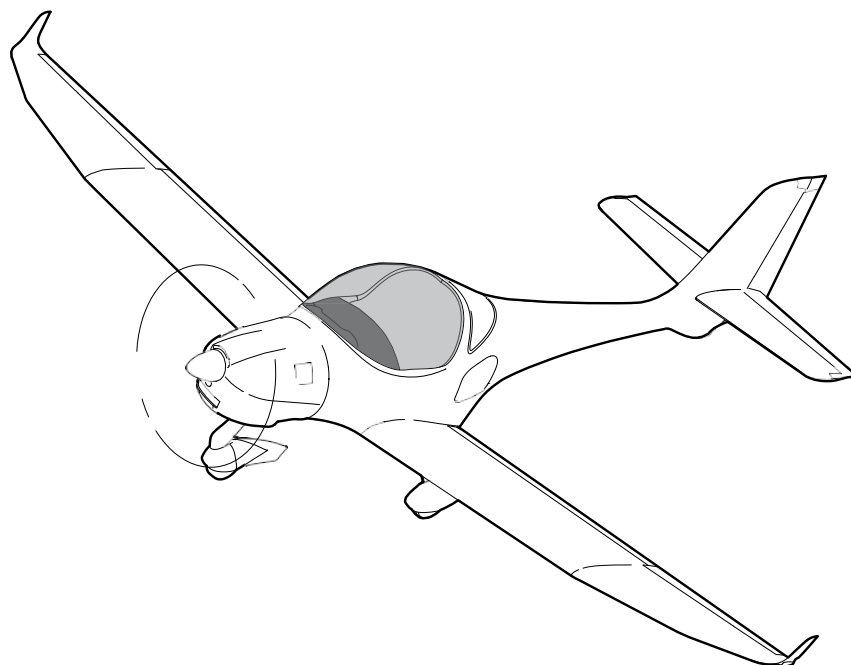




PILOT'S OPERATING HANDBOOK

AQUILA A212



Type / Model: AQUILA AT01-200

Serial Number: AT01-200A-

Registration: _____

Document Number: FM-AT01-1010-104

First Issue: 27.07.2022

Certified according to: JAR-VLA

This Pilot's Operating Handbook (POH) must be carried on board the aircraft at all times. The amendment history and revision status are provided in the list of effective pages and in the list of revisions.

The aircraft must be operated in compliance with the procedures and operating limits stated herein.

INTRODUCTION

With the AQUILA AT01 you have acquired a very efficient training and utility aircraft, which is easy to operate and exhibits excellent handling qualities.

To ensure reliable operation and trouble free flight, we recommend that you read this Pilot's Operating Handbook thoroughly and adhere to the operating instructions and recommendations given herein.

CAUTION

All limitations, procedures and performance data contained in this handbook are EASA approved and mandatory. Failing to follow the procedures and limits set forth in this handbook can lead to a loss of liability by the manufacturer.

THE HANDBOOK

The handbook is presented in loose-leaf form to ease the substitution of revisions and is sized in A5-format for convenient storage in the aircraft.

Tab dividers throughout the handbook allow quick reference to each section. A Table of Contents is located at the beginning of each section to aid the location of specific data within that section.

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LIST OF EFFECTIVE PAGES

Note:

If the applicable POH supplement for Night VFR operation is implemented, the list of resulting effective chapters can be found in chapter 9.

Section	Issue	Approved	Page	Date
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* - partly approved

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LIST OF REVISIONS

All revisions to the handbook, with the exception of individual weight and balance data and revisions to the Equipment List, must be recorded in the List of Revisions. Revisions must either be approved by the EASA or, in the case of changes, in accordance with Part 21.A.263(c)(2) by the Design Organization of AQUILA Aviation International GmbH.

Additions and revisions to text in an existing section will be identified by a vertical black line adjacent to the applicable revised area. A new issue code appears in the footer of the revised pages.

If revisions are distributed, the applicable sections are to be exchanged with the updated version. Generally only complete sections of the POH will be exchanged and not individual pages.

The operation of the AQUILA AT01 is only permitted with a current and up to date POH carried on board. Please refer to the following web page whenever the revision status of your POH is in question.

www.aquila-aviation.de

Issue	Description of Revision	Revised Section(s)	EASA Approval-number	Approval Date
A.01	First Issue	All	10081832	27.07.2022

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POH
AQUILA AT01-200A

Section 0

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

27.07.22
Date, Signature Office of Airworthiness



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Reporting of safety / airworthiness relevant occurrences:

Tel: ++49 –(0)33731-707-0
Fax: ++49 –(0)33731-707-11
E-Mail: occurrence@aquila-aviation.de

AVAILABILITY OF TECHNICAL PUBLICATIONS

To guarantee safe operation and correct maintenance of the AQUILA AT01-200 aircraft, all manuals and technical publications must be kept in the current effective status.

All manuals and technical publications are available from the companies listed below:

(a) *AQUILA AT01-200 related Manuals and Publications*

AQUILA Aviation International GmbH
OT Schönhagen, Flugplatz
D-14959 Trebbin

Tel: ++49 (0)33731-707-0
Fax: ++49 (0)33731-707-11
E-Mail: kontakt@aquila-aviation.de
Internet: <http://www.aquila-aviation.de>

(b) *Engine ROTAX 914 F related Manuals and Publications*

Contact the ROTAX® authorized distributor for ROTAX® Aircraft Engines of the applicable distribution area.

For contact details of the local authorized distributor for ROTAX Aircraft Engines, please refer to chapter 9 of the ROTAX® Operator's Manual for 914 Engines.

(c) *Propeller MTV-21 related Manuals and Publications*

mt-Propeller Entwicklung GmbH
Flugplatz Straubing-Wallmühle
D-94348 Atting

Tel: ++49 – (0)9429-9409-0
Fax: ++49 – (0)9429-8432
Internet: www.mt-propeller.com
E-Mail: sales@mt-propeller.com

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SECTION 1

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1.1 INTRODUCTION

This Pilot's Operating Handbook contains all the information the pilot and instructor require for the safe and efficient operation by day and night of the AQUILA AT01-200 aircraft.

It includes all information required in accordance with JAR-VLA and additional information considered by the manufacturer to be of value to the pilot.

This Manual consists of nine sections which cover all operational aspects of the aircraft equipped with analogue primary instruments.

Optional equipment which has been installed on request of the customer (COM, NAV, GPS and others) is included in Section 9 "Supplements" of this Manual.

Information regarding equipment approved for installation is provided in Section 6 of this manual and in the approved equipment overview list in the Maintenance Manual (Document Number MM-AT01-1020-110).

1.2 AIRCRAFT TYPE CERTIFICATION

The aircraft AQUILA AT01 is type-certified in accordance with the certification specifications of the *Joint Aviation Requirements for Very Light Aeroplanes (JAR-VLA*, including the revision VLA/92/1) by the Luftfahrt-Bundesamt, the National Aviation Authority of Germany.

The Type Certificate under the Type Certificate Data Sheet No. 1106 was issued on the 21st of September 2001.

In accordance with „Certification Review Item A-01“ (15.06.2007) as a Change to the Type Certificate of EASA.A.527, the AQUILA AT01 is certified for flights under N/VFR condition.

Based on this Type Certificate the model AT01-200 was certified.

Category of Airworthiness: Normal

Noise Certification Basis: CS-36 (Amendment 5)

Approved for following operations: VFR by day
VFR by night

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1.3 WARNING, CAUTIONS AND NOTES

Throughout the text, special text boxes marked WARNING, CAUTION and NOTE are used. These terms are defined as follows:

WARNING

Procedures, practices, etc. which may result in personal injury or loss of life if not strictly adhered to. The issues addressed under these text boxes directly affect the airworthiness and the safe operation of the aircraft.

CAUTION

Procedures, practices, etc. which may result in damage to or destruction of equipment if not strictly adhered to. The issues addressed under these text boxes have an indirect or minor impact on the airworthiness and the safe operation of the aircraft.

NOTE

Calls attention to additional procedures or information which are not directly associated with flight safety but are nevertheless important or deviate from standard practices.

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1.4 PRINCIPLE AIRCRAFT DIMENSIONS

1.4.1 Overall Dimensions

Wing Span:	33.79 ft	(10.30 m)
Length:	24.28 ft	(7.40 m)
Height:	7.87 ft	(2.40 m)

1.4.2 Wings

Airfoil:	HQ-XX mod.	
Area:	113.02 sq. ft	(10.50 m ²)
Aspect Ratio:	10.10	
Mean Aerodynamic Chord (MAC):	3.51 ft	(1.07 m)

1.4.3 Horizontal Stabilizer / Elevator

Area:	21.52 sq. ft	(2.00 m ²)
Span:	9.84 ft	(3.00 m)

1.4.4 Fuselage and Vertical Stabilizer / Rudder

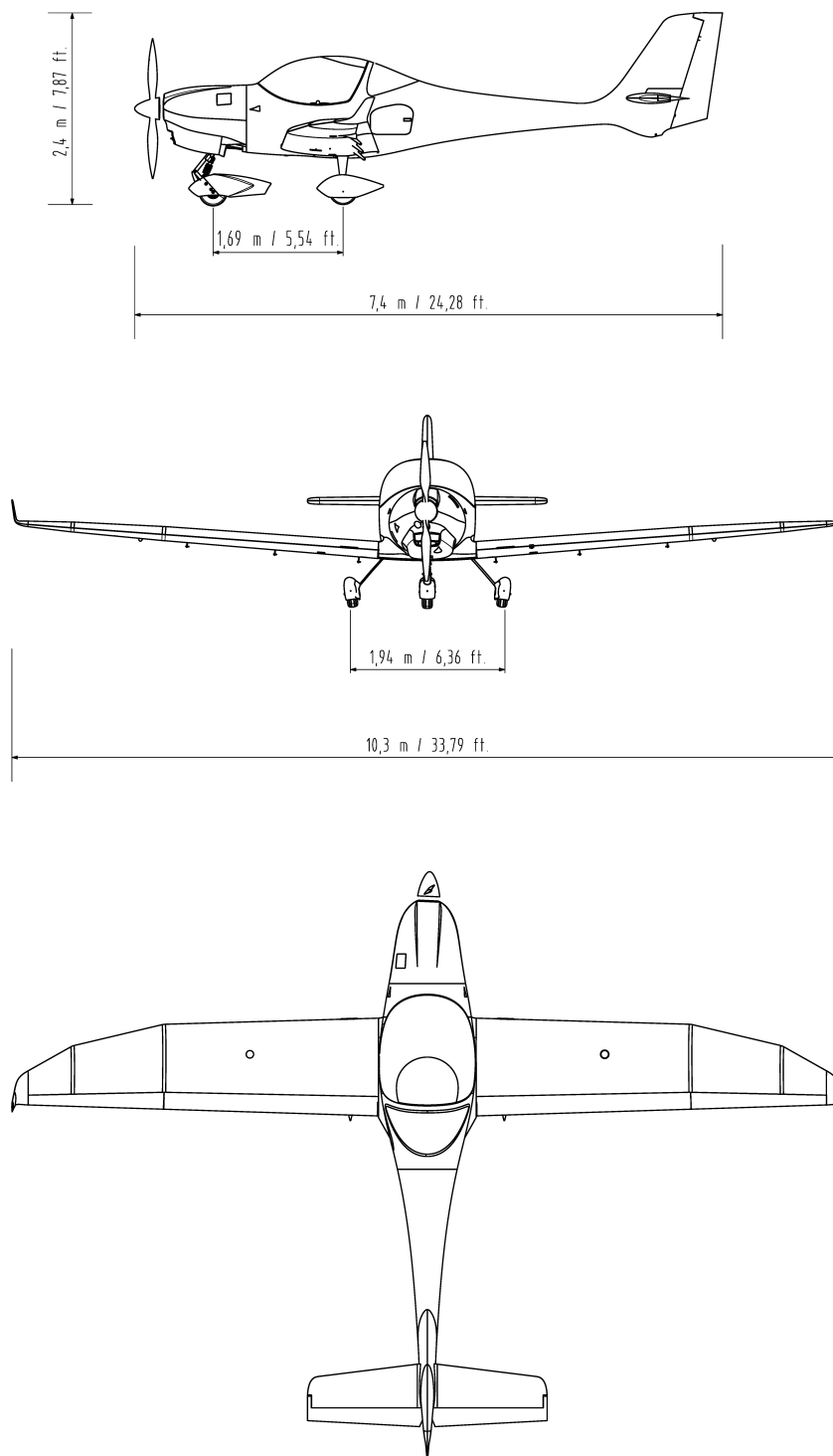
Maximum Fuselage Width	3.94 ft	(1.20 m)
Length	24.28 ft	(7.40 m)
Area (Vertical Tail):	15.61 sq. ft	(1.45 m ²)

1.4.5 Landing Gear

Wheel Track:	6.37 ft	(1.94 m)
Wheel Base:	5.54 ft	(1.69 m)
Tire Size:	5.00-5	

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1.5 AQUILA AT01-200 – THREE VIEW DRAWING



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1.6 ENGINE

The ROTAX® 914 F3 is a 4-cylinder 4-stroke engine with air cooled cylinders and liquid cooled cylinder heads.

The Propeller is driven via an internal reduction gearbox with an integrated overload clutch and a hydraulic constant speed propeller governor.

Reduction Ratio of internal gearbox:	2.43 : 1	
Displacement:	73.9 in ³	(1211 cm ³)
max. Takeoff power (5 min.):	113,3 BHP	(84.5 kW)
at max. Takeoff propeller speed:	2385 RPM	
max. continuous power:	98.6 BHP	(73.5 kW)
at max. continuous propeller speed:	2260 RPM	

1.7 PROPELLER

Hydraulic two-blade, constant speed propeller

Manufacturer:	mt-Propeller
Type:	MTV-21-A/175-05
Diameter:	68.9 in (175 cm)

1.8 FUEL

The following fuel grades are approved for use (min. RON 95):

EN228 Super	ASTM D4814
EN228 Super plus	
AVGAS 100LL	ASTM D910
AVGAS UL 91	ASTM D7547

	<u>Left Fuel Tank</u>	<u>Right Fuel Tank</u>
Fuel Capacity (total):	15.8 US gal (60 l)	15.8 US gal (60 l)
Usable Fuel (total):	14.48 US gal (54.8 l)	14.48 US gal (54.8 l)
Unusable Fuel:	1.37 US gal (5.2 l)	1.37 US gal (5.2 l)

Due to the higher lead content in AVGAS 100LL, wear of the valve seats, deposits in the combustion chamber and lead sediments in the lubrication system will increase when using this type of fuel. Therefore AVGAS should only be used if you encounter problems with vapor lock or if the other fuel types are not available.

Lead free AVGAS UL 91 is similar to AVGAS 100LL (MON 91 ⇒ RON > 95) when it comes to vapor lock susceptibility. However, it does not suffer from lead induced problems.

For training operations the use of fuel grades with **RON > 95** is highly recommended to guard against detonation damages to the engine.

(Please refer to the current issue of the operating manual for the ROTAX® 914 engine series and ROTAX® Service Letter SL-914-014)

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1.9 ENGINE OIL AND COOLANT

1.9.1 Engine Oil

Use only oil with an API classification of “SG” or higher. Heavy duty 4-stroke motor oils tend to meet these requirements. For more information regarding engine oil selection, please refer to the Operator’s Manual for all versions of the 914 engine series and to the current issue of the ROTAX® Service Instruction SI-914-019.

The following chart shows the recommended oil viscosity as a function of the climatic conditions. The use of multi-grade oils is recommended.

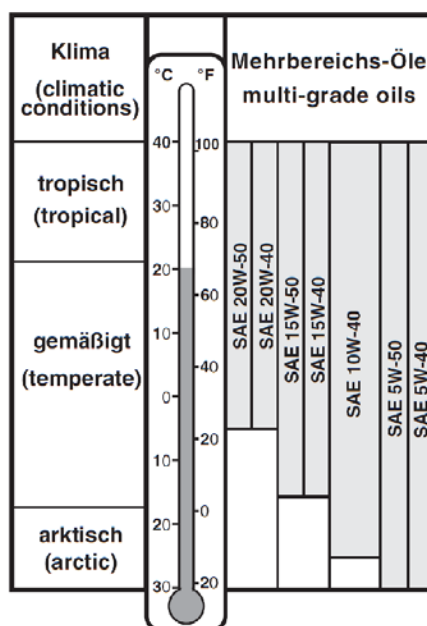


Figure 1-2

CAUTION

Do not use aviation grade oil!

When operating the engine with AVGAS do **not** use full synthetic oil!

If the engine is operated extensively on AVGAS 100LL (more than 30hrs within 100hrs) the interval between oil changes shall be reduced to 50 hrs!

(please refer to the current issue of the ROTAX® Service Instructions SI-914-019)

Max. Oil Capacity:	3.17 US quarts	(3.00 l)
Difference between Max/Min:	0.475 US quarts	(0.45 l)
Max. Oil Consumption:	0.063 US quarts/hr.	(0.06 l/h)

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1.9.2 Engine Coolant

A conventional, ethylene glycol and water based coolant is used.

Please refer to the Operator's Manual for the 914 engine series, section 2.2, and to the current issue of the ROTAX® Service Instructions SI-914-019 when choosing an engine coolant.

Description	Ethylenglycol	Water
Mixture ratio [%] anti-freeze / water	50 + 15	50 - 15

CAUTION

Low quality or contaminated coolant may lead to deposits in the cooling system which may result in insufficient engine cooling.

Coolant Quantity: Minimum: 2.54 US quarts (2.4 l)
Maximum: 2.64 US quarts (2.5 l)

Overflow Bottle: Minimum: 0.106 US quarts (0.1 l)
Maximum: 0.21 US quarts (0.2 l)

1.10 WEIGHTS

Maximum Takeoff Weight (MTOW): 1653 lb. (750 kg)
Maximum Landing Weight (MLW): 1653 lb. (750 kg)
Empty Weight (MZFW): Refer to section 6
Max. Weight in Baggage Compartment: 88.2 lb. (40 kg)
(All baggage must be adequately strapped and secured)
Max. Wing Loading: 14.6 lb./ft² (71.4 kg/m²)
Min. Wing Loading: ca. 10.77 lb./ft² (52.6 kg/m²)

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1.11 TERMINOLOGY AND ABBREVIATIONS

1.11.1 Speeds

IAS:	(Indicated Airspeed) - the speed shown on the airspeed indicator
KIAS:	IAS expressed in knots
CAS:	(Calibrated Airspeed) - the indicated airspeed, corrected for position and instrument error. CAS is equal to true airspeed in standard atmosphere conditions at sea level.
KCAS:	CAS expressed in knots
TAS:	(True Airspeed) - the airspeed relative to undisturbed air, which is the CAS corrected for altitude, temperature and compressibility.
GS:	(Ground speed) - speed of the aircraft relative to the ground
V_A :	Maneuvering Speed
V_S :	Stall speed without engine power
V_{S0} :	Stall speed without engine power in the landing configuration
V_X :	Best Angle-of-Climb Speed
V_Y :	Best Rate-of-Climb Speed
V_{FE} :	Maximum Flap Extended Speed
V_{NE} :	Never Exceed Speed - The speed limit that must not be exceeded at any time
V_{NO} :	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.

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1.11.2 Weight and Balance

<i>Reference Datum:</i>	An imaginary vertical plane from which all horizontal distances are measured for balance purposes
<i>Reference Line:</i>	fixed horizontal reference line
<i>Lever Arm:</i>	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item
<i>Moment:</i>	The product of the weight of an item multiplied by its lever arm
<i>Empty Weight:</i>	Weight of the aircraft including unusable fuel, full operating liquids and full oil.
<i>Max. Takeoff Weight:</i>	Maximum permissible weight approved for the conduction of the takeoff run
<i>Useful Load:</i>	Difference between takeoff weight and basic empty weight
<i>Usable Fuel:</i>	Fuel available for flight planning
<i>Unusable fuel:</i>	Fuel remaining in the fuel tanks that cannot be safely used in flight.
<i>Center of Gravity (C.G.):</i>	The point at which the aircraft would balance if it were possible to suspend it at that point
<i>MAC:</i>	mean aerodynamic chord
<i>MTOW:</i>	maximum takeoff weight
<i>MWL:</i>	maximum landing weight
<i>MZFW:</i>	empty weight

1.11.3 Meteorological Terminology

<i>ISA:</i>	International Standard Atmosphere
<i>MSL:</i>	Altitude above sea level
<i>OAT:</i>	Outside Air Temperature
<i>QNH:</i>	Barometric pressure adjusted to sea level
<i>SAT:</i>	Static Air Temperature - equal to OAT
<i>VFR, Day:</i>	Beginning of morning civil twilight until end of evening civil twilight (sun 6° below horizon)
<i>VFR, Night:</i>	End of evening civil twilight until beginning of morning civil twilight (sun 6° below horizon)
<i>DVFR:</i>	Flight during the day according to visual flight rules
<i>NVFR:</i>	Flight during the night according to visual flight rules

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1.11.4 Engine and Performance

TOP: (Take-off Power) - maximum power permissible for takeoff
MCP: (Max. Continuous Power) - maximum power permitted for continuous operation

1.11.5 Various

Serial No. (S/N): Serial Number of the Aircraft
Part No. (P/N): Part Number
GFRP: Glass Fiber Reinforced Plastic
CFRP: Carbon Fiber Reinforced Plastic
ACL: Anti Collision light
VFR: Visual Flight Rules
PFD: Primary Flight Display
ADC: Air-Data Computer
AHRS: Attitude and Heading Reference System
GDU: Garmin Display Unit
MFD: Multi-Function Display
AI: Attitude Indicator or Artificial Horizon
LDG: Flaps - landing position
T/O: Flaps - takeoff position
UP: Flaps - cruise position
MP: Manifold Pressure
COM: Communication
NAV: Navigation
CB: Circuit Breaker
ATC: Air Traffic Control
FF: Fuel Flow
rpm: revolutions per minute
AS: AQUILA Supplement
EMS: Engine Monitoring System
TCU: Turbo Control Unit

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1.12 CONVERSION FACTORS

1.12.1 Length

1 ft	=	0.304	m
1 in	=	25.4	mm

1.12.2 Speed

1 kt	=	1.852	km/h
1 mph	=	1.609	km/h

1.12.3 Pressure

1 hPa	=	100	N/m ²	=	1 mbar
1 in. Hg	=	33.865	hPa		
1 psi	=	68.97	mbar		

1.12.4 Mass ("Weight")

1 lb	=	0.454	kg
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1.12.5 Volume

1 US Gallon	=	3.78	Liter
1 Imperial Gallon	=	4,546	Liter

1.12.6 Temperature

(t) °C (Celsius)	=	5/9 ((t) °F-32)
(t) °F (Fahrenheit)	=	9/5 (t) °C+32

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SECTION 2

LIMITATIONS

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2.1 INTRODUCTION

This section includes all operating limitations, instrument markings and basic placards necessary for the safe operation of the aircraft, its engine, standard systems and standard equipment.

WARNING

The aircraft must be operated in compliance with the operating limitations.

2.2 AIRSPEED LIMITATIONS

The airspeeds given below are expressed in Indicated Airspeeds (IAS), the airspeed shown on the airspeed indicator:

Indicated Airspeed (IAS)	[kts]	Remarks
V_A Maneuvering speed	112	Do not make full or abrupt control movements above this speed. This may result in overloading the aircraft structure.
V_{FE} Maximum flap extended speed	90	Do not exceed this speed with flaps in T/O or LDG position.
V_{NO} Maximum structural cruising speed	130	Do not exceed this speed except in smooth air, and then only with caution.
V_{NE} Never exceed speed	165	Do not exceed this speed in any operational condition.

	POH AQUILA AT01-200A (N/VFR)	Section 2 LIMITATIONS
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2.3 AIRSPEED INDICATOR MARKINGS

The airspeeds given below are expressed in Indicated Airspeeds (IAS):

Marking (IAS)	[kts]	Remarks
White arc	39-90	Full flap operating range
Green arc	49-130	Normal operating range
Yellow arc	130-165	Operations in this region must be conducted with caution and only in smooth air.
Red line	165	Maximum speed for all operations.

2.4 POWER PLANT LIMITATIONS

2.4.1 Engine

- a) Manufacturer: BRP-ROTAX GmbH & Co KG, Gunskirchen, Austria
b) Model: 914 F3

NOTE

The engine is equipped with a hydraulic propeller governor and drives the propeller via a reduction gearbox. The gearbox reduction ratio is 2.43 : 1.

The tachometer indicates the propeller speed. As a result, all rpm readings in this manual are expressed as propeller speeds, unlike the data in the Engine Operator's Manual.

c) Power Plant Limitations

Maximum Takeoff Power:	113.3 BHP (84.5 kW)
Maximum Takeoff Prop Speed (5 min.):	2385 RPM
Maximum Continuous Power:	98.6 BHP (73.5 kW)
Maximum Continuous Prop Speed:	2260 RPM

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d) Oil Pressure

Minimum: 11.6 psi (0.8 bar) below 590 RPM
Normal: 29 –72.5 psi (2.0-5.0 bar) above 590 RPM
Maximum during a cold start: 101.5 psi (7.0 bar)
(only for a short time)

e) Fuel Pressure*

Minimum: 2.2 psi (0.15 bar)
Maximum: 5.1 psi (0.35 bar)

f) Manifold Pressure

Maximum (MCP): 35 inHg
Maximum (TOP, 5 min): 40 inHg

g) Oil Temperature

Maximum: 266 °F (130 °C)
Minimum: 122 °F (50 °C)

h) Cylinder Head Temperature (CHT)

Maximum: 248 °F (120 °C)

i) Minimum temperature to start the engine

Minimum: -13 °F (-25 °C)
At an OAT below -13 °F (-25 °C) the engine must be preheated.

2.4.2 Propeller

a) Manufacturer: mt-Propeller Entwicklung GmbH, Atting, Germany

b) Model: MTV-21-A/175-05

c) Propeller diameter: (68.9 in) 1,75 m

d) Propeller speed limitations

Maximum take-off propeller speed (max. 5 min): 2385 RPM

Maximum continuous propeller speed: 2260 RPM

* Difference of fuel pressure minus airbox pressure

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2.5 MARKINGS ON POWER PLANT INSTRUMENTS

The following table shows the instrument markings for the engine and their meaning.

Instrument	Red Line (minimum)	Green Arc (normal operating range)	Yellow Arc (caution)	Red Line (maximum)
Tachometer [RPM]	---	0 – 2260	2260 - 2385	2385
Oil Temperature [°F] / ([°C])	122 (50)	122 - 266 (50 – 130)	---	266 (130)
Cylinder Head Temperature [°F] / ([°C])	---	---	---	248 (120)
Oil Pressure [psi] / ([bar])	11.6 (0.8)	29 – 72.5 (2.0 – 5.0)	11.6 – 29 (0.8 – 2.0) 72.5 – 101.5 (5.0 – 7.0)	101.5 (7.0)
Fuel Pressure [psi] / ([bar])	2.2 (0.15)	2.2 – 5.1 (0.15 – 0.35)	---	5.1 (0.35)
Manifold Pressure [inHg]	---	0 – 35	35 – 40	40
Voltmeter [V]	11	12.5 - 15.5	11 - 12.5	15.5
Amperemeter BAT [A]	---	-3 - +100	< -3	---
Amperemeter ALT1 or ALT2 [A]	---	---	---	---
optional: EGT [°F] / ([°C])	---	104 - 1742 (40 - 950)	---	1742 (950)
optional: Fuel Flow [Gal/h] / ([l / h])	---	0 - 11.9 (0 - 45)	< 11.9 (< 45)	---

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2.6 WEIGHT LIMITS

Maximum Takeoff Weight	1653 lb	(750 kg)
Maximum Landing Weight	1653 lb	(750 kg)
Max. Weight in Baggage Compartment	88.2 lb	(40 kg)

WARNING

Exceeding the weight limits can overload the aircraft and is prohibited. In addition, aircraft performance and handling characteristics may be detrimentally affected. The stall speed will increase, so that the instrument markings are no longer accurate.

2.7 CENTER OF GRAVITY LIMITS

The reference datum is located at the wing leading edge, at the fuselage-wing junction. With the aircraft leveled, the reference datum and the vertical fall in a plane.

The center of gravity must be within the following limits:

Forward Limit:	16.8 in.	(0.427 m)	aft of Datum
Rearward Limit:	20.6 in.	(0.523 m)	aft of Datum

WARNING

Exceeding the center of gravity limits is prohibited. Exceeding the limits reduces the controllability and stability of the aircraft.

The procedure to determine the center of gravity location for flight is provided in Section 6 of this handbook.

2.8 MANEUVER LIMITS

The aircraft is certificated in accordance to the JAR-VLA. That certification includes the following maneuvers:

- a) All normal, non acrobatic maneuvers.
- b) Stalls: Wings level stall
- c) Steep Turns: Angle of Bank $\leq 60^\circ$
- d) Chandelle: Entry Speed 120 kts
- e) Lazy Eight: Entry Speed 110 kts

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NOTE

All acrobatic maneuvers as well as maneuvers with a bank angle exceeding 60° are prohibited.

2.9 FLIGHT LOAD FACTORS

The following flight load factors may not be exceeded while performing any approved maneuvers.

Flight Load Factor [g]	at V _A	at V _{NE}	With Flaps Extended
Positive	4.0	4.0	2.0
Negative	-2.0	-2.0	0

WARNING

Exceeding the flight load factors limits may result in damage to the aircraft structure.

CAUTION

*Maneuvers that include intentional negative flight load factors are not permitted.
Intentional Spinning is not permitted.*

2.10 CREW

Maximum number of people on board: 2

Minimum crew: 1 Pilot

With only one person on board, the aircraft
may only be operated from the left seat.

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2.11 KINDS OF OPERATION LIMITS / MINIMUM EQUIPMENT

Certified for: visual flights by Day and Night

Table 1	For VFR by Day and Night*	
Flight and navigational instruments	• Altimeter (0 – 20,000 ft) • Airspeed Indicator (0 – 200 kts) • Magnetic Compass • Working timepiece with a seconds hand ** • VHF Transceiver *** • VSI (± 2000 ft/min)	• Attitude Indicator • Slip Indicator • Directional Gyro • Outside Air Temperature (OAT) Indicator • VOR Receiver* • Transponder (XPDR)
Power Plant Instruments	• Fuel gauge • Oil Temperature Indicator • Oil Pressure Indicator • Cylinder Head Temperature Indicator • Manifold Pressure Gauge • Tachometer • Voltmeter • Ammeter BAT • Ammeter ALT 1 / ALT 2 (with toggle switch)	• Warning FUEL PRESSURE • Warning Light ALT 1 • Warning Light ALT 2 • Warning VOLTAGE • Warning Light TCU • Warning Light BOOST • BAT2 • TCU
Lighting	• Position lights • Anti Collision Lights • Landing Lights • Instrument lighting • Cabin lighting • Flashlight	
Other Equipment	• Seat belts for each occupied seat • Emergency Hammer • Battery ≥ 34 Ah • Alternator ALT 2	

* The minimum equipment listed in Table 1 is valid for Germany. Other countries may require different minimum equipment. This may depend on the type of flight being carried out and the route being flown.

** In Germany a watch with a seconds hand may be used as a working timepiece. Please observe all differing national regulations.

*** In Germany a VHF Transceiver is not required for flights that do not leave the vicinity of an uncontrolled airfield (§4 Abs. 3 FSAV). Regulations of other nations must still be observed.

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NOTE

For specific operations, additional equipment may be necessary. It is the aircraft operator's responsibility to observe the applicable requirements.

2.12 FUEL LIMITATIONS

	<u>Left Fuel Tank</u>	<u>Right Fuel Tank</u>
Fuel capacity (total):	15.85 US gal (60.0 l)	15.85 US gal (60.0 l)
Usable fuel (total):	14.48 US gal (54.8 l)	14.48 US gal (54.8 l)
Unusable fuel:	1.37 US gal (5.2 l)	1.37 US gal (5.2 l)

For approved fuel grades, please refer to paragraph 1.8.

CAUTION

To ensure both fuel tanks are emptied evenly, switch to the other tank at least every 60 minutes.

NOTE

The amount of unusable fuel was determined with flap on LDG and $V_{FE} = 90$ kts. It is the worst case fuel supply configuration within section 4 "NORMAL PROCEDURES".

2.13 TEMPERATURE LIMITATIONS

Parts of the aircraft structure that are exposed to direct vertical sunlight must be painted WHITE.

The cooling system of the engine was certified up to ISA +23°C.

For climbing in OAT higher than ISA +23°C an appropriate airspeed of more than v_y has to be selected by the pilot.

2.14 OPERATING ALTITUDE

The Aquila AT01-200 has a maximum operating altitude of 16,400 ft.

For flights over FL120 an appropriate oxygen supply for all persons aboard is recommended. Furthermore national regulations may be considered if applicable.

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2.15 PLACARDS

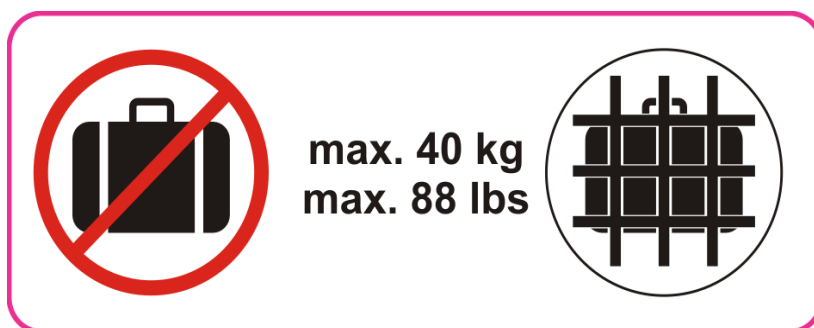
- 1) On the instrument panel, in the lower middle section of the panel:

This aeroplane is classified as VLA (Very Light Aeroplane) for Day and Night VFR in non-icing conditions. All aerobatic maneuvers including intentional spinning are prohibited. See Flight Manual for other limitations.

- 2) On the instrument panel below the Airspeed Indicator:

Maneuvering Speed
VA = 112 kts

- 3) On the inner surface of the baggage compartment door:



- 4) On the instrument panel next to the main switches:

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

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SECTION 3

EMERGENCY PROCEDURES

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3.1 INTRODUCTION

This section provides checklists with the recommended procedures for coping with various emergency situations.

Emergencies caused by aircraft or engine malfunctions are extremely rare if all pre-flight inspections and required maintenance is properly conducted.

However, should an emergency situation occur, the procedures provided here are recommended to correct the problem and master the situation.

Not all types of emergency situations or combinations can be described in the POH. A pilot must therefore always use good airmanship and have a sound knowledge of the aircraft and its systems.

3.1.1 Resetting Circuit-breakers

The **one time only** resetting of a tripped circuit breaker or safety switch is considered a recommendation for the following emergency procedures.

Applicable for all switches: pushing the top = ON; pushing the bottom = OFF

CAUTION

A tripped circuit breaker or safety switch should only be reset if it is needed for continued safe flight and landing. In extreme cases, resetting a circuit breaker may cause an electrical fire.

*A circuit breaker or safety switch should only be reset **once** and be inspected after flight.*

3.2 AIRSPEEDS FOR EMERGENCY OPERATION

Airspeed (IAS)		[kts]
Maneuvering speed	V _A	112
Speed for best glide ratio		
Flaps	UP	78
Flaps	T/O	73
Precautionary landing with / without engine power		
Flaps	LDG	60
Landing without engine power		
Flaps	T/O	65
Flaps	UP	70

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3.3 ENGINE FAILURES – CHECKLISTS

3.3.1 Engine Failure before Take-off

1. Throttle IDLE
2. Brakes APPLY as required

3.3.2 Engine Failure Immediately After Take-off and during Climb

1. Airspeed (IAS) 70 KIAS

WARNING

Depending on the own speed and altitude, the wind condition and the remaining engine power a forced landing must be initiated under consideration of the local conditions.

Turning back to the runway only at adequate altitude, otherwise land straight ahead ! Pay attention to the speed !

Check the following items (if time allows):

2. Fuel selector valve SWITCH to fullest or other tank
3. **Fuel Pump AUX** switch ON
4. Ignition switch BOTH
5. Throttle wide OPEN
6. Propeller control lever HIGH RPM position
7. Choke PRESS (OFF)
8. Carburetor heat PULL (ON)

Before landing (if possible):

9. Fuel selector valve OFF
10. Ignition switch OFF
11. **ALT1 / BAT** switch OFF
12. **ALT2 / BAT** switch OFF

WARNING

*With **ALT1 / BAT** switch in OFF position: Stall warning system inoperative and flap position cannot be changed!*

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3.3.3 In-flight Engine Failures

A) ENGINE ROUGHNESS

- | | |
|--------------------------------|---|
| 1. Carburetor heat | PULL (ON) |
| 2. Fuel Pump AUX switch | ON |
| 3. Ignition switch | SWITCH through the positions
L-BOTH, then R-BOTH |
| 4. Throttle | Maintain setting |
- If roughness continues:
- | | |
|--------------------------|------------------------------------|
| 5. Throttle | REDUCE to min. required for flight |
| 6. Precautionary Landing | PERFORM (see 3.4.1) |

B) LOSS OF OIL PRESSURE

- | | |
|--------------------|-------|
| 1. Oil Temperature | CHECK |
|--------------------|-------|
- If oil pressure sinks below the green range and the oil temperature remains normal:
- | | |
|---------------------------------|--|
| 2. Land at the nearest airfield | |
|---------------------------------|--|
- If oil pressure sinks below the green range and the oil temperature rises:
- | | |
|--------------------------|--|
| 2. Throttle | REDUCE to min. required for flight |
| 3. Precautionary landing | PERFORM (see 3.4.1), Engine may fail suddenly! |

C) LOSS OF FUEL PRESSURE

- | | |
|--------------------------------|--|
| 1. Fuel Pump AUX switch | ON |
| 2. Fuel selector valve | SWITCH to fullest or other tank |
| 3. Throttle | REDUCE to min. required for flight, if possible (Manifold pressure below air pressure) |
| 4. Fuel Pump AUX switch | OFF, when fuel pressure in green range |
- If fuel pressure remains below the green range:
- | | |
|--------------------------|--|
| 5. Precautionary landing | PERFORM (see 3.4.1), Engine may fail suddenly! |
|--------------------------|--|

WARNING

In case of MAIN fuel pump failure the AUX fuel pump has to be switched on within 3 seconds to prevent engine failure at increased boost pressure!

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NOTE

After switching fuel tanks, it may take up to 8 seconds for full fuel pressure to be built up.

D) SUDDEN LOSS OF MANIFOLD PRESSURE & PROPELLER RPM**I. TCU warning light (YELLOW) is NOT blinking** - possible Turbocharger defect (loud Bang?)

- | | | |
|----|-------------------------|--|
| 1. | Throttle | KEEP manifold pressure in green range |
| 2. | Propeller control lever | KEEP RPM in green range |
| 3. | Oil pressure gauge | MONITOR |
| 4. | Precautionary landing | PERFORM (see 3.4.1), Engine may fail suddenly! |

WARNING

In case of Turbocharger failure heavy oil loss due to bearing damage has to be expected.

II. TCU warning light (YELLOW) is blinking - waste gate is not closing

- | | | |
|----|----------------------------|--|
| 1. | Throttle | KEEP manifold pressure in green range |
| 2. | Propeller control lever | KEEP RPM in green range |
| 3. | TCU switch | OFF
(Cover up, switch down) |
| 4. | TCU circuit breaker | PULL |
| 5. | TCU circuit breaker | after 5 seconds PRESS |
| 6. | TCU switch | after 10 seconds (TCU self-test completed)
ON (switch up) |

If the situation does not improve:

- | | | |
|----|-----------------------|--|
| 7. | Precautionary landing | PERFORM (see 3.4.1), Engine may fail suddenly! |
|----|-----------------------|--|

WARNING

If there is a failure of the Turbocharger or a waste gate fixed in open position, an engine power of 66kW (88,5 BHP) is remaining.

(see section 5 for resulting take-off distance and remaining climb rate for balked landing)

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E) SUDDEN INCREASE OF MANIFOLD PRESSURE & PROPELLER RPMI. TCU warning light (YELLOW) is blinking - waste gate closed

- | | | |
|----|-------------------------|---------------------------------------|
| 1. | Throttle | KEEP manifold pressure in green range |
| 2. | Propeller control lever | KEEP RPM in green range |
| 3. | Precautionary landing | PERFORM (see 3.4.1) |

WARNING

If the waste gate is closed, only a distinctly reduced engine power is available.

II. TCU warning light (YELLOW) is NOT blinking - gas bowden cable broken

- | | | |
|----|-------------------------|------------------------------------|
| 1. | Throttle | REDUCE to min. required for flight |
| 2. | Propeller control lever | KEEP RPM in green range |

If manifold pressure cannot be reduced:

- | | | |
|----|-------------------------|---|
| 3. | Throttle | wide OPEN (increase engine power until engine is running as calm as possible) |
| 4. | Propeller control lever | KEEP RPM in green range |

When safe approach altitude for nearest landing field is reached:

5. Perform emergency landing with engine off according to section 3.4.2.

If the situation does not improve:

WARNING

When the gas Bowden cable is broken, the spring-loaded throttle valve is opening in the carburetor completely (take-off power 115% MCP). With the failure only on one side the engine will run very roughly and only by setting full throttle on the still controllable carburetor safe climbing is still possible. For landing the engine has to be turned off at a safe altitude.

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F) OSCILLATION OF MANIFOLD PRESSURE & PROPELLER RPMI. TCU warning light (YELLOW) is NOT blinking - Malfunction TCU

1. Throttle middle position (wastegate open)
2. Propeller control lever KEEP RPM in green range
3. **TCU** switch OFF
(Cover up, switch down)
4. **TCU** circuit breaker PULL
5. **TCU** circuit breaker after 5 seconds PRESS
6. **TCU** switch after 10 seconds (TCU self-test completed)
ON (switch up)

When there is no stabilisation:

6. **TCU** switch OFF (switch down)
7. Throttle KEEP manifold pressure in green range
8. Propeller control lever KEEP RPM in green range
9. Precautionary landing PERFORM (see 3.4.1)

WARNING

Depending on the last waste gate position, without a working TCU there is only a distinctly reduced engine power available.

G) EXCEEDANCE OF THE MAXIMUM ALLOWABLE MANIFOLD PRESSURE OR OF THE MAXIMUM DURATION FOR OPERATION WITH TAKE-OFF POWERI. **BOOST** warning light (RED) is illuminated - Exceedance of max manifold pressure (40inHg)

1. Throttle KEEP manifold pressure in green range
2. Propeller control lever KEEP RPM in green range
3. **TCU** switch check, if ON (switch up)

If there is no switch failure - **Malfunction of TCU likely! (refer to 3.3.3 F)**

II. **BOOST** warning light (RED) is blinking - Exceedance of max. duration for TOP (5 min)

1. Throttle KEEP manifold pressure in green range
2. Propeller control lever KEEP RPM in green range
3. Flight CONTINUE

WARNING

Every exceedance indicated by BOOST warning light has to be recorded in the logbook together with information regarding type, duration and date of the exceedance! Exceedances of less than 3 seconds will not be indicated.

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H) ENGINE RESTART PROCEDURE WITH STOPPED PROPELLER

- | | | |
|----|------------------------------------|--|
| 1. | Non-essential electrical equipment | OFF |
| 2. | ALT1 / BAT switch | ON |
| 3. | ALT2 / BAT2 switch | ON |
| 4. | Propeller control lever | HIGH RPM position |
| 5. | Fuel selector valve | SWITCH to fullest tank |
| 6. | Fuel Pump AUX switch | ON |
| 7. | Throttle | warm engine OPENED 2 cm (0,8 inch)
cold engine IDLE |
| 8. | Choke | warm engine PUSHED (OFF)
cold engine PULL (ON) |
| 9. | Ignition switch | BOTH, then START |

When power is restored:

- | | | |
|-----|----------------------|-------------------------|
| 10. | Oil pressure | CHECK |
| 11. | Choke | PUSHED (OFF) |
| 12. | Electrical equipment | SWITCH ON (as required) |
| 13. | Oil temperature | CHECK |

NOTE

*The engine can also be restarted by Windmilling if the airspeed is increased to approx. 120 kts.
Approx. 1000 ft / 300 m of altitude is required in this method.*

I) ENGINE RESTART PROCEDURE WITH WINDMILLING PROPELLER

At airspeeds above 60 kts the propeller continues to windmill with the engine off.

- | | | |
|----|-----------------------------|---|
| 1. | Airspeed | 78 KIAS |
| 2. | ALT1 / BAT switch | ON |
| 3. | ALT2 / BAT2 switch | ON |
| 4. | Fuel selector valve | SWITCH to fullest or other tank |
| 5. | Propeller control lever | HIGH RPM position |
| 6. | Fuel Pump AUX switch | ON |
| 7. | Ignition switch | BOTH |
| 8. | Throttle | hot engine OPENED 2 cm (0,8 inch)
cold engine IDLE |
| 9. | Choke | hot engine PUSHED (OFF)
cold engine PULL (ON) |

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When power is restored:

- | | | |
|-----|----------------------|-------------------------|
| 10. | Oil pressure | CHECK |
| 11. | Choke | PUSHED (OFF) |
| 12. | Electrical equipment | SWITCH ON (as required) |
| 13. | Oil temperature | CHECK |

3.4 FORCED LANDINGS

Generally the flight path should always be chosen such that, in the event of an emergency, a suitable landing field can be reached.

CAUTION

If, after a forced landing, the aircraft flips over, an emergency hammer can be used to break through the canopy. For this purpose an emergency hammer is attached to back of the right hand seat.

3.4.1 Precautionary Landing

NOTE

A precautionary landing occurs when the pilot decides to discontinue flight to avoid a situation degrading into an emergency. This way the pilot has time to make decisions and choose an adequate landing site or divert to an airfield. The procedure for a precautionary landing is fundamentally the same as a normal landing, which is described in Section 4.

The choice of the landing field is here of particular importance.

Deteriorating weather is a leading cause of precautionary landings.

- | | | |
|----|--|--|
| 1. | Locate Suitable Field | CONSIDER wind direction, terrain and obstructions. |
| 2. | Seat Belts and Harnesses | TIGHT |
| 3. | Initiate descent | |
| 4. | If possible: Overfly landing site at a low altitude and inspect (wind direction, terrain and obstructions) | |
| 5. | Abeam the touchdown point: | |
| | Throttle | AS REQUIRED |
| | Propeller Control Lever | HIGH RPM position |
| | Carburetor Heat | PULL (ON) |
| | Fuel Pump AUX switch | ON |
| | Flaps | LDG |
| | Airspeed | 60 KIAS |

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6. Touch down with lowest possible airspeed.
7. After touchdown:

Brakes	APPLY as required
Fuel selector valve	OFF
Ignition switch	OFF
ALT1 / BAT switch	OFF
ALT2 / BAT2 switch	OFF

3.4.2 Emergency Landing

NOTE

An emergency landing occurs in a state of distress, such as an engine failure, fuel starvation or mechanical problems with the aircraft. In this case a pilot typically has significantly less time to choose a landing site compared with a precautionary landing.

1. Airspeed:

Flaps in LDG position	60 KIAS
Flaps in T/O position	65 KIAS
Flaps in UP position	70 KIAS
 2. Fuel selector valve
 3. Ignition switch
 4. Seat belts and harnesses
 5. COM (ATC)
 6. **ALT1 / BAT** switch
 7. **ALT2 / BAT2** switch
 8. ELT
- | |
|--------------------------------|
| OFF |
| OFF |
| TIGHT |
| REPORT location and intention |
| OFF |
| OFF |
| if necessary activate manually |

WARNING

*With **ALT1 / BAT** switch in OFF position: Stall warning system inoperative, flap position cannot be changed and landing light is OFF!*

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3.5 SMOKE AND FIRE

3.5.1 Engine Fire on the Ground

1. Fuel selector valve OFF
2. Throttle WIDE OPEN
3. **ALT1 / BAT** switch OFF
4. **ALT2 / BAT2** switch OFF
5. Ignition switch OFF
6. Aircraft EVACUATE immediately once engine stops

3.5.2 Engine Fire In-flight

1. Throttle WIDE OPEN
2. Fuel selector valve OFF
3. Cabin heat PUSHED (OFF)
4. Canopy slide-window OPEN
5. Perform a precautionary landing without engine power as described in Section 3.4.2

3.5.3 Electrical Fire with Smoke on the Ground

1. **ALT1 / BAT** switch OFF
2. **ALT2 / BAT2** switch OFF

If engine is running:

3. Throttle IDLE
4. Fuel selector valve OFF
5. Ignition switch OFF
6. Canopy OPEN
7. Fire extinguisher (if installed) USE as required

3.5.4 Electrical Fire with Smoke in Flight

1. **ALT1 / BAT** switch OFF
2. **ALT2** switch OFF (**BAT2** still ON)
3. **Avionics** switch OFF
4. All switches (except Ignition) OFF
5. Cabin ventilation and canopy slide-window OPEN
6. Flashlight ON
7. Fire extinguisher (if installed) Use only if smoke persists
8. Land immediately Refer to Section 3.4 Forced Landings

After landing and aircraft comes to a halt:

9. Engine Shut down
10. Canopy OPEN
11. After engine stops Evacuate aircraft

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CAUTION

When a large amount of smoke is present or the fire extinguisher has been used, ventilate the cabin by unlocking the canopy latch. If possible, the fire extinguisher should be secured after use.

WARNING

*Turning the **ALT1 / BAT** and **ALT2** switches OFF turns off all electrical and electronic equipment, including the flaps, stall warning and landing light!*

3.6 INADVERTENT FLIGHT IN ICING CONDITIONS**WARNING**

Intentional flight in icing conditions is prohibited. During unintentional flight in icing conditions proceed as follows:

1. Carburetor heat PULL (ON)
2. Leave icing conditions immediately by flying a reciprocal heading and/or changing altitude
3. **P/S Heat** switch (if installed) ON
4. Propeller Control Lever HIGH RPM position
5. Cabin heat PULL (ON)
6. Move the control surfaces periodically to keep them from freezing.

CAUTION

The stall speed increases with ice accumulation on the wing leading edge.

Airspeed indicator, altimeter and vertical speed indicator readings may be inaccurate with ice accumulation on the leading edge of the wing. Additionally, the stall warning system may be inoperative or may not work correctly.

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3.7 SPIN RECOVERY PROCEDURE

- | | | |
|----|----------|--|
| 1. | Rudder | Full deflection opposite direction of rotation |
| 2. | Elevator | Neutral or slightly forward |
| 3. | Aileron | Neutral |
| 4. | Throttle | IDLE |
| 5. | Flaps | UP |
| 6. | Rudder | Neutral when rotation stops |
| 7. | Elevator | Carefully ease out of dive |

Make a smooth recovery from the dive to regain level flight attitude. Do not exceed V_{NE} .

WARNING

During spin recovery, adherence to the recovery sequence is essential!

3.8 POWER-OFF GLIDE

Achievable gliding distances vary depending on altitude and current wind conditions. This is very important when choosing a landing site or reaching a near-by airfield.

To achieve maximum gliding distance:

- | | | |
|----|--------------------------|---------|
| 1. | Flaps | UP |
| 2. | Airspeed | 78 KIAS |
| 3. | Demonstrated glide ratio | 14 |
- This means approx. 2.3 NM can be covered for every 1000 ft of altitude (no wind)

NOTE

Headwinds, tailwinds and wing contamination can significantly influence the distance achievable in glide.

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3.9 LANDING WITH A FLAT TIRE

When landing with a defective tire, or this is suspected, proceed as follows:

1. Flaps LDG position
2. Perform touch down on the side of the runway opposite the defective tire. This allows the use of the entire runway width to correct any directional changes caused by the defective tire. (for example: left tire defective, land on the right side of the runway)
3. Perform touch down with the undamaged main tire first. Lower nose wheel as quickly as possible to improve controllability on the ground.
4. Roll out with full aileron deflection in the direction of the undamaged main tire. This reduces the load on the damaged tire.
5. When landing with a defective or damaged nose wheel:
Touch down with minimum speed.
Keep nose wheel off the ground
as long as possible.

3.10 ELECTRICAL SYSTEM MALFUNCTIONS

3.10.1 Complete Electrical System Failure

1. Flight attitude STABILIZE
2. Flashlight ON
3. **ALT1 / BAT** switch CHECK if ON
4. **ALT2 / BAT2** switch CHECK if ON
5. **BAT** circuit breaker (see 3.1.1) RESET if tripped
6. **ALT1** circuit breaker (see 3.1.1) RESET if tripped
7. **ALT2** circuit breaker (see 3.1.1) RESET if tripped

If power cannot be restored, it is recommended to use the flashlight for the instruments and:

8. Throttle below 100% indexed position (increase engine power until engine is running as calm as possible)
9. Propeller control lever below MCP marking
10. Precautionary Landing PERFORM (see 3.4.1), Engine may fail suddenly!

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WARNING

In case of a complete electrical system failure the Main fuel pump is automatically separated from the remaining on-board power supply by a relay. It is supplied with electricity from Alternator 2 directly. In this condition the TCU is not controlling the turbocharger anymore and, depending on the last waste gate position, there may be a distinctly reduced engine power available.

WARNING

Failure of all electrical instruments (PFD, Engine Monitoring), stall warning system inoperative and flap position cannot be changed!

WARNING

Before returning the aircraft to service, problems must be investigated and damages must be resolved.

Possibilities for stabilizing the attitude at N/VFR:

- ⇒ Visual external references (e.g. horizon, lights on ground)
- ⇒ Standby Attitude Indicator with its own battery (e.g. GARMIN G5 AI, if installed)
- ⇒

3.10.2 Battery discharges (BAT)

Ammeter values **ALT1** and/or **ALT2** too low and thus **BAT** value YELLOW (with or without **ALT1** and/or **ALT2** warning light is illuminated)

If the ammeter for BAT is in the YELLOW arc, the power supply of both alternators into the on-board electricity system is insufficient - Battery is discharging.

- | | |
|------------|--|
| 1. Ammeter | CHECK for defect Alternator(s)
for ALT1 acc. point 3.10.3
for ALT2 acc. point 3.10.4 |
|------------|--|

if **both alternators are defect**:

- | | |
|--------------------------------|------------------|
| 2. Fuel Pump AUX switch | CHECK, if ON |
| 3. ALT1 switch | CHECK, if OFF |
| 4. ALT1 circuit breaker | CHECK, if PULLED |
| 5. ALT2 / BAT2 switch | CHECK, if OFF |
| 6. ALT2 circuit breaker | CHECK, if PULLED |

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7. **ALT2 Disconnect** circuit breaker CHECK, if PULLED
8. Brightness level of all additional instruments not necessary for the safe continuation of the flight has to be reduced to half or the instruments have to be turned off.
9. Ammeter and voltmeter MONITOR
10. Precautionary Landing PERFORM (see 3.4.1)

WARNING

The MAIN fuel pump is no longer supplied with electricity in case alternator 2 (ALT2) has failed and the fuel pump is separated from the remaining on-board power supply by turning ALT2 switch off. In this case the AUX fuel pump is the only fuel supply for the engine.

WARNING

A properly maintained and fully charged battery alone is able to supply all necessary systems with electricity for at least 30 minutes. The illuminating of the ENG (YELLOW) warning light with BAT ammeter values shown in YELLOW are indicating the beginning of the 30 minute period. After 30 minutes engine failure due to failure of the remaining AUX fuel pump has to be expected.

3.10.3 Alternator 1 (ALT1) failure

Ammeter value **ALT1** too low and / or **ALT1** warning light is illuminated

1. **ALT1** switch SWITCH through OFF – ON, approx. 10 sec. break
 2. **ALT 1** circuit breaker (see 3.1.1) PUSH, if tripped
- If **ALT1** warning light is still illuminated or ammeter value **ALT 1** still too low:
3. **ALT1** circuit breaker PULL
 4. **ALT1** switch OFF
 5. Brightness level of all additional instruments not necessary for the safe continuation of the flight has to be reduced to half or the instruments have to be turned off.
 6. Ammeter and voltmeter MONITOR
 7. Precautionary Landing PERFORM (see 3.4.1)

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NOTE

The remaining Alternator 2 (ALT 2) is delivering approx. 15A into the on-board power supply and a properly maintained and fully charged battery alone is able to supply all necessary systems with electricity for at least 30 minutes.

Despite the pilot turned off the audio panel it is still possible to radio with COM1 via the headset because the audiopanel is establishing a connection even if it is turned off (failsave design). Intercom functionality is not possible anymore.

CAUTION

Due to its design, the warning light ALT 1 does not illuminate when the alternator is switched off, there is a broken cable or the circuit breaker has tripped!

WARNING

Before returning the aircraft to service, problems must be investigated and damages must be resolved.

3.10.4 Alternator 2 (ALT2) failure

Ammeter value **ALT2** too low and / or **ALT2** warning light is illuminated

- | | |
|--|------------------|
| 1. Fuel pump AUX switch | ON |
| 2. ALT2 / BAT2 switch | check, if ON |
| 3. ALT2 circuit breaker(see 3.1.1) | PUSH, if tripped |
| 4. ALT2 Disconnect circuit breaker(see 3.1.1) | PUSH, if tripped |

If **ALT2** warning light is still illuminated or ammeter value **ALT 2** still too low:

- | | |
|---|---------------------|
| 5. ALT2 and ALT2 Disconnect circuit breaker | PULL |
| 6. ALT2 / BAT2 switch | OFF |
| 7. Brightness level of all additional instruments not necessary for the safe continuation of the flight has to be reduced to half or the instruments have to be turned off. | |
| 8. Ammeter and voltmeter | MONITOR |
| 9. Precautionary Landing | PERFORM (see 3.4.1) |

WARNING

The MAIN fuel pump is no longer supplied with electricity in case alternator 2 (ALT2) has failed and the fuel pump is separated from the remaining on-board power supply by turning ALT2 switch off. In this case the AUX fuel pump is the only fuel supply for the engine.

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CAUTION

Due to its design, the warning light ALT 2 does not illuminate when the alternator is switched off, there is a broken cable or the circuit breaker has tripped!

NOTE

The remaining Alternator 1 (ALT1) is delivering approx. 42A into the on-board power supply and a properly maintained and fully charged battery alone is able to supply all necessary systems with electricity for at least 30 minutes.

Despite the pilot turned off the audio panel it is still possible to radio with COM1 via the headset because the audiopanel is establishing a connection even if it is turned off (failsave design). Intercom functionality is not possible anymore!

WARNING

Before returning the aircraft to service, problems must be investigated and damages must be resolved.

3.10.5 Low Voltage Indication**A) On the ground (voltmeter values YELLOW or RED)**

- | | | |
|----|------------------------------------|---|
| 1. | Engine speed | Increase RPM until value turns GREEN (normally with RPM below 1350) |
| 2. | All non-essential equipment | OFF, until value turns GREEN. |
| 3. | If the value remains YELLOW or RED | Do not fly before the problem is eliminated. |

B) In flight (voltmeter values YELLOW or RED)

- | | | |
|----|------------------------------------|--|
| 1. | All non-essential equipment | OFF, until value turns from YELLOW to GREEN or from RED to YELLOW |
| 2. | If the value remains YELLOW or RED | CHECK ammeter for defective alternator(s)
for ALT1 + ALT2 acc.section 3.10.2
for ALT1 acc. section 3.10.3
for ALT2 acc. section 3.10.4 |

C) During approach and landing (voltmeter value YELLOW or RED)

- | | | |
|----|---------------|------------------------|
| 1. | After landing | Proceed acc. 3.10.5 A) |
|----|---------------|------------------------|

WARNING

If, at any point, the voltmeter value turns RED, land at the nearest airfield and solve the problem before continuing flight.

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3.11 FLAP CONTROL SYSTEM MALFUNCTIONS

FLAP POSITION INDICATOR or FLAP ACTUATOR MALFUNCTION

- | | | |
|----|--|---|
| 1. | Flap Actuator circuit breaker (see 3.1.1) | RESET, if tripped |
| 2. | Flap Control circuit breaker (see 3.1.1) | RESET, if tripped |
| 3. | Flap position | visually CONFIRM on the left wing |
| 4. | Airspeed | maintain within the WHITE ARC on the airspeed indicator |
| 5. | Flap switch | switch through all positions. |

If the flap actuator is inoperative or the flap position indicator reading is incorrect, approach and landing must be conducted at airspeed safe for the current flap setting.

WARNING

During landings with the flaps not in the landing position, stall speed and landing distance increase.

3.12 TRIM CONTROL SYSTEM FAILURES

3.12.1 Trim System Inoperative

- | | | |
|----|--|---|
| 1. | Elevator Trim circuit breaker (see 3.1.1) | RESET, if tripped |
| 2. | Trim switch | repeatedly PRESS "Nose UP" and then "Nose Down" |

NOTE

An inoperative trim system does not affect aircraft controllability. However, the control stick forces are considerably higher and may reach up to 22 lb (10kg).

3. Land at the nearest airfield.

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3.12.2 Trim Actuator Runaway

1. Control Column HOLD in position
2. **Elevator Trim** circuit breaker PULL
3. Trim switch CHECK if pressed or jammed

If the problem is obvious, and can be solved:

4. **Elevator Trim** circuit breaker (see 3.1.1) RESET

NOTE

Approx. 8 seconds are required to trim from full nose-down to full nose-up or vice versa.

If the problem cannot be solved:

5. Land at the nearest airfield.

3.13 AVIONICS MALFUNCTIONS

3.13.1 Complete Avionics Failure

1. **Avionics** switch SWITCH OFF then ON, approx. 20 sec. interval
If the switch trips to the OFF position:
2. Land at the nearest suitable airfield.

3.13.2 Receive Mode Failure of COM-Equipment

1. Push-to-Talk (PPT) switch CHECK, if pilot's and co-pilot's PTT-switches are not pressed or jammed (also check transceiver display). CHECK connectors.
2. Head-set Momentarily switch off SQUELCH.
If no noise is audible:
CHECK head-set connectors.

3.13.3 Transmit Mode Failure of COM-Equipment

1. Transmit-Signal TX CHECK if displayed while transmitting.
2. Selected frequency CHECK, if correct
3. Microphone CHECK, if necessary replace head-set.

If the problem cannot be eliminated, set transponder to 7600 (radio failure) as required.

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3.14 STARTER MALFUNCTION

During engine start on ground, power transmission from the starter to the engine is defect (a continuing and excessive howling tone is audible).

1. Throttle IDLE
2. Ignition switch OFF
3. Repair damage before conducting planned flight.

3.15 IN-FLIGHT FAILURES AND MALFUNCTIONS

3.15.1 Inadvertent Release and Opening of the Canopy in flight

In the event of an inadvertent release and opening of the canopy in flight, a stationary canopy opening angle of about 20° - 30°, depending on the flight condition, is reached. Because the canopy opens forwards, the canopy cannot be torn off during flight. Even though the airflow conditions around the aircraft change considerably with an open canopy in flight, the aircraft remains fully controllable. Initial flight attitude changes can be easily corrected. Do not unbuckle the seat belt in order to close the canopy. During solo flights, carefully try to close the canopy without neglecting flight tasks and pilot responsibilities. If this is not possible, continue the flight with the open canopy and land at the nearest airfield.

1. Keep calm, there is no imminent danger.
2. Flight attitude Stabilize flight attitude. Under consideration of the actual conditions, establish stationary horizontal level flight.

Airspeed 65 – 75 KIAS
3. Canopy If possible, close and lock canopy in flight. Check the canopy locking and the position of the Canopy Locking Lever periodically until landing.
If it is not possible to close the canopy, continue flight with the open canopy and land at the nearest airfield.

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NORMAL PROCEDURES

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4.1 INTRODUCTION

This section provides normal operating procedures and checklists for the aircraft as well as recommended airspeeds.

Additional information is provided in the current issues of the Operators Manual for ROTAX® engine Type 914 series and the Operation and Installation Manual of mt-Propeller® ATA 61-01-024.

Normal procedures associated with optional equipment can be found in Section 9.

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4.2 AIRSPEEDS FOR NORMAL OPERATION

The following airspeeds are based on the maximum take-off weight of 1653 lbs (750 kg). They may also be used for any lower operational weight.

TAKE-OFF		
Airspeed (IAS)		kts
Normal climb speed to 50 Feet (Flaps T/O)		57
Best rate of climb speed at sea level (Flaps UP)	V_Y	65
Best angle of climb speed at sea level (Flaps T/O)	V_X	52

LANDING		
Airspeed (IAS)		kts
Final approach speed for landing (Flaps LDG)		60
Balked landing (Flaps LDG)		60
Maximum demonstrated crosswind component for take-off or landing		15
Maximum airspeed with Flaps LDG	V_{FE}	90

CRUISE		
Airspeed (IAS)		kts
Maneuvering speed	V_A	112
Maximum Turbulent Air Operating Speed	V_{NO}	130

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4.3 DAILY INSPECTION

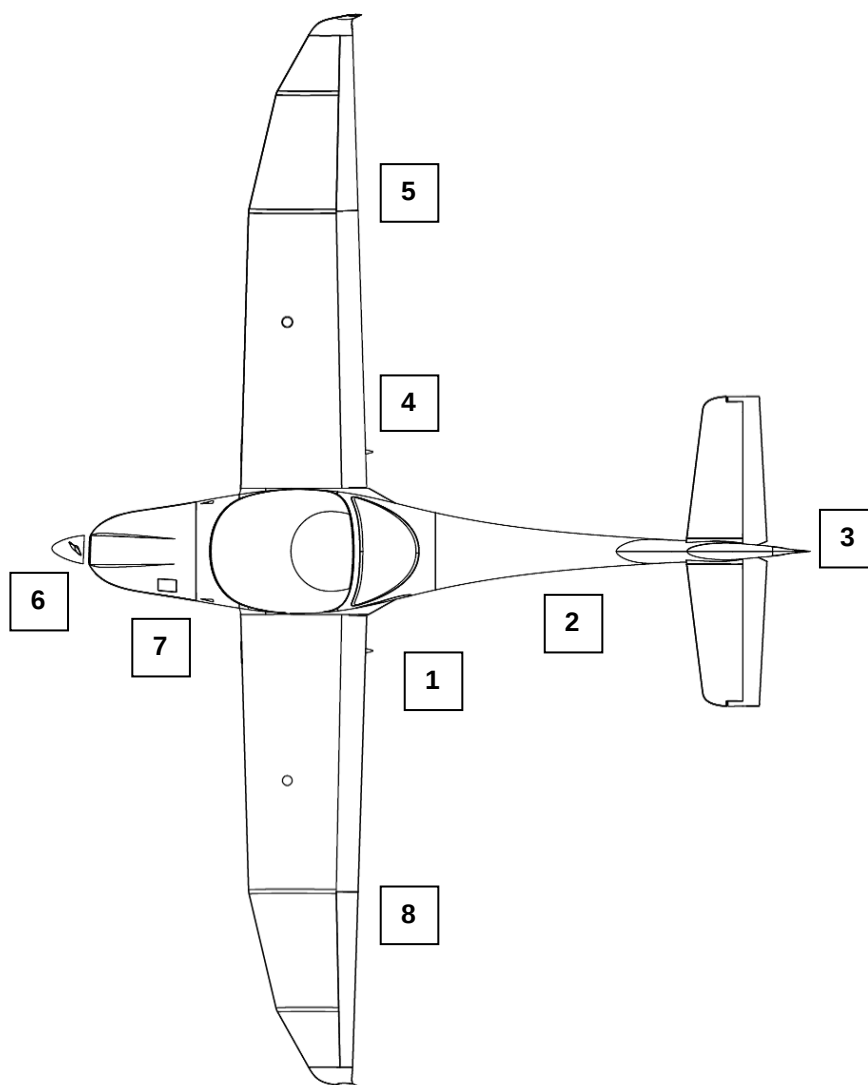
CAUTION

*The daily inspection is begun by checking all 3 fuel sumps for water and contamination. This must be done **before** the aircraft is moved. Otherwise the fuel in the sump may mix.*

- | | | |
|----|--------------------------------|--|
| 1. | Tank drain (left / right wing) | drain and visually inspect for contamination |
| 2. | Gascolator drain | drain and visually inspect for contamination |

A) CABIN

- | | | |
|-----|-----------------------------|----------------------------------|
| 1. | Aircraft Documentation | CHECK on board |
| 2. | Ignition key | REMOVED |
| 3. | ALT1/ BAT switch | ON |
| 4. | Engine instruments | CHECK |
| 5. | Fuel quantity | CHECK |
| 6. | Nav Lights switch | ON, CHECK, OFF |
| 7. | Landing Light switch | ON, CHECK, OFF |
| 8. | ALT1/BAT switch | OFF |
| 9. | ELT | CHECK operational |
| 10. | Foreign objects | CHECK and REMOVE, when necessary |
| 11. | Baggage | STOWED and SECURED |
| 12. | Canopy | CHECK condition and cleanliness |

B) EXTERIOR CHECK, Visual Inspection**CAUTION**

*In this manual, visual inspection means the following:
Inspect for mechanical damage, dirt, cracks, delamination, excessive play, looseness,
leaks, incorrect attachment, foreign objects and general condition.
Control surfaces: in addition, check for free movement.*

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1. Left main landing gear

- | | |
|-----------------------------------|-------------------------------------|
| a) Landing gear strut | Visual inspection |
| b) Wheel fairing | Visual inspection (refer to 7.11.4) |
| c) Tire pressure and slip marking | CHECK |
| d) Tire, wheel, brake | Visual inspection |
| e) Chocks (if in use) | REMOVE |

2. Fuselage

- | | |
|-------------------|-------------------|
| a) Fuselage shell | Visual inspection |
| b) Skid plate | Visual inspection |
| c) Tail tie-down | DISCONNECT |

3. Empennage

- | | |
|--------------------------|--|
| a) Elevator | Visual inspection |
| b) Horizontal stabilizer | Visual inspection |
| c) Rudder | Visual inspection,
CHECK: fitting and bolt
connection, proper control cable
connection and safe-tied. |
| d) Vertical stabilizer | Visual inspection |

4. Right main landing gear

- | | |
|-----------------------------------|-------------------------------------|
| a) Landing gear strut | Visual inspection |
| b) Wheel Fairing | Visual inspection (refer to 7.11.4) |
| c) Tire pressure and slip marking | CHECK |
| d) Tire, wheel, brake | Visual inspection |
| e) Chocks (if in use) | REMOVE |

5. Right wing

- | | |
|---|---|
| a) Entire wing surface (upper and under side) | Visual inspection |
| b) Fuel vent | CHECK if clear |
| c) Flap | Visual inspection |
| d) Aileron and inspection window | Visual inspection |
| e) Wing tip, NAV lights and ACL | Visual inspection |
| f) Fuel level | CHECK with dipstick (see inner
surface of baggage compartment
door) and verify with the indicated
fuel level on the fuel gauge cockpit |
| g) Fuel tank filler cap | CHECK if closed |
| h) Wing tie-down | DISCONNECT |

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6. Nose landing gear

- | | |
|--------------------|-------------------|
| a) Nose gear strut | Visual inspection |
| b) Wheel fairing | Visual inspection |

CAUTION

Both parts of the 2 piece nose wheel fairing must always be installed on the aircraft

- | | |
|-----------------------------------|-------------------|
| c) Tire pressure and slip marking | CHECK |
| d) Tire, wheel | Visual inspection |
| e) Shock absorber unit | Visual inspection |
| f) Chocks and tow bar | REMOVE |

7. Nose section, cowling

WARNING

*Before cranking the propeller:
Ignition, **ALT1/BAT** switch and **ALT2/BAT2** switch: OFF
Set the parking brake.*

WARNING

RISK OF BURNS !

Only check the oil and coolant levels when the engine is cool.

- a) Check oil level Turn the propeller several times in the **direction of engine rotation** to pump oil from the engine back into the oil tank.

CAUTION

NEVER turn the propeller against the direction of engine rotation.

Stop turning the propeller when air begins to return to the oil tank. This is indicated by the sound of air rushing from the open oil tank.

Use the oil dip stick to check that the oil level is between the -min./max.- markings. The difference between -min./max.- is approximately 0.48 US Quarts (0.45 l).

CAUTION

The oil specification in Section 1.9.1 must be adhered to!

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- b) Check coolant level: Verify coolant level in the **expansion tank** and replenish as required. (The expansion tank must be at least 2/3 filled or coolant has to be visible at the gauge glass.)

Verify coolant level in the **overflow bottle** and replenish as required. (The coolant level must be between the min. and max. markings.)

CAUTION

The coolant specification in Section 1.9.2 must be adhered to!

- | | |
|--|---|
| c) Air Intakes | CHECK if clear |
| d) Cooler intake (oil, water, intercooler) | CHECK if free from obstructions |
| e) Cowling | Visual Inspection; CHECK Camloc fasteners |
| f) Propeller and Spinner | Visual inspection |
| g) Propeller blades | CHECK for cracks and other damage |

8. Left wing

- | | |
|---|--|
| a) Entire wing surface (upper and under side) | Visual inspection |
| b) Fuel vent | CHECK if clear |
| c) BAT switch | ON |
| d) Stall warning | press to upper detent, warning tone is audible |
| e) BAT switch | OFF |
| f) Pitot / Static tube | REMOVE cover,
CHECK if all openings are clear |
| g) Wing tip, NAV lights and ACL | Visual inspection |
| h) Aileron and inspection window | Visual inspection |
| i) Fuel level | CHECK with dipstick and verify with the indicated fuel level on the fuel gauge |
| j) Fuel tank filler cap | CHECK if closed |
| k) Flap | Visual inspection |
| l) Wing tie-down | DISCONNECT |

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4.4 PRE-FLIGHT INSPECTION (Walk Around)

- | | | |
|----|------------------|--|
| 1. | Daily Inspection | Confirm has been carried out. |
| 2. | Tow bar | Removed? |
| 3. | Fuel level | CHECK with dipstick and verify with the indicated fuel level on the fuel gauge |

WARNING

*Before cranking the propeller:
Ignition, **ALT1/BAT** switch and **ALT2/BAT2** switch: OFF
Set the parking brake.*

WARNING

*RISK OF BURNS !
Only check the oil and coolant levels when the engine is cool !*

- | | | |
|----|-----------------|---|
| 4. | Check oil level | Turn the propeller several times in the <u>direction of engine rotation</u> to pump oil from the engine back into the oil tank.

Stop turning the propeller when air begins to return to the oil tank. This is indicated by the sound of air rushing from the open oil tank.

Use the oil dip stick to check that the oil level is between the min. and max. markings. The difference between min. and max. is approx. 0.48 US Quarts (0.45 l). |
|----|-----------------|---|

CAUTION

The oil specification in Section 1.9.1 must be adhered to !

- | | | |
|----|---------------------|---|
| 5. | Check Coolant Level | Verify coolant level in the overflow bottle and replenish as required. (The coolant level must be between the min. and max. markings) |
|----|---------------------|---|

CAUTION

The coolant specification in Section 1.9.2 must be adhered to !

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- | | |
|-----------------------------|--|
| 6. Tie-down straps | remove |
| 7. Baggage door | CHECK if closed and locked |
| 8. Pitot cover | remove |
| 9. Control locks | remove |
| 10. Seating position | adjust and lock, check that nose wheel steering and brakes can be operated |
| 11. Carburetor heat | CHECK for free movement, then PUSH (OFF) |
| 12. Cabin heat | CHECK for free movement, then PUSH (OFF) |
| 13. Choke | CHECK for free movement and automatic reset |
| 14. Throttle | CHECK for free movement and if 100% indexed position is perceptible, then set IDLE |
| 15. Propeller Control Lever | CHECK for free movement, then set in HIGH RPM Position |
| 16. Weight and balance | within limits? |

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4.5 CHECKLISTS FOR NORMAL PROCEDURES

4.5.1 Before Engine Start-up

- | | | |
|-----|---------------------------------|--|
| 1. | Daily and Pre-Flight Inspection | COMPLETED |
| 2. | Passenger Briefing | COMPLETED |
| 3. | Seats | ADJUSTED |
| 4. | Seat Belts and Harnesses | FASTENED |
| 5. | Canopy | CLOSED and LOCKED
Check locking mechanism |
| 6. | Parking Brake | SET (pull lever back) |
| 7. | Control column | CHECK for free movement and
correct control surface deflections |
| 8. | Fuel Selector Valve | LEFT or RIGHT |
| 9. | Carburetor Heat | PRESS |
| 10. | Throttle | IDLE |
| 11. | Propeller Control Lever | HIGH RPM position |
| 12. | Avionics Switch | OFF |
| 13. | P/S Heat (if installed) | OFF |
| 14. | Circuit Breakers | CHECK all set |

NOTE

*Cage the Attitude Indicator (if installed) before switching **ALT1/BAT** on.*

- | | | |
|-----|--|---|
| 15. | ALT1 / BAT switch | ON |
| 16. | TCU warning light (YELLOW) | ILLUMINATES (1 second TCU OK, then off) |
| 17. | BOOST warning light (RED) | ILLUMINATES (1 second TCU OK, then off) |
| 18. | ALT1 warning light | ILLUMINATES |
| 19. | Warning VOLTAGE | DISPLAYED |
| 20. | Warning FUEL PRESSURE | DISPLAYED |
| 21. | P/S-HEAT warning light (if installed) | ILLUMINATES |
| 22. | ACL switch | ON |
| 23. | CHECK Manifold Pressure Gauge | COMPARE with ambient air pressure QFE
(1013mbar ~ 29.92inHg) |

CAUTION

In order to avoid engine damage, especially at pressure altitudes below 3000ft and at high CHT, the maximum recommended manifold pressure depending on the type of fuel used and RPM must be observed. (see ROTAX® SL-914-014)

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4.5.2 Engine Start-up

- | | | |
|-----|-------------------------------------|---|
| 1. | Fuel Pump AUX switch | ON |
| 2. | Fuel Pressure | within GREEN range (AUX pump OK) |
| 3. | Fuel Pump AUX switch | OFF |
| 4. | ALT2 / BAT2 switch | ON |
| 5. | ALT2 warning light | ILLUMINATES |
| 6. | Fuel pressure | within GREEN range (MAIN pump OK) |
| 7. | Throttle | - Cold Engine
IDLE
- Hot Engine
0.8 in. (2 cm) OPENED |
| 8. | Choke | - Cold Engine
PULL, and keep pulled
- Hot Engine
RELEASE (automatic reset) |
| 9. | Brakes | PRESS both pedals |
| 10. | Propeller area | CHECK, if CLEAR |
| 11. | Ignition switch | START, then BOTH |
| 12. | Oil Pressure | CHECK, if oil pressure rises |
| 13. | ALT 1 / ALT 2 warning lights | OFF |
| 14. | Warning VOLTAGE | NOT DISPLAYED |
| 15. | Warning FUEL PRESSURE | NOT DISPLAYED |

CAUTION

The oil pressure has to show rising values within 10 seconds after engine start, otherwise shut down the engine immediately!

NOTE

The starter may not be operated for more than 10 seconds at a time. Allow the starter to cool off for at least 2 minutes between attempts.

CAUTION

BAT2 switch must be turned ON at all times during flight to ensure a stabilized control voltage at the ALT2 regulator-rectifier unit. If the on-board power supply fails, ALT2 will ensure the MAIN fuel pump power supply.

NOTE

As long as the propeller keeps moving (also in windmilling) ALT2 will feed the MAIN fuel pump with electricity even in the event of inadvertently switching off ALT2 AND BAT2. However, in this case the stabilizing effect of BAT2 is no longer available, which, in the event of additional extreme voltage fluctuations in the on-board power supply, could result in an automatic shut down of the ALT2 regulator-rectifier unit and cause an engine stoppage.

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4.5.3 Before Taxiing**CAUTION**

Engine run for approx. 2 min at 800 RPM and then at 1000 RPM for Oil Temp 122°F (50°C)

1. **Avionics** switch ON
2. Avionics and flight instruments SET
3. Engine Instruments CHECK

NOTE

Oil can be brought up to temperature during taxiing.

CAUTION

The Ammeter ALT is installed with a toggle switch between ALT1 and ALT2.

4. Voltmeter CHECK if GREEN
5. **ALT1** switch OFF, ammeter ALT2 > 5A (ALT2 OK)
6. **BAT1** switch OFF, CHECK voltmeter if GREEN (BAT2 OK)
7. **BAT1** switch ON
8. **ALT1** switch ON, ammeter ALT2 = 0A (ALT1 OK)
9. Ammeter (BAT, ALT1, ALT2) CHECK if BAT GREEN, ALT1 positive, ALT2 = 0A
10. Trim switch and indication functional CHECK
11. Flap switch and indication functional CHECK, afterwards UP
12. **P/S Heat** switch (if installed) ON, **P/S HEAT** warning light goes OFF
13. **P/S Heat** switch (if installed) OFF, **P/S HEAT** warning light goes ON
14. all switches AS REQUIRED

CAUTION

Due to their design the warning lights ALT1 and ALT2 do not illuminate if the respective alternator is switched off, the alternator cable is broken or the CB is pulled / tripped !

4.5.4 Taxiing

1. Parking Brake RELEASE
2. Brakes CHECK
3. Nose Wheel Steering CHECK (function, free movement)
4. Flight instruments and Avionics CHECK

CAUTION

Do not operate the engine at high RPM when taxiing to prevent damage to the propeller through stones or other foreign objects.

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4.5.5 Before Take-off (at the Taxi Holding Position)

- | | | |
|-----|----------------------------------|---|
| 1. | Brakes | APPLY and HOLD |
| 2. | Parking Brake | SET |
| 3. | Compass and gyro Instruments | CHECK setting |
| 4. | Fuel Selector Valve | LEFT or RIGHT, switch to the fuller tank |
| 5. | Fuel Pressure | CHECK if in the GREEN range
(otherwise, <u>do not attempt</u> take-off) |
| 6. | Engine instruments | CHECK if in the GREEN range |
| 7. | Throttle | SET 1700 RPM |
| 8. | Ignition switch | Magneto check: SWITCH through:
"L-BOTH-R-BOTH" – positions.
CHECK RPM-drop
max. RPM-drop: 210 RPM
max. difference L/R: 65 RPM
RPM drop must be noticeable
<u>then</u> : BOTH position |
| 9. | Carburetor heat | PULL (ON)
(no RPM drop if TCU OK) |
| 10. | Carburetor temperature indicator | slight rise in temperature |
| 11. | Carburetor heat | PUSH (OFF) |
| 12. | Propeller control lever | SWITCH 3 times between HIGH RPM
and LOW RPM positions (end stops) |
- Check points:
- 1) RPM drop: 200 ± 50 RPM
2) increase manifold pressure
3) constant oil pressure (± 0,5 bar)
then: START position

CAUTION

Pull back the propeller control lever slowly to minimize the load on the multi-piece crankshaft!

For training operation switching between HIGH RPM and LOW RPM once is sufficient.

- | | | |
|-----|-----------------------------|-------------------------|
| 13. | Throttle | IDLE |
| 14. | Fuel Pump AUX switch | ON |
| 15. | Flap switch | T/O |
| 16. | Trim switch | white marking |
| 17. | Circuit breakers | CHECK all set |
| 18. | Control column | CHECK for free movement |
| 19. | Lap belt | FASTENED and TIGHTENED |
| 20. | Canopy | CLOSED and LOCKED |
| 21. | Parking brake | RELEASE |

4.5.6 Take-off (up to 50 ft)

CAUTION

To increase power setting raise RPM first and open throttle second.

To decrease power setting close throttle first and lower RPM second.

- | | | |
|----|--------------------------|---|
| 1. | Throttle | WIDE OPEN (TOP = 115% MCP) |
| 2. | Tachometer | CHECK if within 2300 - 2385 RPM |
| 3. | Manifold pressure | CHECK if within 39 - 40 inHg
(41.9 inHg for max. 2 seconds acceptable) |
| 4. | Elevator, control column | NEUTRAL during initial ground roll |
| 5. | Rudder pedals | Maintain direction |
| 6. | Rotatespeed | 50 KIAS |
| 7. | Climb speed | 57 KIAS |

CAUTION

For the shortest take-off distance over a 50-feet obstacle at sea level:

- | | | |
|----|-----------------------|---------|
| 7. | Rotate speed | 50 KIAS |
| 8. | Climb speed (V_X) | 52 KIAS |

4.5.7 Climb

- | | | |
|----|--|--|
| 1. | Throttle (max. 5 minutes) | WIDE OPEN (40 inHg)
afterwards 100% MCP (35 inHg) |
| 2. | Propeller control lever (max. 5 minutes) | 2385 RPM, afterwards 2260 RPM |
| 3. | Engine instruments | CHECK if in GREEN range |

NOTE

*During take-off and climb at take off power the yellow **ENG** warning light illuminates because the maximum continuous RPM and manifold pressure is exceeded.*

This is acceptable for max. 5 minutes.

- | | | |
|----|-----------------------------|-----------------|
| 4. | Flap switch | UP |
| 5. | Climb speed | 65 KIAS |
| 6. | Fuel Pump AUX switch | OFF |
| 7. | Landing Light switch | OFF |
| 8. | Trim switch | SET as required |

NOTE

The best rate-of-climb speed, V_Y , is a function of the operating weight and decreases with altitude. For more information, refer to Section 5.2.6.

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4.5.8 Cruise

1. Throttle AS REQUIRED (Ref. to Section 5, Page 5-11)
2. Propeller control lever SET 1650 to 2260 RPM

CAUTION

Continuous operation with throttle wide open and propeller revolution below 2140 RPM should be avoided to prevent engine damage in particular at pressure altitudes below 3000ft and at high CHT (see ROTAX® SL-914-014)

NOTE

For best manifold pressure/propeller speed combinations: Refer to Section 5, page 5-11

3. Flaps switch UP
4. Trim switch SET as required
5. **P/S Heat** switch (if installed) AS REQUIRED, OFF AT OAT >59°F (15°C)
6. Engine instruments CHECK if in GREEN range
7. Carburetor temperature indicator MONITOR

CAUTION

When carburetor temperature is around 32°F (0°C) Carburetor heat should be applied and engine power should be increased appropriately to prevent carburetor icing.

4.5.9 Descent

1. Throttle First decrease AS REQUIRED
2. Propeller control lever Second SET above 2000 RPM
3. Carburetor heat AS REQUIRED
4. Carburetor temperature indicator MONITOR

CAUTION

For a rapid descent proceed as follows:

Throttle	First IDLE
Propeller control lever	Second START
Carburetor heat	PULL (ON)
Flaps	UP
Airspeed	130 KIAS
Oil and cylinder head temperature	maintain in GREEN range

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4.5.10 Landing

- | | | |
|-----|-----------------------------|------------------|
| 1. | Lap belt | CHECK SECURE |
| 2. | Fuel Pump AUX switch | ON |
| 3. | Carburetor heat | PULL (ON) |
| 4. | Throttle | AS REQUIRED |
| 5. | Airspeed | 90 KIAS |
| 6. | Flaps switch | T/O or LDG |
| 7. | Trim switch | AS REQUIRED |
| 8. | Flaps switch | LDG |
| 9. | Approach speed | 60 KIAS |
| 10. | Propeller control lever | START |
| 11. | Landing Light switch | ON (as required) |

CAUTION

In strong headwinds or crosswinds, in turbulent air or in wind shear, it may be desirable to approach using less flaps and at a higher airspeed.

4.5.11 Go-Around (Balked Landing)

- | | | |
|----|-------------------------|------------------|
| 1. | Propeller control lever | First START |
| 2. | Throttle | Second WIDE OPEN |
| 3. | Carburetor Heat | PUSH (OFF) |
| 4. | Flaps switch | T/O |
| 5. | Airspeed | 65 KIAS |

CAUTION

Continued operation with throttle wide open and carburetor heat engaged should be avoided to prevent engine damage.

4.5.12 After Landing

- | | | |
|----|---------------------------------------|-------------|
| 1. | Throttle | AS REQUIRED |
| 2. | Flaps switch | UP |
| 3. | P/S Heat switch (if installed) | OFF |
| 4. | Carburetor Heat | PUSH (OFF) |
| 5. | Fuel Pump AUX switch | OFF |
| 6. | Transponder | OFF |
| 7. | Landing Light switch | OFF |

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4.5.13 Engine Shutdown

- | | | |
|-----|--------------------------------|--|
| 1. | Throttle | IDLE |
| 2. | Parking Brake | SET |
| 3. | Flaps switch | LDG |
| 4. | ELT | CHECK (frequency 121.5 MHz) |
| 5. | Avionics switch | OFF |
| 6. | Engine run with below 1000 RPM | min. 2 minutes (incl. taxiing) for
turbocharger cool down |
| 7. | Ignition Switch | OFF |
| 8. | ALT2 / BAT2 switch | OFF |
| 9. | Electrical equipment | OFF |
| 10. | ALT1 / BAT switch | OFF |
| 11. | Chocks and tie-downs | AS REQUIRED |

4.5.14 Refueling

1. Engine Shutdown as in Section 4.5.13
2. Ground the aircraft

CAUTION

*During refueling, the aircraft **must** be grounded (for example at the end of the exhaust pipe.)*

3. Open fuel tank filler cap
4. Fill up both tanks one after the other and as evenly as possible

NOTE

Insert the fuel pump nozzle carefully into the tanks to avoid damage.

5. Close fuel tank filler cap
6. Remove grounding cable

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4.5.15 Flight in Heavy Rain and/or with Wing Contamination**CAUTION**

When flying with wet and/or contaminated wings and control surfaces, performance and handling qualities may be reduced. This applies in particular to take-off distance, climb performance, cruising speed and stall characteristics.

The stall speed may increase up to 3 kts and the air speed indicator may give false readings.

Visibility may deteriorate considerably in rain.

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PERFORMANCE

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5.1 INTRODUCTION

The performance data in the following charts give an overview on the performance and capabilities of the AQUILA AT01. This information provides the basis for flight planning prior to every flight.

All data in the charts have been acquired during flight testing conducted with an aircraft and engine in a good operating condition. The performance data was then corrected to ICAO Standard Atmospheric conditions (59°F / 15°C and 29.92 inHg / 1013.25 hPa at sea level).

The performance data presented can be achieved with a well-maintained aircraft and with average piloting techniques, when the procedures specified in this manual are followed.

The fuel flow data for cruise presented here are based on the recommended RPM/manifold pressure setting for each altitude. However, fuel flow and the resulting endurance, with and without reserve, depend on engine condition, surface quality of the aircraft (clean and dry) and meteorological conditions.

For precise flight planning and in order to estimate the amount of fuel required for a particular flight, all available information should be used and all influencing factors considered.

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5.2 PERFORMANCE CHARTS

5.2.1 Airspeed Calibration

Airspeed calibration accounts for the position error of the pitot-static pressure system, but not for the instrument error.

Assumption: zero instrument error

Example: 120 KIAS (indicated airspeed) corresponds to 118 KCAS (calibrated airspeed)

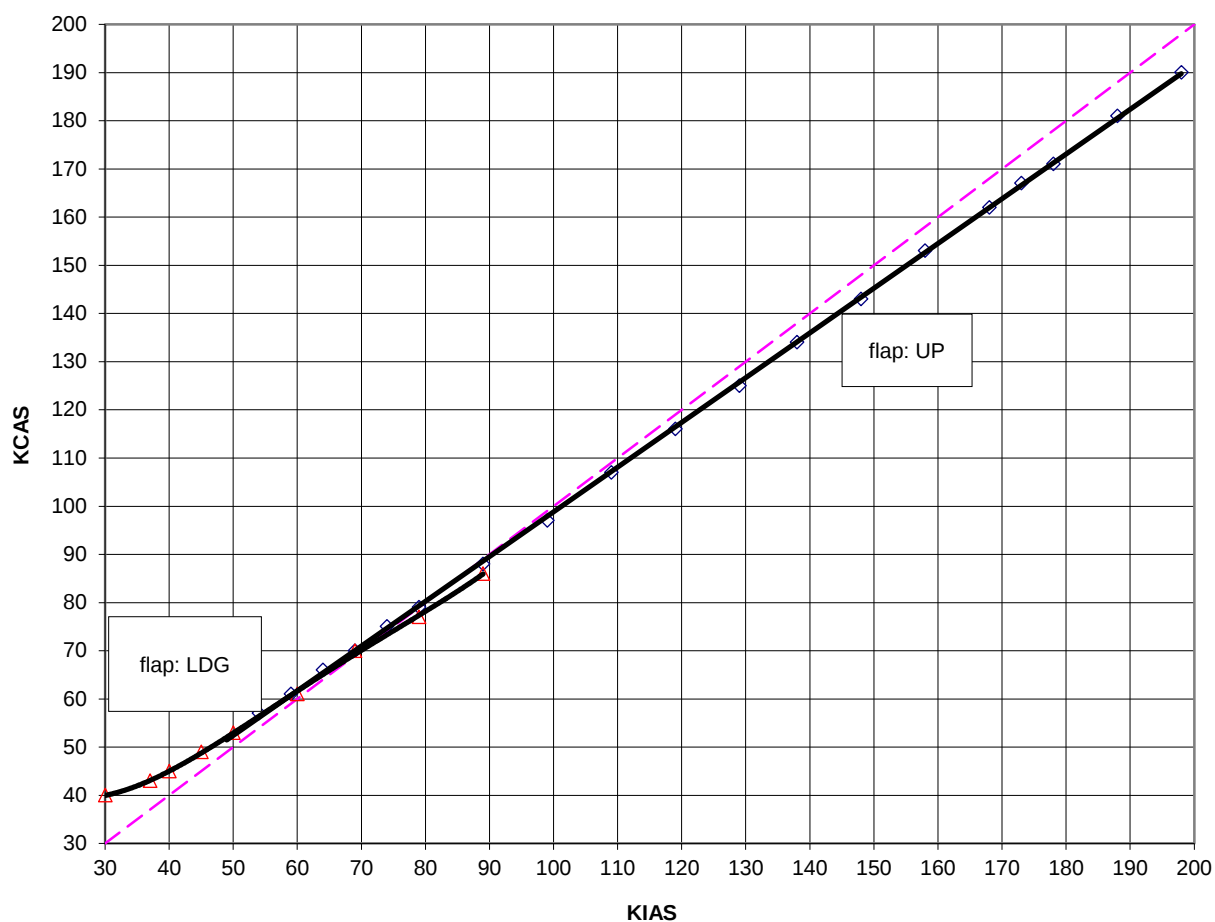


Fig.: 5.2.1 Airspeed Calibration

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5.2.2 Stall Speeds

Stall speeds were determined in the following configuration:

- Forward center of gravity (CG) limit: 16.8 in (427 mm) behind the Ref. Datum
- Takeoff mass 1653 lb. (750 kg)
- Engine idle

Flap Position	Bank Angle				
	0°		30°	45°	60°
	KCAS	KIAS	KIAS	KIAS	KIAS
UP	52	49	51	55	> 64
T/O	48	45	47	51	> 60
LDG	43	39	42	47	> 57

Tab.: 5.2.2 Stall Speeds [kts]

NOTE

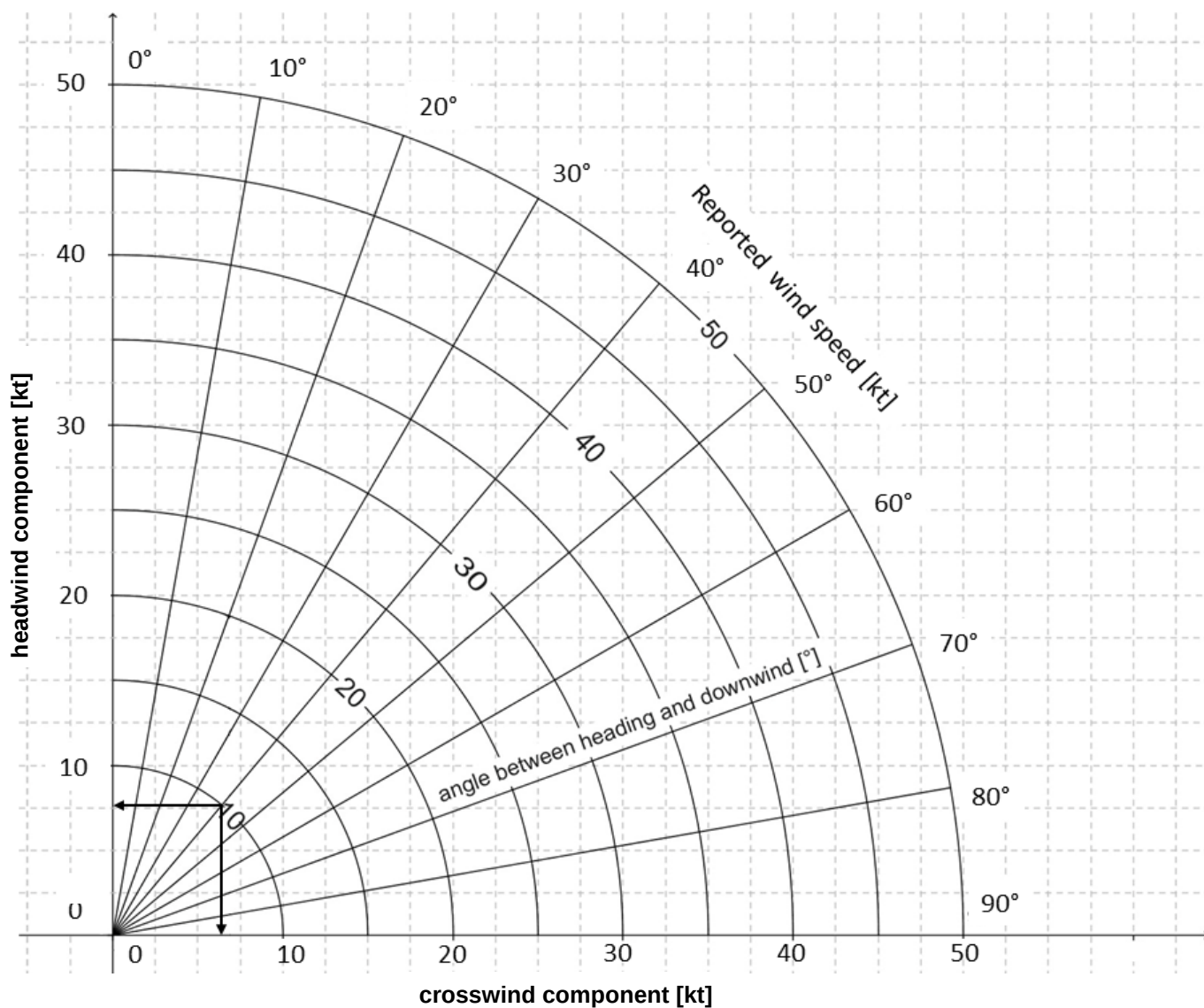
Stalling speed with bank angle should be considered as for reference purposes only. Slight differences in how the aircraft stalls can lead to discrepancies. The greater the angle of bank and flap deflection, the greater the discrepancies.

5.2.3 Demonstrated Crosswind Component, Crosswind Diagram

Maximum demonstrated crosswind component: 15 knots (27 km/h)

CAUTION

In case of gusty winds a final approach with flaps in T/O position and approximately 10% higher approach speed is recommended.



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5.2.4 Flight Planning

The performance tables and diagrams on the following pages contain all information required for flight planning from take-off at your point of departure to the landing at your destination.

Experience shows that the data determined during flight planning match the values achieved in flight accurately. However, it is important that flight planning is done carefully, that the aircraft is in a good operating condition and that the pilot is proficient.

During flight planning, it is important to be conservative when reading diagrams and rounding values. Differences between the actual performance data of the aircraft “at hand” and the data specified in this manual, the influence of turbulence or wing contamination can cause errors of up to 10% when calculating range and endurance.

NOTE

Insects or other contamination on the propeller or the leading edge of the wing can significantly reduce the performance and handling qualities of the aircraft.

The influence of altitude and ambient air temperature on performance is determined as follows:

1. Set the altimeter to 29.92 inHg (1013 hPa) to determine pressure altitude.
2. Using the appropriate diagrams and the ambient air temperature, the density altitude influence can be accounted for.

CAUTION

Reset the altimeter to the appropriate altimeter setting (local QNH value) to determine altitude above sea level.

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5.2.5 Take-off Distance

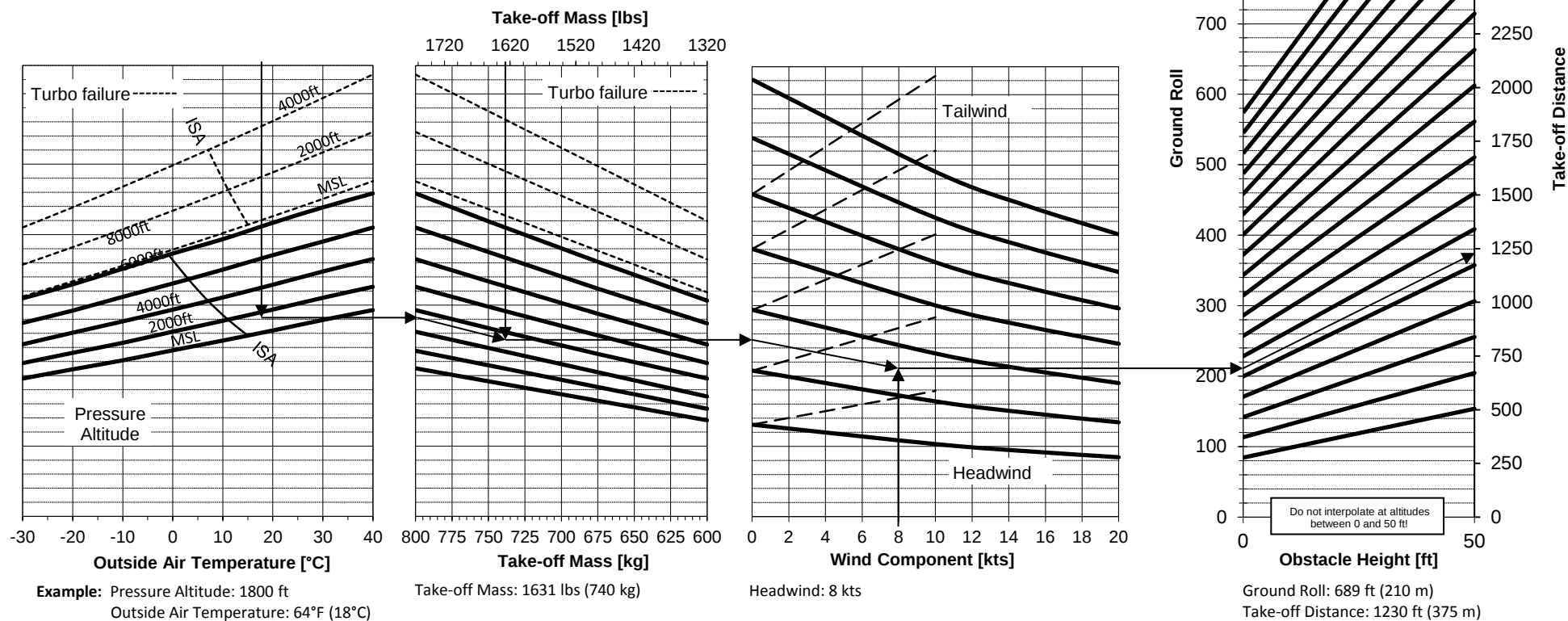
Take-off Mass [lbs] ([kg])	Airspeed [KIAS]	
	Lift-off	50 ft
1763 (800)	50	62
1653 (750)	50	57
1323 (600)	50	55

Conditions:

Throttle: Full Throttle (max. 5 min.)
Prop Speed: 2385 rpm
Flaps: T/O

Notes:

- For operations on dry, mown grass runway, increase ground roll distance by 25%, on soft grass runway up to 40%. - Snow and slush require an appropriate increase in ground roll.
- In high humidity conditions the take-off distance may increase up to 10%.
- An improperly maintained aircraft, deviating from procedures, poor meteorological and ambient conditions (rain, crosswind, wind shear etc.) may increase take-off distances significantly.



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5.2.6 Rate of Climb / Cruise Altitude

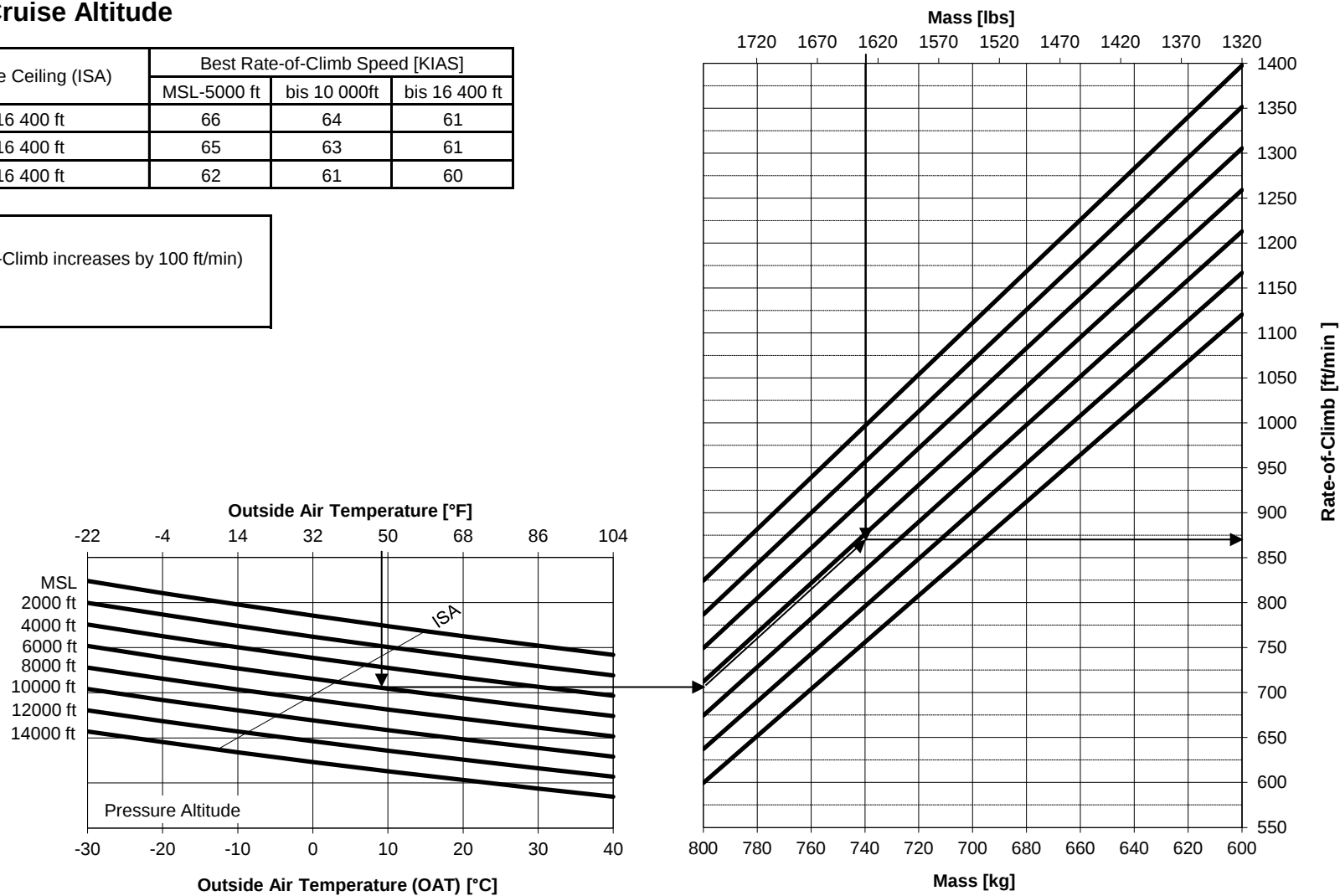
Take-off Mass [lbs] ([kg])	Service Ceiling (ISA)	Best Rate-of-Climb Speed [KIAS]		
		MSL-5000 ft	bis 10 000ft	bis 16 400 ft
1764 (800)	16 400 ft	66	64	61
1653 (750)	16 400 ft	65	63	61
1323 (600)	16 400 ft	62	61	60

Conditions:

Throttle: MCP (for TOP the Rate-of-Climb increases by 100 ft/min)

Prop Speed: 2260 rpm

Flaps: UP



Example: Pressure Altitude: 6000 ft

Mass: 1630 lb (740 kg)

Rate-of-Climb: 868 ft/min

Outside Air Temperature: +48 °F (+9°C)

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5.2.7 Climb: Fuel, Time and Distance

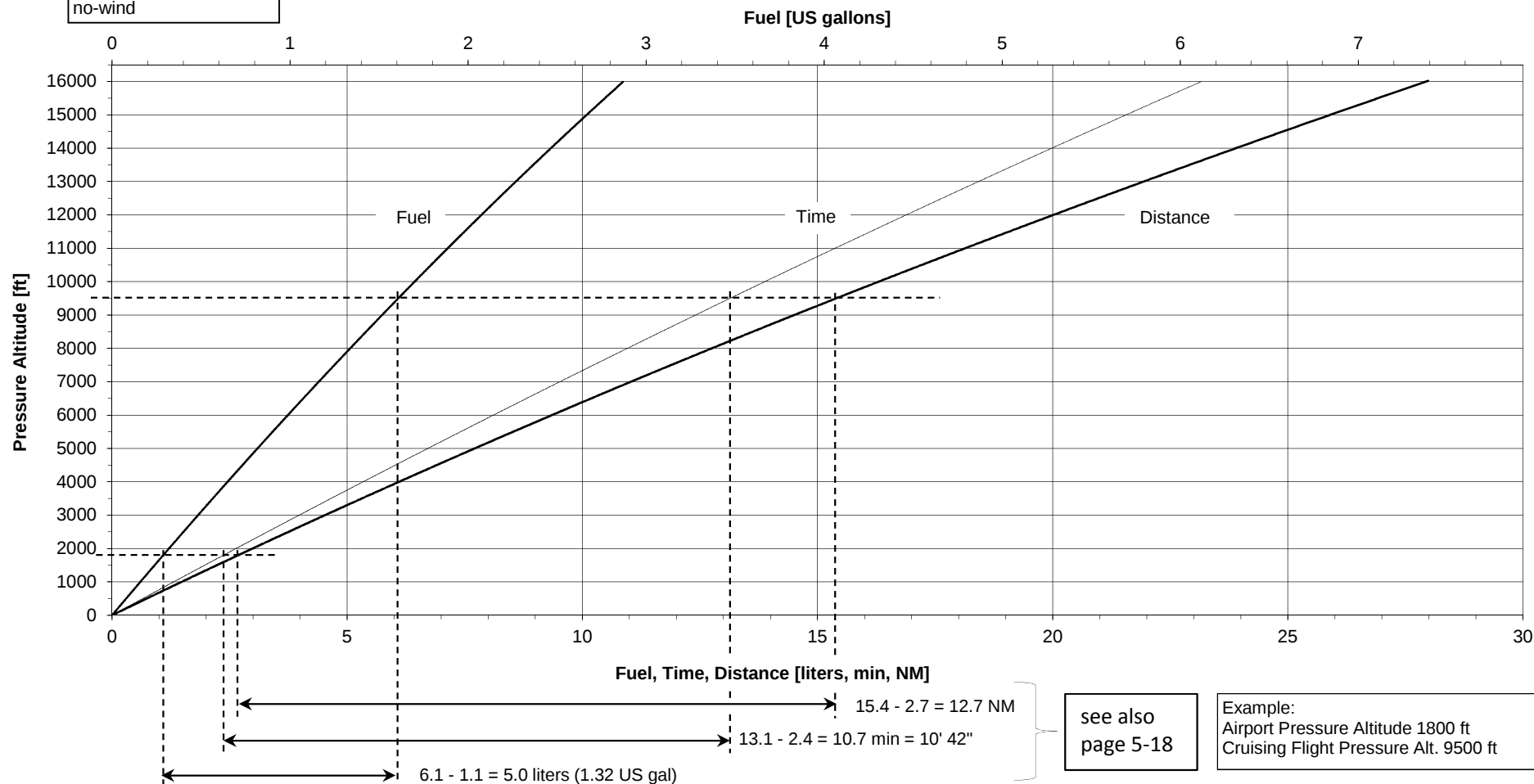
Conditions:

2260 rpm, MCP,
Flaps : UP
m = 800 kg (1764 lb)
no-wind

Vy= 66 KIAS, up to 5000 ft
Vy= 64 KIAS, up to 10.000 ft
Vy= 61 KIAS, up to 16.400 ft

For each 8°C above ISA, increase
time, distance and fuel by 10%.

Time, distance and fuel:
750 kg (1654 lbs): decrease by 15%
700 kg (1544 lbs): decrease by 25%



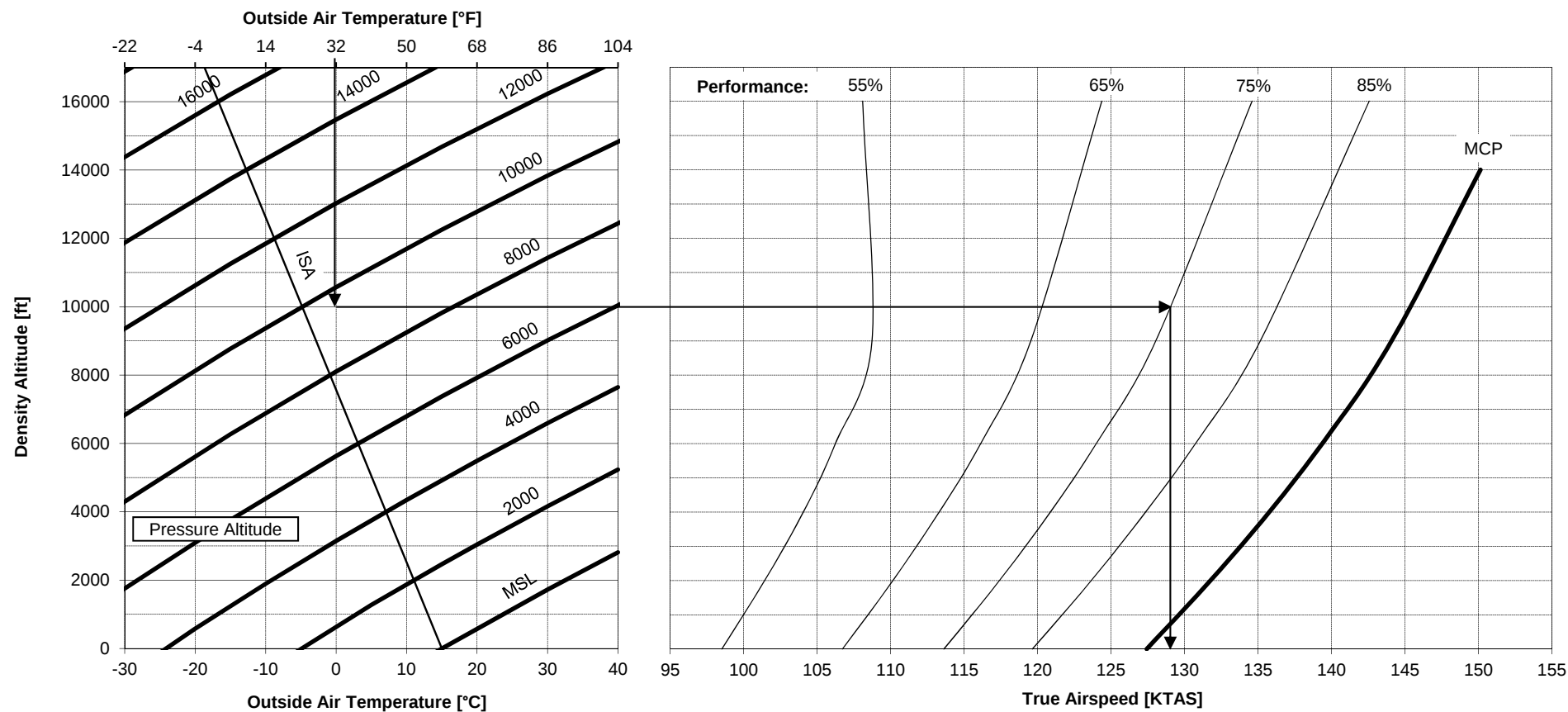
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5.2.8 Cruising Speed (TAS – True airspeed)

Conditions:

Power Setting: according to page 5-11
Flaps: UP

Notice: Flying without any wheel fairings or with mud guards reduces performance up to 10%.



Example: Pressure Altitude: 9500 ft
Outside Air Temperature: 32°F (0°C)

Density Altitude: 10000 ft

Power Setting : 75%

True Airspeed: 129 kts

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5.2.9 Cruise Power Settings

Pressure Altitude	Standard Temp.		Engine performance in % of the maximum continuous power																			
			55%				65%				75%				85%				MCP			
H	T	T	RPM	MP	FF	FF	RPM	MP	FF	FF	RPM	MP	FF	FF	RPM	MP	FF	FF	RPM	MP	FF	FF
[ft]	[°C]	[°F]	[U/min]	[in Hg]	[l/h]	[gal/h]	[U/min]	[in Hg]	[l/h]	[gal/h]	[U/min]	[in Hg]	[l/h]	[gal/h]	[U/min]	[in Hg]	[l/h]	[gal/h]	[U/min]	[in Hg]	[l/h]	[gal/h]
0	15	59	1770	28	13.5	3.6	1970	29	18.5	4.8	2060	31	22.5	6.0	2165	32.2	24.5	6.5	2260	35	27.5	7.3
2000	11	52	1785	28	14.5	3.8	1980	29	19.0	5.0	2065	31	22.5	6.0	2170	32.2	24.5	6.5	2260	35	27.5	7.3
4000	7	44	1800	28	15.5	4.0	1985	29	19.5	5.1	2075	31	23.0	6.1	2180	32.2	25.0	6.6	2260	35	28.0	7.4
6000	3	37	1820	28	16.0	4.3	1990	29	20.0	5.2	2080	31	23.0	6.1	2185	32.2	25.0	6.6	2260	35	28.0	7.4
8000	-1	30	1830	28	17.0	4.5	2000	29	20.5	5.4	2090	31	23.0	6.1	2195	32.2	25.0	6.6	2260	35	28.5	7.5
10.000	-5	23	1850	28	18.0	4.7	2005	29	21.0	5.5	2100	31	23.5	6.2	2200	32.2	25.5	6.8	2260	35	28.5	7.5
12.000	-9	16	1865	28	18.5	4.9	2010	29	21.5	5.6	2105	31	23.5	6.2	2210	32.2	25.5	6.8	2260	35	28.5	7.6
14.000	-13	9	1880	28	19.5	5.2	2015	29	22.0	5.8	2115	31	24.0	6.4	2220	32.2	26.0	6.9	2260	35	29.0	7.6
16.000	-17	1	1900	28	20.5	5.4	2020	29	22.5	5.9	2120	31	24.0	6.4	2225	32.2	26.0	6.9				

MCP: maximum continuous power
RPM: revolutions per minute
MP: manifold pressure
FF: fuel flow

Correction for non ISA temperature conditions:

59°F (15°C) above ISA: Fuel consumption increases by approx. 5%.
Below ISA: For flight planning purposes: assume fuel flow unchanged.

Sample calculation: page 5.22

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5.2.10 Maximum Endurance

Conditions:

Power Setting: according to page 5-11
Flaps: UP

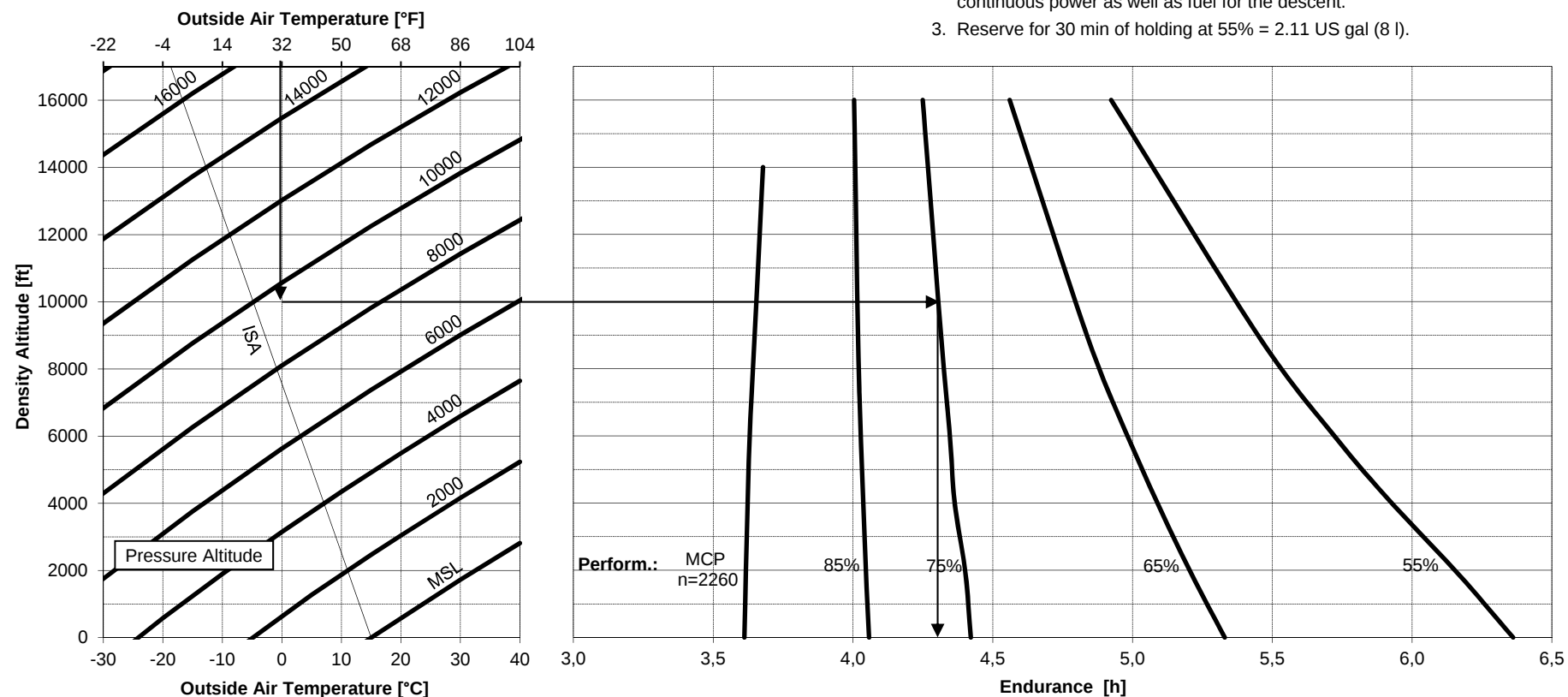
Notice:

A not properly maintained engine and aircraft may considerably reduce the endurance.

Fuel quantity: usable fuel 28.9 US gal (109,6 l)

The calculation of the endurance includes:

1. Fuel for engine start-up and taxiing: 0.8 US gal (3 l).
2. Fuel for take-off and climb to cruise altitude with max. continuous power as well as fuel for the descent.
3. Reserve for 30 min of holding at 55% = 2.11 US gal (8 l).



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5.2.11 Maximum Range

Conditions:

Power Setting: according to page 5-11
Flaps: UP

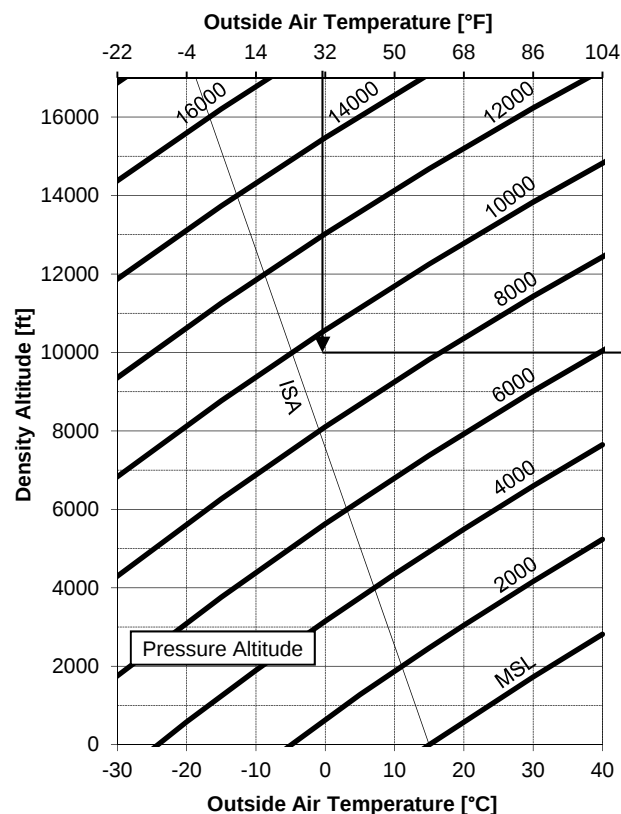
Notice:

A not properly maintained engine and aircraft may considerably reduce the endurance.

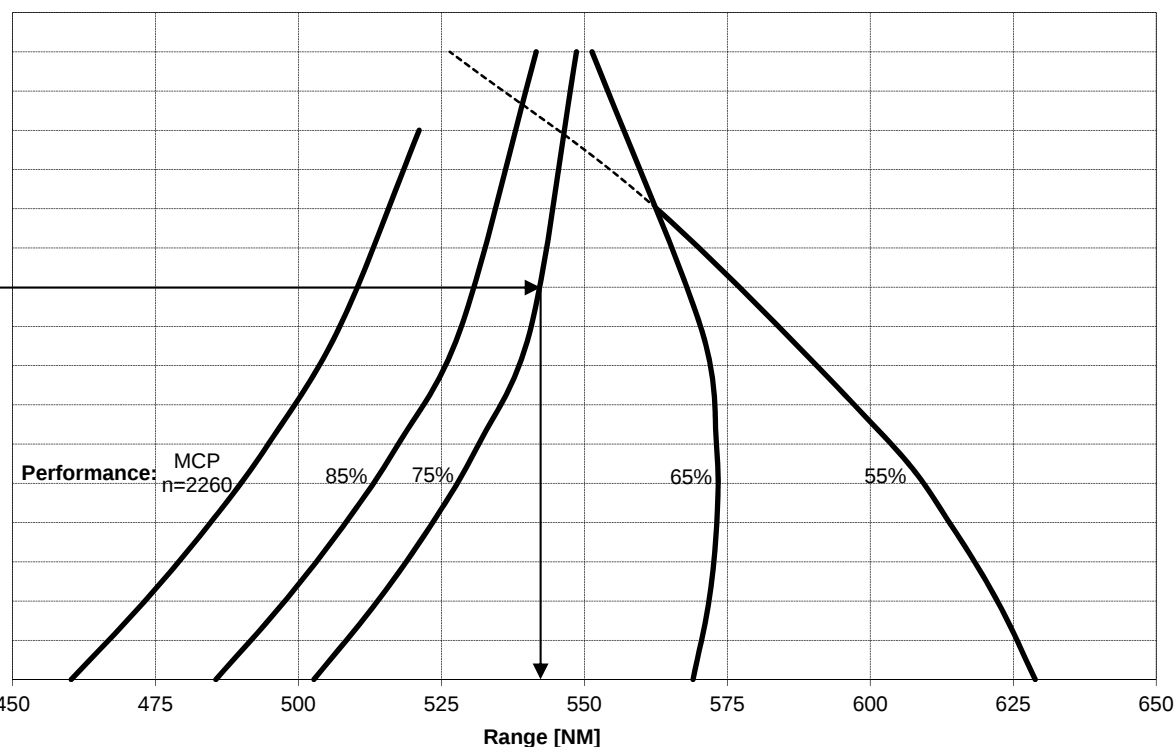
Fuel quantity: usable fuel 28.9 US gal (109,6 l)

The calculation of the endurance includes:

1. Fuel for engine start-up and taxiing: 0.8 US gal (3 l).
2. Fuel for take-off and climb to cruise altitude with max. continuous power as well as fuel for the descent.
3. Reserve for 30 min of holding at 55% = 2.11 US gal (8 l).



Example: Pressure Altitude: 9500 ft
Outside Air Temperature: 32°F (0°C)



Density Altitude: 10000 ft

Power Setting : 75%

Range: 541 NM

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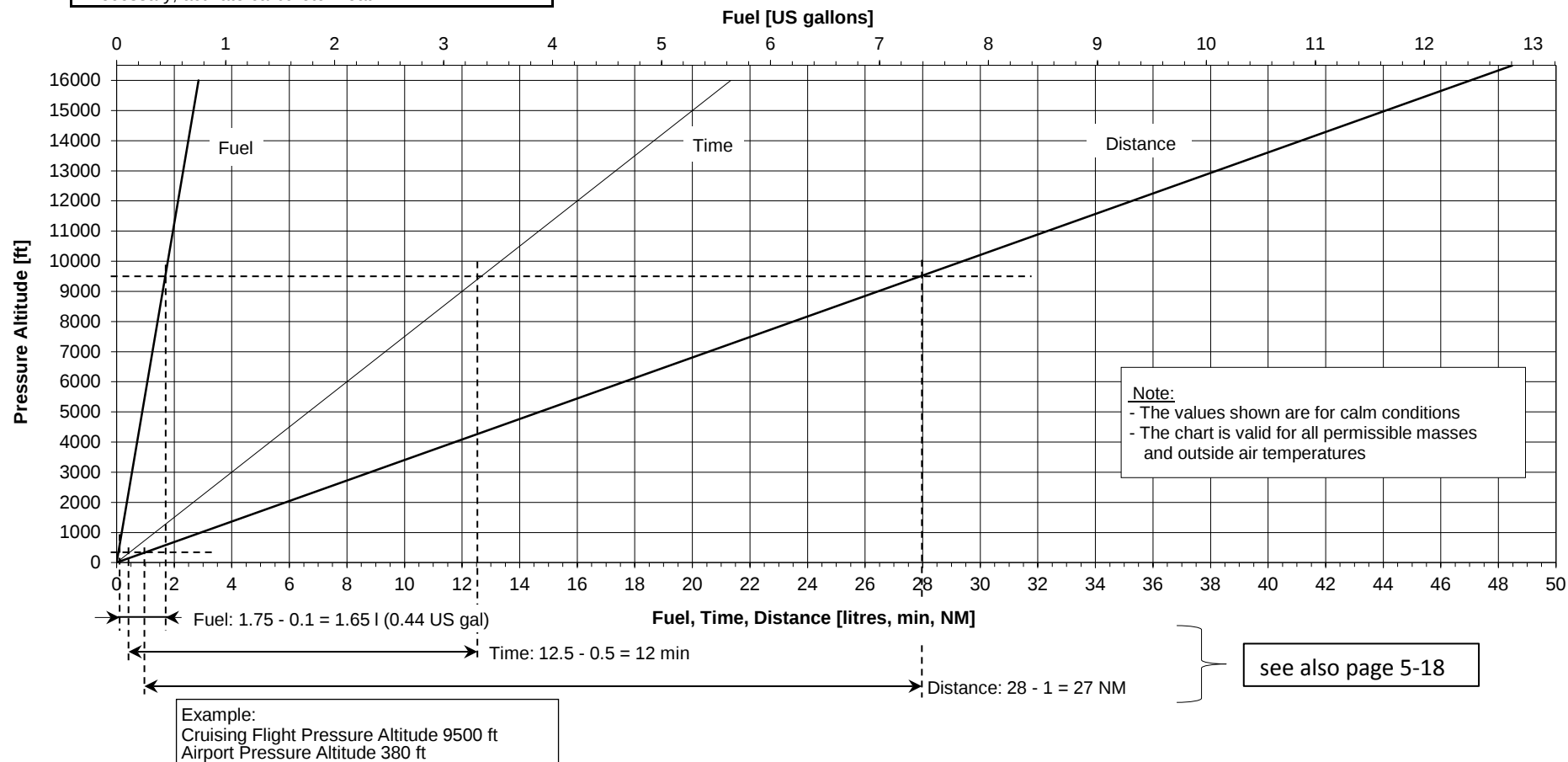
5.2.12 Descent: Fuel, Time, Distance

Procedure:

In descent follow a speed of 121 KIAS.
Set performance for a descent rate of 750 ft / min.
Keep the engine temperature in the green range.
If necessary, activate carburetor heat.

Conditions:

Manifold Pressure: as required. Approx. 15 inHg
Prop speed: 2000 rpm
Flaps: UP



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5.2.13 Landing Distance

Landing Mass [lbs] ([kg])	Airspeed [KIAS]	
	in 50 ft	Touchdown
1764 (800)	65	46
1653 (750)	65	45
1323 (600)	65	43

Conditions:

Power Setting: Idle

Propeller: Take-off (propeller controllever: HIGH-RPM position)

Flaps: LDG

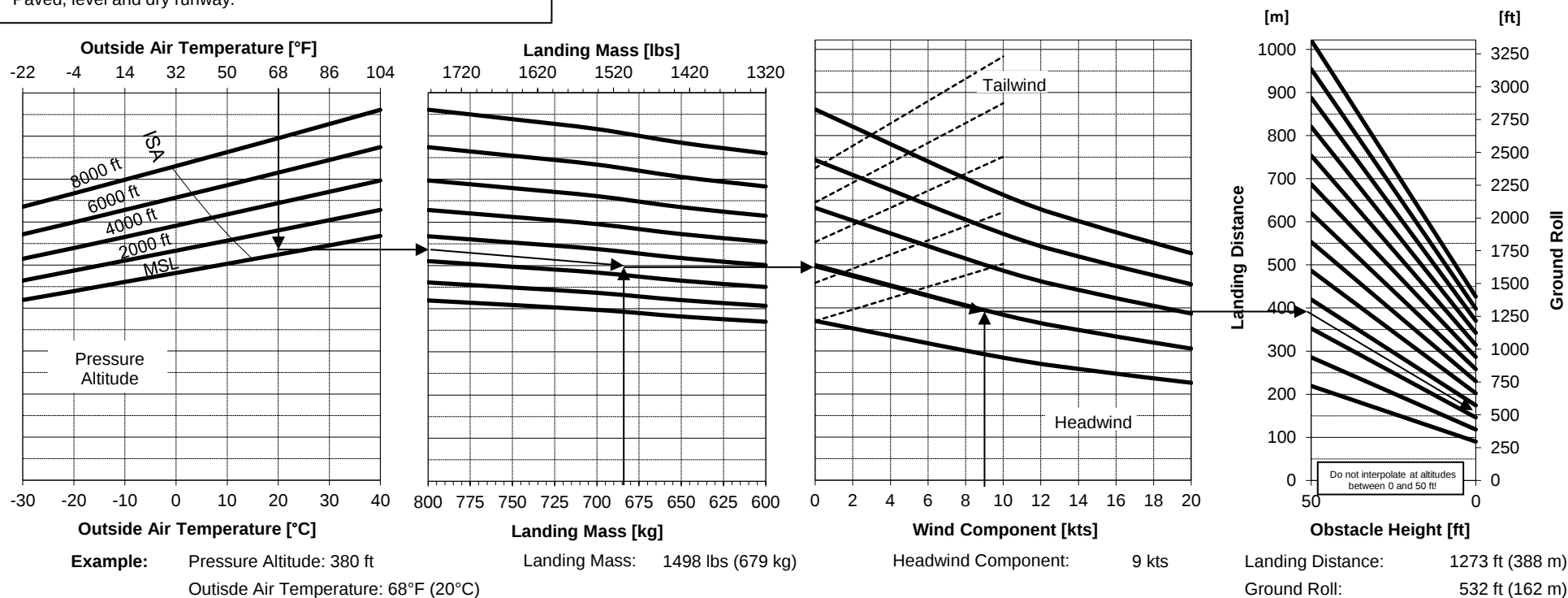
Maximum brake application.

Paved, level and dry runway.

Notice: - When landing on a dry, mown grass runway, increase the required landing distances by 15%.

- Increase ground roll appropriately for wet grass / ground, ice, snow and slush.

- An improperly maintained aircraft, deviating from procedures, poor meteorological and ambient conditions (rain, crosswind, wind shear etc.) may increase landing distances significantly.



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5.2.14 Climb Performance after Balked Landing

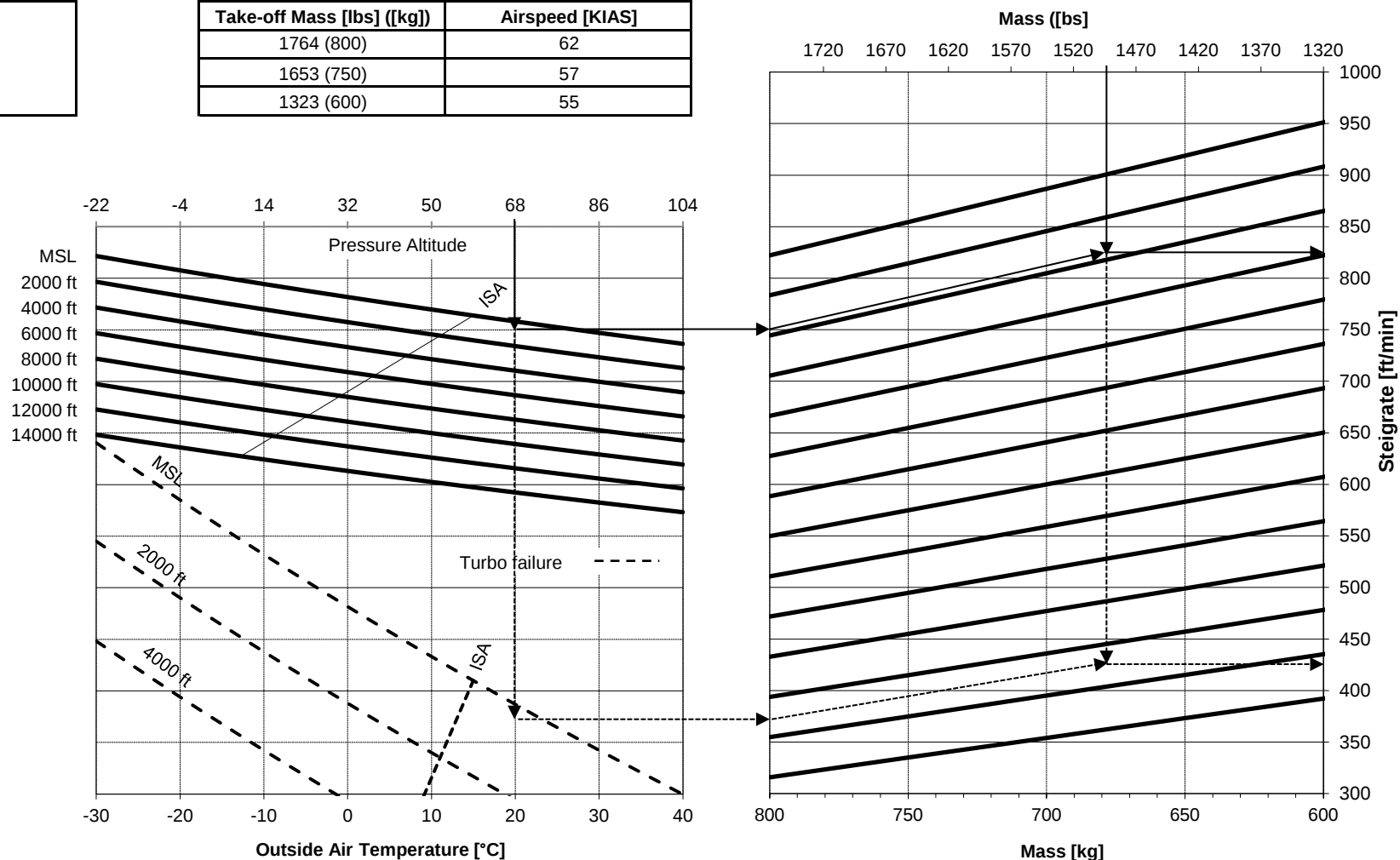
Conditions:

Power Setting: full throttle

Prop Speed: 2385 rpm

Flaps: LDG

Take-off Mass [lbs] ([kg])	Airspeed [KIAS]
1764 (800)	62
1653 (750)	57
1323 (600)	55



Example: Pressure Altitude: 380 ft
Outside Air Temperature: 68°F (+20°C)

Mass: 1498 lbs (679 kg)

Rate-of-Climb: 822 ft/min
Rate-of-Climb (Turbo failure): 420 ft/min

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5.2.15 Flight Planning Example

The following contains a flight-planning example to demonstrate the use of the tables, charts and data presented in this section of the POH. The flight planning is based upon the following conditions:

Aircraft

Take-off mass:..... 1632 lbs (740 kg)
Usable fuel: 29 US Gal (109.6 ltr)
Wheel fairings installed

Conditions at the departure airfield

Pressure altitude:..... 1800 ft
Temperature:..... 64°F (18°C), 13°F (7°C) above ISA in 1800 ft
RWY direction:..... 24 (240°)
Wind conditions 280°/10 kts
RWY length (paved, level and dry RWY)..... 2040 ft (620 m)

Cruise conditions

Overall flight distance to destination 480 NM (888 km)
Cruise altitude (altimeter setting 1013 hPa)... 9500 ft
Temperature at cruise altitude 32°F (0°C), 9°F (5°C) above ISA in 9500 ft
Reported wind en-route 10 kts tailwind component

Conditions at the destination airfield

Pressure altitude..... 380 ft
Temperature 68°F (20°C), 11°F (6°C) above ISA in 380 ft
RWY direction..... 27 (270°)
Wind conditions 220°/15 kts
RWY length (dry and level grass RWY)..... 2560 ft (780 m)

TAKE-OFF DISTANCE

Before using chart 5.2.5 on page 5-7 to determine the required take-off run and take-off distance, the crosswind component of the wind relative to runway direction must be obtained from chart 5.2.3 on page 5-5.

Relative to the runway heading, the wind is 40° from the right at 10 kts (see example page 5-5).

Using these values and chart 5.2.3, we obtain a headwind component of 8 kts and a crosswind component of 7 kts.

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We now have all the necessary data to determine the required take-off distances from chart 5.2.5:

Take-off ground roll.....210 m
Lift-off speed.....50 KIAS
Take-off distance over a 50 ft obstacle.....375 m
Airspeed in 50 ft.....57 KIAS

The required take-off distance is less than the available runway length (TODA) of 620m.

CLIMB

Using chart 5.2.6 a best rate-of-climb of 868 ft/min is determined for an aircraft with a take-off mass of 1632 lbs (740 kg) in 6000 ft at a temperature of 48 °F (9 °C). For the calculation, the average temperature and the average altitude is used.

Time needed and distance covered as well as fuel consumption for the climb may be calculated using chart 5.2.7.

Since take-off occurs at an altitude of 1800 ft, the values for climb to this altitude must be subtracted from the time required, the distance covered and the fuel consumed to the cruise altitude (9500 ft).

Since the outside air temperature is up to 13°F (7°C) above ISA, the values determined must be increased by 10% and because of the lower take-off mass decreased by 15%. For our example, we obtain the following:

Climbing time:..... $(13.1 - 2.4) \cdot 1.1 \cdot 0.85 = 10.0 \text{ min} = 10'00''$
Climbing distance:..... $(15.4 \text{ NM} - 2.7 \text{ NM}) \cdot 1.1 \cdot 0.85 = 11.9 \text{ NM}$
Fuel required:..... $(6.1 \text{ ltr} - 1.1 \text{ ltr}) \cdot 1.1 \cdot 0.85 = 4.7 \text{ ltr}$
 $(1.61 \text{ US gal} - 0.29 \text{ US gal}) \cdot 1.1 \cdot 0.85 = 1.24 \text{ US gal}$

The reported tailwind component of 10 kts at the cruise altitude also has an effect on the climb. However, it has no influence on climbing time and fuel consumption.

Since wind speed tends to increase with altitude, we will assume a tail wind of 7 kts for the entire climb.

During the climb, the tail wind acts on the aircraft for 10 minutes. As a result, we obtain for the covered distance over the ground during the climb segment:

$$11.9 \text{ NM} + \frac{7 \text{ kts} \cdot 10 \text{ min}}{60 \text{ min/h}} = 13.1 \text{ NM}$$

This result shows that the wind only has a small influence on climbing distance and is only of importance when large head or tail winds are present or when climbing to high altitudes. In this example, the wind influence on climbing distance could have been neglected.

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CRUISE

Cruise altitude is chosen under consideration of flight distance, en-route winds and aircraft performance. In this flight-planning example, a typical cruise altitude and en-route wind condition has been chosen.

The range diagram 5.2.11 on page 5-13 shows the relationship between the engine power setting and the maximum achievable range. Lower power settings result in considerable fuel savings and thus greater achievable ranges.

Applying this chart to our example, a power setting of 75 % and a pressure altitude of 9500 ft give a maximum range of 541 NM at a true airspeed of 129 KTAS. The true airspeed at cruise was obtained from chart 5.2.8 on page 5-10 taking into account the atmospheric conditions (outside air temperature and chosen cruise pressure altitude) and the chosen power setting.

The maximum possible flight endurance is obtained from chart 5.2.10 on page 5-12. In our example, the maximum endurance is 4.31 hours (4 h 19 min) at a power setting of 75 %. This maximum flight endurance and the maximum flight range determined above include 30 minutes of reserve at a power setting of 55 %, engine start-up / taxiing, take-off, climb, cruise, descent and landing.

Taking the reported tailwind of 10 kts in 9500 ft into account, the maximum achievable range of 541 NM must be corrected as follows:

Range with no wind	541.0 NM
<u>Range increase due to 10 kts tailwind (4.31 h x 10 kts)</u>	<u>+43.1 NM</u>
	584.1 NM

This shows that, for a flight over a distance of 480 NM at a cruise power setting of 75 %, the fuel reserve is sufficient.

DESCENT

Chart 5.2.12 on page 5-14 is used to calculate time, distance and fuel consumption for the descent segment. In our flight-planning example, descent is initiated at cruise altitude (9500 ft) and ends at 380 ft. During descent, the altimeter setting must be adjusted to local QNH.

Descent duration:.....	12.5 min – 0.5 min = 12.0 min
Descent distance:.....	.28 NM – 1.0 NM = 27 NM
Fuel required:	1.75 ltr – 0.1 ltr = 1.65 ltr
	0.47 US gal – 0.03 US gal = 0.44 US gal

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CALCULATION OF FUEL REQUIRED

Fuel required for engine start-up and taxiing	0.8 US gal (3.0 ltr)
(General Value, see remark "Fuel Quantity" on pg. 5-12 and 5-13)	
Fuel required for climb (page 5-18)	<u>+1.25 US gal (4.7 ltr)</u>
	<u>2.05 US gal (7.7 ltr)</u>
Climb distance (page 5-18)	11.9 NM
Wind correction (tailwind)	<u>+ 1.2 NM</u>
	<u>13.1 NM</u>

During the descent from 9500 ft to 380 ft, a distance of 27 NM is covered and 0.44 US gal (1.65 ltr) of fuel consumed (page 5-14). The influence of the wind has been neglected.

Overall flight distance	480.0 NM
Climb distance	- 11.9 NM
Descent distance	<u>- 27.0 NM</u>
Cruise section	<u>441.1 NM</u>

With the expected 10 kts tail wind, we obtain a (estimated) ground speed of:

$$129 \text{ kts} + 10 \text{ kts} = 139 \text{ kts}$$

for the time spent in cruise we obtain:

$$\frac{441.1 \text{ NM}}{139 \text{ kts}} = 3,17 \text{ h} = 3 \text{ h } 10 \text{ min}$$

The fuel required for the cruise segment is:

$$3.17 \text{ h} \times 6.21 \text{ US gal/h (23.5 l/h)} = 19.69 \text{ US gal (74.5 ltr)}$$

A fuel flow of 6.21 US gal/h (23.5 l/h) is calculated from the table on page 5-11 in the section for the power setting of 75 % MCP as follows:

Option 1: For a temperature of 32°F (0°C) at 9500 ft, we obtain a density altitude of 10000 ft (refer to the tables on page 5-10 and 5-12). By using density altitude instead of pressure altitude, we already accounted for the deviation from ISA conditions. An additional correction, as shown on page 5-11, is no longer necessary as fuel consumption (6.2 US gal/h) is already shown at density altitude.

Option 2: In order to obtain the fuel flow for the cruise altitude of 9500 ft, an interpolation has to be conducted for the values given for 8000 ft and 10000 ft, respectively. Furthermore, the deviation of ISA-temperature by 7.2°F (4°C) has to be accounted for by using the correction, stated on page 5-11:

$$6.18 \text{ gal / h} \times 1.01 \approx 6.2 \text{ gal / h}$$

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The total amount of fuel required is calculated as follows:

Engine start-up, taxiing and climb	2.04 US gal (7.7 ltr)
Cruise	19.14 US gal (72.45 ltr)
Descent	0.44 US gal (1.65 ltr)
Total fuel required	<u>21.62 US gal (81.8 ltr)</u>

If we assume full tanks at take-off, the following reserve remains:

Amount of usable fuel	28.96 US gal (109.6 ltr)
Total fuel required	- 21.62 US gal (81.8 ltr)
Fuel reserve:	<u>7.34 US gal (27.8 ltr)</u>

The actual ground speed of the aircraft must be regularly checked and tracked during flight as it forms the basis of our calculations. If, for example, the expected tailwind of 10 kts does not materialize, the power setting may have to be reduced to 65 % MCP to achieve the same range with the same amount of fuel.

LANDING DISTANCE

To determine the required landing distance use chart 5.2.13 on page 5-15. Once again, use chart 5.2.3 on page 5-5 to determine the wind components relative to the runway.

Relative to the runway heading, the wind is 50° from the left at 15 kts. This gives a headwind component of 9 kts and a crosswind component of 12 kts.

The landing mass is:

Take-off mass	1632 lbs (740 kg)
Fuel burned	- 132 lbs (59.7 kg)
(21.62 gal $\triangleq$ 132 lbs)	<u>1500 lbs (680.3 kg)</u>

Landing distance required over a 50 ft obstacle	1273 ft (388 m)
Addition for grass runway (dry: +15%)	1464 ft (447 m)

Ground roll	532 ft (162 m)
Addition for grass runway (dry: +15%)	612 ft (187 m)

The available runway length of 2560 ft (780 m) is sufficient.

The reported crosswind component is also below the maximum demonstrated crosswind component (15 kts).

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CLIMB PERFORMANCE AFTER BALKED LANDING

In order to determine the possible climb performance after a balked landing use chart 5.2.14 on page 5-16. A climb performance of 822 ft/min is determined for an aircraft mass of 1500 lbs (680 kg) at a pressure altitude of 380 ft and an outside air temperature of 68 °F (20°C). An air speed of 56 KIAS has to be maintained.

horizontal speed.....56 KIAS · 101 ≈ 5656 ft/min
climb rate.....822 ft/min
obstacle height.....50 ft (15 m)

The minimum distance between the rotation point and the end of the runway is calculated as follows:

$$\frac{50 \text{ ft}}{822 \text{ ft/min}} \cdot 5656 \frac{\text{ft}}{\text{min}} = 344 \text{ ft (104 m)}$$

The result does not include any safety factor and should be used as an estimation only. For safety reasons, the decision for a go around must be made earlier than the calculated value.

In the event of a turbocharger failure, a climb rate of 420 ft/min can be determined from diagram 5.2.14, which results in a minimum distance between the rotation point and the end of the runway of 662.8 ft (202m).

Power Setting for Cruise Flight

Sample Determination (see chart 5.2.9)

Cruise altitude:	2000 ft
ISA temperature:	51.8°F (11°C)
Temperature at cruise altitude:	69.8°F (21°C)
Power setting:	65%
RPM:	1980 rpm
Manifold pressure for ISA:	29 in Hg
Fuel consumption for ISA:	5.0 US gal/h (19 l/h)
Fuel consumption calculated for ISA + 10°C:	5.0 + (5.0 x 0.05) = 5.25 US gal/h (20 l/h)

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5.3 NOISE CHARACTERISTICS / ABATEMENT

Certification basis	Actual (MTOW: 750kg / 1653 lbs)	Maximum Allowable
CS-36, Amendment 5	62.7 dB(A)	74.2 dB(A)
ICAO Annex 16, Chapter 10	62.7 dB(A)	74.2 dB(A)

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SECTION 6

WEIGHT AND BALANCE / EQUIPMENT LIST

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6.5.1	Current Equipment List of the Aircraft	6-12

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6.1 INTRODUCTION

Before delivery, the manufacturer determines the basic empty weight and moment as well as the empty C.G. location for each aircraft. This data is documented in the Weight and Balance Record in section 6.3.1 of this section. The certified empty C.G. limits can be found in the Maintenance Manual.

It is the operator's responsibility to document any changes to the empty weight and center of gravity of the aircraft.

The aircraft is to be weighed in the following configuration

Weighing configuration:

- a) Aircraft with:
 - Brake fluid
 - Engine oil (3.17 US qt / 3 liters)
 - Engine coolant (2.64 US qt / 2.5 liters)
 - Unusable fuel (2.74 US Gal / 10.4 liters)
- b) Equipment in accordance with the current equipment list (section 6.5)

NOTE

The aircraft must be weighed in accordance with the relevant aviation regulations at regular intervals or after repairs, after extensive maintenance, after large portions of the aircraft have been painted, after changes to the equipment or when doubt exists as to the accuracy of the last weighing. This data must then be recorded in the Weight and Balance Record.

It is the pilot's responsibility to operate the aircraft within its weight and balance limits.

The aircraft must be flown at a weight and a center of gravity position (C.G.) that are within the approved operating ranges, as defined in this section, to guarantee safe operation, the specified performances and the flight characteristics. The shift in C.G. location due to fuel burn during flight must be taken into account.

The C.G. Limits are defined in section 6.4.3.

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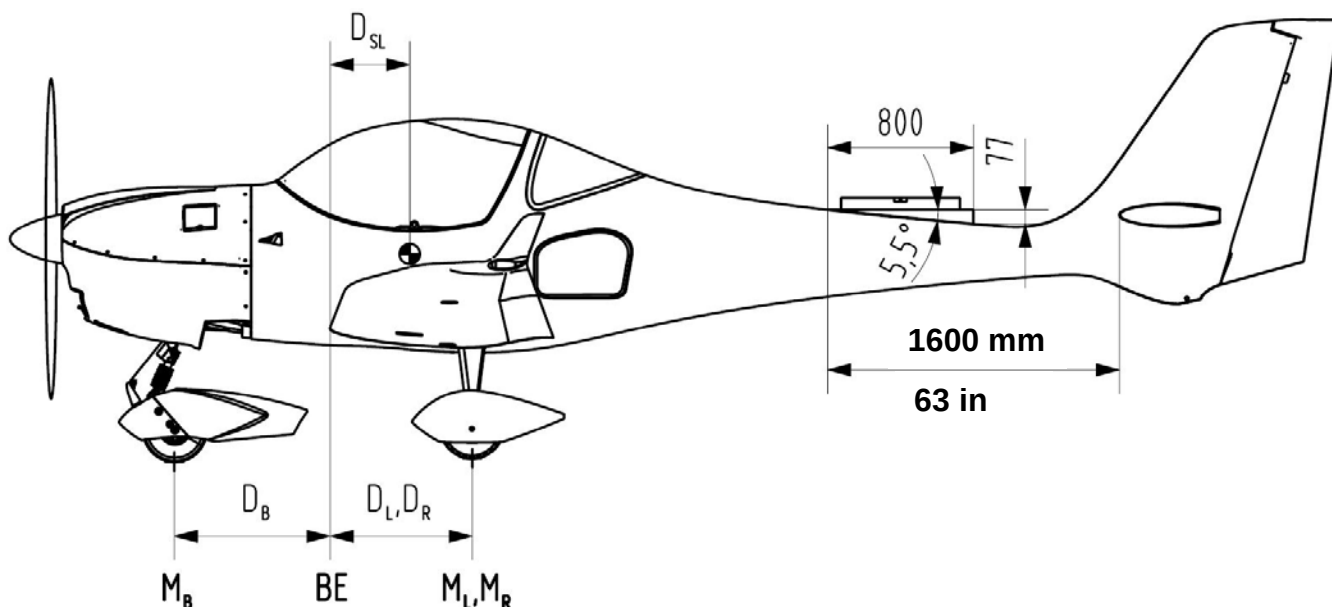
6.2 AIRCRAFT WEIGHING

Reference Datum (BE): Leading edge of wing root rib
Horizontal reference line: Place a wedge (800 : 77) 63 in (1600 mm) ahead of the leading edge of the horizontal stabilizer. Place a level on the wedge and level the aircraft.

Lever D_B : Distance from nose wheel to Reference Datum (BE)

Lever D_L, D_R : Distance from main wheel to Reference Datum (BE)

Lever D_{SL} : Distance of C.G. to Reference Datum (BE)



Aircraft Weighing: Example in [kg, m]					
Position	Weight [kg]	*	Lever [m]	=	Moment [kg*m]
Nose Wheel	$m_B = 106$	*	$D_B = - 0,840$	=	$M_B = - 89$
Left Main Wheel	$m_L = 200$	*	$D_L = + 0,780$	=	$M_L = + 156$
Right Main Wheel	$m_R = 200$	*	$D_R = + 0,780$	=	$M_R = + 156$
Total	$m_{Ges} = 506$				$M_{Ges} = 223$
Center of Gravity	M_{Ges} / m_{Ges}	=	$D_{SL} = 0,440$		

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Aircraft Weighing: Example in [lb, in]					
Position	Weight [lb]	*	Lever [in]	=	Moment [in*lb]
Nose Wheel	$m_B = 234$	*	$D_B = - 33$	=	$M_B = - 7722$
Left Main Wheel	$m_L = 441$	*	$D_L = + 31$	=	$M_L = + 13671$
Right Main Wheel	$m_R = 441$	*	$D_R = + 31$	=	$M_R = + 13671$
Total	$m_{Ges} = 1116$				$M_{Ges} = 19620$
Center of Gravity	M_{Ges} / m_{Ges}	=	$D_{SL} = 17.58$		

CAUTION

Sign Convention:

The lever arms of the main landing gear wheels, D_L and D_R , have a positive (+) value and that of the nose gear, D_N , a negative (-) one.

6.3 WEIGHT AND BALANCE DATA

The current empty weight and C.G. Location must be added to the Weight and Balance Record on page 6-6 and signed off by an authorized person. It is important that the Weight and Balance Record be complete and up to date. The first entry in the record is made during the conformity inspection at the end of the manufacturing process.

NOTE

The pilot uses the empty weight C.G. as the basis for all weight and balance calculations for flight.

It is possible to calculate a new empty weight and C.G. if the changed weights and corresponding levers are known (for example, a change in equipment). If, however, the changed weights and corresponding levers are not known (for example, after repair work) a new weighing will need to be completed.

If the empty weight and C.G. are to be calculated, it is important that current information is being used.

NOTE

The current aircraft weighing report is to be included as page 6-5 of this POH. Previous weighing reports must be clearly marked as such or removed.

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Section 6
WEIGHT AND BALANCE

Replace with current Aircraft Weighing Report

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6.3.1 Weight and Balance Record

AQUILA AT01	Registration Sign:		S/N:		Page:		authorized staff		stamp	
	Mass, Lever, Moment of change acc. to wing leading edge (BE)		empty weight and centre of gravity of the airplane		empty weight		center of gravity (D _{SL})		signature	
in flight direction aft of BE: (+) front of BE: (-)		single-mass		lever of single mass		moment of single mass		empty weight		
"+" or "-"		[kg] or [Lb]		[m] or [in]		[kgm] or [lb in]		[kg] or [Lb]		
description of the change		at delivery		OUT		IN		Date		

6.4 DETERMINING WEIGHT AND BALANCE FOR FLIGHT

In order to operate the aircraft within the approved weight and C.G. limits, the take-off weight and the flight C.G. position must be determined, taking into consideration the loading for the planned flight.

Use the tables and charts provided in sections 6.4.1 through 6.4.3 to determine weight and C.G. position:

Section 6.4.1 Load moment determination (loading graph)

Section 6.4.2 Weight and moment determination

Section 6.4.3 Approved center of gravity and weight limits

Proceed as follows:

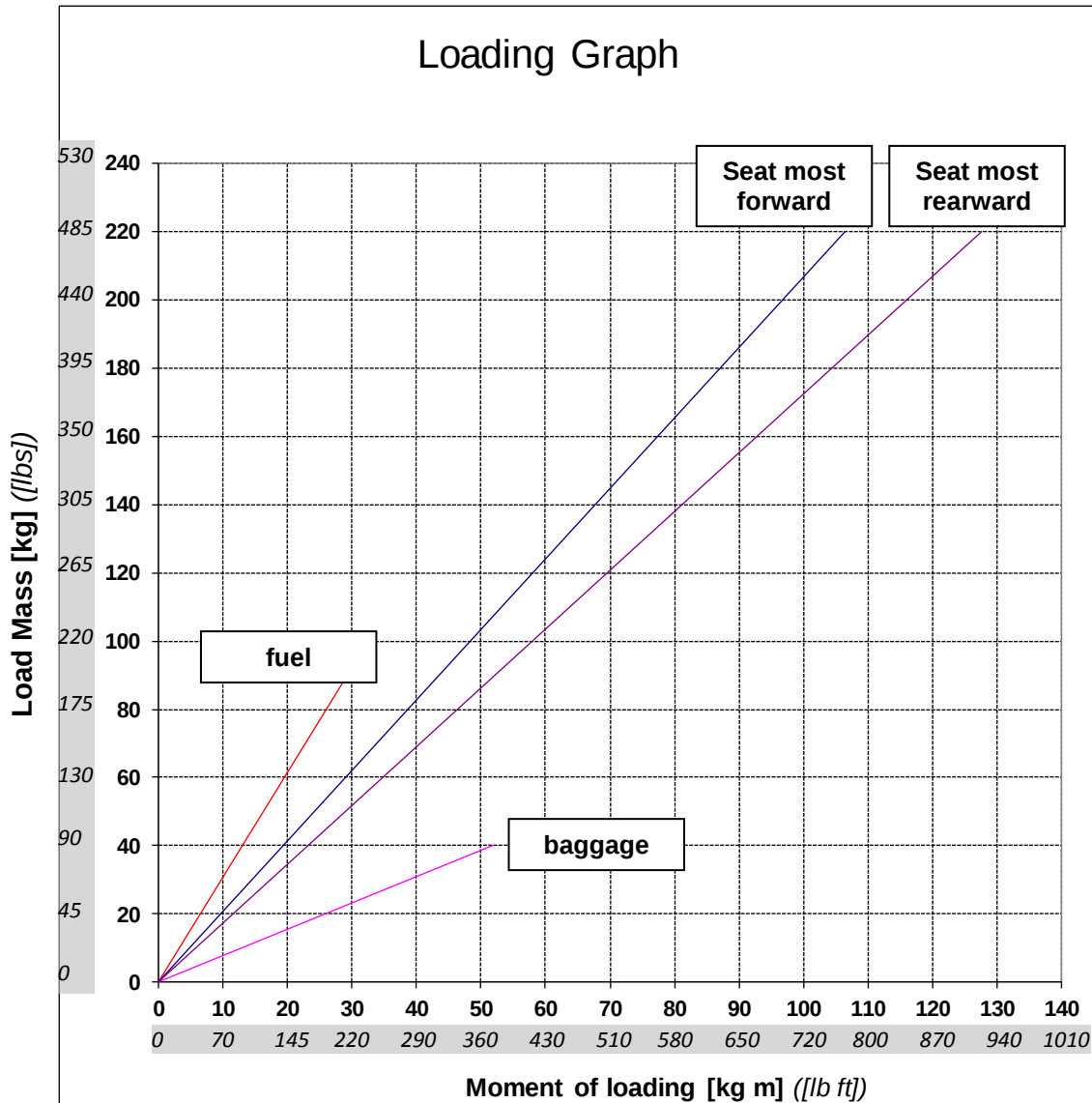
1. Take the basic empty weight m_{empty} and the empty weight moment MO_{empty} from the current Aircraft Weighing Report or the Weight and Balance Record and enter them into the appropriate fields of Table 6.4.2 *Weight and Moment Determination*.
2. Using chart 6.4.1 *Loading Graph* determine the moments of the load (pilot, fuel, baggage, etc.). Enter this information, as well as their weight, into the appropriate fields of Table 6.4.2 *Weight and Moment Determination Table*.

Alternatively, the moments can be calculated with the lever arms from Table 6.4.2 *Weight and Moment Determination Table*.

3. Find the sum of the weights and the moments in their columns. Transfer this information into chart 6.4.3 *Approved C.G. Range and Moment Limits* to check if the current C.G. is within limits.

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6.4.1 Load moment determination (loading graph)



NOTE

When determining the C.G. position, the fact that the seat is adjustable must be taken into consideration. The moments for the forward and the aft seat positions are shown, the moments for all other positions must be interpolated

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6.4.2 Weight and Moment Determination

Calculating Loading Condition	Lever from leading edge of wing root rib (BE) [in] [m]	Aquila AT01 Example		Registration No.:	
		Weight [lb] [kg]	Moment [in lb] [m kg]	Weight [lb] [kg]	Moment [in lb] [m kg]
EMPTY WEIGHT (from Table 6.3.1)	$D_{SL} =$ Exp.: 17.3 in (0.440 m)	1116 506	19620 223		
PILOT	19.1 (0.484) (seat forward) 22.8 (0.580) (seat aft)	121 55	2311 27 (seat forward)		
PASSENGER	19.1 (0.484) (seat forward) 22.8 (0.580) (seat aft)	220 100	4609 53 (seat middle)		
BAGGAGE	51.2 (1.3)	33 15	1690 20		
Weight & Moment without fuel		1490 676	28230 323		
<u>usable</u> FUEL (6.01 lb / US gal) (0.72 kg / l)	12.8 (0.325)	159 (= 26,5 gal) 72 (= 100 ltr)	2035 23		
Total Weight & Moment		1649 748	30265 346		

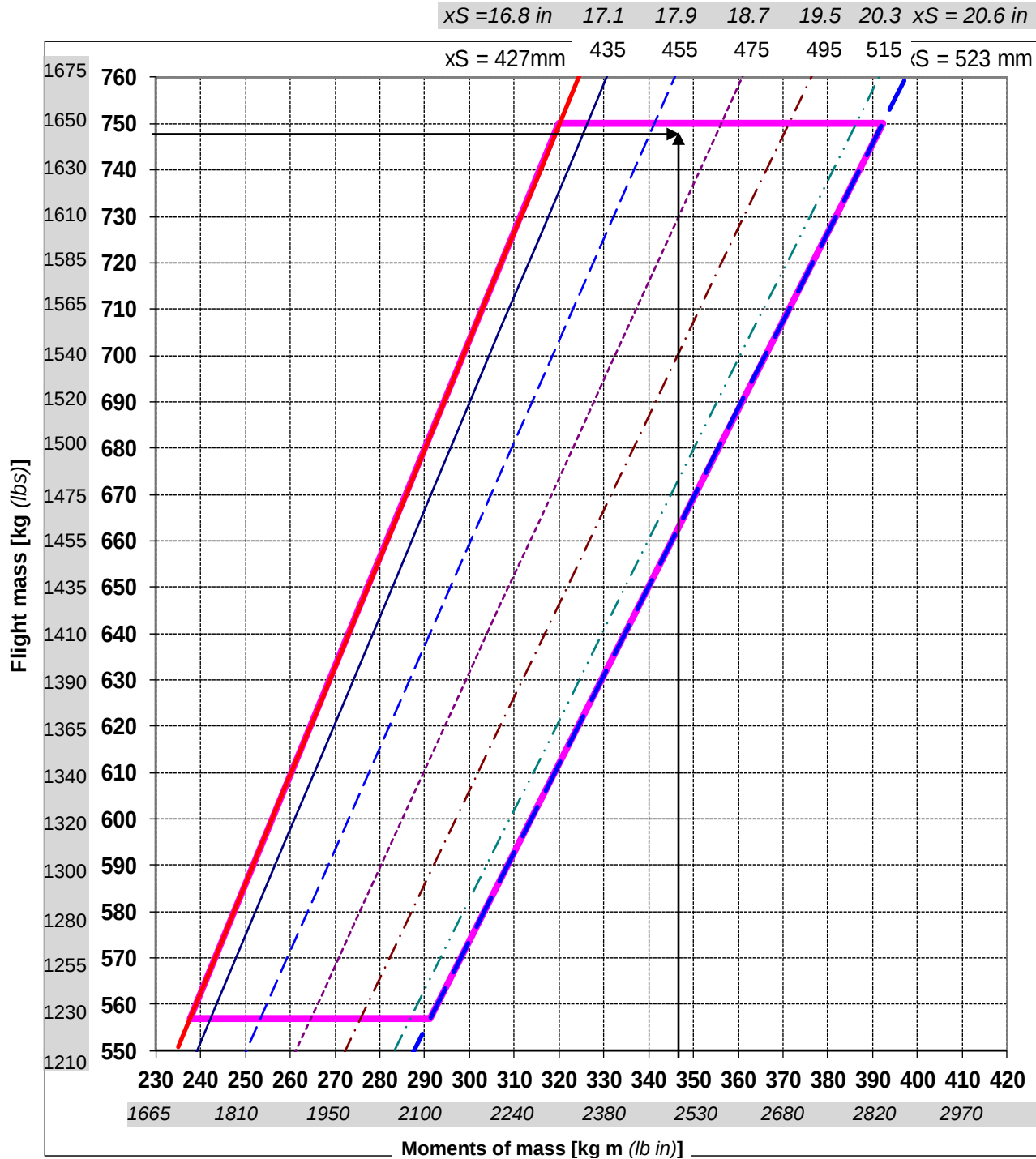
Explanation:

- Transfer the empty weight and the empty C.G. (D_{SL}) from section 6.3.1 or from the current Aircraft Weighing Report.
- Add all the weights
- Transfer the moments from chart 6.4.1 or calculate the moments by multiplying the weight with the arms.
- Find the sum of the weights and moments
- Plot the total weight and moment in the *Center of Gravity Range and Moment Limits diagram 6.4.3*.

The flight C.G. from the example is **30265 in lb / 1649 lb = 18.4 in** (limit range: 16.8 – 20.6 in) respectively **346 kgm / 748 kg = 0,463 m** (limit range: 0,427 – 0,523 m) aft of the datum and is within the limits.

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6.4.3 Approved Center of Gravity Range and Moment Limits



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6.5 EQUIPMENT LIST

The equipment list includes all avionic systems, instruments and other equipment installed in the aircraft.

All changes to the equipment of this aircraft must be documented in the equipment list in this handbook. It must be kept up to date and reflect the current equipment status.

The equipment list in this handbook contains the following information:

1. Designation/Description, Manufacturer, model or P/N and S/N of the avionic system, instrument or other equipment.
2. Indication of the installation location OR lever arm in [in] from the reference datum. Positive lever arms indicate locations behind the reference datum and negative lever arms indicate locations in front of the reference datum.

NOTE

The installation of additional equipment or a change in installed equipment, must be carried out in accordance with the data provided in the Maintenance Manual. The retrofitting of equipment must be conducted in accordance with the applicable Service Bulletin. When in doubt, the type certificate holder or the production organization of AQUILA Aviation should be contacted.

After every change to the aircraft that could cause the empty weight or moment to change (for example, the installation or removal of equipment), the empty weight and C.G. (D_{SL}) need to be redetermined. The change also needs to be documented in an *Aircraft Weighing Report* and in the *Weight and Balance Record* in section 6.3.1.

It may be possible to calculate the empty weight and C.G. if the new weights and levers are known. Otherwise a new weighing will need to be completed.

The new C.G. must lie within the limits (refer to Maintenance Manual, MM-AT-01-1020-110).

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*) Mark where applicable

**) Describe installation location or enter lever arm from reference datum in [in] (keep algebraic sign of lever arm in mind)

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SECTION 7

DESCRIPTION OF THE AIRCRAFT AND ITS SYSTEMS

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7.1 INTRODUCTION

Section 7 of the Pilot's Operating Handbook contains a description of the entire aircraft and its systems as well as information related to their use.

Refer to Section 9 for the description and operating instructions of optional equipment and systems.

7.2 AIRFRAME

The Aquila AT01-200 is a modern single engine two seater in a side-by-side configuration. Due to its high useful load, roomy cockpit, large baggage compartment, good cruise performance and light yet incredibly sturdy airframe, the Aquila is not only a great aircraft for longer tours but also an ideal training platform.

The aircraft is a low wing configuration with a mid mounted horizontal stabilizer.

With the exception of the landing gear, the engine mount, and a few fittings the Aquila AT01-200 is built entirely of composite material. Most components are fabricated using glass-fiber-reinforced plastic (GFRP), with carbon-fiber-reinforced plastic (CFRP) being employed where extra strength is required.

7.3 FUSELAGE

The fuselage and the vertical stabilizer are fabricated in two half shells. While the fuselage portion of the shell is fabricated from solid fiberglass laminate, the vertical stabilizer portion has a sandwich structure.

The engine side the firewall, which is made of a GFRP/CFRP sandwich, is covered with a special fire-resistant ceramic fleece and a stainless steel sheet.

The landing gear frame, together with the seat frame, supports the main landing gear struts. The frame continues upwards and forms a massive roll cage made from GFRP and CFRP.

7.4 WING

The wing is designed with a triple trapezoid planform and a swept-back leading edge. The wing is fastened to fuselage from below using 4 bolts.

The wing shells are GFRP/foam sandwich composite constructions and are reinforced locally by CFRP unidirectional bands.

The fuel tanks are integrated into the leading edge of the wing structure. The 2 fuel tanks, one on each side, have a volume of approx. 15.8 US gal (60 l) each. The inner surface of the fuel tank is sealed with a special surface lining to protect the wing structure from damage.

The position lights, ACL (Anti-Collision Light) and the fuel tank vents are integrated into the winglets.

7.5 EMPENNAGE

The vertical and horizontal stabilizers, as well as the elevator and rudder are semi-monocoque sandwich composite constructions. The shells are fabricated from a GFRP sandwich reinforced by carbon fiber bands. The horizontal stabilizer assembly is bonded directly to the fuselage and cannot be removed.

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7.6 FLIGHT CONTROLS

The flight controls of the Aquila AT01-200 are of conventional design using a control column and non-adjustable rudder pedals. The elevator and ailerons are controlled via push-pull-rods, the rudder via cables.

The flaps and the trim system are electrically actuated.

7.6.1 Ailerons

The ailerons are controlled using push-pull-rods.

A bell crank in the middle of the main wing spar sets the differentiation of the ailerons. Adjustable stops near the control column are used to limit the aileron deflection.

7.6.2 Elevator and Trim System

The elevator is controlled using push-pull-rods.

Adjustable stops near the control column are used to limit the elevator deflection.

The trim system is an electrically actuated spring trim. Even in a situation such as trim runaway, the aircraft remains controllable, though the stick forces may become somewhat higher. The trim is controlled by a spring-loaded switch. The trim indicator is located in the middle of the instrument panel.

The take-off position of the trim is marked on the indicator.

Switch forward: nose down

Switch aft: nose up

In addition, the trim system is protected by a resettable circuit breaker.

7.6.3 Rudder

The rudder is controlled by the rudder pedals by way of cables running in special guides. The control surface travel is limited by stops at the lower rudder attachment fitting.

Precise control and good maneuverability during taxiing on the ground is accomplished by linking the nose wheel steering mechanism directly with the rudder pedals. Differential braking may be used to further reduce the turning radius.

The seat can easily be adjusted to allow the pilot to comfortably reach the rudder pedals.

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7.6.4 Flaps and Flap Position Indication

The flaps are driven by an electric motor, via a spindle and push-pull-rods.

A three-position selector switch is incorporated in the instrument panel for flap operation. A flap position indicator is also located on the instrument panel.

In cruise position the upper green light is illuminated (UP)

In take-off position the middle green light is illuminated (T/O)

In landing position the lower green light is illuminated (LDG)

The flap selector switch position corresponds accordingly to the flap position.

Stripe markings on the flap leading edge offer an additional possibility to visually check the flap position.

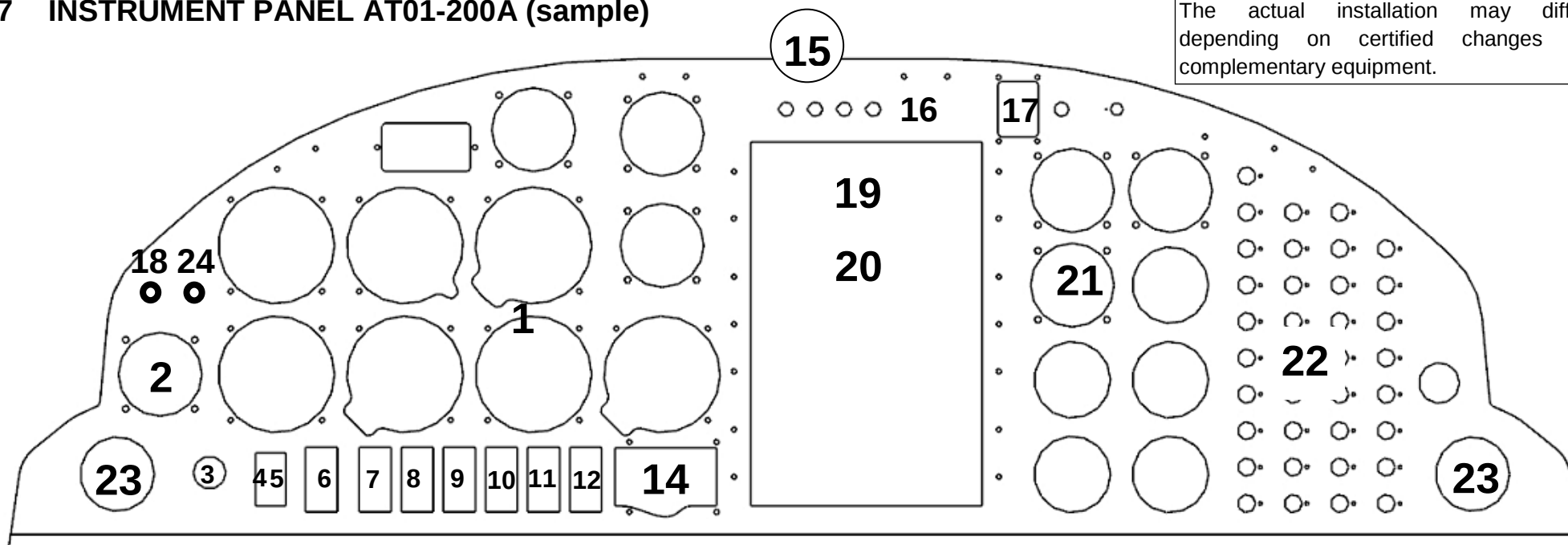
A self locking spindle will maintain a flap position, even in the event of an electrical failure.

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7.7 INSTRUMENT PANEL AT01-200A (sample)

NOTE:

The actual installation may differ depending on certified changes or complementary equipment.



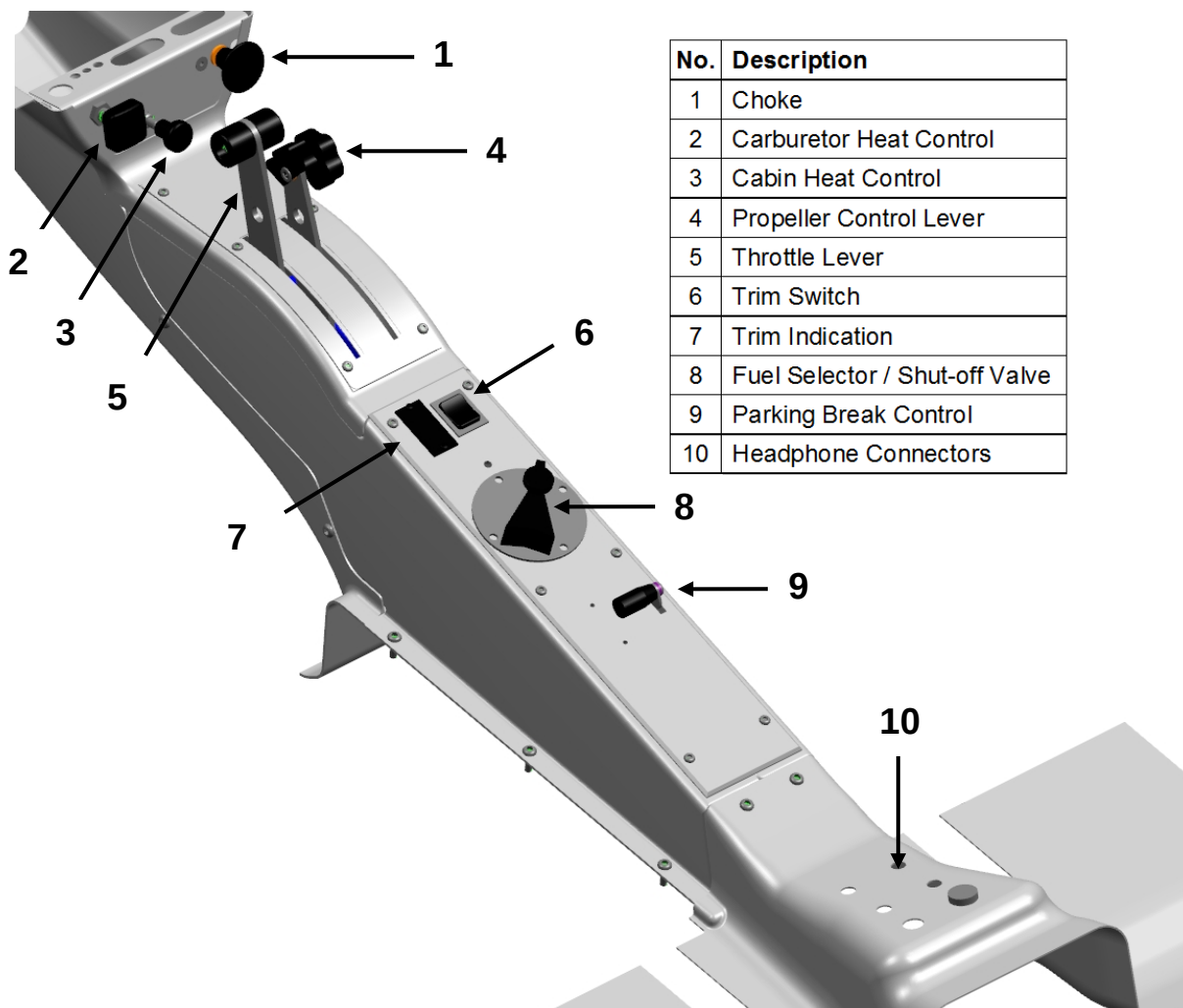
For minimum instrument requirements, refer to Section 2.12 of this manual

No.	Description	No.	Description	No.	Description	No.	Description	No.	Description	No.	Description
1	analogue Instruments	5	ALT2/BAT2	9	ACL	13	Reserved	17	ELT	21	Engine Instruments
2	Stby. artificial horizon	6	Fuel Pump AUX	10	Landing Light	14	Flap Control Switch	18	TCU switch		
3	Ignition Switch	7	Avionics	11	Instrument Lights (opt)	15	Compass	19	COM/NAV/GPS	22	Circuit Breakers
4	ALT1/BAT	8	Nav-Light	12	P/S Heat (opt.)	16	Warning Lights	20	Transponder	23	Ventilation Nozzle

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7.7.1 Overview Control Panel

Controls and displays located on the control panel which is located below the midsection of the instrument panel, are placed so as to be easily viewed and operated from both seats.



7.7.2 Cabin Heat

The cabin heat control knob, by which the hot-air flap is opened and closed, is located in the forward section of the control panel.

At the front section of the instrument panel cover the heated air is divided up for windshield defrosting and cabin heating.

7.7.3 Cabin Ventilation

Two adjustable ventilation nozzles are located on both sides of the instrument panel to supply fresh air to the cabin. The amount and direction of fresh airflow can be adjusted individually for each seat by pivot-mounted nozzle outlets. If required, the sliding windows in the canopy may also be opened for additional ventilation of the cabin.

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7.7.4 Additional lighting (N/VFR)

With the equipment for N/VFR operations a redundant instrument lighting system is installed. The lighting system includes the following:

- ⇒ Panel lighting in the glare shield (controlled by a dimmer unit on the right side of the instrument panel)
- ⇒ Individual instrument lighting by internal instrument lights and additional lighting for instruments, controls on the control panel, and switches and circuit-breakers.

In the event of an emergency a flashlight must be available for every person on board the aircraft.

7.8 SEATS, SEATBELTS AND HARNESSSES

The seats are fabricated from composite materials and are equipped with integrated head rests and removable, energy-absorbing seat cushions.

An oil/gas spring strut with locking mechanism holds the seat in the adjusted position. To adjust the seating position, the spring strut must be unlocked by pushing a handle located by your thigh.

Both seats are equipped with four-part seat belts with a central rotary buckle. The shoulder harnesses are connected to inertial reels.

To fasten the seat belts, put each belt fitting successively into the associated receptacles of the rotary buckle until a distinctive “snap” sound is heard. The seat belts can be released by turning the handle of the rotary buckle clockwise.

7.9 BAGGAGE COMPARTMENT

The AQUILA AT01-200 incorporates a large baggage compartment behind the seats which can be loaded through a lockable baggage door. The baggage compartment is also accessible through the cabin.

The maximum permissible load in the baggage compartment is **88 lbs (40 kg)**. The weight and centre of gravity limits of the aircraft (refer to Section 6 of this handbook) must be observed when loading. The baggage door must be locked during flight.

Tie-down rings for straps are provided on the floor panels of the baggage compartment to strap down baggage and other payload. Suitable tie-down straps may be purchased from the aircraft manufacturer. For small or loose articles, a baggage net is recommended, which is also available for purchase.

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7.10 CANOPY

The large canopy offers an excellent all around view and allows unrestricted access to the cabin. Small sliding windows on both sides of the canopy serve as emergency view windows and can be used for additional cabin ventilation. The canopy is operated by a hand lever located on the left hand side of canopy frame. A gas spring strut adds support while opening the canopy.

7.11 LANDING GEAR

The landing gear consists of a steerable nose gear that is equipped with a shock absorber and a main landing gear. To provide precise control of the aircraft while taxiing on the ground, the nose gear strut is linked directly to the rudder pedals. The main gear struts are made of spring steel to absorb the touch-down loads during landing. Hydraulically actuated disc brakes are provided on the main landing gear.

Because of the robust landing gear and the 5.00 x 5 wheels on the nose and main wheels the AQUILA AT01-200 can be easily operated from a grass surface.

The aircraft can be operated with full size wheel pants or, for soft field operation, mud guards.

7.11.1 Nose Landing Gear and Nose Wheel Steering

The direct linkage between nose wheel and rudder pedals minimizes brake wear.

Good shock absorption and suspension characteristics are provided by a shock absorber made of stacked rubber springs located in the nose wheel fork.

The direct linkage between the nose wheel steering and rudder operation allows swift taxiing, precise taxi maneuvers and small turn radii, also in crosswind conditions without excessive braking.

Differential braking may be used to reduce the turning radius even further.

7.11.2 Main Landing Gear and Brake System

The main landing gear consists of two cantilever struts which act as leaf-springs to absorb the touch-down loads.

The main wheels are equipped with hydraulically actuated disc brakes. The brakes are activated individually on each side by tilting the corresponding rudder pedal in the cockpit forward with the toe. Due to separate brake circuits, the left and right wheel brakes can be actuated individually.

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7.11.3 Parking Brake

The parking brake lever is located in the central control panel. Actuating the parking brake locks the main wheel brakes.

To set the parking brake, the wheel brakes are applied simultaneously with the rudder pedals and, when the desired brake pressure is achieved, the control lever is pulled into the locked position.

To release the parking brake, push the parking brake lever all the way forward.

7.11.4 Wheel Fairings

It is important that no dirt or snow accumulate underneath the wheel pants. For this reason the Aquila AT01-200 can be operated with either full wheel pants (high-speed), with mud guards (soft-field), or without any wheel fairings. The aircraft can also be flown with a combination of wheel fairings, as long as the left and right main wheels have the same fairing.

NOTE

Flying without any kind of wheel fairing increases the chance of damage due to stones which, in turn, may lead to extensive, unscheduled maintenance work.

NOTE

Flying without any wheel fairings or with mud guards reduces performance up to 10%.

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7.12 POWER PLANT

7.12.1 Engine

The ROTAX 914F is a 4 cylinder, 4 stroke horizontally opposed engine with liquid-cooled cylinder heads and air-cooled cylinder barrels. It has brushless magnetos, 2 carburetors, 2 electrical fuel pumps, a reduction drive, an integrated alternator (**ALT2**), an externally engine mounted alternator (**ALT1**) and an attachment for a hydraulic constant speed propeller.

Additionally the engine contains an exhaust turbocharger. It is controlled by a Turbo Control Unit (**TCU**), attached to the instrument panel, with sensors for temperature, pressure and throttle valve position. The TCU controls a servo motor which, via a bowden cable, adjusts a waste gate for manifold pressure and power control. An additional intercooler for turbocharged air ensures, that air temperature behind the turbocharger always remains within the operation limits of the engine.

Reduction ratio of internal gearbox:	2.43 : 1
Displacement:	73.9 in ³ (1211 cm ³)
max. takeoff power (5 min.):	113.3 BHP (84.5 kW)
at max. takeoff propeller speed:	2385 RPM
max. continuous power:	98.6 BHP (73.5 kW)
at max. continuous propeller speed:	2260 RPM

Further information can be found in the engine operating handbook.

7.12.2 Propeller

A two-blade, hydraulically controlled variable pitch propeller (constant speed propeller) of wood-composite-hybrid construction.

Manufacturer:	mt-Propeller
Type:	MTV-21-A/175-05
Diameter:	68.9 in (175 cm)

The propeller blades are wrapped in composite material and protected along the leading edge by a stainless steel sheath. Near the blade root, the propeller is protected additionally by a thick plastic film.

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7.12.3 Throttle and Propeller Control

The black throttle lever and the blue propeller control lever are located on the central control panel.

The throttle controls the manifold pressure (MP):

Throttle forward, more than 100% indexed position: Take-off power (TOP)
(up to 40 inHg MP)

Throttle forward, up to 100% indexed position: Max. continuous power (MCP)
(up to 35 inHg MP)

The propeller control lever controls the pitch of the propeller blades:

Propeller control lever forward: Low pitch (high RPM)

Propeller control lever aft: High pitch (low RPM)

To obtain maximum engine power (max. manifold pressure), place both the throttle and the propeller control levers in their full forward positions.

During climb and cruise, the manifold pressure (throttle position) and the propeller pitch (propeller control lever position) are normally matched to each other. Refer to Section 5 of this manual and to ROTAX® 914F Operator's Manual for more information.

During the final approach for landing, the low pitch setting of the propeller is used to increase the propeller drag at low power settings and to have full climb power available in case of a missed approach (throttle aft and propeller control lever forward).

The adjustment of the propeller blade pitch is accomplished by a hydraulically operated propeller governor that increases the pitch against a spring load. The oil-hydraulic governor keeps the preselected propeller speed at a constant value regardless of manifold pressure and airspeed (constant-speed control). In the case of oil pressure loss, the blades will be automatically set into lowest pitch position. This ensures the further availability of full power.

CAUTION

*In the case of governor loss, the propeller behaves like a non-adjustable propeller.
Manifold pressure is set to ensure that max. permissible RPM is not exceeded.*

The propeller does not have a feathered position.

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7.12.4 Choke

The choke control knob is located on the control panel to the right of the carburetor heat and cabin heat controls.

The choke may only be used for a short time when starting the engine in cold conditions. The throttle must remain in Idle. The choke knob is spring-loaded and returns to the OFF position when released.

7.12.5 Carburetor Heat

The carburetor heat push-pull type control element is located on the control panel to the left of the choke and cabin heat.

When carburetor heat is pulled (ON) one part of the dyadic bowden cable closes a cover on-top of the intercooler. The other part closes a flap in the air intake system behind the air filter so that the engine is then provided with pre-heated intake air from the engine compartment.

The correct use of carburetor heat prevents the formation of carburetor ice that can cause the engine to run rough and, in the worst case, result in complete engine failure. If carburetor icing is encountered, it is usually possible to slowly melt the ice by activating the carburetor heat while maintaining the same power setting.

A carburetor temperature gauge with a caution zone marked is displayed optionally on a digital engine information system (EIS).

The functionality of the carburetor heat should be tested before every flight.

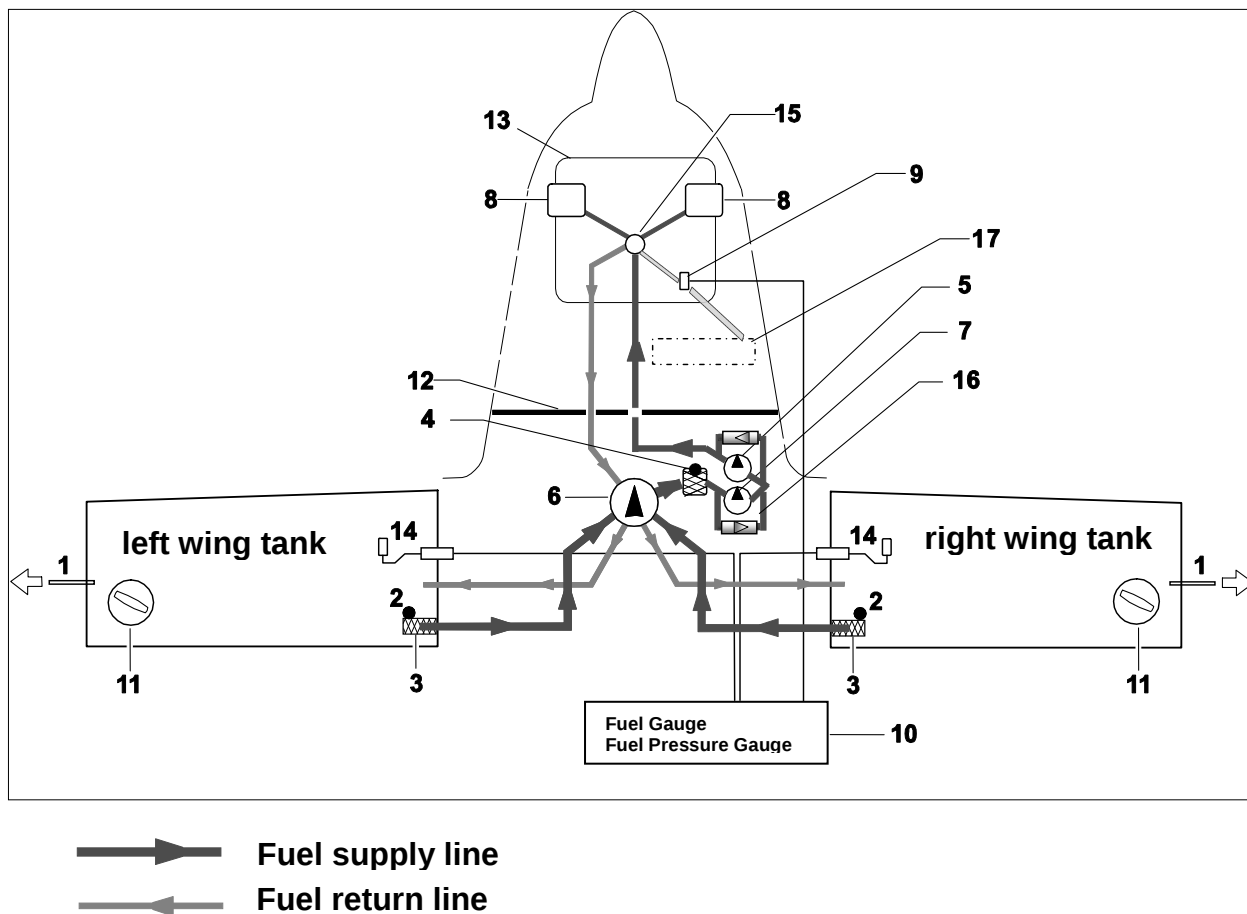
NOTE

Carburetor heat reduces engine power and must be used in accordance with standard rules and procedures.

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7.13 FUEL SYSTEM

7.13.1 Overview



- | | |
|--|------------------------------------|
| 1 Fuel Vent | 8 Carburetors |
| 2 Drain valve | 9 Differential-Pressure-Sensor |
| 3 Coarse fuel filter element | 10 Engine Information System (EIS) |
| 4 Gascolator (fine filter & Drain valve) | 11 Fuel filler cap |
| 5 Electrical fuel pump AUX (ALT1/BAT) | 12 Firewall |
| 6 Fuel selector/shut-off valve | 13 Engine |
| 7 Electrical fuel pump MAIN (ALT2) | 14 Fuel level probe |
| 15 Fuel pressure regulator | 16 By-pass with check valve |
| 17 Airbox | |

Fuel System Schematic

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7.13.2 Fuel Tank

Each wing is equipped with an integral fuel tank. The fuel line of each tank is equipped with a removable coarse fuel filter. The fuel filler caps can be locked. The fuel tanks are vented via a vent line outlet located in the winglets.

A drain valve is located at the lowest point of each fuel tank. Another drain valve is in the gascolator located behind the firewall on the co-pilots side. All drain valves can be easily operated.

A drainage cup is located on the inside of the baggage compartment door.

Fuel is supplied to the engine by an electrical fuel pump MAIN. When needed, an electrical fuel pump AUX can also be switched on. Both fuel pumps are located in a separated area beneath the cockpit ground floor on the co-pilots side.

Upstream the fuel pumps there is a combined filter and drain valve (gascolator) installed. The electrical fuel pump AUX is controlled by a switch on the instrument panel labeled **Fuel Pump AUX**. It must be turned on during take-off and landing, when low fuel pressure is suspected or during critical phases of flight.

Too low fuel pressure relative to the manifold pressure is detected by a differential pressure probe between the fuel pressure regulator and the airbox. The resulting fuel over pressure is displayed as fuel pressure e.g. on the digital Engine Information System (EIS).

NOTE

When flying near the ground, such as during take-off and landing or if low fuel pressure is indicated, the AUX fuel pump must be switched on in addition to the MAIN fuel pump.

7.13.3 Fuel Selector / Shut-Off Valve

The fuel selector is conveniently mounted on the control panel in full view of the pilots. The red, arrow-shaped selector handle has a LEFT, RIGHT, and OFF-position. Each position is notched and has a self-centering mechanism using a spring-loaded pin. The selector handle points to the chosen position.

In both normal operating positions (LEFT/RIGHT), the fuel supply and corresponding return line of the selected fuel tank are opened. The fuel supply and return line of the other fuel tank are closed.

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It is recommended to keep both tanks at approximately the same fuel level.

NOTE

Recommendation: Fuel tanks should be switched at least every 60 minutes.

When the fuel selector valve is in the OFF position, the fuel flow in the supply and return lines is interrupted and it functions as a fuel shut-off valve.

To switch the valve into the OFF-position, the knob located at the top of the handle must be PULLED while simultaneously turning the handle clockwise into the OFF-position.

7.13.4 Fuel Level Indication

A floating sensor which is easy to maintain supplies information concerning fuel levels. The floating gauge is located above the fuel supply; therefore fuel indication depends on the flight attitude. All filling levels above $\frac{3}{4}$ will be indicated as FULL due to the dihedral angle.

Additionally, a dipstick to visually verify the fuel level is delivered with the aircraft. With the aircraft horizontal, the dip-stick is inserted straight into the fuel tank so that the handle of the dipstick lays flat with the upper surface of the wing.

After pulling the dipstick out of the fuel tank, the fuel level can be determined by the “wetted” area of the dipstick. This can then be compared with the electrical fuel level indication on the instrument in the cockpit.

The dip-stick must always be carried with the aircraft. It is stowed on the inboard side of the baggage compartment door.

CAUTION

The fuel level indication in the cockpit must be verified with the fuel dipstick daily. For this purpose level the aircraft out as much as possible.

The dipstick has markings showing $\frac{1}{2}$ and $\frac{3}{4}$ of the maximum fuel tank content.

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7.14 ELECTRICAL SYSTEM

The AT01-200 is equipped with a 12 V direct current (DC) electrical system that is powered by 2 engine-driven alternators and a battery. When the two **ALT1 / BAT** and **ALT2 / BAT2** split master switches are engaged, the electrical equipment can be operated and controlled by rocker switches located on the lower left section of the instrument panel. All electrical circuits are protected by circuit breakers that are accessibly arranged on the right hand section of the instrument panel.

The two engine ignition lines are independent of the aircraft power supply system.

7.14.1 Power Supply and Battery System

The 12 V lead-acid battery (capacity depending on type installed) is connected to the electrical system of the aircraft via a 50-amp circuit breaker and the **BAT** switch. With the engine operating, the battery is charged by a 40-amp alternator that is equipped with an internal regulator and protected by the 50-amp alternator (**ALT1**) circuit breaker and by a 20-amp Alternator with external regulator and protected by the 20-amp alternator (**ALT2**) circuit breaker. The alternator **ALT1** is air-cooled and driven by a V-belt drive geared down from the propeller shaft. **ALT2** is directly driven by the Propeller shaft.

If one alternator regulator fails, one of the red alternator warning lights **ALT1** or **ALT2** located in the annunciator panel will illuminate.

The charging current of the battery as well as the produced current of the alternators are monitored by the BAT ammeter and an additional ammeter which can display ALT1 or ALT2 currents selected by a toggle switch. A voltmeter displays the aircraft voltage level. In an emergency, the battery is able to supply all essential electrical equipment for at least half an hour, provided that the battery is correctly maintained and in a good condition.

7.14.2 Ignition System and Starter

The engine is equipped with 2 electronically controlled ignition systems that have two independent ignition circuits. The ignition system is activated by the ignition switch. An internal control unit interrupts the ignition if the propeller speed drops below 100 RPM.

With the ignition key in the R or L position, an ignition circuit is deactivated. In the BOTH position, both ignition circuits are active. When the key is turned to the START position, the starter motor is activated. When the key is released it returns to the BOTH position and the starter is disengaged.

Further information for engine operation and pre-flight checks are contained in the Operator's Manual for all versions of ROTAX® 914 engines.

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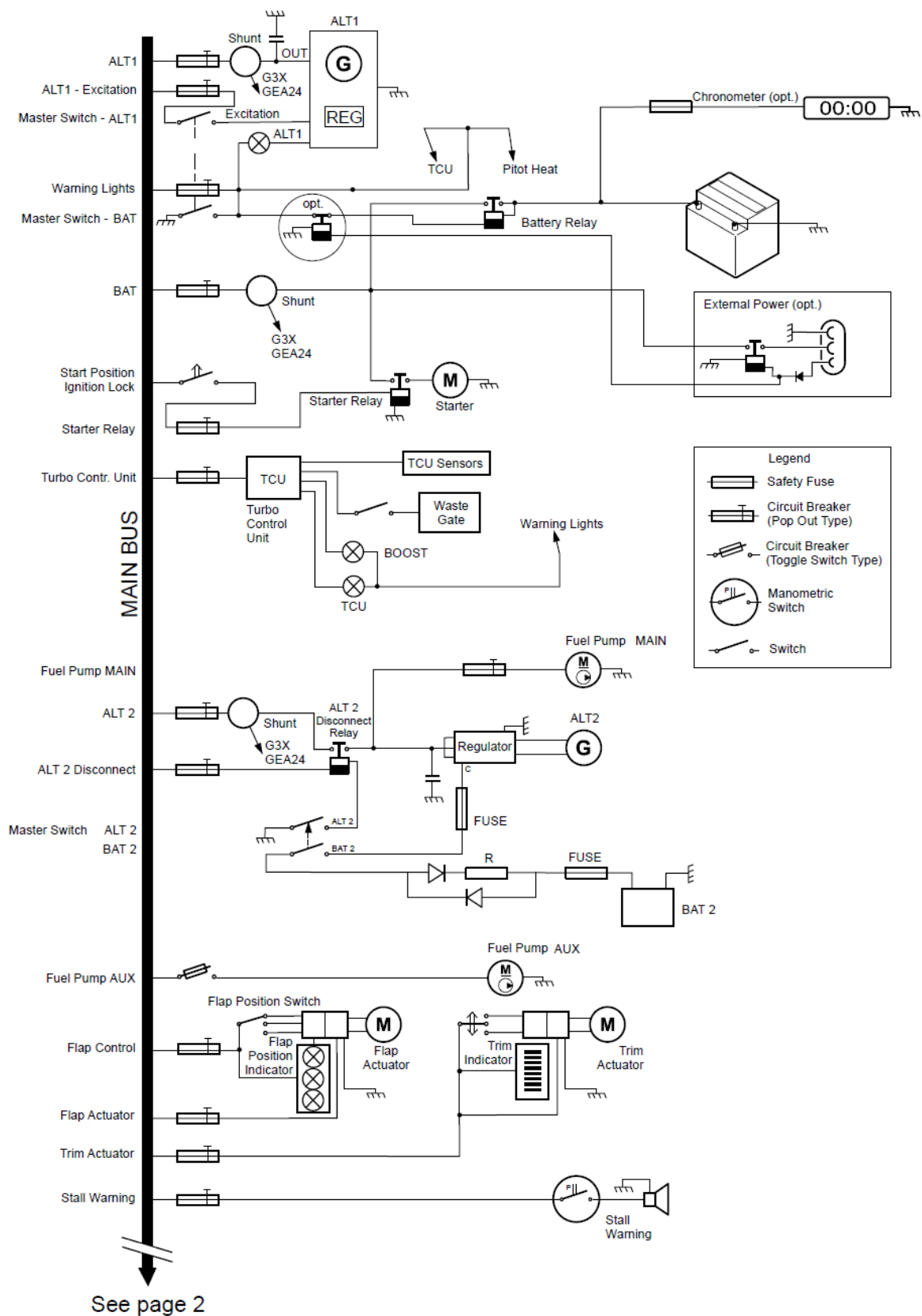


Fig.: Electrical System Schematic 1/2 (G3X-Version)

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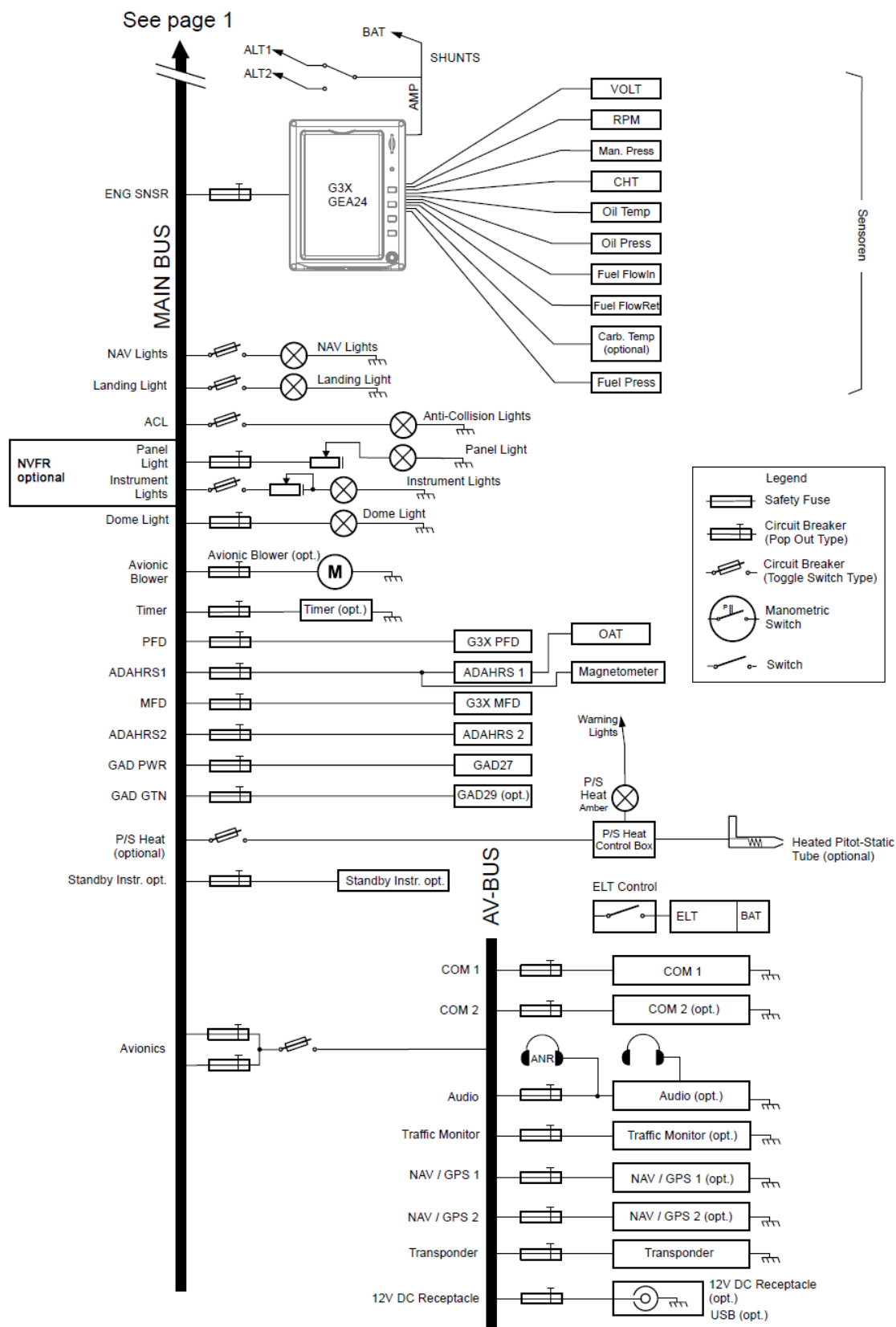


Fig.: Electrical System Schematic 2/2 (G3X-Version)

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7.14.3 Electrical Equipment and Circuit Breakers

All electrical equipment can be turned on or off by push-pull type circuit breakers or by rocker switches with built-in circuit breaker function.

COM/NAV-equipment along with other avionic equipment is supplied with electrical power through the **Avionics** switch. Additionally, the avionic equipment is protected by separate circuit breakers.

Equipment regularly used in flight (fuel pump AUX, ACL, etc.) are controlled by their own rocker switches with built-in circuit breaker function.

7.14.4 Voltmeter and Ammeter

The voltmeter shows the system voltage generated by the power sources.

The BAT ammeter shows the current flowing between the battery and the electrical system of the aircraft. When the battery is being charged, the pointer is in the GREEN arc (+). When the battery is discharging, the pointer is in the YELLOW arc (-). This means that when the battery is supplying the electrical system of the aircraft the pointer is in the YELLOW arc (-). During normal operation, this is a sign of an alternator malfunction. The charging current of each alternator is displayed on the separate ammeter that can be switched between ALT1 and ALT2.

7.14.5 Warning Light ALT1

The red alternator warning light (**ALT1**) should not illuminate during normal operation. The warning light illuminates only if:

- alternator failure (**ALT1** produces no current) occurs

In this case the electrical power is supplied by the battery and ALT2.

The ignition system of the engine is independent of the external alternator and is therefore unaffected.

CAUTION

Due to its design the warning light ALT1 does not illuminate if the alternator is switched off, the alternator cable is broken or the CB is pulled / tripped !

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7.14.6 Warning Light ALT2

The red alternator warning light (**ALT2**) should not illuminate during normal operation. The warning light illuminates only if:

- alternator failure (**ALT2** produces no current) occurs

In this case the electrical power is supplied by the battery and ALT1.

The ignition system of the engine is independent of the external alternator and is therefore unaffected.

CAUTION

Due to its design the warning light ALT2 does not illuminate if the alternator is switched off, the alternator cable is broken or the CB is pulled / tripped !

7.14.7 Warning Light TCU

The yellow **TCU** warning light should not illuminate during normal operation. The YELLOW warning light flashes only if:

- TCU, turbocharger or waste gate malfunction occurs

In case of a TCU malfunction the connection between TCU and servo motor can be interrupted by switching TCU switch OFF (switched down).

7.14.8 Warning Light BOOST

The red **BOOST** warning light should not illuminate during normal operation. The RED warning light illuminates only if:

- Exceeding the maximum manifold pressure

The RED warning light flashes only if:

- Exceeding the maximum time for take-off power

7.14.9 Warning Light P/S-HEAT

Refer to Section 7.16.1.

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7.15 EXTERNAL POWER UNIT (optional)

It is recommended to use an External Power Unit (EPU) for engine start-up at outside air temperatures below -10° C. The EPU receptacle is optional and is mounted on the right fuselage side below the battery. Access is provided by a service door in the lower cowling.

Electrical power for the engine starter and the electrical buses is provided by a three poled plug (MIL standard) protected from reverse polarity by a relay circuit. A second relay disconnects the on-board battery as long as the external power source is connected to the aircraft. This second relay prevents an uncontrolled charging or discharging of the battery during the EPU operation.

WARNING

Before starting the engine with external power, make sure that NO persons or objects are in the vicinity of the propeller disk.

Procedure for starting up the engine with an external power source:

- Plug in and switch on the external power
- **ALT1/BAT** and **ALT2 / BAT2** switch ON
- Start-up engine (in accordance with section 4.5.2 “Engine Start-up”)
- Disconnect external power source.

7.16 PITOT-STATIC SYSTEM

A pitot-static tube is installed on the lower surface of the left wing which, via two separate connections, supplies total pressure and static pressure (from 6 vents distributed on the diameter). Total pressure and static pressure lines travel through the interior of the wing to the wing root where they are connected to water separators. The pressure lines have connections installed at the wing root to simplify disassembly of the wing.

Error in the static system can be neglected for altitude measurement. An airspeed calibration chart is provided in Section 5 of this manual.

NOTE

When the aircraft is parked the pitot static tube should be covered with the supplied pitot tube cover to protect it from dirt and other contamination. The cover is attached to a large “Remove Before Flight” ribbon.

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7.16.1 Pitot Heat (optional)

On request, a heated pitot-static tube can be installed. The heater is turned on using the **P/S Heat** switch.

The size and location of the heated pitot static tube are identical to the unheated version. Temperature is controlled automatically.

Function:

The **P/S HEAT** warning light illuminates when:

- ⇒ **P/S Heat** switch OFF or
- ⇒ Pitot heat is defective

CAUTION

*This aircraft is **not certified** for flight into icing conditions, even if a heated pitot-static tube is installed.*

*Switch **P/S Heat** OFF when OAT exceeds + 59° F (+15° C).*

7.17 STALL WARNING SYSTEM

The stall warning system causes a loud buzzing sound at least 5 kts before the stall is reached in all flap settings.

As the aircraft approaches a stalled condition, a switch on the wing leading edge is activated due to a change in airflow as the angle-of-attack increases. The switch generates a loud buzzing sound as long as this condition is maintained.

NOTE

The stall warning system (a small metal plate on the leading edge) is delicate and must be handled with care.

7.18 AVIONICS

Depending on the installed optional avionic equipment, a NAV/COM transceiver, a transponder or a multi-functional display may be located in the centre section of the instrument panel. Detailed information on the operation of this equipment and descriptions of their systems are provided in the POH Supplements in Section 9.

The COM transmitter is activated by a push-to-talk button, integrated into each control column. The microphone and headphone jacks are located in the rear section of the centre pedestal between the seats.

Operating instructions for COM/NAV equipment are supplied in Section 9.

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POH
AQUILA AT01-200A

Section 7
AIRCRAFT DESCRIPTION

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SECTION 8

HANDLING, SERVICE & MAINTENANCE

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8.1 INTRODUCTION

Section 8 contains factory recommended procedures for correct ground handling as well as information regarding care and servicing of the aircraft. Furthermore, it includes requirements which must be adhered to during inspection as well as during maintenance and when modifications and repairs are carried out.

8.2 AIRCRAFT INSPECTION PERIODS

The required inspection items are listed and described in the Maintenance Manual (Document number MM-AT01-1020-110), the Operation Manual of the ROTAX® type 914 engine series and the Operation and Installation Manual of the propeller.

CAUTION

If the engine is operated extensively on AVGAS 100LL (more than 30 hrs within 100 hrs) the interval between oil changes shall be reduced to 50 hrs.

8.3 MODIFICATIONS AND REPAIRS

Changes to the aircraft are only permissible with the approval of the competent Aviation Authority to ensure that the airworthiness of the aircraft is not adversely affected.

All maintenance and repair work must be accomplished in accordance with the instructions contained in the current issue of the Maintenance Manual.

Prior to major repairs and in situations where the cause of damage to the aircraft is unknown, the aircraft manufacturer or TC holder should be contacted.

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8.4 GROUND HANDLING

8.4.1 Towing

8.4.1.1 Moving forwards

The aircraft can be safely moved and controlled by one person on a smooth and level surface with the tow bar attached to the nose wheel.

CAUTION

The tow bar should always be removed from the aircraft when it is parked.

8.4.1.2 Moving backwards

The aircraft should be pushed backwards using the tow bar. If needed, it is possible to push on the propeller near the blade root. It is also possible to push on the leading edge of the wing near the fuselage.

8.4.1.3 Turning the aircraft on the ground

To turn tightly, push down on the fuselage in front of the vertical stabilizer to raise the nose wheel off the ground. Now the aircraft can be pivoted around the main landing gear.

CAUTION

- 1) *Never push, pull or lift on the horizontal stabilizer or the spinner!*
- 2) *Never push or lift the control surfaces and flaps!*

8.4.2 Parking

For short-term parking, align the aircraft into the wind, retract the flaps, set the parking brakes and chock the main wheels.

When parking the aircraft outside for longer periods or in unforeseeable weather conditions, the aircraft should be tied down as described in section 8.4.3.

Furthermore, cover the pitot-static tube and the stall warning, close the canopy, use a canopy cover and cap the openings in the cowling. To avoid damage to the aircraft and its control surfaces due to gusts or strong winds, secure the control column by pulling it to the control stop and securing it with the waist belt and tightening the straps.

It is, none the less, always recommended to hangar the aircraft.

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CAUTION

Temperatures higher than 50°C in the cockpit may damage avionics and instruments. When parked in the sun, use a canopy cover to keep the cockpit cool.

8.4.3 Tie-Down

The aircraft has three tie-down points; two are located on the lower surface of the wings in the outboard section (fitted with M 8 threads) and the third is located on the lower fin. The tie-down points are marked by red circles.

It is recommended to always carry the eye-bolts delivered with the aircraft and suitable tie-down ropes in the aircraft. The tie-down points should be covered with tape while flying to keep them clean.

8.4.4 Jacking

Two conical jacking points are located on the lower surface of the wing, at the wing root ribs. Both of these jacking points are marked with a red ring. The tail of the aircraft can be supported on the skid plate under the vertical stabilizer. A tail stand may be placed under the skid plate and attached to the tail tie-down point with a fastener.

The nose wheel may be lifted off the ground for maintenance or inspection by weighing the tail down. The weight is best attached at the tail tie-down point.

8.5 CLEANING AND CARE**CAUTION**

Any contamination on the surface of the aircraft deteriorates flight performance and handling qualities.

The stall warning (metal plate on the wing leading edge) is sensitive to excessive amounts of water. Care should be taken when washing the wings near the stall warning.

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8.5.1 Painted Surfaces

To maintain the excellent flight performance and handling qualities of the AQUILA AT01-200 the aircraft must be kept clean and free of damage. Therefore it is recommended to regularly clean the aircraft, paying close attention to the leading edges of the wings and stabilizers.

8.5.1.1 Washing

The aircraft should be washed regularly, using plenty of water, a clean sponge and chamois leather. Severe contamination and dirt, especially insects, should be washed off immediately after every flight, as it is more difficult to remove them when dried.

Only use a mild detergent in cases where the dirt proves very hard to remove. Care should be taken because even a mild detergent will gradually wash away the protective wax coating.

Oil or grease can be removed using a cloth moistened with petroleum. Commercially available aircraft cleaning agents may also be used if they are grease-soluble.

8.5.1.2 Preservation

The aircraft exterior surface is protected with a durable and resistant automotive finish. To retain its protective characteristics, minor damages to the paint should be repaired as soon as practical and the exterior surface of the aircraft waxed one to three times per year using a good **silicone-free automotive hard wax**.

CAUTION

Only silicone-free cleaning and polishing agents may be used.

8.5.2 Canopy

Since acrylic glass can be easily scratched, the same principles apply as for cleaning painted surfaces. The canopy should be cleaned using plenty of water, a soft clean sponge and chamois leather.

Special, commercially available, acrylic glass cleaners can be used to tackle stubborn contamination and dirt. **Never use solvents or thinner to clean the canopy glass.**

Minor scratches may be polished using special acrylic glass polishing pastes that are commercially available. Always follow the manufacturer's instruction to ensure the desired results.

The inside of the canopy may be treated in the same way.

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8.5.3 Propeller

Refer to current issue of the Operating and Installation Manual, E-124, from mt-propeller.

8.5.4 Engine

Refer to current issue of the Operator's Manual for the ROTAX® 914 series engine.

8.5.5 Interior Cleaning

Dust and dirt in the interior of the aircraft should be removed using a vacuum cleaner. Prior to cleaning, loose objects and foreign objects should be removed or properly stowed.

The floor carpets may be removed for cleaning. They can be cleaned in the same manner as house-hold carpets or they may be professionally cleaned.

Use a lint-free, moist cloth to clean plastic surfaces such as the instrument panel cover.

The instruments may be cleaned with a dry and soft cloth.

8.6 GROUND DE-ICING

Approved de-icing fluids are:

Brand	Name
„Kilfrost“	TKS 80
„Aeroshell“	Compound 07
any source	AL-5 (DTD 406B)

Procedure:

1. Remove any snow from the airplane with a soft brush.
2. Spray de-icing fluid onto ice-covered surfaces using a suitable spray bottle.
3. Use a soft piece of cloth to wipe the airplane dry.

CAUTION

Never use de-icing fluids on the acrylic glass of the canopy!

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SECTION 9

SUPPLEMENTS

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9.1 INTRODUCTION

In this section, all equipment that is optionally installed in your aircraft is described by the POH-Supplements. Each supplement describes a complete modification or a piece of installed equipment. Only the supplements that apply to the configuration of your aircraft must be contained in this section.

Section 9.2 “Index of Supplements” lists all existing approved supplements for the AQUILA AT01. This table may be also used as a directory for this section, adapted to your aircraft.

If modifications requiring an STC have been conducted on your aircraft at a Maintenance Organization other than AQUILA Aviation, it is the owner's responsibility to ensure that the appropriate supplements are included in this manual and properly recorded in the index of supplements in section 9.2.

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9.2 INDEX OF SUPPLEMENTS

Registration:

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Supplement No.	Title	Installed
AST-00	Winter Operation	variable
AST-01	Night VFR (AT01-200C)	
AST-02	Increase of permissible Gross Weight to 800kg	
AST-03	Garmin G3X PFD/MFD/EIS (AT01-200A)	
AST-04	Night VFR (AT01-200A)	
AS-09	Garmin GTN 650(Xi)	
AS-10	Garmin GMA 350(c)	
AS-11	ELT – Kannad 406	
AS-14	Trig TT22	
AS-17	Garmin GTR 225/225A/225B	
AS-18	Garmin GNC 255A/255B	
AS-19	Garmin GMA 340	
AS-21	Garmin GTX 335 / 345	
AS-22	Garmin G5 Stby AI	
AS-24	Traffic Sensor AT-1	
AS-27	Autopilot (restricted) Garmin GFC500 (AT01-200C)	
AS-28	Autopilot (restricted) Garmin G3X (AT01-200A)	

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SECTION 9

Pilot's Operating Handbook Supplement AST-04

VFR-DAY and VFR-NIGHT operation

This POH supplement is applicable and must be inserted into Section 9 of the Pilot's Operating Handbook when the AQUILA AT01-200A is equipped for Day- and Night-VFR.

Section 1, 2 and 3 of the basic POH must be completely replaced by the section 1, 2 and 3 of this supplement.

The information in this supplement adds to or replaces information in the basic POH.

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

27.07.2022
Date, Signature Office of Airworthiness

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0.1 RECORD OF REVISIONS

Issue	Reason for Change	Effected Pages	Date of Issue
A.01	Initial Issue (EASA 10081832)	All	27.07.2022

0.2 LIST OF CURRENT PAGES

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