



Havarikommissionen
Accident Investigation Board Denmark

BULLETIN

Accident

8-9-2016

involving

MORANE SAULNIER MS894 A

G-BCLT



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FOREWORD

This bulletin reflects the opinion of the Danish Accident Investigation Board regarding the circumstances of the occurrence and its causes and consequences.

In accordance with the provisions of the Danish Air Navigation Act and pursuant to Annex 13 of the International Civil Aviation Convention, the investigation is of an exclusively technical and operational nature, and its objective is not the assignment of blame or liability.

The investigation was carried out without having necessarily used legal evidence procedures and with no other basic aim than preventing future accidents and serious incidents.

Consequently, any use of this bulletin for purposes other than preventing future accidents and serious incidents may lead to erroneous or misleading interpretations.

A reprint with source reference may be published without separate permit.

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BULLETIN

General

File number: HCLJ510-2016-311
UTC date: 8-9-2016
UTC time: 12:06
Occurrence class: Accident
Location: 0.5 nautical miles (nm) north of the town of Kolt
Injury level: None

Aircraft

Aircraft registration: G-BCLT
Aircraft make/model: MORANE SAULNIER MS894 A
Current flight rules: Visual Flight Rules (VFR)
Operation type: Non-Commercial Operations Pleasure Cross Country
Flight phase: Approach
Aircraft category: Fixed Wing Aeroplane Small Aeroplane
Last departure point: Denmark (Freerslev)
Planned destination: Denmark (Kolt)
Aircraft damage: Destroyed
Engine make/model: FRANKLIN (6A-350-C1)

SYNOPSIS

Notification

All times in this report are UTC.

The Aviation Unit of the Danish Accident Investigation Board (AIB) was notified of the accident by the pilot on 8-9-2016 at 12:41 hrs.

The Danish Transport and Construction Agency (DTCA), the French Accident Investigation Board (Le Bureau d'Enquêtes et d'Analyses - BEA), the European Aviation Safety Agency (EASA), the Directorate-General for Mobility and Transport (DG MOVE) and the Air Accidents Investigation Branch of the United Kingdom (AAIB) were notified on 8-9-2016.

The BEA and the AAIB appointed non-travelling accredited representatives to the AIB safety investigation.

Summary

A partial loss of engine power at 1500 feet on the approach to an airstrip near the town of Kolt was most likely caused by carburettor icing developed during a continuous cruise descent.

A consequential non-recoverable stall in a manoeuvring attempt to return to the airstrip for landing lead to a hard landing in a stubble field.

The accident occurred in daylight and under visual meteorological conditions (VMC).

FACTUAL INFORMATION

History of the flight

The accident occurred during a private VFR flight from a private grass airstrip (Freerslev) on the island of Zealand to a private grass airstrip near the town of Kolt in Jutland. [See appendix 1](#) and [appendix 2](#).

The pilot pre-flight planning and the engine run up before departure did not give rise to remarks.

The enroute flight was uneventful.

13 nm southeast of the town of Kolt, the pilot initiated a continuous cruise descent from flight level (FL) 45. [See appendix 3](#).

During the continuous cruise descent, the pilot unintentionally did not activate the engine carburettor heater.

Approaching an altitude of approximately 1500 feet on a wide left hand base to runway 21, the pilot got visual contact with the airstrip and intended to do a flyby of the airstrip at an altitude of 1500 feet to have a look at the runway conditions.

When the pilot added engine power to maintain the altitude of 1500 feet, the pilot experienced that the engine only produced partial power. When trying to add engine power beyond approximately 2000 revolutions per minute (RPM), the engine almost stopped. When reducing engine RPM, the engine regained partial power.

At an altitude of approximately 1400 feet, the pilot decided to do an emergency landing. Therefore, the pilot reduced the engine power to idle, configured the aircraft for landing, and reduced the indicated airspeed to 65 knots.

On final to runway 21, the pilot observed that the aircraft came in too high for landing, and the pilot performed turning manoeuvres to lose altitude.

Crossing the threshold to runway 21 at an altitude of 200 feet above ground level, the pilot realized that it was no longer possible to land at the airstrip.

The pilot added engine power, but the engine only produced partial and not sufficient power to maintain the present altitude.

Northwest of the airstrip, the pilot initiated a left turn back towards the airstrip. At that point, the pilot believed that it was still possible to return to the airstrip for landing.

However, in order to avoid trees, the pilot scrubbed the idea of returning and decided to do an emergency landing in a stubble field positioned south of the nearby motorway. [See appendix 4.](#)

In the final turn for the stubble field at a low altitude, the pilot observed the airspeed to be below the minimum airspeed for the present aircraft configuration.

The aircraft was exposed to a sudden high sink rate. The aircraft made a hard landing in the stubble field and came to a full stop after a landing roll of 10 metres.

The pilot evacuated the aircraft himself. A witness, who observed the sequence of events, came along to assist the pilot.

Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Others</i>
Fatal			
Serious			
Minor	1		

Damage to aircraft

The aircraft was destroyed.

Other damage

None.

Personnel information

License and medical certificate

The pilot - male, 35 years - was the holder of a valid Danish private pilot license (PPL (A)) issued by the DTCA on 21-6-2010.

The class rating single engine piston land (SEP land) was valid until 30-6-2018.

The medical certificate (class 2) was valid until 30-1-2018.

Flying experience

	Last 24 hours	Last 90 days	Total
All types	2	3	244
This type	2	2	168
Landings this type	2	9	204

Airstrip familiarity

The pilot had experience and was familiar with operations on the airstrip near the town of Kolt.

Rest before flight

The night before the accident flight, the pilot slept 9 hours, and the pilot felt well-rested in the morning.

Aircraft information

General

Registration:	G-BCLT
Type:	Morane Saulnier
Model:	MS894 A
Manufacturer:	Societe de construction d'avions de tourisme de d'affaires
Serial number:	12003
Year of manufacture:	1972
Engine manufacturer:	Franklin aircraft engines
Engine type:	6A-350-C1
Aircraft total flight hours:	1208:15 (7-9-2016)
Airworthiness review certificate:	Valid until 23-11-2016
Technical flight log:	No remarks
Fuel on board before take-off:	Approximately 170 litres

Mass and balance

On request by the AIB, the pilot made a theoretical reconstruction of the aircraft mass and balance at the time of the accident. Some of the text in the reconstruction is in Danish.

[See appendix 5.](#)

Aircraft Flight Manual (AFM)

Normal operating procedures

Decent and landing:

Rapid decent

<i>Carb. air heat control</i>	<i>Pull, hot</i>
<i>Mixture control</i>	<i>Push, rich</i>
<i>Propeller</i>	<i>Full low pitch</i>
<i>Manifold pressure</i>	<i>As required</i>
<i>Every 500 m (1500 ft)</i>	<i>Apply power</i>

Decent and landing:

Approach

<i>Boost pump</i>	<i>On</i>
<i>Fuel selector</i>	<i>Set to fullest tank</i>
<i>Reduce speed to</i>	<i>140 km/h (75 kt - 87 MPH)</i>
<i>Flaps extended</i>	<i>As required</i>
<i>Max. IAS, flaps extended 30°</i>	<i>160 km/h (86 kt - 99 MPH)</i>
<i>Tabs</i>	<i>Set</i>
<i>Final IAS - Flaps 30°</i>	<i>120 km/h (65 kt – 75 MPH)</i>
<i>- Flaps retracted</i>	<i>130 km/h (70 kt – 81 MPH)</i>

Emergency operating procedures

Icing - Carburetor

Under icing conditions, adjust the carburetor air heat control to maintain the temperature between +5° C and +20° C -41 and 68°F.

In the event of icing indications (fall in r.p.m., manifold pressure drop, misfiring), pull out the carburetor air heat control fully for a few seconds until ice has melt, and push back the control to return the temperature between +5° C and +20° C.

Pulling out the carburetor air heat control may result in a r.p.m reduction of as much as 300 r.p.m and significantly increases the fuel consumption per hour. After setting the carburetor air heat control, adjust the mixture control.

Meteorological information

Forecast

Forecast for the area D, Jutland.

The forecast was valid on 8-9-2016 between 12:00 and 18:00 hours.

Turbulence: It was not expected within the time period

Icing: It was not expected within the time period

Visibility/weather/clouds: The whole area except area 1b:
Within the whole time period, a visibility above 8 kilometers
Cloud base above 4000 feet
Top of clouds: No forecast

Area 1b:
In the beginning and in the middle of the time period, a visibility above 8 kilometers, locally 3000-5000 meters in mist
Cloud base above 4000 feet.
Top of clouds: Flight level (FL) 070.

At the end of the time period, a visibility above 8 kilometers.
Cloud base above 4000 feet
Top of clouds: FL 070

Zero degree isotherm: The whole area, above FL 125

Surface wind The whole area except area 1a and 1b:
Southeasterly 10 knots, gradually southeasterly 5 knots

Area 1a and 1b:
Southeasterly 10 knots

Wind and temperature: 2000 feet, the whole area:
150° 15 knots +16° Celsius (C), gradually 160° 20 knots, +16° C

FL 050, the whole area:
180° 15 knots +11° C, gradually 220° 15 knots, +12° C

FL 100, the whole area:
220° 15 knots +7° C, gradually 210° 20 knots, +6° C

Lowest QNH 1009 hpa

Aftercast

The aftercast was valid for the flight route from Freerslev (a village in the Northern part of Zealand) to Kolt (a town southwest of the city of Aarhus in Jutland) at 12:06 hours.

General: Southeasterly current of a warm air mass

Visibility: Good, presumably 20-30 kilometers

Clouds: 0-3/8 cumulus at 3000-4000 feet

Weather: None

Surface wind: East-southeasterly 5-12 knots

Turbulence: None

Windshear: None

Significant weather chart

[See appendix 6.](#)

Weather observations at Aarhus (EKAH)

Aerodrome forecast (TAF)

ekah 081055z 0812/0912 14010kt 9999 sct040 tempo 0900/0907 0300 bcfg bkn002 becmg
0904/0907 30008kt=

Aviation routine weather report (METAR)

ekah 081150z auto 13007kt 090v170 9999ndv ncd 24/12 q1014=

ekah 081220z auto 13007kt 090v160 9999ndv ncd 24/12 q1014=

Model soundings

[See appendix 7](#) and [see appendix 8](#).

Temperatures and dewpoints

Temperatures and dewpoints measured at 2 meters near the city of Aarhus at 12:00 hours.

[See appendix 9](#).

Risk of carburetor icing

[See appendix 10](#).

Aids to navigation

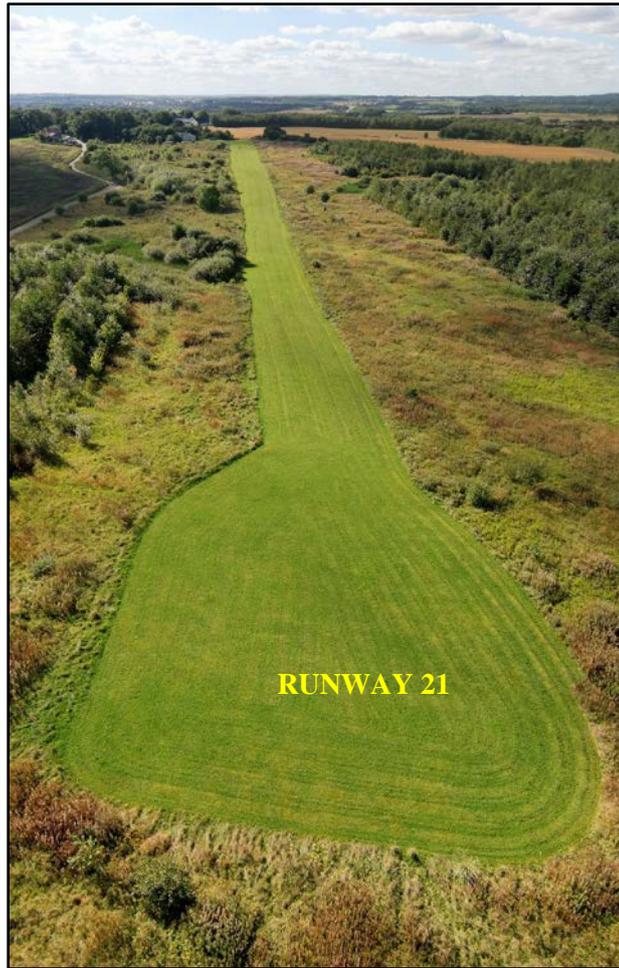
The pilot used a flight planning software tool for generating an electronic flight plan.

During the flight, the pilot used a tablet for electronic presentations of enroute flight and mapping data. Furthermore, the pilot had VFR enroute paper charts to his disposal.

Airstrip information

The point of intended landing was a privately owned grass airstrip positioned 0.6 nm north of the town of Kolt.

Airstrip position:	56° 06'58.97''N 10° 04'30.71''E
Elevation:	Approximately 249 feet
Runway identifications:	03 and 21
Surface:	Grass
Runway dimensions:	500 x 15 meters



Wreckage and impact information

General information

The aircraft came to a full stop in a stubble field 0.4 nm southwest of the intended landing airstrip and 0.5 nm north of the town of Kolt.

The position of the accident site was: 56° 6'47.16"N 10° 3'56.48"E.

The impact marks in the stubble field in combination with the damages to the aircraft were consistent with a hard landing. The landing roll distance was 10 meters.

[See appendix 11](#) and [appendix 12](#).

Technical investigation

General:	Overall, the aircraft appeared to be maintained properly.
Fuel tanks:	The fuel in the right wing tank flushed with the filler cap. Fuel in the left wing tank was not visible through the filler cap. However, the estimated fuel quantity in the left wing tank was approximately two third full. The estimated fuel quantity on board the aircraft was approximately 120 liters.
Aircraft configuration:	The flaps were partly extended. The slats were extended.
Nose and rudder trim:	Both were set to neutral positions.
Engine controls:	The carburetor heat lever handle was set to cold. The propeller lever was set to low pitch. The mixture lever was set to idle cut-off (pilot handling - on ground emergency). The fuel lever was set to off (pilot handling - on ground emergency). The magnetos were set to off (pilot handling - on ground emergency). The wiring and the functionality of the engine controls were visually and physically inspected and checked. The inspection gave no rise to remarks.
Propeller:	The depth of marks from blows on the propeller indicated that the engine at impact produced more than wind milling power but not more than idle power.
Engine:	A visual engine inspection was performed. There were no leakages or damages.

A rotation of the propeller (180°) revealed engine compression, and there were no jarring sounds from the engine.

The fuel pump filters, the fuel feeder lines, and the carburetor bowl contained fuel.

The spark plugs were clean and had no damages.

A borescope inspection of the engine gave no rise to remarks.

Damages to the aircraft: The landing gear collapsed upon impact.

The propeller came in contact with the ground, and one propeller blade bended.

There were damages to the right wing and the lower fuselage.

The aircraft was destroyed.

[See appendix 13](#)

Survival aspects

The pilot used hip and shoulder harnesses.

Neither seats nor seatbelts were overstressed or suffered from malfunctioning.

A witness, who observed the sequence of events, came along to assist the pilot.

Additional information

The European General Aviation (GA) Safety Team (EGAST) at EASA has published a series of GA articles.

An article on piston engine icing is available at the website of the AIB:

[Piston engine icing](#)

ANALYSIS

General

The license, the qualifications and the medical status held by the pilot, the technical status of the aircraft, and the aircraft mass and balance had, in the AIB's opinion, no influence on the sequence of events.

The observed weather conditions in the area of the town of Kolt were equivalent to the forecasted weather conditions.

The pilot had experience and was familiar with the area and the airstrip.

The AIB considers the pilot to be rested before the accident flight.

Risk of carburettor icing

During the continuous cruise descent from FL 45 to an altitude of 1500 feet, the pilot unintentionally did not activate the engine carburettor heater.

The descent checklist prescribed the use of the carburettor heater and the application of engine power every 1500 feet.

The risk of serious carburettor icing at any power (actual temperature and dewpoint at 1500 feet - Tunoe) and the risk of serious carburettor icing at descend power (actual temperature and dewpoint at 2 meters - Aarhus South) were present.

Taking into consideration the sequence of events, the AIB finds it most likely that the partial loss of engine power at 1500 feet was caused by carburettor icing developed during the continuous cruise descent.

Stall at low altitude

A combination of the following factors led to a consequential non-recoverable stall:

- Low altitude
- Low airspeed
- The partial loss of engine power
- A manoeuvring attempt to return to the airstrip for landing

The consequential non-recoverable stall led to a hard landing in a stubble field resulting in the aircraft being destroyed.

CONCLUSION

A partial loss of engine power at 1500 feet on the approach to an airstrip near the town of Kolt was most likely caused by carburettor icing developed during a continuous cruise descent.

A consequential non-recoverable stall in a manoeuvring attempt to return to the airstrip for landing lead to a hard landing in a stubble field.

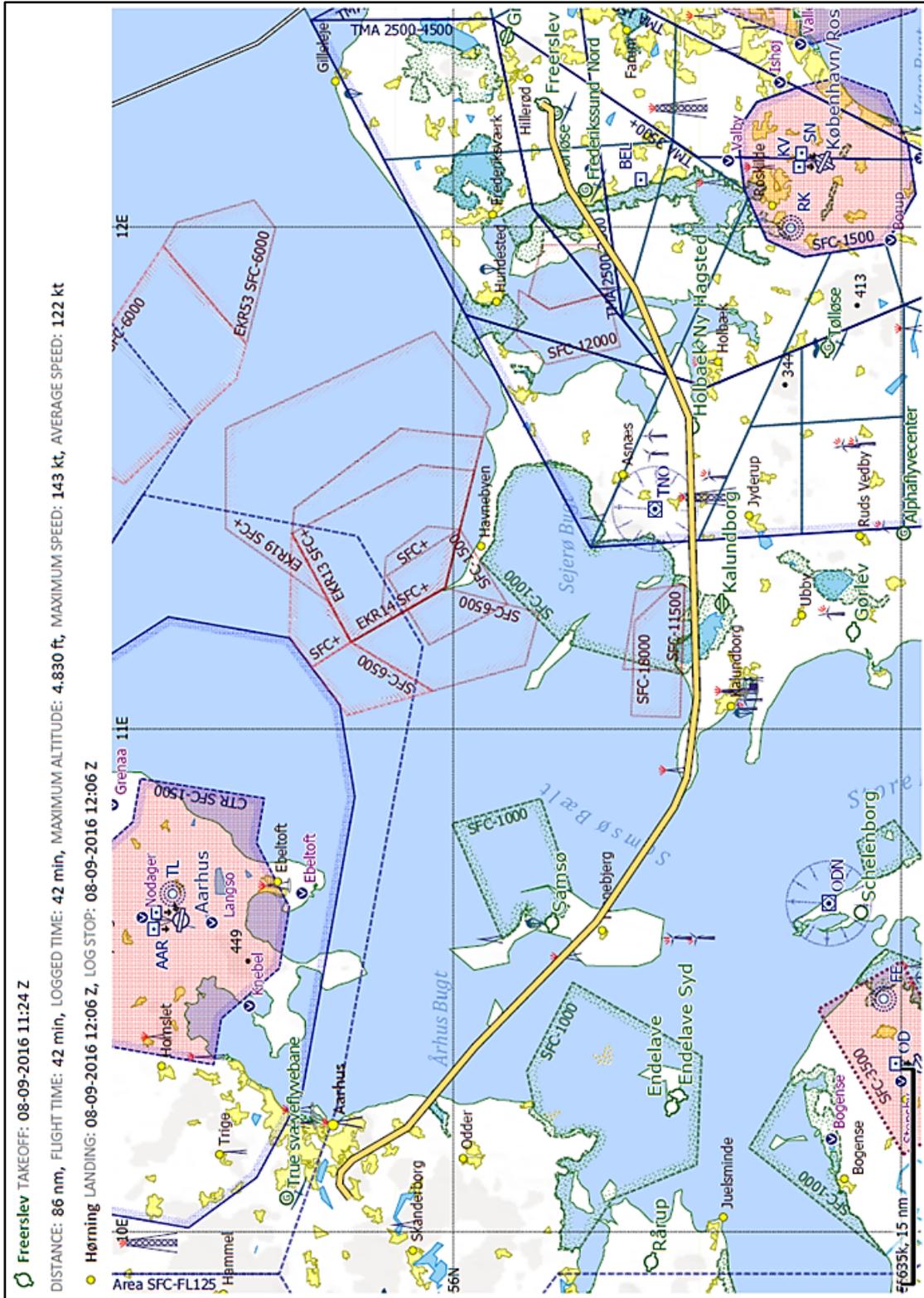
APPENDIX 1

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APPENDIX 2

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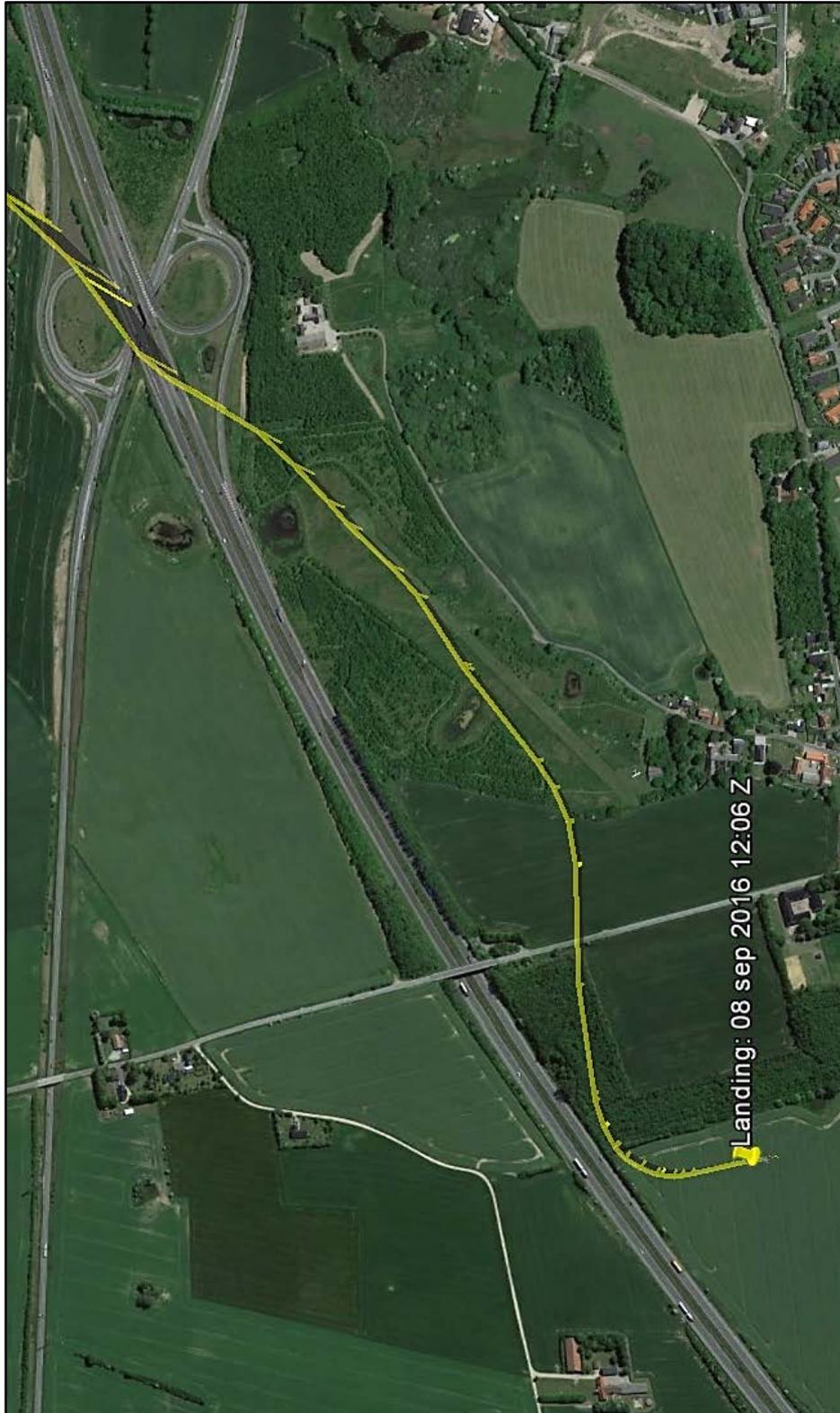
APPENDIX 3

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APPENDIX 4

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APPENDIX 5

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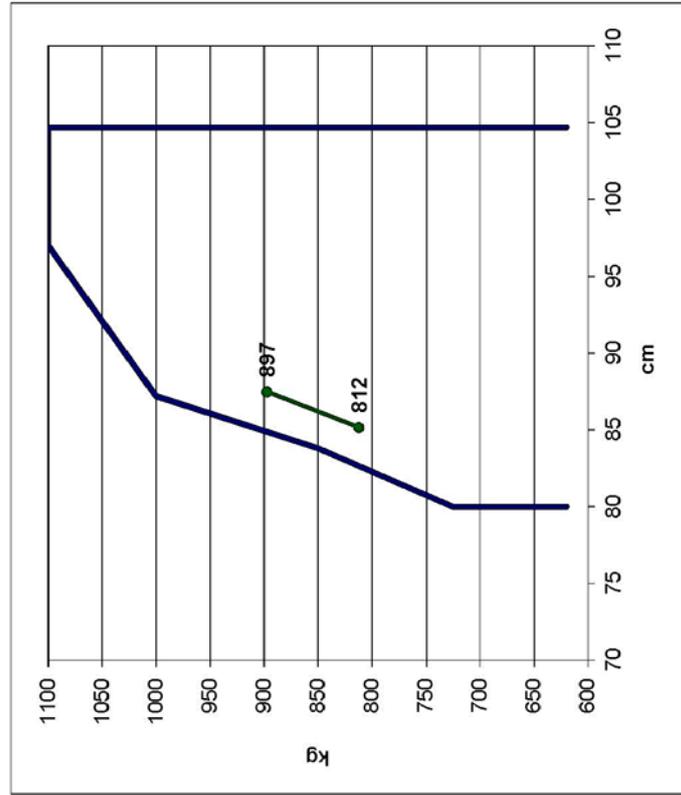
MS894A

Mass and balance MS894A		
	Masse/kg	Moment/(cm*kg)
Tomvægt	689	81.2
Forsæder	108	94.7
Bagsæder	10	177.7
Bagage	5	244.6
Fuel	85	109.6
Med fuel	897	87.5
Uden Fuel	812	85.1
		78497
		69156

*Svarer til: 120 liter fuel

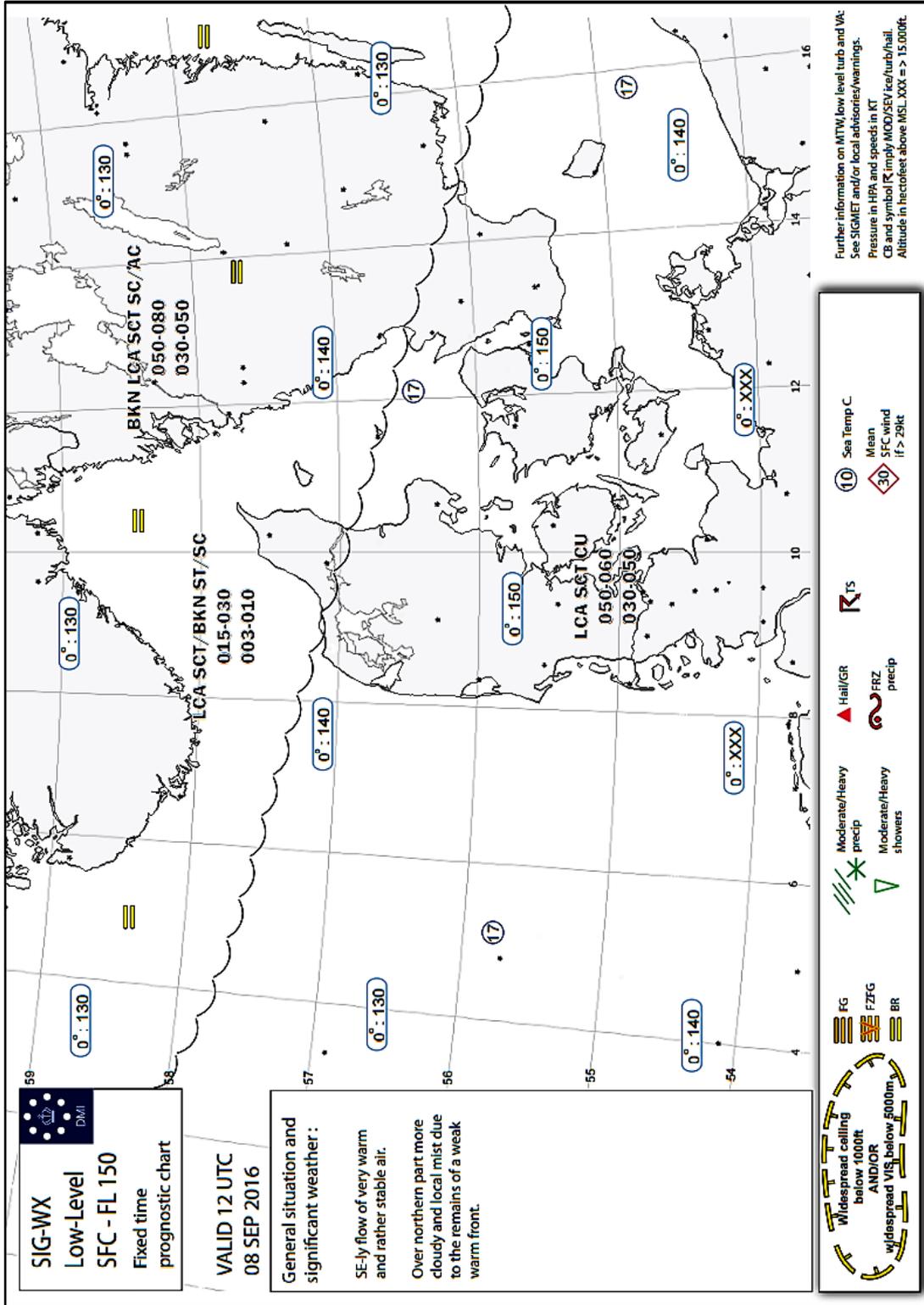
TP-grænser	620	80	49600
	725	80	58000
	850	84	71230
	1000	87	87200
	1100	97	106700
	1100	105	115170
	620	105	64914

MTOW.: 1100 kg
Max. Landingsmasse 1050 kg



APPENDIX 6

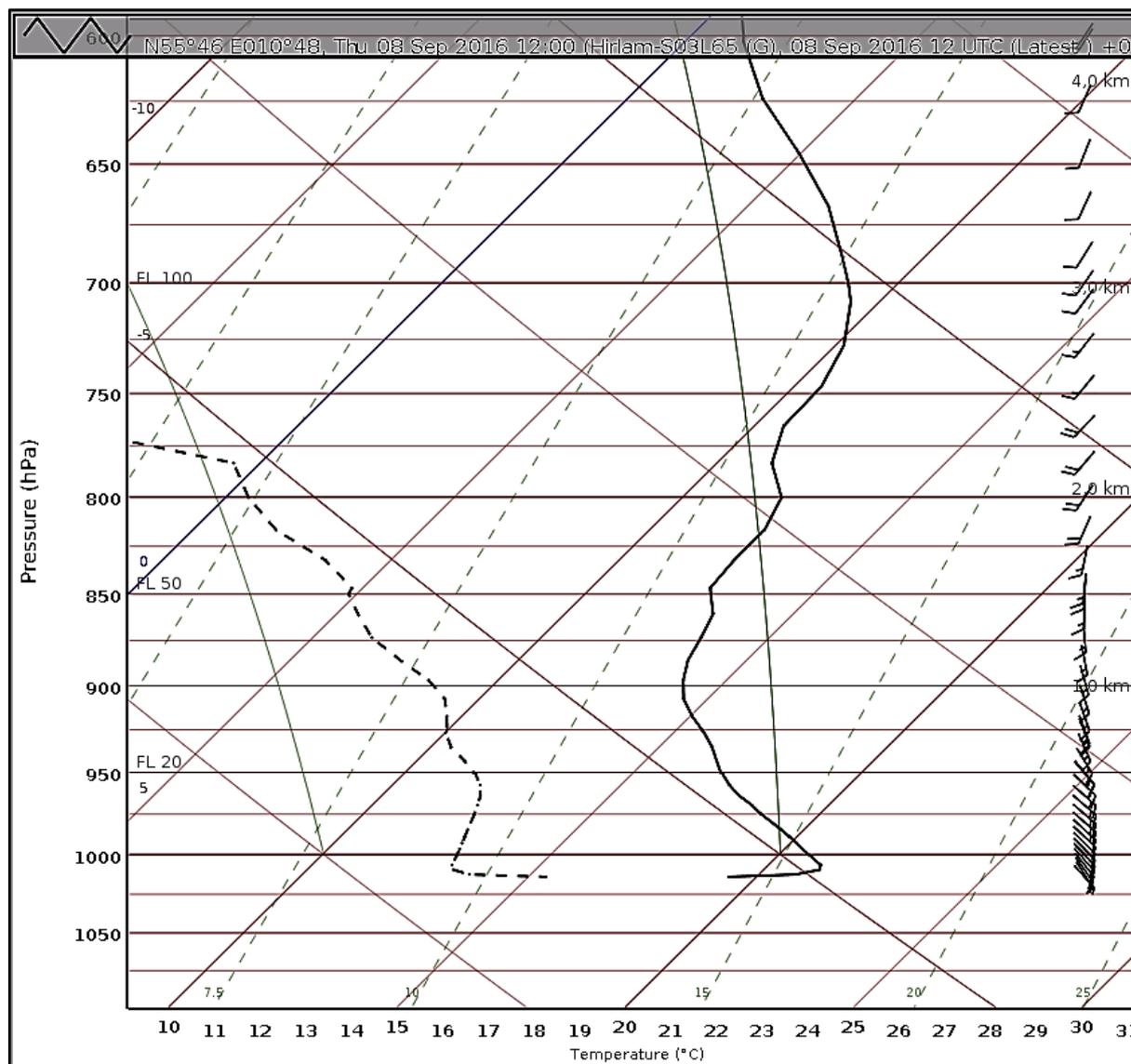
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APPENDIX 7

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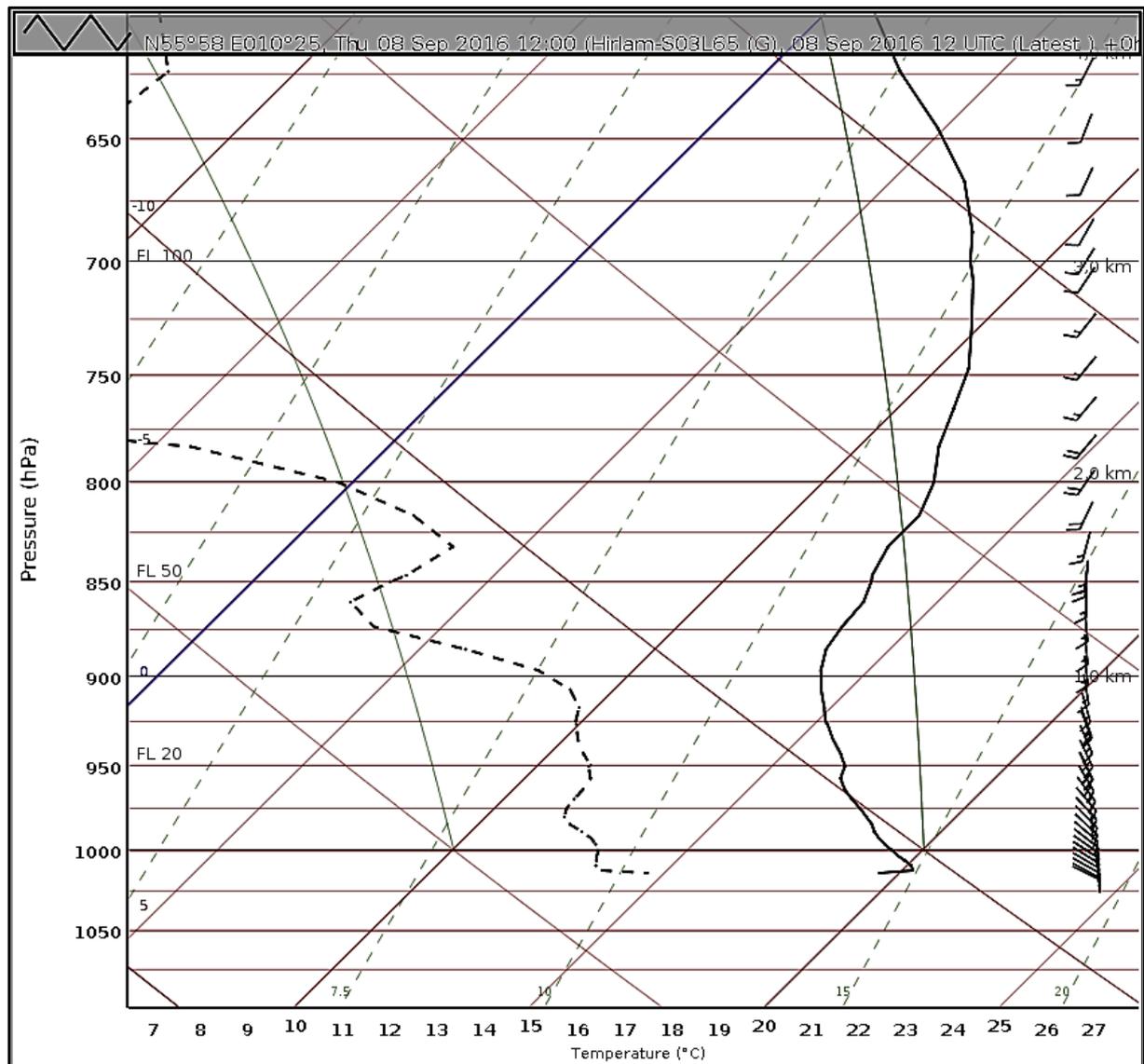
Model sounding at Røsnæs at 12:00 hours.



APPENDIX 8

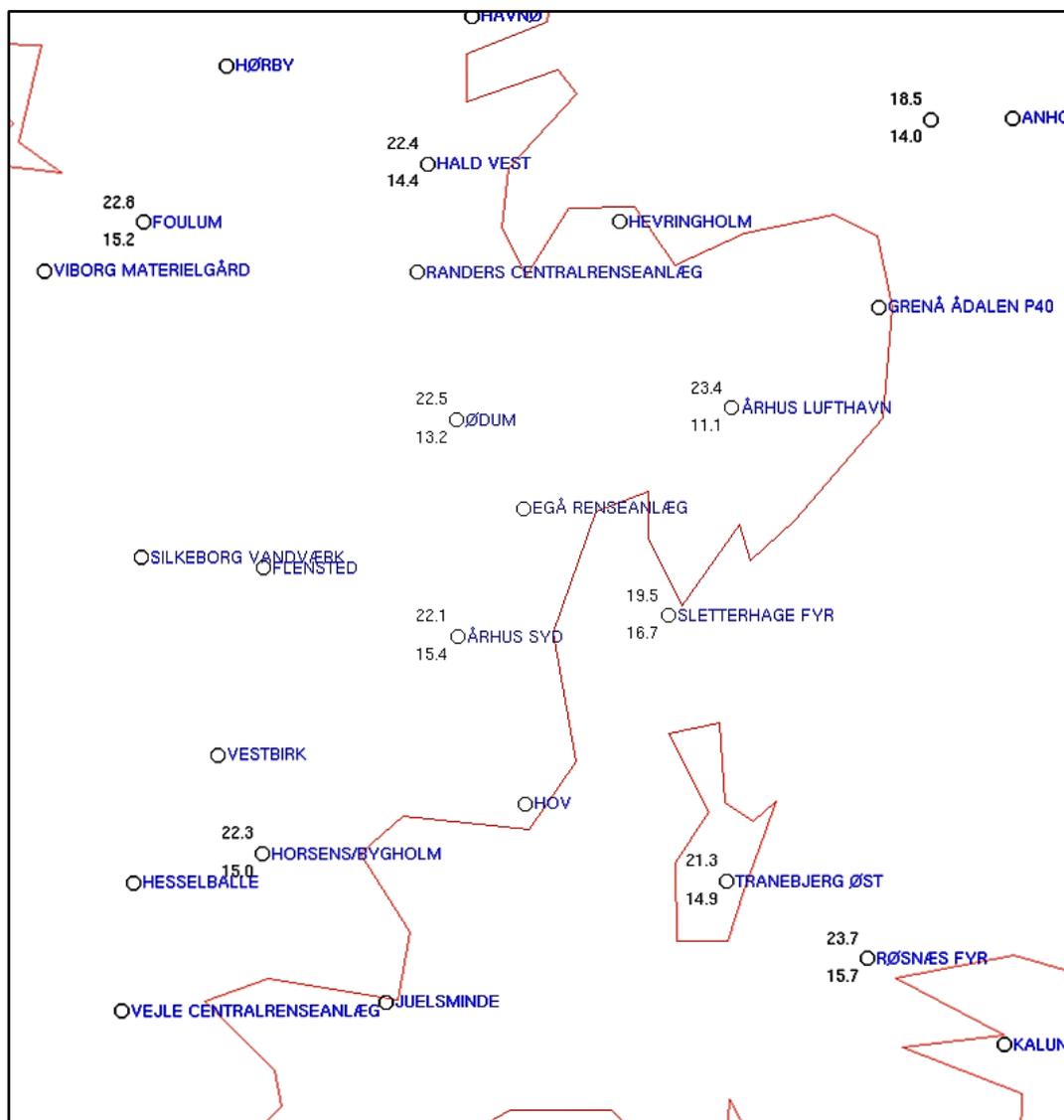
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Model sounding at Tunø at 12:00 hours.



APPENDIX 9

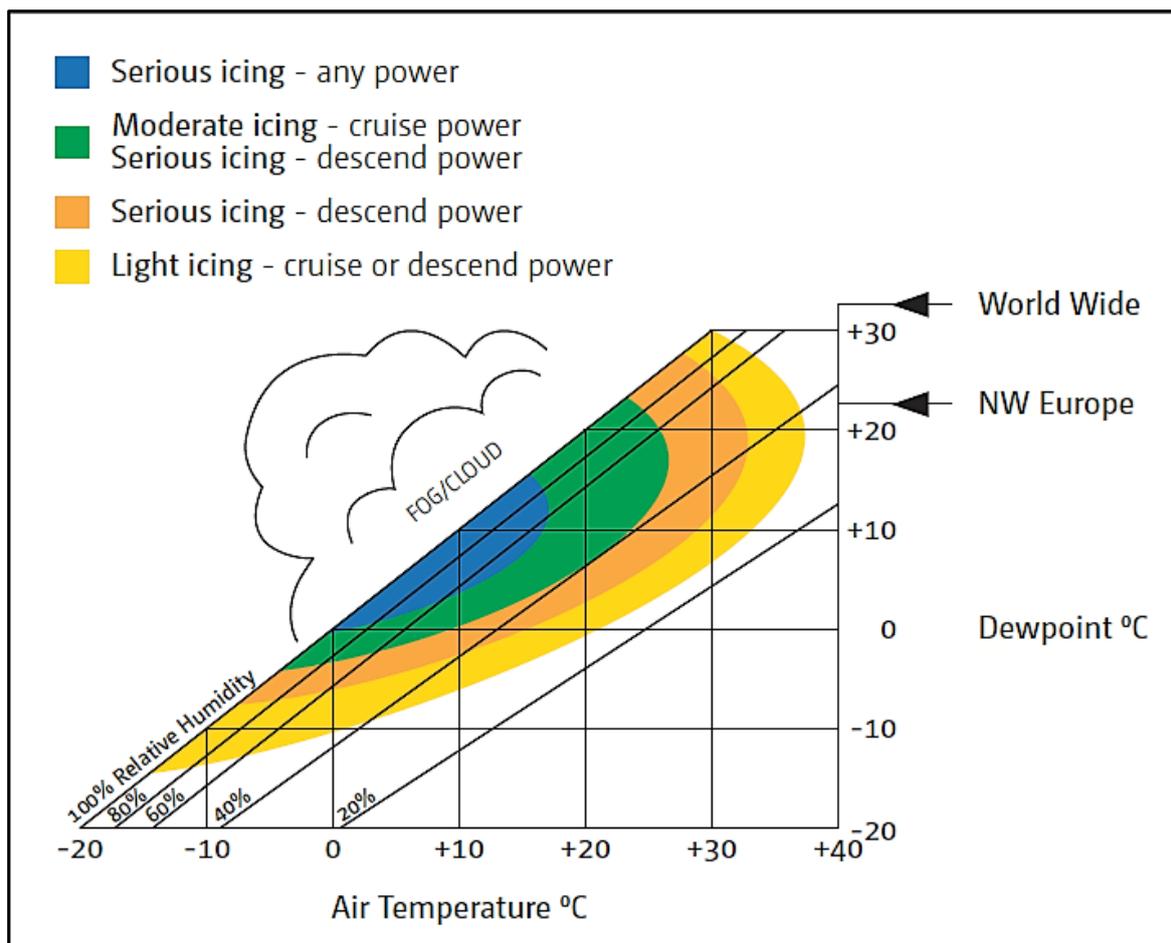
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	Temperature	Dewpoint	Dewpoint depression
Røsnæs (approximately at 1500 feet)	17.5	11.5	6.0
Tunoe (approximately at 1500 feet)	16.5	11.0	5.5
Aarhus South at 2 meters	22.1	15.4	6.7



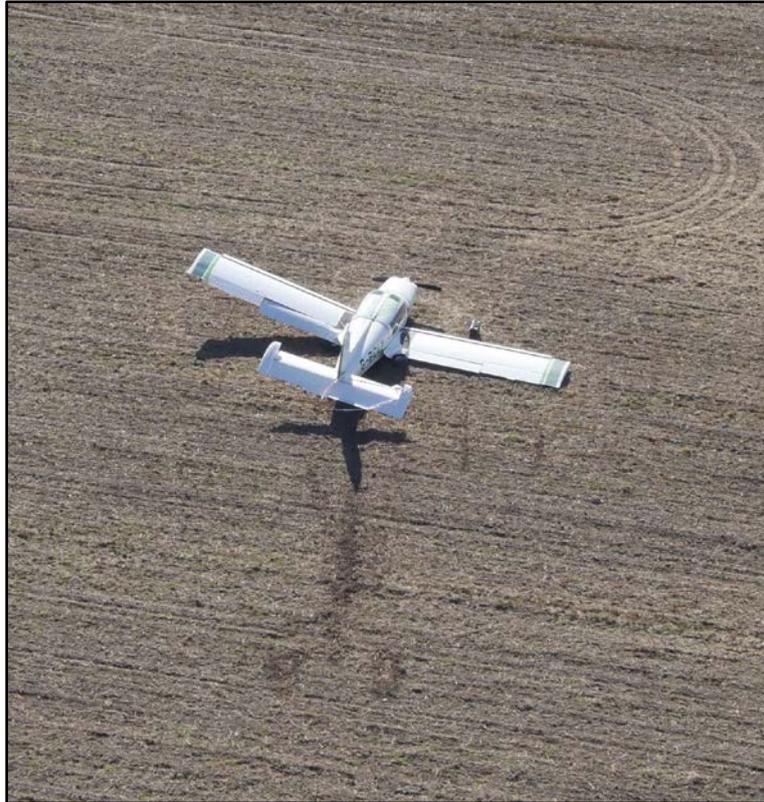
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