Diamond AIRCRAFT

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

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

Original date of approval : 26. APR. 2002

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 Airplane Flight Manual.

DIAMOND AIRCRAFT INDUSTRIES GMBH
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AUSTRIA

0.1 PREFACE

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

Skilful operation of an airplane 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 Airplane 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 airplane.

Rev. No.	Reason	Chapter	Page(s)	Date of Revision	Approval	Date of Approval	Date Inserted	Signature

Rev. No.	Reason	Chap-ter	Page(s)	Date of Revision	Approval	Date of Approval	Date In-serted	Signature

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0.4 TABLE OF CONTENTS

CHAPTER 1
GENERAL

1.1 INTRODUCTION

This Powered Sailplane Airplane 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 airplane. 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 airplane.

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 Airplane 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 airplane 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 airplane 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]
					[hPa] / 33.86 = [inHg]
	[mbar]	millibar	[psi]	pounds per square inch	[bar] x 14.504 = [psi]
	[bar]	bar			
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 airplane with T-tail, side-by-side seating configuration, tricycle landing gear and Schempp-Hirth type air brakes in the upper surface of the wings.

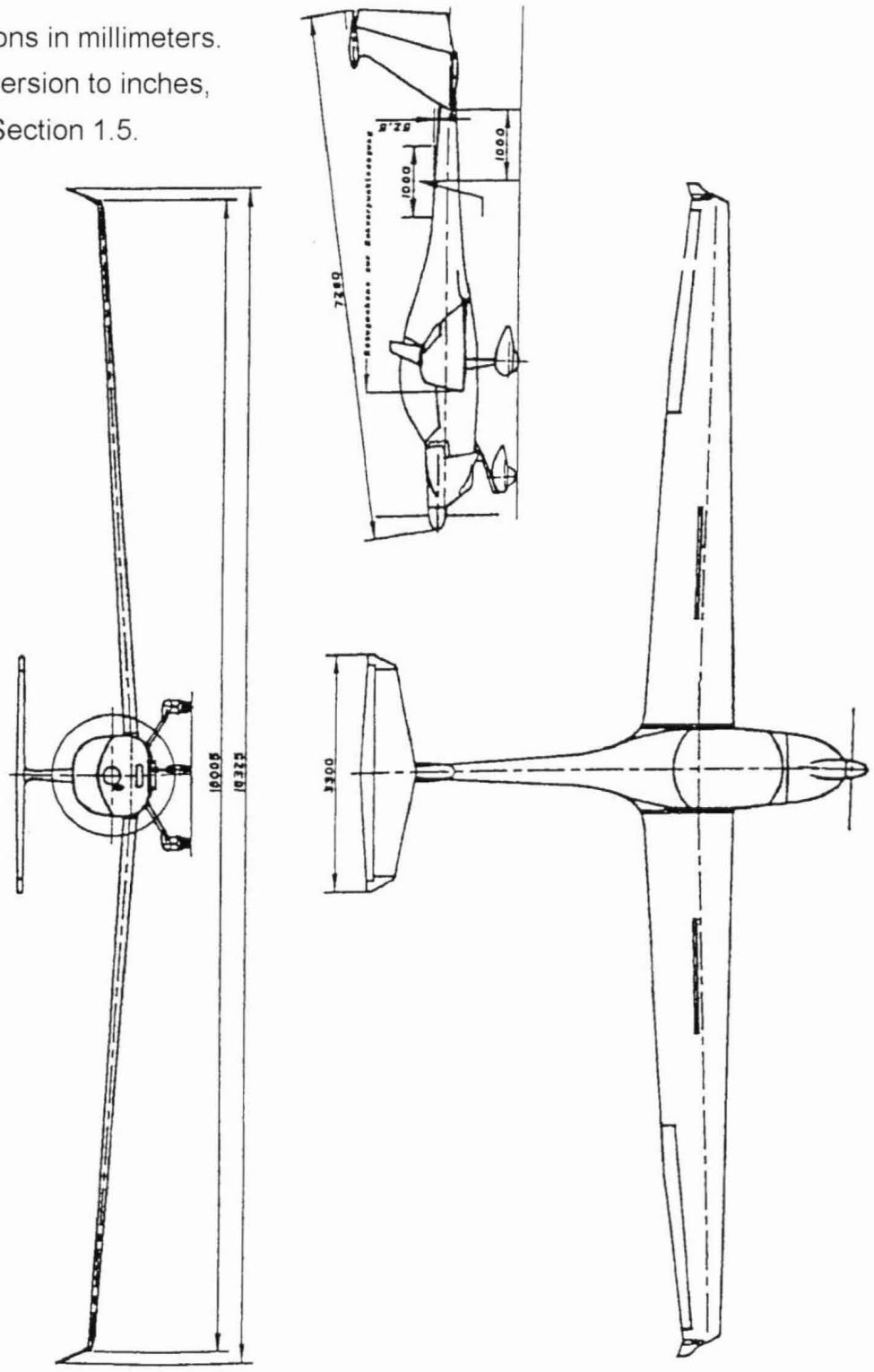
In order to enable a fast disassembly and a space-saving storage the airplane can be furnished with a wing folding mechanism.

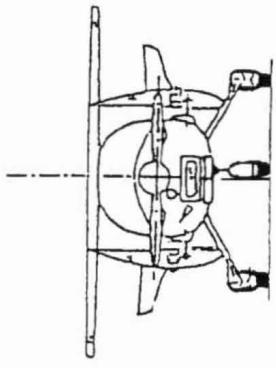
The power plant is a Rotax R 912 S3 engine with an mt-Propeller hydro-mechanically variable pitch propeller, type MTV-21-A-C-F/CF175-05.

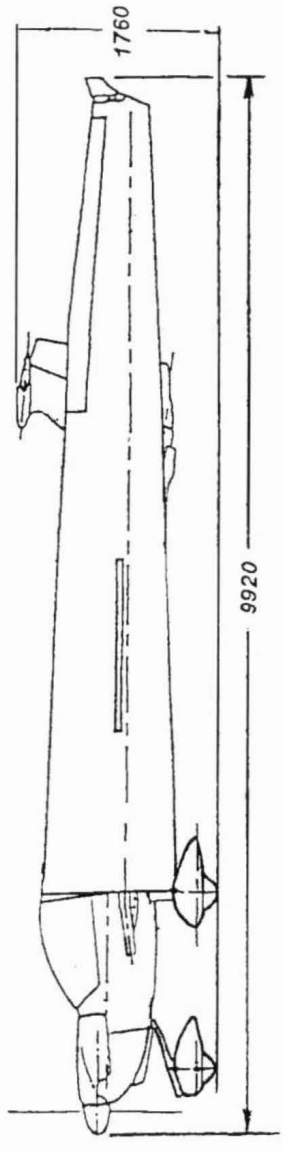
Span (with winglets)	16.33 m	53 ft 7 in
Length	7.28 m	23 ft 11 in
Height	1.78 m	5 ft 10 in
MAC	1.004 m	3 ft $3^1/_2$ in
Wing area	15.30 m²	165 sq.ft
Max. wing loading	50.30 kg/m²	10.3 lb/sq.ft
Aspect ratio	17.11	
Airfoil	Wortmann FX 63-137	

1.7 THREE-VIEW DRAWINGS

Dimensions in millimeters.
For conversion to inches,
refer to Section 1.5.



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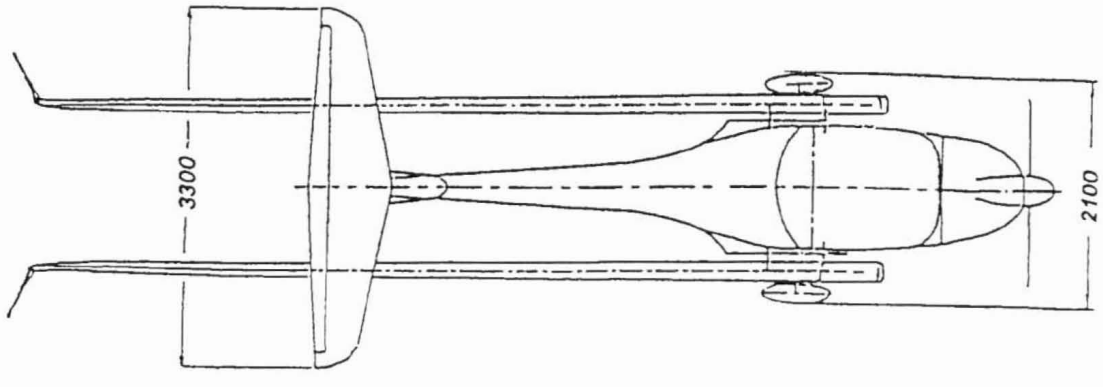
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CHAPTER 2
OPERATING LIMITATIONS

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 airplane, 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 airplane 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 applies to the maximum T/O mass of 770 kg (1698 lb). At lower flight masses, the following limits must be complied with:

T/O mass		Maneuvering speed v_A		
kg	lb	km/h	kts	mph
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 airplane even at speeds below the maneuvering speed v_A.

2.2.2 MISCELLANEOUS AIRSPEEDS

Airspeed		IAS			Remarks
		km/h	kts	mph	
v_y	Best rate-of-climb speed	110	59	68	At this airspeed, the airplane climbs with the maximum possible *rate* of climb. This airspeed is marked on the airspeed indicator with a blue radial line.
v_x	Best angle-of-climb speed	95	51	59	At this airspeed, the airplane 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

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 airplane 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

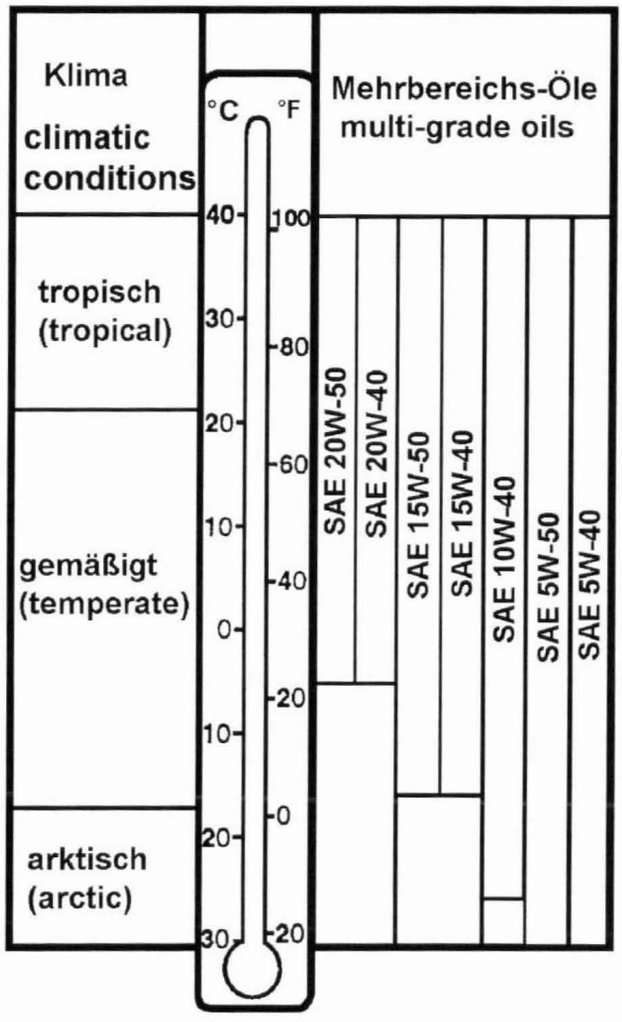
Power check RPM . . . . . 2330 ± 50 RPM

Maximum Cylinder Head
Temperature . . . . . 135 °C

Minimum Oil Temperature . . . . . 50 °C
Maximum Oil Temperature . . . . . 130 °C

Minimum oil pressure . . . . . 0.8 bar
Maximum oil pressure . . . . . 7 bar (short-term, in the event of cold start)
Normal oil pressure range . . . . . 2 to 5 bar

Oil grade: Use only motorcycle oils of a registered brand with gear additives and with API classification "SF" or "SG". The viscosity should be selected according to the following table:



CAUTION

Do not use Aviation Grade oil!

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

2.4.2 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	50-130 °C	-	130 °C
Cylinder head temperature indicator	-	-	-	135 °C
Oil pressure indicator	0.8 bar	2 - 5 bar	0.8 - 2 bar, 5 - 7 bar	7 bar
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 airplane 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 airplane.

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 spinning 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 airplane.

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 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 increased wear of the valve seats and produces more residue 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.

2.14 AEROTOW, WINCH UND AUTO-TOW LAUNCHING

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

2.15 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.

2.16 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
Altitude [m] / [ft]: - 2000 / - 6500; - 3000 / - 9800; - 4000 / - 13100; - 5000 / - 16400; - 6000 / - 19600 — v_{NE} (IAS) [km/h] / [kts] / [mph]: 261 / 141 / 162; 246 / 133 / 153; 233 / 126 / 145; 221 / 119 / 137; 210 / 113 / 130	instrument panel or LH canopy frame	
Aerobatics and Spin 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 com-partment	

CHAPTER 3
EMERGENCY PROCEDURES

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 Airplane Flight Manual, it is absolutely necessary for the pilot to know the airplane 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 airplane

CAUTION

When using a manual parachute, wait two seconds after exiting the airplane 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 airplane 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 airplane 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 airplane performs a stall dive, immediately relax the force on the elevator control and pull out the airplane smoothly. If the stick is pulled further, the airplane 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 airplane 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 airplane 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 CARBURETOR FIRE

1. Fuel valve . . . . . CLOSED
2. Throttle control . . . . . FULL POWER
3. Cabin air and cabin heat . . . . . switch off

3.8.2 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 airplane 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 airplane 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 airplane 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 airplane 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 Section 2.13 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). Airplane 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
2000 to 3000	6500 to 9800	246	133	153
3000 to 4000	9800 to 13100	233	126	145
4000 to 5000	13100 to 16400	221	119	137
5000 to 6000	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 airplane 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 airplane 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 airplane 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

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.

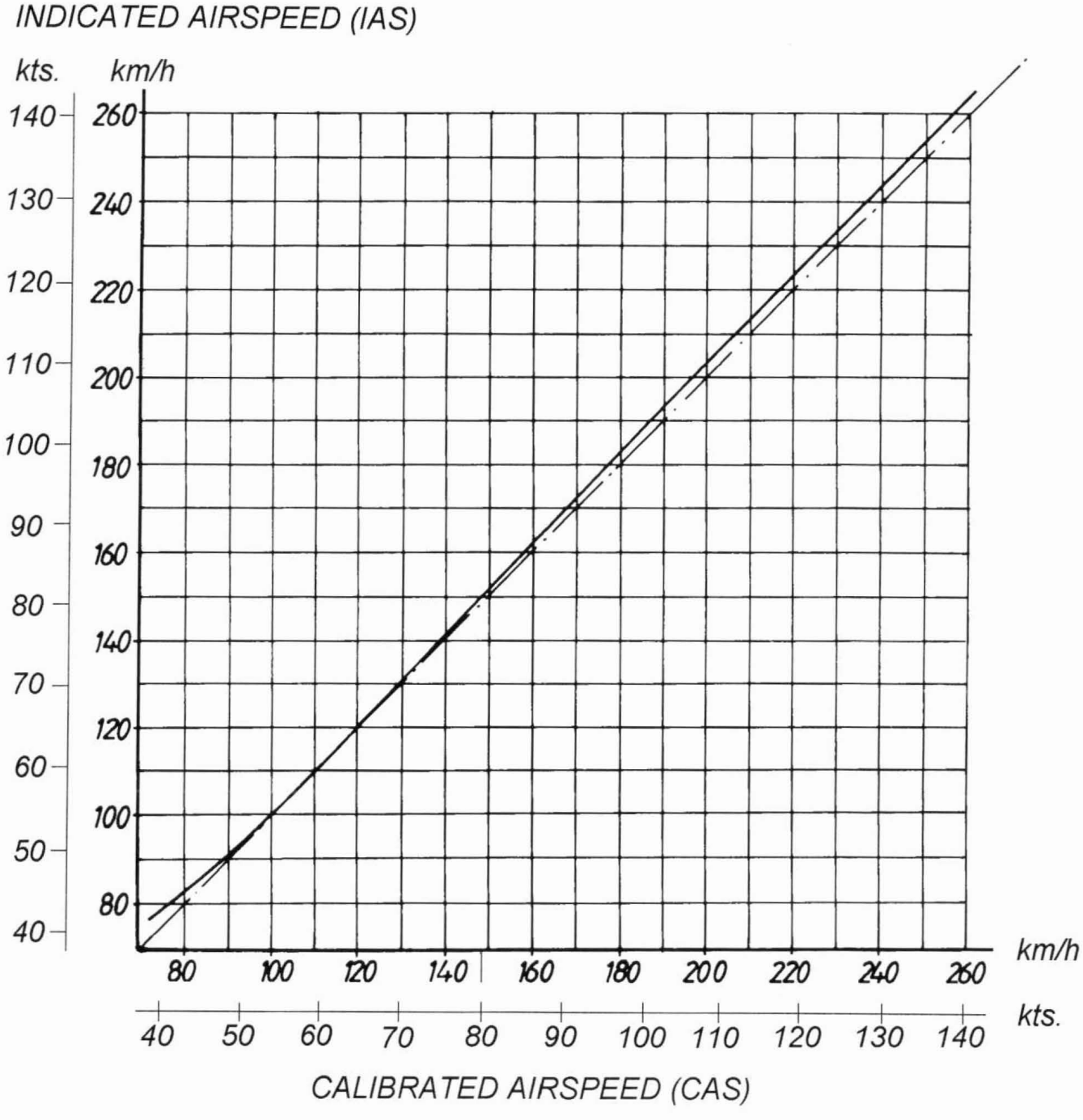
The specified airspeeds must be understood as IAS. The performance data has been evaluated using the normal procedures described in Chapter 4.

NOTE

A poor maintenance condition of the airplane 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 °C (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 airplane, 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

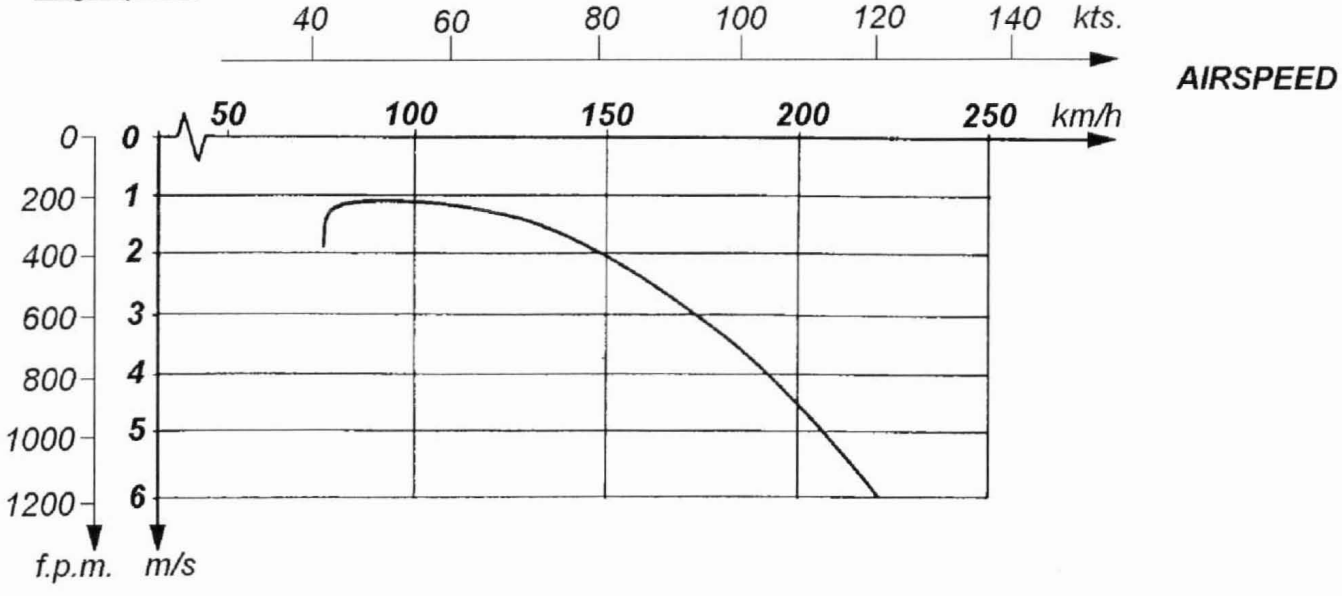
5.3.2 GLIDE PERFORMANCE AND FLIGHT POLAR

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 airplane.

Conditions:

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

Prop. speed	Manif. press.	Fuel flow		Cruising speed			Endurance	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 airplane 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 airplane.

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

6.2 WEIGHING PROCEDURE

The weighing procedure is described in the Airplane Maintenance Manual, Paragraph 4.2. The purpose of weighing the airplane 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 airplane is weighed with the equipment shown in the Equipment Inventory installed. Airplane 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.	Max. useful load	Minimum useful load on seats with full fuel tank		A.M.E.
				no baggage	12 kg baggage	
	[kg]	[mm aft of datum]	[kg]	[kg]	[kg]	

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 2.13 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 airplane. 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.

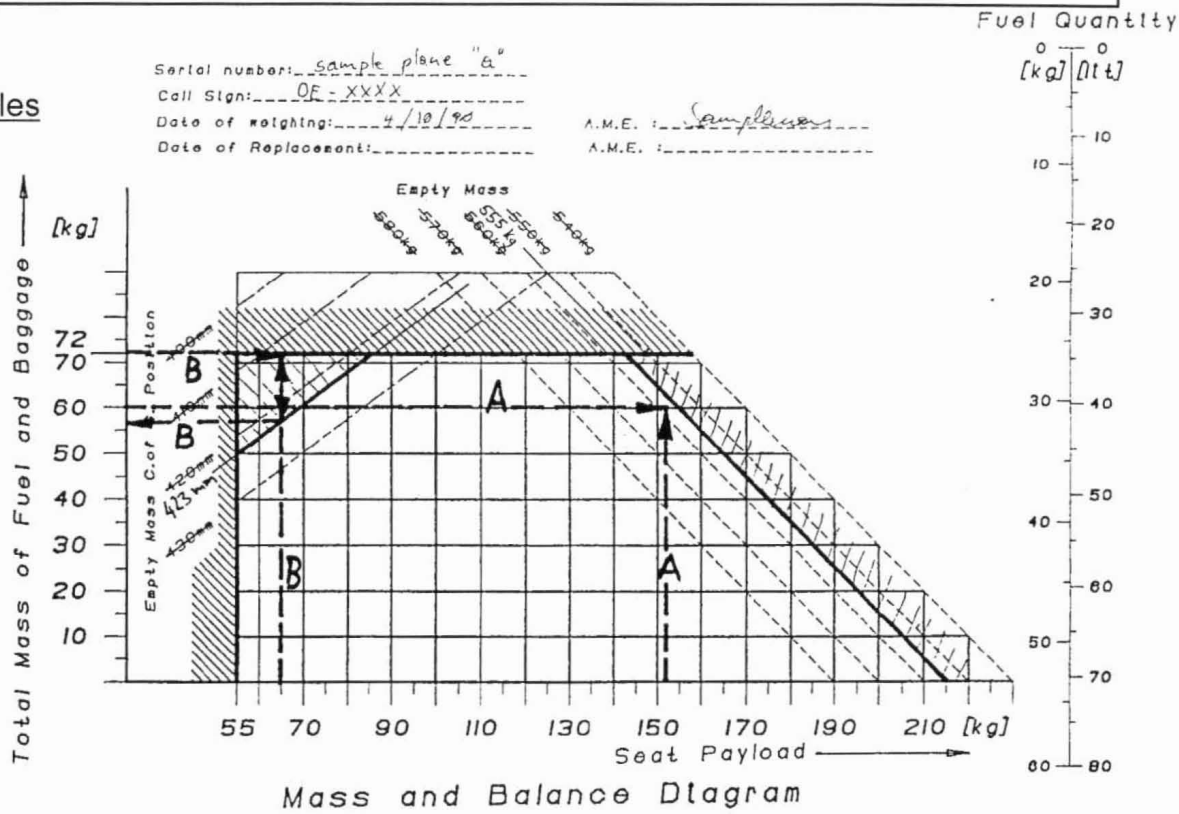
Example A: Pilot 70 kg (154 lb), copilot 82 kg (181 lb), total 152 kg (335 lb). Long range tank, full (60 kg / 132 lb); no baggage. The corresponding point in the diagram does not touch any boundary, hence the loading is permissible.

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.

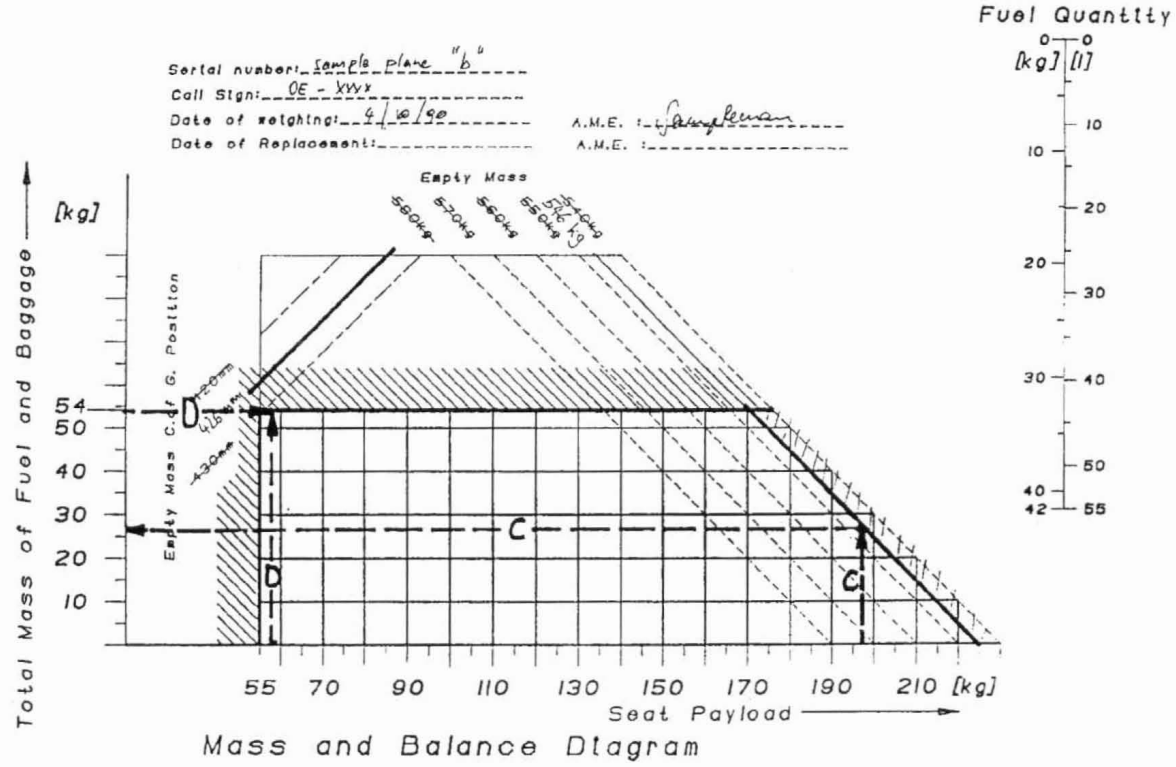
Example C: Pilot 92 kg (203 lb), passenger 105 kg (231 lb), total 197 kg (434 lb). Standard tank. In case they do not take any baggage aboard, they may take off with 27 kg (60 lb) or 36 liters (9.5 US gal) of fuel.

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 airplane "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).

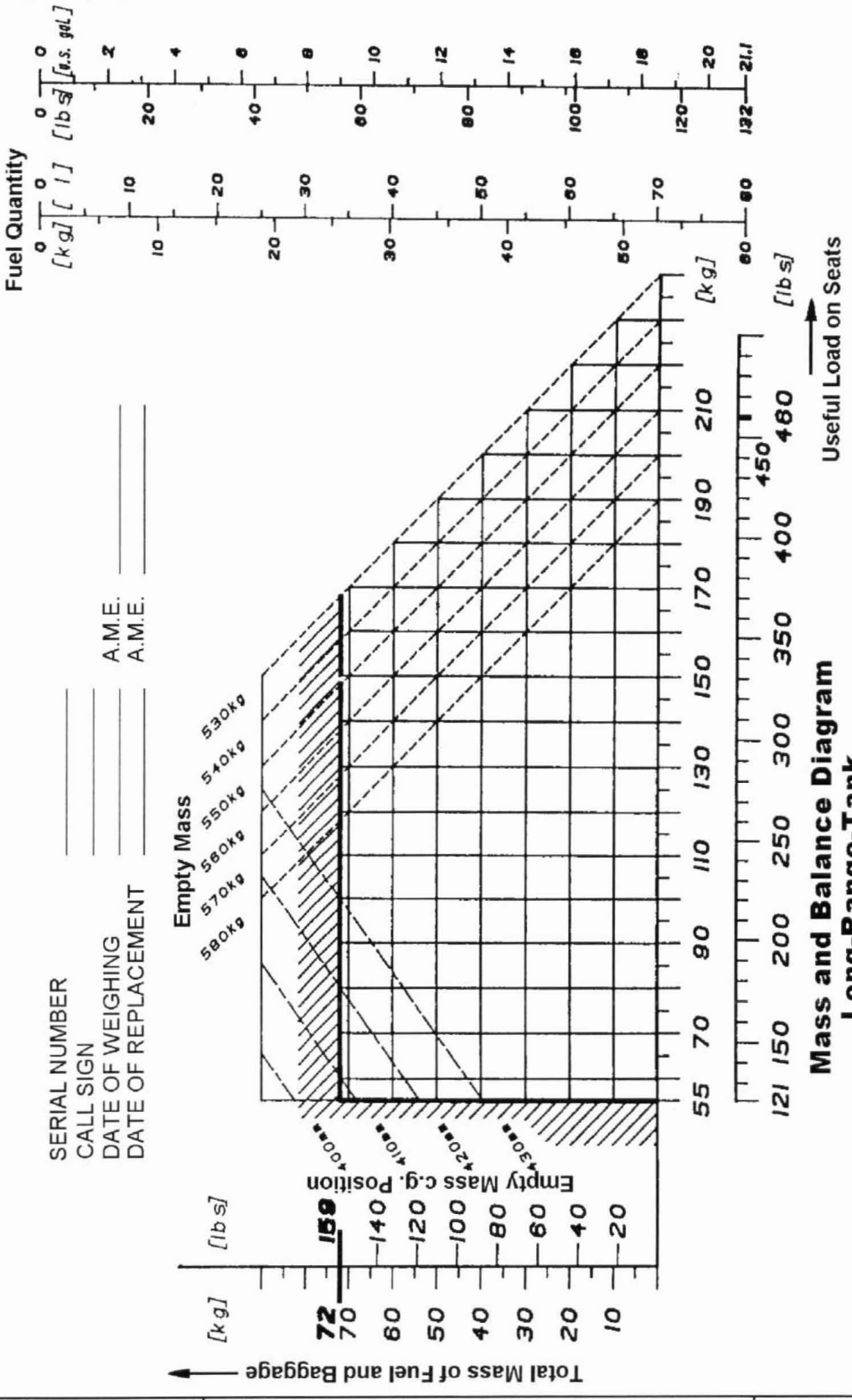
Examples



Mass and Balance Diagram
Long Range Tank (79 liters)



Mass and Balance Diagram
Standard Tank (55 liters)


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

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 airplane, 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.

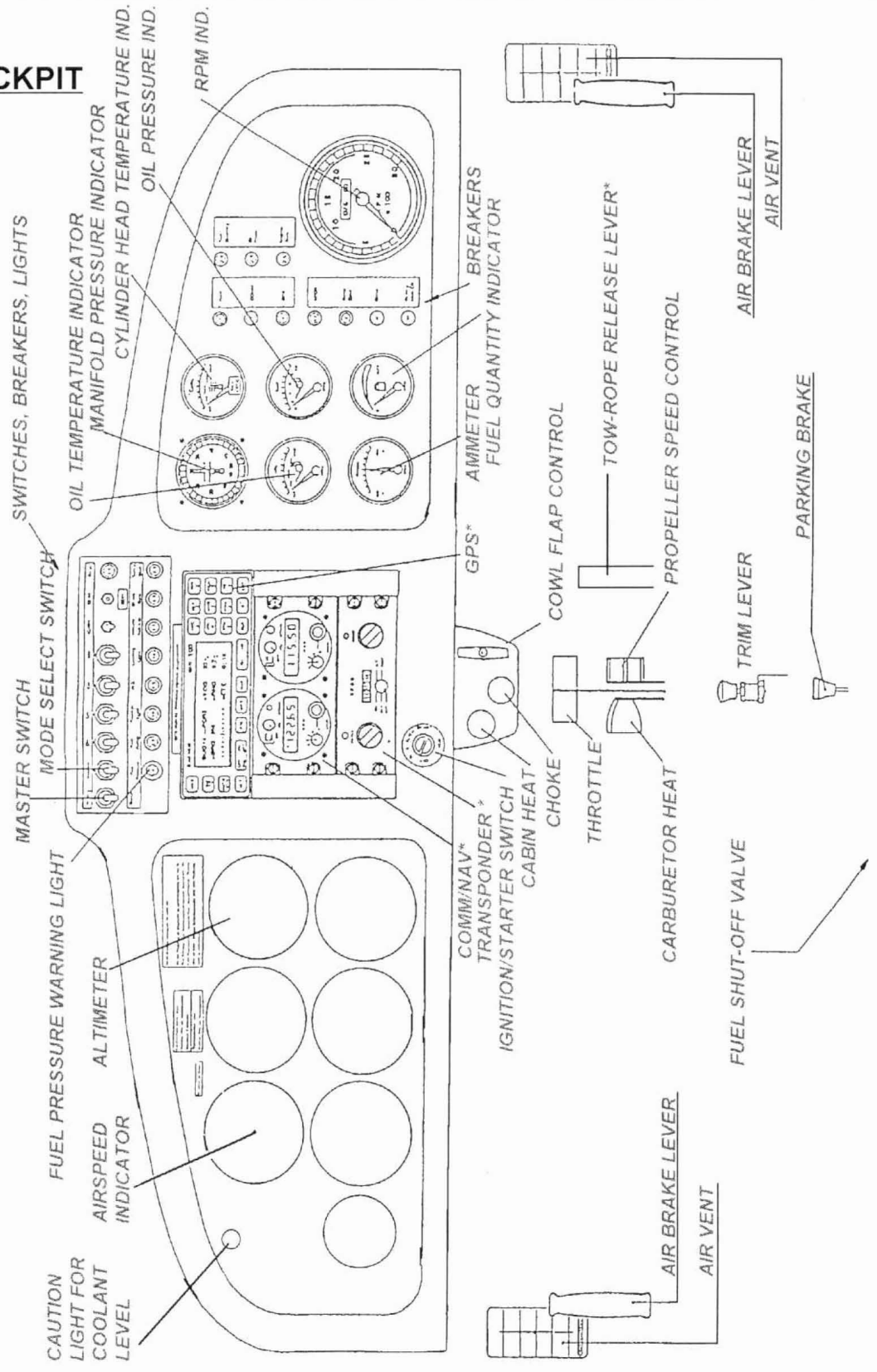
7.7 BAGGAGE COMPARTMENT

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.

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 Airplane 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), airplane 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 Airplane Flight Manual.

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

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

9.2 LIST OF SUPPLEMENTS

Airplane S/N.:	Call Sign:	Date:			
Suppl. No.	**Title**	**Rev. No.**	**Date**	**applicable**	
				YES	**NO**
1	Tow-Plane Operation	0	09 Jan 2002	□	□
3	Electrical Power Socket for Additional Equipment	0	09 Jan 2002	□	□
5	Operation with Winterization Kit	0	09 Jan 2002	□	□
9	Operation with Tow-Rope Retraction Device	0	09 Jan 2002	□	□

Diamond AIRCRAFT

SUPPLEMENT NO. 1
to the Airplane Flight Manual
for the Powered Sailplane
HK 36 TC with ROTAX 912 S

TOW-PLANE OPERATION

Date of Issue of the Supplement : January 9, 2002

Doc. No. : 3.01.12-E

Pages identified by "ACG-appr." in the List of Effective Pages are approved by:

Signature :

Authority :

Stamp : AUSTRO CONTROL GmbH
Abteilung Flugtechnik
Zentrale
A-1030 Wien, Schnirchgasse 11

Date of approval : 10. MAI 2002

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 Airplane Flight Manual.

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

0.1 RECORD OF REVISIONS

Rev. No.	Reason	Chap-ter(s)	Page(s)	Date of Revision	Approval	Date of Approval	Date Inserted	Signature
1	Banner towing in Germany	0	9-1-1 9-1-2	2002-05-06	[approved by Ing. Andreas Winkler for ACG]	2002-06-19		
		2	9-1-10					
2	Increase in Tow Mass	all	all except cover sheet	2003-04-23	AUSTRO CONTROL GmbH 440	08. MAI 2003		

0.2 LIST OF EFFECTIVE PAGES

Chapter	Page	Date
0	9-1-0 9-1-1 9-1-2 9-1-3	09 Jan 2002 23 Apr 2003 23 Apr 2003 23 Apr 2003
1	9-1-4 9-1-5	23 Apr 2003 23 Apr 2003
2	ACG-appr. 9-1-6 ACG-appr. 9-1-7 ACG-appr. 9-1-8 ACG-appr. 9-1-9 ACG-appr. 9-1-10	23 Apr 2003 23 Apr 2003 23 Apr 2003 23 Apr 2003 23 Apr 2003
3	ACG-appr. 9-1-11 ACG-appr. 9-1-12	23 Apr 2003 23 Apr 2003
4	ACG-appr. 9-1-13 ACG-appr. 9-1-14 ACG-appr. 9-1-15 ACG-appr. 9-1-16	23 Apr 2003 23 Apr 2003 23 Apr 2003 23 Apr 2003
5	ACG-appr. 9-1-17 ACG-appr. 9-1-18 ACG-appr. 9-1-19 ACG-appr. 9-1-21 ACG-appr. 9-1-22 ACG-appr. 9-1-23 ACG-appr. 9-1-24 9-1-25	23 Apr 2003 23 Apr 2003 23 Apr 2003 23 Apr 2003 23 Apr 2003 23 Apr 2003 23 Apr 2003 23 Apr 2003
6	9-1-26	23 Apr 2003
7	9-1-27	23 Apr 2003
8	9-1-28	23 Apr 2003

0.3 TABLE OF CONTENTS

1. GENERAL

1.1 INTRODUCTION

These pages constitute Supplement No. 1 to the "Airplane Flight Manual for the Powered Sailplane HK 36 TC with ROTAX 912 S" and are valid only for the operation of the powered sailplane as a tow-plane.

Translation of this Supplement has been done by best knowledge and judgement. In any case, the original document in the German language is authoritative.

1.2 CERTIFICATION BASIS

Tow-plane operation of this airplane has been approved in compliance with the draft of the LBA airworthiness requirements for tow-plane operation dated February 1971.

1.4 EXPLANATIONS

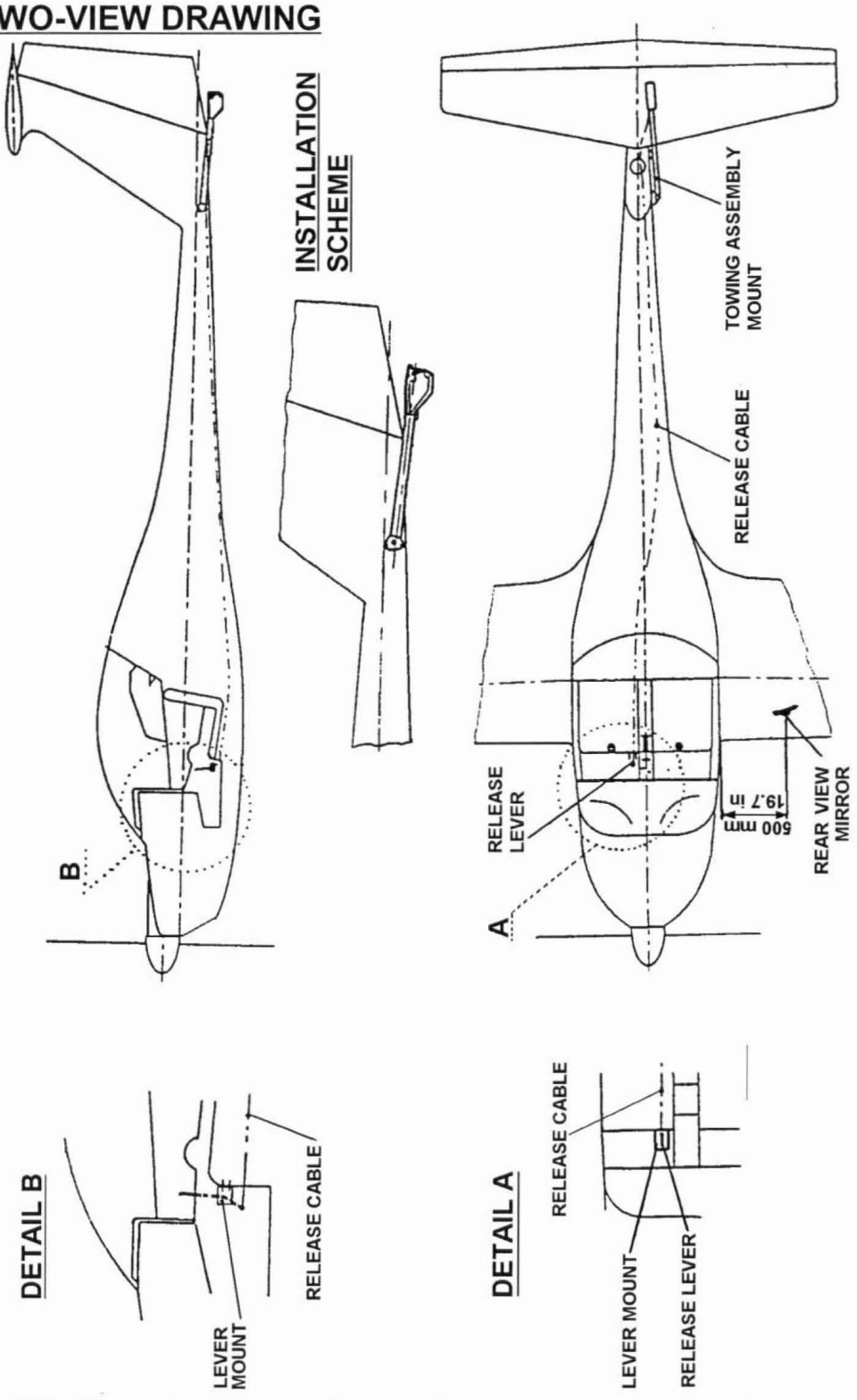
Sailplane — In this Supplement, this term is used to denote the towed sailplane or the towed powered sailplane.

1.6 DESCRIPTIVE DATA

The towing device E 85, manufactured by Tost, is attached to the fuselage tube by means of a steel fitting specially designed for the HK 36 TC. The tow-rope is released through a cable mechanism connected to a release lever in the cockpit.

For tow-plane operation, an additional rear view mirror must be attached to the left wing using two camlocs (see Section 1.7, TWO-VIEW DRAWING).

1.7 TWO-VIEW DRAWING



2. OPERATING LIMITATIONS

2.2 AIRSPEED

NOTE

All airspeeds given in this Supplement are to be understood as indicated airspeeds (IAS).

The maximum permissible speed for sailplane or banner towing is 135 km/h (73 kts / 84 mph) or the maximum permissible towing speed of the towed sailplane or banner, whichever is the lowest.

The minimum permissible speed for the combination is 90 km/h (49 kts / 56 mph) or 1.2 times v_{S1} of the towed sailplane, whichever is the greatest.

The minimum permissible speed for banner towing is 90 km/h (49 kts / 56 mph).

Only sailplanes with a design aerotow speed (v_T) of at least 105 km/h (57 kts / 65 mph) may be towed.

2.6 MASS (WEIGHT)

2.6.1 AEROTOWING

The flight mass of the towed sailplane must not exceed 600 kg (1323 lb).

The maximum take-off mass of the tow-plane is 720 kg (1587 lb).

2.10 FLIGHT CREW

When used as a tow-plane, the HK 36 TC must be flown by a solo-pilot. For instruction purposes, dual flight is permissible, provided that the take-off mass of the tow-plane does not exceed 770 kg (1698 lb) and the flight mass of the sailplane to be towed does not exceed 380 kg (838 lb).

2.12 MINIMUM EQUIPMENT LIST

(a) Additional equipment for tow-plane operation

1 Tost towing device E 85

1 Fitting, Dwg. No. 820-2550-00-00, Sheet 2

1 Release mechanism

1 Caution light (amber) for the tow-rope, if required by national regulations

NOTE

The following equipment is not taken into account for CG determination, is however required for the respective kind of operation:

Sailplane towing:

1 Tow-rope[1)], 30 to 55 m (100 to 180 ft) long
1 Pair of connection rings complying with LN 65091
1 Breaking piece on tow-plane: ultimate load 300 daN (674 lbf), green
1 Rear view mirror

if required by national regulations or by the sailplane manufacturer:

1 Breaking piece on the sailplane, see applicable regulations for required ultimate load

Banner towing:

1 Catch rope, approximately 35 m (115 ft) long
1 Catch hook with turned back ends (Holland Aviation, Part No. 1607)
1 Pair of connection rings complying with LN 65091
1 Rear view mirror
1 Breaking piece on tow-plane: ultimate load 300 daN (674 lbf), green
1 Suitable pick-up mounting on the ground

NOTE

The applicable national requirements for use, approval and suitability of the banner must be observed.

CAUTION

The pilot must ensure that the correct breaking piece (see above) is installed in the tow-rope, as the structure may otherwise become overstressed.

---

[1] Translated extract of the applicable airworthiness requirement (see Section 1.2 of this Supplement No. 1):

2.8 Tow-Rope and Breaking Piece

Only plastic ropes may be used, e.g., polyamide, polyester, polypropylene, etc. in accordance with aeronautical standards, DIN standards or factory specifications, provided that these standards (specifications) contain sufficient data and ensure delivery with continuous quality. The rope connections should be suitably covered to provide wear protection.

[...] At the permissible load on the rope, the strain of the rope should not exceed 30 %.

[...] The owner/operator of the tow-plane is responsible for the selection, use, and maintenance of the tow-rope.

2.15 OTHER LIMITATIONS

2.15.1 SAILPLANE TOWING

* Towing of sailplanes and powered sailplanes is permitted, as long as these are approved for aerotowing.

* The towing of more than one sailplane at a time is not permitted.

* A towing device approved for aerotow launching must be used on the sailplane.

During test flights, the most common sailplane models (light single-seater, single-seater with and without water ballast, dual-seater up to 500 kg / 1102 lbs, sailplanes of open class up to 600 kg / 1323 lbs) were towed without restrictions on the operating limitations. However, the pilot must verify in each case whether the sailplane can be towed without exceeding the operating limitations of the tow-plane or the sailplane.

2.15.2 BANNER TOWING

* For banner towing the drag of the banner is the relevant item. The drag of the banner must not exceed 70 daN (157 lbf) at an airspeed of 135 km/h (73 kts / 84 mph). Should no drag data be available, the banner must be tested in accordance with a test program agreed upon with the competent authority.

NOTE

Low-drag banners with areas up to 40 m² (430 sq. ft.) have been tested.

* Take-off with a banner is not approved.

3. EMERGENCY PROCEDURES

3.7 ENGINE FAILURE

* In case of engine failure during tow-flight, release tow-rope or advise sailplane pilot (via radio or by giving signs) to release.

* Proceed according to the Emergency Procedures in the main part of the Airplane Flight Manual.

3.9 OTHER EMERGENCIES

3.9.1 ABNORMAL POSITION OF TOWED SAILPLANE

* If maneuverability is no longer ensured, due to an abnormal position of the towed sailplane, the tow-rope must be released immediately.

* If the towed sailplane is apparently outside of a 60° cone behind the tow-plane (i.e., if the angle between the tow-rope and the longitudinal axis of the tow-plane exceeds 30°), the tow-rope must be released immediately.

WARNING

The critical configuration is usually the one in which the sailplane climbs above the tow-plane during take-off and climb, especially when using a tow-rope connector located at the CG of the sailplane (if approved).

3.10 FAILURE OF THE RELEASE MECHANISM ON THE SAILPLANE

Landing of the complete combination is possible with the air brakes of the sailplane fully extended and the rate of descent being controlled via the power setting of the tow-plane.

WARNING

During towing, the air brakes of the tow-plane must not be extended.

3.11 BANNER CAUGHT ON LANDING GEAR OR BANNER CANNOT BE DROPPED

* If possible, communicate with ground personnel to ascertain where the banner is caught on the airplane.

* Land with increased approach speed on an asphalt or concrete runway.

CAUTION

Be prepared to counteract if the airplane swings!

4. NORMAL PROCEDURES

4.3 DAILY INSPECTION

* Check towing device and release mechanism for excessive dirt and improper operation (perform release test).
* If installed, check tow-rope caution light for improper operation.
* Check tow-rope, connection rings and breaking piece for excessive wear, damage and improper arrangement.
* Check rear view mirror for insecure attachment.

4.5 NORMAL PROCEDURES AND RECOMMENDED SPEEDS

4.5.2 TAKE-OFF AND CLIMB

(a) Sailplane Towing

CAUTION

During the acceleration phase, care must be taken to ensure that the sailplane lifts off first, and that the minimum towing speed is reached while still in close proximity to the ground.

The normal flying speed during towing is 105 km/h (57 kts / 65 mph). If, due to the construction of the sailplane, a lower flying speed is necessary, the flying speed may be reduced down to the minimum permissible speed for sailplane towing. When towing a sailplane with a high wing loading and/or when turbulence is encountered, towing speeds up to 120 km/h (65 kts / 75 mph) are recommended.

CAUTION

At towing speeds below 105 km/h (57 kts / 65 mph), special attention must be paid to the engine temperatures.

(b) Banner towing

After pick-up of the banner, climb to a safe height with at least 90 km/h (49 kts / 56 mph).

When a safe height has been reached, switch the electric fuel pump OFF.

4.5.3 FLIGHT

During cruise, select power setting as required.

CAUTION

Monitor the engine temperatures!

4.5.5 APPROACH AND LANDING

* Prior to landing, drop tow-rope or banner.
* Verify successful release (check amber caution light, if installed).
* Proceed according to the Normal Procedures in the main part of the Airplane Flight Manual.

Landing with the tow-rope attached is only possible if an approach sector totally clear of obstacles is available and only at an increased approach speed.

Landing with the banner attached is not approved.

4.5.12 PICK-UP OF THE BANNER

CAUTION

Over an appropriate distance in front of and behind the pick-up mounting, the ground must be examined for holes, wires, expansion joints, tufts of grass or other obstacles that the hook could get caught on. Unless otherwise stated by the banner manufacturer, the banner is placed on the ground, opposite to the direction of approach, on the departure side of the pick-up mounting. The banner is picked up in flight. Take-off is performed with the catch-rope attached and pulled behind the tow-plane. A suitable catch hook must be used (with turned back ends, see Section 2.12 MINIMUM EQUIPMENT LIST) to avoid getting caught on the ground.

The approach to the banner pick-up mounting must be sufficiently high and free of obstacles to prevent the hook from getting caught. Any risk for persons or property must be avoided.

The height above the pick-up mounting must be chosen such that the catch hook does not touch the ground. This requires practice. It is advisable to have a marshaller standing in a safe distance to the pick-up mounting.

CAUTION

Do not approach too low!

The conditions for banner pick-up are:

Electric fuel pump	ON
Cowl flap	OPEN
Propeller speed control	TAKE-OFF
Approach speed	min. 100 km/h (54 kts / 62 mph) max. 135 km/h (73 kts / 84 mph)
Throttle control	as required; after picking up the banner: FULL THROTTLE

5. PERFORMANCE

5.2 ACG-APPROVED DATA

5.2.3 TAKE-OFF PERFORMANCE

The following data does not include any safety reserve. It was determined under the following conditions:

- Take-off mass of tow-plane 720 kg (1587 lb)
- Take-off mass and lift-to-drag ratio of towed sailplane as given in table
- Maximum take-off power
- Propeller setting: TAKE-OFF
- Level runway, short and dry grass
- No crosswind component
- Constant headwind component
- Lift-off speed: approximately 90 km/h (49 kts., 56 mph)
- Climb speed: approximately 97 km/h (52 kts., 66 mph)

CAUTION

The minimum permissible speed for the combination is 97 km/h (52 kts. / 60 mph) or 1.2 times v_{S1} of the towed sailplane, whichever is the greatest.

CAUTION

For a safe take-off, the available length of the runway must at least be equal to the take-off distance over a 15 m (50 ft.) obstacle (s_2), in order to provide a safety reserve for emergencies (rupture of tow rope, etc.).

CAUTION

If the sailplane has a suitable mass but a lower lift-to-drag ratio than that given in the table, the next higher table must be used for the determination of the take-off distance. Example: For a sailplane with 400 kg (882 lb) but a lift-to-drag ratio of 35 the table „above 430 kg (948 lb) up to 500 kg (1102 lb) and lift-to-drag ratio min 25" must be used. For sailplanes in the range above 430 kg (948 lb) up to 500 kg (1102 lb) with a lift-to-drag ratio of less than 25, and in the range above 500 kg (1102 lb) up to 600 kg (1323 lb) with a lift-to-drag ratio of less than 58, no data is available.

WARNING

Under unfavorable conditions such as long grass, soft or uneven ground, crosswinds or gusting winds, or wet or dirty wings, especially on the sailplane, the take-off distance can become considerably extended. Under very unfavorable conditions, a safe take-off can become impossible.

5.2.3.1 Take-off distance for sailplane towing

The take-off distances for the towing combination are contained in the following tables, where

s_1 = Take-off roll, and

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

Take-off distance sailplane towing Sailplane up to 300 kg (661 lb), lift-to-drag ratio minimum 25									
Head-wind comp. [kts.]	OAT [°C]	Pressure altitude above MSL [m] / QFE [hPa]							
		0 / 1013		400 / 966		800 / 921		1200 / 877	
		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	237	391	272	441	314	502	366	574
	15	276	447	319	508	370	580	435	667
	30	322	511	373	585	436	671	515	778
5	0	191	330	221	374	257	426	300	489
	15	224	379	261	431	304	495	359	572
	30	262	435	307	499	360	574	429	668

Head-wind comp. [kts.]	OAT [° F]	Pressure altitude above MSL [ft.] / QFE [inHg]							
		0 / 29.9		1310 / 28.5		2620 / 27.2		3940 / 25.9	
		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	776	1282	890	1445	1030	1645	1199	1881
	59	904	1466	1045	1666	1213	1902	1425	2189
	86	1054	1676	1223	1917	1431	2201	1687	2551
5	32	625	1081	725	1226	841	1398	984	1603
	59	734	1241	854	1412	997	1622	1176	1876
	86	859	1427	1006	1637	1181	1882	1407	2190

Take-off distance sailplane towing
Sailplane above 300 kg (661 lb) up to 430 kg (948 lb), lift-to-drag ratio minimum 38

Head-wind comp. [kts.]	OAT [°C]	Pressure altitude above MSL [m] / QFE [hPa]							
		0 / 1013		400 / 966		800 / 921		1200 / 877	
		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	279	504	322	572	374	651	435	746
	15	327	579	379	659	441	756	520	873
	30	381	665	445	761	523	877	621	1021
5	0	225	429	261	488	304	557	357	641
	15	264	494	309	565	362	649	429	751
	30	311	568	364	653	430	755	513	882

Head-wind comp. [kts.]	OAT [° F]	Pressure altitude above MSL [ft.] / QFE [inHg]							
		0 / 29.9		1310 / 28.5		2620 / 27.2		3940 / 25.9	
		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	914	1654	1055	1875	1226	2134	1427	2445
	59	1071	1898	1242	2161	1447	2479	1705	2864
	86	1250	2181	1460	2494	1714	2875	2035	3350
5	32	736	1407	854	1599	996	1827	1171	2101
	59	869	1621	1011	1854	1186	2128	1405	2461
	86	1019	1867	1194	2142	1410	2477	1681	2891

Take-off distance sailplane towing Sailplane above 430 kg (948 lb) up to 500 kg (1102 lb), lift-to-drag ratio minimum 25									
Head-wind comp. [kts.]	OAT [°C]	Pressure altitude above MSL [m] / QFE [hPa]							
		0 / 1013		400 / 966		800 / 921		1200 / 877	
		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	320	517	374	590	439	682	520	792
	15	379	600	446	691	528	802	634	941
	30	450	696	531	808	636	946	774	1123
5	0	259	434	303	498	358	577	427	673
	15	308	507	363	585	433	682	523	803
	30	366	588	437	686	525	807	641	960

Head-wind comp. [kts.]	OAT [° F]	Pressure altitude above MSL [ft.] / QFE [inHg]							
		0 / 29.9		1310 / 28.5		2620 / 27.2		3940 / 25.9	
		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	1049	1694	1225	1935	1439	2236	1706	2598
	59	1243	1969	1461	2264	1731	2631	2078	3088
	86	1476	2281	1742	2648	2086	3101	2537	3683
5	32	847	1424	993	1634	1174	1891	1401	2207
	59	1010	1662	1191	1918	1421	2238	1713	2632
	86	1201	1929	1431	2249	1721	2645	2103	3147

Take-off distance sailplane towing Sailplane above 500 kg (1102 lb) up to 600 kg (1323 lb), lift-to-drag ratio min. 58									
Head-wind comp. [kts.]	**OAT [°C]**	**Pressure altitude above MSL [m] / QFE [hPa]**							
		0 / 1013		**400 / 966**		**800 / 921**		**1200 / 877**	
		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	323	518	373	589	434	672	509	774
	15	379	596	440	681	517	782	611	907
	30	443	686	520	787	615	911	734	1066
5	0	258	433	300	494	351	565	413	652
	15	305	502	355	573	419	660	498	767
	30	358	578	422	665	500	771	601	904

Head-wind comp. [kts.]	**OAT [° F]**	**Pressure altitude above MSL [ft.] / QFE [inHg]**							
		0 / 29.9		**1310 / 28.5**		**2620 / 27.2**		**3940 / 25.9**	
		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	1058	1698	1222	1932	1424	2202	1670	2540
	59	1243	1955	1444	2233	1694	2564	2004	2974
	86	1454	2249	1704	2581	2015	2986	2406	3496
5	32	844	1421	982	1620	1149	1853	1355	2139
	59	999	1646	1165	1880	1374	2164	1633	2516
	86	1174	1895	1384	2180	1640	2528	1970	2964

5.2.3.2 Take-off distance for instruction purposes

The following data does not include any safety reserve. It was determined under the following changed conditions:

- Take-off mass of tow-plane 770 kg (1698 lb)
- Take-off mass of towed sailplane max. 380 kg (838 lb)
- Lift-to-drag ratio of the towed sailplane min. 38

The take-off distances for the towing combination are contained in the following tables, where

s_1 = Take-off roll, and

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

Take-off distance sailplane towing - Instruction Flight
Sailplane max. 380 kg (837 lb), lift-to-drag ratio min. 38

Head-wind comp. [kts.]	OAT [°C]	Pressure altitude above MSL [m] / QFE [hPa]							
		0 / 1013		400 / 966		800 / 921		1200 / 877	
		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	277	449	319	510	370	581	434	669
	15	325	517	377	590	440	675	518	781
	30	379	593	443	679	521	784	620	916
5	0	223	378	259	430	302	492	355	567
	15	262	436	306	500	359	574	426	666
	30	309	502	362	578	429	669	512	781

Head-wind comp. [kts.]	OAT [° F]	Pressure altitude above MSL [ft.] / QFE [inHg]							
		0 / 29.9		1310 / 28.5		2620 / 27.2		3940 / 25.9	
		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	908	1472	1044	1672	1214	1904	1424	2192
	59	1065	1695	1234	1936	1443	2214	1700	2562
	86	1242	1944	1452	2228	1709	2572	2033	3003
5	32	731	1239	848	1411	989	1613	1163	1860
	59	859	1428	1004	1639	1178	1881	1396	2185
	86	1012	1647	1186	1895	1405	2195	1679	2563

5.3 ADDITIONAL INFORMATION

5.3.5 CLIMB PERFORMANCE

When towing a sailplane with a mass of 370 kg (816 lb), the maximum rate of climb is 2.3 meters per second (450 fpm) at sea level in Standard Atmosphere conditions.

When towing a sailplane with a mass of 600 kg (1323 lb), the maximum rate of climb is 2.1 meters per second (410 fpm) at sea level in Standard Atmosphere conditions.

The maximum rate of climb with a banner in accordance with 2.15.2 is 3.05 m/s (600 fpm) at 105 km/h (57 kts / 65 mph) at sea level in Standard Atmosphere conditions.

5.3.7 FUEL CONSUMPTION, CRUISING SPEED, ENDURANCE, RANGE

The fuel consumption and endurance data given in the main part of the Airplane Flight Manual remains valid. Cruising speed and range are significantly lower, depending on the type of the sailplane or the size of the banner.

6. MASS (WEIGHT) AND BALANCE

6.1 INTRODUCTION

For the operation of the HK 36 TC as a tow-plane, the permissible empty mass CG range and the permissible CG range during flight remain unchanged. The loading restrictions under 2.6 MASS (WEIGHT) and 2.10 FLIGHT CREW of this Supplement No. 1 must be complied with.

7. POWERED SAILPLANE AND SYSTEMS DESCRIPTION

7.8 COCKPIT

The release lever for the towing device is yellow and is located to the right of the throttle quadrant. It should have a dead travel of approximately 10 millimeters (0.4 inches). By pulling on the lever, the rope is released.

A caution light (if required) is installed in the instrument panel. It illuminates as long as the tow-rope is being held by the towing device.

7.14 PLACARDS / INSCRIPTIONS

The following additional placards are installed for tow-plane operation of the HK 36 TC:

Placard	Place	Remark
Tow-Rope	next to the caution light for the tow-rope	only if caution light is required
Tow-Rope Release	on the release lever	
Ultimate load of breaking piece: 300 daN (674 lbs.)	on the towing assembly mount	

8. POWERED SAILPLANE HANDLING, CARE AND MAINTENANCE

8.2 POWERED SAILPLANE INSPECTION PERIODS

8.2.1 INSPECTION PERIODS FOR THE TOWING DEVICE

At each 100 hour inspection of the airplane, the system must be cleaned, lubricated, and checked for poor condition and improper operation.

The towing device must be removed from the airplane and sent to the manufacturer for overhaul -

* if defects are found during the 100 hour inspection, or
* after 2000 tows,

whichever comes first.

Diamond AIRCRAFT

SUPPLEMENT NO. 3
to the Airplane Flight Manual
for the Powered Sailplane
HK 36 TC with ROTAX 912 S

ELECTRICAL POWER SOCKET FOR ADDITIONAL EQUIPMENT

Date of Issue of the Supplement : January 9, 2002
Doc. No. : 3.01.12-E

This Supplement does not require approval.

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 Airplane Flight Manual.

DIAMOND AIRCRAFT INDUSTRIES GMBH
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AUSTRIA

0.1 RECORD OF REVISIONS

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7, 8	9-3-6	09 Jan 2002

0.3 TABLE OF CONTENTS

1. GENERAL

1.1 INTRODUCTION

These pages constitute Supplement No. 3 to the "Airplane Flight Manual for the Powered Sailplane HK 36 TC with ROTAX 912 S" and are valid only for the operation of the powered sailplane with the electrical power socket for additional equipment installed.

Translation of this Supplement has been done by best knowledge and judgement. In any case, the original document in the German language is authoritative.

1.6 DESCRIPTIVE DATA

The electrical power socket is intended for the supply of various additional equipment on the ground. This equipment must be provided with a cigarette lighter type plug.

When not in use, the socket must be closed with a cover.

2. OPERATING LIMITATIONS

The electrical power socket may only be used during ground operation, since it cannot be ruled out that the additional equipment will affect the on-board electronic equipment and avionics.

During take-off, cruise and landing, use of the socket is not permitted.

The socket is protected by a 2 ampère fuse.

3. EMERGENCY PROCEDURES

no change

4. NORMAL PROCEDURES

no change

5. PERFORMANCE

no change

6. MASS (WEIGHT) AND BALANCE

6.9 EQUIPMENT LIST

Additional equipment required for the power socket

1 Socket

1 Wire harness with fuse

1 Cover

7. POWERED SAILPLANE AND SYSTEMS DESCRIPTION

7.11 ELECTRICAL SYSTEM

The electrical socket is supplied from electrical bus No. 2 (switch panel) via a fuse. The fuse is located behind the instrument panel and is therefore inaccessible during flight.

7.14 PLACARDS / INSCRIPTIONS

The following additional placard is installed when the additional power socket is installed:

Placard	Place	Remark
Power connector should be used **only** on ground. Maximum load **2 A**.	next to the electrical power socket	

8. POWERED SAILPLANE HANDLING, CARE AND MAINTENANCE

8.2 POWERED SAILPLANE INSPECTION PERIODS

8.2.1 INSPECTION PERIODS FOR THE ELECTRICAL POWER SOCKET

At each 100 hour inspection, the system should be checked for improper operation.

Diamond AIRCRAFT

SUPPLEMENT NO. 5
to the Airplane Flight Manual
for the Powered Sailplane
HK 36 TC with ROTAX 912 S

OPERATION WITH WINTERIZATION KIT

Date of Issue of the Supplement : January 9, 2002

Doc. No. : 3.01.12-E

Pages identified by "ACG-appr." in the List of Effective Pages are approved by:

Signature : Winkler

Authority : AUSTRO CONTROL GmbH
Abteilung Flugtechnik
Zentrale
A-1030 Wien, Schnirchgasse 11

Stamp : AUSTRO CONTROL GmbH 640

Date of approval : 11. JUNI 2002

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 Airplane Flight Manual.

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AUSTRIA

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3, 4, 5, 6	ACG-appr. 9-5-6	09 Jan 2002
7, 8	9-5-7	09 Jan 2002

0.3 TABLE OF CONTENTS

1. GENERAL

1.1 INTRODUCTION

These pages constitute Supplement No. 5 to the "Airplane Flight Manual for the Powered Sailplane HK 36 TC with ROTAX 912 S" and are valid only for the operation of the powered sailplane with the optional winterization kit.

Translation of this Supplement has been done by best knowledge and judgement. In any case, the original document in the German language is authoritative.

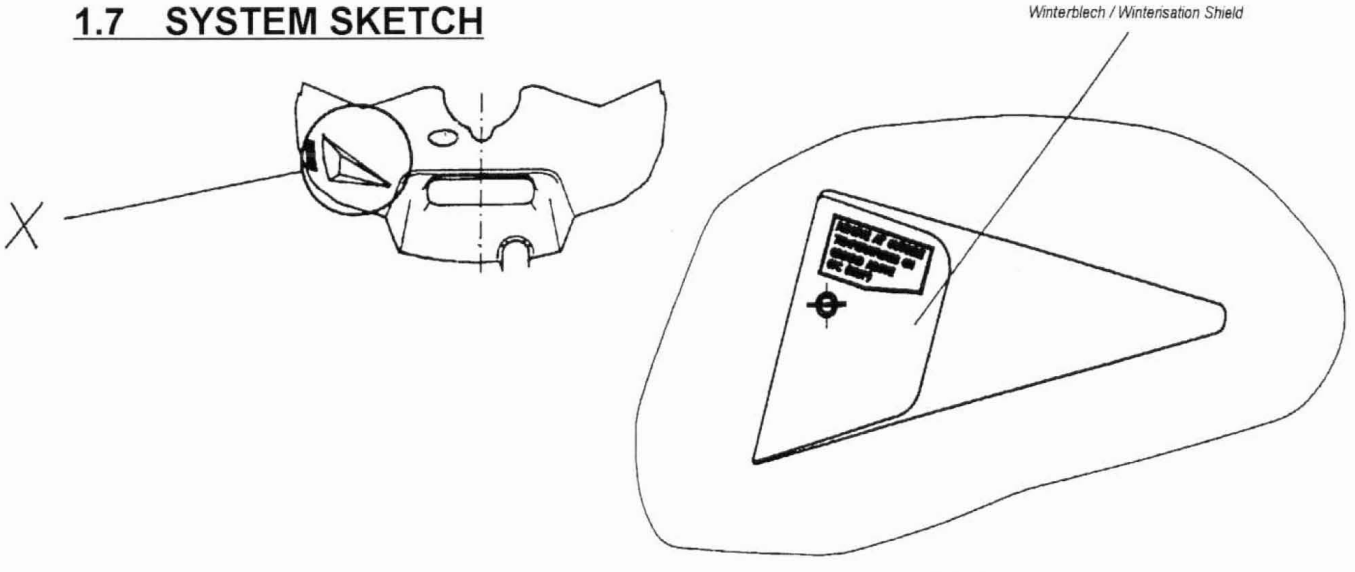
1.6 DESCRIPTIVE DATA

The winterization kit consists of a yellow protective metal plate (winterization shield) which reduces the cross sectional area of the air intake for the oil cooler. The plate is attached to the air intake using a camloc.

The winterization shield can easily be installed or removed.

Diamond Aircraft Service Bulletin No. 53 (latest issue) must be carried out to prepare the powered sailplane for the operation with the winterization kit.

1.7 SYSTEM SKETCH



Detail X

2. OPERATING LIMITATIONS

2.12 MINIMUM EQUIPMENT LIST

Additional equipment for tow-plane operation with winterization kit

1 Winterization shield for the air intake of the oil cooler
1 Camloc for the attachment of the winterization shield

2.15 OTHER LIMITATIONS

The winterization shield should only be used when the outside air temperature on the ground is below 15 °C (59 °F). An excessive increase in engine temperatures may otherwise result.

2.16 LIMITATION PLACARDS

Placard	Place	Remark
REMOVE AT OUTSIDE TEMPERATURES ON GROUND ABOVE 15 °C (59 °F)	on the winterization shield	

3. EMERGENCY PROCEDURES

No change.

4. NORMAL PROCEDURES

4.4 PREFLIGHT INSPECTION

The preflight inspection is supplemented by the following items:

* Check whether the outside air temperature permits the use of the winterization shield.

* If operation is permissible, check for improper mounting or looseness.

5. PERFORMANCE

No change.

6. MASS (WEIGHT) AND BALANCE

The mass (weight) of the winterization kit is so small that it can be neglected. Thus there is no change in Chapter 6.

7. POWERED SAILPLANE AND SYSTEMS DESCRIPTION

7.9 POWER PLANT

By using the winterization shield at low outside air temperatures, the oil temperature increases by up to 20 °C (36 °F), compared to operation without winterization shield.

Due to the increased oil temperature, the water condenses out of the oil more easily.

8. POWERED SAILPLANE HANDLING, CARE AND MAINTENANCE

8.2 POWERED SAILPLANE INSPECTION PERIODS

The winterization shield and its attachment are checked during scheduled inspections as part of the normal maintenance routine.

Diamond AIRCRAFT

SUPPLEMENT NO. 9
to the Airplane Flight Manual
for the Powered Sailplane
HK 36 TC with ROTAX 912 S

OPERATION WITH
TOW-ROPE RETRACTION DEVICE

Date of Issue of the Supplement : January 9, 2002

Doc. No. : 3.01.12-E

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Signature :

Authority :

AUSTRO CONTROL GmbH
Abteilung Flugtechnik
Zentrale
A-1030 Wien, Schnirchgasse 11

Stamp :

Date of approval : 10. MAI 2002

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 Airplane Flight Manual.

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	ACG-appr. 9-1-10	09 Jan 2002
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7	9-1-14	09 Jan 2002
	9-1-15	09 Jan 2002
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	9-1-17	09 Jan 2002

0.3 TABLE OF CONTENTS

1. GENERAL

1.1 INTRODUCTION

These pages constitute Supplement No. 9 to the "Airplane Flight Manual for the Powered Sailplane HK 36 TC with ROTAX 912 S" and are valid only for the operation of the powered sailplane with tow-rope retraction device in combination with the standard towing device and the corresponding AFM Supplement No. 1.

Translation of this Supplement has been done by best knowledge and judgement. In any case, the original document in the German language is authoritative.

1.4 EXPLANATIONS

Sailplane In this Supplement, this term is used to denote the towed sailplane or the towed powered sailplane.

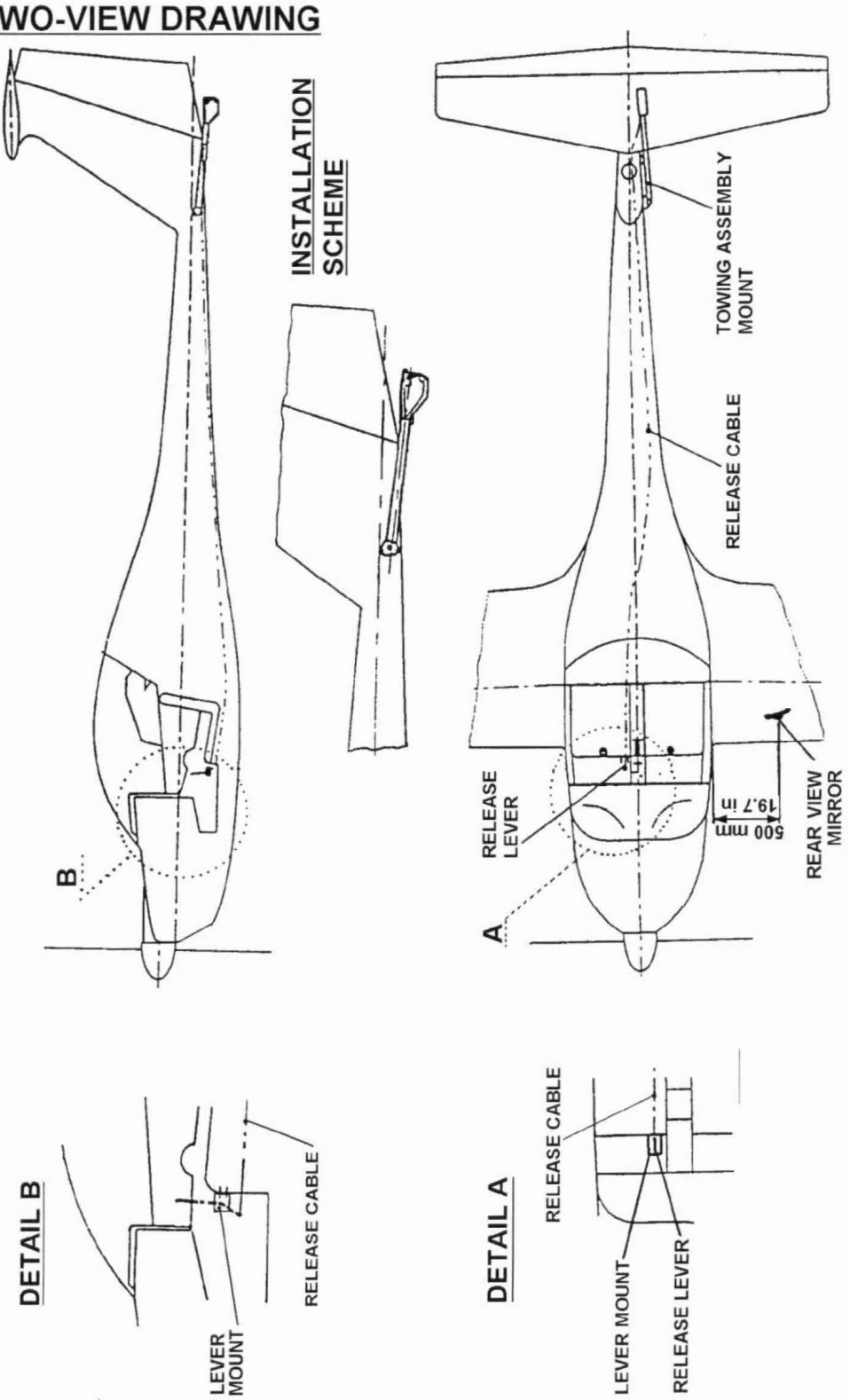
1.6 DESCRIPTIVE DATA

The tow-rope retraction device is installed in the baggage compartment of the powered sailplane. The device allows the retraction of the tow-rope during flight, after the towed sailplane has been released.

The powered sailplane can land immediately without dropping the tow-rope.

The tow-rope may be detached with the cable cutting mechanism in critical moments of flight.

1.7 TWO-VIEW DRAWING



2. OPERATING LIMITATIONS

2.6 MASS (WEIGHT)

During towing operation with the use of the tow-rope retraction device no baggage may be carried in the baggage compartment.

2.12 MINIMUM EQUIPMENT LIST

Additional equipment for tow-plane operation with tow-rope retraction device

1 Tow-rope winch and mount

1 Tow-rope guide tube

1 Cutting mechanism

1 Tow-rope at a length of 30 to 50 m (98 to 164 ft) made of PVC or polyamide, max. diameter 6.3 mm (0.25 in), with green marking in accordance with DAI-WI No. 27

1 Aluminum stop-egg

1 End-piece, silicone protection tube, breaking-piece (with ultimate load of 300 daN / 674 lbf) and ring-couple

2.15 OTHER LIMITATIONS

2.15.1 SAILPLANE TOWING

Operation of tow-rope retraction device and standard towing device at the same time is not permitted, i.e., only one system may be in use at a time, while the other one must be secured against possible use.

2.15.2 BANNER TOWING

Banner towing is not permitted with the tow-rope retraction device.

2.16 LIMITATION PLACARDS

Placard	Place	Remark
WARNING Operation with the Tow-Rope Retraction Device The release cable must be connected with the cable of the cutting mechanism (of the tow-rope retraction device). The standard towing coupling must be secured against use by wire. Operation with the Release Mechanism The release cable must be connected with the standard towing coupling. The ring couple of the tow-rope retraction device must be secured at the cutting lever with a wire against pulling out.	on towing device mount	
During towing operation with use of the Tow-Rope Retraction Device no baggage may be carried.	on cover of winch drum	

3. EMERGENCY PROCEDURES

3.7 ENGINE FAILURE

* In case of engine failure during tow-flight, advise sailplane pilot (via radio or by giving signs) to release, or cut tow-rope.

CAUTION

In case of emergency pull the yellow/red release handle of the cutting mechanism (also release handle of standard towing device) abruptly all the way to the stop.

* Proceed according to the Emergency Procedures in the main part of the Airplane Flight Manual.

3.9 OTHER EMERGENCIES

3.9.1 ABNORMAL POSITION OF TOWED SAILPLANE

* If maneuverability is no longer ensured, due to an abnormal position of the towed sailplane, the tow-rope must be cut immediately.

* If the towed sailplane is apparently outside of a 60° cone behind the tow-plane (i.e., if the angle between the tow-rope and the longitudinal axis of the tow-plane exceeds 30°), the tow-rope must be cut immediately.

WARNING

The critical configuration is usually the one in which the sailplane climbs above the tow-plane during take-off and climb, especially when using a tow-rope connector located at the CG of the sailplane.

3.10 MALFUNCTION OF THE TOW-ROPE RETRACTION DEVICE

If the tow-rope is not retractable during flight, it should be cut above the airfield whilst still in flight. Landings with tow-rope not retracted shall only be performed if an approach sector totally clear of obstacles is available and only at an increased approach speed.

If a knot is tied in the rope, as may happen in very few cases, the rope will be retracted just up to the knot. In such cases land as advised above and undo the knot.

In order to avoid knots being tied, the pilot of the towed sailplane must not release when the rope is under high load.

3.11 MALFUNCTIONS DURING TAXIING

During taxiing verify with help of the rear-view mirror that the tow-rope is totally retracted. Otherwise activate the tow-rope retraction winch by pressing the rocker-switch and retract the tow-rope completely. Not complying to this advice may lead to damage of the tow-plane's tail.

4. NORMAL PROCEDURES

4.4 PREFLIGHT INSPECTION

* Check system for insecure mounting and loose connections.
* Verify that the winch drum is free to turn without any interference in its movement.
* Check stop-egg for looseness.
* Verify that cutting mechanism is connected to release cable.
* Check movement of the cutting knife for interference, by applying a slight pressure by hand.
* Check mouth piece for damage.
* Pull out tow-rope completely and check for damage, especially around the end piece.
* Check breaking piece.
* At cold outside air temperatures check for frozen tow-rope.
* Verify that rear view mirror is correctly adjusted.

4.5 NORMAL PROCEDURES AND RECOMMENDED SPEEDS

4.5.2 TAKE-OFF AND CLIMB

The tow-plane is positioned in front of the sailplane to be towed. The tow-rope must be pulled to the sailplane and attached to the towing coupling. The tow-plane pilot must tauten the tow-rope until the stop-egg is noticed to reach the stop-egg detent. Then the green marking of the tow-rope is visible.

CAUTION

The tow-plane pilot must only start towing after the stop-egg has reached the stop-egg detent. The green marking of the tow-rope must be visible.

4.5.5 APPROACH AND LANDING

1. After the sailplane has released, press the rocker-switch for the tow-rope retraction winch and retract the tow-rope. Illumination of the red warning light inside the rocker-switch indicates operation of the winch.
2. In the rear-view mirror mounted on the left-hand wing observe of the retraction of the tow-rope. When the end-piece with the breaking-piece is retracted, the winch will stop operating automatically.
3. By looking in the rear-view mirror verify the complete retraction of the tow-rope.
4. Perform landing approach as given in the main part of the Airplane Flight Manual. In case the tow-rope is not completely retracted, it should be cut during flight above the airfield. Landings with the tow-rope not retracted shall only be performed if an approach sector totally clear of obstacles is available and only at an increased approach speed.

NOTE

During retraction of the tow-rope it is recommended not to exceed an airspeed of 170 km/h (92 kts / 106 mph). This is in order to avoid early termination of the winch-operation.

5. PERFORMANCE

The data given in Supplement No. 1 remains valid.

6. MASS (WEIGHT) AND BALANCE

6.1 INTRODUCTION

For the operation of the airplane as a tow-plane the airplane must be weighed in order to determine the empty mass (weight) and the corresponding center of gravity.

7. POWERED SAILPLANE AND SYSTEMS DESCRIPTION

7.0 TOW-ROPE RETRACTION DEVICE

The tow-rope retraction device is connected to the electrical system through the automatic circuit breaker. The retraction device is therefore not operative during normal operation of the airplane.

The tow-rope retraction device consists of two sections:

Cutting Mechanism

The cutting mechanism is screwed to the standard towing coupling with an adapter. Tensile forces acting in the tow-rope during towing are released by the stop-egg onto the stop-egg detent and further to the existing towing-device mount. The stop-egg detent is an inner part of the cutting-mechanism located forward of the cutting-knife. The stop-egg is fixed onto the tow-rope and removes any tensile forces from the tow-rope winch.

The release lever for the standard towing device is also used for the actuation of the cutting mechanism.

Electrically Powered Tow-Rope Winch

The electrically powered winch (installed in the baggage compartment) is activated by a rocker switch (on/off switch with integrated thermal circuit protector). A red warning light inside the switch indicates operation of the winch. When the rope's endpiece is swallowed by the mouth piece the winch switches off automatically. 50 meters (164 ft) of tow-rope is the maximum usable length accomodated by the winch-drum. The tow-rope runs in the tow-rope guide tube which leads from the winch-drum to the cutting mechanism.

The rear-view mirror is mounted on the leading edge of the left-hand wing with two camlocs. The mirror is positioned as to give a view of the tow-rope.

7.11 ELECTRICAL SYSTEM

The winch rocker-switch with its integrated automatic circuit breaker is located on the cockpit's left-hand side. Winch-operation is stopped automatically by the automatic circuit breaker.

7.14 PLACARDS / INSCRIPTIONS

7.14.1 LIMITATION PLACARDS

Limitation placards are contained in this Supplement in Section 2.16 LIMITATION PLACARDS.

7.14.2 PLACARDS FOR COCKPIT CONTROLS

Placard	Place	Remark
Towing Coupling / Cutting Mechanism	on the release lever	in addition on the release lever: 4 red rings, 10 mm (0.4 in) wide in intervals of 20 mm (0.8 in), starting at the top

7.14.3 PLACARDS FOR ELECTRICAL EQUIPMENT

Placard	Place	Remark
Tow-Rope Retraction Device	next to rocker switch of tow-rope retraction device	

8. POWERED SAILPLANE HANDLING, CARE AND MAINTENANCE

8.2 POWERED SAILPLANE INSPECTION PERIODS

8.2.2 INSPECTION PERIODS FOR THE TOWING DEVICE

At each 100 hour inspection of the airplane, the retraction device must be checked for poor condition and malfunction and the cutting mechanism must be cleaned and lubricated.

The following steps must be accomplished:

* Verify proper operation of cutting-mechanism by activation with tow-rope fully retracted.
* Disassemble cutting-mechanism and inspect knife for good blade and check for damage.
* Clean inside of cutting-mechanism.
* Clean tow-rope guide tube and check for chafing or abrasion.
* For re-assembly of the cutting-knife the engraved arrow must point aft. Do not overtighten castle nut and secure it with split-pin.
* Lubricate all moving parts.
* Check spring of (red) cutting-lever.
* Check safety clutch for malfunction: if holding load is not between 70 and 90 N (15.7 and 20.2 lbf), have safety clutch adjusted by manufacturer. Holding load shall be measured on the rope directly at the winch drum.
* Check the load needed to pull out the tow-rope: if it is greater than 120 N (27 lbf), check system for excessive wear of tow-rope guide and replace damaged parts.
* Check winch drum for insecure mounting and damage.
* Re-install ring couple according to DAI-WI No. 27 at the end of the tow-rope.
* Check electrical connections.

The TBO of the tow-rope retraction device is 4 years or 2000 tows, whichever comes first.

After 2000 tows a new tow-rope must be installed. If the tow-rope is in a poor condition, a new one must be installed even earlier.