Diamond AIRCRAFT

FLIGHT MANUAL
for the Powered Sailplane
HK 36 TC
with ROTAX 912 S3

Engine	:	**Rotax 912 S3**
Model	:	**HK 36 TC**
Serial No.	:	_____
TC Data Sheet No.	:	**SF 3/82**
Date of Issue	:	**January 9th, 2002**
Doc. No.	:	**3.01.12-E**

Signature	:	
Certification Manager	:	AUSTRO CONTROL GmbH Abteilung Flugtechnik Zentrale
Stamp	:	A-1030 Wien, Schnirchgasse 11
Original date of approval	:	30. MRZ. 2004

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This powered sailplane must be operated in compliance with the information and limitations contained herein. Prior to operating the powered sailplane, the pilot must take notice of all the information contained in this Flight Manual.

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

0.1 PREFACE

Congratulations on your choice of the HK 36 TC powered sailplane.

Skillful operation of a powered sailplane will ensure your safety and provide you with hours of enjoyment. Therefore, you should take the time to get familiar with your new HK 36 TC.

We ask you to read this manual thoroughly and to pay attention to the recommendations given in it. If you do, you can expect many hours of incident-free flight operation from your powered sailplane.

Translation of this Flight Manual has been done by best knowledge and judgement. In any case, the original document in the German language (Doc. No. 3.01.12) is authoritative.

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0.2 RECORD OF REVISIONS

Any revision of the present manual, except current weighing data, must be recorded in the following table and in the case of approved sections endorsed by Austro Control GmbH (ACG).

The new or amended text in the revised page will be indicated by a black vertical line in the left hand margin, and the Revision No. and the date will be shown on the bottom of the page.

In the event that you have obtained your HK 36 TC second-hand, please let us know your address, so that we can supply you with the publications necessary for the safe operation of your powered sailplane.

Rev. No.	Reason	Chapter	Page(s)	Date of Revision	EASA Approval No.	ACG verification	Date Inserted	Signature
1	FAA requirements	all	all	Oct 06, 2003	2004-3363	30. MRZ. 2004		

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0.4 TABLE OF CONTENTS

CHAPTER 1
GENERAL

Page

1.1 INTRODUCTION

% This Powered Sailplane Flight Manual has been prepared to provide pilots and instructors with all the information that is necessary for the safe and efficient operation of the powered sailplane.

This manual includes the material required to be furnished to the pilot by JAR-22. It also contains supplementary data supplied by the powered sailplane manufacturer.

% This Flight Manual conforms to the current version of the customer's powered sail-
% plane. However, any optional equipment (COM, NAV, etc.) is not considered. For their operation, the operation manuals of the respective manufacturers must be followed.

% This must always be kept onboard the powered sailplane.

1.2 CERTIFICATION BASIS

The HK 36 TC powered sailplane with Rotax 912 S engine has been type certified by Austro Control GmbH (ACG) in accordance with Change 5 of JAR-22 for sailplanes and powered sailplanes as a derivative of the HK 36 TC. The Type Certificate Data Sheet No. SF 3/82 has been amended.

Category of Airworthiness: Utility.

1.3 WARNINGS, CAUTIONS AND NOTES

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

WARNING

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

CAUTION

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

NOTE

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

1.4 EXPLANATIONS AND ABBREVIATIONS

a) Airspeeds

IAS — Indicated Airspeed. Airspeed read on airspeed indicator without any correction of errors.

CAS — Calibrated Airspeed. Indicated airspeed, corrected for installation and instrument errors.

% TAS — True Airspeed. The speed of the powered sailplane relative to the air. TAS is CAS corrected for errors due to altitude and temperature.

b) Meteorological terms

Pressure altitude — Altitude indicated by the altimeter when the subscale is set to 1013.25 hPa or 29.92 inHg.

c) Flight performance

Take-off roll — Distance between the start of the take-off run and the lift-off point.

Take-off distance — Distance between the start of the take-off run and the point
% above which the powered sailplane is able to clear a 15 m (50 ft) ob-stacle.

Service ceiling — Maximum altitude that can be reached with a climb rate of at least 0.5 m/s (100 fpm).

c) Mass and balance

Non-lifting parts	Fuselage, rudder, horizontal tail surfaces and useful load
Useful load	Occupants, baggage and fuel

d) Miscellaneous

ACL	Anti Collision Light (Strobe Light)
AGL	Above Ground Level
CG	Center of Gravity
ELT	Emergency Locator Transmitter
GFRP	Glass fiber reinforced plastic
CFRP	Carbon fiber reinforced plastic
ACG	Austro Control GmbH (formerly Bundesamt für Zivilluftfahrt, BAZ)
MÄM	Mandatory Design Change Advisory
OÄM	Optional Design Change Advisory

1.5 UNITS OF MEASUREMENT

Dimension	SI Units		US Units		Conversions
Length	[mm]	millimeters	[in]	inches	[mm] / 25.4 = [in]
	[m]	meters	[ft]	feet	[m] / 0.3048 = [ft]
	[km]	kilometers	[NM]	nautical miles	[km] / 1.852 = [NM]
Volume	[l]	liters	[US gal]	US gallons	[l] / 3.7854 = [US gal]
			[qts]	US quarts	[l] / 0.9464 = [qts]
Speed	[km/h]	kilometers per hour	[kts]	knots	[km/h] / 1.852 = [kts]
			[mph]	miles per hour	[km/h] / 1.609 = [mph]
	[m/s]	meters per second	[fpm]	feet per minute	[m/s] x 196.85 = [fpm]
Speed of rotation	[RPM]	revolutions per minute			--
Mass	[kg]	kilograms	[lb]	pounds	[kg] x 2.2046 = [lb]
Force, weight	[N]	newtons	[lbf]	pounds force	[N] x 0.2248 = [lbf]
Pressure	[hPa]	hecto-pascal	[inHg]	inches of mercury	[hPa] = [mbar]
	[mbar]	millibar	[psi]	pounds per square inch	[hPa] / 33.86 = [inHg]
	[bar]	bar			[bar] x 14.504 = [psi]
Temperature	[°C]	degrees Celsius	[°F]	degrees Fahrenheit	[°C]x1.8 + 32 = [°F]
					([°F] - 32)/1.8 = [°C]
Intensity of electric current	[A]	ampères			--
Electric charge (battery capacity)	[Ah]	ampère-hours			--
Electric potential	[V]	volts			--

1.6 DESCRIPTIVE DATA

The HK 36 TC is a two-seated powered sailplane in fiber-composite structure, designed in compliance with JAR-22; Category of Airworthiness: Utility.

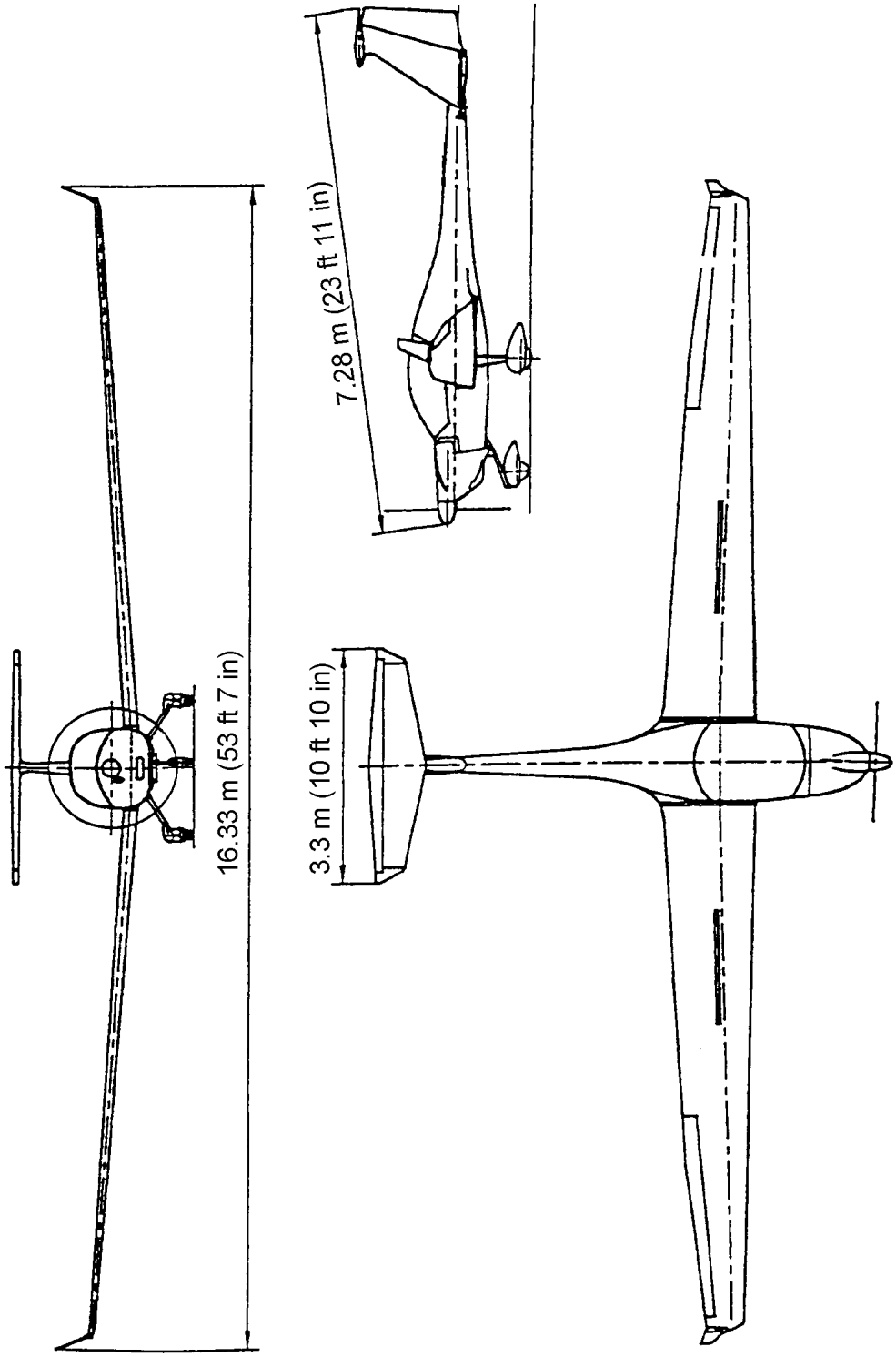
% It is a low wing powered sailplane with T-tail, side-by-side seating configuration, tricycle landing gear and Schempp-Hirth type air brakes in the upper surface of the wings.

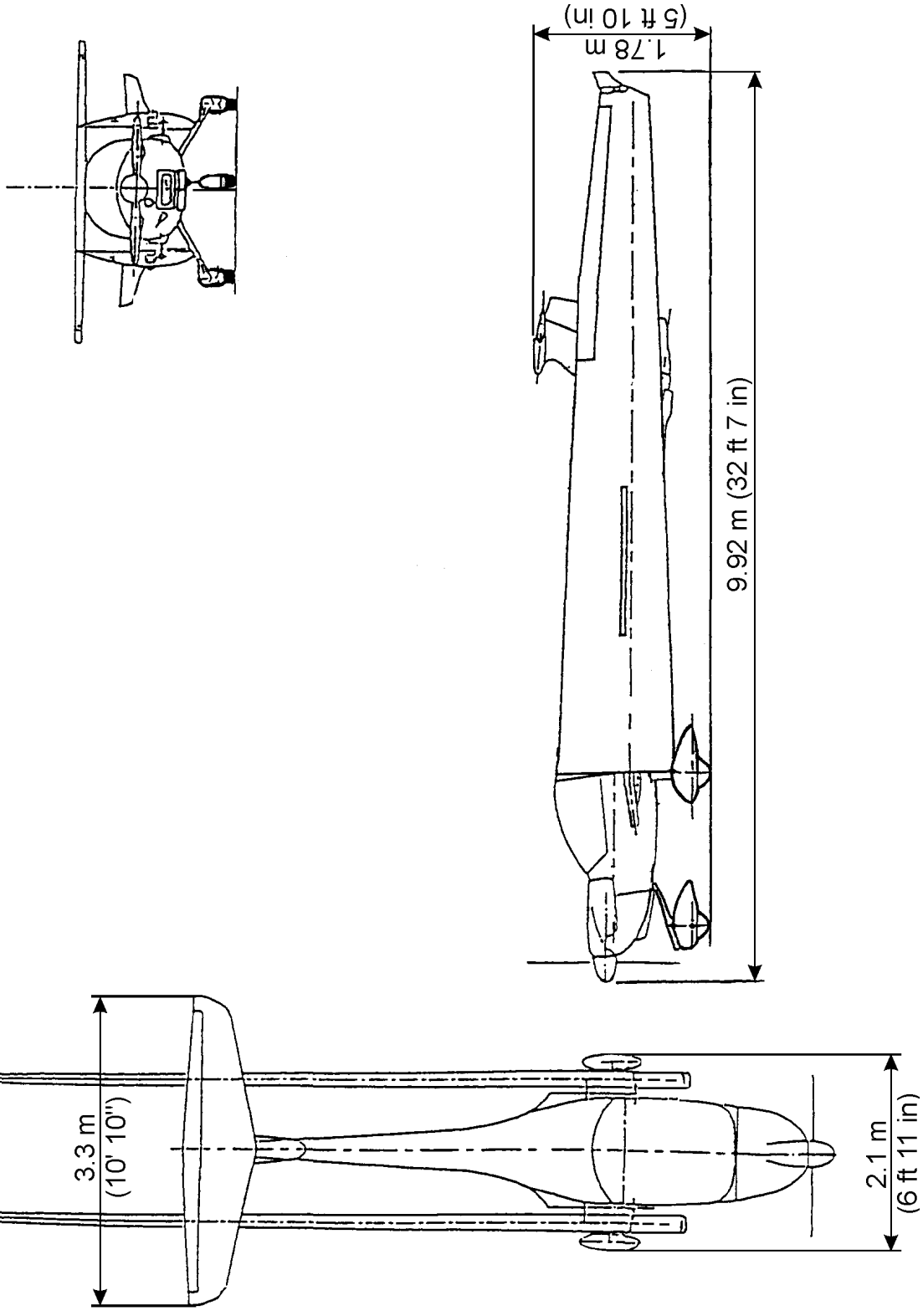
% In order to enable a fast disassembly and a space-saving storage the powered sail-
% plane can be furnished with a wing folding mechanism.

The power plant is a Rotax R 912 S3 engine with an mt-Propeller hydro-mechanically variable pitch propeller, type MTV-21-A-C-F/CF175-05.

Span (with winglets)	16.33 m	53 ft 7 in
Length	7.28 m	23 ft 11 in
Height	1.78 m	5 ft 10 in
MAC	1.004 m	3 ft $3^{1}/_{2}$ in
Wing area	15.30 m²	165 sq.ft
Max. wing loading	50.30 kg/m²	10.3 lb/sq.ft
Aspect ratio	17.11	
Airfoil	Wortmann FX 63-137	

1.7 THREE-VIEW DRAWINGS




1.78 m
(5 ft 10 in)
9.92 m (32 ft 7 in)
3.3 m
(10' 10")
2.1 m
(6 ft 11 in)

CHAPTER 2
OPERATING LIMITATIONS

2.1 INTRODUCTION

Chapter 2 includes operating limitations, instrument markings, and basic placards necessary for the safe operation of the powered sailplane, its engine, standard systems and standard equipment.

The limitations included in this chapter and in Chapter 9 have been approved by Austro Control GmbH (ACG).

WARNING

All operation values must be kept within the limits stated herein during flight.

2.2 AIRSPEED

NOTE

The airspeeds shown below must be understood as IAS.

2.2.1 AIRSPEED LIMITATIONS

Airspeed limitations and their operational significance are shown below:

	Airspeed	IAS			Remarks
		km/h	kts	mph	
v_{NE}	Never exceed speed	261	141	162	Do not exceed this speed in any operation and do not use more than 1/3 of control deflection.
v_{RA}	Rough air speed	210	113	130	Do not exceed this speed except in smooth air, and then only with caution. Examples of rough air are lee-wave rotors, thunderclouds, etc.
v_A	Maneuvering speed	176	95	109	Do not make full or abrupt control movements above this speed, as the powered sailplane structure could be overstressed by full control movement.
v_{ABF}	Maximum admissible speed with air brakes fixed in half-extended position	150	81	93	Above this speed the air brakes can be extended inadvertently over the half-extended position by aerodynamic forces.

The WARNINGS on the following page must be complied with.

WARNING

% In order to ensure the flutter safety of the powered sail-
% plane, the never exceed speed v_{NE} (IAS) is reduced at pressure altitudes above 2000 meters or 6500 ft (see Paragraph 4.5.7 HIGH ALTITUDE FLIGHT).

WARNING

% At speeds beyond the rough air speed v_{RA} the powered
% sailplane may be overstressed by heavy gusts (lee-wave rotors, thunderclouds, whirlwinds and turbulence at close range to mountain ridges).

WARNING

The maneuvering speed stated on the previous page ap-
% plies to the maximum T/O mass of 770 kg (1698 lb). De-
% pending on the flight mass, the following limits must be complied with:

T/O mass		Maneuvering speed v_A		
kg	lb	km/h	kts	mph
% 770	1698	176	95	109
700	1543	168	91	104
650	1433	162	87	101
600	1323	155	84	96

WARNING

These speeds are not marked on the airspeed indicator. Simultaneous full deflection of elevator and rudder can
% overstress the powered sailplane even at speeds below the maneuvering speed v_A.

2.2.2 MISCELLANEOUS AIRSPEEDS

	Airspeed		IAS km/h	IAS kts	IAS mph	Remarks
%	v_y	Best rate-of-climb speed	110	59	68	At this airspeed, the powered sailplane climbs with the maximum possible *rate* of climb. This airspeed is marked on the air-speed indicator with a blue radial line.
%	v_x	Best angle-of-climb speed	95	51	59	At this airspeed, the powered sailplane climbs with the maximum possible *angle* of climb. This airspeed is not marked on the airspeed indicator.
		Recommended lowest approach speed	105	57	65	See NOTE below.

NOTE

Conditions such as strong headwind, danger of wind shear, turbulence, or wet wings require a higher approach speed.

Stalling speeds

see Paragraph 5.2.2 STALLING SPEEDS.

2.3 AIRSPEED INDICATOR MARKINGS

Airspeed indicator markings and their color-code significance are shown below:

Marking	Value or Range (IAS)			Significance
	km/h	kts	mph	
green arc	86 - 210	46 - 113	53 - 130	Normal operating range. Lower limit is 1.1 v_{S1} at max. flight mass and most forward CG. Upper limit is rough air speed v_{RA}.
yellow arc	210 - 261	113 - 141	130 - 162	Caution range, rough air speed v_{RA} to never exceed speed v_{NE}. Maneuvers must be conducted with caution and only in smooth air.
red line	261	141	162	Maximum speed for all operations, never exceed speed v_{NE}.
blue line	110	59	68	Best rate-of-climb speed v_y.
yellow triangle	105	57	65	Approach speed at max. flight mass.

% 2.4 POWER-PLANT, FUEL AND OIL

2.4.1 ENGINE

Engine manufacturer . . . . . Bombardier Rotax, Gunskirchen, Austria
Engine . . . . . Rotax 912 S3

NOTE

The engine drives the propeller through a speed-reducing gear with a gear ratio of 2.43:1. The RPM indicator of the
% powered sailplane indicates the propeller RPM. Consequently, all RPM's given in this manual are propeller RPM's (in contrast to the engine manual).

Max. T/O power (5 minutes) . . . . . 73.5 kW / 100 DIN-hp
Max. T/O RPM . . . . . 2385 RPM

Max. continuous power . . . . . 69 kW / 94 DIN-hp
Max. continuous RPM . . . . . 2260 RPM

Idle RPM . . . . . 600 - 800 RPM

Power check RPM . . . . . 2330 ± 50 RPM

Maximum Cylinder Head
% Temperature . . . . . 135 EC (275 °F)

% **2.4.2 ENGINE OIL**

% Oil temperature

% Minimum Oil Temperature . . . . . 50 EC (122 °F)
% Maximum Oil Temperature . . . . . 130 EC (266°F)

% Oil pressure

% Minimum oil pressure . . . . . 0.8 bar (12 psi)
% Maximum oil pressure . . . . . 7 bar (102 psi)
(short-term, in the event of cold start)

% Normal oil pressure range . . . . . 2 to 5 bar (29 to 73 psi)

% Oil quantity

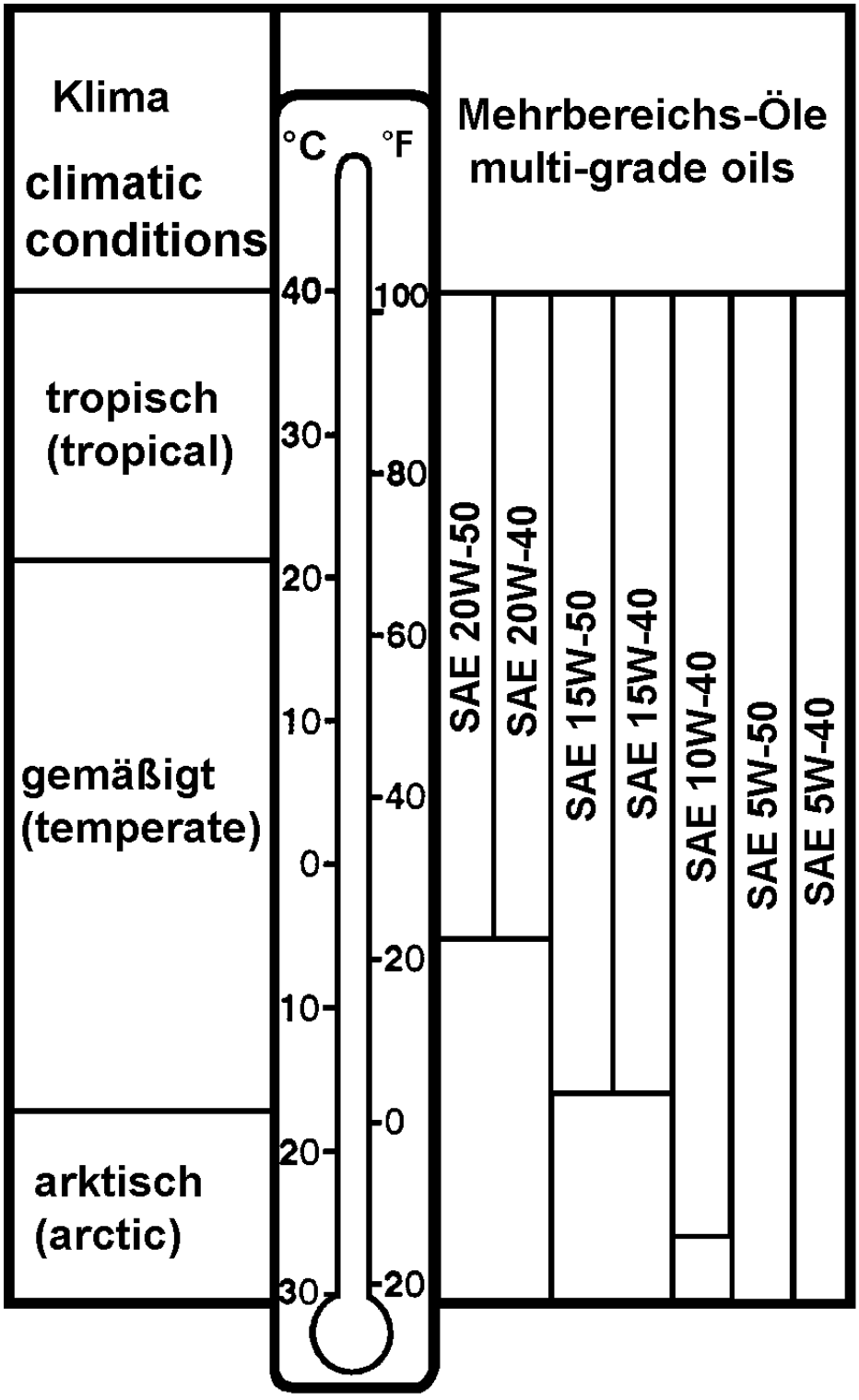
Minimum oil quantity . . . . . 2.0 liters (2.1 US qts)
Maximum oil quantity . . . . . 3.0 liters (3.2 US qts)

% Approved oil grades

Use only motorcycle oils of a registered brand with gear additives and with API classifi-
% cation "SF" or "SG". The viscosity should be selected according to the table shown on
% the following page.

CAUTION

Do not use Aviation Grade oil!


Klima
climatic conditions
Mehrbereichs-Öle
multi-grade oils
°C
°F
tropisch
(tropical)
gemäßigt
(temperate)
arktisch
(arctic)
40
30
20
10
0
10
20
30
100
80
60
40
20
0
20
SAE 20W-50
SAE 20W-40
SAE 15W-50
SAE 15W-40
SAE 10W-40
SAE 5W-50
SAE 5W-40

% **2.4.3 FUEL**

% Fuel capacity

% Standard tank . . . . . 55 liters (14.5 US gal)
% Long range tank . . . . . 79 liters (20.9 US gal)

% Usable fuel

% Standard tank . . . . . 54 liters (14.3 US gal)
% Long range tank . . . . . 77 liters (20.3 US gal)

% Approved fuel grades

% a) AVGAS 100LL

% b) Automotive fuel, min. RON 95: EN 228 Super,
% EN 228 Super Plus
%
% **NOTE**

% Due to its high lead concentration, AVGAS causes in-
% creased wear of the valve seats and produces more resi-
% due in the combustion chambers. It should therefore only
% be used at high ambient temperatures (to prevent vapor
% lock) or when other fuel grades are not available.

2.4.4 PROPELLER

Propeller manufacturer . . . . . mt-Propeller, Straubing, Germany

Propeller . . . . . hydro-mechanically variable pitch propeller MTV-21-A-C-F/CF175-05, pitch angles see Section 7.9 POWER PLANT.

2.5 POWER-PLANT INSTRUMENT MARKINGS

Power-plant instrument markings and their color-code signification are shown below:

Instrument	Red Line = Minimum Limit	Green Arc = Normal Operating Range	Yellow Arc = Caution Range	Red Line = Maximum Limit
RPM indicator	-	600-2260 RPM	2260-2385 RPM	2385 RPM
% Oil temperature indicator	50 °C 122 °F	50-130 °C 122-266 °F	-	130 °C 266 °F
% Cylinder head temperature indicator	-	-	-	135 °C 275 °F
% Oil pressure indicator %	0.8 bar 11.6 psi	2 - 5 bar 29 psi - 72.5 psi	0.8 - 2 bar, 5 - 7 bar 11.6 - 29 psi, 72.5 - 101.5 psi	7 bar 101.5 psi
Fuel quantity indicator	-	-	-	-

2.6 MASS (WEIGHT)

Maximum take-off mass . . . . . 770 kg (1698 lb)

Maximum landing mass . . . . . 770 kg (1698 lb)

Maximum mass of all non-lifting parts . 610 kg (1345 lb)

Maximum mass in baggage compartment . . . . . 12 kg (26 lb)

Maximum useful load (including fuel) . see Mass & Balance Form, page 6-5 f

Maximum useful load on right seat . . . 110 kg (243 lb)

Maximum useful load on left seat . . . . 110 kg (243 lb)

WARNING

% Any exceeding of the mass limits can lead to overstressing of the powered sailplane and to a degradation of flying characteristics and flight performance.

2.7 CENTER OF GRAVITY

The datum plane for the center of gravity (CG) specifications lies perpendicular to the center axis of the conical fuselage tube. It contacts the wing leading edge at the root rib to define its position in longitudinal direction. Procedures for a horizontal alignment and empty mass CG specifications can be found in the Airplane Maintenance Manual (Doc. No. 3.02.21), Section 4.

The permissible flight CG range is:

Maximum forward CG . . . . . 318 mm (12.52 in) aft of datum plane
Maximum rearward CG . . . . . 430 mm (16.93 in) aft of datum plane

WARNING

% A flight CG which lies outside the permissible range deteriorates the controllability and stability of the powered sailplane.

The procedure for determining the CG position is included in Chapter 6.

2.8 APPROVED MANEUVERS

This powered sailplane is certified in the Utility category.

NOTE

% Aerobatics and spins are forbidden!

2.9 MANEUVERING LOAD FACTORS

Table of maximum permissible load factors:

	at v_A	at v_{NE}	with air brakes extended
positive	5.30	4.00	3.50
negative	-2.65	-1.50	0.00

WARNING

Exceeding the maximum permissible load factors can over-
% stress the powered sailplane.

2.10 FLIGHT CREW

Solo flights must be conducted from the left seat.

2.11 KINDS OF OPERATION

The powered sailplane is certified for DAY-VFR operation. Night VFR operation, if permitted by the competent authority, requires additional equipment in accordance with national regulations.

IFR, flights in clouds, flights into known icing conditions and aerobatics are forbidden.

2.12 MINIMUM EQUIPMENT LIST

Minimum equipment (VFR operation)

1 Altimeter
1 Airspeed indicator
1 Magnetic compass
1 Deviation table
1 RPM indicator
1 Running time meter
1 Manifold pressure indicator
1 Oil pressure indicator
1 Oil temperature indicator
1 Cylinder head temperature indicator
1 Fuel quantity indicator
1 Ammeter
1 Fuel pressure warning light

NOTE

A current list of installed equipment (minimum and additional equipment) is provided in the Equipment Inventory which is filed in the Airplane Maintenance Log.

2.13 AEROTOW, WINCH AND AUTO-TOW LAUNCHING

The powered sailplane is designed for self-take-off only.

2.14 OTHER LIMITATIONS

Limitations for soaring when using a battery with a capacity of 18 ampère-hours

The capacity of the lead accumulator is highly dependent on the temperature. Therefore, the duration of continuous soaring at low ambient temperatures is restricted to:

4 hours at 0 °C (32 °F) and
2 hours at -10 °C (14 °F),

good maintenance condition and charge of the battery provided. Average current requirement: 0.3 ampères.

Limitations with 30 ampère-hours battery

No limitations.

2.15 LIMITATION PLACARDS

Placard	Location	Remark
Maneuvering speed at max. gross weight v_A = 176 km/h Min. useful load on the seats, full tank, no baggage [redacted] Min. useful load on the seats, full tank, 12 kg (26 lb) baggage [redacted] Maximum permissible useful load [redacted]	instrument panel or LH canopy frame	if airspeed indicator is calibrated in [kts]: v_A = 95 kts
WARNING Use air brake fixture (hands off) only up to **150 km/h**! A/B may extend beyond fixture at higher speeds.	instrument panel or LH canopy frame	if airspeed indicator is calibrated in [kts]: 81 kts

Placard	Location	Remark
This powered sailplane must be operated as a utility category powered sailplane in compliance with the operating limitations as stated in the form of placards, markings, and manuals. MANEUVERING SPEEDS: at 1698 lb : 95 KIAS; at 1543 lb : 91 KIAS; at 1433 lb : 87 KIAS; at 1323 lb : 84 KIAS MAX. GROSS WEIGHT: 1698 lb MAX. FLIGHT LOAD FACTORS: +5.3 / -2.65 No acrobatic maneuvers, including spin, approved. Altitude loss in a stall recovery: 65 ft. Flight into known icing conditions prohibited. This powered sailplane is certified for the following flight operations as of date of original airworthiness certificate: DAY-VFR.		
	LH canopy frame	required for U.S. registered Serial Nos. only
Altitude [m] / [ft] — v_{NE} (IAS) [km/h] / [kts] / [mph]: - 2000 / - 6500 — 261 / 141 / 162 - 3000 / - 9800 — 246 / 133 / 153 - 4000 / - 13100 — 233 / 126 / 145 - 5000 / - 16400 — 221 / 119 / 137 - 6000 / - 19600 — 210 / 113 / 130	instrument panel or LH canopy frame	
Aerobatics and Spins are forbidden!	instrument panel or LH canopy frame	
GPS not approved for primary navigation.	instrument panel	optional
Landing Light and Position Lights may only be used for 10 % of engine operating time.	instrument panel	optional
No smoking	instrument panel	
Tie baggage down, max. 12 kg (26 lb).	rearward side of baggage compartment	

CHAPTER 3
EMERGENCY PROCEDURES

Page

3.1 INTRODUCTION

This chapter provides checklists and recommended procedures for coping with emergencies that may occur.

Since it is impossible to foresee all kinds of emergencies and consider them in the % Flight Manual, it is absolutely necessary for the pilot to know the powered sailplane and to have knowledge and experience in solving problems that may occur.

3.2 CANOPY JETTISON

1. Red canopy locks (LH and RH) . . . . . swing 180° rearward
2. Canopy . . . . . push up and rearward with both hands

3.3 BAILING OUT

1. Canopy . . . . . jettison
2. Seat harness . . . . . release
% 3. Evacuate powered sailplane

CAUTION

When using a manual parachute, wait two seconds after % exiting the powered sailplane before pulling the release cord.

3.4 STALL RECOVERY

Behavior with power off

Under all loading conditions, air brakes extended or retracted, in straight and level or in
% banked flight, the powered sailplane enters a horizontal stall, during which the ailerons remain effective, even with maximum elevator deflection.

A partial loss of positive control in the stick and pedals, buffeting, and a pitch angle of 20° to 30° occur during this condition.

NOTE

During the horizontal stall, the airspeed indication rises to approximately 85 km/h (46 kts / 53 mph).

Behavior with power on

See behavior with power off. Exception: at 50 % to 100 % power, straight and level
% flight, and maximum rearward center of gravity, the powered sailplane may perform a stall dive over the left or right wing after entering the horizontal stall if the control stick is pulled even further.

Recovery

The horizontal stall can be terminated immediately by relaxing the force on the elevator control.

NOTE

% If the powered sailplane performs a stall dive, immediately
% relax the force on the elevator control and pull out the pow-
% ered sailplane smoothly. If the stick is pulled further, the
% powered sailplane may start to spin.

Altitude loss resulting from stationary horizontal stall described above: approx. 10 - 20 m (33 - 65 ft). Altitude loss resulting from stall dive over a wing: approx. 40 m (130 ft).

3.5 SPIN RECOVERY

1. Rudder . . . . . apply fully opposite to spin direction
   Elevator . . . . . control stick forward
   Ailerons . . . . . neutral

After spin movement has terminated:

% 2. Bring rudder in neutral position, pull powered sailplane out smoothly

3.6 SPIRAL DIVE RECOVERY

There is no tendency to a spiral dive.

The standard recovery procedure is:

1. Rudder . . . . . apply fully opposite to spiral dive rotation
2. Ailerons . . . . . apply fully opposite to spiral dive rotation

% 3. Pull powered sailplane out smoothly

3.7 ENGINE FAILURE

3.7.1 ENGINE FAILURE DURING TAKE-OFF

1. Fuel valve . . . . . check OPEN
2. Electric fuel pump . . . . . check ON
3. Propeller speed control . . . . . TAKE-OFF
4. Ignition switch . . . . . BOTH
5. Choke . . . . . OFF

WARNING

If the symptoms cannot be eliminated immediately and the engine refuses to deliver enough power, then a straight-in landing must be performed if below 80 m (260 ft) AGL.

before touchdown:

Fuel valve . . . . . CLOSED
Ignition switch . . . . . OFF
Master switch . . . . . OFF

3.7.2 ENGINE RESTART WITH A DISCHARGED BATTERY (DURING FLIGHT)

1.	Electrical equipment	OFF
2.	Fuel valve	OPEN
3.	Master switch	ON
4.	Mode select switch	POWER FLIGHT
5.	Choke	as required
6.	Throttle control	IDLE
7.	Ignition switch	BOTH
8.	Airspeed	increase to 160 to 180 km/h (86 to 97 kts / 99 to112 mph)
9.	Propeller speed control	slowly move from FEATHER to TAKE-OFF
10.	Oil pressure	must be available within 10 seconds
11.	Choke	as required
12.	RPM and throttle	as required

CAUTION

After prolonged soaring periods, adequate altitude reserve must be ensured for engine warm-up.

13.	Electrical equipment	as required

14. Continue flight normally
15. Determine reason for battery discharge

CAUTION

The engine is started due to windmilling. Because of the high airspeed required for this process, an altitude loss of up to 300 m (1000 ft) must be expected. The airspeed limitations must not be exceeded.

3.7.3 PROPELLER REMAINS IN FEATHERED POSITION

NOTE

The propeller requires hydraulic pressure for pitch *reduction*. The hydraulic pressure is supplied by a pressure accumulator. If this accumulator is empty, pressure must be built up by the oil pump of the engine. The engine is started with the propeller in feathered pitch and the throttle control in IDLE position.

1.	Electrical equipment	OFF
2.	Fuel valve	OPEN
3.	Master switch	ON
4.	Mode select switch	POWER FLIGHT
5.	Caution light for coolant level	illuminates for approximately 3 seconds and extinguishes
6.	Electric fuel pump	ON; Check whether the red warning light extinguishes after build-up of fuel pressure
7.	Choke	as required
8.	Throttle control	IDLE
9.	Ignition switch	BOTH
10.	Propeller speed control	TAKE-OFF
11.	Ignition switch	turn clockwise to start engine until propeller is in the working position

CAUTION

It is possible to start the engine with the propeller in the feathered position, this however increases engine wear.

12. Oil pressure . . . . . must be available within 10 seconds
13. Choke . . . . . as required
14. RPM and throttle . . . . . as required
15. Electric fuel pump . . . . . OFF
16. Electrical equipment . . . . . as required
17. Continue flight normally
18. After landing, determine the reason for the loss of pressure in the oil pressure accumulator and correct the fault.

3.7.4 ENGINE FAILURE DURING CRUISE

1. Fuel valve . . . . . check OPEN
2. Electric fuel pump . . . . . ON
3. Choke . . . . . check OFF
4. Carburetor heat . . . . . ON at outside temperatures below 10 °C (50 °F)
5. Ignition switch . . . . . check BOTH
6. Fuel quantity indicator . . . . . check

NOTE

If the symptoms cannot be eliminated and the engine refuses to deliver enough power, proceed as follows:

1. Throttle control . . . . . IDLE
2. Ignition switch . . . . . OFF
3. Propeller speed control . . . . . FEATHER
4. Fuel valve . . . . . CLOSED
5. Master switch . . . . . OFF
6. Airspeed . . . . . for best glide ratio
   (105 km/h)
   (57 kts / 65 mph)
7. Look for a suitable landing field
8. Cowl flap . . . . . CLOSED

3.7.5 CARBURETOR ICING

NOTE

Carburetor icing can be recognized by a drop in the engine RPM and/or loss of manifold pressure and/or irregular running of the engine without a change in the throttle control position, the choke position, the propeller setting, the airspeed, or the altitude.

1. Carburetor heat . . . . . ON

NOTE

The engine output will slightly drop, due to the intake air heating, and fuel consumption will slightly increase.

2. Carburetor heat . . . . . OFF as required

3.8 FIRE

3.8.1 ENGINE FIRE DURING START ON THE GROUND

1. Fuel valve . . . . . CLOSED
2. Throttle control . . . . . FULL POWER
3. Master switch . . . . . OFF
4. Ignition switch . . . . . OFF
5. Brakes . . . . . apply - bring powered sailplane to a stop
6. Evacuate powered sailplane immediately.

3.8.2 FIRE DURING TAKE-OFF

(a) If take-off can still be aborted

1. Throttle control . . . . . IDLE
2. Cabin heat . . . . . switch off
3. Brakes . . . . . apply - bring powered sailplane to a stop
4. Evacuate powered sailplane immediately.

(b) If take-off cannot be aborted

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

WARNING

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

2. Airspeed . . . . . 105 km/h (57 kts / 65 mph)

% *after climbing to a height from which the selected landing area can be reached safely:*

% 3. Fuel valve . . . . . CLOSED
% 4. Electric fuel pump . . . . . OFF
% 5. Cabin heat . . . . . switch off
% 6. Master switch . . . . . OFF
% 7. Sliding/knockout windows . . . . . open if required
% 8. Carry out landing without engine power . . . see Paragraph 4.5.5
%

% 3.8.3 ENGINE FIRE DURING FLIGHT

% 1. Airspeed . . . . . 105 km/h (57 kts / 65 mph)
% 2. Fuel valve . . . . . CLOSED
% 3. Throttle control . . . . . FULL POWER
% 4. Electric fuel pump . . . . . OFF
% 5. Cabin heat . . . . . switch off
% 6. Master switch . . . . . OFF
% 7. Select appropriate landing area.
% 8. Carry out landing without engine power.

% 3.8.4 ELECTRICAL FIRE

1. Master switch . . . . . OFF

3.9 OTHER EMERGENCIES

3.9.1 MALFUNCTION OR FAILURE OF PROPELLER SPEED CONTROL

1. Throttle control . . . . . keep RPM in admissible range
2. Airspeed . . . . . reduce

3.9.2 ICING

1. Leave icing area
2. Constantly move the controls to prevent them from being locked by ice

If ice accumulates on canopy:

3. Weather window . . . . . open
4. Cabin heat . . . . . ON

3.9.3 WARNING LIGHT FOR FUEL PRESSURE ILLUMINATES

1. Electric fuel pump . . . . . ON

if the light extinguishes:

* Land on nearest suitable airfield and determine reason for illumination.

if the light does not extinguish:

* Lack of fuel pressure may result in engine failure. See NOTE in 3.7.4 ENGINE FAILURE DURING CRUISE (page 3-9).

3.9.4 CAUTION LIGHT FOR COOLANT LEVEL ILLUMINATES

If possible, turn off engine and land on nearest suitable airfield without engine power.

If turning off the engine is impossible, continue flight with reduced power and land on nearest suitable airfield.

WARNING

Monitor engine temperatures!

3.9.5 EMERGENCY LANDING ON WATER

Emergency landings on water should be performed in extreme emergency situations
% only. It must be assumed, from trials with sailplanes, that the powered sailplane will submerge immediately after touching the water and then surface again.

1. Parachute harness . . . . . open
2. Seat harness . . . . . tighten
3. Approach speed . . . . . normal
4. Touchdown with minimum speed and air brakes retracted

NOTE

Conditions such as strong headwind, danger of wind shear, turbulence or wet wings require a higher approach speed.

WARNING

On touchdown protect your face with one arm!

5. Seat harness . . . . . release
6. Red canopy locks (LH and RH) . . . . . swing 180° rearward, push canopy away

% 7. Evacuate powered sailplane as fast as possible

CHAPTER 4
NORMAL PROCEDURES

4.1 INTRODUCTION

Chapter 4 contains checklists and a description of the normal operating procedures which is based on the results of flight tests. Normal procedures associated with optional systems can be found in Chapter 9.

4.2 RIGGING AND DE-RIGGING

General

Each wing is connected to the fuselage by three bolts. The two main bolts are located at the center of the spar tunnel. They are accessible between the backrests and can be inserted from the front side. A spring loaded hook is placed over the bolt handles to secure the bolts.

The A- and B-bolts are fixed to the fuselage at the wing root. The A-bolt is placed in front of the spar tunnel and the B-bolt lies near the trailing edge. Self locking units are screwed onto the B-bolts, which are accessible through handholes on the upper surface of the wing. Locking rings are integrated in the B-bolt locking units, which therefore do not require any further safetying.

The horizontal stabilizer is attached to the vertical stabilizer by means of three bolts. The two bolts at the rear are fixed to the mount in the vertical stabilizer. The threaded bolt located at the front is fitted with a hexagonal socket. When screwed in, it is automatically secured by means of a locking ring integrated into the horizontal stabilizer.

Wing installation without wing folding mechanism

1. Clean all bolts and bushes and the B-bolt locking unit and apply a light coat of grease.

2. Lift one wing (two persons at the root rib, one at the wing tip) and insert spar stump into spar tunnel. Ensure the smooth insertion of the A- and B-bolts. Connect position lights (optional) and ACL (= strobe light, optional) when the gap between fuselage and wing is just wide enough to reach the wires.

3. Insert main bolt while moving the wing tip in small circles.

   The aileron and air brake control systems are automatically connected.

   Do not release the wing before the main bolt has been inserted completely.

   The wide track of the landing gear supports the attached wing; no support of the wing tip is required.

4. Screw the B-bolt locking unit onto the B-bolt and tighten it by hand.

5. Install the other wing in a similar manner.

6. Tighten both B-bolt locking units with a wrench (size 17 mm), applying moderate hand torque (approximately 6 Nm (4.5 ft.lb)).

7. Secure main bolts with spring loaded hook.

8. Apply water resistant adhesive tape to the gap between fuselage and wing and to the covers on the access holes.

Wing installation with wing folding mechanism

1. Clean all bolts and bushes and the B-bolt locking unit and apply a light coat of grease, remove cover from B-bolt handhole.

2. Unhook one wing from its hanging mount on the stabilizer, pull it rearward to the stop. A second person should stand between the wing and fuselage and relieve the load on the telescopic tube by lifting the wing at the spar stump.

3. Walk forward until the wing is 90° from line of flight; rotate the wing until the root ribs are parallel; keep wing in its correct position.

4. Introduce spar stump into spar tunnel while ensuring the smooth insertion of A- and B-bolts. Connect position lights (optional) and ACL (= strobe light, optional) when the gap between fuselage and wing is just wide enough to reach the wires.

5. Insert main bolt while moving the wing tip in small circles.

   The aileron and air brake control systems are automatically connected.

   Do not release the wing before the main bolt has been inserted completely.

   The wide track of the landing gear supports the attached wing; no support of the wing tip is required.

6. Screw the B-bolt locking unit onto the B-bolt and tighten it by hand.

7. Install the other wing in a similar manner.

8. Tighten both B-bolt locking units with a wrench (size 17 mm), applying moderate hand torque (approximately 6 Nm (4.5 ft.lb)).

9. Secure main bolts with spring loaded hook.

10. Apply water resistant adhesive tape to the gap between fuselage and wing and to the covers on the access holes.

Wing removal

To remove the wings reverse the above procedure.

NOTE

% When installing or removing the wings, ensure that the powered sailplane will not drop onto its nose wheel or tail skid as the center of gravity shifts.

Winglet installation

1. Clean the bolts and bushes if necessary.

CAUTION

Do not lubricate the bolt threads!

2. Install winglet with washers and self locking nuts.

3. Tighten self locking nuts with moderate hand torque (approximately 6 Nm (4.5 ft.lb)).

4. Apply water resistant adhesive tape to the gap.

Winglet removal

To remove the winglet reverse the above procedure.

Horizontal stabilizer installation

1. Clean all bushes and bolts and apply a light coat of grease.
2. Move trim knob to full NOSE DOWN position.
3. Remove the Pitot tube.
4. Position the horizontal stabilizer over the stabilizer mount; the elevator push-rod must be connected by a second person.

WARNING

The elevator control system is not connected automatically!

5. Slip the horizontal stabilizer onto both rearward bolts.
6. Screw in the fastening bolt to the stop with an 8 mm hexagon key, applying moderate hand torque (approximately 6 Nm (4.5 ft.lb)).
7. Check the horizontal stabilizer for insecure attachment and inspect load transmission of elevator control system.
8. Install the Pitot tube.
9. Apply water resistant adhesive tape to the gap between the horizontal stabilizer and the vertical stabilizer.

Horizontal stabilizer removal

To remove the horizontal stabilizer reverse the above procedure.

4.3 DAILY INSPECTION

WARNING

Master switch OFF, ignition switch OFF!

1. Fuel tank drain check: on the drain port (see Section 7.10 FUEL SYSTEM), drain off about 1/8 liter (approx. 1/8 US qt) of fuel using a transparent drain cup. Check for dirt or water.

NOTE

% In order to prevent the water deposited in the tanks from dispersing, the powered sailplane should not be agitated prior to the drain check.

2. Ensure completeness of the onboard documents and ensure that the remaining operating time before the next scheduled inspection (100, 200 or 600 hrs.) allows for the intended flight.

3. Check left fuselage skin for damage and cracks.

4. Inspection of vertical stabilizer:
   - Check skin for damage or cracks.
   - Check rudder for improper or insecure mounting.
   - Check for excessive play.
   - Check rudder control system for improper connection and interference.
   - Remove Pitot tube cover.
   - Check Pitot tube for improper mounting and blockage of bores.

5. Inspection of horizontal stabilizer:
   - Check horizontal stabilizer and tips for improper mounting and insecure attachment, and check skin for damage and cracks.
   - Check elevator for improper mounting, play, damage and cracks.
   - Check elevator control system for improper connection, lack of load transmission and interference.

6. Check right fuselage skin for damage and cracks.

7. Inspection of right wing:
   - Check wing, aileron and winglet for improper or insecure mounting, excessive play, damage, and cracks.
   - Check aileron control system for improper connection, lack of load transmission and interference.
   - Check air brakes for incomplete retraction; ensure flushness with the wing surface.

8. Inspection of right main landing gear:
   - Check landing gear strut for damage and cracks.
   - Check wheel fairing for damage and looseness.
   - Visually check tires and brakes.
   - Ensure correct inflation (2.3 bar (33 psi)).

9. Inspection of propeller:
   - Check propeller blades for damage, cracks and excessive play.
   - Check spinner for damage and insecure mounting.

10. Inspection of nose landing gear:
    - Check nose wheel strut for damage and cracks.
    - Check wheel fairing for damage and looseness.
    - Visually check tire.
    - Ensure correct inflation (1.8 bar (26 psi)).

11. Oil and coolant check:
    - Check oil level.

NOTE

The oil consumption is minor. Refill engine oil only when the oil level reaches or falls below the minimum marking.

    - Ensure coolant level in equalizing reservoir is more than 1/3.

NOTE

The coolant equalizing reservoir should not be more than 2/3 full.

    - Check engine compartment for obvious defects.
    - Check coolers for obstruction.

12. Inspection of left main landing gear:
    - Check landing gear strut for damage and cracks.
    - Check wheel fairing for damage and looseness.
    - Visually check tires and brakes.
    - Ensure correct inflation (2.3 bar (33 psi)).

13. Inspection of left wing:
    - Check wing, aileron and winglet for improper or insecure mounting, excessive play, damage, and cracks.
    - Check aileron control system for improper connection, lack of load transmission and interference.
    - Check air brakes for incomplete retraction; ensure flushness with the wing surface.

14. Check in the cabin:
    - Verify that loading is admissible (refer to Chapter 6).

NOTE

Ensure compliance with loading restrictions by changing and/or rearranging the useful load.

- Master switch . . . . . ON
- Mode select switch . . . . . POWER FLIGHT
- Caution light for coolant level . . . . . check, illuminates for approx. 3 seconds and extinguishes

CAUTION

If the caution light for the coolant level does not extinguish, coolant must replenished (dispatcher vessel, located centrally on the engine). The upper cowling must be removed for replenishing.

WARNING

The pressure cap on the dispatcher vessel must snap in the 'closed' position. Ensure a tight fit!

- All circuit breakers . . . . . pressed in
- Fuel quantity . . . . . check using fuel quantity indicator and log book entries; refuel if necessary

NOTE

% Usable fuel and approved fuel grades: see Paragraph
% 2.4.3 FUEL.

- Master switch . . . . . OFF
- Foreign bodies and loose items . . . . . check
- Canopy . . . . . check for dirt and damage
- Cowl flap . . . . . check for improper operation
- Main bolts . . . . . secured

15. Check of propeller FEATHER position:
    - Rudder pedals . . . . . adjust
    - Canopy . . . . . closed & locked
    - Fuel valve . . . . . OPEN
    - Parking brake . . . . . set
    - Electrical equipment . . . . . OFF
    - Master switch . . . . . ON
    - Mode select switch . . . . . POWER FLIGHT
    - Caution light for coolant level . . . . . illuminates for approx. 3 seconds and extinguishes
    - Propeller speed control . . . . . TAKE-OFF
    - Cowl flap . . . . . OPEN
    - Electric fuel pump . . . . . ON; verify that red warning light extinguishes after build-up of fuel pressure
    - Throttle control . . . . . IDLE
    - Choke . . . . . ON if engine is cold

WARNING

People must stay clear of the propeller danger zone!

- Ignition switch . . . . . turn clockwise to start engine
- Throttle control . . . . . adjust 1000 RPM
- Oil pressure . . . . . must reach operating range within 10 seconds

CAUTION

If oil pressure is too low, turn off engine immediately!

NOTE

When the powered sailplane has been parked for long periods, or the hydraulic pressure accumulator is emptied for any other reason, a loss of oil pressure may occur after oil pressure build-up in the area of the oil pressure sensor. The reason for this is the filling process of the accumulator. The oil pressure indicator may drop to zero for a maximum of 15 seconds.

- Choke . . . . . push forward as required
- Electric fuel pump . . . . . OFF

- At increased idle speed (approximately 1000 RPM) turn off ignition and simultaneously pull propeller speed control all the way back to the FEATHER position.

NOTE

Unless the propeller speed control is actuated simultaneously with the ignition switch, the propeller will remain in the take-off position. Propeller feathering is only possible at 500 RPM or above (see Section 7.9 POWER-PLANT).

- Propeller speed control . . . . . TAKE-OFF

NOTE

If the propeller remains in the feathered position, apply the emergency procedure described in Paragraph 3.7.3 PROPELLER REMAINS IN FEATHERED POSITION.

- Master switch . . . . . OFF
- Mode select switch . . . . . SOARING

4.4 PREFLIGHT INSPECTION

The following checklist placard with the most important items is placed where it is well visible for both pilots:

START CHECK

1. **Mass & Balance checked**
2. **Main bolts secured**
3. **Fuel valve OPEN**
4. **Fuel quantity checked**
5. **Canopy locked**
6. **Seat harness on & secure**
7. **Propeller check**
8. **Magneto check**
9. **Carburetor heat OFF**
10. **Controls free**
11. **Trim checked**
12. **Parking brake released**
13. **Air brakes locked**
14. **Fuel pump ON**

4.5 NORMAL PROCEDURES AND RECOMMENDED SPEEDS

4.5.1 STARTING ENGINE, RUN UP & TAXIING PROCEDURES

1.	Rudder pedals	adjust
2.	Seat harnesses	fasten
3.	Canopy	closed & locked
4.	Fuel valve	OPEN
5.	Controls	free
6.	Air brakes	check operation; lock
7.	Parking brake	set
8.	Electrical equipment	OFF
9.	Master switch	ON
10.	Mode select switch	POWER FLIGHT
11.	Caution light for coolant level	illuminates for approx. 3 seconds and extinguishes
12.	Propeller speed control	TAKE-OFF
13.	Fuel quantity indicator	check
14.	Cowl flap	OPEN
15.	Electric fuel pump	ON; verify that red warning light extinguishes after build-up of fuel pressure
16.	Throttle control	IDLE
17.	Choke	ON if engine is cold

WARNING

People must stay clear of the propeller danger zone!

18. Ignition switch . . . . . turn clockwise to start engine
19. Throttle control . . . . . adjust 1000 RPM
20. Oil pressure . . . . . must reach operating range within 10 seconds

CAUTION

If oil pressure is too low, turn off engine immediately!

NOTE

When the powered sailplane has been parked for long periods, or the hydraulic pressure accumulator is emptied for any other reason, a loss of oil pressure may occur after oil pressure build-up in the area of the oil pressure sensor. The reason for this is the filling process of the accumulator. The oil pressure indicator may drop to zero for a maximum of 15 seconds.

21. Choke . . . . . push forward as required

WARNING

If the engine is warm, the activated choke will considerably reduce the engine output!

22. Electrical equipment . . . . . as required
23. Altimeter . . . . . set
24. Oil temperature . . . . . check

CAUTION

Before loading the engine, allow the oil temperature to rise to 50 °C with the cowl flap open at 1000 to 1500 RPM (also possible during taxiing).

25. Choke . . . . . OFF
26. Check ignition circuits at 1700 RPM . . . . . RPM drop . . . . . 50 to 150 RPM
    difference LH/RH . max. 50 RPM

CAUTION

If RPM drop is too high at low ambient temperatures, repeat check with the carburetor heat ON.

27. Check carburetor heat at 1700 RPM . . . . . RPM drop . . . . approx. 20 RPM

28. Propeller check:
    - Throttle control . . . . . adjust 2000 RPM
    - Pull propeller speed control back to the cam in front of the SOARING position, wait until propeller speed drops to approximately 1800 RPM. Reset to TAKE-OFF position. Carry out this procedure at least three times.

CAUTION

Unless this procedure is carried out several times, it is not ensured that the pitch change mechanism is operative.

29. Power check:
    - Ignition switch . . . . . BOTH
    - Throttle control . . . . . FULL; check 2330 ± 50 RPM

30. Power-plant instruments . . . . . all indicators in green range

4.5.2 TAKE-OFF AND CLIMB

1. Cowl flap . . . . . OPEN
2. Electric fuel pump . . . . . ON
3. Propeller speed control . . . . . TAKE-OFF
4. Throttle control . . . . . FULL THROTTLE
5. RPM . . . . . check 2330 ± 50 RPM
6. Start take-off run with elevator neutral, keep direction with rudder.

% 7. Lift nose wheel at approximately 80 km/h (43 kts / 50 mph). Powered sailplane will lift off by itself at approximately 90 km/h (49 kts / 56 mph).

8. Perform climb with at least 95 km/h (51 kts / 59 mph). Monitor oil pressure, oil temperature and cylinder head temperature which all must stay within the green range.

at a height of 100 m (330 ft) AGL:

9. Electric fuel pump . . . . . OFF

   If the fuel system is intact, the red warning light must not illuminate, because the engine-driven pump maintains the fuel pressure.

For best *angle* of climb adjust airspeed to 95 km/h (51 kts / 59 mph), for best *rate* of climb to 110 km/h (59 kts / 68 mph). Figures apply to maximum T/O mass (max. gross weight).

4.5.3 FLIGHT (INCLUDING IN-FLIGHT ENGINE STOP/START PROCEDURES)

NOTE

Economic power settings can be found in Paragraph 5.3.7 FUEL CONSUMPTION, CRUISING SPEED, ENDURANCE, RANGE.

In-flight engine stop

1. Throttle control . . . . . IDLE
2. Electrical equipment . . . . . OFF

WARNING

Starting the engine with the electric starter can become impossible:

- after prolonged soaring with several electrical consumers switched ON (mis-operation of mode select switch);
- in extreme cold (see Section 2.15 OTHER LIMITATIONS);
- if the battery is in a poorly maintained condition or barely charged.

3. Ignition switch . . . . . OFF
4. Propeller speed control . . . . . FEATHER (pull all the way back over the cam)
5. Mode select switch . . . . . SOARING

NOTE

The propeller will continue to rotate after ignition shut-off due to windmilling. Feathering will occur with the propeller rotating.

6. Cowl flap . . . . . CLOSE

In-flight engine start

NOTE

Starting the engine is possible up to a density altitude of at least 5000 meters (16400 ft).

1. Electrical equipment . . . . . OFF
2. Master switch . . . . . ON
3. Mode select switch . . . . . POWER FLIGHT
4. Caution light for coolant level . . . . . illuminates for approx. 3 seconds and extinguishes
5. Propeller speed control . . . . . TAKE-OFF
6. Cowl flap . . . . . OPEN
7. Choke . . . . . ON if engine is cold
8. Electric fuel pump . . . . . ON
9. Throttle control . . . . . IDLE
10. Ignition switch . . . . . start engine; BOTH

11. Oil pressure . . . . . check

NOTE

The hydraulic pressure accumulator is no longer full after the propeller pitch change. After pressure build-up, there might be a loss of oil pressure in the area of the oil pressure sensor. The reason for this is the filling process of the pressure accumulator. The oil pressure indicator may drop to zero for a maximum of 15 seconds.

12. Choke . . . . . push forward as required
13. Electrical equipment . . . . . as required
14. Oil temperature . . . . . check
15. Propeller check:
    - Throttle control . . . . . adjust 2000 RPM
    - Pull propeller speed control back to the cam in front of the SOARING position, wait until propeller speed drops to approximately 1800 RPM. Reset to TAKE-OFF position. Carry out this procedure at least three times.

CAUTION

Unless this procedure is carried out several times, it is not ensured that the pitch change mechanism is operative.

4.5.4 DESCENT

1. Power . . . . . reduce as required
2. Carburetor heat . . . . . ON if required
3. Trim . . . . . as required
4. Air brakes . . . . . as required

4.5.5 APPROACH AND LANDING

Landing with engine power

1. Propeller speed control . . . . . TAKE-OFF
2. Electric fuel pump . . . . . ON
3. Power . . . . . reduce
4. Carburetor heat . . . . . ON
5. Cowl flap . . . . . OPEN
6. Trim . . . . . as required
7. Air brakes . . . . . as required

NOTE

The air brake lever is arrested when the air brakes are extended half way. With slightly increased force, this position can be overtraveled in either direction. With the air brakes locked in the half-extended position, it is possible to control the glide path with the throttle control. The maximum airspeed for air brakes fixed in the half-extended position (v_{ABF}) must not be exceeded.

8. Sideslip . . . . . possible but not necessary

NOTE

The speed range in which sideslips can be performed depends on the strength of the pilot, since significant rudder control forces are required at higher airspeeds. Usually, the upper limit is approximately 150 km/h (81 kts / 93 mph).

A control force reversal can occur when the rudder is fully deflected and the ailerons are deflected opposite to the rudder. To recover, either release the aileron control or apply approximately 30 N (7 lbf) to the rudder pedal to overcome the control force reversal.

9. Approach speed . . . . . 105 km/h (57 kts / 65 mph) during final approach

NOTE

Conditions such as strong headwind, danger of wind shear, turbulence, or wet wings require a higher approach speed.

10. Touchdown . . . . . on main landing gear
11. Wheel brakes . . . . . apply as required using toe-brakes

CAUTION

The wheels have a differential braking system. Apply toe brakes symmetrically to avoid skidding.

12. Electric fuel pump . . . . . OFF

Balked landing with engine power

1. Air brakes . . . . . retract
2. Power setting . . . . . full power

WARNING

When approaching with the air brakes fixed in the half-extended position, one hand on the control stick and the other on the throttle control, first select full throttle and then retract the air brakes.

NOTE

Climbing is possible with the air brakes fixed in the half-extended position.

3. Perform climb with at least 95 km/h (51 kts / 59 mph). Monitor oil pressure, oil temperature and cylinder head temperature which all must stay within the green range.

at a height of 100 m (330 ft) AGL:

4. Electric fuel pump . . . . . OFF

   If the fuel system is intact, the red warning light must not illuminate, because the engine-driven pump maintains the fuel pressure.

Landing without engine power

NOTE

If the propeller is feathered, sufficient height must be allowed on approach to ensure that the landing field is reached safely. Starting the engine takes too much time during final approach.

1. Trim . . . . . as required
2. Air brakes . . . . . as required

NOTE

The air brake lever is arrested when the air brakes are extended half way. With slightly increased force, this position can be overtraveled in either direction.

3. Approach speed . . . . . 105 km/h (57 kts / 65 mph) during final approach

NOTE

Conditions such as strong headwind, danger of wind shear, turbulence, or wet wings require a higher approach speed.

4. Touchdown . . . . . on main landing gear

5. Wheel brakes . . . . . apply as required using toe-brakes

CAUTION

The wheels have a differential braking system. Apply toe brakes symmetrically to avoid skidding.

4.5.6 (omitted)

4.5.7 HIGH ALTITUDE FLIGHT

The never exceed speed v_{NE} is reduced at pressure altitudes above 2000 meters (6500 ft), as shown in the following table.

	Pressure altitude		Never exceed speed (v_{NE})		
	meters	feet	km/h	kts	mph
	0 to 2000	0 to 6500	261	141	162
%	above 2000 to 3000	above 6500 to 9800	246	133	153
%	above 3000 to 4000	above 9800 to 13100	233	126	145
%	above 4000 to 5000	above 13100 to 16400	221	119	137
%	above 5000 to 6000	above 16400 to 19600	210	113	130

4.5.8 FLIGHT IN RAIN

NOTE

Flight performance deteriorates in rain. The impact on the flying characteristics is minor. Flight in very heavy rain should be avoided because of the reduced visibility.

CAUTION

% The powered sailplane has no lightning protection system.

4.5.9 AEROBATICS

CAUTION

Aerobatics and spinning are not permitted.

4.5.10 ENGINE SHUT-DOWN

1. Propeller speed control . . . . . TAKE-OFF
2. Throttle control . . . . . IDLE
3. Parking brake . . . . . set
4. Electric fuel pump . . . . . OFF
5. Electrical equipment . . . . . OFF
6. Ignition switch . . . . . OFF
7. Master switch . . . . . OFF
8. Mode select switch . . . . . SOARING
9. Air brakes . . . . . lock

4.5.11 PARKING

% When parking for a short time, the powered sailplane should be oriented in headwind direction with the parking brake set and the air brakes fixed in the half-extended position. In case of longer unattended parking or in unpredictable wind conditions, the
% powered sailplane should be moored or stored in a hangar. It is also advisable to cover the Pitot tube.

CAUTION

Avoid outdoor parking for prolonged periods of time.

NOTE

The powered sailplane should not be parked with the propeller in the feathered pitch position. With an empty oil pressure accumulator, the propeller blades cannot move to the take-off position. Starting the engine with the propeller in feathered pitch is possible, but significantly increases engine wear.

CHAPTER 5
PERFORMANCE

Page

5.1 INTRODUCTION

Chapter 5 provides ACG approved data for airspeed calibration, stalling speeds and take-off performance, as well as additional information which does not require approval.

The data in the charts has been determined on the basis of flight tests with the powered sailplane and power-plant in good condition, with the wheel fairings installed and using average piloting techniques.

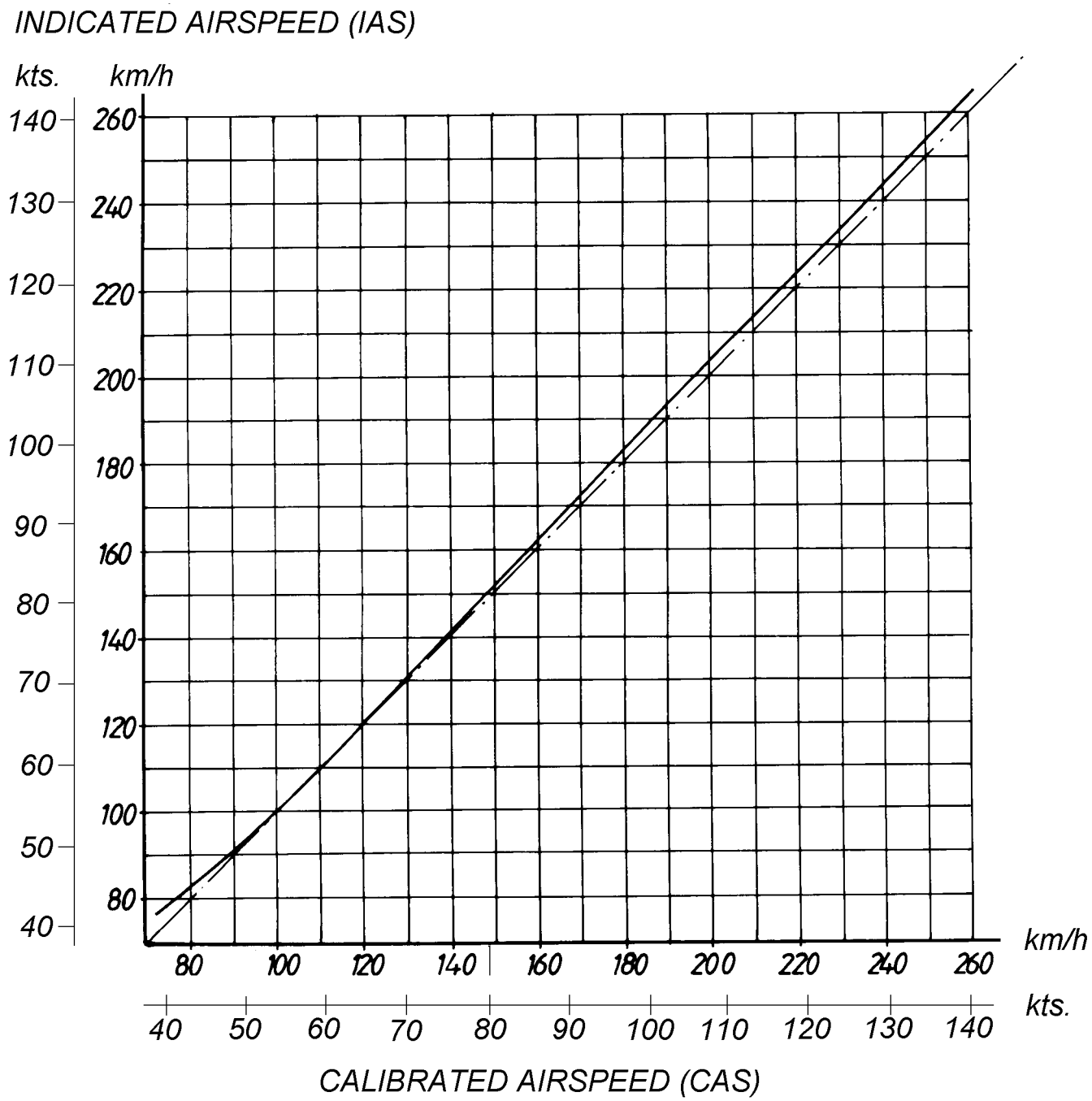
The specified airspeeds must be understood as IAS. The performance data has been evaluated using the normal procedures described in Chapter 4.

NOTE

% A poor maintenance condition of the powered sailplane as well as unfavorable external factors (high temperature, rain) can considerably deteriorate the specified performance values.

5.2 ACG-APPROVED DATA

5.2.1 AIRSPEED INDICATOR SYSTEM CALIBRATION



5.2.2 STALLING SPEEDS

Stalling speeds at different bank angles in km/h:

Air brakes	Bank angle			
	0°	30°	45°	60°
retracted v_{SO}	78 km/h	84 km/h	93 km/h	110 km/h
extended v_{S1}	81 km/h	87 km/h	96 km/h	115 km/h

Stall speeds at different bank angles in kts:

Air brakes	Bank angle			
	0°	30°	45°	60°
retracted v_{SO}	42 kts	45 kts	50 kts	60 kts
extended v_{S1}	44 kts	47 kts	52 kts	62 kts

Stalling speeds at different bank angles in mph:

Air brakes	Bank angle			
	0°	30°	45°	60°
retracted v_{SO}	48 mph	52 mph	58 mph	69 mph
extended v_{S1}	50 mph	54 mph	60 mph	71 mph

NOTE

Conditions such as turbulence, wet wings, or high load factors increase the stalling speeds.

5.2.3 TAKE-OFF PERFORMANCE

Conditions:

- Outside Air Temperature . . . . . 15 EC (59 °F)
- Atmospheric pressure . . . . . 1013 hPa (29.92 inHg)
- Calm
- Full throttle
- Maximum flight mass
- Propeller setting . . . . . TAKE-OFF (full forward)
- Rotation speed . . . . . appr. 80 km/h (43 kts / 50 mph)
- Lift-off speed . . . . . appr. 90 km/h (49 kts / 56 mph)
- Climb-out speed . . . . . appr. 95 km/h (51 kts / 59 mph)
- Runway . . . . . level, asphalt surface

Take-off roll	193 m	633 ft
Take-off distance to clear a 15 m (50 ft) obstacle	308 m	1010 ft

NOTE

For take-off distances under conditions which are different from those described above, refer to the charts in Paragraph 5.3.3.

NOTE

% Poor maintenance condition of the powered sailplane, deviation from the procedures prescribed in this manual and unfavorable external factors (high temperature, rain, unfavorable wind and, in particular, long grass) can considerably extend the take-off distance.

5.3 ADDITIONAL INFORMATION

5.3.1 DEMONSTRATED CROSSWIND PERFORMANCE

Take-off	30 km/h	16 kts
Landing	30 km/h	16 kts

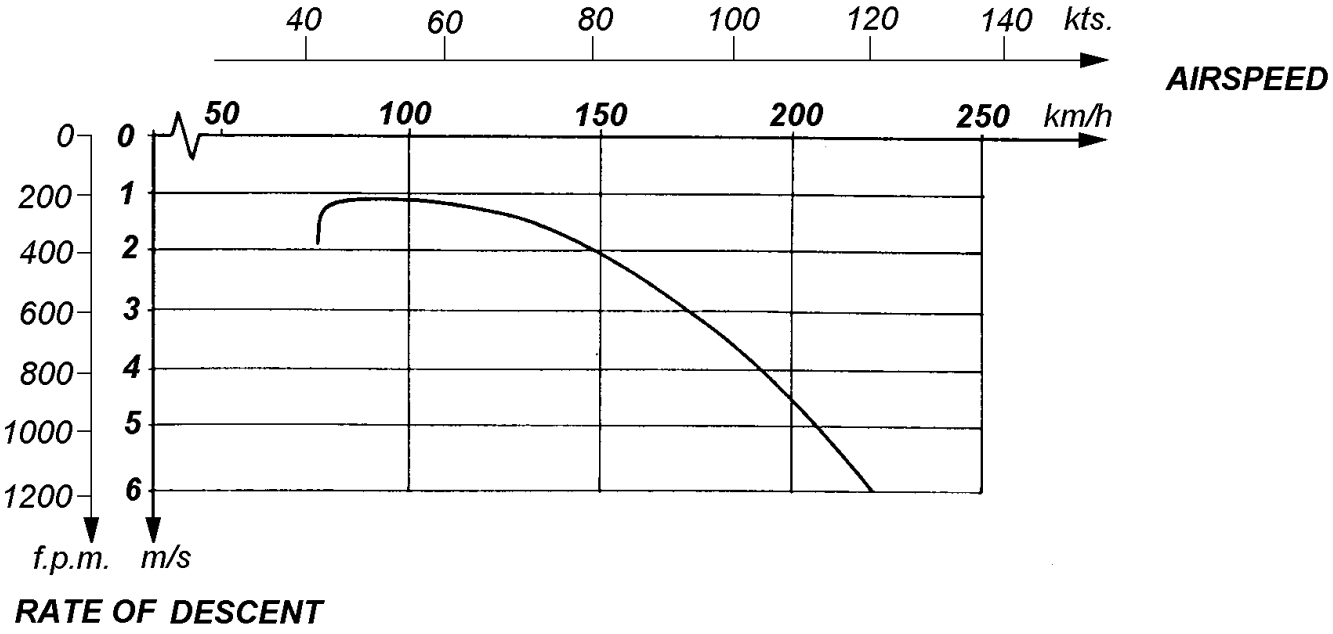
5.3.2 GLIDE PERFORMANCE AND FLIGHT POLAR

Minimum rate of descent	1.18 m/s (232 fpm)	at 97 km/h (52 kts / 60 mph)
Maximum lift drag ratio	27	at 105 km/h (57 kts / 65 mph)

NOTE

These figures as well as the graph below are valid for maximum flight mass with winglets, wheel fairings and spinner installed and the propeller feathered.

Flight polar



5.3.3 TAKE-OFF CHARTS

Conditions:

- Full throttle
- Maximum flight mass
- Propeller setting . . . . . TAKE-OFF
- Rotation speed . . . . . appr. 80 km/h (43 kts / 50 mph)
- Lift-off speed . . . . . appr. 90 km/h (49 kts / 56 mph)
- Climb-out speed . . . . . appr. 95 km/h (51 kts / 59 mph)
- Runway . . . . . level, asphalt surface

s_1 ... Take-off roll

s_2 ... Take-off distance to clear a 15 m (50 ft) obstacle

Head-wind comp. [kts]	**OAT [°C]**	**Pressure altitude above MSL QFE**							
		0 m / 0 ft 1013 hPa		**400 m / 1310 ft 966 hPa**		**800 m / 2620 ft 921 hPa**		**1200 m / 3940 ft 877 hPa**	
		s_1 [m]	**s_2 [m]**	**s_1 [m]**	**s_2 [m]**	**s_1 [m]**	**s_2 [m]**	**s_1 [m]**	**s_2 [m]**
0	0	163	262	187	294	217	332	251	378
	15	190	299	219	367	255	383	298	437
	30	222	339	257	385	301	440	354	498
5	0	128	216	147	243	170	275	199	312
	15	150	247	174	279	202	317	237	362
	30	175	281	204	319	239	364	283	413
10	0	96	175	112	197	130	224	153	255
	15	114	200	133	227	156	258	184	295
	30	134	229	157	260	185	298	220	337

s_1 ... Take-off roll

s_2 ... Take-off distance to clear a 15 m (50 ft) obstacle

Head-wind comp. [kts]	OAT [°F]	Pressure altitude above MSL QFE							
		0 m / 0 ft 29.9 inHg		400 m / 1310 ft 28.5 inHg		800 m / 2620 ft 27.2 inHg		1200 m / 3940 ft 25.9 inHg	
		s_1 [ft]	s_2 [ft]	s_1 [ft]	s_2 [ft]	s_1 [ft]	s_2 [ft]	s_1 [ft]	s_2 [ft]
0	32	535	860	614	965	712	1089	823	1240
	59	623	981	719	1204	837	1257	978	1434
	86	728	1112	843	1263	988	1444	1161	1634
5	32	420	709	482	797	558	902	653	1024
	59	492	810	571	915	663	1040	778	1188
	86	574	922	669	1047	784	1194	928	1355
10	32	315	574	367	646	427	735	502	837
	59	374	656	436	745	512	846	604	968
	86	440	751	515	853	607	978	722	1106

WARNING

A grass runway will extend the take-off roll by at least 20 %, depending on the characteristics of the ground (softness, grass height).

5.3.4 NOISE DATA

The evaluation of noise emission was carried out according to the Noise Regulations of ICAO, Annex 16.

According to Chapter 10:

61.8 dB(A)

According to Chapter 6 (for Austria only):

62.3 dB(A); for basic training and towing flight
(Austrian Federal Law Gazette, 29 Oct 1993, 738th Decree)

5.3.5 CLIMB PERFORMANCE

Conditions:

- Sea level
- Full throttle
- Max. flight mass
- Airspeed . . . . . v_y = 110 km/h (59 kts / 68 mph)
- Propeller RPM . . . . . 2260 RPM

Max. climb rate : 4.9 m/s (965 fpm)

5.3.6 SERVICE CEILING

The service ceiling is above 5000 m (16400 ft).

5.3.7 FUEL CONSUMPTION, CRUISING SPEED, ENDURANCE, RANGE

NOTE

The specifications for endurance and range apply to a full tank and do not include any reserve. The range specifications apply to flight in still air with a well-maintained and correctly adjusted powered sailplane.

%

Conditions:

- Pressure altitude . . . . . 1800 m (5900 ft)

Prop. speed	Manif. press.	Fuel flow		Cruising speed			Endur-ance	Range			Fuel tank capacity	
RPM	inHg	lit./ hr	US gal/ hr	km/h	kts	mph	h:mm	km	NM	stat. miles	liters	US gal
2000	22	16.8	4.4	170	92	106	3:10 4:35	545 775	295 420	335 480	55 79	14.5 20.9
2200	22.7	19.6	5.2	180	97	112	2:45 3:55	495 705	265 380	305 435	55 79	14.5 20.9
2260	23.3	23.2	6.1	190	103	118	2:15 3:15	440 630	235 340	270 390	55 79	14.5 20.9

NOTE

It is generally recommended for a fast cruise to select a propeller speed of 2250 RPM and a manifold pressure which is at least 0.7 inHg under the maximum obtainable. This reduces the fuel consumption considerably whilst hardly affecting the cruising speed.

For an economical cruise it is recommended to set the propeller speed between 2150 and 2050 RPM and the manifold pressure 1 to 2 inHg under the maximum obtainable. Deviation from this recommendation will result in a fuel flow which is significantly higher than that shown in the table above.

CHAPTER 6
MASS (WEIGHT) AND BALANCE

Page

6.1 INTRODUCTION

Chapter 6 describes the range of loading in which the HK 36 TC be operated safely.

Descriptions of the weighing procedure, the determination of the admissible empty % mass CG range and a list of the equipment that must be present in the powered % sailplane during the weighing process are included in the Airplane Maintenance Manual (Doc. No. 3.02.21), Section 4.

WARNING

Exceeding the maximum flight mass (maximum gross % weight) can lead to overstressing of the powered sailplane.

Falling short of the minimum useful load on the seats will % lead to reduced controllability and stability of the powered % sailplane.

6.2 WEIGHING PROCEDURE

The weighing procedure is described in the Airplane Maintenance Manual, Paragraph % 4.2. The purpose of weighing the powered sailplane is to determine the empty mass (empty weight) and the corresponding CG lever arm (i.e., the CG position). It may be carried out by authorized personnel only.

6.3 WEIGHING REPORT

The Weighing Report shows the current empty mass (empty weight) and the corresponding CG position. The Weighing Report is filed in the Airplane Maintenance Log.

NOTE

After equipment changes, repair work, repainting, etc., the new empty mass (empty weight) and the corresponding CG position must be determined by an authorized person in compliance with the Airplane Maintenance Manual. The results must be recorded in the Mass and Balance Form, and the new limits must be drawn on a new Mass and Balance Diagram.

6.4 BASIC EMPTY MASS AND MOMENT

The empty mass CG limitations are defined in the Airplane Maintenance Manual, Section 4.

These limitations guarantee that solo-pilots with a mass (weight) of at least 70 kg (154 lb) will not overstep the maximum rearward CG when flying with a full tank and no baggage.

The CG will not exceed the maximum forward position if not more than 220 kg (485 lb) of useful load on the seats and 10 kg (22 lb) of fuel for a half hour flight are aboard.

6.5 MASS OF ALL NON-LIFTING PARTS

The maximum mass (weight) of all non-lifting parts is 610 kg (1345 lb). A list of all non-lifting parts is included in the Airplane Maintenance Manual, Paragraph 4.6.

NOTE

Due to the design of the HK 36 TC, the maximum mass (weight) of all non-lifting parts will not be exceeded as long as the maximum flight mass (max. gross weight) of 770 kg (1698 lb) is complied with.

6.6 MASS AND BALANCE FORM

The Mass and Balance Form on the next page shows the following values:

- current empty mass
- current empty mass CG position
- current maximum useful load including parachute, seat cushions, fuel, and baggage
- minimum useful load on seats for solo flights with full tank and no baggage
- minimum useful load on seats for solo flights with full tank and maximum baggage mass (12 kg or 26 lb)

Additionally, the Mass and Balance Form is a record of all weighings.

The Mass and Balance Form must be updated by an authorized person using the data recorded in the currently effective Weighing Report. The corresponding instructions can be found in the Airplane Maintenance Manual, Paragraph 4.7.

In addition to the Mass and Balance Form, a new Mass and Balance Diagram is filled out upon each weighing. The corresponding instructions are given in the Airplane Maintenance Manual, Paragraph 4.8.

NOTE

% The powered sailplane is weighed with the equipment
% shown in the Equipment Inventory installed. Powered sail-
% plane operation without winglets, spinner or wheel fairings is permissible in exceptional cases. The influence on the empty mass (weight) and the corresponding CG position is negligible.

MASS AND BALANCE FORM

SERIAL NO.:_____ CALL SIGN:_____

Date of weighing	Empty mass (weight)	Empty mass CG pos. aft of datum	Max. useful load	Minimum useful load on seats with full fuel tank		Signature
				no baggage	12 kg 26.5 lb baggage	
-	[kg]* [lb]*	[mm]* [in.]*	[kg]* [lb]*	[kg]* [lb]*	[kg]* [lb]*	-

*) cross out units which are not used

6.7 USEFUL LOAD

The useful load consists of the masses (weights) of occupants (including parachutes), baggage and fuel.

6.7.1 MAXIMUM USEFUL LOAD

The maximum permissible useful load is shown in the Mass and Balance Form, in the Mass and Balance Diagram, and on the placard in the cockpit.

6.7.2 USEFUL LOAD ON THE SEATS

Minimum useful load on the seats

The Mass and Balance Form and the limitations placard in the cockpit show the following data:

* Minimum useful load on the seats for solo flights with a full tank and no baggage;
* Minimum useful load on the seats for solo flights with a full tank and maximum baggage mass (12 kg or 26 lb)

The minimum useful load on the seats is in no case less than 55 kg (121 lb).

NOTE

Pilots with a mass (a weight) between 55 kg (121 lb) and the minimum useful load on the seats must install a trim weight in the case of solo flights.

Trim weights

If the minimum useful load on the seats is above 55 kg (121 lb), then a trim weight fixture can be installed on the center console 400 mm (15.75 in) aft of the firewall. A deficit in useful load on the seats should be equalized using the following table:

Deficit in useful load on the seats		Trim mass (weight)	
[kg]	**[lb]**	**[kg]**	**[lb]**
5	11	1.7	3.75
10	22	3.4	7.5
15	33	5.1	11.25

Maximum useful load on the seats

The useful load on one seat must not exceed 110 kg (243 lb).

Lever arm of useful load on the seats

A lever arm of 143 mm (5.63 in) aft of datum plane is assumed for all CG calculations.

6.7.3 USEFUL LOAD IN BAGGAGE COMPARTMENT

Maximum useful load in the baggage compartment

The maximum useful load in the baggage compartment is 12 kg (26 lb).

NOTE

When loading baggage, make sure not to exceed the maximum permissible useful load.

Lever arm of useful load in the baggage compartment

The CG envelope assumes that the baggage pieces have the same CG position as the fuel load, i.e. 727 mm (28.62 in) aft of datum for the standard tank, and 824 mm (32.44 in) aft of datum plane for the long range tank.

6.7.4 FUEL LOAD

% The fuel capacity is given in Section 2.4.3 FUEL.

NOTE

When refuelling, make sure not to exceed the maximum permissible useful load.

Lever arm of the fuel tank

The load calculations are based on the following CG positions for the fuel load:

Standard tank (55 l / 14.5 US gal) : 727 mm (28.62 in) aft of datum plane
Long range tank (79 l / 20.9 US gal) : 824 mm (32.44 in) aft of datum plane

6.8 MASS / CG ENVELOPES

The Mass and Balance Diagram is a supplement to the Mass and Balance Form. It gives the pilot the information whether a loading is permissible, taking maximum permissible useful load and minimum useful load on the seats into account. It shows the permissible mass (weight) of fuel and baggage for a given useful load on the seats.

% The diagram applies to one specific powered sailplane. It is redrawn by an authorized person upon each determination of the empty mass (weight) and the corresponding CG position. Limits are drawn on the diagram using the broken subsidiary lines and the data provided by the Mass and Balance Form. The corresponding instructions are laid down in the Airplane Maintenance Manual, Paragraph 4.8.

Use of the Mass and Balance Diagram

The prohibited combinations of useful load on the seats and total mass (weight) of fuel and baggage are represented by the hatching.

Beside the diagram there is a scale for the conversion of the fuel quantity in liters or US gallons to the fuel mass (weight) in kilograms or pounds. The following sample problems show how to use the Mass and Balance Diagram.

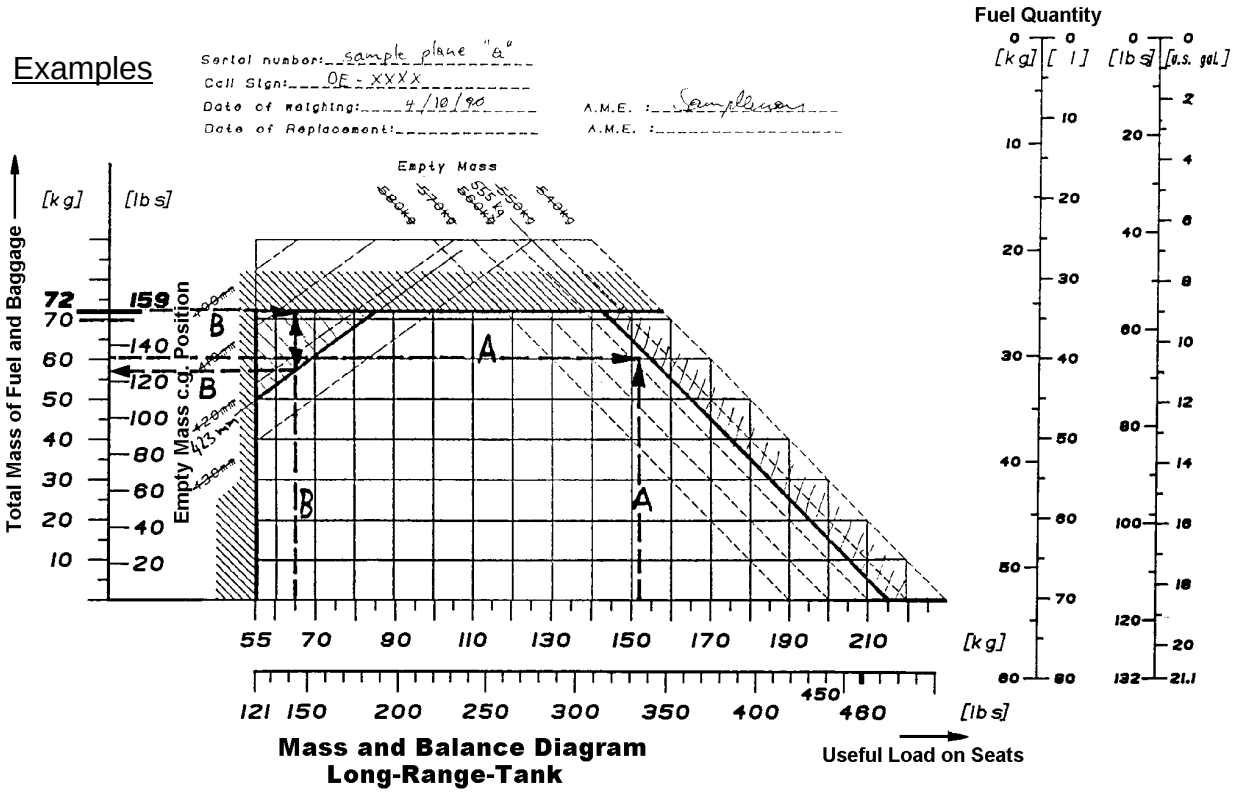
Example A: Pilot 70 kg (154 lb), copilot 82 kg (181 lb), total 152 kg (335 lb). Long range tank, full (60 kg / 132 lb); no baggage. The corresponding point in the diagram does not touch any boundary, hence the loading is permissible.

Example B: Pilot 65 kg (143 lb), solo-flight. Long range tank, full (60 kg / 132 lb); baggage 12 kg (26 lb), total mass of fuel and baggage 72 kg (159 lb). The loading oversteps the maximum rearward CG position. The pilot must remove 15 kg (33 lb) or 20 liters (5.3 US gal) of fuel.

Example C: Pilot 92 kg (203 lb), passenger 105 kg (231 lb), total 197 kg (434 lb). Standard tank. In case they do not take any baggage aboard, they may take off with 27 kg (60 lb) or 36 liters (9.5 US gal) of fuel.

Example D: Pilot 57 kg (126 lb), no copilot. Standard tank, full (42 kg / 93 lb); baggage: 12 kg (26 lb), total mass of fuel and baggage 54 kg (119 lb). Since the maximum
% rearward CG position is not effective in sample powered sailplane "b" (empty mass CG position 426 mm or 16.77 in), the pilot may use the entire maximum mass (weight) of fuel plus baggage, which amounts to 54 kg (119 lb).

Examples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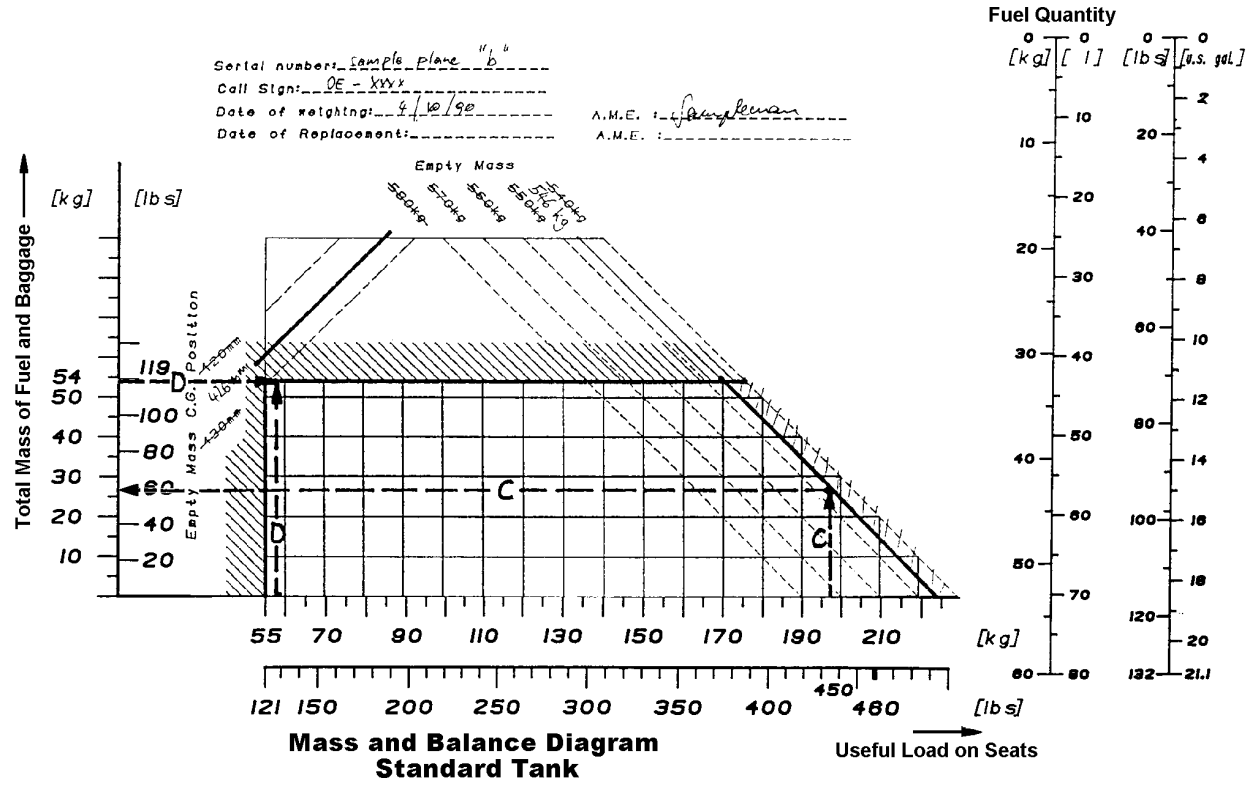
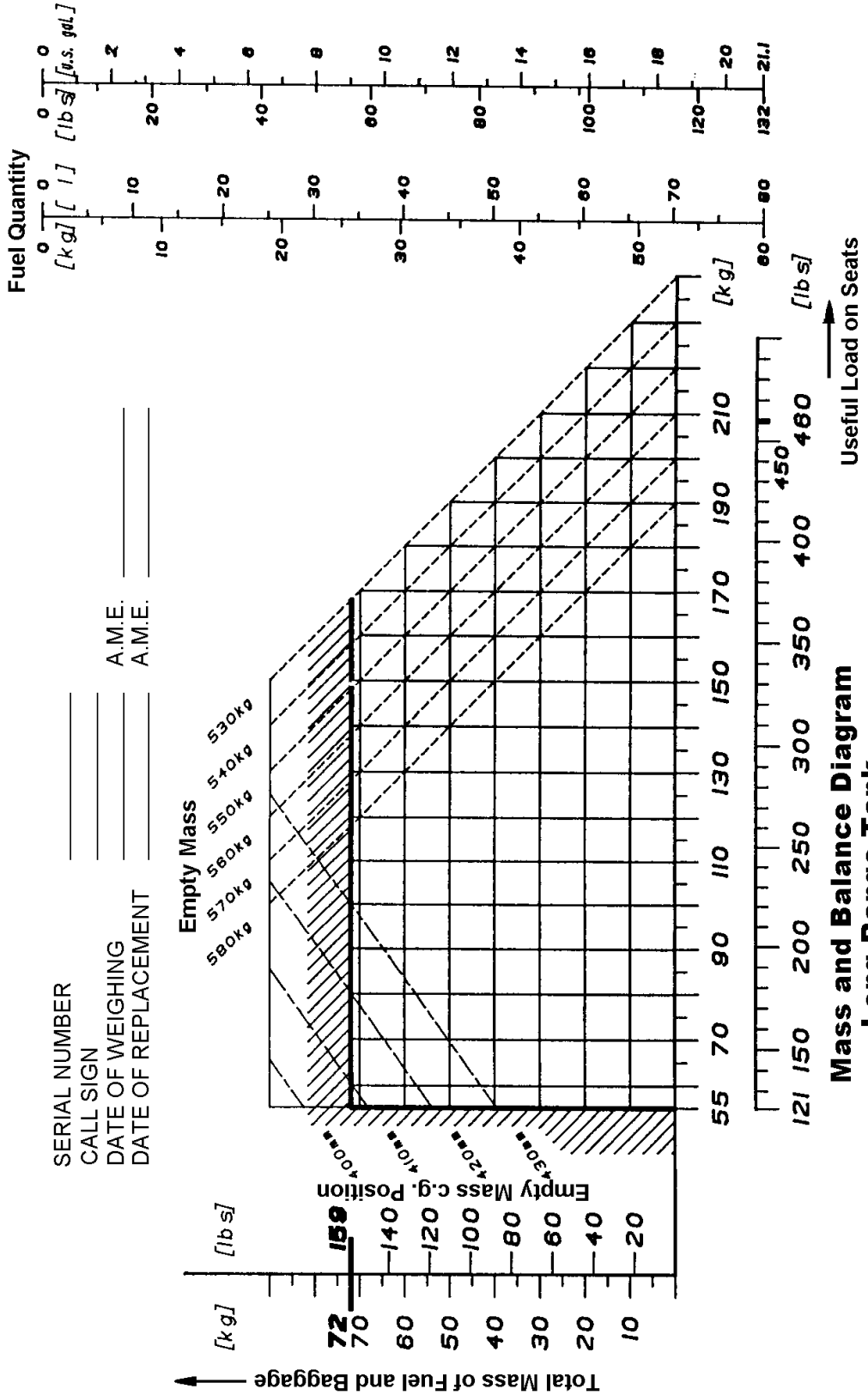
Call Sign: OE - XXXX
Date of weighting: 4/10/90
A.M.E. : Samplemann
Date of Replacement:
A.M.E. :
Empty Mass
580kg
570kg
560kg
555 kg
550kg
540kg
[kg]
[lbs]
Total Mass of Fuel and Baggage
Empty Mass c.g. Position
72
159
70
140
60
120
50
100
40
80
30
60
20
40
10
20
B
A
55 70 90 110 130 150 170 190 210
121 150 200 250 300 350 400 450 480
[lbs]
Useful Load on Seats
Fuel Quantity
[kg] [l] [lbs] [u.s. gal.]
[kg]
Mass and Balance Diagram
Long-Range-Tank


Serial number: sample plane "b"
Call Sign: OE - XXXX
Date of weighting: 4/10/90
A.M.E. : Samplemann
Date of Replacement:
A.M.E. :
Empty Mass
580kg
570kg
560kg
550kg
546 kg
540kg
[kg]
[lbs]
Total Mass of Fuel and Baggage
Empty Mass C.G. Position
54
119
50
100
40
80
30
60
20
40
10
20
D
C
55 70 90 110 130 150 170 190 210
121 150 200 250 300 350 400 450 480
[lbs]
Useful Load on Seats
Fuel Quantity
[kg] [l] [lbs] [u.s. gal.]
[kg]
Mass and Balance Diagram
Standard Tank


Fuel Quantity
[kg] [l] [lbs] [u.s. gal.]
Useful Load on Seats
[kg] [lbs]
Mass and Balance Diagram
Long-Range-Tank
Empty Mass
530kg
540kg
550kg
560kg
570kg
580kg
SERIAL NUMBER
CALL SIGN
DATE OF WEIGHING A.M.E.
DATE OF REPLACEMENT A.M.E.
Empty Mass c.g. Position
Total Mass of Fuel and Baggage
[kg] [lbs]

CHAPTER 7
POWERED SAILPLANE AND SYSTEMS DESCRIPTION

Page

7.1 INTRODUCTION

Chapter 7 provides a description of the powered sailplane and its systems along with information on their operation.

Refer to Chapter 9, Supplements, for details of optional systems and equipment.

7.2 AIRFRAME

Wings

The GFRP/CFRP wings are manufactured in semi-monocoque sandwich construction. The ailerons are made of CFRP and are attached to the wing by means of five hinges, also made of CFRP. Schempp-Hirth type air brakes are provided on the upper surface of the wings. They may be extended at all speeds up to v_{NE}. The air brakes have oil dampers but must be locked. This is performed by pushing the lever to the forward stop overcoming the resistance occurring after the air brake is retracted. The air brake lever catches when the air brakes are extended half way. The wings are connected to the fuselage with three bolts each.

The winglets are manufactured from CFRP and are attached to the wings with two threaded bolts each.

Fuselage

The GFRP fuselage is manufactured in semi-monocoque construction. A special fire-resistant fabric sheet is sandwiched between a stainless steel barrier and the firewall. The main bulkhead is made of CFRP/GFRP.

The instrument panel is made of GFRP. The maximum permissible mass (weight) of the instrument panel including the instruments installed is 17 kg (37.5 lb).

Tail plane

The rudder, elevator and horizontal stabilizer are manufactured in semi-monocoque sandwich construction. The folded-top COM antenna and the Pitot tube mount are located in the vertical stabilizer. The horizontal tail surfaces are attached with two bolts and a fastening screw.

7.3 FLIGHT CONTROLS

Primary control system

The ailerons and elevator are driven by push-rods and the rudder is driven by control cables. Elevator control forces can be compensated by means of a spring trim system.

The aileron and air brake control systems are automatically connected when the wing is installed. However, the ACL (= strobe lights, optional) and position lights (optional) must be connected manually. The elevator control system is not connected automatically.

Elevator trim system

The trim lever with a green knob is located on the center console behind the throttle
% quadrant. To trim the powered sailplane, unlock the knob by pulling it upwards, then move it to the desired position. The knob is spring-loaded and locks when it is released.

Knob forward = NOSE DOWN

Rudder pedal adjustment

CAUTION

The rudder pedals must be adjusted on the ground.

The pedals are unlocked by pulling the black T-grip in front of the control stick.

Move forward:

Push pedals forward with your heels while pulling the grip. Release the grip and allow the pedals to lock perceptibly.

Move rearward:

Pull pedals rearward with the grip. Release the grip, use your feet to push the pedals forward until they lock.

7.4 AIR BRAKE SYSTEM

There is a blue air brake lever on either side panel. By pulling the lever rearward the air brakes are unlocked and extended. The air brake lever catches when the air brakes are extended half way. This position can be overtraveled in either direction with slightly increased force. To lock the air brakes the lever must be pushed to the forward stop overcoming the resistance occurring after the air brake is retracted.

WARNING

When exceeding the maximum admissible speed with the air brakes fixed in the half-extended position, v_{ABF}, the air brakes can become extended by aerodynamic forces.

7.5 LANDING GEAR SYSTEM

The landing gear consists of a resilient main gear with spring steel struts, and a resilient castering nose wheel. An elastomer damper provides suspension for the nose wheel.

Wheel brake

The main wheels are equipped with hydraulically actuated disc brakes which are individually operated through toe pedals.

Parking brake

The draw-button is located on the center console behind the trim lever. The parking brake is released when the button is in the inserted position.

To set the parking brake, draw the button to the stop and actuate the brake pedals a few times. This procedure builds up the required pressure in the brake system which will be maintained until the parking brake is released.

To release the parking brake, step on the toe brakes again, in order to relieve the shut-off valve, and push the button in.

CAUTION

Pushing the button in without stepping on the toe-brakes leads to an overstress of the operating circuit. Excessive wear may result.

7.6 SEATS AND SAFETY HARNESSES

The seat shells are removable in order to permit maintenance and inspection of the control system parts beneath. Jackets on the control sticks and on the air brake levers prevent foreign bodies from falling into the area of the control gear.

The seats are furnished with removable cushions. Parachutes with manual release can be used instead of the cushions. There is no fixture for the release cord of parachutes with automatic release. Therefore, these parachutes cannot be used.

Each seat is provided with a four-part harness. To fasten the harness, the end pieces must be inserted into the lock. To open the harness, turn the twist handle on the lock.

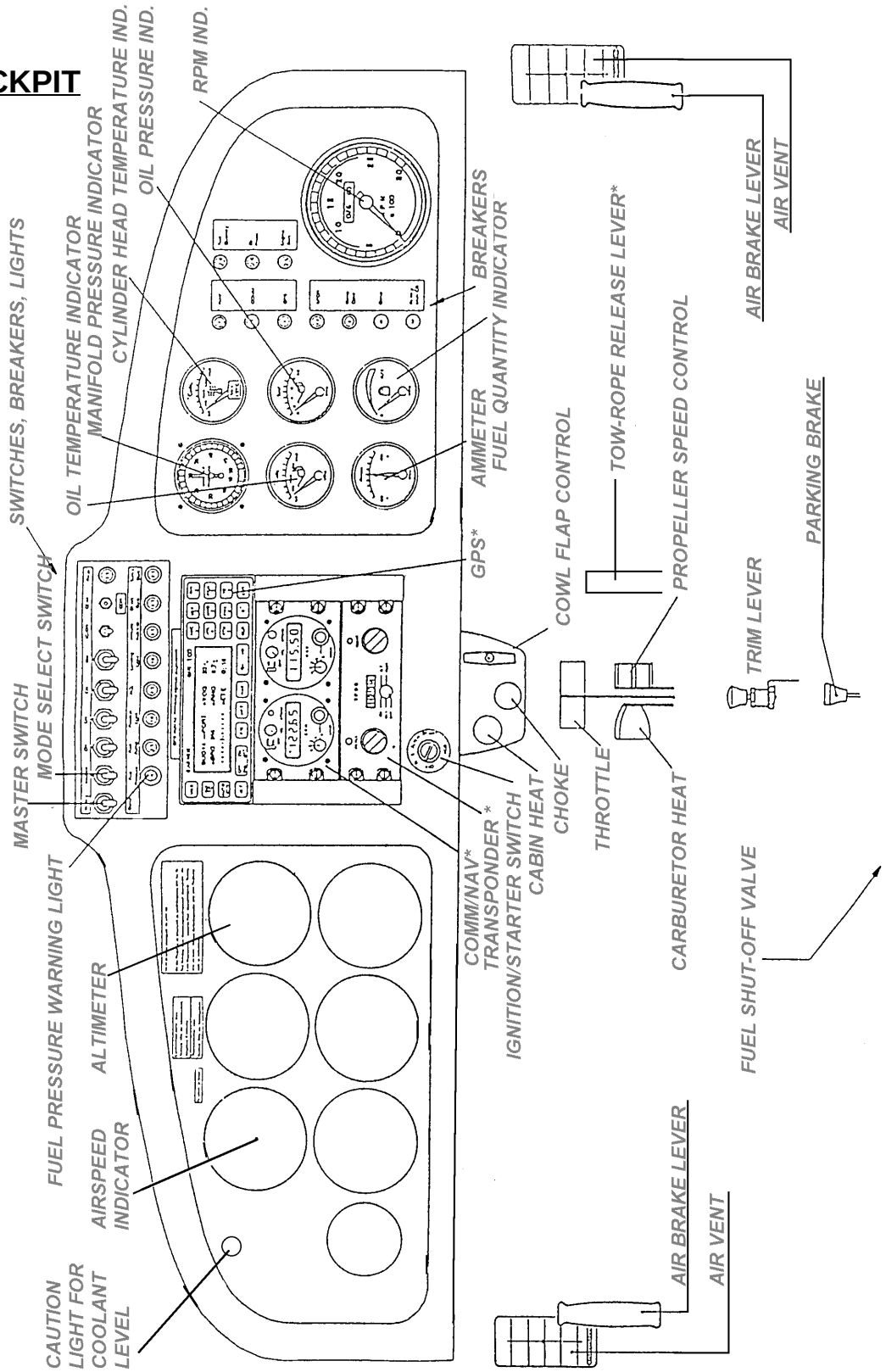
7.7 BAGGAGE COMPARTMENT

The baggage compartment is located behind the backrest above the fuel tank. Baggage pieces should be distributed evenly over the compartment. For safety reasons, the baggage pieces must be tied down.

CAUTION

Before loading the baggage compartment, pay attention to the maximum useful load or, in case of solo flights, the minimum seat payload. Refer to the Mass and Balance Form and/or the Mass and Balance Diagram.

7.8 COCKPIT



Optional equipment is marked with asterisks (*)

Mode select switch

When the mode select switch is in the SOARING position, only the COM equipment and the electric vertical speed indicator (optional) are supplied with battery power. All other electrical equipment is switched off.

Instruments

The flight instruments are installed in the left hand section of the instrument panel. The
% power-plant instruments are installed in the right hand section. The magnetic compass
% with its deviation table is mounted to the canopy above the instrument panel.

Cabin heat

The draw-button for the cabin heat is located in the center console under the instrument panel.

Button pulled out = Cabin heat ON

Cabin air

The cabin can be aerated through the swivelling nozzles on the side panels. The two sliding/knockout windows in the canopy can be opened for additional aerating.

Canopy lock

To close the canopy, pull-shut with the black grips located on the front of the canopy frame. The canopy is locked by pushing forward the two red levers attached to the frame on either side. To open the canopy, reverse the sequence.

CAUTION

Before starting the engine, close and lock the canopy! The red levers must be moved fully forward.

Canopy jettison

By forcefully swinging the two red levers on the left and right side of the canopy frame 180° rearward, the canopy is disconnected from the two brackets on the left and right side. Then the pilot must place both hands above his head against the canopy and push it away in an upward direction.

7.9 POWER-PLANT

Engine

Liquid-cooled 4 cylinder four stroke engine Rotax 912 S3. Crankshaft speeds in parentheses.

Displacement	1352 cm^3 (82.5 in^3)
Max. output power (5 min)	73.5 kW / 100 DIN-hp
	at 2385 RPM (5800 RPM)
Max. continuous power	69 kW / 94 DIN-hp
	at 2260 RPM (5500 RPM)

For further specifications refer to the Operator's Manual for the engine.

The ignition is operated by a key switch. The ignition is switched on by turning the key clockwise until it catches. The starter is operated by turning the key further to the right, all the way to the stop.

Carburetor heat, throttle control, propeller speed control

These three functions are combined in a unit (throttle quadrant) on the center console.

Carburetor heat:

Small rectangular lever,

Lever fully rearward = carburetor heat ON

The carburetor heat is normally OFF (lever fully forward).

Throttle control:

Large round lever,

Lever fully forward = FULL THROTTLE

Propeller speed control:

Black star-shaped lever,

Lever fully forward	= TAKE-OFF
Lever rearward to cam	= CRUISE
Lever fully rearward	= SOARING

Choke

Small black draw-button on the instrument panel (self-resetting),

Choke button pulled = choke ON

Cowl flap

For the operation of the cowl flap, there is a T-grip on the center console next to the cabin heat button. To arrest the T-grip, turn it 90° clockwise.

T-grip pulled = cowl flap CLOSED

The cowl flap is closed during soaring in order to reduce drag. At outside temperatures below 0 °C (32 °F), partial closing of the cowl flap avoids continuous operation with an oil temperature below 80 °C.

NOTE

Continuous operation with oil temperatures below 80 °C may lead to increased accumulation of condensation in the engine oil, which can be recognized by white foam in the oil tank.

CAUTION

Leave the cowl flap at least half open while the engine is running in order to avoid overheating. Pay special attention to the engine temperatures.

Propeller

Hydro-mechanical constant speed propeller
mt-Propeller MTV-21-A-C-F/CF175-05

Diameter . . . . . 175 cm (5 ft 9 in)
Pitch angles:
- low pitch . . . . . 14° ± 0.2°
- high pitch . . . . . 20° ± 1°
- feathered pitch . . . . . 83° ± 1°
- at radius . . . . . 61 cm (2 ft)

Governor

Woodward A 210790 or McCauley DCFU290D17B/T1

Propeller speed control

NOTE

The propeller speed control works differently from the usual systems in so far as hydraulic pressure is needed to *reduce* the blade pitch.

Small pitch is achieved by applying hydraulic pressure supplied by the governor. A spring moves the propeller to the feathered pitch position.

Propeller adjustments are made through the propeller speed control installed into the center console on the right of the throttle control. Pulling the control back to the cam causes an RPM reduction. The governor keeps the selected RPM constant, independent of airspeed and throttle control position. If the engine power selected with the throttle control is not sufficient to maintain the selected RPM, the propeller blades will move to the lowest possible pitch (maximum RPM at this power setting).

If the propeller speed control is moved fully rearward over the cam (FEATHER position) and the propeller speed is higher than 500 RPM, the blades will move into the feathered pitch position. At too low RPMs, claws controlled by centrifugal force extend and keep the blades in low pitch position. Thus, it is impossible to feather the propeller at engine standstill.

During flight the propeller carries on rotating due to windmilling, even with the ignition switched OFF. The propeller stops rotating only when it is feathered. Therefore a propeller brake is not required.

The propeller governor is flanged to the engine. It is driven directly by the engine. The propeller control circuit is part of the engine oil circuit.

In case of defects in the oil system, the propeller is supplied with hydraulic pressure from the pressure accumulator. Without the engine running, the propeller pitch change mechanism will remain operative for at least two minutes. As soon as the oil pressure in the pressure accumulator is used up, the propeller blades will move into the feathered pitch position.

CAUTION

The propeller speed control must not be moved over the cam to the FEATHER position as long as the engine is running.

7.10 FUEL SYSTEM

The aluminum tank is located behind the backrest beneath the baggage compartment. The standard version holds 54 liters (14.3 US gal), the long range version 77 liters (20.3 US gal) of usable fuel. At its lowest spot, the tank is connected to the drain on the bottom side of the fuselage.

The fuel passes through a finger filter before it reaches the electric fuel pump with integrated filter; from there it goes to the fuel shut-off valve, the engine-driven fuel pump and finally to the float chambers of the two carburetors.

Fuel shut-off valve

The fuel shut-off valve is located on the left side of the center console near the pilot's feet.

Tap in flight direction = valve OPEN

Fuel drainage

To drain the tank sump, activate the spring loaded drain by pushing the brass tube in with a drain cup. The brass tube protrudes approximately 30 mm (1.2 in) from the fuselage contour and is located on the left hand side of the fuselage bottom, approximately at the same station as the fuel filler.

Fuel quantity indication

The fuel quantity indicator is adjusted for flight attitude. A slightly low indication is possible on the ground when the tank is partially filled.

7.11 ELECTRICAL SYSTEM

The master switch is a toggle type. The mode select switch is situated to the right of the master switch.

CAUTION

Starting the engine is only possible if the mode select switch is in the POWER FLIGHT position.

In the SOARING position, all electrical equipment, except for the COM equipment and the electric vertical speed indicator (optional), is without power.

The NAV and COM equipment is located in the center section of the instrument panel. The transmit button for the radio is integrated into the control stick. The radio loudspeaker is installed in the baggage compartment. A backrest-mounted connection set for two headsets is optional.

7.12 PITOT AND STATIC SYSTEM

Static pressure, total head and the pressure for the compensation of the vertical speed indicator are measured by means of a Pitot tube which is mounted to the vertical stabilizer. The tube is removable. A safe connection of the lines is established automatically when the Pitot tube is inserted all the way to the stop in the mount.

The lowest point in the Pitot and static lines is bridged by means of bypass lines. Water that might have entered the system can accumulate there. Removal of water must be done during scheduled inspections (refer to the Airplane Maintenance Manual).

7.13 MISCELLANEOUS EQUIPMENT

For the operation of additional avionics, refer to the manuals of the respective manufacturers.

7.14 PLACARDS / INSCRIPTIONS

7.14.1 LIMITATION PLACARDS

Limitation placards are shown in Section 2.16 LIMITATION PLACARDS.

7.14.2 PLACARDS FOR COCKPIT CONTROLS

Placard	Place	Remark
Air Brakes	next to air brake levers	2 pieces
Nose Down - Trim - Nose Up	center console, next to trim lever	
OFF Carburetor Heat ON Full Throttle Idle Propeller Speed Control Take-Off Cruise Feather	center console, next to throttle quadrant	

Placard	Place	Remark
Cabin heat pull - ON Choke pull - ON Cowl Flap - pull to close	instrument panel, center section	
Cabin Air	LH and RH air vent	2 pieces
Fuel Valve OPEN CLOSED	next to fuel shut-off valve	placard "CLOSED": colored red
Parking Brake - pull	next to parking brake button	
CANOPY JETTISON: Pull both handles fully rearward. Push canopy up and away.	behind levers for canopy jettison	colored red, 2 pieces

7.14.3 PLACARDS FOR ELECTRICAL EQUIPMENT

Placard	Place	Remark
ON Power Flt. ON ON ON ON ON Master Soaring Fuel Pr. Fuel Pump Position Lights ACL Landing Light IC	instrument panel, center section	shaded areas are red on placards
Fuel Qty./ Oil Temp. Oil Press./ CHT Generator Battery/ Main CB	instrument panel, RH section, next to circuit breakers	
Attitude Gyro Direction Gyro Turn & Bank	instrument panel, RH section, next to circuit breakers	optional

Placard	Place	Remark
COM NAV GPS ADF MKR COM/ NAV COM/ GPS XPDR	instrument panel, RH section, next to circuit breakers	optional
QDR QDMR Vol.	instrument panel, center section	optional
Headset Pilot Headset Copilot	backrest, top side	optional

7.14.4 MISCELLANEOUS PLACARDS

Placard	Place	Remark
79 l (20.9 US gal) AVGAS 100 LL, Auto Super min. 95 RON leaded or unleaded usable: 77 l (20.3 US gal)	next to tank filler cap	
Oil 3.0 l SAE 15W-40 or according to Flight Manual	oil filler cap	
CAUTION! DO NOT USE AVIATION GRADE ENGINE OIL!	oil inspection door in upper cowling, inside	colored red
Coolant	coolant dis-patcher vessel; equalizing reservoir	2 pieces
Coolant Level	next to caution light for coolant level	
% usable 77 l (20.3 gal)	on fuel quantity indicator	
Oil Temp. CHT	oil and cylinder head tempera-ture indicators	

Placard	Place	Remark
2.3 bar / 33 psi	next to main wheels	2 pieces
1.8 bar / 26 psi	next to nose wheel	

The placard for the Start-Check is shown in Section 4.4 PREFLIGHT INSPECTION.

% Placards for optional equipment are also included in the supplements to the Flight
% Manual (Chapter 9).

CHAPTER 8
POWERED SAILPLANE HANDLING, CARE AND MAINTENANCE

Page

8.1 INTRODUCTION

Chapter 8 contains the manufacturer's recommended procedures for proper ground handling and servicing of the powered sailplane. The Airplane Maintenance Manual lists certain inspection and maintenance requirements which must be followed if the Powered Sailplane is to retain a new plane performance and reliability. It is wise to adhere to the Lubrication Schedule and perform preventative maintenance based on climatic and operating conditions encountered.

8.2 POWERED SAILPLANE INSPECTION PERIODS

Inspections are scheduled every 100, 200 and 600 hours. The respective inspection checklists are prescribed in the Airplane Maintenance Manual (Doc. No. 3.02.21), Section 3.

8.3 POWERED SAILPLANE ALTERATIONS OR REPAIRS

Alterations or repairs of the powered sailplane may only be carried out as prescribed in the Airplane Maintenance Manual and only by authorized personnel. In exceptional
% cases (e.g., ferry flights or test flights after maintenance), powered sailplane operation without winglets, spinner, or wheel fairings is admissible.

8.4 GROUND HANDLING / ROAD TRANSPORT

For ground handling, a tow bar attached to the nose wheel should be used. Road transport using a trailer is described in the Airplane Maintenance Manual, Paragraph 1.2.

8.5 CLEANING AND CARE

It is advisable to remove insects with a wet sponge at the end of every flying day.

CAUTION

Excessive dirt accumulation degrades flight performance.

Refer to the Airplane Maintenance Manual, Paragraph 1.4, for further care measures.

CHAPTER 9
SUPPLEMENTS

Page

9.1 GENERAL

Chapter 9 contains information concerning additional (optional) equipment of the HK 36 TC.

Unless otherwise stated, the procedures given in the Supplements must be applied in
% addition to the procedures given in the main part of the Flight Manual.

All approved supplements are listed in the List of Supplements in this Chapter.

% The Flight Manual contains exactly those Supplements which correspond to the installed equipment.

9.2 LIST OF SUPPLEMENTS

% Powered
% sailplane S/N.: Call Sign: Date:

	Suppl. No.	Title	Rev. No.	Date	applicable	
					YES	NO
%	1	Tow-Plane Operation	3	06 Oct 2003		
%	3	Electrical Power Socket for Additional Equipment	1	06 Oct 2003		
%	5	Operation with Winterization Kit	1	06 Oct 2003		
%	9	Operation with Tow-Rope Retraction Device	1	06 Oct 2003		