Diamond AIRCRAFT

AIRPLANE FLIGHT MANUAL

FOR THE POWERED SAILPLANE

HK 36 TC

Engine	**: Rotax 912 A3**
Model	**: HK 36 TC**
Serial No.	**: _____**
TC Data Sheet No.	**: SF 3/82**
Doc. No.	**: 3.01.10-E**
Date of Issue	**: May 1996**

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Signature : Winkler

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

Stamp : AUSTRO CONTROL GmbH 640

Original date of approval : 23. Sept. 1996

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.

This powered sailplane manual is FAA approved for U.S. registered aircraft in accordance with the provisions of 14 CFR Section 21.29, and is required by FAA Type Certificate Data Sheet No. G07CE.

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.

0.1 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 the responsible airworthiness authority.

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.

If you have purchased a second hand HK 36 TC, please let us know your address so that we can supply you with the publications you need for safe operation of the powered sailplane.

Rev. No.	Aff. Sec.	Affected Pages	Date, Source	Approval	Date of Approval	Date inserted	Signature
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3	4	4-8	15 March 2004		15.03 2014 Sigurgeir Sigmundsson		SS.
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0.3 TABLE OF CONTENTS

SECTION 1
GENERAL

Page No.

1.1 INTRODUCTION

The powered sailplane Flight Manual has been prepared to provide pilots and instructors with information 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 actual version of the customer's airplane. However, any optional equipment (COM, NAV, etc.) is not considered. For their operation, the operation manual of the respective manufacturer must be followed.

This must always be kept onboard the airplane.

1.2 CERTIFICATION BASIS

The HK 36 TC powered sailplane has been approved by Austro Control GmbH (ACG) in accordance with Change 5 of JAR-22 for sailplanes and powered sailplanes as a derivate of the HK 36 TS. The Type Certificate Data Sheet No. SF 3/82 has been extended.

Category of Airworthiness: Utility.

1.3 WARNINGS, CAUTIONS AND NOTES

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

WARNING

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

NOTE

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

1.4 EXPLANATIONS

1.4.1 ABBREVIATIONS

ACG Austro Control GmbH

CG Center of gravity

CFRP Carbon fiber reinforced plastic

GFRP Glass fiber reinforced plastic

OAT Outside Air Temperature

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

TAS True Airspeed (IAS corrected by errors due to instrument, system, altitude and temperature)

1.4.2 PHYSICAL UNITS

	SI units	US units	conversions
length	[mm] millimeters [m] meters	[in.] inches [ft.] feet	[mm] / 25.4 = [in.] [m] / 0.3048 = [ft.]
velocity	[km/h] kilometers per hour [m/s] meters per second	[kts.] knots [mph] miles per hour [fpm] feet per minute	[km/h] / 1.852 = [kts.] [km/h] / 1.609 = [mph] [m/s] * 196.85 = [fpm]
revol. speed	[min^{-1}] revolutions per minute	[RPM] revolutions per minute	[min^{-1}] = [RPM]
mass	[kg] kilograms	[lbs.] pounds	[kg] * 2.2046 = [lbs.]
force, weight	[N] Newtons	[lbs.] pounds	[N] * 0.2248 = [lbs.]
pressure	[hPa] Hectopascal [mbar] millibar [bar] bar	[inHg] inches mercury column [psi] pounds per square inch	[hPa] = [mbar] [hPa] / 33.86 = [inHg] [bar] * 14.504 = [psi]

1.4.3 SPECIAL TERMS

Pressure altitude	Altitude indicated by the altimeter when the subscale is adjusted to 1013.25 mbar (or 1013.25 hPa)
Service ceiling	Maximum altitude that can be reached with a climb rate of at least 0.5 m/s (approx. 100 ft./min.)
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 (approx. 50 ft.) obstacle
Non-lifting parts	Fuselage, rudder, horizontal tail surfaces and useful load
Useful load	Crew, baggage and fuel

1.5 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, nose landing gear and Schempp-Hirth type air brakes in the wings' upper surface.

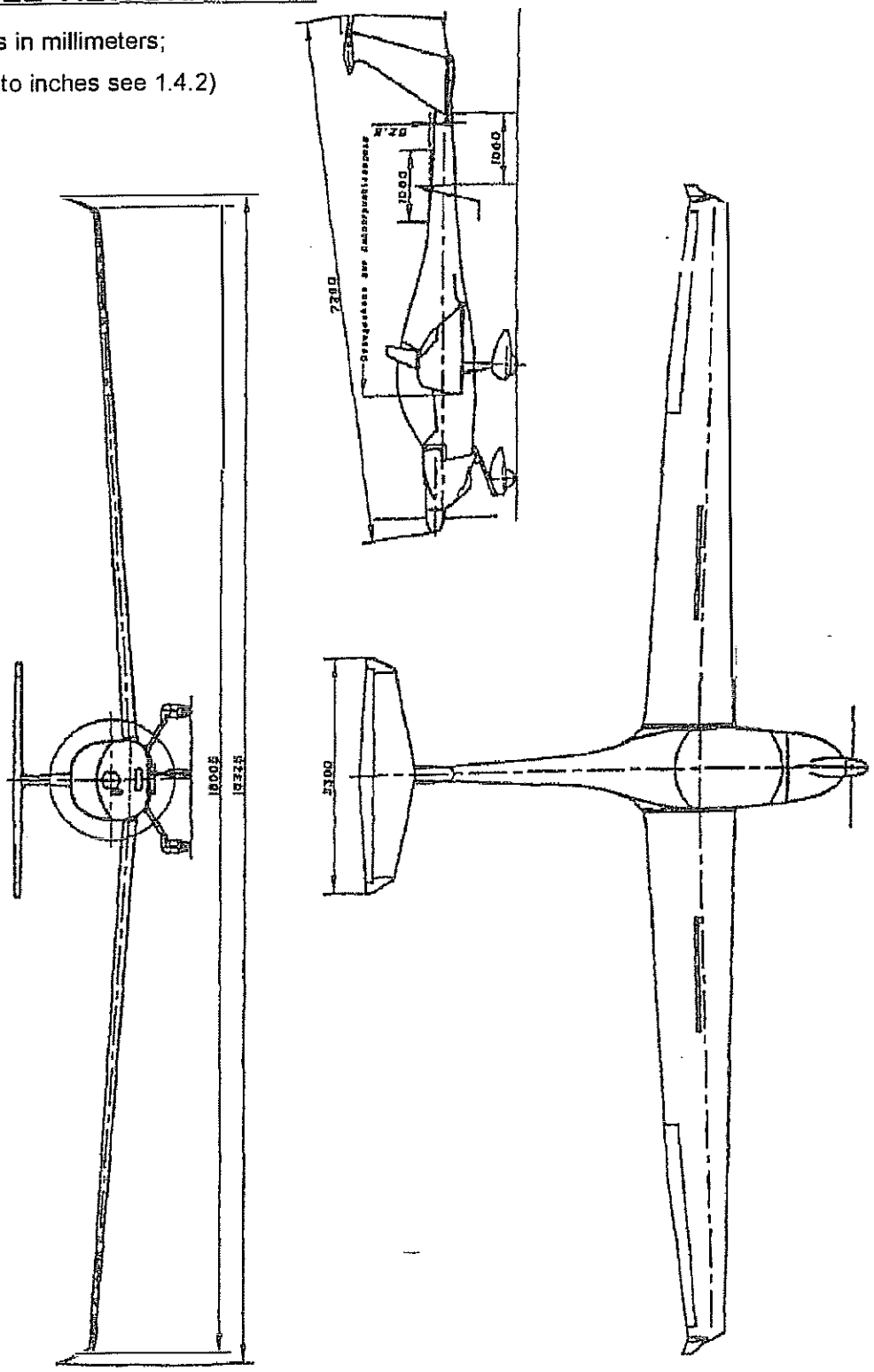
In order to enable a fast disassembly and a space-saving storage the airplane can be furnished with a wing folding mechanism.

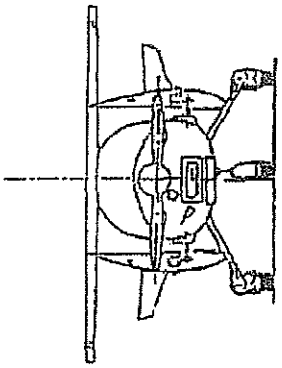
The power plant is a Rotax R 912 A3 engine with an mt-propeller MTV-21-A-C-F/CF175-05 hydro-mechanically variable pitch propeller.

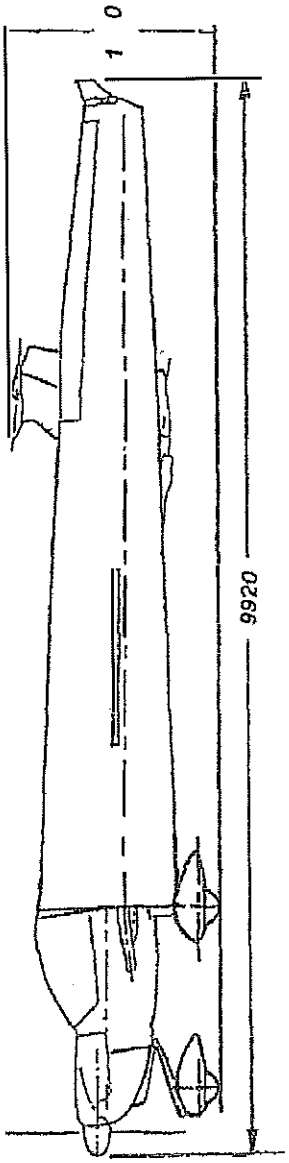
Span	with winglets	: 16.33 m	54	ft.
	without winglets	: 16.01 m	53	ft.
Length		: 7.28 m	24	ft.
Height		: 1.78 m	70	in.
MAC		: 1.004 m	39.5	in.
Wing area		: 15.30 m^2	165	sq.ft.
Max. wing loading		: 50.30 kg/m^2	10.3	lbs./sq.ft.
Aspect ratio		: 17.11		
Airfoil		: Wortmann FX 63-137		

1.6 THREE-VIEW DRAWINGS

(dimensions in millimeters;
conversion to inches see 1.4.2)



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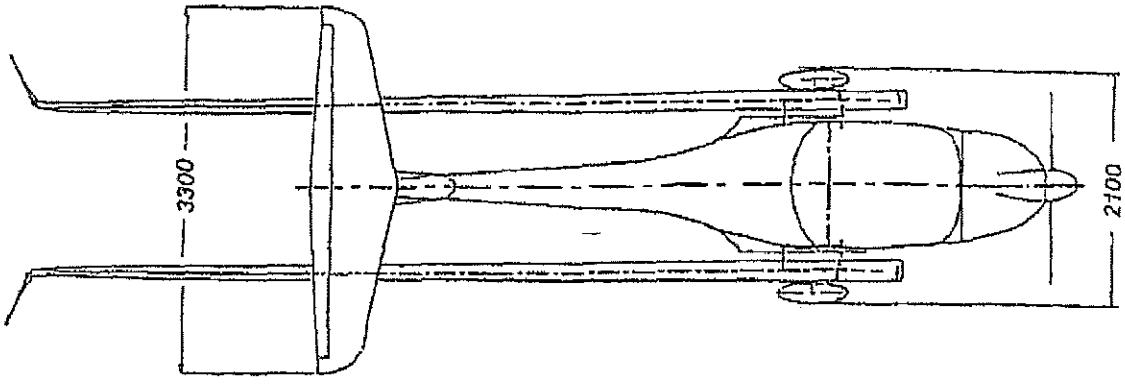
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SECTION 2

LIMITATIONS

Page No.

2.1 INTRODUCTION

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

The limitations included in this section and in Section 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.

Airspeed limitations

Airspeed limitations and their operational significance are shown below:

Airspeed		IAS km/h	IAS kts.	IAS mph	Remark
fiÿM	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. (Do not use more than 1/3 of the travel between position of the controls for unaccelerated flight and deflection to stop.)
fiÀL	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.
fiL	Maneuvering speed	176	95	109	Do not make full or abrupt control movements above this speed, because under certain conditions the powered sailplane may be overstressed by full control movement.
fiL,-	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 is reduced at pressure altitudes above 2000 meters or 6500 ft. (see paragraph 4.5.7).

WARNING

At speeds beyond the rough air speed 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 (max. T/O weight) of 770 kg / 1653 lbs. At lower flight masses, the following limits must be applied:

T/O mass	T/O weight	Maneuvering speed v_A		
kg	lbs.	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 v_A.

Diverse airspeeds

Airspeed		IAS km/h	IAS kts.	IAS mph	Remark
v_y	Best rate of climb speed	105	57	65	At this airspeed the airplane climbs with the maximum possible rate of climb.
v_x	Best angle of climb speed	95	51	59	This airspeed is not marked on the airspeed indicator. At this airspeed the airplane climbs with the maximum possible angle of climb.
	Recommended lowest airspeed for approach	105	57	65	See NOTE below.

NOTE

Conditions like strong headwind, danger of wind shears, turbulence, or wet wings require a higher approach speed

Stalling speeds

see paragraph 5.2.2

2.3 AIRSPEED INDICATOR MARKINGS

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

Marking	Value or Range (IAS) km/h	kts.	mph	Significance
green arc	86 - 210	46 - 113	53 - 130	Normal Operating Range. Lower limit is 1.1 v_{S1} at max. flight mass (weight) and most forward c.g. with air brakes retracted. Upper limit is rough air speed.
yellow arc	210 - 261	113 - 141	130 - 162	Maneuvers must be conducted with caution and only in smooth air.
red line	261	141	162	Maximum speed for all operations v_{NE}.
blue line	105	57	65	Best rate-of-climb speed v_y.
yellow triangle	105	57	65	Approach speed at max. flight mass (weight).

2.4 POWER-PLANT

Engine Manufacturer : Bombardier Rotax
Engine Model : Rotax 912 A3

NOTE

The engine drives the propeller through a speed-reducing gear with a gear ratio of 2.273:1. The built-in tachometer indicates the propeller speed. Consequently, all speeds given in this manual are propeller speeds (in contrast to the engine manual).

Max. T/O power (5 minutes) : 59.6 kW / 81 DIN hp.
Max. T/O RPM : 2550

Max. continuous power : 58 kW / 79 DIN hp.
Max. continuous RPM : 2420

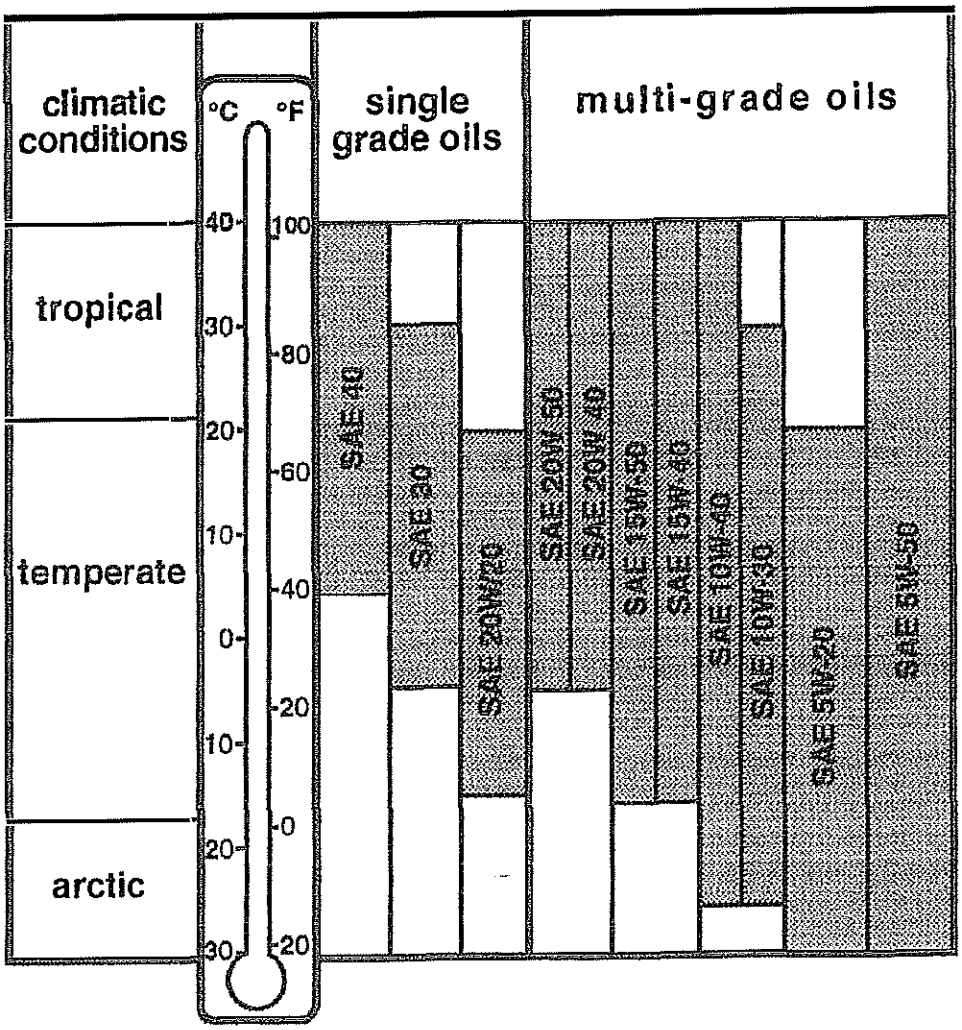
Idle RPM : 650
Power check RPM : 2500 ± 50

Maximum Cylinder Head Temperature : 150° C (302° F)

Maximum Oil Temperature : 140° C (284° F)
Minimum Oil Temperature : 50° C (122° F)

Minimum oil pressure : 1.5 bar (22 psi) at 1250 RPM
Maximum oil pressure : 5 bar (73 psi)
Max. oil pressure in case of cold-start (short-term) : 7 bar (102 psi)

Oil grade : Automotive lubricants for Otto-engines with SAE ratings compatible with seasonal temperatures (see chart). The lubricant quality rating according to the API system must be "SF" or "SG".



HK 36 R AFM **HK 36 T-Series AFM**	Diamond AIRCRAFT	**Temporary Revision** **Alteration of Coolant**

THE AFFECTED PAGE SHOULD BE AMENDED BY THE FOLLOWING STATEMENT:

Approved Coolant:	„EVANS NPG+", or equivalent coolant, must be used without water or other additives.

Doc. No. 3.01.02-E, Doc. No. 3.01.06, Doc. No. 3.01.10-E, Doc. No. 3.01.12-E, Doc. No. 3.01.15-E, Doc. No. 3.01.20-E, Doc. No. 3.01.25-E	TR-MÄM-36-225 29-Mar-2006	Page 2-8a Page 2-8a Page 2-9a Page 2-9a Page 2-10a Page 2-10a Page 2-11a

CAUTION

Under no circumstances should Aviation Grade oil be used!

Oil quantity	minimum	: 2.0 liters (2.1 US quarts)
	maximum	: 3.0 liters (3.2 US quarts)
Propeller manufacturer		: mt-propeller, Straubing, Germany
Propeller model		: Hydraulically variable pitch propeller MTV-21-A-C-F/CF175-05

2.5 POWER-PLANT INSTRUMENT MARKINGS

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

Indicator	Red Line Minimum Limit	Green Arc Normal Operating Range	Yellow Arc Caution Range	Red Line Maximum Limit
RPM indicator	-	650 - 2420 RPM	2420 - 2550 RPM	2550 RPM
Oil temperature indicator	50° C	50° - 140° C	-	140° C
Cylinder head temperature indicator	-	-	-	150° C
Oil pressure indicator	1.5 bar	1.5 - 5 bar	5 - 7 bar	7 bar
Fuel quantity indicator	-	-	-	-

2.6 MASS (WEIGHT)

Maximum take-off mass (max. T/O weight)	: 770 kg	1698 lbs.
Maximum landing mass	: 770 kg	1698 lbs.
Maximum mass of all non-lifting parts	: 610 kg	1301 lbs.
Maximum mass in baggage compartment	: 12 kg	26 lbs.
Maximum useful load (including fuel)	: see paragraph 6.6	
Maximum useful load on right seat	: 110 kg	243 lbs.
Maximum useful load on left seat	: 110 kg	243 lbs.

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 reference datum plane for the center of gravity (CG) specifications is tangent to the leading edge of the wing at the root rib. It is vertical when the fuselage tube lies horizontal. Procedures for a horizontal alignment and empty mass CG specifications can be found in the Maintenance Manual, Section 4.

The permissible flight CG range is:

Maximum forward CG : 318 mm (12.52 in.) aft of reference datum

Maximum rearward CG : 430 mm (16.93 in.) aft of reference datum

WARNING

A flight CG which lies outside the permissible range deteriorates the controllability and stability of the airplane.

The procedure for checking the CG position is included in Section 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:

	v_A	v_{NE}
positive	5.30	4.00
negative	-2.65	-1.50

WARNING

Any exceeding of the maximum permissible load factors may overstress the airplane.

2.10 FLIGHT CREW

Solo flights must be conducted from the left seat!

2.11 KINDS OF OPERATION

The HK 36 TC 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 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

- Aviation Grade 100 LL
- MOGAS, leaded, min. octane rating: 96 ROZ
- Automotive Super, min. octane rating: 95 ROZ, leaded or unleaded

2.13 AEROTOW, WINCH AND AUTOTOW LAUNCHING

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

2.14 OTHER LIMITATIONS

Limitations for soaring when using a battery with a capacity of 18 Amp-hours (Ah):

The capacity of the lead-accumulator is very much dependent on the temperature. Therefore, the length of a continuous soaring at low temperatures is restricted to:

4 hours at 0° C (32° F)

2 hours at -10° C (14° F),

good maintenance condition and charge of the battery provided. Average intensity of current: 0.3 Amps.

There are no such limitations when a 30 Ah battery is installed.

2.15 LIMITATION PLACARDS

The following placard is attached to the instrument panel, left side:

Manoeuvring speed at maximum gross weight	v_A = 176 km/h
Minimum seat payload, full tank, no baggage	
Minimum seat payload, full tank, 12 kg baggage	
Maximum permissible useful load	

The following placard is attached to the canopy frame, left side (US registered S/N's only):

This airplane must be operated as a utility category airplane in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

MAXIMUMS:	MANEUVERING SPEED (IAS)	176 km/h (95 kts. / 109 mph)
	GROSS WEIGHT	770 kg (1698 lbs.)
	FLIGHT LOAD FACTOR	+5.3/-2.65

No acrobatic maneuvers, including spin, approved. Altitude loss in a stall recovery: 20 m (65 ft.). Flight into known icing conditions prohibited. This airplane is certified for the following flight operations as of date of original airworthiness certificate: DAY-VFR.

The following placard is attached to the canopy frame, left side (US and Canadian registered S/N's only):

Altitude [m]	Altitude [ft.]	v_{NE} (IAS) [km/h]	v_{NE} (IAS) [kts.]	v_{NE} (IAS) [mph]
2000	6500	261	141	162
3000	9800	246	133	153
4000	13100	233	126	145
5000	16400	221	119	137
6000	19600	210	113	130

SECTION 3

EMERGENCY PROCEDURES

Page No.

3.1 INTRODUCTION

Section 3 provides checklists and recommended procedures for coping with emergencies that may occur.

Since it is impossible to foresee all kinds of emergencies and consider them in the Flight Manual, it is absolutely necessary for the pilot to know the 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

NOTE

When using a manual parachute release, wait two seconds after exiting the airplane before activating parachute.

3.4 STALL RECOVERY

3.4.1 BEHAVIOR WITH POWER OFF

Under all loading conditions, air brakes applied or retracted, wings level flight or banked flight, the HK 36 TC goes through a horizontal stall. The ailerons keep their effectiveness even with maximum elevator deflection.

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

NOTE

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

3.4.2 BEHAVIOR WITH POWER ON

See behavior with power off. Only at 50 % to 100 % power, wings 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.

3.4.3 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: approximately 10 - 20 m (33 - 65 ft.).
* Altitude loss resulting from stall dive over a wing: approximately 40 m (130 ft.).

3.5 SPIN RECOVERY

1. Rudder ..... apply full opposite to spin direction
2. Control stick ..... forward, ailerons neutral
3. After spin movement has stopped:
   Rudder ..... neutral
4. 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 full opposite to spiral dive rotation
2. Aileron ..... apply full opposite to spiral dive rotation
3. Pull airplane out smoothly

3.7 ENGINE FAILURE (carburetor icing)

3.7.1 ENGINE FAILURE DURING TAKE-OFF

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

WARNING

If the troubles cannot be eliminated immediately, and the engine refuses to deliver enough power, a straight-in landing must be performed under 80 m (260 ft.) of altitude.

Before touchdown:

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

3.7.2 ENGINE RESTART WITH A DISCHARGED BATTERY (during flight)

1. Electrical consumers . . . . . 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 - 97 kts. / 100 - 112 mph)
9. Propeller speed control . . . . . slowly move from FEATHER to TAKE-OFF
10. Oil pressure . . . . . should be available within 10 seconds
11. Choke . . . . . re-adjust if required
12. RPM and throttle . . . . . as required to continue flight

CAUTION

Ensure adequate altitude reserve for engine warm-up after prolonged soaring periods.

13. Electrical consumers . . . . . ON
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 maximum admissible airspeeds must not be exceeded.

3.7.3 PROPELLER STUCK IN FEATHERED POSITION

NOTE

The propeller requires hydraulic pressure for pitch reduction. The hydraulic pressure is supplied through a pressure accumulator. When this accumulator is empty, the 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 consumers . . . . . OFF
2. Fuel valve . . . . . OPEN
3. Master switch . . . . . ON
4. Mode select switch . . . . . POWER FLIGHT
5. Electric fuel pump . . . . . ON

   Check whether the red warning light extinguishes after build-up of fuel pressure
6. Choke . . . . . as required
7. Throttle control . . . . . IDLE
8. Ignition switch . . . . . BOTH
9. Propeller speed control . . . . . TAKE-OFF
10. Ignition switch . . . . . turn clockwise to start engine until the propeller adopts the working position

CAUTION

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

11. Oil pressure . . . . . should be available within 10 seconds
12. Choke . . . . . re-adjust as required
13. RPM and throttle . . . . . as required to continue flight
14. Electric fuel pump . . . . . OFF
15. Electrical consumers . . . . . ON
16. Continue flight normally
17. After landing, ascertain the reason for the loss of oil pressure and rectify the problem.

3.7.4 ENGINE FAILURE DURING CRUISE

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

NOTE

If you cannot eliminate the troubles and the engine refuses to deliver enough power, proceed as follows:

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

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
3. Cabin air . . . . . CLOSE
4. Cabin heat . . . . . 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. Continue to move controls to prohibit lockage from ice
3. If the canopy is iced over:
   weather window . . . . . open
   cabin heat . . . . . open fully

3.9.3 FUEL PRESSURE WARNING LIGHT ILLUMINATES

1. Electric fuel pump - ON
   * If the light extinguishes . . . . . land on nearest airfield, 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.

3.9.4 EMERGENCY LANDING ON WATER

Emergency landings on water should be performed only in extreme emergency situations. Due to trials with sailplanes it is assumed that the airplane will submerge immediately after touching the water and then surface again.

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

NOTE

Conditions like strong headwind, danger of wind shears, 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

SECTION 4

NORMAL PROCEDURES

4.1 INTRODUCTION

Section 4 provides checklists and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems can be found in Section 9.

4.2 RIGGING AND DE-RIGGING

4.2.1 GENERAL

The wings are connected to the fuselage with three bolts each. The two main bolts are placed in the middle 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, the B-bolt lies near the trailing edge. Self locking units are screwed onto the B-bolts, which are accessible through handholes on the wings' upper surface. 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 in the rear are fixed to the mount in the vertical stabilizer. The threaded bolt placed in front is provided with a hexagonal socket. When screwed in, it is automatically secured by means of a locking ring integrated into the horizontal stabilizer.

4.2.2 WING INSTALLATION (WING FOLDING MECHANISM NOT PROVIDED)

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 and strobe lights (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 completely inserted.
   The wide track of the landing gear allows the attached wing to support itself, no outside support 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 wrench (size 17 mm) applying moderate hand force (approximately 6 Nm/4.5 ft.lbs.).

7. Secure main bolts with spring loaded hook.

8. Apply water resistant adhesive tape to the gap between fuselage and wing.

4.2.3 WING INSTALLATION (WING FOLDING MECHANISM PROVIDED)

1. Clean all bolts, bushes and the B-bolt locking unit and apply a light coat of grease, remove lid over B-bolt handhole.
2. Unhook one wing from its hanging mount, 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 and strobe lights (optional) when the gap between the fuselage and wing is just wide enough to reach the wires.
5. Insert main bolt. The aileron and air brake control systems are automatically connected. Do not release the wing before the main bolt has been completely inserted.
   The wide track of the landing gear allows the attached wing to support itself, no outside support 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 force (approximately 6 Nm/4.5 ft.lbs.).
9. Secure main bolts with the spring loaded hook.
10. Apply water resistant adhesive tape to the gap between fuselage and wing.

4.2.4 WING REMOVAL

To remove the wings reverse the procedure.

NOTE

When installing or removing the wings, prevent the airplane from falling onto its nose wheel or tail skid due to the CG movement.

4.2.5 WINGLET INSTALLATION

1. Clean the bolts and bushes if necessary.

CAUTION

Do not lubricate the threaded bolts!

2. Install winglet with washers and self locking nuts.
3. Tighten self locking nuts with moderate hand force (appr. 6 Nm / 4.5 ft.lbs.)
4. Apply water resistant adhesive tape to the gap.

4.2.6 WINGLET REMOVAL

To remove the winglet reverse the procedure.

4.2.7 HORIZONTAL STABILIZER INSTALLATION

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

WARNING

The elevator control system is not connected automatically!

5. Slip the horizontal stabilizer onto the rearward bolts.
6. Screw in the fastening bolt to the stop with an 8 mm hexagon key applying moderate hand force (approximately 6 Nm / 4.5 ft.lbs.).
7. Check the horizontal stabilizer for secure 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.

4.2.8 HORIZONTAL STABILIZER REMOVAL

To remove the horizontal stabilizer reverse the procedure.

4.3 DAILY INSPECTION

WARNING

Master switch OFF, ignition OFF!

1. Fuel tank drain check: drain off about 1/8 liter (approx. 1/8 US quart) of fuel using a transparent drain cup (see paragraph 7.10). Inspect for dirt or water.

NOTE

In order to prevent the water deposited in the tank from dispersing, the airplane should not be agitated prior to the drain check.

2. Ensure completeness of the onboard documents and ensure that the operation time that is left before the next scheduled inspection (100, 200 or 600 hrs.) allows for the intended flight.
3. Inspect left fuselage skin for damage or 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, insecure attachment, and inspect 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.

AFFECTED CHAPTERS:

HK 36 R, HK 36 T-Series:

4.3 Daily Inspection: Item 11

DV 20:

4.4.1 Preflight Inspection: II. Walk around check and visual inspection
Item 7

The note concerning the check of the oil level is complemented as follows:

Prior to the oil level check, remove the oil tank cap and turn the propeller by hand in the direction of normal rotation to transfer all the oil from the engine crankcase to the oil tank. The process is finished when crankcase air can be heard being forced back to the oil tank. This will be noticed as a gurgle sound, coming from the oil tank with the cap removed, verifying the crankcase is purged of residual oil.

CAUTION: The Propeller must not be turned in reverse of the normal direction of rotation.

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:
    - Check if loading is admissible (refer to Section 6).

NOTE

Ensure observation of loading restrictions by changing and/or rearranging the useful load.

- Master switch ..... ON
- Mode select switch ..... POWER FLIGHT
- All circuit breakers ..... pressed in
- Fuel quantity ..... check using fuel quantity indicator and log book entries; refuel if necessary

NOTE

Usable fuel and approved fuel grades: see paragraph 2.12.

- Master switch ..... OFF
- Cabin ..... check for foreign bodies and loose equipment
- Canopy ..... check for dirt and damage
- Cowl flap ..... check operation
- Main bolts ..... verify that bolts are properly secured

15. Check of propeller FEATHER position:
    - Rudder pedals . . . . . adjust
    - Canopy . . . . . closed & locked
    - Fuel valve . . . . . OPEN
    - Parking brake . . . . . set
    - Electrical consumers . . . . . OFF
    - Master switch . . . . . ON
    - Mode select switch . . . . . POWER FLIGHT
    - Propeller speed control . . . . . TAKE-OFF
    - Cowl flap . . . . . OPEN
    - Electric fuel pump . . . . . ON; verify red 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 green range within 10 seconds

CAUTION

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

NOTE

When the powered sailplane is 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 (appr. 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 paragraph 7.9).

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

NOTE

If the propeller does not move to the take-off position, apply the emergency procedure described in paragraph 3.7.

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

4.4 PREFLIGHT INSPECTION

The following checklist with the most important items is placed where it is well visible for either pilot:

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 and 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

4.5 NORMAL PROCEDURES AND RECOMMENDED SPEEDS

4.5.1 LAUNCH/ENGINE STARTING, 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 consumers . . . . . OFF
9. Master switch . . . . . ON
10. Mode select switch . . . . . POWER FLIGHT
11. Propeller speed control . . . . . TAKE-OFF

12. Fuel quantity . . . . . check
13. Cowl flap . . . . . OPEN
14. Electric fuel pump . . . . . ON; verify red light extinguishes after build up of fuel pressure
15. Throttle control . . . . . IDLE
16. Choke . . . . . ON if engine is cold

WARNING

People must stay clear of the propeller danger zone!

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

CAUTION

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

NOTE

When the powered sailplane is 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.

20. Choke . . . . . push forward as required

WARNING

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

21. Electrical consumers . . . . . ON as required
22. Altimeter . . . . . set

23. Oil temperature . . . . . check

CAUTION

Before loading the engine, allow the oil temperature to rise to 50° C (122° F) with the cowl flap open at 1000 to 1500 RPM (taxiing is allowable).

24. Choke . . . . . OFF

25. Ignition circuits check:
    - Throttle control . . . . . adjust 1700 RPM
    - Ignition circuits . . . . . check; drop should be 50 to 150 RPM; difference between circuits 1 and 2 should not exceed 50 RPM.

CAUTION

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

26. Carburetor heat . . . . . check at 1700 RPM; drop should be approx. 20 RPM

27. Propeller check:
    - Throttle control . . . . . adjust 2000 RPM
    - Propeller speed control . . . . . CRUISE (pull back to cam before soaring position) wait until speed drops to approx. 1800 RPM reset to TAKE-OFF position

    Repeat procedure at least three times.

CAUTION

Without repeating the procedure it is not ensured that the pitch change mechanism is operative.

28. Power check:
    - Ignition switch . . . . . check if in BOTH position
    - Throttle control . . . . . FULL, RPM should be 2500 ± 50

29. Power plant instruments . . . . . check if 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 ..... FULL (2500 ± 50 RPM)
5. Start take-off run with elevator neutral, keep direction with rudder.
6. Lift nose wheel at appr. 80 km/h (43 kts. / 50 mph); airplane will lift off by itself at approximately 90 km/h (49 kts. / 56 mph).
7. 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.
8. At an altitude of 100 m (330 ft.) above ground:
   - Electrical fuel pump ..... OFF

   If the fuel system is intact, the red warning lamp must not illuminate, since 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 105 km/h (57 kts. / 65 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.

In-flight engine stop

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

WARNING

Engine start can become impossible:

- After prolonged soaring with several electrical consumers switched on (mis-operation of mode select switch)
- In extreme cold (see paragraph 2.14)
- If the battery is in a poorly maintained condition or barely charged

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

CAUTION

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

6. Cowl flap . . . . . CLOSE

In-flight engine start

1. Electrical consumers ..... OFF
2. Master switch ..... ON
3. Mode select switch ..... POWER FLIGHT
4. Propeller speed control ..... TAKE-OFF
5. Cowl flap ..... OPEN
6. Choke ..... ON if engine is cold
7. Electric fuel pump ..... ON
8. Throttle control ..... IDLE
9. Ignition switch ..... BOTH, start engine
10. Oil pressure ..... check

NOTE

The hydraulic pressure accumulator is not full after the propeller pitch change. After pressure build-up, there might be a loss of 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.

11. Choke ..... OFF if necessary
12. Electrical consumers ..... ON as required
13. Oil temperature ..... check
14. Propeller check:
    - Throttle control ..... adjust 2000 RPM
    - Propeller speed control ..... CRUISE (pull back to cam before soaring position)
      wait until speed drops to approx. 1800 RPM
      reset to TAKE-OFF position

    Repeat procedure at least three times.

CAUTION

Without repeating the procedure it is not ensured that the pitch change mechanism is operative.

Sideslips

The speed range in which sideslips can be performed depends on the strength of the pilot, because 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 appear 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 lbs.) to the pedal to overcome the control force reversal.

4.5.4 APPROACH

1. Throttle control ..... reduce power as required
2. Carburetor heat ..... ON if required
3. Trim ..... adjust as required
4. Air brakes ..... apply as required

4.5.5 LANDING

Power-on landing

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

NOTE

The air brake lever catches 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 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 $v_{FE,-C}$ must not be exceeded.

8. Sideslip ..... possible but not necessary
9. Approach speed ..... 105 km/h (57 kts. / 65 mph) during final approach

NOTE

Conditions like strong headwind, danger of wind shears, 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 brakes symmetrically to avoid skidding.

12. Electric fuel pump ..... OFF

Balked landing with the engine running

1. Air brakes . . . . . retract
2. Throttle . . . . . FULL

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, 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. These must stay within the green range.

4. At an altitude of 100 m (330 ft) above ground:
   - Electrical fuel pump . . . . . OFF

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

Power-off landing

NOTE

If the propeller is feathered, the approach must have enough altitude to ensure the landing field is reached, since starting the engine takes too much time during final approach!

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

NOTE

The air brake lever catches 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 like strong headwind, danger of wind shears, 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 brakes symmetrically to avoid skidding.

4.5.6 (omitted)

4.5.7 HIGH ALTITUDE FLIGHT

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

Pressure altitude		Never exceed speed		
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 changes for the worse in rain. The impact on the flying characteristics is minor. Flight in rain should be avoided because of the reduced visibility.

4.5.9 AEROBATICS

NOTE

Aerobatics and spinning are forbidden.

4.5.10 ENGINE SHUT-DOWN

1. Propeller speed control ..... TAKE-OFF
2. Throttle ..... IDLE
3. Parking brake ..... set
4. Electric fuel pump ..... OFF
5. Electrical consumers ..... OFF
6. Ignition ..... OFF

NOTE

In case of post-ignition in hot weather conditions and when using MOGAS fuel, switch on ignition again, pull choke, cut off ignition after 3 seconds.

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 extended position. In case of longer unattended parking or in unpredictable wind conditions, the airplane should be moored or stored in a hangar.

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 cannot assume the take-off position. Starting the engine with the propeller in feathered pitch is possible, but significantly increases engine wear.

SECTION 5
PERFORMANCE

Page no.

5.1 INTRODUCTION

Section 5 provides approved data for airspeed calibration, stall speeds and take-off performance and additional information which does not require approval.

The data in the charts has been computed from actual flight tests with the powered sailplane and engine in good condition, wheel fairings installed and using average piloting techniques.

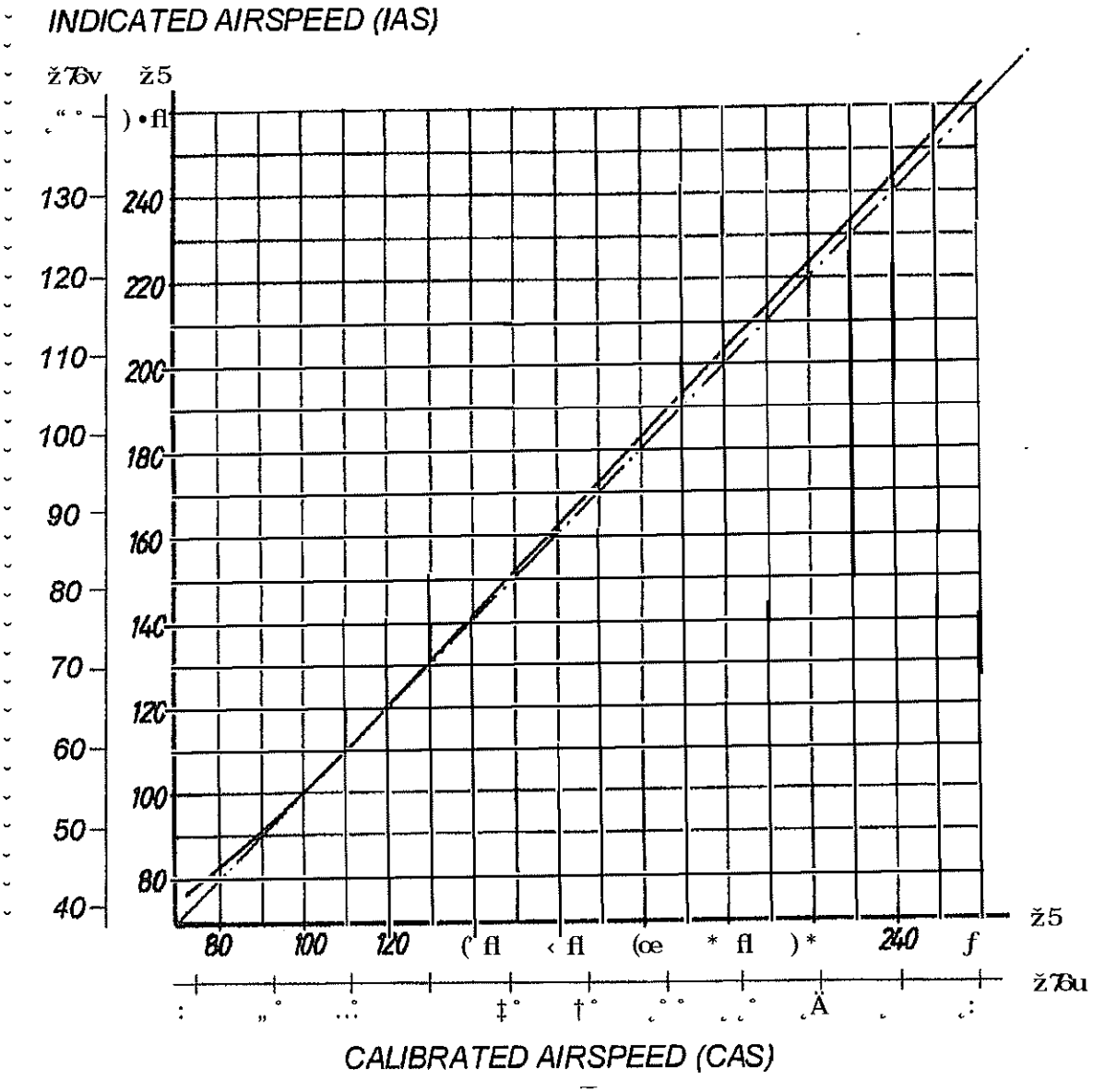
The specified airspeeds must be understood as IAS. The performance data has been evaluated applying the normal procedures described in Section 4.

NOTE

A poor maintenance condition of the airplane and unfavorable external circumstances (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 STALL SPEEDS

Stall 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.

Stall 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 like turbulence, wet wings, or high load factors increase the stall speeds.

5.2.3 TAKE-OFF PERFORMANCE

Conditions:
- Outside air temperature: 15° C (59° F)
- Atmospheric pressure: 1013 hPa (1013 mbar)
- Calm
- Full throttle
- Maximum flight mass (max. gross weight)
- Propeller setting: TAKE-OFF
- Rotation at approx. 80 km/h (43 kts. / 50 mph)
- Lift-off speed approx. 90 km/h (49 kts. / 56 mph)
- Speed during climb approx. 95 km/h (51 kts. / 59 mph)
- Level runway, asphalt surface

Take-off roll	: 201 m (659 ft.)
Take-off distance to clear a 15 m (50 ft.) obstacle	: 338 m (1109 ft.)

NOTE

For take-off distances under circumstances 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 outward circumstances (high temperature, rain, unfavorable wind influence, and in particular high 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. / 19 mph)
Landing : 30 km/h (16 kts. / 19 mph)

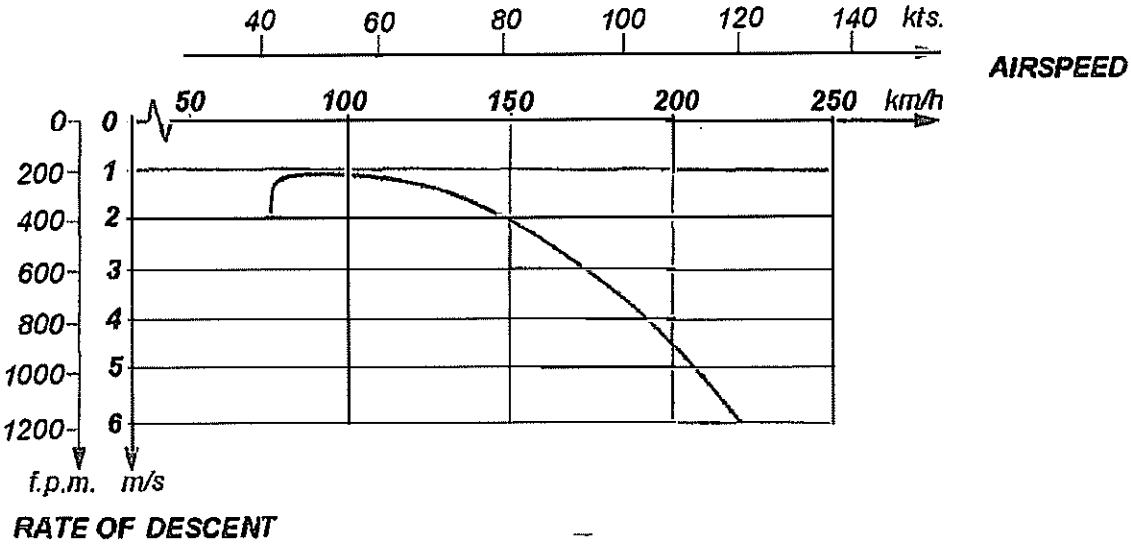
5.3.2 GLIDE PERFORMANCE AND FLIGHT POLAR

Glide performance

Conditions:
- maximum flight mass (max. gross weight)
- winglets, wheel fairings, and spinner installed
- propeller feathered

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

Flight polar:



5.3.3 TAKE-OFF CHARTS

Conditions:
- Full throttle
- Maximum flight mass (max. gross weight)
- Propeller setting: TAKE-OFF
- Rotation at approx. 80 km/h (43 kts. / 50 mph)
- Lift-off speed approx. 90 km/h (49 kts. / 56 mph)
- Speed during climb approx. 95 km/h (51 kts. / 59 mph)
- Level runway, 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 [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	175	301	198	334	224	372	254	417
	15	201	338	227	377	258	420	294	471
	30	229	378	259	422	296	474	338	533
5	0	141	254	160	283	183	316	209	355
	15	163	286	185	320	211	358	242	403
	30	186	321	212	360	243	405	279	457
10	0	111	209	126	236	145	265	166	297
	15	128	238	150	268	168	301	195	340
	30	148	270	170	302	196	342	227	387

WARNING

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

Head-wind comp. [kts.]	OAT [°F]	Pressure altitude above MSL [ft.] / QFE [inHg]							
		0/29.9		1310/28.5		2620/27.2		2940/25.9	
		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	574	988	650	1096	735	1220	833	1386
	59	659	1109	745	1237	846	1378	965	1545
	86	751	1240	850	1385	971	1555	1109	1749
5	32	463	833	525	928	600	1037	686	1165
	59	535	938	607	1050	692	1175	794	1322
	86	610	1053	696	1181	797	1329	915	1499
10	32	364	686	413	774	476	869	545	974
	59	420	781	492	879	551	988	640	1115
	86	486	886	558	991	643	1122	745	1270

WARNING

A grass surface will extend the take-off distances 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, Chapter 10.

Noise emission: 61.8 dB(A).

5.3.5 CLIMB PERFORMANCE

Maximum rate of climb:

Conditions:
- Sea level
- Full throttle
- Max. flight mass (max. gross weight)
- Airspeed: v_y = 105 km/h (57 kts. / 65 mph)
- Propeller speed: 2420 RPM

max. rate of climb = 4.1 m/s (807 ft./min)

5.3.6 SERVICE CEILING

Service ceiling is above 5000 m (16400 ft.).

5.3.7 FUEL CONSUMPTION, CRUISING SPEED, MAXIMUM FLIGHT DURATION, RANGE

NOTE

The specifications for maximum flight duration 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: - Propeller speed: 2200 RPM
- Pressure altitude: 1500 meters (4900 ft.)

manif. press.	fuel consumption		cruising speed			max. duration	range			fuel tank
in. Hg	l/h	US gal. per hr.	km/h	kts.	mph	h:min	km	naut. miles	stat. miles	
23	15	4.0	170	92	106	3:36	612	330	380	55 l
						5:08	873	471	542	79 l
22	13	3.4	160	86	99	4:09	665	359	413	55 l
						5:55	948	512	589	79 l

NOTE

It is generally recommended for a fast cruise that the propeller speed is set at 2400 RPM and that the manifold pressure 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 that the RPM is set between 2300 and 2200 and manifold pressure 1 to 2 inHg under the maximum obtainable.

In order to keep engine wear at a minimum, permanent revolutions under 1900 RPM are not recommended.

SECTION 6
MASS (WEIGHT) AND BALANCE / EQUIPMENT LIST

6.1 INTRODUCTION

This section describes the range of loading in which the HK 36 TC can be operated safely.

Descriptions of the weighing procedure, the computation of the admissible 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, Section 4.

WARNING

Exceeding the maximum mass (maximum gross weight) can overstress the airplane! Falling short of the minimum seat payload (useful load on both seats together) leads to a deterioration of controllability and stability.

6.2 WEIGHING PROCEDURES

The weighing procedures are described in the Airplane Maintenance Manual, paragraph 4.2. The purpose of weighing the airplane is to evaluate the empty mass (empty weight) and the corresponding CG lever arm (i.e. 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 preserved in the Aircraft Maintenance Log.

NOTE

After equipment changes, repair work, repainting, etc. the airplane must be reweighed in compliance with the Airplane Maintenance Manual by an authorized person, and the new empty mass (empty weight) CG position must be determined. The results must be entered 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 (empty weight) 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 lbs.) 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 220 kg (485 lbs.) seat payload and 10 kg (22 lbs.) 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 lbs.). 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 mass (weight) of all non-lifting parts will not be exceeded unless the maximum flight mass (max. gross weight) of 770 kg / 1698 lbs. is overstepped.

6.6 MASS (WEIGHT) AND BALANCE FORM

The Mass and Balance Form on page 6-6 shows the following values:

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

Furthermore, the Mass and Balance Form is a record of all weighings carried out.

The Mass and Balance Form must be updated by an authorized person in compliance with 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

Weighing is done in accordance with the Equipment Inventory. Airplane operation without winglets, spinner and 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 Seat payload with full tank		A.M.E.
				with no baggage	with max. baggage	

6.7 USEFUL LOADS

6.7.1 MAXIMUM USEFUL LOAD

The useful load includes the masses (weights) of the crew, baggage, and fuel. The maximum permissible useful load is shown in the Mass and Balance Form, in the Mass and Balance Diagram, and on the placard on the instrument panel.

NOTE

The total crew mass comprises of the mass of the passengers and parachutes.

6.7.2 SEAT PAYLOAD

Minimum seat payload

The Mass and Balance Form and the placard in the cockpit (left hand section of instrument panel) show the following data:

- Minimum seat payload for solo flights with a full tank and no baggage;
- Minimum seat payload for solo flights with a full tank and maximum baggage mass (12 kg or 26 lbs.).

The minimum seat payload is never less than 55 kg (121 lbs.).

NOTE

Pilots with a mass (a weight) between 55 kg (121 lbs.) and the minimum seat payload shown on the placard in the cockpit must install a trim weight in case of solo flights.

Trim weights

If the minimum seat payload exceeds 55 kg, a trim weight fixture must be installed on the center console 400 mm (15.75 in.) behind the firewall. A seat payload deficit should be equalized using the following table.

Seat payload deficit		Trim mass (weight)	
[kg]	[lbs.]	[kg]	[lbs.]
5	11	1.7	3.75
10	22	3.4	7.5
15	33	5.1	11.25

Maximum seat payload

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

Lever arm of seat payload

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

6.7.3 USEFUL LOAD IN BAGGAGE COMPARTMENT

The maximum useful load in the baggage compartment is 12 kg (26 lbs.). For the preparation of the Mass and Balance Diagram, the lever arm of the baggage was assumed to be equal to the lever arm of the fuel tank (i.e. 727 mm or 28.62 in. for the standard tank, 824 mm or 32.44 in. for the long range tank).

NOTE

When taking baggage aboard, do not exceed the maximum permissible useful load.

6.7.4 FUEL LOAD

Fuel capacity

The fuel capacity is given in paragraph 2.12.

NOTE

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

Lever arm of the fuel tank

A lever arm of 727 mm / 28.62 in. (standard tank) or 824 mm / 32.44 in. (long range tank) aft of reference datum is assumed for all CG computations.

6.8 MASS / C.G. 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 seat payload into account. It shows the permissible mass (weight) of fuel and baggage for a given seat payload.

The diagram applies to one specific airplane. It is based on the data provided by the Mass and Balance Form and must be redrawn by an authorized person upon each weighing, using the broken subsidiary lines.

The corresponding instructions are laid down in the Airplane Maintenance Manual.

Use of the diagram

The forbidden combinations of seat payload 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 lbs., copilot: 82 kg / 181 lbs.
  total: 152 kg / 335 lbs.
* Long range tank: full (60 kg / 132 lbs.), no baggage

The corresponding point in the diagram does not touch any boundary, hence the loading is permissible.

Example B:
* Pilot: 65 kg / 143 lbs., solo-flight
* Long range tank: full (60 kg / 132 lbs.), baggage: 12 kg / 26 lbs.
  total: 72 kg / 159 lbs.

The loading oversteps the maximum rearward CG position. The pilot must remove 15 kg / 33 lbs. (20 liters / 5.3 US gal.) of fuel.

Example C:

* Pilot: 92 kg / 203 lbs., copilot: 105 kg / 231 lbs.
  total: 197 kg / 434 lbs.
* Standard tank

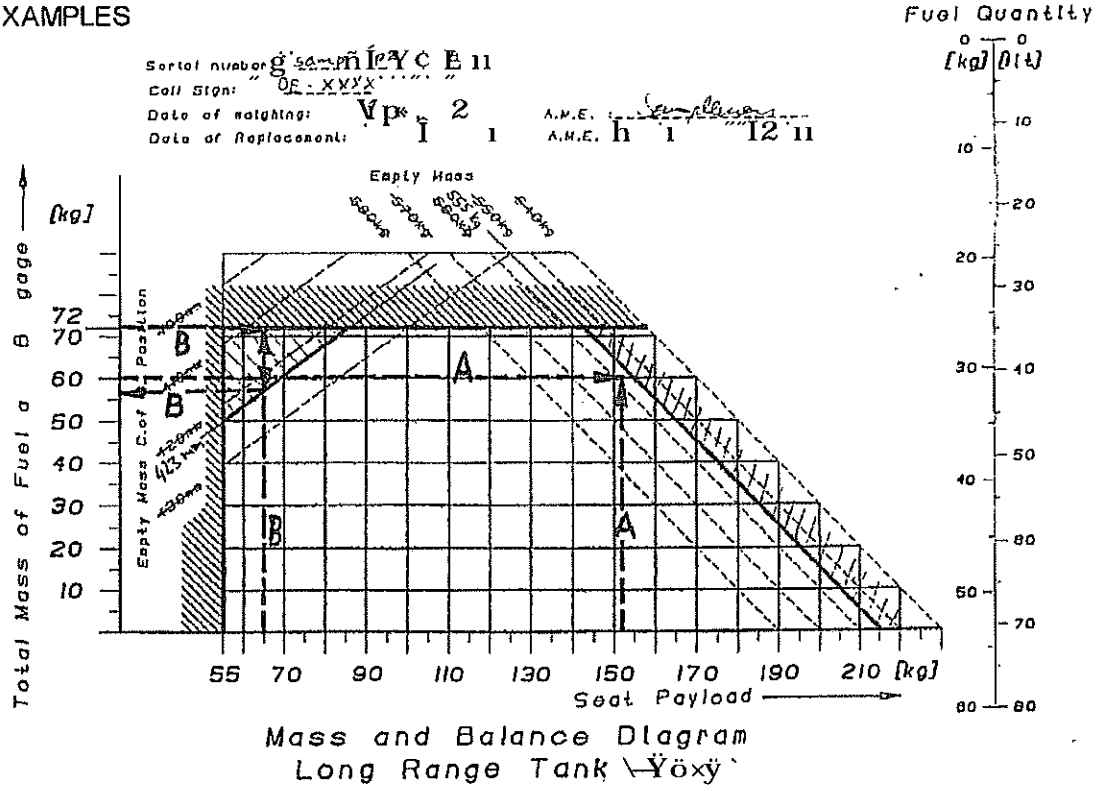
In case they do not take any baggage aboard, they may take off with 27 kg / 60 lbs. (36 l / 9.5 US gal.) of fuel.

Example D:

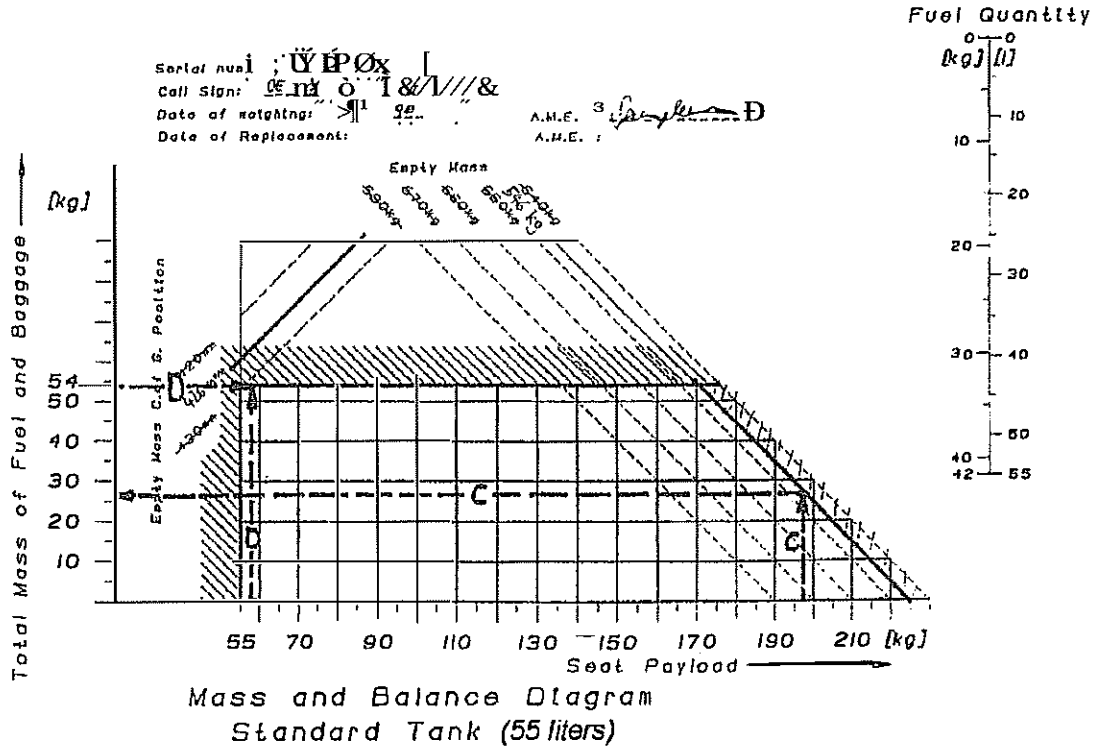
* Pilot: 57 kg / 126 lbs., no copilot
* Standard tank: full (42 kg / 93 lbs.), baggage: 12 kg / 26 lbs
  total: 54 kg / 119 lbs.

Since the maximum rearward CG position is not effective in sample airplane "b", the pilot may exploit the maximum mass (weight) of fuel plus baggage, which amounts to 54 kg/119 lbs.

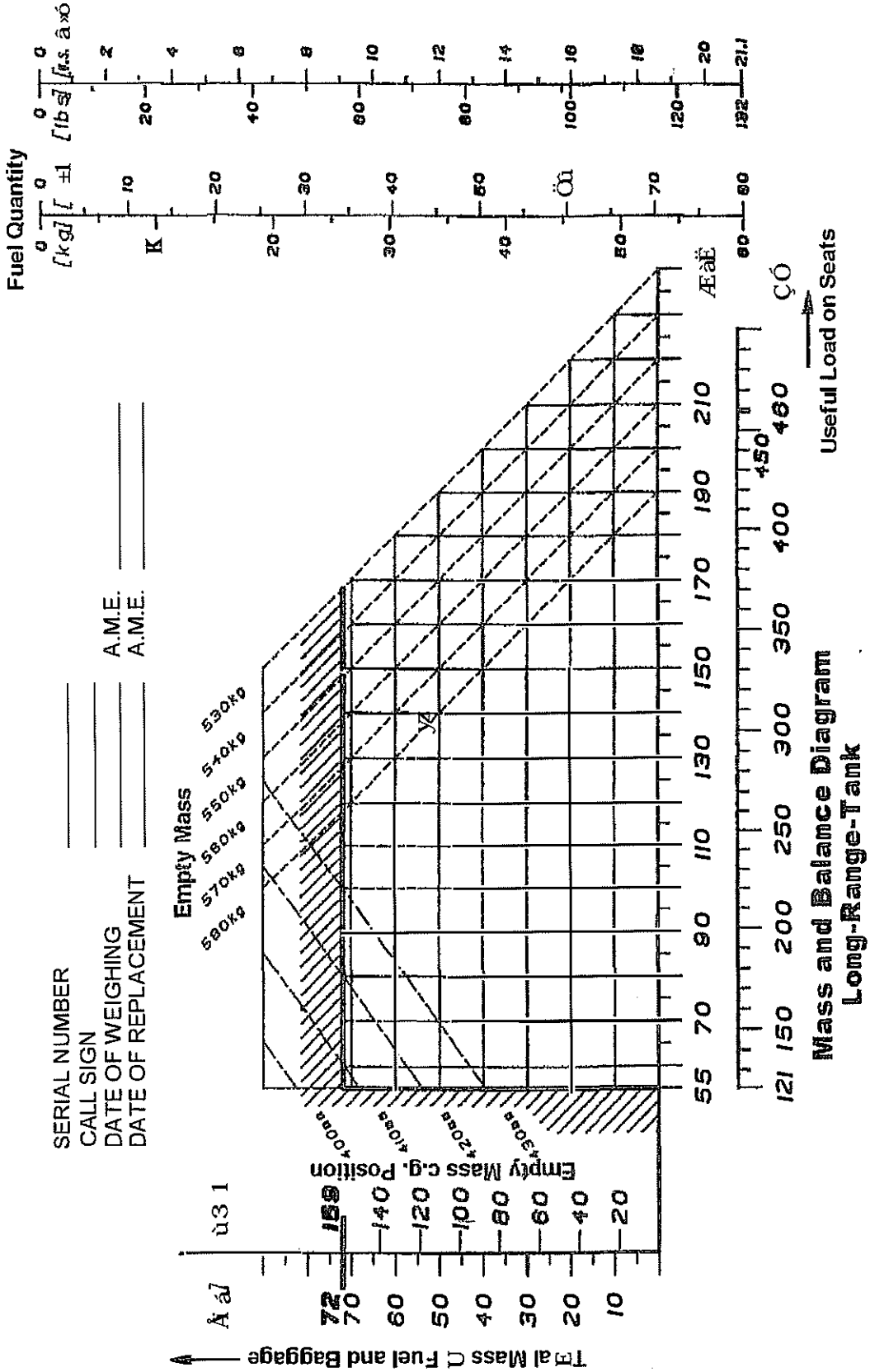
EXAMPLES



Mass and Balance Diagram
Long Range Tank



Mass and Balance Diagram
Standard Tank (55 liters)


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

6.9 EQUIPMENT LIST

Minimum equipment (VFR)

1 Altimeter
1 Airspeed indicator
1 Magnetic compass
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 Deviation table
1 Fuel pressure warning lamp

Additional equipment

A list of the currently installed equipment is provided in the Equipment Inventory which is preserved in the Aircraft Maintenance Log.