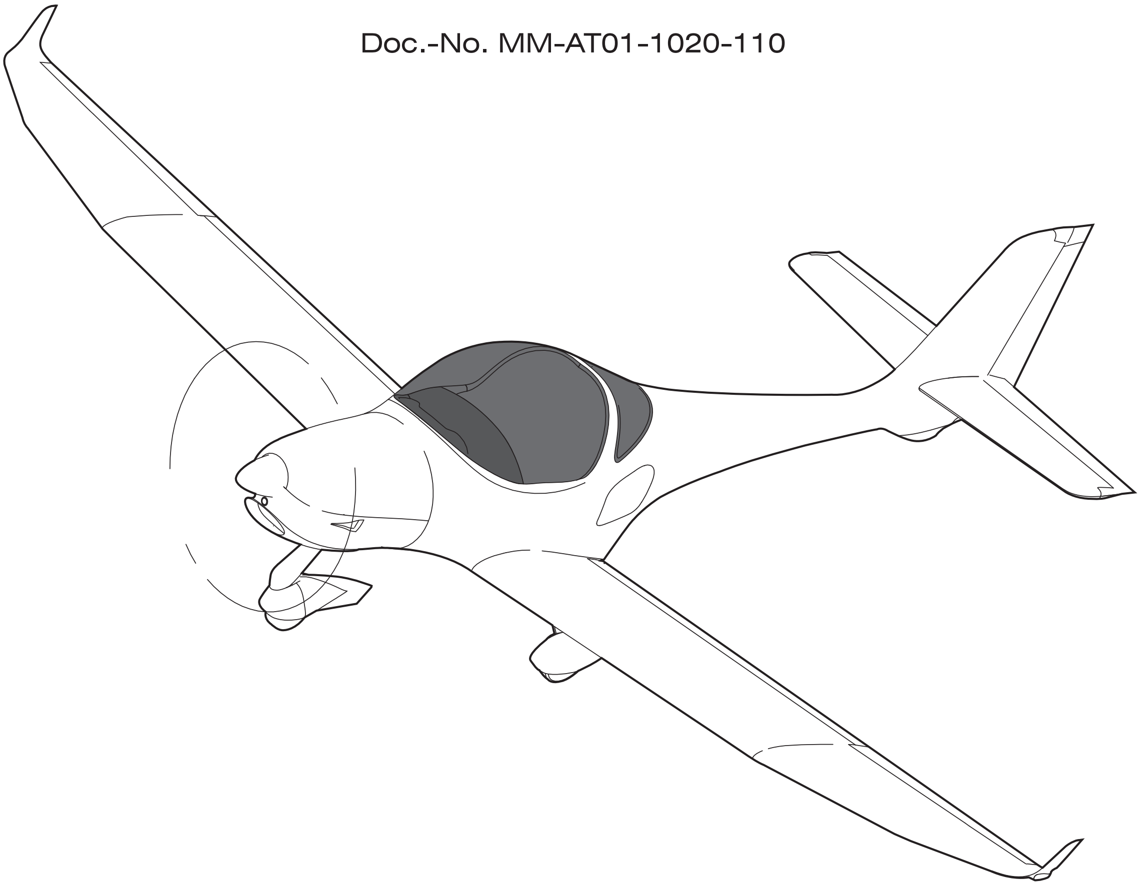
MAINTENANCE MANUAL

AQUILA AT01-100 (A211)
AQUILA AT01-200 (A212)
AQUILA AT01-300 (A211i)

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



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1) Depending on effectivity.

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[1)] Depending on effectivity.

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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						
A.13	31.05.24						

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.13	31.05.24	New model AT01-300
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 AT01-300A Airplane Flight Manual	FM-AT01-1010-107	AQUILA Aviation International GmbH
4.	AQUILA AT01-100/200/300 Illustrated Parts Catalog	PC-AT01-1030-110	AQUILA Aviation International GmbH
5.	Maintenance Manual (Line) for ROTAX 912 Series	MML-912 899196	BRP-Powertrain GmbH & Co KG
6.	Maintenance Manual (Line) for ROTAX 914 Series	MML-914 899608	BRP-Powertrain GmbH & Co KG
7.	Maintenance Manual (Line) for ROTAX 912 i Series	MML-912 i 898743	BRP-Powertrain GmbH & Co KG
8.	Maintenance Manual (Heavy) for ROTAX 912 and 914 Series	MMH-912 / MMH-914 899603	BRP-Powertrain GmbH & Co KG
9.	Maintenance Manual (Heavy) for ROTAX 912 i Series	MMH-912 i 898751	BRP-Powertrain GmbH & Co KG
10.	Operator's Manual for ROTAX 912 Series	OM-912 899700	BRP-Powertrain GmbH & Co KG

Table 1 - List of Technical Publications (Cont.)

No.	Title	Manual No. / Part No.	Supplier
11.	Operator's Manual for ROTAX 914 Series	OM-914 899706	BRP-Powertrain GmbH & Co KG
12.	Operator's Manual for ROTAX 912 i Series	OM-912 i 898741	BRP-Powertrain GmbH & Co KG
13.	Illustrated Parts Catalog for ROTAX 912 and 914 Series	IPC-912 / IPC-914 899473	BRP-Powertrain GmbH & Co KG
14.	Illustrated Parts Catalog for ROTAX 912 i Series	IPC-912 i 899477	BRP-Powertrain GmbH & Co KG
15.	Hydraulically Controlled Variable Pitch Prop. Operation & Installation Manual	E-124	MT-Propeller Entwicklung GmbH
16.	Operation & Installation Manual Hydraulic Constant Speed Governor P-8()()-()	E-1048	MT-Propeller Entwicklung GmbH
17.	Beringer Products - Maintenance Guide Beringer Brake - Servicing Manual Beringer Wheels - Servicing Manual	SM-00 SM-01 SM-02	Beringer Aero
18.	Cleveland Wheels and Brakes Maintenance Manual	AWBCMM0001	Parker Hannifin Corp.
19.	Garmin G500 PFD/MFD System AML STC Installation Manual Instructions for Continued Airworthiness	 190-01102-06 190-01102-00	Garmin International Inc.
20.	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.
21.	EFD1000 and EFD500 Installation Manual Instructions for Continued Airworthiness	 900-00003-001 900-00012-001	Aspen Avionics Inc.
22.	Garmin GMA 340 Audio Panel Installation Manual Pilot's Guide	 190-00149-01 190-00149-10	Garmin International Inc.
23.	Garmin GMA 350/350H Installation Manual Pilot's Guide	 190-01134-11 190-01134-12	Garmin International Inc.
24.	Garmin GTX 328 Transponder Installation Manual	190-00420-04	Garmin International Inc.
25.	Garmin GTX 330 Transponder Installation Manual	190-00207-02	Garmin International Inc.
26.	Garmin 400W Series Installation Manual	190-00356-02	Garmin International Inc.

Table 1 - List of Technical Publications (Cont.)

No.	Title	Manual No. / Part No.	Supplier
27.	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.
28.	Flymap L Installation Manual	500-301	Stauff Systec GmbH
29.	Model SL30 NAV/COMM Installation Manual Pilot’s Guide	 560-0404-03 560-0403-01	Garmin AT Inc.
30.	Model SL40 VHF COMM Installation Manual Pilot’s Guide	 560-0956-03 560-0954-02	Garmin AT Inc.
31.	Kannad 406 AF Compact Installation Manual / Operation Manual	DOC 08038 Ref. 0145599	Kannad Aviation Enquiries Orolia SAS
32.	Kannad AF Integra Operation Manual	DOC 09078 Ref. 0146257	Kannad Aviation Enquiries Orolia SAS
33.	VT-01 Transponder Installation Manual	01.0200.11E	Garrecht Avionik GmbH
34.	VT-02 Transponder Installation Manual	02.0200.11E	Garrecht Avionik GmbH
35.	Glass Panel Engine Monitor MVP-50P-AQ Operating Instructions Component Replacement Considerations	 OI 06031301 06201301	Electronics International Inc.
36.	Acceptable Methods, Techniques and Practices - Aircraft Inspection and Repair	AC 43.13-1B	Federal Aviation Administration (FAA)
37.	Garmin GTR 225 / GNC 255 TSO Installation Manual	190-01182-02	Garmin International Inc.
38.	Garmin GTR 225/225A/225B Pilot’s Guide	190-01182-00	Garmin International Inc.
39.	Garmin GNC 255A/255B Pilot’s Guide	190-01182-01	Garmin International Inc.
40.	Restraint Systems Model 1-10-() Component Maintenance Manual	CMM 25-22-13	Schroth Safety Products GmbH
41.	Garmin G5 Pilot's Guide Part 23 AML STC Maintenance Manual	 190-01112-12 190-01112-11	Garmin International Inc.
42.	Garmin G3X Touch Pilot's Guide Part 23 AML STC Maintenance Manual	 190-02472-00 190-02472-02	Garmin International Inc.
43.	Bendix King KI 300 Electronic Attitude Indicator Installation Manual	89000004-101	Bendix King Honeywell International Inc.

Table 1 - List of Technical Publications (Cont.)

No.	Title	Manual No. / Part No.	Supplier
44.	Andromeda Aurora Installation Manual		Aveo Engineering
45.	Ultra Galactica Installation Manual	AVE-WPST-54G-IM	Aveo Engineering
46.	Parmetheus PAR-36 Plus LED Landing Light STC Manual	14793	Whelen Engineering Company
47.	Garmin GFC500 Autopilot Part 23 AML STC Maintenance Manual	190-02291-01	Garmin International Inc.
48.	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)

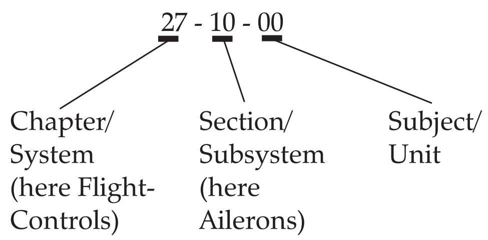
The second element identifis a subsystem in the system:

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:

Page 301 —— First page with service instructions

12 - 17 - 00

15.11.04 —— Publication date

Servicing Battery

(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:

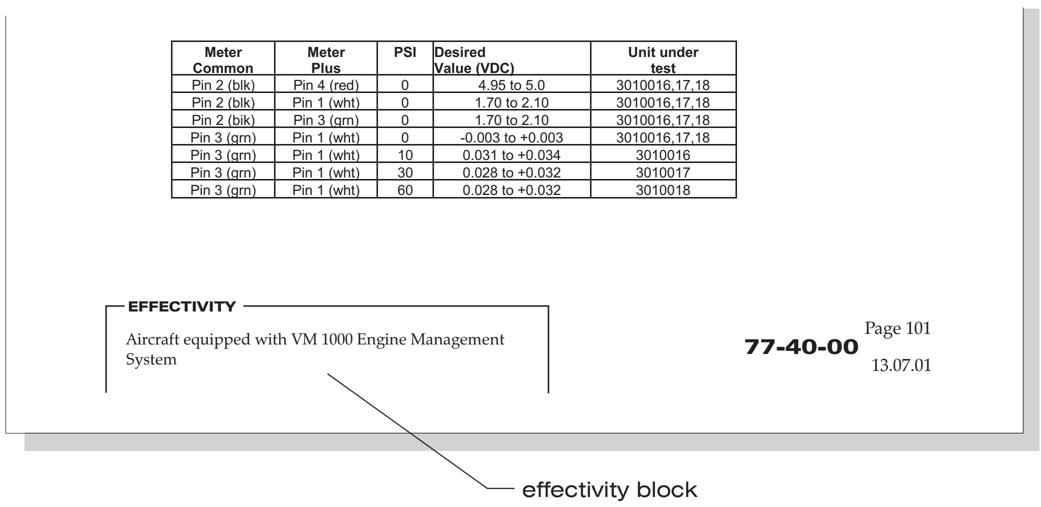
Title
Table of Contents

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. Using the Maintenance Manual

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 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.

<u>WARNING:</u>

Hazard for maintenance personnel!

<u>CAUTION:</u>

Hazard for systems and equipment!

<u>NOTE:</u>

Specific information

E. Abbreviations

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

LIST OF EFFECTIVE CHAPTERS

LIST OF EFFECTIVE CHAPTERS

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

The technical content of this document (revision A.13) is approved under the authority of the DOA ref. EASA.21J.025.

31.05.2024

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
A.05	31.05.24	New model AT01-300	EASA Major Change Approval 10084831

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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 100h	Interval other	Initials
1.	Battery BAT 2 - Replace additional alternator 2 battery (BAT 2).			annual[1)]	

[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 AT01-200/300 (incl. vertical stabilizer and rudder)
AT01-2130-001	Upper cowling AT01-100
AT01-2130-017	Upper cowling AT01-200
AT01-2130-023	Upper cowling AT01-300
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 - Time limits / Maintenance Checks - General. This section provides a general overview of the content and purpose of this chapter.

   B. Section 05-10 - 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 - 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 - 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 - 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[1,2)]	6000 h	no
24	Starter relais	2000 h	no
24	Battery Odyssey PC950[2,3)]	5 years	no
24	Battery BAT 2[2)]	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[1,2)]	3000 h or 10 years	no
28	Flexible rubber hoses of the fuel pump assembly[2,3)]	5 years	no
28	Fuel system check valves[2,3)]	2000 h or 15 years	no
32	Nose landing gear spring package rubber elements	5 years	no
32	Main landing gear struts	no	6000h

1) AT01-100 only
2) AT01-200 only
3) AT01-300 only

Chapter	Component / Part	Replacement Time	Overhaul
32	Flexible teflon hoses of the brake system[4)]	2000 h or 15 years	no
32	Flexible rubber hoses of the brake system[5)]	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[11)]	2000 h or 15 years	no
71	Flexible hoses of the cooling system[11)]	5 years	no
71	Flexible silicone hoses of the air intake system[2)]	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[2)]	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[4)]	3000 h or 5 years	no
34	WINTER instruments	no	Note 5

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

Chapter	Component / Part	Replacement Time	Overhaul
34	ASPEN internal battery	2200 h or 4 years	no
61	Propeller MTV-21-A/170-05[1)] MTV-21-A/175-05[2,3)]	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 912 S[1)]	no	2000 h or 15 years Note 3
71	Engine ROTAX 914 F[2)] (incl. TCU, wiring harness, wastegate motor)	no	2000 h or 15 years Note 3
71	Engine ROTAX 912 iS[3)] (incl. ECU, wiring harness, fuse box)	no	2000 h or 15 years Note 3
71	ROTAX 912 S mechanical MAIN fuel pump[1)]	5 years Note 3	no
71	ROTAX 914 F electrical MAIN fuel pump[2)]	1000 h or 5 years	no
71	ROTAX 912 iS electrical fuel pumps[3)]	2000 h or 15 years	no
71	ROTAX flexible teflon / silicone hoses	with engine overhaul Note 3	no
71	ROTAX rubber parts of the engine (V-belt, hoses[15)], carburetor parts[1,2)], fuel pressure regulator[3)])	5 years Note 3	no
71	Spark plugs	400 h 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.

1) AT01-100 only
2) AT01-200 only
3) AT01-300 only
15) Time limit does not apply to silicone hoses

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

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, SI-912 i-001 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.

      NOTE: In order to demonstrate continued airworthiness, engines must be inspected after every 100 hours of operation or 12 months. If the aircraft has less than 100 hours of operation during one year a 100 hour check must be carried out. For the annual inspection a tolerance of ±2 months is given.

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, Type 912 i 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.

<u>NOTES:</u>

MML*	Maintenance Manual Line for ROTAX Engine Type 912/912i/914 Series
MMH*	Maintenance Manual Heavy for ROTAX Engine Type 912/912i/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	Reference	Interval 100h	other	Initials
1.	Check that the following documents are up-to-date and available upon request: - AT01-100/200/300 Maintenance Manual - AT01-100/200/300 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	AT01-100/200/300 Maintenance Manual, AT01-100/200/300 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		
6.	Engine and engine compartment - General visual inspection for damage or abnormalities. Clean for leakage check.	MML* 12-20-00	X		
7.	Airframe, power plant, propeller - Do a walk around to detect damages, fluid leaks or other abnormalities.		X		
8.	Fuselage and empennage - Clean.		X		
9.	Aircraft interior - Clean and vacuum.		X		
10.	Record all malfunctions and abnormalities.		X		
11.	TCU protocol - Read out TCU via Rotax communication program. Check alarm records. TCU S/N:______________Hours of Operation:____________	76-00 MMH* 76-00-00	X2)		
12.	ECU protocol - Read out ECU via Rotax communication program. Download ECU fault memory (fault and data logs). ECU S/N:______________Hours of Operation:____________	76-00 MMH* 76-10-00	X3)		

2) AT01-200 only
3) AT01-300 only

No.	Engine Ground Test Rotax 912S	Reference	Interval 100h	other	Initials
1.	Perform an engine test run as follows. (RPM in this point are specified as propeller RPM)	MML* 12-20-00	X		
	Start engine and warm-up at 800 RPM for approx. 2 minutes, continue at 1050 RPM until oil temperature reaches 50° C.	Airplane Flight Manual			
	Rudder pedal brakes and parking brake - Check for proper operation.	32-40			
	Magneto RPM drop - Set 1700 RPM. Check that RPM drop is less than 120 RPM while operating on one magneto and no more than a 50 RPM drop difference between left and right magnetos.				
	RPM drop left magneto :_______RPM RPM drop right magneto:_______RPM				
	Propeller governor - Set 1700 RPM and monitor manifold pressure. Reduce engine speed by moving the propeller control from START to CRUISE. Repeat three times. RPM should drop by 200±15 RPM and manifold pressure should rise.	MT*			
	RPM drop: _______RPM / Man. press. rise :_______in. Hg				
	Carburetor heat - Pull knob at 1700 RPM. Propeller RPM should show a drop of at least 20 RPM.				
	RPM drop:_______RPM				
	Engine full power - Advance throttle/propeller to full forward. Tachometer should read 2350±15 RPM.				
	Full power RPM:_______RPM				
	Cool down engine below 1000 RPM.				
	Engine instruments - Check engine parameters.				
	Engine idle - Move throttle control lever to full aft. Tachometer should read 750±50 RPM.				
	Idle RPM:_______RPM				
	Shut down engine, set the ignition switch and ALT1/BAT switch to the OFF position. Remove ignition key from aircraft.				

EFFECTIVITY

Aircraft equipped with Rotax 912S engine

No.	Engine Ground Test Rotax 912iS	Reference	Interval 100h	 other	Initials
1.	Perform an engine test run as follows. (RPM in this point are specified as engine RPM)	MML* 12-20-00	X		
	Fuel system restricting orifice - Check orifice is not blocked. Deactivate MAIN fuel pump by pulling circuit breaker. Time for fuel pressure to drop from 3±0,2 bar below 0,2 bar should be less than 10 seconds.	28-20			
	Start engine and warm-up at 2000 RPM for approx. 2 minutes, continue at 2500 RPM until oil temperature reaches 50° C.	Airplane Flight Manual			
	Rudder pedal brakes and parking brake - Check for proper operation.	32-40			
	Fuel pumps - Check fuel pressure with MAIN / AUX / both fuel pumps running for at least 5 seconds each.	28-20			
	Alternator check - Set 2500 RPM. Alternator ALT2 check - Switch ALT1 OFF. Ammeter ALT2 should show more than 3A. Alternator ALT1 check - Switch ALT1 ON again. Ammeter ALT1 should show more than 3A. Ammeter ALT2 should show 0A				
	Lane and ignition check - Set 4100 RPM. Check that RPM drop / increase is less than 250 RPM while operating on one lane.				
	RPM drop/increase Lane A: _______RPM RPM drop/increase Lane B: _______RPM				
	Propeller governor - Set 4100 RPM and monitor manifold pressure. Reduce engine speed by moving the propeller control from START to CRUISE. Repeat three times. RPM should drop by 500±120 RPM and manifold pressure should rise.	MT*			
	RPM drop: _______RPM / Man. press. rise :_______in. Hg				
	Engine full power - Advance throttle/propeller to full forward. Tachometer should read 5460±40 RPM.				
	Full power RPM:_______RPM				
	Cool down engine at 2500 RPM.				
	Engine instruments - Check engine parameters.				
	Engine idle - Move throttle control lever to full aft. Tachometer should read 1800±100 RPM.				
	Idle RPM:_______RPM				
	Shut down engine, set the LANE A, LANE B and ALT1/BAT switch to the OFF position. Remove ignition key from aircraft.				

No.	Engine Ground Test Rotax 914F	Reference	Interval 100h	other	Initials
1.	Perform an engine test run as follows. (RPM in this point are specified as propeller RPM) **Fuel pumps** - Check fuel pressure with MAIN / AUX / both fuel pumps running for at least 5 seconds each. **Start engine and warm-up** at 800 RPM for approx. 2 minutes, continue at 1050 RPM until oil temperature reaches 50° C. **Rudder pedal brakes and parking brake** - Check for proper operation. **Alternator check** - Set 2500 RPM. Alternator ALT2 check - Switch ALT1 OFF. Ammeter ALT2 should show more than 5A. Battery BAT2 check - Switch ALT1/BAT OFF. Voltmeter should be stable at 13,0 - 13,9V. Alternator ALT1 check - Switch ALT1/BAT ON again. Ammeter ALT1 should show more than 5A. Ammeter ALT2 should show 0A. **Magneto RPM drop** - Set 1700 RPM. Check that RPM drop is less than 210 RPM while operating on one magneto and no more than a 65 RPM drop difference between left and right magnetos. RPM drop left magneto :_______RPM RPM drop right magneto:_______RPM **Propeller governor** - Set 1700 RPM and monitor manifold pressure. Reduce engine speed by moving the propeller control from START to CRUISE. Repeat three times. RPM should drop by 200±15 RPM and manifold pressure should rise. RPM drop: _______RPM / Man. press. rise :_______in. Hg **Carburetor heat** - Pull knob at 1700 RPM. Carburetor temperature should show a rise of at least 2 °C. Temperature rise:_______°C **Engine full power** - Advance throttle/propeller to full forward. Tachometer should read 2350±15 RPM. Full power RPM:_______RPM **Cool down** engine below 1000 RPM (at least 2 min). **Engine instruments** - Check engine parameters. **Engine idle** - Move throttle control lever to full aft. Tachometer should read 750±50 RPM. Idle RPM:_______RPM **Shut down engine**, set the ignition switch and ALT1/BAT switch to the OFF position. Remove ignition key from aircraft.	MML* 12-20-00 28-20 Airplane Flight Manual 32-40 SI-914-034 MT*	X		

EFFECTIVITY

Aircraft equipped with Rotax 914F engine

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 MML* 12-20-00	X	50 h7)	
3.	Oil tank - Check oil tank and clean if contaminated.	MML* 12-20-00	X	50 h7)	
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 MML* 12-20-00	X	50 h7)	
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.	MML* 12-20-00 SI-914-039 SB-AT01-043 MMH* 78-00-00 MMH* 79-00-00	X2)	50 h2,7)	
6.	Visual inspection of the magnetic plug for accumulation of chips	MML* 12-20-00	X		
7.	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, SI-912 i-001 respectively SI-914-019. Refilled:_____________Quantity:_______L <u>CAUTION:</u> 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 MML* 12-10-00 MML* 12-20-00 SI-912-010 SI-912 i-005 SI-914-011 SB-912-040 SB-914-026	X	50 h7)	
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: _____ _____ _____ _____	MML* 12-20-00	X7)	200 h	

2) AT01-200 only
7) If more than 30% of operation hours have been flown with leaded fuel e.g.: AVGAS 100LL

No.	Engine (Cont.)	Reference	Interval 100h	other	Initials
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.	MML* 12-20-00 SB-912-029 SB-914-018	X		
10.	Leakage bore at the base of the water pump - Check for signs of leakage.	MML* 12-20-00	X		
11.	Cooling system - Renew coolant. Flush the cooling system.	12-14 MML* 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 MML* 12-20-00	X		
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 MML* 12-10-00 MML* 12-20-00 SB-912-043 SB-914-029	X		
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 MML* 12-10-00 MML* 12-20-00	X		
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 79-20	X		
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.	MML* 12-20-00	X		
17.	Oil tank vent line - Check for proper routing, for obstructions and clear passage		X		
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.	MML* 12-20-00	X		
19.	Bypass check valves - Inspect check valves in fuel selector and fuel fine filter bypass lines. Check for damage and correct installation (arrow on valve shows correct flow direction).	28-00	X 3)		
20.	Fuel selector / shut-off valve - Check for security of attachment. Check that the valve engages noticeable into the positions LEFT, RIGHT and OFF.		X		

3) AT01-300 only

No.	Engine (Cont.)	Reference	Interval 100h	other	Initials
21.	Fuel filter - Inspect and clean fuel filter inside AUX fuel pump[1)] / gascolator[2,3)].	28-20	X		
22.	Fuel fine filter[3)] - Replace fine filter.	28-20	X[3,16)]	200 h[3)] 2 years[3)]	
23.	Electric fuel pumps - Check the electric fuel pumps.	28-20		1000 h[2,3)]	
24.	Electric fuel pumps - Replace MAIN fuel pump.	28-20		1000 h[2)] 5 years[2)]	
25.	Battery - Clean. Check charge. Measure residual capacity. Capacity (C10) must be at least 19,2 Ah [1,8)] / 25,6 Ah [2,3)]. If necessary, charge/replace battery.	12-17 24-30	X		
26.	Battery BAT 2 - Replace additional alternator 2 battery (BAT 2).	SI-AT01-018		annual[2)]	
27.	Battery BAT 2 - Check fuses of rectifier-regulator installation.	24-20	X[2)]		
28.	Battery tray, terminals and cables - Check for security, corrosion and general condition. Grease battery terminals.	12-22	X		
29.	Starter - Check security of attachment and electrical connections.		X		
30.	Starter relay - Check that there is no electric contact between starter relay housing and airframe ground[3)].	80-10	X[3)]		
31.	External alternator - Check attachment and V-belt tension. Inspect electrical connections.	MML* 12-20-00	X		
32.	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.	MML* 12-20-00 SI-912-027 SI-914-028	X		
33.	Spark plug connectors - Check that resistance spark plug connectors fit tightly on the spark plugs. Minimum pull-off force is 30 N (7 lb).	MML* 12-20-00 SI-912-027 SI-914-028		200 h	
34.	Spark plugs - Replace spark plugs.			200 h[7)] 400 h	
35.	Wiring harness - Inspect the wiring and its connections for secure fit, damage and signs of wear.	MML* 12-20-00	X		
36.	Engine management system[3)] - Check ECU, fuse box and its mountings. Inspect wiring for wear, chafing and other damage and make sure that the connectors are securely attached. Visual inspection of the fuses.	MML* 12-20-00	X[3)]		
37.	Sensors - Check for tight fit, condition and security of attachment.		X		

1) AT01-100 only
2) AT01-200 only
3) AT01-300 only
7) If more than 30% of operation hours have been flown with leaded fuel e.g.: AVGAS 100LL
8) N/VFR equipped aircraft only
16) First 100h since engine replacement / overhaul or fuel system work only.

No.	Engine (Cont.)	Reference	Interval 100h	Interval other	Initials
38.	Exhaust system - Check attachment screws and springs for security and fit. Inspect system for damage and missing parts. Visual inspection of the muffler, turbo charger[2)], exaust pipes and mounting flanges for cracks, corrosion and leakage. Check heat shielding for condition.		X		
39.	Cabin heat - Check heat shroud and heat ducts for damage and security of attachment. Check heat control function.		X		
40.	Exhaust muffler - Remove heat shroud from muffler and inspect muffler for condition, corrosion and leakage. <u>WARNING:</u> FAILURE TO INSPECT MUFFLER FOR LEAKS COULD RESULT IN CARBON MONOXIDE ENTERING THE CABIN, LEADING TO SERIOUS INJURY OR DEATH!	78-10		200 h	
41.	Wastegate flap[2)] - Check the wastegate flap for free running and correct position. Check wastegate Bowden cable for free movement and damage. Lubricate wastegate flap axle.	MML* 12-20-00	X[2)]		
42.	Propeller gear box - Check the friction torque in free rotation. Actual friction torque is measured: _________Nm	MML* 12-20-00	X		
43.	Propeller gear box - Inspect overload clutch.	MML* 12-20-00		600 h[7,13)] 1000 h	
44.	Propeller gear box - Check the propeller gearbox. Check gear set (pittings). Check wear on tooth of overload clutch.	MML* 12-20-00 MMH* 72-00-00		1000 h	
45.	Carburetors - Check carburetor synchronization. Mechanical and pneumatic synchronization.	MML* 12-20-00	X[1,2)]		
46.	Carburetors - Inspect the float chamber assy for contamination and corrosion. Check float weight. <u>CAUTION</u> (Rotax 914 only): High torques on the float chamber attachment screw may damage the float chamber gasket and cause rough engine run.	MML* 12-20-00 SI-912-021 SI-914-023		200 h[1,2)] annual[1,2)]	
47.	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.			200 h[1,2)] annual[1,2)]	
48.	Carburetors - Removal/assembly of the two carburetors for carburetor inspection.	MMH* 73-00-00		200 h[1,2)] annual[1,2)]	
49.	Carburetors - Check the free movement of the carburetor actuation (throttle lever and starting carburetor). Lubricate carburetor throttle shaft.	MML* 12-20-00 12-22	X[1,2)]		
50.	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.	MMH* 73-00-00 SB-912-030 SB-914-019		200 h[1,2)]	

1) AT01-100 only
2) AT01-200 only
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 100h	other	Initials
51.	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. 1)		X 6)		
52.	Throttle control - Check the free movement of the throttle actuation. Check that the Bowden cable(s) allow(s) full travel of the throttle lever from stop to stop. Check Bowden cable(s) for bulging with control lever in the full throttle position. Adjust throttle control if necessary.	76-00	X 1,2)		
53.	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.	MML* 12-20-00	X		
54.	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.		X 2)		
55.	Carburetor heat valve and intercooler cover - Check valve and intercooler cover for correct function and condition.		X 2)		
56.	Alternate air valve - Check valve and actuation for correct function and condition. Adjust control if necessary.		X 3)		
55.	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.		X		
56.	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.	MML* 12-20-00 SB-912-028 SB-914-016 SB-AT01-022	X		
57.	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 liquid levels, replenish as necessary.	05-20 MML* 12-20-00	X)	50 h 7)	

1) AT01-100 only
2) AT01-200 only
3) AT01-300 only
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	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	X		

No.	Fuselage / Cabin	Reference	Interval 100h	other	Initials
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[2,3].	06-30	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	X		
6.	Lubricate canopy lock assembly.	12-22		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	X		
8.	ELT - Perform ELT inspection. Check ELT mount and Velcro strap for security of attachment. Replace strap if necessary.	25-62		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		annual	

2) AT01-200 only
3) AT01-300 only

No.	Fuselage / Cabin (Cont.)	Reference	Interval 100h	other	Initials
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	X[2)]		
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		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		

2) AT01-200 only

No.	Fuselage / Cabin (Cont.)	Reference	Interval 100h	Interval other	Initials
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		annual[12)]	
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		3000 h 5 years	
28.	Wing main bolts - Inspect for proper fit, condition and correct safetying.	57-10	X		
29.	Wing main bolts - Remove for visual inspection and lubrication. Lube type used: ___________________	57-10 12-22		500 h[9)] 5 years[9)] or annual[9)]	
30.	Exterior / interior placards and markings - Check presence, legibility, and security.	11-20 11-30	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 100h	other	Initials
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	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 28-20 28-40		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.			1000 h	
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	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 100h	other	Initials
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		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	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 27-20	X[12)]		

12) if installed

No.	Nose and Main Landing Gear	Reference	Interval 100h	other	Initials
1.	Wheel fairings - Check condition and correct fit. Remove and clean. Check for paint coat damage, cracks, dents and delamination.		X		
2.	Fairing mounts - Inspect for cracks, distortion or other damage.		X		
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.		X		
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	X		
5.	Wheel halves - Disassemble. Visually inspect wheel flanges (and central spacer) for cracks, nicks, scratches, corrosion or other damage. Replace O-ring.	32-40		every 4) tire change	
6.	Wheel bearings - Clean and lubricate.	12-22		500 h 5) annual 5)	
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	X 4)		
8.	Wheel axles - Clean. Visually inspect for cracks, nicks, scratches, corrosion or other damage.		X		
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.		X		
10.	Wheel brakes - Replace brake caliper pistons and rubber seals.	32-40		3000 h 4) 5 years 4)	
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	X		
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.		X		
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.		X		

4) Beringer wheel and brake system only
5) Cleveland / Grove wheel and brake system only

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.		X		
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.		X		

No.	Electrical System / Avionics	Reference	Interval 100h	other	Initials
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.	MML* 12-20-00	X	annual	
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		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	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!		X 12)		
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.		X 12)		
8.	Integrated flight system - Check all components and wiring for damage, corrosion, proper operation and security of attachment.	34-25		annual 12)	
9.	Integrated flight system - Check bonding.	34-25		2000 h 12) 10 years 12)	
10.	Aspen EFD1000 system - Perform bonding check.	34-25		annual 12)	
11.	Aspen EFD1000 system / Garmin G5 - Perform capacity check of the internal back-up battery.	34-25		annual 12,14)	
12.	Tank inlet bonding wires - Check bonding wires at the airframe ground tube for yellow discoloration.	SB-AT01-027		annual 10)	
13.	Autopilot - Check bonding.	22-10		2000 h 12) 10 years 12)	
14.	Autopilot - Perform functional test of disconnect tone audio output (both disconnect switches).	22-10		annual 12)	

10) 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 100h	other	Initials
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[2,3].	32-40 06-30	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	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		

2) AT01-200 only
3) AT01 300 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).
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). 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 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).
(2) Remove wing (refer to 57-00).
(3) Remove rudder (refer to 55-40).
(4) Remove elevator (refer to 55-20).
(5) Remove ailerons (refer to 57-50).
(6) Remove flaps (refer to 57-50).
(7) Remove cowling (refer to 71-10).

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).	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).	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).	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).	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 AT01-100/200/300 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).
         (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).

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).

   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, Type 912 i 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).
      (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).
   (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).

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).
(2) Examine engine cowling. Check for signs of fire damage.
(3) Disconnect battery (refer to 24-30).
(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).
(12) Perform an engine test run (refer to 05-20).

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

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

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

   D. Section 6-30 - 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 m^2	21.64 ft^2
MAC	0,68 m	2.24 ft
Elevator area	0,58 m^2	6.28 ft^2
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 m^2	15.67 ft^2
Rudder area	0,44 m^2	4.76 ft^2
Travel	29 ° ±1,5 °	

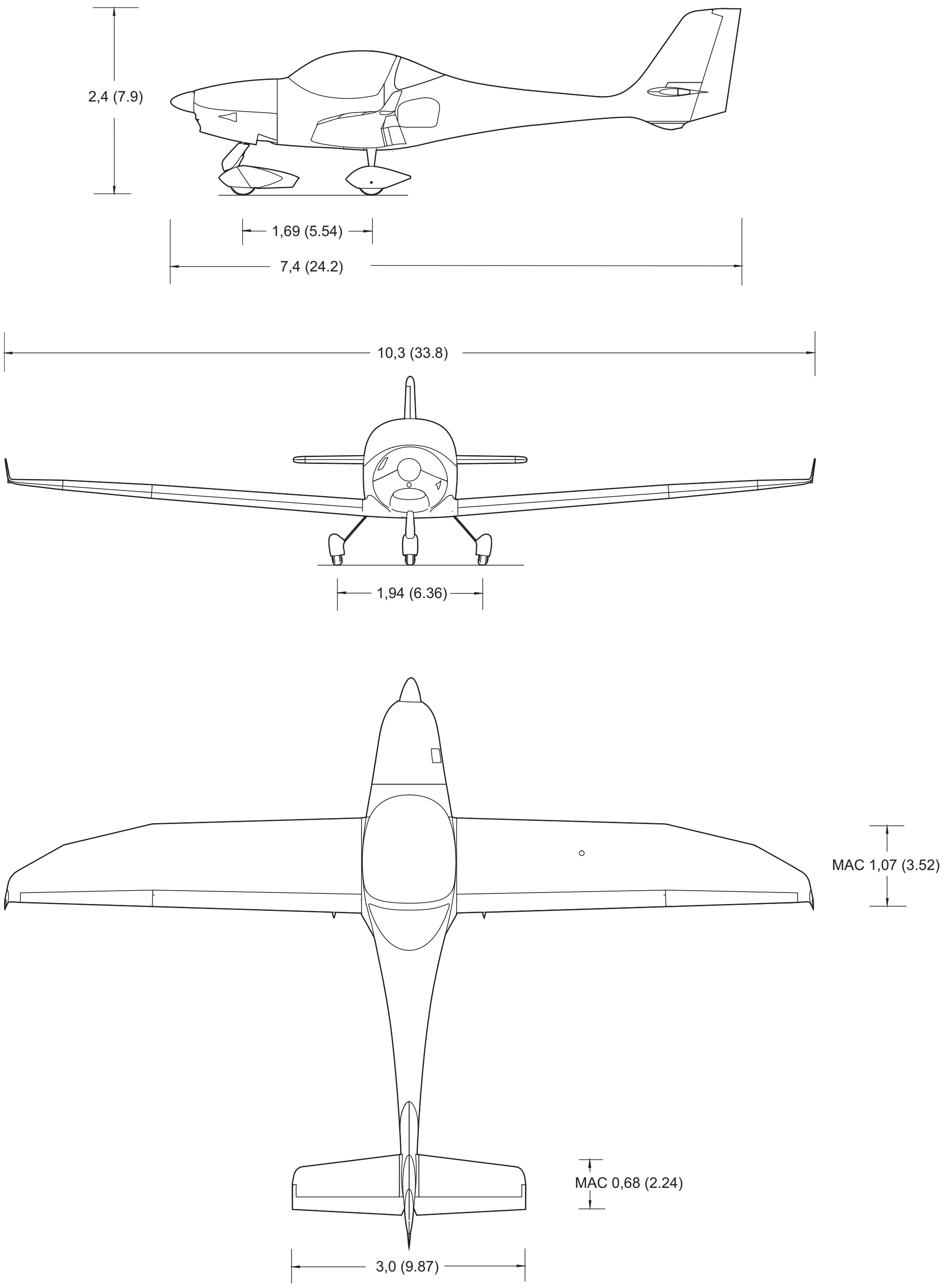
Landing Gear:

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.

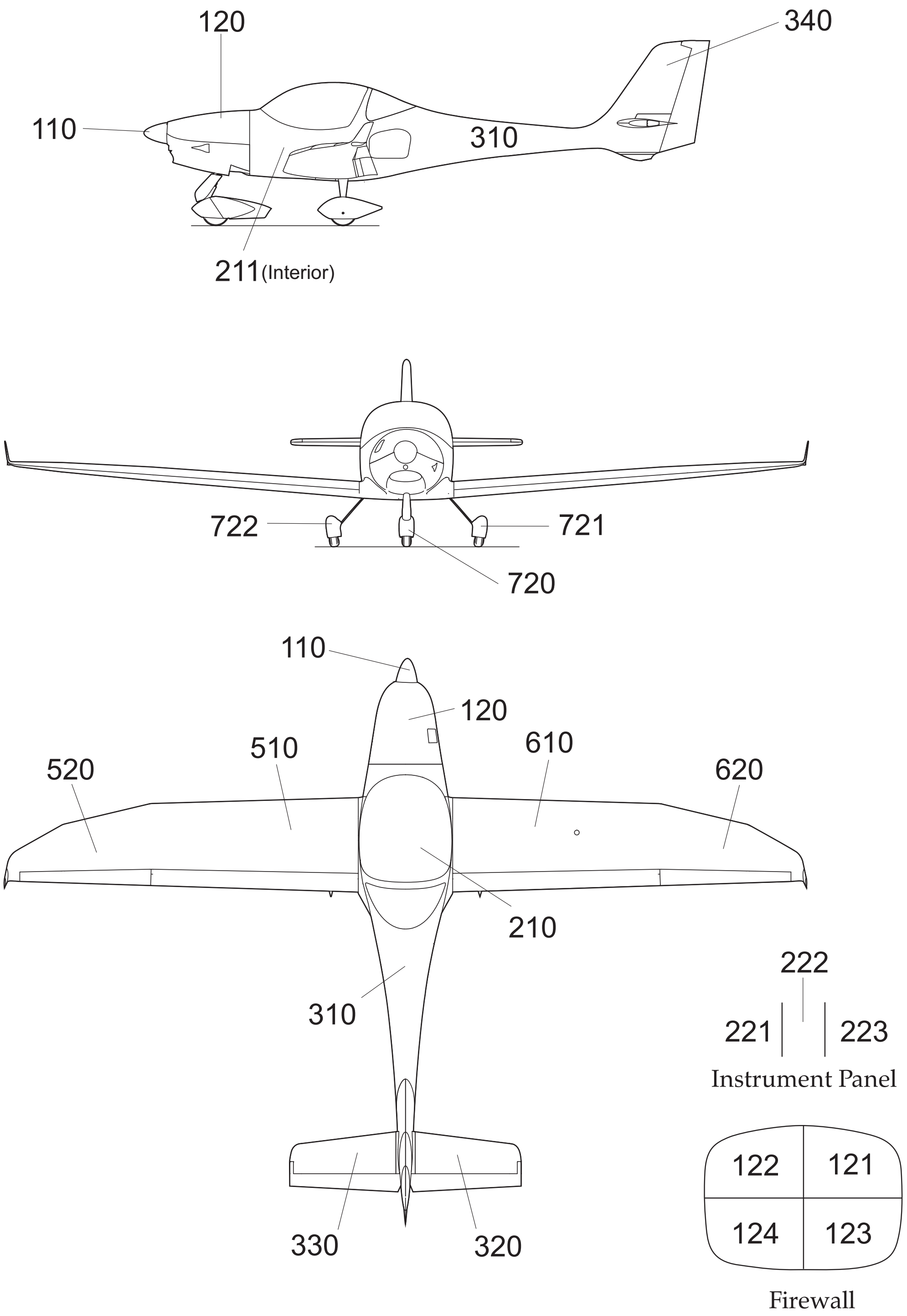
The second digit in the sequence divides the zones into sub-zones (zone 110 - propeller and spinner, zone 120 - upper and lower cowling). The third digit (if needed) divides the sub-zone into smaller subdivisions.

Example:

124
major zone
sub-zone
further division

2. Description

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



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) 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:

340AL

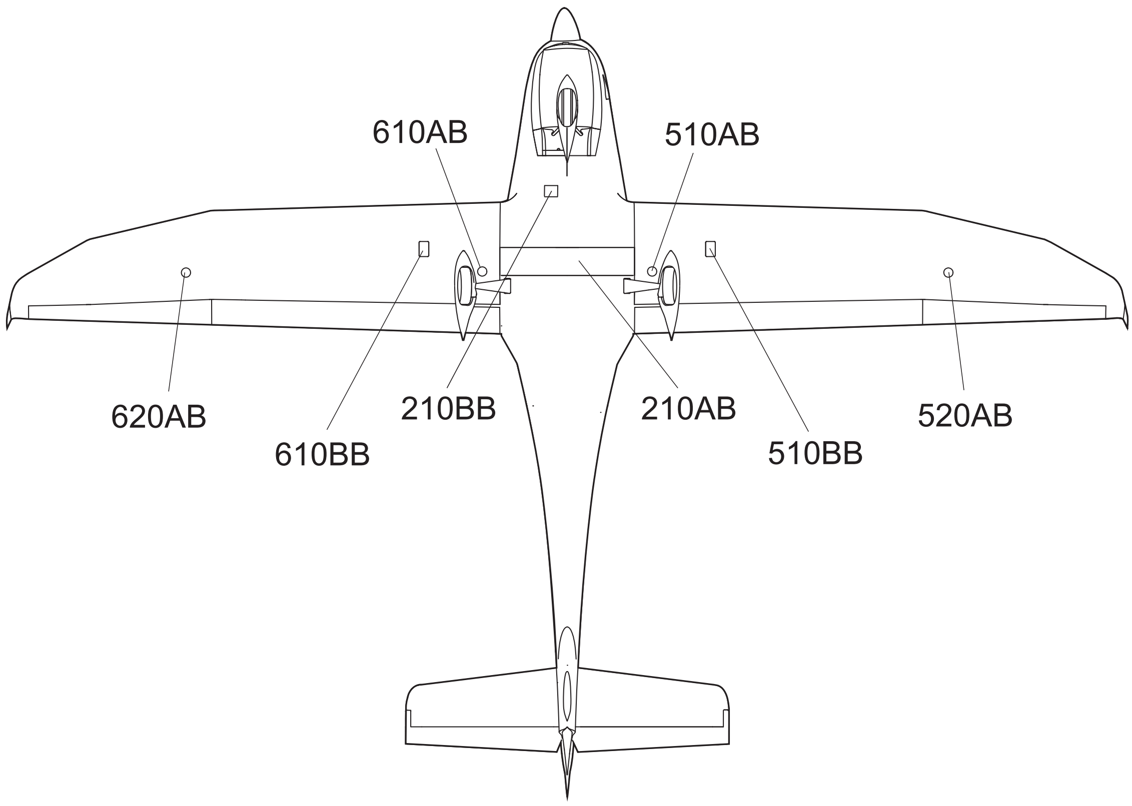
vertical stabilizer — left-hand side

first access / inspection plate in this zone

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 912 iS & 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 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 - Placards and Markings - General. This section provides a general overview of content and purpose of the chapter.

   B. Section 11-20 - 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 - 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.

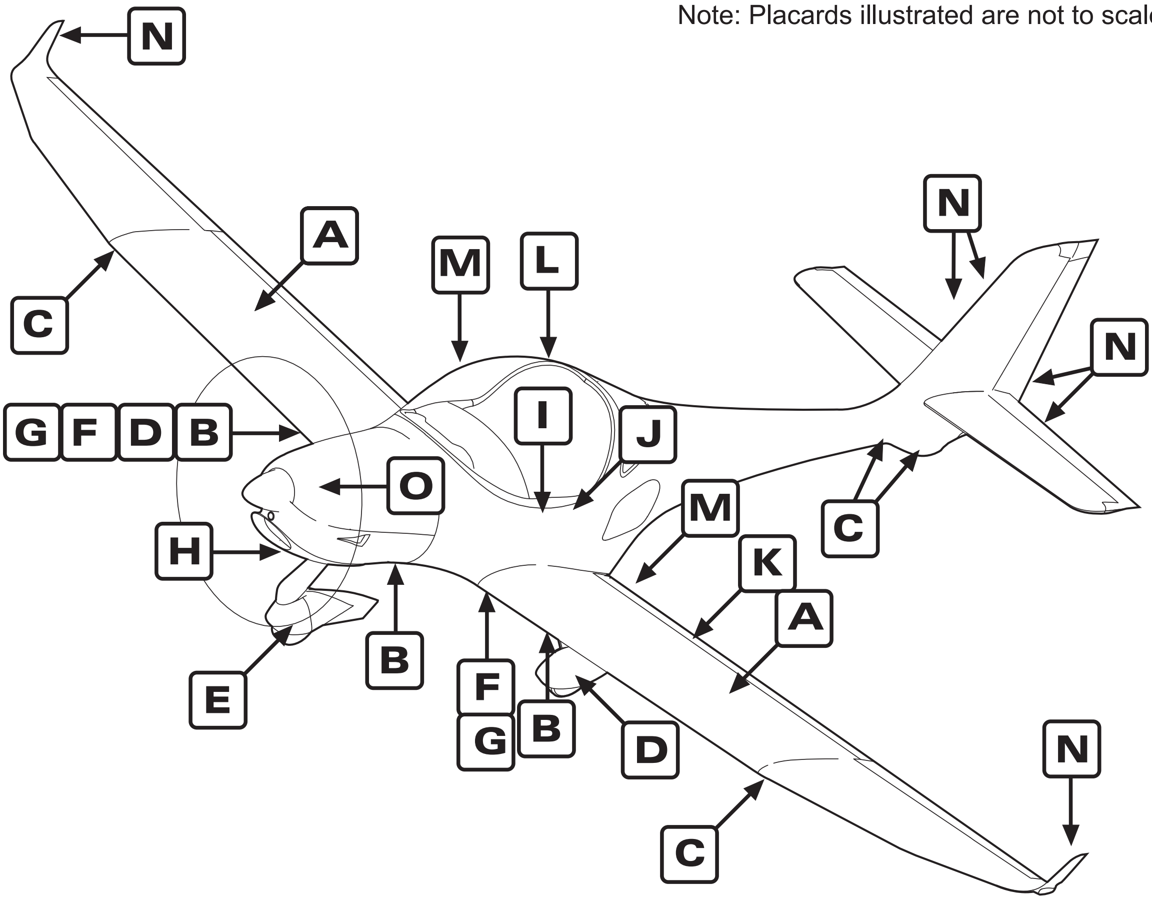
   B. Placing Self-Adhesive Placards
   (1) Clean aircraft surface carefully. Remove all old adhesive traces using isopropyl alcohol.
   (2) Remove paperliner from backside of placard to expose adhesive.
   (3) Position top edge of the placard precisely.
   (4) Work uniformly downward and apply placard 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.

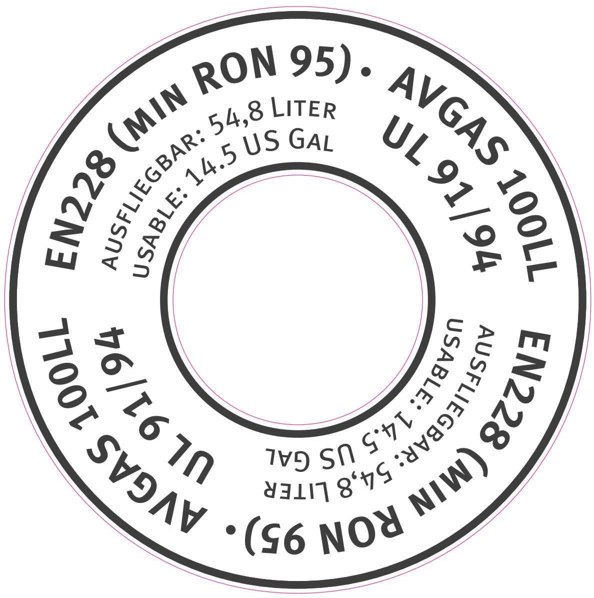
4. Maintenance/Care

   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).
   (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

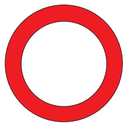
The unusable amount of fuel depends on the model. The shown placard is only valid for the AT01-100/200.

Exterior Placards and Markings
Figure 201 (1)

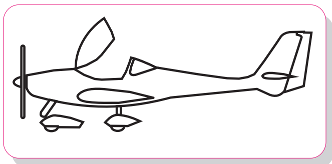
Note: Placards illustrated are not to scale.

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
Aufbockpunkt	Detail- **G**	Jack Point
Erdungspunkt Auspuffendrohr	Detail- **H**	Electric Ground Exhaust Port

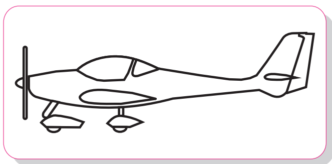
(red jack point markings)



Detail- **F**



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.

Detail-**K**

(flap position markings)

ELT HIER EINGEBAUT	Detail-**L**	ELT INSTALLED HERE

Detail- **M**

NICHT SCHIEBEN

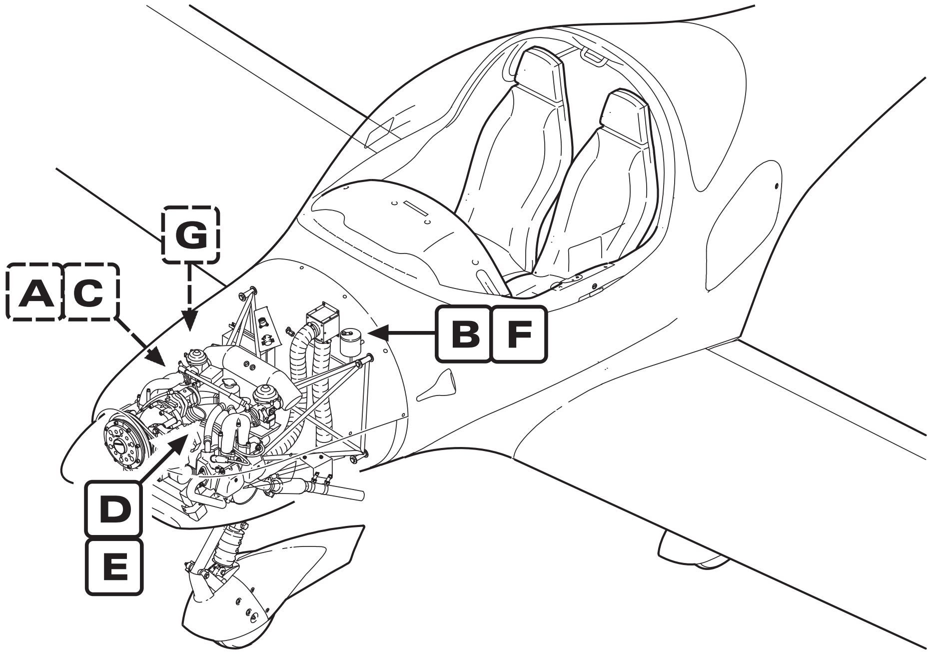
NO PUSH

Detail- **N**

Detail- **O**

Exterior Placards and Markings
Figure 201 (3)

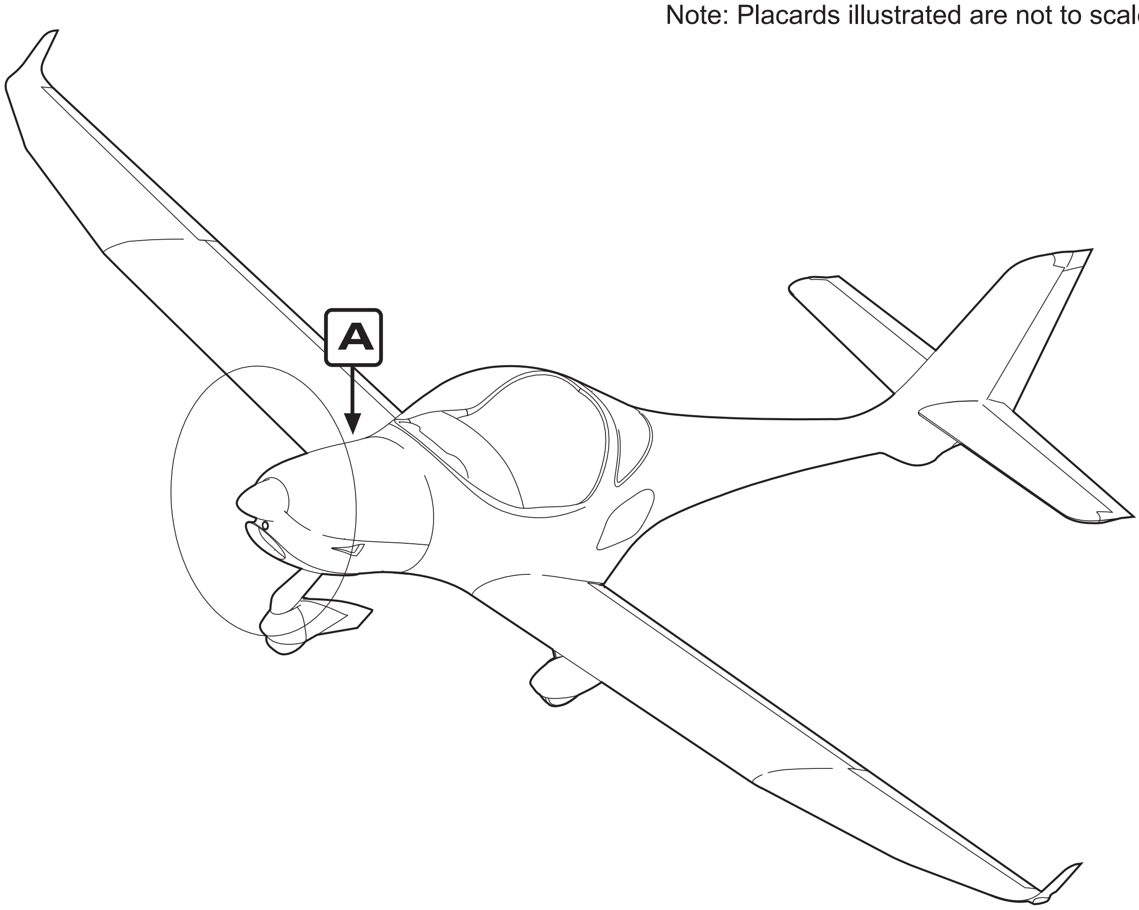
Note: Placards illustrated not in scale.



! 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 2,5 Liter **SIEHE FLUGHANDBUCH**	Detail-E	**COOLANT CAPACITY** **2.64 US quarts, 2,5 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 MARKINGS

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.

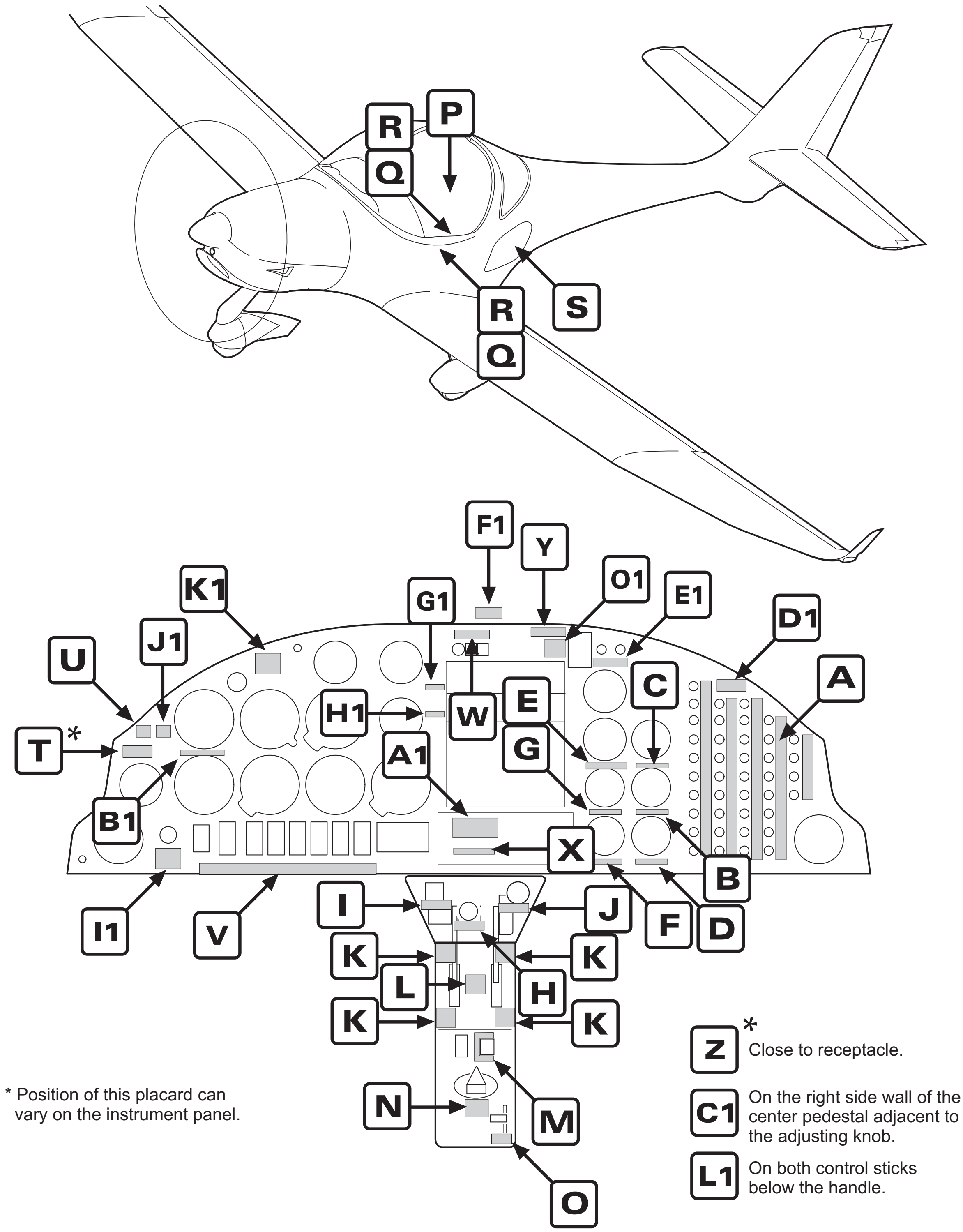
2. Tools, Equipment and Material

	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.



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	Kraftst. Pumpe Test

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	Fuel Pump Test

Detail-**A**

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 LEERLAUF / Min. RPM REISE	Detail- **K**	OPEN / HIGH RPM 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

The unusable amount of fuel depends on the model. The shown placard is only valid for the AT01-100/200.

PARKBREMSE
ZIEHEN EIN

Detail- **O**

PARKING BRAKE
PULL SET

PILOT

COPILOT

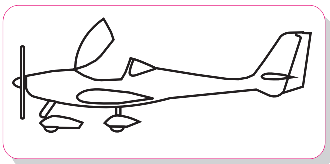
KOPFHÖRER

Detail- **P**

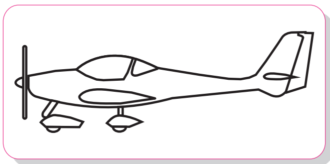
PILOT

COPILOT

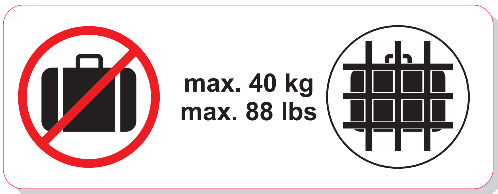
HEADPHONES



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)		9)						5)	8)

Detail-**V**

ALT1	ALT2	BOOST	TCU	KRAFTSTOFF-DRUCK	SPANNUNG	ENG WARN	ENG CAUT	P/S HEAT
ALT1	ALT2	BOOST	TCU	FUEL	VOLT	ENG WARN	ENG CAUT	P/S HEAT
		2)	2)	1)	1)	3)	3)	5)

Detail-**W** 4)

GPS NUR ZUR INFORMATION

Detail-**X** 6)

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 Vereisungs-bedingungen 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 Vereisungs-bedingungen zugelassen. Alle Kunstflugmanöver, einschließlich beabsichtigtem Trudeln, sind verboten. Weitere Betriebsgrenzen stehen im Flughandbuch.

Detail-**A1** 7)

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) AT01-300 only.
4) Aircraft equipped with analog engine instruments or Garmin G3X Touch only.
5) Aircraft equipped with pitot heating system only.
6) Aircraft equipped with non-(E)TSO'd GPS-receiver only.
7) Aircraft equipped for Night-VFR only.
8) Aircraft equipped with autopilot only.
9) 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**[1]

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**[2]

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

ALT1 AMPS ALT2

Detail-**J1**[1,2,3]

Interior Placards and Markings
Figure 201 (6)

1) Aircraft equipped with Garmin G3X Touch only.
2) AT01-200 only.
3) AT01-300 only.

Detail-**K1** 1)

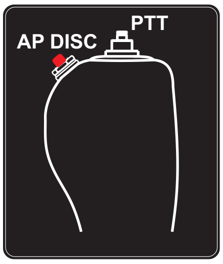
AP operation restricted to ≥ 2000ft AGL
Speed range 60 KIAS to 150 KIAS with Flaps up (cruise) only

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.

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

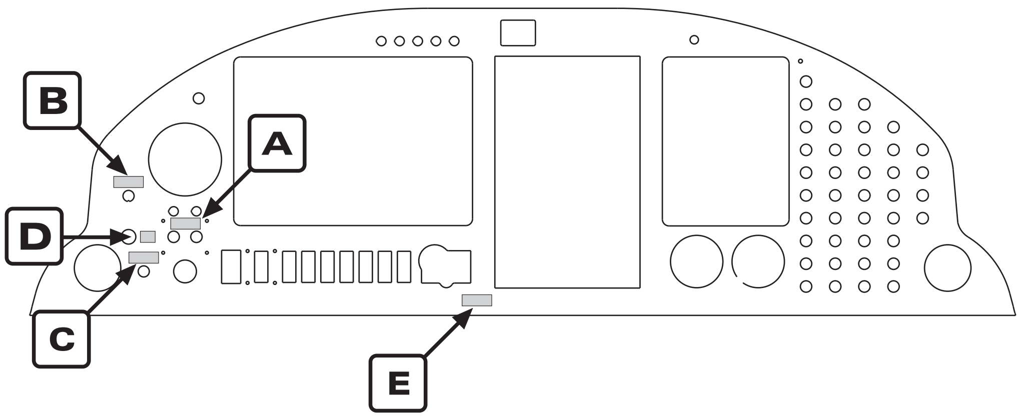
Detail-**O1** 2)

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

Interior Placards and Markings
Figure 201 (7)

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

Note: Placards illustrated are not to scale.



LANE A LANE B — Detail- A

ENG BACKUP PWR — Detail- B

ENG START PWR — Detail- C

Kraftst. Pumpe Test — Detail- D — Fuel Pump Test

ALTERNATE AIR ZIEHEN EIN — Detail- E — ALTERNATE AIR PULL ON

Interior Placards and Markings
Figure 201 (8)

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 - 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 - 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 - 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	AT01-100/200:	109,6	29.0
	AT01-300:	97,0	25.6
Unusable Fuel	AT01-100/200:	10,4	2.7
	AT01-300:	23,0	6.1

   B. Fuel Specification
   The following fuel is approved for use in the AQUILA AT01.
   The minimum RON should be 95 (ASTM D4814: min. AKI 91).

   EN 228 Super (Premium)
   EN 228 Super plus (Premium plus)
   AVGAS 100 LL (Grade ASTM-D910, blue color)
   AVGAS UL 91/94 (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 INSTRUCTION SI-912-016 / SI-914-019 / SI-912i-001).

(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 Instruction SI-912-016 / SI-914-019 / SI-912i-001.

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. <u>General</u>

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 (AT01-200/300). 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.

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

2. <u>Safety and Maintenance Precautions</u>

A. Safety Precautions

<u>WARNING:</u> 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 (AT01-100/300) / 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).

      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 / SI-912i-001).

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 and to ROTAX Aircraft Engines SI-912-016 / SI-914-019 / SI-912i-001, 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 / SI-912i-004).

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).
(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 and to ROTAX Aircraft Engines SI-912-016 / SI-914-019 / SI-912i-001.
(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).
(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 (AT01-100/300) / 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 (AT01-100/300: upper cowling only / refer to 71-10).
      (2) AT01-100/300 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) AT01-100/300 only: Install the cover of the air filter box.
      (5) Reinstall cowling (refer to 71-10).

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.

   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 / SI-912i-001, latest revision, for further information on suitable coolants.
      The maximum coolant quantity is 2,5 liters (2.6 U.S. quarts).

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

      USE ANTIFREEZE CONCENTRATE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

      THE USE OF WATERLESS COOLANT BASED ON PROPYLENE GLYCOL IS NOT PERMITTED!

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

   WARNING: 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).
      (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).

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 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).
      (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).

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.

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).
(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

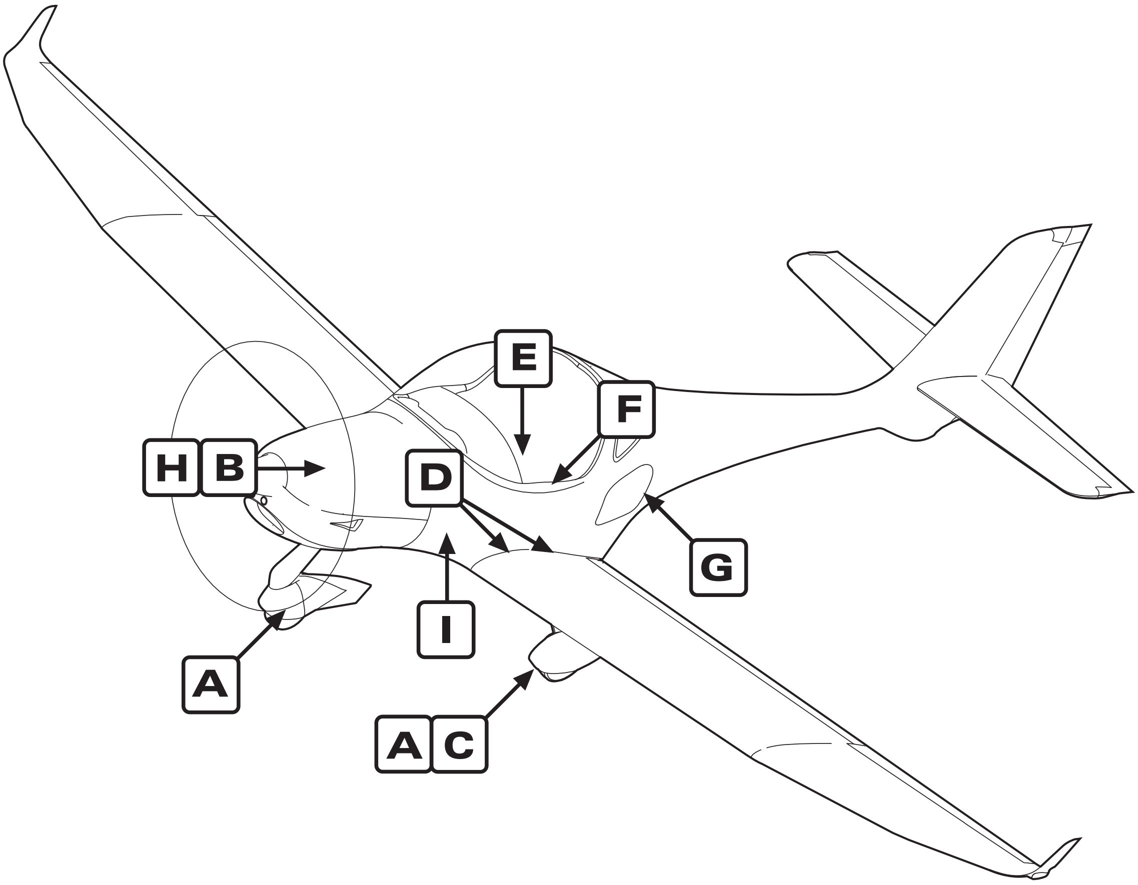
LUBRICATION - SERVICING

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) GR	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).

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).

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 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 with Rotax 912S (Night-VFR only) 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.

On aircraft equipped with a Rotax 912iS engine, 2 internal alternators are available, namely generator A and B. During the starting operation, the engine management system (EMS) is powered by the battery. With sufficient speed generator B takes over this function. After the EMS system check, generator A takes over the supply of the EMS, if the switching threshold is exceeded. Generator B (= ALT 2*) is then used to supply the aircraft electrical components and for charging the battery together with the external alternator ALT 1.
If generator A fails, generator B takes over its functions. The airframe electrical components and the instruments will be supplied by the external alternator.
If generator B fails, the airframe electrical components and the instruments will be supplied by the external alternator. The engine still runs on generator A.
*Generator B is referred to as ALT 2 within the aircraft manuals and labels.

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.

		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 (Rotax 912S / 914F only)	Turn switches ON.
	ALT2 circuit breaker activated (open)	Troubleshoot circuit and reset circuit breaker.
	Defective ALT2 alternator	Refer to applicable ROTAX publications.
	Defective ALT2 regulator (Rotax 912S / 914F only)	Replace ALT2 regulator.
	Defective ALT2 disconnect relay (Rotax 912S / 914F only)	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.
	Defective ECU, fusebox or regulator (Rotax 912iS only)	Refer to applicable Rotax publications.

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 / Night-VFR equipped aircraft only)
   - rectifier-regulator unit (Night-VFR equipped aircraft only)
   - alternator circuit breaker(s)
   - alternator warning light(s)
   - alternator switch(es)

2. Description and Operation

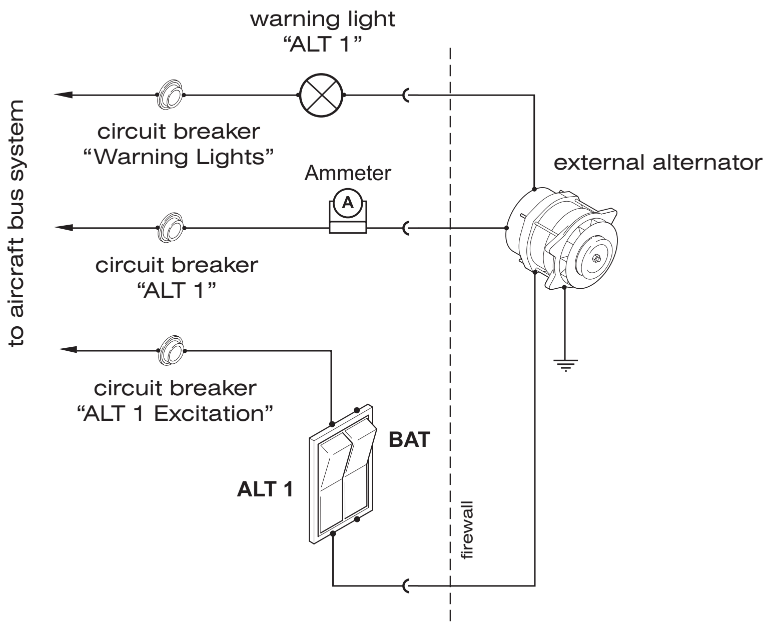
   A. The external alternator (ALT 1) is installed on the forward left side of the engine, to the left of the gearbox. It is belt-driven and incorporates an internal voltage regulator. The external alternator is supplied with an excitation voltage by the battery when the ALT1/BAT switch is turned ON. When 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 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.

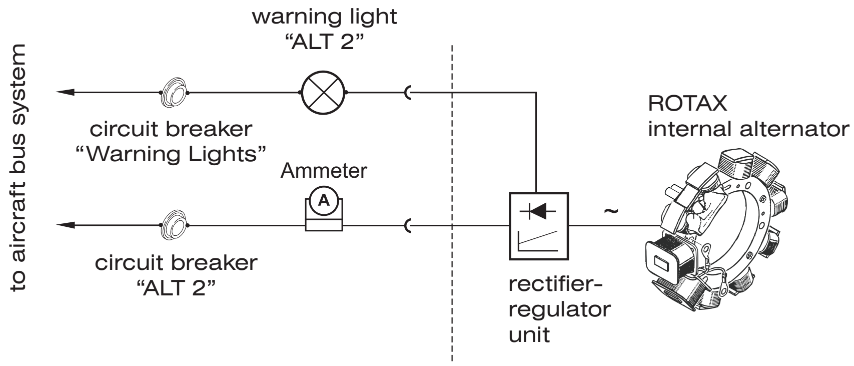
   C. An ammeter measures the charge or discharge current to/from the main battery. The voltmeter is connected with the aircraft bus bar. All instruments are found on the right side of the instrument panel in the instrument cluster or in the digital engine monitor.

   D. 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.

   E. 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

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)
   - rectifier-regulator unit
   - additional battery (BAT 2)
   - Schottky diodes, ALT 2 disconnect relay, resistor, fuses
   - alternator circuit breakers
   - alternator warning lights
   - alternator switches

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. The internal alternator (ALT 2) integrated in the ROTAX engine is used 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.

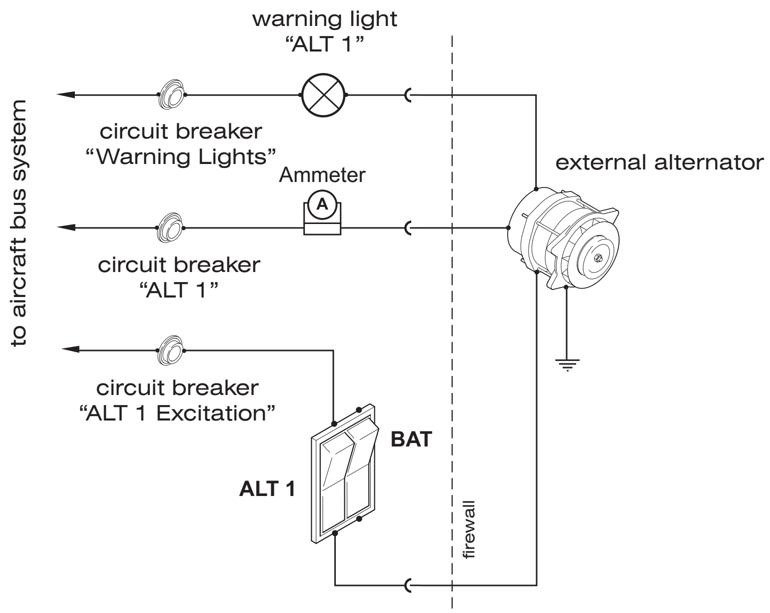
   C. The internal alternator is used as an emergency power supply for the electrical main fuel pump. It is therefore possible to disconnect the internal alternator from the rest of the aircraft's electrical system by switching OFF the ALT2 switch. A voltage drop or short in the aircraft's electrical system 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.

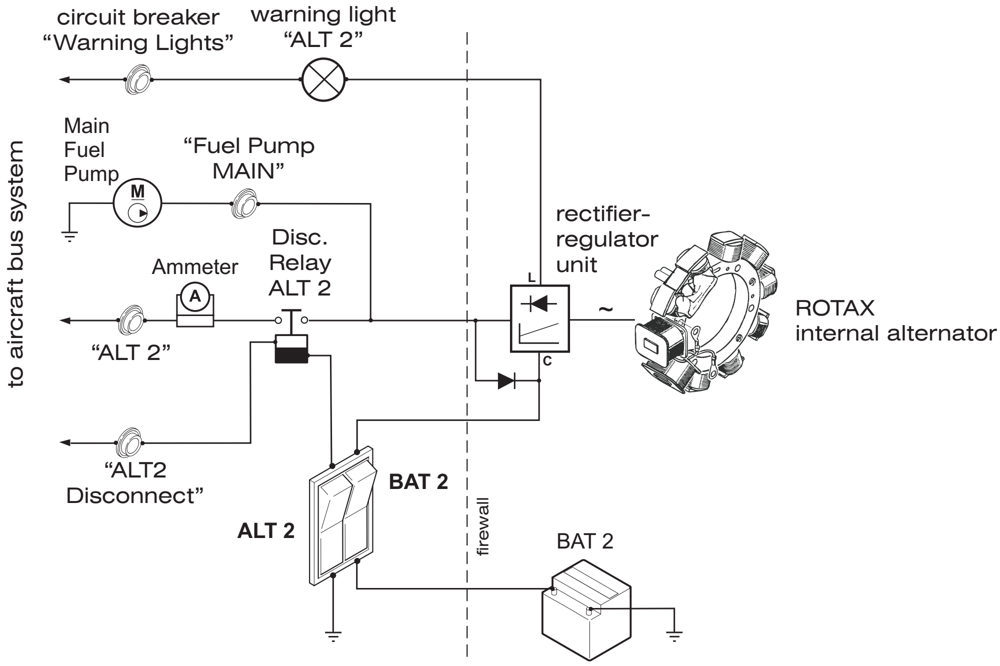
D. An ammeter measures the charge or discharge current to/from the main battery. Additional ammeters are provided for the external and internal alternator. The voltmeter is connected with the aircraft bus bar. All instruments are found on the right side of the instrument panel in the instrument cluster 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)
Figure 2

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:
   - engine control unit (ECU)
   - external alternator (ALT 1)
   - internal alternators A and B (B = ALT 2)
   - fusebox with regulators A and B
   - alternator circuit breakers
   - alternator warning lights
   - alternator switch

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. The two internal alternators A and B, integrated in the Rotax engine, are used to power the Rotax Engine Control Unit (ECU) and its components and the two electrical fuel pumps. These two internal alternators are permanent magnet alternators with 220W (alternator A) and 420W (alternator B).

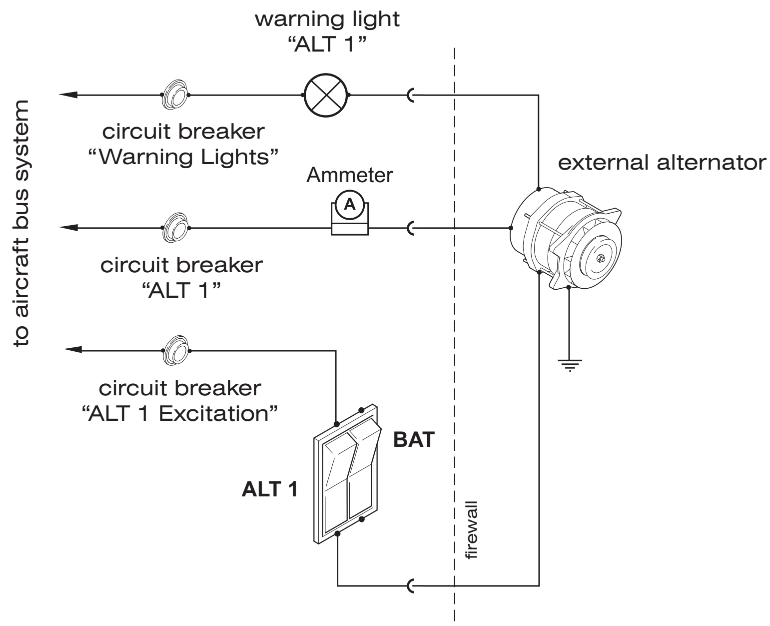
   During the engine starting operation, the ECU system is powered by the battery. With sufficient speed alternator B takes over this function. After the ECU system check, alternator A takes over the supply of the ECU system, if the switching threshold is exceeded. Alternator B (= ALT 2) together with alternator 1 (ALT 1), is then used to supply the aircraft systems and for charging the battery while the engine is running.

   If alternator A fails, alternator B takes over its functions to supply the engine systems and fuel pumps. The airframe electrical components will be supplied by the external alternator 1 (ALT 1) and the battery.
   If alternator B fails, the engine is still runs on its internal alternator A, the aircraft is supplied by the external alternator (ALT 1) and the battery.

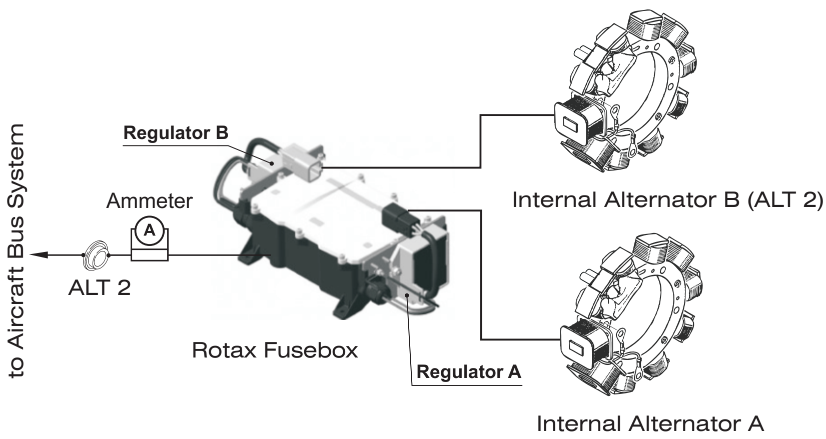
C. Ammeters measure the current from the external (ALT 1) and internal (ALT 2) alternators and the current to/from the battery, a voltmeter is connected with the aircraft bus bar. All instruments are found in the digital engine monitor.

D. 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.

E. Refer to applicable ROTAX publications for more information on the external and internal alternators, ECU and fusebox.



External Alternator System (Schematic)
Figure 1



Internal Alternator System (Schematic)
Figure 2

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 Rotax 912S Night-VFR or Rotax 914 equipped aircraft). Refer to the appropriate ROTAX publications for maintenance procedures on the internal alternator(s).

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).
      (3) Disconnect battery (refer to 24-30).
      (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.

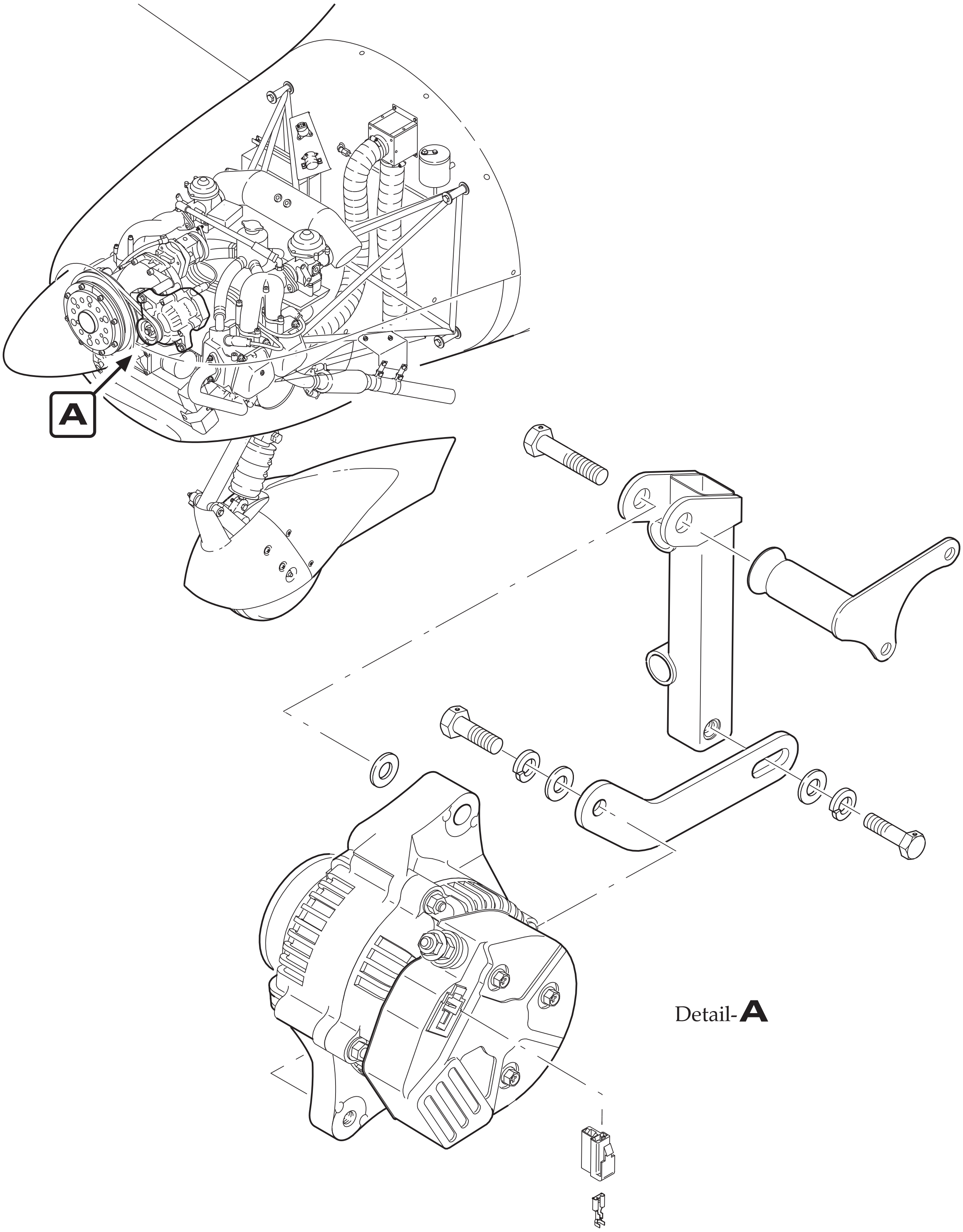
   B. Install External Alternator
      (1) Position alternator into mounting bracket.
      (2) Install shim and mounting bolt as shown in figure 201. Do not tighten yet.
      (3) Loosely secure lower alternator mounting boss to adjustment cam using washers and bolt (refer to figure 201).
      (4) Place 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).
      (11) Install cowling (refer to 71-10).

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).
      (3) Disconnect battery (refer to 24-30).



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).
(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).
(3) Place drive belt on alternator pulley. Verify pulleys are aligned.

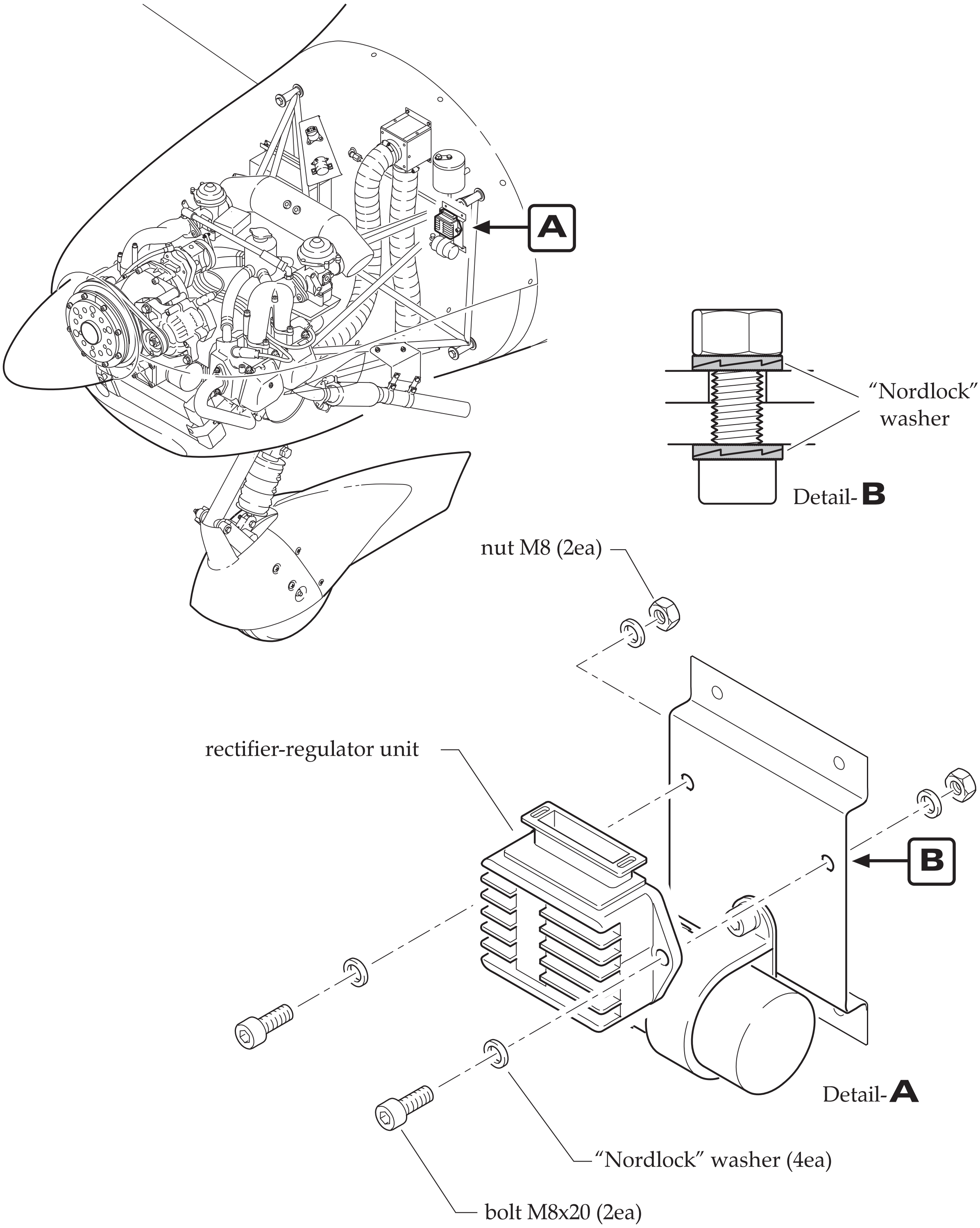
CAUTION: IF A NEW DRIVE BELT IS INSTALLED: THE ENGINE BELT TENSION SHOULD BE RECHECKED WITHIN THE FIRST 15 TO 20 HOURS OF OPERATION.

(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).
(9) Install engine cowling (refer to 71-10).

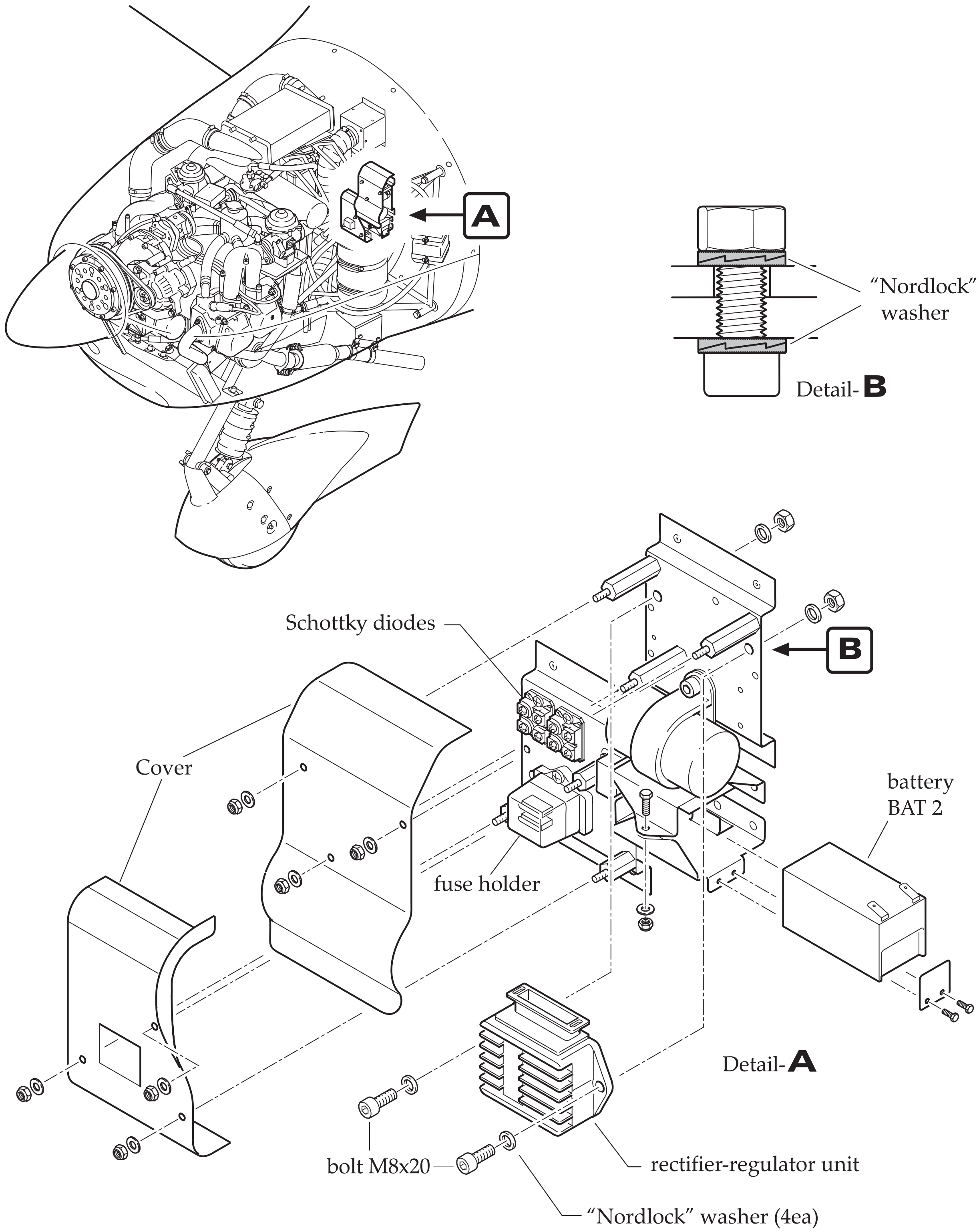
4. Rectifier-Regulator Unit Removal/Installation (Rotax 912S Night-VFR or Rotax 914F only)

A. Remove Rectifier-Regulator Unit
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10).
(3) Disconnect battery (refer to 24-30).
(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).
(5) Install engine cowling (refer to 71-10).



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



Rectifier-Regulator Unit Installation
Figure 202

5. BAT 2 Battery Removal/Installation

A. Remove BAT 2 Battery
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10).
(3) Disconnect main battery (refer to 24-30).
(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).
(6) Reinstall engine cowling (refer to 71-10).

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:

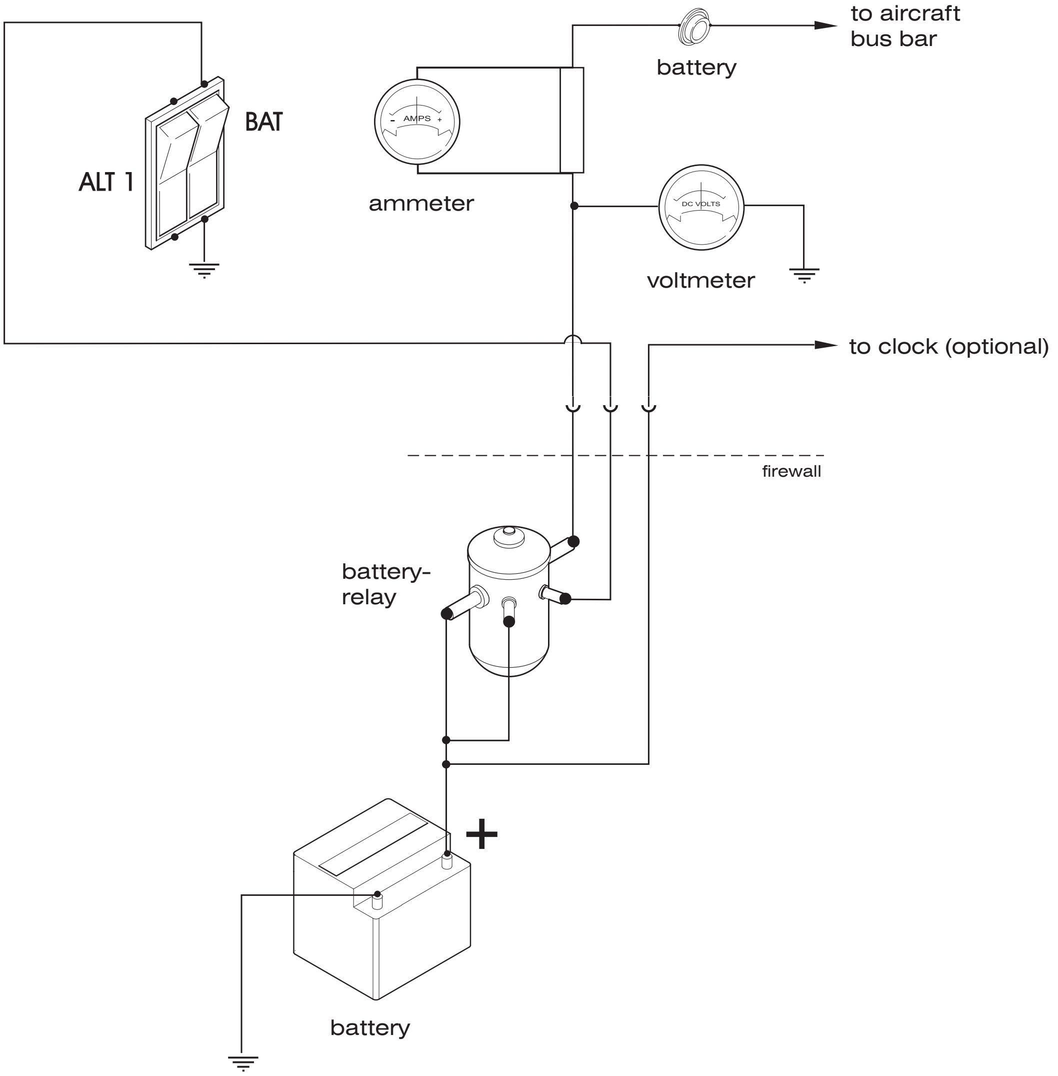
- battery
- battery relay
- BAT switch
- voltmeter
- ammeter

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, 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.

2. Battery Removal/Installation

A. Remove Battery
(1) Ensure BAT switch is in OFF position.
(2) Remove upper engine cowling (refer to 71-10).
(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. 1 Nm (9 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).

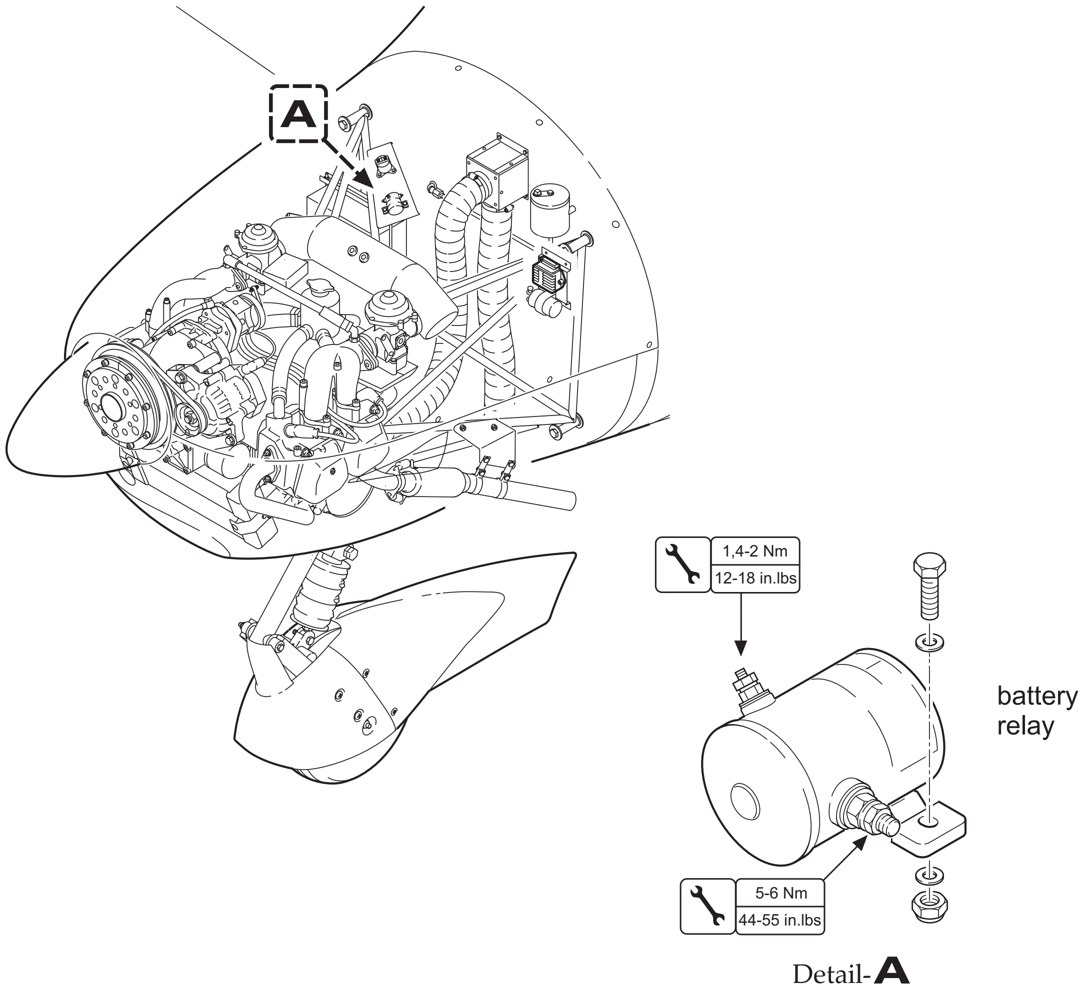
3. Battery Relay Removal/Installation (Ref. Fig. 201)

A. Remove Battery Relay
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10).
(3) Disconnect battery (refer to 24-30).
(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.

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).
   (4) Install engine cowling (refer to 71-10).



Battery Relay Installation
Figure 201

4. Battery Condition Check

For Night-VFR equipped aircraft or aircraft equipped with Rotax 914F or 912iS 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 / 912iS

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 / 912iS 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.
   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.

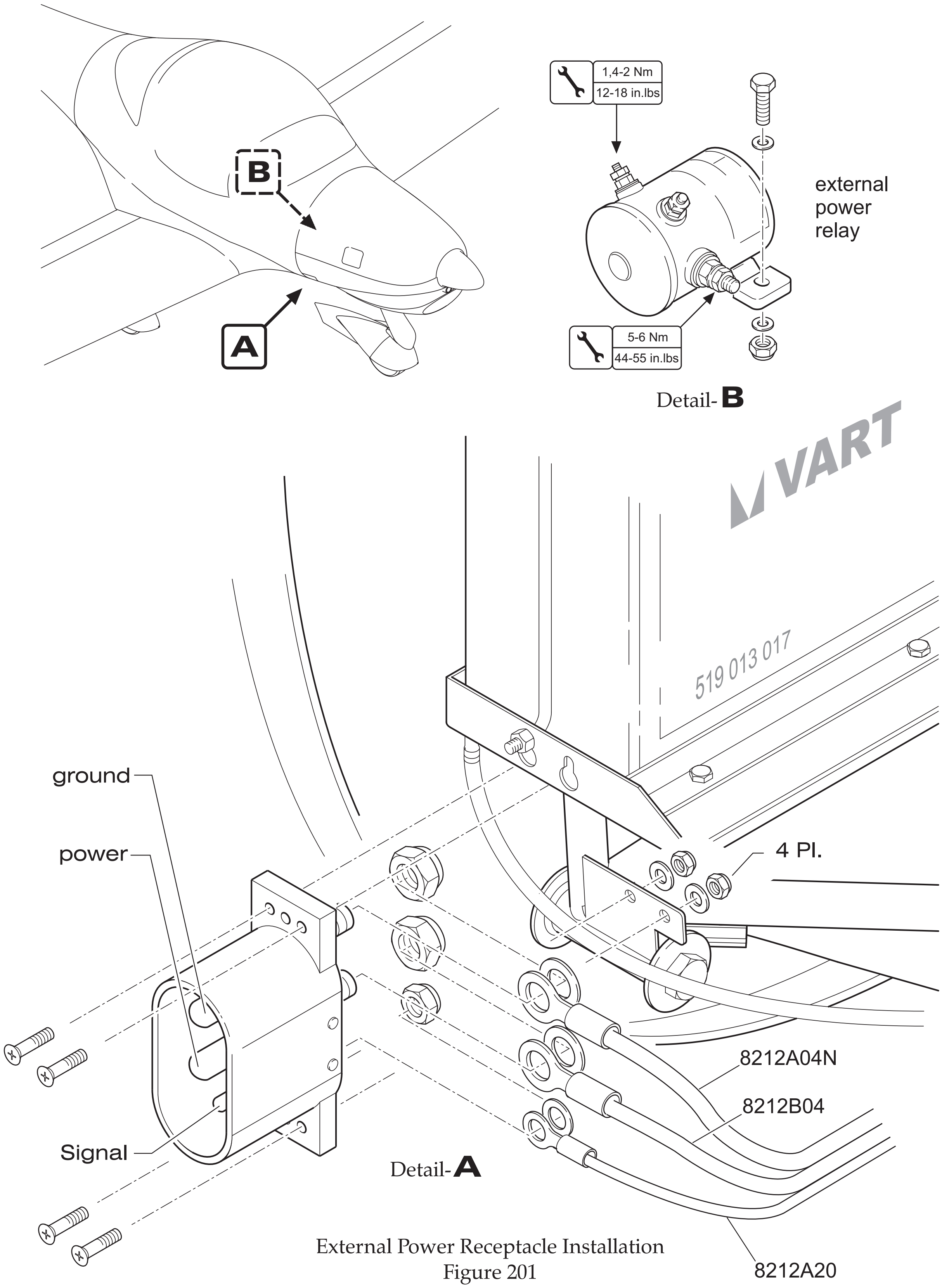
2. External Power Receptacle Removal/Installation

   A. Remove External Power Receptacle
      (1) Ensure electrical power to aircraft is OFF.
      (2) Remove engine cowling (refer to 71-10).
      (3) Disconnect battery (refer to 24-30).
      (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).
      (4) Install engine cowling (refer to 71-10).
      (5) Perform an external power system functional check (refer to “Adjustment/Test” below).

3. External Power Relay Removal/Installation

   A. Remove External Power Relay
      (1) Ensure electrical power to aircraft is OFF.
      (2) Remove engine cowling (refer to 71-10).
      (3) Disconnect battery (refer to 24-30).
      (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).
(4) Install engine cowling (refer to 71-10).
(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).
(3) Remove glare shield (refer to 31-10).
(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).
(9) Install engine cowling (refer to 71-10).

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.

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).
      (3) Remove glareshield (refer to 31-10).
      (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).
      (4) Reconnect battery (refer to 24-30).

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 ALT2 ENG Backup Power	 Rotax 912iS Rotax 912iS
25A	ALT2	Rotax 912S (N/VFR)
20A	ALT2 Fuel Pump MAIN Fuel Pump AUX	Rotax 914F Rotax 912iS Rotax 912iS

Table 201: Circuit Breaker Current Ratings (Cont.)

Current Rating	Circuit Breaker	Effectivity
10A	Flap Actuator	
	COM1 & 2	GTN 650, GNS 430W, GTR 225, GNC 255 GTR 205
	COM/NAV 1 & 2	GNC215
	Landing Light	
	PFD	G500 Txi
	GAD PWR	GAD27 (G3X)
7.5A (8A)	MFD	Aspen EFD1000
	NAV/GPS 1 & 2	GTN 650 (Xi)
	PFD	G500
	AP	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 914F
	Fuel Pump AUX	Rotax 914F
	Attitude Indicator	G5ATT
	Turn Coordin.	G5HSI
	Starter Relay	Rotax 912iS
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 912S
	Fuel Pump Test	Rotax 912iS

Table 201: Circuit Breaker Current Ratings (Cont.)

Current Rating	Circuit Breaker	Effectivity
2A	Warning Lights	
	Trim Control	up to S/N 326
	Flap Control	
	Starter Relay	Rotax 912S, Rotax 914F
	Stall Warning	
	CHT (OAT)	
	Fuel Gauge	
	Instruments 1	
	Instruments 2	
	Panel Light	
	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 914F
	ALT2 Disc.	Rotax 914F
	GAD GTN	G3X w/ GTN650 (Xi)

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 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 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)

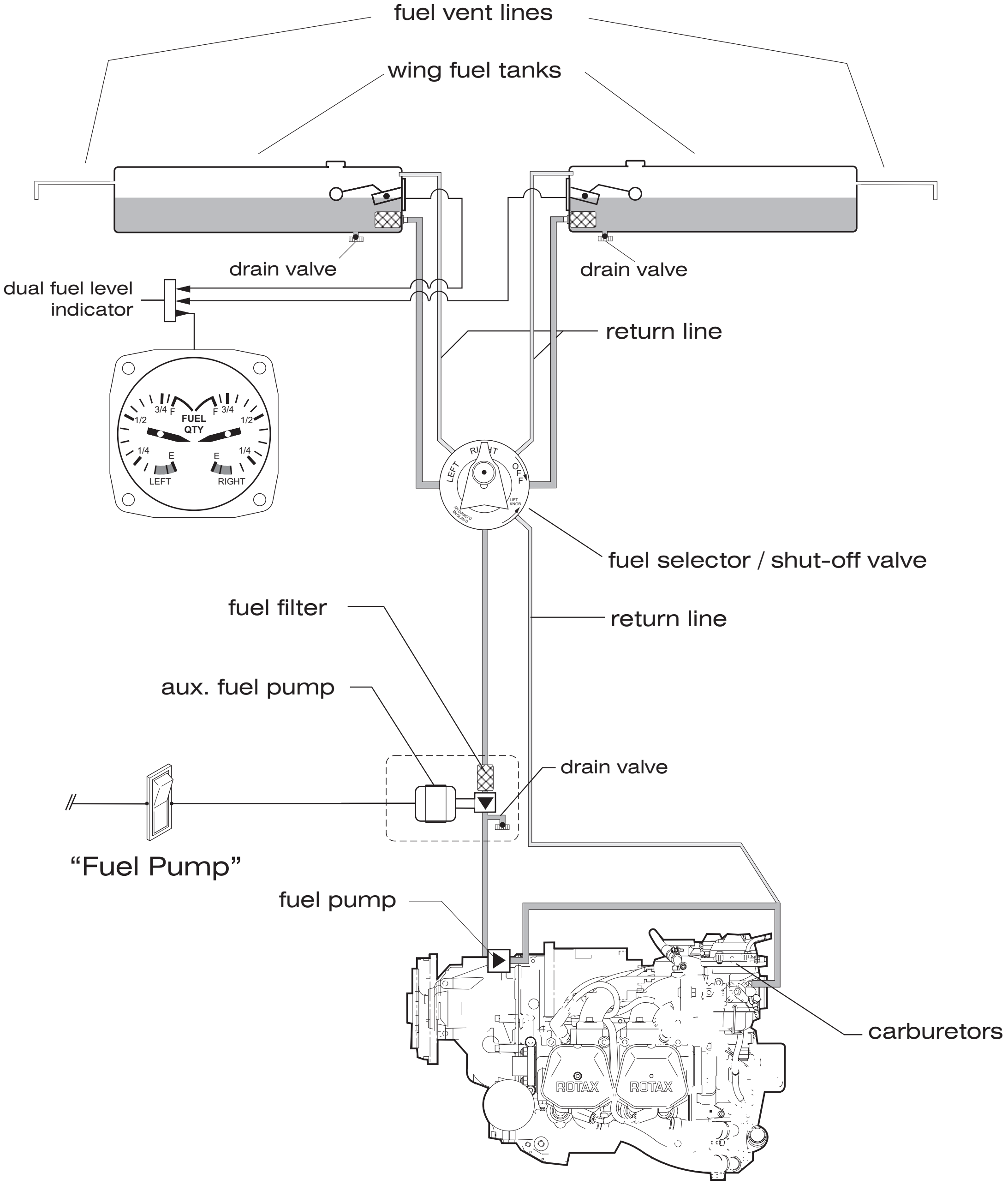
   B. Fuel Supply
   Fuel is delivered to the carburetors by the engine driven fuel pump from the fuel tank that is pre-selected by the fuel selector / shut-off valve. An electrical fuel pump is provided in case of failure of the engine driven fuel pump. Excessive fuel flows through return lines and the 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

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)

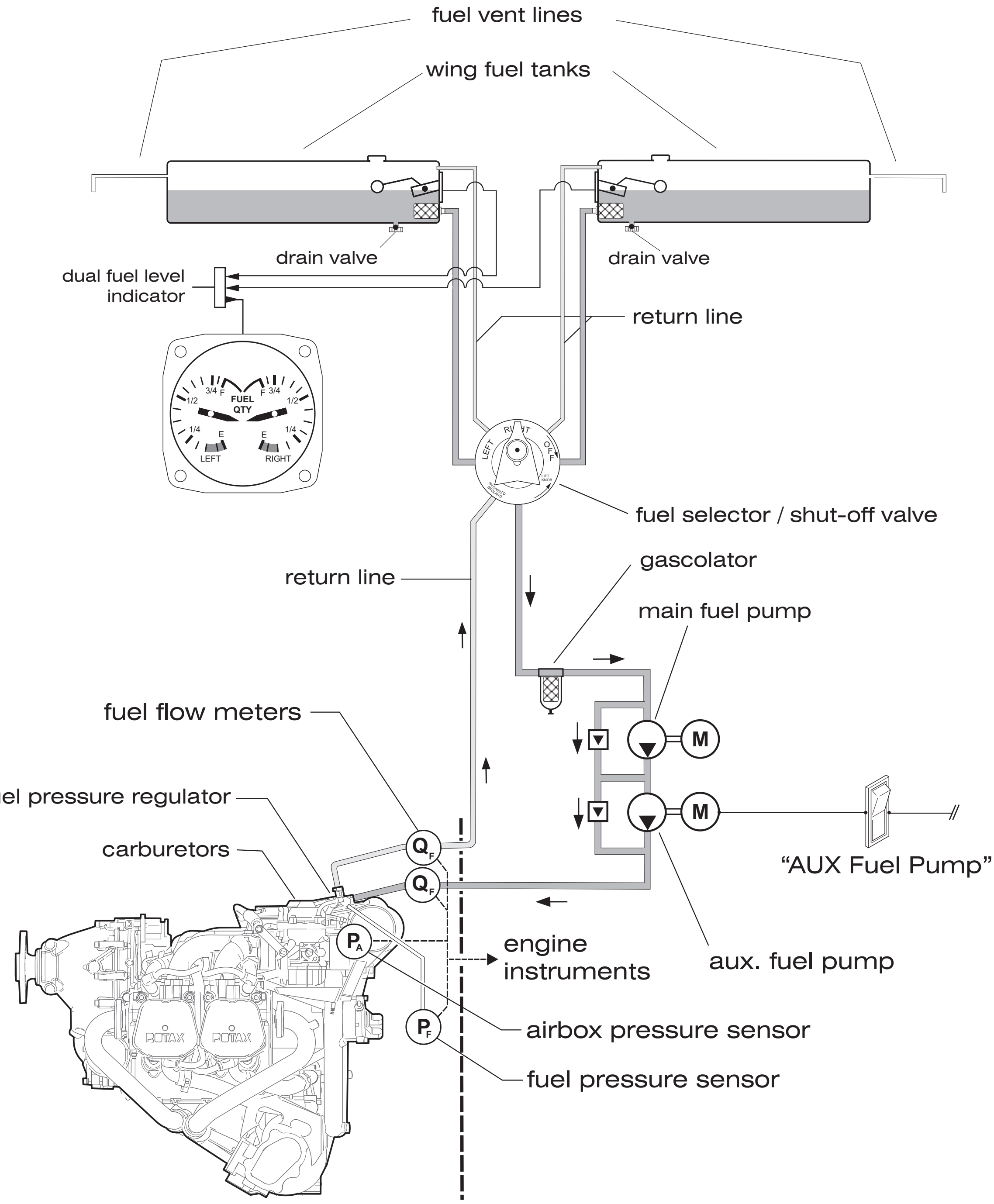
   B. Fuel Supply
   Fuel is delivered to the carburetors by the electric MAIN fuel pump from the fuel tank that is pre-selected by the fuel selector / shut-off valve. An electric AUX fuel pump is provided in case of failure of the MAIN fuel pump. Fuel pressure is maintained by a pressure regulator on the 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 sensors in the fuel supply and return lines. Both sensors 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 (Garmin G3X) or by two separate sensors and the differential pressure is calculated by the engine monitoring system (MVP-50).

   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

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, a combined fuel filter / water trap (gascolator) in the fuselage, a fine filter, a fuel pressure regulator and the injection valves on the engine as well as flexible hoses and metal fuel-lines. Fuel quantities are:

Total fuel:	120 liters (31.7 gallons)
Usable fuel:	97 liters (25.6 gallons)
Unusable fuel:	23 liters (6.1 gallons)

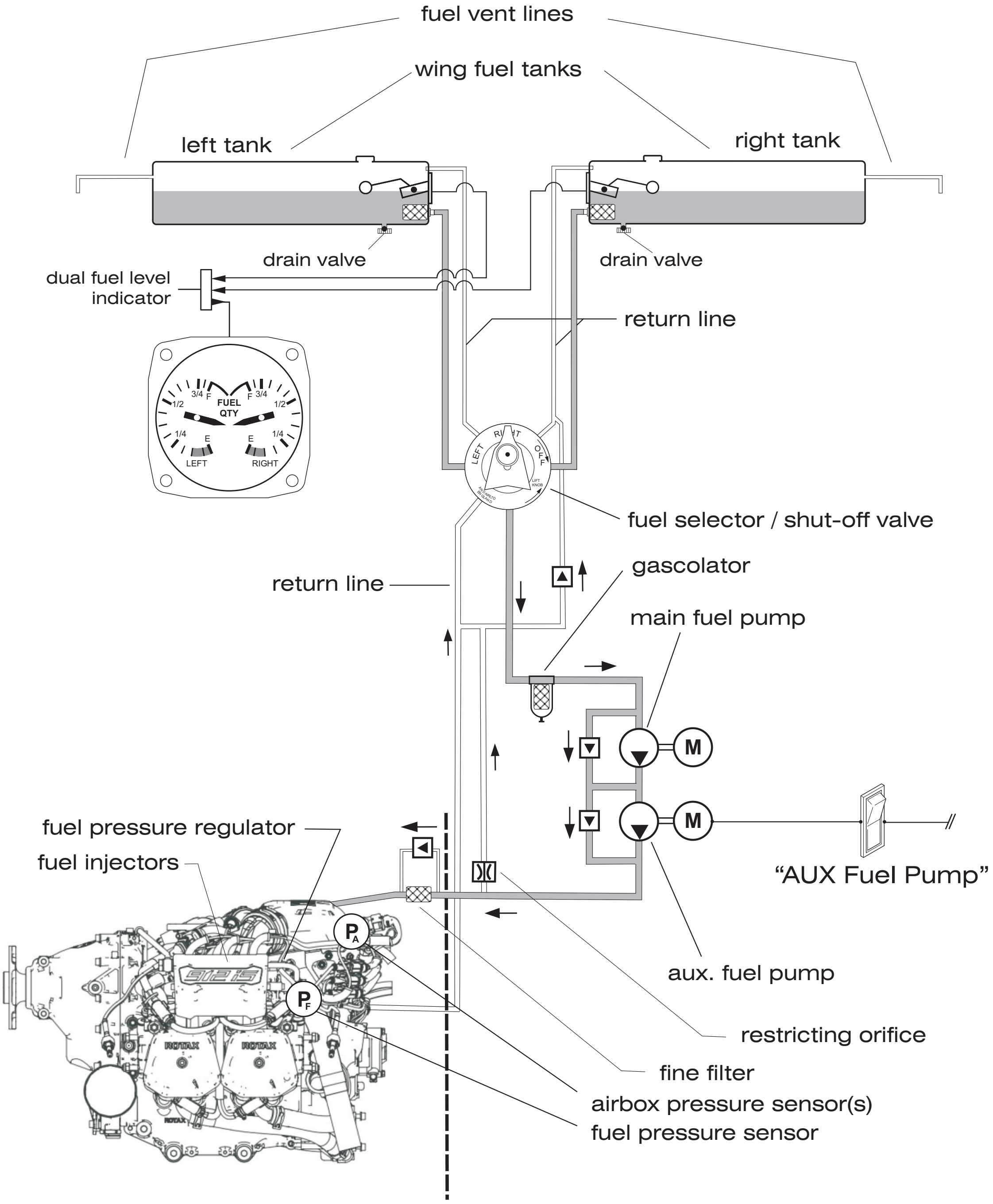
   B. Fuel Supply
   Fuel is delivered to the injection valves by the electric MAIN fuel pump from the fuel tank that is pre-selected by the fuel selector / shut-off valve. An electric AUX fuel pump is provided in case of failure of the MAIN fuel pump. Fuel pressure is maintained by a pressure regulator 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 calculated by the engine control unit (ECU) based on the injection times. Fuel pressure is indicated as difference between the absolute fuel pressure at the pressure regulator and the intake air pressure in the airbox. Both pressures are measured by separate sensors and the differential pressure is calculated / indicated by the 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 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. Fine filter and fuel selector valve have bypass lines with check valves, which open at a pressure difference of approx. 0,8 - 1,2 bar (12 - 17 psi).



Fuel System (Schematic)
Figure 1

FUEL STORAGE - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11!

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).
(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!

1. General

   A. The fuel distribution system consists primarily of the fuel selector / shut-off valve, electrical fuel pump(s), fuel filter(s), check valves, fuel lines and the AUX fuel pump switch.

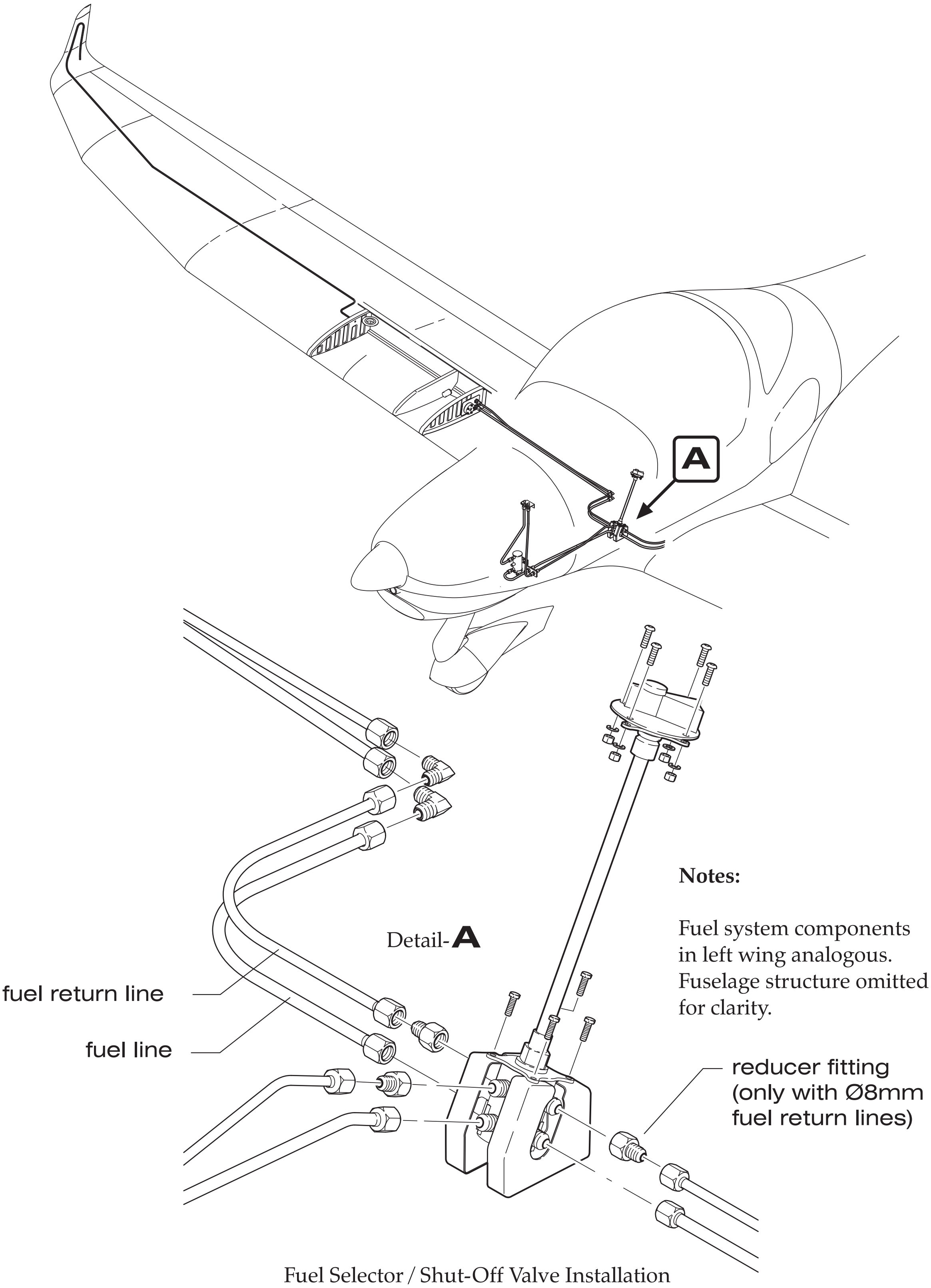
   The fuel selector handle is located in the center console between the seats. The red, arrow shaped handle has a LEFT, RIGHT and OFF position. To switch the valve to the OFF position a knob located at the top of the handle must be pulled while the handle is rotated simultaneously. With the valve in this 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.

   Aircraft equipped with Rotax 912iS engine have a fuel selector bypass line with check valve to avoid high fuel pressures with closed fuel selector valve. This check valve opens if the pressure difference exceeds 0,8 - 1,2 bar (12 - 17 psi) and connects the fuel lines on the engine side with the fuel return line to the RH fuel tank.

   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 912iS / 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.

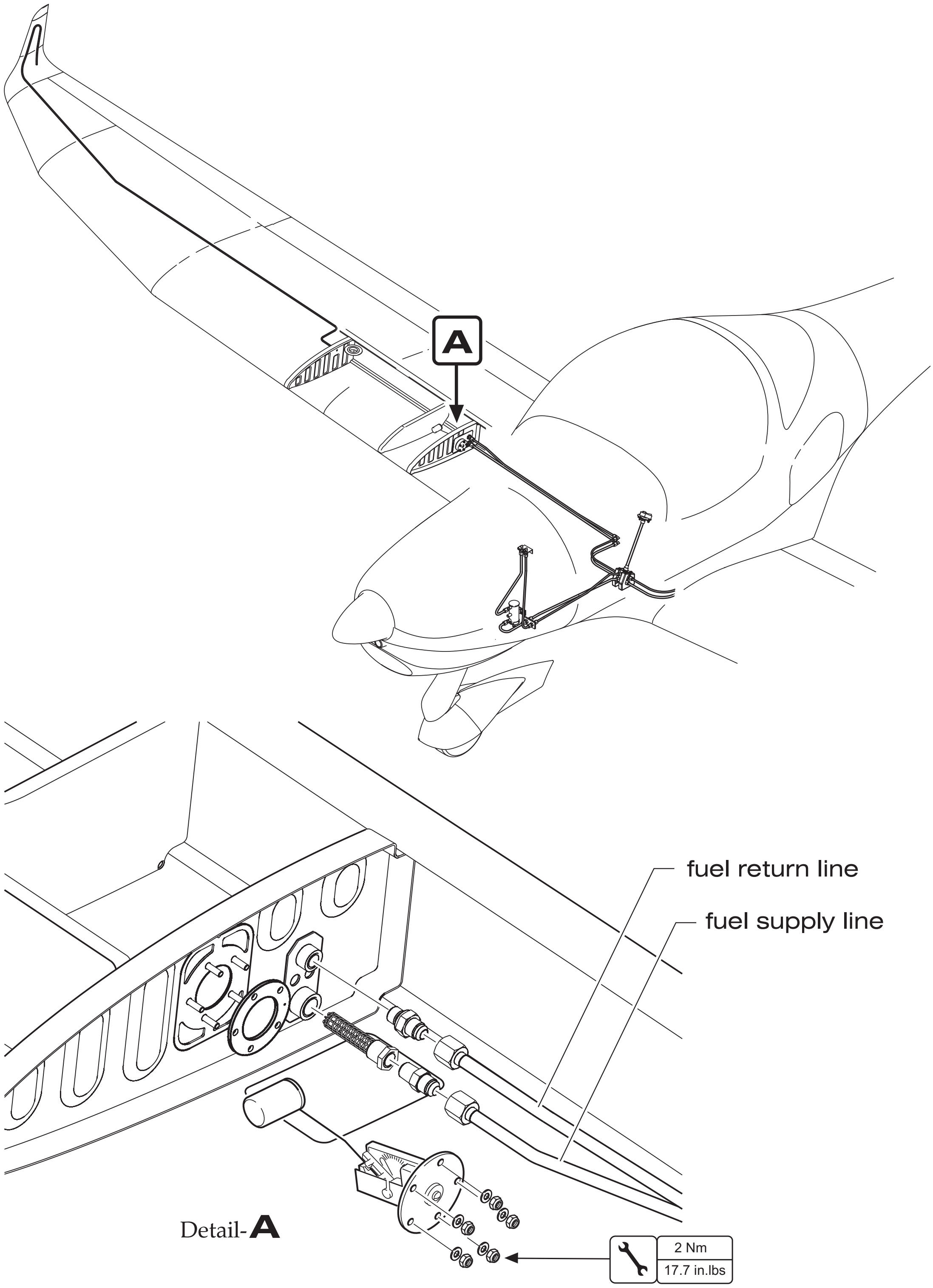
   Aircraft equipped with Rotax 912iS engine have an additional fine filter located in the engine compartment at the lower right firewall. A bypass line with check valve allows fuel supply even if the filter is blocked. This check valve opens if the pressure drop of the filter exceeds 0,8 - 1,2 bar (12 - 17 psi).



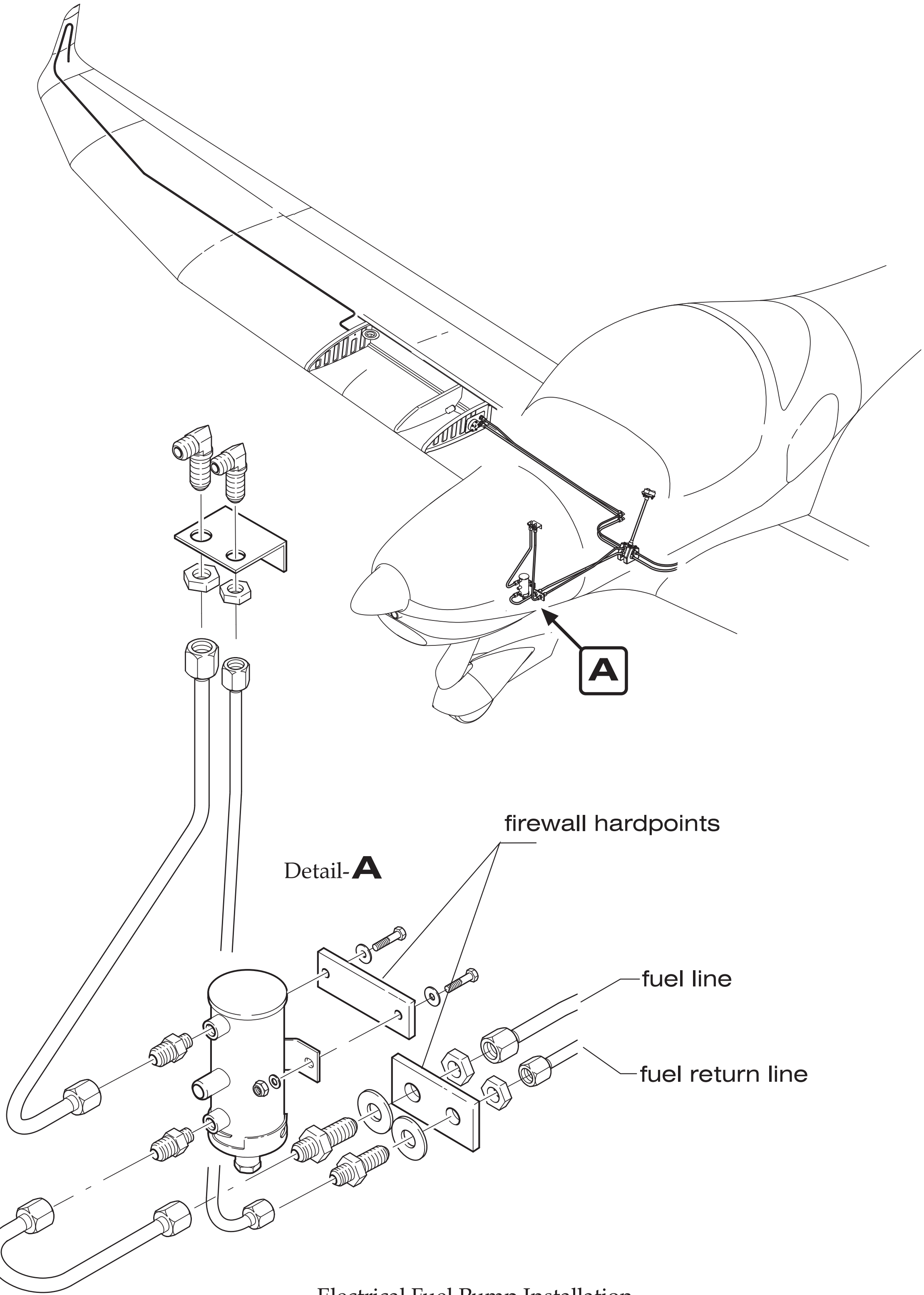
Notes:

Fuel system components in left wing analogous. Fuselage structure omitted for clarity.

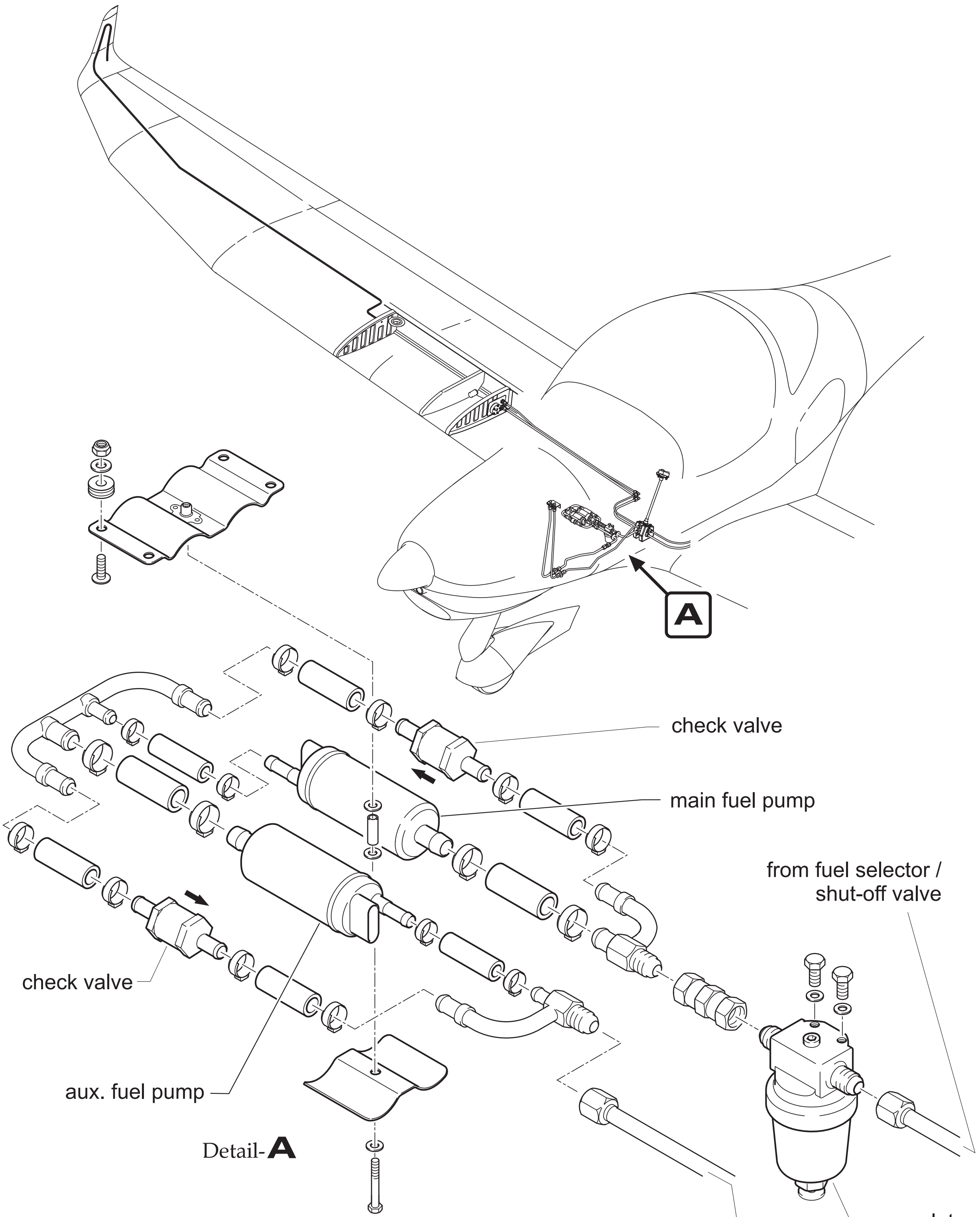
Fuel Selector / Shut-Off Valve Installation
Figure 201



Fuel Level Sensor / Fuel Tank Outlet Strainer Installation
Figure 202



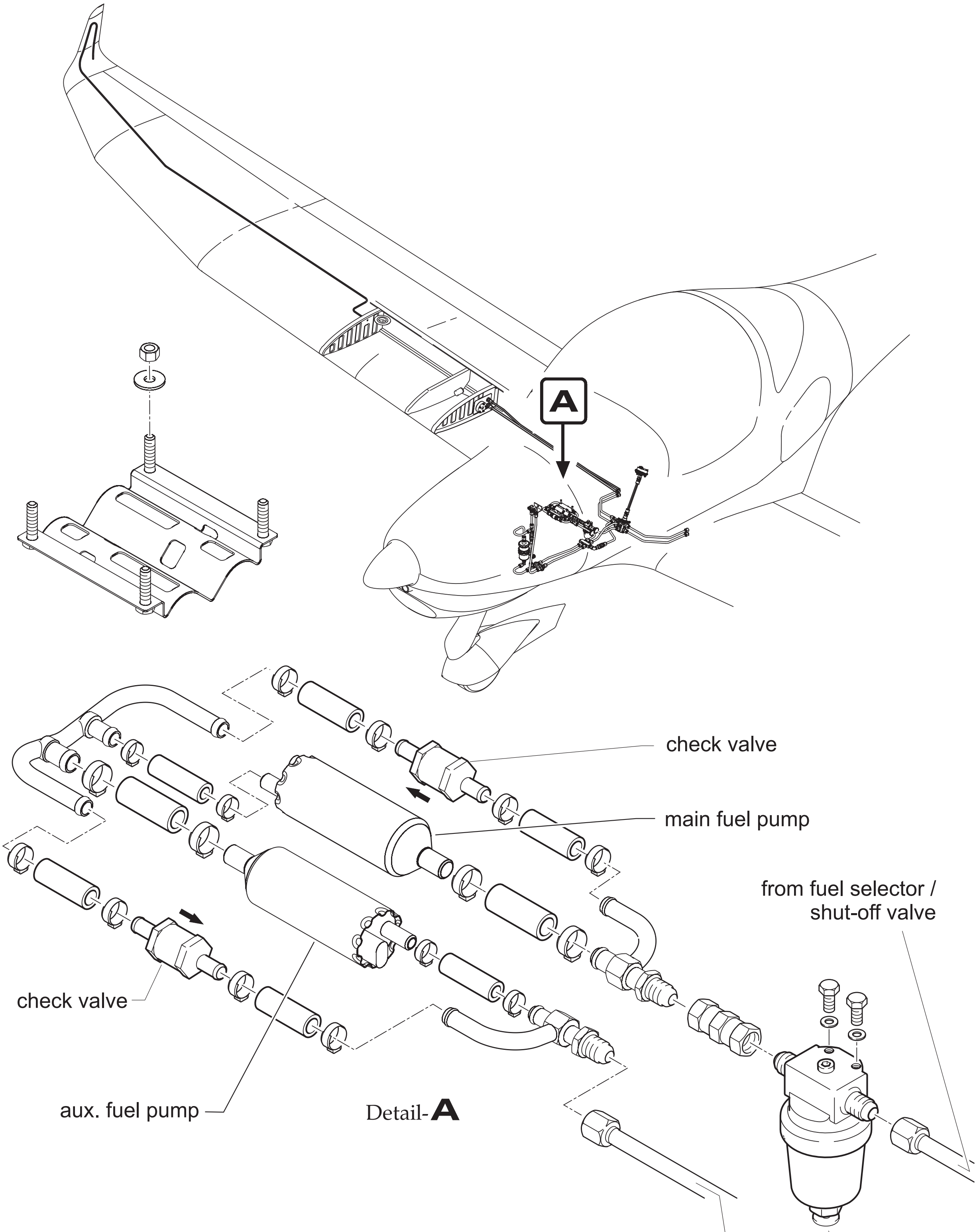
Electrical Fuel Pump Installation
Figure 203



Electrical Fuel Pump Installation
Figure 203

EFFECTIVITY

Aircraft equipped with Rotax 914F engine



Electrical Fuel Pump Installation
Figure 203

EFFECTIVITY

Aircraft equipped with Rotax 912iS engine

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 912iS / 914F) has a filter screen which must be cleaned regularly. The filter screen can be removed for maintenance. The fine filter (Rotax 912iS only) has to be replaced regularly.
   (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 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 912iS / 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.

2. <u>Fuel Selector / Shut-Off Valve Removal/Installation</u>

A. Remove Fuel Selector / Shut-Off Valve
   (1) Ensure electrical power to aircraft is OFF.
   (2) Disconnect battery (refer to 24-30).
   (3) Drain fuel from fuel system completely using the wing fuel tank drains and the drain at the electrical fuel pump (Rotax 912S) / gascolator (Rotax 912iS / Rotax 914F).
   (4) Remove access panels 211 BB and 211 HL/HR in the cabin (refer to 25-12).
   (5) Remove access panel 211 GT with fuel selector / shut-off valve control lever and connecting shaft (refer to 25-12).
   (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).
   (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).
   (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).
(3) Disconnect battery (refer to 24-30).
(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).

4. Electrical Fuel Pump Removal/Installation (Rotax 912iS / Rotax 914F only)

A. Remove Electrical Fuel Pumps
(1) Ensure electrical power to aircraft is OFF.
(2) Close fuel selector / shut-off valve.
(3) Disconnect battery (refer to 24-30).
(4) Drain fuel from system with drainer at bottom of gascolator.
(5) Remove access panels 210BB (refer to 06-30) and 211BB (refer to 25-12).
(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).
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(s) attaching fuel pump assembly to access panel.
(11) Disconnect electrical wires, fuel hoses and circuit board with interference-suppression capacitor (Rotax 914F only) from fuel pumps and remove fuel pumps.

B. Install Electrical Fuel Pumps
(1) Verify battery is disconnected and electrical power to aircraft is OFF.
(2) Arrange the position of fuel pumps, check valves, hose clamps and new fuel hoses to fit into the fuel pump housing.
(3) Attach electrical fuel pumps to access panel 211LT using clamp(s).

NOTE: Rotax 912iS: Do not overtighten the 1-ear clamps, otherwise the fuel pump rotor may stick and pump does not work.

(4) Crimp 1-ear clamps on fuel hose connections.

(5) Perform leakage check: Plug outlet of fuel pump assembly. Connect inlet to air compressor and pressure gauge. Rotax 914F: Apply 2 bar (29 psi) / Rotax 912iS: Apply 6 bar (87 psi) air pressure and check system for leaks. No pressure loss is allowed.
(6) Reconnect electrical wires and circuit board with interference-suppression capacitor (Rotax 914F only) to fuel pumps and bonding wires to fuel lines.
(7) Position access panel 211LT in fuselage together with the fuel pump assembly and secure with screws.
(8) Reconnect fuel lines to/from fuel pump package through access panel 210BB.
(9) Reconnect electrical wires to fuel pump package at connector inside the fuselage.
(10) Reconnect battery (refer to 24-30).
(11) Perform operational check of the fuel distribution system.
(12) Inspect fuel pump assembly and connections for any signs of fuel leakage.
(13) 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).
(4) Drain fuel from system with drainer at bottom of electrical fuel pump.
(5) Remove engine cowling (refer to 71-10).
(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).
(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 912iS / 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).
(4) Drain fuel from system with drainer at bottom of gascolator.
(5) Remove access panel 210BB (refer to 06-30).
(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).
(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.

7. Fuel Fine Filter Removal/Installation (Rotax 912iS only)

A. Remove Fuel Fine Filter
(1) Ensure electrical power to aircraft is OFF.
(2) Close fuel selector / shut-off valve.
(3) Disconnect battery (refer to 24-30).
(4) Drain fuel from system with drainer at bottom of gascolator.
(5) Remove engine cowling (refer to 71-10).
(6) Disconnect fuel lines from fine filter fittings.
(7) Open clamp and remove fine filter from aircraft.
(8) Remove fittings from fine filter.

B. Install Fuel Fine Filter
(1) Verify battery is disconnected and electrical power to aircraft is OFF.
(2) Install fittings to fine filter inlet and outlet.
(3) Position fine filter and clamp at lower right firewall. Install clamp screw and nut.
(4) Reconnect fuel lines to fine filter fittings.
(5) Reconnect battery (refer to 24-30).
(6) Perform operational check of the fuel distribution system.
(7) Inspect fine filter and connections for any signs of fuel leakage.
(8) 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!

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).
(3) Remove glare shield (refer to 31-10).
(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).
(4) Perform a fuel quantity indicating system test / calibration (refer to “Test/Calibration” below).
(5) Install glare shield (refer to 31-10).

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).
(3) Drain wing fuel tank with sensor that is to be removed (refer to 12-11).
(4) Open access / inspection plate 510 BB / 610 BB to gain access to sensor (refer to 06-30).
(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).
(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.

NOTE: If a replacement wing has been installed on the aircraft, the procedure according to S/N from AT01-327 applies.

A. Fuel Quantity Indicating System Test
(1) Prepare aircraft
(a) Drain fuel from wing tanks (refer to 12-11).
(b) Verify fuel selector / shut-off valve is in OFF position.
(c) Level the aircraft laterally and longitudinally (refer to 08-10).
(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 AT01-326).
(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 AT01-327).

(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).
  (b) Verify fuel selector / shut-off valve is in OFF position.
  (c) Level the aircraft laterally and longitudinally (refer to 08-10).
  (d) Remove glare shield (refer to 31-10).
(2) Ensure ALT1 / BAT switch is in the OFF position.

Up to S/N AT01-326:
(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).
(8) Perform fuel quantity indicating system test as described above.
(9) Reinstall glare shield (refer to 31-10).

From S/N AT01-327:
(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).
(8) Perform fuel quantity indicating system test as described above.
(9) Reinstall glare shield (refer to 31-10).

FUEL QUANTITY INDICATION - MAINTENANCE

<u>WARNING:</u> PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11!

1. <u>General</u>

   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 for further information on maintenance of the Garmin G3X Touch system.

2. <u>Fuel Quantity Sensor Removal/Installation</u>

   A. Remove Fuel Quantity Sensor
      (1) Ensure electrical power to aircraft is OFF.
      (2) Disconnect battery (refer to 24-30).
      (3) Drain wing fuel tank with sensor that is to be removed (refer to 12-11).
      (4) Open access / inspection plate 510 BB / 610 BB to gain access to sensor (refer to 06-30).
      (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.

      <u>CAUTION:</u> 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).
      (7) Perform a fuel quantity indicating system calibration (refer to “Test/Calibration” below).

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 (13.2 gallons) are not gaugeable.

A. Fuel Quantity Indicating System Test
(1) Prepare aircraft
(a) Drain fuel from wing tanks (refer to 12-11).
(b) Verify fuel selector / shut-off valve is in OFF position.
(c) Level the aircraft laterally and longitudinally (refer to 08-10).
(2) Ensure electrical power to aircraft is OFF.
(3) Fill unusable amount 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 fuel level indication reads 0 liters (0 gallons) for both tanks.
(7) Turn BAT switch to the OFF position.
(8) Depending on unusable amount of fuel per tank:
5,2 liter: Add 27,4 liters (7.23 gallons) of fuel to each wing fuel tank.
11,5 liter: Add 24,3 liters (6.41 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) Depending on unusable amount of fuel per tank:
5,2 liter: Check that fuel level indication reads 27±3 liters (7.2±0.8 gallons) for both tanks.
11,5 liter: Check that fuel level indication reads 24±3 liters (6.4±0.8 gallons) for both tanks.
(12) Turn BAT switch to the OFF position.
(13) Depending on unusable amount of fuel per tank:
5,2 liter: Add 27,4 liters (7.23 gallons) of fuel to LH wing fuel tank.
11,5 liter: Add 24,3 liters (6.41 gallons) of fuel to LH wing fuel tank.
(14) Turn BAT switch to the ON position.
(15) Depending on unusable amount of fuel per tank:
5,2 liter: Check that fuel level indication reads 55 liters (14.5 gallons) for LH fuel tank.
11,5 liter: Check that fuel level indication reads 48 liters (12.8 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).
(b) Verify fuel selector / shut-off valve is in OFF position.
(c) Level the aircraft laterally and longitudinally (refer to 08-10).

(2) Ensure electrical power to aircraft is OFF.
(3) Fill unusable amount 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) Depending on unusable amount of fuel per tank:
5,2 liter: Add 13,7 liters (3.62 gallons) of fuel to each wing fuel tank.
11,5 liter: Add 12,1 liters (3.20 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”.
Depending on unusable amount of fuel per tank:
5,2 liter: Enter 13,7 liters (3.62 gallons) in the “Actual Fuel Quantity” field.
11,5 liter: Enter 12,1 liters (3.20 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 points with 5,2 liters unusable fuel per tank (Rotax 912S / Roax 914F):

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)

Calibration points with 11,5 liters unusable fuel per tank (Rotax 912iS):

Calibration Point	**Actual Fuel Qty.** [liters (gallons)]	**Total Fuel** [liters (gallons)]	**Usable Fuel** [liters (gallons)]
1	0,0 (0.00)	11,5 (3.04)	0,0 (0.00)
2	12,1 (3.20)	23,6 (6.24)	12,1 (3.20)
3	24,3 (6.41)	35,8 (9.44)	24,3 (6.41)
4	36,4 (9.61)	47,9 (12.65)	36,4 (9.61)
5	48,5 (12.81)	60,0 (15.85)	48,5 (12.81)

FUEL QUANTITY INDICATION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11!

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 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).
      (3) Drain wing fuel tank with sensor that is to be removed (refer to 12-11).
      (4) Open access / inspection plate 510 BB / 610 BB to gain access to sensor (refer to 06-30).
      (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).
      (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).
(3) Remove glare shield (refer to 31-10).
(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).
(4) Reconnect battery (refer to 24-30).
(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).
(b) Verify fuel selector / shut-off valve is in OFF position.
(c) Level the aircraft laterally and longitudinally (refer to 08-10).
(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).
  (b) Verify fuel selector / shut-off valve is in OFF position.
  (c) Level the aircraft laterally and longitudinally (refer to 08-10).
(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!

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.

D. Refer to SI-AT01-028 for further information on the optional retrofit of a fuel pressure sensor.

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).
(4) Disconnect battery (refer to 24-30).
(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).
(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).

FUEL PRESSURE INDICATION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11!

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. Maintenance is limited to the removal and installation of the fuel pressure sensor.
Refer to 34-25 for further information on maintenance of the Garmin G3X Touch system.

C. Fuel pressure is measured by a differential pressure sensor electrically connected to the GEA 24 engine interface. To avoid damages caused by vibrations, the pressure sensor 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. The following sensor is used:
- UMA T1EU07D (G3X setting: UMA 1EU07D)

2. Fuel Pressure Sensor Removal/Installation

A. Remove Fuel Pressure Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Close fuel selector / shut-off valve.
(3) Remove engine cowling (refer to 71-10).
(4) Disconnect battery (refer to 24-30).
(5) Disconnect electrical connector from sensor.
(6) Remove clamp and fuel hose from dry side of sensor.
(7) Remove fuel hose from wet side of sensor.
(8) Unscrew nut and remove sensor from intercooler strut.
(9) Unscrew fittings from sensor.
(10) Plug sensor ports and fuel hoses to avoid entry of any material.

B. Install Fuel Pressure Sensor
(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 sensor (max. torque 10 Nm [89 in.lbs.] or two full turns past hand tight, whichever happens first).
(4) Install sensor on intercooler strut and secure with nut.
(5) Reconnect fuel hose to wet side sensor fitting (max. torque 15 Nm [133 in.lbs]).
(6) Reconnect fuel hose to dry side sensor fitting and secure with clamp.
(7) Reconnect electrical connector to sensor.
(8) Reconnect battery (refer to 24-30).
(9) Run both fuel pumps and check system for leaks and fuel pressure indication.
(10) Install engine cowling (refer to 71-10).

FUEL PRESSURE INDICATION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11!

1. General

A. Fuel pressure indication is included in the engine monitoring system.
Fuel pressure is measured by a pressure sensor (PT-30GA) electrically connected to the engine data converter (EDC). To avoid damages caused by vibrations, the pressure sensor 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 sensor.
Refer to 77-40 for further information on maintenance of the engine monitoring system.

2. Fuel Pressure Sensor Removal/Installation

A. Remove Fuel Pressure Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Close fuel selector / shut-off valve.
(3) Remove engine cowling (refer to 71-10).
(4) Disconnect battery (refer to 24-30).
(5) Disconnect electrical connector from sensor.
(6) Remove fuel hose from sensor fitting.
(7) Open clamp and remove sensor from engine mount.
(8) Unscrew fitting from sensor.
(9) Plug sensor ports and fuel hoses to avoid entry of any material.

B. Install Fuel Pressure Sensor
(1) Ensure battery is disconnected and electrical power to aircraft is OFF.
(2) Clean all parts carefully. Apply Loctite (medium strength) on sensor thread.
(3) Install fitting to sensor (max. torque 10 Nm [89 in.lbs.] or two full turns past hand tight, whichever happens first).
(4) Reconnect fuel hose to sensor fitting (max. torque 15 Nm [133 in.lbs]).
(5) Install sensor on engine mount with clamp.
(6) Reconnect electrical connector to sensor.
(7) Reconnect battery (refer to 24-30).
(8) Run electrical fuel pump(s) and check system for leaks and fuel pressure indication.
(9) Install engine cowling (refer to 71-10).

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!

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 pressure in the airbox. Airbox pressure measurement is included in the engine management system (EMS).

B. Maintenance is limited to the removal and installation of the fuel pressure sensor.
Refer to 34-25 for further information on maintenance of the Garmin G3X Touch system.
Refer to 77-10 for further information on maintenance of the airbox pressure sensors.

C. Fuel pressure is measured by a pressure sensor installed in the fuel line at the fuel pressure regulator and electrically connected to the GEA 24 engine interface.
The following sensor is used:
- Rotax 664365
(G3X setting: custom / calibration: 0.5 V - 1.0 bar; 2.5 V - 6.0 bar / reference: manifold pressure)

2. Fuel Pressure Sensor Removal/Installation

A. Remove Fuel Pressure Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Close fuel selector / shut-off valve.
(3) Remove engine cowling (refer to 71-10).
(4) Disconnect battery (refer to 24-30).
(5) Disconnect electrical connector from sensor.
(6) Hold the banjo bolt at fuel pressure regulator with a wrench to prevent it from turning. Then unscrew and remove sensor from banjo bolt.
(7) Plug sensor and banjo bolt ports to avoid entry of any material.

B. Install Fuel Pressure Sensor
(1) Ensure battery is disconnected and electrical power to aircraft is OFF.
(2) Clean sensor thread carefully. Apply Loctite (medium strength) on sensor thread.
(3) Install sensor to banjo bolt at fuel pressure regulator. Torque to 15 Nm (133 in.lbs) while holding the banjo bolt with a wrench to prevent it from turning.
(4) Reconnect electrical connector to sensor.
(5) Reconnect battery (refer to 24-30).
(6) Run both fuel pumps and check system for leaks and fuel pressure indication.
(7) Install engine cowling (refer to 71-10).

FUEL FLOW INDICATION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11!

1. General

A. Fuel flow is measured by two FT-60 fuel flow sensors: One installed in the fuel supply line, the other one in the return line. Both sensors 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 sensors 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 sensors are electrically connected to the GEA 24 engine interface.

B. Maintenance is limited to the removal and installation of the fuel flow sensor and the fuel flow differential module. Refer to 77-40 for further information on maintenance of the engine monitoring system.

2. Fuel Flow Sensor Removal/Installation

A. Remove Fuel Flow Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Close fuel selector / shut-off valve.
(3) Remove engine cowling (refer to 71-10).
(4) Disconnect battery (refer to 24-30).
(5) Disconnect electrical connector from sensor.
(6) Remove fuel hose from sensor fitting.
(7) Remove 2 screws securing sensor to mounting bracket.
(8) Remove elbow fitting from sensor fitting.
(9) Remove sensor from aircraft and unscrew fittings from sensor.
(10) Plug sensor ports and fuel lines to avoid entry of any material.

B. Install Fuel Flow Sensor
(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 sensor and fuel lines immediately before installation.

CAUTION: DO NOT ALLOW HIGH AIR PRESSURE TO PASS THROUGH THE FLOW SENSOR!

(3) Install fittings to sensor (max. torque 20 Nm [177 in.lbs.] or two full turns past hand tight, whichever happens first).
(4) Position sensor on mounting bracket and connect sensor fitting to fuel line elbow fitting (max. torque Ø10mm line 30 Nm [266 in.lbs] / Ø8mm line 20 Nm [177 in.lbs]).
(5) Secure sensor to mounting bracket using 2 screws, washers and nuts.
(6) Reconnect fuel hoses to sensor fittings (max. torque 30 Nm [266 in.lbs]).

(7) Reconnect electrical connector to sensor.
(8) Reconnect battery (refer to 24-30).
(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 sensors are calibrated by a K-factor. The K-factor represents the number of electrical pulses output by the fuel flow sensor 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).
(11) Perform ground run and check fuel flow indication is proper for engine operation.
(12) Check sensor 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).
(3) Remove glare shield (refer to 31-10).
(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).
(4) Reconnect battery (refer to 24-30).
(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.

FUEL FLOW INDICATION - MAINTENANCE

WARNING: PERFORM ALL FUEL SYSTEM MAINTENANCE IN ACCORDANCE WITH SAFETY PRECAUTIONS CONTAINED IN 12-11!

1. General

   A. Fuel flow is calculated by the engine control unit (ECU) based on the injection times and forwarded to the G3X Touch system via CAN interface.

   B. No sensors are installed for fuel flow measurement. The following setting is used for fuel flow indication on the Garmin G3X Touch:
   - Rotax FADEC

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 / Rotax 912iS) 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 $\pm$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 / Rotax 912iS) 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 (Rotax 914F only), LANE A/B (Rotax 912iS only), ENG BACKUP PWR (Rotax 912iS only) and ignition switches are OFF and the throttle is closed.
(2) Remove upper engine cowling (refer to 71-10).
(3) Remove screws securing spinner dome to spinner bulkhead and remove spinner.
(4) Remove alternator belt from alternator pulley (refer to 24-20).
(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).
(10) Install upper engine cowling (refer to 71-10).
(11) Carry out a functional test (refer to 61-20).

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).
(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

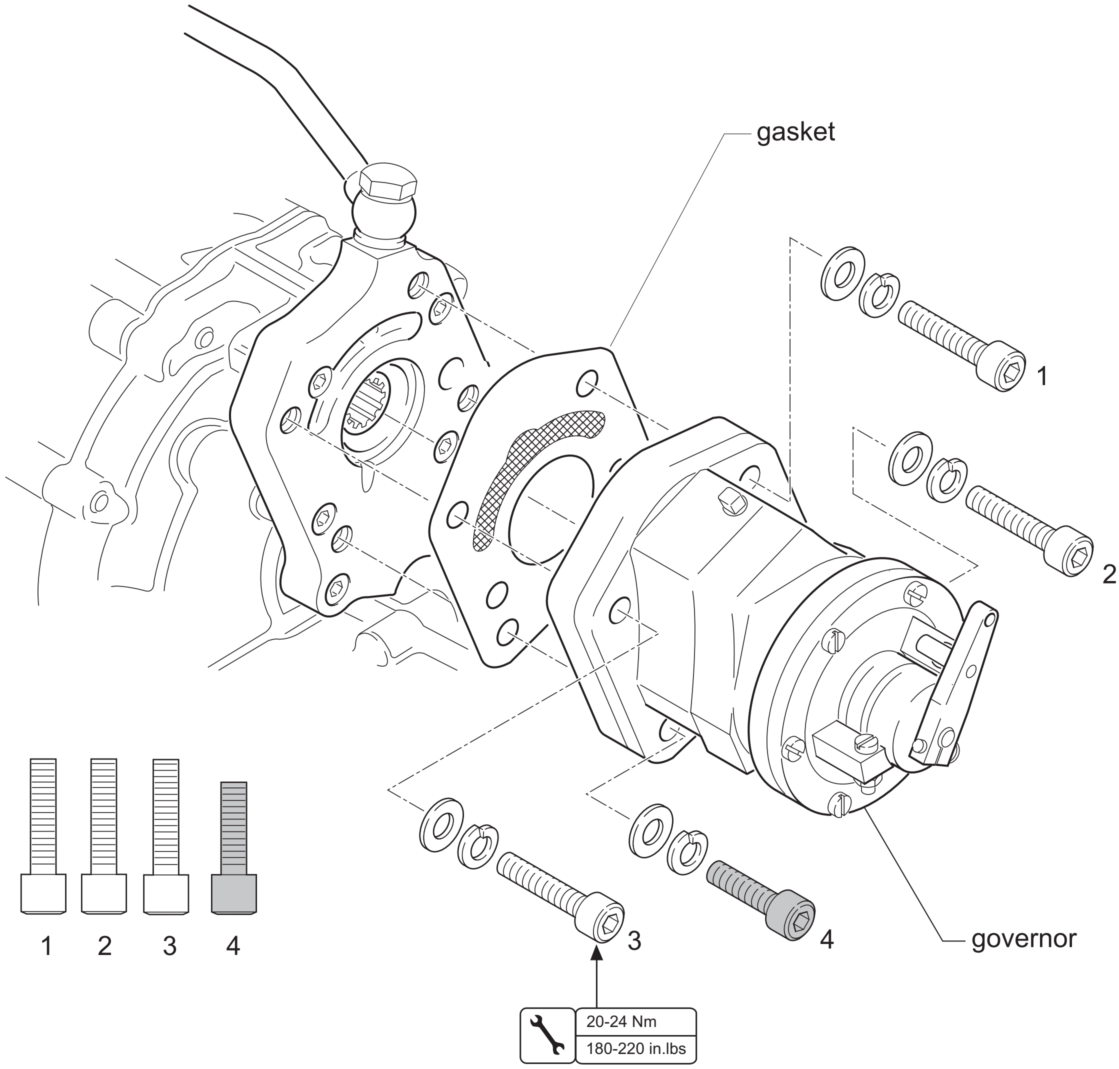
   A. The necessary pressure to adjust the propeller is achieved by a gear pump in the governor which increases engine oil pressure. A flyweight and a speeder spring move a valve, allowing oil flow to and from the piston in the propeller. In on-speed condition there is no oil flow. A speed-adjusting lever 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).
      (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).
(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).
(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).

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).
(2) Remove access panels 211 FT, 211 FB and 211 EC (refer to 25-12).
(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).
(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 (Rotax 912S / 914F) / approx. 2240 rpm (Rotax 912iS).

(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).
(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 (Rotax 912S / 914F) / max. 2260 rpm (Rotax 912iS). Slowly move propeller lever forward. If popeller speed is max. 2385 rpm (Rotax 912S / 914F) / max. 2260 rpm (Rotax 912iS) with propeller lever in full forward position governor adjustment is finished. If propeller speed would exceed the given value, mark the position of the propeller lever where propeller speed is 2385 rpm (Rotax 912S / 914F) / 2260 rpm (Rotax 912iS) 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 (Rotax 912S / 914F) / approx. 2240 rpm (Rotax 912iS).
(5) Perform a test-flight. At 130-140 kts with propeller and power levers full forward propeller speed should be max. 2385 rpm (Rotax 912S / 914F) / max. 2260 rpm (Rotax 912iS).

CHAPTER 71

POWER PLANT

TABLE OF CONTENTS

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® 912S3 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 912S3 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	84 mm (3.31 in)
Stroke	61 mm (2.40 in)
Displacement	1352 cm^3 (82.5 in^3)
Compression ratio	10,8:1
Firing order	1-4-2-3
Direction of rotation (looking at p.t.o. side)	counterclockwise
Acceleration limitation	-0,5 g (max. 5 sec.)
Min. oil pressure (below 3500 rpm)	0,8 bar (12 psi)
Max. oil pressure (short period at cold start)	7,0 bar (101 psi)
Normal oil pressure (above 3500 rpm)	2,0 - 5,0 bar (29 - 73 psi)
Max. oil temperature	130 °C (266 °F)
Min. oil temperature	50 °C (122 °F)
Norm. operating oil temperature	90 - 110 °C (194 - 230 °F)
Max. cylinder head/coolant temperature	120 °C (248 °F)
Max. exhaust gas temperature	880 °C (1616 °F)
Min. fuel pressure	0,15 bar (2.2 psi)
Max. fuel pressure	0,40 bar (5.8 psi)
	0,50 bar (7.3 psi) - fuel pump from S/N 11.0036

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® 912 iSc3 Sport engine. It is a four cylinder, four stroke, horizontally opposed engine with manifold injection. The 912 i Series has liquid cooled cylinder heads and ram air cooled cylinders; this engine also has a fully redundant, electronic engine management system (EMS) including fuel injection and map-controlled ignition. Dry sump forced lubrication ensures constant oil pressure. The propeller is driven via a reduction gear with integrated shock absorber and overload clutch. 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 912 iSc3 Sport engine are given below:

Certification	EASA CS-E (TC No. EASA.E.121)
Take-off performance (ISA)	73,5 kW at 5800 rpm (max. 5 min)
Max. continuous performance	72 kW at 5500 rpm
Number of cylinders	4
Bore	84 mm (3.31 in)
Stroke	61 mm (2.40 in)
Displacement	1352 cm^3 (82.5 in^3)
Compression ratio	10,8:1
Firing order	1-4-2-3
Direction of rotation (looking at p.t.o. side)	counterclockwise
Acceleration limitation	-0,5 g (max. 5 sec.)
Min. oil pressure (below 3500 rpm)	0,8 bar (12 psi)
Max. oil pressure (short period at cold start)	7,0 bar (101 psi)
Normal oil pressure (above 3500 rpm)	2,0 - 5,0 bar (29 - 73 psi)
Max. oil temperature	130 °C (266 °F)
Min. oil temperature	50 °C (122 °F)
Norm. operating oil temperature	90 - 110 °C (194 - 230 °F)
Max. coolant temperature	120 °C (248 °F)
Max. exhaust gas temperature	950 °C (1742 °F)
Min. fuel pressure (above airbox pressure)	2,8 bar (41 psi)
Max. fuel pressure (above airbox pressure)	3,2 bar (46 psi)
Acceptable fuel pressure exceedance	2,5 - 3,5 bar (36 - 51 psi) (max. 3 sec.)

C. Components

(1) Electric System
This system is responsible for supplying the engine management system (EMS) and the airframe with electrical power. It consists of the fusebox with regulators and the internal generators.

(2) Internal Generators A and B
The two generators (generator A and generator B) are electrically isolated and mounted on one stator. Each generator is connected with a regulator mounted on the fusebox. The fusebox takes care of the energy management and allows selecting whether the EMS is supplied by an external power source (e.g battery) or one of the generators. The selection which of the generators is powering the EMS depends on the engine status and can only be done by the engine control unit (ECU).
During the engine start an external power source is needed to power the EMS. After the engine speed is high enough to power the EMS with generator B, the external power source is only required for running the engine in emergency situations. If a defined engine speed threshold has been reached for a certain time generator A takes over to supply the EMS. After this, generator B can be used to supply the airframe (e.g. instrumentation). In no operation state generator A can be used to supply the airframe.
In case of a malfunction of generator A the internal electric supply system changes to fail-safe mode where generator B again is in charge to supply the EMS. In fail-safe mode generator B is not able to charge external power sources or supply the airframe.
The EMS is not capable of supervising the power provided to the airframe. If the EMS is powered by generator A and generator B fails no indication is provided from engine side.

(3) 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.

(4) Engine Management System
The engine management system (EMS) has the following main functionality:
• Ignition control
• Fuel injection control
• Fault detection
• (Internal-) Generator management
Parts of the EMS are sensors, actuators, the engine control unit (ECU) and the wiring harness. The core of the EMS is the engine control unit (ECU), which consists of two modules. These modules will be denoted by Lane A and Lane B, each one capable of taking over control, regulation and monitoring of the engine. In error-free engine operation, both Lanes are turned ON. During engine control by Lane A, Lane B ensures that the engine operation can be maintained even after a failure or reduced functionality of Lane A. Depending on the activity and the failure status of the two Lanes, the ECU automatically selects a Lane to take over control of the engine. A huge quantity of sensors (e. g. sensors for measuring the pressure in the airbox) and actuators (e. g. ignition coils) of the engine are designed with redundancy. In this case, each of the sensors or actuators is connected to a Lane, so that the two Lanes have the same measurement values and send the same output signals.

Nonredundant sensors (e. g. oil pressure sensors) are connected to one Lane only and serve for the expanded monitoring of the engine functionality. Due to an ECU internal communication, these sensor values will be exchanged between the two Lanes (assuming that both Lanes are active and free of errors).

(5) Ignition System
The engine is equipped with 4 double ignition coils. The ignition system is almost entirely wear-free, as the ECU generates and processes the ignition signal electronically.

(6) Fuel Injection
The engine is equipped with an electronic fuel injection system. This system is controlled by the ECU and enables highly accurate metering of the fuel according to operating and load conditions, whilst at the same time also taking ambient conditions into account. The key input variables are throttle valve position, engine speed signal, intake air temperature, ambient pressure, manifold pressure and exhaust temperature (fuel pressure is not taken into account). Ultimately, the required fuel quantity or injection period is determined on the basis of the calculated air density in the airbox. It is monitored continuously.

(7) 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.

(8) 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.

(9) 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® 914F3 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 914F3 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	79,5 mm (3.13 in)
Stroke	61 mm (2.40 in)
Displacement	1211cm³ (73.9 in³)
Compression ratio	9,0:1
Firing order	1-4-2-3
Direction of rotation (looking at p.t.o. side)	counterclockwise
Acceleration limitation	-0,5 g (max. 5 sec.)
Min. oil pressure (below 3500 rpm)	0,8 bar (12 psi)
Max. oil pressure (short period at cold start)	7,0 bar (101 psi)
Normal oil pressure (above 3500 rpm)	2,0 - 5,0 bar (29 - 73 psi)
Max. oil temperature	130 °C (266 °F)
Min. oil temperature	50 °C (122 °F)
Normal operating oil temperature	90 - 110 °C (194 - 230 °F)
Max. cylinder head/coolant temperature	120 °C (248 °F)
Max. exhaust gas temperature	950 °C (1742 °F)
Min. fuel pressure (above airbox pressure)	0,15 bar (2.2 psi)
Max. fuel pressure (above airbox pressure)	0,35 bar (5.1 psi)

EFFECTIVITY
Aircraft equipped with Rotax 914F 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) 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).
   (3) Remove battery from aircraft (refer to 24-30).
   (4) Drain engine oil, fuel and coolant (refer to chapters 28, 75 and 79).
   (5) Disconnect engine / propeller control Bowden cables at engine / propeller governor.
   (6) Remove spinner, propeller and governor (refer to chapter 61).
   (7) Rotax 912S: Disconnect fuel supply hose at firewall and return hose at engine.
   Rotax 912iS / 914F: Disconnect fuel supply and return hoses from engine.
   Remove hose(s) to fuel pressure sensor or fuel pressure sensor from engine.
   (8) Rotax 912S / 914F: Disconnect manifold pressure sensor line at engine.
   (9) Disconnect air hoses from airbox, cooling air baffle, heat exchanger on exhaust muffler and turbocharger (Rotax 914F only).
   (10) Disconnect coolant hose to overflow bottle at expansion tank.
   (11) Disconnect coolant lines at engine and remove tubing and radiator from aircraft.
   (12) Disconnect oil lines at engine and remove tubing and radiator from aircraft.
   If installed: Disconnect hose to oil pressure sensor from engine.
   (13) Rotax 912S / 914F: Disconnect fuel drain lines at engine and remove tubing from aircraft.
   (14) Remove exhaust assembly from aircraft (refer to 78-00).
   (15) Disconnect electrical cables to engine, alternator and sensors at connector or suitable place.

   NOTE: The wire connectors of the Rotax 912iS ECU must not be opened and closed more than 20 times! This must be shown on the device by a clearly visible label with a printed numerical sequence (1-20) and by documentation conforming to selfmonitoring guidelines.

   (16) Remove wiring harness and bonding cables from engine.
   (17) Lift engine just enough to relief weight from engine mounts.
   (18) Remove nuts, washers, and bolts securing engine to AQUILA engine mount.
   (19) 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).

NOTE: Rotax 912S engines use a restricting orifice in the fuel return line to maintain fuel pressure. This orifice is installed inside a banjo bolt at the fuel manifold on top of the engine. New engines are supplied with a 0,35 mm restrictor as standard, the restrictor size is marked on top of the banjo bolt. It has to be replaced by a 0,25 mm restrictor at engine installation. The marking must also be replaced.
Refer also to SI-AT01-008 and SI-AT01-018, annex 11.

(1) Hoist engine into alignment with AQUILA engine mount attach points.
(2) Assemble engine shock mounts.
(3) Install bolts, washers, and nuts connecting both engine mounts. Torque to 25 Nm (221 in.lbs).
(4) Reinstall exhaust assembly to aircraft (refer to 78-00).
(5) Reinstall governor to engine (refer to 61-20).
(6) Reconnect fuel supply and return hoses.
Reinstall fuel pressure sensor / sensor hose(s) to engine.
(7) Rotax 912S / 914F: Reconnect manifold pressure sensor line at engine.
(8) Reconnect oil lines to engine and reinstall tubing and radiator to aircraft (refer to 79-20).
If installed: Reconnect oil pressure sensor hose to engine.
(9) Reconnect coolant lines to engine and reinstall tubing and radiator to aircraft (refer to 75-00).
(10) Reconnect coolant hose to overflow bottle at expansion tank.
(11) Reconnect air hoses to airbox, cooling air baffle, heat exchanger on exhaust muffler and turbocharger (Rotax 914F only).
(12) Rotax 912S / 914F: Reconnect fuel drain lines to engine and reinstall tubing to aircraft.
(13) Reconnect / adjust engine / propeller control Bowden cables (refer to 61-20, 71-60 and 76-00).
(14) Reinstall wiring harness and bonding cables to engine.
(15) Reconnect electrical cables to engine, alternator and sensors.

NOTE: The wire connectors of the Rotax 912iS ECU must not be opened and closed more than 20 times! This must be shown on the device by a clearly visible label with a printed numerical sequence (1-20) and by documentation conforming to selfmonitoring guidelines.

(16) Reinstall propeller and spinner (refer to 61-10).
(17) Replenish engine oil and coolant (refer to 12-12 and 12-14).
(18) Reinstall battery (refer to 24-30).
(19) Install engine cowling (refer to 71-10).
(20) Perform operational check (refer to 05-20).
(21) Perform visual check for signs of leakage.

3. Engine Cleaning

   A. For engine cleaning procedures, refer to 12-23.

4. Engine Storage

   A. If the engine is being removed for storage purposes, it should be preserved. The engine operator's manual, section 8, contains information on preservation techniques.

COWLING - MAINTENANCE

1. General

A. The engine cowling is made from laminated fiberglass / carbon fiber 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 top cover 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) Rotax 912iS: Disconnect electrical cable to ambient air pressure and temperature sensor (AAPTS) at connector.
(10) 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.

(11) Release Camloc quick-release fasteners securing lower cowl to fuselage.
(12) Remove lower cowl from aircraft.

B. Install Engine Cowling

(1) Close canopy.
(2) Rotate propeller to horizontal position.

CAUTION: DO NOT ROTATE THE PROPELLER CLOCKWISE.

(3) Put lower cowl in position and fasten to fuselage with Camloc quick-release fasteners.
(4) Position end cover plate on bottom of lower cowl and secure with Camloc quick-release fasteners.
(5) Fasten radiator and oil cooler to lower cowl with Camloc quick-release fasteners.
(6) Connect electrical cable to landing light at connector.
(7) Rotax 912iS: Connect electrical cable to ambient air pressure and temperature sensor (AAPTS) at connector.
(8) Rotax 912: Install top cover to induction air filter casing and secure with fokker needles.
Rotax 914: Fasten induction air filter casing to lower cowl with Camloc quick-release fasteners.
(9) 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).
   (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) Rotax 912iS: Remove fusebox, ECU and mounting bracket from aircraft (refer to 76-00).
   (8) Remove nose landing gear assembly and support strut from aircraft (refer to chapter 32).
   (9) 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) Rotax 912iS: Reinstall fusebox, ECU and mounting bracket (refer to 76-00).
   (6) Install overflow bottle and drain line to engine mount (refer to 75-10).
   (7) Install oil tank and drain line to engine mount (refer to 79-10).
   (8) Reconnect all ground cables to engine mount.
   (9) 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.

   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. Induction air enters the engine airbox via the air intake, the induction air filter 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.

   B. An alternate air inlet is provided in case the air filter is blocked. The flap valve is located on top of the air filter casing. It is manually controlled from the cabin by pulling the ALTERNATE AIR control knob. The valve opens an alternate air inlet and allows air from inside the cowling to flow to the engine airbox.

2. Maintenance Instructions

   A. Induction Air Filter
   For induction air filter servicing, refer to 12-13.

   B. Alternate Air Control Adjustment / Check
   Always ensure the flap for alternate air is fully closed with the ALTERNATE AIR control knob pushed in.
   (a) Adjust the correct position of valve flap by changing the length of the Bowden cable wire.
   (b) Adjust Bowden cable, so that with the ALTERNATE AIR knob pushed in, the alternate air valve closes completely (only fresh air from outside the cowling).
   (c) Check that with the ALTERNATE AIR knob pulled out, the alternate air valve opens 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.

   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.

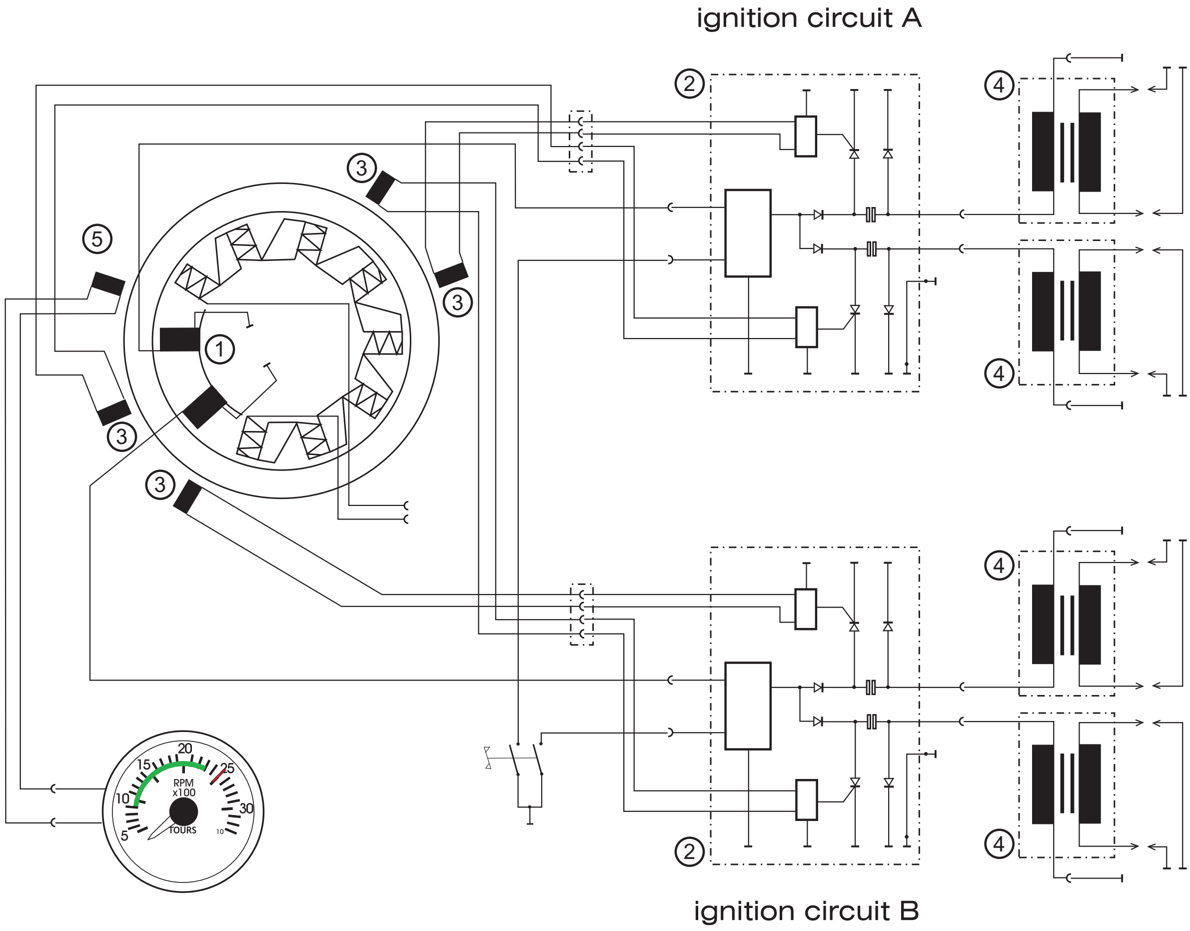
2. General Description

   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

EFFECTIVITY

Aircraft equipped with Rotax 912S / 914F engine

IGNITION SYSTEM - GENERAL

1. Introduction

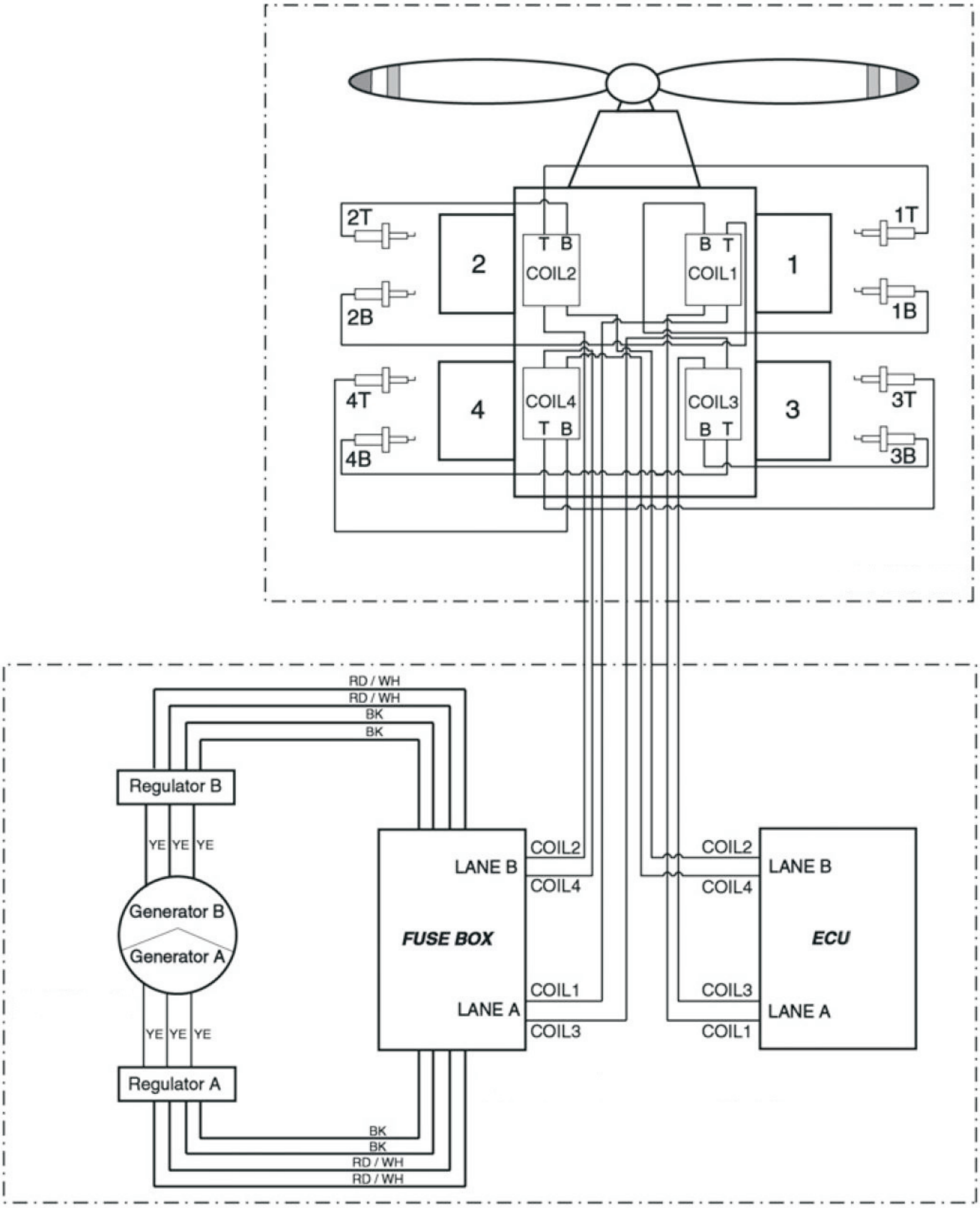
   A. This chapter describes those units and components which generate, distribute and control an electrical current to ignite the fuel air mixture in the engine cylinders.

2. General Description

   A. The engine is equipped with 4 double ignition coils. The ignition system is almost entirely wear-free, as the engine control unit (ECU) generates and processes the ignition signal electronically.

   The ignition unit operates with 4 double ignition coils with double ignition. If the LANE selector switches are both ON, the active LANE controls all 4 double ignition coils which are connected to the 8 spark plugs. In normal Dual LANE Mode (both ON), both spark plugs ignite each cylinder at the same time. In LANE A or LANE B Mode, only one spark plug ignites per cylinder (one LANE switched OFF).

   The ignition unit does not require an external power supply. In normal operation generator A is supplying the double ignition coils via the fuse box. Generator B charges the battery via the fuse box. When engine is started at first generator B supplies the double ignition coils. If throttle is opened and engine revs more than 2500 rpm for a few seconds, the fuse box switches to generator A to supply the double ignition coils and generator B charges the battery. If more electric energy for the non-engine consumers of the aircraft is needed, the external alternator is used.



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.

2. SMD-Electronic Module Removal/Installation

   A. Remove SMD-Electronic Module
      (1) Remove upper engine cowling (refer to 71-10).
      (2) Remove battery from aircraft (refer to 24-30).
      (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).
      (4) Install upper engine cowling (refer to 71-10).

3. Double Ignition Coil Assembly Removal/Installation

   A. Remove Double Ignition Coil Assembly
      (1) Remove upper engine cowling (refer to 71-10).
      (2) Remove battery from aircraft (refer to 24-30).
      (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).
(6) Install engine cowling (refer to 71-10).

4. Spark Plug Removal/Installation

A. Remove Spark Plug
(1) Remove engine cowling (refer to 71-10).
(2) Disconnect battery (refer to 24-30).
(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).
(6) Install engine cowling (refer to 71-10).

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.

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 i Series.

   C. For inspection time requirements of the ignition system components, refer to 05-20.

2. Spark Plug Removal/Installation

   A. Remove Spark Plug
      (1) Ensure ALT1/BAT, LANE A/B, ENG BACKUP and ignition switches are OFF.
      (2) Remove engine cowling (refer to 71-10).
      (3) Disconnect battery (refer to 24-30).
      (4) Remove spark plug connector from spark plug.

   CAUTION: COVER SPARK PLUG HOLE TO PREVENT ENTRY OF FOREIGN MATERIALS.

      (5) Unscrew spark plug and store according to cylinder and position.

   B. Install Spark Plug

   NOTE: Always renew both spark plugs of a cylinder and do not interchange spark plugs between cylinders.

   NOTE: Silicone heat compound at the ground electrode or the head area can lead to ignition problems. Apply heat compound sparingly and do not apply to the first three threads.

      (1) Clean spark plug and spark plug seat as required. Inspect electrode gap.
      (2) Apply a small amount of silicone heat compound to spark plug thread.
      (3) Install spark plug to engine. Torque 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).
      (6) Install engine cowling (refer to 71-10).

3. Inspection/Check

   A. Spark Plugs
      (1) 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.

Face appearance:	**Indicates the following:**
Light tan-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:	- Damaged valve stem seal; - Misfiring; - Too much oil in combustion chamber; - Worn cylinder and piston rings;
White with melt droplets:	- Mixture too lean; - Leaking valves;

(5) Inspect spark plug electrode gap. Renew spark plug if required.

NOTE: 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 i-013.

NOTE: Spark plugs are already gapped upon delivery. No adjustment of the gap is necessary nor allowed.

Spark plug	**Electrode gap:**	**New**	**Wear limit**
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.

CHAPTER 75

COOLING SYSTEM

TABLE OF CONTENTS

COOLING SYSTEM - GENERAL

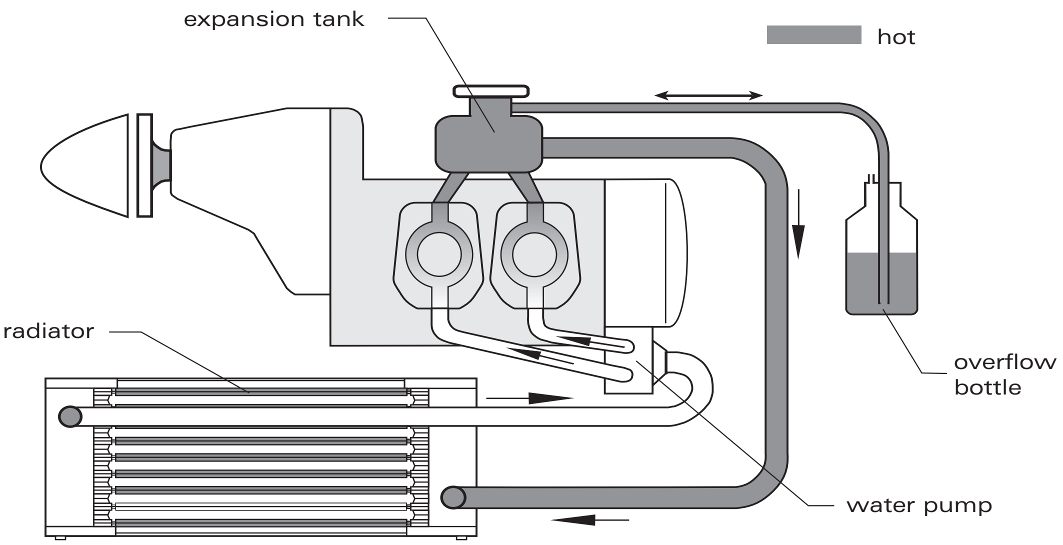
1. Introduction

   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.

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 (Rotax 912 / 914) / cylinder head 4 (Rotax 912 iS).

C. Optional winterization kits are provided for cold weather operations. Refer to 75-00-01.

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.

2. Radiator Removal/Installation

A. Remove Radiator
(1) Remove engine cowling (refer to 71-10).
(2) When engine is cold, open pressure cap of the expansion tank and lowest coolant hose on the radiator and drain the coolant.
(3) Disconnect remaining hose at radiator.
(4) Remove bolts securing radiator to mounting plate.
(5) Remove radiator from aircraft.

B. Install Radiator
(1) Secure radiator to mounting plate using bolts, washers and spacers.
(2) Connect inlet and outlet hoses at radiator. Position radiatior at its final position within engine cowling prior to final installation of spring clamps.
(3) Replenish engine coolant as required (refer to 12-14).
(4) Install engine cowling (refer to 71-10).
(5) Perform an engine run and check radiator and connections for leaks.

3. Overflow Bottle Removal/Installation

A. Remove Overflow Bottle
(1) Remove engine cowling (refer to 71-10).
(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) Replenish engine coolant as required (refer to 12-14).
   (4) Install engine cowling (refer to 71-10).

4. <u>Expansion Tank Removal/Installation</u>

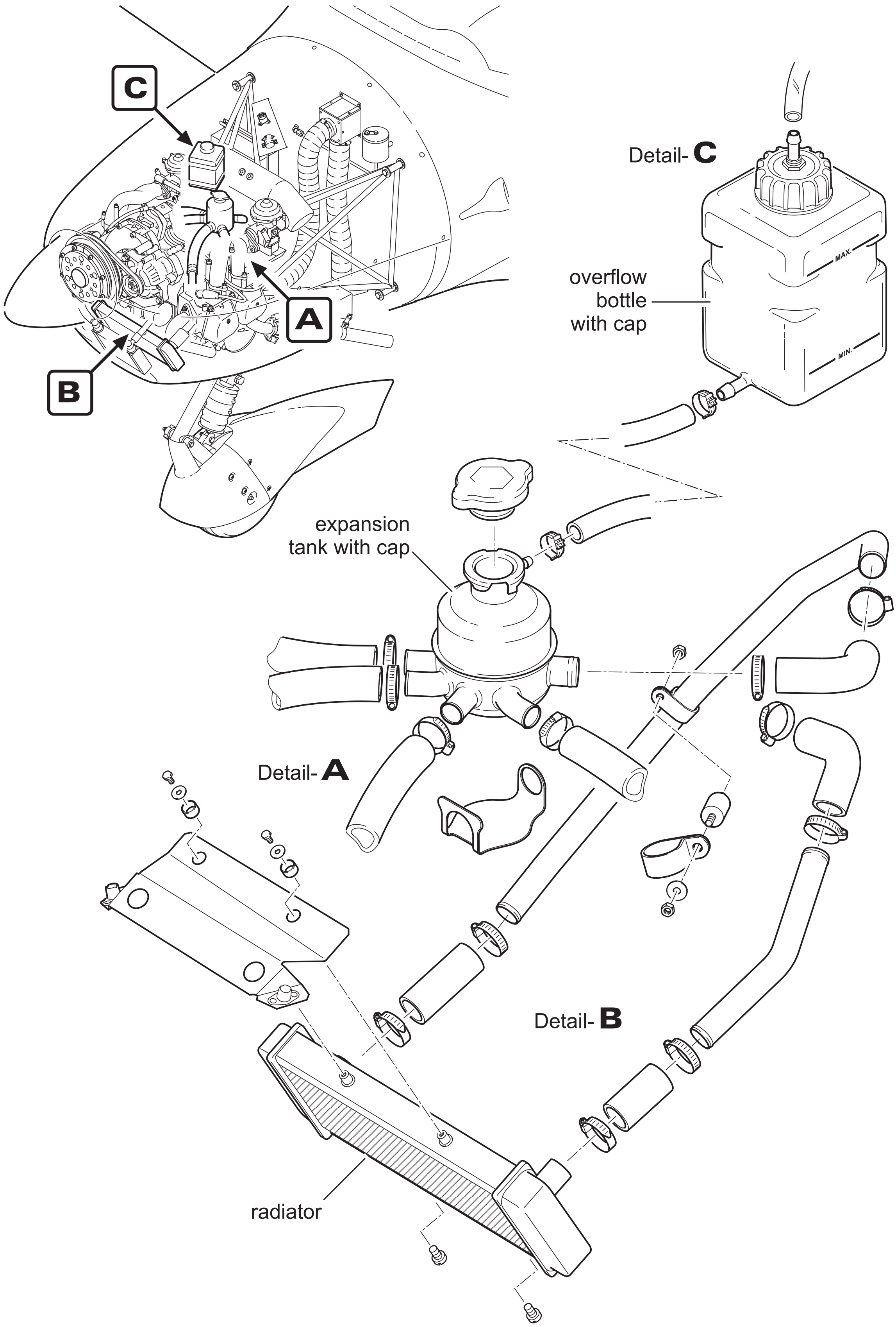
A. Remove Expansion Tank
   (1) Remove engine cowling (refer to 71-10).
   (2) Drain coolant as required either at water pump or radiator.
   (3) Remove all hoses connected to expansion tank.
   (4) Remove expansion tank from engine.

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).
   (4) Install engine cowling (refer to 71-10).
   (5) Perform an engine run and check expansion tank and connections for leaks.

5. <u>Inspection/Check</u>

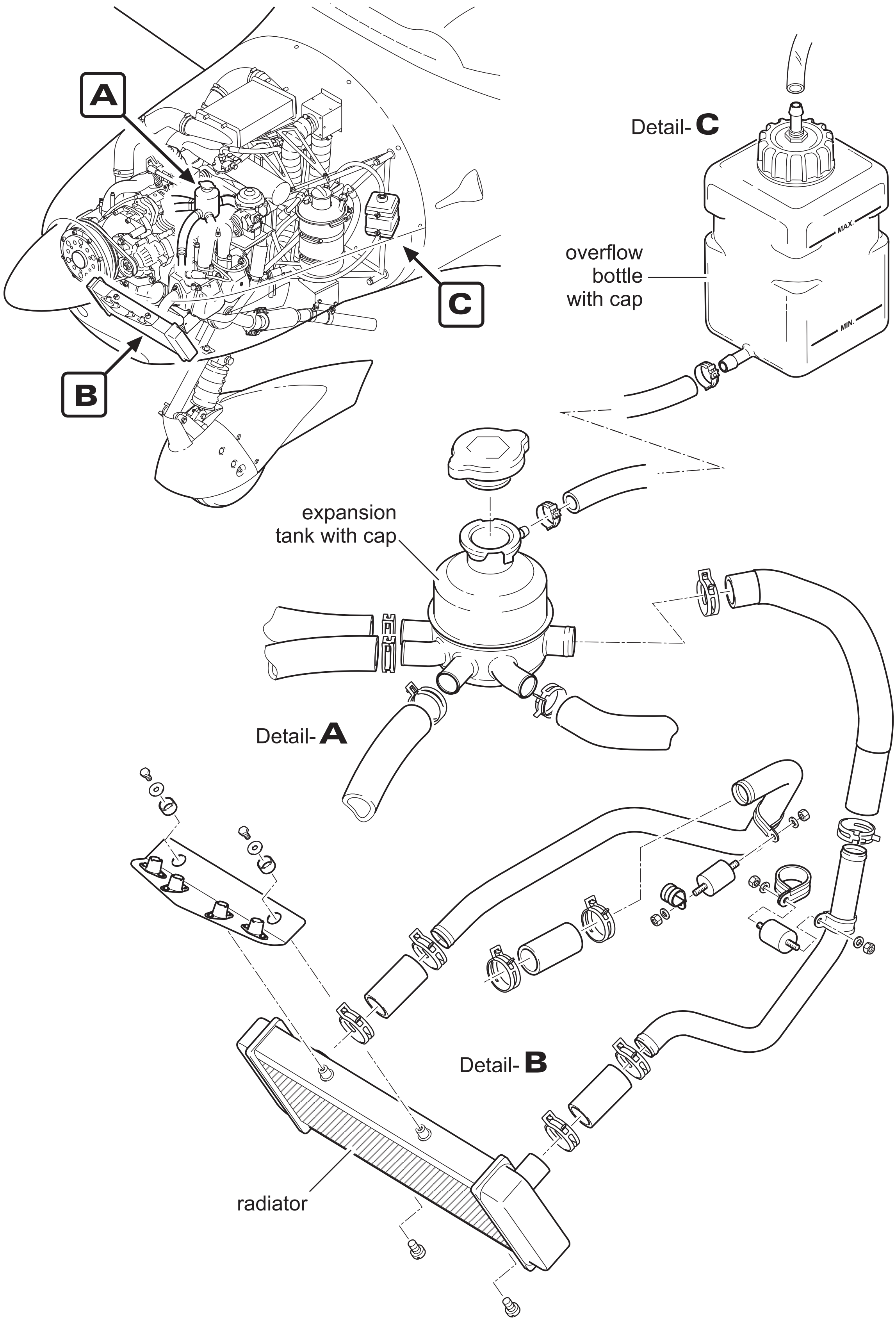
A. Engine Cooling System
   (1) Inspect all coolant hoses for damage through heat, cracking, wear and evidence of leaking.
   (2) Check all connections on cylinder head top- and bottom sides and on the water pump.
   (3) Check expansion tank for damages and leaks. Check protection rubber at bottom of the tank for tight fit.
   (4) Check pressure control valve and return valve in expansion tank cap. The pressure control valve opens at 1,2 bar (17.4 psi).
   (5) Check coolant with densimeter or glycol tester. If necessary, replenish with coolant of same composition. Badly discolored or thick coolant must be renewed.

<u>CAUTION:</u> USE COOLANT IN ACCORDANCE TO 12-14 ONLY.



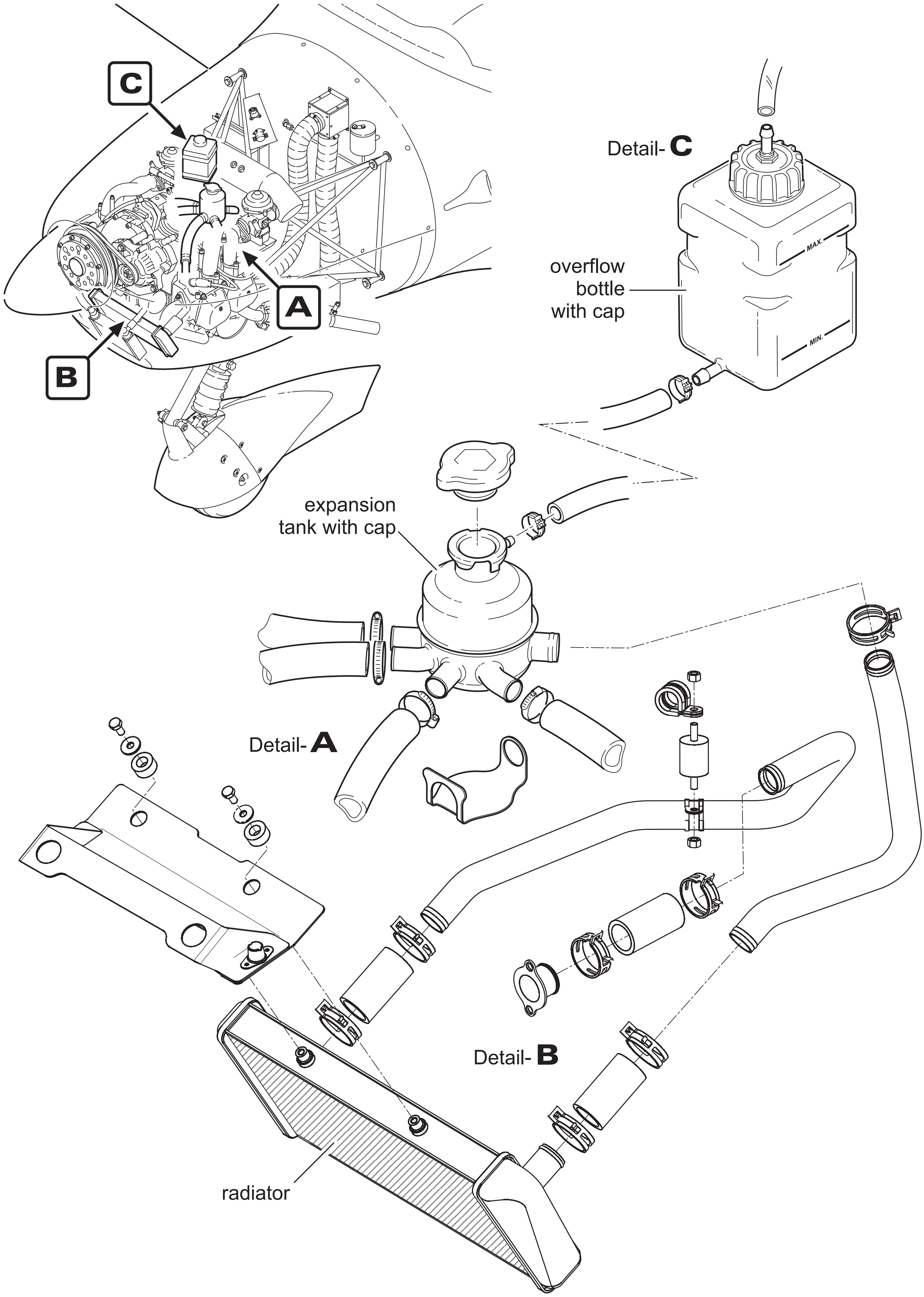
EFFECTIVITY

Aircraft equipped with Rotax 912S engine



EFFECTIVITY

Aircraft equipped with Rotax 914F engine



EFFECTIVITY

Aircraft equipped with Rotax 912iS engine

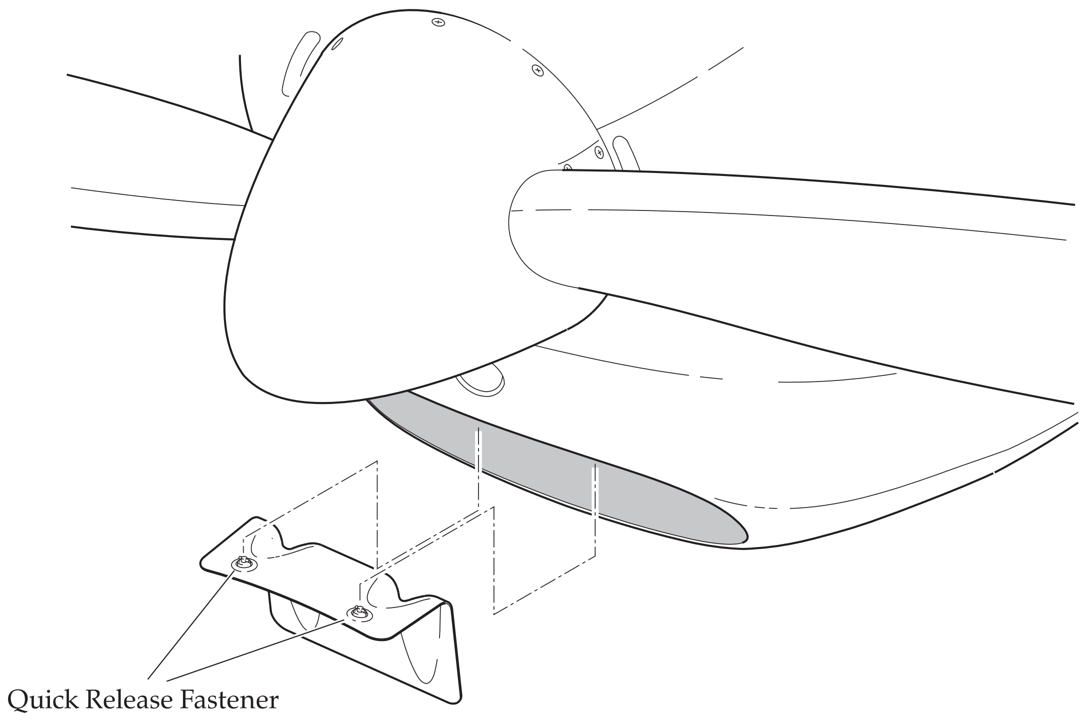
WINTERIZATION KIT - MAINTENANCE

1. General

   A. Optional winter kits are supplied for use in cold weather operations.

   The kits include a special air inlet cover with fasteners, a placard and the appropriate airplane flight manual supplement. The cover should be fitted in front of the oil and coolant radiators as shown in figure 201. This restricts the airflow entering the engine compartment for cooling and provides faster and adequate heating of the engine oil and coolant in cold weather conditions.

   CAUTION: THE MAXIMUM PERMISSIBLE OUTSIDE AIR TEMPERATURE TO PERFORM TAKE-OFF WITH INSTALLED AIR INLET COVER IS GIVEN IN THE AFM SUPPLEMENT AND ON THE PLACARD FOR THE RESPECTIVE COVER AND MUST NOT BE EXCEEDED.



Air Inlet Cover Installation
Figure 201

EFFECTIVITY
Aircraft equipped with a winterization kit

2. Air Inlet Cover Removal/Installation

   A. Install air inlet cover as shown in figure 201.

3. Inspection/Check

   A. Perform the following checks if the air inlet cover is installed.
      (1) Verify the cover is fastened correctly (both quick release fasteners are closed).
      (2) Check the placard delivered with the winterization kit is firmly in place, not damaged and readable.

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 - GENERAL

1. Introduction

   A. This chapter describes and provides maintenance instructions for components and systems used to control the engine. For additional information on engine system components, refer to the respective engine manufacturer's publications.

2. General Description

   A. Engine controls include throttle, propeller and 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 alternate air control knob is to be found in the center console, below the instrument panel.

   Throttle Control
   The throttle control lever is connected via Bowden cable with the throttle valve at the engine airbox. The Bowden cable jackets are attached at both ends to a support bracket which is adjustable on the throttle valve side.

   Propeller Control
   Movement of the propeller speed control lever is transferred to the propeller governor control arm via a Bowden cable.

   Alternate Air
   By pulling the alternate air control knob, a flap valve at the air filter box is operated. The valve allows alternate air from inside the cowling to flow to the airbox. Movement of the alternate air control knob is transferred to the flap valve through a Bowden cable.

   B. The engine is equipped with a fully redundant electronic engine management system (EMS) for fuel injection control, ignition control, fault detection and (internal) generator management. The EMS primarily consists of the engine control unit (ECU), sensors, the EMS power supply, the fuse box, switches and the system wiring.

   Engine Control Unit (ECU)
   The ECU is the central module in the engine management system. Sensors continuously measure pressure, rotation speed, temperature, load and knock signals and send these measurement values to the ECU. The digital ECU uses these measurement values to determine not only the mixture but also the optimum injection point for the fuel and ignition points specifically for each cylinder. The ECU is located on a mounting bracket on the left side of the engine mount.

   The ECU consists of two modules: These modules are denoted by Lane A and Lane B, each one capable of taking over control, regulation and monitoring of the engine. In error-free engine operation, both Lanes are turned ON. During engine control by Lane A, Lane B ensures that the engine operation can be maintained even after a failure or reduced functionality of Lane A. Depending on the activity and the failure status of the two Lanes, the ECU automatically selects a Lane to take over control of the engine.

A huge quantity of sensors (e. g. sensors for measuring the pressure in the airbox) and actuators (e. g. ignition coils) of the engine are designed with redundancy. In this case, each of the sensors or actuators is connected to a Lane, so that the two Lanes have the same measurement values and send the same output signals. Nonredundant sensors (e. g. oil pressure sensors) are connected to one Lane only and serve for the expanded monitoring of the engine functionality. Due to an ECU internal communication, these sensor values will be exchanged between the two Lanes (assuming that both Lanes are active and free of errors).

Communication Interfaces
Each Lane has a maintenance and a display interface (CANbus). While the maintenance interface is required to work with the B.U.D.S. Aircraft Diagnostic Software to perform various diagnostic and maintenance activities, the display CAN interface enables the connection of a display for visualization of engine parameters.

For engines of the ROTAX 912 i Series, the B.U.D.S. Aircraft Diagnostic Software is available. This provides not only the reading of ECU logs, it also provides a variety of functionality to support troubleshooting of the engine. To start this software and connect the engine with a computer a B.U.D.S. Aircraft Diagnostic Software kit is required. This is a hardware interface that provides different software functionality depending on its version.

Fuse Box
In addition to the ECU, the fuse box is another major component of the EMS. The fuse box with its two rectifier regulators (from generator A and generator B) is responsible for a constant power supply to all EMS components including fuel pump module and the aircraft. The fuse box is located on a mounting bracket on the left side of the engine mount.

AAPTS Sensor
The AAPTS sensor is the all-in-one sensor for engine ambient temperature and engine ambient pressure. It is mounted on the air filter casing in the lower cowling.

ENGINE CONTROLS - MAINTENANCE

1. General

   A. For propeller speed control adjustment/test procedures, refer to 61-20.

   B. For carburetor heat / alternate air control adjustment/test procedures, refer to 71-60.

2. Control Quadrant Disassembly/Assembly

   A. For control quadrant disassembly/assembly, refer to figure 201.

3. Throttle Control Cable Removal/Installation

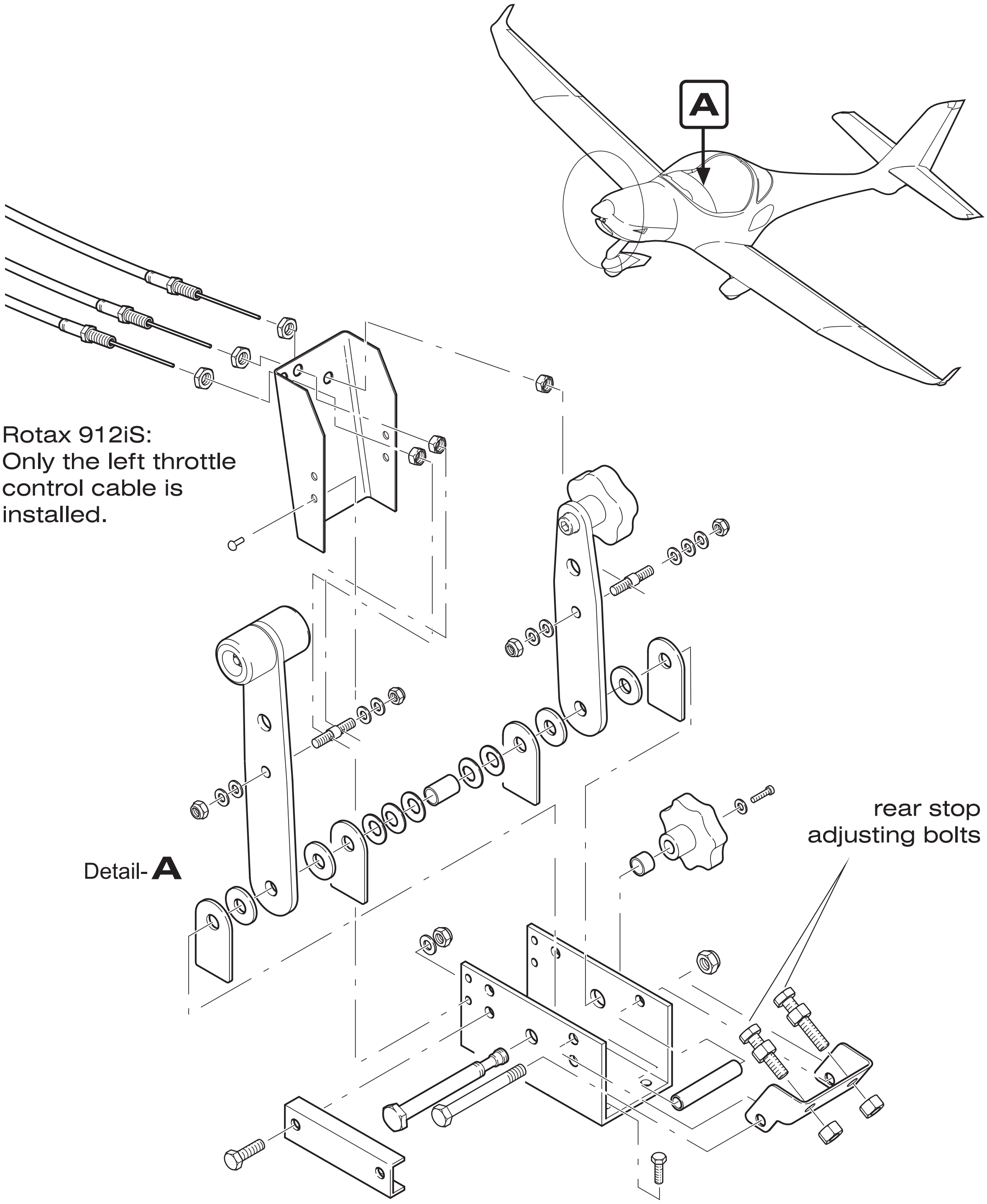
   WARNING: WHEN A THROTTLE CONTROL CABLE IS NOT CONNECTED, THE THROTTLE VALVE IS IN FULL OPEN POSITION. NEVER START ENGINE WHEN A THROTTLE CONTROL CABLE IS NOT CONNECTED.

   A. Remove Throttle Control Cable(s)
   (1) Remove engine cowling (refer to 71-10).
   (2) Remove access panels 211 FT, 211 FB, 211 EC (refer to 25-12) in the cabin.
   (3) Rotax 912S/914F: Disconnect throttle control cables from carburetors.
   Rotax 912iS: Disconnect throttle control cable from throttle valve.
   (4) Disconnect throttle control cable(s) at throttle control lever in the cabin.
   (5) Carefully pull throttle control cables through firewall and control cable support bracket, and remove from aircraft.

   B. Install Throttle Control Cable(s)

   NOTE: When installing throttle control cables, ensure the cables are routed exactly as previously installed. Grease control cable wires prior to installation (e.g. Aeroshell Grease 22). Before installing, ensure firewall feedthrough is clear and free of sealant.

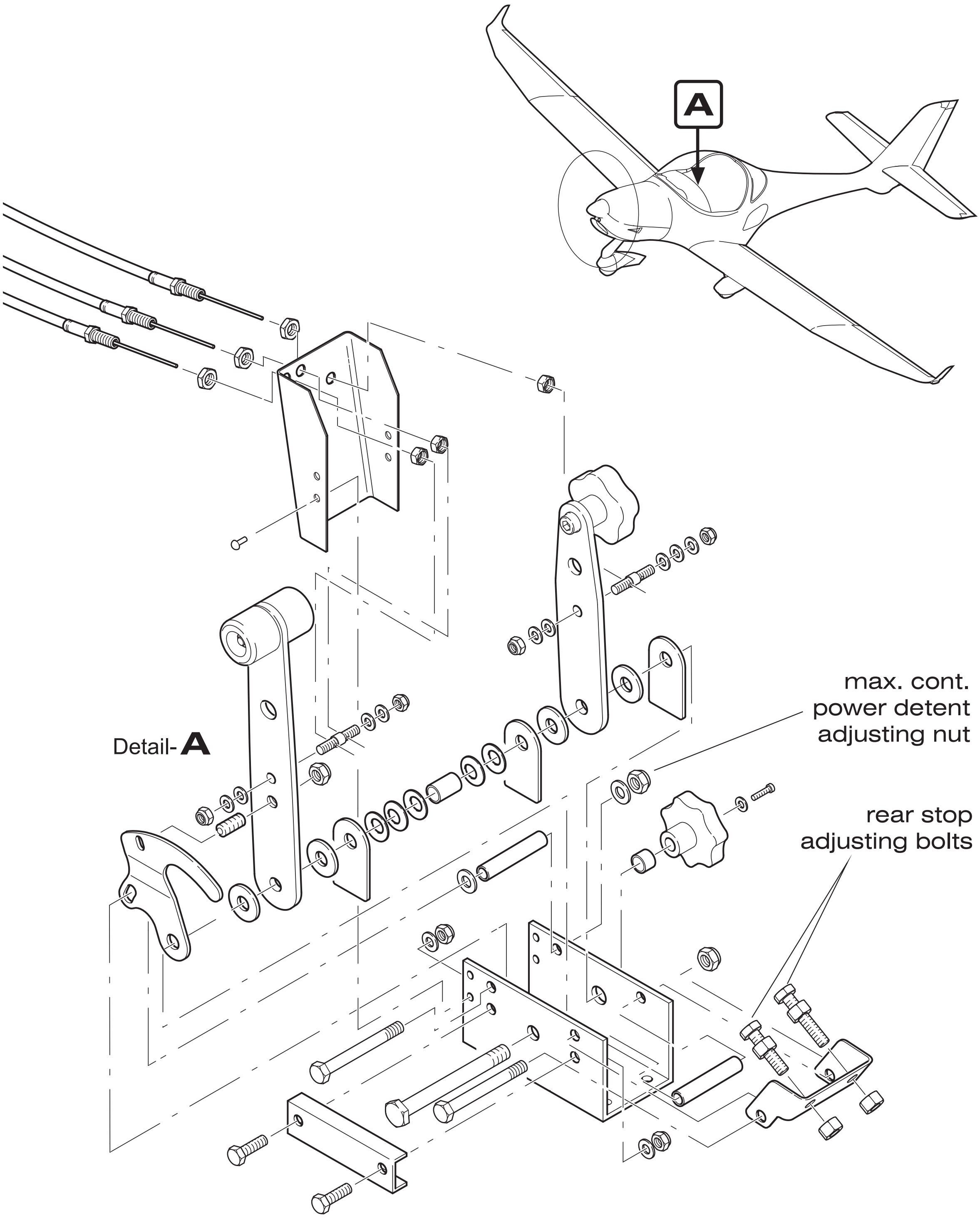
   (1) Route throttle cable(s) from the cabin, through control cable support bracket and then through the firewall to the engine compartment.
   (2) Install washers and nuts securing control cable(s) to cable support bracket at the console.
   (3) Rotax 912S/914F: Secure control cables to support brackets at carburetors and connect to carburetor throttle control arms.
   Rotax 912iS: Secure control cable to support bracket at throttle valve and connect to throttle valve control arm.
   (4) With throttle control lever in full forward position, connect control cable(s) 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) Seal firewall feedthrough with fire protection compound (e.g. Hilti CP 611A).
   (7) Install all items removed for access.



Control Quadrant Assembly
Figure 201

EFFECTIVITY

Aircraft equipped with Rotax 912S / 912iS engine



Control Quadrant Assembly
Figure 201

4. Governor Control Cable Removal/Installation

A. Remove Governor Control Cable
(1) Remove engine cowling (refer to 71-10).
(2) Remove access panels 211 FT, 211 FB, 211 EC (refer to 25-12) 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.

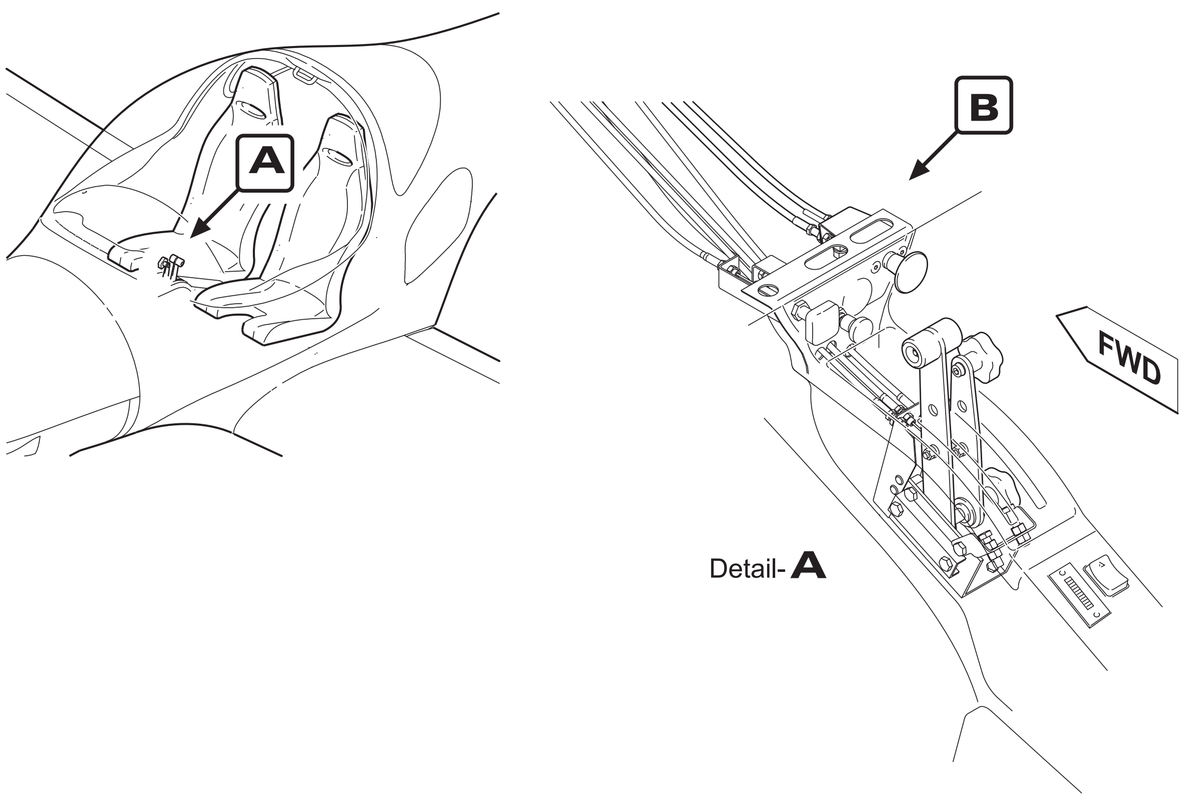
B. Install Governor Control Cable

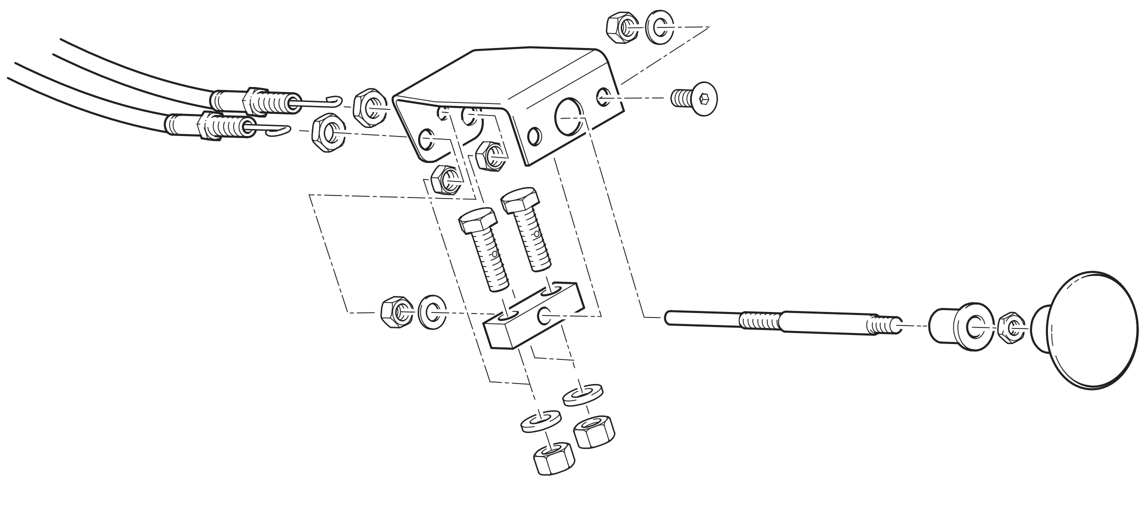
NOTE: When installing the governor control cable, ensure the cable is routed exactly as previously installed. Grease control cable wires prior to installation (e.g. Aeroshell Grease 22). Before installing, ensure firewall feedthrough is clear and free of sealant.

(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).
(7) Seal firewall feedthrough with fire protection compound (e.g. Hilti CP 611A).
(8) Install all items removed for access.

5. Choke Control Adjustment/Test (Rotax 912S / 914F only)

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.





Choke Control Assembly
Figure 202

6. Throttle Control Adjustment/Test

A. Idle Speed Adjustment (Rotax 912S / 914F only)

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. Idle Speed Adjustment (Rotax 912iS only)

NOTE: Always perform idle speed adjustment at operating temperature of the engine.

(1) Pull throttle lever to idle. Adjust the spring loaded screw on the throttle valve until the required idling speed is reached.
(2) Mark adjustments with locking varnish.

NOTE: The screw with the black cap is the setting for the lowest idle speed and adjusted by the factory. This setting must not be changed!

C. Adjust Throttle Control
(1) Move throttle lever in the cockpit to full throttle position.
(2) Disconnect control cable(s) from control arm(s) of both carburetors / the throttle valve.
(3) Move throttle lever in the cockpit 1-2 mm (0.04-0.08 in.) back.
(4) Tighten the Bowden cable clamp(s) on the throttle control arm(s) of both carburetors / the throttle valve.
(5) Move throttle control lever between idle and full throttle positions. Ensure the throttle control lever is only limited by the throttle control arm stop(s) on the carburetors / throttle valve 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 / throttle valve 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 ENGINE 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 arm(s) of the carburetors / throttle valve 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.

Step (9) only for A/C with Rotax 912S / 914F engine.

(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 throttle 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 valve 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 stop(s) on carburetors / throttle valve 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 cable(s) on both the carburetors / throttle valve and the control lever in the cockpit.

(4) Check reset spring(s) 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. <u>Turbo Charger Control</u> (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).

(3) Remove glare shield (refer to 31-10).

(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).
(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).
(7) Perform engine test run.

E. Remove Wastegate Servo Motor
(1) Ensure electrical power is OFF.
(2) Disconnect battery (refer to 24-30).
(3) Remove access panel 211AB (refer to 25-12) 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) and access panel 211AB (refer to 25-12).
(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.). Secure nuts with Loctite 243.
(10) Reinstall tension spring on turbocharger.
(11) Reinstall all items removed for access.

8. Engine Management System (Rotax 912iS only)

A. For maintenance of the engine management system (EMS), refer also to the Maintenance Manual (Heavy Maintenance) for Rotax Engine Type 912 i Series, chapter 76-00-00.

B. Maintenance / Diagnostic Software (Maintenance Tool)
For engines of the Rotax 912 i Series, the maintenance and diagnostic software B.U.D.S. Aircraft is available. This provides not only the reading of ECU logs, it also provides a variety of functionality to support troubleshooting of the engine. To start this software and connect the engine with a computer a B.U.D.S. Aircraft kit is required. This is a USB to CAN converter that provides different software functionality depending on its version.
Refer to the Maintenance Manual (Heavy Maintenance) for Rotax Engine Type 912 i Series, chapter 76-00-00, for information on the software. The required plug connections are provided on the bottom side of the instrument panel on the pilot side.

C. Remove Engine Control Unit (ECU)

NOTE: The wire connectors of the ECU must not be opened and closed more than 20 times! This must be shown on the device by a clearly visible label with a printed numerical sequence (1-20) and by documentation conforming to selfmonitoring guidelines.

(1) Ensure electrical power is OFF.
(2) Remove engine cowling (refer to 71-10).
(3) Disconnect battery (refer to 24-30).
(4) Unplug the ECU connectors (Lane A1, Lane A2 and Lane B).
(5) While supporting the ECU, remove nuts, washers, bolts and spacer bushings securing ECU to mounting bracket on engine mount.
(6) Remove ECU from aircraft.

D. Install Engine Control Unit (ECU)

NOTE: The ECU rubber vibration damping (insulation material) must not be removed. If the rubber dampers were removed, the engine ground and the aircraft ground would be shortcircuited.

NOTE: Cables or engine ground must not touch the ECU. No connection to the airframe or engine is allowed.

NOTE: The ECU must be mounted so, that the plug connectors are facing downwards to the wiring harness.

(1) Put ECU in position on mounting bracket at left side of engine mount and secure using nuts, washers, bolts and spacer bushings.
(2) Reconnect ECU connectors (Lane A1, Lane A2 and Lane B) and turn levers until they lock.
(3) Reconnect battery (refer to 24-30).
(4) Install engine cowling (refer to 71-10).
(5) Perform engine test run.

E. Remove Fuse Box
(1) Ensure electrical power is OFF.
(2) Remove engine cowling (refer to 71-10).
(3) Disconnect battery (refer to 24-30).
(4) Unplug the fuse box connectors (X1, X2, X3, regulator A, regulator B).
(5) Remove ground connections from stud bolts at regulator A and B.
(6) While supporting the fuse box, remove nuts, washers and bolts securing fuse box to mounting bracket on engine mount.
(7) Remove fuse box from aircraft.

F. Install Fuse Box

NOTE: Ensure the regulator connector brackets are installed on the fuse box prior to installation. Refer to Rotax Aircraft Engines Service Instruction SI-PAC-011 for further information.

NOTE: Ensure the optional heat sink set is installed on regulator B of the fuse box prior to installation. Refer to Rotax Aircraft Engines Service Instruction SI-PAC-019 for further information.

(1) Put fuse box in position on mounting bracket at left side of engine mount and secure using nuts, washers and bolts.
(2) Reconnect fuse box connectors (X1, X2, X3, regulator A, regulator B).
(3) Reconnect ground connections at stud bolts on regulator A and B. Torque M4 nuts on regulator A to 1,2 Nm (11 in.lbs). Torque M6 nut on regulator B to 5,9 Nm (52 in.lbs).

NOTE: There must be no electric contact between the ground connetions of regulator A and aircraft ground (engine mount). ENG START PWR and ENG BACKUP PWR switches connect engine ground and aircraft ground and need therefore be switched OFF for this check!

(4) Reconnect battery (refer to 24-30).
(5) Install engine cowling (refer to 71-10).
(6) Perform engine test run.

G. Remove AAPTS Sensor
(1) Ensure electrical power is OFF.
(2) Remove upper engine cowling (refer to 71-10).
(3) Unplug the AAPTS sensor connector.
(4) Remove washer and nut securing sensor to air filter casing.
(5) Remove sensor from aircraft.

H. Install AAPTS Sensor
(1) Put sensor in position on air filter casing and secure using washer and nut. Torque to max. 1 Nm (9 in.lbs).
(2) Reconnect AAPTS sensor connector.
(3) Install engine cowling (refer to 71-10).

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 for further information on fuel pressure, fuel quantity and fuel flow measuring systems.

   C. Refer to 79-00 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 / engine speed
      (2) Manifold pressure
      (3) Oil pressure
      (4) Oil temperature
      (5) Cylinder head / coolant 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.

   D. On aircraft equipped with Rotax 912iS engine, the engine internal sensors are used also for engine parameter indication. All engine sensors (except fuel pressure) are connected to the engine control unit (ECU) and forwarded to the G3X Touch system via CAN interface.

      Some engine sensors (engine speed, manifold pressure) are designed with redundancy. In this case, each of the sensors is connected to a LANE, so that the two LANES have the same measurement values and send the same output signals. Non-redundant sensors (oil pressure, oil temperature, coolant temperature, exhaust gas temperature) are connected to one LANE only and serve for the expanded monitoring of the engine functionality. Due to an ECU internal communication, these sensor values will be exchanged between the two LANES (assuming that both LANES are active and free of errors). Sensor values will only be indicated with the corresponding LANE operative.

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).
      (3) Remove glare shield (refer to 31-10).
      (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).
      (4) Reconnect battery (refer to 24-30).

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).
      (3) Remove glare shield (refer to 31-10).
      (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).
      (4) Reconnect battery (refer to 24-30).

POWER INDICATION - MAINTENANCE

1. General

A. Propeller / engine speed is indicated via the Garmin G3X Touch system.
Rotax 912iS: Engine speed measurement is included in the engine management system (EMS).
Rotax 912S / 914F: Propeller / engine speed is measured by a sensor mounted on the internal alternator casing at the rear end of the engine.
Sensor / EMS are connected to the GEA 24 engine interface at the back of the instrument panel.

B. Manifold pressure is indicated via the Garmin G3X Touch system.
Rotax 912iS: Manifold pressure measurement is included in the EMS.
Rotax 912S / 914F: Manifold pressure is measured by a pressure sensor connected to the compensating tube on top of the engine through a rubber hose.
Sensor / EMS are connected to the GEA 24 engine interface at the back of the instrument panel.

C. The manifold pressure sensor is mounted at the back of the instrument panel (Rotax 912S) / on the right side of the intercooler (Rotax 914F) / at the airbox (Rotax 912iS).
The following sensors are used:

- Rotax 912S/914F:	Kavlico P4055-30A	(G3X setting: Kavlico P4055-30A)
- Rotax 912iS:	2x Rotax 664364	(G3X setting: Rotax FADEC)

D. Maintenance is limited to the removal and installation of the of the system components. Refer to 34-25 for further information on maintenance of the Garmin G3X Touch system. Refer to applicable ROTAX Aircraft Engines publications for further information on sensor / EMS maintenance. If the manifold pressure rubber hose is damaged or in bad condition it must be replaced.

2. Manifold Pressure Sensor Removal/Installation

A. Remove Manifold Pressure Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Disconnect battery (refer to 24-30).
(3) Rotax 912S: Remove glare shield (refer to 31-10).
Rotax 914F/912iS: Remove upper engine cowling (refer to 71-10).
(4) Disconnect electrical connector from sensor.
(5) Unscrew sensor from manifold block at the back of the instrument panel (Rotax 912S) / on the right side of the intercooler (Rotax 914F) / from the airbox (Rotax 912iS) and remove sensor from aircraft.

B. Install Manifold Pressure Sensor
(1) Clean sensor thread.
(2) Rotax 912S/914F only: Apply thread sealant to manifold pressure sensor. 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.

(3) Rotax 912S/914F: Install sensor to manifold block at the back of the instrument panel (Rotax 912S) / on the right side of the intercooler (Rotax 914F). Torque two full turns past hand tight.
Rotax 912iS: Install sensor and sealing washer to airbox and torque to 15 Nm (133 in.lbs).

(4) Connect electrical connector to sensor.
Rotax 912iS: Install also clip and check for tight fit and correct position of the clip on sensor and connector.

(5) Rotax 912S: Install glare shield (refer to 31-10).
Rotax 914F/912iS: Install upper engine cowling (refer to 71-10).

(6) Reconnect battery (refer to 24-30).

(7) 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 sensor connected to the compensating tube on top of the engine through a rubber hose. The sensor is electrically connected to the engine data converter (EDC). The manifold pressure sensor is mounted at the back of the instrument panel.
   The following sensor is used:
   - Rotax 912S: Electronics International PT-30ABS
   - Rotax 914F: Electronics International PT-60ABS

   D. Maintenance is limited to the removal and installation of the manifold pressure sensor. Refer to 77-40 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.

   E. The MVP-50 system is designed for a specific aircraft and engine. When built, the system is put together with various sensors and necessary calibrations are performed. Some components are not interchangeable and require a specific calibration.
   If the manifold pressure sensor is replaced, the new calibration offset for the new sensor 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 Sensor Removal/Installation

   A. Remove Manifold Pressure Sensor
   (1) Ensure electrical power to aircraft is OFF.
   (2) Disconnect battery (refer to 24-30).
   (3) Remove glare shield (refer to 31-10).
   (4) Disconnect electrical connector from sensor.
   (5) Disconnect hose at hose nozzle on firewall.
   (6) While supporting the sensor, remove screws securing sensor to instrument panel.
   (7) Remove sensor from aircraft.

   B. Install Manifold Pressure Sensor
   (1) Position sensor at back of instrument panel and attach with screws.
   (2) Connect electrical connector to sensor.
   (3) Connect hose to hose nozzle on firewall.
   (4) Install glare shield (refer to 31-10).
   (5) Reconnect battery (refer to 24-30).
   (6) Store calibration offset of the new sensor in the MVP-50 (maintenance password required).
   (7) Check manifold pressure indication: Verify the displayed pressure is within +/-1 inHg of the ambient pressure.

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).
      (3) Remove glare shield (refer to 31-10).
      (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).
      (4) Reconnect battery (refer to 24-30).

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).
      (3) Disconnect battery (refer to 24-30).
      (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 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).
(6) Install engine cowling (refer to 71-10).

4. Carburetor Temperature Sensor Removal/Installation (optional)

A. Remove Carburetor Temperature Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10).
(3) Disconnect battery (refer to 24-30).
(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).
(4) Install engine cowling (refer to 71-10).

TEMPERATURE INDICATION - MAINTENANCE

1. General

A. Cylinder head temperature (CHT) / coolant temperature 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). On aircraft equipped with Rotax 912iS, sensor signals are processed by the engine control unit (ECU) and sent to the GEA 24 engine interface.

B. The CHT / coolant temperature sensor is mounted in the head of cylinder no. 3 (Rotax 912S / Rotax 914F) / cylinder no. 4 (Rotax 912iS). The following sensor is used with the MVP-50:
- Electronics International P-103
The following sensors are used with the Garmin G3X Touch system:

- Rotax 912S/914F:	Rotax 965531	(G3X setting: Rotax 965531)
- Rotax 912iS:	Rotax 965537	(G3X setting: Rotax FADEC)

C. Carburetor temperature indication is optionally 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).

D. The carburetor temperature is mounted 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. The following sensor is used:
- Electronics International P-AQ (G3X setting: Type K)

E. Exhaust gas temperature (EGT) is optionally indicated on the G3X Touch system.
Rotax 912iS: EGT measurement is included in the engine management system (EMS).
Rotax 914F: Temperature is measured by type K thermocouples electrically connected to the GEA 24 engine interface.

F. The exhaust gas temperature sensors are located in the exhaust bends near the cylinder outlet. The following sensors are used:

- Rotax 914F:	4x Rotax 966370	(G3X setting: Type K)
- Rotax 912iS:	4x Rotax 866261	(G3X setting: Rotax FADEC)

G. Maintenance is limited to the removal and installation of the temperature sensors.
Refer to 77-40 for further information on maintenance of the engine monitoring system.
Refer to 34-25 for further information on maintenance of the Garmin G3X Touch system.

2. CHT / Coolant Temperature Sensor Removal/Installation

A. Remove CHT / Coolant Temperature Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10).
(3) Disconnect battery (refer to 24-30).
(4) Disconnect electrical lead to sensor.
(5) Unscrew and remove sensor from engine.

CAUTION: COOLANT MAY LEAK THROUGH SENSOR OPENING.

B. Install CHT / Coolant Temperature 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.
Rotax 912S/914F: Torque to 7 Nm (62 in.lbs).
Rotax 912iS: Torque to 15 Nm (133 in.lbs).
(3) Check coolant level. Replenish as necessary.
(4) Connect electrical connector to sensor.
(5) Reconnect battery (refer to 24-30).
(6) Install engine cowling (refer to 71-10).
(7) Check CHT / coolant temperature indication:
Verify the displayed temperature is within +/- 2°C of the ambient temperature (engine needs sufficient time to reach ambient temperature).

3. Carburetor Temperature Sensor Removal/Installation (optional)

A. Remove Carburetor Temperature Sensor
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10).
(3) Disconnect battery (refer to 24-30).
(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).
(4) Install engine cowling (refer to 71-10).
(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).
(3) Disconnect battery (refer to 24-30).
(4) Disconnect electrical lead to sensor.
(5) Unscrew and remove sensor from engine.

B. Install Exhaust Gas Temperature Sensor

(1) Clean all parts carefully.
(2) Apply heat resistant anti seize paste (e.g. Loctite LB 8150) on sensor thread.
(3) Rotax 914F: Install sensor and new copper sealing washer to exhaust bend and torque to 10 Nm (89 in.lbs).
Rotax 912iS: Install sensor to exhaust bend and torque to 25 Nm (221 in.lbs).
(4) Connect electrical connector to sensor.
Rotax 912iS: Carefully push connector into connector bracket.
(5) Reconnect battery (refer to 24-30).
(6) Install engine cowling (refer to 71-10).
(7) 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 sensors 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 sensors and necessary calibrations are performed. Some components are not interchangeable and require a specific calibration.

   D. For instructions on maintenance of the probes and sensors 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).
(3) Remove glare shield (refer to 31-10).
(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).
(4) Reconnect battery (refer to 24-30).
(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).
(3) Remove glare shield (refer to 31-10).
(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).
(4) Reconnect battery (refer to 24-30).
(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.

   C. Refer to SI-AT01-029 for further information on main muffler cracks.

   D. An optimized muffler / tail pipe version has been developed to reduce exhaust backpressure. This exhaust is installed as standard from S/N AT01-401 and can be retrofitted with SB-AT01-041.

   E. Aircraft equipped wit Rotax 912iS engine use temperature sensors to monitor exhaust gas temperature (EGT). This sensors are installed in the exhaust bends near the cylinder outlet. Refer to 77-20 for further information on EGT measurement.

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).
      (2) Disconnect flexible hose from heat shroud.
      (3) Rotax 912iS: Disconnect EGT sensor connectors and unscrew / remove EGT sensors.
      (4) While supporting the tail pipe, remove springs / screws securing tail pipe to main muffler.
      (5) Loosen clamp(s) securing tail pipe to support bracket on engine mount and remove tail pipe from aircraft.
      (6) 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) Check that studs on cylinder head are firmly in place.
      (2) Apply heat resistant anti seize paste (e.g. Loctite LB 8150) to ball joints.
      (3) Assemble the rear exhaust bends and muffler with springs.
      (4) Put preassembled exhaust system in position and secure to engine using new nuts. Do not yet tighten the fixing nuts.
      (5) Install the front exhaust bends with springs and new nuts. Do not yet tighten the fixing nuts.

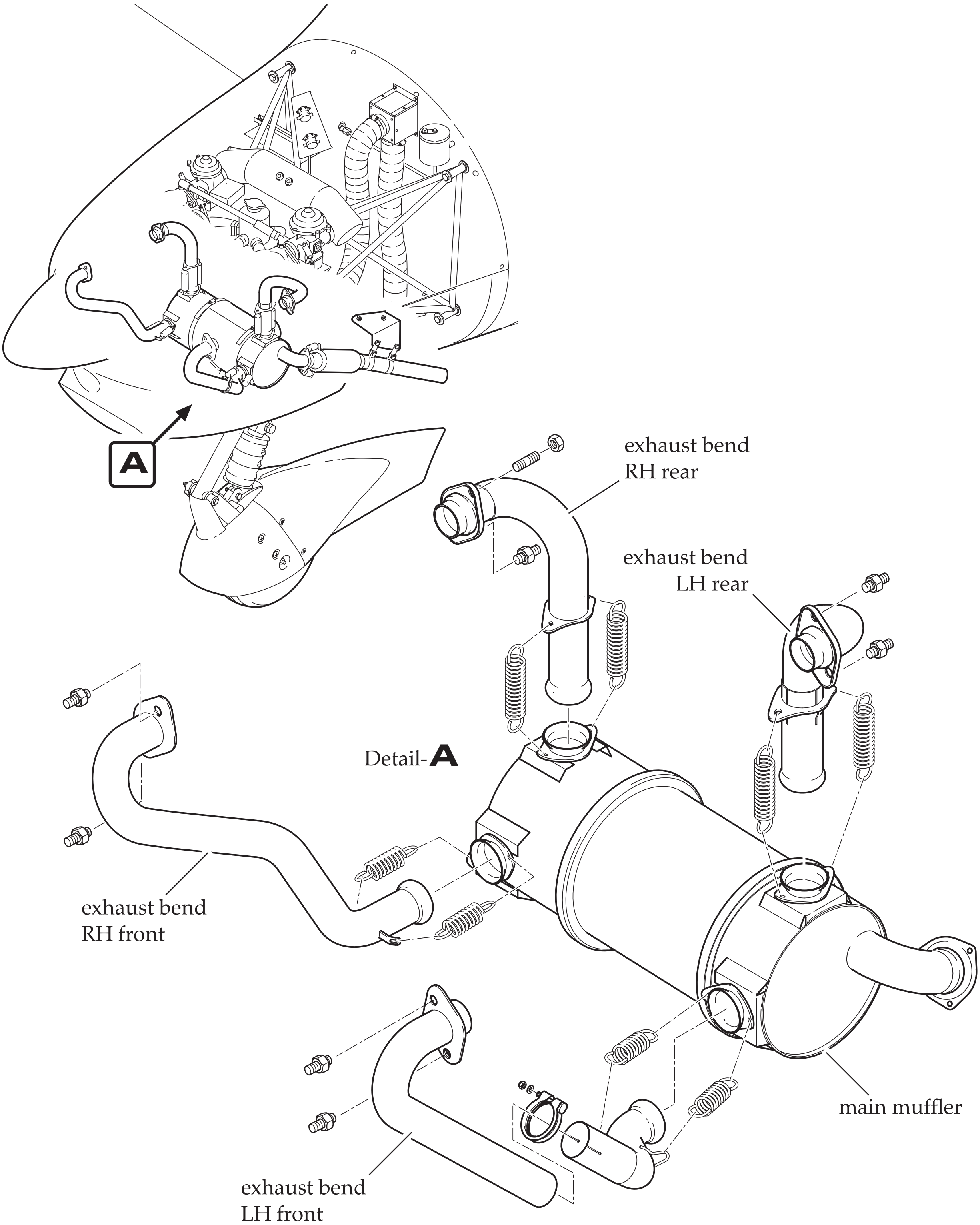
(6) Install lower engine cowling and set up the exhaust system to ensure sufficient clearance from adjacent assemblies and the cowling. Torque nuts on cylinders to 15 Nm (133 in.lbs). Remove lower engine cowling again.
(7) Position tail pipe to main muffler and secure tail pipe to support bracket on engine mount with clamp(s).
(8) While supporting the tail pipe, install springs / screws securing tail pipe to main muffler.
(9) Rotax 912iS: Apply heat resistant anti seize paste (e.g. Loctite LB 8150) to EGT sensor theads. Install sensors to exhaust bends and torque to 25 Nm (221 in.lbs). Reconnect sensor and carefully push connector into connector bracket.
(10) Connect flexible hose to heat shroud.
(11) Install engine cowling (refer to 71-10).
(12) Perform engine test run. Listen for sounds of exhaust gas leakage.
(13) Examine exhaust system and insides of cowling for signs of exhaust gas leakage.

3. Main Muffler Inspection/Check

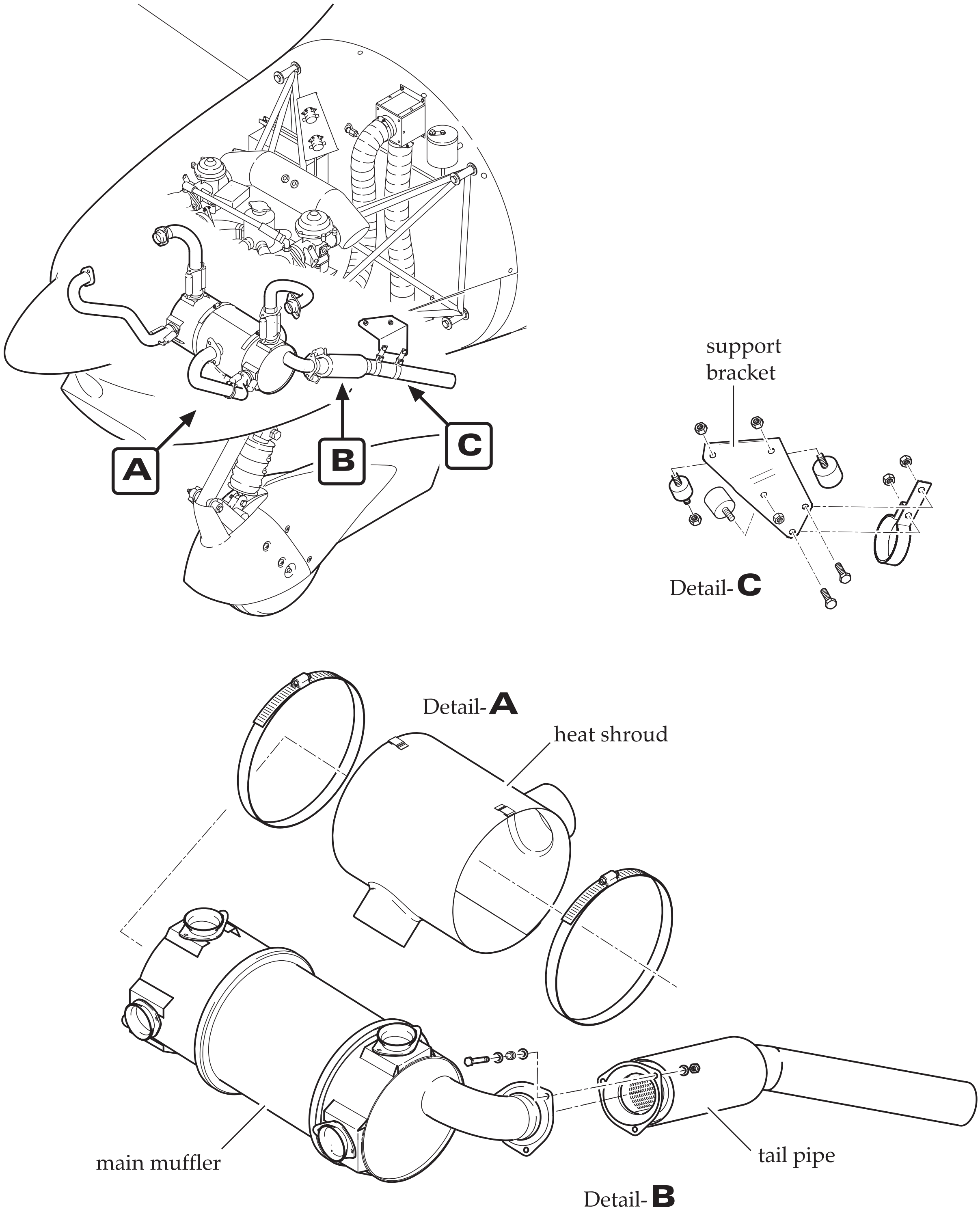
WARNING: FAILURE TO INSPECT THE MAIN MUFFLER FOR LEAKS COULD RESULT IN CARBON MONOXIDE ENTERING THE CABIN AREA, LEADING TO SERIOUS INJURY OR DEATH.

A. For main muffler inspection/check time intervals refer to 05-10.

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



Heat Shroud / Tail Pipe Installation
Figure 202

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 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.

D. An optimized heat shroud version has been developed to increase cabin heating. This heat shroud is installed as standard from S/N AT01-394 and can be retrofitted with SB-AT01-043.

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).
(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

NOTE: The retaining clamp at the muffler needs to be turned downwards to fit into the 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).

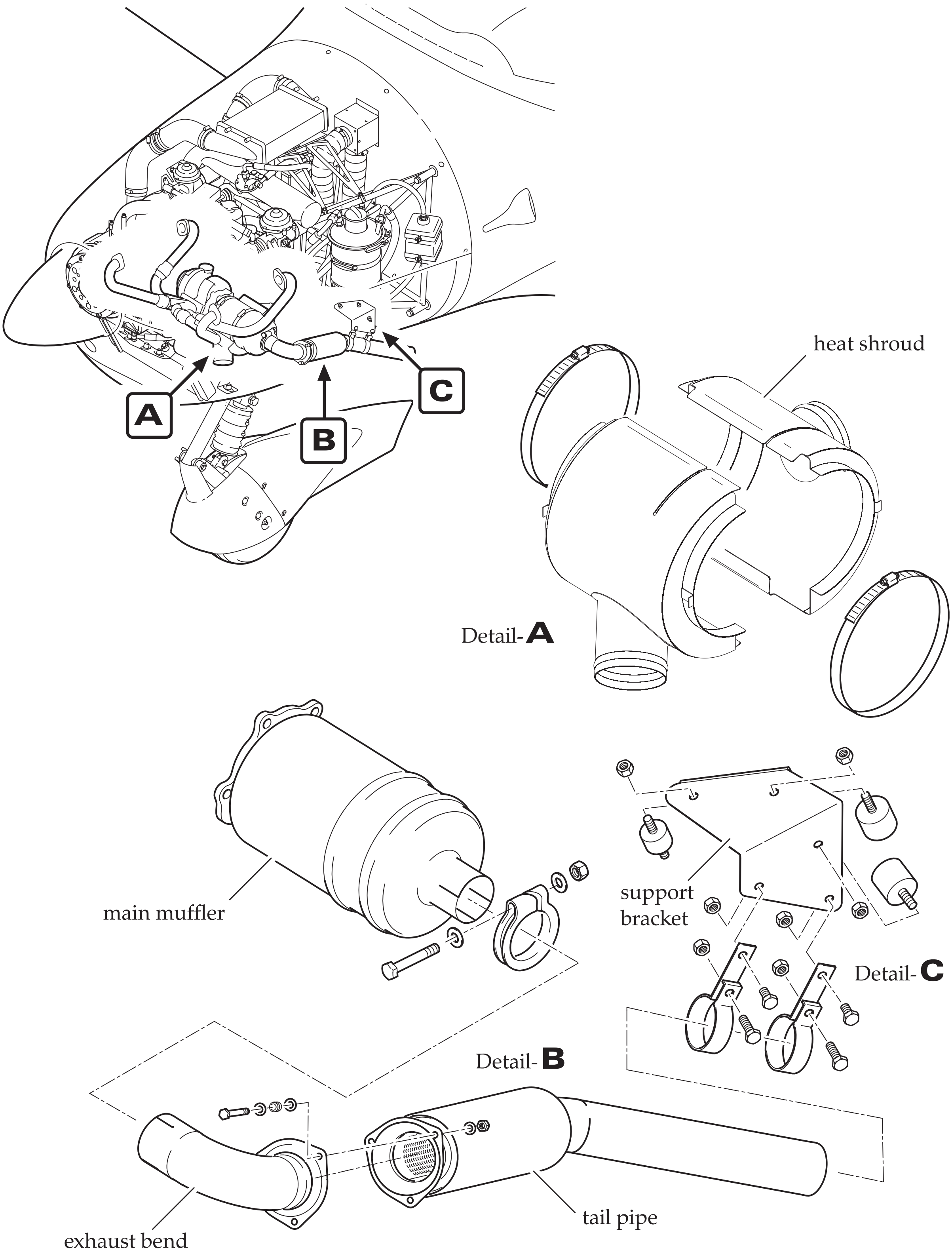
3. Tail Pipe Removal/Installation

A. Remove Tail Pipe

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

CHAPTER 79

OIL

TABLE OF CONTENTS

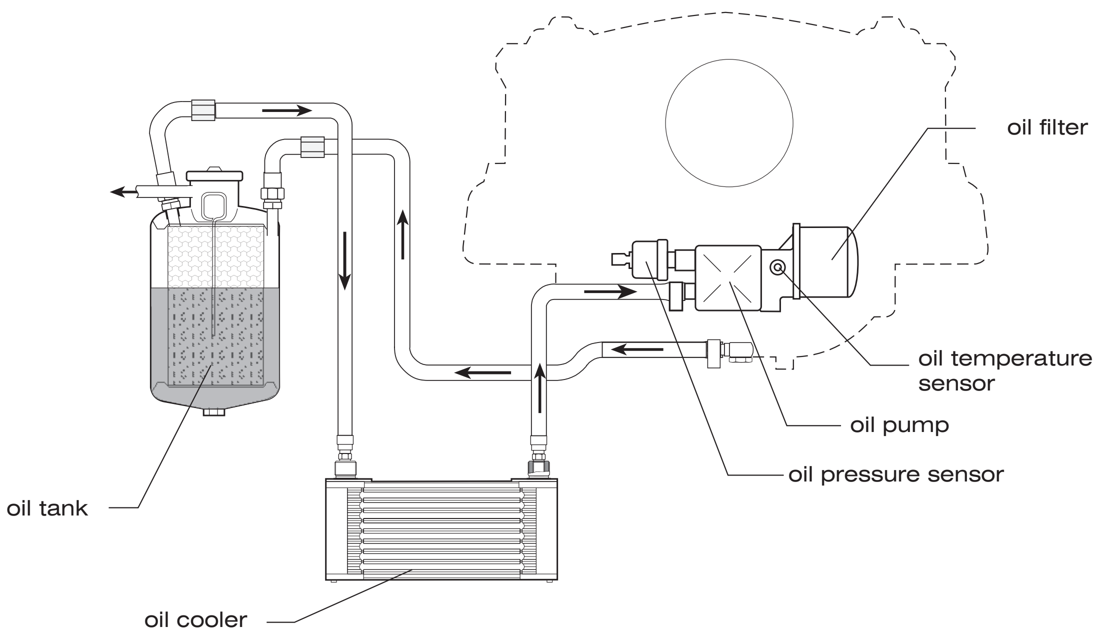
OIL - GENERAL

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/iS 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 and 79-33 for further information on the engine oil indicating system.

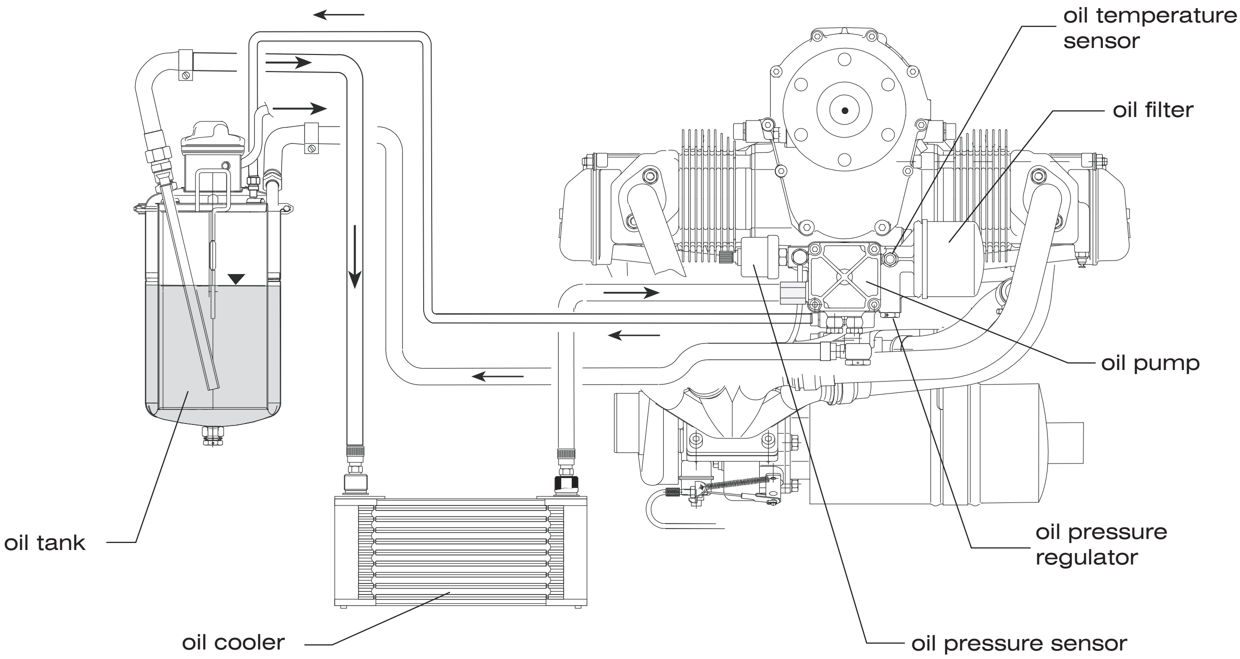
OIL - GENERAL

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

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 and 79-33 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!

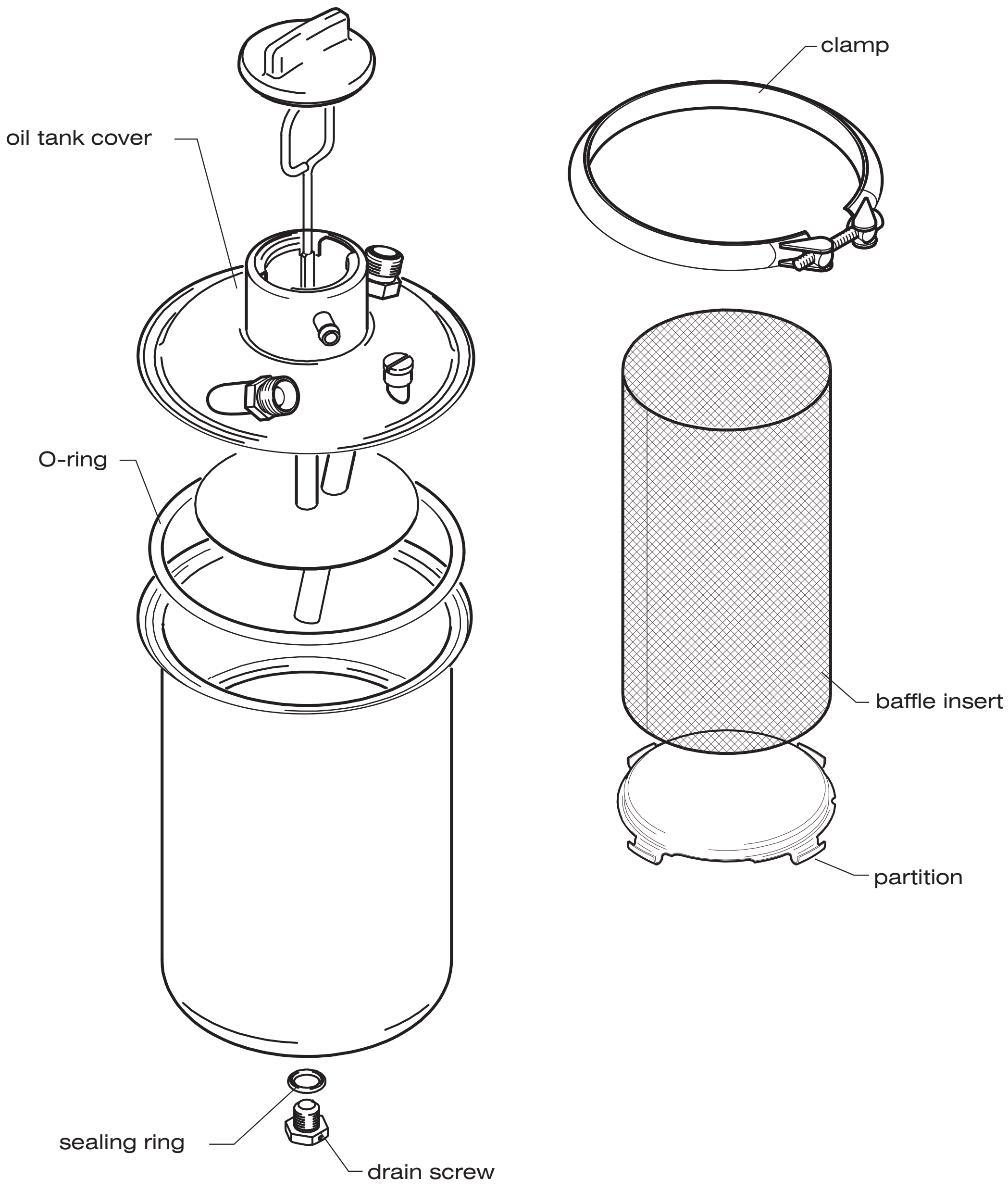
   A. Remove Oil Tank
      (1) Remove upper engine cowling (refer to 71-10).
      (2) Disconnect inlet and outlet hoses at oil tank.
      (3) Loosen clamps securing oil tank to engine mount. Remove oil tank from aircraft.

   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 / SI-912 i-004 for purging of the lubrication system.
      (4) Install engine cowling (refer to 71-10).
      (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).
      (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 / SI-912 i-004 for purging of the lubrication system.
      (11) Install engine cowling (refer to 71-10).
      (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/iS) or in the lower rear part of the lower engine cowling below / behind the exhaust muffler and behind an air duct (Rotax 914F). The oil inlet and outlet hose assemblies are connected to the oil cooler casing.

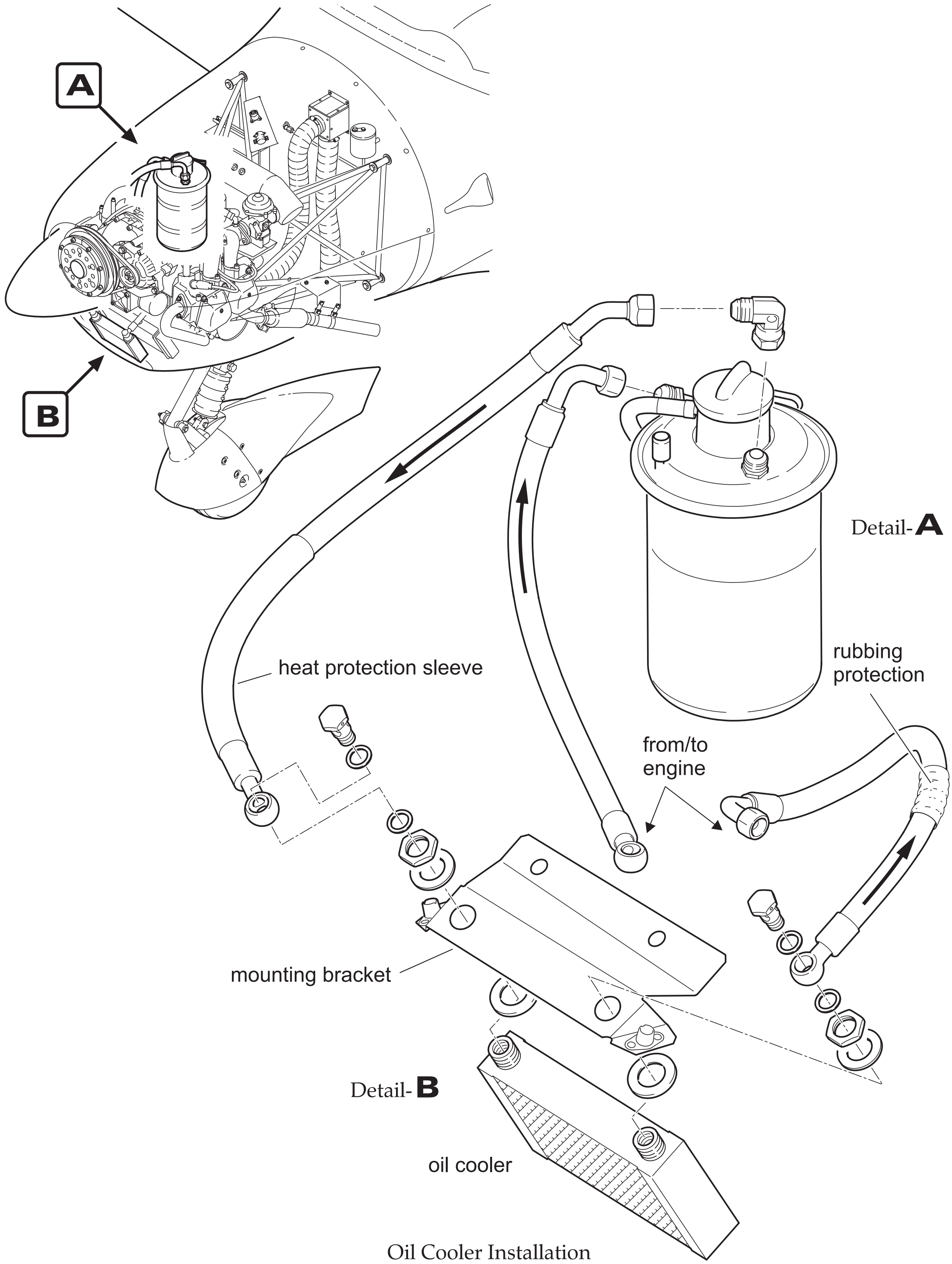
   B. The oil cooler should be replaced if metal particles were found while servicing oil screens and the engine therefore had to be disassembled.

2. Oil Cooler Removal/Installation

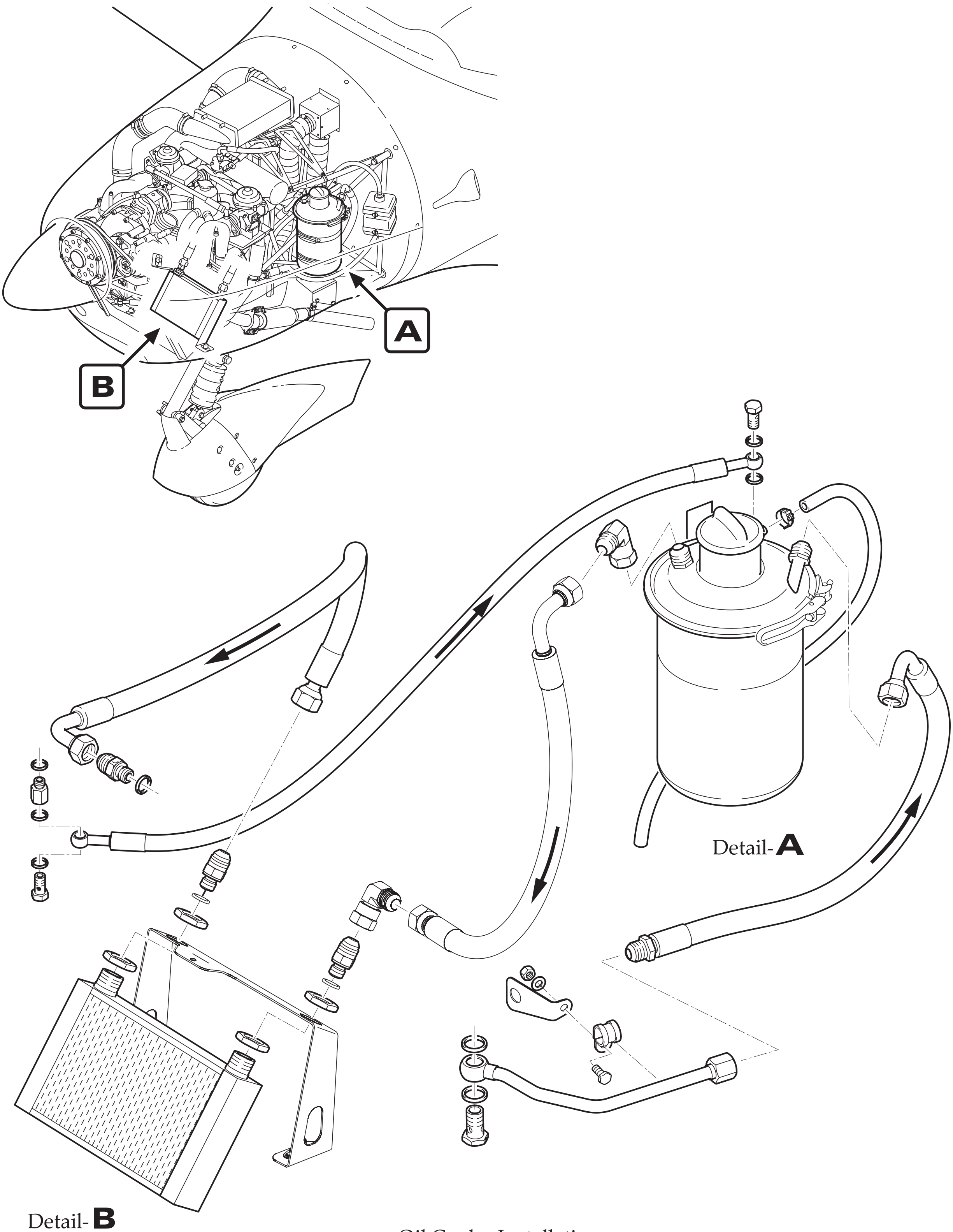
   CAUTION: IF ENGINE HAS BEEN RUNNING RECENTLY, HOT ENGINE COMPONENTS MAY CAUSE SKIN BURNS!

   A. Remove Oil Cooler
      (1) Remove engine cowling (refer to 71-10).
      (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 (Rotax 912S only) and nuts.
      (2) Connect inlet and outlet hoses at oil cooler. Position oil cooler and lines at their final position within engine cowling prior to final installation of oil lines.
      (3) Replenish engine oil as required. Refer to Rotax SI-912-018 / SI-914-020 / SI-912 i-004 for purging of the lubrication system.
      (4) Install engine cowling (refer to 71-10).
      (5) Perform an engine run and check oil cooler and connections for leaks.



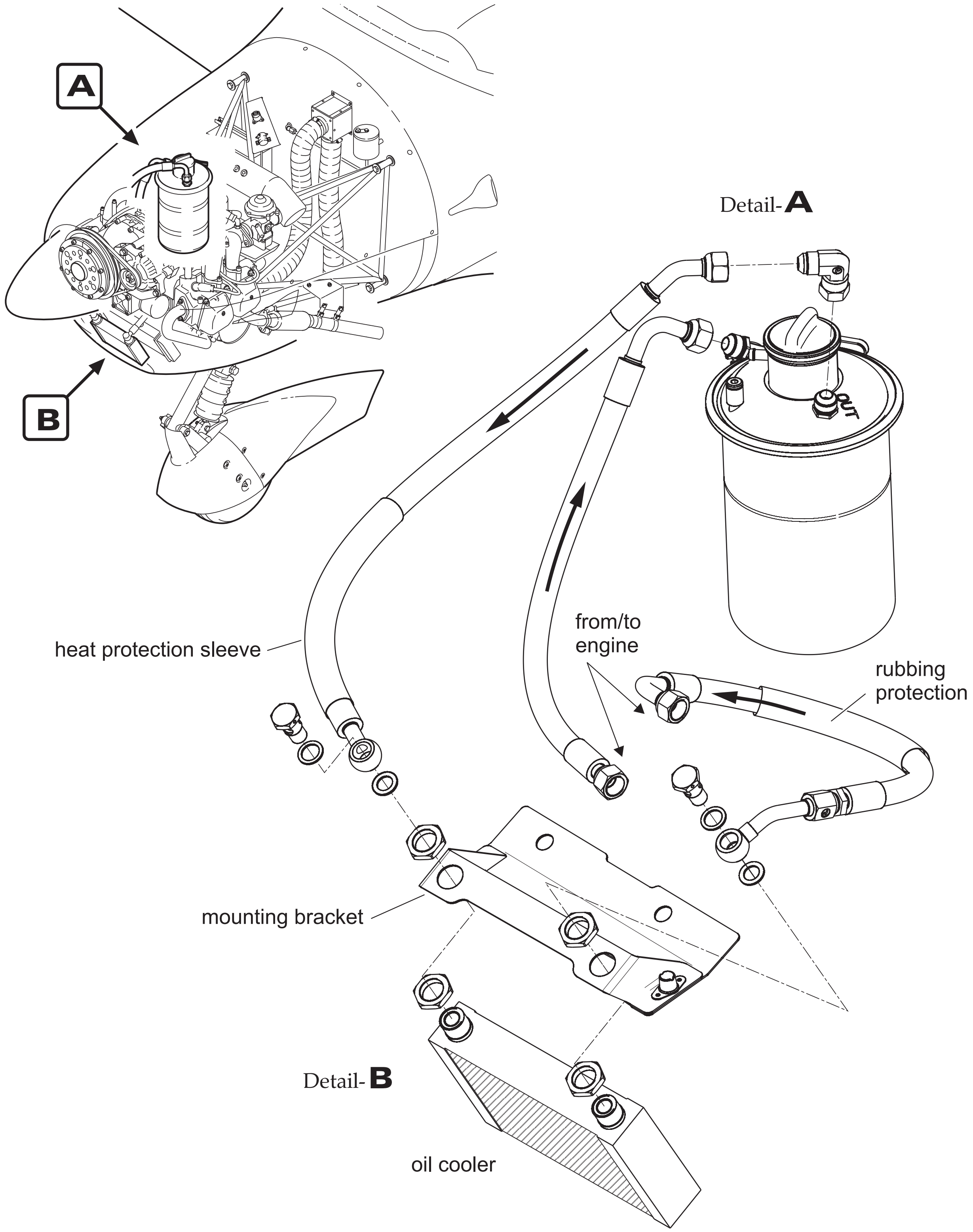
Oil Cooler Installation
Figure 201



Oil Cooler Installation
Figure 201

EFFECTIVITY

Aircraft equipped with Rotax 914F engine



Oil Cooler Installation
Figure 201

OIL PRESSURE INDICATION - MAINTENANCE

1. General

   A. The oil pressure indicating system consists of an oil pressure sensor, 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 sensor is then connected with the GEA 24 engine interface. On aircraft equipped with Rotax 912iS, sensor signals are processed by the engine control unit (ECU) and sent to the GEA 24 engine interface.

   B. Maintenance is limited to the removal and installation of the system components. Refer to 34-25 for further information on maintenance of the Garmin G3X Touch system. Refer to applicable ROTAX Aircraft Engines publications for further information on sensor maintenance.

   C. The oil pressure sensor is mounted on the right side of the oil pump casing (Rotax 912S / 914F) or on the rear RH side of the crankcase (Rotax 912iS). The following sensors are used:
   - Rotax 912S / 914F: Rotax 456180 (G3X setting: Rotax 456180)
   - Rotax 912iS: Rotax 664365 (G3X setting: Rotax FADEC)

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).
      (3) Remove glare shield (refer to 31-10).
      (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).
      (4) Reconnect battery (refer to 24-30).

3. Oil Pressure Sensor Removal/Installation

   A. Remove Oil Pressure Sensor
      (1) Ensure electrical power to aircraft is OFF.
      (2) Remove engine cowling (refer to 71-10).
      (3) Disconnect battery (refer to 24-30).
      (4) Disconnect electrical connector from sensor.
      (5) Unscrew and remove sensor and gasket from engine.

   CAUTION: CAP OR PLUG SENSOR PORT TO PREVENT ENTRY OF FOREIGN MATERIAL.

B. Install Oil Pressure Sensor

(1) Clean sensor thread.
(2) Lubricate sensor thread with Loctite 243.
Rotax 912S / 914F: Do not use Loctite 243 if oil pump housing is not dry. Use a suitable new gasket ring instead.
(3) Install sensor to engine.

Rotax 912S / 914F:	Torque to 7 Nm (62 in.lbs).
Rotax 912iS:	Torque to 15 Nm (133 in.lbs).

(4) Replenish engine oil as required (refer to 12-12).
(5) Connect electrical connector to sensor.
(6) Reconnect battery (refer to 24-30).
(7) Install engine cowling (refer to 71-10).
(8) Carry out engine ground run and check for leakage and correct engine indication.

OIL PRESSURE INDICATION - MAINTENANCE

1. General

   A. Engine oil pressure indication is included in the engine monitoring system. Pressure is measured by a pressure sensor electrically connected to the engine data converter (EDC).

   B. Maintenance is limited to the removal and installation of the oil pressure sensor. Refer to 77-40 for further information on maintenance of the engine monitoring system.

   C. Oil pressure is measured on the right side of the oil pump casing. To avoid damages caused by vibrations the pressure sensor 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. The following sensor is used:
   - Electronics International PT-100GA

2. Oil Pressure Sensor Removal/Installation

   A. Remove Oil Pressure Sensor
      (1) Ensure electrical power to aircraft is OFF.
      (2) Remove engine cowling (refer to 71-10).
      (3) Disconnect battery (refer to 24-30).
      (4) Disconnect electrical connector from sensor.
      (5) Unscrew pressure fitting and remove sensor from clamp.

      CAUTION: CAP OR PLUG SENSOR PORT TO PREVENT ENTRY OF FOREIGN MATERIAL.

   B. Install Oil Pressure Sensor
      (1) Bleed air from sensor oil hose and connect pressure sensor to NPT fitting on oil hose. Torque max. 2 full turns past finger-tight.

      CAUTION: DO NOT USE THE PRESSURE sensor CASING TO TIGHTEN THE PRESSURE FITTING!

      (2) Install pressure sensor with clamp.
      (3) Replenish engine oil as required (refer to 12-12).
      (4) Connect electrical connector to sensor.
      (5) Reconnect battery (refer to 24-30).
      (6) Install engine cowling (refer to 71-10).
      (7) Carry out engine ground run and check for leakage and correct engine indication.

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. On aircraft equipped with Rotax 912iS, sensor signals are processed by the engine control unit (ECU) and sent to the GEA 24 engine interface.

   B. Maintenance is limited to the removal and installation of the system components. Refer to 34-25 for further information on maintenance of the Garmin G3X Touch system. Refer to applicable ROTAX Aircraft Engines publications for further information on sensor maintenance.

   C. Oil temperature is measured in the oil filter / oil pump area (Rotax 912S / 914F) or on the rear RH side of the crankcase (Rotax 912iS). The following sensors are used:

- Rotax 912S / 914F:	Rotax 965531	(G3X setting: Rotax 965531)
- Rotax 912iS:	Rotax 965537	(G3X setting: Rotax FADEC)

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).
      (3) Remove glare shield (refer to 31-10).
      (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).
      (4) Reconnect battery (refer to 24-30).

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).
      (3) Disconnect battery (refer to 24-30).
      (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) Clean sensor thread.

(2) Lubricate sensor thread with Loctite 243.
Rotax 912S / 914F: Do not use Loctite 243 if oil pump housing is not dry. Use a suitable new gasket ring instead.

(3) Install sensor to engine.

Rotax 912S / 914F:	Torque to 7 Nm (62 in.lbs).
Rotax 912iS:	Torque to 15 Nm (133 in.lbs).

(4) Replenish engine oil as required (refer to 12-12).

(5) Connect electrical connector to sensor.

(6) Reconnect battery (refer to 24-30).

(7) Install engine cowling (refer to 71-10).

(8) Carry out engine ground run and check for leakage and correct engine indication.

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).

   B. Maintenance is limited to the removal and installation of the oil temperature sensor. Refer to 77-40 for further information on maintenance of the engine monitoring system.

   C. Engine oil temperature is measured in the oil filter / oil pump area. The following sensor is used:
   - Electronics International P-103

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).
      (3) Disconnect battery (refer to 24-30).
      (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 with new sealing washer.
      Torque to 7 Nm (62 in.lbs).
      (2) Replenish engine oil as required (refer to 12-12).
      (3) Connect electrical lead to sensor.
      (4) Reconnect battery (refer to 24-30).
      (5) Install engine cowling (refer to 71-10).
      (6) Carry out engine ground run and check for leakage and correct engine indication.

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. The starter relay is located on the top right side of the engine mount.

   B. On aircraft equipped with Rotax 912S / Rotax 914F engine, the starter relay housing needs contact to aircraft ground. It is grounded by its attachment bolts. On aircraft equipped with Rotax 912iS engine, the starter relay housing must be installed isolated from aircraft ground. It is grounded via a separate wire.

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. Refer to applicable ROTAX Aircraft Engines publications for removal/installation of the electric starter.

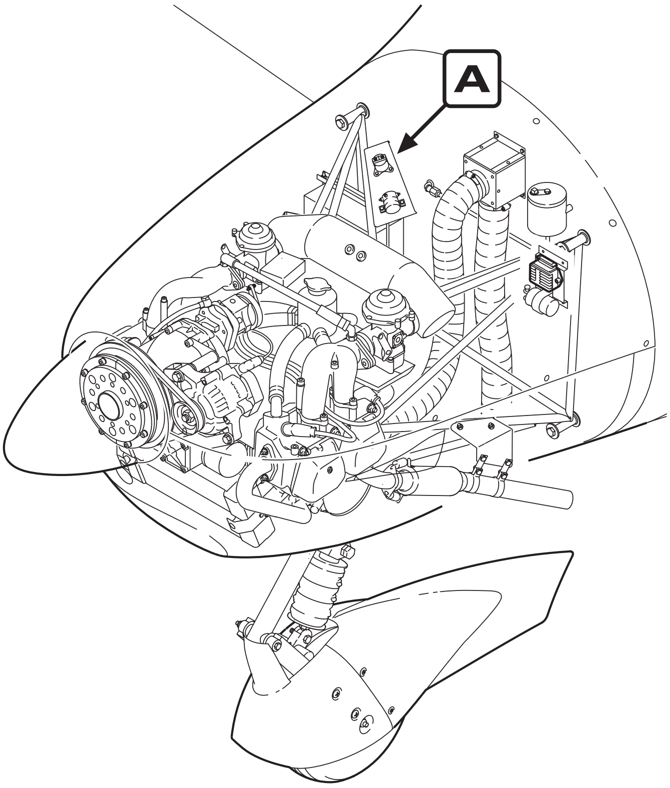
3. Starter Relay Removal/Installation

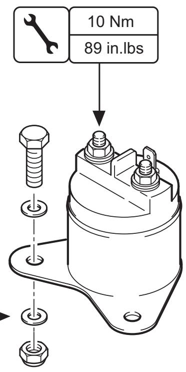
A. Remove Starter Relay
(1) Ensure electrical power to aircraft is OFF.
(2) Remove engine cowling (refer to 71-10).
(3) Disconnect battery (refer to 24-30).
(4) Remove 3 cables from top of starter relay.
(5) Remove nuts, lock washers, washers and screws securing starter relay to engine mount.
(6) Remove starter relay from aircraft.

B. Install Starter Relay
(1) Ensure electrical power to aircraft is OFF.
(2) Position starter relay on engine mount and secure with screws, washers, lock washers and nuts. Ensure surface of engine mount below toothed washer is metallically bright. Remove paint or rust if necessary.

NOTE: Electric contact is necessary between the starter relay housing and aircraft ground (engine mount)!

(3) Install 3 cables on top of starter relay. Torque nuts to 10 Nm (89 in.lbs).
(4) Reconnect battery (refer to 24-30).
(5) Install engine cowling (refer to 71-10).
(6) Carry out engine ground run and check for correct starter function.





electric contact to aircraft ground: surface of engine mount below toothed washer metallically bright (remove paint)

Detail-A

Starter Relay Installation
Figure 201

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. Refer to applicable ROTAX Aircraft Engines publications for removal/installation of the electric starter.

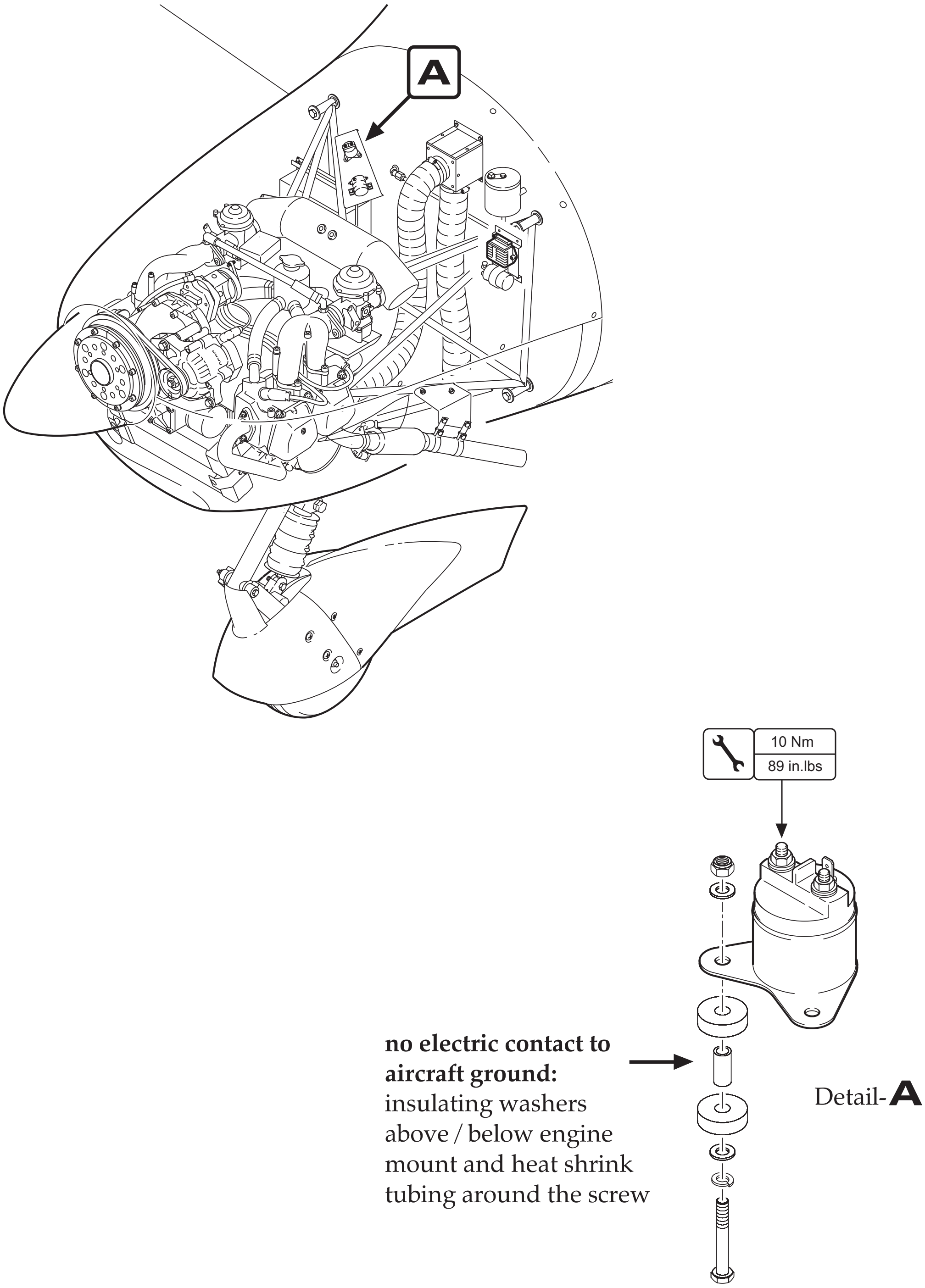
3. Starter Relay Removal/Installation

   A. Remove Starter Relay
   (1) Ensure electrical power to aircraft is OFF.
   (2) Remove engine cowling (refer to 71-10).
   (3) Disconnect battery (refer to 24-30).
   (4) Remove 3 cables from top of starter relay.
   (5) Remove nuts, lock washers, washers and screws securing starter relay to engine mount.
   (6) Remove cable from starter relay housing and remove starter relay from aircraft.

   B. Install Starter Relay
   (1) Ensure electrical power to aircraft is OFF.
   (2) Position starter relay on engine mount and secure with screws, washers, lock washers, insulating washers and nuts. Ensure heat shrink tubing is in place on screws (at least through engine mount and both insulating washers). Ensure cable is installed with cable lug between washer and starter relay housing.

   NOTE: There must be no electric contact between the starter relay housing and aircraft ground (engine mount). ENG START PWR and ENG BACKUP PWR switches connect engine ground and aircraft ground and need therefore be switched OFF for this check!

   (3) Install 3 cables on top of starter relay. Torque nuts to 10 Nm (89 in.lbs).
   (4) Reconnect battery (refer to 24-30).
   (5) Install engine cowling (refer to 71-10).
   (6) Carry out engine ground run and check for correct starter function.



Starter Relay Installation
Figure 201

EFFECTIVITY

Aircraft equipped with Rotax 912iS engine