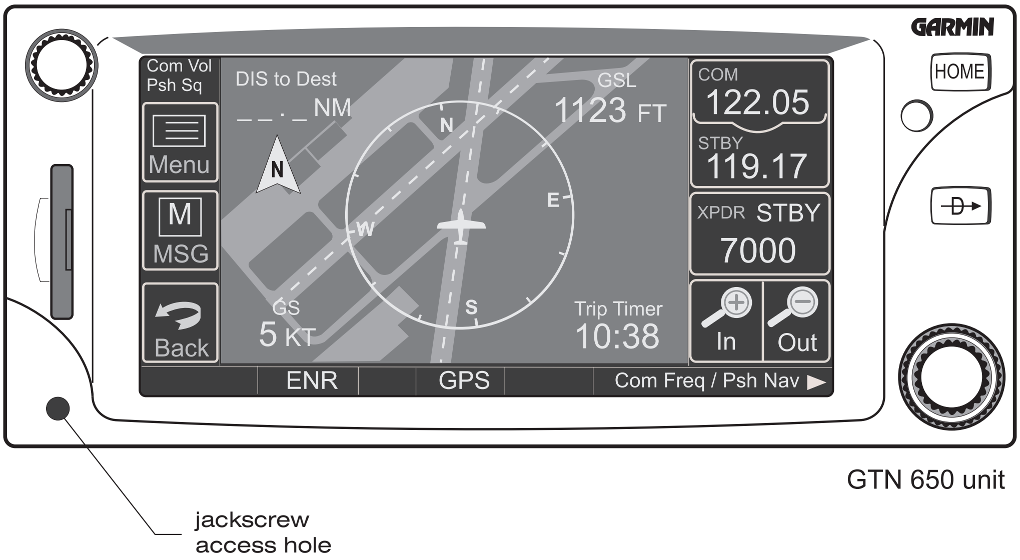
B. GNS 430W / GTN 650 VHF Speech Communication Portion - Description
   (1) The GNS 430W / GTN 650 speech communications portion consists of a digitally tuned integrated VHF communications (COM) transceiver. The transceiver receives all narrow- and wide-band VHF communications transmissions within a frequency range of 118.000 MHz to 136.975 MHz in 25.0 kHz steps (760 channels) or for use in Europe in 8.33 kHz steps (2280 channels).
   (2) The VHF COM antenna is laminated on the inner shell of the vertical stabilizer. The VHF NAV antenna is laminated on the inner shell of the horizontal stabilizer. Both antennas cannot be removed or replaced. A second VHF COM antenna may be installed on the bottom of the fuselage when the aircraft is equipped with a second NAV/COM transceiver.

EFFECTIVITY

Aircraft equipped with Garmin
GNS 430W / GTN 650



GNS 430 unit



GTN 650 unit

GNS 430, GTN 650 Front View
Figure 1

EFFECTIVITY

Aircraft equipped with Garmin
GNS 430W / GTN 650

SPEECH COMMUNICATION – MAINTENANCE

1. General

   A. The scope of maintenance is limited to the removal and installation of the components. For removal and installation procedures for the GNS 430W / GTN 650 GPS antenna, refer to 34-40-00.

   B. Refer to Garmin 400W series installation manual, P/N 190-00356-02, latest revision for additional maintenance information on the GNS 430W system, or to Garmin GTN 6XX/7XX AML STC installation manual, P/N 190-01007-A3, latest revision for the GTN 650 system, respectively.

2. NAV/COM Transceiver Removal/Installation

   A. Remove NAV/COM
      (1) Ensure electrical power to aircraft is OFF.
      (2) Insert a 3/32" hex wrench into the mounting hole (see figure 1) on the face of the NAV/COM and engage hex bolt. Turn wrench counterclockwise until locking paw releases unit from mounting tray.
      (3) Take hold of NAV/COM and carefully pull out of mounting tray.
      (4) Disconnect all plug connectors and cables. Mark the removed cables as required.

   B. Install NAV/COM
      (1) Ensure that all plugs at the back of the mounting tray are properly reconnected.
      (2) Carefully slide NAV/COM forward into the mounting tray.
      (3) Insert a 3/32" hex wrench into the mounting hole (see figure 1) on the face of NAV/COM and engage hex bolt (max. torque 1,7 Nm [15 in.lbs]). Turn wrench clockwise until locking paw secures unit to mounting tray.
      (4) Switch ON BAT and AVIONICS switches.
      (5) Turn NAV/COM power ON and verify LCD display illuminates.
      (6) Conduct a functional test of the unit.
      (7) Turn OFF the NAV/COM and the BAT and AVIONICS switches.

3. COM Antenna Removal/Installation (only external COM antenna)

   A. Remove Antenna
      (1) Ensure electrical power to aircraft is OFF.
      (2) Open baggage compartment door and remove access / inspection plate 211 KC (refer to 25-12-00).
      (3) Disconnect coax connector from antenna.
      (4) While supporting the antenna, remove 3 nuts securing antenna to fuselage.
      (5) Remove mounting plate.
      (6) Remove antenna with gasket from outside of fuselage.

B. Install Antenna

CAUTION: WIRING MUST NOT INTERFERE WITH THE OPERATION OF MOVEABLE AIRCRAFT COMPONENTS.

(1) Position antenna with gasket to fuselage.
(2) Install mounting plate from inside the fuselage.
(3) Secure antenna base to fuselage using screws, nuts and washers. Reinstall ground wire.
(4) Check bonding of the re-installed connection. Resistance must not exceed 3 mΩ.
(5) Reconnect coaxial connector and secure.
(6) Install access / inspection plate 211 KC (refer to 25-12-00).

4. Inspection/Check

A. A flight test is recommended after the GNS 430W / GTN 650 unit installation to ensure proper function. Check the communications transceiver for satisfactory operating range in several altitudes. Verify that the unit is communicating properly with in-panel instruments. Compare on-screen indications with the information depicted on the CDI.

SPEECH COMMUNICATION - DESCRIPTION

1. Introduction

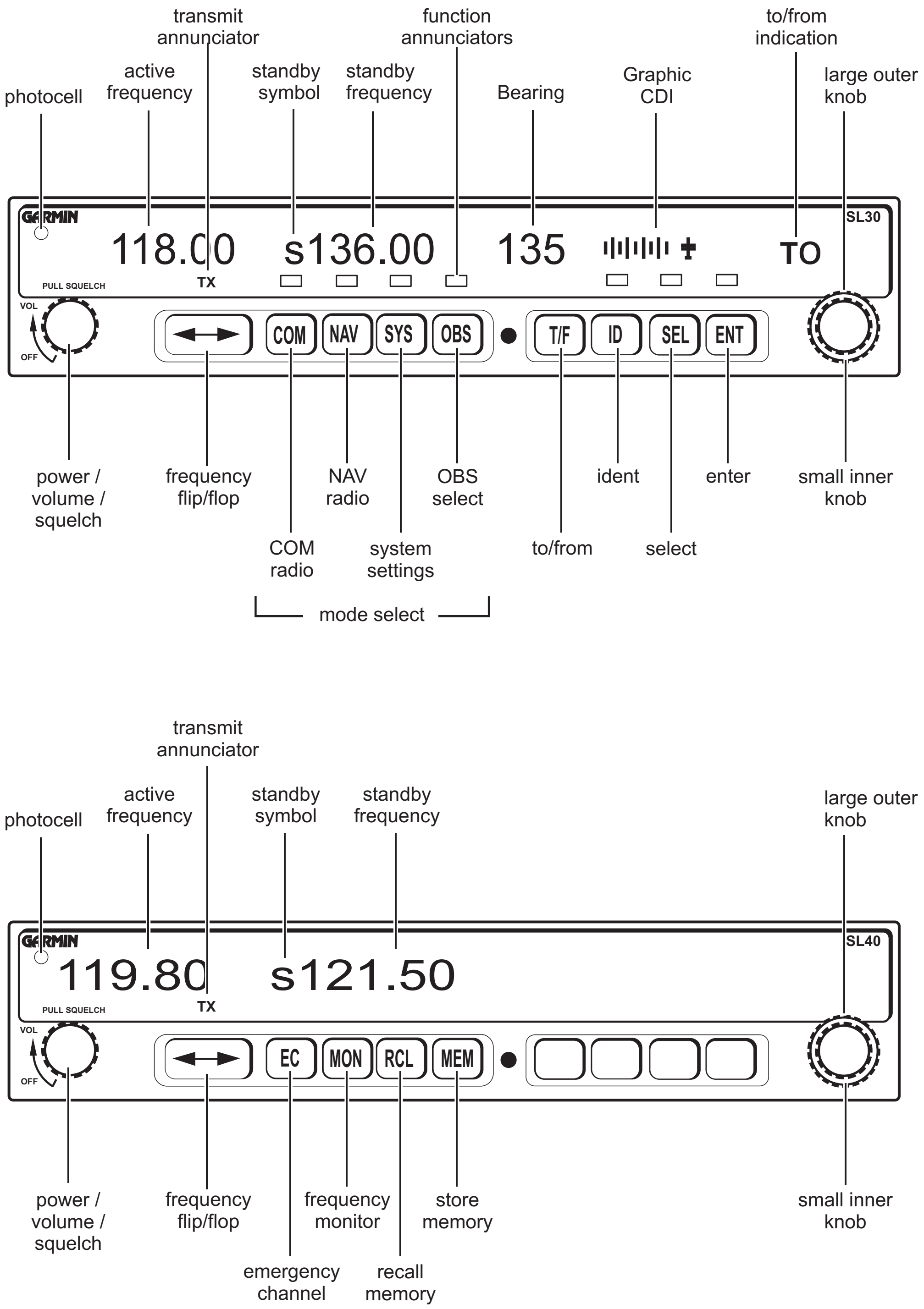
A. This section covers the portion of the system which utilizes voice communication from air-to-air or air-to-ground installations. It includes the VHF speech communications portion of the NAV/COM radio Garmin SL30 or SL40.
The SL30 combines a VHF communication transceiver and a VHF navigation receiver which includes a VOR, localizer and glideslope receiver as well as a built-in course deviation indicator. For information on the navigation portion of the SL30, refer to the SL30 NAV/COM pilot's guide, P/N 190-00486-00, latest revision.
The SL40 is a derivative of the SL30 having only its communication functions. The SL30 and SL40 contain an independent, voice-activated intercom unit with a separate power supply.

B. For a complete description of the SL30 / SL40, refer to the Garmin SL30 and SL40 pilot's guide, P/N 560-0403-01 (SL30) or P/N 560-0954-XX (SL40), latest revision.

2. Description and Operation

A. Fig. 1 shows the SL30 / SL40 front view.

B. SL30 VHF Speech Communication Portion / SL40 – Description
   (1) The knob on the left side of the SL30 controls power on/off, volume and squelch test. To turn the power on, the knob must be rotated clockwise past the detent. Once the transceiver is turned on, clockwise rotation of the knob increases the speaker and headphone volume level, counter-clockwise rotation reduces the volume level. Frequency tuning is accomplished by rotating the large (for MHz settings) and small (for kHz settings) knobs to select the desired standby frequency. The active frequency is displayed on the left side of the display, the standby frequency is indicated on the right side adjacent to the active frequency. To switch between the frequencies, the frequency flip/flop button must be pressed. A photocell located on the upper left side of the display automatically adjusts the brightness of the display to the ambient light conditions.
   (2) The VHF COM antenna is laminated on the inner shell of the vertical stabilizer. The VHF NAV antenna is laminated on the inner shell of the horizontal stabilizer. Both antennas cannot be removed or replaced. A second VHF COM antenna may be installed on the bottom of the fuselage when the aircraft is equipped with a second NAV/COM transceiver.



Garmin SL30 / SL40, Front View
Figure 1

EFFECTIVITY

Aircraft equipped with Garmin SL30 / SL40

SPEECH COMMUNICATION – MAINTENANCE

1. General

A. The scope of maintenance is limited to the removal and installation of system components.

B. For further information, refer to Garmin SL30 NAV/COM installation manual, P/N 560-0404-XX, latest revision, or Garmin SL40 NAV/COM installation manual, P/N 560-0956-XX, latest revision, as well as any other appropriate manufacturer publications. For overhaul and repair, the manufacturer of the equipment has to be consulted.

2. NAV/COM Transceiver Removal/Installation

A. Remove NAV/COM Transceiver
(1) Ensure electrical power to aircraft is OFF.
(2) Insert a 3/32" hex wrench into the mounting hole (see figure 1) on the face of the NAV/COM and engage hex bolt. Turn wrench counterclockwise until locking paw releases unit from mounting tray.
(3) Take hold of NAV/COM and carefully pull out of mounting tray.
(4) Disconnect all plug connectors and cables. Mark the removed cables as required.

B. Install NAV/COM Transceiver
(1) Ensure that all plugs at the back of the mounting tray are properly reconnected.
(2) Carefully slide NAV/COM forward into the mounting tray.
(3) Insert a 3/32" hex wrench into the mounting hole (see figure 1) on the face of NAV/COM and engage hex bolt (max. torque 1,7 Nm [15 in.lbs]). Turn wrench clockwise until locking paw secures unit to mounting tray.
(4) Switch ON BAT and AVIONICS switches.
(5) Turn NAV/COM power ON and verify LCD display illuminates.
(6) Conduct a functional test of the unit.
(7) Turn OFF the NAV/COM and the BAT and AVIONICS switches.

3. COM Antenna Removal/Installation (only external COM antenna)

A. Remove Antenna
(1) Ensure electrical power to aircraft is OFF.
(2) Open baggage compartment door and remove access / inspection plate 211 KC (refer to 25-12-00).
(3) Disconnect coax connector from antenna.
(4) While supporting the antenna, remove 3 nuts securing antenna to fuselage.
(5) Remove mounting plate.
(6) Remove antenna with gasket from outside of fuselage.

B. Install Antenna

CAUTION: WIRING MUST NOT INTERFERE WITH THE OPERATION OF MOVEABLE AIRCRAFT COMPONENTS.

(1) Position antenna with gasket to fuselage.
(2) Install mounting plate from inside the fuselage.
(3) Secure antenna base to fuselage using screws, nuts and washers. Reinstall ground wire.
(4) Check bonding of the re-installed connection. Resistance must not exceed 3 mO.
(5) Reconnect coaxial connector and secure.
(6) Install access / inspection plate 211 KC (refer to 25-12-00).

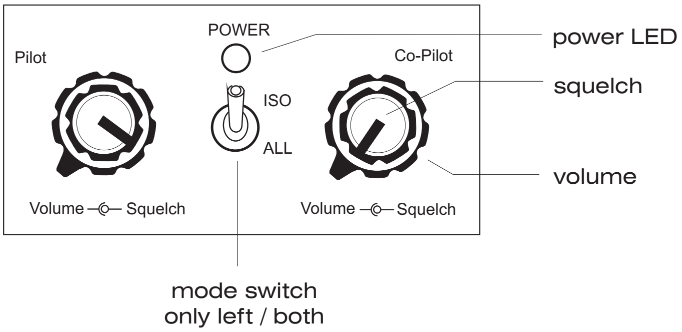
AUDIO INTEGRATING - MAINTENANCE

1. General

A. This section covers that portion of the system which controls the output of the communication and navigation receivers to crew member headphones and speakers, and the output of the crew member microphones to the communication transmitters.

B. The intercom system consists primarily of the PM 501 / PM 500EX audio control unit, located on the instrument panel, the pilot and co-pilot audio jacks mounted on the middle console near the seat backs and the push-to-talk (PTT) switches located on the control sticks.

C. The intercom system enables the use of headsets on both seats:
   (1) The communication between crew members;
   (2) Separate adjustment of sound volume at each headset;
   (3) Separate regulation of the responding level of the microphones;
   (4) The connection of the left or both crew members for audible monitoring of air-ground communication.



Intercom Control Panel
Figure 201

2. Audio Control Unit Removal/Installation

A. Remove Audio Control Unit
- (1) Ensure electrical power to aircraft is OFF.
- (2) Disconnect the plug at the back of the audio control unit.
- (3) Remove control knob caps on the front panel of the audio control unit.
- (4) Loosen and remove nuts attaching audio control unit on the left side to mounting bracket.
- (5) Holding the audio control unit, remove two screws on front panel fixing the control unit to instrument panel.
- (6) Remove audio control unit.

B. Install Audio Control Unit
- (1) Install audio control unit to the instrument panel and secure using two screws.
- (2) Secure audio control unit on the left-hand side to the mounting bracket using two nuts.

NOTE: During installation make sure that the position of control knob caps is conform to the position of the control knob axles.

- (3) Install the control knob caps on the face of the audio control unit.
- (4) Reconnect the plug connector and secure as required at the back of the audio control unit.
- (5) Conduct a functional test of the unit.

EFFECTIVITY

Aircraft equipped with PS Engineering
PM 501 / PM 500EX

AUDIO INTEGRATING - MAINTENANCE

1. General

A. This section covers that portion of the system which controls the output of the communication and navigation receivers to crew member headphones and speakers, and the output of the crew member microphones to the communication transmitters.

B. The GMA 340 / GMA 350 intercom system consists primarily of the GMA 340 / GMA 350 audio control unit, located on the instrument panel in the avionics column, the pilot and co-pilot audio jacks mounted on the middle console near the seat backs and the push-to-talk (PTT) switches located on the control sticks.

C. The Garmin GMA 340 / GMA 350 audio panel (refer to figure 201) provides audio amplification, audio selection, marker beacon control (optional) and a voice activated intercom system for the headsets and microphones. The system allows audio switching for up to three transceivers (COM 1,COM 2 and COM 3) and five receivers (NAV 1, NAV 2, ADF, DME and MKR). A fail-safe mode connects the pilot headphone and microphone to COM 1 if power is removed or if the MIC selector switch is turned to the OFF position.

D. For a complete description of the GMA 340 / GMA 350 audio panel, refer to the Garmin GMA 340 pilot's guide, P/N 190-00149-10, revision A or higher, and to the Garmin GMA 350 pilot's guide, P/N 190-01134-12, revision D or higher.

E. For additional information on maintenance of the GMA 340 / GMA 350 audio panel, refer to the Garmin GMA 340 installation manual, P/N 190-00149-01, revision K or later, and to the Garmin GMA 350 installation manual, P/N 190-01134-11, revision B or later.

2. Audio Control Unit Removal/Installation

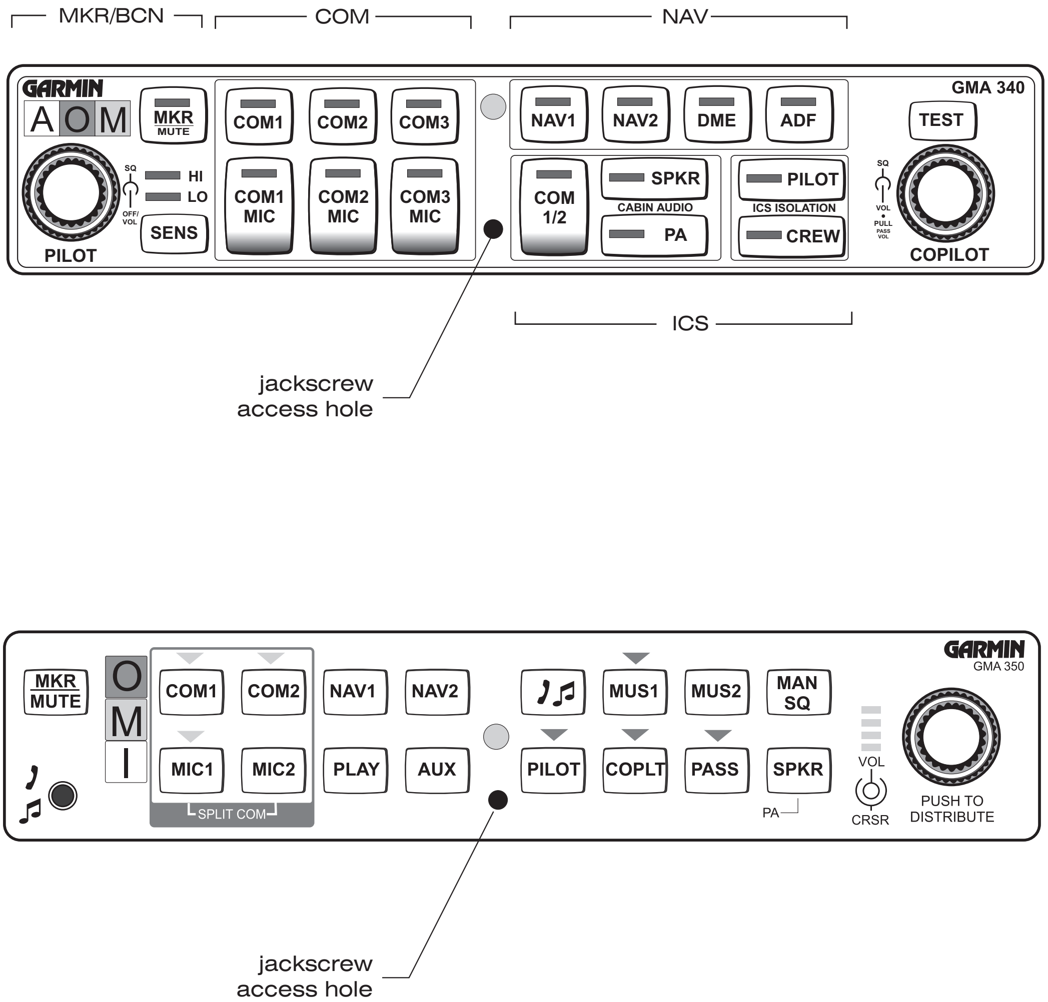
A. Remove Audio Control Unit
(1) Ensure electrical power to aircraft is OFF.
(2) Insert a 3/32″ hex wrench into the jackscrew access hole on the faceplate (refer to figure 201).
(3) Turn jackscrew counterclockwise to loosen locking cam. Cam will move the unit out and disengage from the electrical connectors.
(4) Carefully pull out the audio control unit from the rack.

B. Install Audio Control Unit

CAUTION: CHECK WIRING CONNECTIONS FOR ERRORS BEFORE INSERTING THE GMA 340 / GMA 350 INTO THE TRAY. INCORRECT WIRING COULD CAUSE INTERNAL COMPONENT DAMAGE.

(1) Slide the unit into the rack until the jackscrew makes contact with the receptacle located in the back plate.
(2) Insert a 3/32″ hex wrench into the jackscrew access hole on the faceplate (refer to figure 201).

(3) Turn the wrench clockwise until the unit is secured in the rack. Continue turning until tight, but do not over-tighten.
(4) Conduct a functional test of the unit.



GMA 340 / GMA 350 Audio Panel, Front View
Figure 201

EFFECTIVITY

Aircraft equipped with Garmin
GMA 340 / GMA 350

CHAPTER 24

ELECTRICAL POWER

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ELECTRICAL POWER - GENERAL

1. Introduction

A. This chapter describes the units and components, which generate, control and supply AC and DC electrical power for other systems.

2. General Description

A. The aircraft is equipped with a 12V DC electrical system. It is powered by a belt driven 600W alternator (ALT 1) and a 12V battery which is installed on the front-right side of the firewall.
All essential electrical accessories in the system are protected by circuit breakers. These are to be found on the right side of the instrument panel.
Electrical power distribution to the various accessories is characterized through functionality and safety. It is accomplished by two main bus bars - the aircraft bus bar and the avionics bus bar.

On aircraft equipped for Night-VFR or with a Rotax 914 engine, the internal alternator (ALT 2) integrated in the engine is activated in order to provide a second independent power source. To supply DC to the electrical system, this permanent magnet generator is used in combination with a Rotax specified rectifier-regulator, which is installed at the front-left side of the firewall.

On aircraft equipped with a Rotax 914 engine, the internal alternator is used as an emergency power supply for the electrical main fuel pump. It is therefore possible to disconnect the internal alternator from the rest of the aircraft's electrical system and to feed the main fuel pump exclusively. As a safety measure, an additional battery (BAT 2) is installed at the front-left side of the firewall to stabilize the voltage on control pin "C" of the rectifier-regulator. This prevents the regulator from switching off the internal alternator in case of severe voltage drops.

As an option, the aircraft may be equipped with an external power receptacle mounted on the right side of fuselage just forward of the firewall. The receptacle permits the use of an external power source for cold weather starting and maintenance procedures requiring reliable power for an extended period.

ELECTRICAL POWER - TROUBLESHOOTING

1. Troubleshooting

   A. If a power problem or a complete blackout occurs, first check all connections to the components and the circuit breakers.

   B. Troubleshooting Chart:

TROUBLE	POSSIBLE CAUSE	REMEDY
No alternator output, voltmeter indicates 12 V, ammeter indicates discharge	ALT1 switch OFF Defective alternator Circuit breaker activated (open)	Turn switch ON. Replace alternator. Troubleshoot circuit and reset circuit breaker.
Battery will not supply power or is incapable of cranking engine.	Battery is discharged	Step 1: Place BAT switch and LDG LIGHT switch in ON Position. Measure battery voltage. A normally charged battery will indicate 12,5 volts or more. If . voltage is low, proceed to step 2. If voltage is normal proceed to step 3.
	Defective battery	Step 2: Charge battery approx. 30 minutes. If the battery tester indicates a good battery, the cause was a discharged battery. If the tester indicates a defective battery, replace the battery.
	Defective wiring or electrical connection between battery terminal and battery relay.	Step 3: With switch BAT in ON position, measure voltage between battery terminal and battery relay. Correct value would be 0 V. If voltage reads 0 V, proceed to step 4. If a voltage reading is obtained, check wiring between battery terminal and battery relay.
	Defective battery relay.	Step 4: With switch BAT in ON position, measure voltage between relay terminals. Correct value would be 0 V. If voltage reads 0 V, proceed to step 5.

TROUBLE	POSSIBLE CAUSE	REMEDY
		If a voltage reading is obtained, replace battery relay.
	Defective wiring or electrical connection between battery relay and starter relay.	Step 5: With switch BAT in ON position, measure voltage between starter side relay terminal, and starter relay. Correct value would be 0 V. If a voltage reading is obtained, check wiring between starter side relay terminal and starter relay
No internal alternator output (ammeter ALT2 indicates 0A with ALT1 switched OFF)	ALT2/BAT2 switch OFF	Turn switches ON.
	Defective ALT2	Refer to applicable ROTAX publications.
	Circuit breaker activated (open)	Troubleshoot circuit and reset circuit breaker.
	Defective ALT2 regulator	Replace ALT2 regulator.
	Defective ALT2 disconnect relay	With switches BAT and ALT2/BAT2 in ON position, measure voltage between disconnect relay terminals. Correct value would be 0V. If a voltage reading is obtained, check the wiring at the coil of the disconnect relay and it’s circuit breaker. Measure the voltage between the coil terminals of the disconnect relay, if a voltage above 12V is obtained, replace the disconnect relay.

ALTERNATOR SYSTEM - DESCRIPTION

1. Introduction

A. The alternator system supplies the electrical equipment with electrical power when the engine is running and is the main current source in the power supply design.

B. The alternator system consists of the following components:

- external alternator (ALT 1)
- internal alternator (ALT 2 / only Night-VFR or Rotax 914 equipped aircraft)
- rectifier-regulator unit (only Night-VFR or Rotax 914 equipped aircraft)
- additional battery (BAT 2 / only Rotax 914 equipped aircraft)
- alternator circuit breaker(s)
- alternator warning light(s)
- alternator switch(es)
- Schottky diodes, ALT 2 disconnect relay, resistor, fuses (only Rotax 914 equipped aircraft)

2. Description and Operation

A. The external alternator (ALT 1) is installed on the forward left side of the engine, to the left of the gearbox. It is belt-driven and incorporates an internal voltage regulator. The external alternator is supplied with an excitation voltage by the battery when the ALT1/BAT switch is turned ON. When the engine is running, the alternator generates a three-phase current that is rectified and regulated by the internal voltage regulator. The voltage regulator supplies a 14 V DC voltage to the aircraft bus when engine speed is at or above 800 rpm. The maximum current load is approx. 45 A.
The alternator circuit breaker is installed in the circuit breaker panel on the far right side of the instrument panel and it protects the system from overloading. The red ALT 1 warning light is located in the row of annunciator lights on the instrument panel and indicates undervoltage.

B. Aircraft equipped for Night-VFR or with a Rotax 914 engine additionally use the internal alternator (ALT 2) integrated in the ROTAX engine as a second independent power source. This permanent magnet alternator (250W) does not need any external voltage supply for excitation. To supply DC to the aircraft electrical system it is used in combination with a ROTAX specified rectifier-regulator unit, which is installed on the front-left side of the firewall. The red ALT 2 warning light is located in the row of annunciator lights on the instrument panel. It is controlled by the rectifier-regulator unit and indicates undervoltage.

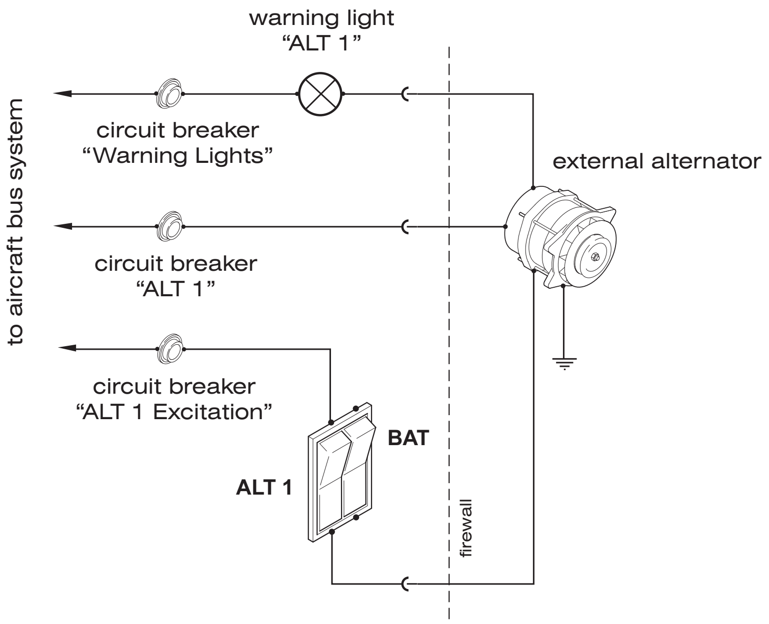
C. On aircraft equipped with a Rotax 914 engine, the internal alternator is used as an emergency power supply for the electrical main fuel pump. It is therefore possible to disconnect the internal alternator from the rest of the aircraft's electrical system by switching OFF the ALT2 switch.
A voltage drop or short in the aircraft's electrical system will automatically disconnect the internal alternator's output from the rest of the system. In all of these cases, the internal alternator feeds the main fuel pump exclusively.
As a safety measure, an additional battery (BAT 2) is installed at the front-left side of the firewall to stabilize the voltage on control pin "C" of the rectifier-regulator. This prevents the regulator from switching off the internal alternator in case of severe voltage drops.

BAT 2 is protected from loads (incl. the main fuel pump) by a Schottky diode and charged by the internal alternator with charging overcurrent protection. The battery is switched OFF via the ALT2/BAT2 switch whenever the aircraft is parked to prevent discharge of the battery.
For wiring protection two 10A fuses are installed together with the Schottky diodes under a separate cover on the front left side of the firewall in the engine compartment.
BAT 2 has to be replaced annually.

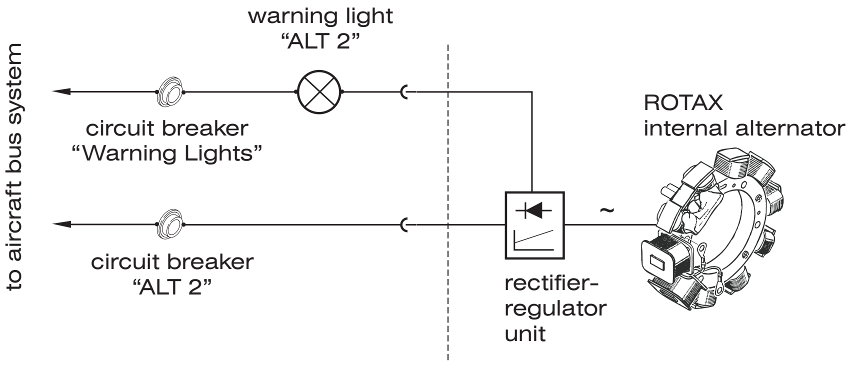
D. An ammeter measures the charge or discharge current to/from the main battery. On aircraft equipped with Rotax 914 engine additional ammeters are provided for the external and internal alternator. The voltmeter is connected with the aircraft bus bar. All instruments are found on the right side of the instrument panel in the instrument cluster or in the digital engine monitor.

E. The alternator warning lights and ammeter discharge indication may illuminate during low rpm with an electrical load on the system, for example during low rpm taxi. The lights will extinguish at higher rpm.

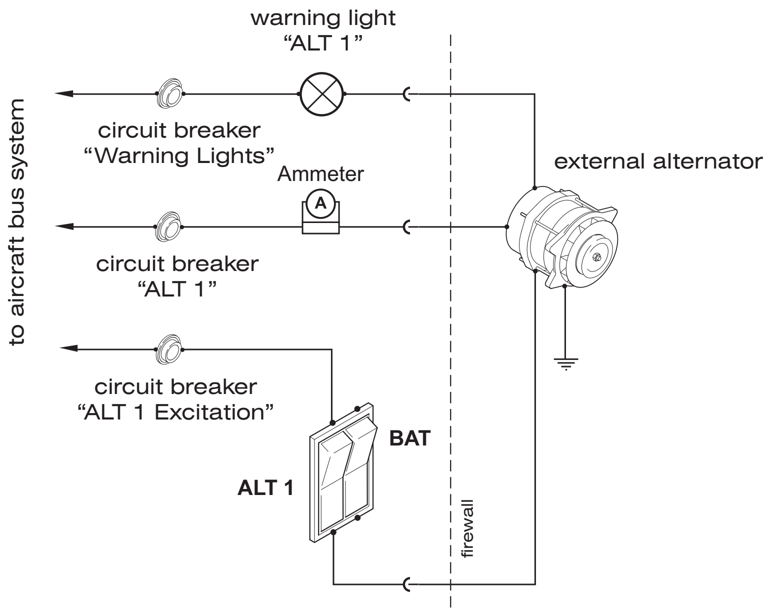
F. Refer to applicable ROTAX publications for more information on the external and internal alternators and the rectifier-regulator unit.



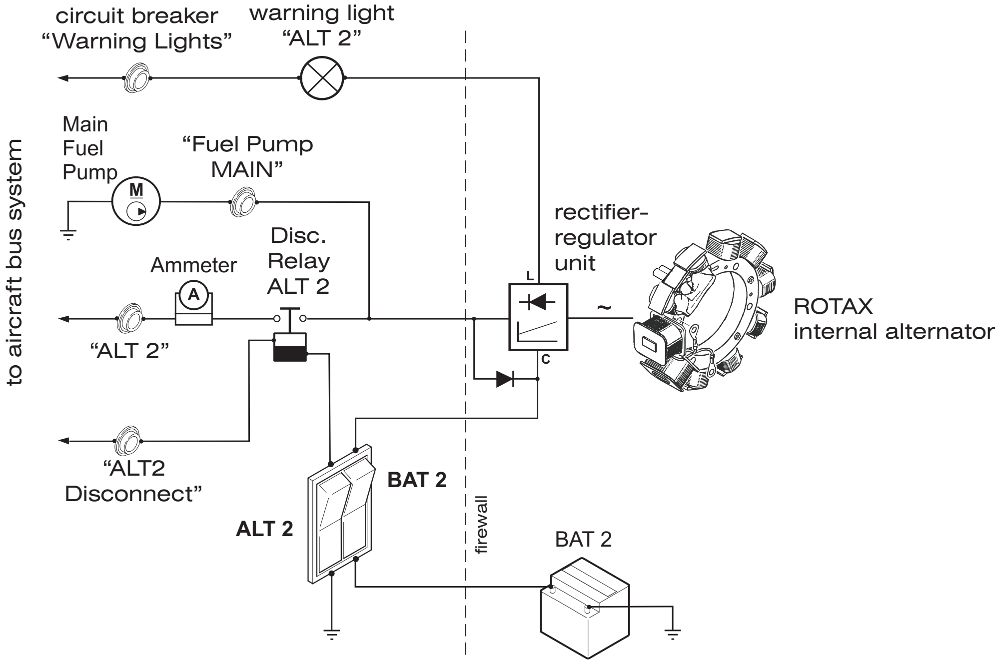
External Alternator System (Schematic)
Figure 1



ROTAX Internal Alternator System (Schematic, Night-VFR equipped aircraft only)
Figure 2



External Alternator System (Schematic)
Figure 1



ROTAX Internal Alternator System (Schematic)
Figure 2

EFFECTIVITY

Aircraft equipped with Rotax 914F engine

ALTERNATOR SYSTEM - MAINTENANCE

1. General

A. Maintenance is limited to the removal and installation of the (external) alternator, drive belt and rectifier-regulator unit (only Night-VFR or Rotax 914 equipped aircraft). Refer to the appropriate ROTAX publications for maintenance procedures on the internal alternator.

2. External Alternator Removal/Installation

A. Remove External Alternator
  (1) Ensure electrical power to aircraft and ignition switch is OFF. Remove key.
  (2) Remove cowling (refer to 71-10-00).
  (3) Disconnect battery (refer to 24-30-00).
  (4) Disconnect electrical cables (include ground cable) from alternator.
  (5) Cut safety wire and loosen adjusting bolt and alternator mounting bolts.
  (6) Slip drive belt off alternator pulley.
  (7) Remove mounting bolts securing alternator to engine. Remove alternator from engine.

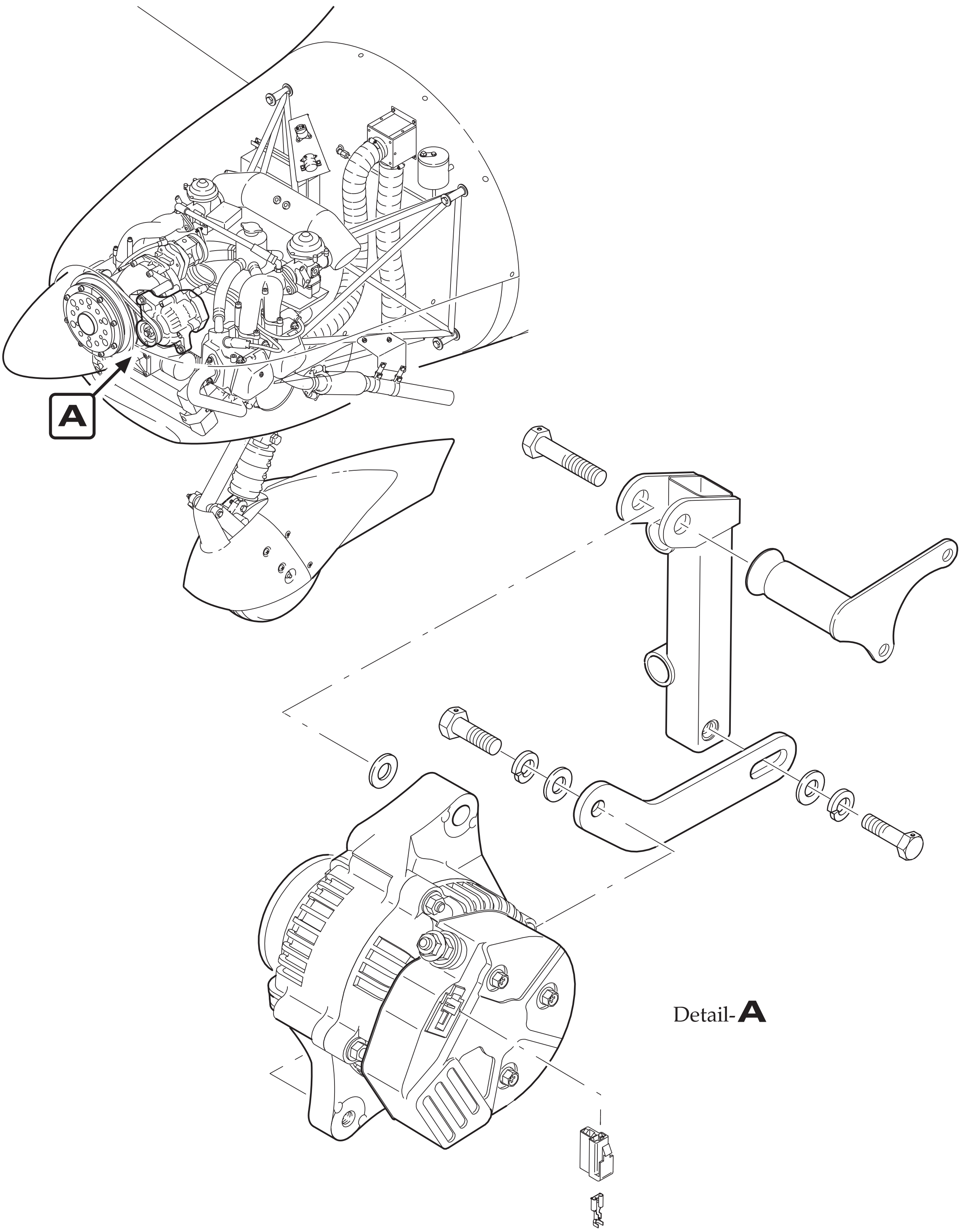
B. Install External Alternator
  (1) Position alternator into mounting bracket.
  (2) Install shim and mounting bolt as shown in figure 201. Do not tighten yet.
  (3) Loosely secure lower alternator mounting boss to adjustment cam using washers and bolt (refer to figure 201).
  (4) Place drive belt on alternator pulley. Verify pulleys are aligned.

CAUTION: IF A NEW DRIVE BELT IS INSTALLED: THE ENGINE BELT TENSION SHOULD BE RECHECKED WITHIN THE FIRST 15 TO 20 HOURS OF OPERATION.

  (5) Apply a torque wrench to the alternator pulley nut and adjust belt tension so the belt slips at:
    (a) 10 - 12 Nm (88 - 106 in.lbs) of torque with a used belt;
    (b) 15 - 18 Nm (133 - 159 in.lbs) of torque with a new belt
  (6) Tighten adjusting bolt. Torque to 22 Nm (195 in.lbs).
  (7) Tighten alternator mounting bolts.
    (a) Torque M10 bolt (upper alternator mounting bracket) to 40 Nm (355 in.lbs).
    (b) Torque M8 bolt to 22 Nm (195 in.lbs).
  (8) Safety wire all bolts.
  (9) Reconnect electrical cables including the ground cable.
  (10) Reconnect battery (refer to 24-30-00).
  (11) Install cowling (refer to 71-10-00).

3. External Alternator Drive Belt Removal/Installation

A. Remove Alternator Drive Belt
  (1) Ensure electrical power to aircraft and ignition switch is OFF. Remove key.
  (2) Remove engine cowling (refer to 71-10-00).
  (3) Disconnect battery (refer to 24-30-00).



External Alternator Installation
Figure 201

(4) Cut safety wire and loosen adjusting bolt and alternator mounting bolts.
(5) Slip drive belt off alternator pulley.
(6) Remove propeller (refer to 61-10-00).
(7) Remove alternator drive belt.

B. Install Alternator Drive Belt
(1) Install alternator drive belt around drive pulley.
(2) Install propeller (refer to 61-10-00).
(3) Place drive belt on alternator pulley. Verify pulleys are aligned.

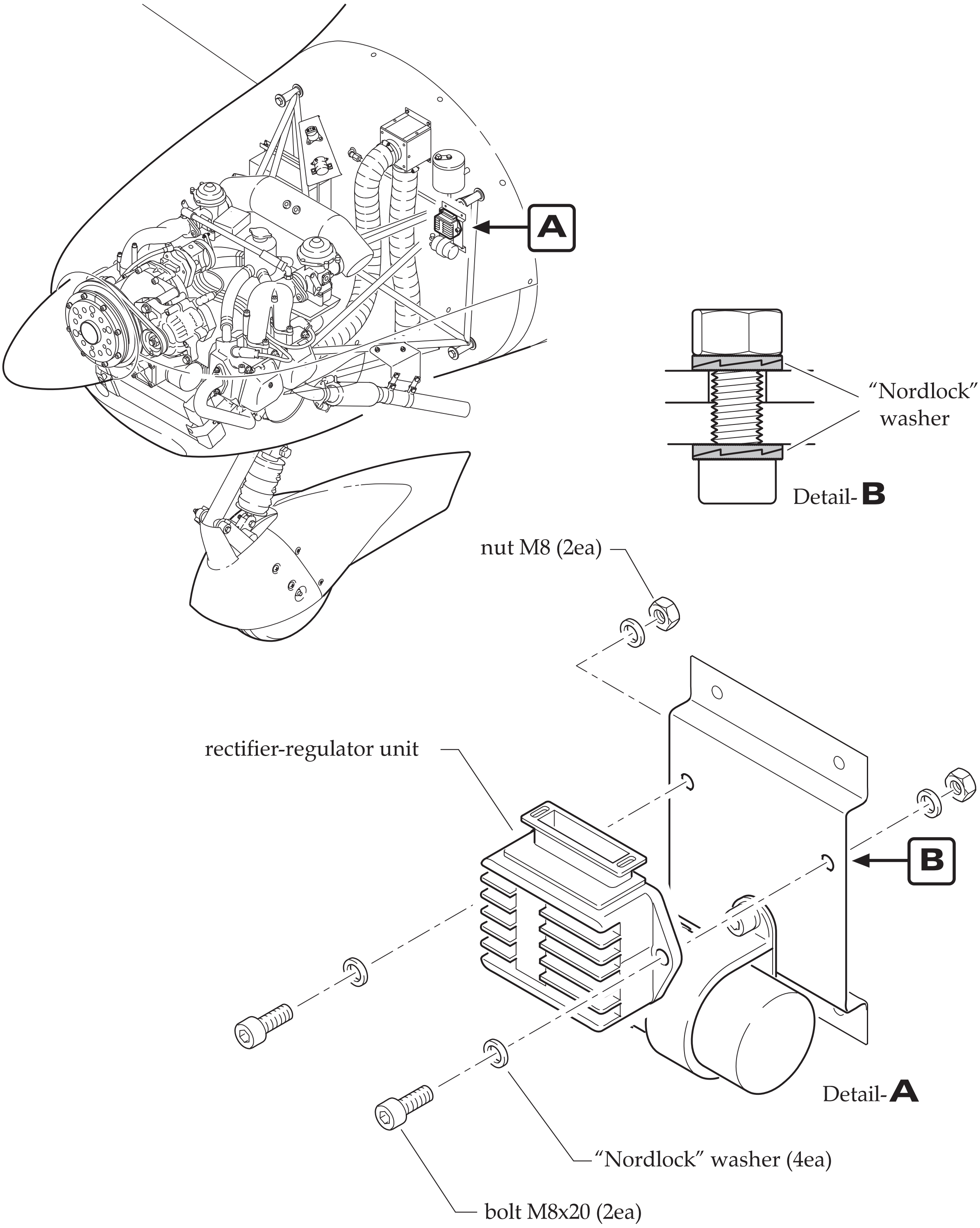
<u>CAUTION:</u> IF A NEW DRIVE BELT IS INSTALLED: THE ENGINE BELT TENSION SHOULD BE RECHECKED WITHIN THE FIRST 15 TO 20 HOURS OF OPERATION.

(4) Apply a torque wrench to the alternator pulley nut and adjust the belt tension so the belt slips at:
    (a) 10 - 12 Nm (88 - 106 in.lbs) of torque with a used belt;
    (b) 15 - 18 Nm (133 - 159 in.lbs) of torque with a new belt
(5) Tighten adjusting bolt. Torque to 22 Nm (195 in.lbs).
(6) Tighten alternator mounting bolts.
    (a) Torque M10 bolt (upper alternator mounting bracket) to 40 Nm (355 in.lbs).
    (b) Torque M8 bolt to 22 Nm (195 in.lbs).
(7) Safety wire all bolts.
(8) Reconnect battery (refer to 24-30-00).
(9) Install engine cowling (refer to 71-10-00).

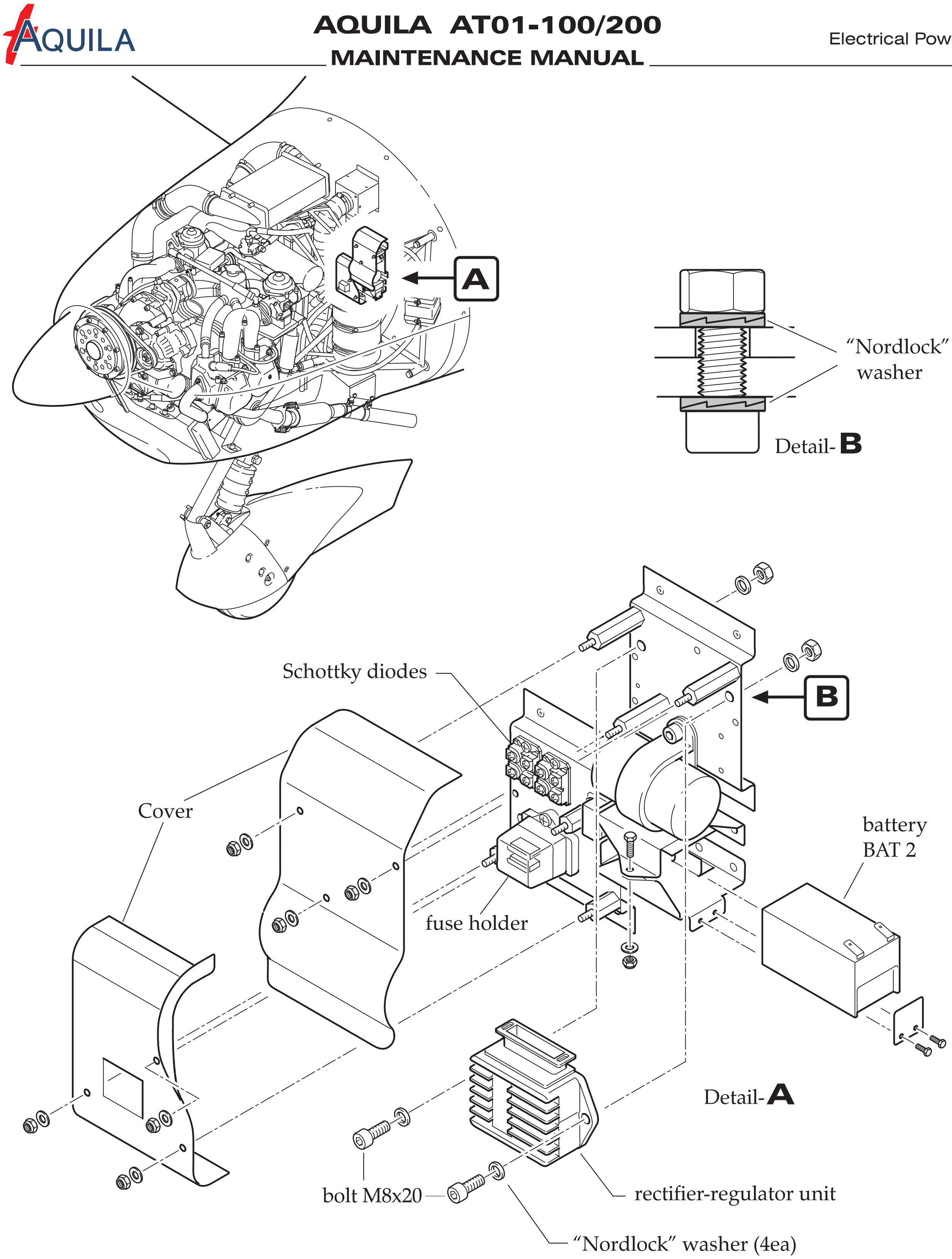
4. <u>Rectifier-Regulator Unit Removal/Installation</u> (Ref. Fig. 202, N/VFR or Rotax 914 equipped aircraft only)

A. Remove Rectifier-Regulator Unit
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10-00).
(3) Disconnect battery (refer to 24-30-00).
(4) Remove cover from rectifier-regulator unit (Rotax 914 only).
(5) Disconnect all wires from rectifier-regulator unit.
(6) Remove the attachment bolt and the nuts from the mounting plate and rectifier-regulator unit. Attend to the "Nordlock" washers.

B. Install Rectifier-Regulator Unit
(1) Install the rectifier-regulator unit with two screws M8x20 (DIN ISO 4762), four "Nordlock" washers and two nuts M8 (DIN ISO 934) on the mounting plate. Attend to the various washers and their installation sequence.
(2) Connect the wire to the rectifier-regulator unit.
(3) Install rectifier-regulator unit cover (Rotax 914 only).
(4) Reconnect battery (refer to 24-30-00).
(5) Install engine cowling (refer to 71-10-00).



Rectifier-Regulator Unit Installation (Night-VFR equipped aircraft only)
Figure 202



Rectifier-Regulator Unit Installation
Figure 202

EFFECTIVITY

Aircraft equipped with Rotax 914F engine

5. BAT 2 Battery Removal/Installation (Ref. Fig. 202)

A. Remove BAT 2 Battery
   (1) Ensure electrical power to aircraft is OFF.
   (2) Remove engine cowling (refer to 71-10-00).
   (3) Disconnect main battery (refer to 24-30-00).
   (4) Disconnect BAT 2 battery cables.
   (5) Remove clamp screw connecting upper and lower BAT 2 mounting bracket.
   (6) Remove 2 screws fixing closing plate to lower BAT 2 bracket. Remove closing plate.
   (7) Pull out BAT 2 battery sidewards from mounting bracket.

B. Install BAT 2 Battery
   (1) Place battery into mounting bracket.
   (2) Reinstall closing plate to lower BAT 2 mounting bracket using 2 screws.
   (3) Reinstall clamp screw connecting upper and lower BAT 2 mounting bracket.

CAUTION: EXCESSIVELY HIGH TORQUES COULD RESULT IN DAMAGE TO THE BATTERY AND ESCAPING BATTERY ACID.

   (4) Reconnect BAT 2 battery cables.
   (5) Reconnect main battery (refer to 24-30-00).
   (6) Reinstall engine cowling (refer to 71-10-00).

MAIN BATTERY SYSTEM - DESCRIPTION

1. Introduction

A. The battery system supplies power to the electrical equipment if the alternator fails. It represents the auxiliary electrical power source.

B. The battery system consists of the following components:

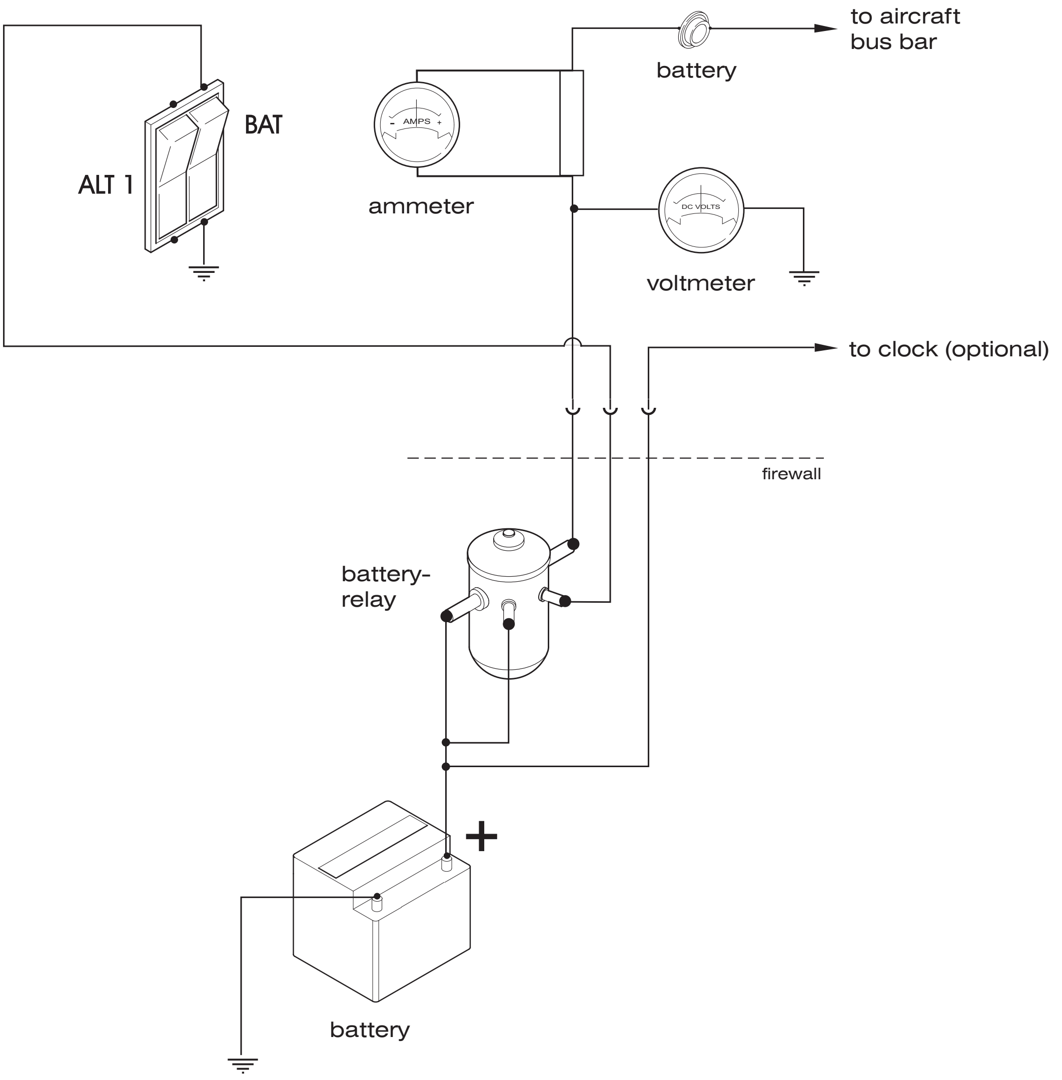
- battery
- battery relay
- BAT switch
- voltmeter
- ammeter

2. Description and Operation

A. The aircraft has a 12-volt, lead-acid battery, which is installed in a battery tray on the front-right side of the firewall. It is accessible by removing the upper engine cowling.
The battery relay is fixed above the battery at the engine mount.

B. To connect the battery to the aircraft bus the BAT switch, located on the lower left instrument panel, must be in the ON position, thus connecting one battery relay terminal to aircraft ground. The other relay terminal is permanently supplied with a positive voltage by the battery. In this way the aircraft bus bar is supplied with current via the battery relay.
The voltmeter is connected with the aircraft bus bar. The ammeter measures the charge or discharge current to/from the battery via a shunt. Both instruments are located on the right side of the instrument panel in the instrument cluster or in the digital engine monitor.

BATTERY SYSTEM (SCHEMATIC)



Battery System (Schematic)
Figure 1

MAIN BATTERY SYSTEM - MAINTENANCE

1. General

CAUTION: ALWAYS DISCONNECT THE BATTERY BEFORE DOING ANY MAINTENANCE ON THE ELECTRICAL SYSTEM. DISCONNECT THE NEGATIVE LEAD FIRST. RECONNECT THE NEGATIVE LEAD LAST. SECURE THE BATTERY LEADS FROM ACCIDENTAL CONNECTION DURING MAINTENANCE WORKS.
ROTAX 914 EQUIPPED AIRCRAFT: DISCONNECT ALSO THE BAT 2 BATTERY BY REMOVING THE TWO 10 A FUSES FROM RECTIFIER-REGULATOR UNIT INSTALLATION (REFER TO 24-20-00, FIGURE 202).

NOTE: It is recommended to remove the battery from the aircraft before doing any maintenance on the electrical system to avoid the risk of accidental connection.

A. Maintenance is limited to the removal and installation of the battery and the battery relay and a battery condition check. For information on the regular servicing required, refer to 12-17-00.

2. Battery Removal/Installation

A. Remove Battery
  (1) Ensure BAT switch is in OFF position.
  (2) Remove upper engine cowling (refer to 71-10-00).
  (3) Remove battery hold down strap.
  (4) Disconnect battery cables.
  (5) Remove battery from mounting tray.

B. Install Battery
  (1) Place battery into mounting tray and secure with battery hold down strap. Torque nuts to max. 2 Nm (18 in.lbs).

  CAUTION: EXCESSIVELY HIGH TORQUES COULD RESULT IN DAMAGE TO THE BATTERY AND ESCAPING BATTERY ACID.

  (2) Reconnect battery cables. Torque nuts to
    - Exide Sprinter P12V600: 6 Nm (53 in.lbs)
    - Hawker Odyssey PC950: max. 3,9 Nm (35 in.lbs)
  (3) Install engine cowling (refer to 71-10-00).

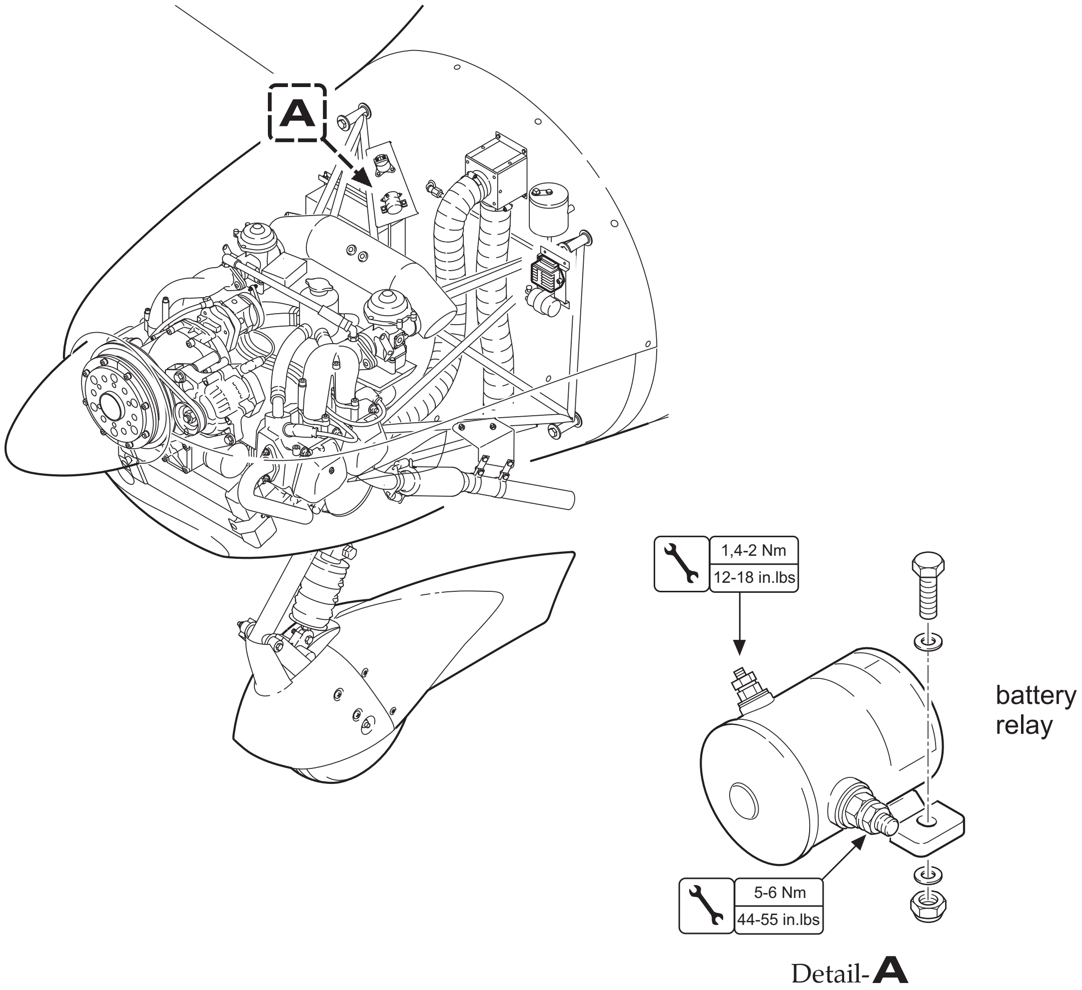
3. Battery Relay Removal/Installation (Ref. Fig. 201)

A. Remove Battery Relay
  (1) Ensure electrical power to aircraft is OFF.
  (2) Remove engine cowling (refer to 71-10-00).
  (3) Disconnect battery (refer to 24-30-00).
  (4) Identify and disconnect wires at battery relay.
  (5) Remove nuts, washers and bolts securing relay to engine mount and remove relay from aircraft.

B. Install Battery Relay
   (1) Position and secure battery relay to engine mount using bolts, washers and nuts.
   (2) Identify and reconnect wires to relay.

<u>CAUTION:</u> DO NOT REMOVE INNER NUT WHEN ASSEMBLING. USE WRENCH TO HOLD INNER NUT IN PLACE WHEN APPLYING OUTER NUT.

   (3) Reconnect battery (refer to 24-30-00).
   (4) Install engine cowling (refer to 71-10-00).



Battery Relay Installation
Figure 201

4. Battery Condition Check

For Night-VFR equipped aircraft or aircraft equipped with Rotax 914F engine, check the battery condition according to one of the following methods:

A. Measure „state of health“ (SOH) according to SAE using specialized test equipment (Schumacher PTI900X or similar). The battery is airworthy if the tester displays a SOH of at least 80%.

Battery P/N	Battery description	Ah (C10)	Effectivity
AT01-8210-128	Exide Sprinter P12V600	24 Ah	Rotax 912S
AT01-8210-129	Hawker Odyssey PC950	32 Ah	Rotax 914F

B. Measure capacity by discharging the battery with a current of approximately 10% (C10) of the battery capacity. Use automated test equipment that stops discharging at a voltage not lower than 11,0 Volts. The battery is airworthy if the measured capacity is at least:

- 19,2 Ampere-hours for aircraft equipped with Rotax 912S engine and for Night-VFR
- 25,6 Ampere-hours for aircraft equipped with Rotax 914F engine.

NOTE: Method B is harder on the battery and takes more time, but is more accurate.
Test only fully charged batteries and re-charge battery immediately after test.

NOTE: Select battery type „AGM“, „SLA“ or „VRLA“ if a setting is available in the test equipment.

EXTERNAL POWER - MAINTENANCE

1. General

   A. This section covers that portion of the system which connects external electrical power to the aircraft's electrical systems. It includes items such as external power receptacle and relays.

   B. As an option the aircraft may be equipped with an external power receptacle mounted on the right side of the engine mount, just below the battery. The standard, oval shaped, 3-pin receptacle is accessible through an hinged access plate in the right side of the engine cowling. Furthermore, the system includes an external power relay attached to the engine mount and a relay behind the instrument panel. For wiring refer to 91-00-00.
   When a 12 V DC power supply is connected to the external power receptacle the shorter, third connector engages the external power relay, which connects the external power to the aircraft main bus. Simultaneously, the battery switch will be disconnected from the ground terminal by the second relay behind the instrument panel. This prevents an energizing of the battery relay while an external power supply is being used.
   The signal power to the external power relay contains an isolation diode to prevent reverse polarity.

   C. Maintenance is limited to the removal and installation of components.

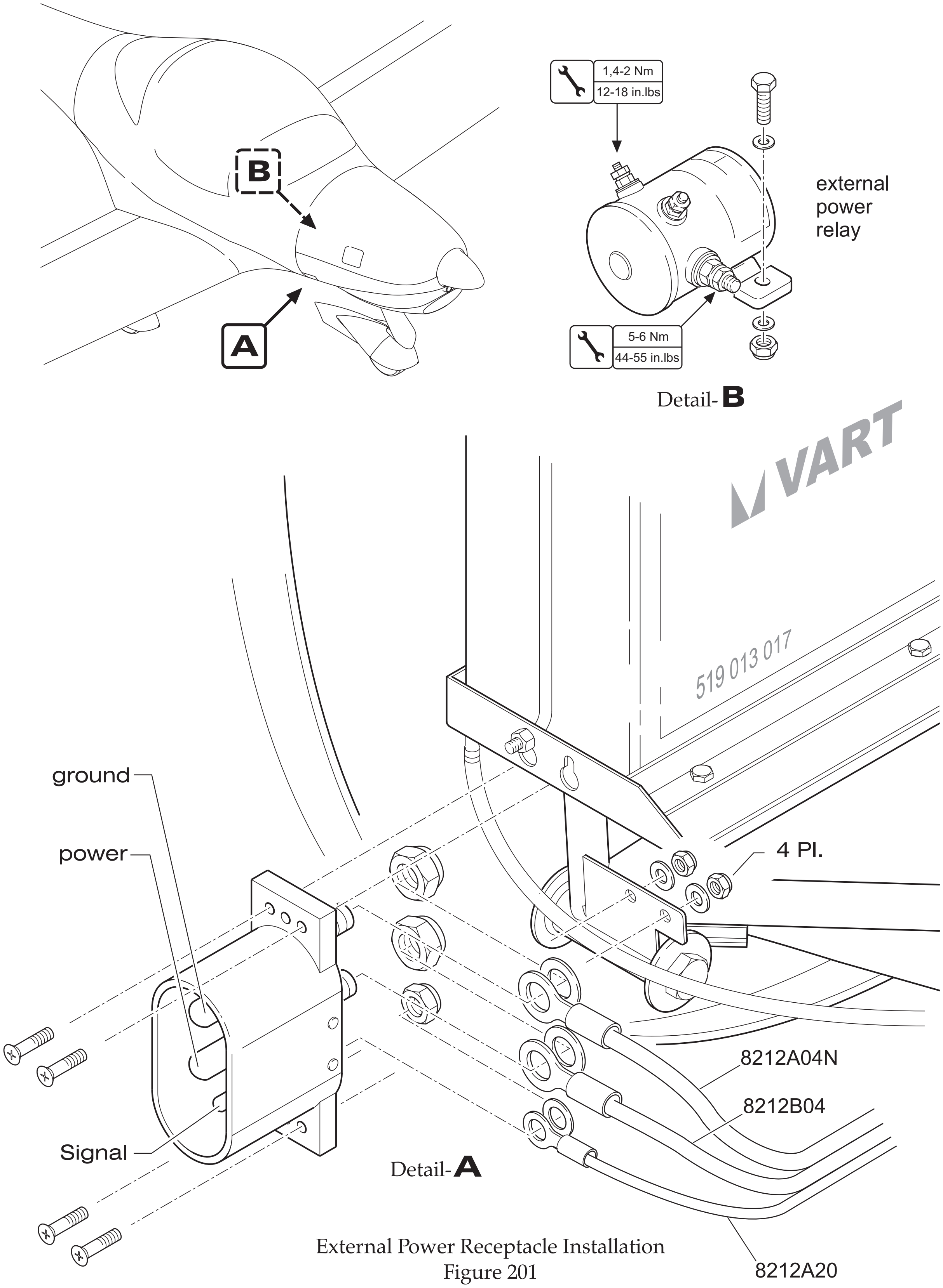
2. External Power Receptacle Removal/Installation (Ref. Fig. 201)

   A. Remove External Power Receptacle
      (1) Ensure electrical power to aircraft is OFF.
      (2) Remove engine cowling (refer to 71-10-00).
      (3) Disconnect battery (refer to 24-30-00).
      (4) Identify and disconnect all wires at EPU receptacle.
      (5) Remove nuts, washers and bolts securing receptacle to engine mount and remove receptacle.

   B. Install External Power Receptacle
      (1) Position and secure EPU receptacle to engine mount using bolts, washers and nuts.
      (2) Identify and reconnect wires to EPU receptacle.
      (3) Reconnect battery (refer to 24-30-00).
      (4) Install engine cowling (refer to 71-10-00).
      (5) Perform an external power system functional check (refer to “Adjustment/Test” below).

3. External Power Relay Removal/Installation (Ref. Fig. 201)

   A. Remove External Power Relay
      (1) Ensure electrical power to aircraft is OFF.
      (2) Remove engine cowling (refer to 71-10-00).
      (3) Disconnect battery (refer to 24-30-00).
      (4) Identify and disconnect wires at external power relay.
      (5) Remove nuts, washers and bolts securing relay to engine mount and remove relay.



External Power Receptacle Installation
Figure 201

EFFECTIVITY

Aircraft equipped with an external power receptacle

B. Install External Power Relay
  (1) Position and secure external power relay to engine mount using bolts, washers and nuts.
  (2) Identify and reconnect wires to external power relay.

  CAUTION: DO NOT REMOVE INNER NUT WHEN ASSEMBLING. USE WRENCH TO HOLD INNER NUT IN PLACE WHEN APPLYING OUTER NUT.

  (3) Reconnect battery (refer to 24-30-00).
  (4) Install engine cowling (refer to 71-10-00).
  (5) Perform an external power system functional check (refer to “Adjustment/Test below).

4. Adjustment/Test

A. External Power System Functional Check
  (1) Connect an 14 V DC external power supply to aircraft.
  (2) Place the BAT switch to the ON position.
  (3) Verify the voltmeter shows 14 V.
  (4) Disconnect external power supply from aircraft.
  (5) The voltmeter must show 12 V.
  (6) Place the BAT switch in OFF position.

5. Inspection/Check

A. External Power System Inspection/Check
  (1) Check latching mechanism and hinge of the external power access plate for integrity and condition.
  (2) Remove engine cowling (refer to 71-10-00).
  (3) Remove glare shield (refer to 31-10-00).
  (4) Check external power receptacle for security.
  (5) Check system relays for condition and security.
  (6) Inspect electrical cables of the system for proper routing, chafing, broken or loose terminals, general condition, and sharp bends in wiring.
  (7) Verify the external power placard is firmly in place and legible.
  (8) Install glare shield (refer to 31-10-00).
  (9) Install engine cowling (refer to 71-10-00).

ELECTRICAL LOAD DISTRIBUTION - DESCRIPTION

1. Introduction

A. Distribution of electrical power supplied by the external and optional the internal alternator and the battery is accomplished by bus bars. The bus architecture allows power to be routed to the essential circuitry if any one of the main power sources fails.
All essential electrical accessories in the system are protected by push pull type circuit breakers which can be reset in flight. The circuit breaker panel is on the far right of the instrument panel and each circuit breaker is labeled. All circuit breakers have their rated values identified on the top of the shaft.

B. For power routing throughout the aircraft, refer to wiring diagrams shown in 91-00-00.

2. Description and Operation

A. The electrical system has two main bus bars: the aircraft bus bar and the avionics bus bar. All systems are connected to the aircraft bus bar which are essentially for aircraft operation. The avionics bus bar supplies the avionics equipment with power.

B. The external alternator output and the battery are connected with the aircraft bus via circuit breakers. Optional the internal alternator is connected with the aircraft bus via a rectifier-regulator unit and a circuit breaker (and a disconnect relay on Rotax 914 equipped aircraft). The circuit breakers are located on the right side of the instrument panel in the circuit breaker panel.

The current is distributed from the aircraft bus bar via circuit breakers to the electrical circuits of several systems and components and via the AVIONICS switch to the avionics bus bar. From there, it is further distributed to the several components of the avionics equipment via circuit breakers. The AVIONICS switch allows avionics equipment to be removed separately from the residual electrical system.

CIRCUIT BREAKER - MAINTENANCE

1. General

A. The circuit breaker panel is equipped with circuit breakers of the "push to reset" type.
One terminal of each switch/breaker is directly connected to the appropriate bus bar, the other is wired to the component/system it protects.

2. Circuit Breaker Removal/Installation

A. Remove Circuit Breaker
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glareshield (refer to 31-10-00).
(4) Disconnect wire(s) and bus to the selected circuit breaker.
(5) Remove retaining ring and washer from circuit breaker on the front of instrument panel.
(6) Remove circuit breaker.

NOTE: It may be necessary to loosen more than one circuit breaker to remove the selected circuit breaker.

B. Install Circuit Breaker
(1) Place circuit breaker(s) into position on the instrument panel and secure.
(2) Identify and connect wire(s) and bus to the selected circuit breaker.
(3) Reinstall glareshield (refer to 31-10-00).
(4) Reconnect battery (refer to 24-30-00).

3. Circuit Breaker Current Ratings

A. Refer to table 201 for circuit breaker current ratings.

Table 201: Circuit Breaker Current Ratings

Current Rating	Circuit Breaker	Effectivity
50A	ALT1 BAT	
30A	Switch Panel	
25A	ALT2	Rotax 912 (N/VFR)
20A	ALT2	Rotax 914
10A	Flap Actuator COM1 & 2 Landing Light PFD GAD PWR	 GTN 650, GNS 430W, GTR 225, GNC 255 G500 Txi GAD27 (G3X)

Table 201: Circuit Breaker Current Ratings (Cont.)

Current Rating	Circuit Breaker	Effectivity
7.5A (8A)	MFD NAV/GPS 1 & 2 PFD AP	Aspen EFD1000 GTN 650 G500 Autopilot (GMC507 & servos)
5A	Elevator Trim	from S/N 327
	Trim Actuator	up to S/N 326
	ALT1 Excitation	
	AHRS	G500
	ADC	G500
	12V Receptacle	
	12V / USB	
	Audio	GMA 340, GMA 350
	GPS	GPS Map 69X, Aera 79X
	TXP	GTX 328, GTX 330
	COM1 & 2	SL30, SL40
	MFD	Flymap + AHRS, G3X
	NAV/GPS1 & 2	GNS 430W
	PFD	G3X
	G5 GAD	G5HSI
	Engine Instr. 1	MVP-50
	P/S Heat	Pitot Heating
	Nav Lights	
	ACL	
	Fuel Pump MAIN	Rotax 914
	Fuel Pump AUX	Rotax 914
	Attitude Indicator	G5ATT
	Turn Coordin.	G5HSI
4A	NAV/GPS1 & 2	GNC 255
3A	Dome Light	
	Attitude Indicator	
	Turn Coordin.	
	Directional Gyro	
	TXP	TT-22, VT-02, VT2000, GTX3x5
	Traffic Monitor	AT-1
	Instrument Lights	
	Fuel Pump AUX	Rotax 912
2A	Warning Lights	
	Trim Control	up to S/N 326
	Flap Control	
	Starter Relay	
	Stall Warning	
	CHT (OAT)	
	Fuel Gauge	
	Instruments 1	
	Instruments 2	
	Panel Light	

Table 201: Circuit Breaker Current Ratings (Cont.)

Current Rating	Circuit Breaker	Effectivity
2A	Avionic Blower	
	Traffic Monitor	TRX 1500, TRX 2000
	Blind Encoder	ACK-A30
	Audio	PM 501, PM 500EX
	NAV/GPS1	SL30, CDI1
	NAV/GPS2	SL30, CDI2
	GPS	GPS Map 495, GPS Map 496, Aera 5XX
	ADAHRS1 & 2	ADAHRS (G3X)
	ENG SNSR	GEA24 (G3X)
	Flood Lights	
	TCU	Rotax 914
	ALT2 Disc.	Rotax 914
	GAD GTN	G3X w/ GTN650

ELECTRICAL SYSTEM WIRING - MAINTENANCE

1. General

A. Repairs of the electrical system wiring are limited to the replacement and splicing of electrical wires. In general all repairs have to be carried out by certified repair stations or properly certified and trained persons.

B. Carry out a complete functional check of the concerned equipment after every repair.

C. Refer to 91-00-00 for wiring diagrams and wire routing diagrams.

2. Splicing

A. Splicing is permitted on wiring as long as it does not affect the reliability and the electromechanical characteristics of the wiring. Splicing of power wires, coaxial cables, shielded wires or wire sizes above AWG 18 is not permitted. There should not be more than one splice in any one wire segment between any two connectors or other disconnect points. Refer to AC 43.13-1B, chapter 11, section 13 “Splicing” for further information on splicing procedures and equipment.

3. Wire Replacement

A. If wires are replaced, they have to be replaced by identical ones (same MIL specification and AWG). New wires have to be routed, fixed and protected in the same manner as the old wires.

CHAPTER 25

EQUIPMENT / FURNISHINGS

TABLE OF CONTENTS

EQUIPMENT / FURNISHINGS - GENERAL

1. Introduction

A. This chapter describes removable items of equipment and interior furnishings contained in the cabin and baggage compartment.

2. General Description

A. The seats can be adjusted back and forward. The restraint system of each seat is attached to the fuselage structure. It consists of shoulder harness with an inertia-reel retractor and lap belts which allow for complete freedom of movement of the upper torso area. In the event of a sudden deceleration, the reels lock to provide positive restraint for the user.

B. The cabin interior is easy to care for and designed for functionally. The panels and coverings can be removed for maintenance purposes.

C. The baggage compartment is directly behind the seats. It can be loaded through the baggage compartment door on the left side of fuselage.

D. An emergency locator transmitter (ELT) is installed. The transmitter unit is fitted to the baggage compartment floor immediately behind the right seat back.

SEATS - MAINTENANCE

1. General

A. The seats are made from fiber composite materials and equipped with integrated safety head rests and removable, hard-wearing seat cushions.
An infinitely adjustable seat meets the requirements of a wide range of pilots. The seat track is angled upward for forward travel so that shorter people will be positioned slightly higher as they adjust the seat forward. A lockable oil/gas spring strut holds the seat in the desired position.
To position the seat, push the seat position control knob located below the seat frame on the right, slide the seat into position, and then release the knob.

2. Seat Removal/Installation

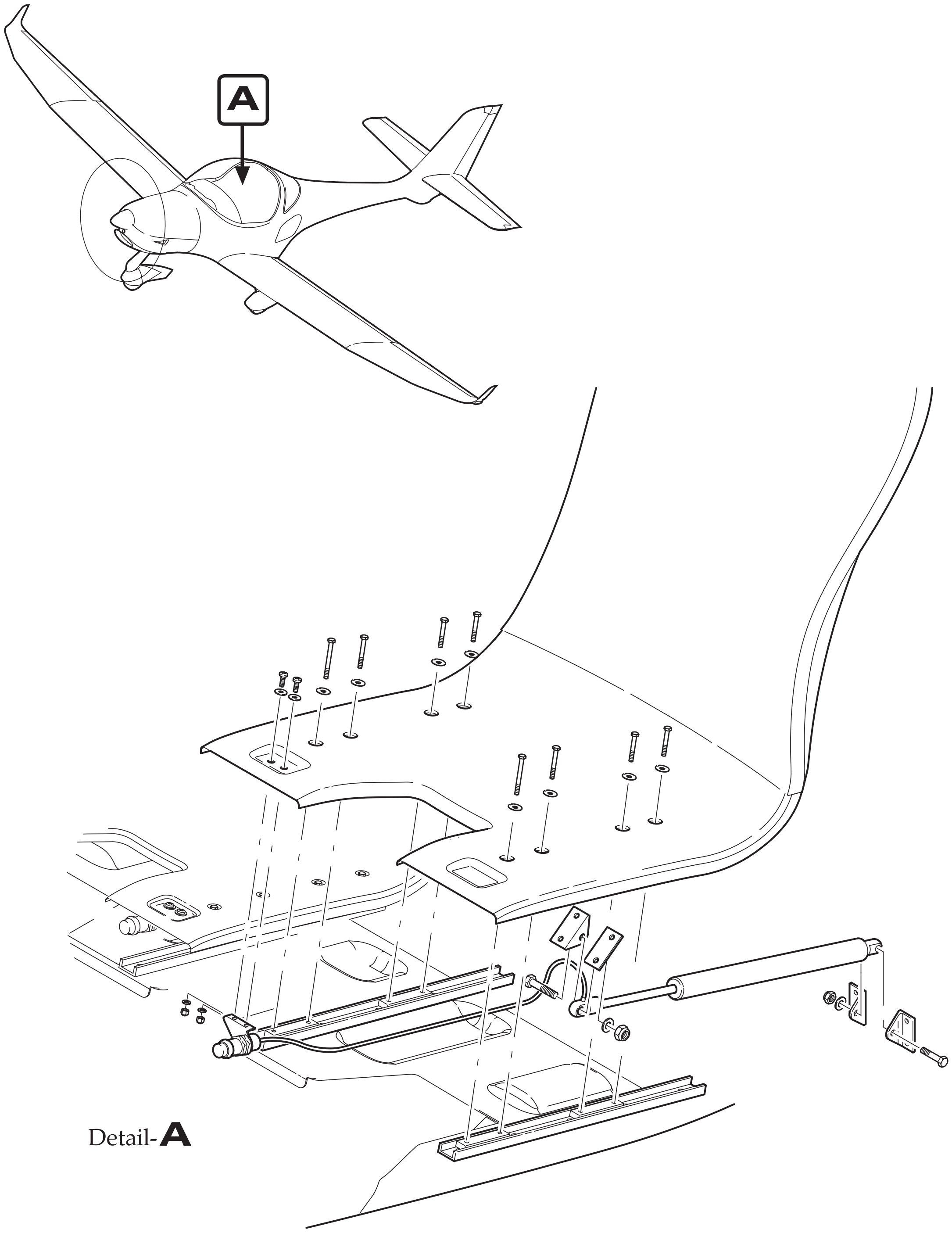
A. Remove Seat
  (1) Remove seat cushion.
  (2) Remove control knob at the remote control of the gas spring locking valve and then the retaining nut which secures the remote control to attachment bracket.
  (3) Disconnect gas spring strut from seat by removing bolt at strut end.
  (4) Remove bolts securing seat to seat rails and remove seat.

B. Install Seat
  (1) Position seat and secure to seat rails with bolts.
  (2) Slide remote control of gas spring locking valve into hole of attachment bracket.
  (3) Connect gas spring strut to seat using bolt, washer and self locking nut.
  (4) Secure remote control to attachment bracket with retaining nut and install control knob.
  (5) Install seat cushion.

3. Seat Rails Removal/Installation

A. Remove Seat Rails
  (1) Remove seat (refer to “Seat Removal” above).
  (2) Remove screws securing seat rails to fuselage structure and remove seat rails.

B. Install Seat Rails
  (1) Position seat rails and secure to fuselage structure with screws.
  (2) Install seat (refer to “Seat Installation” above).



Seat Installation
Figure 201

4. Gas Spring Strut Assembly Removal/Installation

A. Remove Gas Spring Strut Assembly

(1) Remove seat cushion.
(2) Remove control knob at the remote control of the gas spring locking valve and then the retaining nut which secures the remote control to attachment bracket.
(3) Disconnect gas spring strut from seat by removing bolt at strut end.
(4) Disconnect gas spring strut from fuselage structure by removing bolt at strut base and remove gas spring strut assembly.

B. Install Gas Spring Strut Assembly

(1) Slide remote control of gas spring locking valve into hole of attachment bracket.
(2) Reconnect gas spring strut to seat using bolt, washer and self locking nut.
(3) Connect gas spring strut to fuselage structure using bolt, washer and self locking nut.
(4) Secure remote control to attachment bracket with retaining nut and install control knob.
(5) Install seat cushion.

RESTRAINT SYSTEM - MAINTENANCE

1. General

   A. The seats are equipped with automatic, four point seat belts/shoulder harness assemblies. A central rotary buckle is used to fasten the seat belts/shoulder harness. The design incorporates an inertia reel system for the shoulder portion. The shoulder harnesses are attached to the baggage compartment bulkhead, and allow complete freedom of movement of the upper torso. In the event of a sudden deceleration, the reels lock automatically to protect the occupants.
   The seat belts are attached to fittings on the landing gear bulkhead.

   B. Maintenance is limited to the removal and installation of restraint systems.

2. Restraint System Removal/Installation

   A. Remove Restraint System
      (1) Open baggage compartment bulkhead access panel.
      (2) Remove baggage compartment floor board.
      (3) Remove bolts securing inertia reel to baggage compartment bulkhead and remove shoulder harness from aircraft.
      (4) Remove bolts securing seat belts to fuselage structure and remove seat belts.

   B. Install Restraint System
      (1) Install inertia reel in baggage compartment bulkhead using hex bolts, washers and self-locking nuts. Route shoulder belts through belt guide in the seat back.
      (2) Attach seat belts to fuselage structure using hex bolts, spacers, washers and self- locking nuts.
      (3) Install all items removed for access.

CABIN INTERIOR - MAINTENANCE

1. General

A. The panels, coverings and carpets can be removed for maintenance purposes.

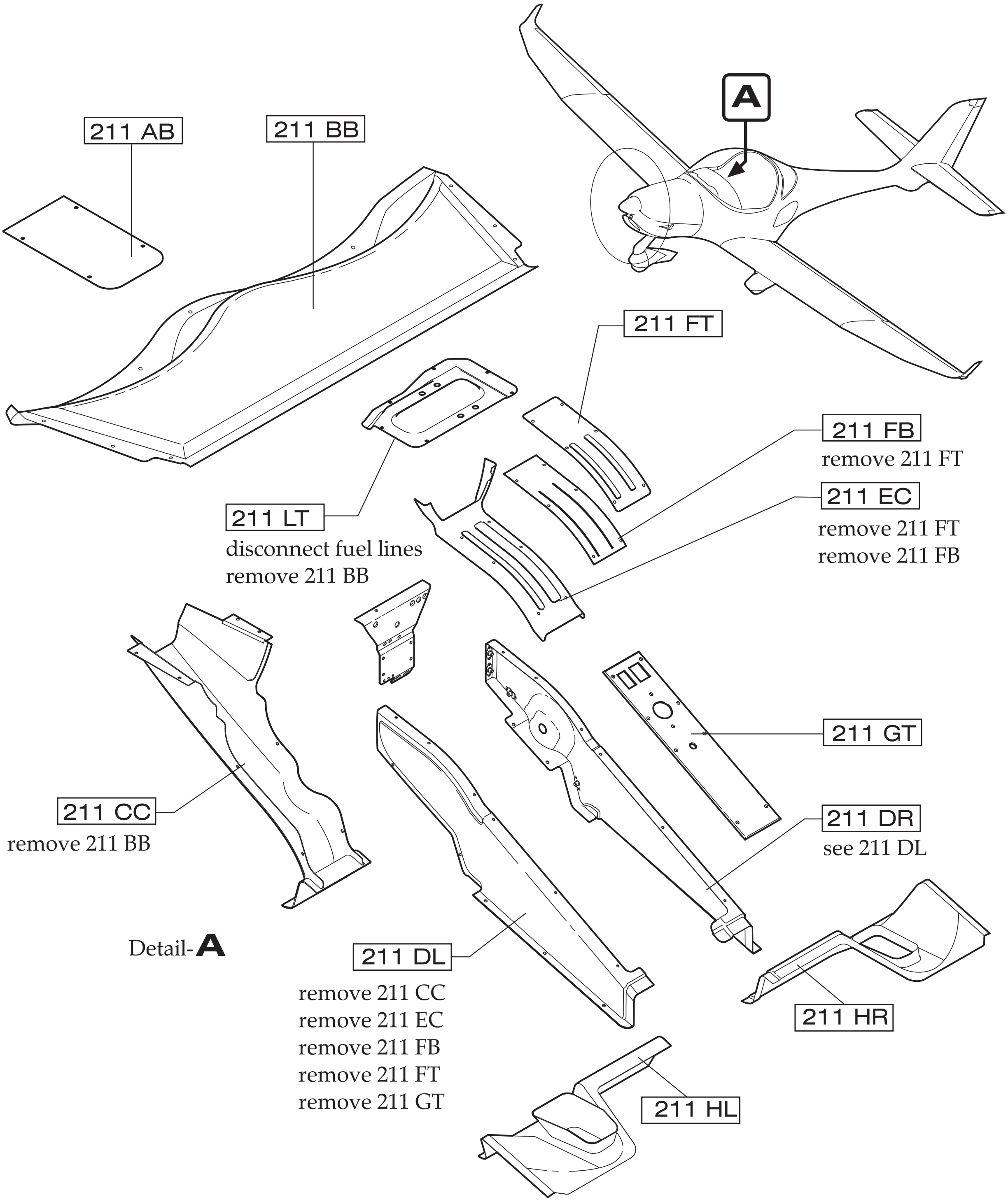
B. For cabin interior cleaning and care refer to chapter 12, section "Cabin interior - Cleaning and Care".

2. Panels, Coverings and Carpets Removal and Installation

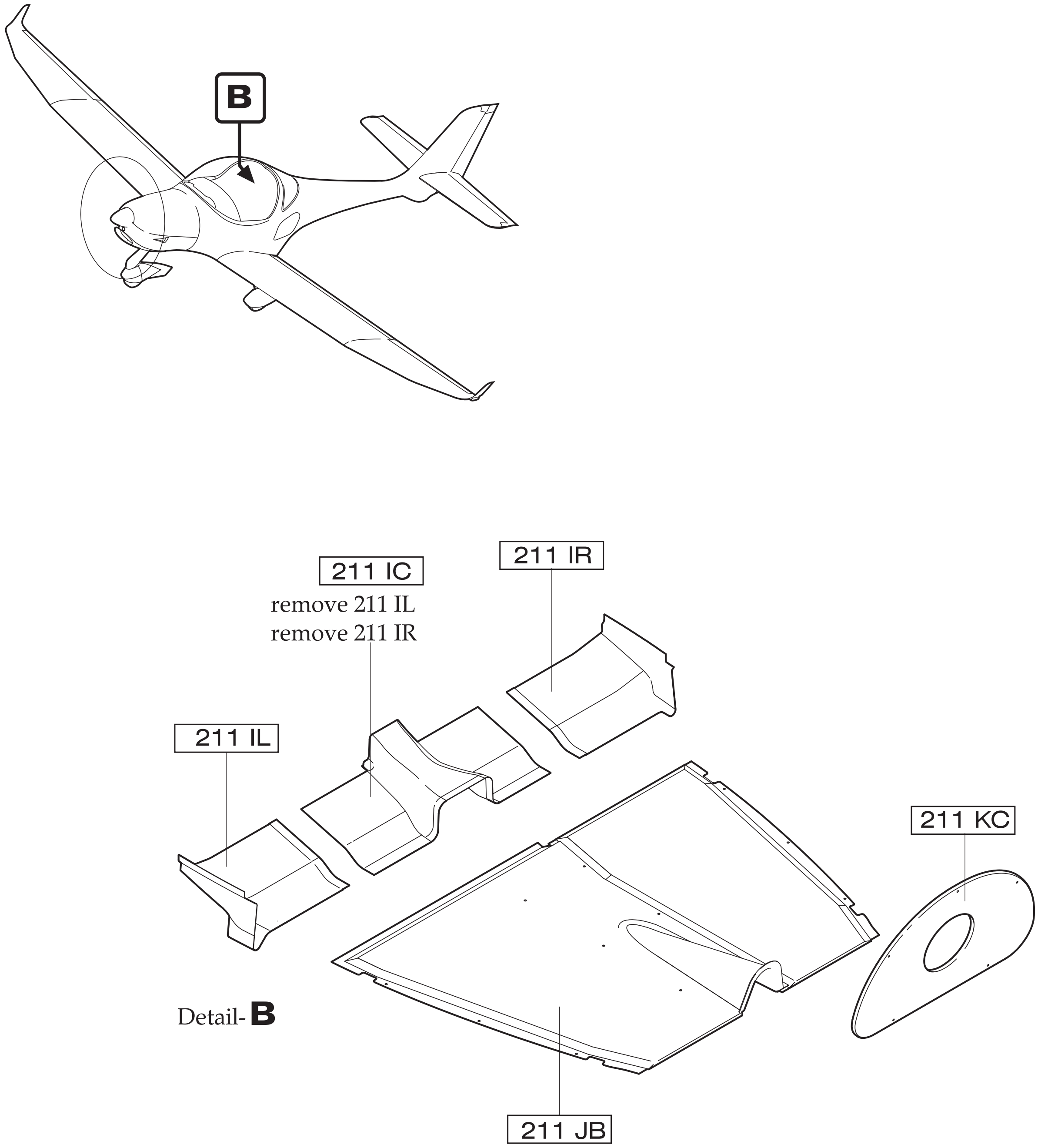
A. Panels are typically attached to the aircraft fuselage structure with small screws.

B. Seat cushions and carpets are fixed with hook-and-loop fasteners.

C. See figure 201 for an exploded view of the cabin interior.



Panels and Covers
Figure 201 (1)



Panels and Covers
Figure 201 (2)

CARGO TIE-DOWNS - MAINTENANCE

1. General

A. Eight cargo tie-down rings are provided to secure baggage. Baggage nets may be used to hold baggage in position during flight.
The cargo tie-down rings are secured directly to the floorboard by nutplates or they secure the floorboard to the supports.

EMERGENCY EQUIPMENT - DESCRIPTION

1. Introduction

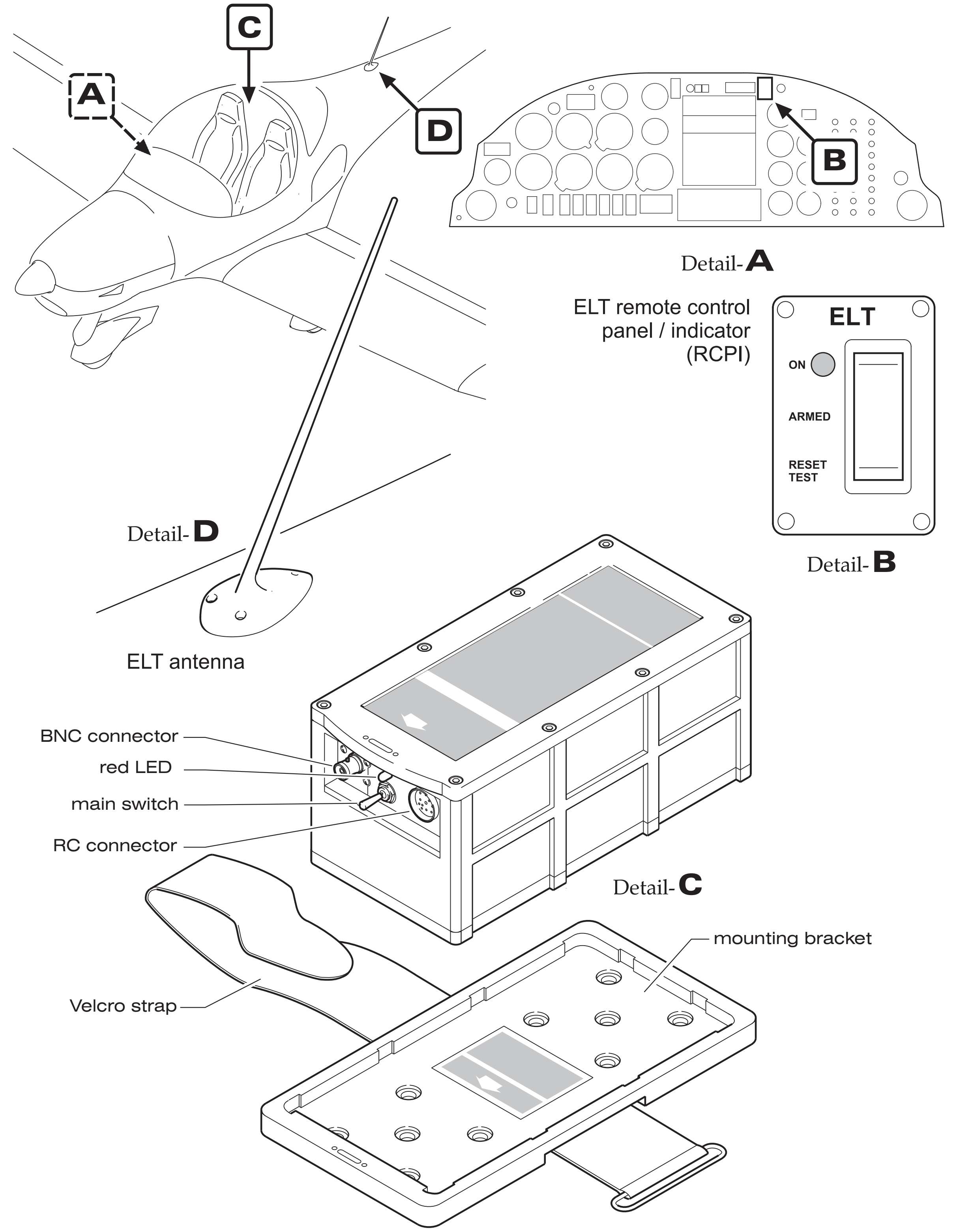
A. This section describes those items of equipment carried for use in emergencies and includes the emergency locator transmitter (ELT) and a fire extinguisher.

B. As standard the aircraft is equipped with a Kannad 406 AF Compact / Integra ELT. Due to the multiplicity of equipment coming onto the market a different ELT may be installed. Refer to the manuals provided by the equipment manufacturer for further information.

2. Description and Operation (Ref. Fig. 1)

A. The ELT is designed to transmit on the frequencies 121,5 MHz and 406 MHz. The basic emergency frequency 121,5 MHz is mainly used for homing in the final stages of the rescue operations. The 406 MHz frequency is used by the COSPAS-SARSAT satellites for precise pinpointing and identification of the aircraft in distress.
The ELT can be activated either automatically when a crash occurs or manually by means of a control switch on the front panel. The incorporated g-switch activates the unit if it detects a deceleration along the longitudinal axis.
Once activated, the transmitter operates continuously on 121,5 MHz. Simultaneously, during the first 24 hours of operation, a digital message is transmitted on 406 MHz every 50 seconds.

B. The ELT is installed on the baggage compartment floor immediately behind the right seat back. The ELT antenna is located on top of fuselage behind the cabin. The Kannad 406 Integra is additionally equipped with an internal GPS and backup antenna. The ELT remote control panel / indicator (RCPI) is mounted on the instrument panel, right side.
For in-flight use, both the front panel of the ELT and the RCPI are easily accessible from the pilot's normal seated position. If it is equipped with a portable antenna the unit can be removed from the aircraft and used as a personal locating device when it is necessary to leave the aircraft after an accident.
The ELT front panel includes a 3-position ARM/OFF/ON switch.
With the control switch in ARM position the ELT is in stand-by mode for automatic activation, the normal operation mode. Selecting the ON position starts the transmission after 50 seconds.



ELT Main Components (Kannad 406 AF Compact)
Figure 1

EMERGENCY LOCATER TRANSMITTER - MAINTENANCE

1. General

A. This section covers removal and installation procedures of ELT components as well necessary periodic maintenance.

B. Consider all publications / requirements of the appropriate national authority regarding ELT operation and maintenance.

C. Refer to the publications provided by the ELT manufacturer for complete information on installation, programming, operation and maintenance of the ELT.

2. ELT Removal/Installation

A. Remove ELT
  (1) Open the baggage compartment door.
  (2) Turn the main transmitter control switch on the ELT to the OFF position.
  (3) Disconnect antenna cable from front panel off the ELT.
  (4) Unstrap transmitter unit and remove from aircraft.

B. Install ELT

WARNING: THE ELT MUST BE MOUNTED WITH THE ARROW (PRINTED ON THE BATTERY CASE AND LABELED “FLIGHT DIRECTION”) POINTING IN THE DIRECTION OF FLIGHT.

  (1) Install transmitter on to mounting tray with arrow on battery case pointing in direction of flight and secure with strap.
  (2) Connect antenna cable to front of ELT.
  (3) Perform a functional test (refer to “Adjustment/Test” below).

3. ELT Antenna Removal/Installation

A. Remove ELT Antenna
  (1) Open baggage compartment door and remove access / inspection plate 211 KC (refer to 25-12-00).
  (2) Disconnect antenna cable from antenna base.
  (3) Supporting the antenna, remove nuts and washers securing ELT antenna to fuselage, remove ground wire.
  (4) Remove mounting plate.
  (5) Remove antenna with gasket from topside of fuselage.

B. Install ELT Antenna
  (1) Position antenna with gasket on topside of fuselage.
  (2) From inside the fuselage install mounting plate.
  (3) Secure antenna base to topside of fuselage using screws, nuts and washers. Reinstall ground wire.
  (4) Reconnect coaxial connector and secure.
  (5) Install access / inspection plate 211 KC (refer to 25-12-00).
  (6) Perform a functional test (refer to "Adjustment/Test" below).

4. Battery Replacement

WARNING: BATTERY REPLACEMENT MAY ONLY BE CARRIED OUT BY A MAINTENANCE ORGANIZATION.

A. The transmitter battery expiry date is fixed at 5 or 6 years after manufacture depending on manufacturer. Battery replacement is mandatory:
  (1) after any activation for distress purposes;
  (2) after any unintentional activation for an unknown duration;
  (3) after more than one hour of real transmission (cumulated duration);
  (4) before or on battery expiration date.

NOTE: The identification and maintenance marking affixed to the ELT casing provides information on battery (type, expiry date), identification data programmed in the ELT (protocol, identification number, hexadecimal transcription of the beacon identification code) and aircraft (tail number).

5. Adjustment/Test

A. For signal transmission test, operational test of the controls and crash sensor and self-test procedures refer to the Kannad 406 AF Compact / Integra installation / operation manual.

6. Inspection/Check

A. The following inspections must be performed at least once every 12 months. For inspection of the Kannad 406 AF Compact / Integra ELT, refer to the respective installation / operation manual.

  (1) Remove ELT from mounting bracket (refer to "ELT Removal/Installation" above).
  (2) Inspect ELT, mounting bracket and fasteners for cracks and other obvious damage.
  (3) Inspect cable connection for cuts or abrasions on its outer jacket. Disconnect the BNC connectors at both ends. Examine the BNC connectors and the mating plug on the antenna and ELT unit for any signs of corrosion or damage.
  (4) Gain access to the ELT battery and inspect. No corrosion should be detectable. Verify that the batteries are approved and check the expiration date. Replace if necessary.
  (5) Verify the external placard "ELT LOCATED HERE" is firmly in place and legible.
  (6) Perform ELT functional test (refer to "Adjustment/Test" above) and reinstall ELT.

FIRE EXTINGUISHER - MAINTENANCE

1. General

A. The aircraft is equipped with a liquefied-gas type fire extinguisher AIR TOTAL HAL 1 mounted in a quick-release bracket attached to the floor board of the baggage compartment, behind the right seat.
The fire extinguisher uses Halon 1211, a liquid gas which is non-toxic and is approved for use on class A, B (liquid, grease) and class C (electrical equipment) fires.

B. For more information on the fire extinguisher, refer to the operating instructions for fire extinguishers AIR TOTAL HAL 1; HAL 1,2; HAL 2,5 supplied with the extinguisher.

2. Description and Operation

A. Technical data:

(1)	Extinguishing agent	Halon 1211
(2)	Fire class GER.	ABC
(3)	U.S. class	ABC
(4)	Total weight	2,2 kg (- 2% / year, max. 10%)
(5)	Filling pressure	11 bars

B. Handling
   (1) Lift carrying handle.
   (2) Press down safeguard.
   (3) Depress trigger.

3. Maintenance Instructions

B. The charge pressure must be checked regularly via the manometer. Verify that the seal wire is not broken. After use, the extinguisher must be refilled by the manufacturer. After 10 years, a major overhaul must be carried out by the manufacturer.

4. Fire Extinguisher Removal/Installation

A. Remove Fire Extinguisher
   (1) Release quick-release clamp.
   (2) Remove fire extinguisher from bracket assembly.

B. Install Fire Extinguisher
   (1) Position fire extinguisher in bracket assembly.
   (2) Secure with quick release clamp.

FIRE EXTINGUISHER - MAINTENANCE

1. General

A. The aircraft is equipped with a liquefied-gas type fire extinguisher H3R Aviation RT A400 or A344T mounted in a quick-release bracket attached to the floor board of the baggage compartment, behind the right seat.
The fire extinguisher uses Halon 1211 / 1301, a liquid gas which is non-toxic and is approved for use on class B (liquid, grease) and class C (electrical equipment) fires.

B. For more information on the fire extinguisher, refer to the instruction manual for the fire extinguisher supplied with the extinguisher. See also the "Monthly Inspection Record".

2. Description and Operation

A. Technical data:

(1)	Extinguishing agent	Halon 1211 / 1301
(2)	Fire class GER.	A, B, C
(3)	U.S. class	A, B, C
(4)	Total weight	A400: 0.530 kg (± 10g) A344T: 1,021 kg

B. Handling
   (1) Lift carrying handle.
   (2) Pull out pin.
   (3) Press lever.

3. Maintenance Instructions

A. Inspect monthly.
B. Verify that the yellow seal wire is not broken.
C. No obvious physical damage, corrosion, or clogged nozzle.
D. HMIS label (Hazardous Materials Identification System) and operating instructions are in place and clearly visible.
E. A400: Weigh the unit and return to the manufacturer if the gross weight is below 500g.
A344T: Check that the gauge pressure is in the operable (green) range.

NOTE: When an inspection reveals a deficiency in any of the conditions listed above, the fire extinguisher must be removed from service, not discharged, and returned to H3R, a fire equipment dealer or distributor so that the halon can be recovered.

F. After use, the extinguisher must be returned to the manufacturer.
G. After 12 years, remove extinguisher from service regardless of condition.

EFFECTIVITY
Aircraft equipped with a H3R fire extinguisher

4. Fire Extinguisher Removal/Installation

   A. Remove Fire Extinguisher
      (1) Release quick-release clamp.
      (2) Remove fire extinguisher from bracket assembly.

   B. Install Fire Extinguisher
      (1) Position fire extinguisher in bracket assembly.
      (2) Secure with quick release clamp.

EFFECTIVITY

Aircraft equipped with a H3R fire extinguisher

CHAPTER 27

FLIGHT CONTROLS

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

FLIGHT CONTROLS - GENERAL

1. Introduction

A. This chapter contains information about the flight controls used to manually control the aircraft in flight. It also includes functional and maintenance information about the flaps.

2. General Description

A. The conventionally designed flight control system is divided into aileron control, rudder control, elevator control and the wing flaps system. The aircraft is equipped with dual controls. The control stick and rudder pedals are used for control input. Elevator trim can be actuated electrically. Aileron and elevator control motion is transferred to the control surfaces via pushrods and bellcranks. The rudder control system utilizes control cables and bellcranks for rudder actuation. The flaps are operated and fixed in the desired position by an electrical flap actuator.

B. For dimensions, areas and free play tolerances of the control surfaces refer to 06-00-00.

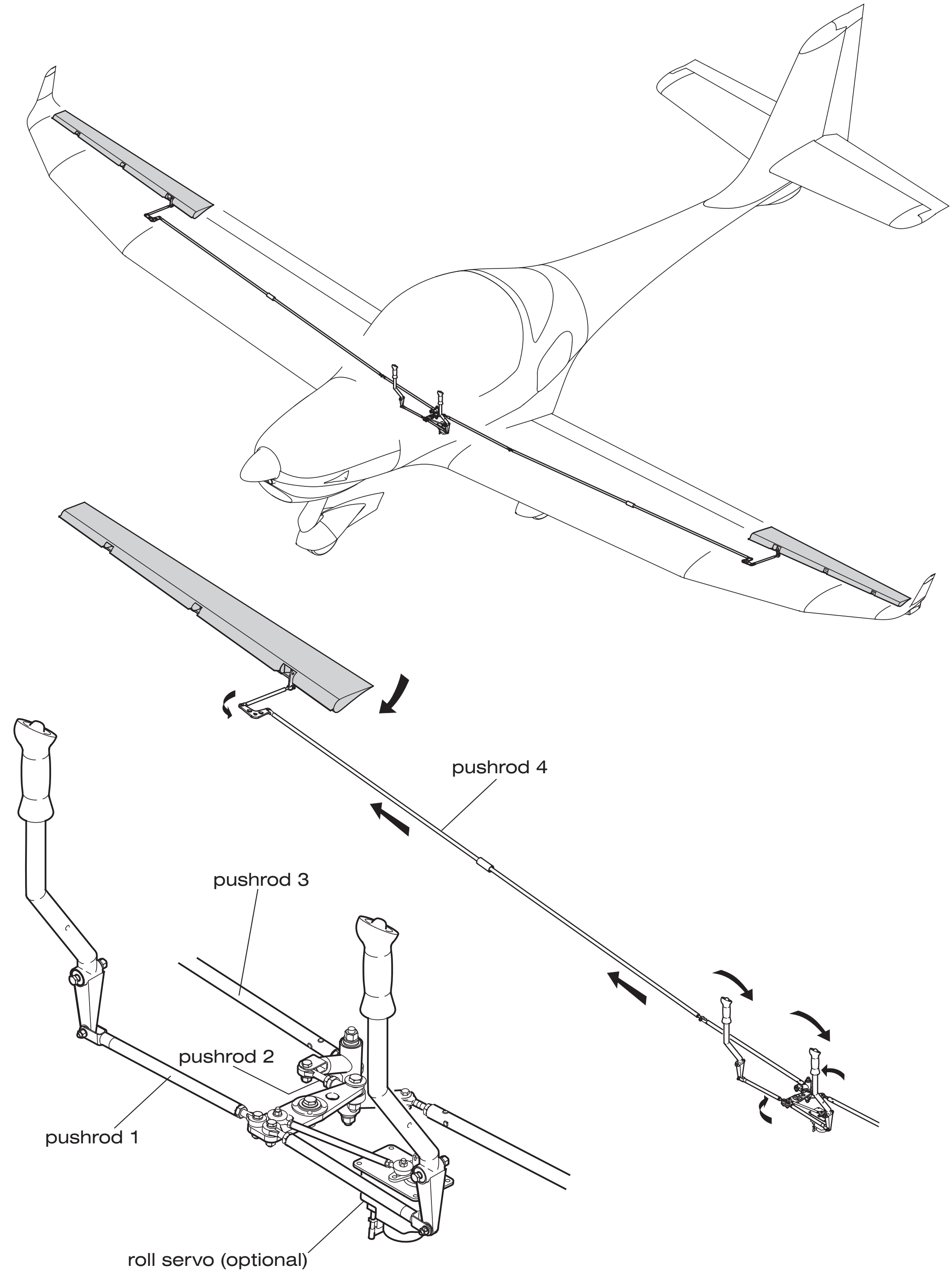
AILERON CONTROL SYSTEM - DESCRIPTION

1. Introduction

A. This section describes that portion of the flight control system which controls the position and movement of the ailerons. The rigging procedure for the aileron control system is also provided. The ailerons are actuated via pushrods and bellcranks. Each aileron has weight compensation. To correct the tendency to roll precisely, a ground-adjustable trim tab is provided at the leading edge of the left aileron.

2. Description and Operation

A. For aileron control system design and function refer to figure 1.



Aileron Control System Design and Function
Figure 1

AILERON CONTROL SYSTEM - MAINTENANCE

1. General

A. For a breakdown of components, refer to figure 201, 202 and 203.

WARNING: WHEN INSTALLING COMPONENTS OF CONTROL SYSTEM, NEW SELF-LOCKING NUTS SHOULD ALWAYS BE USED. NEVER USE A SELF-LOCKING NUT MORE THAN ONCE.

2. Control Stick Removal/Installation

A. Remove Control Stick
(1) Remove access panel 211 HL (HR) (refer to 25-12-00).
(2) Disconnect electrical cable to the transmission button.
(3) Disconnect pushrod at control stick base.
(4) Remove bolt securing control stick to torque tube assembly and remove stick.

B. Install Control Stick
(1) Position control stick and secure to torque tube assembly using bolt, washer and nut.
(2) Connect pushrod to control stick base.
(3) Reconnect electrical cable to the transmission button.
(4) Install access panel 211 HL (HR) (refer to 25-12-00).

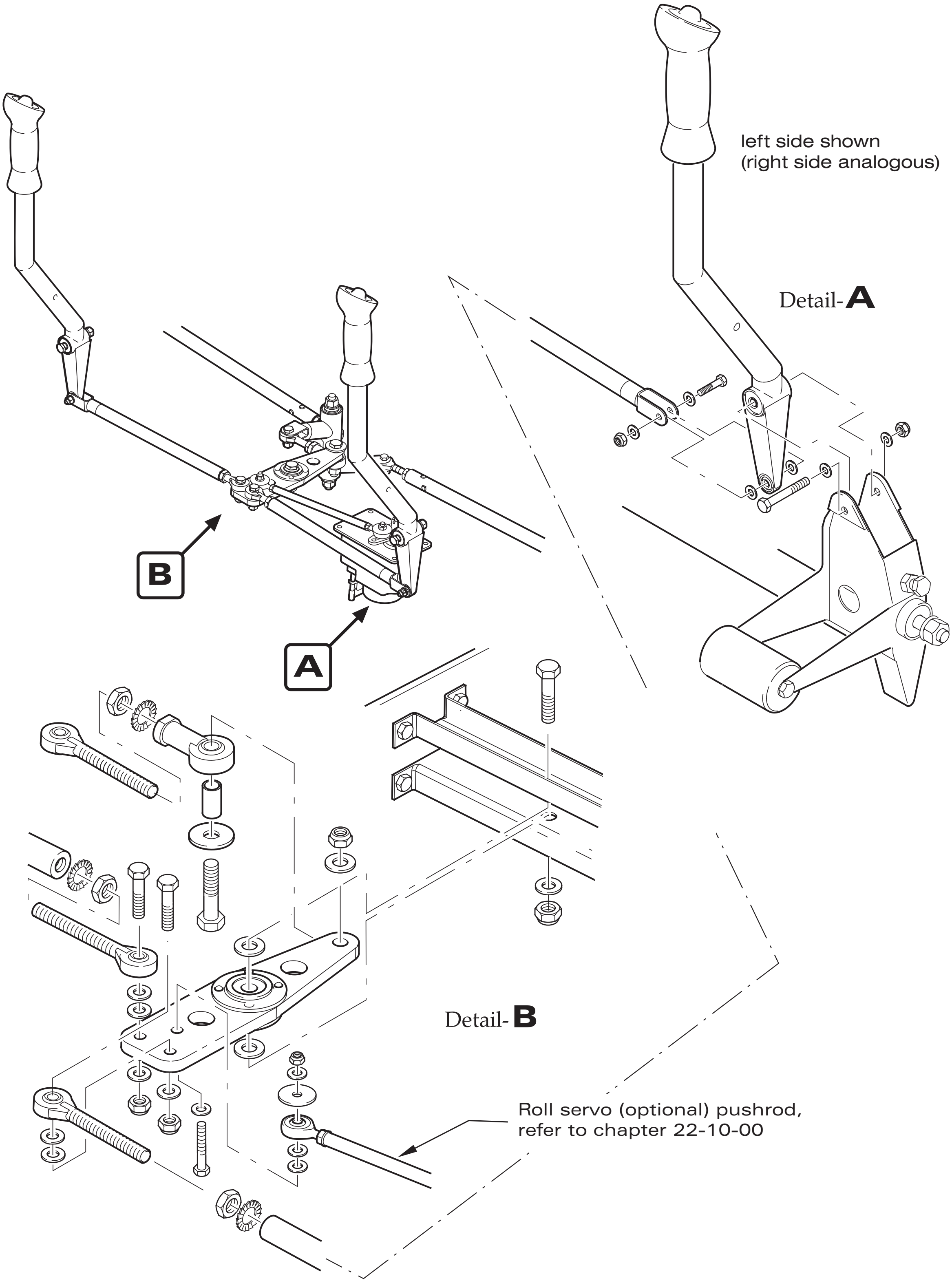
3. Pushrod Removal/Installation

A. Remove Pushrod 1
(1) Remove access panel 211 HL (HR) (refer to 25-12-00).
(2) Disconnect pushrod at control stick base.
(3) Disconnect pushrod at front bell crank and remove pushrod.

B. Install Pushrod 1
(1) Connect pushrod to front bellcrank and control stick base.
(2) Perform aileron control system inspection/check (refer to “Inspection/Check” below).
(3) Install access panel 211 HL (HR) (refer to 25-12-00).

4. Front Bellcrank Removal/Installation

A. Remove Front Bellcrank
(1) Remove access plate 210 AB (refer to 06-30-00).
(2) Remove access panel 211 HL and 211 HR (refer to 25-12-00).
(3) Disconnect pushrods at front bellcrank (optional roll servo pushrod: refer to 22-10-00).
(4) Remove pivot bolt securing bellcrank to bellcrank brackets and remove bellcrank.



Component Installation
Figure 201

B. Install Front Bellcrank
  (1) Position front bellcrank between brackets and secure using bolt, washer and nut.
  (2) Connect pushrods to front bellcrank (optional roll servo pushrod: refer to 22-10-00).
  (3) Perform aileron control system inspection/check (refer to “Inspection/Check” below).
  (4) Install access plate 210 AB (refer to 06-30-00).
  (5) Install access panel 211 HL and 211 HR (refer to 25-12-00).

5. Pushrod 2 Removal/Installation

A. Remove Pushrod 2
  (1) Remove access plate 210 AB (refer to 06-30-00).
  (2) Disconnect pushrod at front bellcrank.
  (3) Disconnect pushrod at rear bell crank and remove pushrod.

B. Install Pushrod 2
  (1) Connect pushrod to front bellcrank and rear bellcrank.
  (2) Perform aileron control system inspection/check (refer to “Inspection/Check” below).
  (3) Install access plate 210 AB (refer to 06-30-00).

6. Rear Bellcrank Removal/Installation

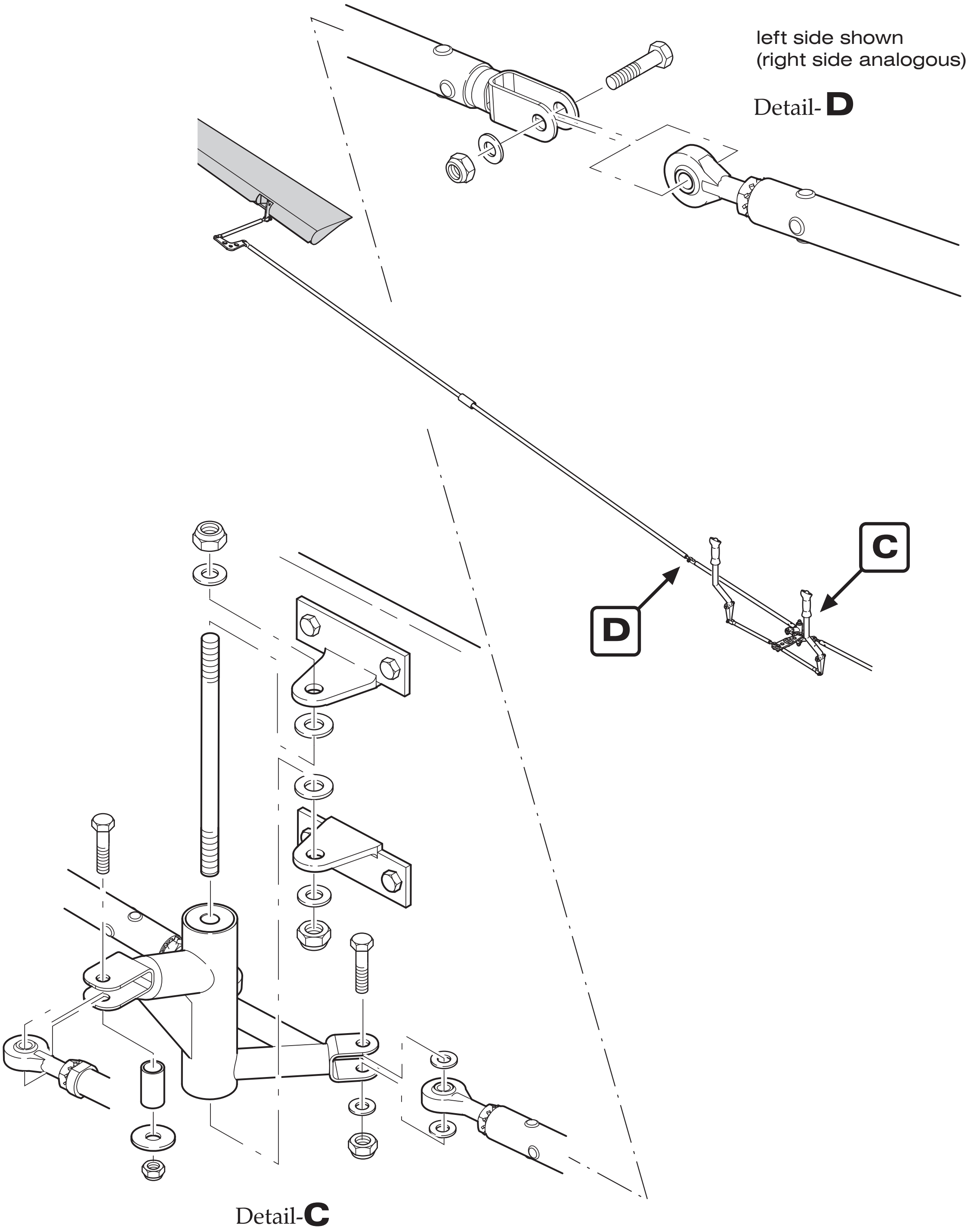
A. Remove Rear Bellcrank
  (1) Remove access plate 210 AB (refer to 06-30-00).
  (2) Disconnect pushrods at rear bellcrank.
  (3) Remove nuts, washers and bellcrank axle securing bellcrank to bellcrank brackets and remove bellcrank.

B. Install Rear Bellcrank
  (1) Position rear bellcrank between brackets and secure using axle, washers and nuts.
  (2) Attach pushrods to rear bellcrank.
  (3) Perform aileron control system inspection/check (refer to “Inspection/Check” below).
  (4) Install access plate 210 AB (refer to 06-30-00).

7. Pushrod 3 Removal/Installation

A. Remove Pushrod 3
  (1) Remove access plate 210 AB (refer to 06-30-00).
  (2) Disconnect pushrod at rear bellcrank.
  (3) Disconnect pushrod at pushrod 4.

B. Install Pushrod 3
  (1) Connect pushrod to rear bellcrank and pushrod 4.
  (2) Perform aileron control system inspection/check (refer to “Inspection/Check” below).
  (3) Install access plate 210 AB (refer to 06-30-00).



Component Installation
Figure 202

8. Pushrod 4 Removal/Installation

A. Remove Pushrod 4
(1) Remove wing (refer to 57-10-00).
(2) Open access panel 520 (620) AB (refer to 06-30-00).
(3) Disconnect pushrod at aileron bellcrank.
(4) Remove rod end bearing.
(5) Cautiously withdraw pushrod from wing.

B. Install Pushrod 4
(1) Position pushrod into the wing.
(2) Install rod end bearing.
(3) Attach pushrod to aileron bellcrank.
(4) Install wing (refer to 57-10-00).
(5) Connect pushrod 4 to pushrod 3.
(6) Re-rig aileron control system (refer to "Adjustment/Test" below).
(7) Perform aileron control system inspection/check (refer to "Inspection/Check" below).
(8) Close access panel 520 (620) AB (refer to 06-30-00).

9. Aileron Bellcrank Removal/Installation

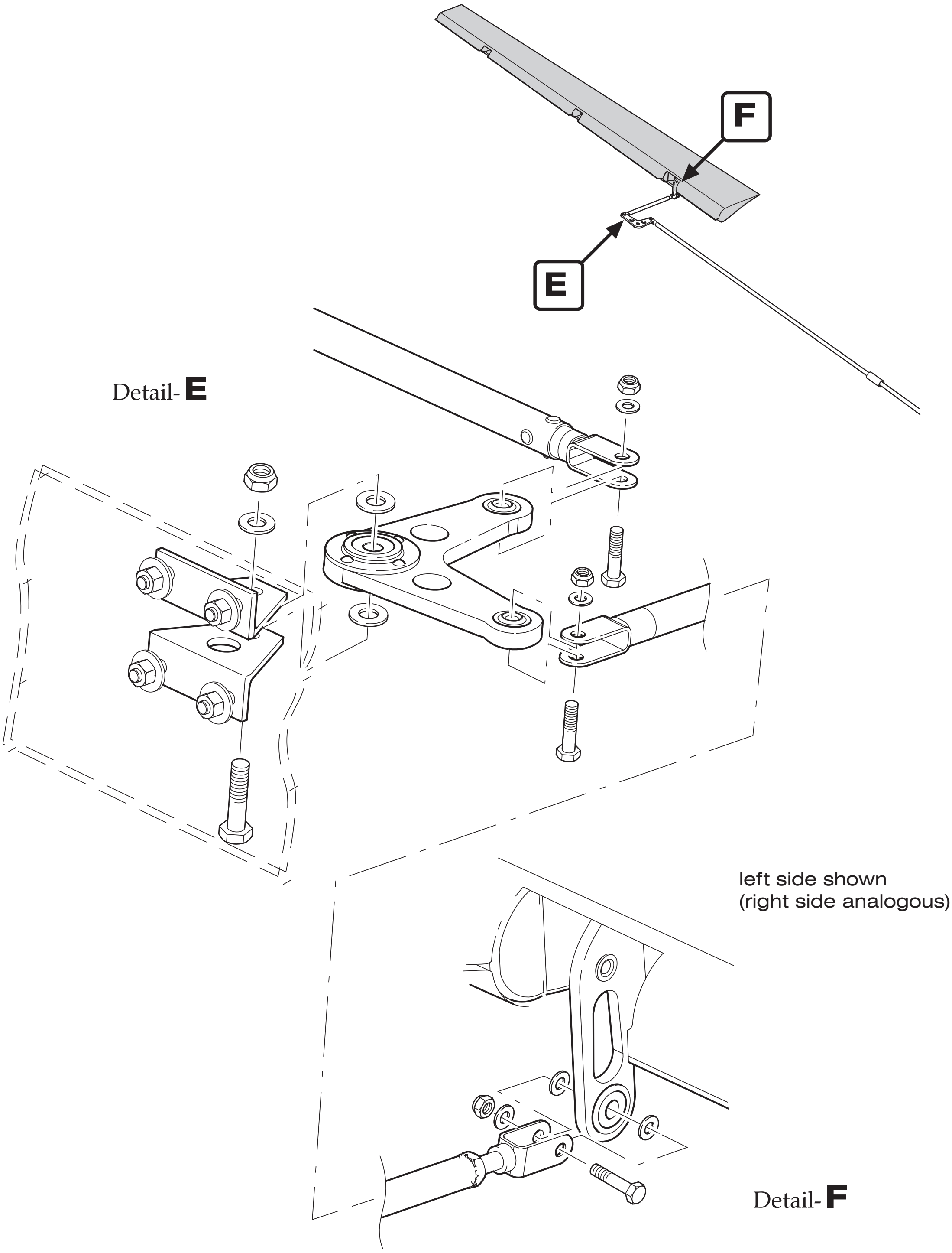
A. Remove Aileron Bellcrank
(1) Open access plate 520 (620) AB (refer to 06-30-00).
(2) Disconnect pushrods at aileron bellcrank.
(3) Remove pivot bolt securing bellcrank to bellcrank bracket assembly. Remove bellcrank and washers through access plate.

B. Install Aileron Bellcrank
(1) Attach bellcrank to structure using pivot bolt, ensuring required washers are in place.
(2) Reconnect aileron pushrod to bellcrank.
(4) Reconnect pushrod 4 to the bellcrank.
(5) Perform aileron control system inspection/check (refer to "Inspection/Check" below).
(6) Close inspection/access plate 520 (620) AB (refer to 06-30-00).

10. Inspection/Check

A. Inspection/Check
(1) Perform a visual inspection of the aileron control system. Check all components for proper installation and security. No signs of excessive play.

NOTE: The maximum permissible value of aileron play at the hinge pins is 1,0 mm (0.04 in.) axial play and 0,3 mm (0.01 in.) radial play. The maximum control circuit backlash is 10 mm (0.4 in.).
In case of excessive play of the control surfaces in their hinges, replace worn hinge bushings (refer also to 57-50-00).



Aileron Bellcrank Installation
Figure 203

(2) Verify minimum rod end thread engagement of 8 mm (0.312 in.).
(3) Verify ailerons can be moved smoothly through the full travel. No grinding is audible.
(4) Check ailerons for correct travel using an inclinometer. If necessary perform aileron control system adjustment/test (refer to "Adjustment/Test" below).

<u>NOTE:</u> For aileron rigging specifications, refer to chapter 6 „Dimensions and Areas“.

(5) Install all items removed for access.

11. Adjustment/Test

A. Adjustment/Test
(1) Remove access plate 210 AB (refer to 06-30-00).
(2) Remove access plate 620 AB and 520 AB (refer to 06-30-00).
(3) Remove access plate 211 HL and HR (refer to 06-30-00).
(4) Adjust pushrod 2 until:
  (a) front and rear bellcrank are parallel to each other.
  (b) both bellcranks are perpendicular to the wing spar.
(5) Fix bellcranks in a suitable manner.
(6) Adjust pushrod 3 for each aileron so the aileron bellcrank is in neutral position (line between bellcrank pivot bolt and aileron pushrod attach bolt is parallel to the wing spar).
(7) Adjust each aileron pushrod until the control surface is neutral with reference to wing trailing edge.
(8) Adjust pushrod 1 for each control stick until the control stick is in neutral position.
(9) Set free the front and rear bellcrank.
(10) Fasten inclinometer to left aileron and set at 0°.
(11) Adjust aileron stop bolts at control yoke assembly to allow up and down aileron travel specified in 06-10-00.
(12) Perform an aileron control system inspection/check (refer to "Inspection/Check" above).
(13) Install all items removed for access.

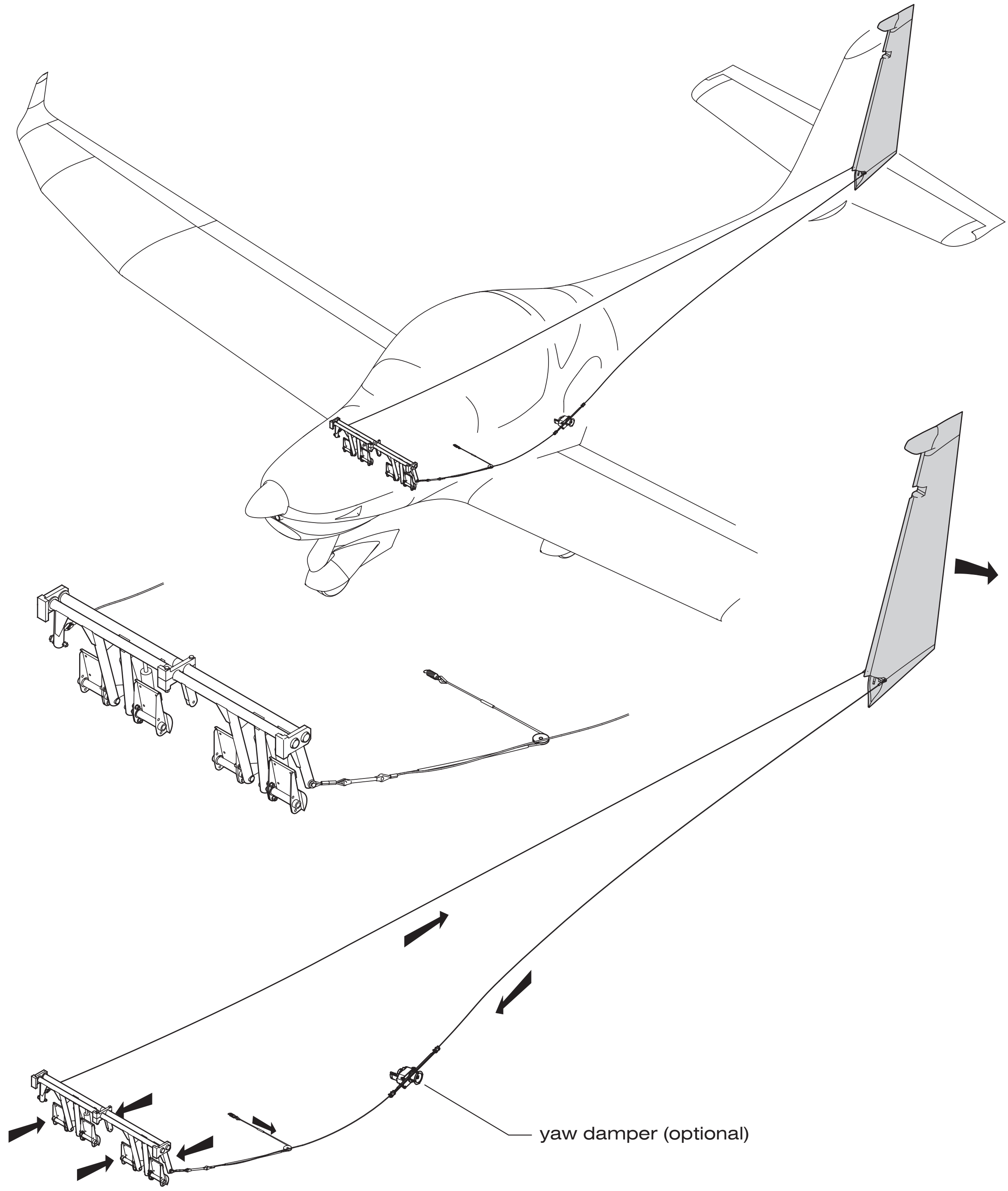
RUDDER CONTROL SYSTEM - DESCRIPTION

1. Introduction

A. This section describes that portion of the flight control system which controls the position and movement of the rudder. The rigging procedure for the rudder control system is also provided. The rudder control system consists of conventional rudder pedals, cables and pulleys.

2. Description and Operation

A. For rudder control system design and function refer to figure 1.



Rudder Control Design and Function
Figure 1

RUDDER CONTROL SYSTEM - MAINTENANCE

1. General

A. For a breakdown of the components, refer to figure 201 and 202.

WARNING: WHEN INSTALLING COMPONENTS OF THE CONTROL SYSTEM, NEW SELF-LOCKING NUTS SHOULD ALWAYS BE USED. NEVER USE A SELF-LOCKING NUT MORE THAN ONCE.

A SYSTEM RIGGING AND INSPECTION/CHECK MUST BE PERFORMED AFTER LOOSENING ANY FLIGHT CONTROL CABLE TO ENSURE PROPER CONTROL SURFACE OPERATION.

2. Control Cables

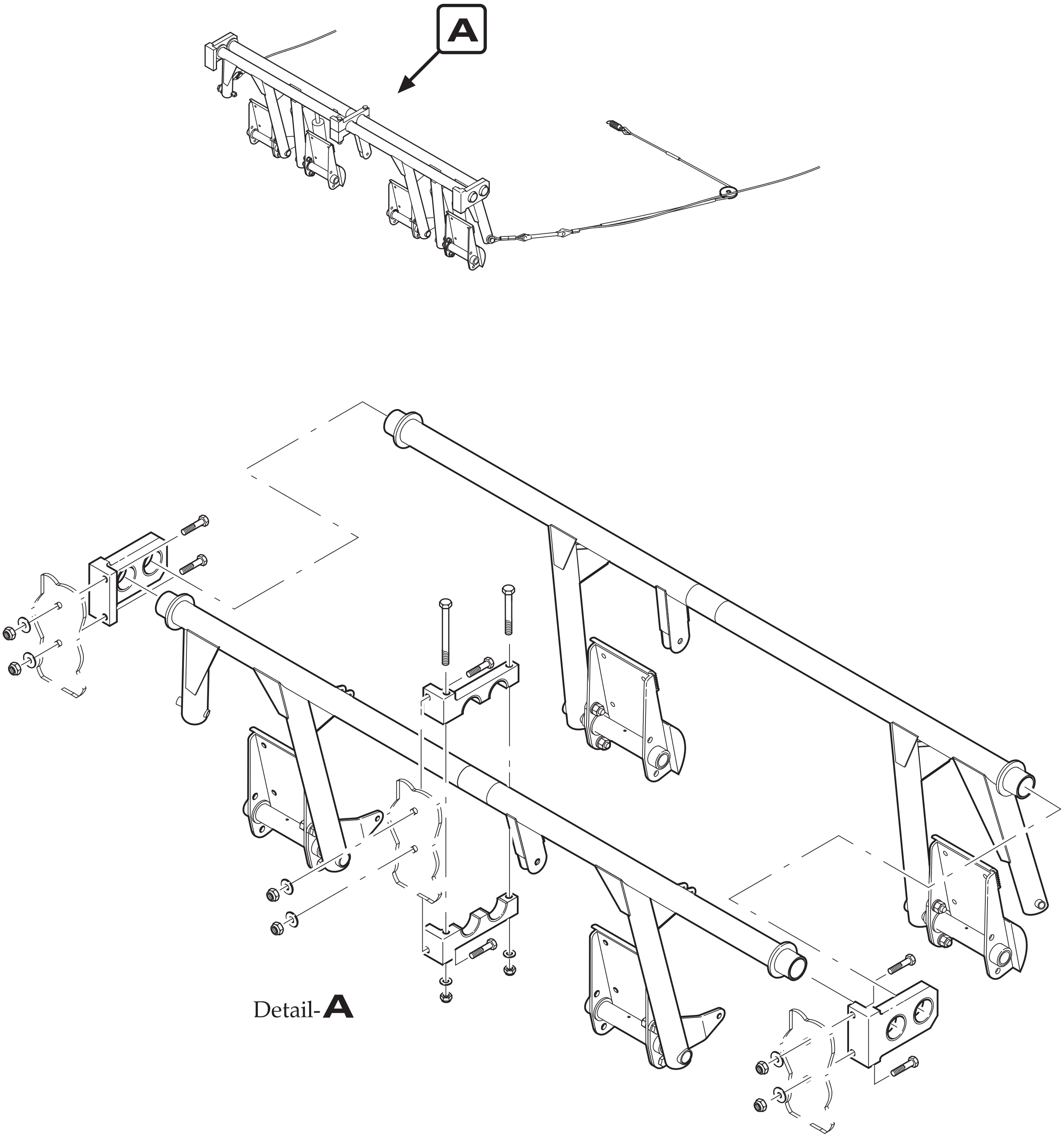
A. The maintenance of the control cables is important for the precise and safe functioning of the rudder control system. Control cables should be regularly checked for mechanical damage and damage caused by corrosion.

(1) Broken Wire Check
Check cables for broken strands of wire by passing a cloth along length of cable. The cloth will snag at such places. Check particularly carefully at the bridle cable clamps, if the yaw damper (GFC 500 autopilot) is installed. If broken wires are found, the affected control cable must be examined in more detail and removed if necessary. If a broken single wire is found, the control cable must be replaced. The procedures for control cable removal and installation are described below.

(2) Corrosion Check
External corrosion can be detected by a careful visual examination of the cables. Finding internal corrosion is more difficult. If internal corrosion is suspected, remove cable from the aircraft and examine more closely, especially in areas with broken wires.

3. Rudder Pedal Assembly Removal/Installation

A. Remove Rudder Pedal Assembly
(1) Slacken control cables of rudder control.
(2) Disconnect control cables from rudder control actuator arms.
(4) Disconnect brake master cylinders at rudder pedal assembly.
(5) Disconnect steering tubes at rudder bars.
(6) Remove bolts securing lower half of the middle bearing block to upper half and remove lower bearing block half.
(7) Remove bolts attaching left and right bearing blocks to firewall and work rudder bars out of area below instrument panel.



Rudder Control Installation
Figure 201

B. Install Rudder Pedal Assembly
   (1) Position rudder bars in left and right bearing blocks and secure bearing blocks to firewall using bolts.
   (2) Reinstall lower half of middle bearing block.
   (3) Reconnect steering tubes to rudder bars.
   (4) Reconnect master cylinders to the rudder pedal assembly.
   (5) Reconnect control cables to rudder control actuator arms and re-rig system (refer to “Adjustment/Test“ below).
   (6) Check correct operation of the rudder control system (refer to “Inspection/Check” below).

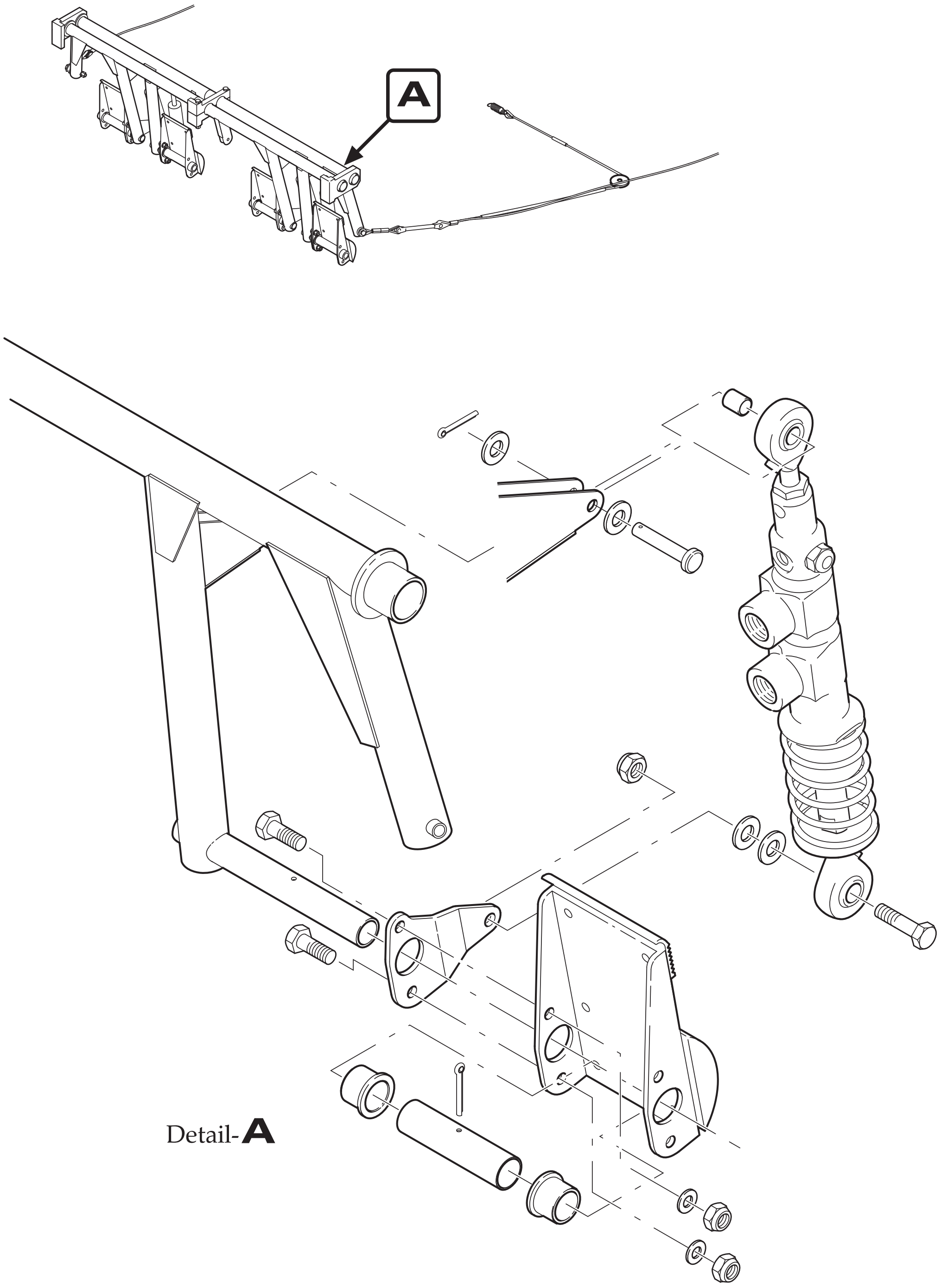
4. Control Cable Removal/Installation

A. Remove a Control Cable
   (1) Relieve cable tension at turnbuckle.
   (2) Disconnect control cable at the turnbuckle.
   (3) Disconnect control cable at the rudder.
   (4) If a yaw damper is installed (GFC 500 autopilot): Disconnect bridle cable from left rudder cable (refer to 22-10-00).
   (5) Cut the eye-end from the control cable which is to be removed at the turnbuckle end.
   (6) Withdraw control cable from the aircraft.

B. Install a Control Cable

WARNING: THE CONTROL CABLE EYE-ENDS SHOULD BE INSTALLED BY TRAINED AND AUTHORIZED PERSONNEL ONLY. IF THE EYE-ENDS ARE NOT INSTALLED PROPERLY; A RUDDER CONTROL SYSTEM FAILURE MAY OCCUR.
USE CABLES TO SPECIFICATION LN9374 OR ISO 2020 OR MIL-DTL-83420, STRECHED TO 60% MBS (DIAMETER 3,2 MM [1/8 IN.]).

   (1) Prepare a new control cable with the required length and one eye-end.
   (2) Push that control cable through the tube from the rudder side.
   (3) If a yaw damper is installed (GFC 500 autopilot): Ensure the control cable passes through a PTFE tube piece (length: 290 mm) at the servo installation position (refer to 22-10-00 for an illustration).
   (4) Install the second eye-end at the turnbuckle end.
   (5) Reconnect the control cable to the rudder using bolt, washer and nut.
   (6) Reconnect the control cable to the turnbuckle using bolt , washer and nut.
   (7) Rig rudder control cable including cables of the aileron-rudder interconnect.
   (8) If a yaw damper is installed (GFC 500 autopilot): Connect the bridle cable to the left rudder control cable (refer to 22-10-00). Adjust pretension of rudder control cable and servo bridle cable (refer to 22-10-00 for tension values).
   (9) Check correct operation of rudder control system / aileron-rudder interconnect (refer to “Adjustment/Test“ and “Inspection/Check” below).



Rudder Pedal / Master Cylinder Installation
Figure 202

5. Inspection/Check

A. Inspection/Check

(1) Perform a visual inspection of the rudder control system. Check all components for proper installation and security. No signs of excessive play.

NOTE: The maximum permissible value of rudder play at hinge pins is 1,0 mm (0.04 in.) axial play and 0,3 mm (0.01 in.) radial play.
In case of excessive play of the control surface in its hinges, replace worn hinge bushings (refer also to 57-50-00).

(2) Examine control cables for broken wires and corrosion.
(3) Verify rudder can be moved smoothly through full travel. No grinding is audible.
(4) If a yaw damper is installed (GFC 500 autopilot): Check rudder control cable and servo bridle cable for correct pretension. Adjust pretension if necessary (refer to 22-10-00 for tension values).
(5) Check rudder for correct travel using an inclinometer, if necessary perform rudder control system adjustment/test (refer to “Adjustment/Test” below).

NOTE: For rudder rigging specifications, refer to chapter 6 “Dimensions and Areas“.

(6) Install all items removed for access.

6. Adjustment/Test

A. Adjustment/Test

(1) Remove engine cowling (refer to 71-10-00).
(2) Slacken control cables of rudder control.
(3) Tie down or weight tail to raise nose wheel off the ground.
(4) Set the rudder pedals to neutral and fix in suitable manner.
(5) Fix the rudder in neutral position with reference to vertical stabilizer.
(6) Tension the control cables with the turnbuckles until the control system is free of clearance at room temperature.
(7) If a yaw damper is installed (GFC 500 autopilot): Adjust pretension of rudder control cable and servo bridle cable (refer to 22-10-00 for tension values).
(8) Adjust nose wheel steering tubes so the nose wheel is streamlined.
(9) Set the rudder control system free.
(10) Adjust secondary stops on the nose wheel strut so that for full right and left rudder deflection:
    (a) the rudder stops contact before secondary stops.
    (b) secondary stops show a 0,5 mm (0.02 in.) gap between stop bolt and nose wheel assembly.
(11) Tighten jam nuts.
(12) Verify rudder pedals are free for the full range of movement.
(13) Perform a rudder control system inspection/check (refer to “Inspection/Check” above).
(14) Install engine cowling (refer to 71-10-00) and lower nose wheel.

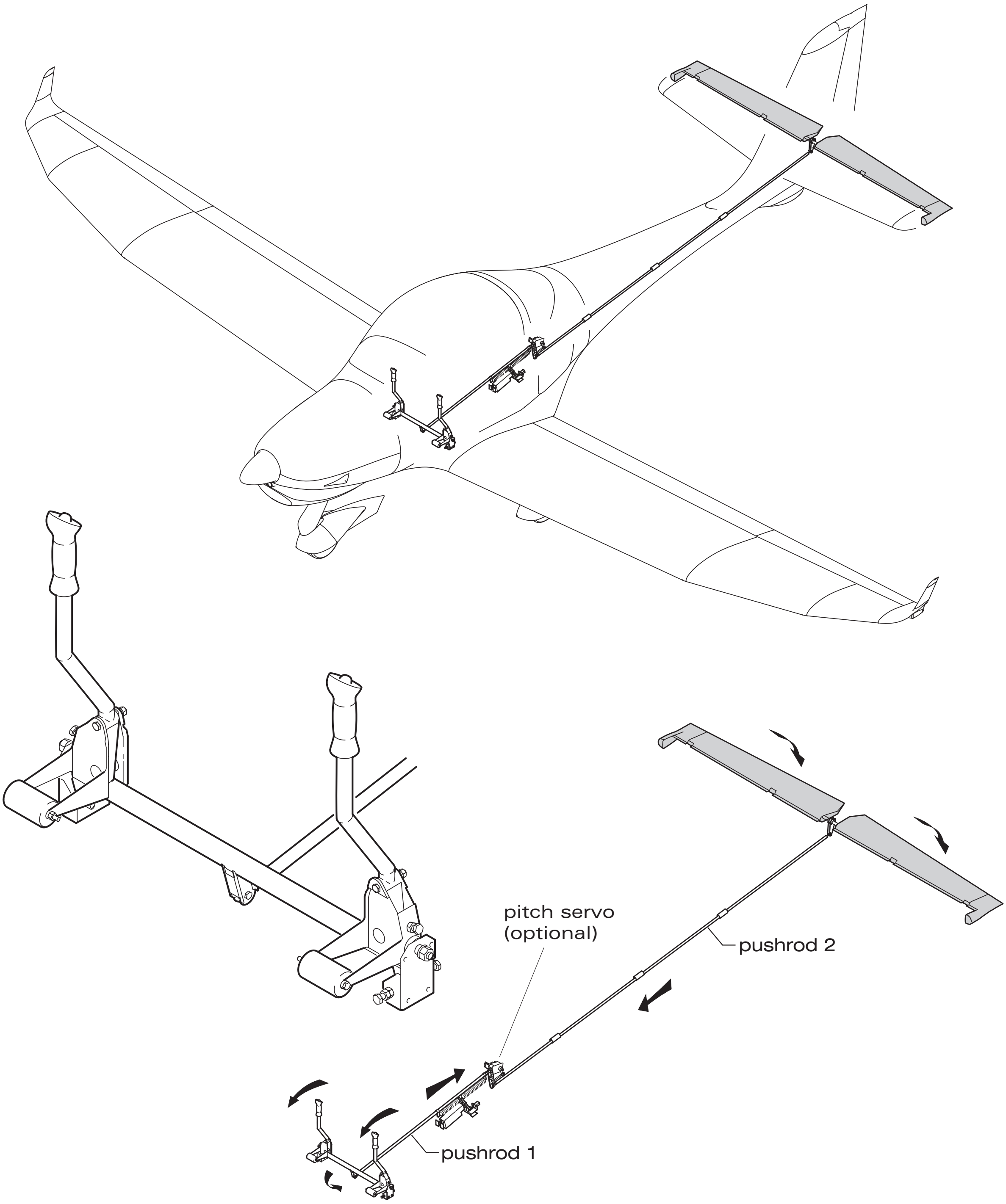
ELEVATOR CONTROL SYSTEM - DESCRIPTION

1. Introduction

   A. This section describes that portion of the flight control system which controls the position and movement of the elevator. The rigging procedure for the elevator control system is also provided. The system consists of control sticks, elevator torque tube assembly, pushrods and the elevator bellcrank.
   The aircraft is equipped with an electrical spring-force elevator trim system.

2. Description and Operation

   A. For elevator control system design and function refer to figure 1.



Elevator Control System Design and Function
Figure 1

ELEVATOR CONTROL SYSTEM - MAINTENANCE

1. General

A. For a breakdown of the components, refer to figure 201 and 202.

WARNING: WHEN INSTALLING COMPONENTS OF THE CONTROL SYSTEM NEW SELF-LOCKING NUTS SHOULD ALWAYS BE USED. NEVER USE A SELF-LOCKING NUT MORE THAN ONCE.

2. Elevator Torque Tube Assy Removal/Installation

A. Remove Elevator Torque Tube Assy
(1) Remove seats (refer to 25-10-00).
(2) Remove control sticks (refer to 27-10-00).
(3) Disconnect pushrod 1 from elevator actuation arm.
(4) Remove pivot bolt, washers and nut from both ends of the torque tube with which the torque tube is attached to the support bracket.
(5) Remove torque tube from aircraft.

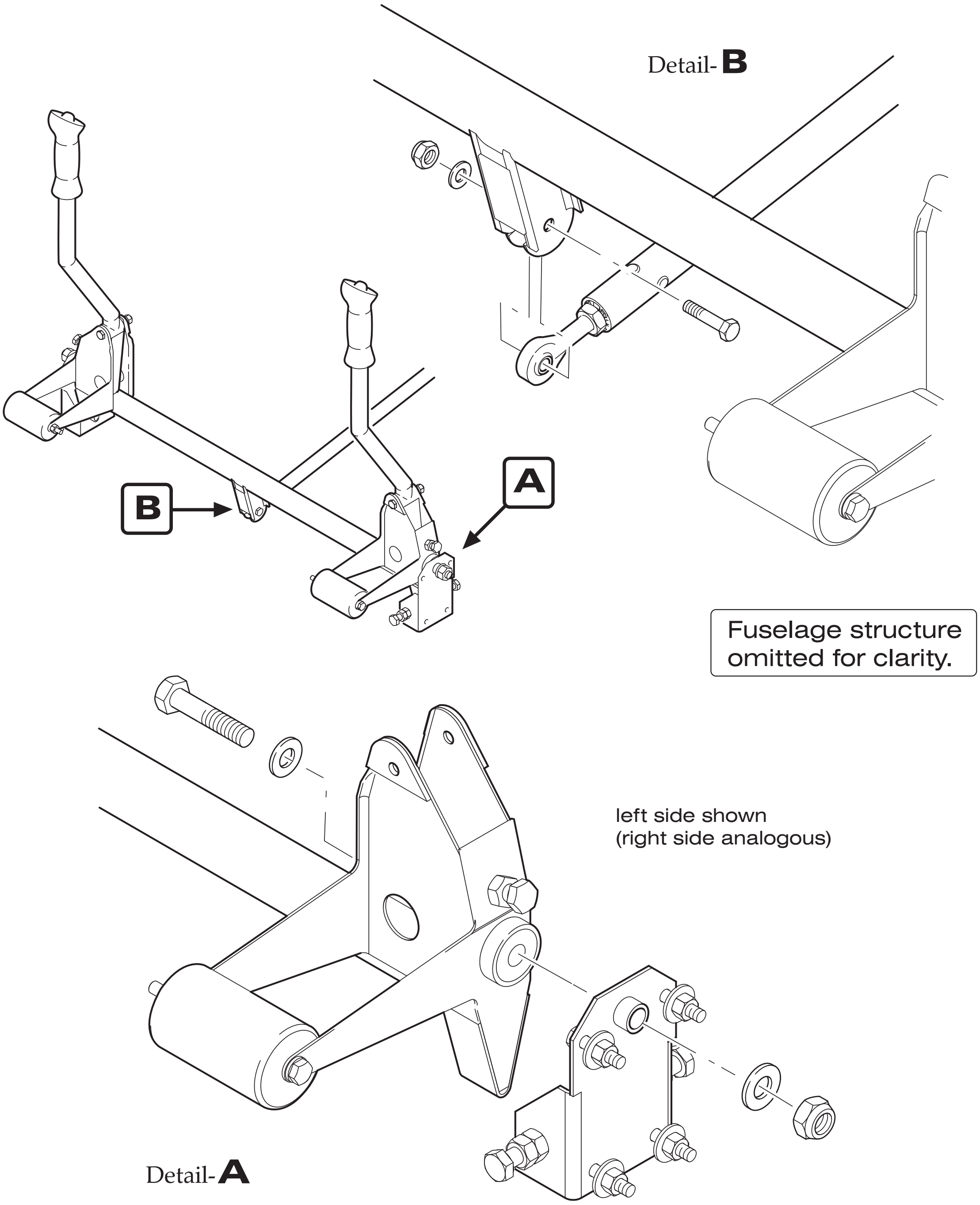
B. Install Elevator Torque Tube Assy
(1) Position torque tube between support brackets.
(2) Attach pivot bolt, washers and nut to both ends of the torque tube with which the torque tube is attached to the support bracket.
(3) Connect pushrod 1 to elevator actuation arm.
(4) Install control sticks (refer to 27-10-00).
(5) Check elevator and aileron control for proper operation and rig if necessary (refer to “Aileron Control System Maintenance“ and „Adjustment/Test“ below).

3. Pushrod 1 Removal/Installation

A. Remove Pushrod 1
(1) Remove seats (refer to 25-10-00).
(2) Remove baggage compartment floor panel (refer to 25-12-00).
(3) Disconnect trim system springs from pushrod.
(4) Disconnect pushrod at elevator actuation arm.
(5) Disconnect pushrod at elevator bellcrank.
(6) Remove pushrod from aircraft.

B. Install Pushrod 1
(1) Position pushrod and connect to elevator bellcrank.
(2) Connect pushrod to elevator actuation arm.
(3) Connect springs of trim system to pushrod.

NOTE: If spring attachment clamps have been removed, refer to 27-31-00 for their correct position.



Component Installation
Figure 201

(4) Check elevator control system and elevator trim system for proper operation and rig if necessary (refer to 27-30-00 and 27-31-00).
(5) Install baggage compartment floor panel (refer to 25-12-00).
(6) Install seats (refer to 25-10-00).

4. Elevator Bellcrank Removal/Installation

A. Remove Elevator Bellcrank

(1) Remove baggage compartment floor panel (refer to 25-12-00).
(2) Disconnect pushrods from elevator bellcrank (optional pitch servo pushrod: refer to 22-10-00).
(3) Remove pivot bolt securing elevator bellcrank to support brackets.
(4) Remove elevator bellcrank.

B. Install Elevator Bellcrank

(1) Mount bellcrank to structure using pivot bolt, nut and washer. Ensure spacers are placed correctly.
(2) Reconnect pushrods to bellcrank (optional pitch servo pushrod: refer to 22-10-00).
(3) Check elevator control system and elevator trim system for proper operation and rig if necessary (refer to 27-30-00 and 27-31-00).
(4) Install baggage compartment floor panel (refer to 25-12-00).

5. Inspection/Check

A. Inspection/Check

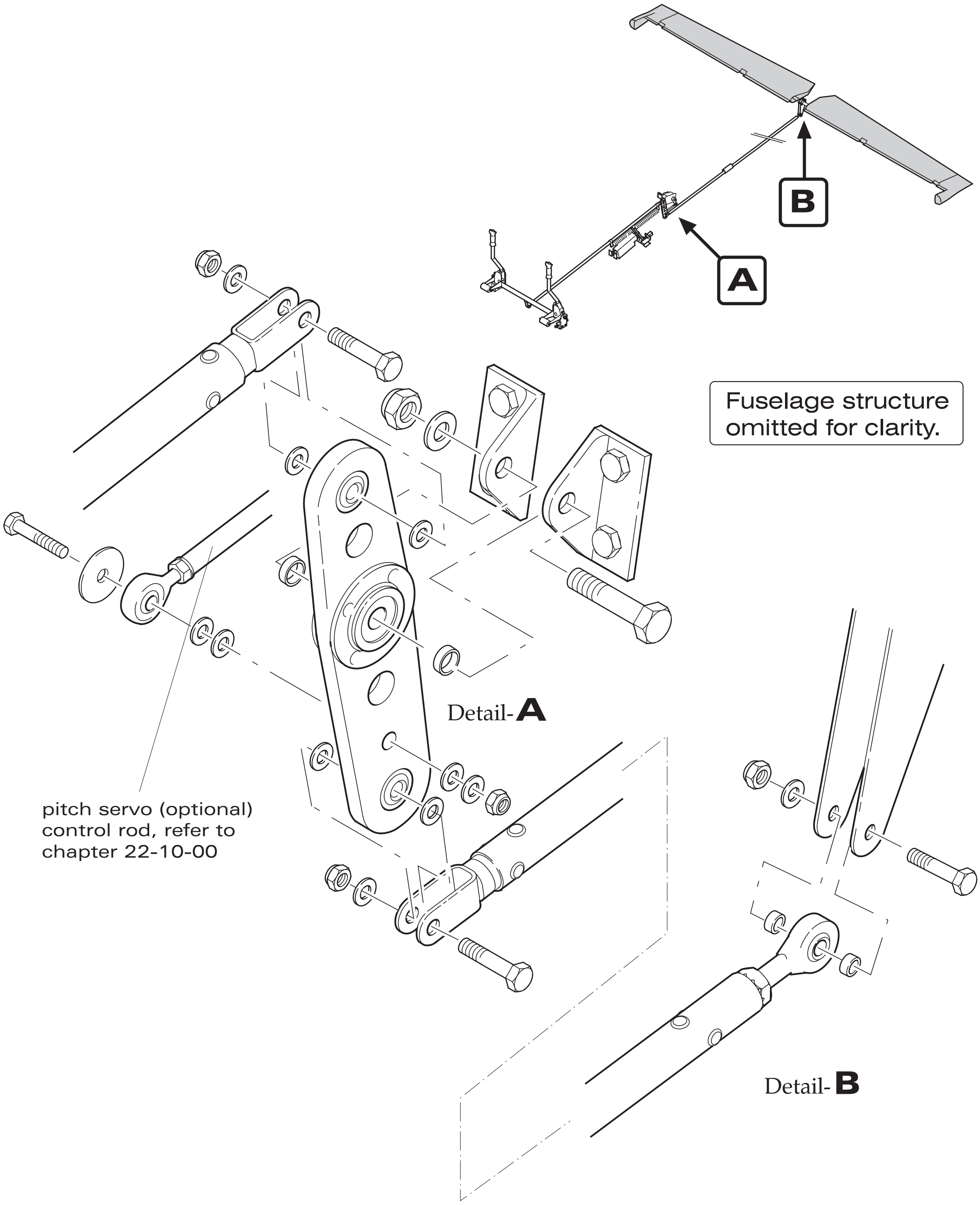
(1) Perform a visual inspection of elevator control system. Check all components for proper installation and security. No signs off excessive play.

NOTE: The maximum permissible value of elevator play at hinge pins is 1,0 mm (0.04 in.) axial play and 0,3 mm (0.01 in.) radial play. The maximum control circuit backlash is 10 mm (0.4 in.).
In case of excessive play of the control surfaces in their hinges, replace worn hinge bushings (refer also to 57-50-00).

(2) Verify minimum rod end thread engagement of 8 mm (0.312 in.).
(3) Verify elevator can be moved smoothly through full travel. No grinding is audible.
(4) Verify both sticks are free for the full range of movement and maximum up and down elevator travel is achieved.
(5) Check elevator for correct travel using an inclinometer, if necessary perform elevator control system adjustment/test (refer to “Adjustment/Test” below).

NOTE: For elevator rigging specifications, refer to chapter 6 “Dimensions and Areas“.

(6) Install all items removed for access.



Fuselage structure omitted for clarity.

Component Installation
Figure 202

6. Adjustment/Test

A. Adjustment/Test
   (1) Remove baggage compartment floor panel (refer to 25-12-00).
   (2) Remove access plate 211 HL and HR (refer to 25-12-00).
   (3) Lock elevator bellcrank in neutral position in a suitable manner (the line between pushrod attach points on bellcrank is perpendicular to the pushrod 2).
   (4) Streamline elevator to neutral with horizontal stabilizer by adjusting elevator pushrod (pushrod 2).
   (5) Adjust pushrod 1 until the control yoke assembly is in neutral position.

ELEVATOR TRIM CONTROL - DESCRIPTION

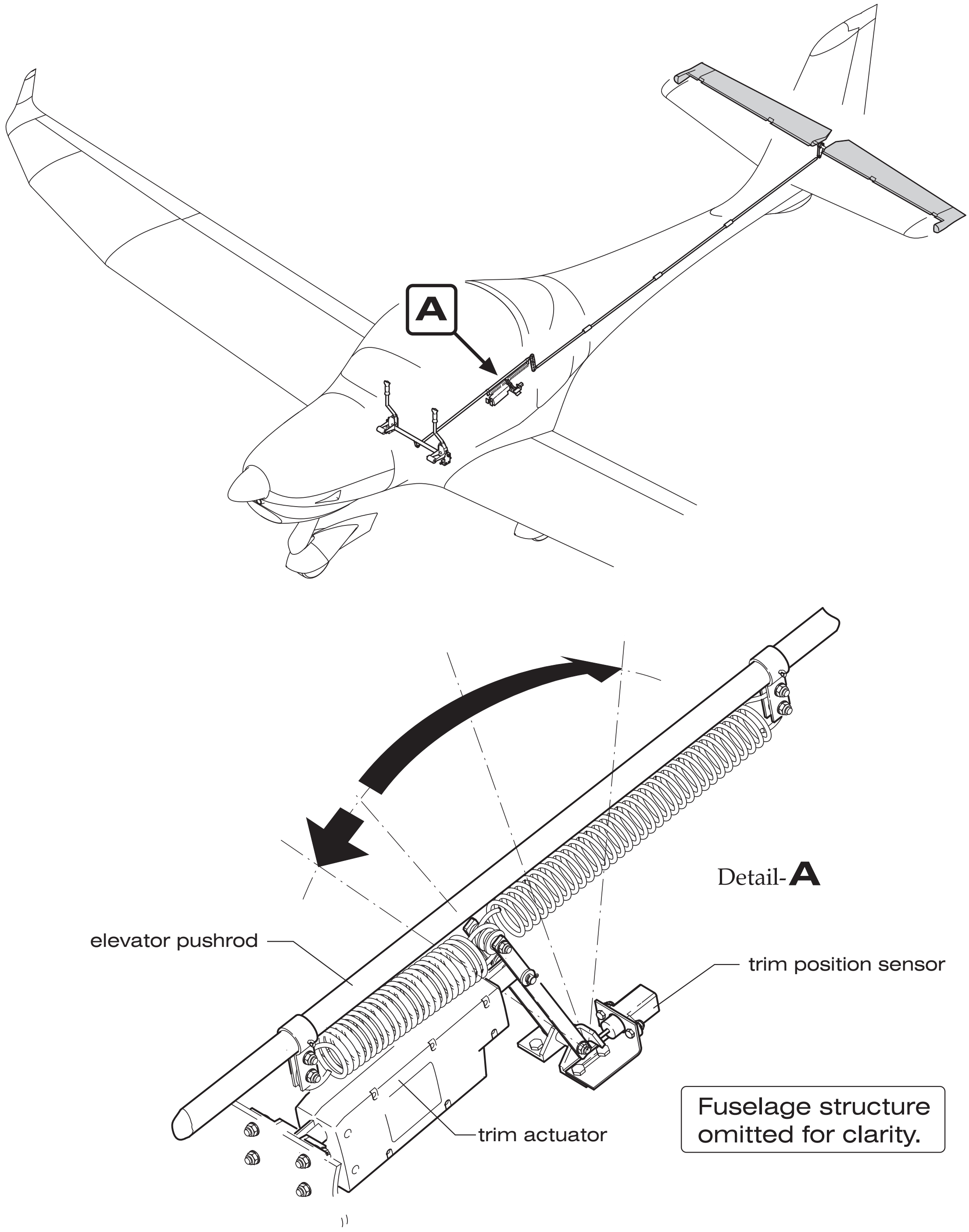
1. Introduction

A. The aircraft isequipped with an electrical spring-force trim system. An electrical trim actuator changes the pre-load of a pair of springs that applies a defined force to the elevator pushrod.

2. Description and Operation

A. For an illustration of elevator trim control design and function refer to figure 1.

B. The trim system is controlled by a rocker switch located on the rear portion of the middle console. Pressing the forward side of the switch will trim nose down; pressing the rear side of the switch will trim nose up.
The switch operates an electrical trim actuator that is mounted under the baggage compartment floor panel, parallel to the elevator pushrod.
The electrical circuit of the trim system is protected by a circuit breaker that can be pulled in the event of a trim system malfunction.



Fuselage structure omitted for clarity.

Elevator Trim System Design And Function
Figure 1

ELEVATOR TRIM CONTROL - MAINTENANCE

1. General

A. For a breakdown of the components, refer to figure 201.

2. Trim Actuator Removal/Installation

A. Remove Trim Actuator
- (1) Set the elevator trim system to neutral.
- (2) Place the BAT switch in OFF position.
- (3) Remove baggage compartment floor panel (refer to 25-12-00).
- (4) Disconnect trim actuator electrical wires at connector.
- (5) Disconnect the springs at trim system actuation arm.
- (6) Disconnect trim actuator push rod at trim system actuation arm.
- (7) Remove bolts securing trim actuator to fuselage structure and remove trim actuator.

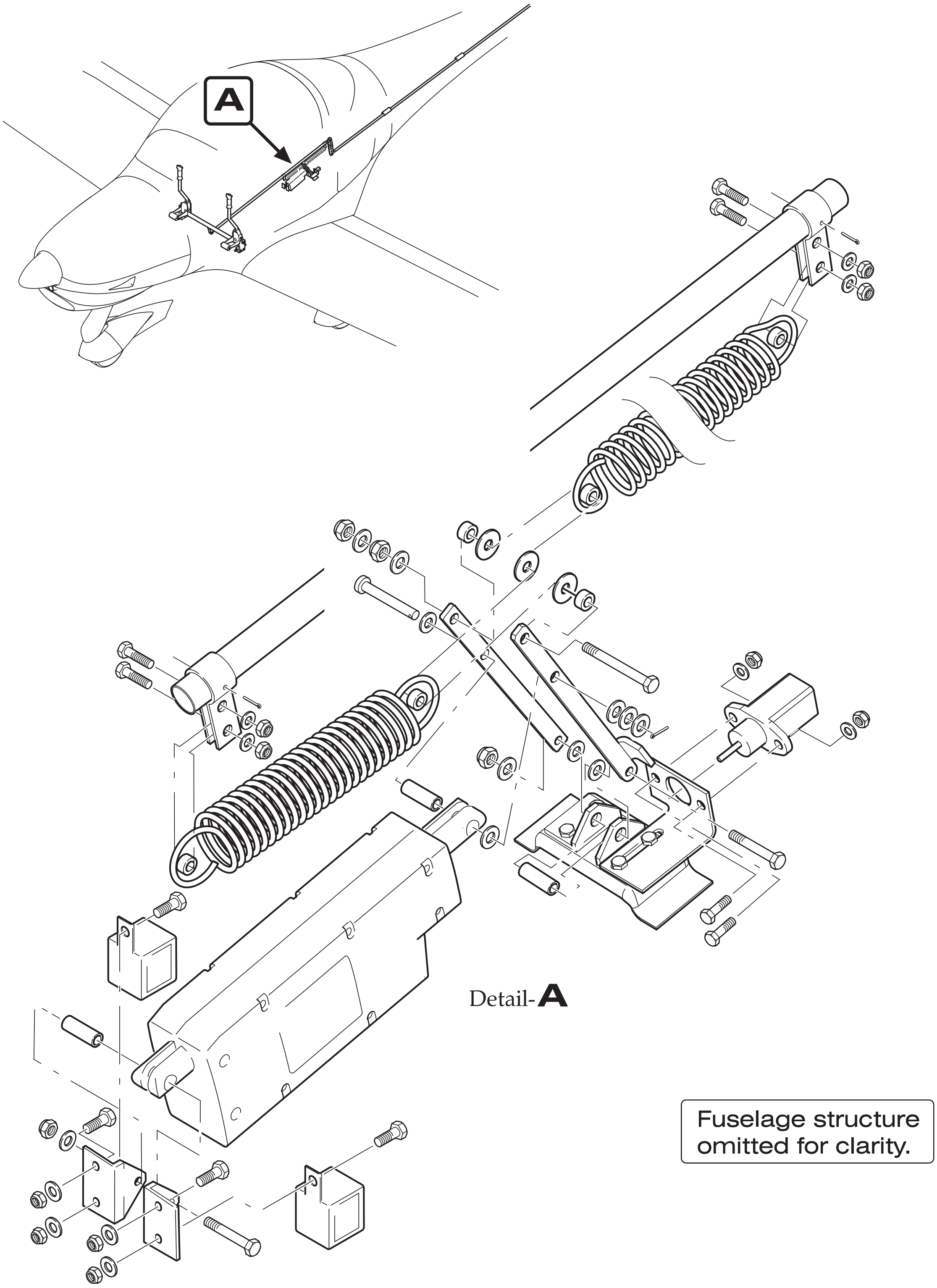
B. Install Trim Actuator
- (1) Attach trim actuator to fuselage structure with bolts, washers and nuts.
- (2) Reconnect trim actuator push rod to trim system actuation arm using hardware.
- (3) Reconnect springs to trim system actuation arm.

NOTE: There are two different types of springs used in the trim system. The spring on the forward side is black colored, the spring on the rear side is silver colored.

- (4) Connect trim actuator electrical connection.
- (5) Check elevator trim control for proper function (refer to “Inspection/Check” below).
- (6) Install baggage compartment floor panel (refer to 25-12-00).

3. Inspection/Check

A. Inspection/Check
- (1) Perform a visual inspection of elevator trim system. Check all components for proper installation and security. No signs off excessive play.
- (2) Verify distance between rear edge of rear pipe bracket (securing rear spring to elevator pushrod) and connecting bore of rear fork head. Nominal value: 55 ± 2 mm (2.17 ± 0.08 in.)
- (3) Place BAT switch in ON position.
- (4) Keep hands away from control stick and run trim actuator to full nose-down trim position until travel is stopped by limit switch.
- (5) Check forward movement of the control stick. Verify proper trim position indicator reading.
- (6) With full nose-down trim: Measure control force by means of a spring balance. Attach balance in upper third of grip piece and pull rearward until control stick moves from stop. Control force nominal value: 40 ± 5 N (9 ± 1.1 lbs)
- (7) Keep hands away from control stick and run trim actuator to full nose-up trim position until travel is stopped by limit switch.
- (8) Check backward movement of the control stick. Verify proper trim position indicator reading.
- (9) Set the elevator trim to neutral and place BAT switch in OFF position.
- (10) Install all items removed for access.



Elevator Trim System Installation
Figure 201

FLAP CONTROL SYSTEM - DESCRIPTION

1. Introduction

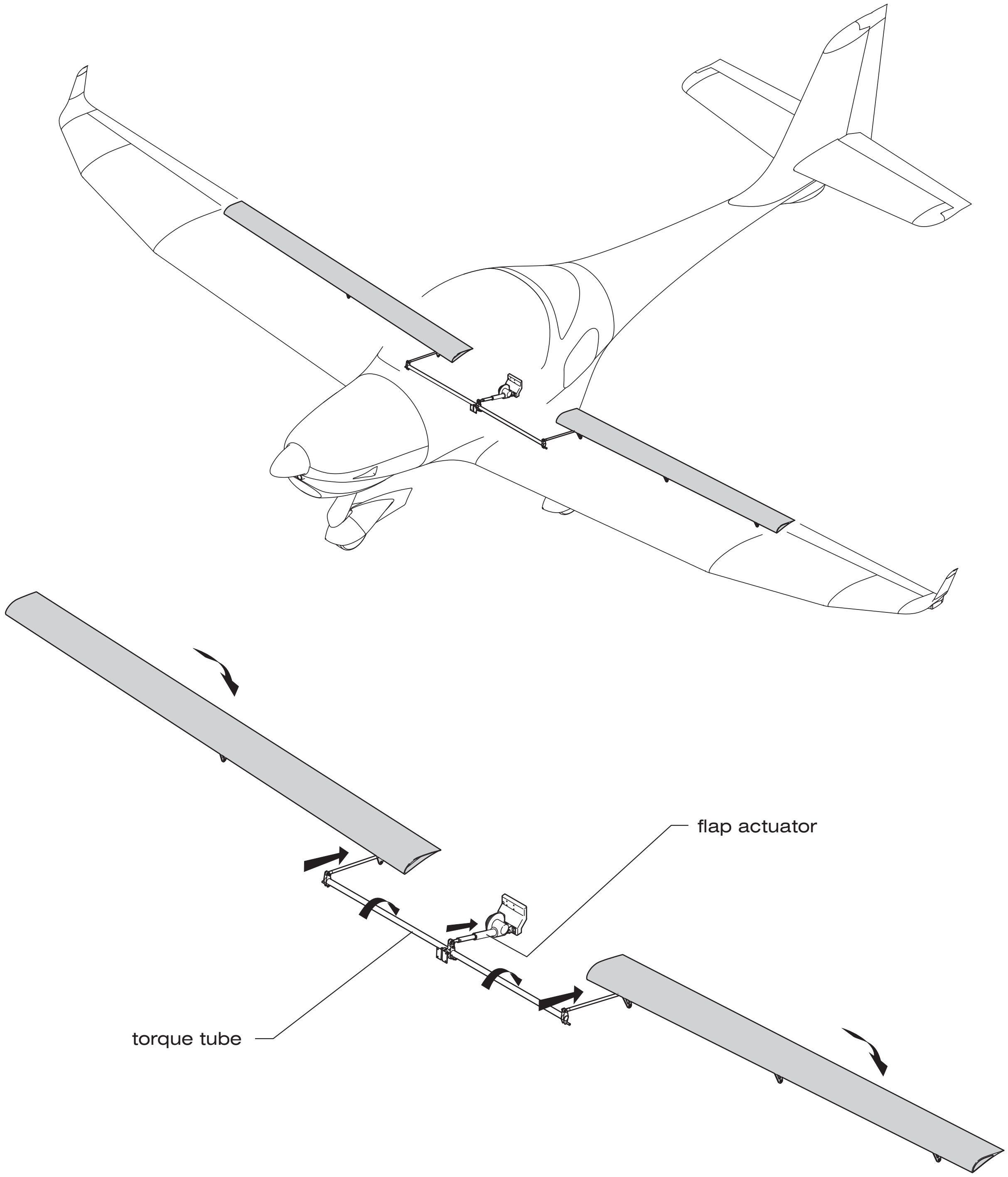
A. This section describes that portion of the flight control system which controls the position and movement of the flaps. The rigging procedure forthe flap control system is also provided.
The aircraft is equipped with electrically actuated flaps. They are operated and fixed in the desired position by an electrical flap actuator.

2. Description and Operation

A. The wing flaps system consists of a three-position selector switch which is incorporated in the instrument panel, a LED flap position indicator near the three-position selector switch, the electric flap actuator, located under the baggage floor, a torque tube, pushrods and the flaps on each wing.

B. The linear flap actuator drives the torque tube interconnected between the left and right flaps. Limit switches are attached to the flap actuator. They identify flap position and surface travel, and turn off the actuator once the desired position is reached, i.e: 17° or 35°.
The flap actuator has a slip coupling to prevent mechanical damage if a restriction occurs. In the event of a failure in the electric flap control circuit, torque tube/actuator geometry prevents the flaps from causing an uncontrollable flight condition.

C. For an illustration of flap control system design and function refer to figure 1.



Flap Control System Design and Function
Figure 1

FLAP CONTROL SYSTEM - MAINTENANCE

1. General

A. This section provides instructions for removal and installation of components and instruction for flap control system rigging.

B. For a breakdown of the components, refer to figure 201, 202, 203, and 204.

2. Flap Actuator Assembly Removal/Installation

A. Remove Flap Actuator Assembly
   (1) Ensure electrical power to aircraft is OFF.
   (2) Remove baggage compartment floor panel (refer to 25-12-00).
   (3) Disconnect flap actuator electrical wires at connector.
   (4) Disconnect flap actuator from torque tube coupler.
   (5) Remove nut, bolt and washers securing the flap actuator assembly to the actuator bracket and remove flap actuator assembly from aircraft.

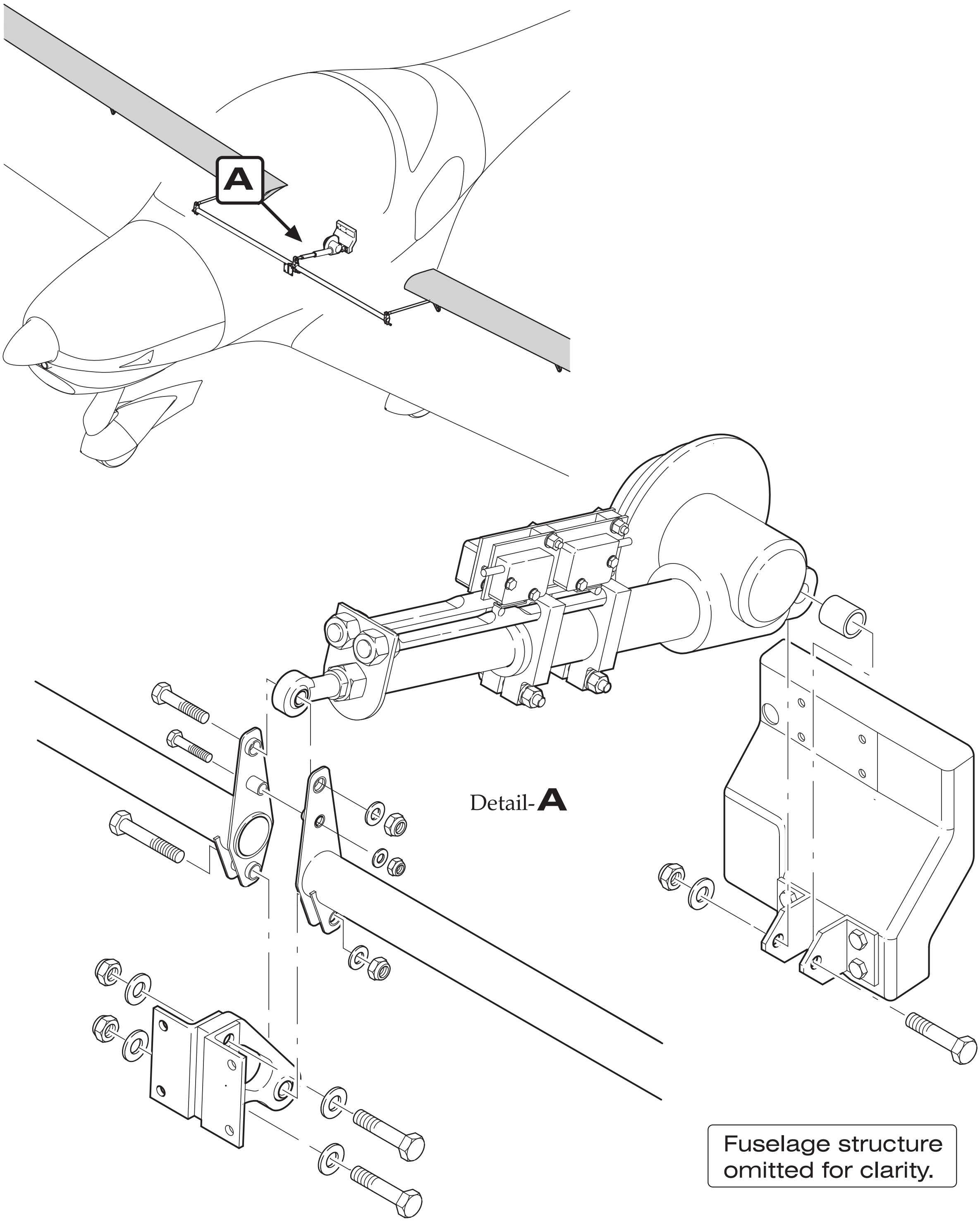
B. Install Flap Actuator Assembly
   (1) Place flap actuator assembly in the actuator bracket and attach using washers and bolt.
   (2) Attach washers, bolt and nut securing the flap actuator pushrod to the torque tube coupler.
   (3) Connect flap actuator electrical wires at connector.
   (4) Perform flap control system inspection/check and rig system, if necessary (refer to “Inspection/Test” and “Adjustment/Test” below).
   (5) Install baggage compartment floor panel (refer to 25-12-00).

3. Torque Tube Assembly Removal/Installation

A. Remove Torque Tube Assembly
   (1) Remove access plate 210 AB (refer to 06-30-00).
   (2) Remove access plate 610 AB and 510 AB (refer to 06-30-00).
   (3) Disconnect flap pushrod from torque tube assembly at each flap.
   (4) Disconnect flap actuator pushrod from torque tube assembly.
   (5) Remove bolt connecting torque tube halves.
   (6) Remove bolt securing torque tube halves to pivot bracket.
   (7) Withdraw right and left torque tube halves from inside the wing.

B. Install Torque Tube Assembly
   (1) Position torque tube halves inserting pivot pin located at outer end into the bearing inside the wing.

   CAUTION: ENSURE THE LONG EDGE OF THE COUPLER IS FACING TOWARDS THE WING SPAR.



Flap Control System Installation
Figure 201

(2) Secure both halves to pivot bracket using bolt, washer and nut.
(3) Install spacer and bolt, washer and nut connecting halves.
(4) Connect torque tube assembly to flap actuator pushrod.
(5) Perform flap control system inspection/check and rig system, if necessary (refer to "Inspection/Check" and "Adjustment/Test" below).

4. Flap Pushrod Removal/Installation

NOTE: Left and right flap pushrod removal/installation is analogous.

A. Remove Flap Pushrod

(1) Remove wing access plate 610 AB (510 AB)(refer to 06-30-00).

CAUTION! WHEN DISCONNECTING FLAP PUSHROD FROM FLAP HORN, EXERCISE CAUTION TO PREVENT THE FLAP FROM INADVERTENT SWINGING DOWNWARD.

(2) Supporting the flap, disconnect flap pushrod at the flap horn.
(3) Disconnect flap pushrod from torque tube assembly and remove pushrod from wing.

B. Install Flap Pushrod

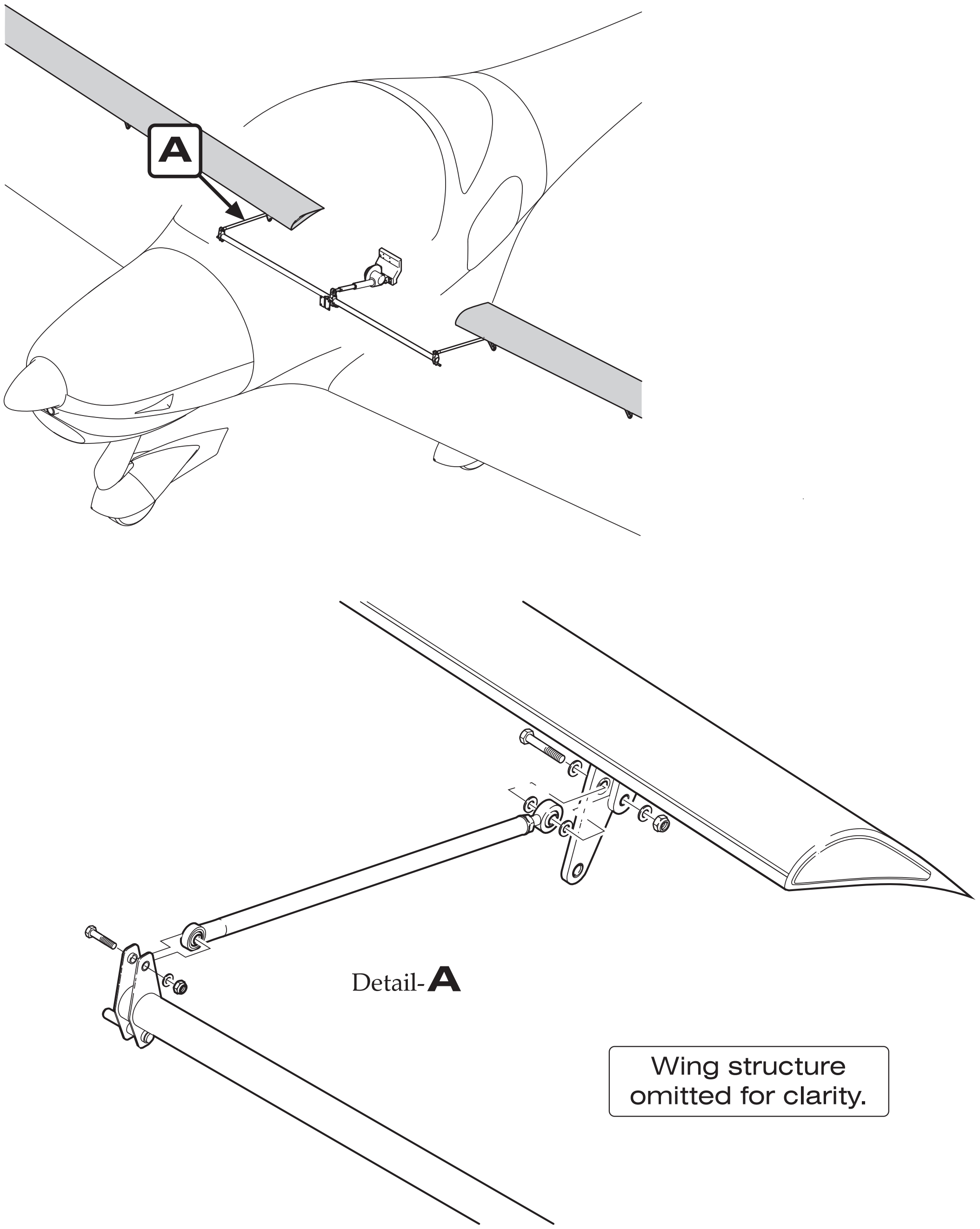
(1) Position and connect flap pushrod to torque tube assembly.
(2) Connect flap pushrod at flap horn.
(3) Re-rig flap control system and perform inspection/check (refer to "Inspection/Check" and "Adjustment/Test" below).
(4) Install all items removed for access.

5. Inspection/Check

A. Inspection/Check

(1) Prepare inspection.
    (a) Remove baggage compartment floor panel.
    (b) Remove fuselage access panel 210 AB (refer to 06-30-00).
    (c) Remove access panel 610 AB and 510 AB (refer to 06-30-00).
(2) Inspect flap control system visually.
    (a) Verify proper installation and safetying of all items in the entire flap control system.
    (b) Check electrical connections.
    (c) Examine limit switches for security and condition.
    (d) Verify minimum rod end thread engagement of 8 mm (0.312 in.).
    (e) Verify no excessive play of control surfaces at hinge pins. Check the control circuit backlash.

NOTE: The maximum permissible value of control surface play at hinge pins is 1,0 mm (0.04 in.) axial play and 0,3 mm (0.01 in.) radial play. The maximum control circuit backlash is 5 mm (0.2 in.).
In case of excessive play of the control surfaces in their hinges, replace worn hinge bushings (refer also to 57-50-00).



Wing structure omitted for clarity.

Flap Control System Installation
Figure 201

(3) Perform operational check of the flap control system.
  (a) Operate flaps through their full range of travel, observing for uneven travel or jumpy motion and binding.
  (b) Check correct flap full UP position. Rig if necessary (refer to “Adjustment/Test” below).
  (c) With flap full UP, fasten an inclinometer to inboard side of left flap and set to 0°.
  (d) Lower flap to T/O and then to LDG positions and check flap angles as specified in 06-10-00.
  (e) Repeat check on right flap.

NOTE: If the results of inspection do not fall within the tolerance specified in 06-10-00, contact AQUILA Aviation for disposition.

(4) Install all items removed for access.

6. Adjustment/Test

A. Adjustment/Test

(1) Remove access plate 210 AB (refer to 06-30-00).
(2) With BAT switch in ON position turn flap control switch to CRUISE.
(3) Turn BAT switch OFF.
(4) Adjust push rod at flap actuator so that the flap torque tube assembly is in neutral position (refer to figure 201).
(5) Adjust pushrods at each flap until the control surfaces are neutral with reference to wing trailing edge at root area.
(6) Perform an flap control system inspection/check (refer to “Inspection/Check” above).
(7) Install all items removed for access.

CHAPTER 28

FUEL

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

FUEL - GENERAL

1. Introduction

   A. This chapter covers those units and components which are not part of the engine but store or deliver fuel to the engine or indicate fuel quantity and pressure. For further information on the internal engine fuel system components, refer to applicable ROTAX publications.

2. General Description

   A. The fuel system consists of two main fuel tanks which are integral parts of the wings, a fuel selector / shut-off valve on the center console, an auxiliary fuel pump with an integrated fuel filter, an engine driven fuel pump and two single-barrel float type carburetors in the engine compartment as well as flexible hoses and metal fuel-lines. Fuel quantities are:

Total fuel:	120 liters (31.7 gallons)
Usable fuel:	109,6 liters (28.9 gallons)
Unusable fuel:	10,4 liters (2.8 gallons)

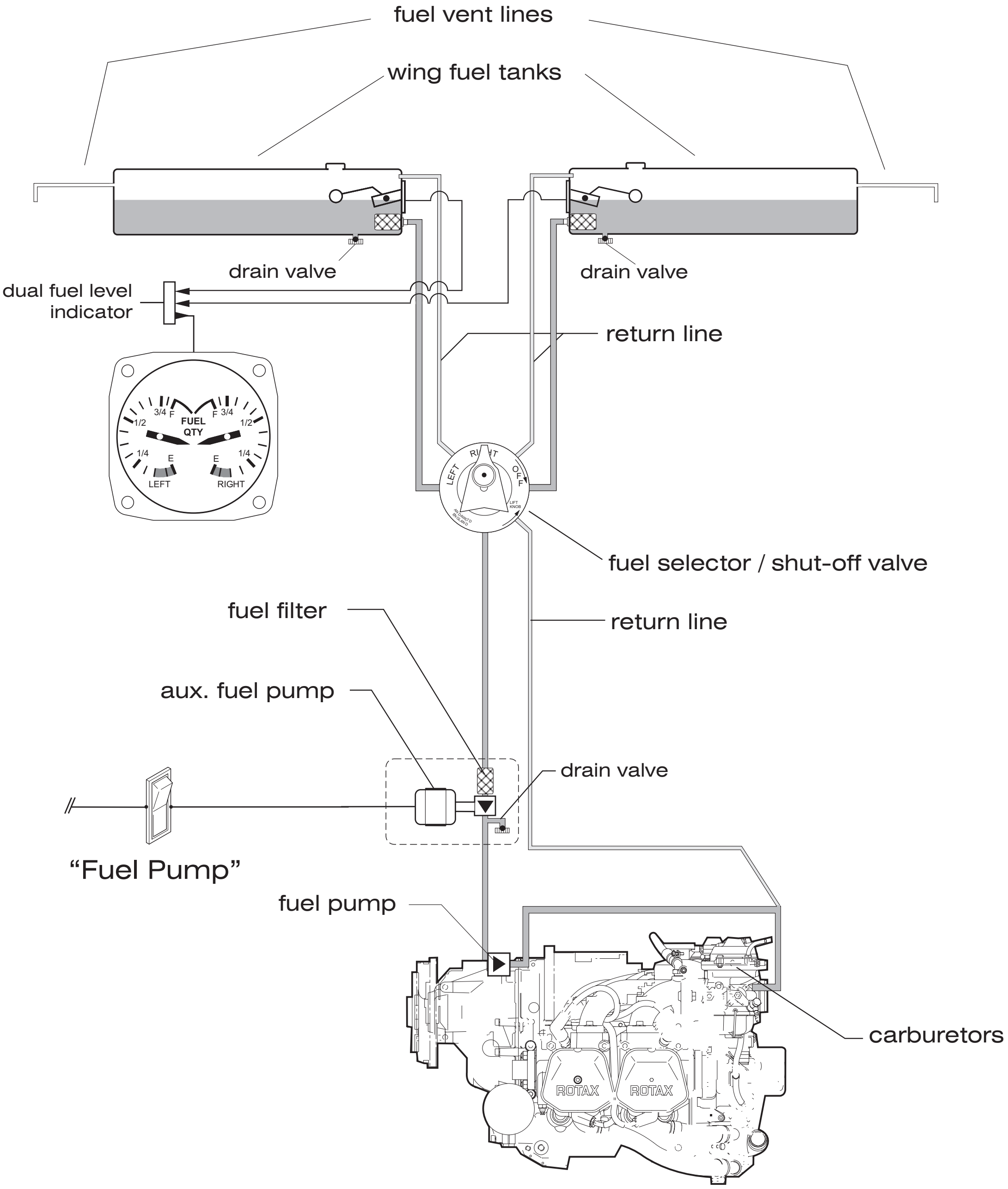
   B. Fuel Supply
   Fuel is delivered to the carburetors by the engine driven fuel pump from the fuel tank that is preselected by the fuel selector / shut-off valve. An electrical fuel pump is provided in case of failure of the engine driven fuel pump. Excessive fuel flows through return lines and the fuel selector valve back to the same tank.

   C. Fuel Indication
   Fuel quantity is measured by resistive float type fuel level sensors located on the inboard fuel tank rib. Fuel pressure is measured at the engine and indicated either by a warning light or the optional engine monitoring system.

   D. Fuel System Ventilation
   The fuel tanks are vented from the top of each fuel tank through a vent line, connected at the outboard fuel tank rib, to a vent located on the winglets.

   E. Fuel Drain System
   Each tank has a manually operated drain at the bottom, inboard rear corner. A further drain valve is installed at the fuel system's lowest point, namely at the base of electrical fuel pump.

   F. Fuel Lines
   Fuel lines are made of aluminum tubing behind the firewall and stainless steel in the engine compartment. Flexible hoses are made of Teflon with steel fittings and silicone-coated fire sleeves.



Fuel System (Schematic)
Figure 1

EFFECTIVITY

Aircraft equipped with Rotax 912S engine

FUEL - GENERAL

1. Introduction

A. This chapter covers those units and components which are not part of the engine but store or deliver fuel to the engine or indicate fuel quantity and pressure. For further information on the internal engine fuel system components, refer to applicable ROTAX publications.

2. General Description

A. The fuel system consists of two main fuel tanks which are integral parts of the wings, a fuel selector / shut-off valve on the center console, two redundant electric fuel pumps that are bypassed with check valves and a combined fuel filter / water trap (gascolator) in the fuselage, a fuel pressure regulator and two single-barrel float type carburetors on the engine as well as flexible hoses and metal fuel-lines. Fuel quantities are:

Total fuel:	120 liters (31.7 gallons)
Usable fuel:	109,6 liters (28.9 gallons)
Unusable fuel:	10,4 liters (2.8 gallons)

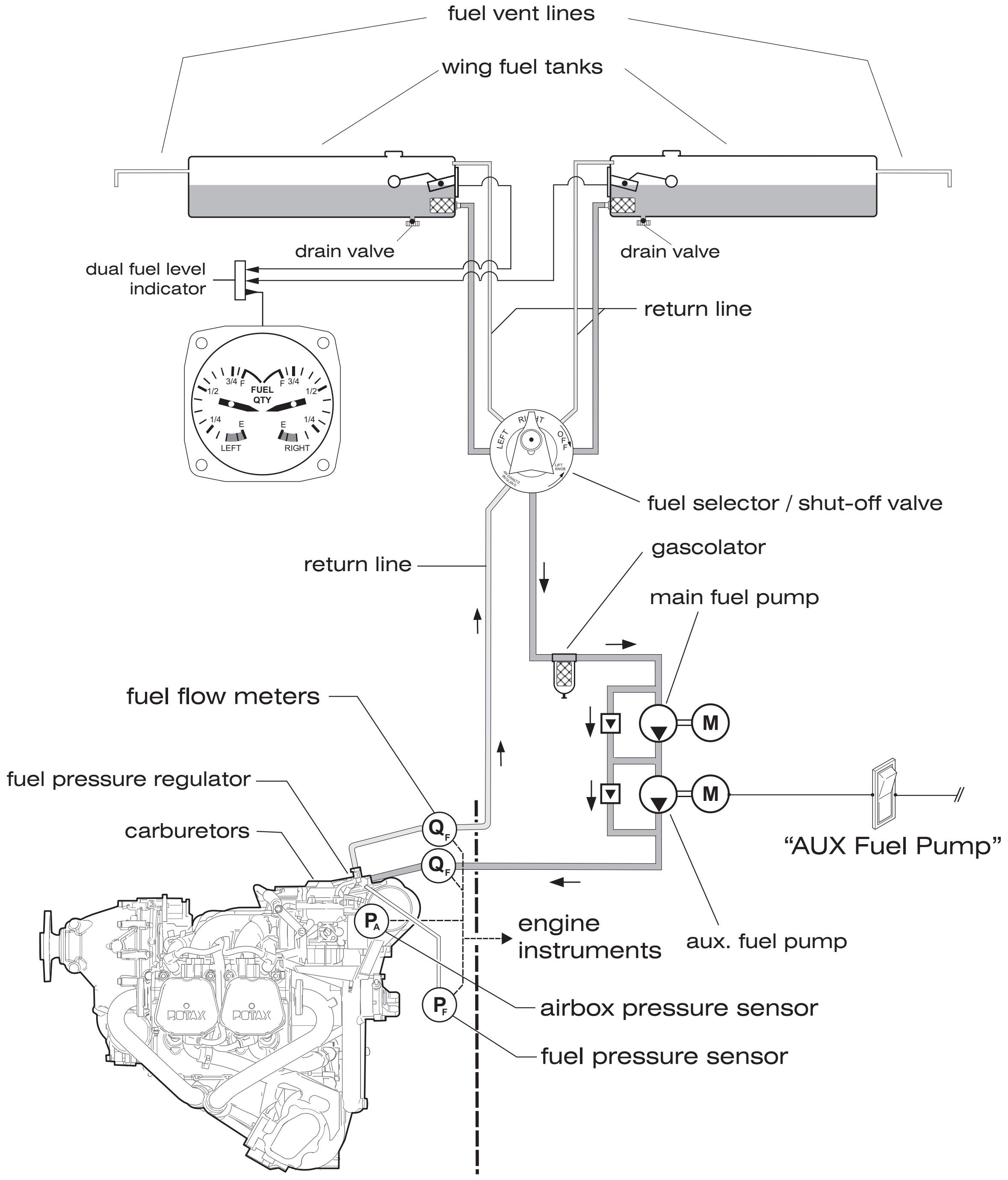
B. Fuel Supply
Fuel is delivered to the carburetors by the electric MAIN fuel pump from the fuel tank that is pre-selected by the fuel selector / shut-off valve. An electric AUX fuel pump is provided in case of failure of the MAIN fuel pump. Fuel pressure is maintained by a pressure regulator on the engine. Excessive fuel flows through return lines and the fuel selector valve back to the same tank.

C. Fuel Indication
Fuel quantity is measured by resistive float type fuel level sensors located on the inboard fuel tank rib. Fuel flow is measured by transducers in the fuel supply and return lines. Both transducers are installed on a bracket in the engine compartment. Fuel pressure is indicated as difference between the absolute fuel pressure at the pressure regulator and the boost pressure in the airbox. Both pressures are measured either by a differential pressure sensor or by two separate sensors and the differential pressure is calculated / indicated by the engine monitoring system (MVP-50 only).

D. Fuel System Ventilation
The fuel tanks are vented from the top of each fuel tank through a vent line, connected at the outboard fuel tank rib, to a vent located on the winglets.

E. Fuel Drain System
Each tank has a manually operated drain at the bottom, inboard rear corner. A further drain valve is installed at the fuel system's lowest point, namely at the gascolator on the bottom side of the fuselage.

F. Fuel Lines
Fuel lines are made of aluminum tubing behind the firewall and stainless steel in the engine compartment. Flexible hoses are made of Teflon with steel fittings and silicone-coated fire sleeves.



Fuel System (Schematic)
Figure 1

EFFECTIVITY

Aircraft equipped with Rotax 914F engine

FUEL STORAGE - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11-00!

1. General

A. The fuel storage system consists of two integral fuel tanks, located at the inboard portion of each wing in front of the main spar. They are bounded by the upper and lower wing skins which are reinforced in this area, the main spar web, and the inboard and outboard fuel tank ribs.
Each fuel tank has a lockable fuel filler cap which is grounded to the airframe. The inner surfaces of the composite integral tanks are sealed with a special fuel tank sealing material to protect the composite fiber structure. A fuel baffle rib is provided to reduce fuel slosh in the fuel outlet and the fuel quantity sensor areas. The fuel tanks are vented from the top of each fuel tank through a vent line connected at the outboard fuel tank rib to a vent located on the winglets. Each inboard fuel tank rib has an outlet over the sump level that is equipped with a removable mesh strainer.

The inboard fuel tank ribs are easily accessible for maintenance work through access panel 610 BB / 510 BB in the lower wing skin.

B. The wing fuel tanks are maintenance-free. However, if a leak is suspected, AQUILA Aviation should be consulted.

2. Wing Fuel Tank Leakage Test

A. The following procedure should be used to check a wing fuel tank for leakage.
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Drain fuel from wing fuel tank.
(4) Open access plate 610 BB (510 BB).
(5) Disconnect fuel outlet line from fuel tank.
(6) Disconnect fuel return line from fuel tank.
(7) Cap fuel tank vent line.
(8) Attach a suitable manometer (water manometer) to fuel tank outlet fitting.

WARNING: NEVER APPLY REGULATED OR UNREGULATED AIR FROM AN AIR COMPRESSOR TO THE FUEL SYSTEM OR COMPONENTS.

CAUTION: DO NOT PRESSURIZE THE FUEL TANKS TO MORE THAN 1.0 PSI. STRUCTURAL DAMAGE MAY OCCUR TO THE FUEL TANK IF MORE THAN 1.0 PSI IS APPLIED.

(9) Connect a well-regulated supply of air (1.0 psi maximum) to the return line fitting.
(10) Make sure filler cap is installed and sealed.
(11) Apply pressure slowly until 1.0 psi is obtained.
(12) Shut off air supply.
(13) If fuel tank holds pressure for 15 minutes, the tank with vent line is sealed.

FUEL DISTRIBUTION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11-00!

1. General

A. The fuel distribution system consists primarily of the fuel selector / shut-off valve, electrical fuel pump(s), fuel filter, fuel lines and the AUX fuel pump switch.

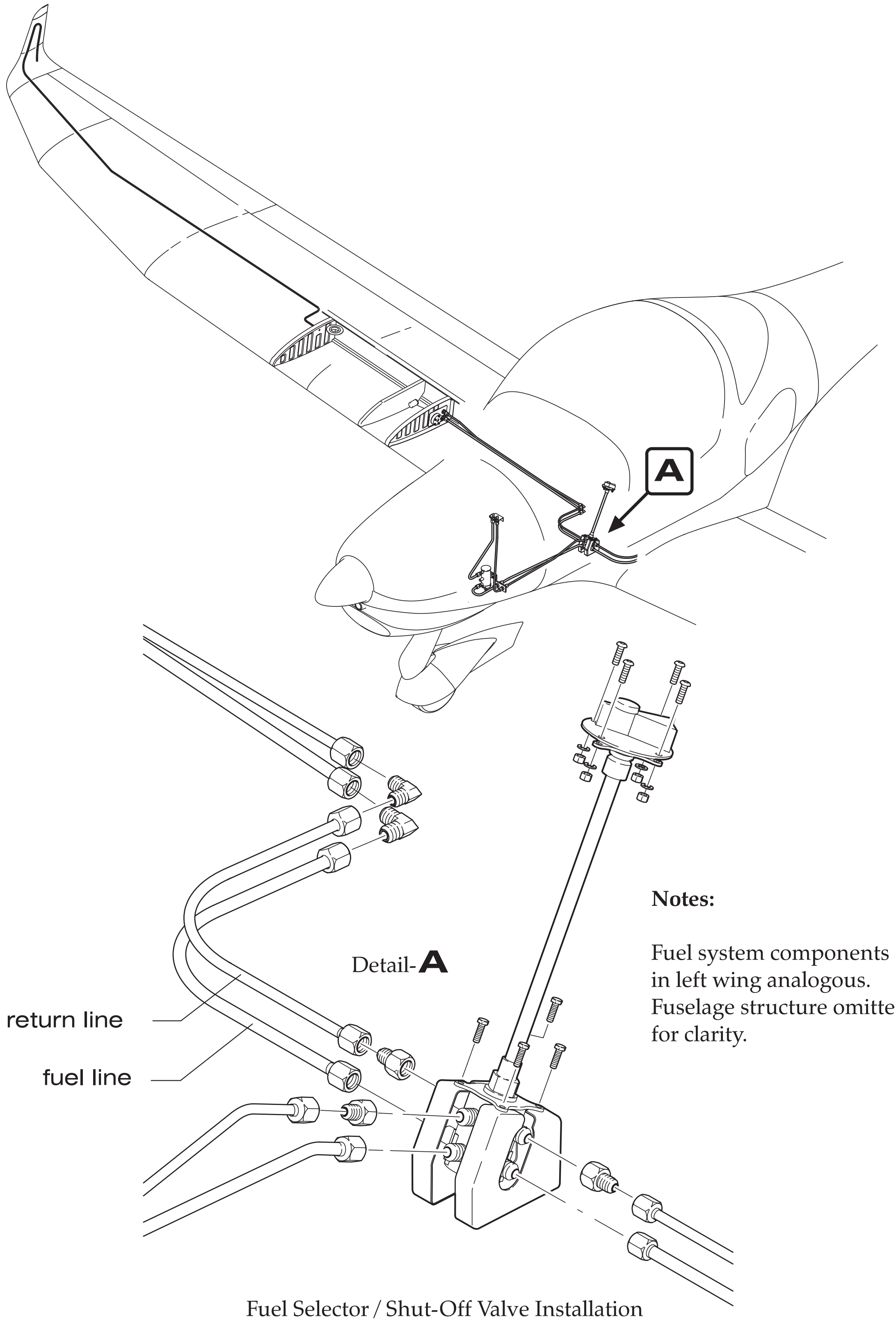
The fuel selector handle is located in the center console between the seats. The red, arrow shaped handle has a LEFT, RIGHT and OFF position. To switch the valve to the OFF position a knob located at the top of the handle must be pulled while the handle is rotated simultaneously. With the valve in this position fuel flow from and to the tanks is stopped. In both operating positions the fuel supply / return lines of the selected fuel tank are open while the fuel supply / return lines of the other one are closed.

Rotax 912S:
The electrical fuel pump is incorporated into the system without a bypass. In this way fuel flows through a fuel strainer which is integral of the fuel pump even if the pump is off. The electrical fuel pump is mounted in the engine compartment at the lower right firewall.

Rotax 914F:
The electrical fuel pumps are located in a separate compartment below the cockpit floor. Both pumps are connected in series to offer maximum reserves against vapor lock at high altitudes and temperatures. Separate check valves are installed parallel to the fuel pumps to allow operation with only one pump. Fuel flows from the tanks via a combined fuel filter / water trap (gascolator) to the electric fuel pumps and from there to the pressure regulator on the engine. The gascolator is accessible via inspection cover from outside the fuselage, whereas the inspection cover for the fuel pump package is located under the cockpit floor.

B. A clean fuel distribution system is very important for the secure and continuous supply of fuel to the engine. The fuel system is equipped with drain valves with which fuel in the system can be examined for contamination and grade.

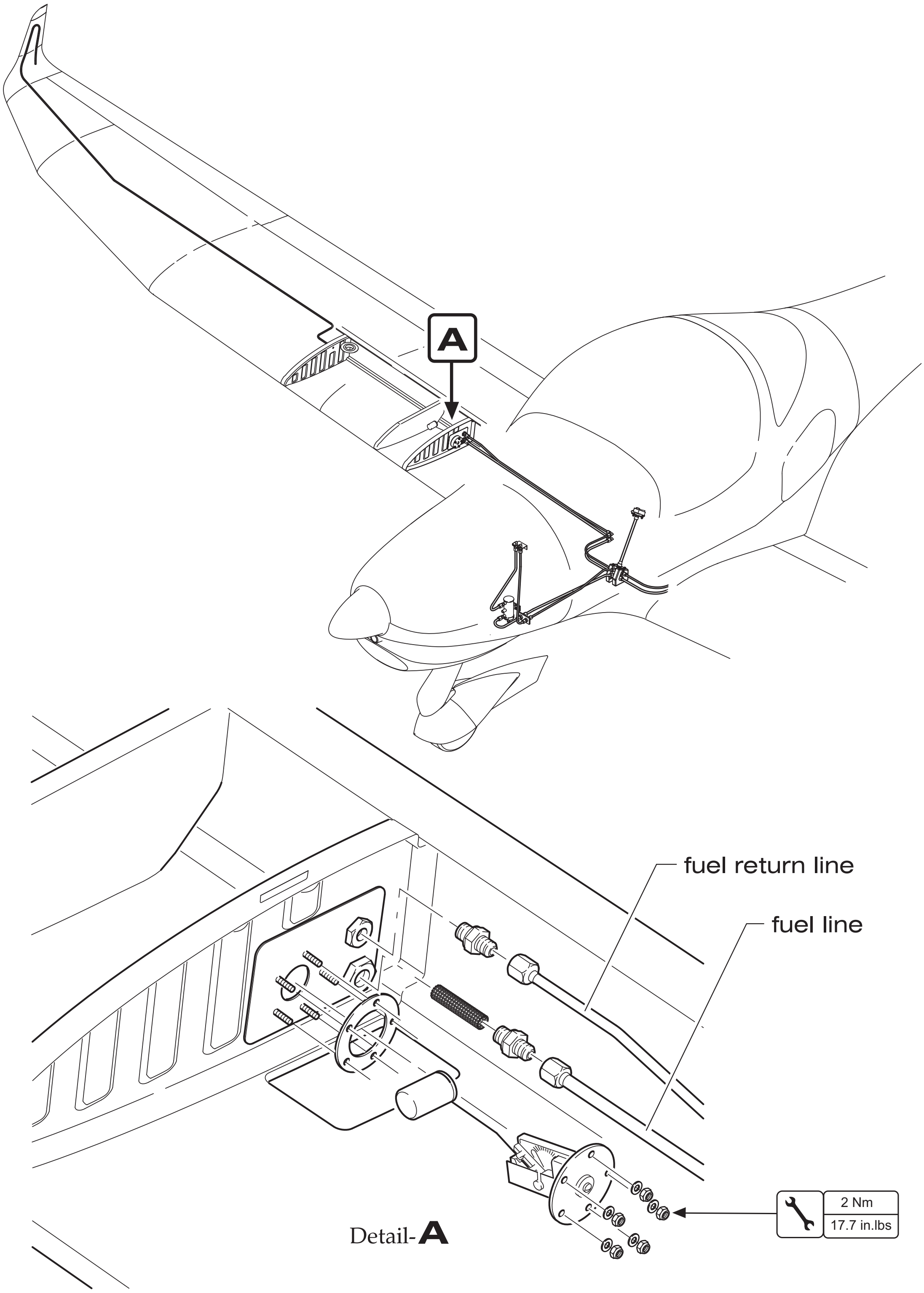
(1) The electrical fuel pump (Rotax 912S) / gascolator (Rotax 914F) has a filter screen which must be cleaned regularly. The filter screen can be removed for maintenance.
(2) A mesh strainer is installed on the fuel outlet in each fuel tank. The strainer is accessible by opening the fuel tank rib access panel 610 BB / 510 BB. The strainer is brazed to a fitting that is installed in the fuel tank port. The fuel strainers in the fuel tanks should always be cleaned after aircraft has been in storage. If any damage or restrictions are noted, the strainer should be replaced.
(3) The fuel system has a drain valve at it’s lowest point, namely at the base of the electrical fuel pump (Rotax 912S) / gascolator (Rotax 914F). The drain valve is accessible from outside the nose section without removing any component. It should be used regularly to check fuel for water and contamination.
(4) Each wing fuel tank has a drain-valve at it’s base. The drain valves are accessible from outside at the bottom of the wings in the wing root area. They should be used regularly to check fuel for water and contamination.



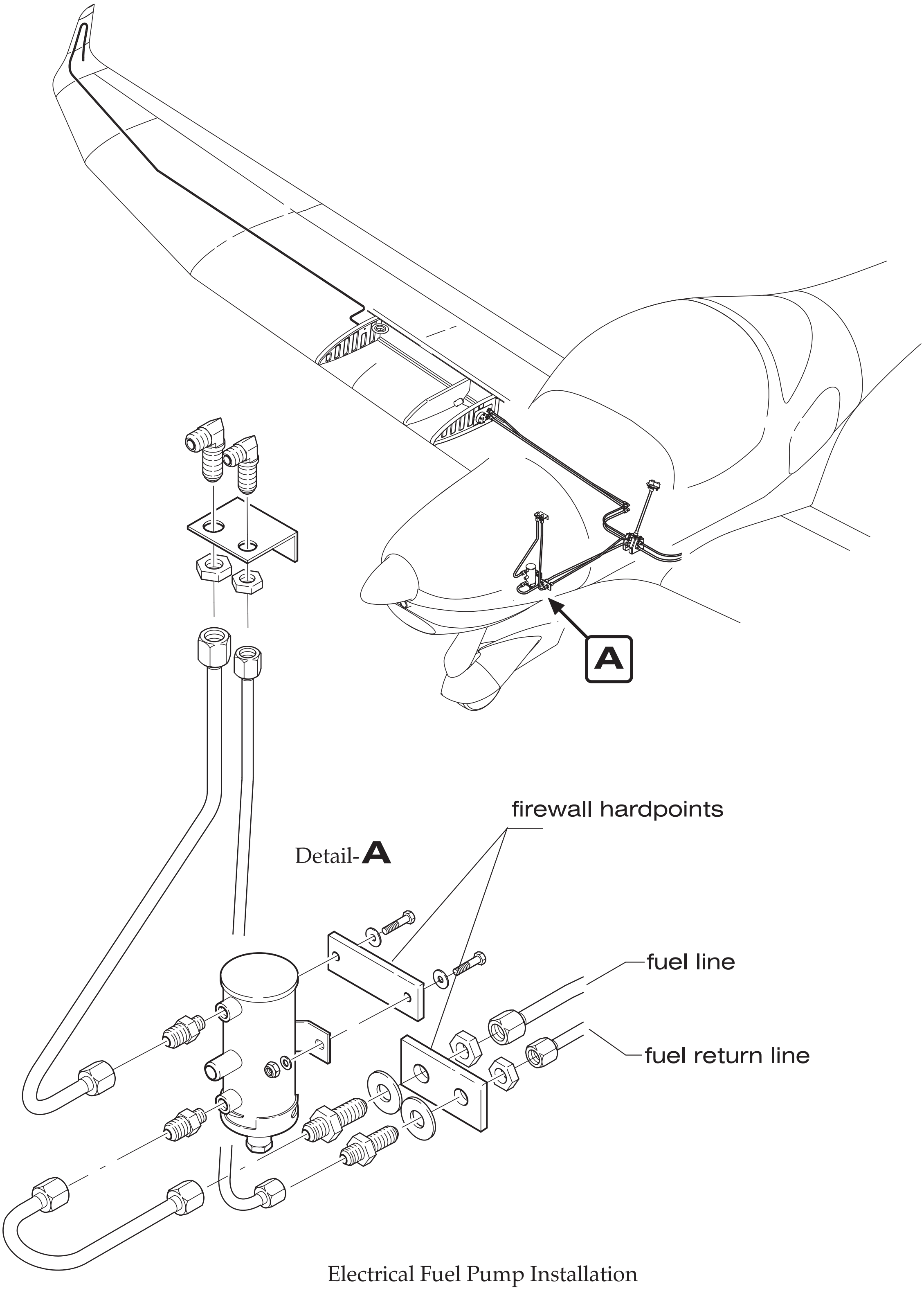
Notes:

Fuel system components in left wing analogous. Fuselage structure omitted for clarity.

Fuel Selector / Shut-Off Valve Installation
Figure 201



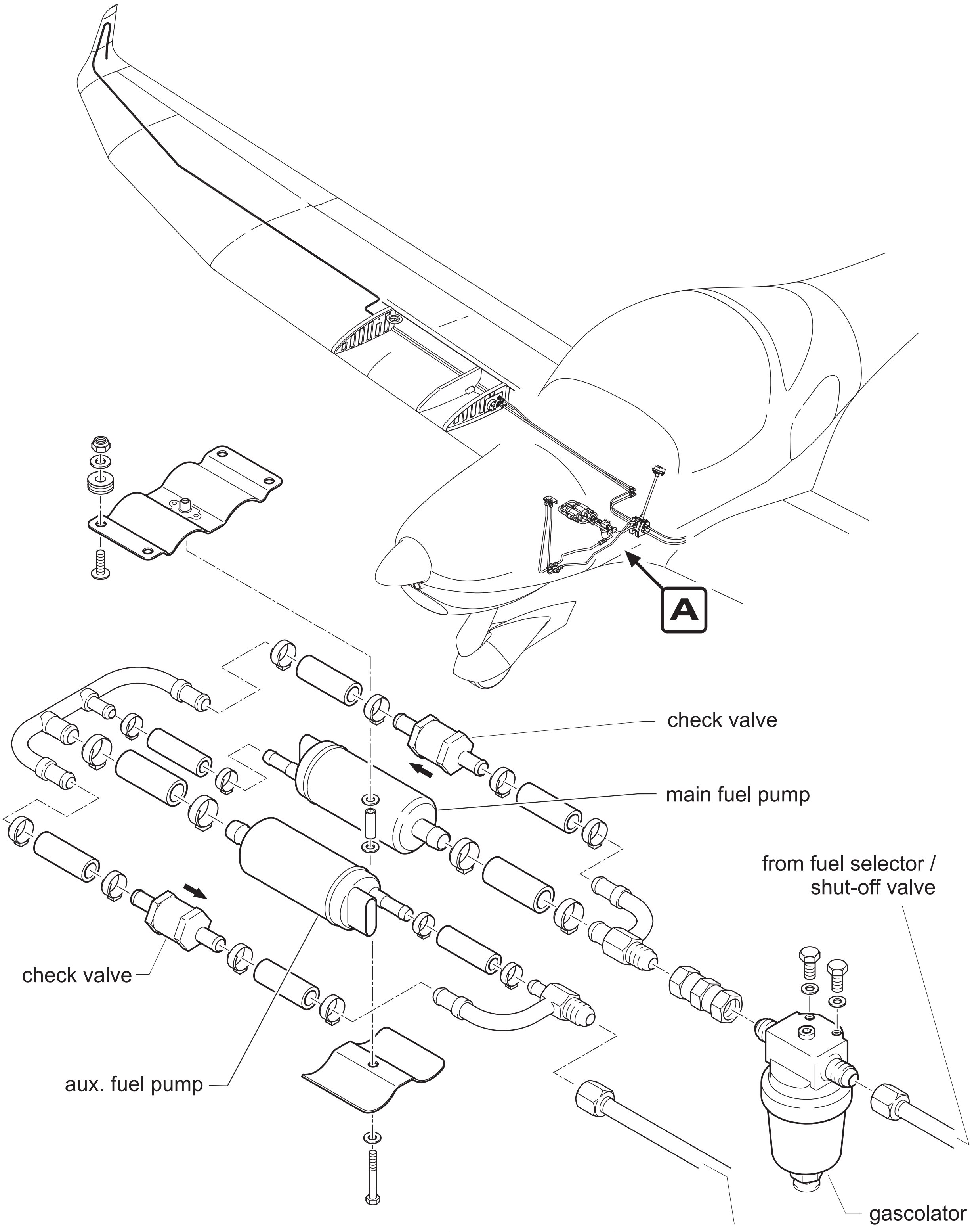
Fuel Level Sensor / Fuel Tank Outlet Strainer Installation
Figure 202



Electrical Fuel Pump Installation
Figure 203

EFFECTIVITY

Aircraft equipped with Rotax 912S engine



Electrical Fuel Pump Installation
Figure 203

EFFECTIVITY

Aircraft equipped with Rotax 914F engine

2. Fuel Selector / Shut-Off Valve Removal/Installation

A. Remove Fuel Selector / Shut-Off Valve
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Drain fuel from fuel system completely using the wing fuel tank drains and the drain at the electrical fuel pump (Rotax 912) / gascolator (Rotax 914).
(4) Remove access panels 211 BB and 211 HL/HR in the cabin (refer to 25-12-00).
(5) Remove access panel 211 GT with fuel selector / shut-off valve control lever and connecting shaft (refer to 25-12-00).
(6) Disconnect the fuel supply and return lines at valve.
(7) Remove bolts securing valve to mounting bracket and remove the fuel selector / shut-off valve assembly from aircraft.

B. Install Fuel Selector / Shut-Off Valve
(1) Verify battery is disconnected and electrical power to aircraft is OFF.
(2) Place fuel selector / shut-off valve in position and secure using washers and bolts.
(3) Connect all fuel supply and return lines at valve.
(4) Connect the fuel selector / shut-off valve control lever. Make sure that both the valve and the valve control lever are set to OFF and install access panel 211 GT with fuel selector / shut-off valve control lever and connecting shaft (refer to 25-12-00).
(5) Refuel the aircraft.
(6) Pressure check complete fuel system (refer to “Fuel System Pressure Test” below).
(7) Inspect fuel selector / shut-off valve and enclosure for any signs of fuel leakage.
(8) Reconnect battery (refer to 24-30-00).
(9) Perform operational check of the fuel distribution system.
(10) Install all items removed for access.

3. Electrical Fuel Pump Removal/Installation (Rotax 912S only)

A. Remove Electrical Fuel Pump
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10-00).
(3) Disconnect battery (refer to 24-30-00).
(4) Close fuel selector / shut-off valve.
(5) Disconnect the pump wires.
(6) Disconnect fuel lines at electrical fuel pump. Drain fuel from line.
(7) Remove bolts, washers and nuts securing electrical fuel pump to firewall and remove electrical fuel pump.

B. Install Electrical Fuel Pump
(1) Verify battery is disconnected and electrical power to aircraft is OFF.
(2) Secure electrical fuel pump to firewall using bolts, washers and nuts.
(3) Reconnect fuel lines to electrical fuel pump.
(4) Reconnect the pump electrical wires.
(5) Reconnect battery (refer to 24-30-00).

4. Electrical Fuel Pump Removal/Installation (Rotax 914F only)

A. Remove Electrical Fuel Pump
   (1) Ensure electrical power to aircraft is OFF.
   (2) Close fuel selector / shut-off valve.
   (3) Disconnect battery (refer to 24-30-00).
   (4) Drain fuel from system with drainer at bottom of gascolator.
   (5) Remove access panels 210BB (refer to 06-30-00) and 211BB (refer to 25-12-00).
   (6) Disconnect electrical wires to fuel pump package at connector inside the fuselage.
   (7) Disconnect fuel lines to/from fuel pump package through access panel 210BB from below the fuselage.
   (8) Remove screws securing access panel 211LT to fuselage (refer to 25-12-00).
   Don't remove the 4 nuts attaching the fuel pump package to the access panel.
   (9) Remove access panel 211LT from fuselage together with the fuel pump package.
   (10) Remove clamp screw and clamp attaching fuel pump package to access panel.
   (11) Disconnect electrical wires, fuel hoses and circuit board with interference-suppression capacitor from fuel pump and remove fuel pump.

B. Install Electrical Fuel Pump
   (1) Verify battery is disconnected and electrical power to aircraft is OFF.
   (2) Reconnect electrical wires, fuel hoses and circuit board with interference-suppression capacitor to fuel pump.
   (3) Attach electrical fuel pump to access panel 211LT using clamp screw and clamp.
   (4) Position access panel 211LT in fuselage together with the fuel pump package and secure with screws.
   (5) Reconnect fuel lines to/from fuel pump package through access panel 210BB.
   (6) Reconnect electrical wires to fuel pump package at connector inside the fuselage.
   (7) Pressure check complete fuel system (refer to "Fuel System Pressure Test" below).
   (8) Inspect fuel pump package for any signs of fuel leakage.
   (9) Reconnect battery (refer to 24-30-00).
   (10) Perform operational check of the fuel distribution system.
   (11) Install all items removed for access.

5. Fuel Filter Maintenance (Rotax 912S only)

A. Maintenance is accomplished by the following procedure:
   (1) Ensure electrical power to aircraft is OFF.
   (2) Close fuel selector / shut-off valve.
   (3) Disconnect battery (refer to 24-30-00).
   (4) Drain fuel from system with drainer at bottom of electrical fuel pump.
   (5) Remove engine cowling (refer to 71-10-00).
   (6) Remove locking wire at lower fuel pump cap.
   (7) Remove lower fuel pump cap.
   (8) Remove filter element and clean by washing.
   (9) Check disk magnet for metal particles.
   (10) Reassemble filter and cap.
   (11) Secure cap using locking wire.
   (12) Reconnect battery (refer to 24-30-00).

(13) Perform operational check of the fuel distribution system.
(14) Inspect system for any signs of fuel leakage.
(15) Install all items removed for access.

6. Fuel Filter Maintenance (Rotax 914F only)

A. Maintenance is accomplished by the following procedure:

(1) Ensure electrical power to aircraft is OFF.
(2) Close fuel selector / shut-off valve.
(3) Disconnect battery (refer to 24-30-00).
(4) Drain fuel from system with drainer at bottom of gascolator.
(5) Remove access panel 210BB (refer to 06-30-00).
(6) Remove locking wire from black retaining ring at gascolator.
(7) Remove gascolator sediment bowl by gripping the black retaining ring and unscrewing until it is free of the bowls threads.
(8) Inspect bowl and clean if required.
(9) Gently grip at the top of the filter element and unscrew to remove.
(10) Clean filter element by washing in fuel or blowing off contaminant with air.
(11) Reinstall filter element. Gently grip at the top of the filter element and screw to hand tight.
(12) Fit new O-ring to the bowl.
(13) Line up arrow on sediment bowl and engraved line on the gascolator body. Carefully push bowl into gascolator body and tighten the retaining ring.
(14) Secure retaining ring using locking wire.
(15) Reconnect battery (refer to 24-30-00).
(16) Perform operational check of the fuel distribution system.
(17) Inspect system for any signs of fuel leakage.
(18) Install all items removed for access.

FUEL QUANTITY INDICATION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11-00!

1. General

A. The fuel quantity indicating system consists of two resistive float type fuel quantity sensors, one in each tank, a dual fuel quantity indicator and wiring connecting the components.
The fuel quantity indicator is located on the right side of the instrument panel and has been calibrated during installation.
The fuel quantity sensors are easily accessible for maintenance or replacement through access panels in the lower wing skin.

B. Maintenance is limited to the removal and installation of the system components.

2. Fuel Quantity Indicator Removal/Installation

A. Check SI-AT01-018 (annex 1) when installing a new indicator. The pin assignment of the indicator may have changed.

B. Remove Fuel Quantity Indicator
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glare shield (refer to 31-10-00).
(4) Remove cable connector from back of indicator.
(5) While supporting indicator, remove screws attaching indicator to instrument panel.
(6) Remove indicator from aircraft.

C. Install Fuel Quantity Indicator.
(1) Position indicator to instrument panel hole and secure with screws.
(2) Install cable connector at back of indicator.
(3) Reconnect battery (refer to 24-30-00).
(4) Perform a fuel quantity indicating system test / calibration (refer to “Test/Calibration” below).
(5) Install glare shield (refer to 31-10-00).

3. Fuel Quantity Sensor Removal/Installation

A. Remove Fuel Quantity Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Drain wing fuel tank with sensor that is to be removed (refer to 12-11-00).
(4) Open access / inspection plate 510 BB / 610 BB to gain access to sensor (refer to 06-30-00).
(5) Remove nuts securing sensor to inboard fuel tank rib.
(6) Disconnect electrical cables from sensor.
(7) Carefully withdraw sensor from wing tank.

B. Install Fuel Quantity Sensor
- (1) Verify battery is disconnected and electrical power to aircraft is OFF.
- (2) Check ease of movement of the float arm before installing the sensor.
- (3) Place sensor with new gasket on to the threaded studs at inboard fuel tank rib.

CAUTION: THE FUEL QUANTITY SENSOR SHOULD BE FED CAREFULLY INTO THE FUEL TANK. A BENT FLOAT ARM MAY CAUSE ERRONEOUS READINGS.

- (4) Connect electrical cables to sensor.
- (5) Secure sensor with washers and nuts. Torque nuts crosswise to 2 Nm (17.7 in.lbs).
- (6) Reconnect battery (refer to 24-30-00).
- (7) Perform a fuel quantity indicating system calibration (refer to "Test/Calibration" below).

4. Fuel Quantity Indicating System Test/Calibration

NOTE: When a fuel quantity sensor is replaced, the fuel quantity indicating system must be calibrated. When a fuel quantity indicator is replaced, the system must be at least functionally tested and recalibrated as necessary.

NOTE: Due to the dihedral angle of the wing and the position of the fuel quantity sensor (total) fuel levels above approx. 50 liters (13.21 gallons) are not gaugeable.

A. Fuel Quantity Indicating System Test
- (1) Prepare aircraft
  - (a) Drain fuel from wing tanks (refer to 12-11-00).
  - (b) Verify fuel selector / shut-off valve is in OFF position.
  - (c) Level the aircraft laterally and longitudinally (refer to 08-10-00).
- (2) Ensure ALT1 / BAT switch is in the OFF position.
- (3) Fill 5,2 liters (1.37 gallons) of fuel into each wing fuel tank.
- (4) Wait approx. 30 seconds. Then gently shake wing to assure fuel quantity sensors settle in their final position.
- (5) Turn BAT switch to the ON position.
- (6) Wait until pointer settles in it's final position. Check that fuel quantity indicator reads empty for both tanks (<"E" up to S/N AT01-100A/B-326).
- (7) Turn BAT switch to the OFF position.
- (8) Add 13,7 liters (3.62 gallons) of fuel to each wing fuel tank.
- (9) Wait approx. 30 seconds. Then gently shake wing to assure fuel quantity sensors settle in their final position.
- (10) Turn BAT switch to the ON position.
- (11) Wait until pointer settles in it's final position. Check that fuel quantity indicator reads "1/4" ±1/2 scale line for both tanks.
- (12) Turn BAT switch to the OFF position.
- (13) Add 41,1 liters (10.86 gallons) of fuel to LH wing fuel tank.
- (14) Turn BAT switch to the ON position.
- (15) Wait until pointer settles in it's final position.
  Check that LH fuel quantity indicator reads full (>"3/4" from S/N AT01-100A/B-327).
- (16) Turn BAT switch to the OFF position.
- (17) Repeat steps (13) thru (16) for RH wing fuel tank.

B. Fuel Quantity Indicating System Calibration

NOTE: A calibration module is necessary to perform the steps described below. The calibration module is installed at the back of the fuel quantity indicator. For further information on fuel tank calibration or if no calibration module is installed refer to SI-AT01-018, latest revision.

(1) Prepare aircraft
  (a) Drain fuel from wing tanks (refer to 12-11-00).
  (b) Verify fuel selector / shut-off valve is in OFF position.
  (c) Level the aircraft laterally and longitudinally (refer to 08-10-00).
  (d) Remove glare shield (refer to 31-10-00).
(2) Ensure ALT1 / BAT switch is in the OFF position.

<u>Up to S/N AT01-100A/B-326:</u>
(3) Fill 18,9 liters (4.99 gallons) of fuel into each wing fuel tank.
(4) Gently shake wing to assure fuel quantity sensors settle in their final position.
(5) Turn BAT switch to the ON position.
(6) Use the two potentiometers of the calibration module at the back of the fuel quantity gauge to set the pointers of the gauge to “1/4”. Pay attention to the delayed indication of the gauge.
(7) Turn BAT switch to the OFF position and drain fuel from wing tanks (refer to 12-11-00).
(8) Perform fuel quantity indicating system test as described above.
(9) Reinstall glare shield (refer to 31-10-00).

<u>From S/N AT01-100A/B-327:</u>
(3) Fill 5,2 liters (1.37 gallons) of fuel into each wing fuel tank.
(4) Wait approx. 30 seconds. Then gently shake wing to assure fuel quantity sensors settle in their final position.
(5) Turn BAT switch to the ON position.
(6) Use the two potentiometers of the calibration module at the back of the fuel quantity gauge to set the pointers of the gauge to “E”. Pay attention to the delayed indication of the gauge.
(7) Turn BAT switch to the OFF position and drain fuel from wing tanks (refer to 12-11-00).
(8) Perform fuel quantity indicating system test as described above.
(9) Reinstall glare shield (refer to 31-10-00).

FUEL QUANTITY INDICATION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11-00!

1. General

A. Fuel quantity indication is included in the Garmin G3X Touch system.
Fuel quantity is measured by two resistive type fuel quantity sensors, one in each tank, electrically connected to the GEA 24 engine interface at the back of the instrument panel. The fuel quantity sensors are easily accessible for maintenance or replacement through access panels in the lower wing skin.

B. Maintenance is limited to the removal and installation of the system components.
Refer to 34-25-00 for further information on maintenance of the Garmin G3X Touch system.

2. Fuel Quantity Sensor Removal/Installation

A. Remove Fuel Quantity Sensor
- (1) Ensure electrical power to aircraft is OFF.
- (2) Disconnect battery (refer to 24-30-00).
- (3) Drain wing fuel tank with sensor that is to be removed (refer to 12-11-00).
- (4) Open access / inspection plate 510 BB / 610 BB to gain access to sensor (refer to 06-30-00).
- (5) Remove nuts securing sensor to inboard fuel tank rib.
- (6) Disconnect electrical cables from sensor.
- (7) Carefully withdraw sensor from wing tank.

B. Install Fuel Quantity Sensor
- (1) Verify battery is disconnected and electrical power to aircraft is OFF.
- (2) Check ease of movement of the float arm before installing the sensor.
- (3) Place sensor with new gasket on to the threaded studs at inboard fuel tank rib.

CAUTION: THE FUEL QUANTITY SENSOR SHOULD BE FED CAREFULLY INTO THE FUEL TANK. A BENT FLOAT ARM MAY CAUSE ERRONEOUS READINGS.

- (4) Connect electrical cables to sensor.
- (5) Secure sensor with washers and nuts. Torque nuts crosswise to 2 Nm (17.7 in.lbs).
- (6) Reconnect battery (refer to 24-30-00).
- (7) Perform a fuel quantity indicating system calibration (refer to “Test/Calibration” below).

EFFECTIVITY

Aircraft equipped with Garmin G3X Touch

3. Fuel Quantity Indicating System Test/Calibration

NOTE: When a fuel quantity sensor is replaced, the fuel quantity indicating system must be calibrated.

NOTE: Due to the dihedral angle of the wing and the position of the fuel quantity sensor (total) fuel levels above approx. 50 liters (13.21 gallons) are not gaugeable.

A. Fuel Quantity Indicating System Test
(1) Prepare aircraft
    (a) Drain fuel from wing tanks (refer to 12-11-00).
    (b) Verify fuel selector / shut-off valve is in OFF position.
    (c) Level the aircraft laterally and longitudinally (refer to 08-10-00).
(2) Ensure ALT1 / BAT switch is in the OFF position.
(3) Fill 5,2 liters (1.37 gallons) of fuel into each wing fuel tank.
(4) Wait approx. 30 seconds. Then gently shake wing to assure fuel quantity sensors settle in their final position.
(5) Turn BAT switch to the ON position.
(6) Check that G3X fuel level indication reads 0 liters (0 gallons) for both tanks.
(7) Turn BAT switch to the OFF position.
(8) Add 27,4 liters (7.23 gallons) of fuel to each wing fuel tank.
(9) Wait approx. 30 seconds. Then gently shake wing to assure fuel quantity sensors settle in their final position.
(10) Turn BAT switch to the ON position.
(11) Check that G3X fuel level indication reads 27±3 liters (7.2±0.8 gallons) for both tanks.
(12) Turn BAT switch to the OFF position.
(13) Add 27,4 liters (7.23 gallons) of fuel to LH wing fuel tank.
(14) Turn BAT switch to the ON position.
(15) Check that G3X fuel level indication reads > 52 liters (13.7 gallons) for LH fuel tank.
(16) Turn BAT switch to the OFF position.
(17) Repeat steps (13) thru (16) for RH wing fuel tank.

B. Fuel Quantity Indicating System Calibration

NOTE: Refer to Garmin G3X Touch EFIS Part 23 AML STC Maintenance Manual for further information on the fuel tank calibration procedure.

(1) Prepare aircraft
    (a) Drain fuel from wing tanks (refer to 12-11-00).
    (b) Verify fuel selector / shut-off valve is in OFF position.
    (c) Level the aircraft laterally and longitudinally (refer to 08-10-00).
(2) Ensure ALT1 / BAT switch is in the OFF position.
(3) Fill 5,2 liters (1.37 gallons) of fuel into each wing fuel tank.
(4) Wait approx. 30 seconds. Then gently shake wing to assure fuel quantity sensors settle in their final position.
(5) Turn BAT switch to the ON position.
(6) Call up the G3X fuel quantity calibration page.
(7) Select “Fuel Quantity 1/L”, “Calibrate”, “Flight”. Enter 0,0 liters (0.0 gallons) in the “Actual Fuel Quantity” field. Select “Store Calibration Point” to save the first point.

(8) Select "Fuel Quantity 2/R", "Calibrate", "Flight" and repeat step (7) for the RH wing fuel tank.
(9) Add 13,7 liters (3.62 gallons) of fuel to each wing fuel tank.
(10) Wait approx. 30 seconds. Then gently shake wing to assure fuel quantity sensors settle in their final position.
(11) Select "Fuel Quantity 1/L", "Calibrate", "Flight". Enter 13,7 liters (3.6 gallons) in the "Actual Fuel Quantity" field. Select "Store Calibration Point" to save the second point.
(The sensor value displayed in the "Input Voltage" field should change when fuel is added.)
(12) Select "Fuel Quantity 2/R", "Calibrate", "Flight" and repeat step (11) for the RH wing fuel tank.
(13) Repeat steps (9) thru (12) for the remaining 3 calibration points:

Calibration Point	**Actual Fuel Qty.** [liters (gallons)]	**Total Fuel** [liters (gallons)]	**Usable Fuel** [liters (gallons)]
1	0,0 (0.0)	5,2 (1.37)	0,0 (0.00)
2	13,7 (3.6)	18,9 (4.99)	13,7 (3.62)
3	27,4 (7.2)	32,6 (8.61)	27,4 (7.24)
4	41,1 (10.9)	46,3 (12.23)	41,1 (10.86)
5	54,8 (14.5)	60,0 (15.85)	54,8 (14.48)

FUEL QUANTITY INDICATION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11-00!

1. General

A. Fuel quantity indication is included in the engine monitoring system.
Fuel quantity is measured by two resistive type fuel quantity sensors, one in each tank, electrically connected to the engine data converter (EDC) via an interface module (RFLM-4) at the back of the instrument panel. The fuel quantity sensors are easily accessible for maintenance or replacement through access panels in the lower wing skin.

B. Maintenance is limited to the removal and installation of the system components.
Refer to 77-40-00 for further information on maintenance of the engine monitoring system.

2. Fuel Quantity Sensor Removal/Installation

A. Remove Fuel Quantity Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Drain wing fuel tank with sensor that is to be removed (refer to 12-11-00).
(4) Open access / inspection plate 510 BB / 610 BB to gain access to sensor (refer to 06-30-00).
(5) Remove nuts securing sensor to inboard fuel tank rib.
(6) Disconnect electrical cables from sensor.
(7) Carefully withdraw sensor from wing tank.

B. Install Fuel Quantity Sensor
(1) Verify battery is disconnected and electrical power to aircraft is OFF.
(2) Check ease of movement of the float arm before installing the sensor.
(3) Place sensor with new gasket on to the threaded studs at inboard fuel tank rib.

CAUTION: THE FUEL QUANTITY SENSOR SHOULD BE FED CAREFULLY INTO THE FUEL TANK. A BENT FLOAT ARM MAY CAUSE ERRONEOUS READINGS.

(4) Connect electrical cables to sensor.
(5) Secure sensor with washers and nuts. Torque nuts crosswise to 2 Nm (17.7 in.lbs).
(6) Reconnect battery (refer to 24-30-00).
(7) Perform a fuel quantity indicating system calibration (refer to “Test/Calibration” below).

3. Resistive Fuel Module Removal/Installation

A. Remove Resistive Fuel Module
- (1) Ensure electrical power to aircraft is OFF.
- (2) Disconnect battery (refer to 24-30-00).
- (3) Remove glare shield (refer to 31-10-00).
- (4) Disconnect electrical connectors from back of module.
- (5) While supporting the module, remove screws securing module to instrument panel.
- (6) Remove module from aircraft.

B. Install Resistive Fuel Module
- (1) Position module at back of instrument panel and attach with screws.
- (2) Connect electrical connectors to module.
- (3) Install glare shield (refer to 31-10-00).
- (4) Reconnect battery (refer to 24-30-00).
- (5) Perform a fuel quantity indicating system test (refer to “Test/Calibration” below).

4. Fuel Quantity Indicating System Test/Calibration

NOTE: When a fuel quantity sensor is replaced, the fuel quantity indicating system must be calibrated. When a resistive fuel module is replaced, the system must be functionally tested.

NOTE: Due to the dihedral angle of the wing and the position of the fuel quantity sensor (total) fuel levels above approx. 50 liters (13.21 gallons) are not gaugeable.

A. Fuel Quantity Indicating System Test
- (1) Prepare aircraft
  - (a) Drain fuel from wing tanks (refer to 12-11-00).
  - (b) Verify fuel selector / shut-off valve is in OFF position.
  - (c) Level the aircraft laterally and longitudinally (refer to 08-10-00).
- (2) Ensure ALT1 / BAT switch is in the OFF position.
- (3) Fill 5,2 liters (1.37 gallons) of fuel into each wing fuel tank.
- (4) Wait approx. 30 seconds. Then gently shake wing to assure fuel quantity sensors settle in their final position.
- (5) Turn BAT switch to the ON position.
- (6) Check that engine monitoring system reads 0 liters (0 gallons) for both tanks.
- (7) Turn BAT switch to the OFF position.
- (8) Add 27,4 liters (7.23 gallons) of fuel to each wing fuel tank.
- (9) Wait approx. 30 seconds. Then gently shake wing to assure fuel quantity sensors settle in their final position.
- (10) Turn BAT switch to the ON position.
- (11) Check that engine monitoring system reads 27±3 liters (7.2±0.8 gallons) for both tanks.
- (12) Turn BAT switch to the OFF position.
- (13) Add 27,4 liters (7.23 gallons) of fuel to LH wing fuel tank.
- (14) Turn BAT switch to the ON position.
- (15) Check that engine monitoring system reads > 52 liters (13.7 gallons) for LH fuel tank.
- (16) Turn BAT switch to the OFF position.
- (17) Repeat steps (13) thru (16) for RH wing fuel tank.

B. Fuel Quantity Indicating System Calibration

NOTE: Refer to Electronics International MVP-50 operating instructions for further information on the fuel tank calibration procedure. The necessary password can be obtained from AQUILA Aviation on request.

(1) Prepare aircraft
  (a) Drain fuel from wing tanks (refer to 12-11-00).
  (b) Verify fuel selector / shut-off valve is in OFF position.
  (c) Level the aircraft laterally and longitudinally (refer to 08-10-00).
(2) Ensure ALT1 / BAT switch is in the OFF position.
(3) Fill 5,2 liters (1.37 gallons) of fuel into each wing fuel tank.
(4) Wait approx. 30 seconds. Then gently shake wing to assure fuel quantity sensors settle in their final position.
(5) Turn BAT switch to the ON position.
(6) Call up the MVP-50 “Fuel Tank Calibration Screen” (level 1 password required).
(7) Select “Fuel Tank” - “FUEL L”, “Calibration Point” - “Empty” and “Use Current Count” - “Yes” to transfer the current sensor count to the sensor count field of this calibration point.
(8) Select “Fuel Tank” - “FUEL R” and repeat step (7) for the RH wing fuel tank.
(9) Add 13,7 liters (3.62 gallons) of fuel to each wing fuel tank.
(10) Wait approx. 30 seconds. Then gently shake wing to assure fuel quantity sensors settle in their final position.
(11) Select “Fuel Tank” - “FUEL L” and “Calibration Point” - “2”.
Set “Qty” to “3.6 GAL” and select “Use Current Count” - “Yes” for this calibration point.
(The tanks must be calibrated in U.S. gallons.)
(12) Select “Fuel Tank” - “FUEL R” and repeat step (11) for the RH wing fuel tank.
(13) Repeat steps (9) thru (12) for the remaining 3 calibration points:

Calibration Point	**Qty.** [gallons]	**Total Fuel** [liters (gallons)]	**Usable Fuel** [liters (gallons)]
Empty	0.0	5,2 (1.37)	0,0 (0.00)
2	3.6	18,9 (4.99)	13,7 (3.62)
3	7.2	32,6 (8.61)	27,4 (7.24)
4	10.9	46,3 (12.23)	41,1 (10.86)
Full	14.5	60,0 (15.85)	54,8 (14.48)

EFFECTIVITY

Aircraft equipped with MVP-50

FUEL PRESSURE INDICATION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11-00!

1. General

   A. Low fuel pressure is indicated by a warning light.

   B. Fuel pressure is measured by a pressure switch at the fuel manifold on top of the engine.

   C. Maintenance is limited to the removal and installation of the fuel pressure switch.

2. Fuel Pressure Switch Removal/Installation

   A. Remove Fuel Pressure Switch
      (1) Ensure electrical power to aircraft is OFF.
      (2) Close fuel selector / shut-off valve.
      (3) Remove engine cowling (refer to 71-10-00).
      (4) Disconnect battery (refer to 24-30-00).
      (5) Disconnect electrical connector from pressure switch.
      (6) Unscrew pressure switch from fuel manifold.
      (7) Plug fuel manifold port to avoid entry of any material.

   B. Install Fuel Pressure Switch
      (1) Ensure battery is disconnected and electrical power to aircraft is OFF.
      (2) Clean all parts carefully. Apply Loctite (medium strength) on pressure switch thread.
      (3) Install pressure switch to fuel manifold (1/2 turn past hand tight).
      (4) Reconnect electrical connector to pressure switch.
      (5) Reconnect battery (refer to 24-30-00).
      (6) Run AUX fuel pump and check system for leaks and fuel pressure warning.
      Warning light should be OFF with fuel pump running and ON without fuel pressure.
      (7) Install engine cowling (refer to 71-10-00).

FUEL PRESSURE INDICATION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11-00!

1. General

A. Fuel pressure indication is included in the Garmin G3X Touch. It is indicated as difference between the absolute fuel pressure and the boost pressure in the airbox.

B. Fuel pressure is measured by a differential pressure transducer electrically connected to the GEA 24 engine interface. To avoid damages caused by vibrations, the pressure transducer is not mounted directly on the engine but on an intercooler strut. On the wet side it is connected to the fuel pressure regulator via a flexible fuel hose and a restricting orifice. On the dry side it is connected to the airbox via a flexible fuel hose.

C. Maintenance is limited to the removal and installation of the fuel pressure transducer.
Refer to 34-25-00 for further information on maintenance of the Garmin G3X Touch system.

2. Fuel Pressure Transducer Removal/Installation

A. Remove Fuel Pressure Transducer
(1) Ensure electrical power to aircraft is OFF.
(2) Close fuel selector / shut-off valve.
(3) Remove engine cowling (refer to 71-10-00).
(4) Disconnect battery (refer to 24-30-00).
(5) Disconnect electrical connector from transducer.
(6) Remove clamp and fuel hose from dry side of transducer.
(7) Remove fuel hose from wet side of transducer.
(8) Unscrew nut and remove transducer from intercooler strut.
(9) Unscrew fittings from transducer
(10) Plug transducer ports and fuel hoses to avoid entry of any material.

B. Install Fuel Pressure Transducer
(1) Ensure battery is disconnected and electrical power to aircraft is OFF.
(2) Clean all parts carefully. Apply Loctite (medium strength) on fitting threads.
(3) Install fittings to both sides of transducer (max. torque 10 Nm [89 in.lbs.] or two full turns past hand tight, whichever happens first).
(4) Install transducer on intercooler strut and secure with nut.
(5) Reconnect fuel hose to wet side transducer fitting (max. torque 15 Nm [133 in.lbs]).
(6) Reconnect fuel hose to dry side transducer fitting and secure with clamp.
(7) Reconnect electrical connector to transducer.
(8) Reconnect battery (refer to 24-30-00).
(9) Run both fuel pumps and check system for leaks and fuel pressure indication.
(10) Install engine cowling (refer to 71-10-00).

FUEL PRESSURE INDICATION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11-00!

1. General

A. Fuel pressure indication is included in the engine monitoring system.
Fuel pressure is measured by a pressure transducer (PT-30GA) electrically connected to the engine data converter (EDC). To avoid damages caused by vibrations, the pressure transducer is not mounted directly on the engine. It is installed on the engine mount and connected via a flexible fuel hose. The fuel hose is connected to the fuel system via a restricting orifice.
Fuel pressure is measured at the fuel manifold (Rotax 912S) / fuel pressure regulator (Rotax 914F) on top of the engine. With the Rotax 914F fuel pressure is indicated as difference between the absolute fuel pressure and the boost pressure in the airbox. Therefore an additional pressure sensor (PT-30GA) for airbox pressure is needed. The difference is calculated / indicated by the engine monitoring system.

B. Maintenance is limited to the removal and installation of the fuel pressure transducer. Refer to 77-40-00 for further information on maintenance of the engine monitoring system.

2. Fuel Pressure Transducer Removal/Installation

A. Remove Fuel Pressure Transducer
(1) Ensure electrical power to aircraft is OFF.
(2) Close fuel selector / shut-off valve.
(3) Remove engine cowling (refer to 71-10-00).
(4) Disconnect battery (refer to 24-30-00).
(5) Disconnect electrical connector from transducer.
(6) Remove fuel hose from transducer fitting.
(7) Open clamp and remove transducer from engine mount.
(8) Unscrew fitting from transducer.
(9) Plug transducer ports and fuel hoses to avoid entry of any material.

B. Install Fuel Pressure Transducer
(1) Ensure battery is disconnected and electrical power to aircraft is OFF.
(2) Clean all parts carefully. Apply Loctite (medium strength) on transducer thread.
(3) Install fitting to transducer (max. torque 10 Nm [89 in.lbs.] or two full turns past hand tight, whichever happens first).
(4) Reconnect fuel hose to transducer fitting (max. torque 15 Nm [133 in.lbs]).
(5) Install transducer on engine mount with clamp.
(6) Reconnect electrical connector to transducer.
(7) Reconnect battery (refer to 24-30-00).
(8) Run electrical fuel pump(s) and check system for leaks and fuel pressure indication.
(9) Install engine cowling (refer to 71-10-00).

EFFECTIVITY
Aircraft equipped with MVP-50

FUEL FLOW INDICATION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11-00!

1. General

A. Fuel flow is measured by two FT-60 fuel flow trancducers: One installed in the fuel supply line, the other one in the return line. Both transducers are mounted on a bracket located on the engine side of the firewall. Fuel flow indication is included in the engine monitoring system.
MVP-50: Both fuel flow transducers are electrically connected to a FFDM-1 fuel flow differential module, located in the instrument panel. The differential module is electrically connected to the engine data converter (EDC). G3X: Both fuel flow transducers are electrically connected to the GEA 24 engine interface.

B. Maintenance is limited to the removal and installation of the fuel flow transducer and the fuel flow differential module. Refer to 77-40-00 for further information on maintenance of the engine monitoring system.

2. Fuel Flow Transducer Removal/Installation

A. Remove Fuel Flow Transducer
(1) Ensure electrical power to aircraft is OFF.
(2) Close fuel selector / shut-off valve.
(3) Remove engine cowling (refer to 71-10-00).
(4) Disconnect battery (refer to 24-30-00).
(5) Disconnect electrical connector from transducer.
(6) Remove fuel hose from transducer fitting.
(7) Remove 2 screws securing transducer to mounting bracket.
(8) Remove elbow fitting from transducer fitting.
(9) Remove transducer from aircraft and unscrew fittings from transducer.
(10) Plug transducer ports and fuel lines to avoid entry of any material.

B. Install Fuel Flow Transducer
(1) Ensure battery is disconnected and electrical power to aircraft is OFF.
(2) Ensure hoses and fittings are free of any loose material. If required, clean them. Remove caps from transducer and fuel lines immediately before installation.

CAUTION: DO NOT ALLOW HIGH AIR PRESSURE TO PASS THROUGH THE FLOW TRANSDUCER!

(3) Install fittings to transducer (max. torque 20 Nm [177 in.lbs.] or two full turns past hand tight, whichever happens first).
(4) Position transducer on mounting bracket and connect transducer fitting to fuel line elbow fitting (max. torque supply line 30 Nm [266 in.lbs] / return line 20 Nm [177 in.lbs]).
(5) Secure transducer to mounting bracket using 2 screws, washers and nuts.
(6) Reconnect fuel hoses to transducer fittings (max. torque 30 Nm [266 in.lbs]).

EFFECTIVITY

Aircraft equipped with fuel flow indication

(7) Reconnect electrical connector to transducer.
(8) Reconnect battery (refer to 24-30-00).
(9) Run both fuel pumps and check system for leaks and fuel flow indication. Fuel flow indication should read zero with fuel pumps running and the engine switched OFF.

NOTE: Fuel flow transducers are calibrated by a K-factor. The K-factor represents the number of electrical pulses output by the fuel flow transducer per gallon of fuel. If readings are inaccurate, the K-factor may need to be adjusted (K-factor initial value is 68.000).

(10) Install engine cowling (refer to 71-10-00).
(11) Perform ground run and check fuel flow indication is proper for engine operation.
(12) Check transducer and connections for leaks, loose fittings, security of attachment and other damage.

3. Fuel Flow Differential Module Removal/Installation (MVP-50 only)

A. Remove Fuel Flow Differential Module

(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glare shield (refer to 31-10-00).
(4) Disconnect electrical connector from differential module.
(5) Remove screws securing differential module to instrument panel.
(6) Remove differential module from aircraft.

B. Install Fuel Flow Differential Module

(1) Position differential module on instrument panel and attach with screws.
(2) Connect electrical connector to differential module.
(3) Install glare shield (refer to 31-10-00).
(4) Reconnect battery (refer to 24-30-00).
(5) Run both fuel pumps and check fuel flow indication. Fuel flow indication should read zero with fuel pumps running and the engine switched OFF.
(6) Perform ground run and check fuel flow indication is proper for engine operation.

CHAPTER 31

INDICATING / RECORDING SYSTEMS

TABLE OF CONTENTS

INDICATING / RECORDING SYSTEMS - GENERAL

1. Introduction

A. Basically the instruments and avionic equipment can be chosen by the customer, but it cannot be installed in any arbitrary combination. Before removing or installing equipment the aircraft manufacturer AQUILA Aviation must be contacted, with the exception of replacing a unit by an identical one.

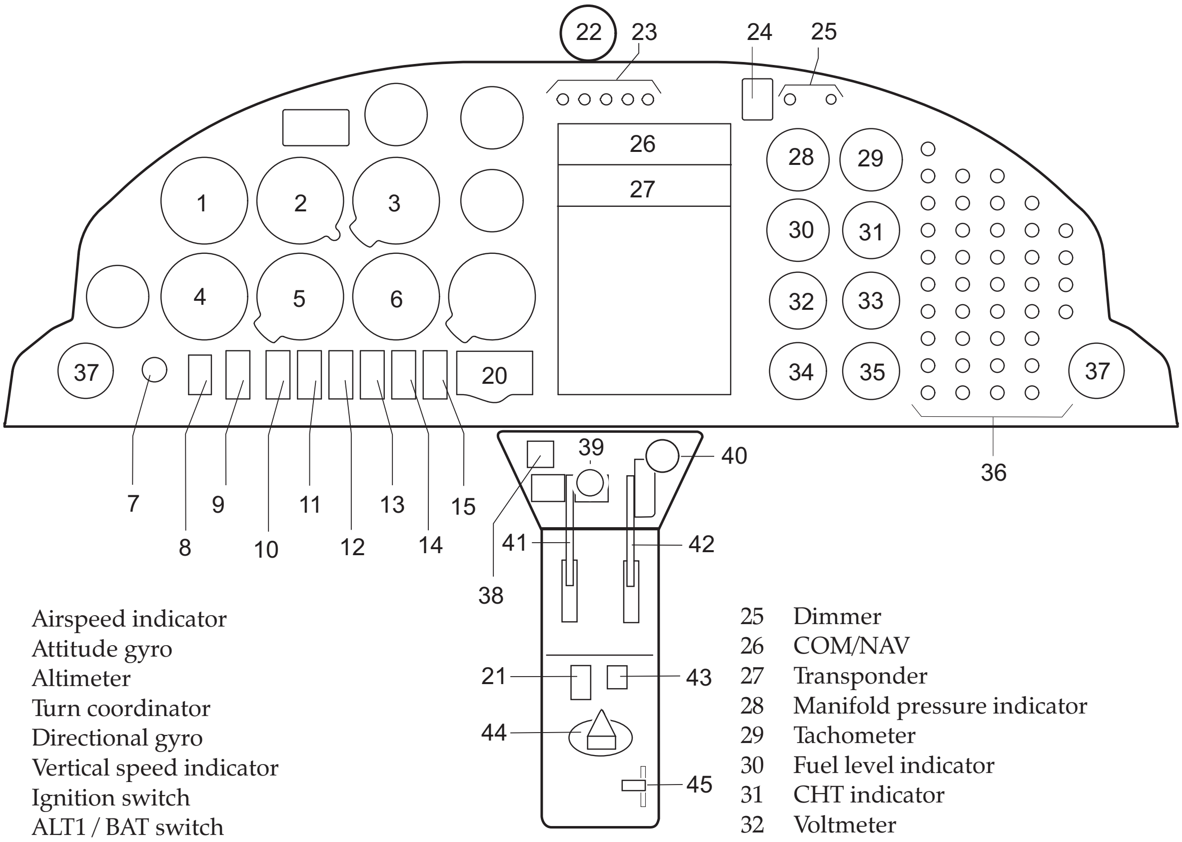
2. General Description

A. For easy and quick reference, the instruments and controls are clearly divided in groups. The group of flight instruments is directly in front of the pilot. Below the flight instruments is a row of switches. The middle section of the panel contains the avionics equipment including the NAV/COM transceiver and the transponder. On the right side of the avionics column the power gauges, the tachometer and the manifold pressure indicator, are mounted. A group of instruments for monitoring engine and system conditions is located below. These gauges show the fuel level in each tank, cylinder head temperature, oil temperature, oil pressure as well as amperes and volts of the electrical system. The circuit breaker panel is located in front of the co-pilot.

B. A center console contains the control knobs for the carburetor heat, the choke, cabin heating, the throttle and rpm control levers, the fuel selector / shut-off valve, the parking brake control knob, and the trim control switch and indicator.

C. The description, function and maintenance of the several specific instruments is contained in the appropriate section of this manual.

D. For an overview of the position of the various instruments, devices and controls on the instrument panel and center pedestal, refer to figure 1.



1	Airspeed indicator
2	Attitude gyro
3	Altimeter
4	Turn coordinator
5	Directional gyro
6	Vertical speed indicator
7	Ignition switch
8	ALT1 / BAT switch
9	AUX fuel pump switch
10	Avionic master switch
11	NAV light switch
12	Anti-collision light switch
13	Landing light switch
14	Instrument light switch (optional)
15	Pitot heat switch (optional)
20	Flap control switch / position indicator
21	Elevator trim position indicator
22	Magnetic compass
23	Warning lights
24	ELT remote control
25	Dimmer
26	COM/NAV
27	Transponder
28	Manifold pressure indicator
29	Tachometer
30	Fuel level indicator
31	CHT indicator
32	Voltmeter
33	Oil temperature indicator
34	Ammeter
35	Oil pressure indicator
36	Circuit breaker panel
37	Fresh air ventilator
38	Carburetor heat control
39	Cabin heat control
40	Choke control
41	Throttle lever
42	Propeller control lever
43	Elevator trim switch
44	Fuel selector / shut-off valve
45	Parking brake control lever

Note: Arrangement of instruments may be different due to varying equipment.

Instrument Panel Basic Configuration for Day & Night VFR
Figure 1

INDICATING / RECORDING SYSTEMS - GENERAL

1. Introduction

A. Basically the instruments and avionic equipment can be chosen by the customer, but it cannot be installed in any arbitrary combination. Before removing or installing equipment the aircraft manufacturer AQUILA Aviation must be contacted, with the exception of replacing a unit by an identical one.

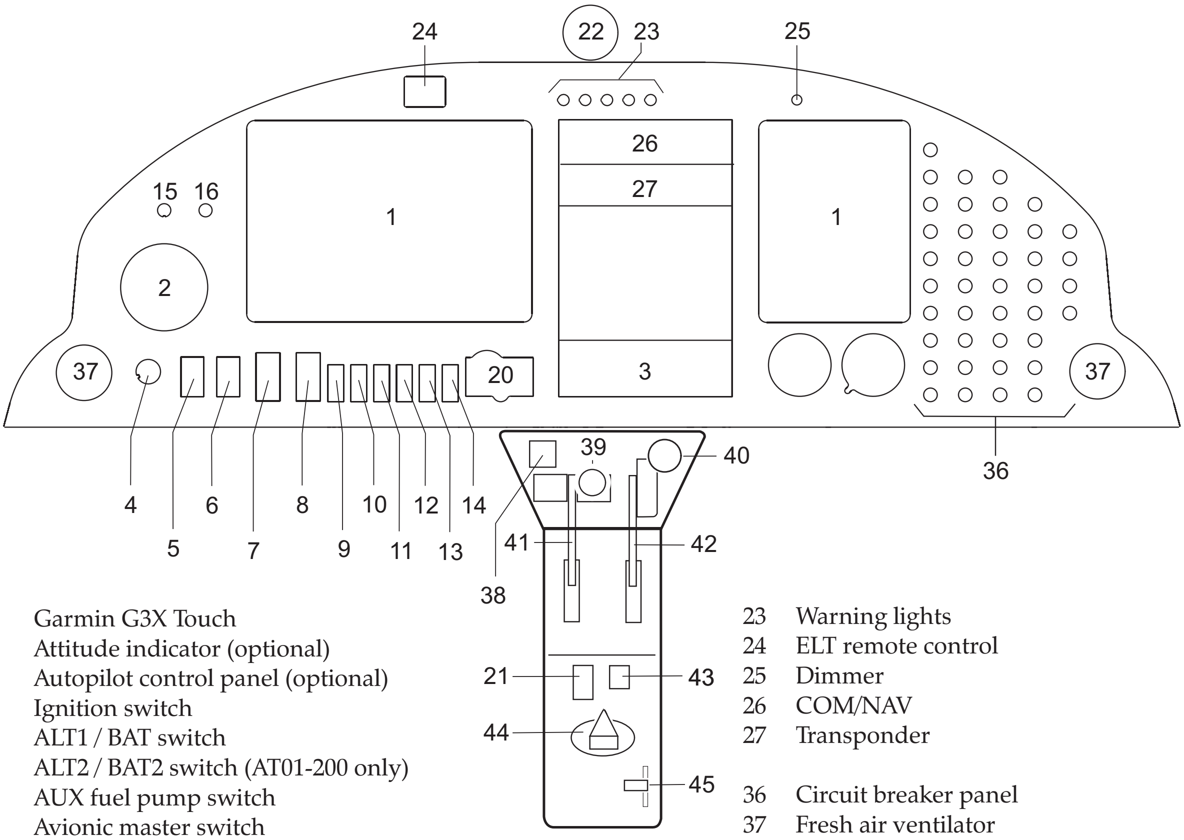
2. General Description

A. For easy and quick reference, the instruments and controls are clearly divided in groups.
The Garmin G3X as the primary flight display is directly in front of the pilot. The back-up attitude indicator for NVFR is installed close to the Garmin G3X. Below the G3X is a row of switches.
The middle section of the panel contains the avionics equipment including the NAV/COM transceiver and the transponder. On the right side of the avionics column a second G3X display is mounted. Both G3X displays may be used for monitoring engine and system conditions, including manifold pressure, propeller speed, fuel quantity and pressure (Rotax 914 only), cylinder head temperature, oil temperature and pressure as well as amperes and volts of the electrical system.
The circuit breaker panel is located in front of the co-pilot.

B. A center console contains the control knobs for the carburetor heat, the choke, cabin heating, the throttle and rpm control levers, the fuel selector / shut-off valve, the parking brake control knob, and the trim control switch and indicator.

C. The description, function and maintenance of the several specific instruments is contained in the appropriate section of this manual.

D. For an overview of the position of the various instruments, devices and controls on the instrument panel and center pedestal, refer to figure 1.



1	Garmin G3X Touch
2	Attitude indicator (optional)
3	Autopilot control panel (optional)
4	Ignition switch
5	ALT1 / BAT switch
6	ALT2 / BAT2 switch (AT01-200 only)
7	AUX fuel pump switch
8	Avionic master switch
9	NAV light switch
10	Anti-collision light switch
11	Landing light switch
12	Instrument light switch (optional)
13	Pitot heat switch (optional)
14	Autopilot switch (optional)
15	TCU switch (AT01-200 only)
16	Ammeter switch (AT01-200 only)
20	Flap control switch / position indicator
21	Elevator trim position indicator
22	Magnetic compass
23	Warning lights
24	ELT remote control
25	Dimmer
26	COM/NAV
27	Transponder
36	Circuit breaker panel
37	Fresh air ventilator
38	Carburetor heat control
39	Cabin heat control
40	Choke control
41	Throttle lever
42	Propeller control lever
43	Elevator trim switch
44	Fuel selector / shut-off valve
45	Parking brake control lever

Note: Arrangement of instruments may be different due to varying equipment.

Instrument Panel Basic Configuration for Day & Night VFR
Figure 1

EFFECTIVITY

Aircraft equipped with Garmin G3X Touch

INDICATING / RECORDING SYSTEMS - GENERAL

1. Introduction

A. Basically the instruments and avionic equipment can be chosen by the customer, but it cannot be installed in any arbitrary combination. Before removing or installing equipment the aircraft manufacturer AQUILA Aviation must be contacted, with the exception of replacing a unit by an identical one.

2. General Description

A. For easy and quick reference, the instruments and controls are clearly divided in groups.
The Garmin G500 / G500 TXi as the primary flight display is directly in front of the pilot.
The back-up attitude indicator for NVFR is installed close to the Garmin G500 / G500 TXi.
Below the G500 / G500 TXi is a row of switches.
The middle section of the panel contains the avionics equipment including the NAV/COM transceiver and the transponder. On the right side of the avionics column the power gauges, the tachometer and the manifold pressure indicator, are mounted. A group of instruments for monitoring engine and system conditions is located below. These gauges show the fuel level in each tank, cylinder head temperature, oil temperature, oil pressure as well as amperes and volts of the electrical system. The circuit breaker panel is located in front of the co-pilot.

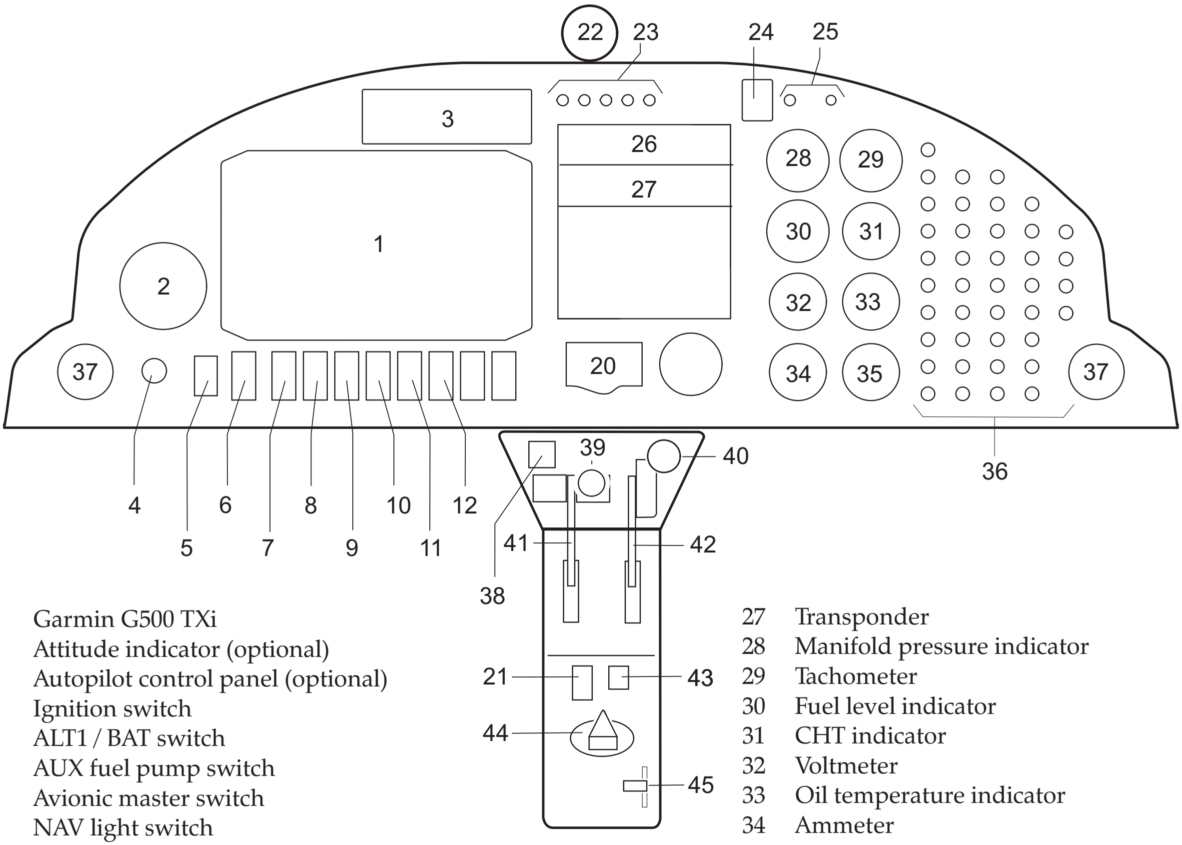
B. A center console contains the control knobs for the carburetor heat, the choke, cabin heating, the throttle and rpm control levers, the fuel selector / shut-off valve, the parking brake control knob, and the trim control switch and indicator.

C. The description, function and maintenance of the several specific instruments is contained in the appropriate section of this manual.

D. For an overview of the position of the various instruments, devices and controls on the instrument panel and center pedestal, refer to figure 1.

EFFECTIVITY

Aircraft equipped with Garmin G500 / G500 TXi



1	Garmin G500 TXi	27	Transponder
2	Attitude indicator (optional)	28	Manifold pressure indicator
3	Autopilot control panel (optional)	29	Tachometer
4	Ignition switch	30	Fuel level indicator
5	ALT1 / BAT switch	31	CHT indicator
6	AUX fuel pump switch	32	Voltmeter
7	Avionic master switch	33	Oil temperature indicator
8	NAV light switch	34	Ammeter
9	Anti-collision light switch	35	Oil pressure indicator
10	Landing light switch	36	Circuit breaker panel
11	Instrument light switch (optional)	37	Fresh air ventilator
12	Pitot heat switch (optional)	38	Carburetor heat control
		39	Cabin heat control
20	Flap control switch / position indicator	40	Choke control
21	Elevator trim position indicator	41	Throttle lever
22	Magnetic compass	42	Propeller control lever
23	Warning lights	43	Elevator trim switch
24	ELT remote control	44	Fuel selector / shut-off valve
25	Dimmer	45	Parking brake control lever

Note: Arrangement of instruments may be different due to varying equipment.

Instrument Panel Basic Configuration for Day & Night VFR
Figure 1

INDICATING / RECORDING SYSTEMS - GENERAL

1. Introduction

A. Basically the instruments and avionic equipment can be chosen by the customer, but it cannot be installed in any arbitrary combination. Before removing or installing equipment the aircraft manufacturer AQUILA Aviation must be contacted, with the exception of replacing a unit by an identical one.

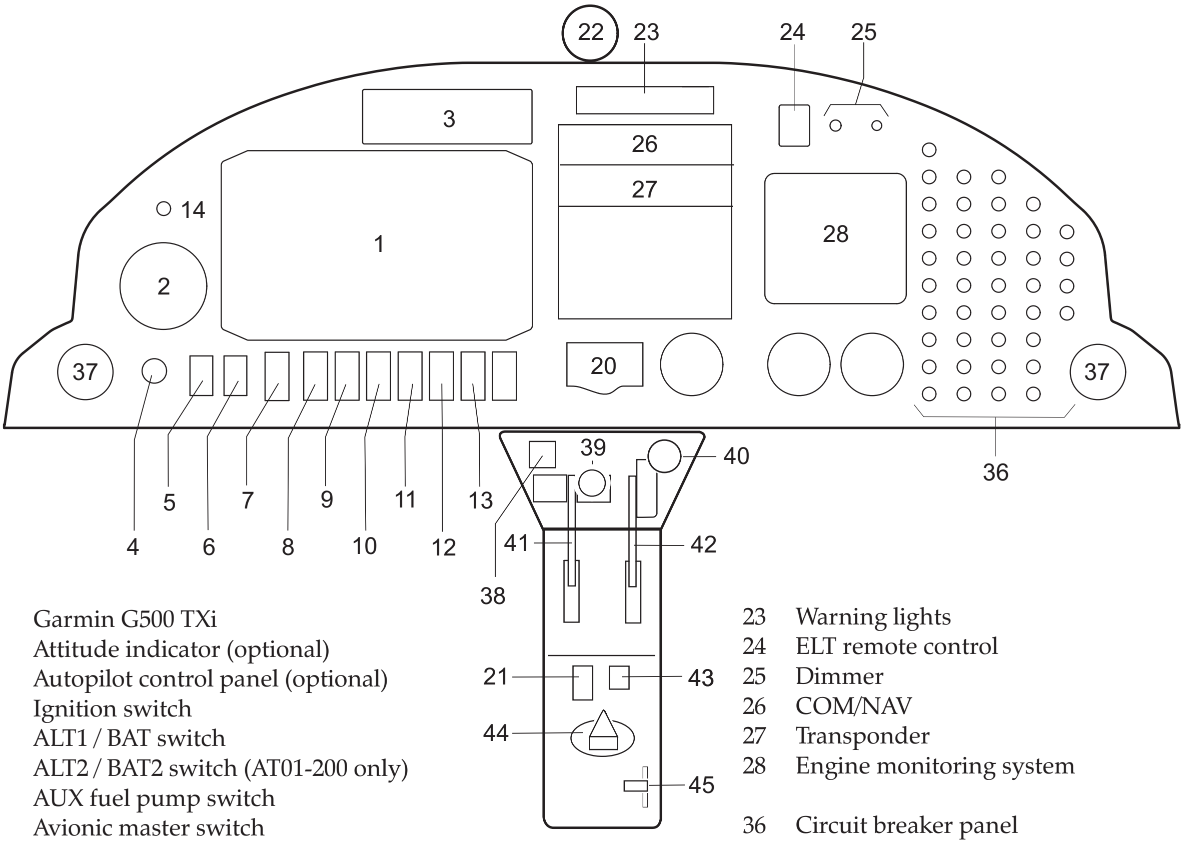
2. General Description

A. For easy and quick reference, the instruments and controls are clearly divided in groups.
The Garmin G500 / G500 TXi as the primary flight display is directly in front of the pilot.
The back-up attitude indicator for NVFR is installed close to the Garmin G500 / G500 TXi.
Below the G500 / G500 TXi is a row of switches.
The middle section of the panel contains the avionics equipment including the NAV/COM transceiver and the transponder. On the right side of the avionics column the engine monitoring system is mounted. This system is used for monitoring engine and system conditions, including manifold pressure, propeller speed, fuel quantity and pressure, cylinder head temperature, oil temperature and pressure as well as amperes and volts of the electrical system. The circuit breaker panel is located in front of the co-pilot.

B. A center console contains the control knobs for the carburetor heat, the choke, cabin heating, the throttle and rpm control levers, the fuel selector / shut-off valve, the parking brake control knob, and the trim control switch and indicator.

C. The description, function and maintenance of the several specific instruments is contained in the appropriate section of this manual.

D. For an overview of the position of the various instruments, devices and controls on the instrument panel and center pedestal, refer to figure 1.



1	Garmin G500 TXi
2	Attitude indicator (optional)
3	Autopilot control panel (optional)
4	Ignition switch
5	ALT1 / BAT switch
6	ALT2 / BAT2 switch (AT01-200 only)
7	AUX fuel pump switch
8	Avionic master switch
9	NAV light switch
10	Anti-collision light switch
11	Landing light switch
12	Instrument light switch (optional)
13	Pitot heat switch (optional)
14	TCU switch (AT01-200 only)
20	Flap control switch / position indicator
21	Elevator trim position indicator
22	Magnetic compass
23	Warning lights
24	ELT remote control
25	Dimmer
26	COM/NAV
27	Transponder
28	Engine monitoring system
36	Circuit breaker panel
37	Fresh air ventilator
38	Carburetor heat control
39	Cabin heat control
40	Choke control
41	Throttle lever
42	Propeller control lever
43	Elevator trim switch
44	Fuel selector / shut-off valve
45	Parking brake control lever

Note: Arrangement of instruments may be different due to varying equipment.

Instrument Panel Basic Configuration for Day & Night VFR
Figure 1

EFFECTIVITY

Aircraft equipped with Garmin G500 / G500 TXi and MVP-50

INSTRUMENT PANEL - MAINTENANCE

1. General

A. The instrument panel is made from aluminum alloy and is formed in one piece with a shelf. The shelf fits between the panel and the firewall. The panel shelf is attached on the left and right sides to support consoles and secured to the fuselage with bolts. The equipment is mounted in cut-outs and can be easily accessed from the rear of the panel when the glareshield is removed.
If required, e.g. during maintenance on the fuselage structure, the instrument panel assembly can be removed completely.

2. Glare Shield Removal/Installation

A. Remove Glare Shield
  (1) Ensure electrical power to aircraft is OFF.
  (2) Remove 4 screws on top of glare shield securing glare shield to instrument panel.
  (3) Remove 3 screws on each side of glare shield securing glare shield to fuselage.
  (4) Disconnect electrical connectors to allow removal of the glare shield.
  (5) Remove glare shield.

B. Install Glare Shield
  (1) Check all connections, wires, electrical connectors and hoses on rear side of instrument panel.
  (2) Put glare shield in position and connect electrical connectors to glare shield.
  (3) Secure glare shield to fuselage and instrument panel using screws.

3. Instrument Panel Removal/Installation

A. Remove Instrument Panel
  (1) Disconnect battery (refer to 24-30-00).
  (2) Remove glare shield (refer to “Glare Shield Removal/Installation” above).

NOTE: It is recommended to label wires, hoses and plugs which must be disconnected to ensure correct reinstallation of the instrument panel.

Refer to 91-00-00 for wiring diagrams. Refer to 34-10-00 (system schematic) for proper connecting components of the pitot-static system.

  (3) Identify all electrical connectors, hoses, and associated wiring.
  (4) Disconnect all electrical connectors, hoses, and associated wiring to allow removal of the instrument panel assembly.
  (5) Remove nuts, bolts, washers and spacers securing instrument panel to center console.
  (6) Remove nuts, bolts, washers and spacers securing instrument panel to fuselage. Remove instrument panel assembly from aircraft.

B. Install Instrument Panel
  (1) Put instrument panel assembly in position and secure to fuselage using bolts, spacers, washers and nuts.
  (2) Secure instrument panel to center console using bolts, spacers, washers, and nuts.
  (3) Connect all electrical connectors, hoses, and associated wiring that have been disconnected during disassembly procedure.
  (4) Install glare shield (refer to “Glare Shield Removal/Installation” above).
  (5) Reconnect battery (refer to 24-30-00).
  (6) Perform instrument panel inspection/check as described below.

C. Instrument Panel Inspection/Check
  (1) Perform pitot system leakage test (refer to 34-10-00).
  (2) Perform static system leakage test (refer to 34-10-00).
  (3) Perform functional test for all instruments and systems to assure proper operation.

NOTE: A flight test is recommended after instrument panel installation to ensure the proper functioning of all instruments and systems.

CHAPTER 32

LANDING GEAR

TABLE OF CONTENTS

TABLE OF CONTENTS - CONTINUED

LANDING GEAR - GENERAL

1. Introduction

A. This chapter describes units and components which furnish a means of supporting and steering the aircraft on the ground, including the main and nose landing gears, brakes, wheels and tires.

2. General Description

A. The aircraft has a fixed tricycle landing gear with a steerable nose gear. Its wheels are either manufactured by Beringer, Cleveland or Grove. The wheels are equipped with either "Highspeed" aerodynamic wheel fairings to decrease drag forces or "Softfield" wheel fairings to avoid soiling of the wing and fuselange.
The main gear struts are leaf springs which are attached to the center section of fuselage using two mounting brackets each. The nose gear is a tubular strut which is attached to the engine mount and linked through the rudder pedals to provide ground control. For shock absorption an elastomer package is installed between nose gear strut and nose wheel fork. Hydraulically actuated disc type brakes are installed on the inboard side of the main gear wheels.

B. Descriptive Data

Tire type:	8 ply or 10 ply tubeless (Beringer) 6 ply tube-type (Cleveland / Grove)
Wheelbase:	1,685 m (5,53 ft)
Track width (max. fuel, no persons on board):	1,938 m (6,36 ft)
Main tire size:	5.00x5
Nose tire size:	5.00x5
Main tire pressure:	2,5 bar (36 psi)
Nose tire pressure:	2,5 bar (36 psi) (Beringer) 2,0 bar (29 psi) (Cleveland / Grove)
Max. nose gear wheel fork deflection:	+/- 20°
Max. brake system operating pressure:	60 bar (870 psi) (Beringer) 69 bar (1000 psi) (Cleveland / Grove)

MAIN LANDING GEAR - DESCRIPTION

1. Introduction

A. The main landing gear consists of the main landing gear struts, the wheels with brakes and the wheel fairings. The wheel fairings are standard equipment. The main gear struts are cantilever spring legs made of spring steel and carry the landing loads. The aircraft is serially equipped with disc type brakes.

2. Description and Operation

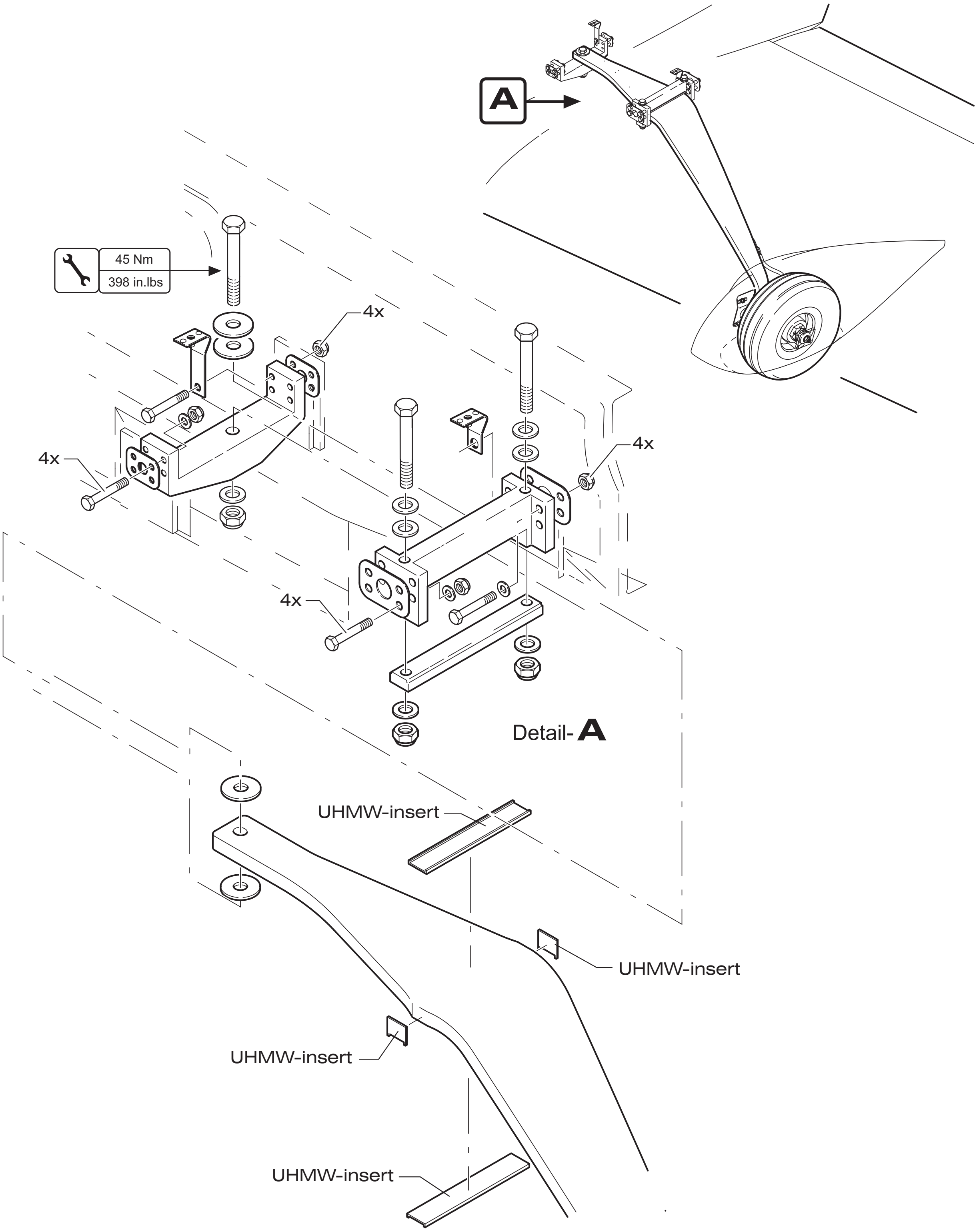
A. Each main landing gear strut is attached to the fuselage structure by means of two aluminum mounting brackets. These brackets are bolted to the main landing gear ribs, which are bonded into the fuselage belly.
The struts are mounted to the inner bracket with a special single bolt. The outer mounting bracket consists of two parts; the upper part on top of the main strut and the lower retaining bar below the main strut. The retaining bar is attached to the upper part of the bracket with two bolts. This arrangement ensures correct absorption of the landing loads, similar to a rocker plate.
To prevent chafing damage and to allow angular movement of the struts, synthetic rubber inserts have been installed between the contact surfaces.
The wheel axle is attached to the lower end of the landing gear strut with four bolts.
A mounting plate for the wheel fairing is installed on the inboard side of the lower end of each main landing gear strut using the bolts to secure the wheel axle to strut.

MAIN LANDING GEAR - MAINTENANCE

1. Main Gear Leg Removal/Installation

A. Remove a Main Gear Leg
(1) Gain access to the appropriate landing gear mounting brackets (refer to 25-00-00).
(2) Lift aircraft (refer to 07-10-00).
(3) Remove screws/nut securing wheel fairing to wheel assembly and remove fairing.
(4) Remove brake line and brake caliper from main gear leg (refer to 32-40-00).
(5) Remove grounding connection from inboard end of the main gear leg.
(6) Remove bolt and nut attaching inboard end of main gear leg to inner mounting bracket.
(7) Loosen two bolts securing main gear leg retainer clamp to outer mounting bracket.
(8) Pull main gear leg from fuselage.

B. Install a Main Gear Leg
(1) Slide main gear leg into place so the leg retainer clamp is supporting the leg.
(2) Install bolt attaching inboard end of main gear leg to inner mounting bracket in the fuselage belly. Ensure flexible washers and washers are in correct position. Torque to to 45 Nm (398 in.lbs).
(3) Tighten two bolts securing main gear leg retainer clamp to outer mounting bracket.
(4) Reconnect grounding connection to inboard end of the main gear leg.
(5) Reinstall brake caliper, brake line and wheel (refer to 32-40-00).
(6) Reinstall wheel fairing.
(7) Test brake system and ensure brakes are operating properly (refer to 32-40-00).



Main Gear Leg Installation
Figure 201

NOSE LANDING GEAR - DESCRIPTION

1. Introduction

   A. The aircraft has a steerable nose landing gear which is equipped with a shock absorber and wheel fairing.

2. Description and Operation

   A. The nose gear consists of a welded tubular steel strut pivotally attached to the engine mount.
   The forward bottom end of the nose gear strut has a horizontal pivot for the nose wheel fork.
   The nose wheel fork with the nose gear wheel can thus only move up and down.
   Shock absorption is provided by a shock absorber unit equipped with stacked rubber disks, which is installed between nose wheel fork and nose gear strut.
   Nose wheel steering is accomplished through use of the rudder pedals. Spring loaded steering rod assemblies connect the nose gear steering arm at the upper end of the nose gear strut to arms on the rudder pedals. Steering is afforded up to approximately 20 degrees each side of neutral.

NOSE LANDING GEAR - MAINTENANCE

1. Nose Gear Leg Removal/Installation (Figure 201)

A. Remove Nose Gear Leg
   (1) Jack aircraft or weight tail of aircraft to raise nose wheel (refer to 07-00-00).
   (2) Remove engine cowling (refer to 71-10-00).
   (3) Disconnect retaining springs at the nose gear steering arm.
   (4) Disconnect steering rod assemblies at nose gear steering arm.
   (5) Remove nut securing upper end of the nose gear strut to engine mount.
   (6) Remove pivot bolt securing nose gear strut assembly to the engine mount at the bracket.
   (7) Remove nose gear leg from the aircraft downwards.

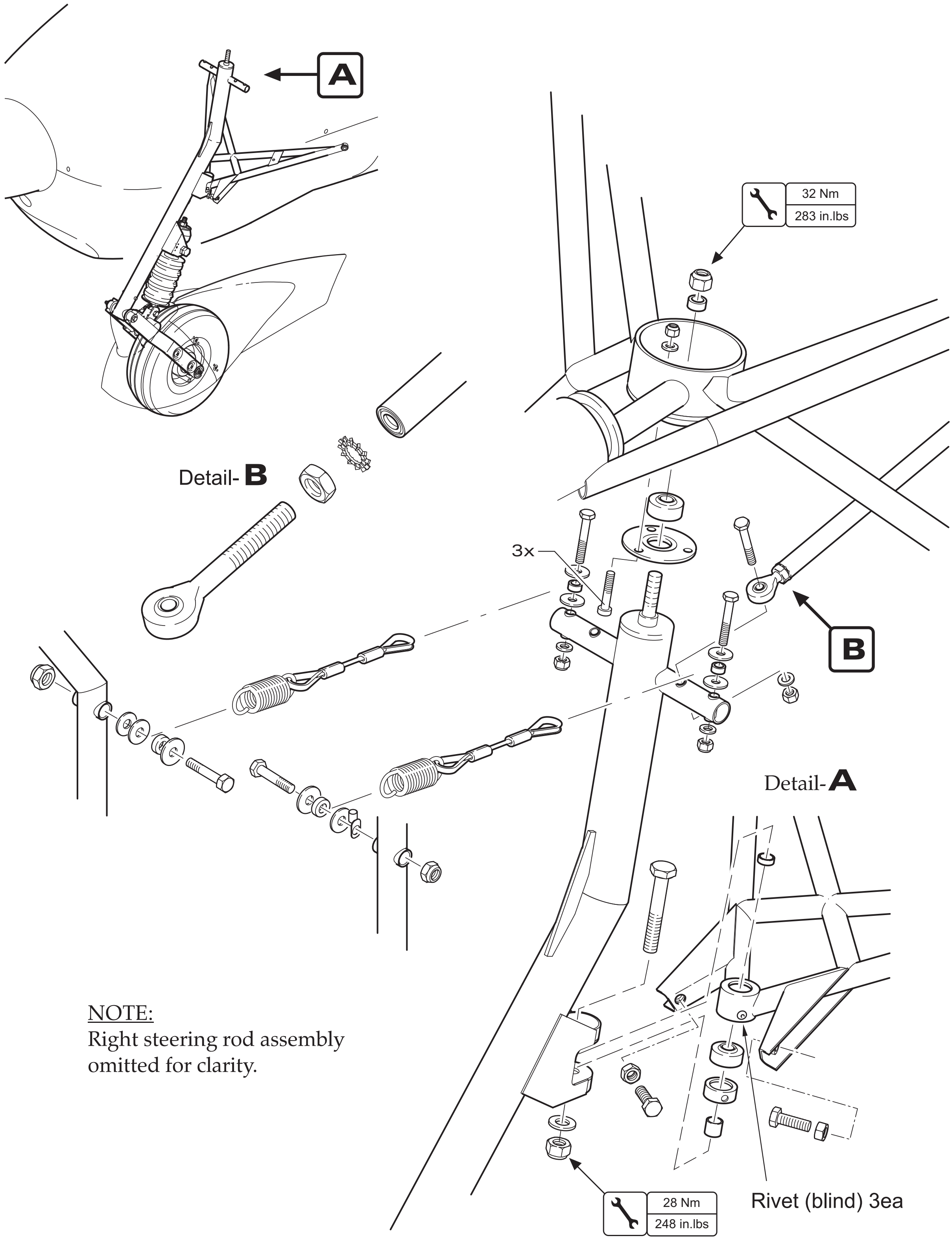
B. Install Nose Gear Leg
   (1) Place nose gear leg in position.
   (2) Install pivot bolt securing nose gear strut assembly to the engine mount at the bracket.
   (3) Install nut securing upper end of the nose gear strut to engine mount.
   (4) Connect steering rod assemblies to the nose gear steering arm.
   (5) Connect retaining springs to the nose gear steering arm.
   (6) Install engine cowling (refer to 71-10-00)

2. Wheel Fairing “High Speed” Removal/Installation

NOTE: The threaded pins are secured to the nose wheel fork with high strength threadlocker (Loctite 648 or equivalent) and should protrude the nose wheel for by approx. 13 mm (upper pins) resp. 16 mm (lower pins). The threaded pins don’t need to be removed for wheel fairing removal/installation.

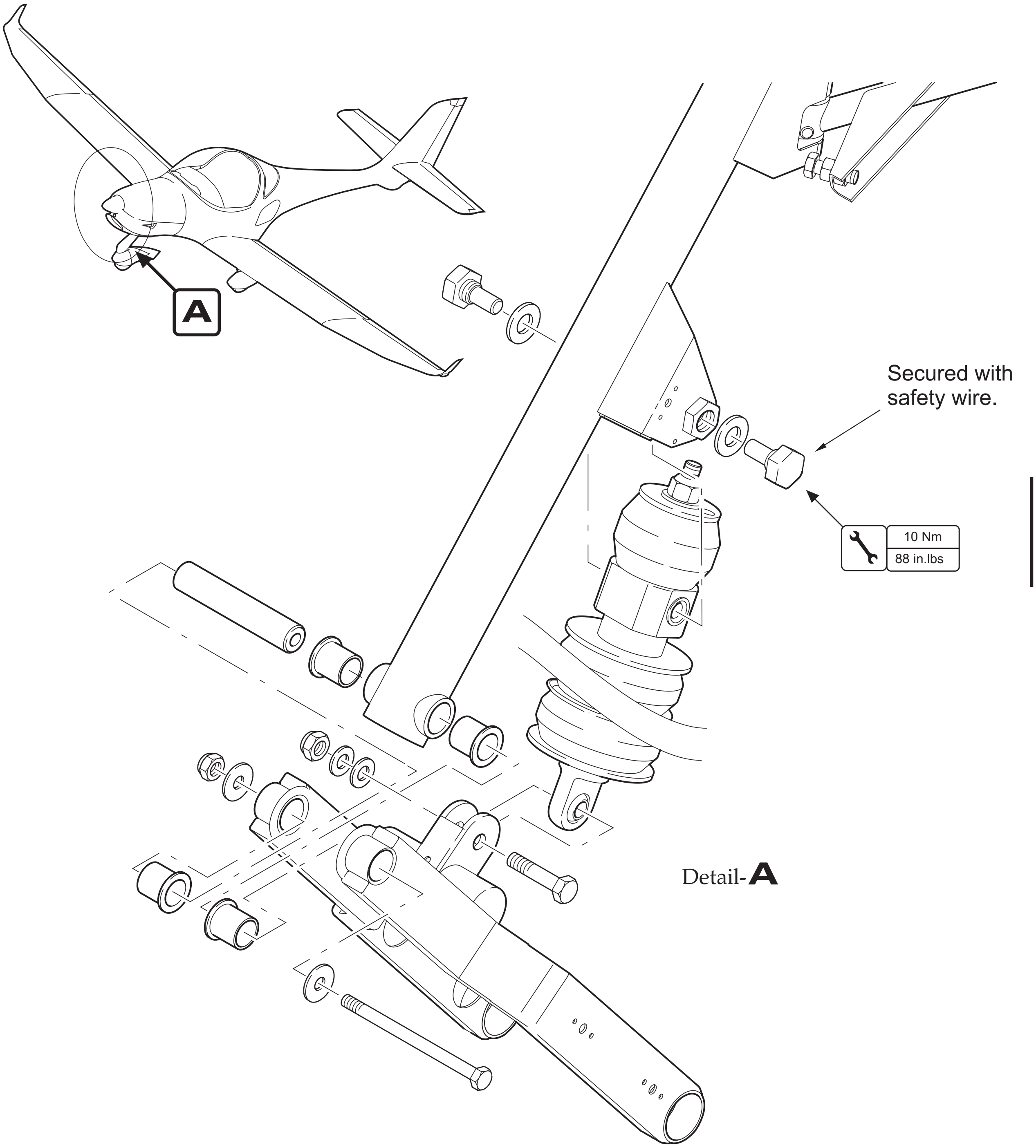
A. Remove Wheel Fairing
   (1) Remove nuts and washers securing wheel fairing to nose wheel fork.
   (2) Carefully bend apart and remove front part of the wheel fairing over threaded pins.
   (3) Carefully bend apart and remove rear part of the wheel fairing over threaded pins.

B. Install Wheel Fairing
   (1) Place rear part of the wheel fairing in position. Carefully bend apart wheel fairing and install over threaded pins.
   (2) Place front part of the wheel fairing in position. Carefully bend apart wheel fairing and install over threaded pins.
   (3) Secure wheel fairing using washers and nuts.



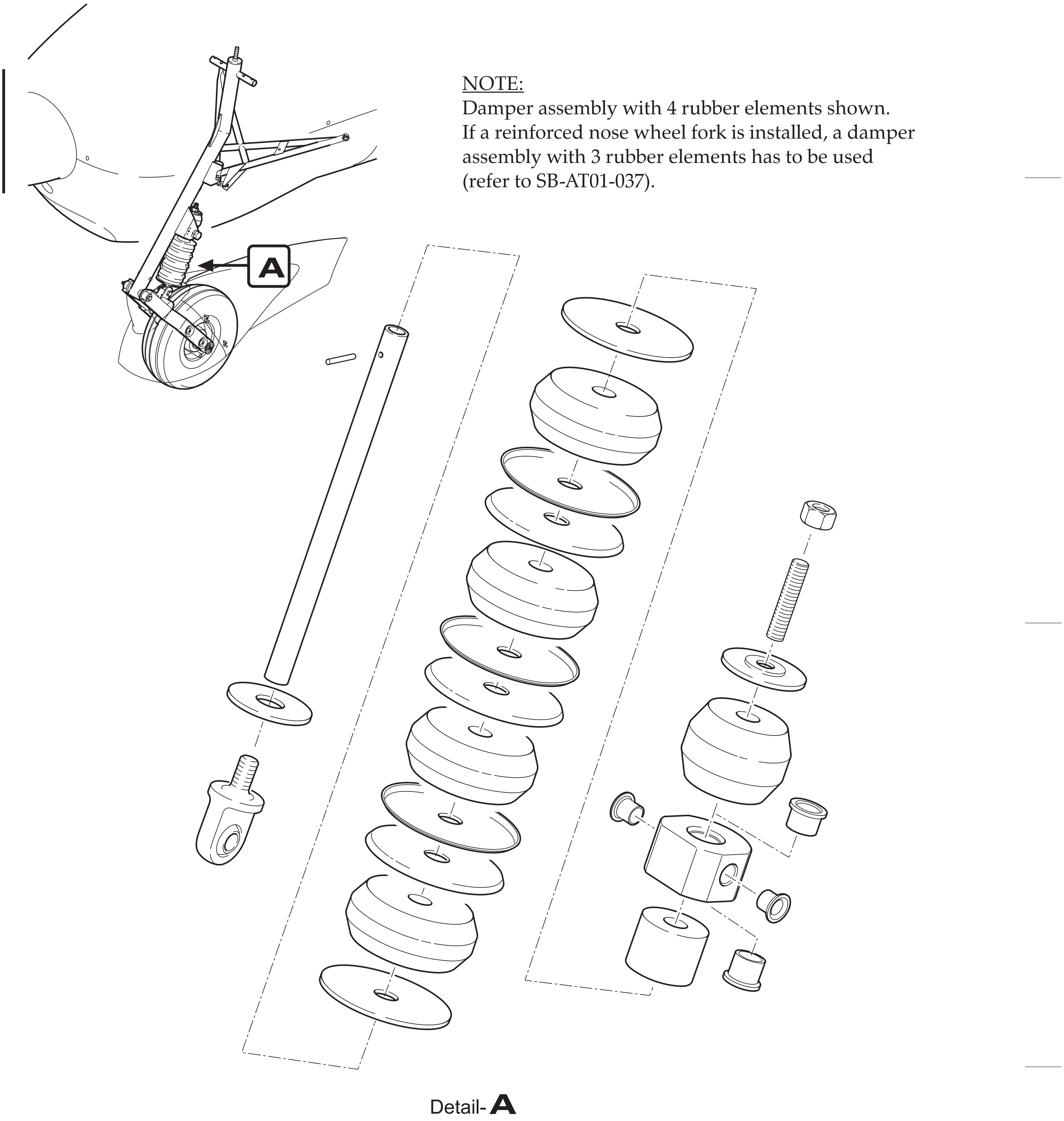
NOTE:
Right steering rod assembly omitted for clarity.

Nose Gear Leg Installation
Figure 201



Damper Assy and Nose Wheel
Fork Installation
Figure 202

NOTE:
Damper assembly with 4 rubber elements shown.
If a reinforced nose wheel fork is installed, a damper assembly with 3 rubber elements has to be used (refer to SB-AT01-037).



Damper Assembly
Figure 203

WHEELS AND BRAKES - DESCRIPTION

1. Introduction

A. This section describes components and maintenance of the wheels and the brake system.

B. For tire specifications, refer to “Landing Gear - General”.

C. For more detailed information on the installed wheels and brakes, refer to the maintenance guide for Beringer products, P/N SM-00, latest revision (www.beringer-aero.com).

2. Description and Operation

A. The wheels are made of aluminium alloy and consist of two wheel halves. RF-005 and RA-002 wheels also consist of a separate central spacer. Inner and outer wheel flanges are held together by screws secured by threadlocker. A thin anodizing coating protects aluminium from corrosion. The wheels are designed for tubeless tires using large O-rings between the parts. Bearings are factory greased and sealed.
The main wheels are made to be used together with a brake assembly and disc.

B. The aircraft has two separate brake circuits operated by pushing the upper part of the rudder pedals. The pilot's and co-pilot's left toe brake pedals operate the left circuit by supplying pressure to the brake caliper on the left main landing gear wheel. The right toe brake pedals operate the right caliper. Pressing both the pilot's and co-pilot's brake pedal will increase brake pressure.

The parking brake valve is located in the center console. It contains two valves which can seal the brake pressure into the calipers. This keeps the brakes ON. The pressure will reduce in time and the brakes will slowly release.

The brake fluid reservoir is located on the left hand side in front of the firewall. It is connected to the inlets of the pilot's master brake cylinders. Their outlets are connected to the inlets of the master brake cylinders on the co-pilot's rudder pedals, the outlets of which are connected to the parking brake valve. The parking brake valve connects to the brake calipers. All brake lines are stainless steel braided with PTFE inner tube and stainless fittings.

The brake caliper is made of aluminium alloy and protected against corrosion by a thin anodizing coating. Calipers consist of two separate parts bolted together: the casing with pistons and the back plate. To assure equal pressure on both brake pads, disc is floating and brake pads can slide on 2 of the 3 assembly screws. Brake casing is equipped with the same inlet port on each side to be used on left or right strut of the aircraft. The unused port is sealed by a bleeding screw.

WHEELS AND BRAKES - MAINTENANCE

1. General

A. This section gives basic maintenance instructions for Beringer wheels and brakes. For further information refer to the Beringer products maintenance guide, P/N SM-00, latest revision, and the referenced documents (www.beringer-aero.com).

2. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
3.B. and 4.B.	-	waterproof grease	-	commercially available
5.B.	1	plywood tool with conical bushing	OT-002	Beringer Aero / AQUILA
5.A. and B.	-	tire lubricant (silicone free)	-	commercially available
12.A. and B.	1	brake bleeding kit	ONC01	Beringer Aero / AQUILA

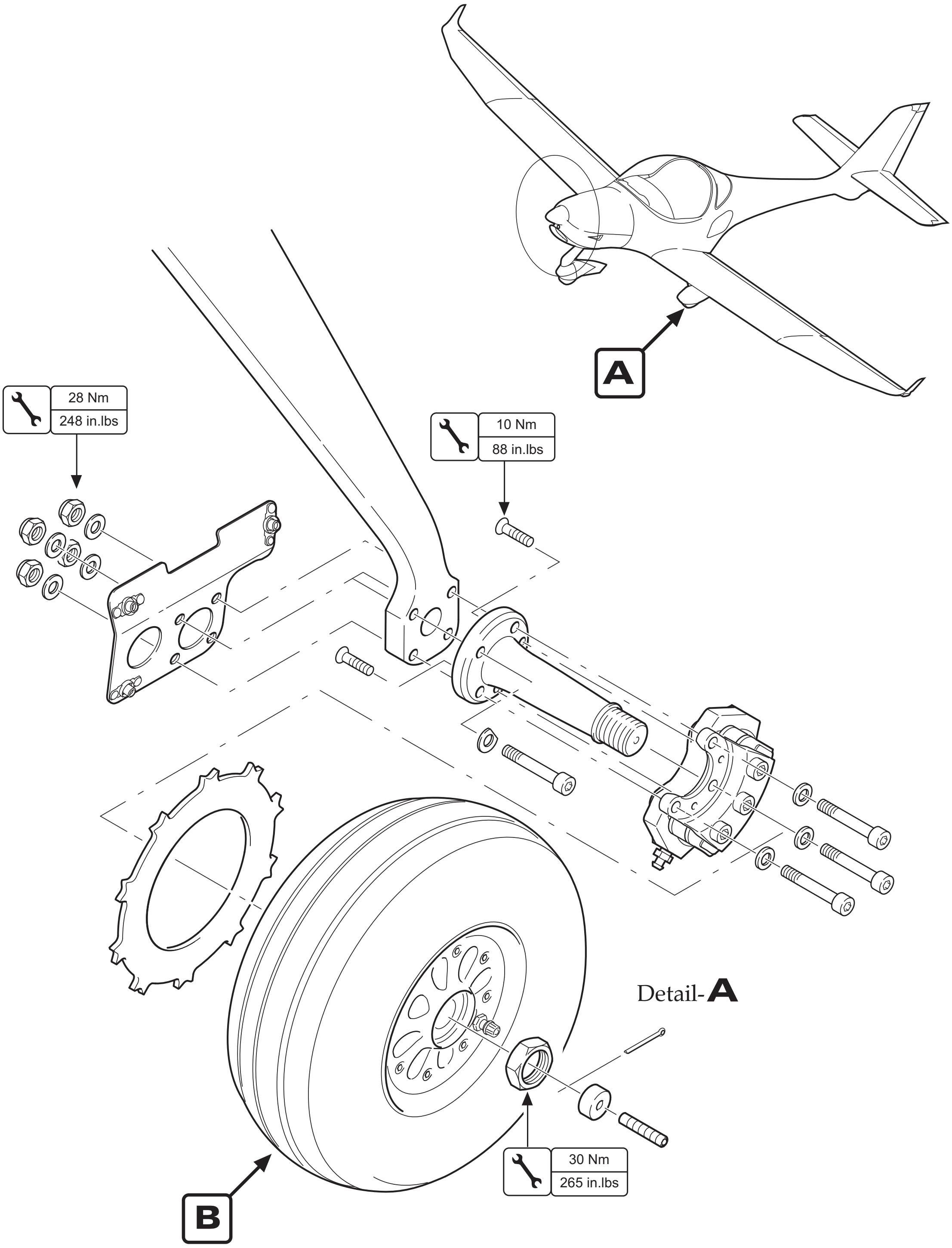
3. Main Gear Wheel Removal/Installation (Figure 201)

A. Remove a Main Gear Wheel
- (1) Jack aircraft or appropriate main gear wheel (refer to 07-00-00).
- (2) Remove screws/nuts securing wheel fairing and remove wheel fairing.
- (3) Remove cotter pin and axle nut. Cut and remove disc safety wire.
- (4) Pull off wheel from axle.

B. Install a Main Gear Wheel
- (1) Position brake disc in the brake caliper (same orientation as before).
- (2) Greasing the axle on the bearing surfaces (e.g. Bel-Ray waterproof grease) is recommended for corrosion protection. Do not contaminate braking surfaces such as pads and discs.
- (3) Slide wheel on to axle while placing brake disc ears in wheel slots.
- (4) Torque axle nut to 30 Nm (265 in.lbs) and secure with new cotter pin.
- (5) Install new brake disc safety wire.
- (6) Install wheel fairing.

4. Nose Gear Wheel Removal/Installation (Figure 202)

A. Remove Nose Gear Wheel
- (1) Jack aircraft or weight tail of aircraft to raise nose wheel (refer to 07-00-00).
- (2) Remove screws/nuts securing wheel fairing and remove wheel fairing.
- (3) Remove axle bolt from wheel fork.
- (4) Remove cap bushings from wheel fork arms.
- (5) Remove nose wheel assembly from wheel fork.
- (6) Remove axle and spacer sleeve from wheel.

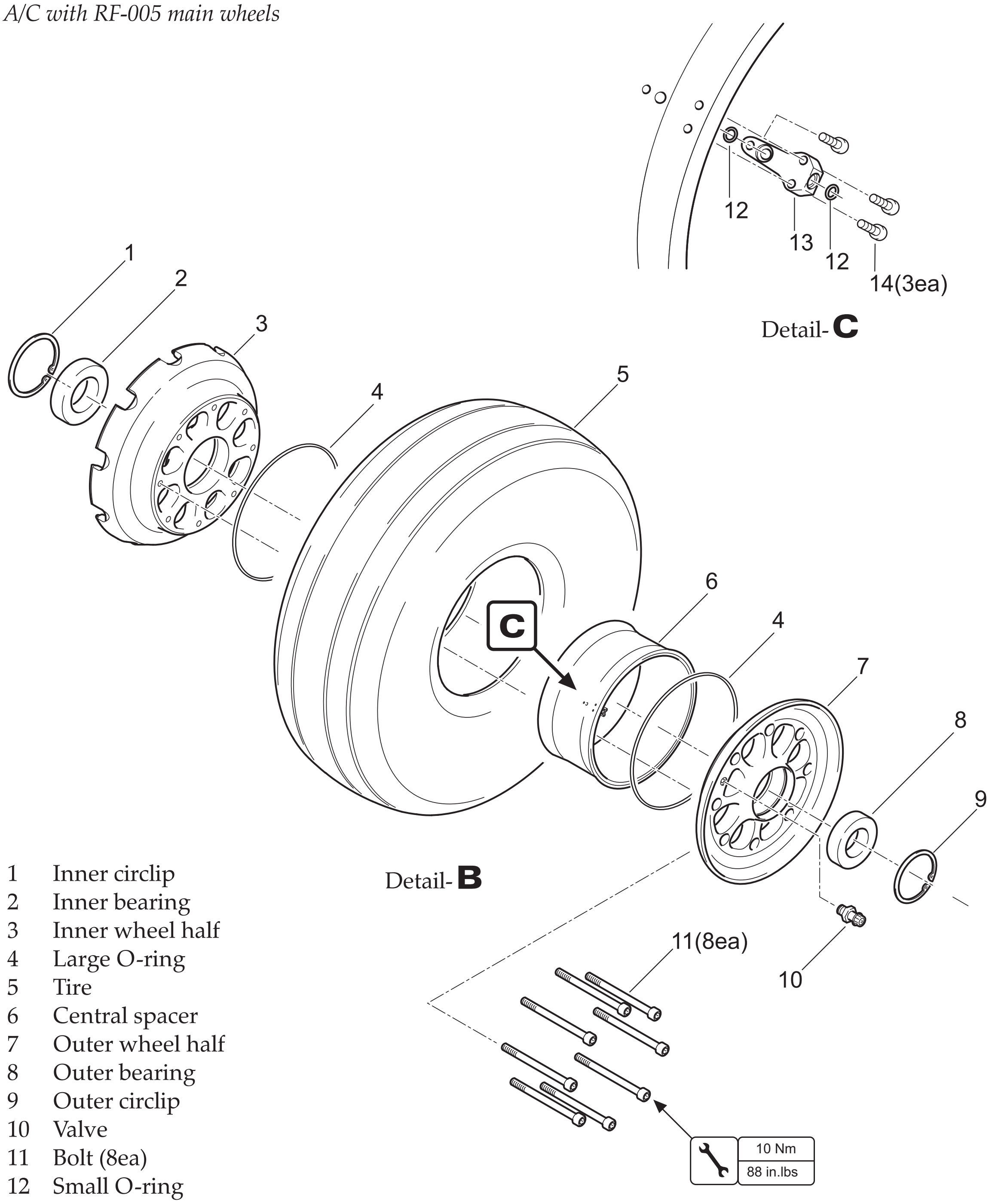


Main Gear Wheel Installation / Disassembly
Figure 201 (1)

EFFECTIVITY

Aircraft equipped with Beringer wheel/brake system

***On A/C with RF-005 main wheels*



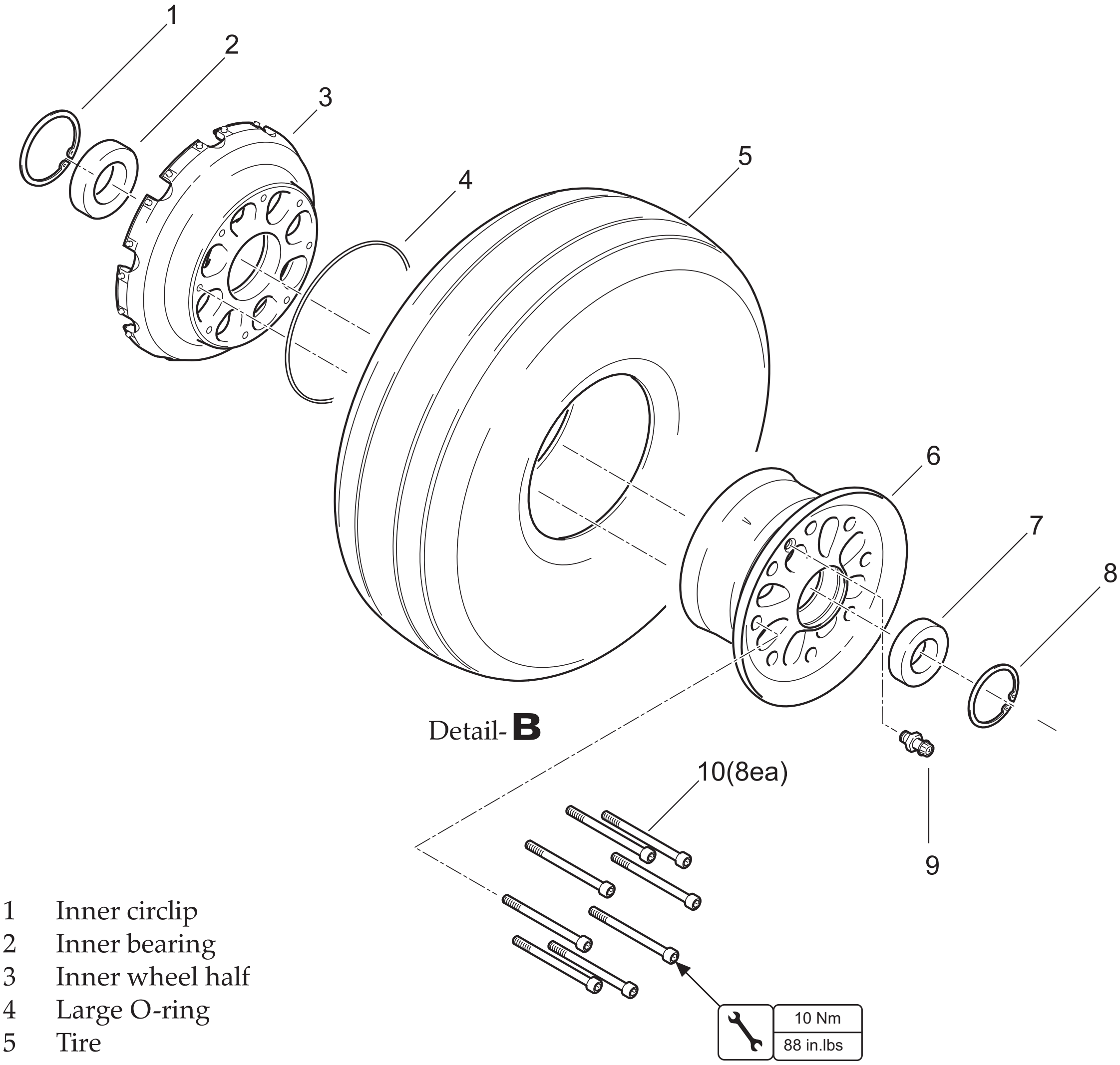
1	Inner circlip
2	Inner bearing
3	Inner wheel half
4	Large O-ring
5	Tire
6	Central spacer
7	Outer wheel half
8	Outer bearing
9	Outer circlip
10	Valve
11	Bolt (8ea)
12	Small O-ring
13	Connector
14	Screw (3ea)

Main Gear Wheel Installation / Disassembly
Figure 201 (2)

EFFECTIVITY

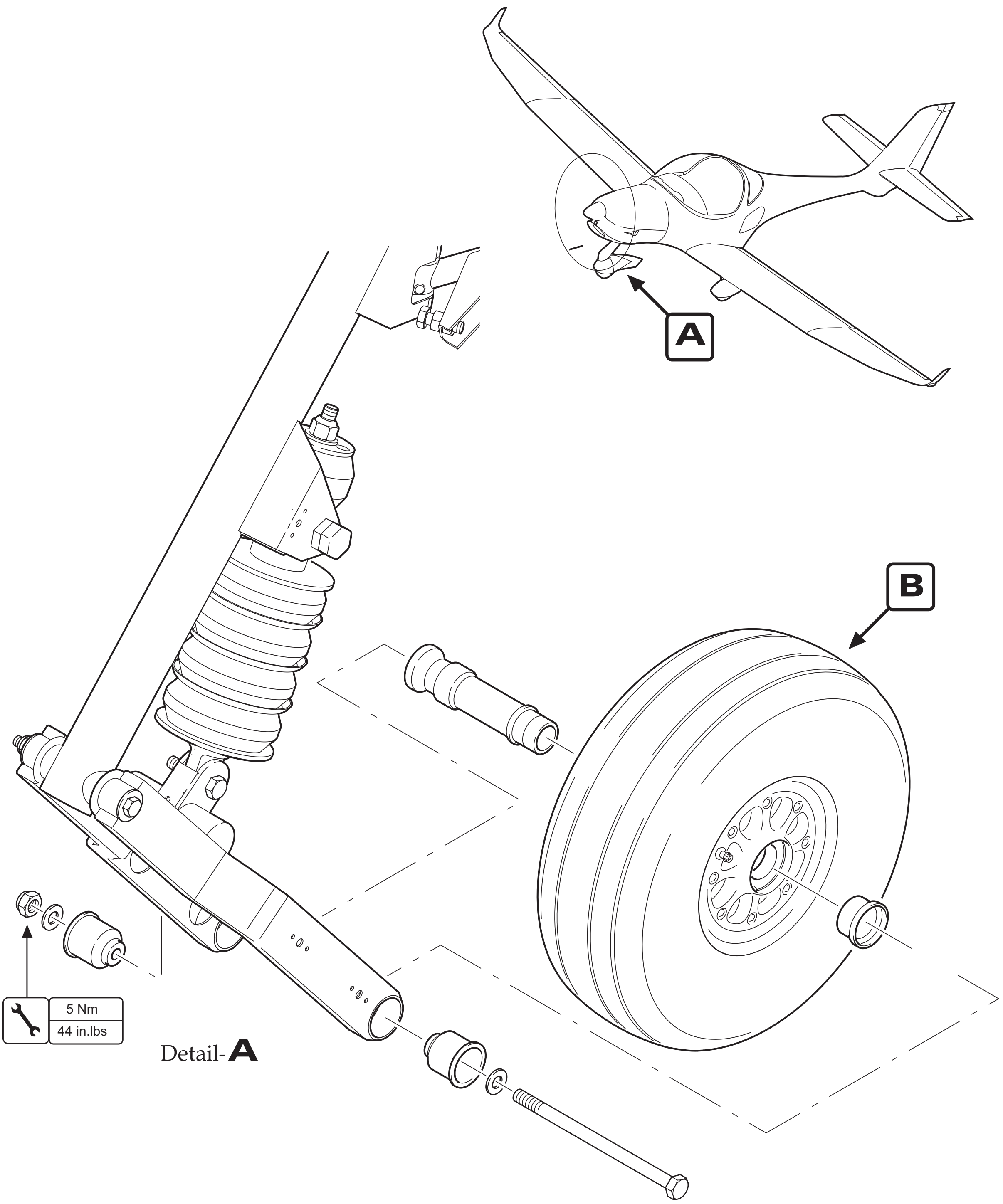
Aircraft equipped with Beringer wheel/brake system

***On A/C with RF-018 main wheels*



1	Inner circlip
2	Inner bearing
3	Inner wheel half
4	Large O-ring
5	Tire
6	Outer wheel half
7	Outer bearing
8	Outer circlip
9	Valve
10	Bolt (8ea)

Main Gear Wheel Installation / Disassembly
Figure 201(3)

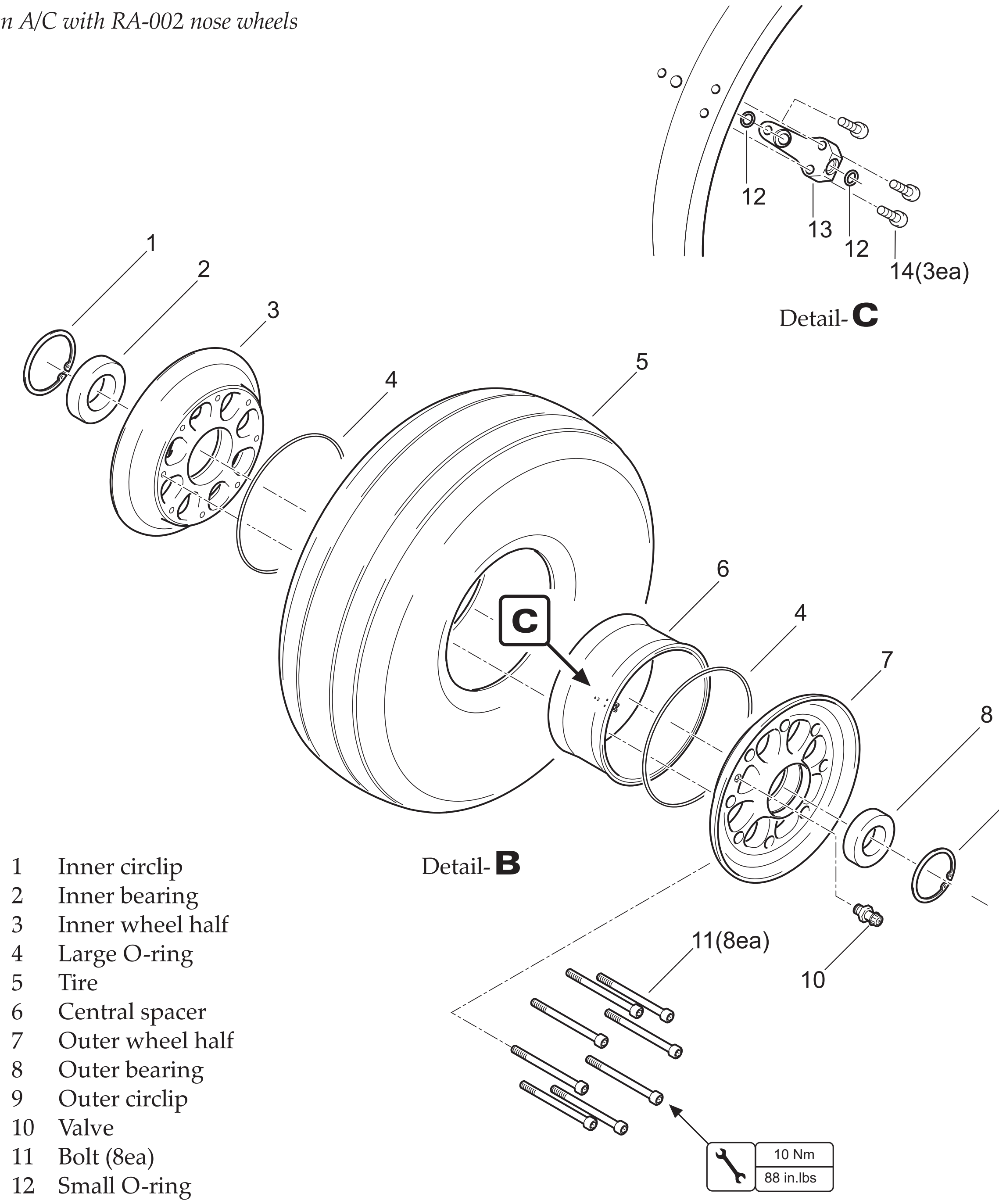


Nose Gear Wheel Installation / Disassembly
Figure 202(1)

EFFECTIVITY

Aircraft equipped with Beringer wheel / brake system

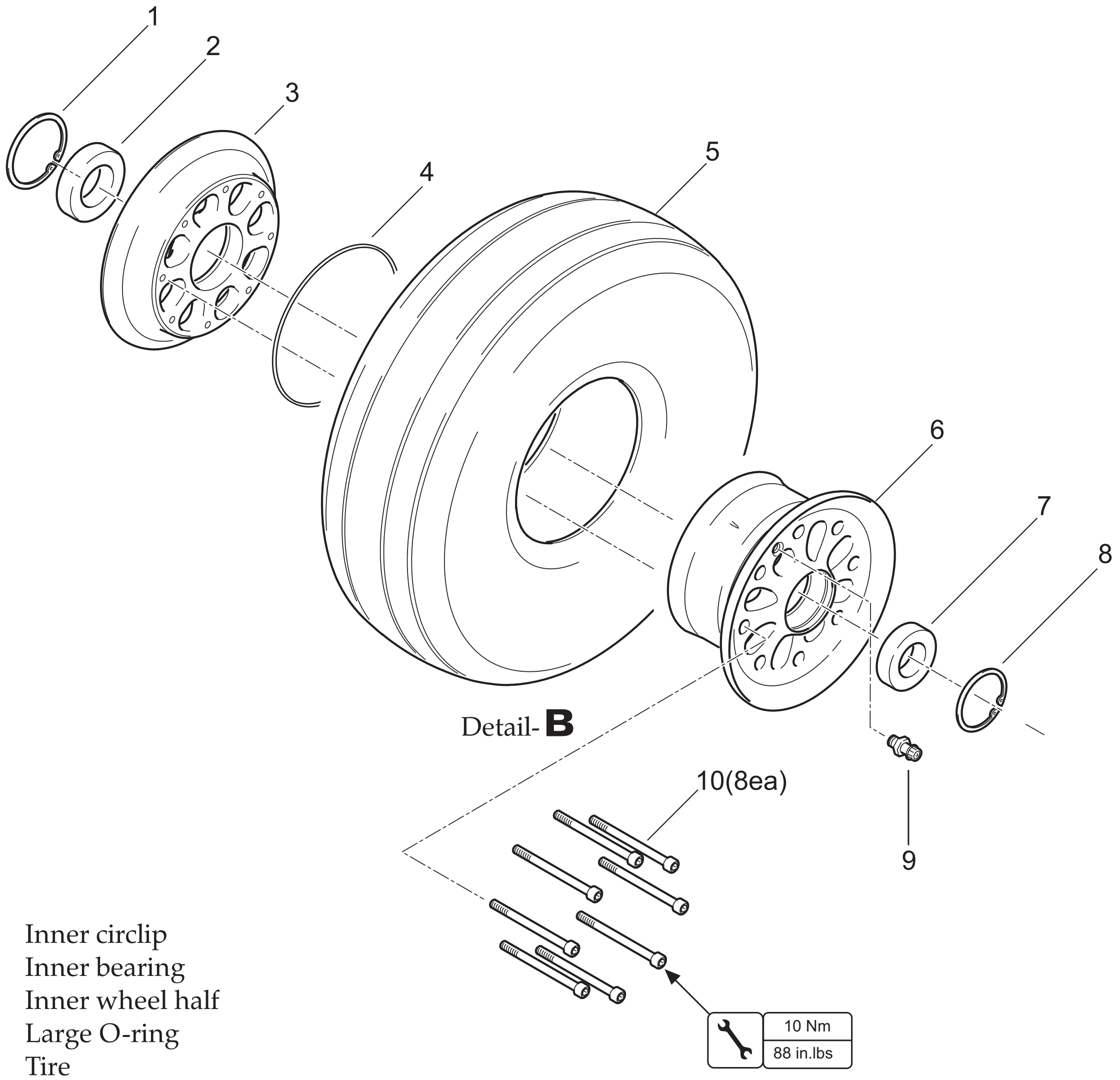
***On A/C with RA-002 nose wheels*



1	Inner circlip
2	Inner bearing
3	Inner wheel half
4	Large O-ring
5	Tire
6	Central spacer
7	Outer wheel half
8	Outer bearing
9	Outer circlip
10	Valve
11	Bolt (8ea)
12	Small O-ring
13	Connector
14	Screw (3ea)

Nose Gear Wheel Installation / Disassembly
Figure 202(2)

***On A/C with RA-014 nose wheels*



1	Inner circlip
2	Inner bearing
3	Inner wheel half
4	Large O-ring
5	Tire
6	Outer wheel half
7	Outer bearing
8	Outer circlip
9	Valve
10	Bolt (8ea)

Nose Gear Wheel Installation / Disassembly
Figure 202(3)

B. Install Nose Gear Wheel

(1) Greasing the axle on the bearing surfaces (e.g. Bel-Ray waterproof grease) is recommended for corrosion protection.
(2) Slide axle into wheel and spacer sleeve onto axle.
(3) Slide the whole wheel assembly between wheel fork arms.
(4) Insert cap bushings into wheel fork arms.
(5) Insert axle bolt and washers and torque nut to 5 Nm (44 in.lbs).
(6) Install wheel fairing.

5. Wheel Disassembly/Assembly/Tire Change

A. Disassemble a Wheel

WARNING: DO NOT ATTEMPT TO DISASSEMBLE A WHEEL UNTIL TIRE HAS BEEN COMPLETELY DEFLATED.

WARNING: DO NOT ATTEMPT TO REMOVE VALVE CORE UNTIL TIRE HAS BEEN COMPLETELY DEFLATED. VALVE CORE WILL BE EJECTED AT HIGH VELOCITIES IF UNSCREWED BEFORE AIR PRESSURE HAS BEEN RELEASED.

(1) Remove wheel from aircraft (refer to “Wheel Removal” above).
(2) Remove valve cap and deflate tire completely. Then remove valve core.
(3) Break tire beads away from wheel flanges by applying pressure by hand or using a wood or plastic tool as close to the tire bead as possible. Tire lubricant may be used to help. Repeat operation every 90° on both sides.

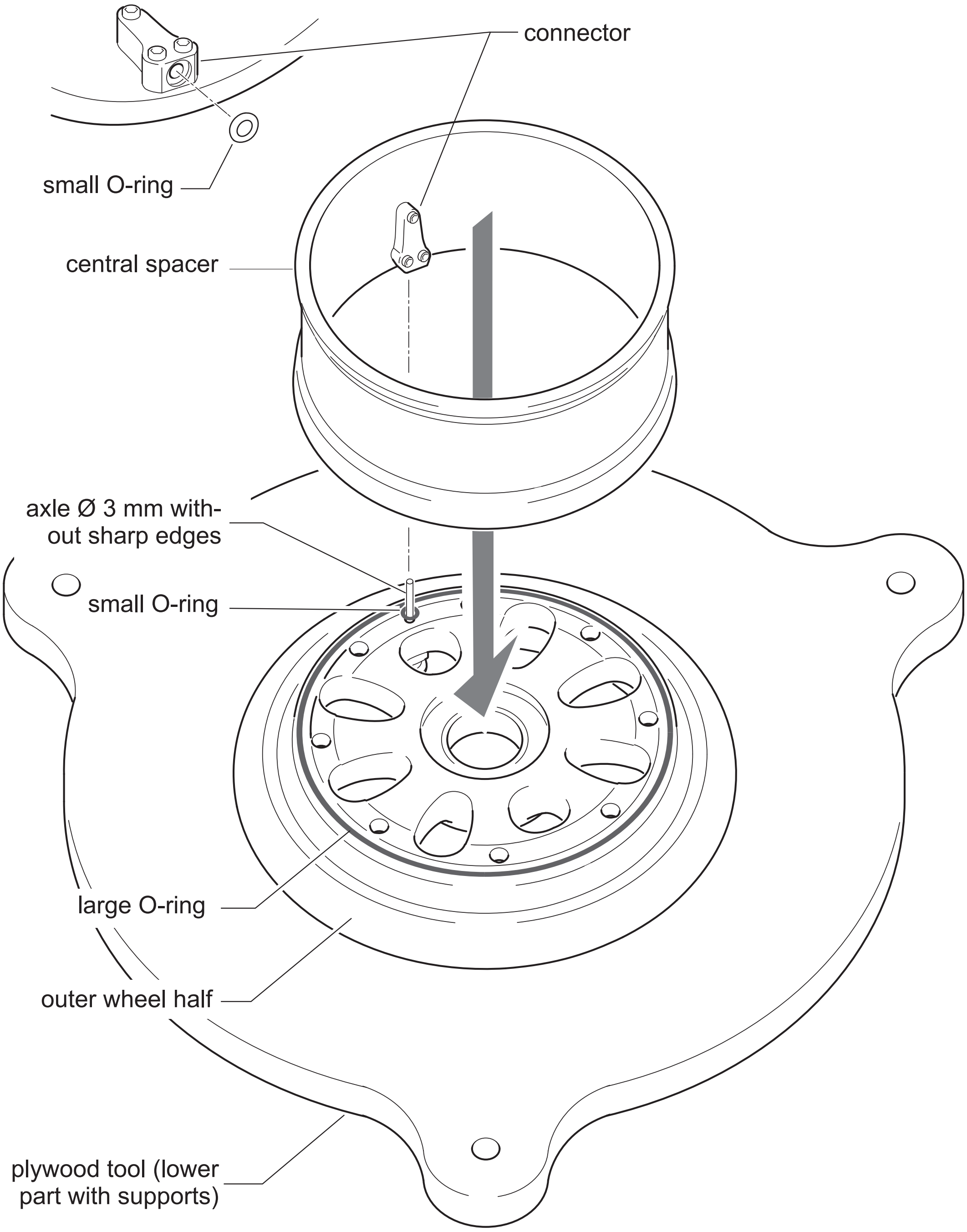
CAUTION: DO NOT PRY BETWEEN TIRE BEAD AND WHEEL FLANGE AS THIS MAY DESTROY STRUCTURAL AND SEALING PROPERTIES OF WHEEL AND TIRE.

(4) Remove all screws holding wheel halves together.

CAUTION: DO NOT USE IMPACT OR POWER WRENCHES.
DO NOT REMOVE ASSEMBLY SCREWS BEFORE THE TIRE BEADS ARE FULLY FREE FROM THE WHEEL.

(5) Separate wheel halves (and central spacer for RF-005 / RA-002 wheels).
Remove tire and O-rings.
(6) Carefully lay wheel halves (and central spacer) on a flat clean bench.

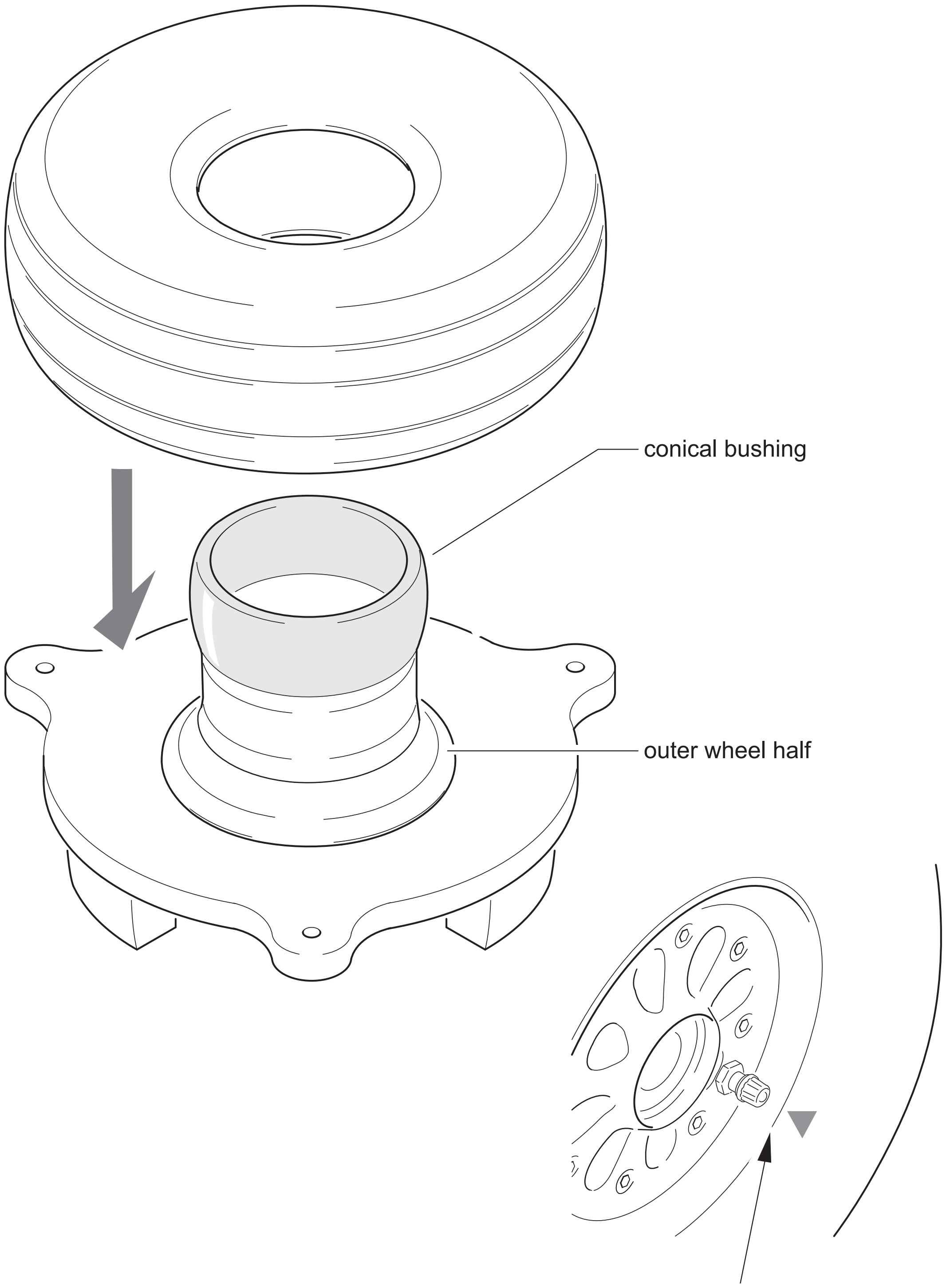
***On A/C with RF-005 and RA-002 wheels*



Wheel Assembly
Figure 203 (1)

EFFECTIVITY

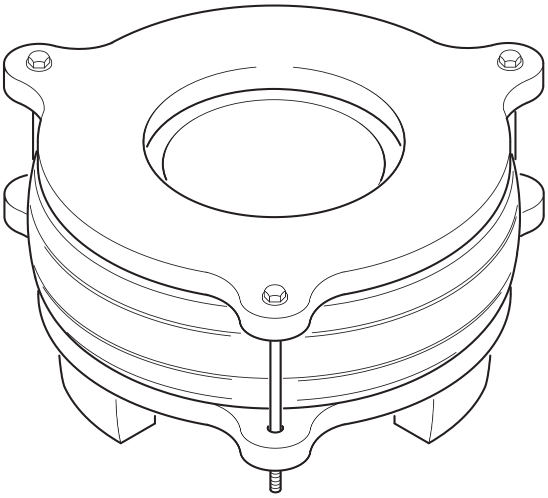
Aircraft equipped with Beringer wheel/brake system

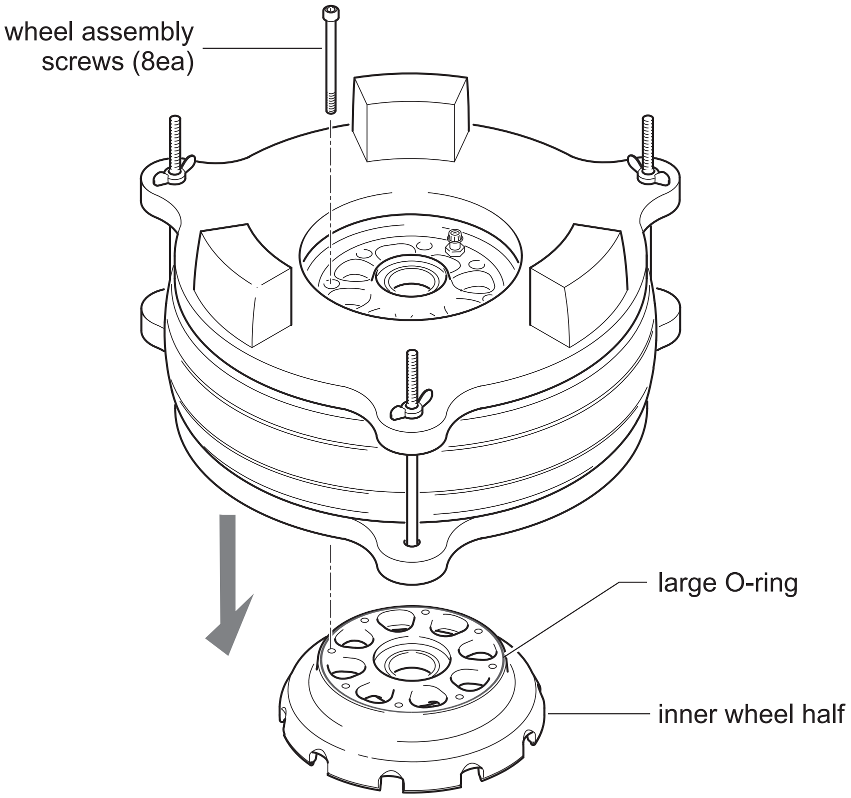


Wheel Assembly
Figure 203 (2)

EFFECTIVITY

Aircraft equipped with Beringer wheel/brake system





Wheel Assembly
Figure 203 (3)

EFFECTIVITY

Aircraft equipped with Beringer wheel/brake system

B. Assemble a Wheel

NOTE: Plywood tool with conical bushing made from polished aluminium required for wheel assembly. Additionally an axle with diameter 3 mm (3/32 in.) without sharp edges is required for positioning the central spacer on RF-005 / RA-002 wheels.

NOTE: Make sure the seal grooves are perfectly clean. Any foreign object debris may cause loss of airtightness. Take care O-rings are in place when assembling wheel halves. Replace O-rings and valves with new ones after uninstallation.

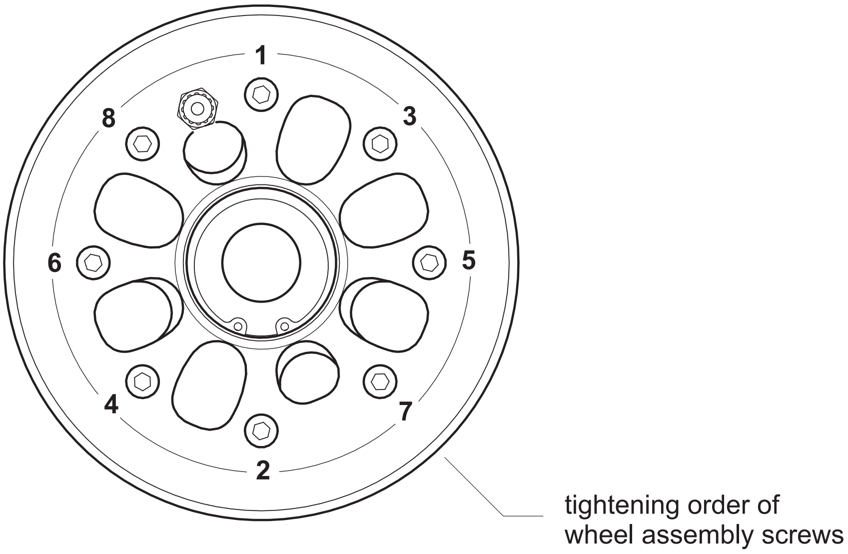
(1) Make sure that inside of tire is clean and dry. Clean tire bead seat with a cloth impregnated with dry-cleaning solvent as to remove residual grease or wax.

CAUTION: OILY SOLVENT MUST NOT BE USED ON TIRE BEAD SEAT BECAUSE TIRE WILL NOT STICK PROPERLY ON THE WHEEL.

(2) Place outer wheel half on plywood tool.
***Steps (3) and (4) only for A/C with RF-005 and RA-002 wheels*
(3) Position large O-ring in the groove. Before placing the small O-ring remove valve core and insert an axle with diameter 3 mm (3/32 in.) through valve to position small O-ring.
(4) Insert central spacer with connector in front of valve. The axle helps positioning the central spacer.

NOTE: If the connector is not in front of the valve there may be a leakage.

(5) Insert conical bushing on outer wheel half / central spacer.
(6) Spray tire lubricant on tire beads and on conical bushing.
(7) Insert tire on assembly with red spot in front of valve.
(8) Place second part of plywood tool on assembly and screw the three butterfly nuts. Press tire till conical bushing can be removed.
(9) Place inner wheel half on table and position large O-ring in the groove.
(10) Return plywood tool with assembly on to the inner wheel half. Position assembly so that bolt holes are aligned.



(11) Install wheel assembly screws. Secure screws using medium strength threadlocker (Loctite 243 recommended). Screw to contact and torque tighten to 10 Nm (88 in.lbs). Respect order when torque tightening. Torque all screws to 10 Nm (88 in.lbs) a second time.

CAUTION: USING A WRONG THREADLOCKER MAY CAUSE LOOSE OF SCREWS OR REMOVAL PROBLEM.

CAUTION: DO NOT USE IMPACT OR POWER WRENCHES.

(12) Screw valve core.
(13) Inflate the tire to 2/3 of the maximum rated pressure. Measure inflation pressure 24h later and check that pressure drop is not more than 10%. A higher pressure drop means there is a leakage. The wheel must be disassembled to check for eventual defect.
(14) Adjust tire pressure as required (refer to “Landing Gear General”).

6. Disc Clip Removal/Installation

A. Removal of Clips and Clip Screws (main wheels only)
(1) Remove screws and clips if they are out of tolerance. Max. play allowed is 0.5 mm (0.02 in.).

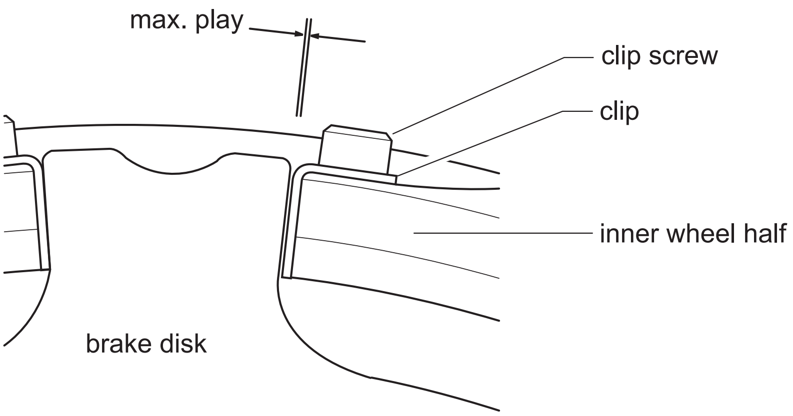
CAUTION: CLIP SCREWS HAVE BEEN MOUNTED WITH THREADLOCKER: DO NOT FORCE WHILE SCREWING OUT THE SCREWS OTHERWISE YOU MAY BRAKE THE SCREW.

B. Installation of Clips and Clip Screws (main wheels only)
(1) If clips have been removed install new clips and new screws. Secure screws using high strength threadlocker (Loctite 271 recommended).

CAUTION: USING A WRONG THREADLOCKER MAY CAUSE LOOSE OF SCREWS OR REMOVAL PROBLEM.

(2) Torque tighten to 1.5 Nm (13 in.lbs) while pressing the clip onto the rim with a grip.
(3) Check that disc slides in wheel slots without effort.

NOTE: If disc cannot slide in the slots, remove concerning clip and install again.



EFFECTIVITY

Aircraft equipped with Beringer wheel/brake system

7. Wheel Bearing Removal/Installation

A. Removal of Wheel Bearings

(1) Disassemble wheel (refer to “Wheel Disassembly” above).
(2) Remove circlips on wheel half with a snap-ring plier.
(3) Place wheel flange in an oven at 110°C to 120°C for 30 minutes (never exceed 150°C).
(4) Remove wheel half from heat source and immediately remove bearing. If bearing does not fall out by itself: tap it evenly with a fiber drift pin or use a press with a suitable interface.

B. Installation of Wheel bearings

(1) Place wheel flange in an oven at 110°C to 120°C for 30 minutes (never exceed 150°C).

CAUTION: DO NOT ATTEMPT TO INSTALL BEARING WITHOUT HEATING THE WHEEL FLANGE, IT WILL DAMAGE BEARING BORE.

(2) Install ball bearing into bearing bore of heated wheel flange using appropriate tool. Tap gently into place with a fiber drift making sure cup is evenly seated against shoulder of wheel half.

CAUTION: DO NOT REUSE A BALL BEARING THAT HAS ALREADY BEEN MOUNTED, EVEN IF IN NEW CONDITION.

CAUTION: USE ONLY A BALL BEARING APPROVED BY BERINGER. THERE ARE MANY DIFFERENT QUALITIES IN BALL BEARINGS AND MOST OF THEM ARE NOT COMPLIANT WITH BERINGER REQUIREMENTS.

CAUTION: DO NOT USE A HAMMER TO PRESS BEARING, IT WILL DAMAGE BALLS AND CAUSE FAILURE OF BALL BEARING.

(3) Install new circlips after cooling down period. Check that circlips are in place.

CAUTION: CIRCLIPS MAINTAIN BALL BEARINGS, IF CIRCLIPS ARE NOT IN PLACE BEARING CAN SLIDE OUT AND CAUSE BLOCKING OF THE WHEEL.

8. Brake Pad Replacement (Figure 204)

Brake pads have to be changed before the groove in the friction material becomes invisible.

A. On Aircraft Pads Change

(1) Remove main gear wheel from main gear strut (refer to “Main Gear Wheel Removal” above).
(2) Remove the 2 outer caliper assembly screws. The middle screw does not need to be removed.

NOTE: Do not remove the caliper back plate from the axle.
Do not disconnect the hydraulic fitting.

CAUTION: DO NOT APPLY BRAKE PRESSURE WHILE THE CALIPER CASING IS SEPARATED.

(3) Remove the old brake pads.

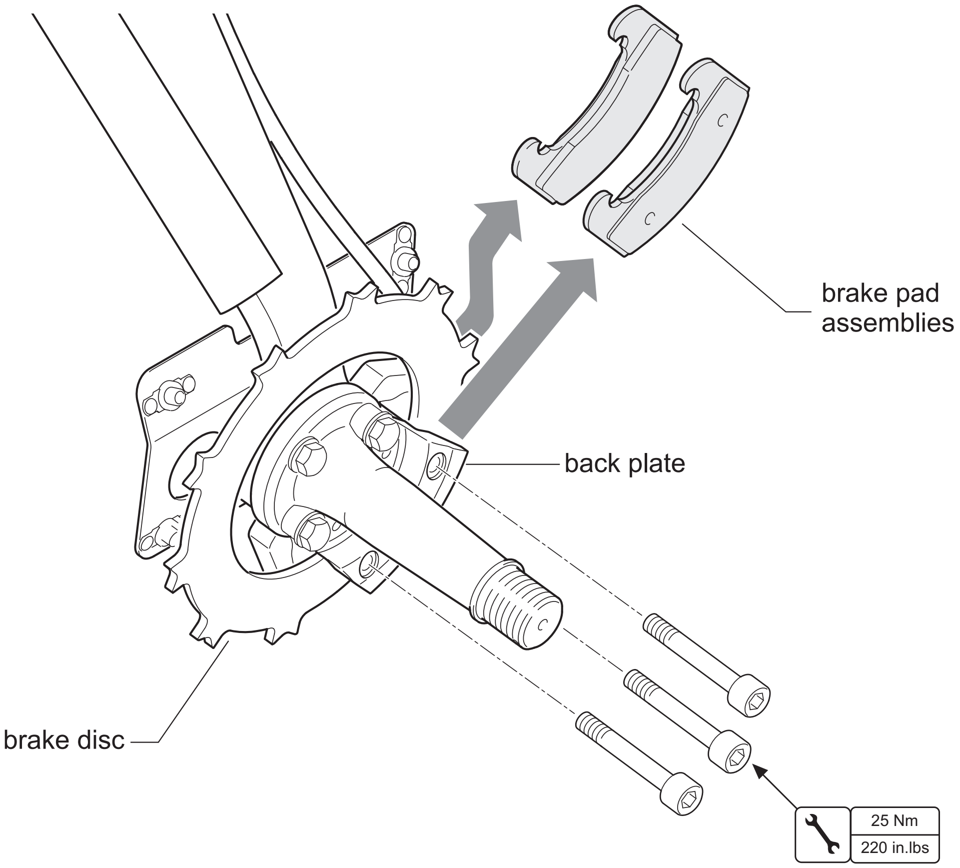
NOTE: The disc has not to be removed during the pad change. It is recommended to leave the disc in place.

(4) Clean all around pistons with a dry cloth to remove dust.

CAUTION: DO NOT USE SOLVENT OF ANY TYPE TO CLEAN CALIPER HOUSING AND PISTONS. SOLVENT WILL PENETRATE TO PISTON SEALS AND MAY DAMAGE THEM. USE ONLY A DRY CLOTH.

(5) Grease around piston. Push back the pistons with fingers and wipe excess grease.

CAUTION: IF PUSHING BACK WITH HANDS IS TOO HARD THEN PISTONS AND SEALS ARE STICKING OR MAY BE BLOCKED FOR OTHER REASON. MAINTENANCE IS REQUIRED WITH CHANGE OF SEALS AND EVENTUAL CHANGE OF OTHER PARTS.



Brake Pad Replacement
Figure 204

EFFECTIVITY

Aircraft equipped with Beringer wheel/brake system

(6) Insert new brake pads.

CAUTION: NEVER MIX OLD AND NEW PADS. ALL 4 PADS MUST BE REPLACED AT THE SAME TIME.

NOTE: Pad insulator and grid should not be reused, they come together with new brake pads.

(7) Reinstall caliper assembly screws. Secure screws using medium strength threadlocker (Loctite 243 recommended). Screw to contact and torque tighten to 25 Nm (220 in.lbs). Torque all screws to 25 Nm (220 in-lbs) a second time.

CAUTION: USING A WRONG THREADLOCKER MAY CAUSE LOOSE OF SCREWS OR REMOVAL PROBLEM.

CAUTION: CHECK THAT BRAKE PADS CAN SLIDE WITHOUT EFFORT.

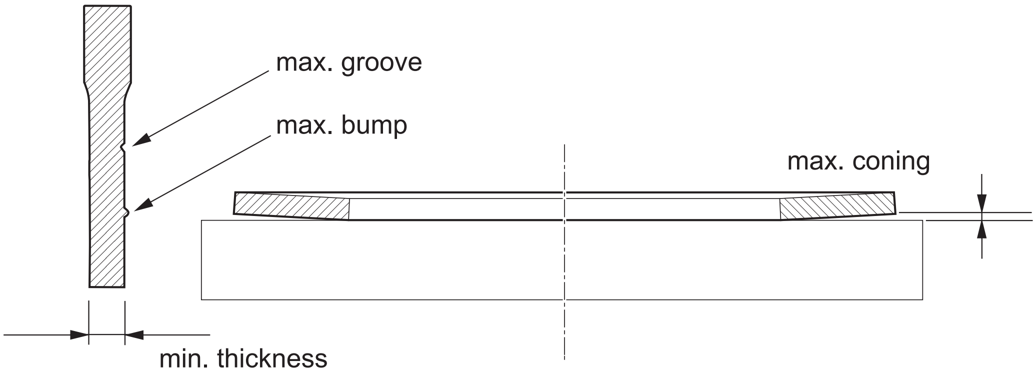
(8) Reinstall main gear wheel (refer to “Main Landing Gear Wheel Installation” above).
(9) Apply brake pressure 5-10 times and check brake fluid level in the reservoir.
(10) Check brake efficiency and also the residual drag on the wheel.

CAUTION: WHEN THE BRAKES ARE RELEASED YOU MUST BE ABLE TO TURN THE WHEEL EASILY BY HAND.

(11) Condition brake pads (refer to “Brake System Conditioning” below).

9. Brake Disc Replacement

The minimum allowable brake disc thickness is 3.8 mm (0.15 in.). Maximum coning allowed is 0.3 mm (0.012 in.). The maximum values for grooves and bumps are 0.2 mm (0.008 in.). The maximum value for inner diameter variation (ovalization) is 0.2 mm (0.008 in.).



A. Change a Brake Disc

CAUTION: BRAKE DISCS HAVE TO BE CHANGED BY PAIR ON BOTH LEFT AND RIGHT SIDE AT THE SAME TIME.

CAUTION: WHEN NEW BRAKE DISCS ARE INSTALLED BRAKE PADS MUST BE CHANGED TO NEW ONES EVEN IF NOT WORN OUT.

(1) Follow brake pad change procedure (refer to “Brake Pad Replacement” above).
(2) Degrease new brake disc prior to installation.
(3) Replace brake disc.
(4) Continue brake pad change procedure and condition new brake pads/disc (refer to “Brake System Conditioning” below).

10. Brake Master Cylinder Removal/Installation (Figure 205)

WARNING: CONTACT WITH HYDRAULIC FLUID CAN CAUSE SKIN IRRITATIONS.

CAUTION: EXCESSIVE HYDRAULIC FLUID WILL ATTACK THE SURFACE OF VARIOUS MATERIALS. READ AND ADHERE TO ALL MANUFACTURERS INSTRUCTIONS. PROVIDE A SUITABLE COLLECTING VESSEL FOR HYDRAULIC FLUID.

A. Remove a Brake Master Cylinder
  (1) Remove bleeder fitting at wheel brake caliper and drain hydraulic fluid from master brake cylinders.
  (2) Disconnect brake master cylinder from rudder pedal assembly.
  (3) Disconnect hydraulic brake line hoses from master cylinder and remove brake master cylinder.
  (4) Plug or cap hydraulic fittings, hoses and lines to prevent the entry of contaminants.

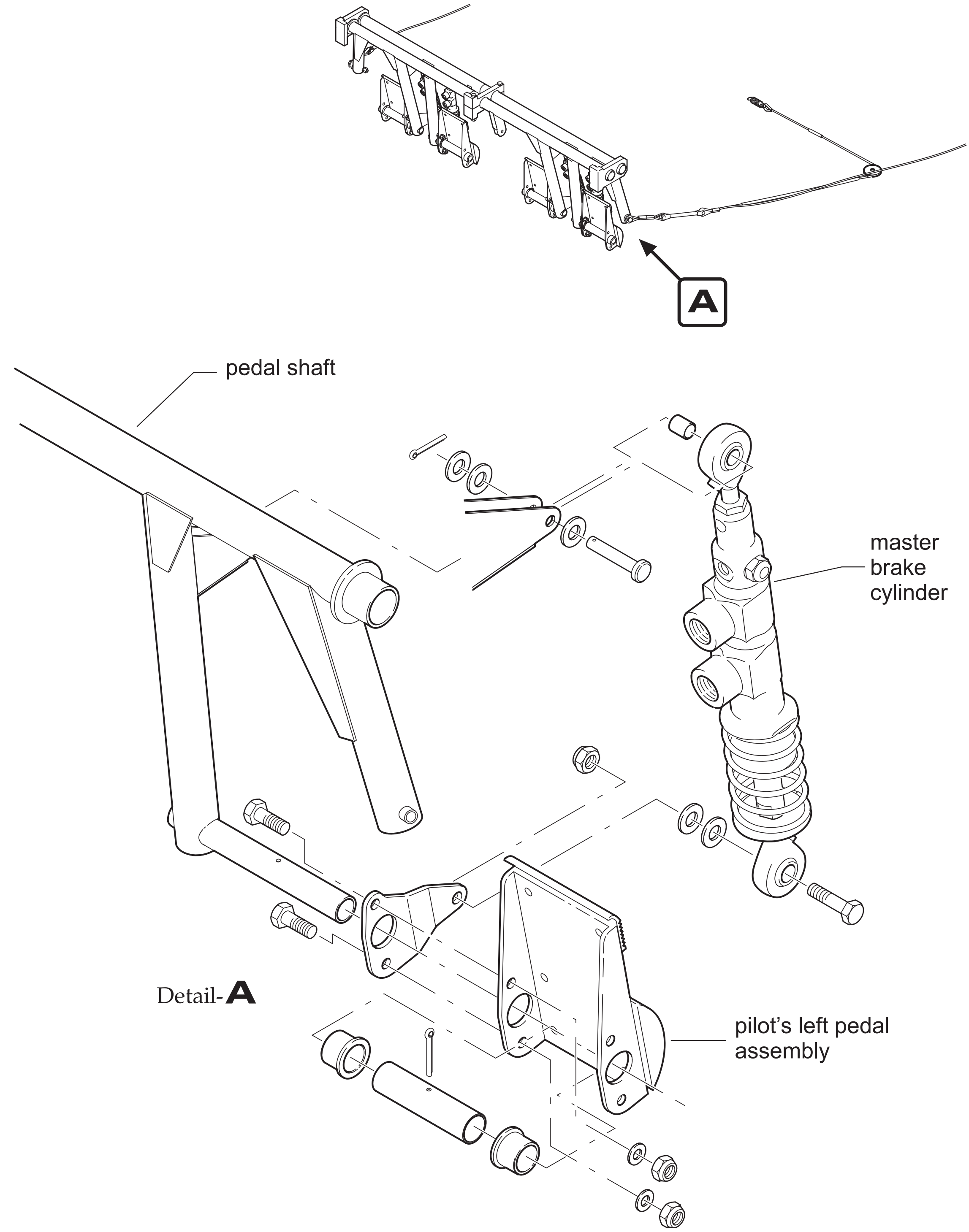
B. Install a Brake Master Cylinder
  (1) Connect hydraulic hoses to brake master cylinder.
  (2) Place brake master cylinder into position and connect brake master cylinder to rudder pedal assembly.
  (3) Install bleeder fitting at wheel brake caliper.
  (4) Refill and bleed brake system (refer to “Brake System Bleeding” below).
  (5) Test brake system and ensure brakes are operating properly (refer to “Adjustment/Test” below).

11. Brake Caliper Disassembly/Assembly (Figures 201 & 206)

WARNING: CONTACT WITH HYDRAULIC FLUID CAN CAUSE SKIN IRRITATIONS.

CAUTION: EXCESSIVE HYDRAULIC FLUID WILL ATTACK THE SURFACE OF VARIOUS MATERIALS. READ AND ADHERE TO ALL MANUFACTURERS INSTRUCTIONS. PROVIDE A SUITABLE COLLECTING VESSEL FOR HYDRAULIC FLUID.

A. Disassembly of Brake Caliper
  (1) Remove main gear wheel from main gear strut (refer to “Main Gear Wheel Removal” above).
  (2) Remove bleeder fitting at wheel brake caliper and drain hydraulic fluid.
  (3) Disconnect brake hose from caliper. Plug or cap openings to prevent entry of contaminants.
  (4) Remove the 3 caliper assembly screws and remove pads, brake disc and brake caliper.



Master Brake Cylinder Installation
Figure 205

(5) Dismantle the wheel axle to loosen the back plate. Remove 2 screws securing backplate to axle and remove backplate.

(6) Remove pistons.

NOTE: Air pressure can be used to remove pistons. Replace caliper back plate and blow air pressure into inlet.

WARNING: PISTONS WILL BE EJECTED AT HIGH VELOCITIES. SERIOUS INJURY TO PERSONNEL CAN RESULT IF PRECAUTIONARY MEASURES ARE IGNORED.

(7) Remove seals with a plastic clamp or a thin plastic plate.

CAUTION: DO NOT USE A SCREW DRIVER. DO NOT USE A METAL PLATE OR TOOL EVEN FROM SOFT METAL LIKE ALUMINIUM, IT WILL SCRATCH THE SEAL GROOVE AND CAUSE FLUID LEAKAGE.

B. Assembly of Brake Caliper

(1) Lubricate new seals, piston bore and piston cylinder with a thin coat of thick silicone grease.

CAUTION: NEVER REUSE A PISTON SEAL THAT HAS ALREADY BEEN REMOVED FROM HIS GROOVE.

NOTE: Use silicone grease (-50°C to 200°C) per MIL-S-8660 or SAE AS 8660 or compliant with FDA CFR art. 178.3570 (liquid grease in spray is not allowed).

(2) Insert seals in their groove only by hand.

(3) Insert new pistons into caliper housing only by hands. One or two fingers should be enough to push the piston.

CAUTION: DO NOT USE ANY TOOL FOR THESE OPERATIONS.

CAUTION: NEVER PUSH BACK THE PISTONS USING A TOOL OR A PRESS. IF PISTONS DON'T SLIDE WITH HANDS THEY WILL BE STICKING. THIS CAN CAUSE BRAKING TROUBLES AND OVERHEATING.

NOTE: Do not try to sand or polish the pistons, they must be replaced by new ones with perfect polishing and controlled surface.

(4) Attach backplate to wheel axle. Torque 2 screws to 10 Nm (88 in.lbs).

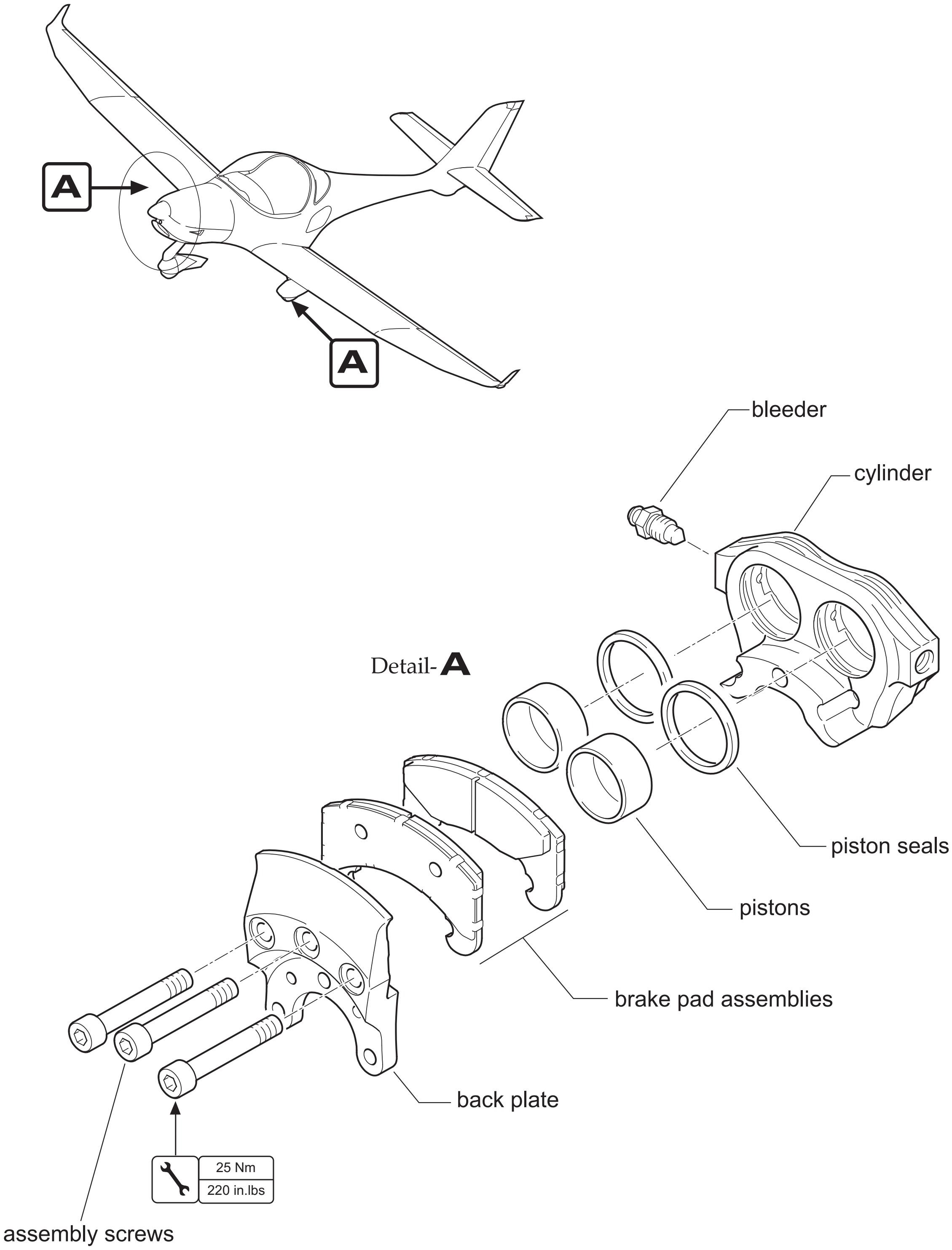
(5) Reinstall wheel axle to landing gear leg. Torque 4 nuts to 28 Nm (248 in.lbs).

(6) Position brake caliper on back plate and insert brake pads and disc.

(7) Install caliper assembly screws. Secure screws using medium strength threadlocker (Loctite 243 recommended). Screw to contact and torque tighten to 25 Nm (220 in.lbs). Torque all screws to 25 Nm (220 in.lbs) a second time.

CAUTION: USING A WRONG THREADLOCKER MAY CAUSE LOOSE OF SCREWS OR REMOVAL PROBLEM.

CAUTION: CHECK THAT BRAKE PADS CAN SLIDE WITHOUT EFFORT.



Brake Caliper Assembly
Figure 206

EFFECTIVITY

Aircraft equipped with Beringer wheel/brake system

(8) Install bleeding screw and reconnect brake line to caliper.

CAUTION: COPPER SEALS MUST BE CHANGED AT EACH REMOVAL OF THE HYDRAULIC FITTING.

(9) Reinstall main gear wheel (refer to “Main Landing Gear Wheel Installation” above).
(10) Refill and bleed brake system (refer to “Brake System Bleeding” below).
(11) Test and condition brake system (refer to “Brake System Conditioning” below).

12. Brake System Bleeding / Brake Fluid Change

To bleed the brakes or change the brake fluid, use a fluid pump, a clear tube, and a collecting container. Only hydraulic fluid fulfilling the MIL-H-5606 specification should be used.

WARNING: CONTACT WITH HYDRAULIC FLUID CAN CAUSE SKIN IRRITATIONS.

CAUTION: EXCESSIVE HYDRAULIC FLUID WILL ATTACK THE SURFACE OF VARIOUS MATERIALS. READ AND ADHERE TO ALL MANUFACTURERS INSTRUCTIONS. PROVIDE A SUITABLE COLLECTING VESSEL FOR HYDRAULIC FLUID.

CAUTION: PROTECT THE DISC AND PADS FROM BRAKE FLUID CONTAMINATION. BRAKE PADS ARE POROUS AND CANNOT BE CLEANED IF CONTAMINATED, THEY MUST BE REPLACED BY NEW ONES.

A. Bleeding Procedure
(1) Connect fluid pump to the brake caliper bleeder fitting. Use a zip-tie to secure the hose to the bleeding screw. Make sure the bottle is filled with at least 400ml of brake fluid.
(2) Connect collecting container with clear tube to brake fluid reservoir.
(3) Open the bleeder by 3/4 to 1 turn and pump fluid from the caliper through the master cylinders to the reservoir until no air bubbles are evident in the reservoir (clear tube). Then, tighten the bleeder fitting.
(4) Repeat for both brake calipers.
(5) Test brake system and ensure brakes are operating properly (refer to “Adjustment/Test” below).

B. Brake Fluid Change Procedure
(1) Remove bleeder fitting at wheel brake caliper and drain hydraulic fluid.
(2) Operate the pilot’s brake pedal to remove remaining brake fluid from the system.
(3) Refill and bleed brake system as described above.
(4) Repeat for both brake calipers.

13. Brake System Adjustment/Test

A. There is no need to adjust the brakes since the brake pistons and disc move to compensate for brake and wear.

B. After component replacement or repair:
   (1) Check the brakes for firm pedal pressure and bleed the system if either brake feels spongy.
   (2) Perform a minimum of six stops from a speed of between 25 and 40 knots, using light pedal effort and letting the brakes cool partially (about one minute) between stops. Check the aircraft is not turning from centerline while apply left and right brakes uniformly.
   (3) Check all fittings and hoses for any leakage.

14. Brake System Conditioning

When new brake pads have been installed, it is important to condition them properly to obtain the service life designed into them. Rated brake torque value is reached only after a full conditioning of brake pads and disc.

CAUTION: BRAKE TORQUE VALUE CAN BE ONLY 50% OF RATED BRAKE TORQUE BEFORE THE CONDITIONING. PILOT MUST TAKE INTO CONSIDERATION THIS PARAMETER TO AVOID LOOSE OF AIRCRAFT CONTROL DURING THE CONDITIONING PROCEDURE.

A. Conditioning Procedure
   (1) Taxi aircraft for 500 m (1500 ft) with light brake effort.
   (2) Perform two consecutive stops from 30 – 35 knots down to 5 knots. Apply light brake effort during these two stops. Do not try to apply full brake effort.
   (3) Allow the brakes to cool down for 10 to 15 minutes.
   (4) Apply brakes and check for restraint at high static throttle. If brakes hold, conditioning is complete. If brakes cannot hold aircraft during static run-up, allow the brakes to cool completely and repeat steps 1 through 4.

This conditioning procedure will wear off high spots and prepare pads and disc friction surfaces. A visual inspection of disc will indicate the pads condition: a smooth surface with light and regular grooves indicates that pads and disc are properly conditioned.

NOTE: A rough surface of disc with deep grooves and isolated bumps indicates that an excessive brake effort has been applied during conditioning. In this case, bumps must be sanded and conditioning procedure repeated.

CAUTION: A WRONG CONDITIONING MAY AFFECT BRAKE PERFORMANCES AND INCREASE WEAR OF PADS AND DISC.

WHEELS AND BRAKES - DESCRIPTION

1. Introduction

A. Nose and main landing gear wheels are of conventional design.
The wheels of the main landing gear are each equipped with a single brake disc, floating cylinder brake assembly.

B. For tire specifications, refer to “Landing Gear - General”.

C. For more detailed information on Cleveland wheels and brakes, refer to Cleveland Wheels & Brakes component maintenance manual, P/N AWBCMM0001, latest revision.

2. Description and Operation

A. The main gear wheels consist of the two wheel halves, the tubing, and the tire. The brake disc is bolted to the inboard wheel side. The tire valve is on the outboard wheel side. There are two sets of roller bearings in each wheel, one on the inboard wheel half and one on the outboard wheel half.
The nose gear wheel construction is the same as that of the main gear wheels but without a brake disc.

B. The brake system comprises single disc, hydraulically actuated brakes on each main landing gear wheel, four master cylinders, linked with the rudder pedals, a brake fluid reservoir on the left cabin wall in front of the firewall, and brake fluid lines and hoses.

The brakes are operated by pushing the upper part of either the left or right rudder pedal- in either pilot position. Each set of rudder pedals is interconnected. This motion is mechanically transmitted to the respective brake master cylinder, and through brake fluid lines and hoses out to the respective hydraulic brake assembly.

WHEELS AND BRAKES - MAINTENANCE

1. Main Gear Wheel Removal/Installation

A. Remove a Main Gear Wheel

(1) Jack aircraft or appropriate main gear wheel (refer to 7-00-00).
(2) Remove screws securing wheel fairing and remove wheel fairing.
(3) Remove bolts securing brake back plate to brake caliper. Remove back plate.
(4) Remove wheel axle nut.
(5) Pull wheel from axle.

B. Install a Main Gear Wheel

(1) Slide the wheel assembly on to the axle, with the brake disc inboard and the valve stem outboard.
(2) Install axle nut and finger-tighten. Then, while slowly continuing to tighten with a wrench, simultaneously rotate the wheel assembly by hand. Tighten until a slight resistance in the wheel bearings is obvious. Back off nut to nearest castellation and install cotter pin.

NOTE: When the axle nut is set in its final position, there should be no resistance to rotation and no side-to-side play in the wheel bearings.

(4) Position brake back plate between brake disc and inboard wheel hub and secure using bolts and washers.
(5) Install wheel fairing.

2. Main Gear Wheel Disassembly/Assembly

A. Disassemble a Main Gear Wheel

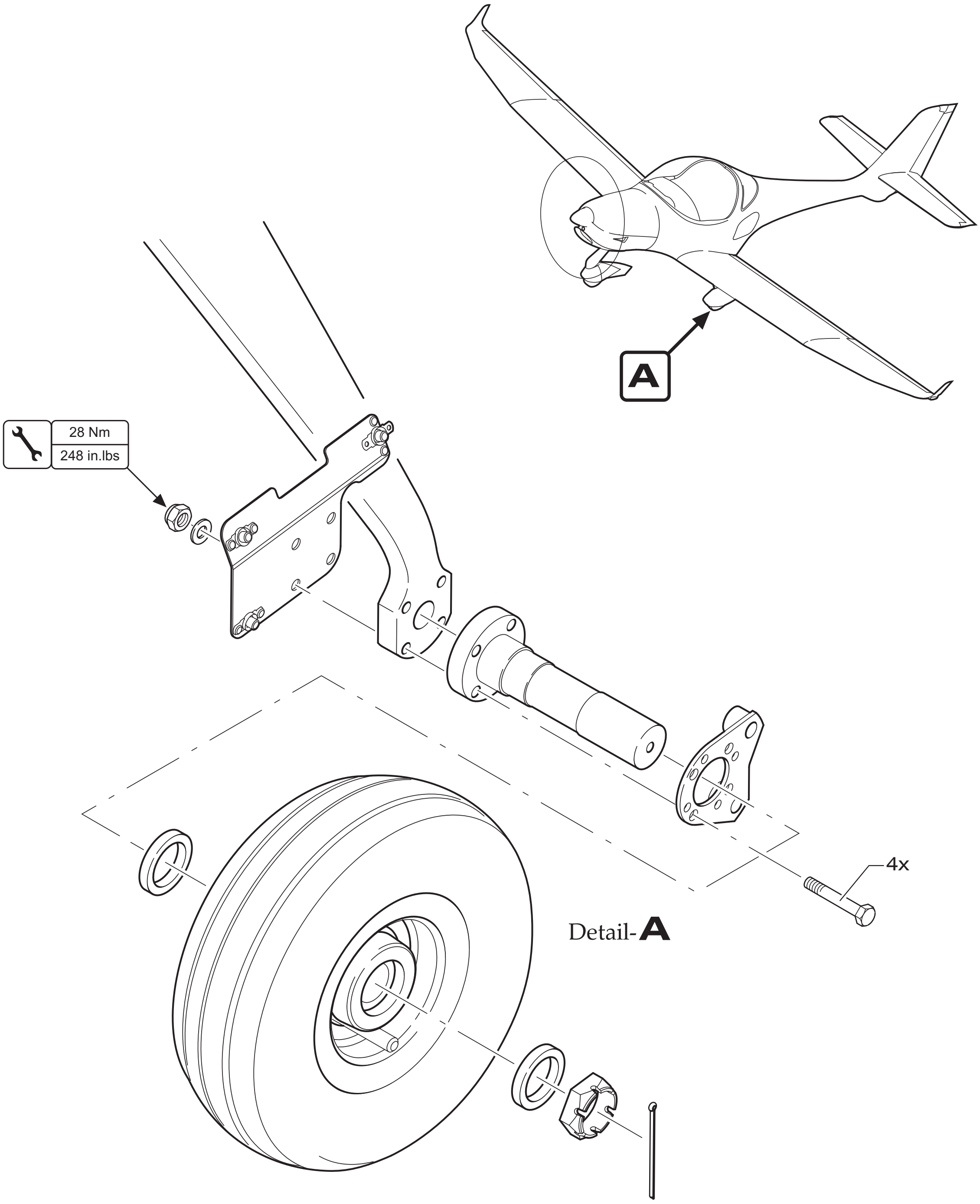
WARNING: DO NOT ATTEMPT TO SEPARATE WHEEL HALVES BEFORE WHEEL AND TUBE ARE COMPLETELY DEFLATED.

(1) Completely deflate tire and tube, and break loose tire bead.
(2) Remove bolts to separate wheel halves and brake disc.
(3) Remove wheel halves and brake disc from tire.
(4) Remove tube from tire.
(5) If necessary remove wheel bearing assembly from wheel halves.

B. Assemble a Main Gear Wheel

(1) If removed, install wheel bearing assembly to wheel halves.
(2) Insert tube into tire with the valve stem aligned with the painted reference mark on the tire. Inflate the tube with just enough pressure to give it shape inside the tire.
(3) Insert the two wheel halves into the tire, taking care to avoid pinching the tube between them. Guide the valve stem through the rubber-grommeted hole in the outboard wheel half while bringing the halves together.

NOTE: When the wheel halves are joined, it is recommended to double check that the tube isn't pinched, using an inspection mirror and a flashlight.



Main Gear Wheel Installation
Figure 201

EFFECTIVITY

Aircraft equipped with Cleveland/Grove wheel/brake system

(4) Reassemble the wheel unit, including the brake disc, with bolts, washers, and nuts. Torque to 10 - 12 Nm (89 - 106 in.lbs.).
(5) Inflate the tire as required (refer to “Landing Gear - General”).

3. Nose Gear Wheel Removal/Installation

A. Remove Nose Gear Wheel
(1) Jack aircraft or weight tail of aircraft to raise nose wheel (refer to 07-00-00).
(2) Remove screws securing wheel fairing and remove wheel fairing.
(3) Remove axle bolt from wheel fork.
(4) Remove cap bushings from wheel fork arms.
(5) Remove nose wheel assembly backwards from wheel fork.

B. Install Nose Gear Wheel
(1) Slide the whole wheel assembly (with axle, spacers, and washers in position) between wheel fork arms.
(2) Insert cap bushings into wheel fork arms.
(3) Insert axle bolt and torque nut until slight bearing drag, when the wheel is rotated. Then, turn back nut to nearest castellation and install pin.

NOTE: When the axle bolt nut is set in its final position, there should be no resistance to rotation and no side-to-side play in the wheel bearings.

(4) Install wheel fairing.

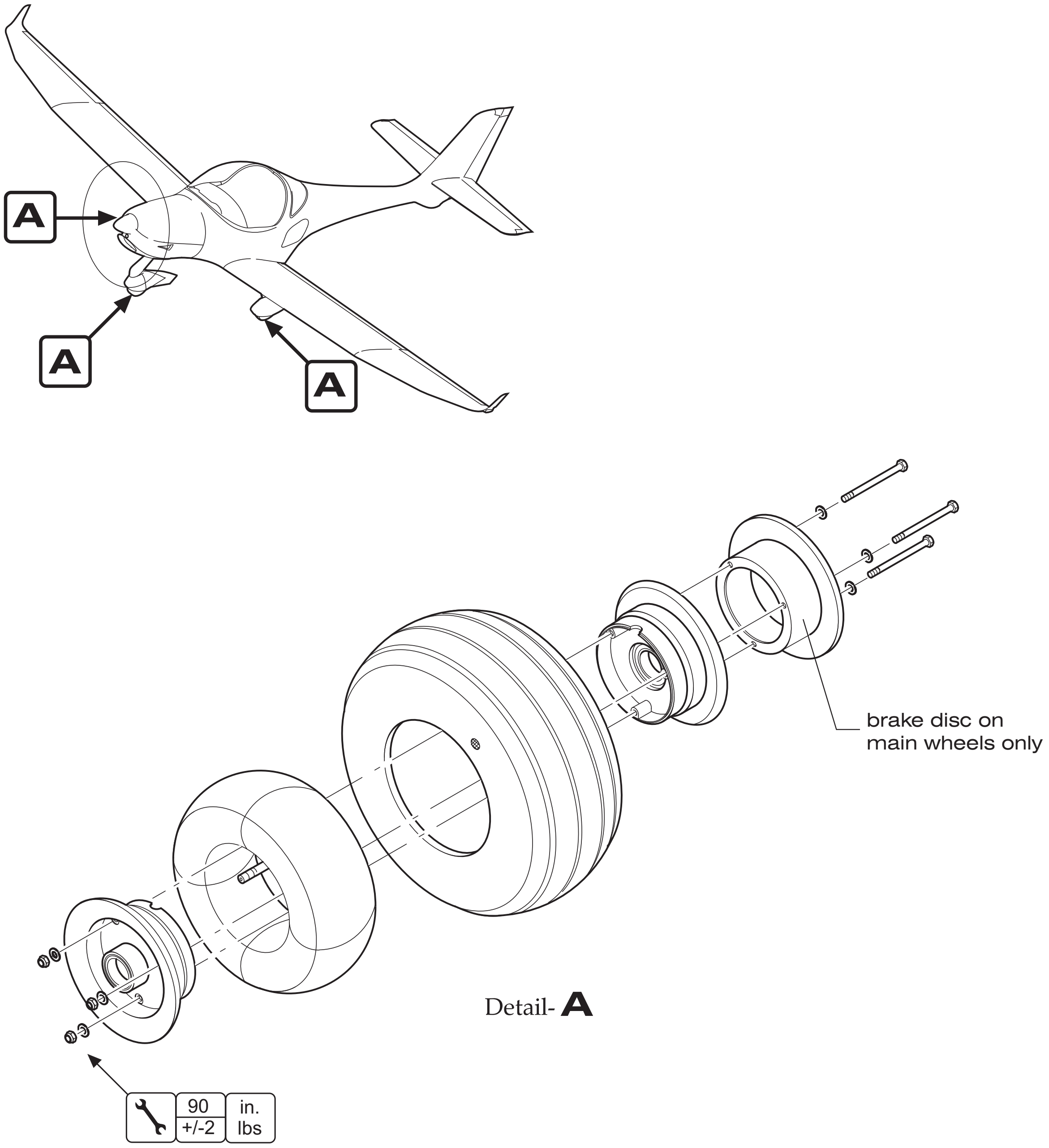
4. Nose Gear Wheel Disassembly/Assembly

A. Disassemble Nose Gear Wheel
(1) Remove spacers, washers, and axle from wheel.

WARNING: DO NOT ATTEMPT TO SEPARATE WHEEL HALVES UNTIL WHEEL AND TUBE ARE COMPLETELY DEFLATED.

(2) Completely deflate tire and tube and break loose tire bead.
(3) Remove bolts to separate wheel halves.
(4) Remove wheel halves from tire.
(5) Remove tube from tire.
(6) If necessary remove wheel bearing assembly from wheel halves.

B. Assemble Nose Gear Wheel
(1) If removed, install wheel bearing assembly to wheel halves.
(2) Insert tube into tire with the valve stem aligned with the painted reference mark on the tire. Inflate the tube with just enough pressure to give it shape inside the tire.
(3) Insert the two wheel halves into the tire, taking care to avoid pinching the tube between them. Guide the valve stem through the rubber-grommeted hole in the outboard wheel half while bringing the halves together.



Wheel Assembly
Figure 202

EFFECTIVITY

Aircraft equipped with Cleveland/Grove wheel/brake system

NOTE: When the wheel halves are joined, it is recommended to double check that the tube isn't pinched, using an inspection mirror and a flashlight.

(4) Reassemble the wheel unit with bolts, washers, and nuts. Torque to 10 - 12 Nm.
(5) Inflate the tire as required (refer to “Landing Gear General”).
(6) Insert wheel axle and place washers and spacers onto the axle.

5. Brake Master Cylinder Removal/Installation

WARNING: CONTACT WITH HYDRAULIC FLUID CAN CAUSE SKIN IRRITATIONS.

CAUTION: EXCESSIVE HYDRAULIC FLUID WILL ATTACK THE SURFACE OF VARIOUS MATERIALS. READ AND ADHERE TO ALL MANUFACTURER’S INSTRUCTIONS. PROVIDE A SUITABLE COLLECTING VESSEL FOR HYDRAULIC FLUID.

A. Remove a Brake Master Cylinder

(1) Remove bleeder fitting at wheel brake caliper and drain hydraulic fluid from brake cylinder.
(2) Disconnect brake cylinder from rudder pedal assembly.
(3) Disconnect hydraulic brake line hoses from cylinder and remove brake cylinder.
(4) Plug or cap hydraulic fittings, hoses and lines to prevent contaminants entering.

NOTE: Brake master cylinder repair should be accomplished according to manufacturer's specifications.

B. Install a Brake Master Cylinder

(1) Connect hydraulic hoses to brake master cylinder.
(2) Put brake master cylinder in position and connect cylinder to rudder pedal assembly.
(3) Install bleeder fitting at wheel brake caliper.
(4) Refill and bleed brake system (refer to “Brake System Bleeding” below).
(5) Test brake system and ensure brakes are operating properly (refer to “Adjustment/Test”).

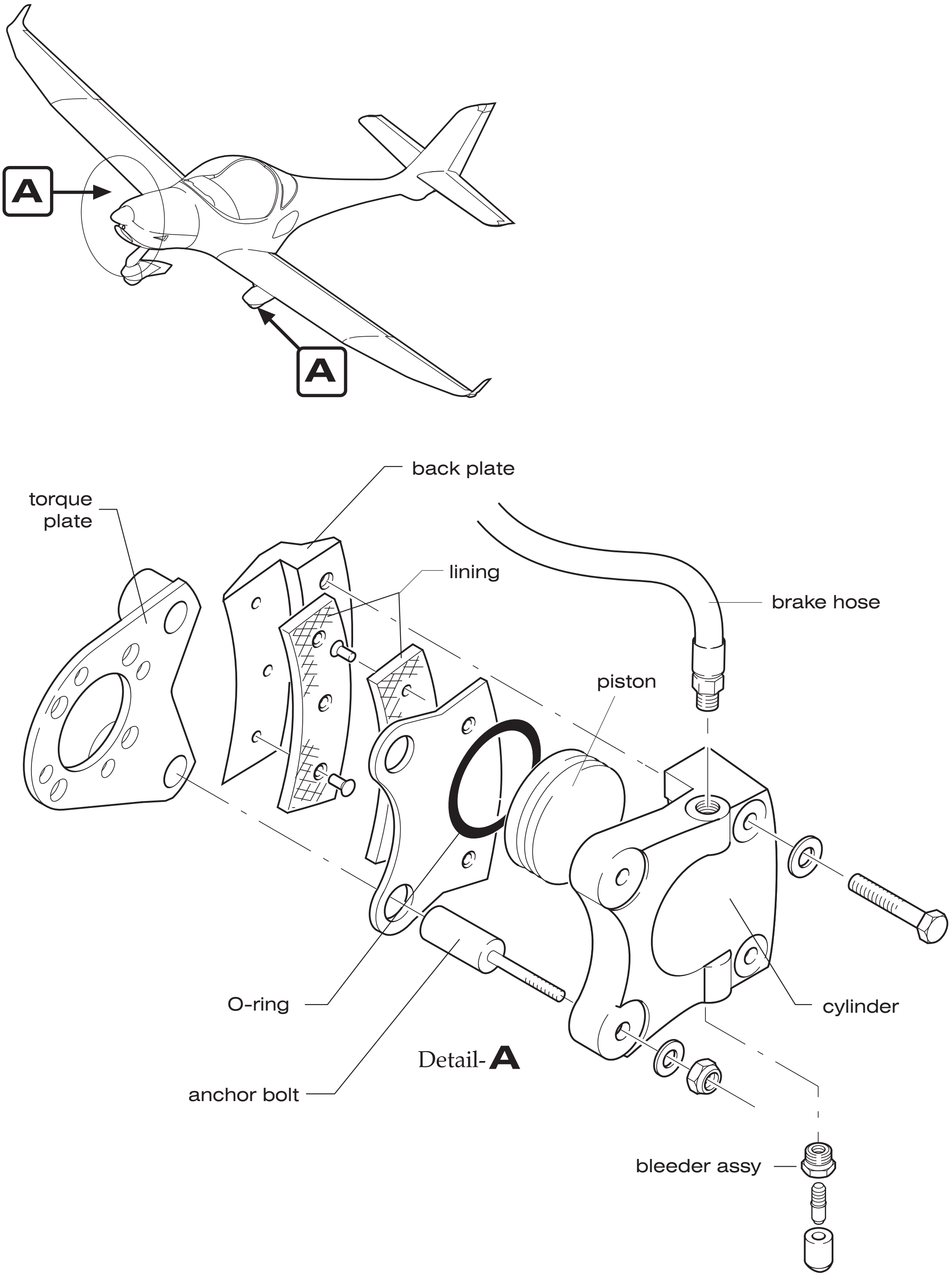
6. Brake Caliper Removal/Installation

WARNING: CONTACT WITH HYDRAULIC FLUID CAN CAUSE SKIN IRRITATIONS.

CAUTION: EXCESSIVE HYDRAULIC FLUID WILL ATTACK THE SURFACE OF VARIOUS MATERIALS. READ AND ADHERE TO ALL MANUFACTURER’S INSTRUCTIONS. PROVIDE A SUITABLE COLLECTING VESSEL FOR HYDRAULIC FLUID.

A. Remove a Caliper

(1) Disconnect brake line at brake caliper and immediately plug or cap hydraulic fitting and brake line.
(2) Remove bolts securing the back plate to caliper casing.
(3) Remove back plate and slide caliper casing with pressure plate away from the wheel.



Brake Caliper Assembly
Figure 203

B. Install a Caliper
  (1) Slide the caliper casing anchor pins into the torque plate bushings until the lining on the pressure plate contacts the brake disc.
  (2) Position the back plate against the other side of the disc and thread the two caliper casing bolts with their washers into the back plate from opposite side of the caliper casing. Tighten bolts to 90 in.lbs..
  (3) Safety-wire the bolts.
  (4) Reconnect brake line to caliper.
  (5) Refill if necessary, and bleed brake system (refer to "Brake System Bleeding" below).
  (6) Test brake system and ensure brakes are operating properly (refer to "Adjustment/Test").

7. Brake Disc Removal/Installation

A. Remove a Brake Disc
  (1) Remove main gear wheel from main gear strut (refer to "Main Gear Wheel Removal/Installation" above).
  (2) Disassemble main gear wheel (refer to "Main Gear Wheel Disassembly/Assembly" above).
  (3) Remove brake disc.

B. Install a Brake Disc

NOTE: Before re-installing the brake disc, inspect it for camber and excessive scoring. Scoring should not deeper than 0,5 mm (0.02 in.).

  (1) Install brake disc (refer to "Main Gear Wheel Disassembly/Assembly" above).

8. Brake Lining Replacement

Minimum permissible brake lining thickness is 2,5 mm (3/32 in.).

A. Remove Brake Linings
  (1) Remove caliper from main gear wheel (refer to "Brake Caliper Removal/Installation" above).
  (2) Slide pressure plate off anchor pins of the brake caliper casing assembly.
  (3) Place the back plate or pressure plate on a vice with the lining material down and with the rivets positioned over gap between the vice jaws. Drive the rivets out using a hammer and a punch.

B. Install Brake Lining
  (1) Position the new lining material against the back plate or the pressure plate, making sure that the counter-bores on both pieces are facing outward (away from each other).
  (2) Insert a rivet into each of the holes in the lining material with the head of the rivet fitting into the counter-bore in the lining.
  (3) Place the plate and lining into a brake lining installation fixture with the head of the rivet down against the bucking anvil of the tool. Insert the rivet setting mandrel into the fixture with the mandrel contacting the rivet tail.
  (4) Support the plate and the lining in the installation fixture with one hand while tapping the mandrel with a hammer. Proceed slowly and rotate the assembly while driving the rivet so that the tail is evenly formed.

NOTE: Before setting the first rivet fully, start the other rivets to keep the lining aligned properly with the plate.

(5) Set all the rivets fully.
(6) Slide the pressure plate with its new lining material over the caliper casing anchor pins.
(7) Re-install caliper from main gear wheel (refer to “Brake Caliper Removal/Installation” above).

9. Brake System Bleeding / Brake Fluid Change

To bleed the brakes or change the brake fluid, use a fluid pump, a clear tube, and a collecting container. Only hydraulic fluid fulfilling the MIL-H-5606 specification should be used.

WARNING: CONTACT WITH HYDRAULIC FLUID CAN CAUSE SKIN IRRITATIONS.

CAUTION: EXCESSIVE HYDRAULIC FLUID WILL ATTACK THE SURFACE OF VARIOUS MATERIALS. READ AND ADHERE TO ALL MANUFACTURERS INSTRUCTIONS. PROVIDE A SUITABLE COLLECTING VESSEL FOR HYDRAULIC FLUID.

CAUTION: PROTECT THE DISC AND PADS FROM BRAKE FLUID CONTAMINATION. BRAKE PADS ARE POROUS AND CANNOT BE CLEANED IF CONTAMINATED, THEY MUST BE REPLACED BY NEW ONES.

A. Bleeding Procedure

(1) Connect fluid pump to the brake caliper bleeder fitting.
(2) Connect collecting container with clear tube to brake fluid reservoir.
(3) Open the bleeder and pump fluid from the caliper through the master cylinders to the reservoir until no air bubbles are evident in the reservoir (clear tube). Then, tighten the bleeder fitting.
(4) Repeat for both brake calipers.
(5) Test brake system and ensure brakes are operating properly (refer to “Adjustment/Test” below).

B. Brake Fluid Change Procedure

(1) Remove bleeder fitting at wheel brake caliper and drain hydraulic fluid.
(2) Operate the pilot’s brake pedal to remove remaining brake fluid from the system.
(3) Refill and bleed brake system as described above.
(4) Repeat for both brake calipers.

10. Adjustment/Test

A. There is no need to adjust the brakes as the brake pistons move to compensate for brake and wear.

B. After component replacement or repair:

(1) Check the brakes for firm pedal pressure and bleed the system if either brake feels spongy.
(2) Perform a minimum of six stops from a speed of between 25 and 40 knots, using light pedal effort and letting the brakes cool partially (about one minute) between stops. Check the aircraft is not turning from centerline while apply left and right brakes uniformly.
(3) Check all fittings and hoses for any leakage.

CHAPTER 33

LIGHTS

TABLE OF CONTENTS

LIGHTS - GENERAL

1. Introduction

   A. This chapter describes interior and exterior lighting systems used on the aircraft, including removal and installation procedures of components and light bulb replacement instructions.

2. General Description

   A. A cockpit light is installed for general cabin lighting, for emergency instrument panel lighting and as a reading light. The dimmable and swivel cockpit light is located in the roof of the cabin just behind the seats. The light is controlled through a dimmer switch on the light.

   The voltmeter, the ammeter, the oil temperature, the oil pressure and the cylinder head temperature indicators as well as most of the avionic equipment are internally lighted. Refer to appropriate manufacturer's publications for maintenance instructions.
   In aircraft equipped for Night-VFR additional instrument and panel lighting is installed:
   If instruments do not have internal lighting they are illuminated by post lights or Nulites. As a second source of light a LED row is integrated into the instrument panel cover. Both, LED row and Nulites / post lights are controlled by a separate dimmer.
   To avoid shadowing on placards there is a placard bar below the switches on the bottom of the instrument panel. For emergency lighting there are flashlights and all placards are luminescent.

   B. Exterior lighting consists of wing tip navigation lights with integral anti-collision strobe lights and position lights and a single landing light.

INTERIOR LIGHTS - MAINTENANCE

1. General

A. If instruments do not have internal lighting, they are illuminated by post lights or Nulites. Post lights are LED lights that illuminate the instrument panel and function as instrument mounting bolts. Nulites are installed between the instrument and the instrument panel. They have a special bezel that focuses the light toward the instrument. Maintenance of post lights and Nulites is limited to their removal and installation.

B. In Night-VFR equipped aircraft a LED row is integrated into the instrument panel cover. The row is bonded to the instrument panel cover and therefore cannot be replaced or removed. Refer to 31-10-00 for glare shield removal/installation procedures.

C. A cockpit light is installed in the roof of the cabin just behind the seats. Maintenance is limited to the removal/installation of the light.

2. Post Light Removal/Installation

A. Remove Post Light
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glare shield (refer to 31-10-00).
(4) Disconnect electrical connector at back of post light.
(5) Remove washer and nut securing post light to instrument panel and remove cable shoe and post light.

B. Install Post Light
(1) Put post light and cable shoe in position and secure using washer and nut.
(2) Connect electrical connector at back of post light.
(3) Install glare shield (refer to 31-10-00).
(4) Reconnect battery (refer to 24-30-00).
(5) Perform functional check.

3. Nulite Removal/Installation

A. Remove Nulite
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glare shield (refer to 31-10-00).
(4) Cut electrical wires to Nulite .
(5) Remove affected instrument as described in the appropriate chapter of this manual.
(6) Remove Nulite.

B. Install Nulite
   (1) Put Nulite in position between the instrument panel and the instrument with the wires coming out of the top.
   (2) Install affected instrument as described in the apropriate chapter of this manual.
   (3) Reconnect wires to Nulite using crimp seal butt connector. Secure with cable ties.
   (4) Install glare shield (refer to 31-10-00).
   (5) Reconnect battery (refer to 24-30-00).
   (6) Perform functional check.

4. Cockpit Light Removal/Installation

A. Remove Cockpit Light
   (1) Ensure electrical power to aircraft is OFF.
   (2) Disconnect electrical wires at connector.
   (3) Remove screws securing light to headset bracket and remove light.

B. Install Cockpit Light
   (1) Put light in position and secure to the headset bracket using screws, washers and nuts.
   (2) Reconnect electrical wires at connector.
   (3) Perform functional check.

EXTERIOR LIGHTS - MAINTENANCE

1. General

   A. The aircraft is equipped with Aveo Engineering Andromeda Aurora (up to S/N AT01-326) / Ultra Galactica (from S/N AT01-327 or SI-AT01-018, annex 19) or Whelen Orion 660 (SI-AT01-026) navigation/position/anti-collision lights and a Hella 90mm module halogen / Whelen Parmetheus PAR-36 Plus LED landing light.

   B. The maintenance of exterior lights is limited to the removal and installation of components and light bulb replacement (halogen light only). Refer to manufacturer instructions for further information on maintenance of the lights.

   C. The illumination unit of the navigation/position/anti-collision lights cannot be repaired. If one LED of the cluster has failed the complete illumination unit has to be replaced.

2. Landing Light Removal/Installation/Check

   A. Remove Landing Light
      (1) Remove upper cowling (refer to 71-10-00)
      (2) Disconnect landing light electrical wires at connector.
      (3) Remove screws securing landing light to cowling and remove landing light from aircraft.

   B. Install Landing Light
      (1) Put landing light in position in the cowling and secure using screws.
      (2) Connect landing light electrical wires at connector.
      (3) Perform functional check, adjust landing light if necessary (refer to “Inspection/Check” below).
      (4) Install upper cowling (refer to 71-10-00).

   C. Landing Light Inspection/Check
      (1) Turn BAT switch ON.
      (2) Turn LDG light ON.
      (3) Verify the landing light works properly.
      (4) Turn OFF all switches.
      (5) Inspect lens for abrasion, crazing or cracking.
      (6) Inspect mounting, connections and wire integrity.

3. Navigation/Position/Anti-Collision Light Removal/Installation/Check

A. Remove Aveo Engineering Navigation/Position/Anti-Collision Light

(1) Ensure BAT, NAV light and ACL light switches are in OFF position.
(2) Remove screw(s) securing base plate to wing tip fairing. Carefully remove light.
(3) Disconnect wires at connector.

B. Install Aveo Engineering Navigation/Position/Anti-Collision Light

(1) Ensure BAT, NAV light and ACL light switches are in OFF position.
(2) Connect wires at connector.
(3) Position gasket and base plate on wing tip fairing and secure with screw(s). Torque screw(s) to 1 Nm (9 in.lbs).
(4) Perform a navigation / position / anti-collision light functional test (refer to "Inspection/Check" below).

C. Remove Whelen Navigation/Position/Anti-Collision Light

(1) Ensure BAT, NAV light and ACL light switches are in OFF position.
(2) Carefully remove the #4 Phillips head screw and lens retainer. Remove the lens from the light assembly by lifting the rear of the lens.
(3) Slide the lens rearward and lift upwards to remove.

CAUTION: DO NOT TOUCH THE LEDS WITH EITHER FINGERS OR SHARP OBJECTS.

(4) Remove the 3 Phillips head screws securing the baseplate to the light assembly. Carefully remove light assembly.
(5) Disconnect wires at connector.

D. Install Whelen Navigation/Position/Anti-Collision Light

(1) Ensure BAT, NAV light and ACL light switches are in OFF position.
(2) Connect wires at connector.
(3) Reinstall light assembly on baseplate. Note that proper orientation is achieved with the drain hole down.

CAUTION: DO NOT TOUCH THE LEDS WITH EITHER FINGERS OR SHARP OBJECTS.

(4) Install lens in the reverse order as removal and return the lens retainer to its installed location. Visually confirm that the lens and retainer are fully and properly seated.
(5) Reinsert #4 phillips head screw and tighten firmly.
(6) Perform a navigation / position / anti-collision light functional test (refer to "Inspection/Check" below).

E. Navigation/Position/Anti-Collision Light Inspection/Check

NOTE: To reduce eye strain, use an optical filter such as dark glasses or a blue covering dome during LED inspection.

(1) Inspect light for excessive scratching, pitting, discoloration or cracking. Replace if required.
(2) Turn NAV light switch ON and verify that the navigation / position light works properly.
(3) Turn ACL light switch ON and verify that the anti-collision strobe light works properly.
(7) Turn OFF all switches.

CHAPTER 34

NAVIGATION

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TABLE OF CONTENTS (Cont.)

NAVIGATION - GENERAL

1. Introduction

A. This chapter describes units and components that provide aircraft navigational information.

2. General Description

A. Different instruments and devices offer a means of determining flight conditions, aircraft attitude and position of the aircraft over the ground.
The following groups can be separated according to way data is sourced:

(1) Devices which use magnetic, gyroscopic and inertia forces to supply data to determine aircraft attitude and heading, including:
  (a) Attitude indicator
  (b) Directional gyro
  (c) Turn coordinator
  (d) Magnetic compass

(2) Devices which sense environmental conditions and use the data to influence navigation, including:
  (a) Airspeed indicator
  (b) Altimeter
  (c) Vertical speed indicator
  (d) Stall warning system

(3) Devices which provide information to determine position and are mainly independent of ground installations, including:
  (a) GPS receiver

(4) Devices which provide information to determine position and are mainly dependent on ground installations. That includes:
  (a) VOR/LOC receiver
  (b) Transponder

PITOT/STATIC SYSTEM - DESCRIPTION

1. Introduction

A. Depending on the aircraft configuration, the static and pitot pressure system supplies static and pitot pressure for the airspeed indicator, altimeter, vertical speed indicator and air data computer.

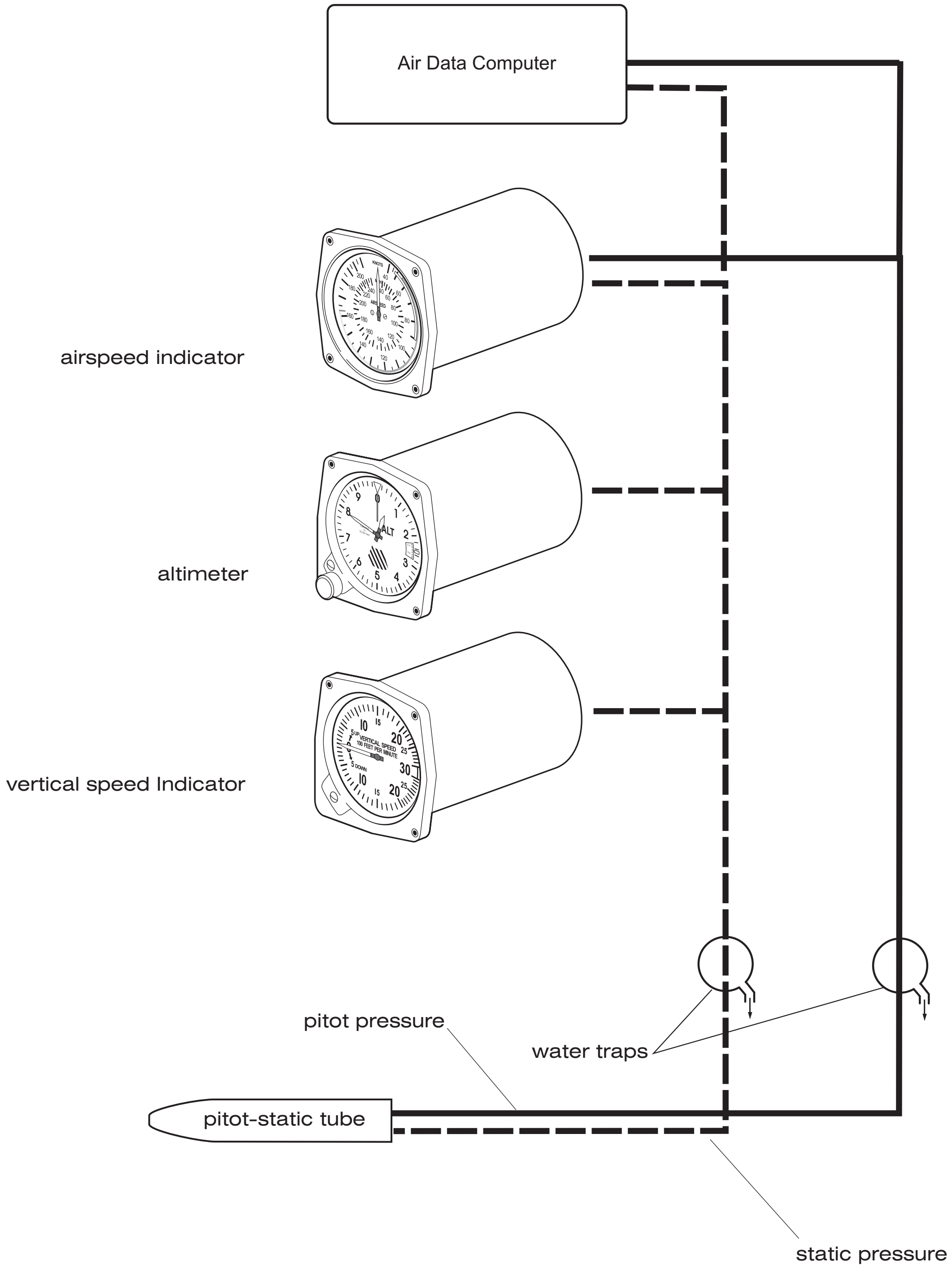
2. Description and Operation

A. Pitot-Static Tube and Lines
Pitot and static pressures are picked up by the pitot-static tube installed on the underside of the left wing, and carried through lines inside the wing and fuselage to the gauges on the instrument panel. The pitot and static pressure lines have water traps to prevent water entering the flight instruments. These water traps are located on the wing spar inside the fuselage and accessible for maintenance via an access panel.

B. Pitot Heating
Optional the aircraft is equipped with a heated pitot tube to prevent icing. It consists of a heating coil and a temperature sensor inside the pitot tube and a control box installed on the bottom of the instrument panel (left-hand side). Both are connected by electrical wires. Additionally there is an amber warning light in the instrument panel that indicates if the pitot heat is either switched OFF or if it is switched ON and there is no heating current although the temperature inside the pitot tube is below 155°C (311°F) ± 5%.

C. Figure 1 shows the pitot/static system schematically.

NOTE: Equipment installed may vary depending on aircraft configuration.



Pitot-Static System Schematic
Figure 1

PITOT/STATIC SYSTEM - MAINTENANCE

1. General

CAUTION: NEVER BLOW COMPRESSED AIR THROUGH PITOT OR STATIC LINES TOWARD INSTRUMENTS AS THIS CAN CAUSE DAMAGE TO INSTRUMENTS.

A. Proper maintenance of the pitot/static system is essential for proper altimeter, airspeed and vertical speed indications. Moisture, obstructions and leaks in the system will result in erroneous, erratic or zero readings on the associated instruments.
Water traps should be regularly inspected.

B. A cover should be placed over the pitot-static tube when the aircraft is parked, to prevent insects and water from entering the pitot orifice.

2. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
7.B. / 7.C.	1	Sphygmomanometer pressure bulb with check valve	-	commercially available
7.B. / 7.C.	1	Surgical hose		commercially available

3. Pitot-Static Tube Removal/Installation

CAUTION: ENSURE THE PITOT HEAT (OPTIONAL) IS SWITCHED OFF AND THE TUBE HAS COOLED DOWN BEFORE TOUCHING THE TUBE. A HEATED PITOT TUBE CAN GET EXTREMELY HOT DURING OPERATION.

A. Remove Pitot-Static Tube
(1) Ensure electrical power to aircraft is OFF.
(2) Remove screws securing pitot-static tube to wing skin.
(3) Identify and disconnect pitot / static lines and electrical connector (optional) at pitot tube.
(4) Remove pitot-static tube from aircraft.

B. Install Pitot-Static Tube
(1) Connect pitot / static lines and electrical connector (optional) at pitot-static tube
(2) Put pitot-static tube in position on the wing and secure using screws.
(3) Perform a pitot-static system functional test (refer to “Inspection/Check” below).
(4) Carry out a functional test of the P/S heating (if installed / Pitot-static tube must get warm with P/S heating switched ON and cool down when switched OFF again).

4. P/S Heat Control Box Removal/Installation (optional)

CAUTION: NEVER OPERATE PITOT HEATING WITHOUT THE CONTROL BOX AS THIS CAN DESTROY THE PITOT TUBE.

A. Remove the Control Box
   (1) Ensure electrical power to aircraft is OFF.
   (2) Disconnect battery (refer to 24-30-00).
   (3) Remove glare shield (refer to 31-10-00).
   (4) Disconnect electrical connector from control box.
   (5) Remove cable ties securing control box to instrument panel.
   (6) Remove control box from aircraft.

B. Install the Control Box
   (1) Put control box in position in instrument panel and secure using cable ties.
   (2) Reconnect electrical connector to control box.
   (3) Install glare shield (refer to 31-10-00).
   (4) Reconnect battery (refer to 24-30-00).
   (5) Carry out a functional test of the P/S heating (Pitot-static tube must get warm with P/S heating switched ON and cool down when switched OFF again).

5. Instruments Removal/Installation

A. Remove an Instrument

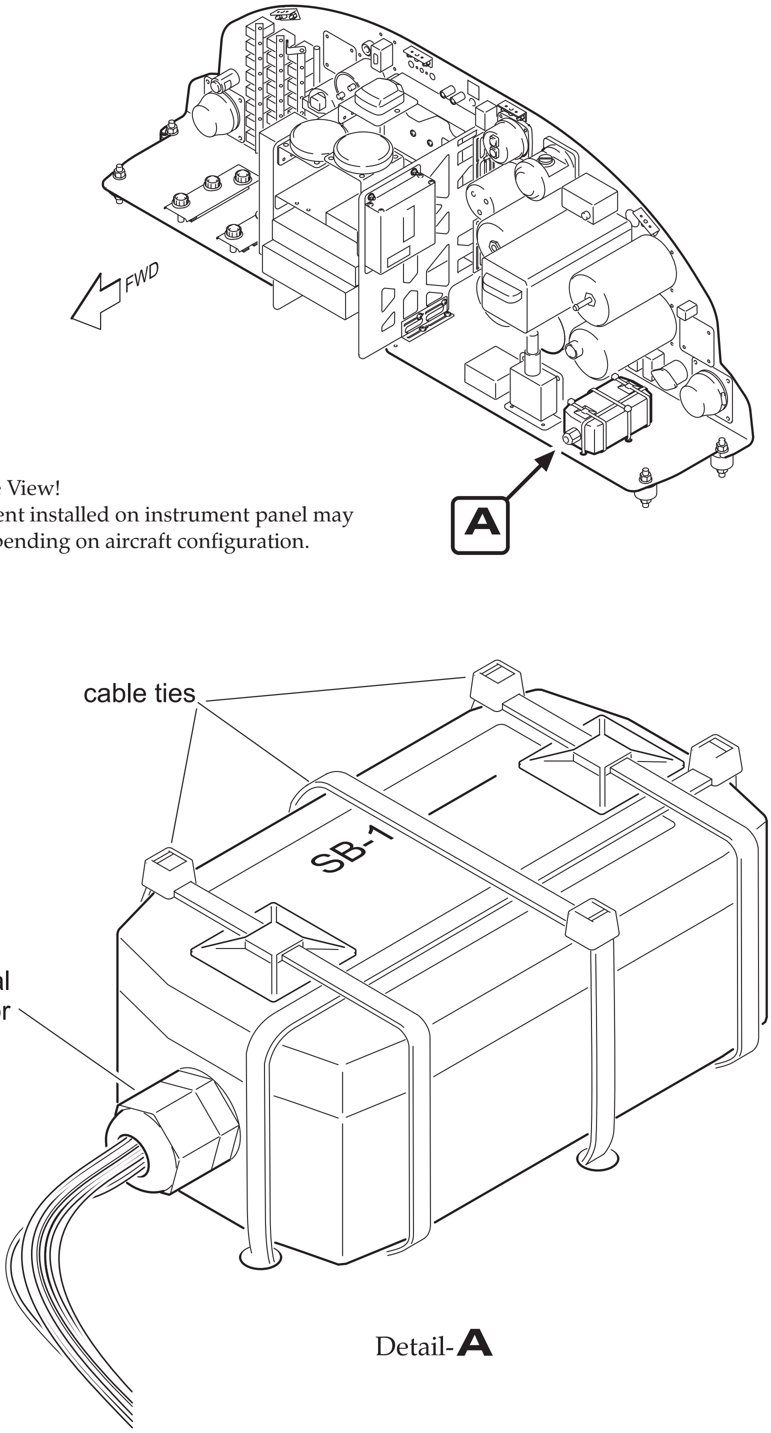
CAUTION: PLUG OR CAP INSTRUMENT PORTS IMMEDIATELY AFTER DISCONNECTING PITOT OR STATIC LINES TO PREVENT DIRT OR FOREIGN MATERIAL FROM ENTERING.

   (1) Gain access to the back of instrument and disconnect static/pitot hose from instrument.
   (2) While supporting the instrument, remove screws securing instrument to instrument panel.
   (3) Remove instrument.

B. Install an Instrument
   (1) Place instrument to instrument panel and secure with screws.
   (2) Reconnect static/pitot hose to instrument.
   (3) Perform a pitot-static system functional test (refer to “Inspection/Check” below).

6. Water Trap Inspection/Draining

A. Inspect/Drain the Water Traps
   (1) Remove access plate 210AB (refer to 06-30-00).
   (2) Inspect water traps in the pitot/static lines for water.
   (3) Drain if necessary by removing the water trap. Remove cable ties and pitot/static lines.
   (4) If removed, reinstall the water trap using cable ties. Reconnect pitot/static lines.
   (5) If a water trap has been removed, perform a pitot-static system functional test (refer to “Inspection/Check” below).
   (6) Reinstall access plate 210AB (refer to 06-30-00).



NOTE: Example View!
Equipment installed on instrument panel may vary depending on aircraft configuration.

P/S Heat Control Box
Figure 202

7. Inspection/Check

A. After any component replacement or repair, the system should be checked for proper function and a leakage test should be performed.

B. Pitot System Leak Test

(1) Fasten surgical hose and sphygmomanometer bulb over pitot head.
(2) Pump bulb until airspeed indicator registers 150 KIAS.
(3) Close check valve.
(4) Wait 15 seconds for airspeed indicator to stabilize.
(5) Observe airspeed indicator for one minute.
(6) The airspeed should drop no more than 10 KIAS.
(7) Slowly release check valve so pressure is reduced gradually to prevent instrument damage.
(8) If test reveals a leak in system, check all connections for tightness and repair faulty components.

C. Static System Leak Test

(1) Tape over static ports at pitot-static tube.
(2) Insert a “T” in a static pressure line.
(3) Squeeze sphygmomanometer bulb and close check valve to establish a vacuum inside bulb.
(4) Connect sphygmomanometer to the static pressure line.
(5) Slowly open air bulb check valve until altimeter indicates a 1000 ft increase in altitude then close check valve to trap suction in system.
(6) While increasing suction and altimeter indicating 1000 ft, ensure that the airspeed indicator shows an increase and the vertical speed indicator shows a climb indication.
(7) Leakage must not exceed 100 ft/min of altitude loss as indicated on the altimeter.
(8) If leakage rate is below the maximum allowable, the leak test is finished. Remove tape, sphygmomanometer assembly and “T” and reconnect static pressure line.
(9) If leakage rate exceeds the maximum allowable, check all fittings and hoses for condition and tightness and repeat leak test.
(10) If leakage rate still exceeds the maximum allowable, undertake the following:
(11) Disconnect static pressure lines from airspeed indicator, vertical speed indicator and altitude encoder.
(12) Connect lines together using suitable fittings so altimeter is the only instrument still connected to static pressure system.
(13) Repeat leak test to ascertain whether the static pressure system or the bypassed instruments are causing the leakage. If instruments are at fault, they must be repaired by an approved repair station or replaced. If static pressure system is faulty, proceed as follows:

CAUTION: DO NOT APPLY POSITIVE PRESSURE WITH AIRSPEED INDICATOR OR VERTICAL SPEED INDICATOR CONNECTED TO STATIC PRESSURE SYSTEM.

(14) Remove sphygmomanometer assembly.
(15) Attach hose to “T” and slowly apply positive pressure until altimeter indicates a 500 ft decrease in altitude. Maintain this altimeter indication while checking for leaks.
(16) Coat line with a solution of mild soap and water, watching for bubbles to locate leaks.
(17) Tighten leaking connections. Repair or replace defective components.
(18) Reconnect airspeed, vertical speed indicator and altitude encoder. Repeat static system leak test.

STALL WARNING SYSTEM - DESCRIPTION

1. Introduction

A. The aircraft is equipped in with a stall warning system. It signals an approaching stall to the pilot by an audible alarm in the cockpit.

2. Description and Operation

A. The stall warning system consists of a mechanical transmitter, located in the leading edge of the left wing and a warning buzzer behind the instrument panel. Both are connected by electrical wires.

B. As the aircraft approaches a stall, the low pressure on the upper surface of the wings moves forward around the leading edge of the wings. As a result, a microplate at the transmitter is deflected upwards. A mechanical contact is made which sends an electrical signal to the warning buzzer in the cockpit. The warning buzzer gives off a 2 kHz alerting tone.

STALL WARNING SYSTEM - MAINTENANCE

1. General

A. Maintenance is limited to the removal/installation of system components. In wintry conditions, make sure that the system transmitter microplate is always clear of ice and snow.

2. Transmitter Removal/Installation

A. Remove Transmitter
(1) Ensure electrical power to aircraft is OFF.
(2) Remove three screws securing transmitter covering with transmitter to wing structure.
(3) Carefully remove transmitter with covering through opening from wing.
(4) Label and disconnect electrical connectors.
(5) Remove two screws securing transmitter covering to transmitter and remove covering.

B. Install Transmitter
(1) Install transmitter covering to transmitter using two screws.
(2) Reconnect electrical connectors.
(3) Put transmitter and covering in position and secure with three screws to wing structure.
(4) Perform a flight test to functionally check the stall warning system (refer to “Adjustment” below).

3. Warning Buzzer Removal/Installation

A. Remove Warning Buzzer
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glare shield (refer to 31-10-00).
(4) Disconnect electrical connector.
(5) Remove nuts securing buzzer to instrument panel and remove buzzer.

B. Install Warning Buzzer
(1) Put buzzer in position at back of instrument panel and secure using two nuts.
(2) Connect electrical connector.
(3) Install glare shield (refer to 31-10-00).
(4) Reconnect battery (refer to 24-30-00).
(5) Perform a functional check of the stall warning system.

4. Adjustment

A. The stall warning system is so adjusted that the system will come into action approx. 10 – 15 km/h (6 - 8kts) before the aircraft stalls. If these values are not achieved, it is possible to modify the system behavior by shortening the microplate by a few millimeters. This will lower the speed the system is activated. A test for proper system operation is only possible in flight. Repeat the procedure until the microplate has the correct length.

ATTITUDE AND DIRECTION - MAINTENANCE

1. General

CAUTION: GYROS ARE DELICATE AND CAN NOT WITHSTAND THE SHOCK OF BEING DROPPED, JARRED OR STRUCK BY PIECES OF EQUIPMENT. DO NOT PLACE GYROS ON ANY HARD SURFACE. PAD WITH GENEROUS FOAM.

A. The construction and function of the magnetic compass, turn coordinator, attitude indicator and directional gyro is conventional, with no special features.

B. Maintenance is limited to component removal and re-installation.

2. Magnetic Compass Removal/Installation

A. Remove Magnetic Compass
  (1) Ensure electrical power to aircraft is OFF.
  (2) Disconnect battery (refer to 24-30-00).
  (3) Remove glare shield (refer to 31-10-00).
  (4) Disconnect electrical wires from compass.
  (5) Remove screws securing compass to glare shield and remove compass from aircraft.

B. Install Magnetic Compass
  (1) Put compass in position on glare shield and secure using screws.
  (2) Connect electrical wires to magnetic compass.
  (3) Install glare shield (refer to 31-10-00).
  (4) Reconnect battery (refer to 24-30-00).
  (5) Do a compass swing (refer to “Adjustment/Test” below).

3. Turn Coordinator Removal/Installation

A. Remove Turn Coordinator
  (1) Ensure electrical power to aircraft is OFF.
  (2) Disconnect battery (refer to 24-30-00).
  (3) Remove glare shield (refer to 31-10-00).
  (4) Disconnect electrical connector from turn coordinator.
  (5) While supporting the turn coordinator, remove screws securing turn coordinator to instrument panel.
  (6) Remove turn coordinator from aircraft.

B. Install Turn Coordinator
  (1) Put turn coordinator in position in instrument panel and secure using screws.
  (2) Reconnect electrical connector to turn coordinator.
  (3) Install glare shield (refer to 31-10-00).
  (4) Reconnect battery (refer to 24-30-00).
  (5) Conduct a functional test of the unit.

4. Attitude Indicator Removal/Installation

A. Remove Attitude Indicator
- (1) Ensure electrical power to aircraft is OFF.
- (2) Disconnect battery (refer to 24-30-00).
- (3) Remove glare shield (refer to 31-10-00).
- (4) Disconnect electrical connector from attitude indicator.
- (5) While supporting the indicator, remove screws securing indicator to instrument panel.
- (6) Remove attitude indicator from aircraft.

B. Install Attitude Indicator
- (1) Put attitude indicator in position in instrument panel and secure with screws.
- (2) Connect electrical connector to the instrument.
- (3) Install glare shield (refer to 31-10-00).
- (4) Reconnect battery (refer to 24-30-00).
- (5) Conduct a functional test of the unit.

5. Directional Gyro Removal/Installation

A. Remove Directional Gyro
- (1) Ensure electrical power to aircraft is OFF.
- (2) Disconnect battery (refer to 24-30-00).
- (3) Remove glare shield (refer to 31-10-00).
- (4) Disconnect electrical connector from back of the instrument.
- (5) While supporting the gyro, remove screws securing directional gyro to instrument panel.
- (6) Remove directional gyro from aircraft.

B. Install Directional Gyro
- (1) Put directional gyro in position in instrument panel and secure with screws.
- (2) Connect electrical connector to the instrument.
- (3) Install glare shield (refer to 31-10-00).
- (4) Reconnect battery (refer to 24-30-00).
- (5) Conduct a functional test of the unit.

6. Adjustment / Test

A. Magnetic Compass Calibration
- (1) Prior to calibrating the compass, the aircraft should be in a flight environment which is as realistic as possible.
  - (a) Place aircraft in level flight attitude
  - (b) Check the canopy is closed.
  - (c) Check flaps are retracted.
  - (d) Start engine and turn ON all electrical equipment that is usually used at cruise (refer to airplane flight manual).

CAUTION: DUE TO INSUFFICIENT ENGINE COOLING ON THE GROUND, DO NOT CONTINUOUSLY OPERATE THE ENGINE AT CRUISE RPM FOR MORE THAN 3 MIN.

(e) Run engine and set throttle at cruise position.

NOTE: When performing maintenance on the magnetic compass, use a non-magnetic or plastic screwdriver.

(2) Remove screws securing access plate to compass casing to reveal adjustment screws.
(3) Set adjustment screws of compensator to zero. Zero position is indicated when dot of screw is aligned with dot on compass frame.
(4) Taxi aircraft to compass rose.
(5) Align centerline of aircraft on magnetic North heading. Adjust N - S set screw until compass reads North.
(6) Align centerline of aircraft on magnetic East heading. Adjust E - W set screw until compass reads East.
(7) Align centerline of aircraft on magnetic South heading and note resulting South error.
(8) Adjust N - S set screw until half of error is removed.
(9) Align centerline of aircraft on magnetic West heading and note resulting West error.
(10) Adjust E - W set screw until half of error is removed.
(11) Align centerline of aircraft in successive magnetic 30-degree headings and record compass readings on appropriate compass correction (deviation) card. Deviations must not exceed 10 degrees on any heading.

INTEGRATED FLIGHT SYSTEM - MAINTENANCE

1. General

A. This section provides instructions necessary for authorized personnel to inspect and maintain the Aspen EFD1000 system. The system consists of the following major components:
- primary flight display (PFD)
- remote sensor module (RSM)
- configuration module (CM)

B. Maintenance of the EFD1000 system has to be carried out in accordance with the Aspen EFD1000 and EFD500 Installation Manual (P/N 900-00003-001) and the Aspen EFD1000 and EFD500 Instructions for Continued Airworthiness (P/N 900-00012-001).

C. No special tools are required for the removal and replacement of any system LRUs. If a LRU is found to be defective it should be removed and returned to a properly rated facility for repair or replacement. If fasteners are deformed in any way, they must be replaced.

D. The operation of the Aspen EFD1000 requires the software version given in the AQUILA Service Information SI-AT01-012.

The actual software version is documented in the aircraft equipment list, located in chapter 6 of the airplane flight manual.

All Service information released from AQUILA and related to software versions has to be attached to this maintenance manual for continuing airworthiness!

E. For bonding checks on the AQUILA AT01-100/200 no procedures or equipment are necessary other than that which are commonly expected for bonding measurements on small aircraft. Refer to AC 43.13-1B, chapter 11, section 15 “Grounding and Bonding” for further information on bonding check procedures and equipment.

2. EFD Removal/Installation

A. Remove EFD
(1) Verify electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Carefully insert a flat blade screw driver into the locking mechanism on the top center of the EFD.
(4) While gently prying pull back the top of the EFD and extract from bracket.
(5) Remove nut securing braided ground strap to EFD.
(6) Remove pitot and static quick connectors (EFD1000 only) by pulling back outer spring loaded locking sleeve while unplugging connectors. To remove 44 pin D-sub connector unscrew both jackscrews fully and pull connector straight back.

EFFECTIVITY

Aircraft equipped with ASPEN EFD 1000 PFD

B. Install EFD
- (1) Verify electrical power to aircraft is OFF.
- (2) Install 44 pin D-sub connector and tighten jacks crews until connector is fully seated.
- (3) Install pitot and static lines (EFD1000 only) to back of EFD by firmly pressing the fitting until fully seated (pitot and static quick connectors are keyed and cannot be crossed).
- (4) Gently pull on connector to ensure proper connection.
- (5) Connect braided bonding strap to EFD with nut.
- (6) Insert bottom of EFD into bracket and pivot top forward until it locks into place on bracket.
- (7) Reconnect battery (refer to 24-30-00).
- (8) Verify all system interfaces are functional (refer to section 10.6 of the Aspen EFD1000 and EFD500 Installation Manual) and the correct software version is installed.
- (9) Verify proper bonding per section 10.1.2 of the Aspen EFD1000 and EFD500 Installation Manual.
- (10) Perform a system leak test (refer to 34-11-00).

3. EFD Battery Replacement

A. Replace EFD Battery

NOTE: EFD battery replacement must only be performed by a properly certified individual or facility.

- (1) Remove EFD (refer to "EFD Removal/Installation" above).
- (2) Remove two screws on each end of the oval-shaped cover plate on backside of the EFD.
- (3) Unplug electrical connector and slide battery out of EFD.
- (4) Install new battery into EFD, then connect battery plug.
- (5) Position cover plate and tighten the cover screws. Tighten to 1,4 Nm (12 in.lbs).
- (6) Re-install and test EFD (refer to "EFD Removal/Installation" above).

4. Remote Sensor Module (RSM) Removal/Installation

A. Remove RSM
- (1) Verify electrical power to aircraft is OFF.
- (2) Disconnect battery (refer to 24-30-00).
- (3) Gain access to the underside of the RSM mounting location.
- (4) Unplug the RSM connector. Unscrew RSM electrical connector from inside and undo shield ground wire from ground stud.
- (5) Remove sealant from around base of RSM and on mounting screws.
- (6) Remove four 8-32 non-ferrous mounting screws from RSM and remove RSM from aircraft taking care to guide 24 inch "pigtail" connector out through ½ inch hole in aircraft skin.

B. Install RSM
- (1) Verify electrical power to aircraft is OFF.
- (2) Replace the O-ring on the RSM. Contact Aspen Avionics for O-ring replacement (256-00001-001).
- (3) Verify RSM shim is installed between aircraft skin and RSM if required.
- (4) Feed circular connector down through ½ inch hole in aircraft skin and mount RSM (vent hole faces aft) with four 8-32 non-ferrous screws. Tighten to 1,4-1,7 Nm (12-15 in.lbs).

NOTE: It is critical that the screws are non-ferrous to avoid compass errors.

(5) Connect the circular electrical connector and cable tie harness to prevent chafing and interference.
(6) Connect shield ground wire to ground stud.
(7) Seal around base and on top of four mounting screws of the RSM using a good quality electrical sealant (Sikaflex-221 or equivalent, silicone-free).
(8) Reconnect battery (refer to 24-30-00).
(9) Verify proper bonding per section 10.1.2 and perform RSM calibration per section 10.5 of the Aspen EFD1000 and EFD500 Installation Manual.
(10) Check OAT operation per section 10.6.4 and check RSM GPS operation per section 10.6.6 of the Aspen EFD1000 and EFD500 Installation Manual.

5. Configuration Module (CM) Removal/Installation

A. Remove CM

(1) Verify electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Cut the two cable ties affixing the CM to the PFD wiring harness.
(4) Unplug the Molex connector by pressing down on the locking tab and gently pulling the connector from the module.

B. Install CM

(1) Verify electrical power to aircraft is OFF.
(2) Plug the Molex connector into the module until it clicks.
(3) Cable tie the module to the PFD wiring harness..
(4) Reconnect battery (refer to 24-30-00).
(5) Perform the installation menu unit configuration per section 10.4.5 of the Aspen EFD1000 and EFD500 Installation Manual.
(6) Perform RSM calibration per section 10.5 of the Aspen EFD1000 and EFD500 Installation Manual.

6. Inspection/Check

A. All units, brackets, installation hardware and wiring of the EFD1000 system should be checked as defined below during annual inspection. Items found to be defective should be repaired or replaced prior to returning the aircraft to service. The performance of this inspection should not create the need for additional protective treatment (Alodine, paint, etc) of surfaces within the aircraft.

B. EFD Inspection
(1) Inspect the EFD(s) for damage and verify proper operation using the documents identified in section 1 of the Aspen EFD1000 and EFD500 Instructions for Continued Airworthiness.
(2) Check the EFD wiring, pneumatic tubing and quick disconnects for integrity, damage, chafing or excessive wear.
(3) Check EFD braided bonding strap for proper termination at the EFD and aircraft grounding point to maintain HIRF and lightning compliance.
(4) Verify the resistance is 3 mΩ or less from EFD ground stud to airframe ground.
(5) Inspect the installation of the EFD for corrosion on the EFD and the mounting structure.
(6) Inspect the fasteners for tightness and general condition.

C. RSM Inspection
(1) Inspect the RSM(s) visually for damage and wear on the lightning strip.
(2) Check RSM wiring for damage, chafing or excessive wear.
(3) Verify the RSM doubler plate bonding resistance from the ground stud to airframe ground is 3 mO or less to maintain HIRF and lightning compliance.
(4) Inspect the RSM installation incl. doubler for corrosion on the RSM, the RSM shim (optional), the fuselage skin and the doubler.
(5) Inspect the installation for cracks in the fuselage and loose or damaged fasteners.

D. Configuration Module
(1) Check the configuration module(s) for damage.
(2) Check the configuration module wiring for damage, chafing or excessive wear.

E. EFD Internal Battery
Perform operational test as described in section 11 of the Aspen EFD1000 and EFD500 Instructions for Continued Airworthiness. This test must be run at room temperature approximately 25º C.
(1) Turn on the EFD1000.
(2) Press MENU key.
(3) Select POWER SETTINGS page from the main menu.
(4) Press the BATTERY line select key.
(5) BAT LEVEL IN --.-- will be displayed for a short period of time.
(6) Once the capacity is measured ON BAT XX% REM will be displayed. The ON BAT indication must read a minimum of 80% to continue. If the battery capacity is below 80%, the battery should be charged by returning the EFD to aircraft power.
(7) With the battery displaying greater than 80% charge set a timer for 30 minutes. After the 30 minute time has elapsed the EFD must still be operating on battery. If the internal battery will not supply the minimum 30 minutes operating time or fails to charge above 80%, replace the battery and return the failed battery to Aspen Avionics.
(8) Switch the EFD back to aircraft power and recharge the internal battery to 80% or greater prior to release to service.

INTEGRATED FLIGHT SYSTEM - MAINTENANCE

1. General

A. This section provides instructions necessary for authorized personnel to inspect and maintain the Garmin G500 system. The system consists of the following major components:
- GDU 620 display
- GRS 77 AHRS
- GDC 74A ADC
- GMU 44 magnetometer
- GTP 59 outside air temperature probe

B. Maintenance of the G500 system has to be carried out in accordance with the Garmin G500 AML STC Installation Manual (P/N 190-01102-06) and the G500 PFD/MFD System Instructions for Continued Airworthiness (P/N 190-01102-00).

C. Maintenance is "on condition" only. Refer to "Inspection/Check" below for necessary tests or checks and the specific intervals for the G500 system.

D. The operation of the Garmin G500 requires the software versions given in the corresponding AQUILA Flight Manual Supplement.

The actual software version is documented in the aircraft equipment list, located in chapter 6 of the airplane flight manual.

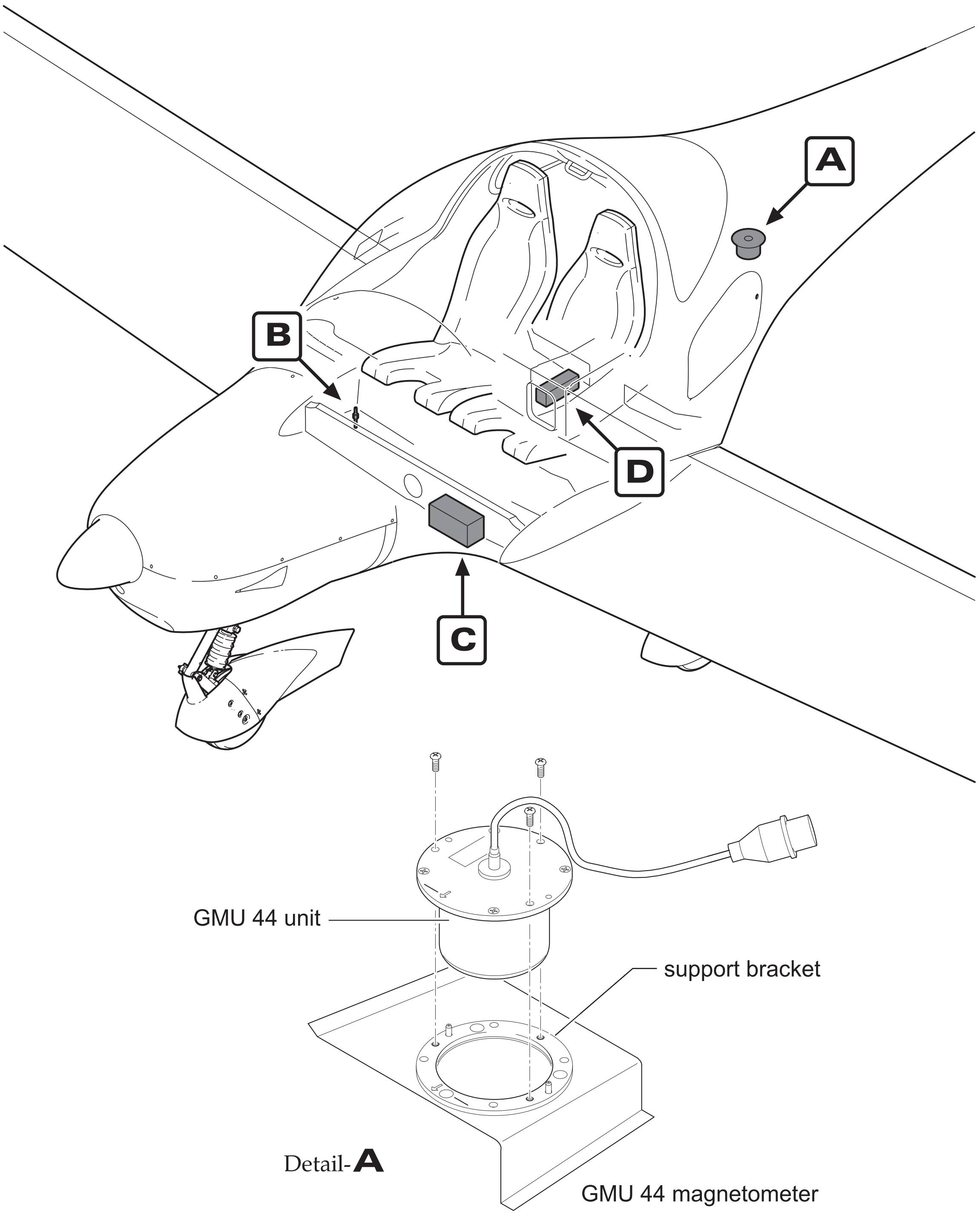
All service information released from AQUILA and related to software versions has to be attached to this maintenance manual for continuing airworthiness!

E. For bonding checks on the AQUILA AT01-100/200 no procedures or equipment are necessary other than that which are commonly expected for bonding measurements on small aircraft. Refer to AC 43.13-1B, chapter 11, section 15 "Grounding and Bonding" for further information on bonding check procedures and equipment.

2. G500 Removal/Installation (Ref. Fig. 201)

A. For removal/installation and configuration/testing of G500 LRUs, refer to the procedures in sections 3 and 5 of the G500 AML STC Installation Manual.

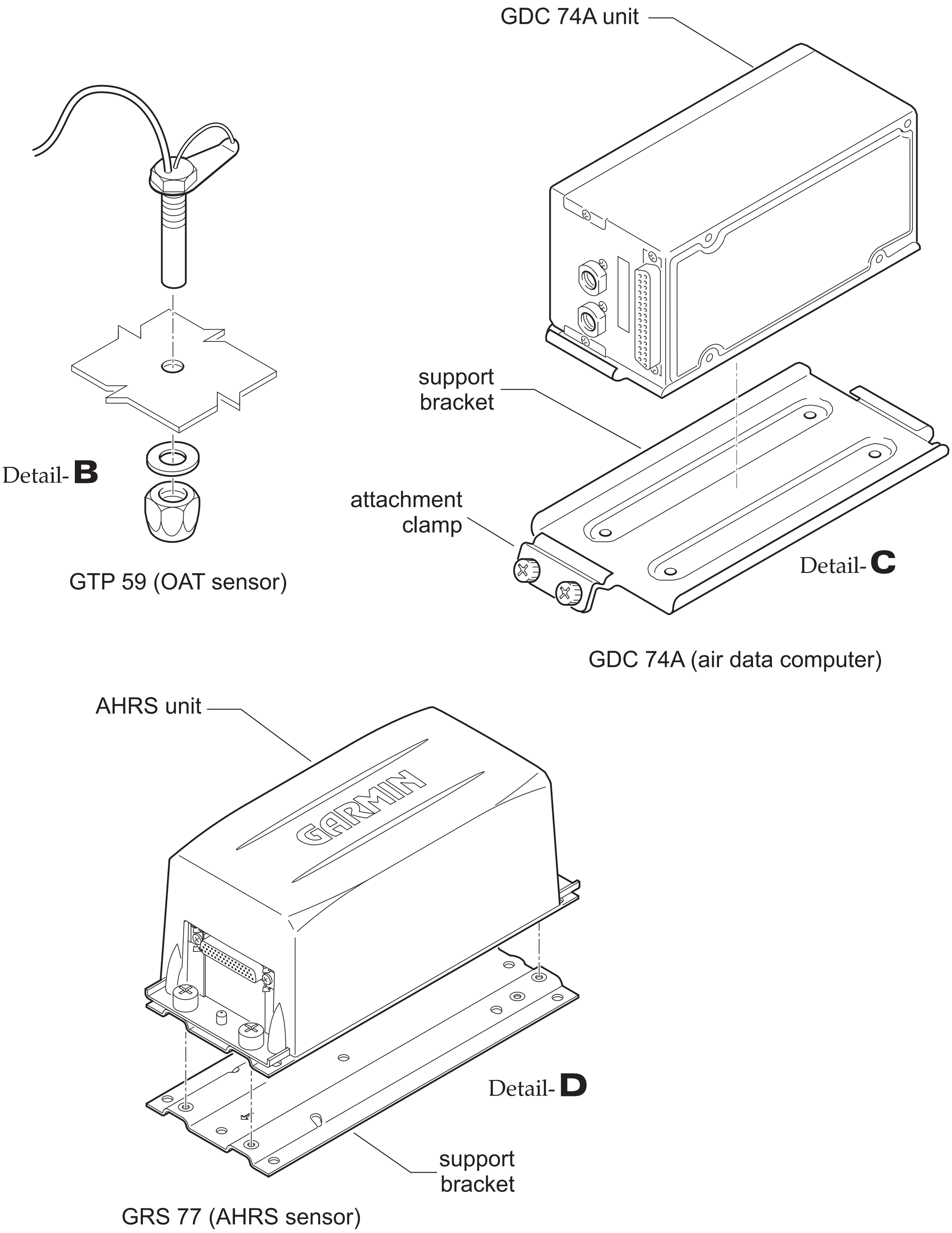
B. If any work has been done on the aircraft that could affect the system wiring, antenna cable, or any interconnected equipment, verify the G500 system unit power-up self-test sequence is successfully completed and no failure messages are annunciated on the GDU 620 display. Refer to the checkout procedures in section 5 of the G500 AML STC Installation Manual.



G500 System Components
Figure 201 (1)

EFFECTIVITY

Aircraft equipped with Garmin G500



G500 System Components
Figure 201 (2)

3. Inspection/Check

A. All G500 system LRUs are designed to detect internal failures. A thorough self-test is executed automatically upon application of power to the units, and built-in tests are continuously executed. Detected errors are indicated on the GDU 620 display via failure annunciations.

B. Operation of the G500 system is not permitted unless an inspection as described in this section has been completed within the preceding 12 calendar months. See the following table for necessary tests or checks and the specific intervals for the G500 system:

No.	Garmin G500	Reference	Interval	Initials
1.	Visual inspection - Complete visual inspection of all installed G500 system LRUs incl. supporting structures and wiring harnesses must be performed to ensure continued integrity of the installation.	G500 ICA 2.5	12 months	
2.	Pitot-static and airspeed checks - Perform an altimeter and a pitot-static and airspeed check every 24 month or when the GDC 74A is removed and reinstalled/replaced or the pitot and static system connectors are disturbed.	34-11-00 G500 IM 5.8	24 months1)	
3.	Electrical bonding check - Perform an electrical bonding check of the G500 system LRUs in accordance with Garmin G500 Instructions for Continued Airworthiness..	G500 IM 3.8 G500 ICA 2.5	2000h 10 years	
4.	GRS 77 AHRS - Update AHRS magnetic field model.		when available (5 year cycle)	
5.	GMU 44 - Perform magnetometer interference test and magnetometer calibration procedure in accordance with Garmin G500 Part 23 AML STC Installation Manual.	G500 IM 5.6	other2)	

1) National regulation may require shorter interval.
2) After adding, replacing or servicing components that are ferrous or electrical changes to the installation that affect components within 3m of the GMU 44 location.

INTEGRATED FLIGHT SYSTEM - MAINTENANCE

1. General

A. This section provides instructions necessary for authorized personnel to inspect and maintain the Garmin G500 TXi system. The system consists of the following major components:
- GDU 1060 display (with integrated ADAHRS)
- GMU 44 magnetometer
- GTP 59 outside air temperature probe

B. Maintenance of the G500 TXi system has to be carried out in accordance with the Garmin G500 TXi Part 23 AML STC Maintenance Manual (P/N 190-01717-B1).

C. Maintenance is “on condition” only. Refer to “Inspection/Check” below for necessary tests or checks and the specific intervals for the G500 TXi system.

D. The operation of the Garmin G500 TXi requires the software versions given in the corresponding AQUILA Flight Manual Supplement.

The actual software version is documented in the aircraft equipment list, located in chapter 6 of the airplane flight manual.

All service information released from AQUILA and related to software versions has to be attached to this maintenance manual for continuing airworthiness!

E. For bonding checks on the AQUILA AT01-100/200 no procedures or equipment are necessary other than that which are commonly expected for bonding measurements on small aircraft. Refer to AC 43.13-1B, chapter 11, section 15 “Grounding and Bonding” for further information on bonding check procedures and equipment.

2. G500 TXi Removal/Installation

A. For removal/installation and configuration/testing of G500 TXi LRUs, refer to the procedures in section 5 of the G500 TXi Part 23 AML STC Maintenance Manual.

B. If any work has been done on the aircraft that could affect the system wiring, antenna cable, or any interconnected equipment, verify the G500 TXi system unit power-up self-test sequence is successfully completed and no failure messages are annunciated on the GDU 1060 display. Refer to the checkout procedures in section 5.15 of the G500 TXi Part 23 AML STC Maintenance Manual.

EFFECTIVITY

Aircraft equipped with Garmin G500 TXi

3. Inspection/Check

A. All G500 TXi system LRUs are designed to detect internal failures. A thorough self-test is executed automatically upon application of power to the units, and built-in tests are continuously executed. Detected errors are indicated on the GDU 1060 display via failure annunciations, system messages, or a combination of the two. A list of reported errors for the system can be printed in the form of a maintenance log using the instructions provided in section 4.1 of the Garmin G500 TXi Part 23 AML STC Maintenance Manual.

B. Operation of the G500 TXi system is not permitted unless an inspection as described in this section has been completed within the preceding 12 calendar months. See the following table for necessary tests or checks and the specific intervals for the G500 TXi system:

No.	Garmin G500 TXi	Reference	Interval	Initials
1.	Visual inspection - Complete visual inspection of all installed G500 TXi system LRUs and wiring harnesses must be performed to ensure continued integrity of the installation.	G500TXi MM 3.4	12 months	
2.	Pitot-static and airspeed checks - Perform an altimeter and a pitot-static and airspeed check every 24 month or when the ADC is removed and reinstalled/replaced or the pitot and static system connectors are disturbed.	34-11-00 G500TXi MM 5.15	24 months1)	
3.	Electrical bonding check - Perform an electrical bonding check of the G500 TXi system LRUs in accordance with Garmin G500 TXi maintenance manual.	G500TXi MM 3.5	2000h 10 years	
4.	GDU 1060 ADAHRS - Update AHRS magnetic field model.		when available (5 year cycle)	
5.	GMU 44 - Perform magnetometer interference test and magnetometer calibration procedure in accordance with Garmin G500 TXi Part 23 AML STC Installation Manual.	G500TXi IM 6.6	other2)	
6.	GDU 1060 cooling fan - Replace cooling fan on the GDU 1060 every 3000 fan operating hours. The number of hours the fan has been operating can be viewed in configuration mode.	G500TXi MM 5.1	3000h recommended	

1) National regulation may require shorter interval.
2) After adding, replacing or servicing components that are ferrous or electrical changes to the installation that affect components within 3m of the GMU 44 location.

INTEGRATED FLIGHT SYSTEM - MAINTENANCE

1. General

A. This section provides instructions necessary for authorized personnel to inspect and maintain the Garmin G3X Touch system. The system consists of the following major components:
- GDU 460 display (pilot side)
- GDU 470 display (co-pilot side)
- GSU 25C ADAHRS
- GEA 24 engine interface
- GAD 27 electronic adapter unit
- GMU 11 magnetometer
- GTP 59 outside air temperature probe

B. Maintenance of the G3X Touch system has to be carried out in accordance with the Garmin G3X Touch EFIS Part 23 AML STC Maintenance Manual (P/N 190-02472-02).

C. Maintenance is “on condition” only. Refer to “Inspection/Check” below for necessary tests or checks and the specific intervals for the G3X Touch system.

D. The operation of the Garmin G3X Touch system requires the software versions given in the corresponding AQUILA Flight Manual Supplement.

The actual software version is documented in the aircraft equipment list, located in chapter 6 of the airplane flight manual.

All service information released from AQUILA and related to software versions has to be attached to this maintenance manual for continuing airworthiness!

E. For bonding checks on the AQUILA AT01-100/200 no procedures or equipment are necessary other than that which are commonly expected for bonding measurements on small aircraft. Refer to AC 43.13-1B, chapter 11, section 15 “Grounding and Bonding” for further information on bonding check procedures and equipment.

2. G3X Removal/Installation

A. For removal/installation of G3X LRUs, refer to the unit replacement procedures in section 6 of the G3X Touch EFIS Part 23 AML STC Maintenance Manual. For configuration and testing of reinstalled or replaced G3X units, refer to section 7 of the G3X Touch EFIS Part 23 AML STC Maintenance Manual.

B. If G3X LRUs are removed and reinstalled or if any work has been done on the aircraft that could affect the system wiring, antenna cables, or any interconnected equipment, the checkout and return to service procedures in section 8 of the G3X Touch EFIS Part 23 AML STC Maintenance Manual have to be completed.

C. If a Garmin G3X autopilot is installed: Refer to 22-10-00 and to the Garmin GFC 500 Part 23 AML STC Maintenance Manual, section 9, for autopilot configuration and return to service-procedures after G3X removal, installation or replacement. For autopilot settings refer to SB-AT01-042 and referenced documents.

3. Inspection/Check

A. G3X Touch EFIS LRUs maintenance is “on condition” only. No component-level overhaul is required the G3X Touch. “On Condition” replacement and/or servicing should occur when an item exhibits conditions, symptoms, and/or abnormalities defined in section 5 of the G3X Touch EFIS Part 23 AML STC Maintenance Manual.

B. Operation of the G3X system is not permitted unless an inspection as described in this section has been completed within the preceding 12 calendar months. See the following table for necessary tests or checks and the specific intervals for the G3X system:

No.	Garmin G3X Touch	Reference	Interval	Initials
1.	Visual inspection - Complete visual inspection of all installed G3X system LRUs and wiring harnesses must be performed to ensure continued integrity of the installation.	G3X MM 4.4	12 months	
2.	Pitot-static and airspeed checks - Perform an altimeter and a pitot-static and airspeed check every 24 month or when the GSU 25 is removed and reinstalled/replaced or the pitot and static system connectors are disturbed.	34-11-00	24 months$^{1)}$	
3.	Electrical bonding check - Perform an electrical bonding check of the G3X Touch system LRUs in accordance with Garmin G3X Touch maintenance manual.	G3X MM 4.5	2000h 10 years	
4.	GSU 25C - Update AHRS magnetic field model.	G3X MM 4.6	when available (5 year cycle)	
5.	GMU 11 - Perform magnetometer interference test and magnetometer calibration procedure in accordance with Garmin G3X Touch maintenance manual.	G3X MM 5.4.4 G3X MM 7.2.1.2 G3X MM 8.13.3	other$^{2)}$	

1) National regulation may require shorter interval.
2) After adding, replacing or servicing components that are ferrous or electrical changes to the installation that affect components within 3m of the GMU 11 location.

INTEGRATED FLIGHT SYSTEM - MAINTENANCE

1. General

A. This section provides instructions necessary for authorized personnel to inspect and maintain the Garmin G5. The system consists of the following major components:
- G5 electronic flight instrument
- G5 battery pack
- GAD 29B data bus converter (optional)
- GMU 11 magnetometer (optional)

B. Maintenance of the G5 has to be carried out in accordance with the Garmin G5 Electronic Flight Instrument Part 23 AML STC Maintenance Manual (P/N 190-01112-11).

C. Maintenance is “on condition” only. Refer to “Inspection/Check” below for necessary tests or checks and the specific intervals for the G5 system.

D. The operation of the Garmin G5 requires the software versions given in the corresponding AQUILA Flight Manual Supplement.

The actual software version is documented in the aircraft equipment list, located in chapter 6 of the airplane flight manual.

All service information released from AQUILA and related to software versions has to be attached to this maintenance manual for continuing airworthiness!

E. For bonding checks on the AQUILA AT01-100/200 no procedures or equipment are necessary other than that which are commonly expected for bonding measurements on small aircraft. Refer to AC 43.13-1B, chapter 11, section 15 “Grounding and Bonding” for further information on bonding check procedures and equipment.

2. G5 Removal/Installation

A. For removal/installation of G5 LRUs, refer to the unit replacement procedures in section 6 of the G5 Electronic Flight Instrument Part 23 AML STC Maintenance Manual. For configuration and testing of reinstalled or replaced G5 units, refer to section 7 of the G5 Electronic Flight Instrument Part 23 AML STC Maintenance Manual.

B. If G5 LRUs are removed and reinstalled or if any work has been done on the aircraft that could affect the system wiring, antenna cables, or any interconnected equipment, the checkout and return to service procedures in section 8 of the G5 Electronic Flight Instrument Part 23 AML STC Maintenance Manual have to be completed.

C. If Garmin GFC 500 autopilot is installed: Refer to 22-10-00 and to the Garmin GFC 500 Part 23 AML STC Maintenance Manual, section 9, for autopilot configuration and return to service-procedures after G5 removal, installation or replacement. For autopilot settings refer to SB-AT01-034 and referenced documents.

EFFECTIVITY

Aircraft equipped with Garmin G5

3. Inspection/Check

A. G5 LRUs maintenance is “on condition” only. No component-level overhaul is required the G5. “On Condition” replacement and/or servicing should occur when an item exhibits conditions, symptoms, and/or abnormalities defined in section 5 of the Garmin G5 Electronic Flight Instrument Part 23 AML STC Maintenance Manual.

B. Operation of the G5 system is not permitted unless an inspection as described in this section has been completed within the preceding 12 calendar months. See the following table for necessary tests or checks and the specific intervals for the G5 system:

No.	Garmin G5	Reference	Interval	Initials
1.	Visual inspection - Complete visual inspection of all installed G5 system LRUs and wiring harnesses must be performed to ensure continued integrity of the installation.		12 months	
2.	Pitot-static and airspeed checks - Perform an altimeter and a pitot-static and airspeed check every 24 month or when the G5 is removed and reinstalled/replaced or the pitot and static system connectors are disturbed.	34-11-00	24 months 1)	
3.	Electrical bonding check - Perform an electrical bonding check of the G5 system LRUs in accordance with Garmin G5 maintenance manual.	G5 MM 4.3	2000h 10 years	
4.	G5 battery - Perform battery capacity check: - Without power applied to the aircraft, turn on the G5 by pressing the power button in the lower left corner of the unit. - Note the remaining battery capacity (%) at the top left corner of the display. - After about a minute, the remaining capacity will change from (%) to time (hour:min). - If the remaining capacity is less than one hour (1:00), allow the battery to charge until the capacity shows greater than 95% and repeat the check. - If the remaining capacity is less than one hour (1:00) after charging, the battery must be replaced.	G5 MM 4.2.7	12 months	
5.	GMU 11 - Perform magnetometer interference test and magnetometer calibration procedure in accordance with Garmin G5 maintenance manual.	G5 MM 7.8.1 G5 MM 7.5.3 G5 MM 7.6	other 2)	

1) National regulation may require shorter interval.
2) After adding, replacing or servicing components that are ferrous or electrical changes to the installation that affect components within 3m of the GMU 11 location.

INDEPENDENT POSITION DETERMINING – MAINTENANCE

1. General

A. This section covers that portion of the system which provides information to determine position and is mainly independent of ground installations. This includes the GPS portion of the GNS 430W or GTN 650 (Xi) navigation management system (NMS). The scope of maintenance is limited to the removal and installation of the components. For removal and installation procedures for the GNS 430W / GTN 650 (Xi), refer to 23-10-00.

B. Garmin GNS 430W / GTN 650 (Xi) System
The GNS 430W / GTN 650 (Xi) system is a fully integrated, panel-mounted instrument which contains a VHF communications transceiver, a VOR/ILS receiver and GPS navigation computer. 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. GPS signals are received by an antenna mounted on top of fuselage behind the cabin.

C. Refer to Garmin 400W Series Installation Manual, P/N 190-00356-02, latest revision for additional maintenance information on the GNS 430W system, or to Garmin GTN 6XX/7XX AML STC Installation Manual, P/N 190-01007-A3, latest revision for the GTN 650 system, or to Garmin GTN Xi Part 23 AML STC Maintenance Manual, P/N 190-01007-C1, latest revision for the GTN 650 Xi system.

2. GPS Antenna Removal/Installation

A. Remove GPS Antenna
   (1) Open baggage compartment door and remove access / inspection plate 211 KC (refer to 25-12-00).
   (2) Disconnect antenna cable from antenna.
   (3) Remove nuts and washers securing antenna to fuselage.
   (4) Remove antenna from aircraft.

B. Install GPS Antenna
   (1) Put gasket and antenna from outside, and backing plate from inside in position in fuselage.
   (2) Install washers and nuts securing antenna to fuselage. Simultaneously connect ground cable to backing plate.
   (3) Seal the antenna and gasket to fuselage using a good quality electrical sealant (Sikaflex-221 or equivalent, silicone-free).
   (4) Connect antenna cable.
   (5) Close baggage compartment door and install access / inspection plate 211 KC (refer to 25-12-00).

INDEPENDENT POSITION DETERMINING – MAINTENANCE

1. General

   A. This section covers that portion of the system which provides information to determine position and is mainly independent of ground installations. This includes the FlymapL multifunctional display/GPS.

   B. The scope of maintenance is limited to the removal and installation of the components. For further information on the FlymapL, refer to the FlymapL Installation Manual, doc. no. 500-310, latest revision, or its operator's manual. For overhaul and repair, the manufacturer of the equipment has to be consulted.

   C. FlymapL Multifunction Display/GPS
   The FlymapL multifunctional display is a panel-mounted, multi-functional system with an internal GPS receiver providing GPS navigation planning and the display of a great variety of navigation, airspace and warning information. The FlymapL system enables the display of GPS navigation information in Jeppesen® aeronautical and standard ICAO cartographic maps: Its database contains an elevation model for terrain proximity warning. Interfaces to other sensors and aircraft systems allow the display of additional information (weather information, NOTAMs/METAR/TAF, positions of and collision warnings with other aircraft), if the necessary subsystems are installed. The FlymapL multifunctional display system is approved for VFR operation only and is not intended to be used as the primary source for flight parameters and navigation data. For more information, refer to the operator's manual of the FlymapL.

   The FlymapL is installed in a mounting frame located in the avionics rack in the mid section of the instrument panel. GPS signals are received by an antenna mounted on a bracket that is attached to the RH side support plate of the instrument panel.

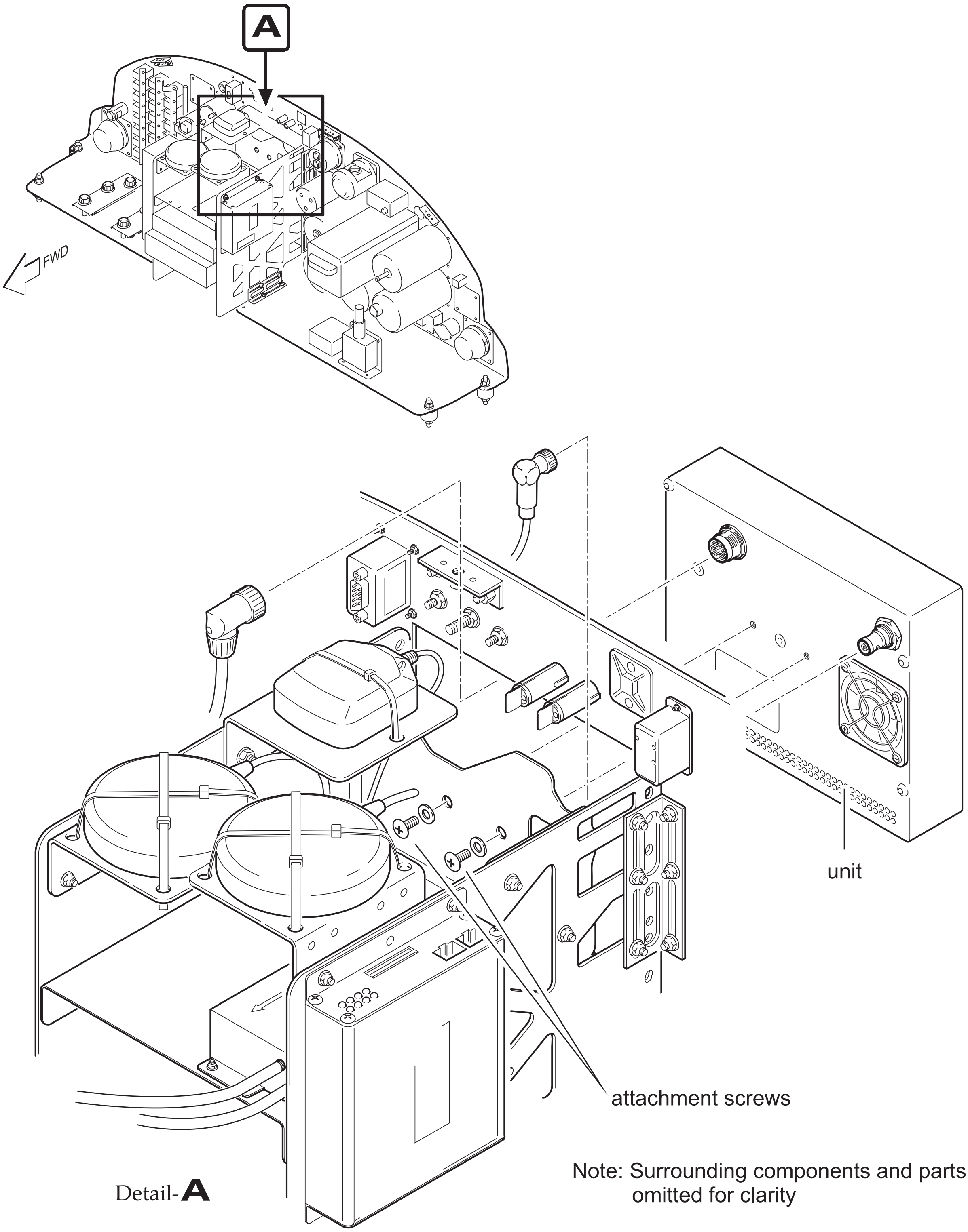
2. FlymapL Unit Removal/Installation (Ref. Fig. 201)

   A. Remove FlymapL Unit
      (1) Ensure electrical power to aircraft is OFF.
      (2) Disconnect battery (refer to 24-30-00).
      (3) Remove glare shield (refer to 31-10-00).
      (4) Disconnect all plug connectors and cables. Mark the removed cables as required.
      (5) Remove both Philips-head screws of the FlymapL attachment on the rear side of the unit.
      (6) Carefully pull out the unit from the rack.

   B. Install FlymapL Unit

   CAUTION: WHEN MOUNTING THE UNIT, DO NOT PRESS ON THE DISPLAY WINDOW AS DAMAGE MAY RESULT.

      (1) Insert the unit carefully in the rack until it is in its final installation position.
      (2) Install both Philips-head screws on the rear side of the unit to fix the FlymapL to its installation bracket.
      (3) Connect all required plug connectors and cables to the rear side of the unit. Make sure that all plugs and cables are properly connected.



FlymapL Unit Installation
Figure 201

(4) Install glare shield (refer to 31-10-00).
(5) Reconnect battery (refer to 24-30-00).
(6) Conduct a functional test of the installed unit.

3. GPS Antenna Removal/Installation (Ref. Fig. 202)

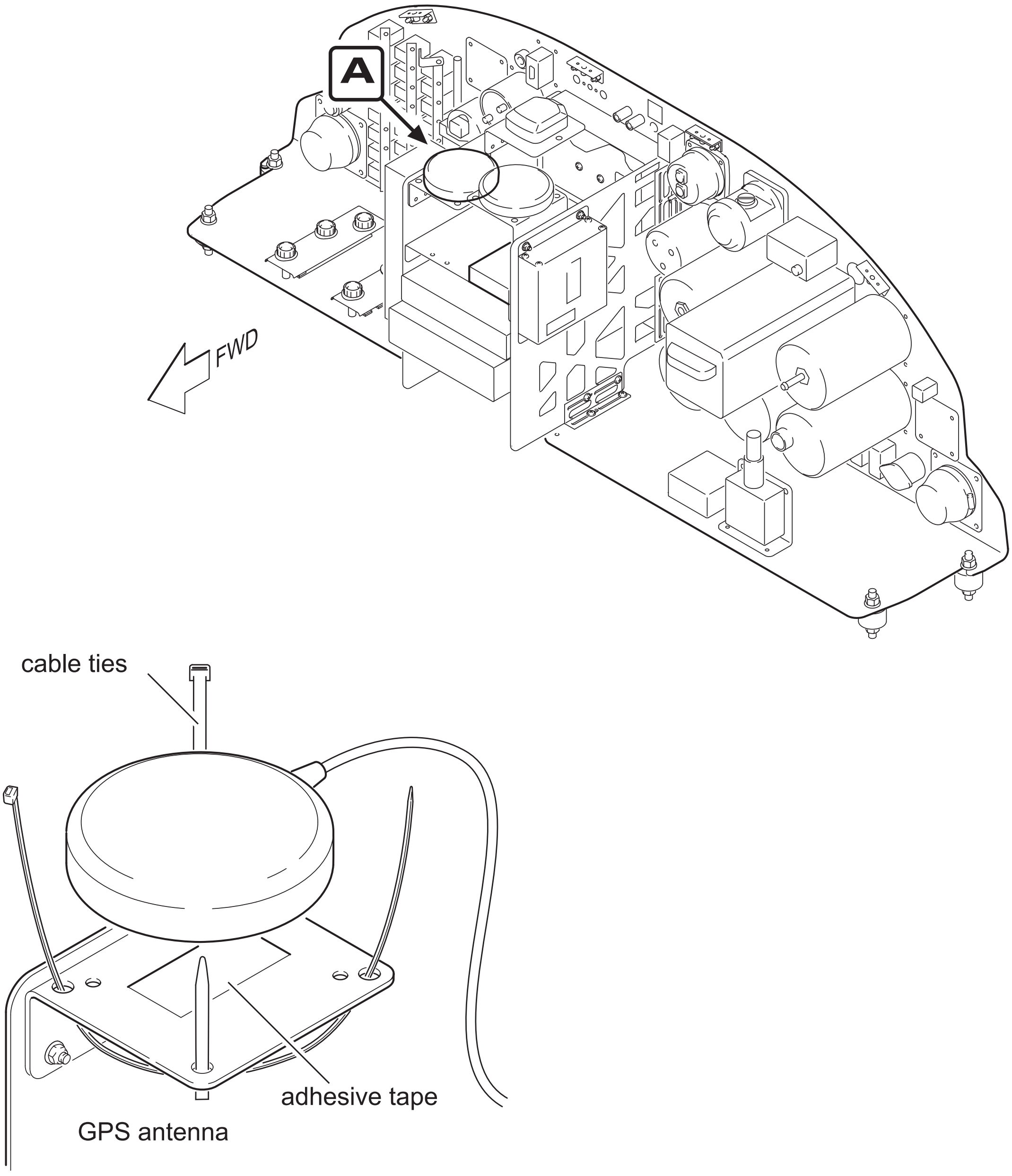
A. Remove FlymapL GPS Antenna
(1) Ensure electrical power to aircraft is OFF.
(2) Remove glare shield (refer to 31-10-00).
(3) Disconnect antenna cable from FlymapL unit and remove cable ties.
(4) Mark installation position and remove cable ties of the antenna attachment.
(5) Carefully remove antenna which is additionally secured to its installation bracket by double-sided adhesive tape. Remove tape and adhesive residue with acetone.

B. Install FlymapL GPS Antenna
(1) Install double-sided adhesive tape on the installation bracket of the GPS antenna and remove the protective film from the adhesive tape.
(2) Attach the antenna to the installation bracket in its correct installation position as previously marked and press it on the installation bracket. Secure the GPS-antenna with 2 cross-wise mounted cable ties.
(3) Install antenna cable properly and connect it to the FlymapL unit.
(4) Install glare shield (refer to 31-10-00).
(5) Perform a functional check of the unit.

4. Inspection/Check

A. When the power is connected to the FlymapL it will automatically switch on. After a short startup period the map will appear. If in the centre of the screen a red cross appears together with the word GPS, no GPS signal is detected. Check GPS antenna connection and make sure that the GPS antenna has full view to the open sky without any obstacles.

If an aircraft symbol is displayed on the screen at the current location and the map is automatically align either with the aircraft in the centre (for North Up display) or with the aircraft near to the bottom of the screen (for Course Up display), the system is working properly (refer to the FlymapL operating manual for additional functions of the FlymapL display system).



Detail-A

FlymapL GPS Antenna Installation
Figure 202

EFFECTIVITY

Aircraft equipped with FlymapL

DEPENDENT POSITIONING DETERMINING - MAINTENANCE

1. General

A. This section covers that portion of the system which provides information to determine position and is mainly dependent on ground installations. This includes the VOR/ILS receiver portion of the GNS 430W / GTN 650 (Xi) navigation management system (NMS), the VOR/ILS receiver portion of the SL30 COM/NAV transceiver as well as the Garmin GTX 328, GTX 330, GTX 335 and GTX 345 mode S transponders.

B. Garmin GNS 430W / GTN 650 (Xi) System
The GNS 430W / GTN 650 (Xi) system is a fully integrated, panel mounted instrument, which contains a VHF communications transceiver, a VOR/ILS receiver and a GPS navigation computer. The primary function of the VOR/ILS receiver portion of the equipment is to receive and demodulate VOR, localizer and glideslope signals. NAV/LOC/GS signals are received by the VOR/LOC antenna located in the fuselage belly behind the baggage compartment. This antenna is embedded in the fuselage shell structure and is therefore maintenance-free. However, if any maintenance should be required, contact the manufacturer.
For further information on the GNS 430W / GTN 650 (Xi) unit, refer to 23-10-00 and 34-40-00.

C. Garmin SL30 COM/NAV Transceiver
The SL30 is a combination of a VHF communications transceiver and a VHF navigation receiver which includes VOR, localizer and glideslope receiver, a built-in course deviation indicator and an independent voice-activated intercom.
The VOR, localizer and glideslope receivers provide 200 channels with a frequency range of 108 to 117.95 MHz for VOR, 108 to 111.95 for localizer and 329.15 to 335 MHz for glideslope reception. VOR/LOC/GS signals are received by the VOR/LOC antenna which is integrated into the lower fuselage shell structure behind the baggage compartment. This antenna is maintenance free and cannot be removed. However, if any maintenance or repair is necessary, contact the manufacturer.
For further information on the SL30 unit, refer to 23-10-00.

D. Garmin GTX 328, GTX 330, GTX 335 and GTX 345 Mode S Transponder
The GTX 328, GTX 330, GTX 335 and GTX 345 transponders are radio transmitters and receivers that operate on radar frequencies, receiving ground radar or TCAS interrogations. The GTX transmits a coded response of pulses to ground based radar on a frequency of 1090 MHz. Each unit has IDENT capability and replies to mode A, mode C and mode S all-call interrogation.

The electrical circuit of the GTX is protected by a circuit breaker labeled “TXP”. The transponder antenna is installed on the bottom of the cabin, below the co-pilot's seat.

For a complete description of the GTX, refer to:
- GTX 328 Pilot’s Guide, P/N 190-00420-03, latest revision
- GTX 328 Installation Manual, P/N 190-00420-04, latest revision
- GTX 330 Pilot’s Guide, P/N 190-00207-00, latest revision
- GTX 330 Installation Manual, P/N 190-00207-02, latest revision
- GTX 335/345 Series Pilot's Guide, P/N 190-01499-00, latest revision
- GTX 3X5 Installation Manual, P/N 190-01499-02, latest revision

2. Transponder Removal/Installation

A. Remove Garmin GTX Transponder
(1) Ensure electrical power to aircraft is OFF.
(2) Insert a 3/32 hex wrench into the access hole at the unit face and engage hex bolt.
(3) Turn wrench counterclockwise until the unit is forced out about 3/8" and can be freely pulled from the rack.
(4) Pull unit from rack.

B. Install Garmin GTX Transponder

CAUTION: BE SURE NOT TO OVERTIGHTEN THE UNIT INTO THE RACK. APPLICATION OF HEX WRENCH TORQUE EXCEEDING 15 IN.LBS CAN DAMAGE THE LOCKING MECHANISM.

NOTE: It may be necessary to insert the hex wrench into the access hole on the unit face and rotate the mechanism 90° counterclockwise to ensure correct position prior to placing the unit in the rack.

(1) Slide unit carefully straight in the rack until it stops, about 1 inch short of the final position.
(2) Insert a 3/32 hex wrench into the access hole at the bottom of the unit face and engage hex bolt.
(3) Turn wrench clockwise until the unit is secured in the rack.
(4) Carry out return to service procedures and a functional test of the installed unit in accordance with the corresponding Garmin manual.

3. Transponder Antenna Removal/Installation

A. Remove Transponder Antenna
(1) Ensure electrical power to aircraft is OFF.
(2) Remove access/inspection plate 211 BB (refer to 25-12-00) to gain access to the transponder antenna.
(3) Remove nuts and washers securing transponder antenna to fuselage.

NOTE: The connected antenna cable prevents the antenna from falling away from the aircraft.

(4) From outside the aircraft, disconnect antenna cable at connector and remove antenna from aircraft.

B. Install Transponder Antenna
(1) From outside the aircraft, connect antenna cable to the transponder antenna.
(2) From inside the fuselage, insert antenna studs through mounting holes and position the backing plate.
(3) Install washers and nuts securing transponder antenna to fuselage skin.
(4) Seal the antenna to fuselage using a good quality electrical sealant (Sikaflex-221 or equivalent, silicone-free).
(5) Install access/inspection plate 211 BB (refer to 25-12-00).
(6) Carry out a functional test of the transponder.

4. Inspection/Check

A. Maintenance of the GTX has to be carried out in accordance with:
- GTX 328 Transponder Maintenance Manual, P/N 190-00420-05, latest revision
- Garmin GTX 33X and GTX 3X5 ADS-B Maintenance Manual, P/N 190-00734-11, latest revision

B. Garmin GTX transponder maintenance is “on condition” only. No component-level overhaul is required. “On Condition” replacement and/or servicing should occur when an item exhibits conditions, symptoms, and/or abnormalities defined in the corresponding Garmin maintenance manual.

C. Refer to the corresponding Garmin maintenance manual for necessary tests or checks and the specific maintenance intervals for the GTX transponder.

CHAPTER 51

STRUCTURES

TABLE OF CONTENTS

STRUCTURES - GENERAL

1. Introduction

A. This chapter provides a general overview of the structural design. The chapter contains information and procedures applicable to all composite repairs as well as information and procedures for aircraft painting and priming.

B. Please contact AQUILA Aviation GmbH for support in case damage to the aircraft structure the cause of which is unknown or suspect, and prior to major repairs to obtain detailed information.

AQUILA Aviation GmbH
Flugplatz
14959 Schönhagen
Germany

Tel.: +49(0) 33731 707-0
Fax.: +49(0) 33731 707-11

2. General Description

Most of the aircraft structure is made from composite materials. Glass-fiber (GFRP) and carbon-fiber reinforced plastics (CFRP) are used which are bedded in an epoxy resin matrix. The aircraft structure consists of monolithic GFRP or CFRP shells and structure components as well as sandwich shells which have a rigid foam core.

A. Fuselage
The fuselage with the vertical and horizontal stabilizers represents one component. Including the vertical stabilizer, it consists of two half-shells. The fuselage portion of the half-shells is made from solid (non-foam) fiberglass laminate, the vertical stabilizer has a sandwich structure. The fuselage GFRP skin is reinforced by four carbon-fiber stringers, arranged lengthwise through the entire fuselage.
Four ring frames and a baggage compartment frame provide support to the fuselage shells in the tail section. A landing gear bulkhead, a seat bulkhead and a side-force bulkhead carry single loads.
The front of fuselage ends with the firewall which includes the metal fittings for supporting the engine mount. The firewall, constructed of a GFRP/CFRP composite sandwich, has a fire protection lining on the front side which consists of an especially fire-resistant ceramic fleece and a stainless-steel sheet.
The landing gear bulkhead which together with the seat bulkhead supports the main landing gear struts, is complemented upwards through a compact CFRP/GFRP roll-over bar.

B. Wings
The plan view of the wing is a triple trapezoid that is complemented by a winglet at its end. The wing has top and bottom shells, constructed of a GFRP composite sandwich and locally reinforced by CFRP straps. The aircraft has a one-piece wing because the wing spar is manufactured in one piece and is continuous from wing tip to wing tip. The I-section spar has caps made from unidirectional carbon-fiber and a GFRP composite sandwich web.
Each wing half ends inboard with a front root rib and a rear root rib, which are mounted to the fuselage center section with a bolt apiece.

The four lateral force bolts are inserted from the cabin through the fuselage bushings into the wing bolt casings and secured axially with screws.
The outboard end of the wing has a winglet with the NAV lights and the fuel tank vents.
The inboard portion of the wings contains an integral fuel tank.
The ailerons are located at the wing trailing edge near the wing tips. They are of a semi-monocoque sandwich construction consisting of rigid foam core and glass and carbon fiber layers.
The flaps, of a semi-monocoque CFRP sandwich construction, are mounted to the trailing edge of each wing between the inboard end of the ailerons and the fuselage.
They are attached to the wings using hinges that are located below the bottom of the wing. This results in the gap between wing trailing edge and flap leading edge and increases as the flap extend. This increases the lift force and simultaneously the drag force.

C. Stabilizers
The vertical and horizontal stabilizers, as well as the elevator and rudder are of semi-monocoque design consisting of shells fabricated from GFRP sandwich reinforced with CFRP.
The vertical and the horizontal stabilizers have a main spar and a rear shear web with integrated hinges. The horizontal stabilizer is molded to the fuselage and cannot be removed.

3. Structure Classes

A. Primary Structure
These parts are important for the structural integrity of the aircraft. For example: fuselage, wing, stabilizer and control surface shells, spars, frames, joints, brackets.

B. Secondary Structure
These parts are not important for the structural integrity of the aircraft. For example: panels, covers, access plates, fairings.

COMPOSITE DAMAGE INVESTIGATION

1. General

A. This section contains maintenance information and procedures such as investigation and damage classification applicable to fiber laminate structure components.

2. Inspection Methods

A. Visual Inspection

Most damage to a composite structure will be visually detectable. A wide variety of component surface discontinuities such as scratches, cracks, dimples, dents and creases may indicate damage. The use of optical aids such as flashlights, inspection mirrors and simple magnifiers is recommended. To allow remote visual inspection of internal surfaces or other inaccessible areas, a borescope can be used.

If the exterior surface is damaged, e.g. paint cracks, always assume that the underlying structure may also be damaged. To determine the extent of composite damage, other inspection methods may be additionally required.

B. Tap Testing

Tap testing is used for a quick evaluation of composite surfaces to detect the presence of delamination or debonding. The tap testing procedure consists of lightly tapping the surface of the part with a coin, special light hammer or any another suitable object. The acoustic response is compared with that of a known good area. Areas of disbonding or delamination will sound “flat” or “dead”, undamaged areas should sound sharp and clear. The tap testing method should be used in conjunction with the exploration method.

C. Ultrasonic Inspection

Ultrasonic inspection can easily detect subsurface discontinuities, such as cracks, shrinkage cavities, bursts, pores, delaminations and porosity. This method is based on the fact that the amount of reflection that occurs when a sound wave strikes an interface depends largely on the physical state of the materials forming the interface and to a lesser extent on the specific physical properties. The ultrasonic instrument generates an ultrasonic pulse, detects and amplifies the returning echo and displays the detected signal on a cathode ray tube or similar display. For specific inspection procedures refer to manufacturer publications of the ultrasonic test equipment used. If a flaw is detected, further exploration of the suspect composite area as described below is required.

D. Exploration

Exploration is an extension of visual inspection, but requires removal of the facing coat. The exploration method must be employed when subsurface damage has been detected by tap testing, during ultrasonic inspection or to determine the precise extend of damage.

3. Damage Classification

A. Damage to composite structures can be divided into four classes:

(1) Damage Class 1
Severe, extensive damage that requires partial component restoration or general component replacement.

(2) Damage Class 2
Damage to primary or secondary structures with sandwich penetration such as holes or fractures. Both sides of sandwich penetrated and the laminate on both sides must be repaired and the core section replaced.

(3) Damage Class 3
Damage only to outer laminate layers on one side of a sandwich construction without or only minor gouging of core material.

(4) Damage Class 4
Damage to outer surface of composite structures such as superficial scars, scratches, surface abrasion or erosion. No holes or laminate fractures.

B. Minor Damages
Only the damages listed below can be considered as small damages and repaired by qualified personnel without a repair scheme which has been approved by the manufacturer. In general all damages in force introduction or reinforced areas (i.e. spars, ribs) have to be carried out by certified repair stations for composite aircraft structure works.

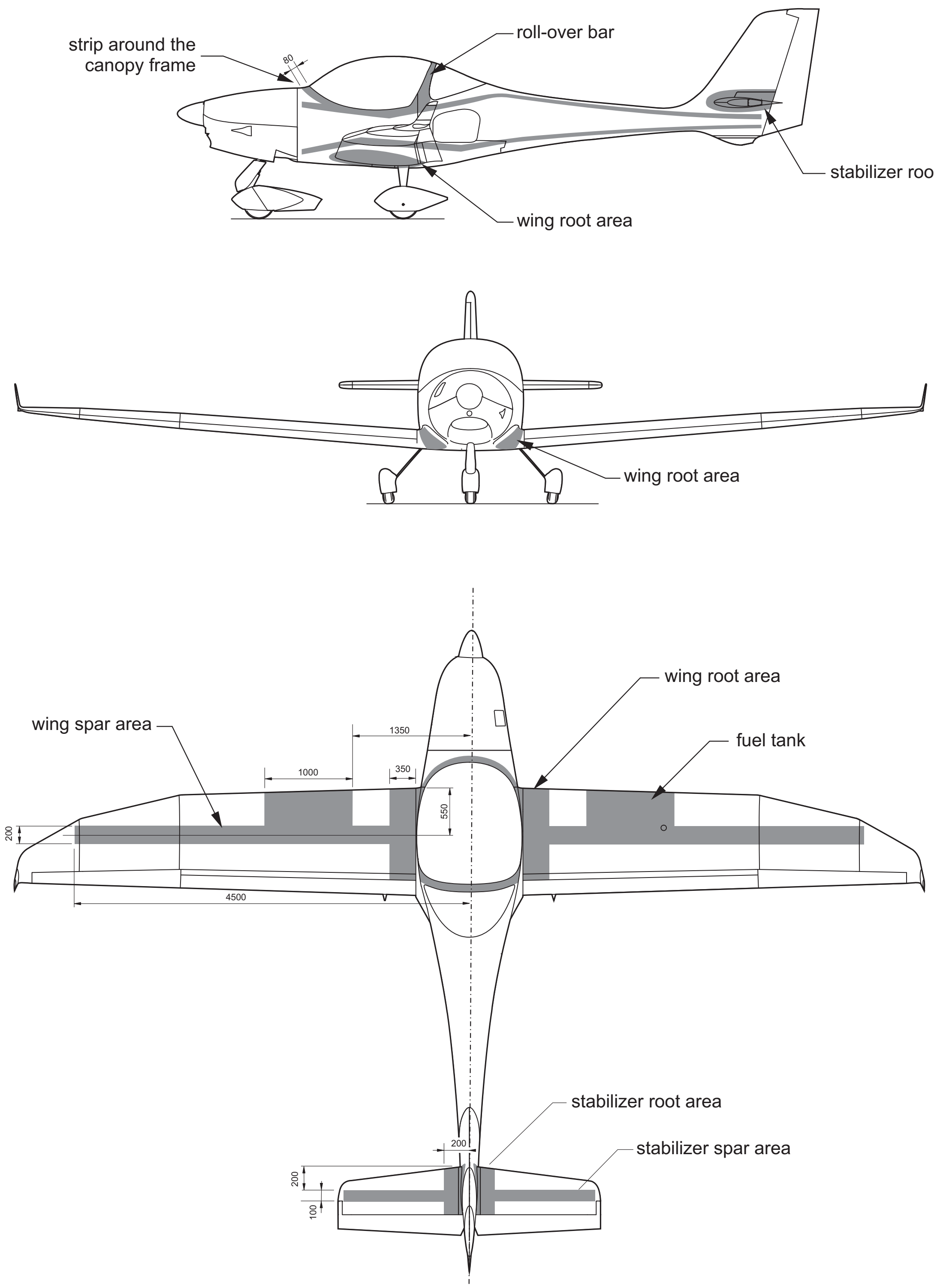
(1) Any damages limited to varnish or filler.

(2) Damages not exceeding the permissible dimensions of holes, dents and cracks that are listed in the following table:

Part	Average hole or dent diam.	Crack length
Front fuselage (cockpit)	50 mm [2 in.]	75 mm [3 in.]
Rear fuselage (tail boom)	25 mm [1 in.]	50 mm [2 in.]
Wing	75 mm [3 in.]	100 mm [4 in.]
Stabilizers	25 mm [1 in.]	50 mm [2 in.]
Flap, Aileron	25 mm [1 in.]	50 mm [2 in.]
Rudder, Elevator	25 mm [1 in.]	50 mm [2 in.]
Cowling, Fairings	75 mm [3 in.]	100 mm [4 in.]

(3) Damages not affecting glass and carbon rovings or carbon tapes in the primary structure.

(4) No class 1 damages and no damages in critical areas. Refer to figure 201 for an overview of the main critical areas of the aircraft.



Damages - Critical Areas
Figure 201

COMPOSITE REPAIR

1. General

A. This section covers required information to complete successful repairs to aircraft components that are made from fiber laminate. Necessary repair data, such as ply lay-up and ply orientation for various areas, as well as repair materials and procedures are provided. Not included are general practices used during most composite repairs, such as cleaning and preparing the damaged area, proper preparation of materials, mixing and applying resin or proper curing the repair. Personnel must be familiar with these practices prior to attempting fiberglass composite repairs on this aircraft.

2. Repair Requirements

A. The following requirements must be met:
   (1) Repairs for which no description is given in this chapter may only be carried out in accordance with a repair scheme which must be approved in accordance with the procedures established by the competent certifying authority.
   (2) Only damages classified as minor damages (refer to 51-10-00) can be repaired by qualified personnel without a repair scheme which has been approved by the manufacturer or cognizant regulatory authority.
   (3) In general all damages in force introduction or reinforced areas (i.e. spars, ribs) have to be carried out by certified repair stations for composite aircraft structure works or properly certified and trained persons.
   (4) Class 4 damages (refer to 51-10-00) don't have to be repaired immediately after detection if adequately protected from environmental conditions (e.g. adhesive tape).
   (5) Repairs must be completed by competent technicians trained in composite repair.
   (6) Before beginning a repair make sure all required tools, equipment and materials are ready. If you are not familiar with the proper use of all the repair tools, never attempt a fiberglass composite repair.
   (7) Use the approved materials outlined in this section only. Prepare materials in accordance with information given in this manual and manufacturer instructions.
   (8) Review material safety data sheets for material to be used. Observe shelf life.
   (9) Repairs should be made in a clean, temperature controlled environment. Optimal repair temperature lies between 16°C and 27°C (60°F - 80°F) with 50% relative humidity or less.
   (10) It is recommended to prepare a test specimen during actual repair which can be subjected to a destructive test to establish the quality of the adhesive bond in the repaired part.
   (11) To preserve the good aerodynamic characteristics of the aircraft smooth and precisely contour repaired surfaces.
   (12) All control surfaces have to be checked for weight and control surface moment after repair.

B. Safety Precautions
   (1) Read and adhere to all manufacturer instructions, warnings and cautions on the materials and chemicals used.
   (2) Sanding fiber laminates results in a fine dust that may cause skin and/or respiratory irritation unless suitable protection is used.
   (3) Never handle fabric materials with bare hands, use clean cotton or rubber gloves.

(4) Solvents used in repair processes are composed of a group of chemicals that often prove toxic. To avoid toxic poisoning, work in a well-ventilated area only and always be alert for symptoms of poisoning. If symptoms are observed, it is vital to immediately remove the person from the contaminated area.
(5) Protective clothing should be worn to avoid skin contact with chemical substances.
(6) Many of the chemicals used are flammable.

3. Approved Materials

Description	**Number / Specification**	**Manufacturer / Supplier**
Carbon fiber roving	Tenax-J HTA-1600	TENAX fibers GmbH & Co.KG Kasinostr. 19-21 42097 Wuppertal
Glass fiber roving	EC14(2400)P185	Vetrotex Reinforcement GmbH Bicherouxstraße 61 52134 Herzogenrath
Carbon fiber tape	Carbon UD-UD CST240/60	Epo GmbH Siemensring 31-33 47877 Willich
Glass fiber fabric	IG 02034 IG 90070 IG 92110 IG 92125 IG 92140	P-D INTERGLAS GmbH Benzstraße 14 89155 Erbach
Carbon fiber fabric	IG 98140	P-D INTERGLAS GmbH Benzstraße 14 89155 Erbach
Resin repair system	Scheufler L285 H285, H286, H287	Martin G. Scheufler Kunstharzprodukte GmbH Am Ostkai 21/22 70327 Stuttgart
Cell foam	Divinicell H60	Lange+Ritter GmbH Dieselstr. 25 70839 Gerlingen
Polyester filler		any source

4. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
6.A.	as required	sandpaper 30-grit to 400 grit	-	commercially available
	as required	isopropyl alcohol	-	commercially available
	as required	peel ply	-	commercially available
	as required	release film	-	commercially available
	as required	hot glue	-	commercially available
	as required	cotton cloth	-	commercially available
	1	mixing container	-	commercially available
	as required	stir sticks	-	commercially available
	1	scale	-	commercially available
	1 pair	gloves	-	commercially available
8.A.	as required	masking tape 2-inch	-	commercially available
	as required	sandpaper 240-grit to 360-grit	-	commercially available
	as required	cotton cloth	-	commercially available
	as required	isopropyl alcohol	-	commercially available

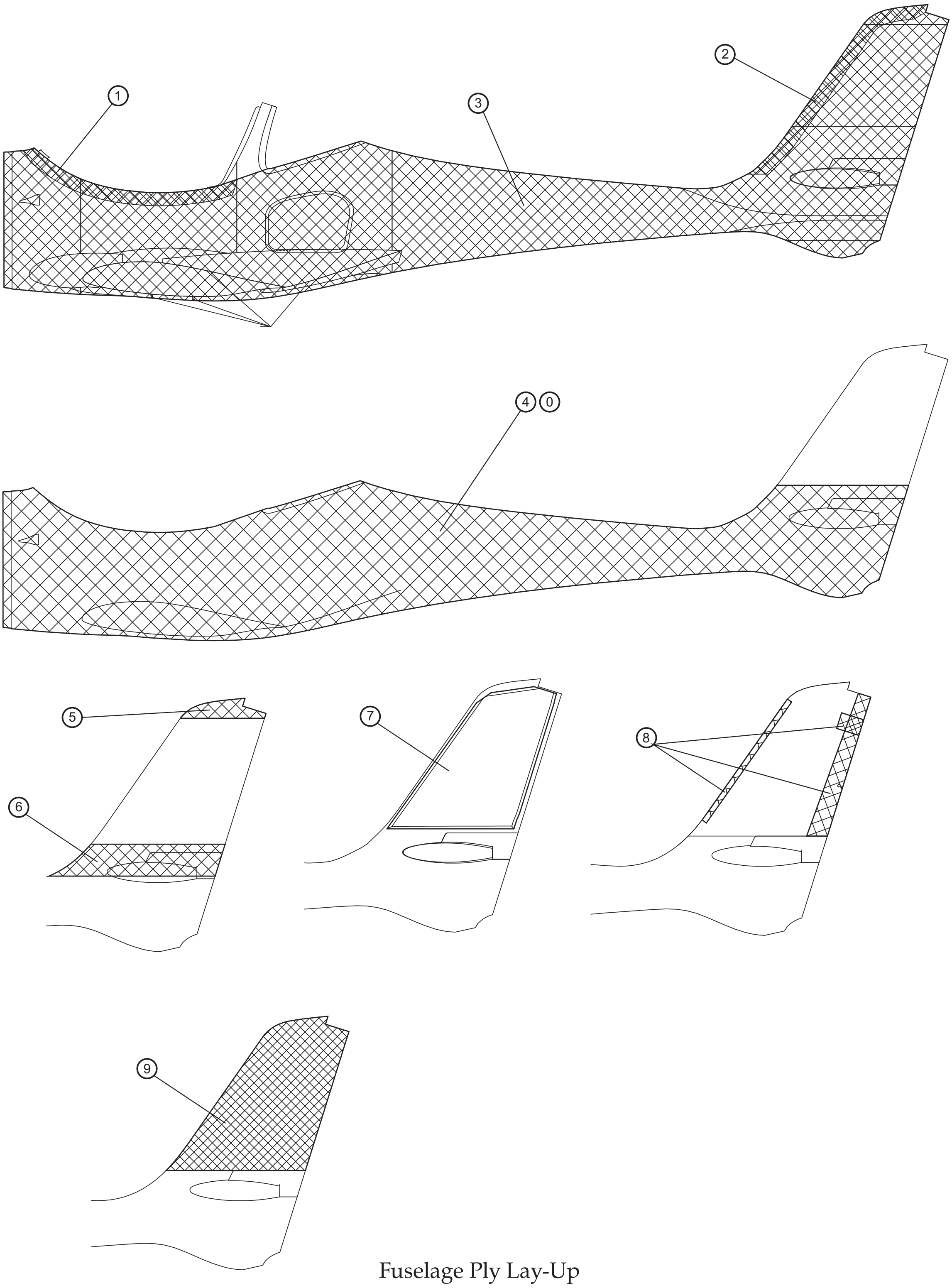
	as required	2k epoxy primer activator thinner	LE2001 XK206 EV301	DuPont
8.B.	as required	cotton cloth	-	commercially available
	as required	isopropyl alcohol	-	commercially available
	as reqired	coating activator thinner	PUR EV310 PUR EV313 PUR EV303	DuPont

5. Material Data Sheet

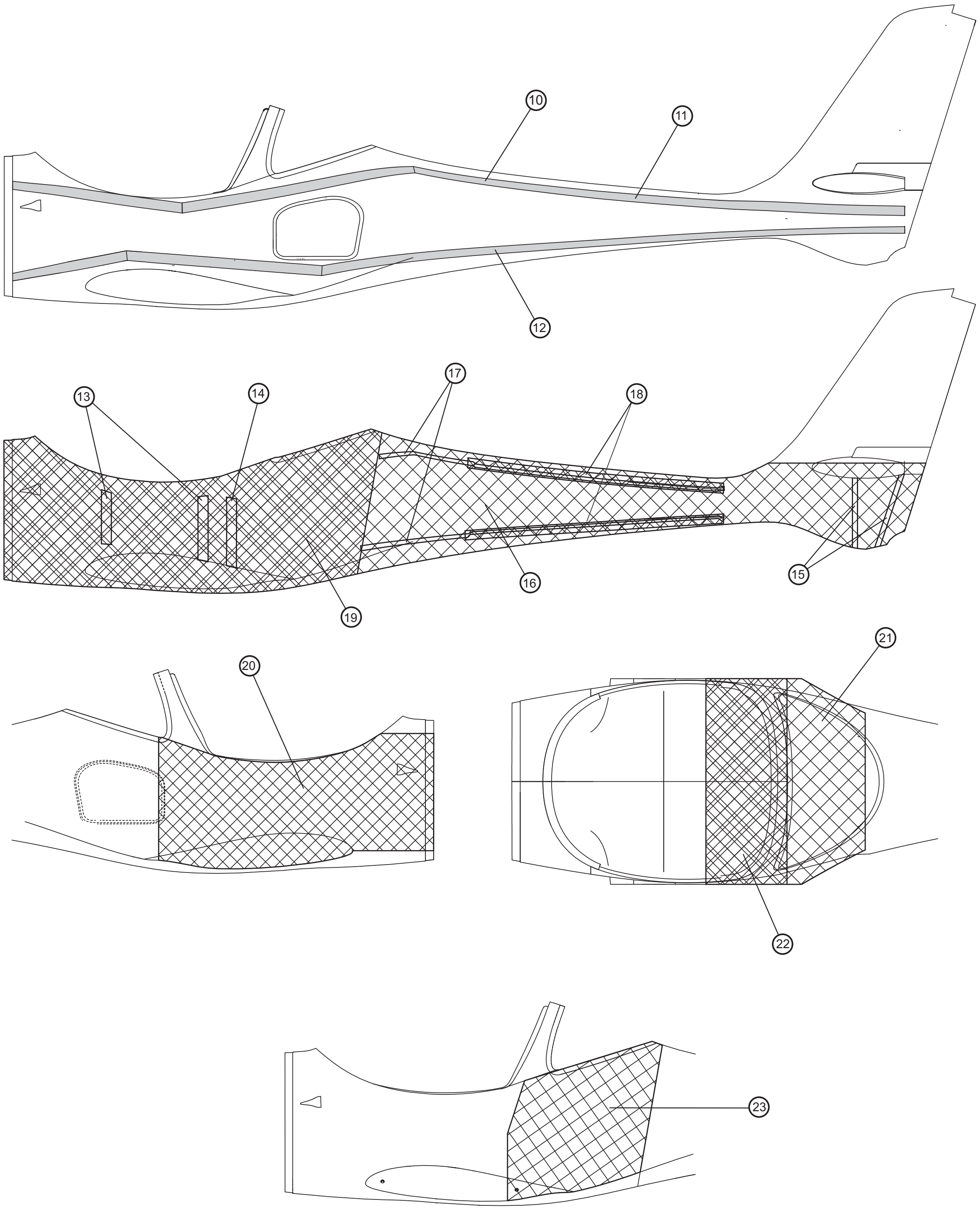
A. The material data sheet in combination with figures 202 (fuselage), 203 (wing), 204 (flap), 205 (aileron), 206 (elevator) and 207 (rudder) should be used for information on ply lay-up and ply orientation. The item numbers give the order in which the layers are applied.

Item No.	Layers	Description	Remarks
0	1	Interglas 02034	finish layer [1]
1	1	Interglas 92110	width 80 mm
2	1	Interglas 92110	width 100 mm
3	1	Interglas 92125	overall
4	1	Interglas 92140	
5	1	Interglas 92125	max. width 125 mm
6	2	Interglas 92125	width 200 mm
7	-	DH 60-06	rigid foam
8	1	Interglas 92125	
9	1	Interglas 92110	
10	4	CST 240/60	overall
11	3	CST 240/60	fr. wind. up to end of tail
12	7	CST 240/60	overall
13	3	CST 240/60	
14	5	CST 240/60	
15	2	CST 240/30	
16	1	Interglas 92140	overall
17	4	CST 240/30	up to baggage bulkhead
18	2	Interglas 92125	stringer covering
19	1	Interglas 92125	up to baggage bulkhead
20	1	Interglas 92125	sidewalls only
21	1	Interglas 92140	bottom only
22	1	Interglas 92125	bottom only
23	1	Interglas 92140	sidewalls only

[1] from AT01-100A/B/C-328; finish layer neglectable for repairs

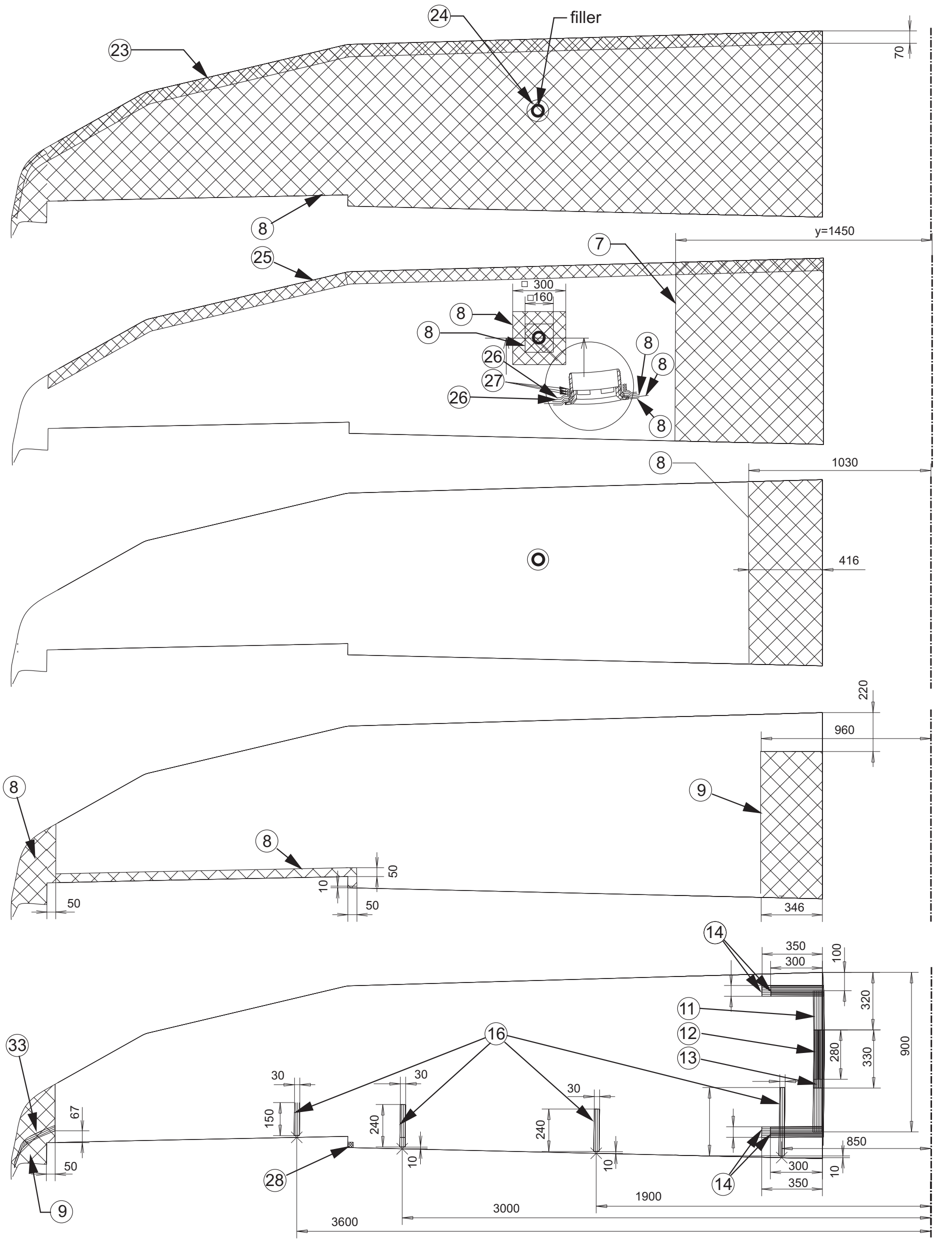


Fuselage Ply Lay-Up
Figure 202 (1)

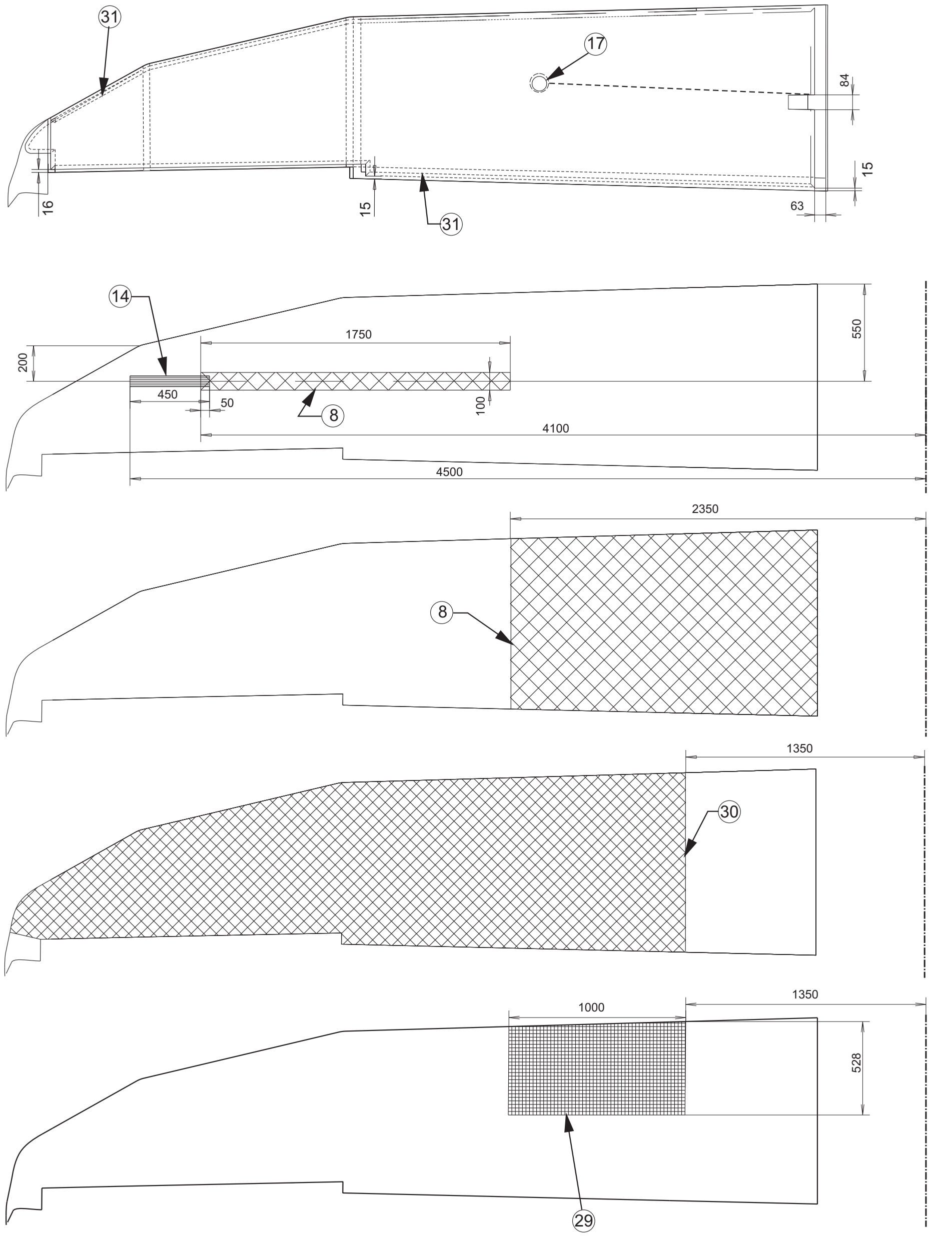


Fuselage Ply Lay-Up
Figure 202 (2)

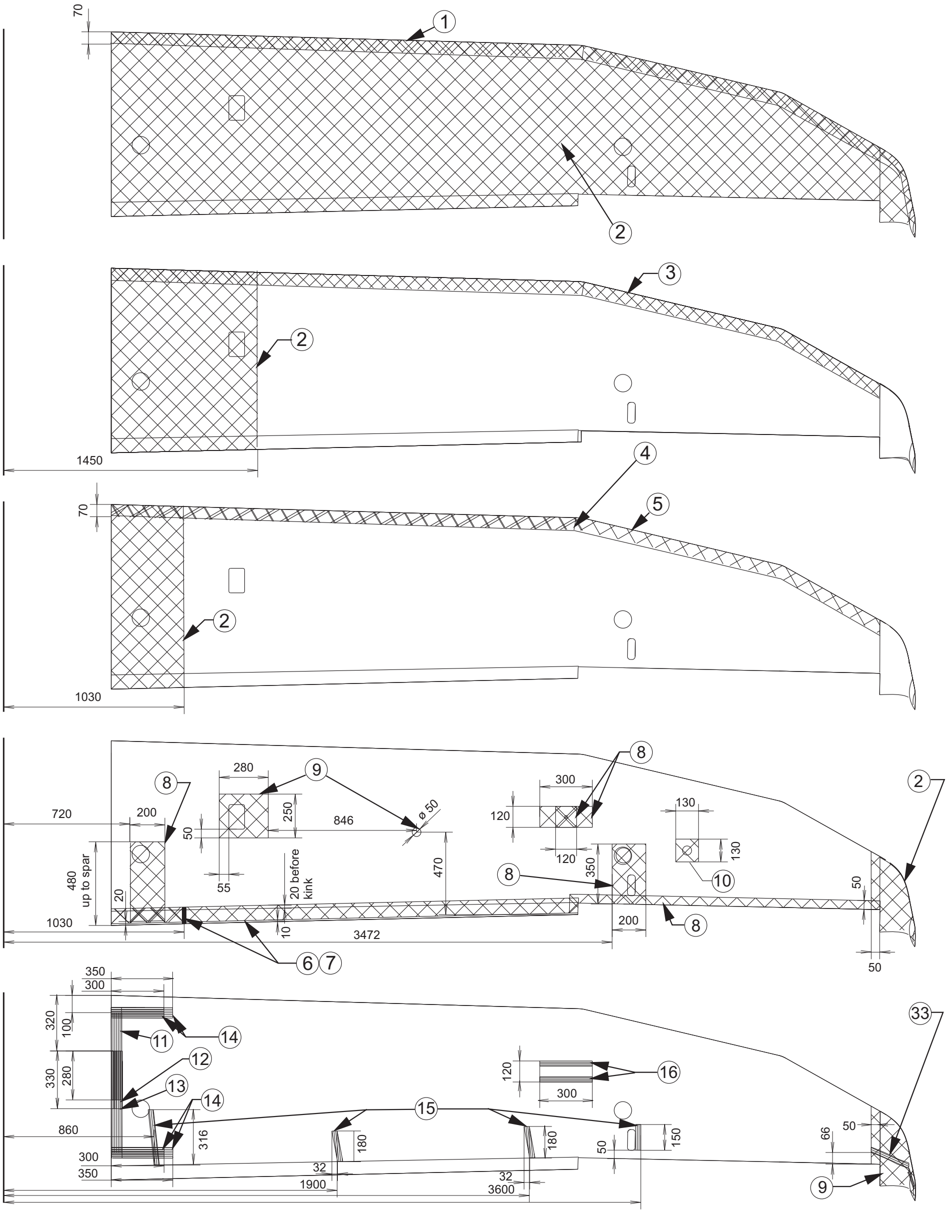
Item No.	Layers	Description	Remarks
1	1	Interglas 92110	width 110 mm
2	1	Interglas 92125	
3	1	Interglas 92125	width 100 mm strip, overlap in winglet area
4	1	Interglas 92125	
5	1	Interglas 92125	
6	2	Interglas 92125	up to aileron
7	1	Interglas 92125	up to y=1030 mm
8	1	Interglas 92125	
9	2	Interglas 92125	
10	2	Interglas 92125	only left-hand side
11	2	CST 240/60	length 800 mm
12	1	CST 240/60	length 280 mm
13	1	CST 240/60	length 330 mm
14	1	CST 240/60	
15	2	CST 240/30	obliquely outwards
16	2	CST 240/30	
17	2	roving 5x EC 14-2400 P185	
18	8	roving 5x EC 14-2400 P185	
19	6	roving 5x EC 14-2400 P185	
20	1	Interglas 90070	
21	1	Interglas 92110	from 1350 mm
22	1	Interglas 92125	up to 2350
23	1	Interglas 92110	
24	1	Interglas 92110	circle 123 mm x 63 mm, centered beneath filler
25	1	Interglas 92125	strip width 80 mm, overlap in winglet area
26		Interglas 92125	strip 240 mm x 50 mm, bent around filler
27	3	roving 5x EC 14-2400 P185	wrapped around filler
28	3	Interglas 92125	graduated by 5 mm
29	1	Interglas 90070	
30	1	Interglas 92110	
31		DH 60 - 08	rigid foam
32		Pregnit GGBE/GMBE	GFRP plate
33	2	CST 240/30	at 50% winglet depth, up to 60 mm before winglet end



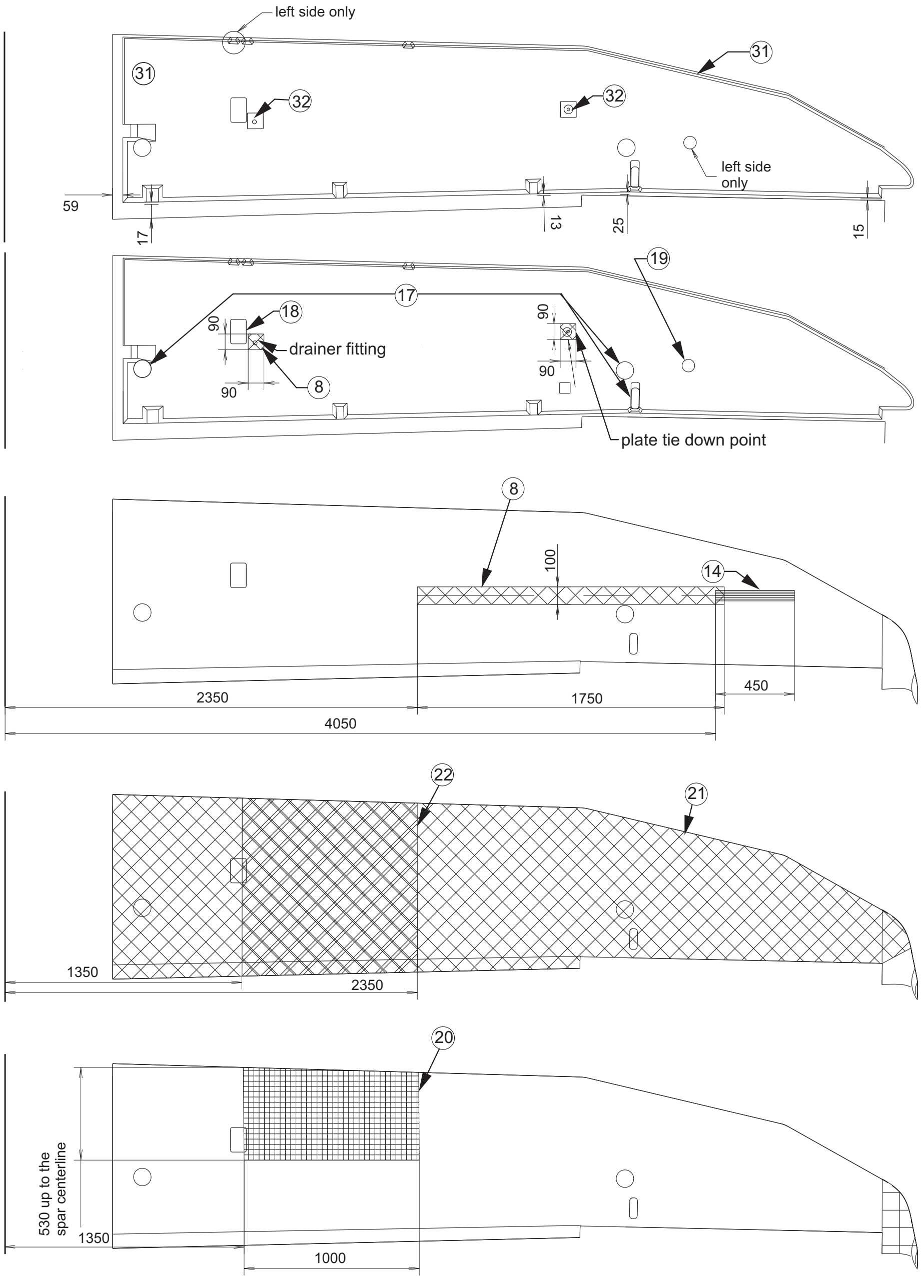
Upper Wing Shell Ply Lay-Up
Figure 203 (1)



Upper Wing Shell Ply Lay-Up
Figure 203 (2)



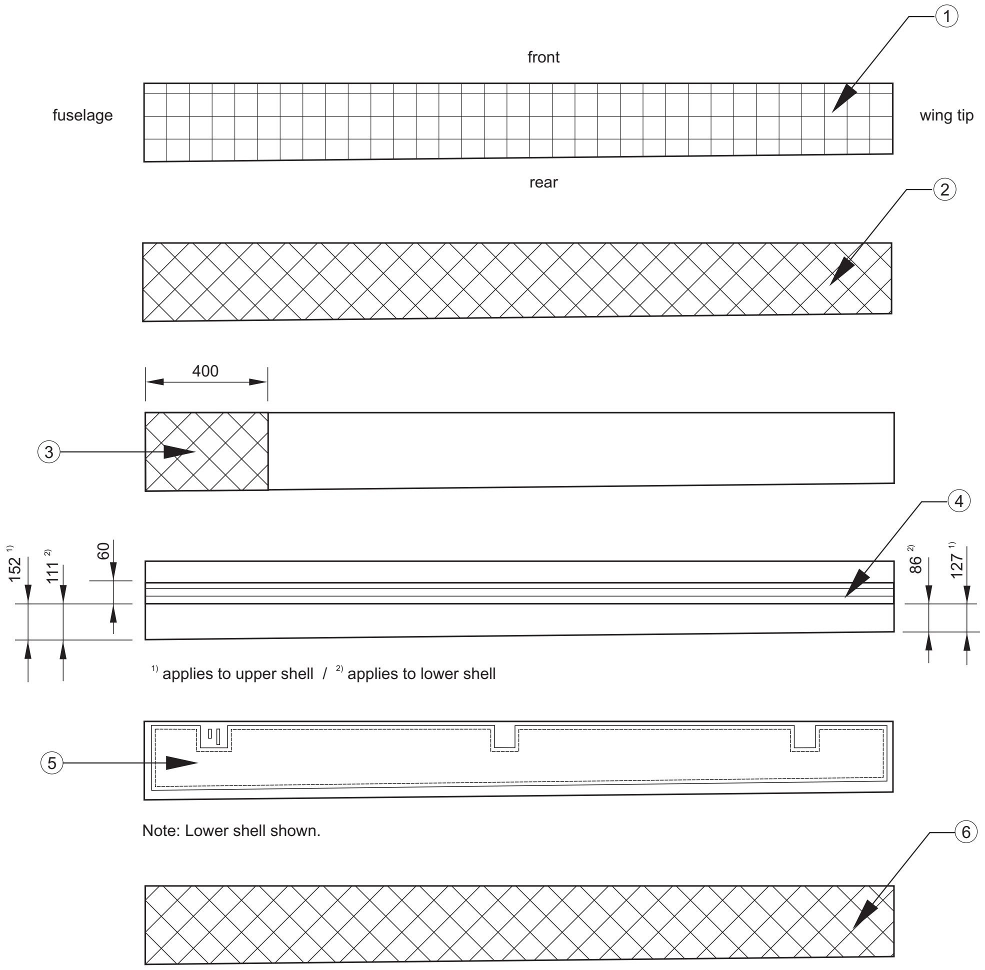
Lower Wing Shell Ply Lay-Up
Figure 203 (3)



Lower Wing Shell Ply Lay-Up
Figure 203 (4)

Item No.	Layers	Description	Remarks
1	1	Interglas 90070	overall
2	1	Interglas 98140	overall
3	1	Interglas 98140	width 400 mm (on fuselage side)
4	1	CST 240/60	
5	-	DH60-03	rigid foam
6	1	Interglas 98140	overall

Ply lay-up for upper / lower flap shell and LH / RH flap symmetrical.



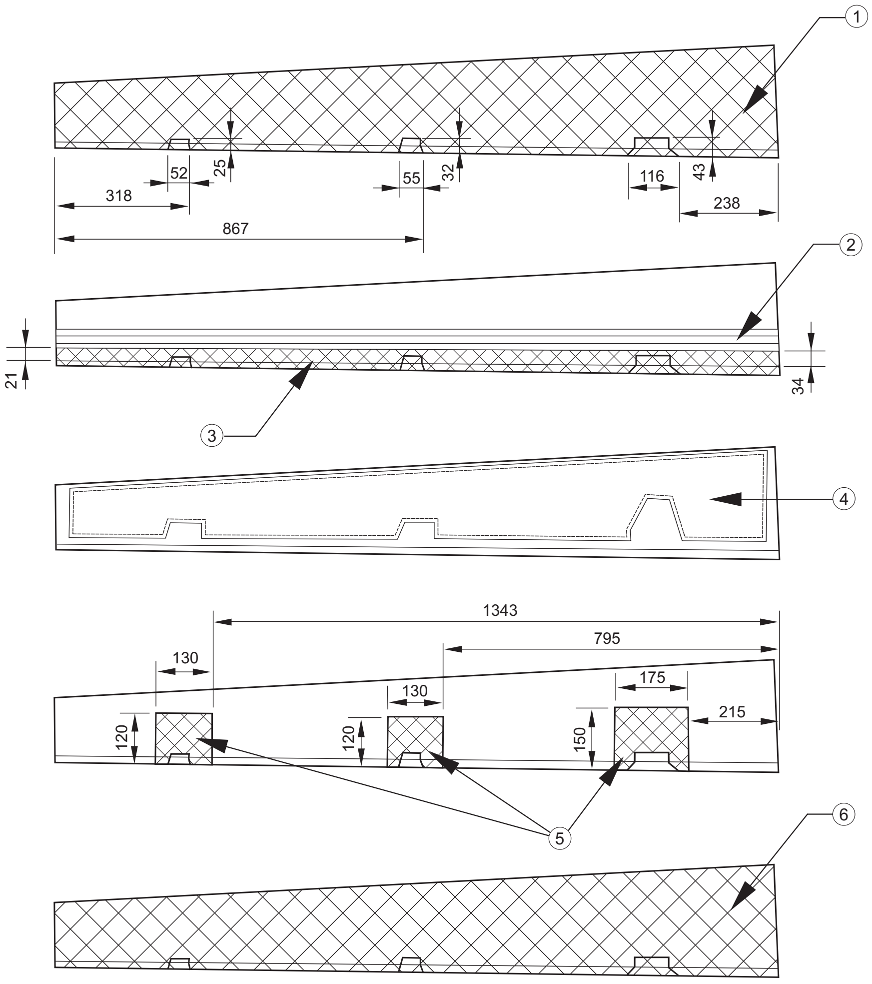
1) applies to upper shell / 2) applies to lower shell

Note: Lower shell shown.

Flap Shell Ply Lay-Up
Figure 204

Item No.	Layers	Description	Remarks
1	1	Interglas 92110	overall
2	2	CST 240/30	
3	2	Interglas 92125	
4	-	DH60-03	rigid foam
5	1	Interglas 92110	
6	1	Interglas 92110	overall

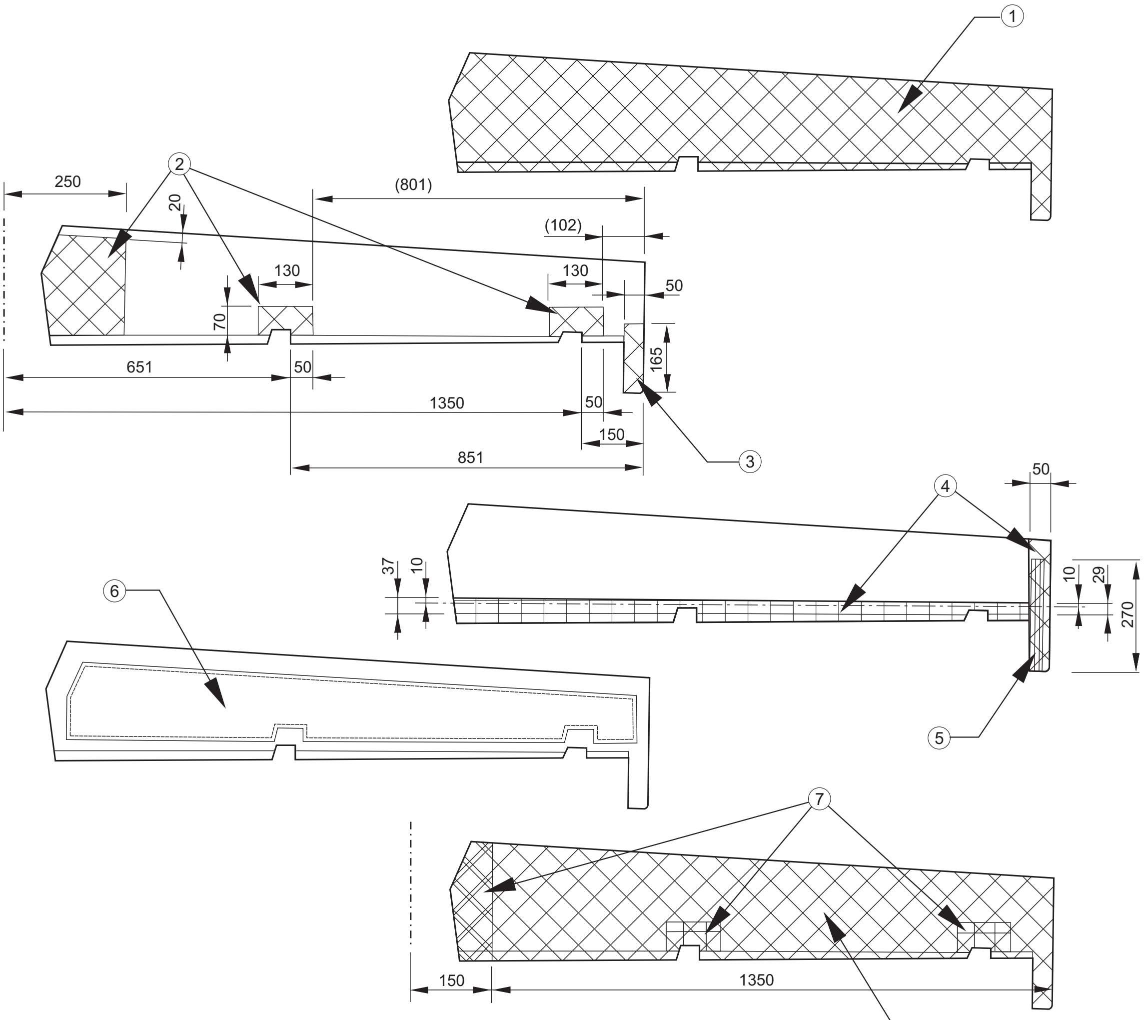
Ply lay-up for upper / lower aileron shell and LH / RH aileron symmetrical.



Aileron Shell Ply Lay-Up
Figure 205

Item No.	Layers	Description	Remarks
1	1	Interglas 92110	overall
2	1	Interglas 92110	
3	1	Interglas 92125	
4	1	Interglas 92125	
5	1	CST 240/30	
6	-	DH60-03	rigid foam
7	1	Interglas 92110	
8	1	Interglas 92110	overall

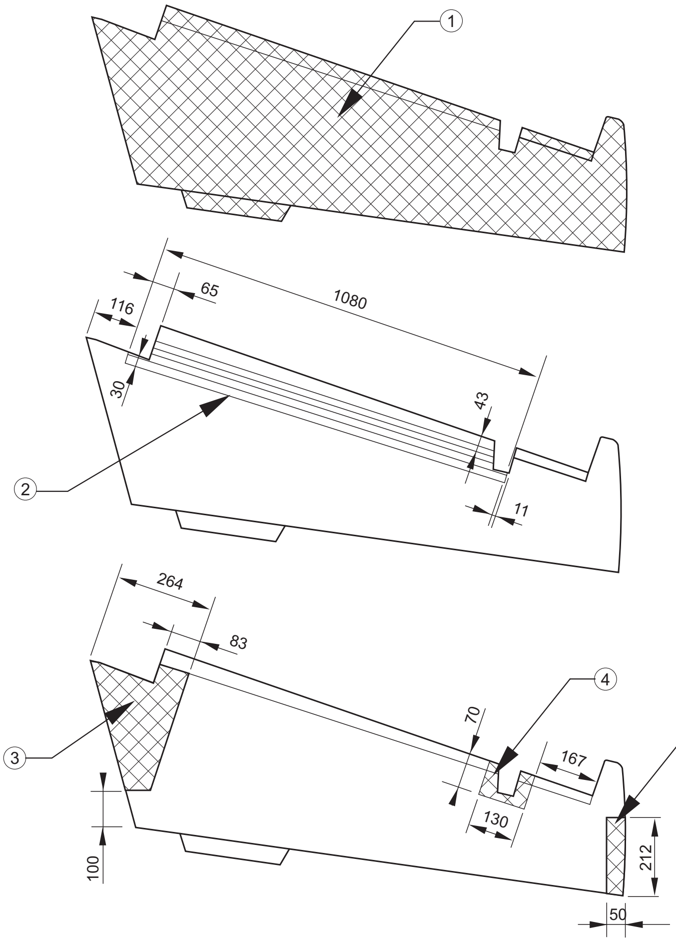
Ply lay-up for upper / lower elevator shell and LH / RH elevator symmetrical.



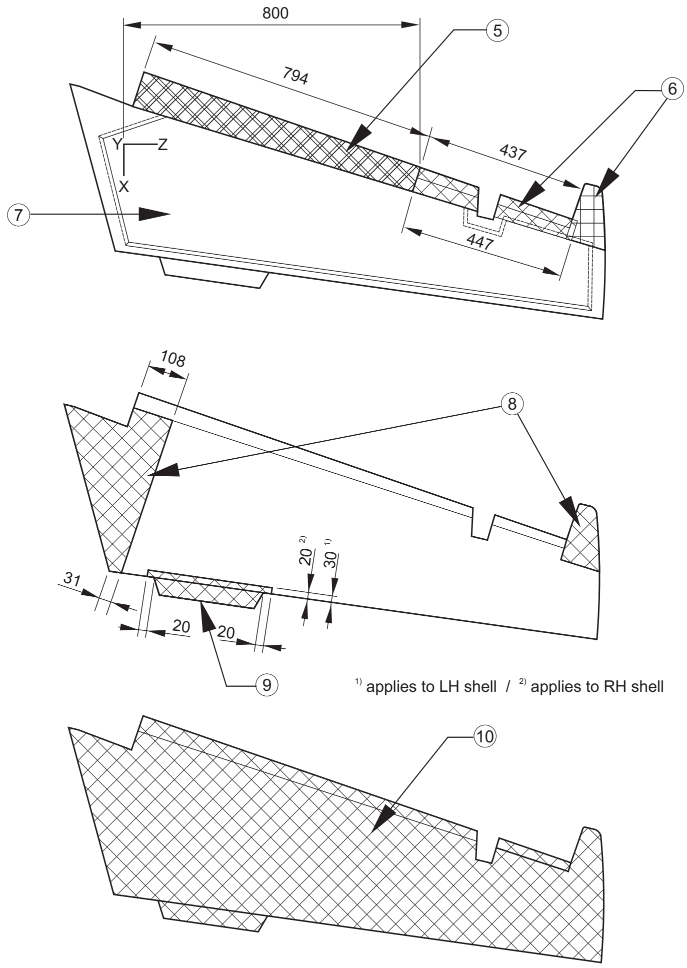
Elevator Shell Ply Lay-Up
Figure 206

Item No.	Layers	Description	Remarks
1	1	Interglas 92110	overall
2	1	CST 240/60	
3	2	Interglas 92110	
4	1	Interglas 92110	
5	4	Interglas 92125	
6	2	Interglas 92125	
7	-	DH60-03	rigid foam
8	1	Interglas 92110	
9	1	Interglas 92125	
10	1	Interglas 92110	overall

Ply lay-up for LH / RH rudder shell symmetrical.



Rudder Shell Ply Lay-Up
Figure 207 (1)



$^{1)}$ applies to LH shell / $^{2)}$ applies to RH shell

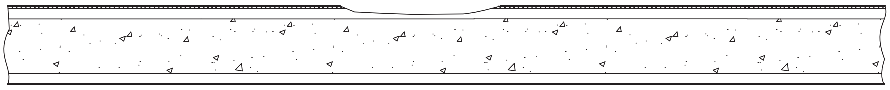
Rudder Shell Ply Lay-Up
Figure 207 (2)

6. Repair of Sandwich Components

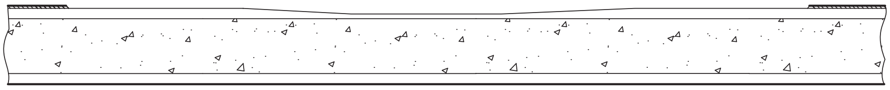
A. Material Specifications

Type	Material	Weave	Weight	Thickness	Scarf
Interglas 90070	glass	plain	80 g/m²	0,07 mm	4 mm
Interglas 92110	glass	2/2 twill	163 g/m²	0,14 mm	8 mm
Interglas 92125	glass	2/2 twill	280 g/m²	0,25 mm	14 mm
Interglas 92140	glass	2/2 twill	390 g/m²	0,35 mm	20 mm
Interglas 98140	carbon	plain	204 g/m²	0,26 mm	18 mm

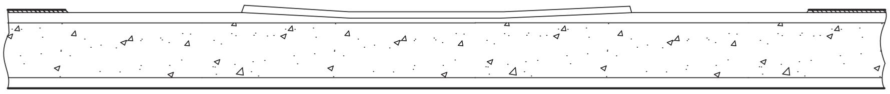
B. Outer Laminate Repair (surface defects)



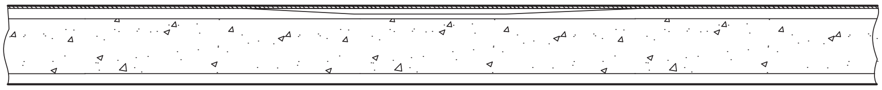
(1) Remove surface finish from damaged area. Carefully examine the area around the damage. Check for disbonding between laminate layers and core material.
(2) Remove damaged/loose laminate by sanding with 80-grit sandpaper.
(3) Scarf the edges of the repair area with a grinding disk or block (refer to “Material Specifications” above for scarf size).



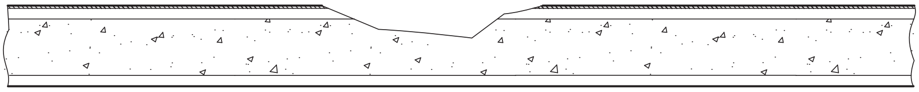
(4) Solvent clean prepared area.
(5) Lay up repair plies according to the existing layer direction (refer to “Material Data Sheet” above). If the layer orientation is not clear please contact AQUILA Aviation GmbH.



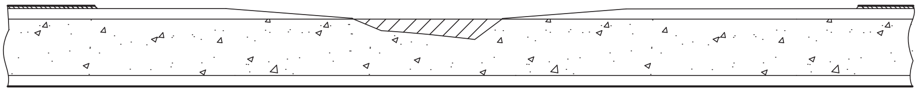
(6) Pre-cure the repair at least 24 hours at 20°C (68°F) to 25°C (77°F).
(7) Post-cure the repair at least 15 hours at 54°C (129°F) to 60°C (140°F).
(8) Sand the repair surface down to contour.
(9) Refenish the repair area as described in “Exterior Finish” below.



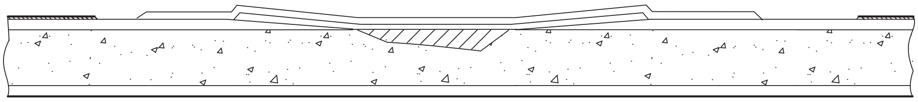
C. Minor Core Damage



(1) Remove surface finish from damaged area. Carefully examine the area around the damage. Check for disbonding between laminate layers and core material.
(2) Remove damaged/loose laminate by sanding with 80-grit sandpaper.
(3) Scarf the edges of the repair area with a grinding disk or block (refer to “Material Specifications” above for scarf size).
(4) Solvent clean prepared area.
(5) Fill the damaged foam area with resin thickened by microballoons and allow to cure.
(6) Sand the repair area down to contour.



(7) Solvent clean prepared area.
(8) Lay up repair plies according to the existing layer direction (refer to “Material Data Sheet” above). If the layer orientation is not clear please contact AQUILA Aviation GmbH.



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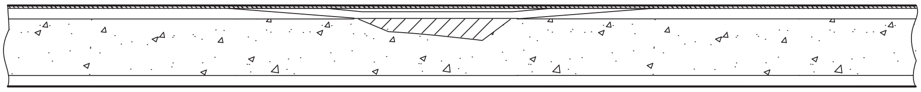
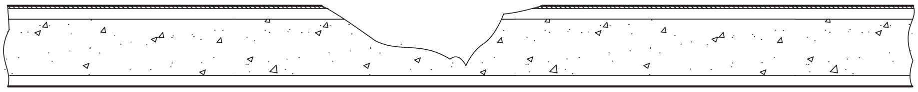
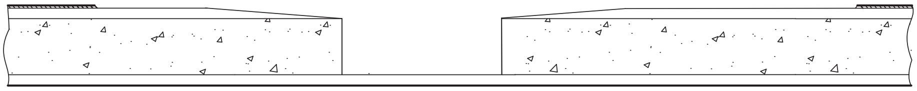
(9) Pre-cure the repair at least 24 hours at 20°C (68°F) to 25°C (77°F).
(10) Post-cure the repair at least 15 hours at 54°C (129°F) to 60°C (140°F).
(11) Sand the repair surface down to contour.
(12) Refenish the repair area as described in “Exterior Finish” below.



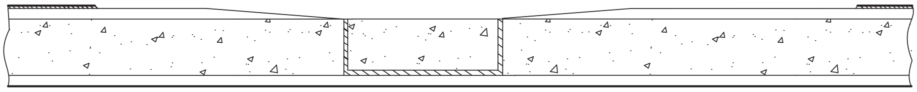
D. Core Replacement



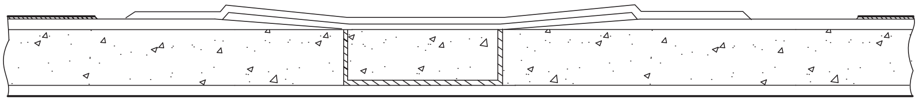
(1) Remove surface finish from damaged area. Carefully examine the area around the damage. Check for disbonding between laminate layers and core material.
(2) Remove damaged/loose laminate and core and carefully trim out to a circular or oval shape. Check edge of damage for separation of core and inner laminate. Check inner laminate for damage and repair first if required.
(3) Scarf the edges of the repair area with a grinding disk or block (refer to “Material Specifications” above for scarf size).



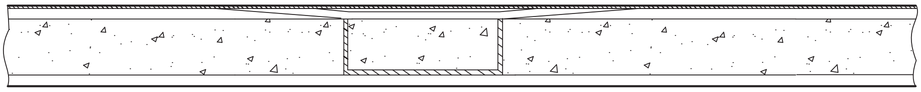
(4) Solvent clean prepared area.
(5) Prepare a replacement core (refer to “Material Data Sheet” above) and fit it snugly in the trimmed shape. Leave a small amount of clearance for resin microballoon mixture.
(6) Bond in replacement core with resin thickened by microballoons and allow to cure.



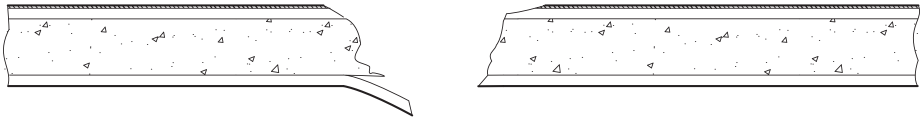
(7) Sand the replacement core down to contour.
(8) Solvent clean prepared area.
(9) Lay up repair plies according to the existing layer direction (refer to “Material Data Sheet” above). If the layer orientation is not clear please contact AQUILA Aviation GmbH.



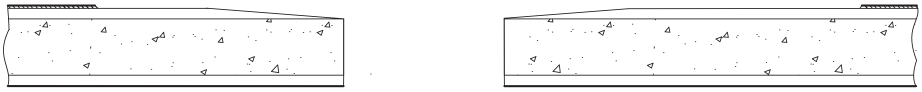
(10) Pre-cure the repair at least 24 hours at 20°C (68°F) to 25°C (77°F).
(11) Post-cure the repair at least 15 hours at 54°C (129°F) to 60°C (140°F).
(12) Sand the repair surface down to contour.
(13) Refenish the repair area as described in “Exterior Finish” below.



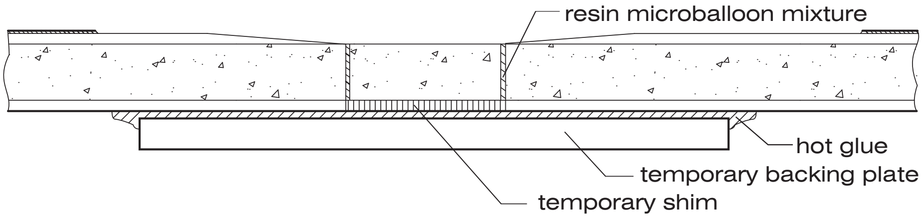
E. Inner Laminate Repair (sandwich penetration, access to inner side)



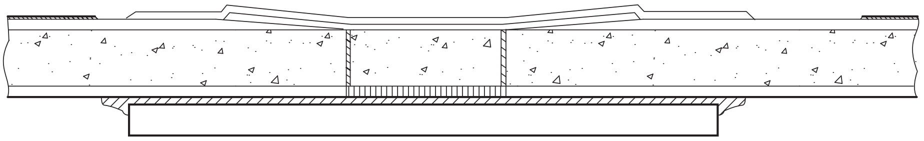
(1) Remove surface finish from damaged area. Carefully examine the area around the damage. Check for disbonding between laminate layers and core material.
(2) Remove damaged/loose laminate and core and carefully trim out to a circular or oval shape. Check edge of damage for separation of core and inner laminate.
(3) Scarf the edges of the repair area with a grinding disk or block (refer to “Material Specifications” above for scarf size).



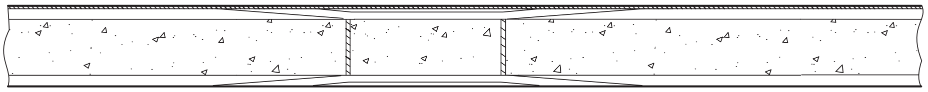
(4) Solvent clean repair area.
(5) Prepare a temporary backing plate and shim and glue it to inner laminate.
(6) Prepare a replacement core (refer to “Material Data Sheet” above) and fit it snugly in the trimmed shape. Leave a small amount of clearance for resin microballoon mixture.
(7) Bond in replacement core with resin thickened by microballoons and allow to cure.



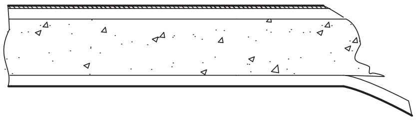
(8) Sand down the replacement core to contour.
(9) Solvent clean repair area.
(10) Lay up outer repair plies according to the existing layer direction (refer to “Material Data Sheet” above). If the layer orientation is not clear please contact AQUILA Aviation GmbH.



(11) Pre-cure the repair at least 24 hours at 20°C (68°F) to 25°C (77°F).
(12) Post-cure the repair at least 15 hours at 54°C (129°F) to 60°C (140°F).
(13) Sand the repair surface down to contour.
(14) Complete by scarfing and laminating opposite facing in a similar manner.
(15) Refenish the repair area as described in “Exterior Finish” below.

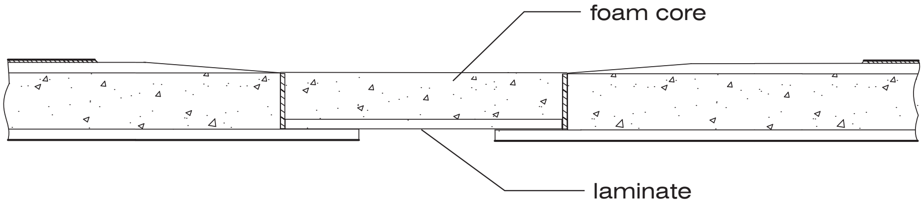


F. Inner Laminate Repair (sandwich penetration, no access to inner side)

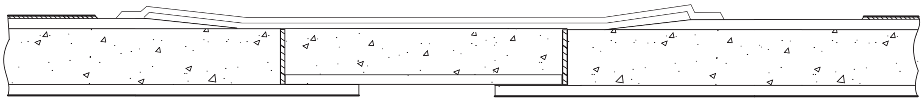


(1) Remove surface finish from damaged area. Carefully examine the area around the damage. Check for disbonding between laminate layers and core material.
(2) Remove damaged/loose outer laminate and core where no secure bond between core and laminate is suspected (circular or oval shaped hole). If necessary enlarge cut out to prepare an overlap in inner laminate of at least 20mm (0.8 inch). Check edge of damage for separation of core and inner laminate.
(3) Scarf the edges of the external repair area with a grinding disk or block (refer to “Material Specifications” above for scarf size).

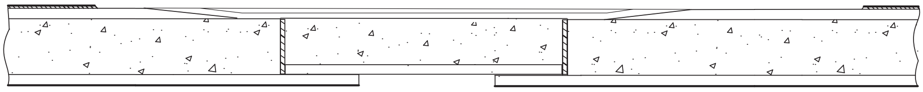
(4) Solvent clean repair area.
(5) Prepare a replacement core (refer to “Material Data Sheet” above) and fit it snugly in the trimmed shape. Leave a small amount of clearance for resin microballoon mixture.
(6) Prepare the foam core for inserting in the repair:
    (a) Apply a thin coat of resin to the foam core.
    (b) Apply a coat of resin thickened with microballoons to the foam core.
    (c) Laminate the inner layers onto the inner surface of the foam core. Make sure that layer orientation is correct (refer to “Material Data Sheet” above).
(7) Apply a thin coat of resin to the repair area.
(8) Put the foam core and inner laminate into position in the repair.



(9) Pre-cure the repair at least 24 hours at 20°C (68°F) to 25°C (77°F).
(10) Sand down the replacement core to contour.
(11) Solvent clean repair area.
(12) Apply a coat of resin thickened by microballoons to the foam core.
(13) Apply a thin coat of resin to the scarfed edges of the repair area.
(14) Lay up outer repair plies according to the existing layer direction (refer to “Material Data Sheet” above). If the layer orientation is not clear please contact AQUILA Aviation GmbH.



(15) Pre-cure the repair at least 24 hours at 20°C (68°F) to 25°C (77°F).
(16) Post-cure the repair at least 15 hours at 54°C (129°F) to 60°C (140°F).
(17) Sand the repair surface down to contour.
(18) Refenish the repair area as described in "Exterior Finish" below.

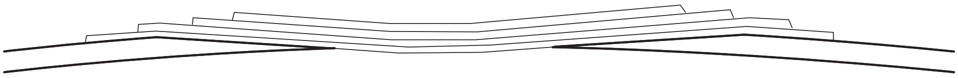


7. Repair of Monolithic Components

A. Monolithic Component Repair

(1) Remove surface finish from damaged area. Carefully examine the area around the damage. Check for disbonding between laminate layers.
(2) Scarf the edges of the repair area with a grinding disk or block (refer to "Material Specifications" above for scarf size).

(3) Solvent clean prepared area.
(4) Lay up repair plies according to the existing layer direction (refer to "Material Data Sheet" above). If the layer orientation is not clear please contact AQUILA Aviation GmbH.



(5) Pre-cure the repair at least 24 hours at 20°C (68°F) to 25°C (77°F).
(6) Post-cure the repair at least 15 hours at 54°C (129°F) to 60°C (140°F).
(7) Sand the repair surface down to contour.
(8) Refenish the repair area as described in "Exterior Finish" below.

8. Exterior Finish

Prior painting over a repair, inspect the repair to ensure that it has hardened completely and has been properly contoured.

CAUTION: MASK OFF SURFACE AROUND REPAIR AREA THAT DOES NOT REQUIRE FILLING OR PAINT, PAY SPECIAL ATTENTION TO STATIC PORTS, ANTENNAS AND DRAIN HOLES.

A. Filler

NOTE: Filler should be used for repairing cosmetic blemishes and minor surface defects.

(1) Sand the application area with 240 to 280-grit dry sandpaper.
(2) Clean the application area with a suitable solvent.
(3) Mix filler thoroughly in accordance with the manufacturer's instructions.
(4) Apply filler with a clean applicator according to the manufacturer's instructions.
(5) When the filler has hardened, lightly sand the repair area with 280-grit sandpaper and then switch for final sanding to 360-grit sandpaper to remove all sanding scratches.

B. Paint

(1) Prepare the surface for paint by applying filler as required.
(2) Clean the application area with a suitable solvent.
(3) Visually inspect prepared surface for imperfections prior to painting.
(4) Mix and apply paint as recommended by the manufacturer.

CHAPTER 52

DOORS

TABLE OF CONTENTS

DOORS - GENERAL

1. Introduction

   A. This chapter describes the canopy and the baggage door. It includes items such as structure, latching mechanism and maintenance instructions.

2. General Description

   A. The canopy consists of a composite frame and a large one-piece acrylic glass window which are bonded together. The window has two direct vision panels that can be opened in flight. The canopy moves up and forward to open. A latching mechanism holds the canopy closed by two latching pins. The canopy is locked from the outside with a key lock.

   B. The baggage door is located on the left side of the fuselage, just aft of the wing. It is made of composite materials. The door allows easy access to the baggage compartment. The baggage door is hinged on the forward edge and latched on the rear edge. The door is locked from the outside with a key lock.

CANOPY - MAINTENANCE

1. General

A. The canopy consists of a frame fabricated from carbon fiber laminate and rovings, and a large one-piece acrylic glass window which are bonded together. The window has two direct-vision panels, one on each side. The direct-vision panels can be opened in flight.
The canopy is mounted to a tubular steel frame at the front. The frame attaches to two hinges on the rear face of the firewall. The canopy moves up and forward to open. A gas strut will help raise the canopy to the full up position and holds the canopy open.

B. The canopy latching mechanism is shown in figure 201. It incorporates two latching pins, one on either side, and an inner and outer door handle in the left canopy frame. Rotating the door handle either from inside or outside the aircraft, either inserts or retracts the two latching pins into or out of the receivers in the fuselage. The right pin operates synchronously via a push-pull cable that runs inside the canopy frame. Roll pins hold the latch in the fully latched position.

2. Canopy Removal/Installation

A. Remove Canopy
(1) Open canopy.
(2) Remove flexible air hose from canopy frame.
(3) While helpers support the canopy, remove four hex bolts securing the canopy to the hinge frame and lift the canopy clear of the aircraft.

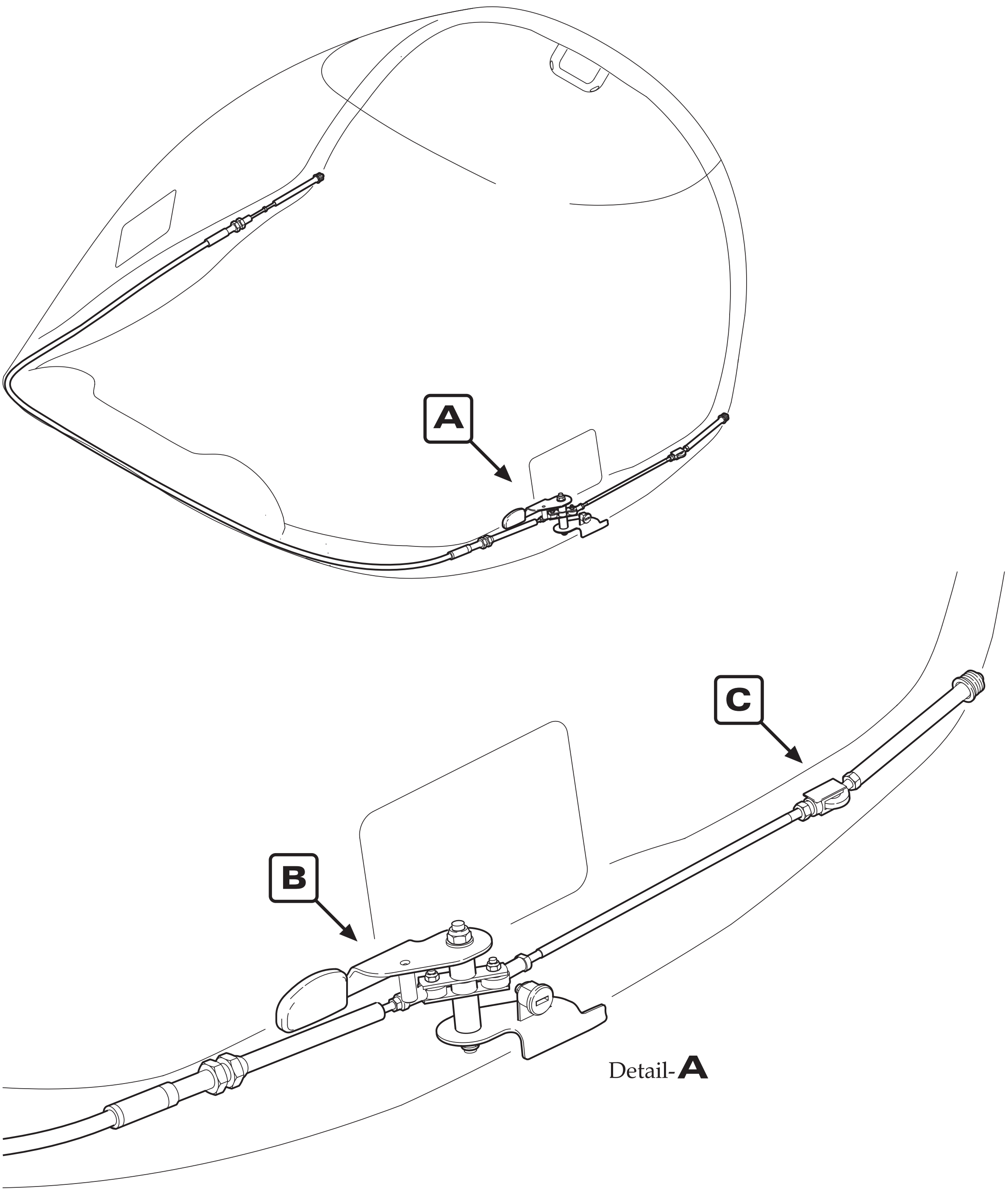
B. Install Canopy
(1) Lift canopy into position on the aircraft.
(2) Install washers and hex bolts securing the canopy to the hinge frame.
(3) Install flexible air hose to canopy frame.

3. Canopy Latching Mechanism Maintenance (Ref. Fig. 201)

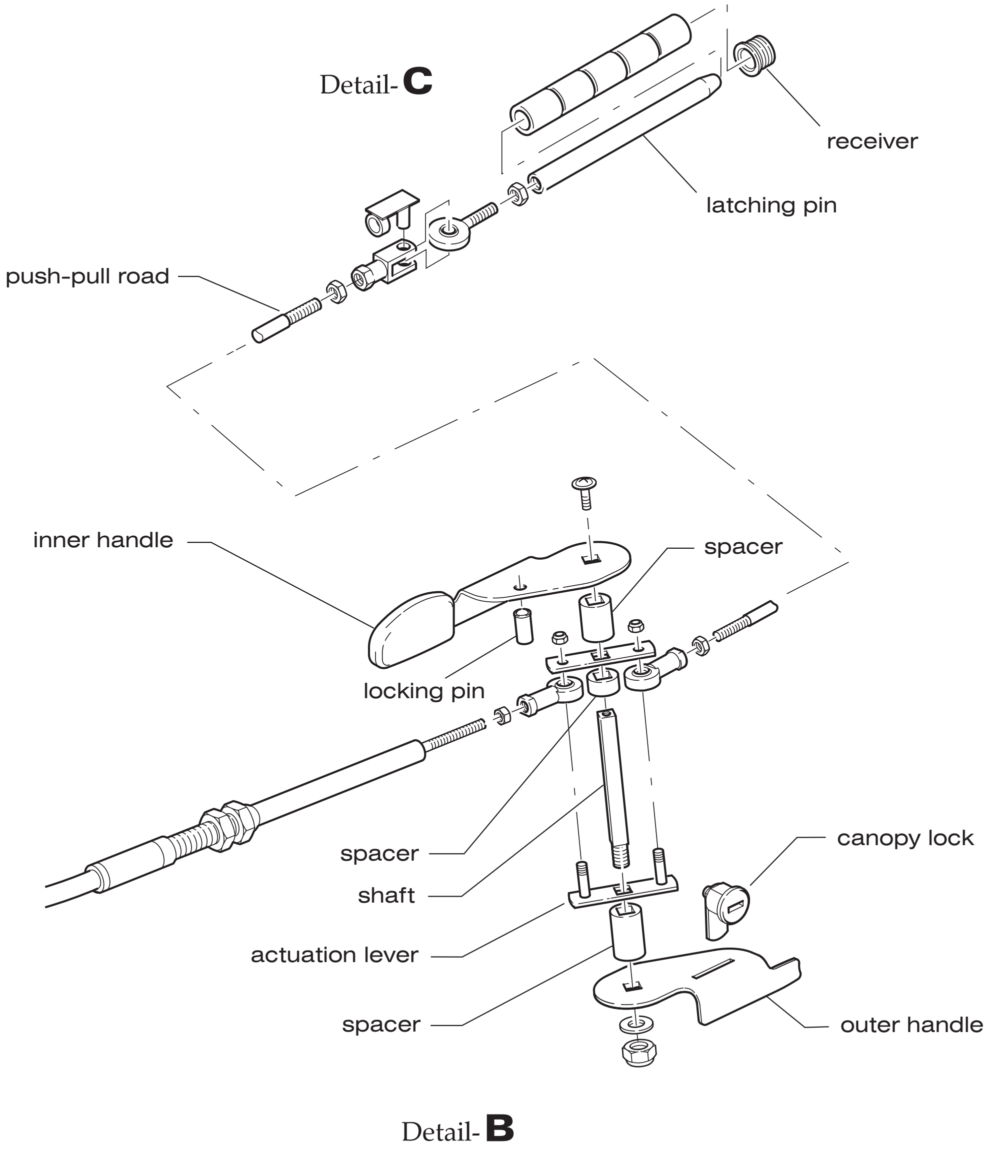
A. Access Canopy Latching Mechanism
To gain access to the central portion of the canopy latching mechanism, remove screws securing the covering to canopy frame and remove covering.

CAUTION: THE DRIVESHAFT OF THE CANOPY LOCKING MECHANISM MAY FALL DOWN WHEN REMOVING THE ATTACHMENT SCREW.

B. Adjust Latching Pin
(1) Remove screws securing the covering to the canopy and remove covering.
(2) Remove the bolt, securing appropriate rod end to the actuation lever.
(3) Turn the rod end in the corresponding direction.
(4) Reconnect rod end to the actuation lever using bolt, washer and nut.
(5) Check proper functioning of the canopy latching mechanism. Repeat the above procedures as required.
(6) Install the covering to canopy frame using screws.



Canopy Latching Mechanism
Figure 201 (1)



Canopy Latching Mechanism
Figure 201 (2)

C. Install/Adjust Locking Pin

(1) Remove screws securing the covering to the canopy and remove covering.
(2) Clean thread of hole and locking pin with ethyl alcohol.
(3) Thoroughly apply epoxy resin to the thread tapped inside the GRP plate of the cover.
(4) Screw locking pin into cover, starting from outer side in downward direction. The locking pins spring loaded thrust pad has to face in upward direction. As initial setting adjust the locking pin so that the pin potrudes the surface of the cover by 2 mm.
(5) Reinstall covering to canopy frame using screws.
(6) Functional test of the canopy locking and fine adjustment of the locking pin:
    (a) If canopy locking latch is excessively tight and rough-running, the locking pin has to be turned slightly downward.
    (b) If canopy locking latch is too smooth-running, the locking pin has to be turned slightly upward.
(7) Cure bonded locking pin at approx. 20°C for at least 24 hours.
(8) Do a final functional test of the canopy locking mechanism.

NOTES: The bonded locking pin can be loosened with a gripper after removing the cover.

If the complete locking mechanism is too smooth-running, the inner friction of the locking mechanism can be increased by an additional tightening of the self-locking nut. If necessary, an additional Washer 1800125_8,4 (DIN 125, zinc-plated) can be installed between the washer of the self-locking nut and the outer canopy locking latch.

BAGGAGE DOOR - MAINTENANCE

1. General

   A. The baggage door is made of glass fiber laminate. It is hinged on the forward edge via two GFRP hinge arms and latched on the rear edge. The door is locked from the outside with a key lock.

2. Baggage Door Removal/Installation

   A. Remove Baggage Door
      (1) Open baggage door.
      (2) While supporting the baggage door, remove the cotter pins, bolts and washers securing the baggage door hinge arms to the fuselage.
      (3) Remove baggage door.

   B. Install Baggage Door
      (1) Lift baggage door into position on the aircraft.
      (2) Install bolts, washers and cotter pins securing the baggage door hinge arms to the fuselage.
      (3) Perform functional check of the baggage door latching mechanism.

CHAPTER 53

FUSELAGE

TABLE OF CONTENTS

FUSELAGE - GENERAL

1. Introduction

A. This chapter provides a description of the general fuselage structure. For systems and components installed in the fuselage structure, refer to the respective chapters in this manual.

2. General Description

A. The fuselage is a semi-monocoque structure made primarily of composite materials. The fuselage structure consists of two halves made from fiberglass laminate bonded along a centerline lap-joint. The vertical stabilizer is an integral part of the fuselage structure. Bulkheads and frames give the fuselage strength and stiffness.

The fuselage shells are primarily solid laminate (no foam) constructions. Only the area of the vertical stabilizer is made of fiberglass with a foam core. The fuselage skin is reinforced by four carbon-fiber stringers, arranged lengthwise through the entire fuselage.

FUSELAGE MAIN FRAME - DESCRIPTION

1. Description and Operation

This section describes those structural components which make up the main frame including firewall, bulkheads and ring frames.

A. Firewall
The firewall separates the engine compartment from the rest of the fuselage and supports various aircraft components on both the forward and aft sides. The firewall, constructed of a GFRP/CFRP composite sandwich, includes metal fittings for supporting the engine mount, and incorporates several hardpoints for the support of various engine and system components. The forward side has a fire protection lining that consists of an especially fire-resistant ceramic fleece and a stainless steel sheet.

B. Side Force Bulkhead
A sandwich-type bulkhead bonded into the fuselage belly in front of the seat bulkhead carries the side forces. It is a rigid GFRP molding.

C. Seat Bulkhead
The seat bulkhead is a rigid GFRP molding. It has layers of carbon cloth on the top and bottom faces. The bulkhead is bonded into the fuselage belly. To four hardpoints in the bulkhead structure are provided for the attachment of the main landing gear brackets.

D. Landing Gear Bulkhead
The landing gear bulkhead has a similar structure as the seat bulkhead. It carries the landing gear loads.

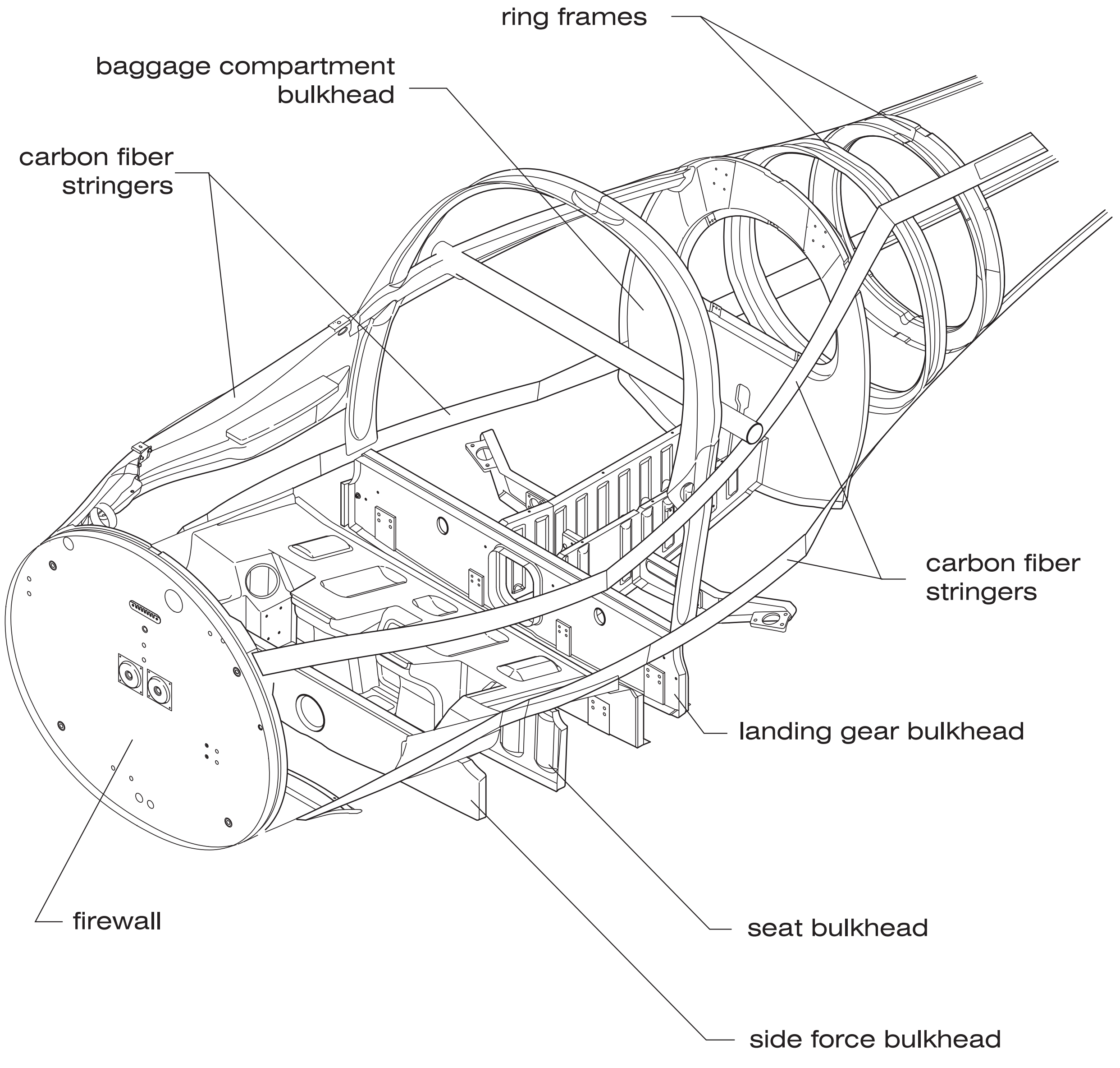
E. Roll-Over Bar
The landing gear bulkhead, which, together with the seat bulkhead, carries the main landing gear struts, is complemented upwards by a compact CFRP/GFRP roll-over molding.

F. Baggage Compartment Bulkhead
The baggage compartment bulkhead is a sandwich construction and made from GFRP. It forms the rear of the baggage compartment. The bulkhead bonds to the inner fuselage shells. The passenger seat shoulder harness is attached to the bulkhead.

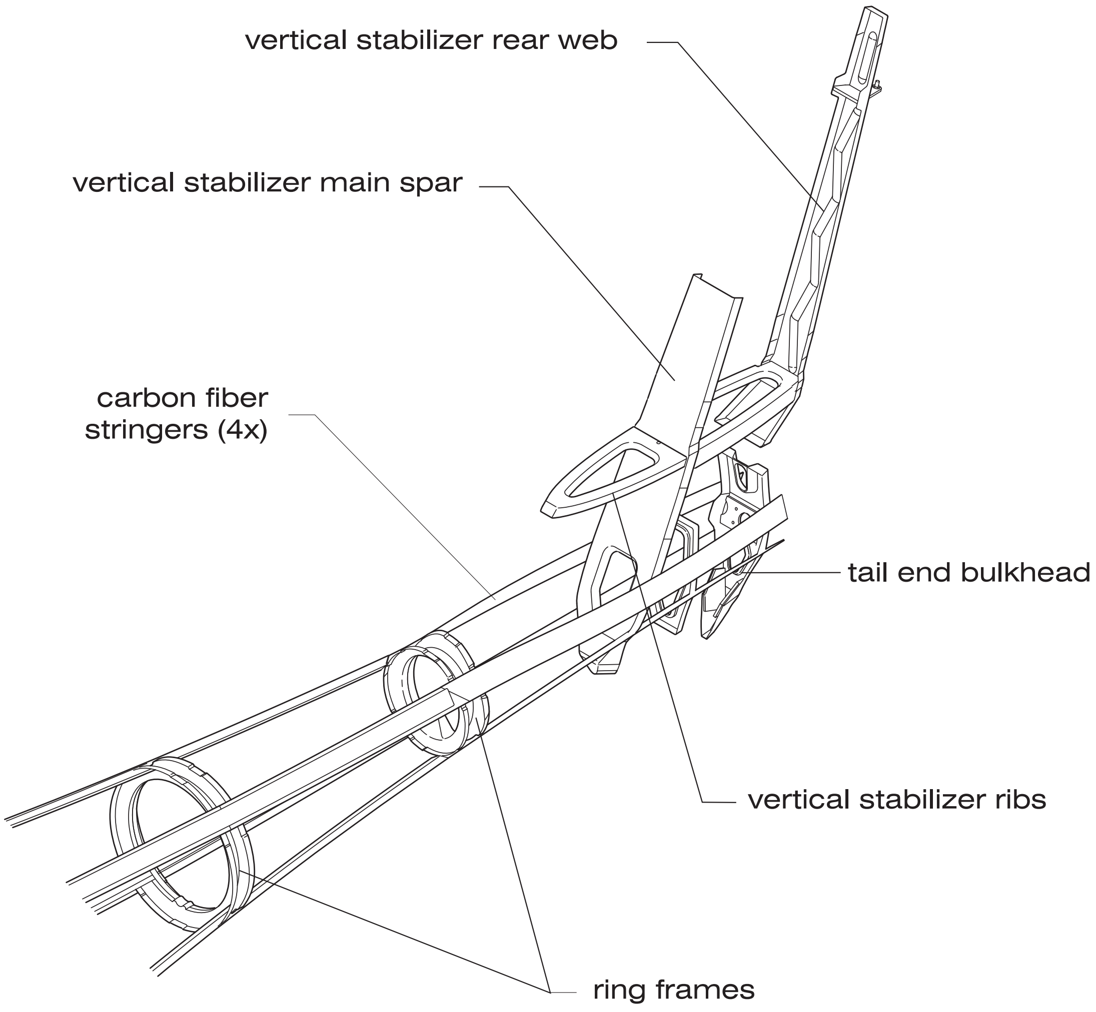
G. Ring Frames
The ring frames give the fuselage aft of the cockpit strength and stiffness. They are of rigid GFRP molding and bonded into the fuselage shells. They have holes for the rudder control cables and provide support for the elevator pushrod bearings.

H. Vertical Stabilizer Main Spar
The vertical stabilizer main spar is a rigid GFRP molding which bonds to the fuselage shell. It also bonds to the vertical stabilizer front and rear rib.

I. Vertical Stabilizer Rear Web
The vertical stabilizer rear web is a rigid GFRP molding, which bonds to the fuselage shell and to the vertical stabilizer rear web. The rear web assembly contains the top rudder mounting.



Fuselage Structure
Figure 201 (1)



Fuselage Structure
Figure 201 (2)

J. Vertical Stabilizer Ribs
The vertical stabilizer front and rear ribs are of rigid GFRP molding and bonded to the fuselage shells and to the vertical stabilizer main spar. The rear rib also bonds to the rear web.

K. Tail End Bulkhead
The tail end bulkhead is a rigid GFRP molding that is bonded to the fuselage shells. The bulkhead contains a reinforced area to which the lower rudder attachment bracket is bolted.

FUSELAGE MAIN FRAME - MAINTENANCE

1. General

   A. Maintenance of the fuselage is limited to the repair of the fuselage skin. Most areas of the fuselage skin are field-repairable, some areas are difficult to repair or require special procedures to ensure the structural integrity of the repair. Refer to chapter 51 for standard repair procedures and for repair data for the fuselage shells.

   B. If the damage area is inside the fuselage AQUILA Aviation GmbH must be contacted prior to beginning repair work.

   C. Repairs must be completed by competent technicians who are trained in composite repair.

AUXILIARY STRUCTURE - DESCRIPTION

1. Description and Operation

This section describes those structural components which make up the auxiliary structure including fuselage floor structure, center console, access panels and entry step.

A. Fuselage Floor Structure
The floor structure of the aircraft consists of a forward floor, a left and right baggage compartment floor, a left and right control stick cover and a left, right and center cover of the well of the landing gear. Forward floor and baggage compartment floors are foam core composite laminate panels designed to support flight and user loads. The covers of the well of the landing gear are composite laminate panels. Refer to 25-12-00 for an exploded view of the cabin interior.

B. Center Console
The center console consists of a left, right, upper forward, lower forward and aft composite laminate part and metal covers. Refer to 25-12-00 for an exploded view of the cabin interior.

C. Entry Step
The entry step is made of 28x1,5 mm [1.1x0.06 in.] steel tubes welded to a 3 mm [0.12 in.] steel flange. It is secured to the fuselage by 3 screws.

CHAPTER 55

STABILIZERS

TABLE OF CONTENTS

STABILIZERS - GENERAL

1. Introduction

A. This chapter describes the horizontal and vertical stabilizers as well as the structure of the elevator and rudder. Maintenance information is provided.

2. General Description

A. The empennage consists of a horizontal stabilizer, a two-piece elevator, a vertical fin and a rudder. All of the structural components are made from composite materials.
The horizontal and vertical stabilizers are of fully cantilever, semi-monocoque design consisting of spars, ribs and skin. The skin is bonded to the supporting structure. The vertical stabilizer is a composite structure and is an integral part of the main fuselage shell.

The aerodynamically and mass-balanced rudder is connected to the vertical stabilizer by two hinged brackets. The lower one has a yoke that drives the rudder via control cables.

The aerodynamically and mass-balanced elevator is attached to the horizontal stabilizer rear shear web at five hinge points. A torque tube connects the elevator halves.

HORIZONTAL STABILIZER - MAINTENANCE

1. General

   A. The horizontal stabilizer is of a fully cantilever, semi-monocoque design. The structure, made of composite materials, consists of a front spar, a rear shear web, root ribs and top and bottom shells. The shells have a GFRP skin with a rigid foam core. The horizontal stabilizer is molded to the fuselage. The rear shear web integrates hinge brackets for elevator attachment.

   B. Because the horizontal stabilizer is made from composite materials and is molded to the fuselage, no servicing is required.

ELEVATOR - MAINTENANCE

1. General

A. The two-piece elevator is made from composite materials. Each half has a top and a bottom shell which are bonded together. The shells have a sandwich structure with a rigid foam core. The following are bonded between the shells: a horn rip at the outer end, two hinge brackets in the front area and a rib at the inboard end. All structure components are GFRP moldings.
A mass balance weight is fastened to the outboard horn rib. A welded, two-piece torque tube assembly is bolted to the inboard rib. The elevator halves are mounted together by means of the torque tube assembly.

B. This section provides removal and installation instructions for the elevator assembly and procedures for elevator balancing.

2. Elevator Removal/Installation

A. Remove Elevator
(1) Remove rudder (refer to 55-40-00).
(2) Remove bellcrank/elevator mounting bolts, self-locking nuts, washers and spacers (3 places).
(3) Slide the elevator off the horizontal stabilizer hinge pins by sliding the elevator away from the fuselage.

B. Install Elevator
(1) Fit the elevator on to the hinge pins.
(2) Install bellcrank/elevator mounting bolts.
    (a) Position spacer between left and right torque tube assemblies.
    (b) Insert bolt from left side and install washer and new self-locking nut.
    (c) Install hinge bolt at center hinge from left. Ensure the spacers are in position. Install washer and new self-locking nut.
    (d) Reconnect elevator push-pull rod using hardware.
(3) Install rudder (refer to 55-40-00).
(4) Check proper elevator control system operation (refer to 27-30-00).

3. Adjustment - Elevator Balancing

Weighing and the determination of control surface moment should be performed after repairs or painting. The residual moment of the control surface and its maximum permissible total weight must be within the ranges as specified in 06-10-00.

To weigh a control surface, it must be removed from aircraft. Weighing can be accomplished using any convenient method.

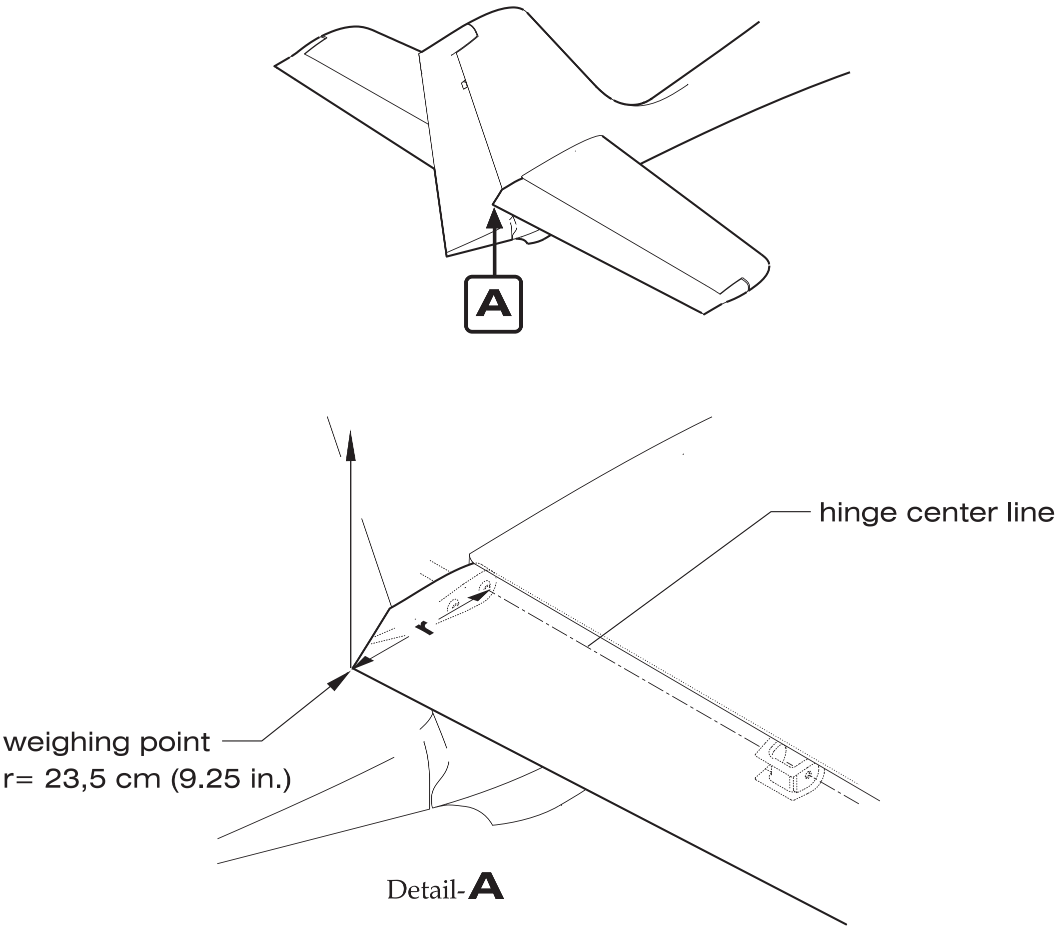
WARNING: CORRECT CONTROL SURFACE BALANCE IS IMPORTANT FOR FLIGHT SAFETY. OUT OF BALANCE CONTROL SURFACES CAN FLUTTER AND CAUSE STRUCTURAL FAILURE.

A. Elevator Balancing

<u>NOTE:</u> Calculate the static control surface moment as follows: M = F x r [Nm]

(1) Disconnect elevator assembly from elevator push-pull rod (refer to 27-30-00).
(2) Weigh by means of a conventional spring balance at the given weighing point (refer to figure 201).
  (a) Attach spring balance at weighing point. The initial position of the elevator for each measurement should be parallel to the chord line.

<u>NOTE:</u> The chord line is defined as the line extending from the trailing edge through the hinge line.



Detail-A

Elevator Balancing
Figure 201

(b) Raise the spring balance slowly until the control surface begins to move. Note the reading and the direction of the movement (i.e. 11,2 N up).

(c) Lower the spring balance slowly until the control surface begins to move down. Note the reading and the direction of the movement to (i.e. 11,8 N down).

(3) Calculate the moments as described above. Both results must be within the permitted limits.

VERTICAL STABILIZER - MAINTENANCE

1. General

   A. The vertical stabilizer is an integral part of the fuselage structure and is made from composite laminate materials. No servicing is required.

   B. For more information on fuselage structure, refer to 53-10-00.

RUDDER - MAINTENANCE

1. General

A. The rudder is made from composite materials. The assembly consists primarily of the left and right shells which are bonded together. The shells have a sandwich structure with a rigid foam core. The following are bonded between the shells: a horn rib at the rudder tip, a hinge rib near the top in the front area and and a hinge rib at the base. All structure components are GFRP moldings. A mass balance weight is fastened to the horn rib. The rudder bellcrank is bolted to the lower hinge rib.

B. This section provides removal and installation instructions for the rudder and rudder balancing procedures.

2. Rudder Removal/Installation

A. Remove Rudder
(1) Relieve tension on rudder control cables by loosening carry-through cable turnbuckles and disconnect from the rudder bellcrank.
(2) Remove castellated nut from hinge bolt at the base of rudder.
(3) Slide the rudder off the second hinge pin by lifting the rudder and remove from vertical stabilizer.

B. Install Rudder
(1) Put the rudder in position and install washer and castellated nut. Secure bolt with cotter pin.

NOTE: Make sure there is a washer on the hinge bolt before installing the rudder. Installing the rudder without this washer can cause the rudder to bind.

(2) Reconnect control cables to the rudder bellcrank.
(3) Adjust cable tension (refer to 27-20-00).
(4) Check proper rudder control function and adjustment and rig where necessary (refer to 27-20-00).

3. Adjustment - Rudder Balancing

Weighing and the determination of control surface moment should be performed after repairs or painting. The residual moment of the control surface and its maximum permissible total weight must be within the ranges as specified in 06-10-00.

To weigh a control surface, it must be removed from aircraft. Weighing can be accomplished using any convenient method.

WARNING: CORRECT CONTROL SURFACE BALANCE IS IMPORTANT FOR FLIGHT SAFETY. OUT OF BALANCE CONTROL SURFACES CAN FLUTTER AND CAUSE STRUCTURAL FAILURE.

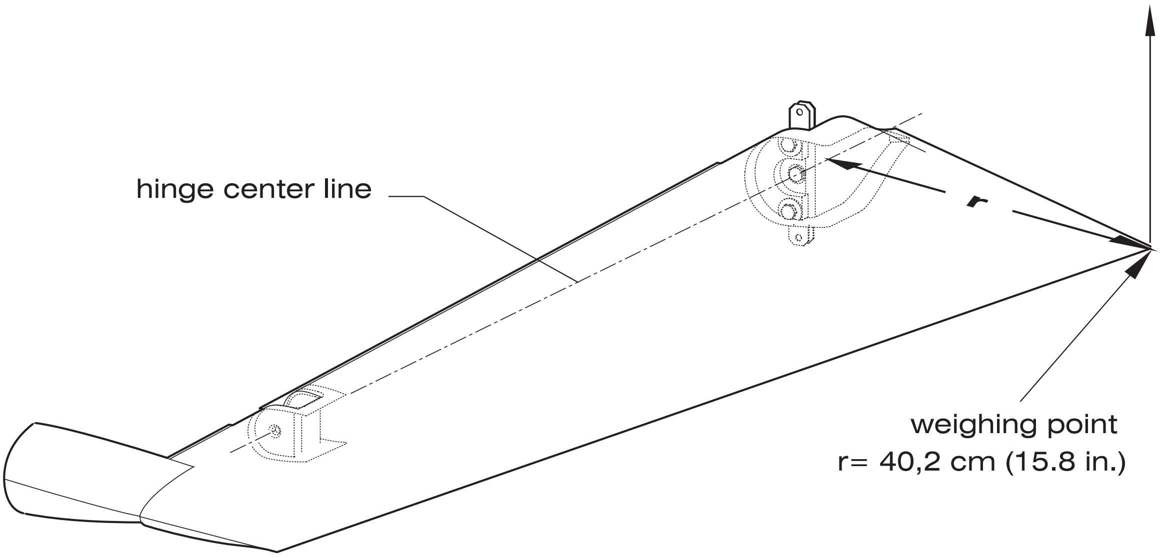
A. Rudder Balancing

NOTE: Calculate the static control surface moment as follows: M = F x r [Nm]

(1) Remove rudder from aircraft (refer to “Rudder Removal/Installation” above).
(2) Use any suitable method to support the rudder horizontally at the pivot axis so it can rotate freely around the pivot axis.
(3) Weigh by means of a conventional spring balance at the given weighing point (refer to figure 201).
    (a) Attach spring balance at weighing point. The initial position of the elevator assembly for each measurement should be parallel to the chord line.

    NOTE: The chord line is defined as the line extending from the trailing edge through the hinge line.

    (b) Raise the spring balance slowly until the control surface begins to move. Note the reading and the direction of the movement (i.e. 11,2 N up).
    (c) Lower the spring balance slowly until the control surface begins to move. Note the reading and the direction of the movement to (i.e. 11,8 N down).
(3) Calculate the moments as described above. Both results must be within the permitted limits.



Rudder Balancing
Figure 201

CHAPTER 56

WINDOWS

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WINDOWS - GENERAL

1. Introduction

A. This chapter describes the acrylic glass windows of the canopy and the fuselage.

B. Refer to 52-10-00 for information on the canopy structure.

C. Refer to 12-23-00 for information on cleaning and care of acrylic glass windows.

2. General Description

A. The aircraft has two windows. The one-piece canopy window covers the cockpit and is also the windscreen. The window has two direct-vision panels, one on each side, which can be opened in flight. The second window covers the rear section of the cabin.
Both windows are molded acrylic glass (plexiglass). A high-performance elastic adhesive bonds each window to the structure.

FLIGHT COMPARTMENT WINDOWS - MAINTENANCE

1. General

A. This section describes the repair of damaged acrylic glass windows.

B. A properly carried out repair is essential to preserve the optical properties of acrylic glass windows. Personnel must be familiar with repair practices prior to attempting acrylic glass repairs on the aircraft.

CAUTION: DO NOT USE ANY ORGANIC SOLVENTS SUCH AS THINNER, FUEL OR ALCOHOL ON ACRYLIC GLASS!

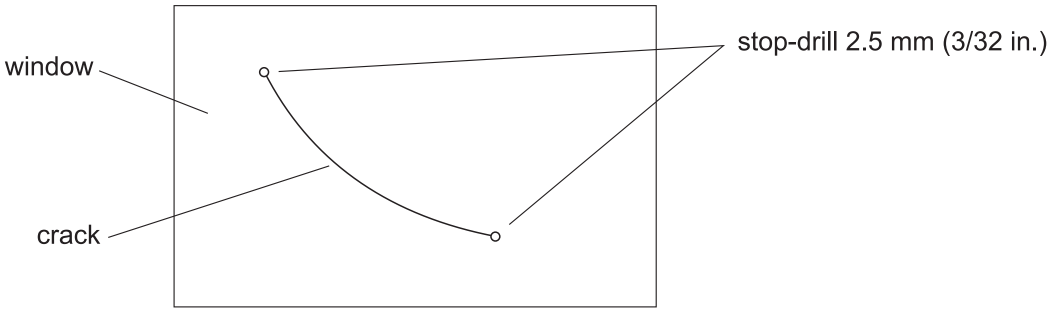
2. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
3.C.	1	small high-speed rotary grinder	-	commercially available
3.C.	as required	filler or or	Acrifix 192 Tensol cement No. 70 Agovit 1900	commercially available
3.C.	as required	masking tape	-	commercially available
3.C.	as required	plastic adhesive tape	-	commercially available
3.C.	1	cold ultra-violet light source (only for Acrifix 192)	-	commercially available
3.C.	as required	wet abrasive paper	Micro Mesh 3200 Micro Mesh 8000	commercially available
3.C.	1	rubber block	-	commercially available
3.C.	as required	polish	Xerapol	commercially available
3.C.	as required	finish	-	commercially available
3.C.	as required	polishing cloth	-	commercially available

3. Window Repairs

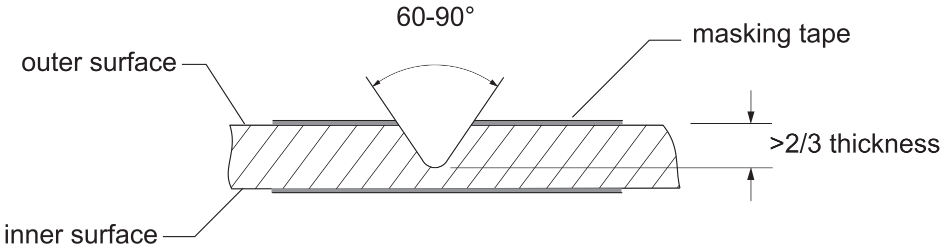
A. Damage Limits
Maximum crack length: 150 mm (6 in.)
Do not repair cracks which are located in the pilot's forward field of view.

B. Temporary Repairs
(1) Stop-drill the ends of short cracks. Use a 2,5 mm (3/32 in.) drill.



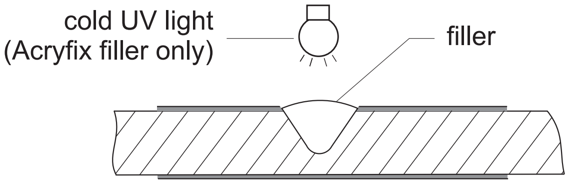
(2) Repair the crack not later than the next 100-hour inspection.

C. Permanent Repairs
(1) Remove canopy (refer to 52-10-00).
(2) Put canopy on a firm working surface with the crack horizontal.
(3) Put protective covers over the inside of the cockpit.
(4) Mask area around the crack on both inner and outer surfaces.
(5) Cut a groove along the crack in the outer surface of the window.



(6) Countersink temporary stop drill holes.
(7) Seal the stop-drill holes on the inner surface. Use plastic adhesive tape.
(8) Apply filler to the groove and the stop drill holes.

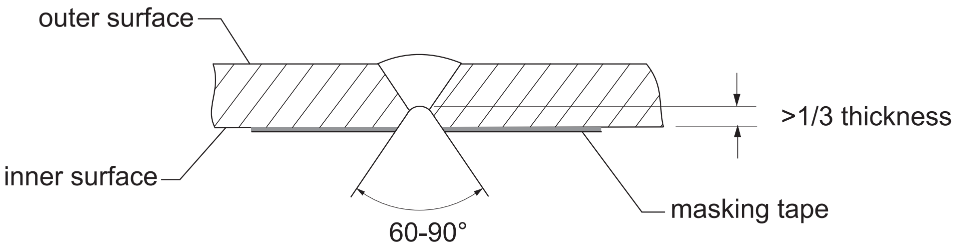
NOTE: Fillers become smaller when they cure. Apply enough filler to be above the level of the window surface. Cut the filler back when it has cured.
Keep the filler in place with plastic adhesive tape when repairing a vertical crack.
Apply a second coat of filler after the first coat has cured.



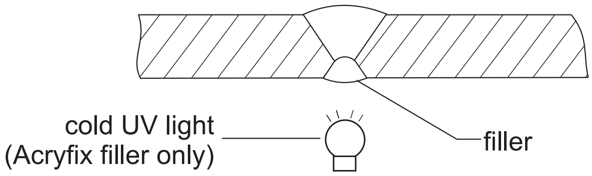
(9) Let the filler cure (refer to manufacturer's instructions).
(10) If possible, turn the window so that the inner surface is up. Remove any plastic adhesive tape.

(11) Cut a groove along the crack in the inner surface of the window.

NOTE: This groove is less deep than the outer surface groove. It must cut into the outer layer of filler. This prevents holes in the filler.

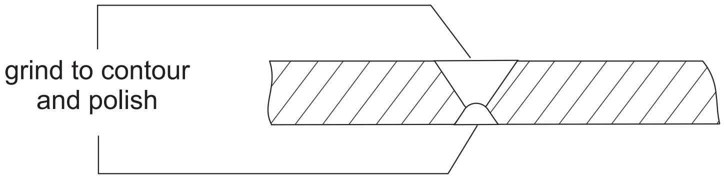


(12) Countersink the filler in the stop drill holes on the inner surface to 1 mm (0.04 in.).
(13) Apply filler to the groove and the stop drill holes.



(14) Let the filler cure (refer to manufacturer's instructions).
(15) Remove the masking materials.
(16) Grind the filler on inner and outer side to the profile of the surface using wet abrasive paper and a sanding block.

NOTE: Grains of sand between the acrylic glass surface and the abrasive paper can cause deep scratches. Abrasive paper must not crinkle or crease. When changing to a finer grain size grind crosswise to the previous grinding direction.



(17) Polish the repair area using polish and a polishing cloth.

NOTE: Polishing cloths have to be dust-free. Use only single-use cloths.
Use finish to remove residual polish and to seal the surface.

CHAPTER 57

WINGS

TABLE OF CONTENTS

WINGS - GENERAL

1. Introduction

A. This chapter describes the wing, flaps and aileron structures. It also provides maintenance information.

2. General Description

A. The wings are made from composite materials which provide very smooth and seamless flight surfaces. They are of a cantilever, semi-monocoque design, with a one-piece main spar, ribs and shear webs covered with top and bottom shells. The wing trailing edge contains conventional ailerons and flaps. Each wing incorporates an integral fuel tank which is located in front of the main spar at the inboard portion of the wing.

WINGS - MAINTENANCE

1. General

A. The wing structure is shown in figure 201. The wing main spar is made in one piece. The I-section spar has caps made from unidirectional carbon-fiber and a GFRP composite sandwich web.
The ribs, including the flap control ribs and the shear webs are of a rigid GFRP molding. The wing top and bottom shells are bonded to the spar, ribs and aft shear web forming a torsion box that carries all of the wing bending and torsion loads. Each shell has a sandwich structure with a rigid foam core.
The wing main spar passes under the fuselage below the two seats. Each wing half ends inboard with a front root rib and a rear root rib which are mounted to the fuselage center section with a bolt each.
The four lateral force bolts are inserted from the cabin through the fuselage bushings into the wing bolt casings and secured axially with screws. The bushes and bolts transfer shear loads into the fuselage center section.

B. The section provides removal and installation instructions for the wings and the wing bolts.

2. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
3.A./B.	1	Wing stand	-	AQUILA Aviation Int. GmbH
3.A./4.A	1	Wing attachment bolt removal tool	-	AQUILA Aviation Int. GmbH

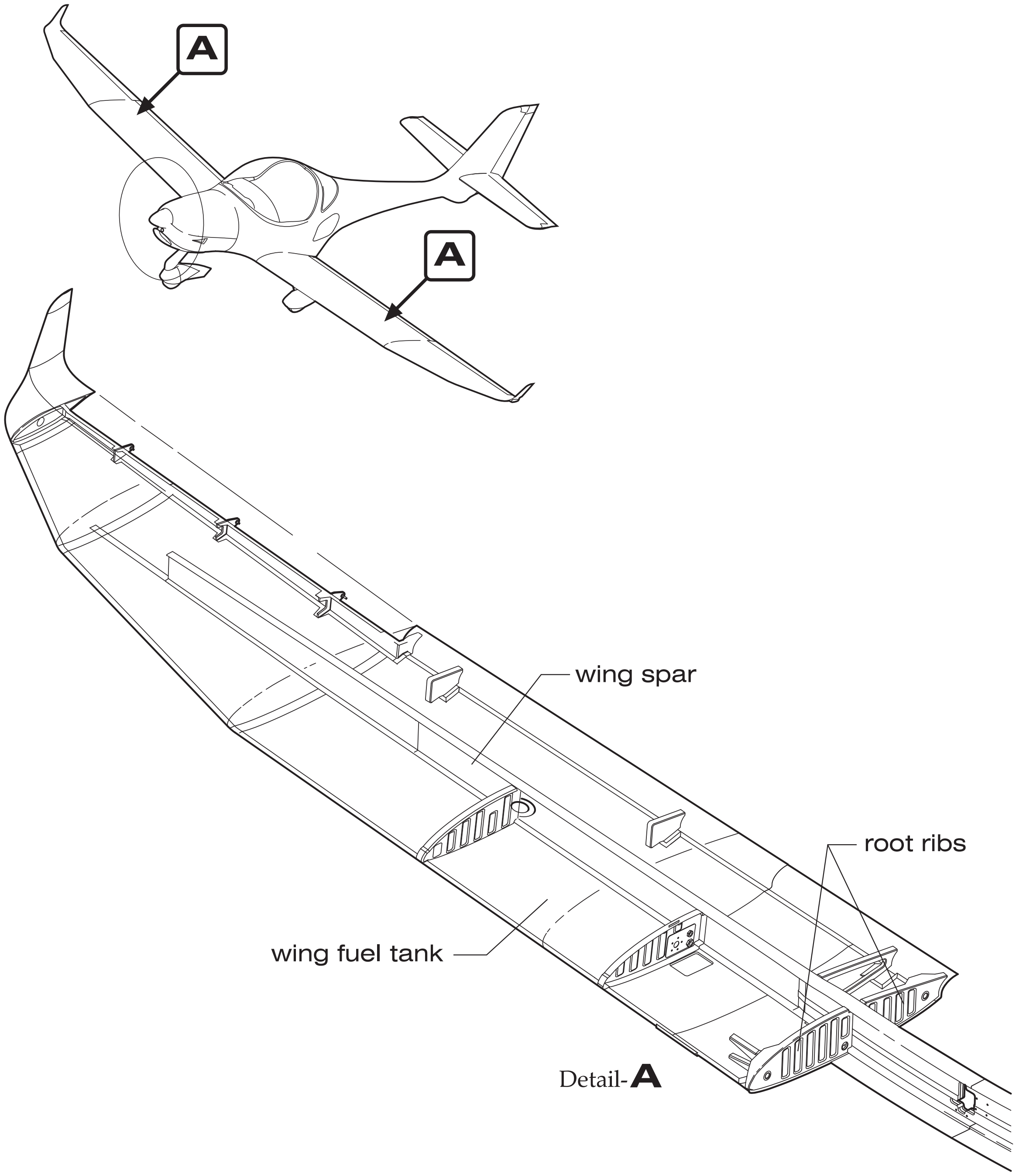
3. Wing Removal/Installation

CAUTION: AT LEAST SEVEN PERSONS ARE NEEDED FOR WING REMOVAL OR INSTALLATION. A SHORT BRIEFING IS RECOMMENDED PRIOR TO STARTING WITH PROCEDURES.

A. Remove the Wing
(1) Prepare a suitable, padded stand for proper storage of the removed wing.

NOTE: It is recommended to use the special wing stand which may be obtained from AQUILA Aviation International GmbH.

(2) Shock the main wheels fore and aft.
(3) Ensure electrical power to aircraft is OFF.
(4) Disconnect battery (refer to 24-30-00).
(5) Ensure the fuel selector/shut-off valve is in OFF position.
(6) Drain fuel from wing fuel tanks.
(7) Remove access/inspection plates 210 AB (refer to 06-10-00), 211 BB and 211 JB (refer to 25-12-00).
(8) Remove elevator pushrod 1 (refer to 27-30-00).



Wing Structure
Figure 201

(9) Disconnect electrical wires at connector inside the spar tunnel.
(10) Disconnect fuel lines (four places).
(11) Identify and disconnect pitot and static lines at water traps.
(12) Disconnect aileron front from aileron rear bellcrank (refer to 27-10-00).
(13) Disconnect flap actuator from flap torque tube assembly (refer to 27-50-00).

NOTE: Tape flaps in the streamlined position during wing removal. This will prevent flap movement during handling.

CAUTION: FOR THE REST OF THIS PROCEDURE AT LEAST ONE PERSON MUST SUPPORT/LIFT EACH WING AT THE OUTBOARD END, AT LEAST ONE PERSON MUST SUPPORT/LIFT THE LEADING EDGE AT THE ROOT RIB OF EACH WING HALF, AND AT LEAST ONE PERSON MUST SUPPORT/LIFT THE TRAILING EDGE AT THE ROOT RIB OF EACH WING HALF.

DO NOT LIFT THE WING AT ANY CONTROL SURFACE!

(14) From inside the cabin, remove bolts securing wing attachment bolts.
(15) Supporting the wing, remove wing attachment bolts.
  (a) Install wing attachment bolt removal tool.
  (b) Extract the bolt.

NOTE: It may be necessary to rock the wing slightly to remove attachment bolts.

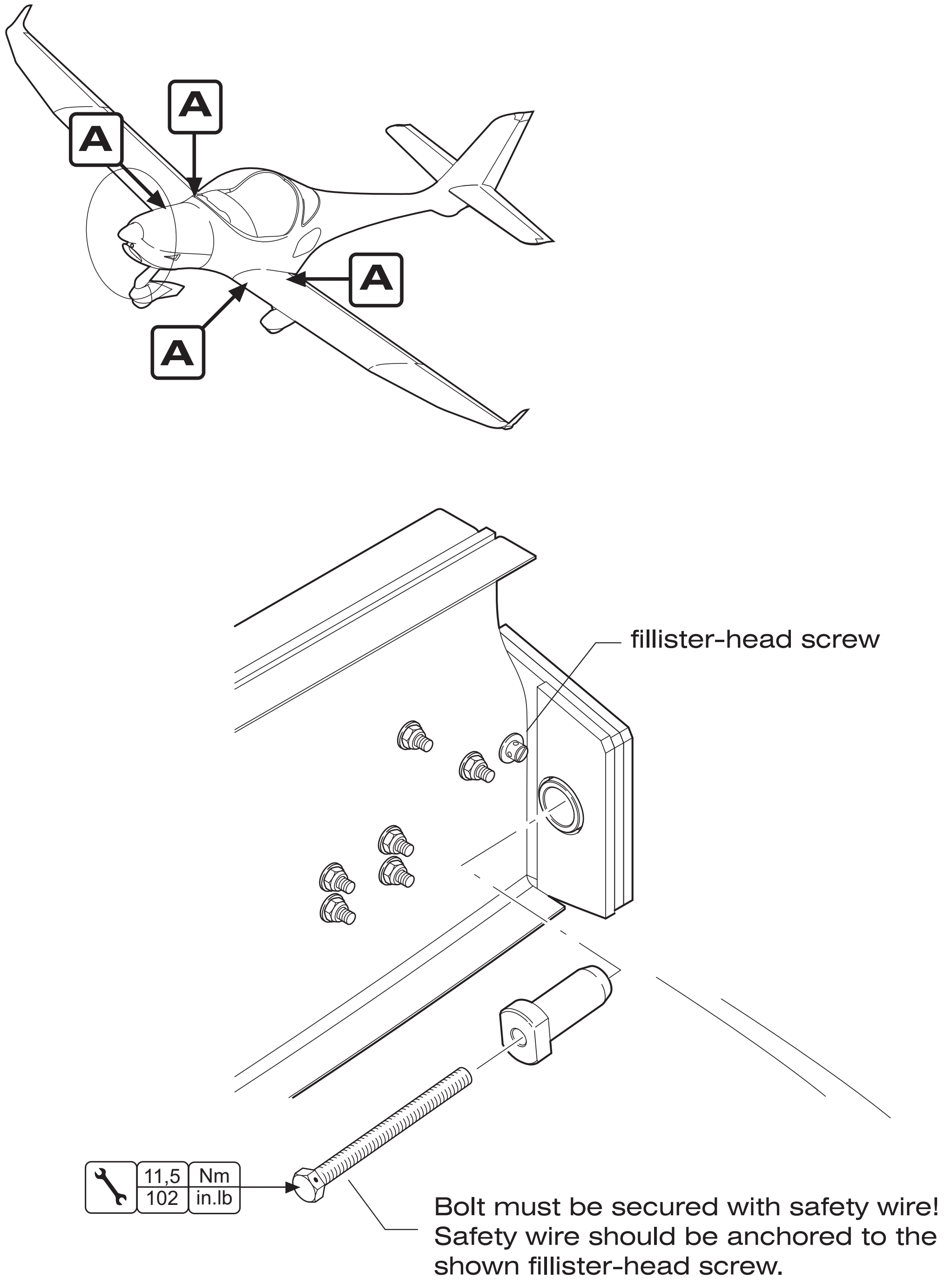
CAUTION: PAY ATTENTION TO LANDING GEAR STRUTS AND AILERON BELLCRANK IN THE FUSELAGE BELLY.

(16) Remove wing carefully from aircraft and lay on padded stand.

B. Install the Wing
(1) Perform a pre-installation check.
  (a) Examine the wing attachment bolt bushings for damage and condition. Look especially at the inner faces.
  (b) Examine the wing root ribs and the outer ribs of the fuselage center section for damage and condition. Check the area around the bushings. Check for looseness between bushings and ribs.
  (c) Check the wing attachment bolts for any damage and condition.
(2) Position wing to the aircraft and install wing attachment bolts.

NOTE: Grease wing attachment bolts lightly before installing bolts (refer to 12-22-00).

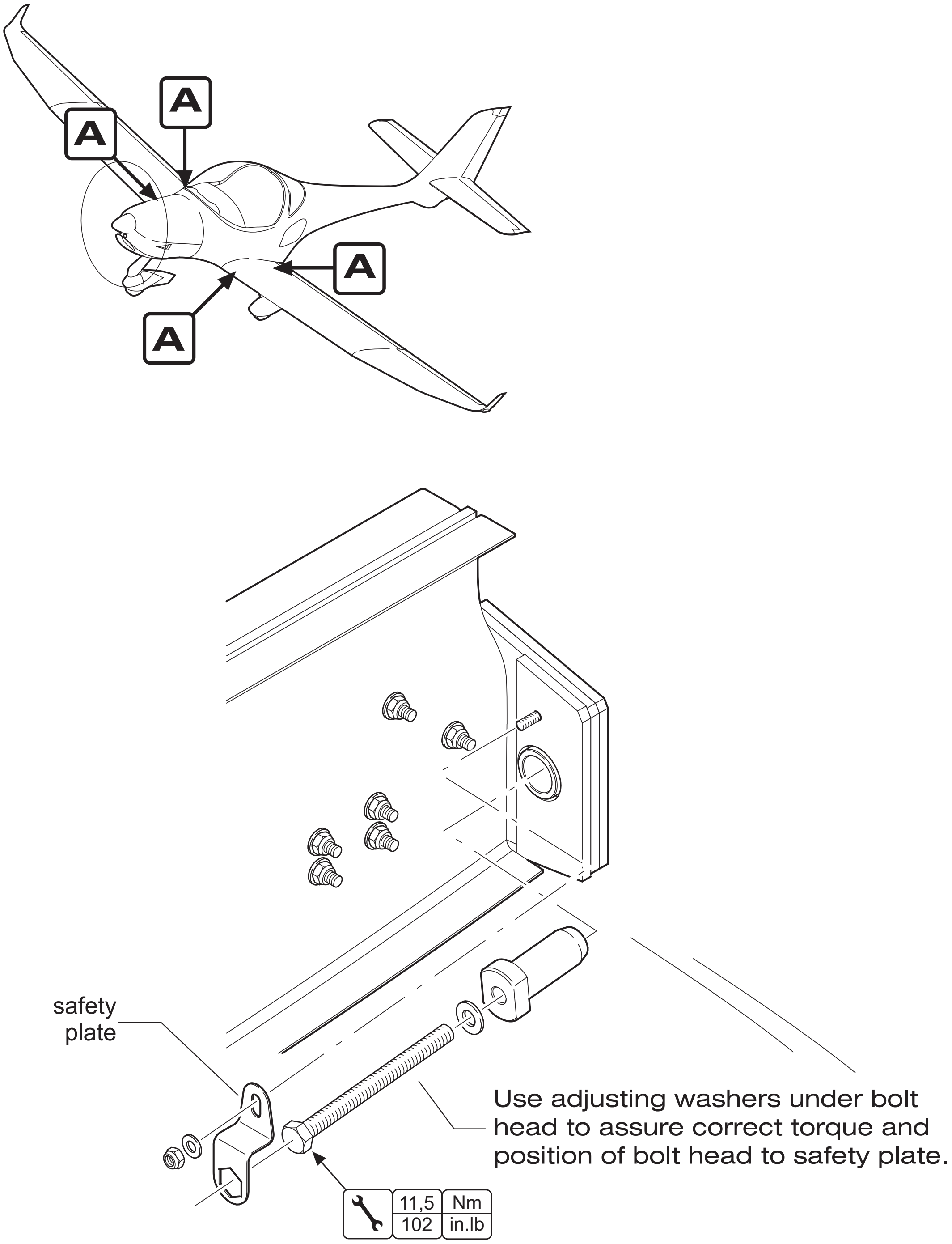
(3) Install bolts securing wing attachment bolts. Torque to 11,5 Nm (102 in.lbs) and secure (up to S/N 331: safety wire / from S/N 332: use safety plate [Use adjusting washers to assure correct torque and correct position of bolt head to cut-out in safety plate.]).
(4) Connect flap actuator to flap torque tube assembly (refer to 27-50-00) inside the spar tunnel.
(5) Connect aileron front to aileron rear bellcrank (refer to 27-10-00).
(6) Connect fuel lines (four places).
(7) Reconnect pitot and static lines.
(8) Connect electrical wires at connector.



Bolt must be secured with safety wire!
Safety wire should be anchored to the shown fillister-head screw.

Note: The rear right location is shown.

Wing Bolt Installation
Figure 201



Note: The rear right location is shown.

Wing Bolt Installation
Figure 201

(9) Install elevator pushrod 1 (refer to 27-30-00) from inside the cabin.
(10) Re-fuel wing tanks. Check fuel lines and fittings inside the spar tunnel for signs of leakage.
(11) Reconnect battery (refer to 24-30-00).
(12) Perform aileron control system inspection/check (refer to 27-10-00).
(13) Perform elevator control system and elevator trim system inspection/check and adjust system if necessary as described in 27-30-00 and 27-31-00.
(14) Perform flap control system inspection/check and adjust system if necessary as described in 27-50-00.
(15) Check NAV lights, strobe lights, stall warning system and pitot/static system for proper operation.
(16) Perform fuel level indicating system functional test (refer to 28-41-00).
(17) Install access/inspection plates and upholstery removed during maintenance.

4. Wing Attachment Bolt Removal/Installation

NOTE: This procedure is to be used if one wing attachment bolt has to be removed for maintenance purposes.

CAUTION: DURING THIS PROCEDURE AT LEAST ONE PERSON MUST SUPPORT/LIFT THE WING AT THE OUTBOARD END, AT LEAST ONE PERSON MUST SUPPORT/LIFT THE LEADING EDGE AT THE ROOT RIB OF THE WING HALF AND AT LEAST ONE PERSON MUST SUPPORT/LIFT THE TRAILING EDGE AT THE ROOT RIB OF THE WING HALF.
DO NOT REMOVE MORE THAN ONE WING ATTACHMENT BOLT AT A TIME!
DO NOT LIFT THE WING AT ANY CONTROL SURFACE!

A. Remove a Wing Attachment Bolt
(1) Remove access/inspection plates 211 BB and 211 JB (refer to 25-12-00).
(2) Remove bolt securing wing attachment bolt from inside the cabin.
(3) Supporting the wing, remove wing attachment bolt.
 (a) Install wing attachment bolt removal tool.
 (b) Extract the bolt.

NOTE: It may be necessary to rock the wing slightly to remove attachment bolts.

B. Install a Wing Attachment Bolt
(1) Perform a pre-installation check.
 (a) Examine the wing attachment bolt bushing for damage and condition. Look especially at the inner faces.
 (b) Check the wing attachment bolt for any damage and condition.
(2) Install wing attachment bolts.

NOTE: Grease wing attachment bolts lightly before installation (refer to 12-22-00).

(3) Install bolts securing wing attachment bolts. Torque to 11,5 Nm (102 in.lbs) and secure (up to S/N 331: safety wire / from S/N 332: use safety plate [Use adjusting washers to assure correct torque and correct position of bolt head to cut-out in safety plate.]).
(4) Reinstall access/inspection plates 211 BB and 211 JB (refer to 25-12-00).

CONTROL SURFACES - MAINTENANCE

1. General

A. The flap structure is shown in figure 201. The top and bottom shells have a sandwich structure with a rigid foam core. GFRP molded ribs are bonded between the shells. A flap hinge arm is bonded to each rib.

B. The aileron structure is shown in figure 201. The top and bottom shells have a sandwich structure with a rigid foam core. GFRP molded hinge brackets are bonded between the shells in the front area. The aileron horn is also bonded to the most inboard bracket.
A ground-adjustable trim tab at the leading edge of the left aileron is provided to correct the tendency to roll precisely. The trim tab is mounted to the aileron with screws, washers and nuts.

C. This section contains instructions for flaps and aileron removal and installation as well as control surface balancing procedures.

D. Figure 201 shows the flaps and aileron structure.

2. Flap Removal/Installation

A. Remove a Flap
(1) Retract flaps fully.

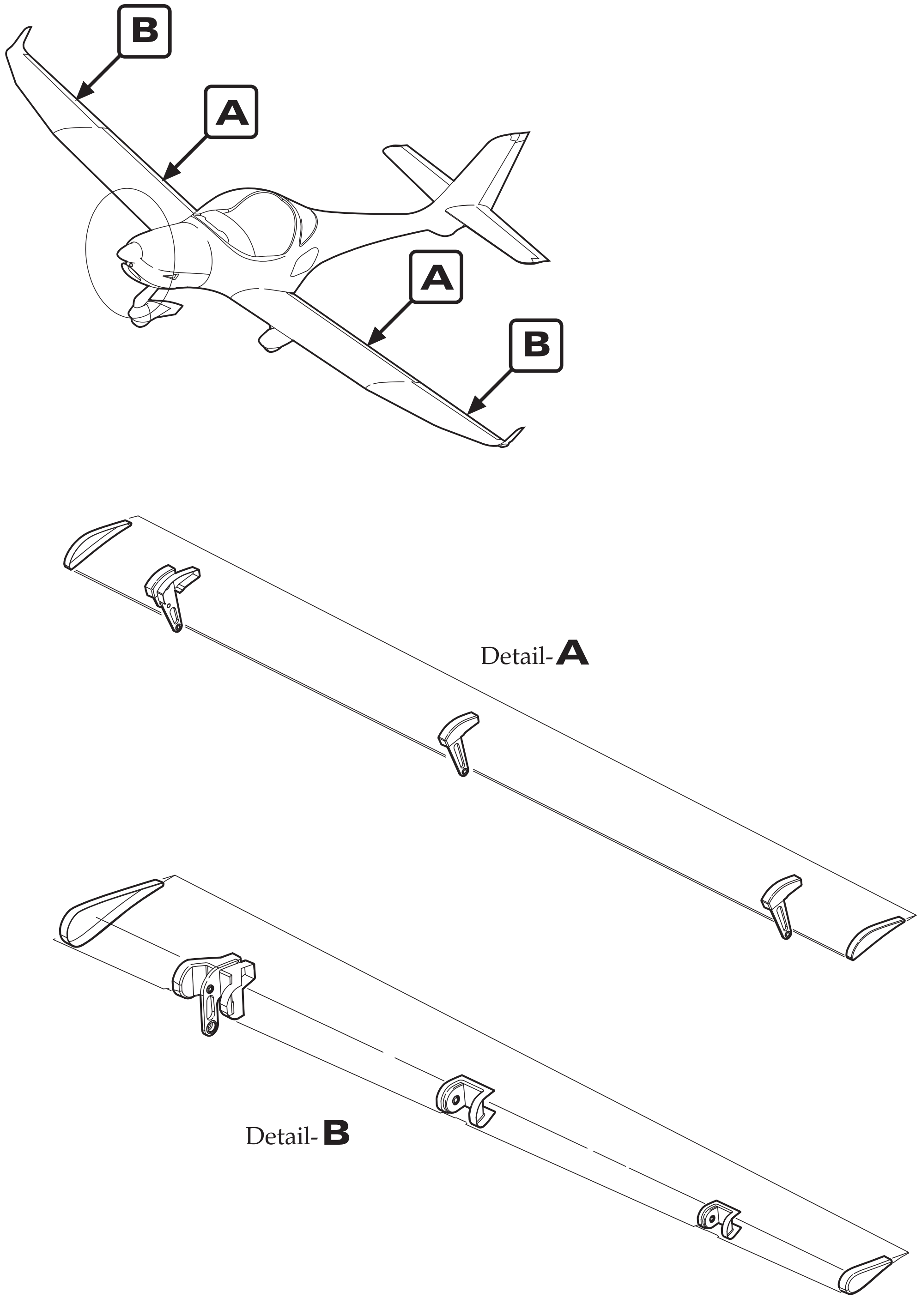
CAUTION: WHEN DISCONNECTING FLAP PUSH-PULL ROD FROM FLAP HORN, EXERCISE CAUTION TO PREVENT THE FLAP FROM INADVERTENT SWINGING DOWNWARD.

(2) Supporting the flap, disconnect flap push-pull rod at the flap horn.
(3) Allow the flap to swing down and remove three castellated nuts securing flap on hinge pins.
(4) Slide flap inboard clear of the hinge pins and remove flap from wing.

B. Install Flaps
(1) Put the flap in position and secure with washer and castellated nut at each of the three hinge mounts.
(2) Connect flap push-pull rod to flap horn.
(3) Secure three castellated nuts with cotter pins.
(4) Check proper operation of flaps.

3. Aileron Removal/Installation

A. Remove Aileron
(1) Extend the flaps completely.
(2) Remove castellated nut securing the aileron to hinge pins at the inboard hinge.
(3) Slide aileron inboard clear of the hinge pins and remove aileron from wing.



Flap/Aileron Structure
Figure 201

B. Install Aileron

(1) Put the aileron in position and secure with washer and castellated nut at inboard hinge. Secure castellated nut with cotter pin.
(2) Connect aileron push-pull rod to aileron horn.
(3) Check proper aileron control system operation.
(4) Check proper aileron travel. Adjust if necessary (refer to 27-10-00).

4. Adjustment - Control Surface Balancing

Weighing and the determination of control surface moment should be performed after repairs or painting. The residual moment of the control surface and its maximum permissible total weight must be within the ranges as specified in 06-10-00.

To weigh a control surface, it must be removed from the aircraft. Weighing can be accomplished using any convenient method.

WARNING: CORRECT CONTROL SURFACE BALANCE IS IMPORTANT FOR FLIGHT SAFETY. OUT OF BALANCE CONTROL SURFACES CAN FLUTTER AND CAUSE STRUCTURAL FAILURE.

A Aileron Balancing

NOTE: Calculate the static control surface moment as follows: M = F x r [Nm]

NOTE: The following procedure is analogous for left and right aileron.

(1) Disconnect aileron from aileron push-pull rod.
(2) Weigh by means of a conventional spring balance at the given weighing point (refer to figure 204).
    (a) Attach spring balance at weighing point. The initial position of the aileron for each measurement should be parallel to the chord line.

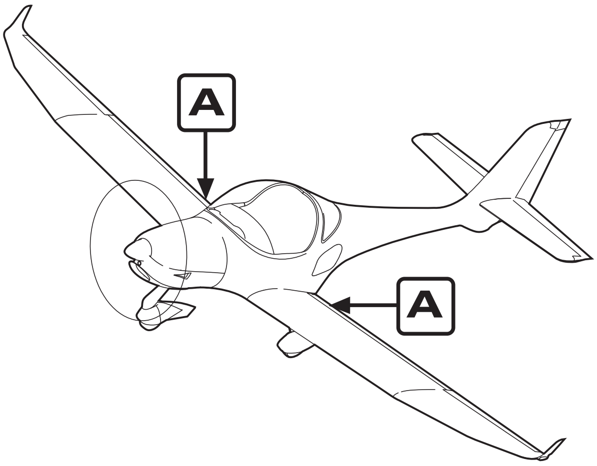
    NOTE: The chord line is defined as the line extending from the trailing edge through the hinge line.

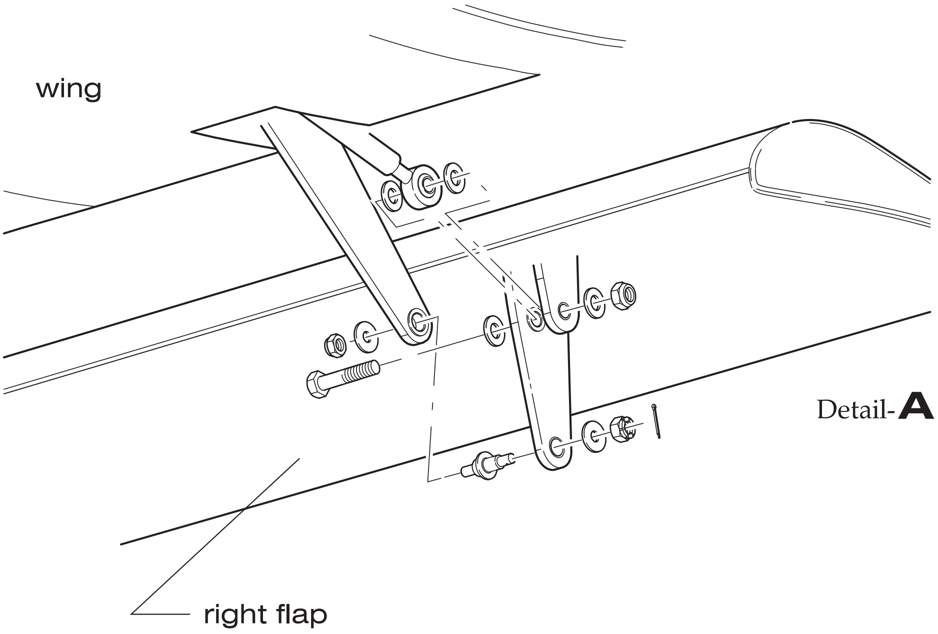
    (b) Raise the spring balance slowly until the control surface begins to move. Note the reading and the direction of the movement (i.e. 11,2 N up).
    (c) Lower the spring balance slowly until the control surface begins to move. Note the reading and the direction of the movement to (i.e. 11,8 N down).
(3) Calculate the moments as described above. Both results must be within the permitted limits.

B Wing Flap Balancing

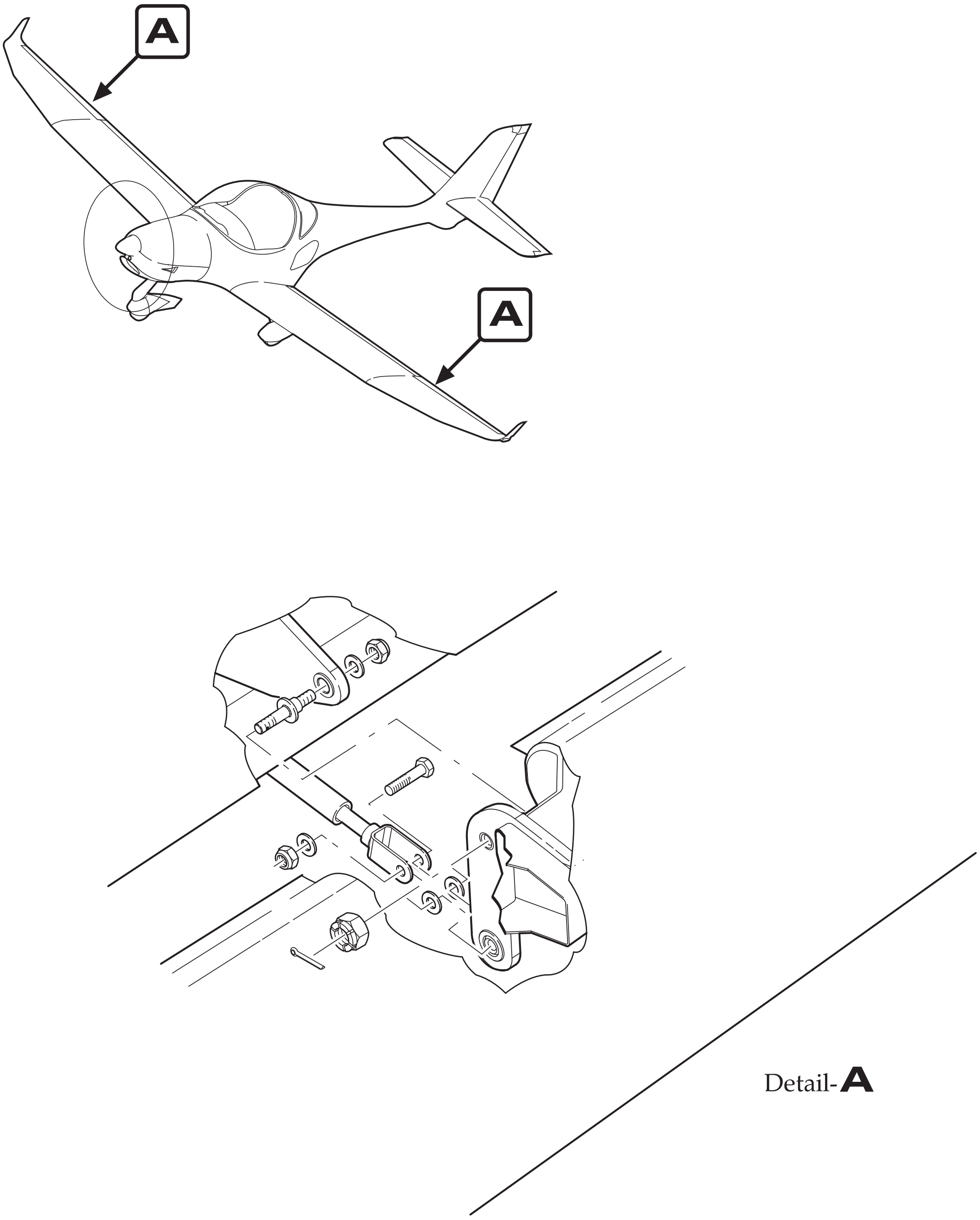
NOTE: Calculate the static control surface moment as follows: M = F x r [Nm]

(1) Disconnect flap actuator from torque tube coupler (refer to 27-50-00).
(2) Weigh by means of a conventional spring balance at the given weighing point (refer to figure 204).

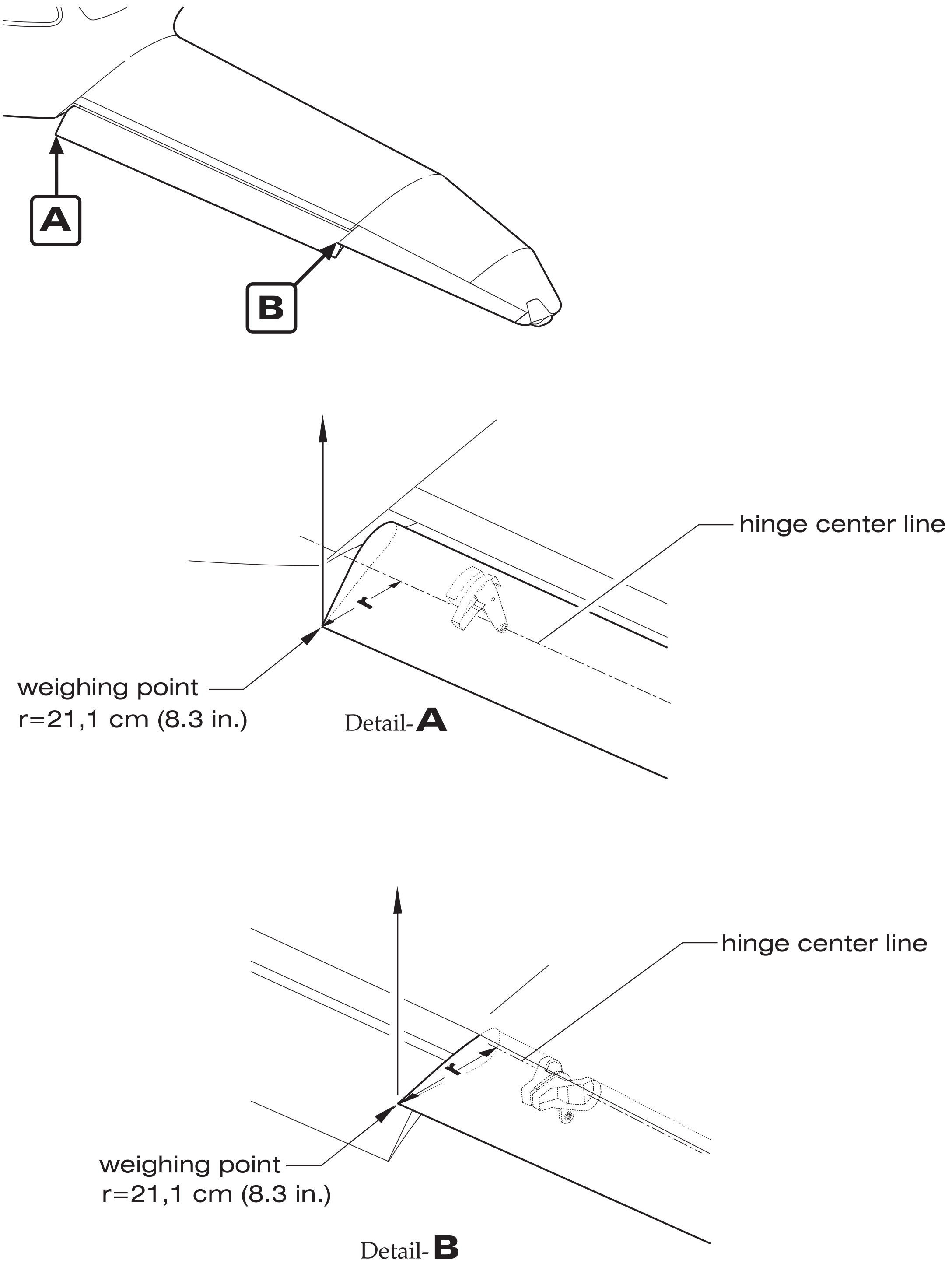




Flap Installation
Figure 202



Aileron Installation
Figure 203



Flap / Aileron Balancing
Figure 204

(a) Attach spring balance at weighing point. The initial position of the flaps for each measurement should be 35° down.
(b) Raise the spring balance slowly until the control surface begins to move. Note the reading and the direction of the movement (i.e. 11,2 N up).
(c) Lower the spring balance slowly until the control surface begins to move. Note the reading and the direction of the movement to (i.e. 11,8 N down).

(3) Calculate the moments as described above. Both results must be within the permitted limits.

CHAPTER 61

PROPELLER

TABLE OF CONTENTS

PROPELLER - GENERAL

1. Introduction

A. This chapter describes the propeller. Maintenance information is provided.

B. Revs given in this chapter are propeller speeds.

2. General Description

A. The aircraft uses a MT-Propeller MTV-21-A/170-05 (Rotax 912S) or MTV-21-A/175-05 (Rotax 914F) variable pitch, two blade wood-composite propeller. The propeller has a governor which controls propeller pitch hydraulically. The governor keeps the pre-selected propeller speed at a constant value, regardless of manifold pressure and airspeed.

PROPELLER - TROUBLESHOOTING

1. General

A. The following chart lists some of the more common troubles which may occur with the propeller, their probable causes and remedies.

2. Troubleshooting Chart

Trouble	Probable Cause	Remedy
Static rpm too low	Propeller limits engine speed.	Reduce pitch with the check nuts on the piston guide. Turning loose nut by ¼ turn will increase rpm by approx. 100 rpm.
	Governor limits engine speed.	Increase governor rpm by unscrewing the stop screw. One turn on screw will change rpm by approx. 25 rpm. Ensure the control is long enough to be able to touch the top. Secure screw with safety wire.
Rpm in flight too high	Governor allows overspeed.	Adjust rpm to the desired value in flight and turn the stop screw after landing until it touches the governor lever. Do not change position of the rpm control during final approach. Secure screw with safety wire.
Blade shake (Fore and aft movement)	Blade bearing loose.	If more than 3 mm, return propeller to the factory or any approved repair station to correct the pre-load of the blade retention bearing.
Blade shake (Blade angle play)	Blade loose due to blade bearing setting and/or increased play through wear in the pitch change mechanism (pitch change pin, pitch change block).	If more than 2°, return propeller to the factory or any approved repair station.
Sluggish rpm change	1. Oil is cold. 2. Excessive friction.	Run engine until oil temperature is in the green arc. Move blades by turning them by hand within the angular play. If excessive friction exists, the blade retention system has to be inspected, contact factory.

2. Troubleshooting Chart (Cont.)

Trouble	**Probable Cause**	**Remedy**
Surging rpm	1. Trapped air in propeller piston.	Move propeller control at least twice before flying at about 1800 rpm with a drop of about 500 rpm.
	2. Sludge deposit.	Clean oil tubes in the motor, in the propeller piston and eventually in the governor (only possible at the manufacturer).
	3. Wrong speeder spring in in the governor.	Check that the governor part number corresponds to the aircraft data sheet. If the rpm does not stabilize after 5 periods this is an indication for a wrong speeder spring, contact factory.
	4. Wrong pitch stops in the propeller.	Compare pitch values to those of the data sheet. Note static rotational speed.
	5. Abrupt movement of of propeller or throttle control.	Move the controls carefully and slowly.
	6. Wrong carburetor setting.	Correct as specified in the engine manual.
	7. Oscillating tachometer.	Check tachometer and transmitter.
Rpm variations (more than ±50 rpm) between climb, cruise, and descent at identical propeller setting.	1. Excessive friction in the hub.	Contact manufacturer.
	2. Excessive friction in the governor.	Contact manufacturer.
	3. Worn rpm tachometer.	Replace/repair instrument.
Rpm increase during normal operation without change of propeller lever position.	1. Oil leakage or hot oil.	Check for oil leaks, replace gaskets, decrease oil temperature with higher air speed.
	2. Worn oil transfer causes a decrease in blade angle of attack.	If the system works with cold oil and fails at high oil temperature, this indicates high leakage in the oil transfer system on the propeller shaft. Repair engine.
	3. Internal leakage in the propeller.	Contact manufacturer
	4. Governor drive failure or broken relief valve spring.	Check governor drive and governor on the test bench. If sudden oil leakage occurs, move power lever back until the rpm decreases. In this condition the propeller goes back to the low pitch stop automatically and no oil pressure is needed. Adjust the propeller control for take off position. Apply enough

2. Troubleshooting Chart (Cont.)

Trouble	**Probable Cause**	**Remedy**
		power to remain about 100 rpm below take-off rpm. Note that propeller rpm should be always lower than adjusted with the propeller control. This will hold the governor in an underspeed condition and no oil pressure will be transferred from the governor to the propeller.
Rpm decrease during normal operation without change of propeller lever position.	1. Speeder spring in the governor broken.	Check governor on the test bench.
	2. Dirt in the fuel system or carburetor.	Clean or repair.
	3. Control inoperative.	Check free movement and positive stop contact. If the cause cannot be found in the fuel system the flight may be continued when throttle setting is reduced, avoiding excessive manifold pressure and overheating of the engine. The rpm will remain low because the propeller pitch is on the high pitch stop.
Extremely slow pitch change or no pitch change on ground (rpm changes with airspeed like a fixed pitch propeller)	1. Blocked oil line.	Check engine.
	2. Sludge deposit in propeller (This does not occur suddenly but slowly worsens over time.).	Clean propeller and crankshaft.
	3. Damaged pitch change mechanism.	Contact manufacturer. This error may appear suddenly.
	4. Corrosion in the blade bearings.	Repair propeller.
Oil leakage (visible outside or hidden inside)	Damaged gasket.	Replace gaskets or repair propeller.
Rough running engine, possibly in limited rpm range only	1. Bad static balance.	Re-balance statically, mount balance weights to forward spinner bulkhead.
	2. Bad dynamic balance.	Re-balance dynamically, mount balance to rear spinner bulkhead.
	3. Operation in restricted rpm range.	Refer to airplane flight manual. Check rpm gauge for correct reading. Repair or replace if necessary.

PROPELLER ASSEMBLY - MAINTENANCE

1. General

A. The aircraft is equipped with a MT-Propeller MTV-21-A/170-05 (Rotax 912S) or MTV-21-A/175-05 (Rotax 914F) variable pitch, two blade wood-composite propeller.

B. For more detailed information on the installed propeller, refer to MT-Propeller E-124 operation and installation manual for hydraulically controlled variable pitch propeller, latest revision.

2. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
4.B.	1	O-ring	AT01-7310-104	AQUILA Aviation

3. Description

A. The variable pitch propeller consists of the following main groups: hub with blade bearings and pitch change mechanism, blades and spinner.

Hub

The one-piece hub is made from forged or milled aluminum alloy with the outer surface shot-peened and anodized. The blade bearings are specially designed ball bearings where the ball acts as a split retainer in order to hold the blades in the hub, creating an increased safety factor against blade loss. The outer bearing race is made as one-piece and is pressed into the hub, while the inner race is split and installed on the blade ferrule. The blade preload is adjusted by the thickness of plastic shims. Blade and bearing are held in the hub by a retention ring.
Blade pitch change is achieved via a pin in the blade root. A plastic block connects the blade with the piston and the axial movement of the servo piston turns the blades. The return spring and the sleeve, which acts as high (low) pitch stop, are installed on the front piston.
There are two check nuts outside the hub with which the low (high) pitch stop can be adjusted. The inner part of the hub is used as the cylinder for the pressure oil. This arrangement allows a simple and light-weight design. Balance wieghts are installed in the front spinner support.

Blades

The propeller has wood-composite (natural composite) blades, using high compressed wood in the root and lightweight wood in the remaining body. Epoxy fiberglass covers the entire blade surface and is painted with acryl varnish. The outer portion is protected against erosion by a stainless steel erosion sheath bonded to the blade edge. The inner portion of the blade is protected by a self-adhesive PU-strip. The blade ferrule is attached with special lag screws to the blade root and is additionally bonded with epoxy resin.

Spinner

The spinner dome is a one-piece part made from fiber reinforced composite. The bulkhead is truncated aluminum alloy. Filler plates increase the stiffness of the dome on the cutouts for the blades. The dome is mounted to the bulkhead by means of screws.

4. Propeller Removal/Installation

A. Remove Propeller

(1) Ensure ALT1/BAT, ALT2/BAT2 (AT01-200 only) and ignition switches are OFF and the throttle is closed.
(2) Remove upper engine cowling (refer to 71-10-00).
(3) Remove screws securing spinner dome to spinner bulkhead and remove spinner.
(4) Remove alternator belt from alternator pulley (refer to 24-20-00).
(5) Position a hoist and lifting sling in front of the aircraft and attach sling to propeller.
(6) Place a drain pan beneath propeller to catch oil spillage.
(7) Loosen and remove nuts and washers attaching propeller to engine flange.
(8) Remove propeller from aircraft.

CAUTION: DO NOT STORE PROPELLER ON IT'S TIPS!

B. Install Propeller

(1) Clean engine and propeller flange with a suitable cleaning agent.
(2) Apply a light coat of engine oil to new O-ring and insert O-ring into groove inside hub at flange mounting. Check correct position of O-ring in propeller flange.
(3) Place alternator belt around V-belt pulley.

CAUTION: CARE MUST BE TAKEN WHEN INSTALLING THE PROPELLER. THE PROPELLER SHOULD NOT BE PULLED ON TO THE ENGINE FLANGE WITH THE NUTS IN ORDER TO AVOID DAMAGE TO THE HUB AND TO AVOID SHEARING OFF MATERIAL CAUSING OIL LEAKS ON THE O-RING.

(4) Using hoist and sling, put propeller in position to engine mounting flange.
(5) Put V-belt pulley with carriers in position to engine mounting flange.

CAUTION: STOP NUTS WITH WASHERS SHOULD BE TIGHTENED CROSSWISE WITH EQUAL FORCE TO AVOID HUB DAMAGE.

(6) Install washers and nuts securing propeller assembly to engine flange. Torque nuts to 45 - 47 Nm (398 - 416 in.lbs).
(7) Check track of blades (max. 3mm [1/8 in.] measured approx. 10 cm [4 in.] from the tip on the trailing edge).
(8) Install spinner dome on bulkhead observing mating marks. Torque screws with plastic washers 4 - 5 Nm (35 - 44 in.lbs). Check runout of the dome. Max. 2 mm (0.08 in.) permissible.
(9) Install alternator belt and adjust belt tension (refer to 24-20-00).
(10) Install upper engine cowling (refer to 71-10-00).
(11) Carry out a functional test (refer to 61-20-00).

5. Inspection/Check

A. Inspection/Check
   - (1) Remove screws securing spinner dome to spinner bulkhead and remove spinner.
   - (2) Check spinner for cracks and other damage.
   - (3) Perform a visual inspection of the propeller blades.
     - (a) Check for critical cracks (refer to MT-Propeller E-124 operation and installation manual for hydraulically controlled variable pitch propeller)
     - (b) Inspect for notches, dents, nicks or other damage. Repair as required (refer to 61-10-00).
     - (c) Check that the metal erosion sheath is not loose.
     - (d) Check that proper PU-strip is in place.
   - (4) Check blade shake, max. 3 mm (1/8 in.).
   - (5) Check blade angle play, max. 2°.
   - (6) Check track of blades (max. 3mm [1/8 in.] measured approx. 10 cm [4 in.] from the tip on the trailing edge).
   - (7) Inspect outside condition of the hub and parts for cracks, corrosion, deterioration.
   - (8) Inspect check nut for low pitch stop for tightness.
   - (9) Check safety wiring.
   - (10) Check flange stopnuts for tightness.
   - (11) Inspect blade root and hub for oil and grease leaks.

B. Overspeed

If up to 110 % take-off rpm of the approved engine/propeller combination is experienced, immediately perform a 100 hrs inspection (refer to MT-Propeller E-124 operation and installation manual for hydraulically controlled variable pitch propeller). A factory overhaul is required if overspeeds between 111 % and 120 % are experienced. A ferry flight can be undertaken after performing a 100-hours inspection. If more than 121 % is experienced, the propeller may not be used again and must be returned to the factory for investigation.

6. Cleaning

A. Clean propeller if necessary with any car wash solution or equivalent.

7. Repairs

CAUTION: IT IS IMPORTANT TO AVOID MOISTURE PENETRATING INTO THE WOODEN CORE OF THE PROPELLER BLADES. IF IN DOUBT, CONSULT AN AIRCRAFT INSPECTOR FOR FINAL DECISION ON REPAIR.

A. Normal stone nicks are unimportant as long as the plastic protection of the wood core exists. Air bubbles with a maximum diameter of 15 mm (0.6 in.) are also unimportant as long as their size does not increase during use.

Scratches and nicks should be protected during routine maintenance with a coating of water resistant varnish.

B. Trailing edge splitting can arise from a stone hit. If the split is not longer than 40 mm (1.5 in.), it can be glued with epoxy cement. If some wood is missing (not deeper than 8 mm [0.25 in.]), fill damaged area with epoxy, let it harden, grind surface smooth and cover with water-resistant varnish, preferably polyurethane.

C. Small surface scratches and nicks can be repaired by filling them with epoxy resin and covering them with polyurethane varnish.

D. The manufacturer can repair broken blade tips if more than 7/8 of the blade still exists without cracks. Blade tipping can be replaced. Damaged trailing edges can be repaired.

E. Damaged or missing PU strips on the leading edge must be replaced by new ones.

PROPELLER CONTROL - MAINTENANCE

1. General

A. The aircraft is equipped with a constant speed propeller. A MT-Propeller P-850-12 governor controls the blade pitch.

B For more detailed information on the installed governor, refer to MT-Propeller E-1048 operation and installation manual for hydraulically constant speed governor P-8( )( )-( ), latest revision.

2. Tools, Equipment and Material

	Quantity	Equipment	Parts No.	Manufacturer
4.B.	1	gasket	AT01-7080-012	AQUILA Aviation

3. Description

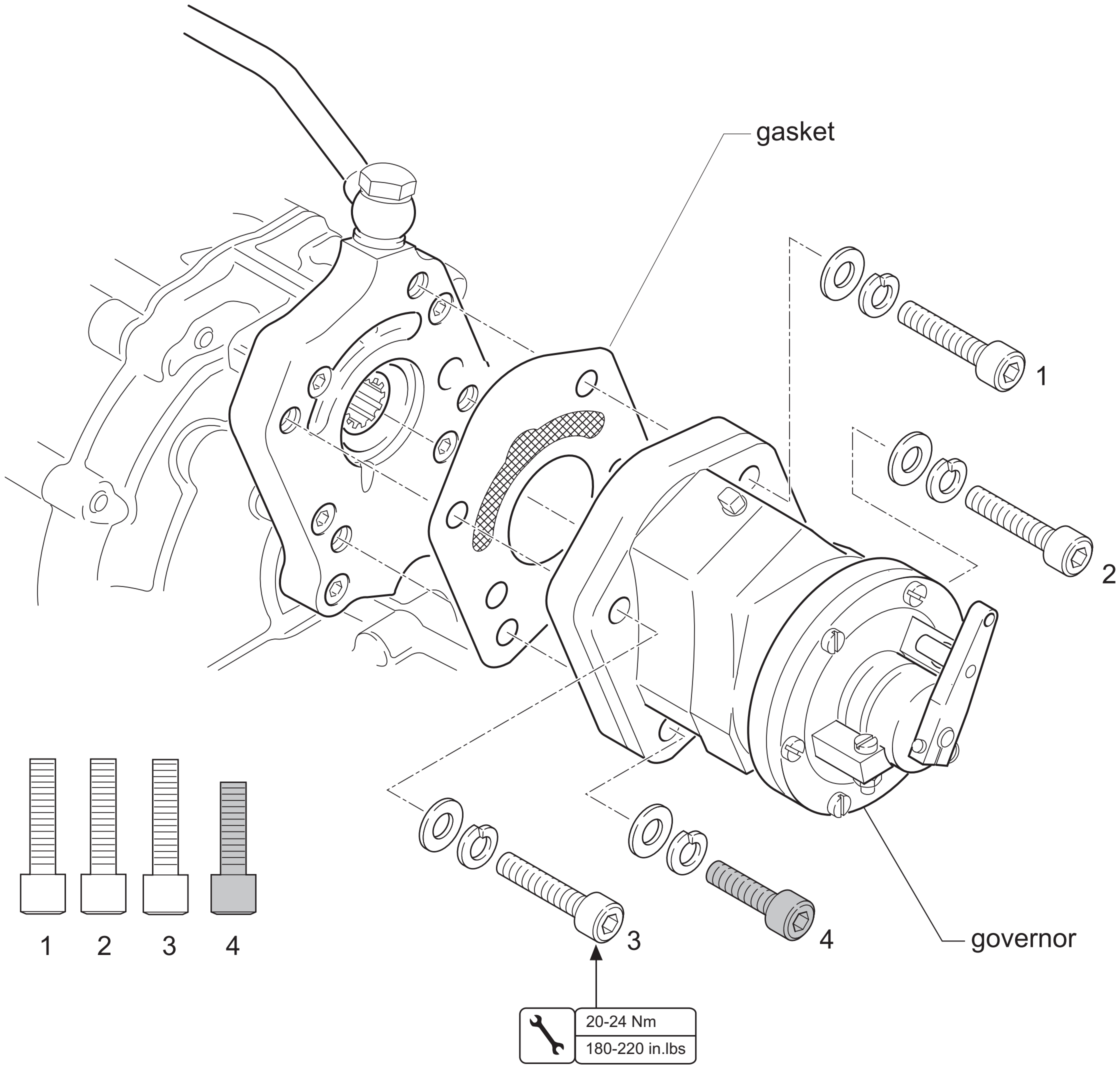
A. The necessary pressure to adjust the propeller is achieved by a gear pump in the governor which increases engine oil pressure. A flyweight and a speeder spring move a valve, allowing oil flow to and from the piston in the propeller. In on-speed condition there is no oil flow. A speed-adjusting lever changes the pre-load of the speeder spring which finally results in a change in engine speed. The propeller has a single-acting piston to increase pitch, whereas the natural twisting forces of the blades reduce propeller pitch. The governor produces oil pressure to increase pitch. The relief valve pressure should be set to 310 ±10 psi.

4. Governor Removal/Installation (Ref. Fig. 201)

CAUTION: TO PREVENT FOREIGN MATERIAL ENTERING THE SYSTEM, INSTALL COVER TO GOVERNOR MOUNTING PAD.

A. Remove Governor
- (1) Remove upper engine cowling (refer to 71-10-00).
- (2) Disconnect governor control cable end from governor control arm.
- (3) Remove screws, washers and lockwashers securing governor to crankcase and remove governor from engine.
- (4) Remove and discard gasket.

B. Install Governor
- (1) Clean engine pad and mounting hardware before installing new mounting gasket. Ensure governor drive spline mates correctly with engine accessory drive spline.
- (2) Position new gasket coated with engine oil or equivalent on engine mounting pad.
- (3) Install governor on gasket using srews, washers and lockwashers.
  Torque to 20 - 24 Nm (180 - 220 in.lbs).
- (4) Install governor control cable to governor control arm.



Governor Installation
Figure 201

(5) Adjust governor (refer to “Adjustment/Test” below).
(6) Install upper engine cowling (refer to 71-10-00).
(7) Carry out a functional test (refer to “Adjustment/Test” below).

5. Inspection/Check

A. Perform the following inspections frequently and in particular after any maintenance on the propeller / governor:
(1) Remove upper engine cowling (refer to 71-10-00).
(2) Move the propeller lever in the cabin between max. rpm and min. rpm. Verify the lever moves freely without restrictions trough full range.
(3) Ensure the propeller lever has positive clearance to the console slot in both the full forward and full aft positions (at least 3 mm [0.125 in.]).

WARNING: NO OIL LEAKAGE IS PERMITTED.

(4) Visually inspect governor and installation for any signs of oil leakage.
(5) Check all screws, bolts and nuts are tightened properly and safety wired, as required.
(6) Install upper engine cowling (refer to 71-10-00).

6. Adjustment/Test

CAUTION: ENGINE TEST RUN MAY BE PERFORMED BY AUTHORIZED PERSONNEL ONLY.

CAUTION: AVOID PROLONGED OPERATION OF THE ENGINE WITH HIGH RPM ON THE GROUND BECAUSE IT CAN RESULT IN EXCESSIVE ENGINE TEMPERATURE AND BLADE DAMAGE.

NOTE: Precise results for propeller rpm setting can only be obtained in flight-tests.
As a general rule, engine redline rpm cannot be reached during a full power static run-up. The governor is not controlling the propeller at this time, the propeller is against its low pitch stop. Attempting to increase propeller static run-up rpm by adjusting the governor high rpm screw will have no effect and will probably result in a propeller overspeed during the take-off roll. The procedure outlined below sets maximum rpm in a limited range only.

NOTE: Always measure propeller speed with an optical revolution counter!

A. Adjustment

NOTE: The propeller low pitch stop and the governor max. rpm screw are preset by MT-Propeller and therefore usually require no adjustment.

(1) Remove upper engine cowling (refer to 71-10-00).
(2) Remove access panels 211 FT, 211 FB and 211 EC (refer to 25-12-00).
(3) Remove safety wire from low pitch / high rpm stop screw on governor and unscrew for max. propeller speed. Lock stop screw in that position.

CAUTION: AFTER ADJUSTMENT THE STOP SCREW MUST OVERLAP THE STOP SCREW SUPPORT BY AT LEAST 2 MM (0.08 IN.).

CAUTION: CHECK POSITION OF CONTROL SHAFT WITH CONTROL LEVER AT THE MAX. RPM STOP. ENSURE THAT THE SPLINES ARE NOT BEYOND THE GOVERNOR CASING, OTHERWISE THE O-RING COULD BE DAMAGED. THIS WILL RESULT IN AN OIL LEAKAGE WHICH IS NOT ACCEPTABLE.

(4) Adjust governor control cable on governor control lever jam nut so that governor control arm touches the governor max. rpm control arm stop when the propeller control lever is in max. rpm position.
(5) Continue with step (14) if the propeller is already set up correctly.
(6) Remove spinner and plates from spinner bulkhead (refer to 61-10-00).
(7) Start and warm up engine.
(8) Slowly increase propeller speed with power lever (propeller lever in max. rpm position) until max. propeller speed is reached.

CAUTION: DO NOT EXCEED A MAX. PROPELLER SPEED OF 2385 RPM!

NOTE: Only the propeller limits the engine speed in this step. Engine speed is not controlled by the governor.

(9) Shut down engine after short cool down period.
(10) Loosen check nuts on propeller hub and mark their position. Adjust max. propeller speed by adjusting the nuts. Turning loose by ¼ turn will increase the propeller speed by approx. 100 rpm. Secure nuts again.

NOTE: The max. static propeller speed on ground should be approx. 2350 rpm.

(11) Repeat steps (7) thru (10) until max. propeller speed is set up correctly.
(12) Safety wire check nuts on propeller hub.
(13) Re-install spinner and plates to spinner bulkhead (refer to 61-10-00).
(14) Start and warm up engine.
(15) Place power and propeller levers in full forward position for max. propeller speed.
(16) Slowly move propeller lever back until governor starts reducing propeller speed. Leave propeller lever in that position.
(17) Shut down engine after short cool down period.
(18) Adjust low pitch / high rpm stop screw on governor to current position of governor control arm. Safety wire stop screw.
(19) Push propeller lever full forward and pull slightly back again by approx. 2 mm (0.08 in.).
(20) Adjust governor control cable on governor control arm so that governor control arm touches the governor max. rpm control arm stop with the propeller lever in it's current position.
(21) Start and warm up engine.
(22) Adjust power lever for approx. 1700 rpm (propeller lever in max. rpm position).
(23) Pull back propeller lever until the propeller speed drops by 200 rpm.
(24) Pull back power lever in idle position.
(25) Adjust propeller lever low rpm stop screw to the current propeller lever position.
(26) Repeat steps (22) thru (25) until drop of propeller speed is 200 rpm.

(27) Perform a test-flight. At 130-140 kts with propeller and power levers full forward propeller speed should be max. 2385 rpm. Slowly move propeller lever forward. If popeller speed is max. 2385 rpm with propeller lever in full forward position governor adjustment is finished. If propeller speed would exceed 2385 rpm, mark the position of the propeller lever where propeller speed is 2385 rpm and continue with step (28).
(28) After landing move propeller lever to the position that has been marked during test-flight.
(29) Repeat steps (18) to (27) until max. propeller speed in flight is adjusted.

B. Functional Test
(1) Start and warm up engine.
(2) Adjust power lever for approx. 1700 rpm with propeller lever full forward. Pull propeller lever back to the low rpm stop. Propeller speed should drop by 200 rpm. Push propeller lever full forward and observe rpm increase. Decrease and increase of propeller speed should have about the same time. Cycle three times to bleed air out of the system.
(3) Adjust power lever at approx. 2200 rpm now. Pull propeller lever back until rpm drops about 100 rpm. When the rpm is stabilized, increase manifold pressure by about 3 in.Hg and observe the governor function. Propeller speed must stabilize.
(4) Watch for a clean ground surface to avoid blade damage and advance power lever and propeller lever for take-off power and rpm. The static rpm must be limited by the propeller and should be approx. 2350 rpm.
(5) Perform a test-flight. At 130-140 kts with propeller and power levers full forward propeller speed should be max. 2385 rpm.

CHAPTER 71

POWER PLANT

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POWER PLANT - GENERAL

1. Introduction

A. This chapter provides maintenance information for the power plant and associated components. Engine-related information is limited to the most important specifications. For further, more detailed information, refer to applicable ROTAX® Aircraft Engines publications.

B. Revs given in this chapter are engine speeds.

2. General Description

A. The aircraft is powered by a ROTAX® 912S engine. It is a four cylinder, horizontally opposed, spark ignition engine with dry sump forced lubrication. The cylinder heads are liquid cooled and the cylinders are ram-air-cooled. The propeller is driven via a reduction gear with integrated shock absorber and overload clutch.
The engine is equipped with 2 constant depression Bing carburetors and a dual breakerless capacitor discharge ignition. An electric starter, a belt driven 40A-12V DC external alternator, a mechanical fuel pump and a hydraulic constant speed propeller governor are mounted to the engine. The cylinders are numbered from front to rear with the odd numbers on the right and the even numbers on the left. The right front cylinder is number 1, the left front cylinder is number 2, the right rear cylinder is number 3 and the left rear cylinder is number 4.

B. The most important technical data of the ROTAX 912S engine are given below:

Certification	FAR 33 / JAR-E
Take-off performance (ISA)	73,5 kW at 5800 rpm (max. 5 min)
Max. continuous performance	69 kW at 5500 rpm
Number of cylinders	4
Bore, mm (in.)	84 (3.31)
Stroke, mm (in.)	61 (2.40)
Displacement, cm^3 (in^3)	1352 (82.5)
Compression ratio	10,5:1
Firing order	1-4-2-3
Spark occurs, degrees BTC	26
Direction of rotation (looking at p.t.o. side)	counterclockwise
Max. oil capacity, l (qts)	3 (3.2)
Engine speed measurement	electronically
Acceleration limitation: 0 up to -0,5g	5 sec.
Min. oil pressure below 3500 rpm, bar (psi)	0,8 (12)
Norm. oil pressure above 3500 rpm, bar (psi)	2,0 - 5,0 (29 - 73)
Max. oil temperature, °C (°F)	130 (266)
Min. oil temperature, °C (°F)	50 (122)
Norm. operating oil temperature, °C (°F)	90 - 110 (194 - 230)
Max. cylinder head/coolant temperature, °C (°F)	129 (264) - old cylinder heads 120 (248) - new cylinder heads
Weight - dry, kg (lbs) (without ext. alternator, muffler, airbox, governor)	58,3 (128)

EFFECTIVITY

Aircraft equipped with Rotax 912S engine

C. Components

(1) Starter
The starter is mounted at the rear lower right side of the engine. It is a direct drive 12 V DC motor. Starting a pinion gear in the starter engages the crankshaft ring gear and turns the engine over. When the engine reaches a pre-determined speed, centrifugal action decouples the starter pinion from the crankshaft ring gear.

(2) External Alternator
A 40-ampere, belt-driven alternator is mounted on the forward left side of the engine. It powers the entire aircraft electrical load and charges the battery during normal system operation. The alternator contains the rectifier which provides 12 VDC current.

(3) Ignition System
The engine is equipped with a breakerless capacitor discharge-type dual ignition system which operates independently from the aircraft electrical system. The ignition unit is completely maintenance-free.

(4) Carburetors
The Bing carburetors are constant compression carburetors comprising a cross-draught, butterfly-valve carburetor with variable choke tube. The carburetors have a double-float system and a rotary-valve type starting carburetor. The throttle slide is suspended from the roller diaphragm and projected into the venturi. This changes the smallest cross-section of the venturi as a function of the vacuum at this point. In this way the device provides an almost constant pressure drop and an almost constant velocity in the choke tube.

(5) Reduction Gear
The powerplant incorporates a propeller gearbox to reduce propeller speed in relation to crankshaft speed. The reduction ratio between crankshaft and propeller is 2.43:1. The gearbox has a torsional shock absorber to reduce torsional vibration. Shock absorbing is based on progressive torsional cushioning due to axial spring load acting on a dog hub.
The design also incorporates an overload clutch. Friction-damped free play at the dog hub is necessary to achieve a smooth idling.
Due to this backlash at the dog hub, a distinct torsional impact arises during engine start, shut-down and during sudden load changes. However, it remains harmless due to the built-in overload clutch. The overload clutch also protects the crankshaft from undue load in the case of ground contact of the propeller.

(6) Hydraulic Governor
The governor keeps the pre-selected propeller speed at a constant value, regardless of manifold pressure and airspeed. It is mounted to the propeller gear box.

POWER PLANT - GENERAL

1. Introduction

A. This chapter provides maintenance information for the power plant and associated components. Engine-related information is limited to the most important specifications. For further, more detailed information, refer to applicable ROTAX® Aircraft Engines publications.

B. Revs given in this chapter are engine speeds.

2. General Description

A. The aircraft is powered by a ROTAX® 914F engine. It is a turbocharged four cylinder, horizontally opposed, spark ignition engine with dry sump forced lubrication. The cylinder heads are liquid cooled and the cylinders are ram-air-cooled. The propeller is driven via a reduction gear with integrated shock absorber and overload clutch.
The engine is equipped with 2 constant depression Bing carburetors and a dual breakerless capacitor discharge ignition. The turbocharger is exhaust-driven with electronic control of boost pressure (TCU = turbo control unit). An electric starter, a belt driven 40A-12V DC external alternator and a hydraulic constant speed propeller governor are mounted to the engine.
The cylinders are numbered from front to rear with the odd numbers on the right and the even numbers on the left. The right front cylinder is number 1, the left front cylinder is number 2, the right rear cylinder is number 3 and the left rear cylinder is number 4.

B. The most important technical data of the ROTAX 914F engine are given below:

Certification	FAR 33 / JAR-E
Take-off performance (ISA)	84,5 kW at 5800 rpm (max. 5 min)
Max. continuous performance	73,5 kW at 5500 rpm
Number of cylinders	4
Bore, mm (in.)	79,5 (3.13)
Stroke, mm (in.)	61 (2.40)
Displacement, cm^3 (in^3)	1211 (73.9)
Compression ratio	9,0:1
Firing order	1-4-2-3
Spark occurs, degrees BTC	26
Direction of rotation (looking at p.t.o. side)	counterclockwise
Max. oil capacity, l (qts)	3 (3.2)
Engine speed measurement	electronically
Acceleration limitation: 0 up to -0,5g	5 sec.
Min. oil pressure below 3500 rpm, bar (psi)	0,8 (12)
Norm. oil pressure above 3500 rpm, bar (psi)	2,0 - 5,0 (29 - 73)
Max. oil temperature, °C (°F)	130 (266)
Min. oil temperature, °C (°F)	50 (122)
Norm. operating oil temperature, °C (°F)	90 - 110 (194 - 230)
Max. cylinder head/coolant temperature, °C (°F)	120 (248)
Weight - dry, kg (lbs) (without ext. alternator, governor)	71,7 (158)

C. Components

(1) Starter
The starter is mounted at the rear lower right side of the engine. It is a direct drive 12 V DC motor. Starting a pinion gear in the starter engages the crankshaft ring gear and turns the engine over. When the engine reaches a pre-determined speed, centrifugal action decouples the starter pinion from the crankshaft ring gear.

(2) External Alternator
A 40-ampere, belt-driven alternator is mounted on the forward left side of the engine. It powers the entire aircraft electrical load and charges the battery during normal system operation. The alternator contains the rectifier which provides 12 VDC current.

(3) Ignition System
The engine is equipped with a breakerless capacitor discharge-type dual ignition system which operates independently from the aircraft electrical system. The ignition unit is completely maintenance-free.

(4) Carburetors
The Bing carburetors are constant compression carburetors comprising a cross-draught, butterfly-valve carburetor with variable choke tube. The carburetors have a double-float system and a rotary-valve type starting carburetor. The throttle slide is suspended from the roller diaphragm and projected into the venturi. This changes the smallest cross-section of the venturi as a function of the vacuum at this point. In this way the device provides an almost constant pressure drop and an almost constant velocity in the choke tube.

(5) Turbocharger
The exhaust-driven turbocharger makes use of the energy in the exhaust gas for precompression of the intake air (boost pressure). The boost pressure in the airbox is controlled by means of an electronically controlled flap (wastegate) in the exhaust gas turbine.
The wastegate is controlled by the TCU (turbo control unit) and actuated by an electric servo motor via a bowden cable. It regulates the speed of the turbocharger and consequently the boost pressure. The required nominal boost pressure in the airbox is determined by the throttle position sensor mounted on the left carburetor.

(6) Reduction Gear
The powerplant incorporates a propeller gearbox to reduce propeller speed in relation to crankshaft speed. The reduction ratio between crankshaft and propeller is 2.43:1. The gearbox has a torsional shock absorber to reduce torsional vibration. Shock absorbing is based on progressive torsional cushioning due to axial spring load acting on a dog hub.
The design also incorporates an overload clutch. Friction-damped free play at the dog hub is necessary to achieve a smooth idling.
Due to this backlash at the dog hub, a distinct torsional impact arises during engine start, shut-down and during sudden load changes. However, it remains harmless due to the built-in overload clutch. The overload clutch also protects the crankshaft from undue load in the case of ground contact of the propeller.

(7) Hydraulic Governor
The governor keeps the pre-selected propeller speed at a constant value, regardless of manifold pressure and airspeed. It is mounted to the propeller gear box.

POWER PLANT - TROUBLESHOOTING

1. General

   A. The following chart lists some of the more common engine troubles, which may be encountered during maintenance, their probable causes and remedies.

2. Troubleshooting

   A. Safety Precautions:
      (1) Before beginning troubleshooting on engine, ensure that a fire extinguisher is available.
      (2) Before rotating the propeller by hand, check the ignition switch is OFF and the throttle is closed. Do not stand within the arc of the propeller blades while turning the propeller.
      (3) Before attempting to start the engine, always ascertain the propeller area is free of people.
      (4) Residual oil and fuel draining from engine hoses and lines constitutes a fire hazard.

   B. Troubleshooting Chart

Trouble	**Probable Cause**	**Remedy**
Engine will not start	Lack of fuel	Fill fuel tank. Check fuel system for leaks. Open fuel selector/shut-off valve. Clean dirty lines and strainers.
	Defective spark plugs	Clean and adjust or replace spark plugs.
	Defective ignition wire	Check with electric tester, and replace any defective wires.
	Defective battery	Replace with charged battery.
	Improper operation of magneto breaker	Clean points. Check internal timing of magnetos.
	Water in carburetor	Drain carburetor and lines.
	Internal engine failure	Check oil screens for metal particles. If found a complete overhaul of the engine may be required.
Failure of engine to idle properly	Incorrect idle mixture	Adjust mixture.

	Leak in induction system	Tighten all connections in induction system. Replace any parts that are defective.
	Incorrect idle adjustment	Adjust throttle stop to obtain correct idle.
	Uneven cylinder compression	Check condition of piston rings and valve seats.
	Faulty ignition system	Check entire ignition system.
	Insufficient fuel pressure	Adjust fuel pressure.
Low power and uneven running	Mixture too rich indicated by sluggish operation, red exhaust flame at night. Extreme cases indicated by black smoke from exhaust.	Readjustment of carburetors by authorized personnel.
	Mixture too lean; indicated by over heating or backfiring.	Check fuel lines for dirt or other restrictions. Readjustment of carburetors by authorized personnel is indicated.
	Incorrect carburetor synchronization	Perform mechanical or pneumatic carburetor synchronization.
	Leaks in induction system	Tighten all connections. Replace defective parts.
	Improper fuel	Fill tank with fuel of recommended grade.
	Defective spark plugs	Clean and adjust gap or replace spark plugs.
	Defective spark plug terminal connectors	Replace connectors on spark plug wire.
	Defective ignition system	Inspect plug connections between electronic module and ignition coils for security, wear

		and corrosion. Check cables for damage, for ground contact and security.
Failure of engine to develop full power	Leak in induction system	Tighten all connections and replace defective parts.
	Throttle lever out of adjustment	Adjust throttle lever.
	Improper fuel flow	Check strainers, lines and flow at the fuel inlet.
	Restriction in air scoop	Examine air scoop and remove restrictions.
	Improper fuel	Drain and refill tank with recommended fuel.
	Incorrect carburetor synchronization	Perform mechanical or pneumatic carburetor synchronization.
	Propeller or governor limit the engine speed	Refer to troubleshooting section in 61-00-00.
Rough engine	Cracked engine mount	Replace or repair mount.
	Defective mounting bushings	Install new mounting bushings.
	Uneven compression	Check compression.
Low oil pressure	Insufficient oil	Fill to proper level with recommended oil.
	Air lock or dirt in pressure regulator	Inspect and clean oil pressure regulator.
	Leak in suction line or pressure line	Check for signs of leakage, Replace defective parts as required.
	High oil temperature	See "High oil temperature” in "Trouble" column.
	Defective pressure gauge	Replace.
	Stoppage in oil pump intake passage	Check line for obstruction. Clean suction strainer.

High oil temperature	Insufficient air cooling	Check oil cooler for condition, deformation or obstruction.
	Insufficient oil supply	Fill to proper level with specified oil.
	Low grade of oil	Replace with oil conforming to specifications.
	Clogged oil lines or strainers	Remove and clean oil strainers.
	Excessive blow-by	Usually caused by worn or stuck rings.
	Failing or failed bearing	Examine oil filter / magnetic plug for metal particles.
	Defective temperature gauge	Replace gauge.
Excessive oil consumption	Low grade of oil	Fill tank with oil conforming to specifications.
	Failing or failed bearings	Check sump for metal particles.
	Worn piston rings	Install new rings.
	Incorrect installation of piston rings	Install new rings.
Metal chips in oil system (oil filter / magnetic plug)	Internal damage on engine or gearbox	If there are larger accumulations of metal chips, an engine overhaul and flushing of entire oil circuit incl. propeller (at manufacturer) is required. Replace oil radiator.

POWER PLANT - MAINTENANCE

1. General

A. This section provides instructions on engine removal and installation.
For information beyond the scope of this section, such as repair and overhaul of the engine or components, refer to applicable ROTAX® Aircraft Engines GmbH publications.

2. Engine Removal/Installation

A. Remove Engine

CAUTION: PLACE A SUITABLE TAIL STAND UNDER TAIL OF AIRCRAFT BEFORE REMOVING ENGINE.

PLUG OR CAP ALL OPENINGS, HOSE, AND LINES IMMEDIATELY AFTER DISCONNECTION TO PREVENT ENTRY OF FOREIGN MATERIAL.

(1) Place all electrical switches and the fuel selector valve in the cockpit in the OFF position.
(2) Remove engine cowling (refer to 71-10-00).
(3) Remove battery from aircraft (refer to 24-30-00).
(4) Drain engine oil, fuel and coolant (refer to chapters 28, 75 and 79).
(5) Remove spinner and propeller (refer to 61-10-00).
(6) Disconnect Bowden cables at carburetors and governor (and support).
(7) Rotax 912: Disconnect Bowden cable at airbox flapper valves.
Rotax 914: Disconnect Bowden cables at turbocharger, air distribution box on air filter casing and intercooler cover.
(8) Rotax 912: Disconnect fuel supply hose at firewall and return hose at engine.
Rotax 914: Disconnect fuel supply and return hoses from engine (at pressure regulator).
If installed: Disconnect hose to fuel pressure sensor from engine.
(9) Disconnect manifold pressure line at engine.
(10) Rotax 912: Disconnect air hoses from airbox and heat exchanger on exhaust muffler.
Rotax 914: Disconnect air hoses from airbox, turbocharger and heat exchanger on exhaust muffler. Remove tubing and air filter casing from aircraft.
(11) Disconnect coolant hose to overflow bottle at expansion tank.
(12) Disconnect coolant lines at engine and remove tubing and radiator from aircraft.
(13) Disconnect oil lines at engine and remove tubing and radiator from aircraft.
If installed: Disconnect hose to oil pressure sensor from engine.
(14) Disconnect fuel drain lines at engine and remove tubing from aircraft.
(15) Remove exhaust assembly from aircraft (refer to 78-00-00).
(16) Disconnect electrical cables to engine, alternator and sensors at connector or suitable place.
(17) Remove wiring harness and bonding cables from engine.
(18) Lift engine just enough to relief weight from engine mounts.
(19) Remove nuts, washers, and bolts securing engine to AQUILA engine mount.
(20) Remove engine from aircraft.

B. Install Engine

NOTE: Remove all protective plugs or caps and labels as each component is installed.

NOTE: Reinstall all tubes, hoses, control cables and wiring as previously installed (including heat, abrasion and fire protection and supports / attachments).

(1) Hoist engine into alignment with AQUILA engine mount attach points.
(2) Assemble engine shock mounts.
(3) Install engine mount bolts, washers, and nuts (refer to 71-20-00). Torque to 25 Nm (221 in.lbs).
(4) Reinstall exhaust assembly to aircraft (refer to 78-00-00).
(5) Rotax 912: Reconnect fuel supply hose at firewall and return hose at engine.
Rotax 914: Reconnect fuel supply and return hoses to engine (at pressure regulator).
If installed: Reconnect fuel pressure sensor hose to engine.
(6) Reconnect manifold pressure line at engine.
(7) Reconnect oil lines to engine and reinstall tubing and radiator to aircraft.
If installed: Reconnect oil pressure sensor hose to engine.
(8) Reconnect coolant lines to engine and reinstall tubing and radiator to aircraft.
(9) Reconnect coolant hose to overflow bottle at expansion tank.
(10) Rotax 912: Reconnect air hoses to airbox and heat exchanger on exhaust muffler.
Rotax 914: Reconnect air hoses to airbox, turbocharger and heat exchanger on exhaust muffler. Reinstall tubing and air filter casing to aircraft.
(11) Reconnect fuel drain lines to engine and reinstall tubing to aircraft.
(12) Reconnect and adjust Bowden cables at carburetors and governor (refer to 61-20-00 and 76-00-00).
(13) Rotax 912: Reconnect and adjust Bowden cable at airbox flapper valves (refer to 71-60-00).
Rotax 914: Reconnect and adjust Bowden cables at turbocharger, air distribution box on air filter casing and intercooler cover (refer to 71-60-00 and 76-00-00).
(14) Reinstall wiring harness and bonding cables to engine.
(15) Reconnect electrical cables to engine, alternator and sensors.
(16) Reinstall propeller and spinner (refer to 61-10-00).
(17) Replenish engine oil and coolant (refer to 75-10-00 and 79-10-00).
(18) Reinstall battery (refer to 24-30-00).
(19) Perform operational check (refer to 05-20-00).
(20) Perform visual check for signs of leakage.
(21) Install engine cowling (refer to 71-10-00).

3. Engine Cleaning

A. For engine cleaning procedures, refer to 12-23-00.

4. Engine Storage

A. If the engine is being removed for storage purposes, it should be preserved. The ROTAX 912/914 series engines operator's manual, section 11, contains information on preservation techniques.

COWLING - MAINTENANCE

1. General

A. The engine cowling is made from laminated fiberglass and comprises an upper and a lower half. The oil access door is located on the side of the upper cowling. An air intake and the induction air filter casing are to be found on the lower cowling.
Both cowling halves are fixed to the fuselage and to each other via Camloc quick-release fasteners. The cowling halves can thus be easily removed during engine maintenance.
The insides of the cowling halves have a specific fire-proof finish.

2. Engine Cowling Removal/Installation

A. Remove Engine Cowling

WARNING: DO NOT REMOVE COWLING WITH THE ENGINE RUNNING.

IF ENGINE HAS BEEN RUNNING RECENTLY, HOT ENGINE COMPONENTS MAY CAUSE SKIN BURNS!

(1) Close canopy.
(2) Rotate propeller to horizontal position.

CAUTION: DO NOT ROTATE THE PROPELLER CLOCKWISE.

(3) Release Camloc quick-release fasteners securing upper cowl to lower cowl.
(4) Release Camloc quick-release fasteners securing upper cowl to fuselage.
(5) Remove upper cowl from aircraft.
(6) Rotax 912: Remove flexible air hose from induction air filter casing.
Rotax 914: Remove Camloc quick-release fasteners securing induction air filter casing to cowl.
(7) Release Camloc quick-release fasteners securing radiator and oil cooler to lower cowl.
(8) Disconnect electrical cable to landing light at connector.
(9) Release Camloc quick-release fasteners securing end cover plate to bottom of lower cowl.

CAUTION: TWO PEOPLE ARE REQUIRED WHEN REMOVING OR INSTALLING THE LOWER ENGINE COWLING TO PREVENT THE COWLING BEING DAMAGED, BENT, SCRATCHED OR DROPPED.

(10) Release Camloc quick-release fasteners securing lower cowl to fuselage.
(11) Remove lower cowl from aircraft.

B. Install Engine Cowling
(1) Put lower cowl in position and fasten to fuselage with Camloc quick-release fasteners.
(2) Position end cover plate on bottom of lower cowl and secure with Camloc quick-release fasteners.
(3) Connect electrical cable to landing light at connector.
(4) Fasten radiator and oil cooler to lower cowl with Camloc quick-release fasteners.

(5) Rotax 912: Install flexible air hose to induction air filter casing and secure using clamp.
Rotax 914: Fasten induction air filter casing to lower cowl with Camloc quick-release fasteners.

(6) Put upper cowl in position and secure to lower cowl and fuselage with Camloc quick-release fasteners.

ENGINE MOUNT - MAINTENANCE

1. General

A. The engine is elastically attached to the aircraft by means of an engine mount, which is equipped with vibration dampers. The engine mount consists of welded steel tubes and is fastened to the fuselage at four points on the firewall by steel bolts. The vibration dampers isolate engine noise and vibration from the airframe.

B. This section is applicable to the engine mount made by AQUILA Aviation.
Maintenance not covered by this chapter is possible, if carried out according to AC 43.13-1B, September 8, 1998.

2. Maintenance Instructions

A. The components of vibration dampers should be inspected for condition when the engine is removed. Metal components should be examined for cracks and excessive wear due to aging and deterioration. Rubber components should be inspected for separation, swelling, cracking or clearly visible setting. Vibration dampers showing such or other signs of aging must be replaced.

B. Vibration dampers should never be cleaned with any type of solvent. If they need cleaning, use a clean, dry cloth.

3. Engine Mount Removal/Installation

A. Remove Engine Mount
(1) Remove engine (refer to 71-00-00).
(2) Remove master relay, starter relay, electrical wiring and connectors secured to the engine mount from engine mount.
(3) Disconnect all ground cables from engine mount.
(4) Remove oil tank and hoses from aircraft (refer to chapter 79).
(5) Remove overflow bottle and coolant lines from aircraft (refer to chapter 75).
(6) Rotax 914: Remove intercooler, mounting brackets and tubing from aircraft.
(7) Remove nose landing gear assembly and support strut from aircraft (refer to chapter 32).
(8) Remove bolts securing engine mount to aircraft structure and remove engine mount.

B. Install Engine Mount
(1) Align engine mount with mounting points on firewall.
(2) Install engine mount to firewall. Torque bolts to 30 Nm (265.5 in.lbs).
(3) Reinstall nose landing gear assembly and support strut (refer to chapter 32).
(4) Rotax 914: Reinstall intercooler, mounting brackets and tubing.
(5) Install overflow bottle and drain line to engine mount (refer to 75-10-00).
(6) Install oil tank and drain line to engine mount (refer to 79-10-00).
(7) Reconnect all ground cables to engine mount.
(8) Reinstall master relay, starter relay and electrical wiring to engine mount.

AIR INDUCTION SYSTEM - MAINTENANCE

1. General

   A. Induction air enters the carburetors via the air intake, the induction air filter, the airbox and flexible ducts. The air intake and the induction air filter casing are located on the left side of the lower cowling. The airbox is of a welded aluminum design and located on top of the engine. It has a second inlet for preheated air from the exhaust muffler area.

   B. The airbox comprises two coupled flap valves. The valves are manually controlled from the cabin by pulling the CARBURETOR HEAT control knob. The valves interrupt the airflow from the air intake and allow heated alternate air from the exhaust muffler area to flow to the carburetors.

2. Maintenance Instructions

   A. Induction Air Filter
   For induction air filter servicing, refer to 12-13-00.

   B. Flap Valves
   Always ensure one flap is closed and the other fully open.
   (a) Adjust the correct position of the valve flaps to each other by changing the length of the linkage bar between the two flap valve control arms.
   (b) Adjust Bowden cable so that with the CARBURETOR HEAT knob pushed in, the carburetor heat valve closes completely.

AIR INDUCTION SYSTEM - MAINTENANCE

1. General

A. The Rotax 914 engine is equipped with an exhaust gas turbocharger, making use of the energy in the exhaust gas for precompression of the intake air (boost pressure).

Induction air enters the turbocharger via the air intake, the induction air filter, an air distribution box and flexible ducts located on the right side of the lower cowling. The air distribution box has a second inlet for preheated air from the exhaust turbocharger area.

Compressed and heated air is then routed from the turbocharger to the carburetors via the intercooler, an aluminum airbox on top of the engine and flexible ducts.

B. The air distribution box comprises a flap valve. The valve is manually controlled from the cabin by pulling the CARBURETOR HEAT control knob. The valve interrupts the airflow from the air intake and allows heated alternate air from the exhaust turbocharger area to flow to the carburetors. The effect is increased by a cover on the intercooler, that is closed simultaneously.

2. Maintenance Instructions

A. Induction Air Filter
For induction air filter servicing, refer to 12-13-00.

B. Carburetor Heat Control Adjustment / Check
Always ensure the flap for preheated alternate air is fully closed and the openings in the intercooler cover overlap with the CARBURETOR HEAT control knob pushed in.

(a) Adjust the correct positions of valve flap and intercooler cover by changing the length of the dual control Bowden cable wires.

(b) Adjust Bowden cable, so that with the CARBURETOR HEAT knob pushed in, the carburetor heat valve closes completely (only fresh air from outside the cowling) and the openings of the intercooler cover are completely open (openings in both cover sheets overlap).

(c) Check that with the CARBURETOR HEAT knob pulled out, the carburetor heat valve opens completely (only preheated air from inside the cowling) and the openings of the intercooler cover are completely closed (no cooling fins are visible from above the intercooler).

CHAPTER 74

IGNITION SYSTEM

TABLE OF CONTENTS

IGNITION SYSTEM - GENERAL

1. Introduction

A. This chapter describes those units and components which generate, distribute and control an electrical current to ignite the fuel air mixture in the engine cylinders.

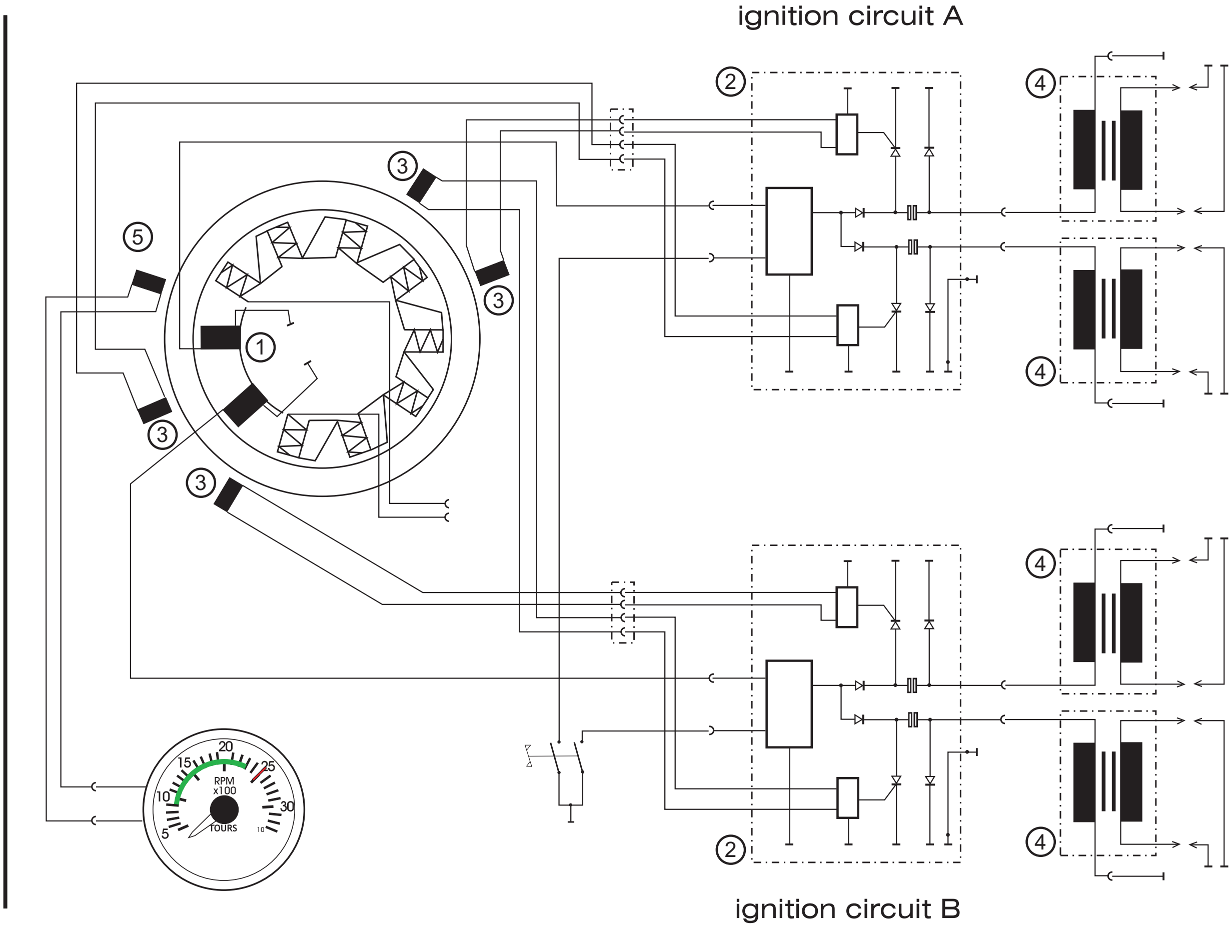
2. General Description

A. The engine is equipped with a breakerless dual ignition system (DCDI - Dual Capacitor Discharge Ignition). The ignition unit is completely maintenance-free and needs no external power supply.

Refer to figure 1 for an schematic circuit diagram of the ignition system. Each of the two independent charging coils (1) located on the generator stator supplies one of the two ignition circuits. The energy is stored in capacitors of the electronic modules (2). At the moment of ignition 2 of the 4 external trigger coils (3) actuate the discharge of the capacitors via the primary circuit of the dual ignition transformers (4). The 5th trigger coil (5) is provided for the rev counter signal.

A combined, rotary-type switch, mounted on the instrument panel right side in the row of switches below the flight instruments, controls ignition system and starter operation. It has the positions OFF, R, L, BOTH and START. With the switch OFF, the charging coils are grounded and will not supply capacitors with current. During normal engine operation, the switch is in the BOTH position. It is switched to L or R only to check the ignition circuits or if one ignition circuit is not working properly. To start the engine, the switch should be rotated to the right into the spring-loaded START position, activating the starter (if ALT1/BAT is ON). When the switch is released, it will automatically return to the BOTH position.

IGNITION SYSTEM



Ignition System Electrical Schematic
Figure 1

IGNITION SYSTEM - MAINTENANCE

1. General

A. Maintenance of the ignition system is limited to the removal and installation of components. Information on verification and renewal of spark plugs is also provided.

B. For information beyond the scope of this section pertaining to the ignition system, refer to the maintenance manual for ROTAX® Engine Type 912 Series respectively Type 914 Series.

C. For inspection time requirements of the ignition system components, refer to 05-20-00.

2. SMD-Electronic Module Removal/Installation

A. Remove SMD-Electronic Module
  (1) Remove upper engine cowling (refer to 71-10-00).
  (2) Remove battery from aircraft (refer to 24-30-00).
  (3) Disconnect electrical connections to electronic module.
  (4) Remove machine screws, lock washer and washers securing electronic module, cable clamp, and ground cable terminal to engine.
  (5) Remove electronic module from engine.

B. Install SMD-Electronic Module
  (1) Put electronic module, cable clamp and ground cable terminal in position and secure to the engine using lock washer, washers and screws.
  (2) Connect electrical connections to electronic module.
  (3) Install battery (refer to 24-30-00).
  (4) Install upper engine cowling (refer to 71-10-00).

3. Double Ignition Coil Assembly Removal/Installation

A. Remove Double Ignition Coil Assembly
  (1) Remove upper engine cowling (refer to 71-10-00).
  (2) Remove battery from aircraft (refer to 24-30-00).
  (3) Remove clamps and cable ties securing ignition cables to engine.
  (4) Remove spark plug connectors from spark plugs.
  (5) Remove machine screws, bolts, nuts, lock washers and washers securing coil assembly to engine.
  (6) Remove coil assembly.

B. Install Double Ignition Coil Assembly
  (1) Install coil assembly to engine using machine screws, bolts, nuts, lock washers and washers. Ensure correct position of the hardware.
  (2) Route ignition cables to the appropriate spark plug position.

  NOTE: There are yellow marking sleeves on the cables.

(3) Install spark plug connectors to spark plugs.
(4) Install clamps and cable ties securing ignition cables to engine.
(5) Install battery (refer to 24-30-00).
(6) Install engine cowling (refer to 71-10-00).

4. Spark Plug Removal/Installation

A. Remove Spark Plug

(1) Remove engine cowling (refer to 71-10-00).
(2) Disconnect battery (refer to 24-30-00).
(3) Remove resistor spark plug connector from spark plug.

CAUTION: COVER SPARK PLUG HOLE TO PREVENT ENTRY OF FOREIGN MATERIALS.

(4) Unscrew spark plug and remove from engine.

B. Install Spark Plug

NOTE: New spark plugs and spark plug connectors have been introduced by Rotax. Refer to Rotax SI-912-027 respectively SI-914-028 for further information.

(1) Clean spark plug as required.
(2) Apply a small amount of heat conduction compound to spark plug thread.
(3) Install spark plug to engine. Torque old plug type to 20 Nm (177 in.lbs) / new plug type to 16 Nm (142 in.lbs) on the cold engine.
(4) Install spark plug connector to spark plug.
(5) Reconnect battery (refer to 24-30-00).
(6) Install engine cowling (refer to 71-10-00).

5. Inspection/Check

A. Spark Plugs

NOTE: Always renew both spark plugs of a cylinder and do not interchange spark plugs between cylinders.

NOTE: Mixing of spark plug types and spark plug connector types is NOT allowed.
All spark plugs and spark plug connectors must be of the same part number for the entire engine.

(1) Mark position of the spark plugs (e.g. cyl. 1 top) and remove spark plugs as described above.
(2) Inspect the spark plugs for damage (melt beads, burn off). Renew spark plug if required.
(3) Inspect spark plug thread for damage (especially at burn off). Renew spark plug if required.
(4) Inspect plug face appearance (refer to table 1).
(5) Inspect spark plug electrode gap. Renew spark plug if required.

NOTE: New spark plug type: Due to the curved gap between the center electrode and the ground electrodes, it is suggested to use a wire type feeler gauge for accurate gap measurement. Refer to Rotax SI-912-027 respectively SI-914-028.

NOTE: Spark plugs are already gapped upon delivery. No adjustment of the gap is necessary nor allowed.

Spark plug	**Electrode gap:**	**New**	**Wear limit**
Old type (P/N 297940)		0,6 mm - 0,7 mm 0.024 in - 0.028 in.	0,9 mm 0.035 in.
New type (P/N 297656)		0,8 mm - 0,9 mm 0.031 in. - 0.035 in.	1,1 mm 0.043 in.

(6) Install spark plugs to engine as described above. Ensure the correct type of spark plug is used.

Table 1: Spark Plug Face Appearance and Causes

Face appearance	Indicates the following:
Light colored to brown:	Plug and calibration are correct.
Velvet black:	- Mixture too rich; - Insufficient air intake (clogged air filter); - Operating temperature too low;
Oily, glossy coating:	- Misfiring; - Too much oil in combustion chamber; - Worn cylinder and piston rings;
White with melt droplets:	- Mixture too lean; - Leaking valves;

B. Ignition System Wiring

(1) Check all cable connectors for tight fit and good contact.
(2) Inspect all ground connections for corrosion and security. Repair as required. Check plug connections between pick-up cable, electronic module, charging and shorting cables for corrosion and security. Repair as required.
(3) Check plug connections between electronic module and ignition coils for security, wear and corrosion.
(4) Check grounding cables for tight fit and corrosion. Repair as required.
(5) Verify shielding of cable assemblies for damage, ground contact and security.
(6) Inspect all eight ignition cables to spark plug connector for damage and tight fit. Check resistor plug connector for tight fit on spark plug. Repair or replace as necessary.

CHAPTER 75

COOLING SYSTEM

TABLE OF CONTENTS

COOLING SYSTEM - GENERAL

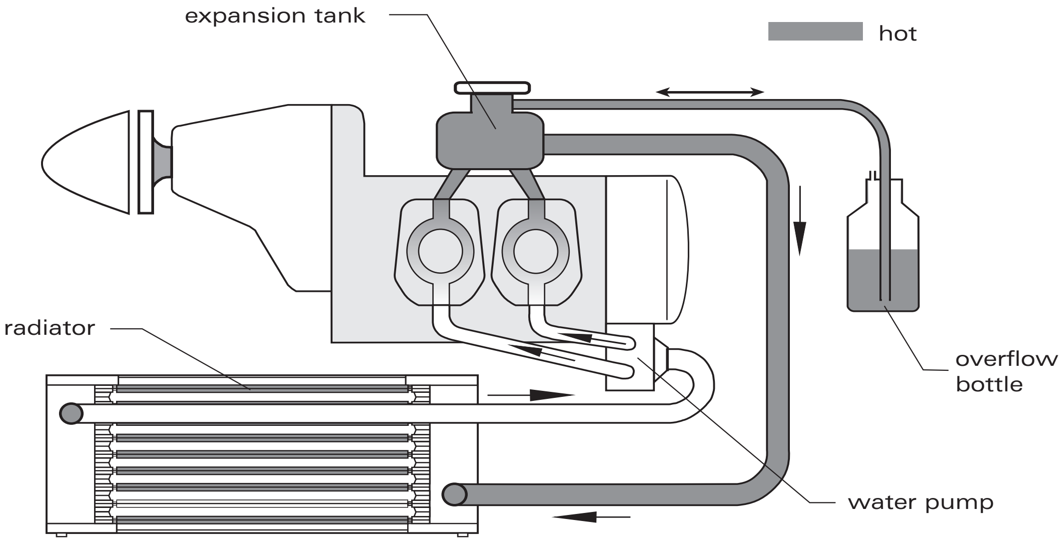
1. Introduction

A. This chapter covers those units and components which are used for liquid cooling of the cylinder heads and are not part of the engine.
For additional information on the internal engine cooling system components, refer to the respective engine manufacturer's publications.

B. For cooling system servicing, such as replenishing or flushing, refer to 12-14-00.

2. General Description

A. The cooling system of the engine is designed for liquid cooling of the cylinder heads and ram air cooling of the cylinders. The cooling system of the cylinder heads is a closed circuit with an expansion tank.



Engine Cooling System (Schematic)
Figure 1

B. The coolant flow is forced by a camshaft driven water pump from the radiator to the cylinder heads. The coolant passes from the top of the cylinder heads on to the expansion tank. Since the radiator is installed below engine level, the expansion tank located on top of the engine allows for coolant expansion.

The expansion tank is closed by a pressure cap (with excess pressure valve and return valve). As coolant temperature rises, the excess pressure valve opens and the coolant will flow through the hose at atmospheric pressure to the transparent overflow bottle. When coolant temperature drops, the coolant will be sucked back into the cooling circuit. Coolant temperature is measured by a temperature sensor installed in cylinder head 3.

COOLING SYSTEM - MAINTENANCE

1. General

WARNING: NEVER OPEN RADIATOR, EXPANSION TANK OR OVERFLOW BOTTLE CAP WHEN THE COOLING SYSTEM IS STILL HOT! FOR REASONS OF SAFETY, COVER CAP WITH A CLOTH AND OPEN SLOWLY. SUDDEN OPENING OF THE CAP WOULD PROVOKE EXIT OF BOILING COOLANT AND RESULT IN SEVERE SCALDS.

CAUTION: IF ENGINE WAS RUNNING RECENTLY, HOT ENGINE COMPONENTS MAY CAUSE SKIN BURNS!

A. Maintenance of the engine cooling system is limited to removal and installation of components. Inspection procedures for the cooling system are also provided.

B. For information beyond the scope of this section pertaining to the engine cooling system, refer to the respective engine manufacturer’s publications.

C. For inspection time requirements of the cooling system components, refer to 05-20-00.

2. Radiator Removal/Installation

A. Remove Radiator
(1) Remove engine cowling (refer to 71-10-00).
(2) Disconnect inlet and outlet hoses at radiator.
(3) Remove bolts securing radiator to mounting plate and remove radiator.

B. Install Radiator
(1) Secure radiator to mounting plate using bolts, washers and spacers.
(2) Connect inlet and outlet hoses at radiator.
(3) Install engine cowling (refer to 71-10-00).
(4) Replenish engine coolant as required.
(5) Perform an engine run and check oil cooler / radiator and connections for leaks.

3. Overflow Bottle Removal/Installation

A. Remove Overflow Bottle
(1) Remove engine cowling (refer to 71-10-00).
(2) Disconnect hose at overflow bottle.
(3) Open clamps securing overflow bottle to bracket and remove overflow bottle from aircraft.

B. Install Overflow Bottle
  (1) Place overflow bottle on bracket. Ensure the correct position of the protection rubbers.
  (2) Secure overflow bottle to bracket with clamps.
  (3) Connect hose at overflow bottle.
  (4) Install engine cowling (refer to 71-10-00).

4. Expansion Tank Removal/Installation

A. Remove Expansion Tank
  (1) Remove engine cowling (refer to 71-10-00).
  (2) Drain coolant as required either at water pump or radiator.
  (3) Remove all hoses connected to expansion tank.
  (4) Remove expansion tank from engine.

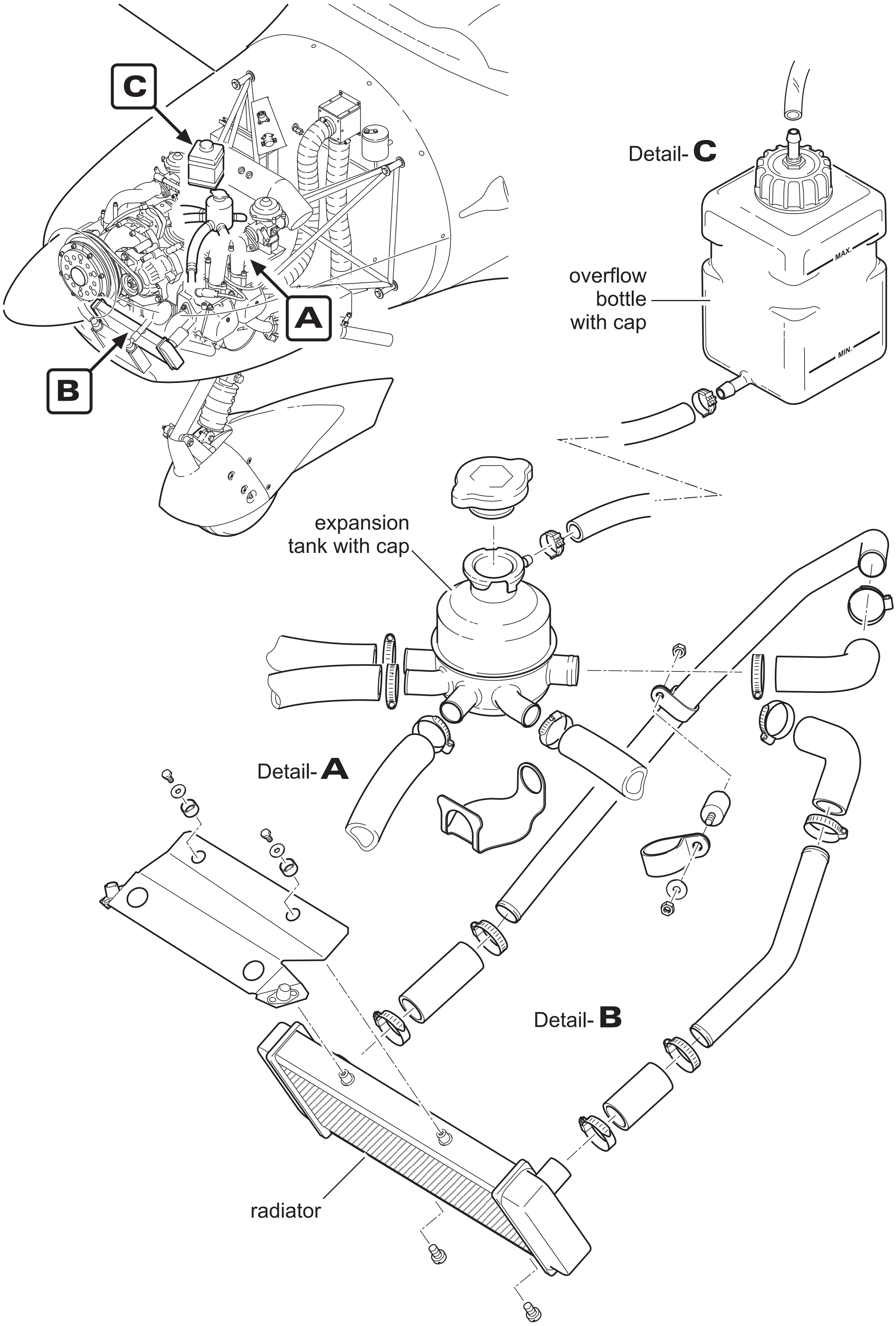
B. Install Expansion Tank
  (1) Position expansion tank on engine.
  (2) Connect all hoses to expansion tank.
  (3) Replenish coolant as required (refer to 12-14-00).
  (4) Install engine cowling (refer to 71-10-00).

5. Inspection/Check

A. Engine Cooling System
  (1) Inspect all coolant hoses for damage through heat, cracking, wear and evidence of leaking.
  (2) Check all connections on cylinder head top- and bottom sides and on the water pump.
  (3) Check expansion tank for damages. Check protection rubber at bottom of the tank for tight fit.
  (4) Check gasket of radiator cover as well as the pressure control valve and return valve. The pressure control valve opens at 1,2 bar (17.4 psi).

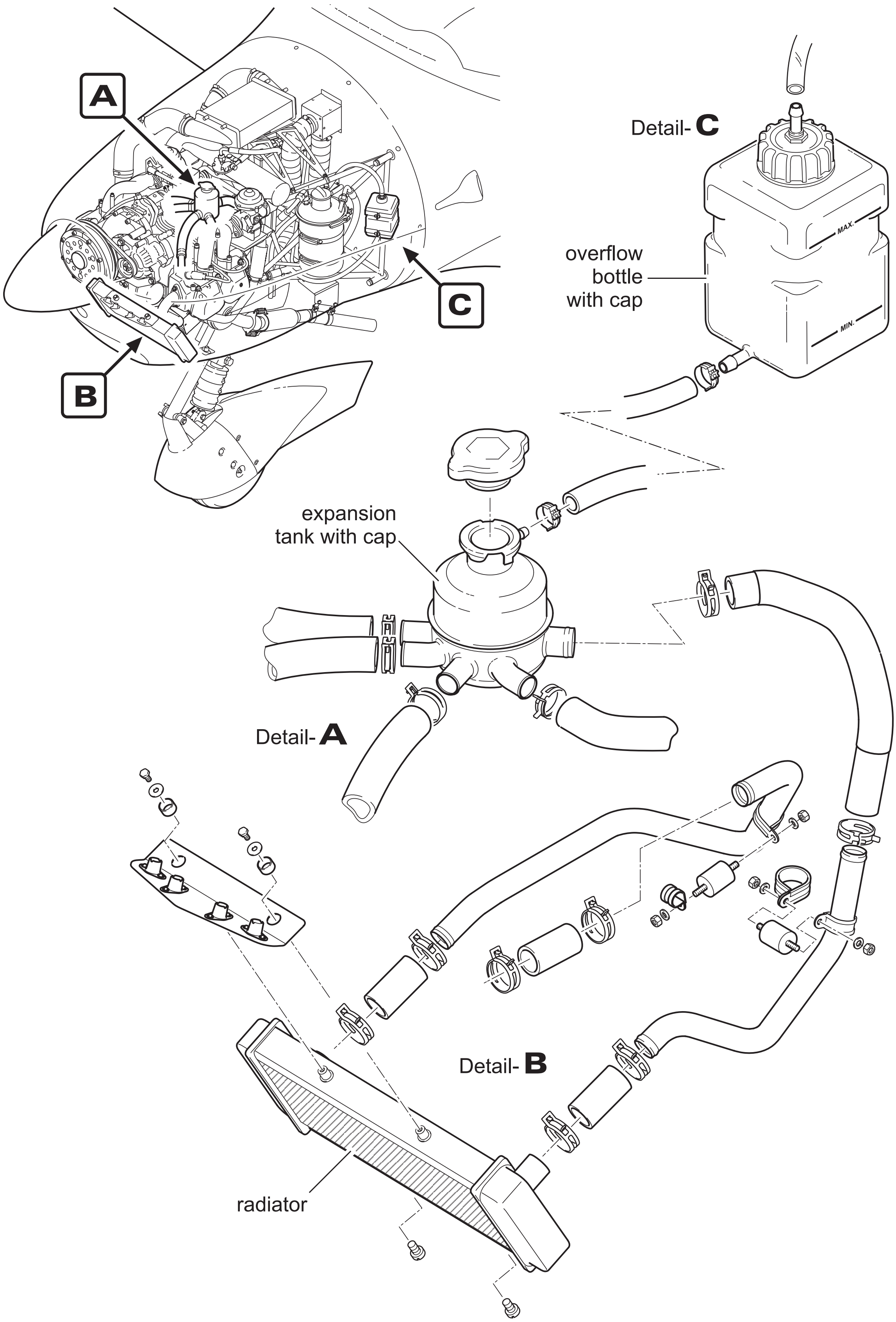
CAUTION: USE COOLANT IN ACCORDANCE TO 12-14-00 ONLY.

  (5) Check coolant with densimeter or glycol tester. lf necessary, replenish with coolant of same composition. Badly discolored or thick coolant must be renewed.



EFFECTIVITY

Aircraft equipped with Rotax 912S engine



EFFECTIVITY

Aircraft equipped with Rotax 914F engine

CHAPTER 76

ENGINE CONTROLS

TABLE OF CONTENTS

ENGINE CONTROLS - GENERAL

1. Introduction

A. This chapter describes and provides maintenance instructions for components and systems used to control the engine.

2. General Description

A. Engine controls include throttle, choke, propeller and carburetor heat / alternate air. The primary engine controls, the throttle and propeller controls, employ conventional push-pull type levers and are connected to a control quadrant mounted on the center console. The push-pull type choke and carburetor heat / alternate air control knobs are to be found in the center console, below the instrument panel.

Throttle Control
The throttle control lever is connected via Bowden cables with the throttle actuation arm on each carburetor. The Bowden cable jackets are attached at both ends to a support bracket which is adjustable on the carburetor side.

Propeller Control
Movement of the propeller speed control lever is transferred to the propeller governor control arm via a Bowden cable. The Bowden cable is adjustable on the propeller governor.

Choke
The choke control knob is connected via Bowden cables to the choke actuation lever on each carburetor.

Carburetor Heat / Alternate Air (Rotax 912S)
By pulling the carburetor heat control knob, two coupled flap valves in the air distribution box are operated. The valves stop airflow from the air intake and allow heated alternate air from the exhaust muffler area to flow to the carburetors. Movement of the carburetor heat knob is transferred to the flap valves through a Bowden cable.

Carburetor Heat / Alternate Air (Rotax 914F)
By pulling the carburetor heat control knob, a flap valve on the air filter casing is operated. The valve stops airflow from the air intake and allows heated alternate air from the turbocharger area to flow to the carburetors. Simultaneously two slotted aluminium sheets above the intercooler are moved relative to each other, so that the slots are covered and no cooling air can flow through the intercooler.

B. On aircraft equipped with a Rotax 914F engine the exhaust-driven turbocharger makes use of the energy in the exhaust gas for precompression of the intake air (boost pressure). The boost pressure in the airbox is controlled by means of an electronically controlled flap (wastegate) in the exhaust gas turbine.

Turbo Control Unit (TCU)

The wastegate is controlled by the TCU and actuated by an electric servo motor via a bowden cable. It regulates the speed of the turbocharger and consequently the boost pressure. The position of the wastegate is determined from the following sensors: throttle position, airbox pressure, ambient pressure, wastegate position, rev counter and airbox temperature.

The TCU is located on the rear side of the instrument panel. The electric servo motor is located below the cockpit floor on the cockpit side of the firewall.

TCU Communication Program

The TCU incorporates a serial RS232 interface located on the rear side of the instrument panel. By using a specially developed program, all input and exit signals of the TCU can be monitored, checked and recorded. This program allows quick and efficient error diagnostics without having to dismantle the complete control unit. It can monitor and record the operation of many elements, including the 2 pressure sensors, temperature sensors, rev pickup, throttle valve and wastegate position.

Refer to ROTAX Maintenance Manual (Heavy Maintenance) for Rotax Engine Type 912 and 914 Series, chapter 76-00-00, for further information on the TCU communication program.

ENGINE CONTROLS - MAINTENANCE

1. General

A. For propeller speed control adjustment/test procedures, refer to 61-20-00.

B. For carburetor heat control adjustment/test procedures, refer to 71-60-00.

2. Control Quadrant Disassembly/Assembly

A. For control quadrant disassembly/assembly, refer to figure 201.

3. Throttle Control Cable Removal/Installation

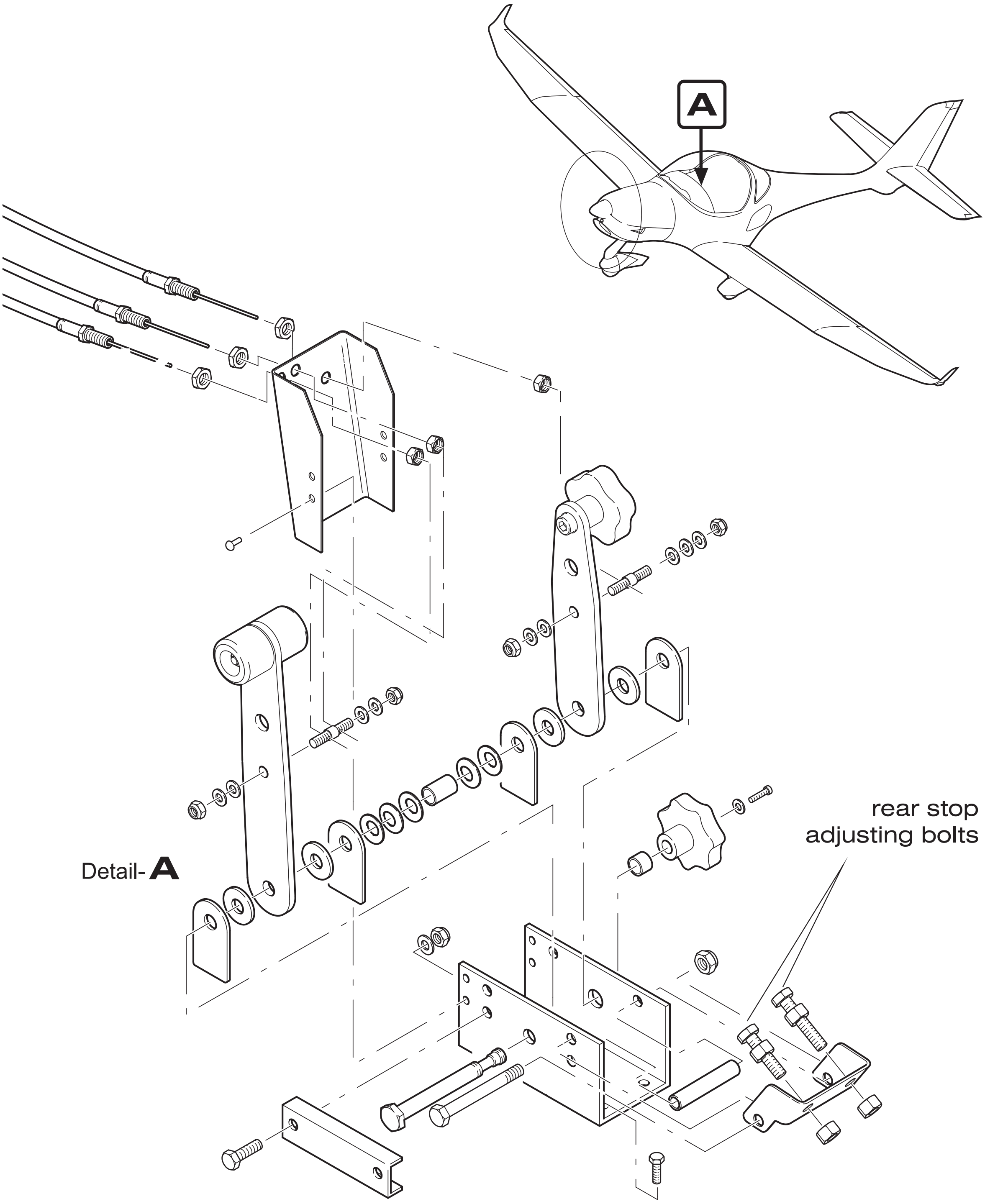
WARNING: WHEN THE THROTTLE CONTROL CABLES ARE NOT CONNECTED, THE CARBURETORS ARE IN FULL OPEN POSITION. NEVER START ENGINE WHEN THE CARBURETOR THROTTLE CONTROL CABLES ARE NOT CONNECTED.

A. Remove Throttle Control Cables
- (1) Remove engine cowling (refer to 71-10-00).
- (2) Remove access panels 211 FT, 211 FB, 211 EC (refer to 25-12-00) in the cabin.
- (3) Disconnect throttle control cables from carburetors.
- (4) Disconnect throttle control cables at throttle control lever.
- (5) Carefully pull throttle control cables through firewall and control cable support bracket, and remove from aircraft.

B. Install Throttle Control Cables

NOTE: When installing throttle control cables, ensure the cables are routed exactly as previously installed. Grease control cable wires with engine oil prior to installation. Before installing, ensure cable fitting on firewall is clear and free of sealant.

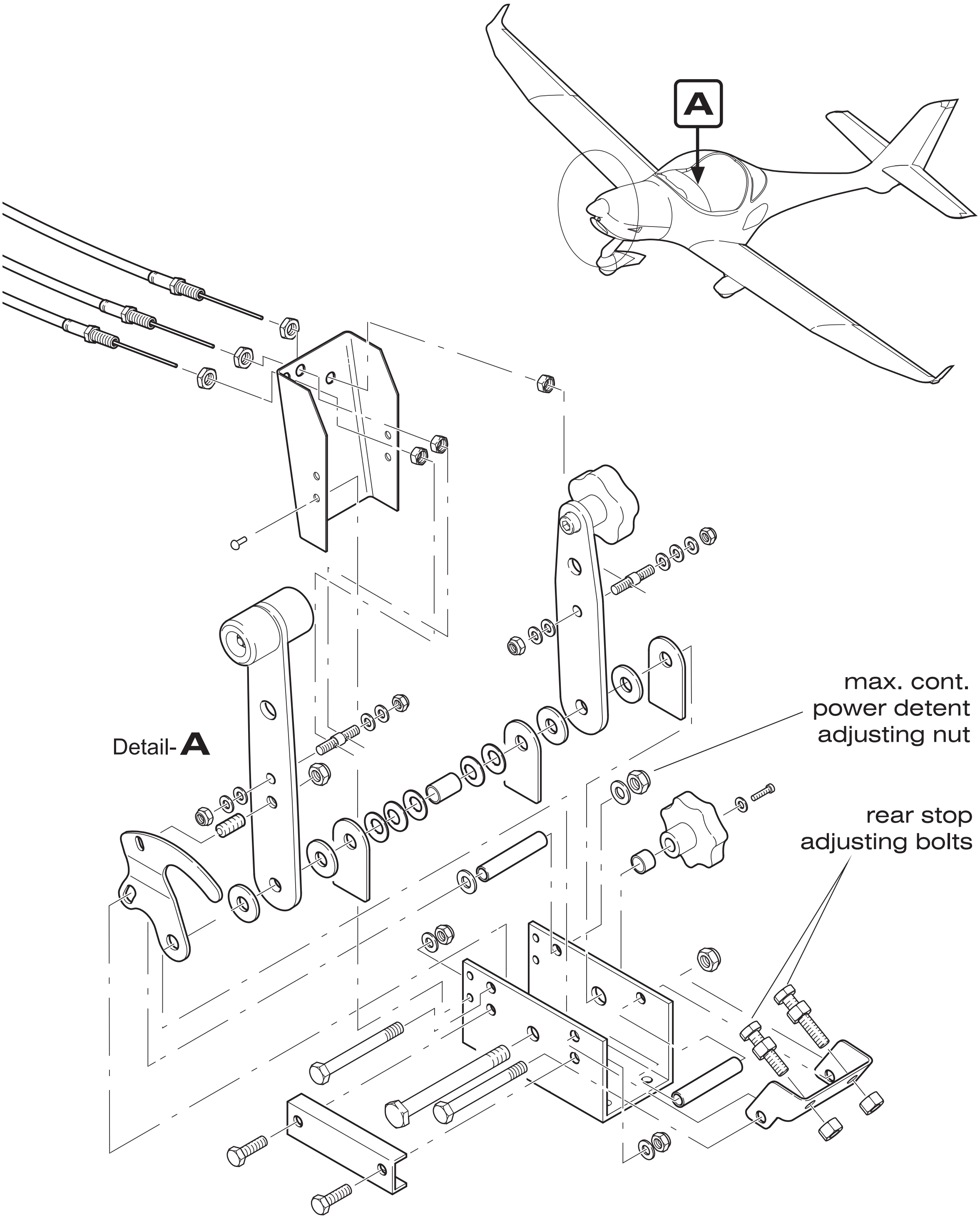
- (1) Route throttle cables from the cabin, through control cable support bracket and then through the firewall to the engine compartment.
- (2) Install washers and nuts securing control cables to cable support bracket at the console.
- (3) Secure control cables to support brackets at carburetors and connect to carburetor throttle control arm using hardware in the engine compartment.
- (4) With throttle control lever in full forward position, connect control cables to the throttle control lever in the cabin as shown in figure 201.
- (5) Perform throttle control cable adjustment/test (refer to “Throttle Control Adjustment/Test” below).
- (6) Fill firewall seal fitting with silicone sealant.
- (7) Install all items removed for access.



Control Quadrant Assembly
Figure 201

EFFECTIVITY

Aircraft equipped with Rotax 912S engine



Control Quadrant Assembly
Figure 201

EFFECTIVITY

Aircraft equipped with Rotax 914F engine

4. Governor Control Cable Removal/Installation

A. Remove Governor Control Cable
- (1) Remove engine cowling (refer to 71-10-00).
- (2) Remove access panels 211 FT, 211 FB, 211 EC (refer to 25-12-00) in the cabin.
- (3) Disconnect governor control cable from governor control arm.
- (4) Remove any clamps or ties securing governor cable to engine or engine mount.
- (5) Disconnect governor control cable at propeller control lever.
- (6) Carefully pull governor control cable through firewall and control cable support bracket, and remove from aircraft.

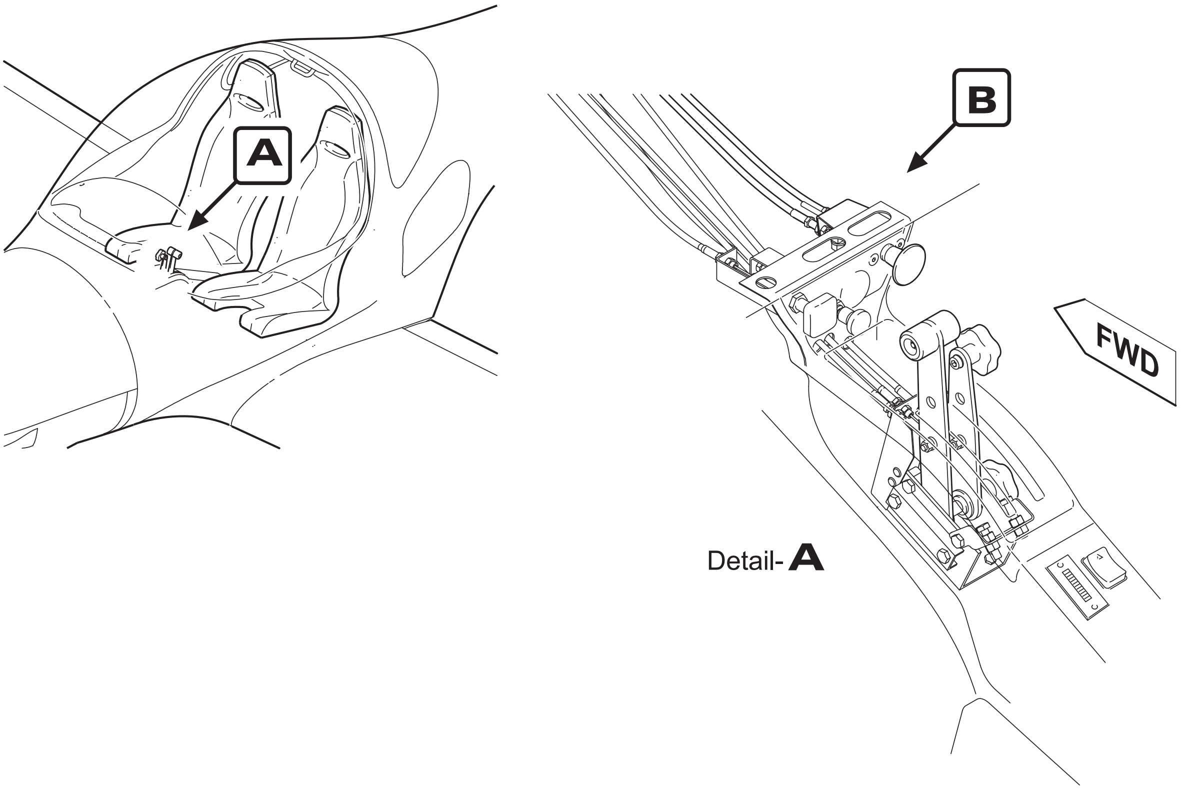
B. Install Governor Control Cable

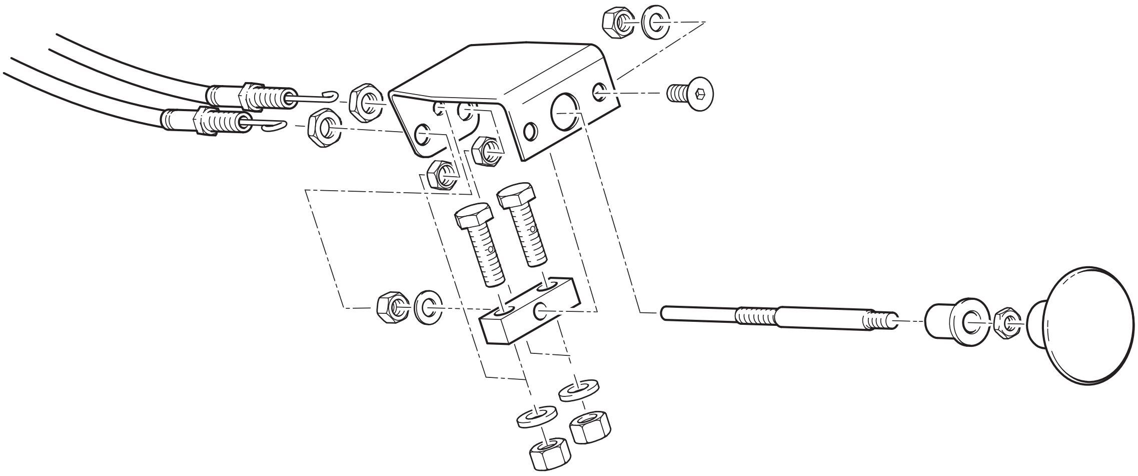
NOTE: When installing the governor control cable, ensure the cable is routed exactly as previously installed. Grease control cable wire with engine oil prior to installation. Before installing, ensure cable fitting on firewall is clear and free of sealant.

- (1) Route governor cable from the cabin, through control cable support bracket and then through the firewall to the engine compartment.
- (2) Install washers and nuts securing control cable to cable support bracket at the console.
- (3) Install governor control cable to governor control arm using hardware at the governor in the engine compartment.
- (4) Connect control cable to the propeller control lever in the cabin as shown in figure 201.
- (5) Re-install clamps or ties securing governor cable to engine or engine mount.
- (6) Perform governor control adjustment/test (refer to 61-20-00).
- (7) Fill firewall seal fitting with silicone sealant.
- (8) Install all items removed for access.

5. Choke Control Adjustment/Test

A. Adjust Choke Control
- (1) Adjust control cables so, if the choke control knob is in the full forward position, the starting carburetor control arms on both carburetors reach their low stop.





Detail- B

Choke Control Assembly
Figure 202

6. Throttle Control Adjustment/Test

A. Idle Speed Adjustment

NOTE: Always perform idle speed adjustment at operating temperature of the engine.

(1) Close idle mixture control screw by turning clockwise.
(2) Open idle mixture control screw again 1.5 turns counterclockwise.

NOTE: Turning idle mixture control screw in clockwise direction results in a leaner mixture and turning counterclockwise in a richer mixture.
If no satisfactory engine idling cannot be achieved, an additional pneumatic synchronization will be necessary.

B. Adjust Throttle Control

(1) Move throttle lever in the cockpit to full throttle position.
(2) Disconnect control cables from the throttle control arms of both carburetors.
(3) Move throttle lever in the cockpit 1-2 mm (0.04-0.08 in.) back.
(4) Tighten the Bowden cable clamps on the throttle control arms of both carburetors.
(5) Move throttle control lever between idle and full throttle positions. Ensure the throttle control lever is only limited by the throttle control arm stops on the carburetors and has positive clearance of 1 mm (0.04 in.) to the console slot in both the full forward and full aft positions. In the full throttle position there must be no notable bulging of the Bowden cables on both the carburetors and the control lever in the cockpit.

WARNING: IN FULL THROTTLE POSITION THE THROTTLE WIRE MUST NOT BULGE NOTABLE OUT OF LINE BETWEEN THE LEVER AND THE BOWDEN CABLE ADJUSTMENT (COCKPIT AND CARBURETOR SIDE), BECAUSE THIS MAY RESULT IN FATIGUE FAILURE OF THE THROTTLE WIRE!

(6) Adjust rear stop adjusting bolt in the cockpit so the throttle control lever and the control arms of the carburetors contact their rear stops simultaneously.

Steps (7) and (8) only for A/C with Rotax 914F engine.
(7) Check displayed throttle valve positions via communication program (refer to “Turbo Charger Control” below). Display with throttle valve completely closed: 0% (max. 3%). Display with throttle valve completely open: 115% (min. 113%). Indication should be linear over the complete range (0-115%).
(8) Loosen nut that clamps lever with detent for max. continuous power (refer to figure 201 above). Adjust detent for max. continuous power to 100% (max. 103%) throttle position via communication program and tighten clamp nut.

(9) Perform carburetor synchronization (refer to ROTAX Maintenance Manual for Rotax Engine Type 912 Series, chapter 12-20-00, section 10 respectively Rotax Engine Type 914 Series, chapter 12-20-00, section 12).

C. Throttle Inspection/Check

(1) Check proper Bowden cable routing to prevent influence to carburetor actuation caused by any movement of engine or other controls, thus possibly falsifying precise idle speed setting and synchronization.
(2) Inspect the throttle control cable attachment to carburetors throttle control arm and to the control quadrant. Check hardware for security and condition.
(3) Check the throttle control slides smoothly and without any resistance to movement throughout its full range of travel. Verify the throttle control lever is only limited by the throttle control arm stops on carburetors and has positive clearance of 1 mm (0.04 in.) to the console slot in both the full forward and full aft positions. In the full throttle position there must be no notable bulging of the Bowden cables on both the carburetors and the control lever in the cockpit.
(4) Check reset springs and inspect engagement holes for wear.
(5) If required lubricate carburetors actuation linkage with engine oil.

Step (6) only for A/C with Rotax 914F engine.

(6) Check displayed throttle valve positions via communication program (refer to "Turbo Charger Control" below). Display with throttle valve completely closed: 0% (max. 3%). Display with throttle valve completely open: 115% (min. 113%). Indication should be linear over the complete range (0-115%). Display at detent for max. continuous power: 100% (max. 103%).

7. Turbo Charger Control (Rotax 914F only)

A. For maintenance of the wastegate control, refer also to the Maintenance Manual (Heavy Maintenance) for Rotax Engine Type 912 and 914 Series, chapters 76-00-00 and 78-00-00.

B. TCU Communication Program Connection

Refer to the Maintenance Manual (Heavy Maintenance) for Rotax Engine Type 912 and 914 Series, chapter 76-00-00, section 3.1) for information on the TCU communication program. The required RS 232 plug connection is provided on the bottom side of the instrument panel on the pilot side.

C. Remove Turbo Control Unit (TCU)

(1) Ensure electrical power is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glare shield (refer to 31-10-00).
(4) Remove 4 nuts securing TCU to instrument panel.
(5) Disconnect electrical connector from TCU.
(6) Remove TCU from aircraft.

D. Install Turbo Control Unit (TCU)

(1) Put TCU in position on lower left side of instrument panel and secure using 4 nuts.
(2) Reconnect electrical connector to TCU.
(3) Reconnect battery (refer to 24-30-00).
(4) Perform inspection of throttle valve position using the communication program.
(5) Check self-test of the servo motor and caution lamps when switching on the TCU.
(6) Install glare shield (refer to 31-10-00).
(7) Perform engine test run.

E. Remove Wastegate Servo Motor
(1) Ensure electrical power is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove access panel 211AB (refer to 25-12-00) from front cockpit floor.
(4) Remove wastegate control cable from servo motor (refer to “Remove Wastegate Control Cable” below).
(5) Remove 2 screws securing servo motor to fuselage.
(6) Disconnect electrical connectors to wastegate servo motor.
(7) Remove wastegate servo motor from aircraft.

F. Install Wastegate Servo Motor
(1) Put servo motor in position on bracket below front cockpit floor and secure using 2 screws.
(2) Reconnect electrical connectors to servo motor.
(3) Install / adjust wastegate control cable (refer to “Install/Adjust Wastegate Control Cable” below).
(4) Verify relevant values using the TCU communication program (refer to Rotax Heavy Maintenance Manual, chapter 76-00-00, section 3.1).
(5) Check self-test of the servo motor and caution lamps when switching on the TCU.
(6) Reinstall all items removed for access.
(7) Perform engine test run.

G. Remove Wastegate Control Cable
(1) Ensure electrical power is OFF.
(2) Remove engine cowling (refer to 71-10-00) and access panel 211AB (refer to 25-12-00).
(3) Remove tension spring on turbocharger with a suitable tool.
(4) Loosen set screw of nipple on servo motor and pull Bowden cable out of the cable retainer.

NOTE: Do not lose the pressure spring. Remove spring and store in a safe place.

(5) Remove cotter pin and pin from wastegate lever.
(6) Pull Bowden cable out of the conduit.

H. Install/Adjust Wastegate Control Cable

NOTE: When installing the wastegate control cable, ensure the cable is routed exactly as previously installed. Grease control cable wire with engine oil prior to installation.

(1) Put throttle lever into idle position.
(2) To ascertain the servo motor position, power-up the TCU.

NOTE: After the automatic self test of the servo motor, the servo motor will remain in position with wastegate „closed“. The servo motor is self locking.
Position finding is absolutely necessary for correct adjustment of the Bowden cable.

(3) Ensure electrical power is OFF.

NOTE: Risk of destroying the servo motor if it is activated by the TCU during assembly.

(4) If the cable retainer has been removed at disassembly, apply Loctite 648 on cable retainer and press it into servo motor housing.
(5) Fit Bowden cable to wastegate lever with pin and cotter pin.
(6) Feed Bowden cable through flexible conduit, adjusting screw and nuts.
(7) Check Bowden cable and wastegate lever for freedom of movement.
(8) Insert pressure spring in cable retainer. Thread Bowden cable through and around the rope sheave. Fix set screw of nipple with a tightening torque of 2,5 Nm (22.1 in.lbs).
(9) Adjust Bowden cable with M6 hex. nuts, so that no clearance is perceptible on wastegate lever and the pressure spring is pre-tensioned by 1 to 2 mm (0.04 - 0.08 in.).
(10) Reinstall tension spring on turbocharger.
(11) Reinstall all items removed for access.

CHAPTER 77

ENGINE INDICATING

TABLE OF CONTENTS

ENGINE INDICATING - GENERAL

1. Introduction

A. This chapter describes those systems and components which indicate engine operation.

B. Refer to 28-00-00 for further information on fuel pressure, fuel quantity and fuel flow measuring systems.

C. Refer to 79-00-00 for further information on oil pressure and oil temperature measuring systems.

2. General Description

A. Engine parameters are either indicated by analog instruments, an engine monitoring system or the G3X Touch system. Engine instruments are placed on the right side of the instrument panel.

B. The following parameters of engine output and condition are measured and indicated:
(1) Propeller speed
(2) Manifold pressure
(3) Oil pressure
(4) Oil temperature
(5) Cylinder head temperature
(6) Fuel pressure (optional)
(7) Fuel flow (optional)
(8) Carburetor temperature (optional)
(9) Exhaust gas temperature (optional)

C. Excepting the analog manifold pressure indicator, all parameters are measured with sensors which transform engine parameters in equivalent electrical signals. The signals are then transmitted to the indicator and translated into readings. The analog manifold pressure indicator is a mechanical pressure gauge connected to the engine via a rubber hose.

POWER INDICATION - MAINTENANCE

1. General

A. Propeller speed is indicated by a tachometer which is mounted on the instrument panel. The tachometer receives an electrical signal from a sensor mounted on the internal alternator casing at the rear end of the engine. Additionally the tachometer generates a 12V output signal above a propeller speed of approx. 400 rpm. This signal is used to control the engine hourmeter.

B. Manifold pressure is measured mechanically by a pressure gauge which is connected through a rubber hose to the compensating tube located on top of the engine.

C. Maintenance is limited to the removal and installation of the indicators. For further information on maintenance of the RPM sensor, refer to the applicable ROTAX publications. If the manifold pressure rubber hose is damaged or in bad condition it must be replaced.

2. Tachometer Removal/Installation

A. Remove Tachometer
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glare shield (refer to 31-10-00).
(4) Remove cable connector from back of tachometer.
(5) While supporting the tachometer, remove screws securing tachometer to instrument panel.
(6) Remove tachometer from aircraft.

B. Install Tachometer
(1) Position tachometer to instrument panel hole and secure with screws.
(2) Install cable connector at back of tachometer.
(3) Install glare shield (refer to 31-10-00).
(4) Reconnect battery (refer to 24-30-00).

3. Manifold Pressure Gauge Removal/Installation

A. Remove Manifold Pressure Gauge
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glare shield (refer to 31-10-00).
(4) Remove rubber hose from back of gauge.
(5) While supporting the gauge, remove screws securing gauge to instrument panel.
(6) Remove gauge from aircraft.

B. Install Manifold Pressure Gauge
(1) Position gauge to instrument panel hole and secure with four screws.
(2) Install rubber hose at back of gauge.
(3) Install glare shield (refer to 31-10-00).
(4) Reconnect battery (refer to 24-30-00).

POWER INDICATION - MAINTENANCE

1. General

   A. Propeller speed indication is included in the Garmin G3X Touch system. Propeller/engine speed is measured by a sensor mounted on the internal alternator casing at the rear end of the engine and electrically connected to the GEA 24 engine interface at the back of the instrument panel.

   B. Manifold pressure indication is included in the Garmin G3X Touch system. Manifold pressure is measured by a pressure transducer installed at the back of the instrument panel (Rotax 912) / on the right side of the intercooler (Rotax 914). It is connected to the compensating tube on top of the engine through a rubber hose. The transducer is electrically connected to the GEA 24 engine interface at the back of the instrument panel.

   C. Maintenance is limited to the removal and installation of the manifold pressure transducer. Refer to 34-25-00 for further information on maintenance of the Garmin G3X Touch system. For further information on maintenance of the RPM sensor, refer to the applicable ROTAX publications. If the manifold pressure rubber hose is damaged or in bad condition it must be replaced.

2. Manifold Pressure Transducer Removal/Installation

   A. Remove Manifold Pressure Transducer
      (1) Ensure electrical power to aircraft is OFF.
      (2) Disconnect battery (refer to 24-30-00).
      (3) Rotax 912: Remove glare shield (refer to 31-10-00).
      Rotax 914: Remove upper engine cowling (refer to 71-10-00).
      (4) Disconnect electrical connector from transducer.
      (5) Unscrew transducer from manifold block at the back of the instrument panel (Rotax 912) / on the right side of the intercooler (Rotax 914) and remove transducer from aircraft.

   B. Install Manifold Pressure Transducer
      (1) Apply thread sealant to manifold pressure transducer. To reduce the risk of system contamination, minimal amount of sealant should be applied leaving at least 2 threads at the end of the fitting clear of sealant.
      (2) Install transducer to manifold block at the back of the instrument panel (Rotax 912) / on the right side of the intercooler (Rotax 914)
      (3) Connect electrical connector to transducer.
      (4) Rotax 912: Install glare shield (refer to 31-10-00).
      Rotax 914: Install upper engine cowling (refer to 71-10-00).
      (5) Reconnect battery (refer to 24-30-00).
      (6) Check manifold pressure indication:
      - Verify that the manifold pressure gauge does not have a red or amber X on it.
      - Verify that the gauge reads ambient pressure +/-1 inHg.

POWER INDICATION - MAINTENANCE

1. General

A. Propeller speed indication is included in the engine monitoring system.
Propeller/engine speed is measured by a sensor mounted on the internal alternator casing at the rear end of the engine and electrically connected to the engine data converter (EDC).

B. Manifold pressure indication is included in the engine monitoring system.
Manifold pressure is measured by a pressure transducer installed at the back of the instrument panel and connected to the compensating tube on top of the engine through a rubber hose. The transducer is electrically connected to the engine data converter (EDC).

C. Maintenance is limited to the removal and installation of the manifold pressure transducer. Refer to 77-40-00 for further information on maintenance of the engine monitoring system. For further information on maintenance of the RPM sensor, refer to the applicable ROTAX publications. If the manifold pressure rubber hose is damaged or in bad condition it must be replaced.

D. The MVP-50 system is designed for a specific aircraft and engine. When built, the system is put together with various transducers and necessary calibrations are performed. Some components are not interchangeable and require a specific calibration.
If the manifold pressure transducer is replaced, the new calibration offset for the new transducer will need to be stored in the MVP-50. This offset is noted on the yellow sticker on its side, and in the paper in the box it came in. Contact AQUILA Aviation for the password required.

2. Manifold Pressure Transducer Removal/Installation

A. Remove Manifold Pressure Transducer
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glare shield (refer to 31-10-00).
(4) Disconnect electrical connector from transducer.
(5) Disconnect hose at hose nozzle on firewall.
(6) While supporting the transducer, remove screws securing transducer to instrument panel.
(7) Remove transducer from aircraft.

B. Install Manifold Pressure Transducer
(1) Position transducer at back of instrument panel and attach with screws.
(2) Connect electrical connector to transducer.
(3) Connect hose to hose nozzle on firewall.
(4) Install glare shield (refer to 31-10-00).
(5) Reconnect battery (refer to 24-30-00).
(6) Store calibration offset of the new transducer in the MVP-50 (maintenance password required).
(7) Check manifold pressure indication: Verify the displayed pressure is within +/-1 inHg of the ambient pressure.

EFFECTIVITY

Aircraft equipped with MVP-50

TEMPERATURE INDICATION - MAINTENANCE

1. General

A. Cylinder head temperature is measured by a temperature-sensitive sensor that is mounted in the no. 3 cylinder head. The indicator is located in the cluster of engine gauges on the right side of the instrument panel. It translates the electrical signal from the sensor into the relevant reading.

B. Optional a type K thermocouple carburetor temperature sensor is installed in the intake manifold directly in front of the carburetor. The indicator is located in the cluster of engine gauges on the right instrument panel.

C. Maintenance of the temperature measuring system is limited to the removal and installation of the sensors and indicators.

2. Temperature Indicator Removal/Installation

A. Remove Temperature Indicator
  (1) Ensure electrical power to aircraft is OFF.
  (2) Disconnect battery (refer to 24-30-00).
  (3) Remove glare shield (refer to 31-10-00).
  (4) Disconnect electrical connector from back of indicator.
  (5) While supporting the indicator, remove screws securing indicator to instrument panel.
  (6) Remove indicator from aircraft.

B. Install Temperature Indicator
  (1) Position indicator in instrument panel and attach with screws.
  (2) Connect electrical connector at back of indicator.
  (3) Install glare shield (refer to 31-10-00).
  (4) Reconnect battery (refer to 24-30-00).

3. CHT Sensor Removal/Installation

A. Remove CHT Sensor
  (1) Ensure electrical power to aircraft is OFF.
  (2) Remove engine cowling (refer to 71-10-00).
  (3) Disconnect battery (refer to 24-30-00).
  (4) Disconnect electrical lead to sensor.
  (5) Unscrew and remove sensor from engine.

<u>CAUTION:</u> COOLANT MAY LEAK THROUGH SENSOR OPENING.

B. Install CHT Sensor
  (1) Clean all parts carefully. Apply Loctite (medium strength) on sensor thread.
  (2) Install sensor to engine. Torque to 7 Nm (62 in.lbs).
  (3) Check coolant level. Replenish as necessary.

EFFECTIVITY

Aircraft equipped with analog engine instruments

(4) Connect electrical connector to sensor.
(5) Reconnect battery (refer to 24-30-00).
(6) Install engine cowling (refer to 71-10-00).

4. <u>Carburetor Temperature Sensor Removal/Installation</u> (optional)

A. Remove Carburetor Temperature Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10-00).
(3) Disconnect battery (refer to 24-30-00).
(4) Disconnect electrical lead to sensor.
(5) Unscrew and remove sensor from engine.

B. Install Carburetor Temperature Sensor
(1) Install sensor head and new copper sealing washer. Secure with Loctite (medium strength).

<u>CAUTION:</u> TIGHTEN THE SENSOR HEAD CAREFULLY TO AVOID STRIPPING THE THREAD.

(2) Connect electrical connector to sensor.
(3) Reconnect battery (refer to 24-30-00).
(4) Install engine cowling (refer to 71-10-00).

TEMPERATURE INDICATION - MAINTENANCE

1. General

A. Cylinder head temperature (CHT) indication is included in the MVP-50 engine monitoring system / G3X Touch system. Temperature is measured by a temperature-sensitive sensor electrically connected to the engine data converter (MVP-50) / GEA 24 engine interface (G3X). The cylinder head temperature is measured in the head of the no. 3 cylinder.

B. Carburetor temperature indication is included in the MVP-50 engine monitoring system / G3X Touch system. Temperature is measured by a type K thermocouple electrically connected to the engine data converter (MVP-50) / GEA 24 engine interface (G3X). The carburetor temperature is measured in the intake manifold directly in front of the carburetor. The sensor may be installed either left or right hand side, depending on mounting conditions.

C. Exhaust gas temperature (EGT) indication is optionally included in the G3X Touch system. Temperature is measured by type K thermocouples electrically connected to the GEA 24 engine interface. The exhaust gas temperature is measured in the exhaust manifolds approx. 100mm (4 in.) from the exhaust flange connections.

D. Maintenance is limited to the removal and installation of the temperature sensors.
Refer to 77-40-00 for further information on maintenance of the engine monitoring system.
Refer to 34-25-00 for further information on maintenance of the Garmin G3X Touch system.

2. CHT Sensor Removal/Installation

A. Remove CHT Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10-00).
(3) Disconnect battery (refer to 24-30-00).
(4) Disconnect electrical lead to sensor.
(5) Unscrew and remove sensor from engine.

CAUTION: COOLANT MAY LEAK THROUGH SENSOR OPENING.

B. Install CHT Sensor
(1) Clean all parts carefully. Apply Loctite (medium strength) on sensor thread.
(2) Install sensor and new sealing washer (MVP-50 only) to engine. Torque to 7 Nm (62 in.lbs).
(3) Check coolant level. Replenish as necessary.
(4) Connect electrical connector to sensor.
(5) Reconnect battery (refer to 24-30-00).
(6) Install engine cowling (refer to 71-10-00).
(7) Check CHT indication: Verify the displayed temperature is within +/- 2°C of the ambient temperature (engine needs sufficient time to reach ambient temperature).

EFFECTIVITY

Aircraft equipped with MVP-50 / Garmin G3X Touch

3. Carburetor Temperature Sensor Removal/Installation

A. Remove Carburetor Temperature Sensor

(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10-00).
(3) Disconnect battery (refer to 24-30-00).
(4) Disconnect electrical lead to sensor.
(5) Unscrew and remove sensor from engine.

B. Install Carburetor Temperature Sensor

(1) Install sensor head and new copper sealing washer. Secure with Loctite (medium strength).

CAUTION: TIGHTEN THE SENSOR HEAD CAREFULLY TO AVOID STRIPPING THE THREAD.

(2) Connect electrical connector to sensor.
(3) Reconnect battery (refer to 24-30-00).
(4) Install engine cowling (refer to 71-10-00).
(5) Check carburetor temperature indication: Verify displayed temperature is within +/- 2°C of the ambient temperature (engine needs sufficient time to reach ambient temperature).

4. Exhaust Gas Temperature Sensor Removal/Installation (optional)

A. Remove Exhaust Gas Temperature Sensor

(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10-00).
(3) Disconnect battery (refer to 24-30-00).
(4) Disconnect electrical lead to sensor.
(5) Unscrew and remove sensor from engine.

B. Install Exhaust Gas Temperature Sensor

(1) Clean all parts carefully. Apply Loctite (Anti Seize 8151) on sensor thread.
(2) Install sensor and new copper sealing washer to exhaust manifold. Torque to 10 Nm (89 in.lbs).
(3) Connect electrical connector to sensor.
(4) Reconnect battery (refer to 24-30-00).
(5) Install engine cowling (refer to 71-10-00).
(6) Check EGT indication: Verify the displayed temperatures are within +/- 10°C of the ambient temperature (engine needs sufficient time to reach ambient temperature).

ENGINE MONITORING SYSTEM - MAINTENANCE

1. General

A. The aircraft is equipped with an Electronics International MVP-50 glass panel engine monitor. The system consists of four major components:
- the MVP display,
- the EDC-33 engine data converter,
- the probes and transducers and
- the wiring and extension cables.

B. Maintenance is limited to the removal and installation of system components. For overhaul and repair the manufacturer of the equipment has to be consulted. For further information on the engine monitoring system refer to Electronics International MVP-50 installation instructions and MVP-50 operating instructions.

C. The MVP-50 system is designed for a specific aircraft and engine. When built, the system is put together with various transducers and necessary calibrations are performed. Some components are not interchangeable and require a specific calibration.

D. For instructions on maintenance of the probes and transducers refer to the corresponding chapters of this manual.

2. Display Removal/Installation

A. The MVP-50 display stores information vital to the functionality of the system.
This information includes:
- Configuration (layout of the screens and limits for each function)
- Manifold pressure calibration (offset)
- Temperature compensation calibration (offset)
- Fuel tank calibration
- Identification (aircraft tail number and engine specifics)
- Timer status (tach time, engine hours, cycles)

Any replacement display will need to be reconfigured identically to the original. The first step in preparing a replacement is to perform a backup of all config files on the orignal MVP-50 to a USB stick. This backup will include the fuel tank calibration. Record engine hours and tach time. Ideally, the config backup should be performed immediately after fuel tank calibration, and stored until needed.

To prevent accidental installation of an incorrect configuration it is not possible to simply retrieve all backup config files into another MVP-50 display; instead the config files need to be emailed to Electronics International for processing. Zipping the config directory on the USB stick simplifies this process. The configuration will be returned ready to be retrieved to the new MVP-50 display.

AQUILA Aviation or Electronics International support will provide the necessary level 2 password to allow this process. The unit and tracking IDs are needed for password generation.

The engine hours and tach time can be restored to the new MVP-50 display using the maintenance password. Contact AQUILA Aviation for the password required to change the tail number.

B. Remove Display
   (1) Ensure electrical power to aircraft is OFF.
   (2) Disconnect battery (refer to 24-30-00).
   (3) Remove glare shield (refer to 31-10-00).
   (4) Disconnect electrical connectors from back of display.
   (5) While supporting the display, remove screws securing display to instrument panel.
   (6) Remove display from aircraft.

C. Install Diplay
   (1) Position display in instrument panel hole and attach with screws.
   (2) Connect electrical connectors at back of display.
   (3) Install glare shield (refer to 31-10-00).
   (4) Reconnect battery (refer to 24-30-00).
   (5) Perform ground run. Check functionality of the system. Check that engine limits in the system correspond to the airplane flight manual.

3. Engine Data Converter (EDC) Removal/Installation

NOTE: When replacing an EDC it is important that it be replaced with the same model. The EDC can be replaced without affecting the calibration of other functions.

A. Remove Engine Data Converter
   (1) Ensure electrical power to aircraft is OFF.
   (2) Disconnect battery (refer to 24-30-00).
   (3) Remove glare shield (refer to 31-10-00).
   (4) Disconnect electrical connectors from back of EDC.
   (5) While supporting the EDC, remove screws securing EDC to instrument panel.
   (6) Remove EDC from aircraft.

B. Install Engine Data Converter
   (1) Position EDC at back of instrument panel and attach with screws.
   (2) Connect electrical connectors to EDC.
   (3) Install glare shield (refer to 31-10-00).
   (4) Reconnect battery (refer to 24-30-00).
   (5) Perform ground run. Check functionality of the system.

CHAPTER 78

EXHAUST

TABLE OF CONTENTS

EXHAUST SYSTEM - GENERAL

1. Introduction

A. This chapter describes such systems and components which direct the engine exhaust gases out of the engine compartment.

2. General Description

A. The exhaust system comprises four exhaust bends, a main muffler, a rear muffler, a tail pipe and an exhaust-driven turbocharger (aircrraft equipped with Rotax 914F engine only).

B. A shroud around the main muffler serves as a heat exchanger. The air that is heated by the heat exchanger is then ducted to the aircraft cabin for cabin heating and windshield defogging.

C. The exhaust system on aircraft equipped with Rotax 914F engine collects all gases which accumulate in the combustion chamber of the cylinders and routes them via exhaust bends and exhaust manifold to the exhaust turbocharger.
There, the combustion gases drive the exhaust gas turbine. The turbine in turn drives a compressor to precompress intake air and achieve a power increase. Boost pressure is controlled by means of an electromechanically controlled flap (wastegate) in the turbine.
From the exhaust turbocharger, the combustion gases are routed to the mufflers, which are fitted for noise reduction.

EXHAUST SYSTEM - MAINTENANCE

1. General

   A. Each engine cylinder has an exhaust bend leading down to the main muffler that is located beneath the engine. The exhaust bends and a tail pipe with rear muffler are connected to the main muffler over ball joints. The ball joints are employed to allow movement due to heat expansion and normal operating loads at the connections. The ball joints are secured with two springs each. The single tail pipe routes the exhaust gases out through the lower cowling area.

   B. Maintenance on the exhaust system includes exhaust system removal and installation and a leak test. Welding repairs are possible if carried out according to AC 43.13-1B, September 8, 1998.

WARNING: WORKS MUST BE CARRIED OUT ON COLD ENGINE. RISK OF BURNS!

2. Exhaust System Removal/Installation

   A. Remove Exhaust System
      (1) Remove engine cowling (refer to 71-10-00).
      (2) Disconnect flexible hose from heat shroud.
      (3) While supporting the tail pipe, remove springs securing tail pipe to main muffler.
      (4) Loosen clamps securing tail pipe to support bracket on engine mount and remove tail pipe from aircraft.
      (5) While supporting the exhaust system, remove nuts securing exhaust bends to engine and remove exhaust system from engine.

   B. Install Exhaust System

CAUTION: INSTALLATION OF EXHAUST SYSTEM COMPONENTS UNDER TENSION INCREASES RISK OF CRACKING.

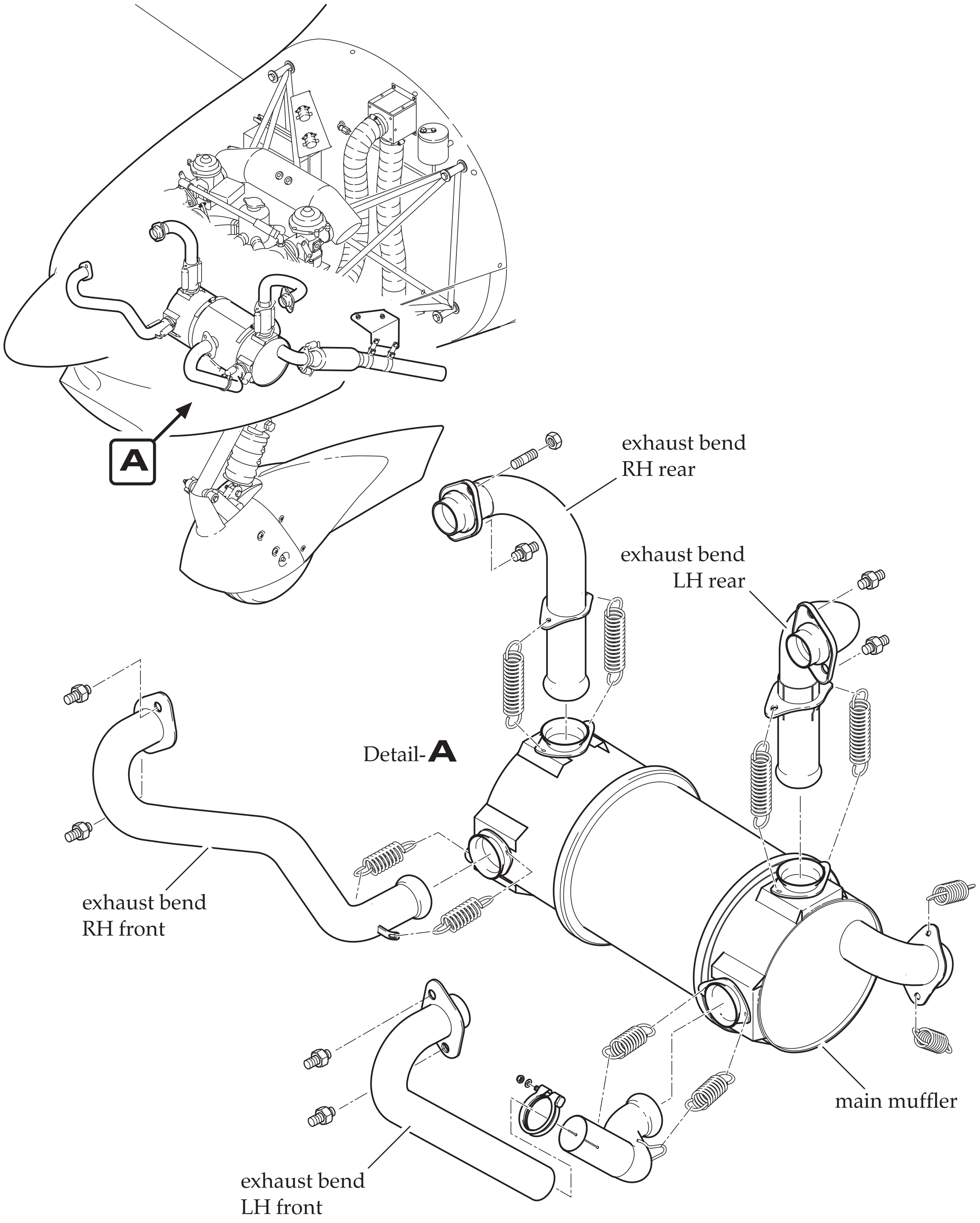
      (1) Apply heat resistant anti seize paste (e.g. Loctite LB 8150) to ball joints.
      (2) Put exhaust system with new gaskets in position and secure to engine using nuts. Do not yet tighten the fixing nuts.
      (3) Install lower engine cowling and set up the exhaust system to ensure sufficient clearance from adjacent assemblies and the cowling. Torque nuts on cylinders to 15 Nm (133 in.lbs). Remove lower engine cowling again.
      (4) Position tail pipe to main muffler and secure tail pipe to support bracket on engine mount with clamps.
      (5) While supporting the tail pipe, install springs securing tail pipe to main muffler.
      (6) Connect flexible hose to heat shroud.
      (7) Install engine cowling (refer to 71-10-00).
      (8) Perform engine test run. Listen for sounds of exhaust gas leakage.
      (9) Examine exhaust system and insides of cowling for signs of exhaust gas leakage.

3. Main Muffler Inspection/Check

WARNING: FAILURE TO INSPECT THE MAIN MUFFLER FOR LEAKS COULD RESULT IN CARBON MONOXIDE ENTERING THE CABIN AREA, LEADING TO SERIOUS INJURY OR DEATH.

A. For main muffler inspection/check time intervals refer to 05-10-00.

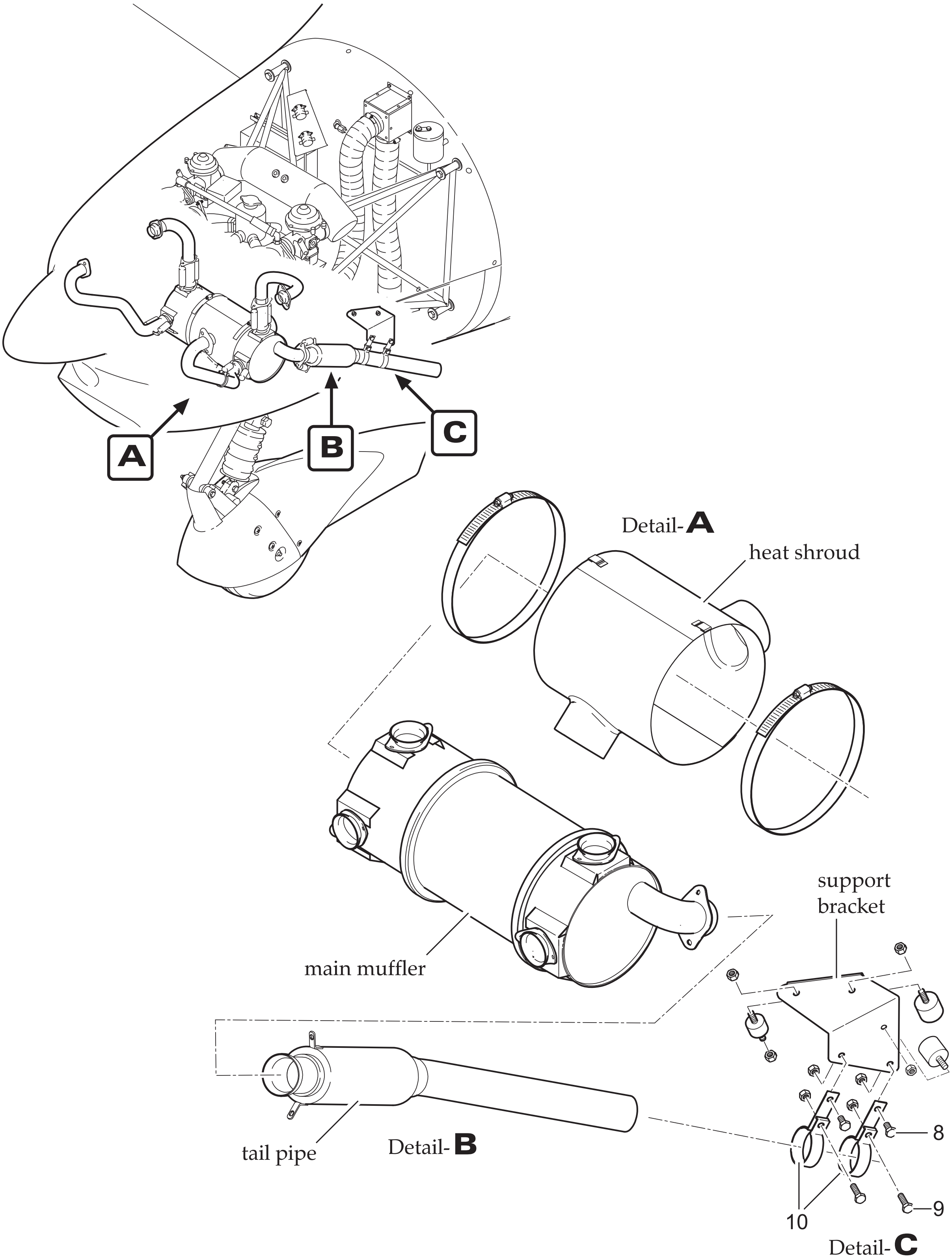
B. Main Muffler Inspection/Check Procedures
  (1) Remove exhaust bends from muffler and unwrap heat shroud from around muffler.
  (2) Visually inspect the exterior of muffler for cracks, dents, soot and evidence of exhaust gases escaping through holes or tears. Pay particular attention to the welds.
  (3) Examine the interior of the main muffler with a flashlight and a mirror for tears, holes and general condition.
  (4) Use a water test to determine main muffler integrity:
    (a) Install solid test plugs on three muffler openings.
    (b) Install ported test plug on remaining muffler opening.
    (c) Attach pressure source and apply 2.5 psi to interior of muffler.
    (d) Submerge pressurized muffler in water and inspect for leaks.
    (e) If any leaks are detected, the muffler must be removed from service and repaired or replaced.
    (f) Remove muffler from water, remove test plugs and dry muffler with compressed air.



Main Muffler Installation
Figure 201

EFFECTIVITY

Aircraft equipped with Rotax 912S engine



Heat Shroud / Tail Pipe Installation
Figure 202

EFFECTIVITY

Aircraft equipped with Rotax 912S engine

EXHAUST SYSTEM - MAINTENANCE

1. General

A. Exhaust gases are routed from the engine cylinders via exhaust bends and exhaust manifold to the exhaust turbocharger and from there to the main muffler and the tail pipe with rear muffler. The exhaust system is made of stainless steel. Exhaust bends are connected to the exhaust manifold via slide sleeves to compensate expansion due to heat. The muffler is supported via an exhaust bracket on the engine suspension frame. A tail pipe with rear muffler routes the exhaust gases out through the lower cowling area.

B. The complete exhaust system with exception of the tail pipe, rear muffler and heat shroud is within the scope of delivery of the engine. Refer to the applicable Rotax publications for information on maintenance of the exhaust system. Refer to 76-00-00 for information on maintenance of the turbo charger control.

C. Maintenance on the tail pipe, rear muffler and heat shroud is limited to the removal and installation of components. Welding repairs are possible if carried out according to AC 43.13-1B, September 8, 1998.

WARNING: WORKS MUST BE CARRIED OUT ON COLD ENGINE. RISK OF BURNS!

2. Heat Shroud Removal/Installation

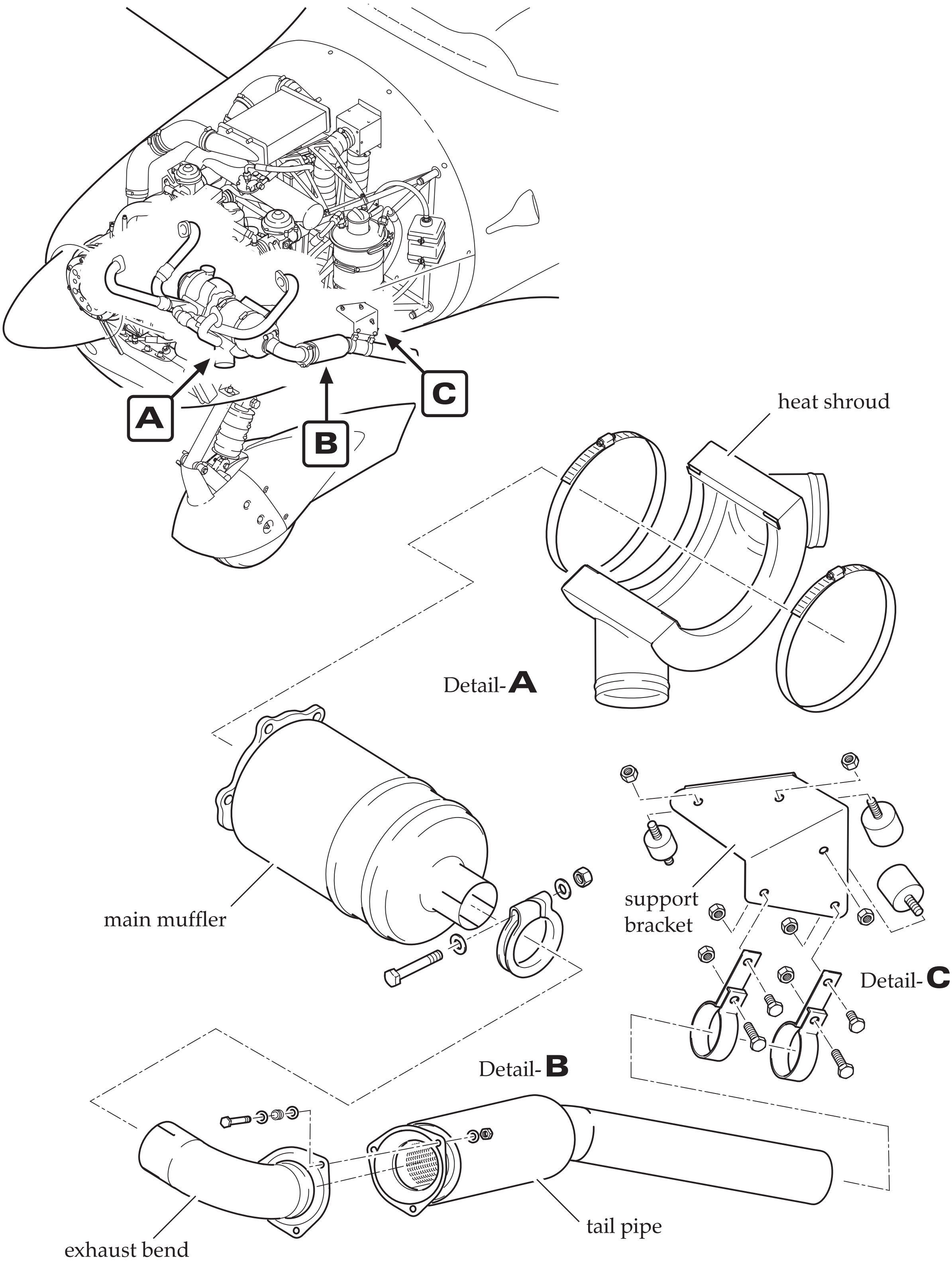
A. Remove Heat Shroud
   (1) Remove engine cowling (refer to 71-10-00).
   (2) Disconnect flexible hoses from heat shroud.
   (3) Open clamps securing heat shroud to main muffler and remove heat shroud from aircraft.

B. Install Heat Shroud
   (1) Position heat shroud on main muffler and secure with clamps.
   (2) Connect flexible hoses to heat shroud and secure with clamps.
   (3) Install engine cowling (refer to 71-10-00).

3. Tail Pipe Removal/Installation

A. Remove Tail Pipe
   (1) Remove engine cowling (refer to 71-10-00).
   (2) While supporting the tail pipe, remove screws, washers, nuts, cotter pins and springs securing tail pipe to exhaust bend on main muffler.
   (3) Loosen clamps securing tail pipe to support bracket on engine mount and remove tail pipe from aircraft.
   (4) Loosen clamp securing exhaust bend to main muffler and remove exhaust bend from aircraft.

B. Install Tail Pipe
   (1) Slide exhaust bend on socket of main muffler.
   (2) Align exhaust bend to support bracket on engine mount and secure with clamp.
   (3) Apply heat resistant anti seize paste (e.g. Loctite LB 8150) to ball joint.
   (4) Position tail pipe to exhaust bend and secure tail pipe to support bracket on engine mount with clamps.
   (4) While supporting the tail pipe, install screws, washers, nuts, cotter pins and springs securing tail pipe to exhaust bend on main muffler.
   (5) Install engine cowling (refer to 71-10-00).
   (6) Perform engine test run. Listen for sounds of exhaust gas leakage.
   (7) Examine exhaust system and insides of cowling for signs of exhaust gas leakage.



Heat Shroud / Tail Pipe Installation
Figure 201

EFFECTIVITY

Aircraft equipped with Rotax 914F engine

CHAPTER 79

OIL

TABLE OF CONTENTS

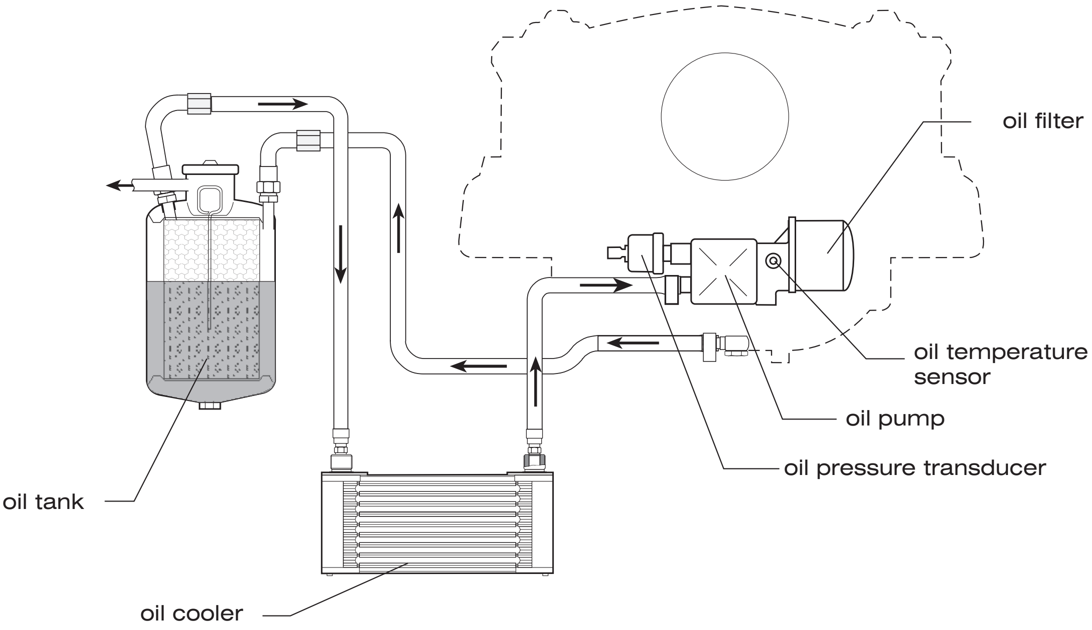
OIL - GENERAL

1. Introduction

A. This chapter covers those units and components which are not part of the engine but store and/or supply lubricating oil to/from the engine or indicate oil condition.
For additional information on the internal engine oil system components, refer to the respective engine manufacturer´s publications.

2. General Description

A. The external oil system comprises an oil tank, oil cooler and an oil filter. An oil pressure and oil temperature measuring system monitors oil condition.
The oil tank is attached to the engine mount on the right hand side of the engine. The oil cooler is located in the forward part of the lower engine cowling behind the main air intake. It is connected to the engine and the oil tank via flexible hoses. The oil pump with an integrated oil pressure regulator is mounted at the front of the engine below the propeller gearbox. It is driven by the camshaft. The oil filter is installed on the left side of the oil pump casing.



Lubrication System (Schematic)
Figure 1

EFFECTIVITY

Aircraft equipped with Rotax 912S engine

B. Oil Circuit

The oil pump sucks the engine oil from the oil tank via the oil cooler and forces it through the oil filter to the points of lubrication in the engine. Surplus oil emerging from the points of lubrication accumulates on the bottom of the crankcase and is forced back to the oil tank by the blow-by gases. The oil circuit is vented via a bore on the oil tank.

C. Oil Indication

Oil temperature and oil pressure is measured by sensors electrically connected with either analog instruments or an engine monitoring system (optional). Refer to sections 79-31-00 and 79-33-00 for further information on the engine oil indicating system.

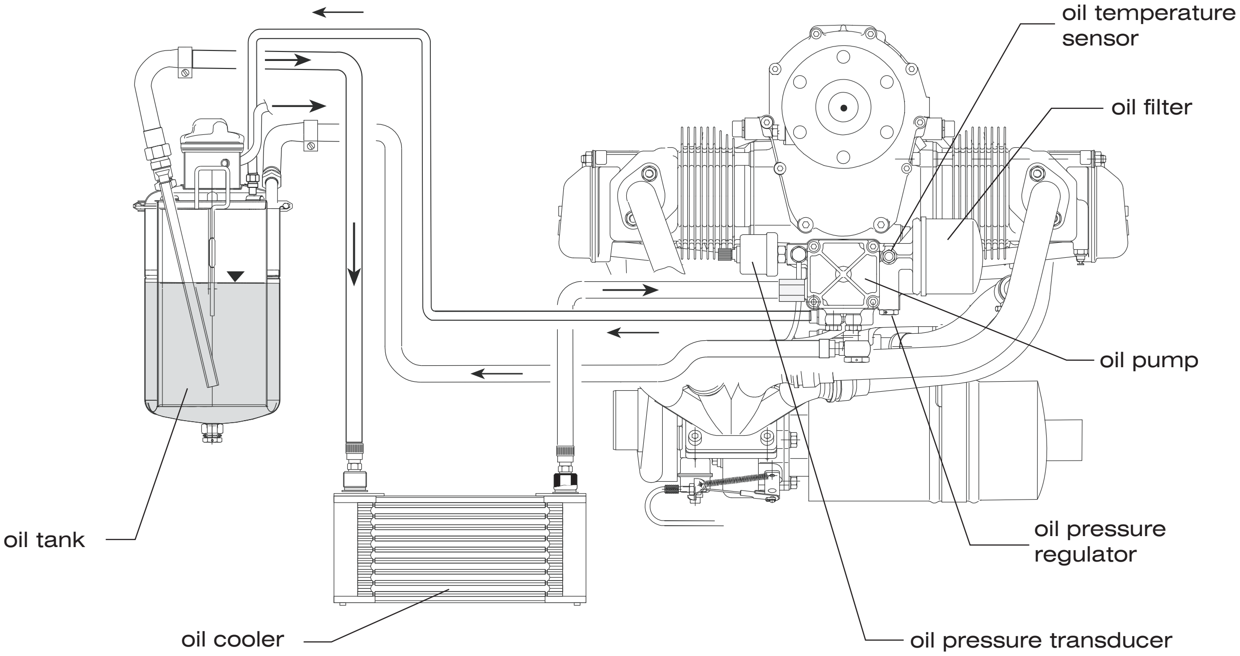
OIL - GENERAL

1. Introduction

A. This chapter covers those units and components which are not part of the engine but store and/or supply lubricating oil to/from the engine or indicate oil condition.
For additional information on the internal engine oil system components, refer to the respective engine manufacturer´s publications.

2. General Description

A. The external oil system comprises an oil tank, oil cooler and an oil filter. An oil pressure and oil temperature measuring system monitors oil condition.
The oil tank is attached to the engine mount on the left hand side of the engine. The oil cooler is located in the lower right part of the lower engine cowling. It is connected to the engine and the oil tank via flexible hoses. The main oil pump with an integrated oil pressure regulator is mounted at the front of the engine below the propeller gearbox. An additional suction pump for the turbocharger oil circuit is installed in front of the main pump. Both pumps are driven by the camshaft. The oil filter is installed on the left side of the oil pump casing.



Lubrication System (Schematic)
Figure 1

EFFECTIVITY
Aircraft equipped with Rotax 914F engine

B. Oil Circuit

The oil pump sucks the engine oil from the oil tank via the oil cooler and forces it through the oil filter to the points of lubrication in the engine. Surplus oil emerging from the points of lubrication accumulates on the bottom of the crankcase and is forced back to the oil tank by the blow-by gases. The oil circuit is vented via a bore on the oil tank.

The lubrication of the turbocharger shaft is via a separate oil line from the main oil pump. A choke valve on the entry into the turbocharger housing prevents flooding of the turbocharger with engine oil by gravity after engine stop. Oil emerging from the turbocharger collects in the oil sump. From there, it is sucked off by the suction pump via a separate line and pumped back to the oil tank via a hose.

C. Oil Indication

Oil temperature and oil pressure is measured by sensors electrically connected with an engine monitoring system. Refer to sections 79-31-00 and 79-33-00 for further information on the engine oil indicating system.

OIL TANK - MAINTENANCE

1. General

A. The oil tank is attached to the engine mount. It can be removed and disassembled (figure 201) for maintenance.

B. The oil tank must be removed, disassembled and cleaned when oil contamination is detected.

2. Oil Tank Removal/Installation

CAUTION: IF ENGINE HAS BEEN RUNNING RECENTLY, HOT ENGINE COMPONENTS MAY CAUSE SKIN BURNS!

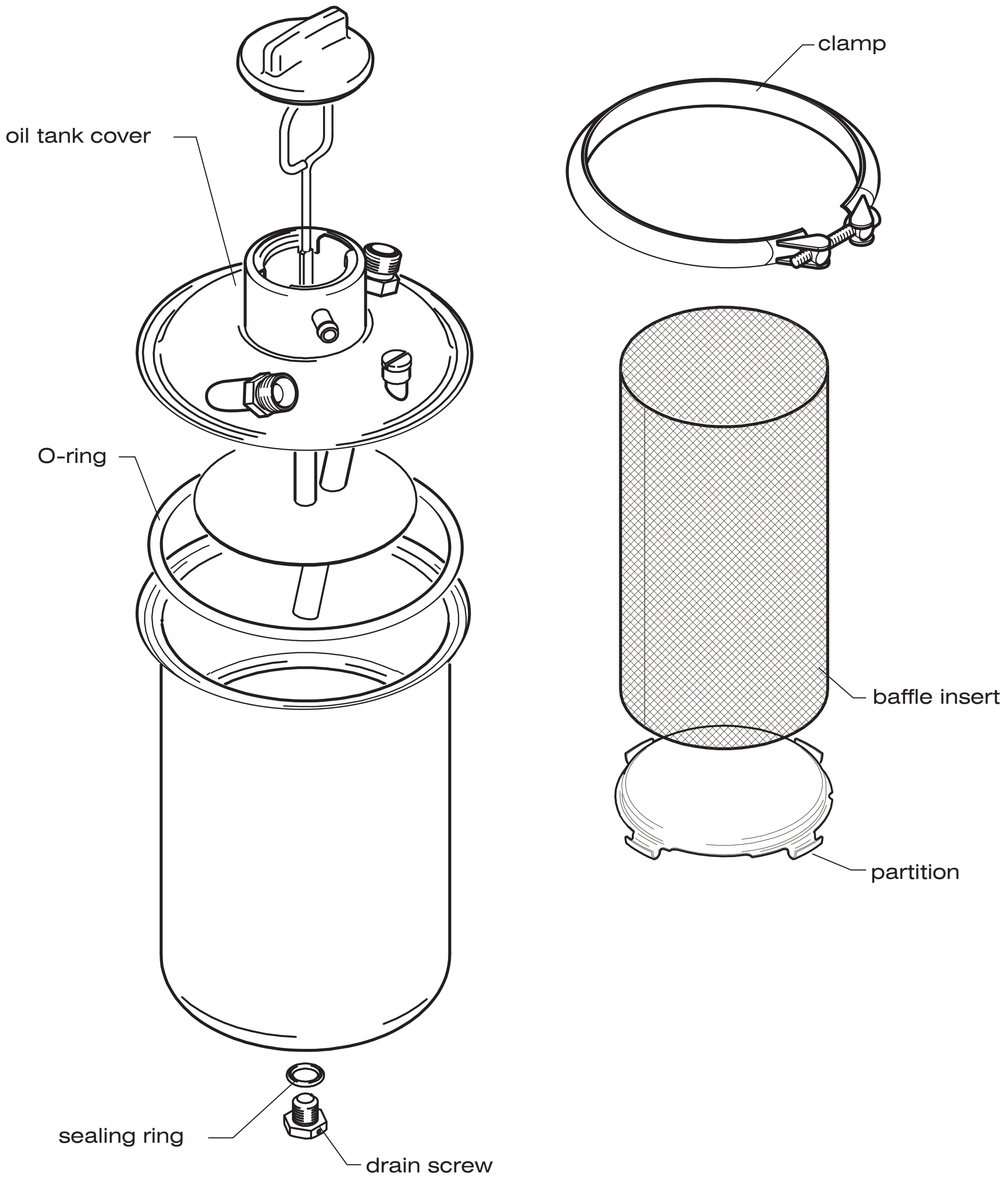
A. Remove Oil Tank
  (1) Remove upper engine cowling (refer to 71-10-00).
  (2) Disconnect inlet and outlet hoses at oil tank.
  (3) Loosen clamps securing oil tank to engine mount. Remove oil tank from aircraft.

B. Install Oil Tank
  (1) Position oil tank on engine mount and secure with clamps.
  (2) Connect inlet and outlet hoses at oil tank.
  (3) Replenish engine oil as required. Refer to Rotax SI-912-018 / SI-914-020 for purging of the lubrication system.
  (4) Install engine cowling (refer to 71-10-00).
  (5) Perform an engine run and check oil tank and connections for leaks.

3. Oil Tank Cleaning

CAUTION: IF ENGINE HAS BEEN RUNNING RECENTLY, HOT ENGINE COMPONENTS MAY CAUSE SKIN BURNS!

A. Oil Tank Cleaning Procedure
  (1) Remove upper engine cowling (refer to 71-10-00).
  (2) Disconnect inlet and outlet hoses at oil tank.
  (3) Remove clamp and oil tank cover with O-ring.
  (4) Remove baffle insert and partition.
  (5) Unscrew and remove drain screw.
  (6) Clean all parts and inspect for damage.
  (7) Re-assemble oil tank.
  (8) Fit drain screw with a new gasket, torque to 25 Nm (220 in.lbs) and safety wire.
  (9) Connect inlet and outlet hoses at oil tank.
  (10) Replenish engine oil as required. Refer to Rotax SI-912-018 / SI-914-020 for purging of the lubrication system.
  (11) Install engine cowling (refer to 71-10-00).
  (12) Perform an engine run and check oil tank and connections for leaks.



Oil Tank Disassembly
Figure 201

OIL COOLER - MAINTENANCE

1. General

   A. The oil cooler is mounted in front of the radiator on the inner forward part of the lower engine cowling behind the main air intake (Rotax 912S) or in the lower right part of the lower engine cowling below / behind the turbocharger and behind an air duct (Rotax 914F). The oil inlet and outlet hose assemblies are connected to the oil cooler casing.

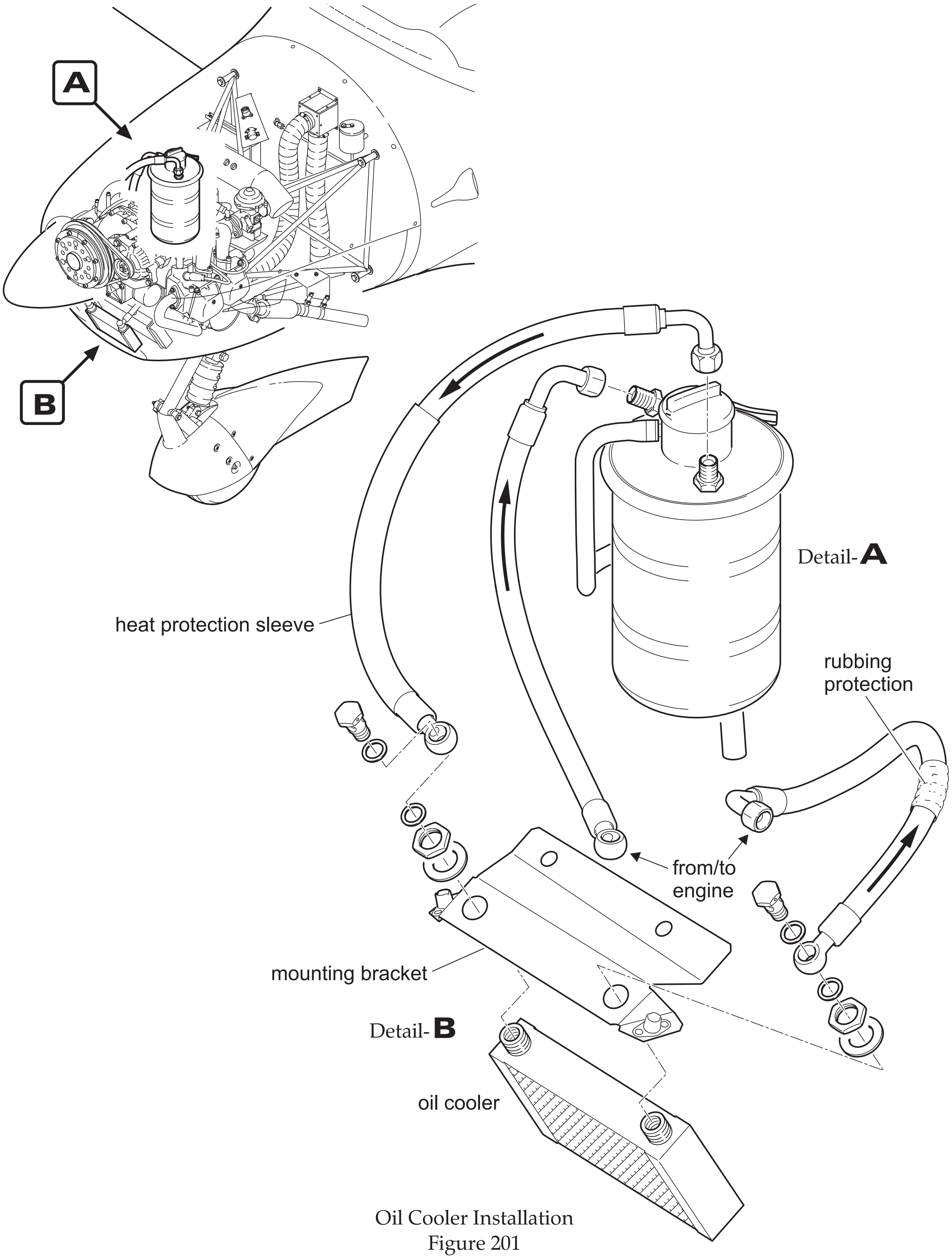
   B. The oil cooler should be replaced if metal particles were found while servicing oil screens and the engine therefore had to be disassembled.

2. Oil Cooler Removal/Installation

   CAUTION: IF ENGINE HAS BEEN RUNNING RECENTLY, HOT ENGINE COMPONENTS MAY CAUSE SKIN BURNS!

   A. Remove Oil Cooler
      (1) Remove engine cowling (refer to 71-10-00).
      (2) Disconnect inlet and outlet hoses at oil cooler.
      (3) Remove nuts securing oil cooler to mounting plate and remove oil cooler.

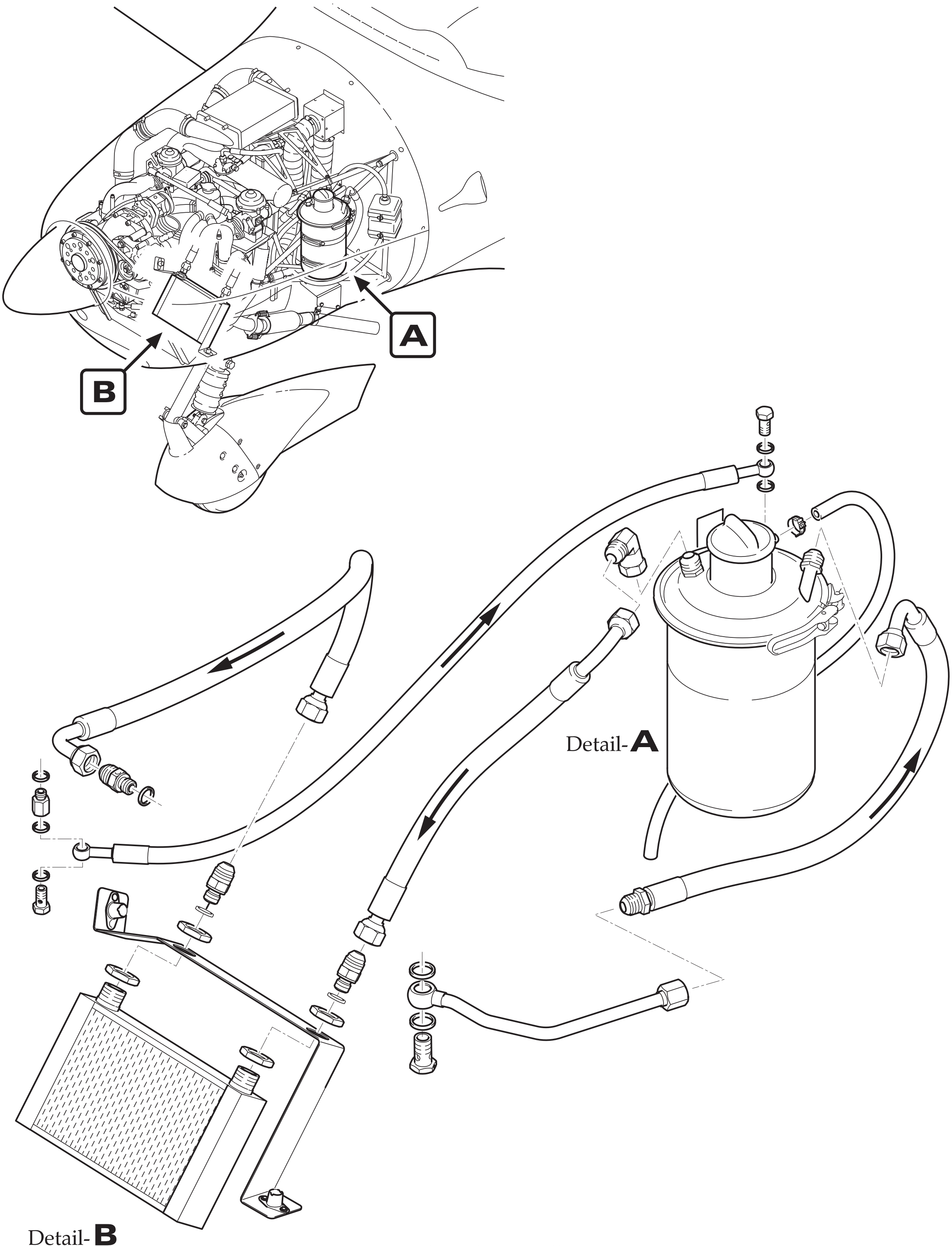
   B. Install Oil Cooler
      (1) Install oil cooler on mounting plate using washers and nuts.
      (2) Connect inlet and outlet hoses at oil cooler.
      (3) Replenish engine oil as required. Refer to Rotax SI-912-018 / SI-914-020 for purging of the lubrication system.
      (4) Install engine cowling (refer to 71-10-00).
      (5) Perform an engine run and check oil cooler and connections for leaks.



Oil Cooler Installation
Figure 201

EFFECTIVITY

Aircraft equipped with Rotax 912S engine



Oil Cooler Installation
Figure 201

OIL PRESSURE INDICATION - MAINTENANCE

1. General

A. The oil pressure indicating system consists of an oil pressure transducer, an oil pressure indicator and wiring connecting the two components. On aircraft equipped with Garmin G3X Touch system, oil pressure is indicated via the G3X displays. The oil pressure transducer is then connected with the GEA 24 engine interface.
The oil pressure transducer is mounted on the right side of the oil pump casing. The oil pressure transducer is a membrane pressure transducer with a built-in current source. The current varies depending upon oil pressure. The transducer is supplied with system voltage.
The analog oil pressure indicator is located on the right side of the instrument panel in the cluster of engine gauges.

B. Maintenance is limited to the removal and installation of the system components. Refer to 34-25-00 for further information on maintenance of the Garmin G3X Touch system.

2. Oil Pressure Indicator Removal/Installation

A. Remove Oil Pressure Indicator
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glare shield (refer to 31-10-00).
(4) Remove cable connector from back of indicator.
(5) While supporting the indicator, remove screws attaching indicator to instrument panel.
(6) Remove indicator from aircraft.

B. Install Oil Pressure Indicator
(1) Position indicator to instrument panel hole and secure with screws.
(2) Install cable connector at back of indicator.
(3) Install glare shield (refer to 31-10-00).
(4) Reconnect battery (refer to 24-30-00).

3. Oil Pressure Transducer Removal/Installation

A. Remove Oil Pressure Transducer
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10-00).
(3) Disconnect battery (refer to 24-30-00).
(4) Disconnect electrical connector from transducer.
(5) Unscrew and remove transducer and gasket from engine.

CAUTION: CAP OR PLUG TRANSDUCER PORT TO PREVENT ENTRY OF FOREIGN MATERIAL.

B. Install Oil Pressure Transducer
  (1) Install new gasket and transducer to engine. Torque to 15 Nm (135 in.lbs).
  (2) Connect electrical connector to transducer.
  (3) Reconnect battery (refer to 24-30-00).
  (4) Install engine cowling (refer to 71-10-00).

OIL PRESSURE INDICATION - MAINTENANCE

1. General

A. Engine oil pressure indication is included in the engine monitoring system.
Pressure is measured by a pressure transducer electrically connected to the engine data converter (EDC). Engine oil pressure is measured on the right side of the oil pump casing.
To avoid damages caused by vibrations the pressure transducer is not mounted directly on the engine. It is installed on the lower right side of the engine mount and connected via a flexible oil hose. The oil hose is connected to the engine via a restricting orifice.

B. Maintenance is limited to the removal and installation of the oil pressure transducer. Refer to 77-40-00 for further information on maintenance of the engine monitoring system.

2. Oil Pressure Transducer Removal/Installation

A. Remove Oil Pressure Transducer
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10-00).
(3) Disconnect battery (refer to 24-30-00).
(4) Disconnect electrical connector from transducer.
(5) Unscrew pressure fitting and remove transducer from clamp.

CAUTION: CAP OR PLUG TRANSDUCER PORT TO PREVENT ENTRY OF FOREIGN MATERIAL.

B. Install Oil Pressure Transducer
(1) Bleed air from sensor oil hose and connect pressure transducer to NPT fitting on oil hose. Torque max. 2 full turns past finger-tight.

CAUTION: DO NOT USE THE PRESSURE TRANSDUCER CASING TO TIGHTEN THE PRESSURE FITTING!

(2) Install pressure transducer with clamp.
(3) Replenish engine oil as required. Refer to Rotax SI-912-018 / SI-914-020 for purging of the lubrication system.
(4) Connect electrical connector to transducer.
(5) Reconnect battery (refer to 24-30-00).
(6) Install engine cowling (refer to 71-10-00).

OIL TEMPERATURE INDICATION - MAINTENANCE

1. General

A. The oil temperature indicating system consists of a temperature sensor, an oil temperature indicator and wiring connecting the two components. On aircraft equipped with Garmin G3X Touch system, oil temperature is indicated via the G3X displays. The oil temperature sensor is then connected with the GEA 24 engine interface.
Oil temperature is measured in the oil filter / oil pump area. The resistance-type sensor functions with system voltage. The analog oil temperature indicator is mounted on the right side of the instrument panel in the cluster of engine gauges.

B. Maintenance is limited to the removal and installation of the system components. Refer to 34-25-00 for further information on maintenance of the Garmin G3X Touch system.

2. Oil Temperature Indicator Removal/Installation

A. Remove Oil Temperature Indicator
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30-00).
(3) Remove glare shield (refer to 31-10-00).
(4) Remove cable connector from back of indicator.
(5) While supporting the indicator, remove screws attaching indicator to instrument panel.
(6) Remove indicator from aircraft.

B. Install Oil Temperature Indicator
(1) Position indicator in the instrument panel hole and secure with screws.
(2) Install cable connector at back of indicator.
(3) Install glare shield (refer to 31-10-00).
(4) Reconnect battery (refer to 24-30-00).

3. Oil Temperature Sensor Removal/Installation

A. Remove Oil Temperature Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10-00).
(3) Disconnect battery (refer to 24-30-00).
(4) Disconnect electrical lead to sensor.
(5) Unscrew and remove sensor from engine.

<u>CAUTION:</u> CAP OR PLUG SENSOR PORT TO PREVENT ENTRY OF FOREIGN MATERIAL.

B. Install Oil Temperature Sensor
(1) Install sensor to engine. Torque to 10 Nm (90 in.lbs).
(2) Connect electrical connector to sensor.
(3) Reconnect battery (refer to 24-30-00).
(4) Install engine cowling (refer to 71-10-00).

OIL TEMPERATURE INDICATION - MAINTENANCE

1. General

A. Engine oil temperature indication is included in the engine monitoring system. Temperature is measured by a type K thermocouple electrically connected to the engine data converter (EDC). Engine oil temperature is measured in the oil filter / oil pump area.

B. Maintenance is limited to the removal and installation of the oil temperature sensor. Refer to 77-40-00 for further information on maintenance of the engine monitoring system.

2. Oil Temperature Sensor Removal/Installation

A. Remove Oil Temperature Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10-00).
(3) Disconnect battery (refer to 24-30-00).
(4) Disconnect electrical lead to sensor.
(5) Unscrew and remove sensor from engine.

CAUTION: CAP OR PLUG SENSOR PORT TO PREVENT ENTRY OF FOREIGN MATERIAL.

B. Install Oil Temperature Sensor
(1) Install sensor to engine. Torque to 10 Nm (90 in.lbs).
(2) Connect electrical connector to sensor.
(3) Reconnect battery (refer to 24-30-00).
(4) Install engine cowling (refer to 71-10-00).

CHAPTER 80

STARTING

TABLE OF CONTENTS

STARTING - GENERAL

1. Introduction

   A. This chapter describes the starter as a component of the starting system.

2. General Description

   A. The starting system comprises the starter, a relay and the ignition/starter switch.
   The starter is mounted at the rear lower right side of the engine. During the engine starting process, the starter pinion gear drives the crankshaft through a freewheel ring gear and turns the engine over.

STARTER - MAINTENANCE

1. General

   A. The aircraft is equipped with a direct-drive 12V DC starter. The starter is mounted at the rear lower right side of the engine.
   During starting, a starter relay is activated by the ignition key. Its contacts close and electrical current energizes the starter motor. The starter pinion gear drives the crankshaft through a freewheel gear and turns the engine over. When the engine is running, a sprag clutch decouples the freewheel gear from the crankshaft..

   B. For a complete description and information concerning operation, troubleshooting, maintenance, overhaul and repair of the starter, refer to appropriate manufacturer's publication.

2. Starter Removal/Installation

   A. Remove Starter
      (1) Remove engine (refer to 71-00-00).
      (2) Disconnect large (P-lead) electrical cable at starter.
      (3) Remove clamp securing starter to engine.
      (4) Remove nuts, lock washers and washers securing starter to engine.
      (5) Remove starter with spacers and washers from engine.

   B. Install Starter
      (1) Position starter to engine. Ensure washers and spacers are in place.
      (2) Install washers, lock washers and nuts securing starter to engine.
      (3) Install clamp securing starter to engine.
      (4) Reconnect large (P-lead) electrical cable at starter.
      (5) Install engine (refer to 71-00-00).

CHAPTER 91

CHARTS AND DIAGRAMS

TABLE OF CONTENTS

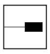
CHARTS AND WIRING DIAGRAMS - GENERAL

1. Introduction

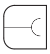
A. This chapter includes several wiring diagrams for reference purposes.

2. Electrical Symbols

A. Below a collection of electrical symbols used in the wiring diagrams:

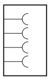


connector, single pole, male

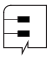


connector, single pole, female

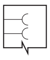
connector, 4 pole, male



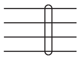
connector, 4 pole, female



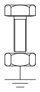
connector part, male



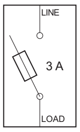
connector part, female



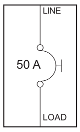
wire, shielded



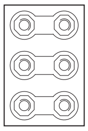
ground bolt



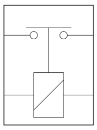
circuit breaker switch



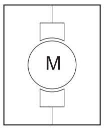
circuit breaker



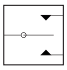
terminal block



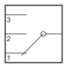
relay



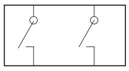
motor



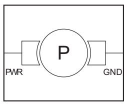
switch, SPCO



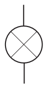
switch, SPTT



switch, DPST



pump



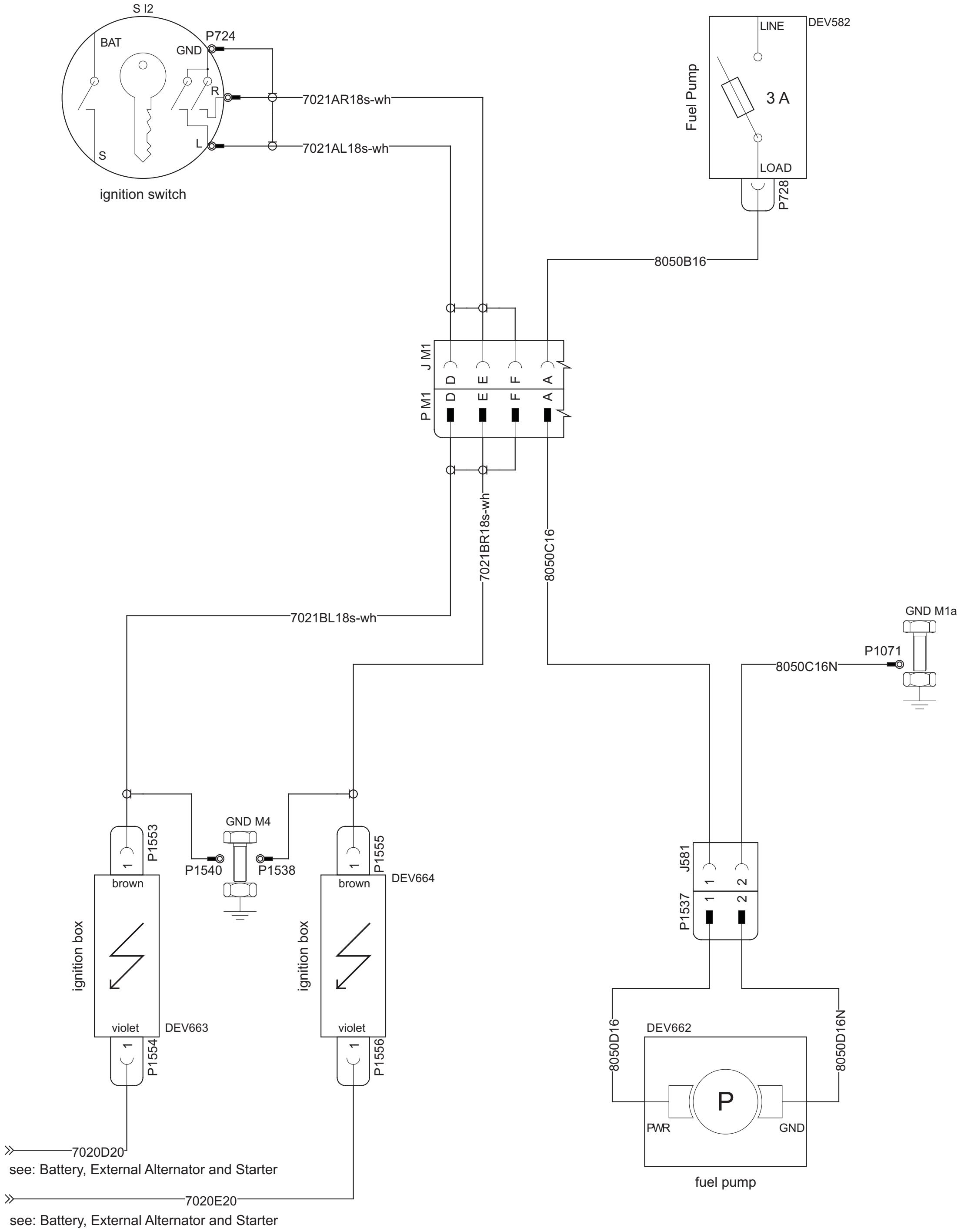
light (bulb)

diode

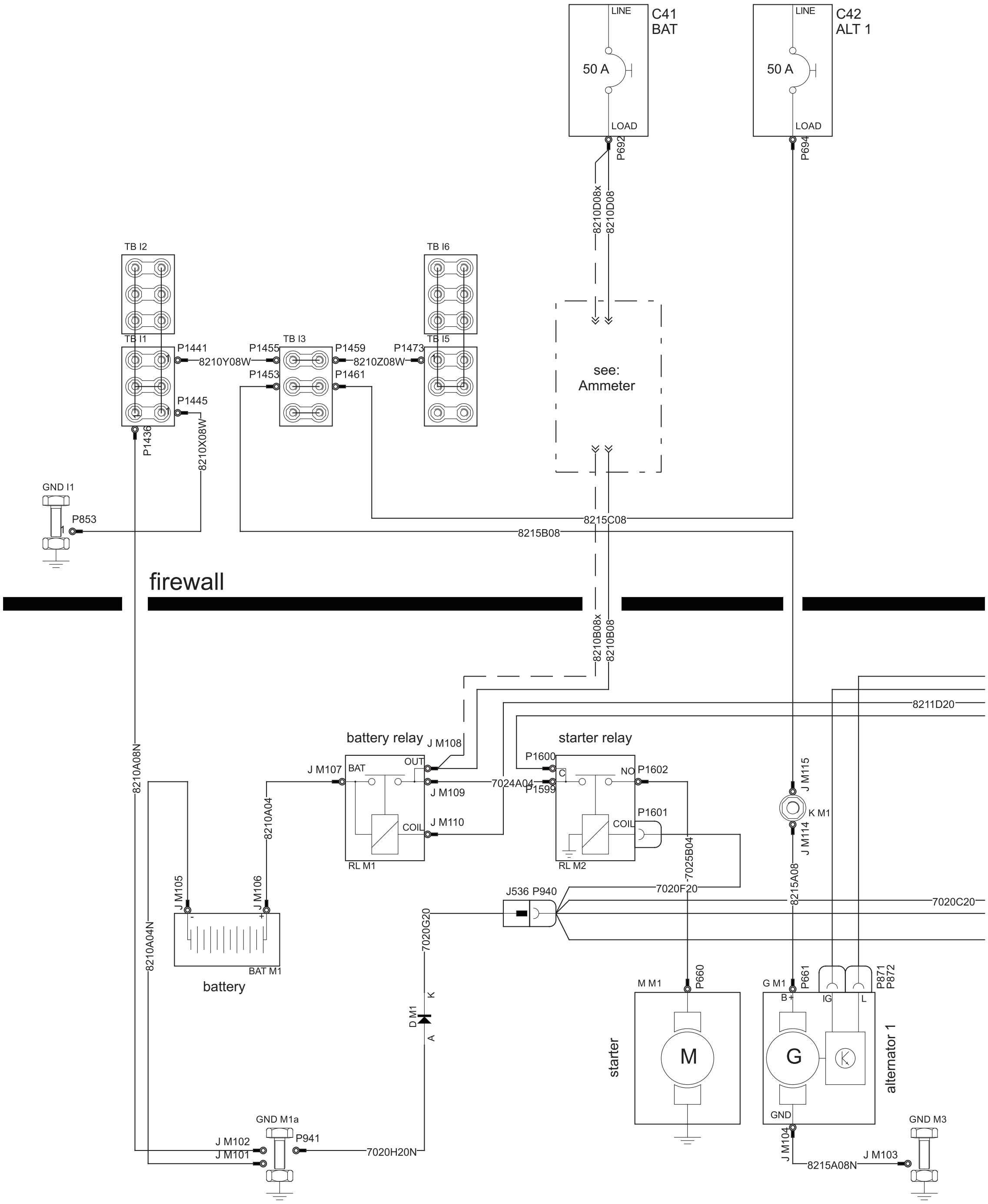
3. Wiring Diagrams

A. The wiring diagrams listed below define the wiring of the basic electrical equipment.

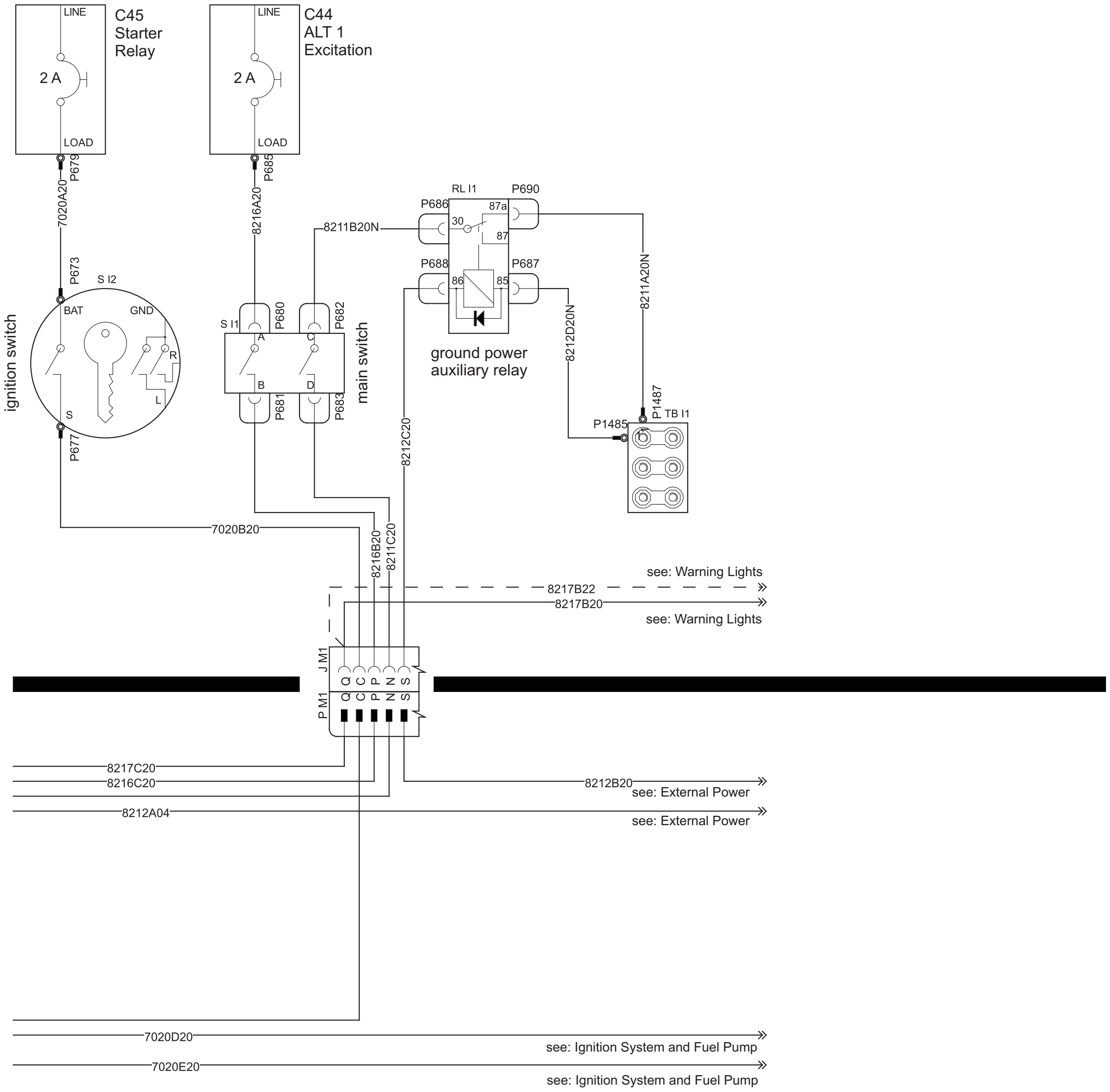
No.	Wiring diagram	Ref. Fig.	Effectivity
(1)	Ignition System and Fuel Pump	Fig. 1	
(2)	Battery, External Alternator and Starter	Fig. 2	
(3)	Internal Alternator	Fig. 3	A/C equipped for Night-VFR
(4)	External Power	Fig. 4	A/C with ext. power receptacle
(5)	Voltage Monitoring	Fig. 5	A/C equipped for Night-VFR
(6)	Fuel Indicating System	Fig. 6	
(7)	Circuit Breakers and Switches	Fig. 7	
(8)	Ammeter	Fig. 8	A/C with analog engine instr.
(9)	Ammeter	Fig. 9	A/C with MVP-50
(10)	Warning Lights	Fig. 10	A/C with LED warning lights
(11)	Warning Lights	Fig. 11	A/C with annunciator panel
(12)	Lights	Fig. 12	
(13)	Engine Indicating	Fig. 13	A/C with analog engine instr.
(14)	Instrument Lighting	Fig. 14	A/C equipped for Night-VFR
(15)	Stall Warning System	Fig. 15	
(16)	Elevator Trim System	Fig. 16	
(17)	Flap Control System	Fig. 17	
(18)	Pitot Heating System	Fig. 18	A/C with pitot heating
(19)	12V Power Supply	Fig. 19	
(20)	Headset Console	Fig. 20	
(21)	Engine Monitoring System	Fig. 21	A/C with MVP-50



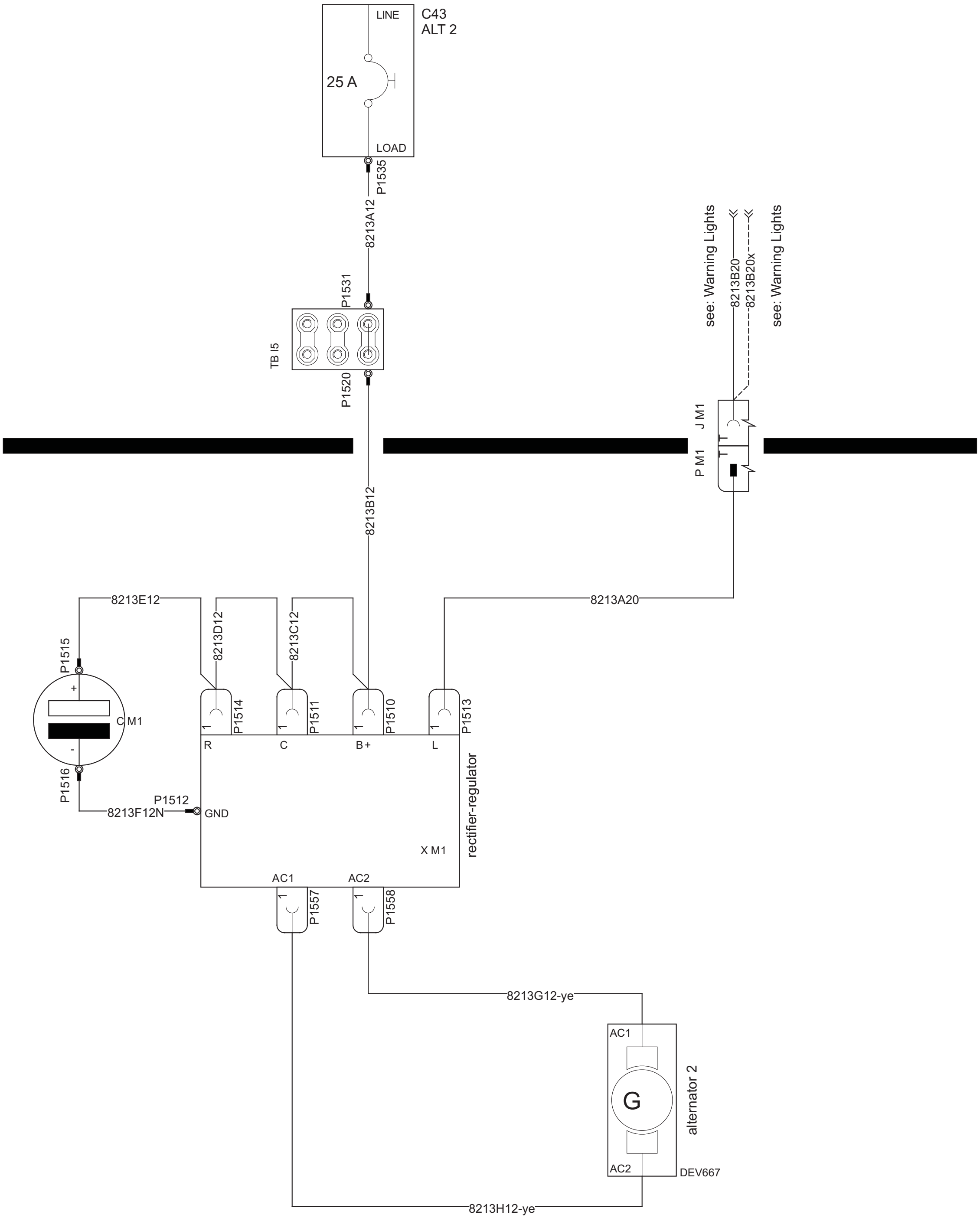
Ignition System and Fuel Pump
Figure 1



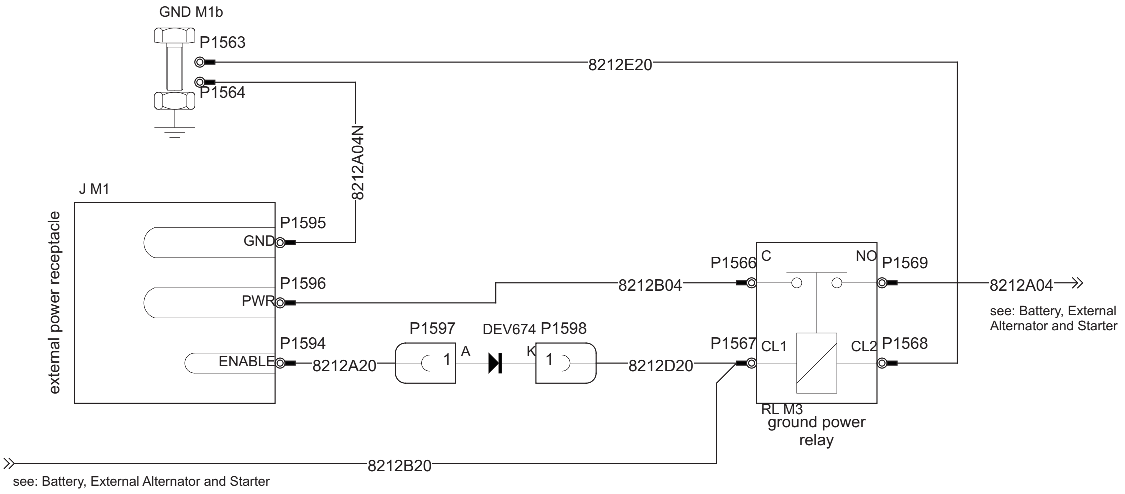
Battery, External Alternator and Starter
Figure 2 (1)



Battery, External Alternator and Starter
Figure 2 (2)



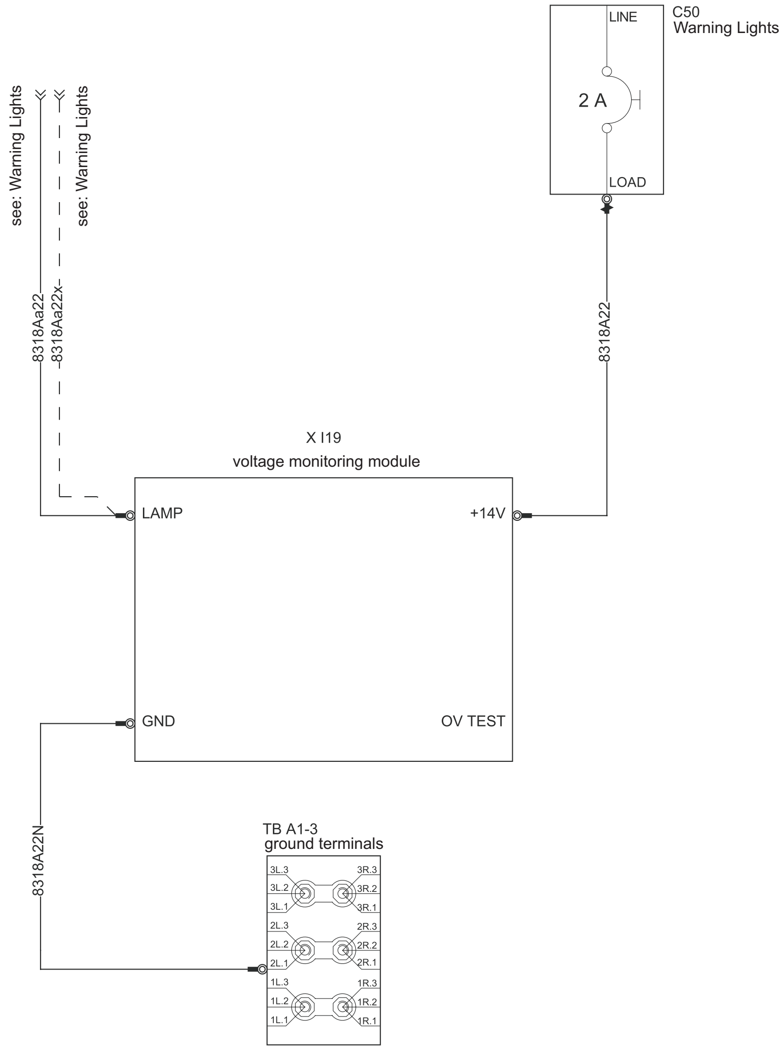
Internal Alternator
Figure 3



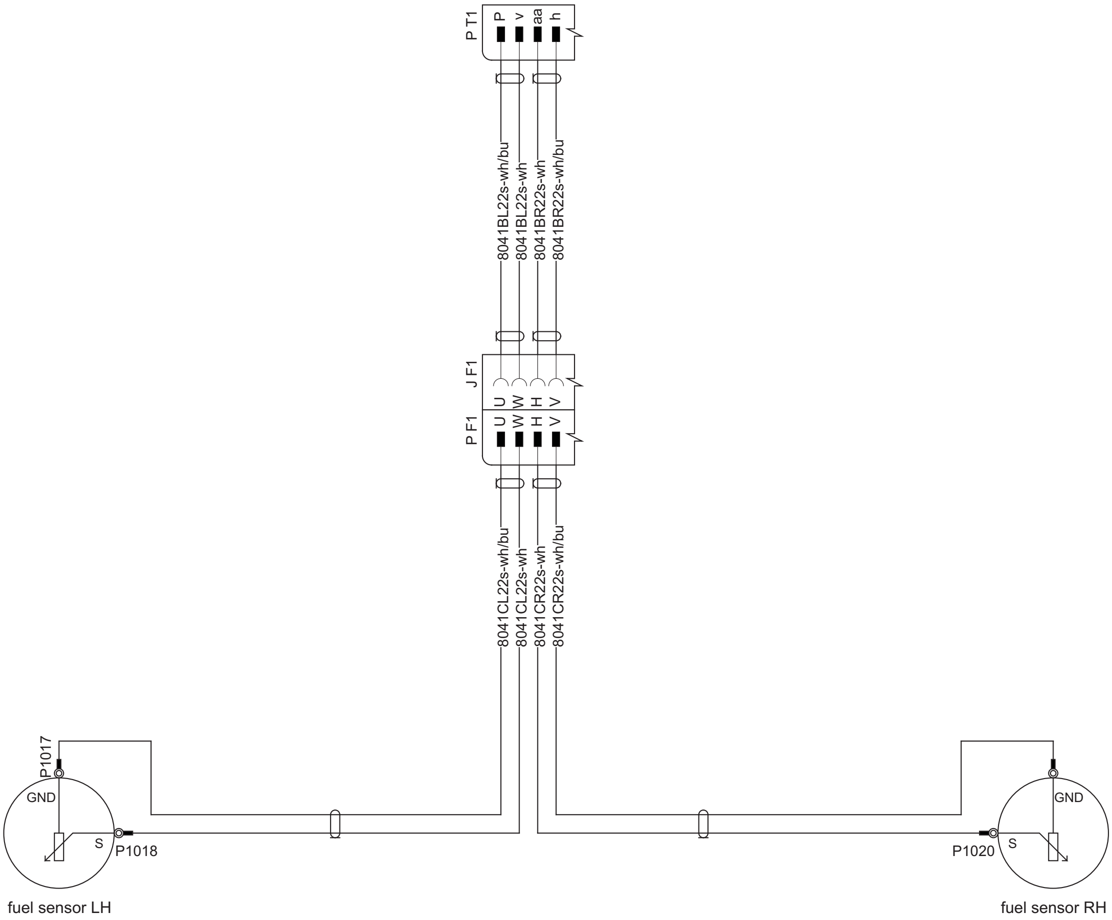
External Power
Figure 4

EFFECTIVITY

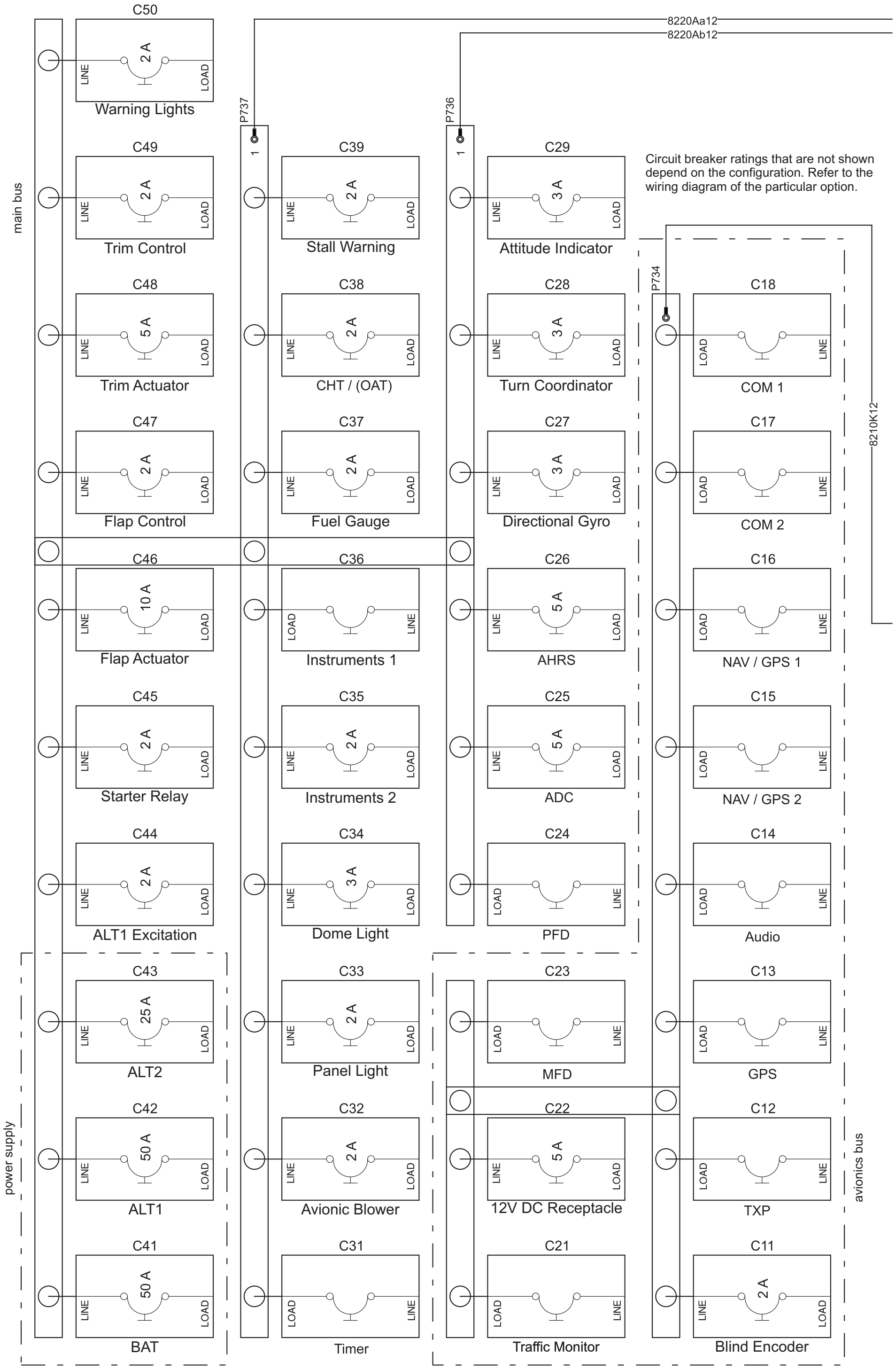
Aircraft equipped with an external power receptacle



Voltage Monitoring
Figure 5

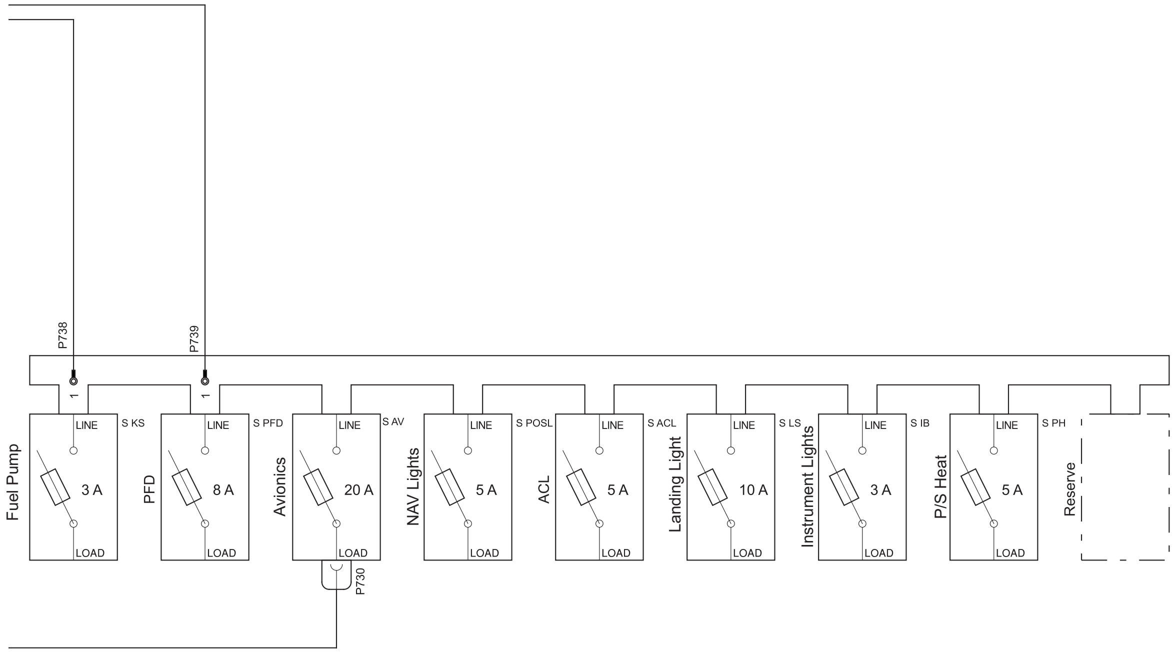


Fuel Indicating System
Figure 6

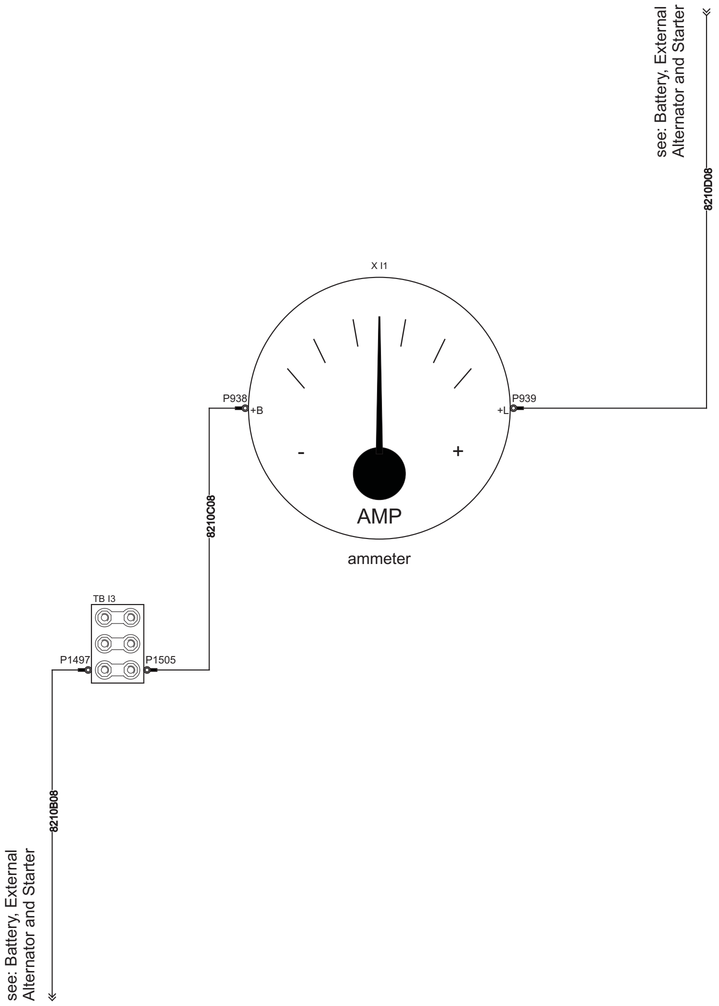


Circuit breaker ratings that are not shown depend on the configuration. Refer to the wiring diagram of the particular option.

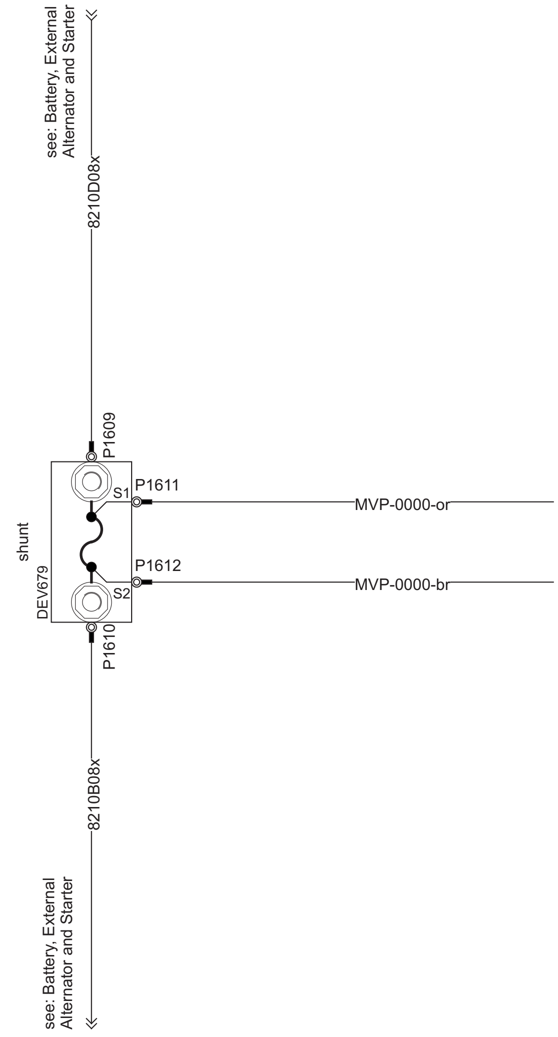
Circuit Breakers and Switches
Figure 7 (1)



Circuit Breakers and Switches
Figure 7 (2)



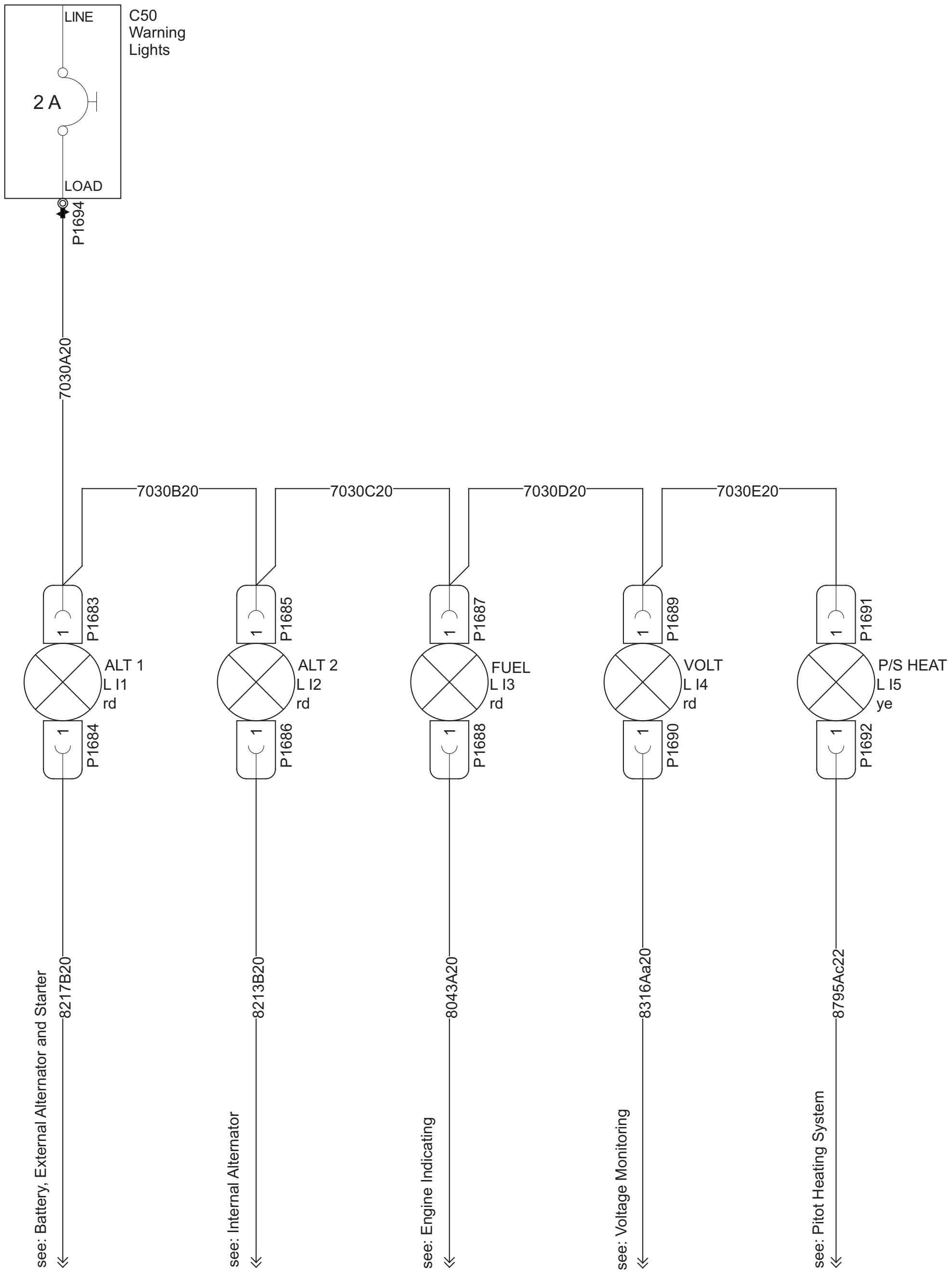
Ammeter
Figure 8



Ammeter
Figure 9

EFFECTIVITY

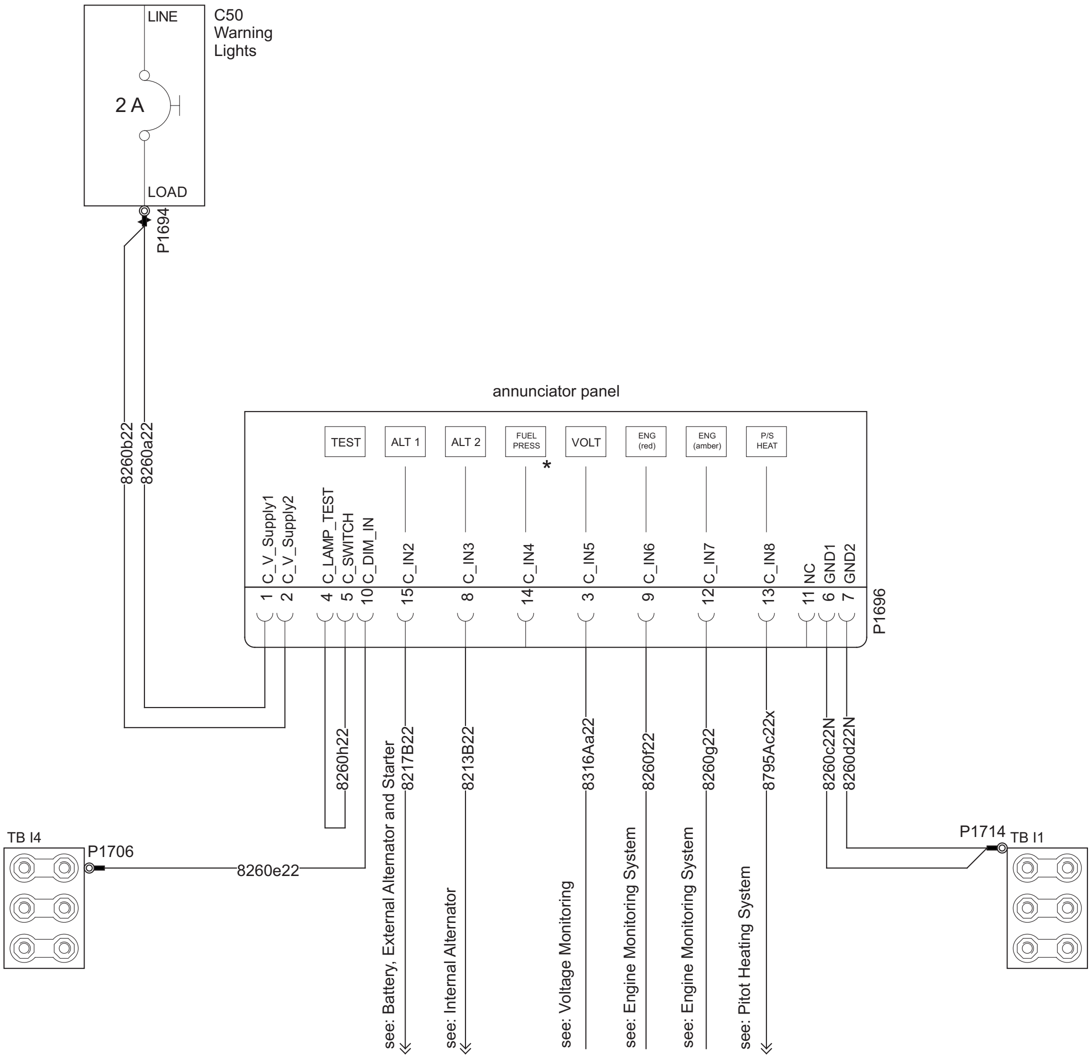
Aircraft equipped with MVP-50



Warning Lights
Figure 10

EFFECTIVITY

Aircraft equipped with LED warning lights

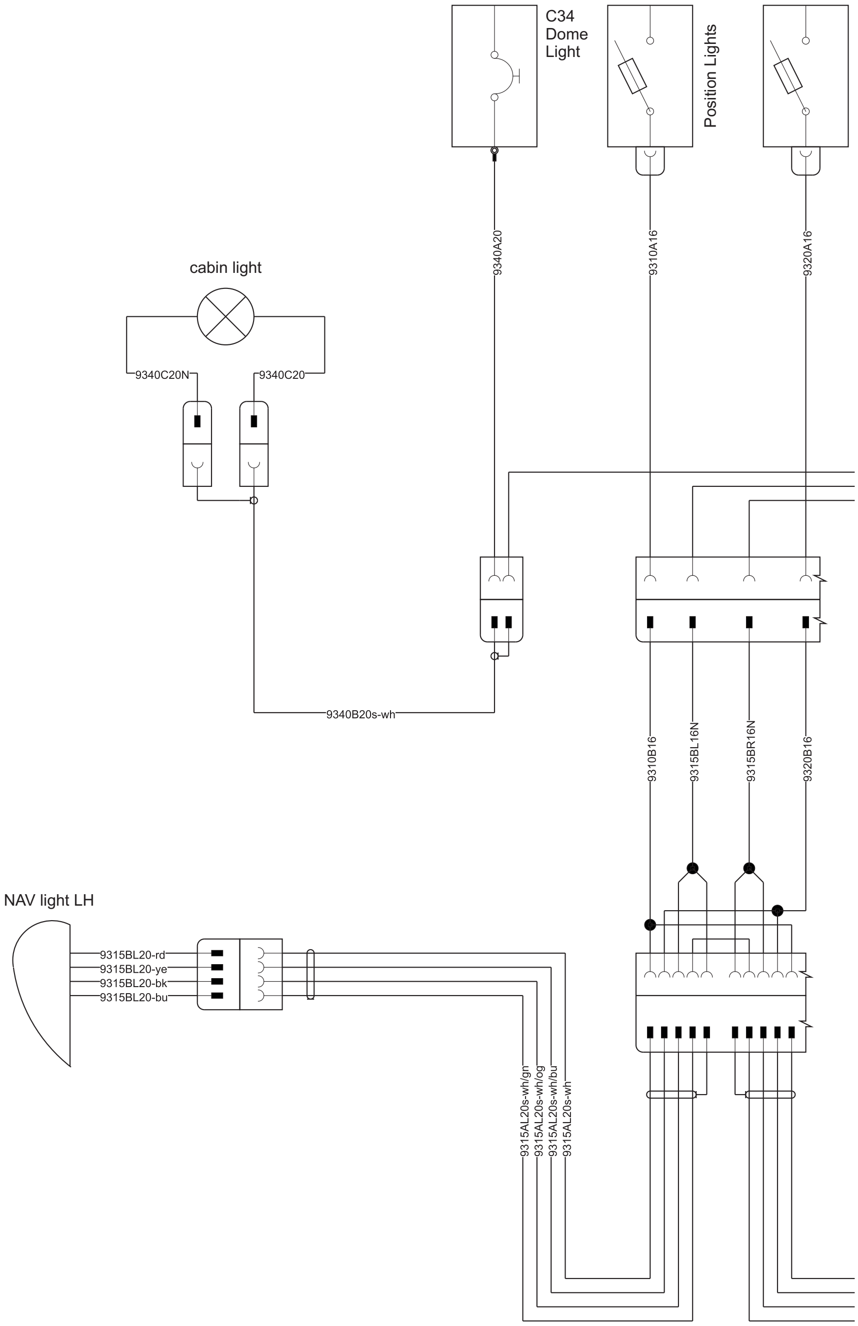


* The warning light FUEL PRESS is not used if an MVP-50 is installed.
Low fuel pressure is indicated by the red warning light ENG instead.

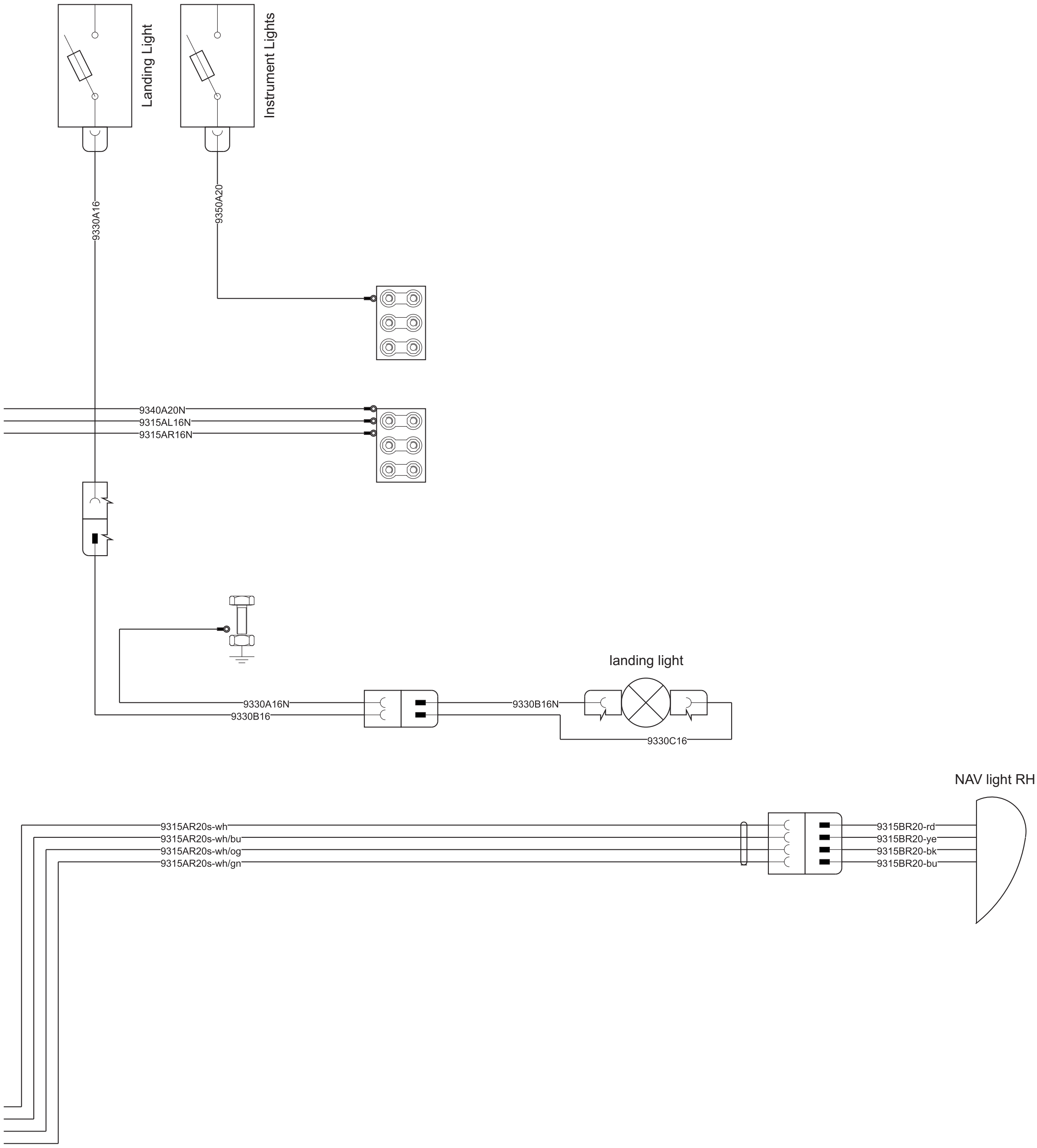
Warning Lights
Figure 11

EFFECTIVITY

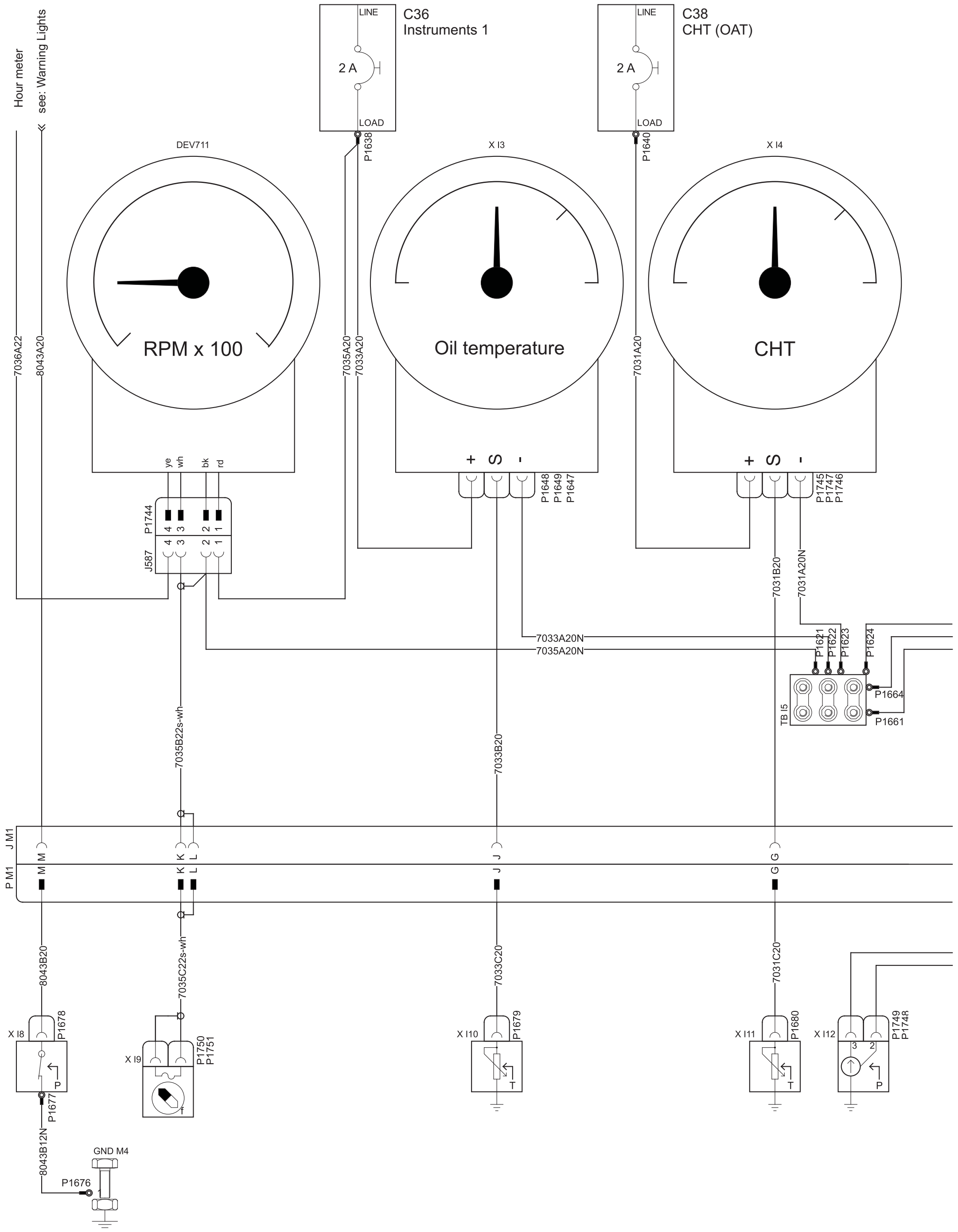
Aircraft equipped with annunciator panel



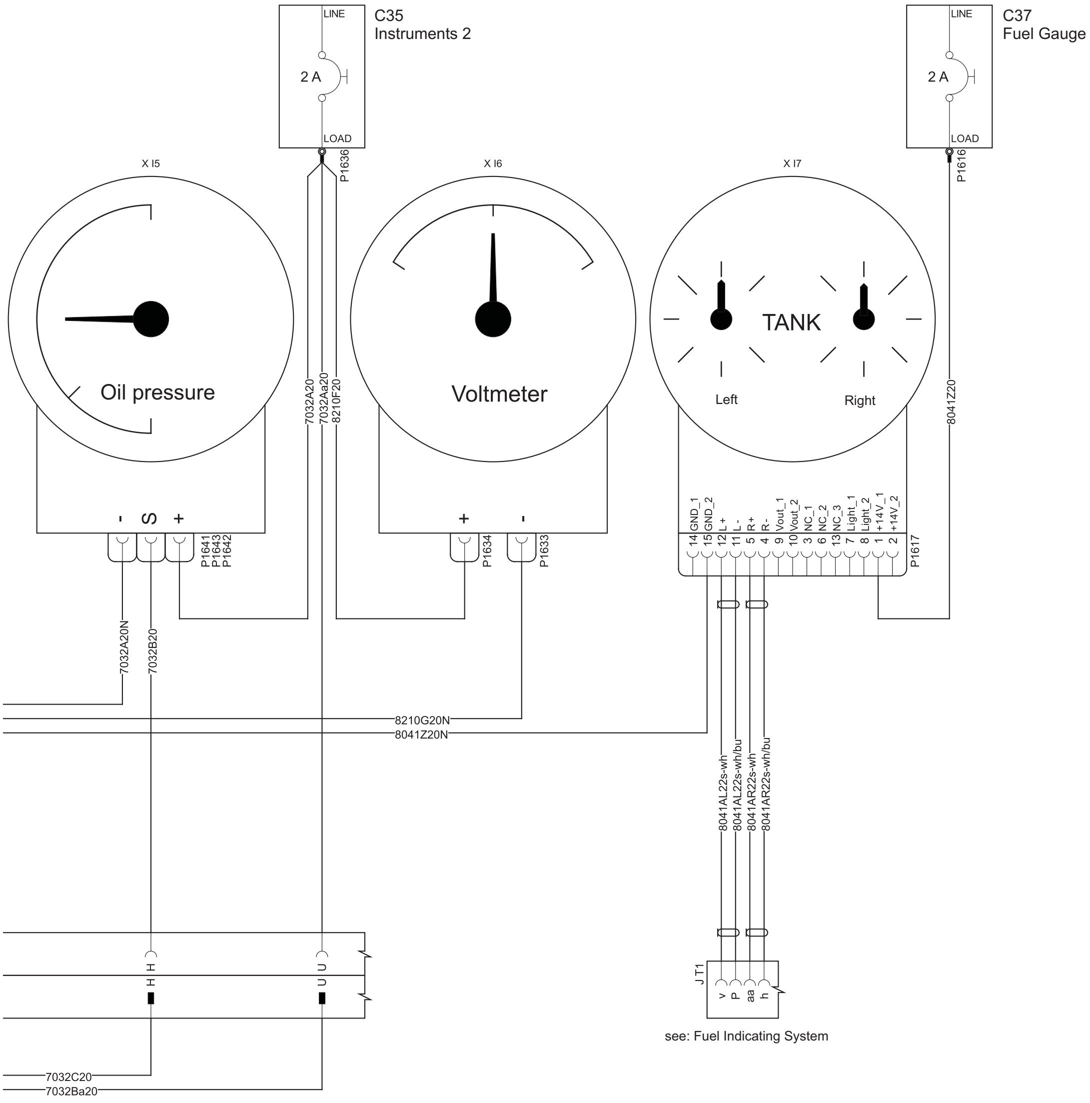
Lights
Figure 12 (1)



Lights
Figure 12 (2)



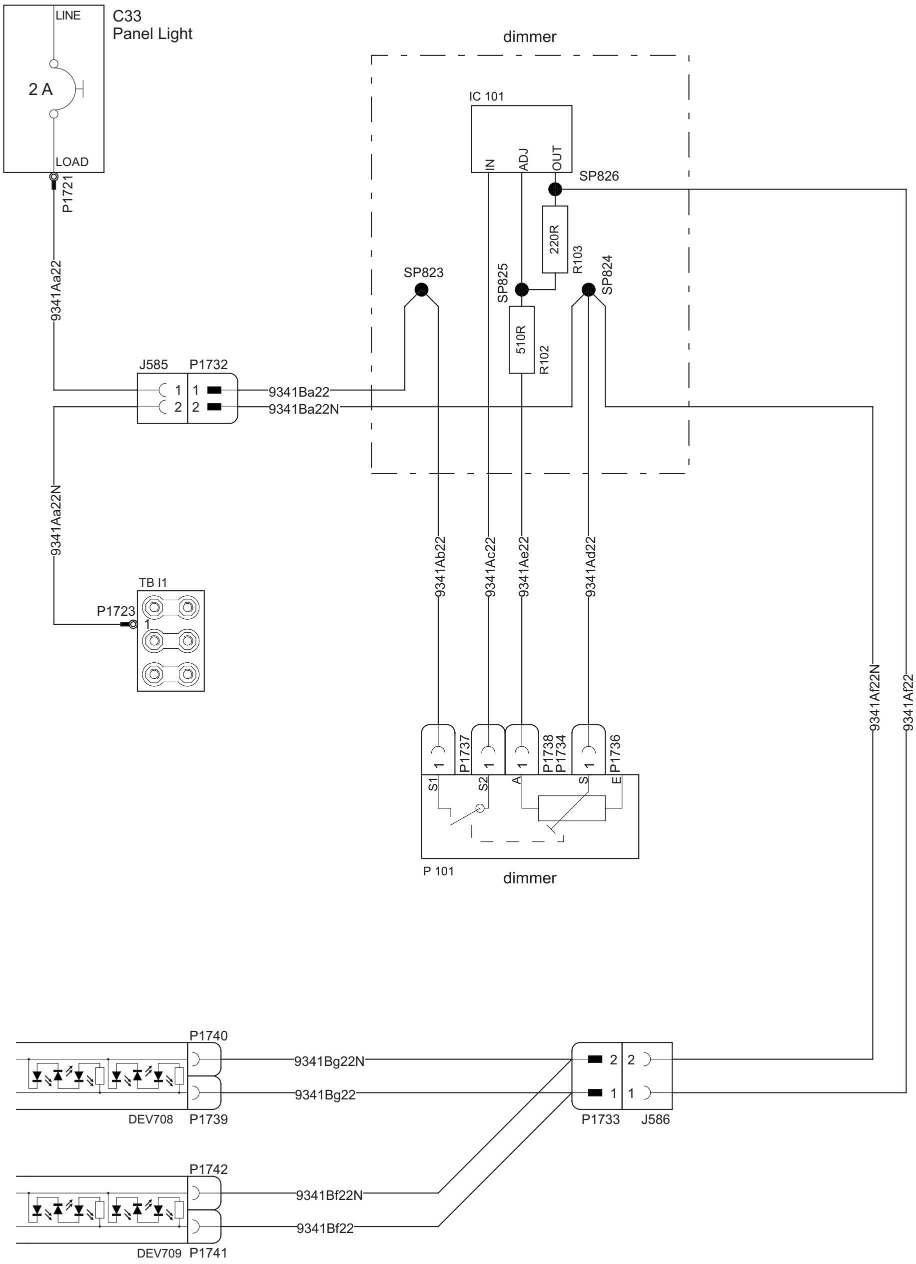
Engine Indicating
Figure 13 (1)



Engine Indicating
Figure 13 (2)

EFFECTIVITY

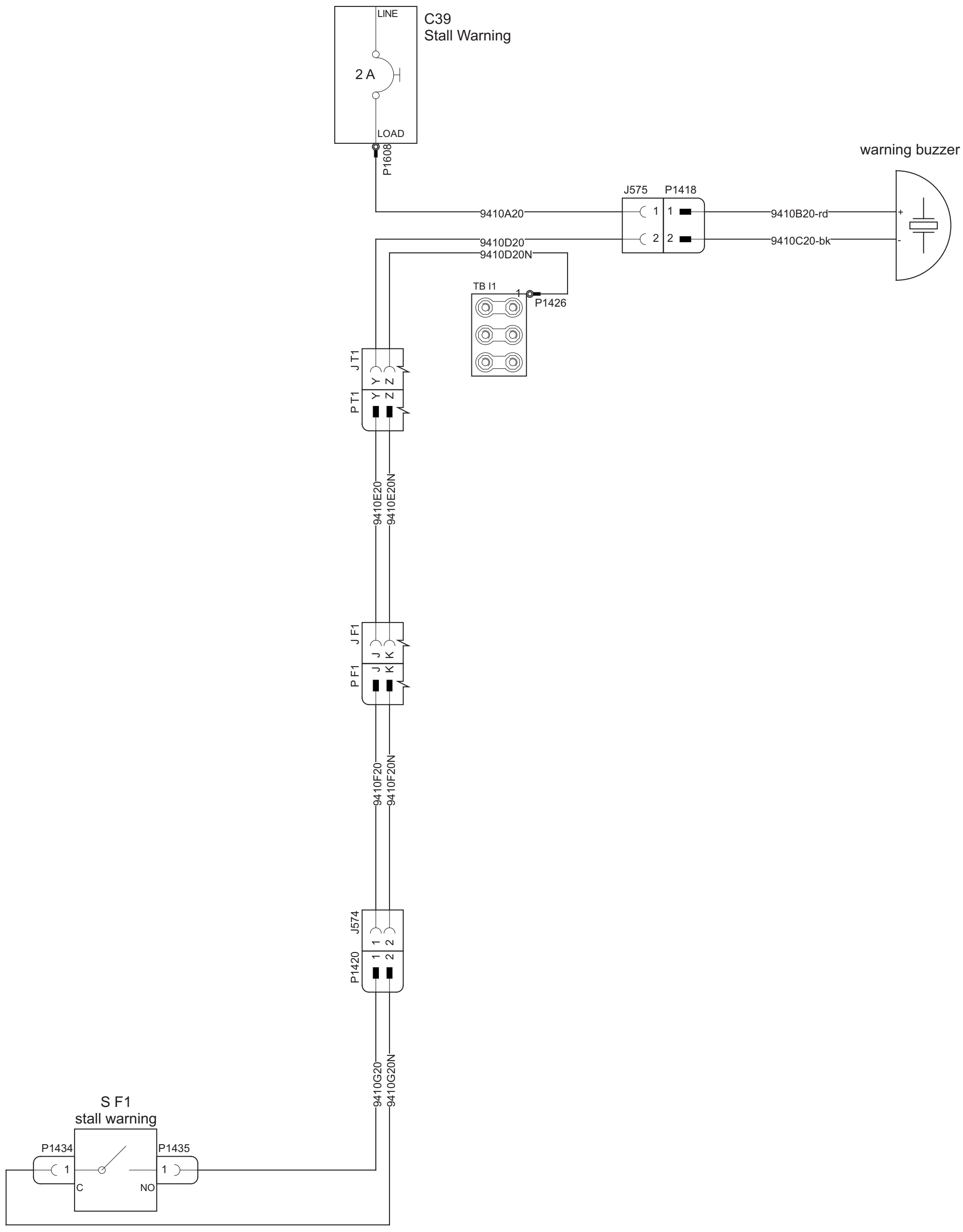
Aircraft equipped with analog engine instruments



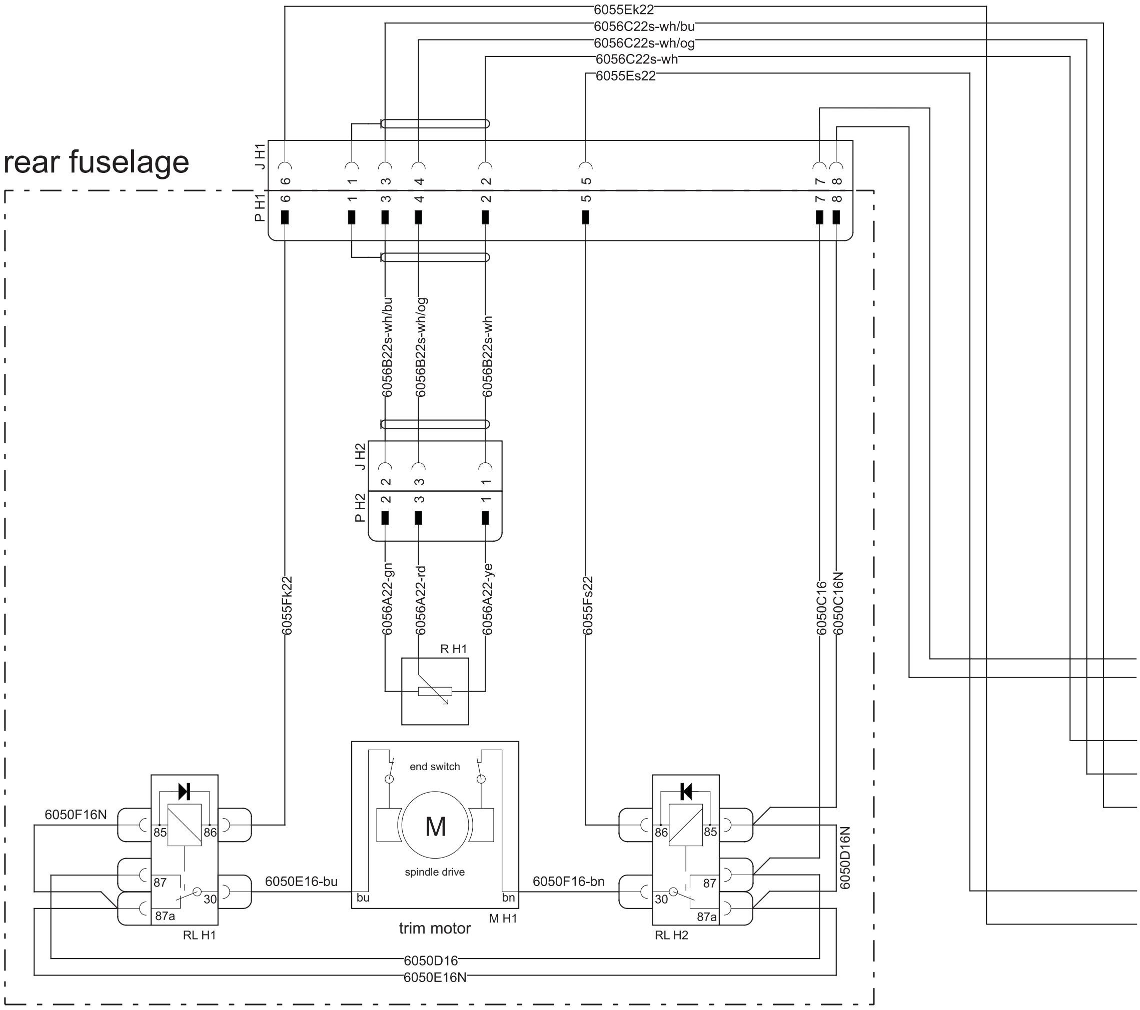
Instrument Lighting
Figure 14

EFFECTIVITY

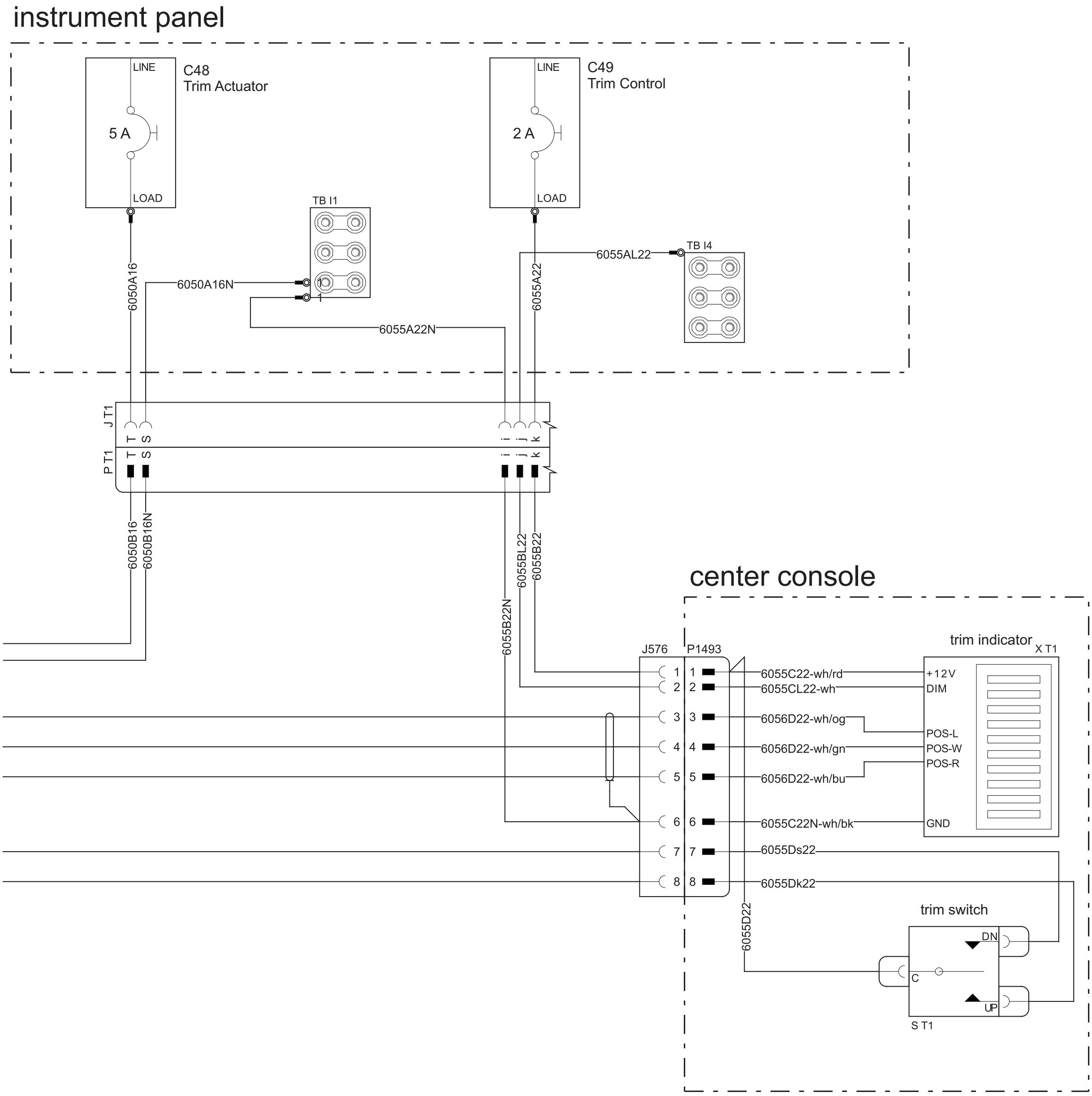
Aircraft equipped for Night-VFR



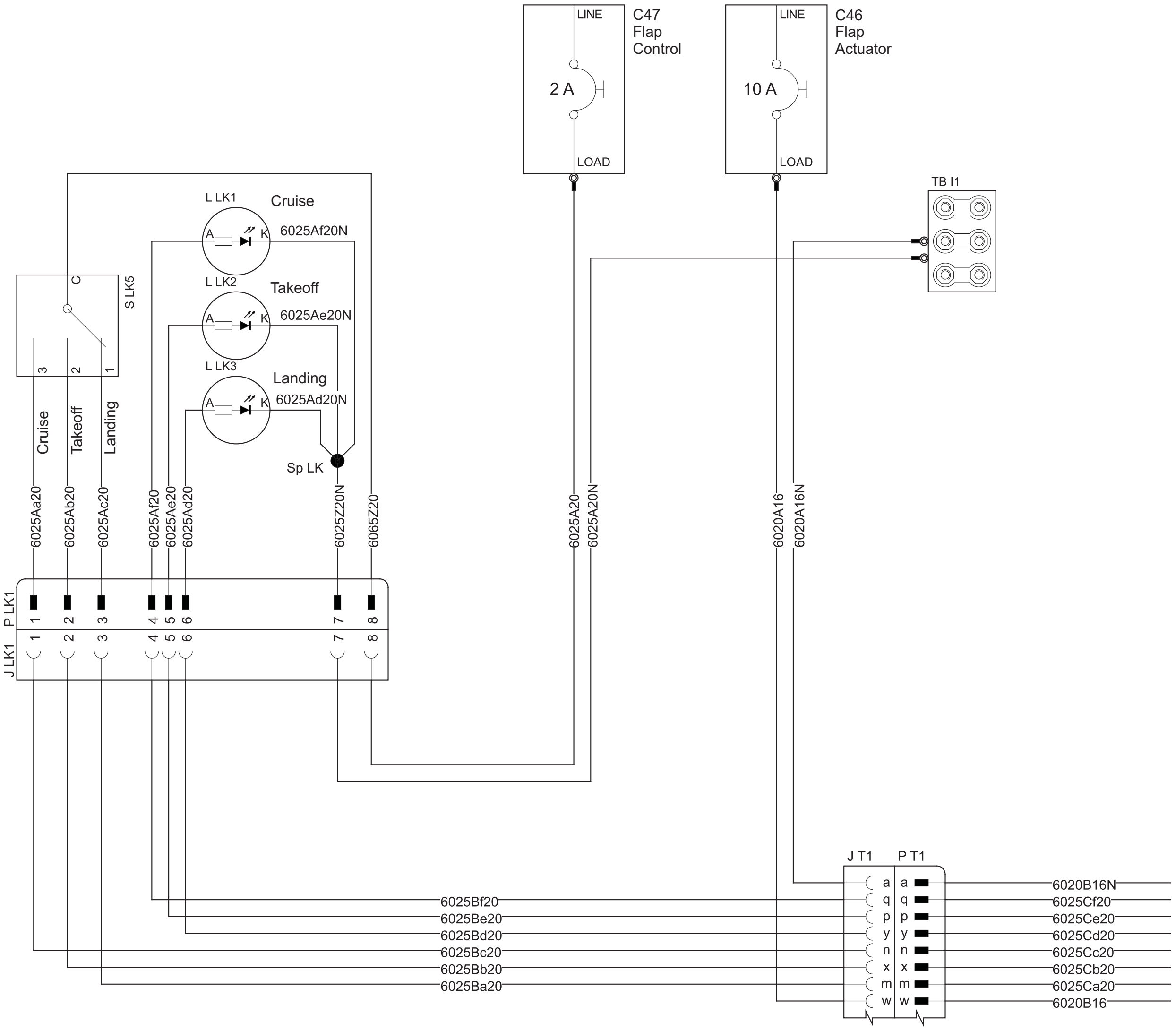
Stall Warning System
Figure 15



Elevator Trim System
Figure 16 (1)



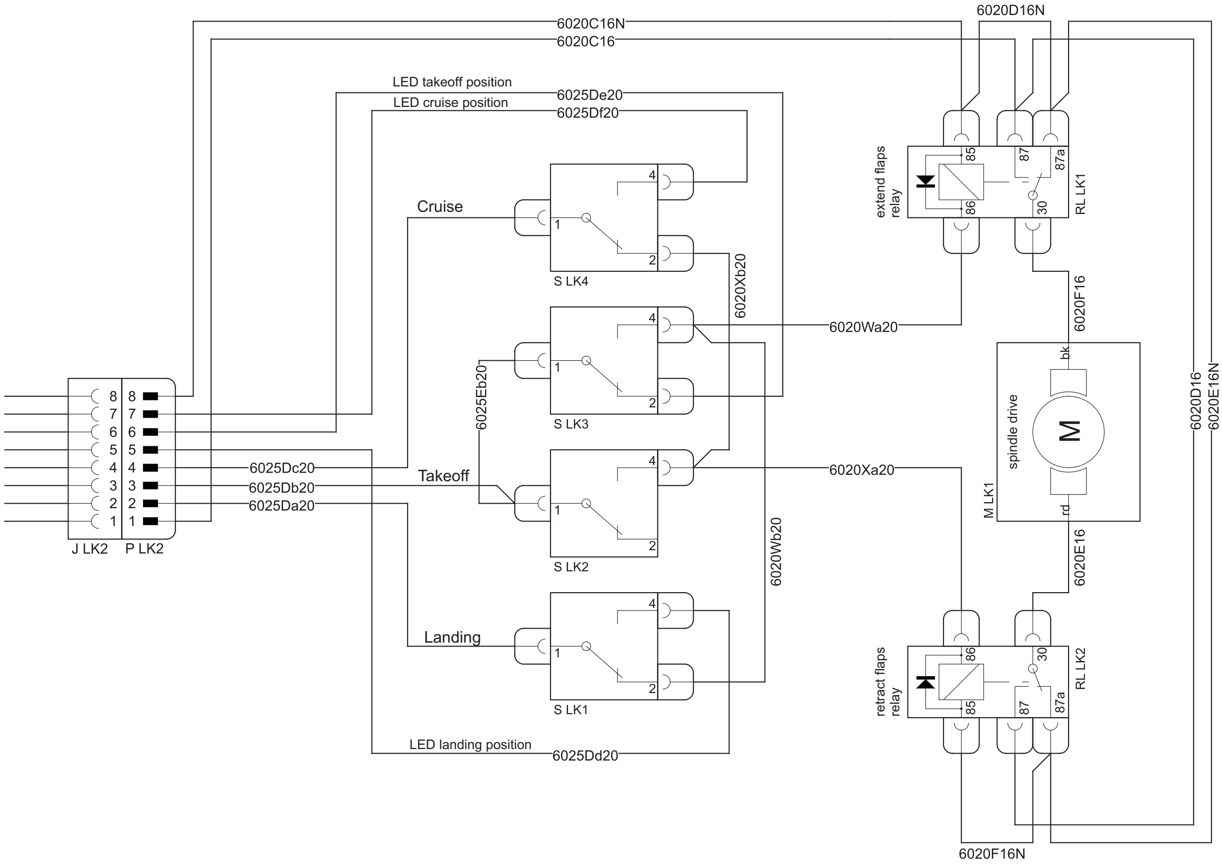
Elevator Trim System
Figure 16 (2)



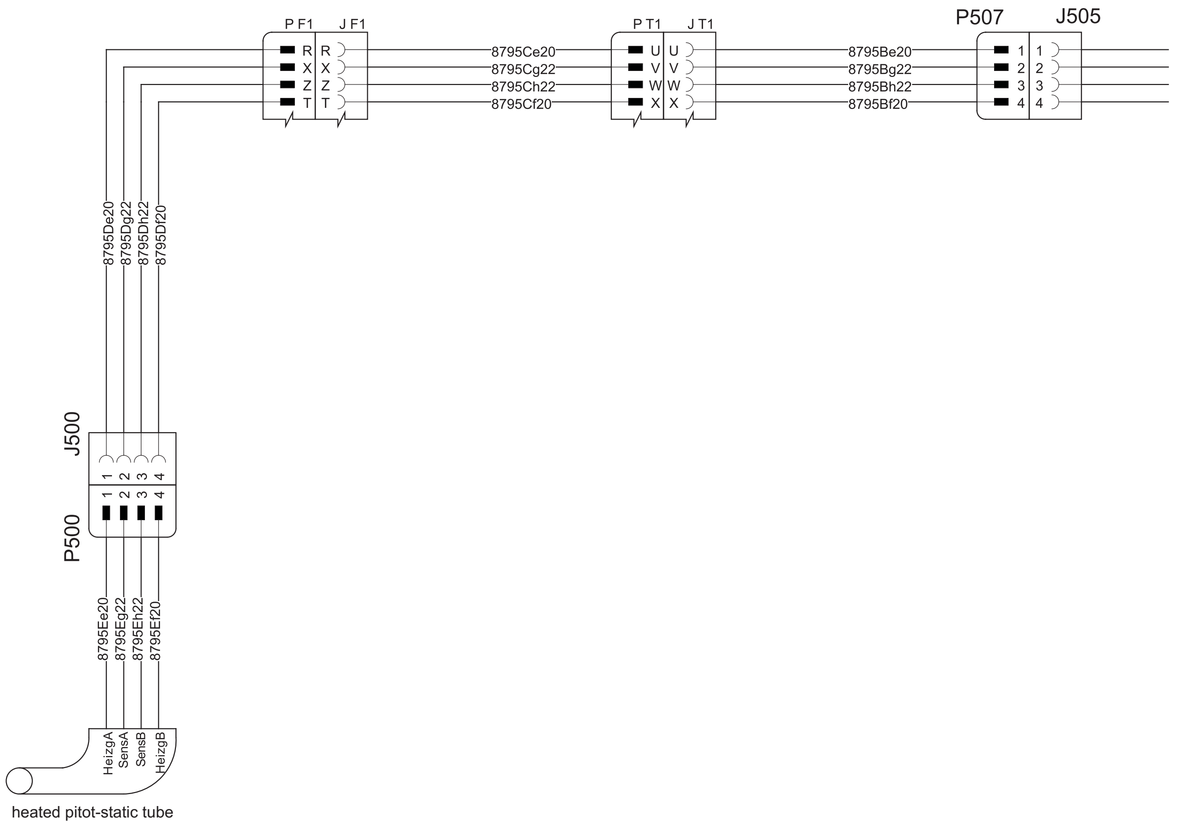
Flap Control System
Figure 17 (1)

Micro switches at cam rod				Flap status	Linear actuator
S LK4	S LK3	S LK2	S LK1		
0	0	1	1	landing position	retracted
0	0	1	0	in transit	
0	0	0	0	takeoff position	
0	1	0	0	in transit	
1	1	0	0	cruise position	extended

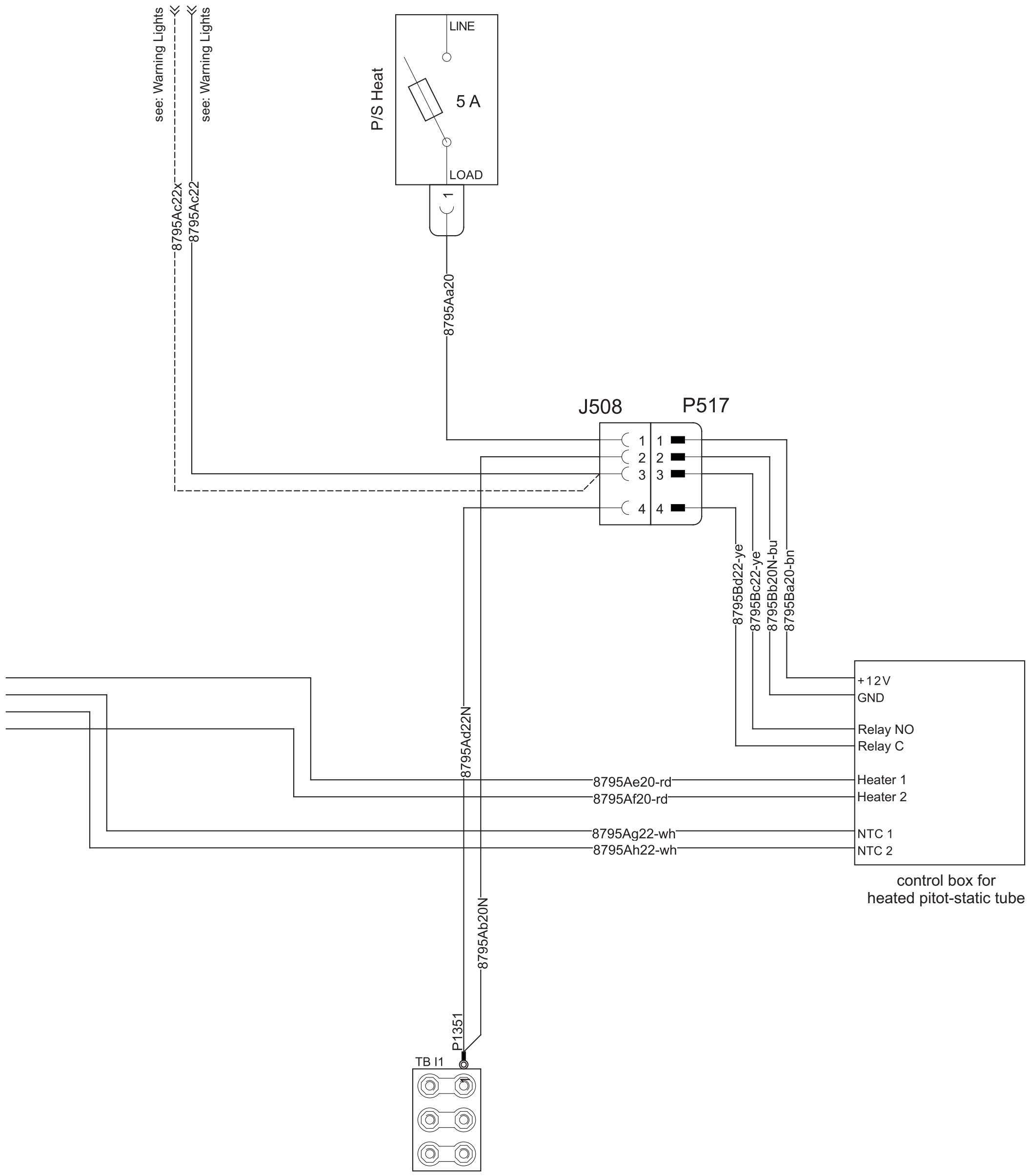
0 = Hybernation as shown, 1 = actuated



Flap Control System
Figure 17 (2)



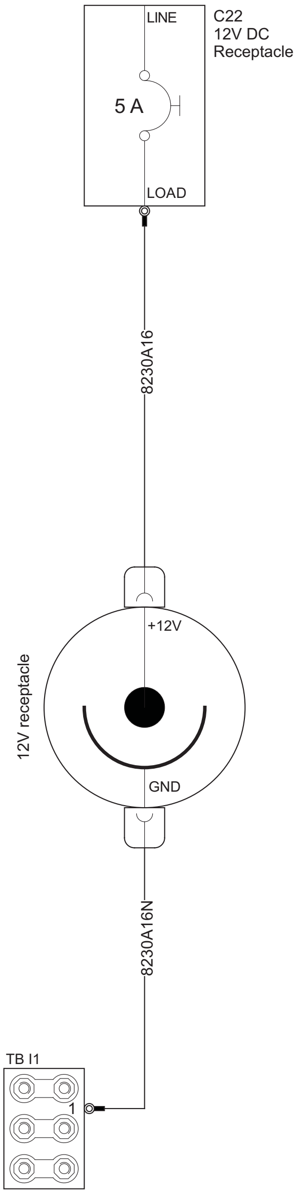
Pitot Heating System
Figure 18 (1)



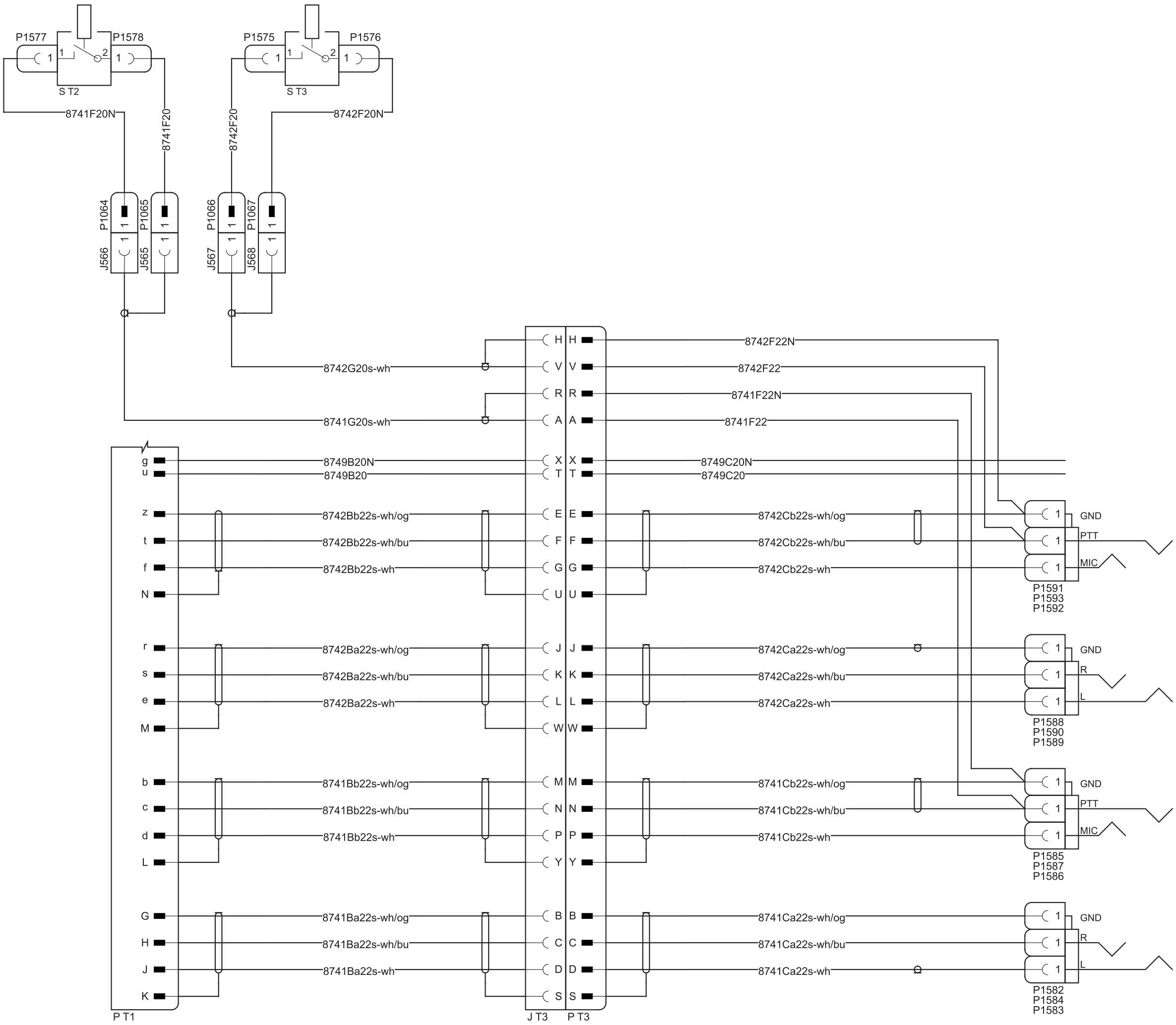
Pitot Heating System
Figure 18 (2)

EFFECTIVITY

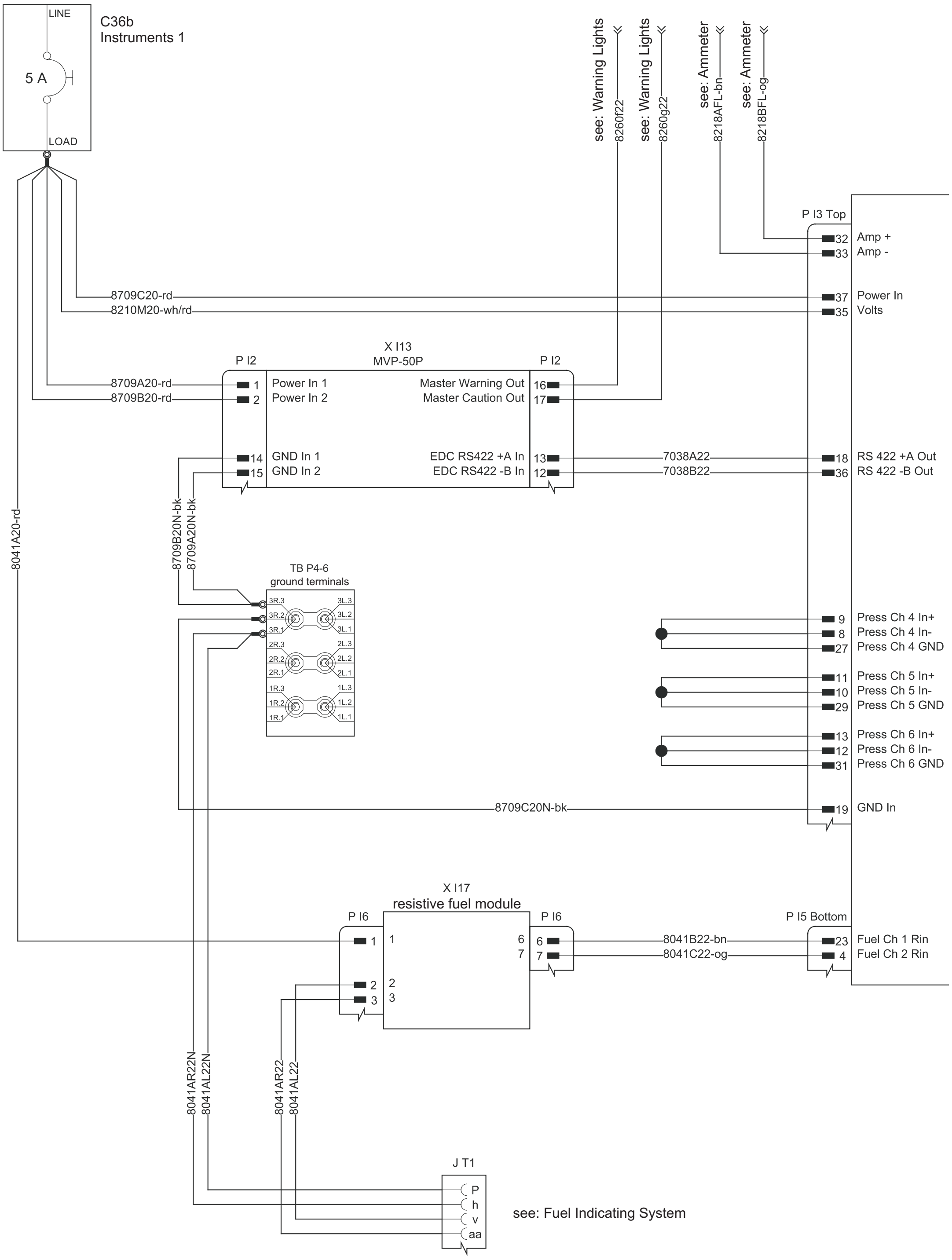
Aircraft equipped with pitot heating system



12V Power Supply
Figure 19



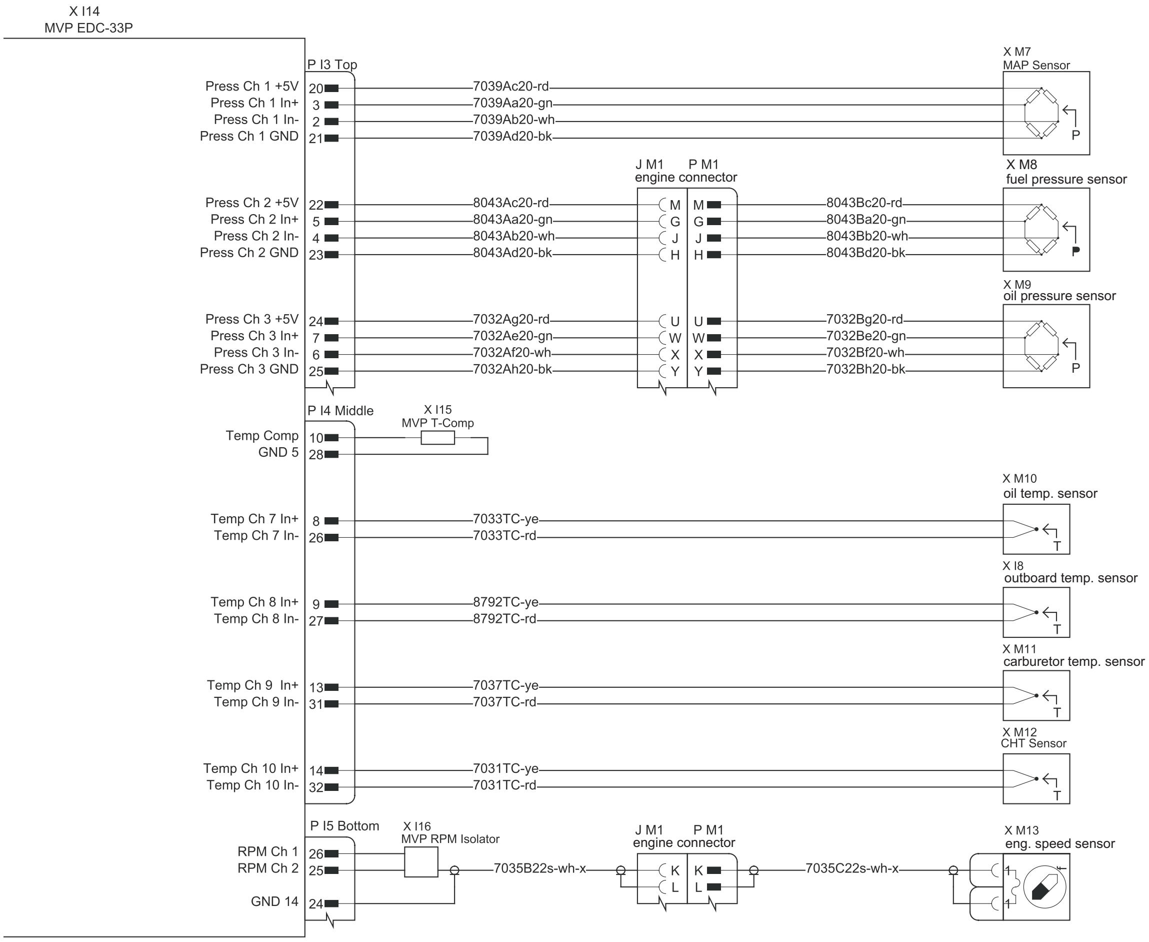
Headset Console
Figure 20



Engine Monitoring System
Figure 21 (1)

EFFECTIVITY

Aircraft equipped with MVP-50

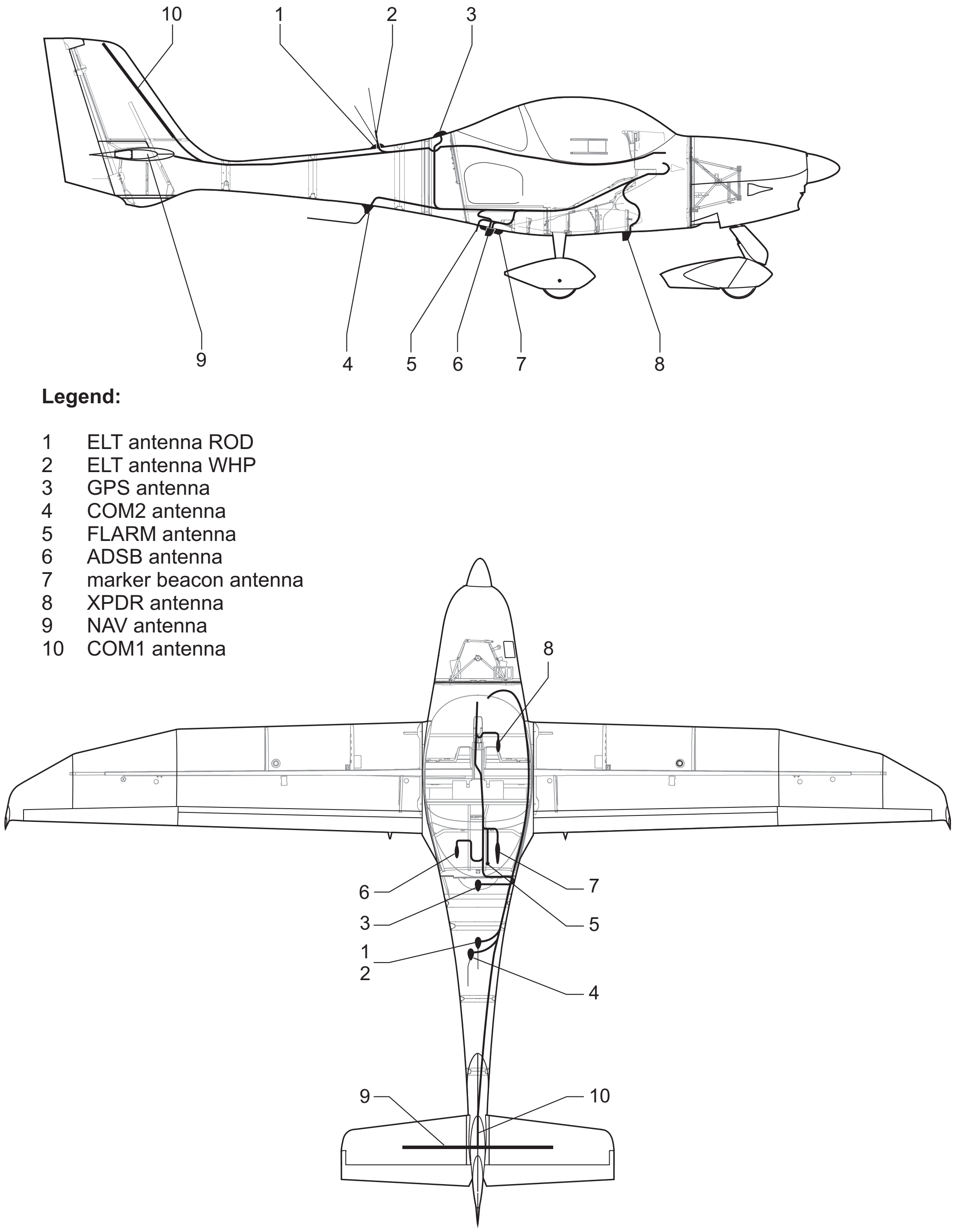


Engine Monitoring System
Figure21 (2)

4. Wire Routing Diagrams

A. The wire routing diagrams listed below define the wiring of the basic electrical equipment.

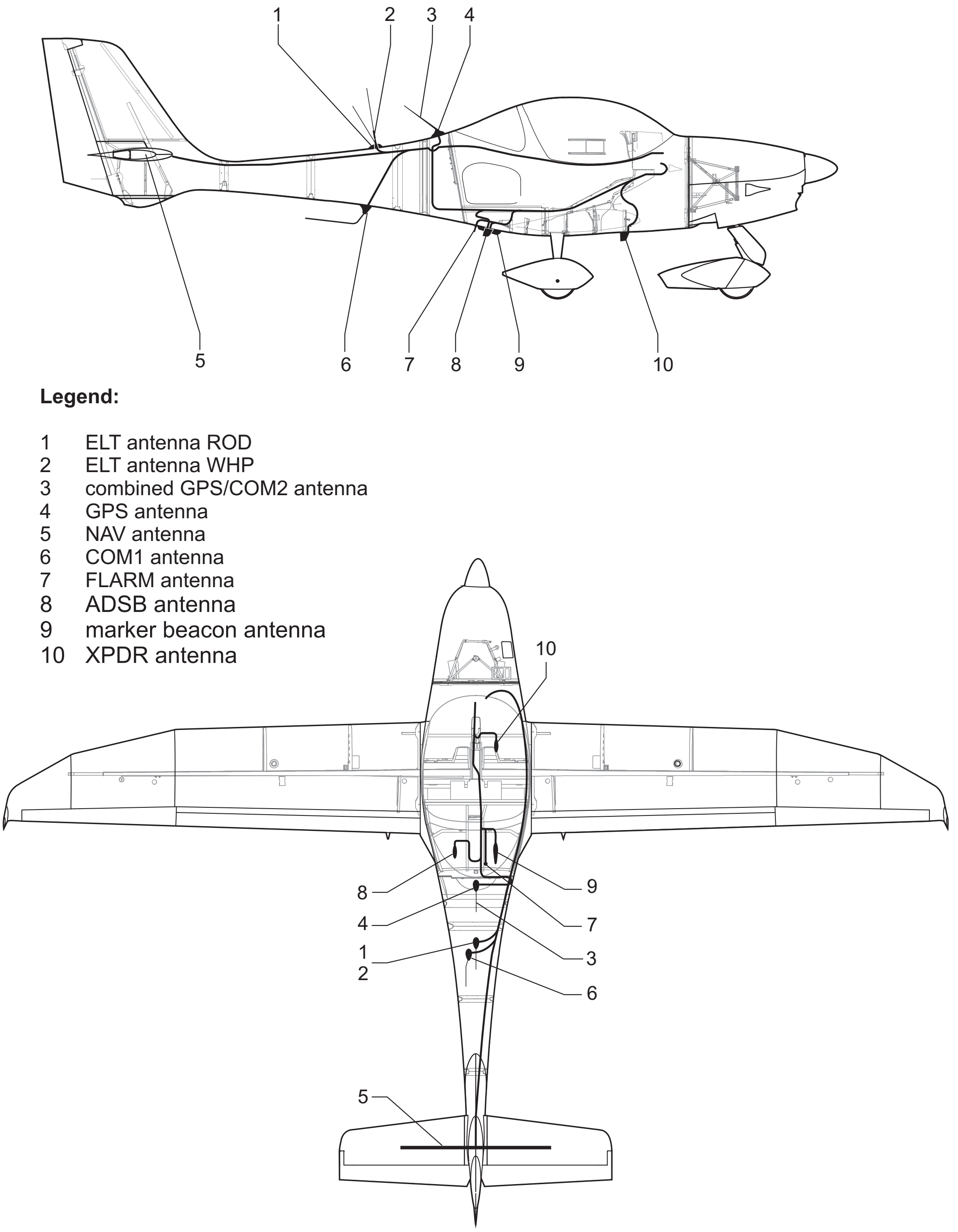
No.	Wire routing diagram	Ref. Fig.	Effectivity
(1)	Antennas	Fig. 1	300 - 306
(2)	Antennas	Fig. 1	307 - 311
(3)	Antennas	Fig. 1	312 - 999
(4)	Garmin G500	Fig. 2	
(5)	Wings and Lights	Fig. 3	
(6)	Misc. Equipment	Fig. 4	



Legend:

1	ELT antenna ROD
2	ELT antenna WHP
3	GPS antenna
4	COM2 antenna
5	FLARM antenna
6	ADSB antenna
7	marker beacon antenna
8	XPDR antenna
9	NAV antenna
10	COM1 antenna

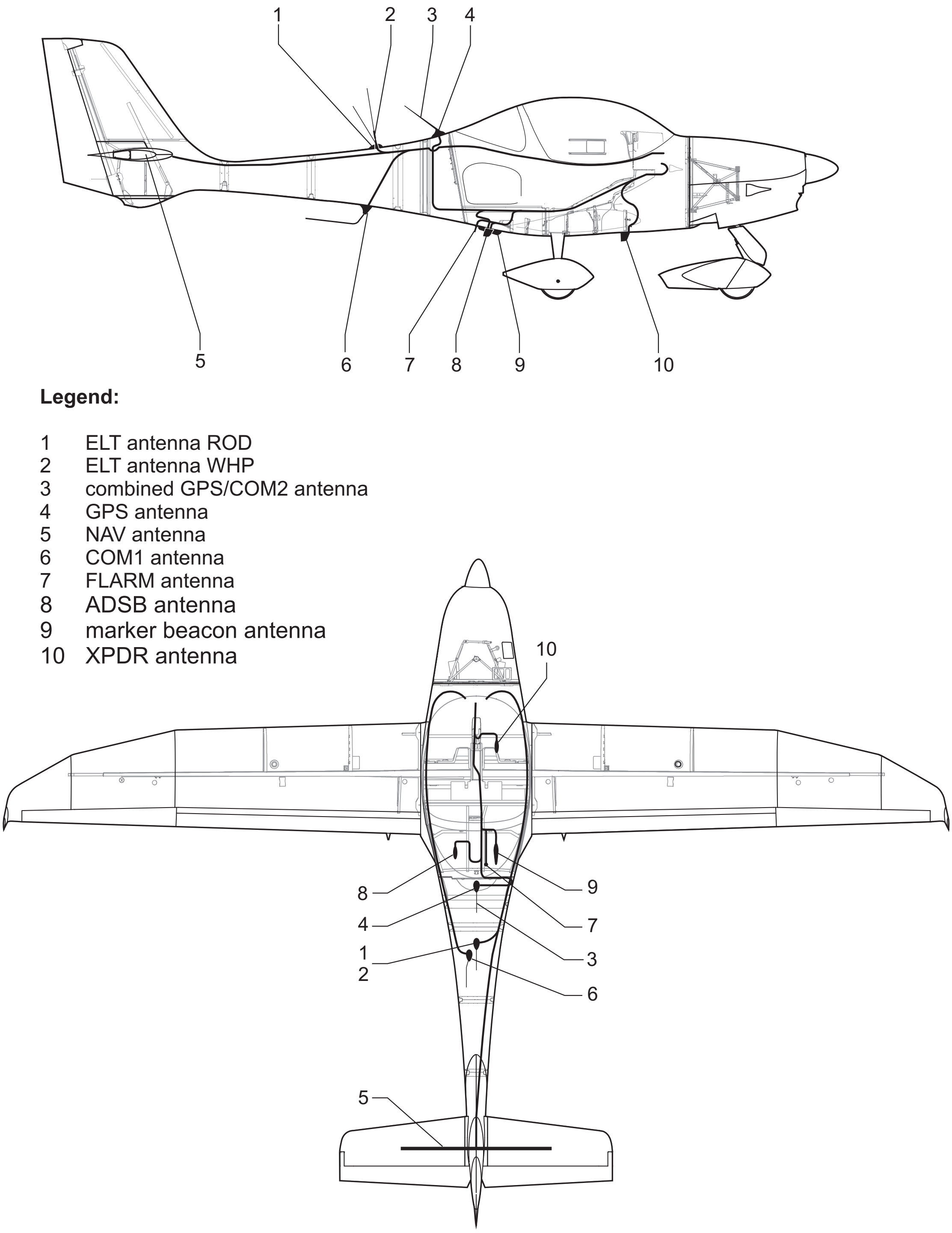
Antennas - Wire Routing
Figure 1



Legend:

1 ELT antenna ROD
2 ELT antenna WHP
3 combined GPS/COM2 antenna
4 GPS antenna
5 NAV antenna
6 COM1 antenna
7 FLARM antenna
8 ADSB antenna
9 marker beacon antenna
10 XPDR antenna

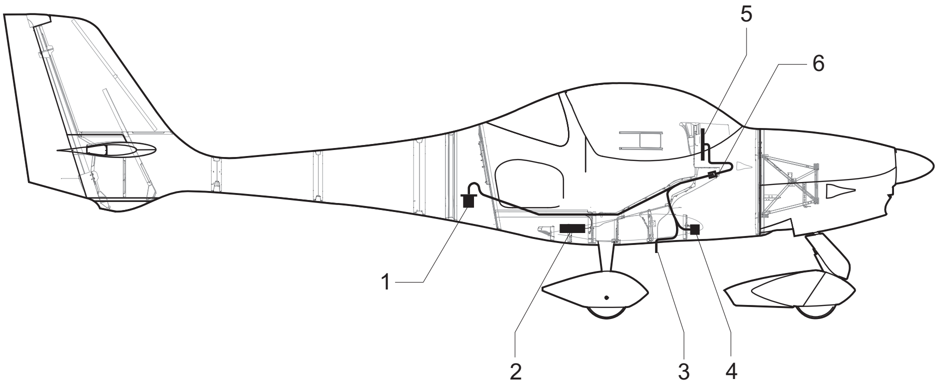
Antennas - Wire Routing
Figure 1



Legend:

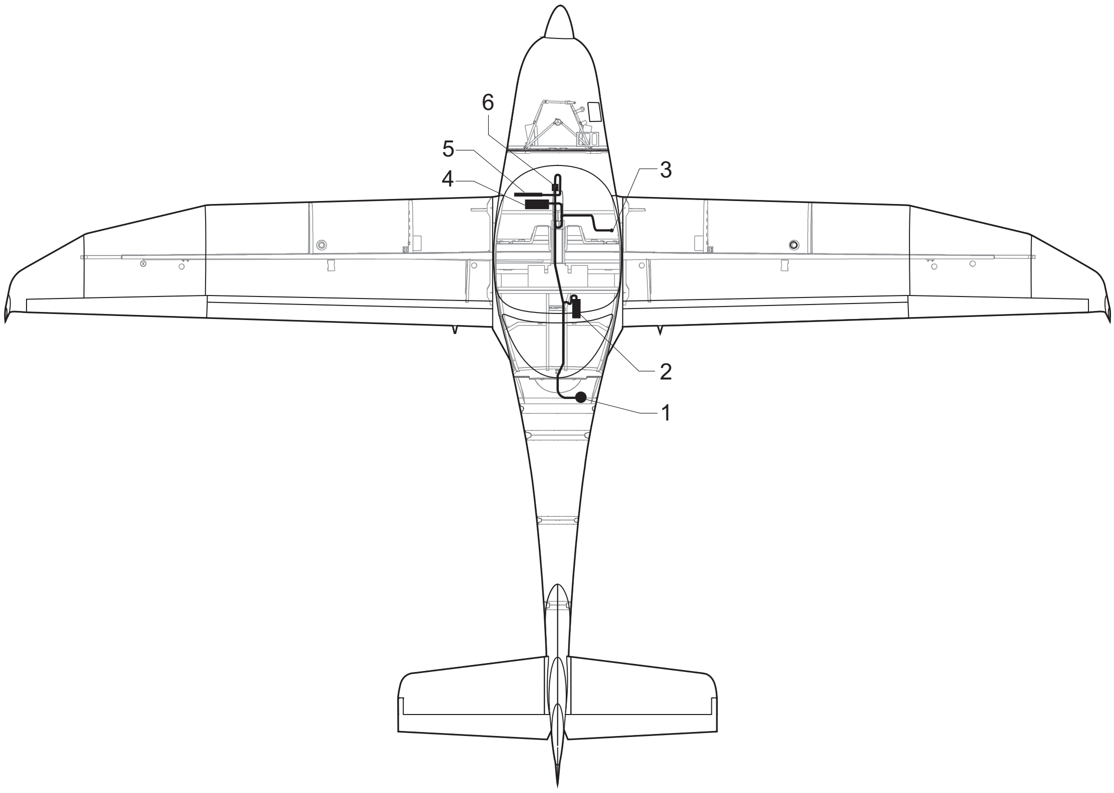
1	ELT antenna ROD
2	ELT antenna WHP
3	combined GPS/COM2 antenna
4	GPS antenna
5	NAV antenna
6	COM1 antenna
7	FLARM antenna
8	ADSB antenna
9	marker beacon antenna
10	XPDR antenna

Antennas - Wire Routing
Figure 1

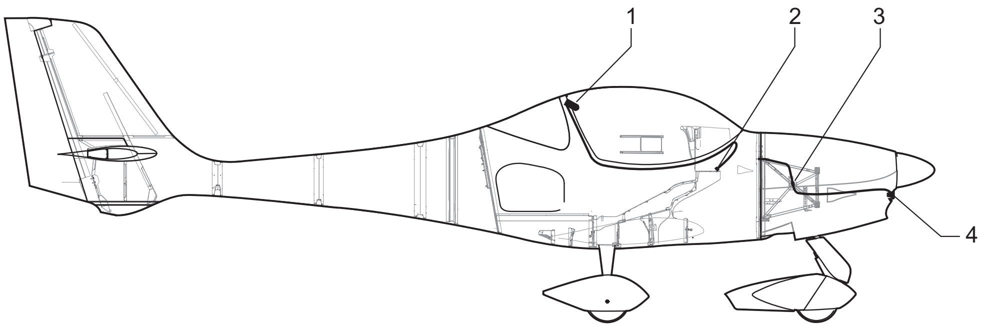


Legend:

1	GMU 44
2	GRS 77
3	GTP 59
4	GDC 741
5	GDU 620
6	fuselage connector G500

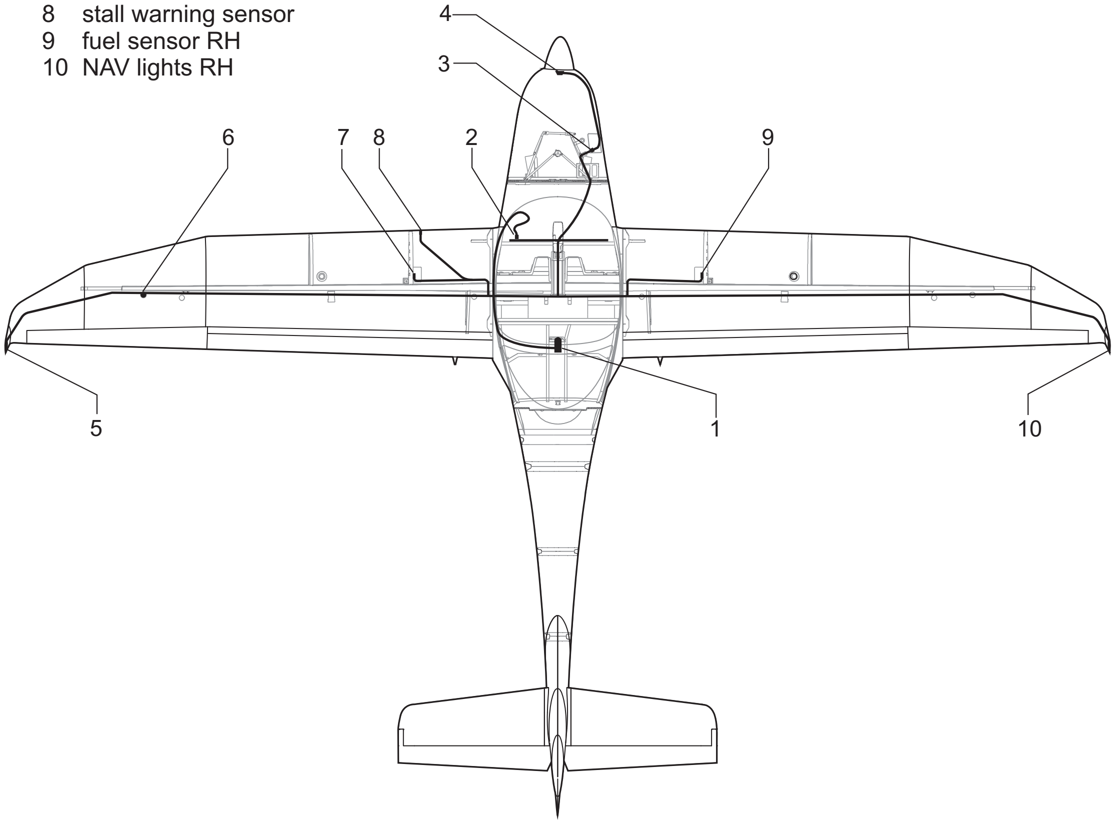


Garmin G500 - Wire Routing
Figure 2

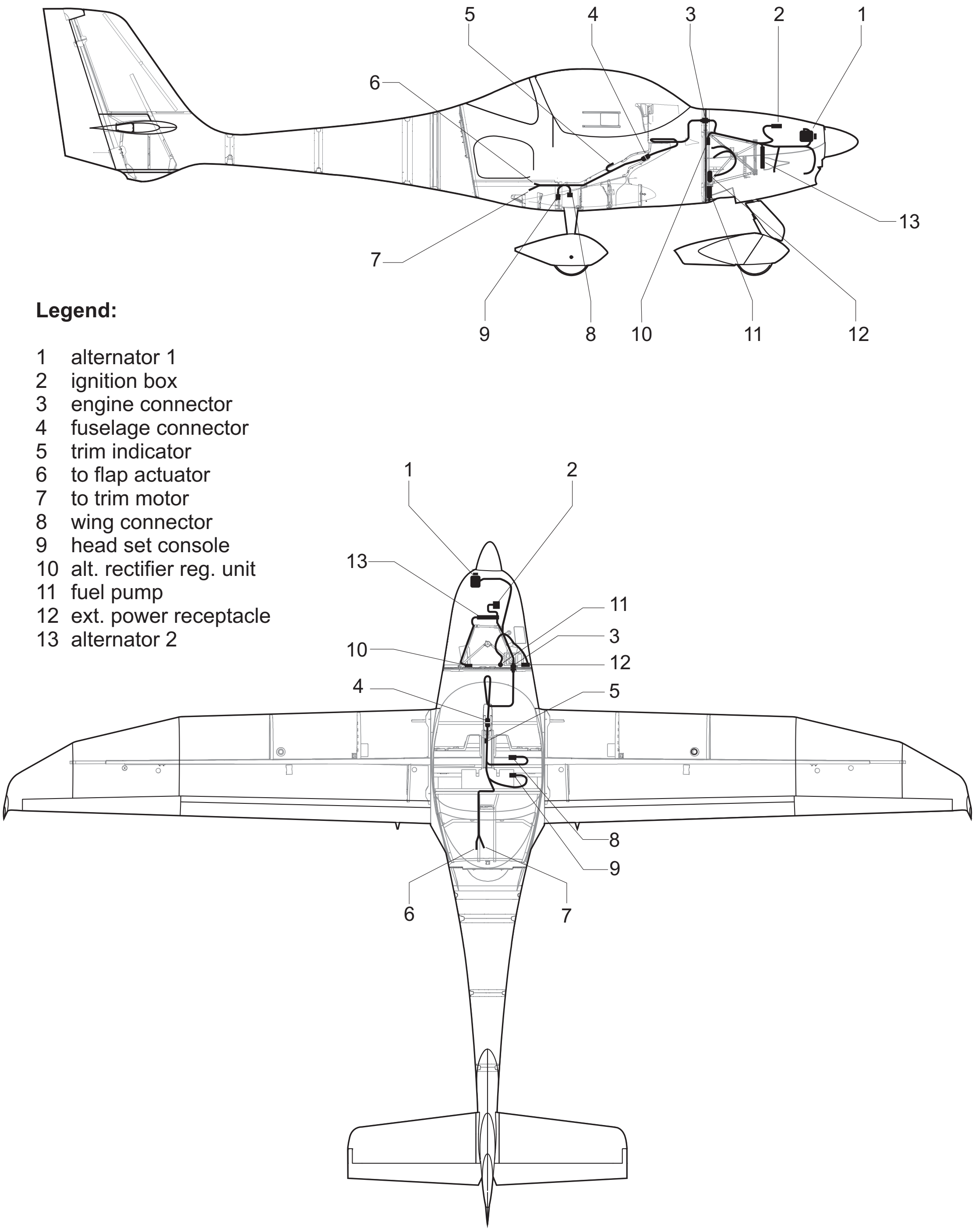


Legend:

1	dome light
2	connector, dome light
3	connector landing light
4	landing light
5	NAV lights LH
6	Pitot heat
7	fuel sensor LH
8	stall warning sensor
9	fuel sensor RH
10	NAV lights RH



Wings and Lights - Wire Routing
Figure 3



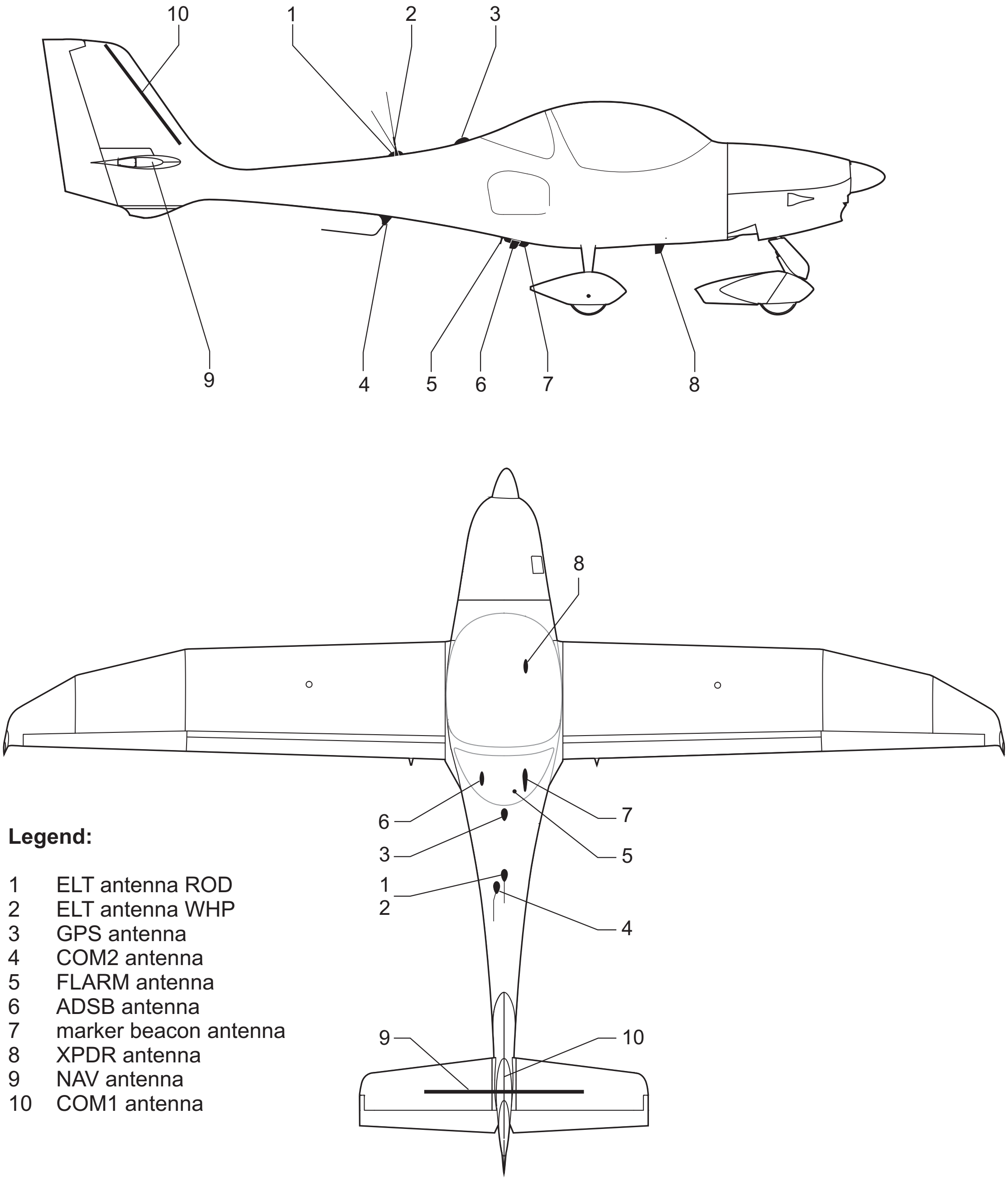
Legend:

1	alternator 1
2	ignition box
3	engine connector
4	fuselage connector
5	trim indicator
6	to flap actuator
7	to trim motor
8	wing connector
9	head set console
10	alt. rectifier reg. unit
11	fuel pump
12	ext. power receptacle
13	alternator 2

Misc. Equipment - Wire Routing
Figure 4

5. Antenna Overview

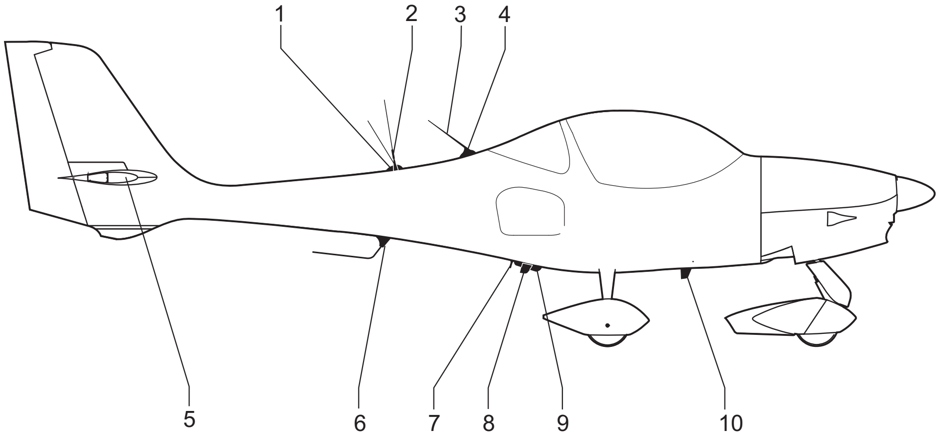
A. The diagram below defines the position of the various antennas.

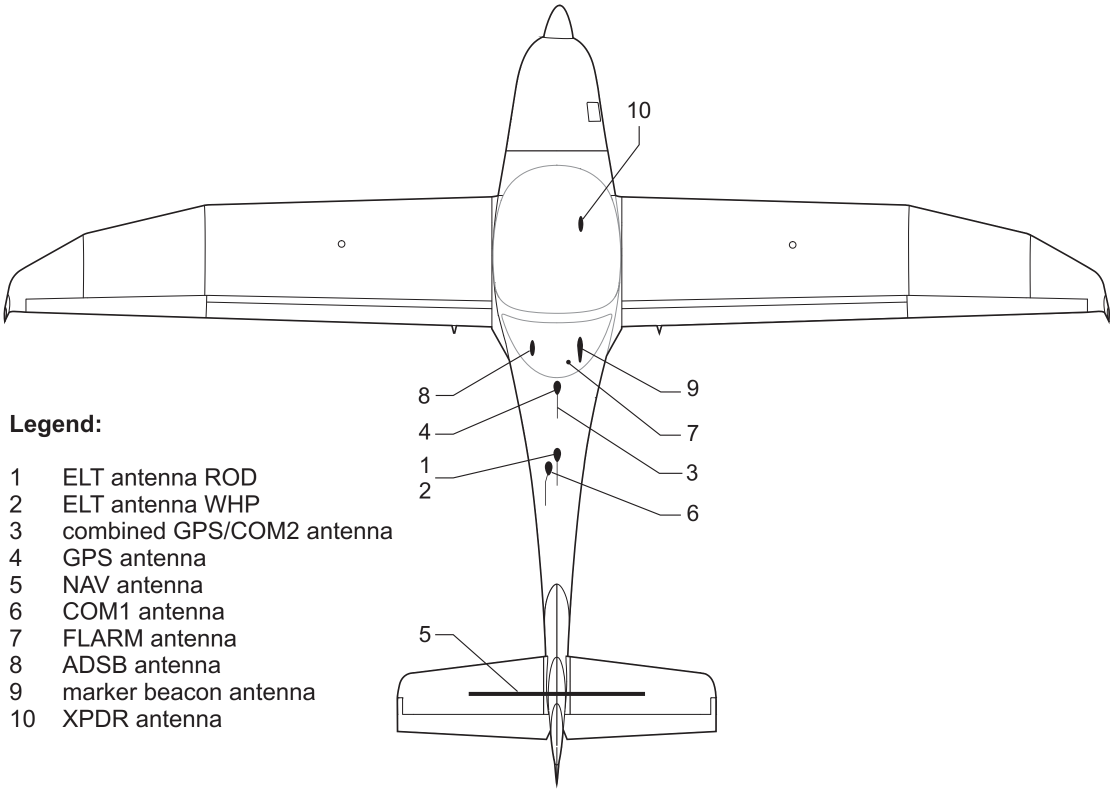


Legend:

1	ELT antenna ROD
2	ELT antenna WHP
3	GPS antenna
4	COM2 antenna
5	FLARM antenna
6	ADSB antenna
7	marker beacon antenna
8	XPDR antenna
9	NAV antenna
10	COM1 antenna

Antenna Overview
Figure 1





Legend:

1	ELT antenna ROD
2	ELT antenna WHP
3	combined GPS/COM2 antenna
4	GPS antenna
5	NAV antenna
6	COM1 antenna
7	FLARM antenna
8	ADSB antenna
9	marker beacon antenna
10	XPDR antenna

Antenna Overview
Figure 1

EFFECTIVITY

307 - 999