

SUPPLEMENT 9

**TO THE AIRPLANE FLIGHT MANUAL
FOR THE POWERED SAILPLANE
HK 36 TTS**

**OPERATION WITH
TOW-ROPE RETRACTION DEVICE**

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This powered sailplane must be operated in compliance with the information and limitations contained herein.

Prior to operating the powered sailplane, the pilot must take notice of all the information contained in this Airplane Flight Manual.

0.1 RECORD OF REVISIONS

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SECTION 1

GENERAL

1.1 INTRODUCTION

Pages 9-9-0 through 9-9-25 constitute Supplement No. 9 to the Airplane Flight Manual for the powered sailplane HK 36 TTS and are valid only for the operation of the powered sailplane as a tow-plane with the tow-rope retraction device installed.

1.2 CERTIFICATION BASIS

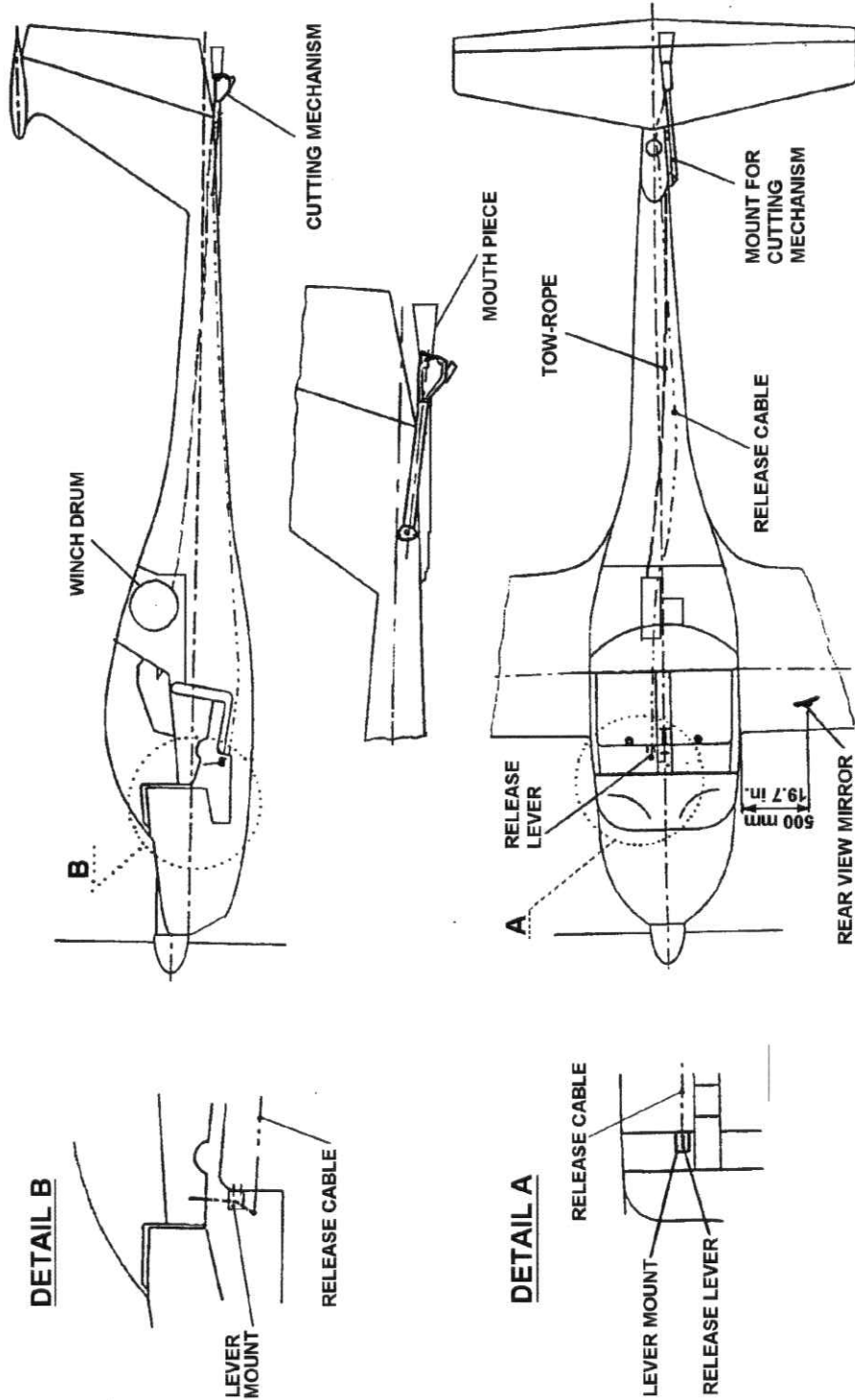
Tow-plane operation of this airplane has been approved within the framework of Austrian type certification requirements in agreement with national operational requirements, CRI - O3, "Tow-rope retraction device".

1.5 DESCRIPTIVE DATA

The airplane is equipped with a steel mount specifically designed for the purpose of towing. It is attached to the fuselage tube at the tail and takes up the loads created during towing by the cutting mechanism. The tow-rope retraction winch is installed in the baggage compartment of the powered sailplane and allows the retraction of the tow-rope during flight, after the towed sailplane has been released. The powered sailplane is able to land without dropping the tow-rope. The tow-rope may be detached with the cable cutting mechanism in critical moments of flight. For the operation as a tow-plane a rear-view mirror must be attached to the left-hand wing by the use of two camlocs (see 1.6, THREE-VIEW DRAWING).

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1.6 THREE-VIEW DRAWING



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SECTION 2

LIMITATIONS

2.2 AIRSPEED

NOTE

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

The maximum permissible airspeed for tow-plane operation is 135 km/h (73 kts. / 84 mph) or the maximum permissible airspeed for towing of the towed sailplane, whichever is less.

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

The maximum permissible airspeed for towing of the towed sailplane must be at least 110 km/h (59 kts. / 68 mph).

2.6 MASS (WEIGHT)

Tow-plane operation

For sailplane towing, the flight mass (weight) of the sailplane to be towed must not exceed 600 kg (1323 lbs.). The maximum take-off mass (weight) of the tow-plane is 720 kg (1587 lbs.).

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2.10 FLIGHT CREW

During tow-plane operation the HK 36 TTS must be flown solo.

For instruction purposes, a flight crew of two is permissible, provided that the total mass (weight) of the combination of powered sailplane and towed sailplane does not exceed 1320 kg (2910 lbs.).

2.14 OTHER LIMITATIONS

It is not permitted to tow more than one sailplane at the same time.

HK 36 TTS registered in Germany may not tow sailplanes using their C.G. towing coupling.

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

NOTE

During test flights, the most common sailplane models (double seaters up to 600 kg (1323 lbs.) and single seaters with and without water ballast) were towed without exceeding the operating limitations. However, the pilot must verify in each case whether the sailplane can be towed within the operating limitations of the tow-plane and the sailplane.

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

During towing operations no baggage may be carried.

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SECTION 3

EMERGENCY PROCEDURES

3.7 ENGINE FAILURE

1. In case of engine failure during towing advise sailplane pilot (via radio or by giving signs) to release. Otherwise cut the tow-rope.

CAUTION

In case of emergency pull the yellow/red release handle of the cutting mechanism abruptly all the way to the stop.

2. Proceed according to the Emergency Procedures as given in the main part of the HK 36 TTS Airplane Flight Manual.

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3.9 OTHER EMERGENCIES

Extreme Position of Towed Sailplane

If maneuverability is significantly impaired due to an extreme position of the towed sailplane, the tow-rope must be cut immediately.

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

WARNING

In general the most critical situation during towing is created when the towed sailplane is flying higher than the powered sailplane at take-off and climb, especially when the towed sailplane is using a C.G.-coupling (if use is authorized).

Failure of 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.

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Failures 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 all the way. Not complying to this advice may lead to damage of the tail.

3.10 FAILURE OF THE RELEASE DEVICE ON THE SAILPLANE

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

WARNING

During tow-plane operation, the air brakes of the tow-plane must not be extended!

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SECTION 4

NORMAL PROCEDURES

4.4 PRE-FLIGHT INSPECTION

Add the following items to the preflight inspection:

1. Check system for insecure mounting and loose connections.
2. Check movement of the cutting knife for interference, by applying a slight pressure by hand.
3. Check green mouth piece for damage.
4. Check breaking piece.
5. Pull out tow-rope completely and check for damage, especially around endpiece, also verify that the winch drum is free to turn without any interference in its movement.
6. At cold outside air temperatures check for frozen tow-rope.
7. Retract tow-rope a few meters (yards) until aluminum stop-egg is visible in view-window of winch drum cover. Check for loose screw-connection of stop-egg.
8. Retract tow-rope completely, applying a resisting force to the tow-rope so that it is wound up tightly on the drum.
9. Verify rear-view mirror is correctly adjusted.
10. Verify push-type circuit breaker is pushed in, i.e. the white marking must not be visible.

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4.5 NORMAL PROCEDURES AND RECOMMENDED SPEEDS

4.5.2 TAKE-OFF AND CLIMB

The towing-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 heard 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, i.e. the green marking of the tow-rope must be visible.

CAUTION

When towing sailplanes with high wing loading, acceleration must be performed close to the ground, because the take-off speed of the sailplane may exceed the take-off speed of the tow-plane.

The normal airspeed during towing is 115 km/h (62 kts. / 71 mph). If, due to the construction of the sailplane, a lower airspeed is necessary, the airspeed may be reduced down to the minimum airspeed for 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 115 km/h (62 kts. / 71 mph), special attention must be paid to keep the engine temperatures within the admissible range.

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4.5.4 APPROACH

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. If the rope's endpiece is retracted, the winch will stop operating automatically.
3. By looking in the rear-view mirror verify the complete retraction of the tow-rope; the red-colored part at the end of the rope must be swallowed by the green mouth-piece.
4. Perform landing approach as given in the main part of the HK 36 TTS Airplane Flight Manual.

CAUTION

In case the tow-rope is not completely retracted, it should be cut during flight above the airfield. 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.

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.

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SECTION 5

PERFORMANCE

5.2 ACG-APPROVED DATA

5.2.3 TAKE-OFF PERFORMANCE

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

- Take-off power
- Take-off mass (weight) of tow-plane . . . 720 kg (1587 lbs.)
- Propeller setting TAKE-OFF
- Lift-off speed appr. 90 km/h (49 kts. / 56 mph)
- Climb speed appr. 97 km/h (52 kts. / 60 mph)
- Level runway, short and dry grass
- No crosswind component
- Constant headwind component

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).

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.

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

s_1 = Take-off roll

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

Take-off mass (weight) of sailplane: 600 kg (1323 lbs.)

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	288	521	313	560	341	600	371	645
	15	334	594	364	636	396	685	432	741
	30	387	673	422	725	476	808	541	907
5	0	233	444	254	478	278	514	305	555
	15	271	507	297	546	325	589	358	638
	30	315	577	346	623	393	696	449	784

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	945	1709	1027	1837	1119	1969	1217	2116
	59	1096	1949	1194	2087	1299	2247	1417	2431
	86	1270	2208	1385	2379	1562	2651	1775	2976
5	32	764	1457	833	1568	912	1686	1001	1821
	59	889	1663	974	1791	1066	1932	1175	2093
	86	1033	1893	1135	2044	1289	2283	1473	2572

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Take-off mass (weight) of sailplane: 400 kg (882 lbs.)

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	229	419	249	448	270	494	293	515
	15	265	473	287	509	311	544	338	586
	30	303	534	329	573	370	636	418	708
5	0	185	356	201	383	219	411	241	442
	15	214	405	234	435	256	469	280	505
	30	247	457	270	492	305	548	347	612

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	751	1375	817	1470	886	1621	961	1690
	59	869	1552	942	1670	1020	1785	1109	1923
	86	994	1752	1079	1880	1214	2087	1371	2323
5	32	607	1168	659	1257	719	1348	791	1450
	59	702	1329	768	1427	840	1539	919	1657
	86	810	1499	886	1614	1001	1798	1138	2008

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5.3 ADDITIONAL INFORMATION

5.3.5 CLIMB PERFORMANCE

When towing a sailplane with a mass of 600 kg (1323 lbs.), the maximum rate of climb is 2.3 meters per second (453 ft./min.) at sea level in Standard Atmosphere conditions.

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SECTION 6

MASS (WEIGHT) AND BALANCE / EQUIPMENT LIST

6.1 INTRODUCTION

For the operation of the HK 36 TTS as a tow-plane, the permissible empty mass (weight) CG range and the permissible CG range during flight remain unchanged. The loading restrictions under 2.6 and 2.10 of this Supplement No. 9 must be observed.

6.9 EQUIPMENT LIST

The following equipment is necessary for tow-plane operation using the tow-rope retraction device and is included in the calculation of airplane basic empty mass (weight) and corresponding center of gravity:

- 1 Electrically powered tow-rope winch and mount
- 1 Tow-rope guide tube
- 1 Mount for cutting mechanism
- 1 Cutting mechanism
- 1 Tow-rope at a length of 30 to 50 m (98 to 164 ft.) made of PVC or polyamide with max. diameter 6.3 mm (0.25 in.) with green marking as of DAI-WI No. 27.
- 1 Aluminum stop-egg

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- 1 End-piece, silicon protection tube, breaking-piece (with ultimate load of 400 daN / 900 lbf) and ring-couple
See if national regulations or sailplane manufacturer require an ultimate load different to the one mentioned above.

The following equipment, which is not taken into account for the determination of airplane basic empty mass (weight) and corresponding CG, is also required for tow-plane operation:

- 1 Rear view mirror

CAUTION

The Pilot must ensure that the correct breaking piece (see above) is installed on the tow-rope, as the structure may otherwise become overstressed. In any case the ultimate load of the braking piece must not exceed 400 daN (900 lbf).

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SECTION 7

POWERED SAILPLANE AND SYSTEMS

DESCRIPTION

7.1 INTRODUCTION

Tow-Rope Retraction Device

The tow-rope retraction device consists of two sections:

a) Cutting Mechanism

The cutting mechanism is attached to the fuselage tube by means of the cutting mechanism mount. Tensile forces acting in the tow-rope during towing are released by the stop-egg onto the stop-egg detent. 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.

b) 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 circuit protector). A red warning light inside the switch indicates operation of the winch. When the rope's endpiece is swallowed by the green mouth piece the winch switches off automatically. 50 meters (164 ft.) of tow-rope is the maximum usable length accommodated by the winch-drum. The tow-rope runs in the tow-rope guide tube which leads from the winch-drum to the cutting mechanism.

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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.

7.8 COCKPIT

The release-handle for the cutting mechanism is yellow/red in color and is located in the cockpit right to the throttle-quadrant. Its dead travel shall be 10 mm (0.4 inch). The tow-rope is cut by abruptly pulling the release handle with force and all the way to the stop.

7.11 ELECTRICAL SYSTEM

The winch rocker-switch with its integrated circuit breaker and a manually operated push-type circuit breaker (featuring an indicating-type reset button) are located on the cockpit's left-hand side. A red warning light inside the switch indicates operation of the winch. Winch-operation is stopped automatically by the rocker-switch.

If there is any type of stoppage on the tow-rope (i.e. if the forces on the tow-rope during retraction are too large for the winch) the integrated circuit breaker will activate and stop the winch operation.

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7.14 PLACARDS / INSCRIPTIONS

The following additional placards are installed for tow-plane operation of the HK 36 TTS with the tow-rope retraction device:

✧ on cover of winch-drum:

During towing operations no baggage may be carried.

✧ underneath rocker-switch of tow-rope retraction device:

Tow-Rope Retraction Device

✧ on release lever:

Tow-Rope Cutting Mechanism

Four red colored rings (e.g. adhesive tape), 10 mm (0.4 in.) wide, in intervals of 20 mm (0.8 in.), starting at the top.

✧ on the mount for the cutting mechanism:

**Ultimate Load of Breaking Piece:
max. 400 daN / 900 lbf**

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SECTION 8

POWERED SAILPLANE HANDLING, CARE AND MAINTENANCE

8.2 POWERED SAILPLANE INSPECTION PERIODS

8.2.1 INSPECTION PERIODS FOR THE TOW-ROPE RETRACTON DEVICE

At each 100 hour inspection, 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:

1. Verify proper operation of cutting-mechanism by activation with tow-rope fully retracted.
2. Disassemble cutting-mechanism and inspect knife for good blade and check for damage.
3. Clean inside of cutting-mechanism.
4. Clean tow-rope guide tube and check for chafing or abrasion.
5. For reassembly of the cutting-knife the engraved arrow must point aft. Do not overtighten castle nut and secure it again with split-pin.
6. Lubricate all moving parts.
7. Check spring of red cutting-lever.
8. 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 directly at the winch drum.

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9. Measure 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 housing and change damaged parts if necessary.
10. Check winch drum mount for insecure mounting and damage.
11. Attach ring couple according to DAI-WI No. 27 at the end of the tow-rope.
12. Check electrical connections.
13. Check breaking piece for damage and poor condition.

TBO of tow-rope retraction device is 4 years or 2000 landings in tow-plane operation, whichever comes first.

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

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