REPORT

HCL 69/00	**Accident**		
Aircraft Type:	Socata TB 10	Aircraft Registration:	D-EACQ
Engine(s):	Lycoming O-360-A1AD	Type of flight:	Private, VFR
Crew:	1 - Fatal	Passagers:	2 - Fatal
Place:	South of Skovmose on Als	Date and time:	29.11.2000, 1713 UTC

This is a translation of the Danish report. Time used in this report is UTC.

Synopsis

The Air Traffic Control Centre notified The Danish Aircraft Accident Board about the accident on November 29th, 2000, 1759 UTC.
Bundesstelle für Flugunfalluntersuchung (BFU), Germany and Bureau Enquetes-Accidents (BEA), France were notified on the November 30th, 2000.

The accident flight was a private NIGHT-VFR flight from Soenderborg (EKSB) to Hamburg (EDDH). The aircraft arrived earlier on the same day from EDDH with the same crew and passengers.

At 1705 hrs, the aircraft took off from EKSB runway 14. The clearance was to climb straight ahead until Alsie VOR (114.70MHz) radial 190°, then follow the radial to LBE VOR (115.10 MHz).

The ATC tower lost the radio contact with the aircraft approximately 10 minutes later.

The aircraft was not observed on neither the Danish ATC Radar System nor on the German ATC Radar System. Consequently, the Air Traffic Control Centre at Copenhagen Airport was notified.

A helicopter search and rescue operation was initiated, as a witness had contacted the police and informed them that she had seen an aircraft accident at approximately 1713 hrs in the water south of the island Als (off Skovmose).

Parts from the aircraft were found at approximately 1820 hrs at the position N54° 52,121 E010° 01,542 (off Skovmose).

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

The AAIB has not issued any recommendations following this accident.

Summary

The pilot lost visual reference when the aircraft approached the sea (Lillebaelt) in complete darkness. The pilot did not have instrument experience. He was spatial disorientated and the aircraft was inverted. The aircraft began a descent and the speed increased. The pilot was probably trying to correct the over speed by pulling back the steering wheel, which resulted in an increased over speed and rapid descent. The aircraft hit the water and was destroyed.

1. Factual information

1.1 History of flight

The accident flight was a private VFR-NIGHT flight from EKSB to EDDH.
Earlier on the same day, the pilot and the two passengers had been flying from EDDH to EKSB.
They took-off from EDDH at 1447 hrs and they landed at EKSB at 1546 hrs.
The pilot filed an ATC flight plan with an estimated time of departure 1650 hrs. The expected en route time was one hour. The pilot and the passengers returned to the aircraft after a short stay at the airport.

The aircraft was not refuelled at EKSB. According to the ATC flight plan, the endurance was before take-off from EKSB 2 hours and 30 minutes. The planned route was direct to LBE VOR and then direct to EDDH.

At 17:00:30, EKSB TWR cleared the flight into position on runway 14. The pilot received wind and pressure information. Wind direction and velocity was 170° at 7 knots. The QNH was 1009 hPa.

TWR requested the pilot about the numbers of persons onboard and was informed that three persons were onboard.

At 17:02:43, TWR asked the pilot if he was ready for take-off. The pilot answered that he was not ready yet.

At 17:04:52, the pilot reported that he was ready for take-off. The pilot requested to maintain runway heading and then follow ALS VOR radial 190°. The TWR approved the request and cleared the flight for take-off. The TWR informed the pilot that the wind was 170° at 7 knots and asked the pilot to report, when he climbed through 3000 feet.

The aircraft took-off at 1705 hrs from runway 14.

At 17:06:59, the aircraft was at the extended centreline to runway 14 (139° MAG). The aircraft altitude was 700 feet (MSL) and climbing. During the climb above 700 feet, the wind velocity was increasing to 210° at 25 knots and the aircraft started to drift approximately 16°-18° to the left. This drift changed the track to approximately 121°.

A scheduled airline at EKSB was getting ready for take-off. The TWR controller had to make sure that D-EACQ was well clear of the departure sector before the airline could receive take-off clearance.

At 17:10:52 hrs, TWR asked the pilot about the present altitude and was informed the altitude was ‘two point six’.

At 17:11:00 hrs, the TWR asked the pilot, if he had started the right hand turn towards LBE VOR (ALS VOR radial 190°). The pilot answered at 17:11:19 – 17:11:30 that he was about to follow ALS VOR radial 190°. The TWR then asked the pilot to report when he was established on radial 190°. The pilot

acknowledged at 17:11:40 hrs. At that time, (17:11:39 hrs) the aircraft was approximately 2.1 nm to the left of the extended centreline to runway 14 and approximately 1.1 nm south of ALS VOR.

The average true track from the time the aircraft was climbing from 700 feet to 2900 feet was approximately 121°. The average groundspeed was approximately 87 knots. The wind at this altitude was 210° at 25 knots. This indicate that the true heading was approximately 137°-139° and the airspeed was 90 KTAS and KCAS 87 knots. The average rate of climb was 433 feet/minute.

At 17:11:47 hrs, the aircraft crossed ALS VOR radial 190° at a distance of 1.2 nm.

At 17:12:11 hrs, the aircraft changed track to the right to a true track of approximately 160°. The altitude was 2900 feet and the aircraft had started a descent.

At 17:12:19 hrs, the aircraft was approaching the coastline near 'Drejet'. At the direction of flight, the sea (Lillebaelt) was without any light.

At 17:12:27 hrs, the aircraft was on a track of 150° and the altitude was decreased to 2400 feet.

The average rate of descent from 17:12:11 hrs to 17:12:27 hrs was approximately 1875 feet/minute.

At 17:12:35 hrs, the aircraft changed the track to the left to a true track of approximately 090°. The altitude was 2400 feet.

At 17:13:07 hrs, the aircraft changed track to the right to a true track of approximately 230°. The altitude was reduced to 2100 feet.

The average rate of descent from 17:12:27 hrs to 17:13:07 was 450 feet/minute.

At 17:13:15 hrs, the aircraft changed the track to the left to a true track of approximately 180°.

Between 17:13:07 hrs and 17:13:15 the groundspeed was according to the radar data approximately 469 knots.

A witness walking on the ditch near 'Skovmose' saw the aircraft passing 'Drejet' on a heading of approximately 090°. The witness could clearly see the navigations lights. The witness could determinate by the position of the green and red navigation lights that the aircraft was turning to a heading of approximately 230°. Shortly hereafter, the witness could by the position of the navigation lights determinate that the aircraft changed the heading to approximately 360° towards the coastline. However, the radar data indicated that the aircraft track was on a southbound (180°) track away from the coastline. Shortly hereafter, the witness heard the sound of impact with the water and the aircraft disappeared from the view.

At 17:13:23 hrs, the last radar data was recorded (probably at an altitude of 700 feet or less).

Between 17:13:07 hrs and 17:13:23 hrs, the average rate of descent was more than 5250 feet/minute.

At 17:14:42 hrs, the TWR tried to get radio contact with the aircraft, but the controller did not get any answer.

The last radio contact with the aircraft was recorded at 17:11:40 hrs.

The aircraft was located at the bottom of the sea on the position N54° 52,1' E010° 01,5' approximately 300 meter south of the coastline at 'Skovmose'.

The three persons onboard suffered fatal injuries and the aircraft was destroyed.
The aircraft track is displayed in appendix D.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	1	2	-
Serious	-	-	-
Minor/None	-	-	-

1.3 Damage to aircraft

The aircraft was destroyed.

1.4 Other damage

None.

1.5 Personnel information

The pilot was a 63-year-old German citizen. He was holder of a valid German Private Pilot Licence (PPL). The PPL was issued on August 18th, 1981. The PPL was valid until August 17th, 2001.

The German authorities had on August 19th, 1999 issued an VFR-NIGHT (CVFR) attachment to the PPL.

In this attachment, the privileges was listed:

''Privileges of the licence
The licence entitles the holder to act
1. in non-commercial operations for non-commercial and non-professional activities as pilot-in-command or as co-pilot of aeroplanes for which a type rating has been issued for flight by day. It entitles to carry out flights by night in the vicinity of an aerodrome if its holder has acquired a total flight experience of 75 hours and if he has carried out 10 take-offs and 10 landings by night with aeroplanes under the supervision of a flight instructor, ''

On March 15th, 1997 the German authorities had issued a VFR-NIGHT cross-country permission to the pilot.

The pilot flying experience prior to the accident was:

	Last 24 hours	Last 90 days	Total
All types	Unknown	Unknown	1338:39
This type	Unknown	Unknown	Unknown

The flying experience listed was the known experience on August 1999.

Since January 5th, 2000, the pilot had following experience on the accident aircraft D-EACQ (according to the aircraft technical logbook):

05.01.2000	EDDH	1355	EDXR	1434	0:39	3 landings day,
10.05.2000	EDDH	1336	EDLW	1440	1:04	1 landing day,
10.05.2000	EDLW	1646	EDDH	1801	0:54	1 landing day,
25.09.2000	EDDH	1300	EDDH	1314	0:14	1 landing day,
06.11.2000	EDDH	1248	EDDH	1325	0:37	1 landing day,
20.11.2000	EDDH	1430	EDHL	1449	0:19	1 landing day,
21.11.2000	EDHL	1547	EDHL	1554	0:07	2 landings day &
21.11.2000	EDHL	1554	EDDH	1617	0:23	1 landing evening.

Hamburg (EDDH), Schachtholm (EDXR), Wichede (EDLW) & Blankensee (EDHL).

No further personal information was recovered.

1.6 Aircraft information

General

Manufacturer:	Socata Tarbes France
Type of aircraft:	TB 10
Year of manufacturing:	1987
Serial number:	722
Registration:	D-EACQ
Airworthiness:	Expiry date May 2001
Type of operations:	Private, VFR

The Flight Manual (FM) stated the type of operations in section Limitations:

TYPE OF USE
VFR – IFR – night and day – depending on equipment
Flying under icing conditions is prohibited
Spin is prohibited
Inverted flight is prohibited

The Flight Manual (FM) stated in the section NIGHT V.F.R.:

9.1 — DESCRIPTION

— List of approved and mandatory equipment allowing flight of the aircraft in night flight

The column «Installation» indicates whether the equipment is mounted in standard version or in night flight option.

Equipment	Night flight	Instal-lation
— RADIO-NAVIGATION		
VHF - category 2	yes	Opt.
VOR/LOC - category 2	yes	Opt.
or		
Radio-compass - category 2	yes	Opt.
— NAVIGATION EQUIPMENT		
Artificial gyroscopic horizon	yes	Opt.
Turn and bank indicator	yes	Stand.
Gyroscopic directional indicator	yes	Opt.
Gyro «ON» indicator	yes	Opt.
Rate of climb indicator	yes	Stand.
Anti-collision light	yes	Opt.
Position light	yes	Stand.
Landing and taxiing lights	yes	Opt.
Adjustable cabin lighting	yes	Opt.
Electric torch	Personal equipment	
Night VFR plate	yes	Opt.

Airframe
No information.

Engine

Manufacturer:	Lycoming
Type:	O-360-A1AD
Serial number:	L-22139-36A

Propel

Manufacturer:	Hartzel
Type:	HC-C2YK-1BF/F 7666 A-2
Serial number:	CH28169

Other equipment
None.

Deficiencies
There were no technical remarks in the technical logbook of the aircraft (bordbuch).

Weight and balance
It was not determined, if a weight and balance was computed prior to the flight.
The weight and balance computation below is a reconstruction:

Basic weight: 756 Kg. Centre of gravity: 968 mm.

	Masse in lb	Arm in inches	Moment in lb*Inch
Aircraft basic weight	1667 lb	38,11 inch	63529,37
Pilot + 1 passenger	0330 lb	45,86 inch	15133,80
1 passenger	0165 lb	82,48 inch	13609,20
Zero Fuel Weight	2162 lb	42,68 inch	92272,37
Fuel (2 ½H x 10 GPH)	0147 lb	42,32 inch	06221,04
Take-off Weight	2309 lb	42,66 inch	98493,41
Maximum take-off weight	2535 lb		

The aircraft was within the weight and centre of gravity limitations.

Performance
The Flight Manual stated following:
Climb performance
Conditions: Climb speed: 78 KIAS – 90 MPH IAS
Weight: 2535 lbs (1150 kg)
Aeroplane without wheel fairings: option Nr 525
Flaps retracted

Pressure altitude	Vertical speed (ft/min)	
(Ft)	+32° F	+59° F
	(0° C)	(+15° C)
0	726	677
2000	623	575
4000	514	470
6000	411	367

The Flight Manual stated following:
Stalling Speeds
Conditions: Weight: 2535 lbs (1150 kg)
Power off
Flaps retracted

Bank	0°	30°	45°
	60 KIAS	65 KIAS	72 KIAS
	70 MPH IAS	75 MPH IAS	83 MPH IAS

The Flight Manual stated following:

Never exceed speed Vne:	165 KIAS	
Designed limit load factor (normal category):	+3,8	-1,5
Designed limit load factor (utility category):	+4,4	-1,8

1.7 Meteorological information

1.7.1 General.

The general description of the meteorological conditions at the area south of the island Als on November 29th, 2000 at 1715 hrs UTC.

Overview: Open warm sector.

Weather: None.

Visibility: 15-20 km.

Clouds: 2/8 – 3/8 of ac. Cloud base approximately 8000 feet.

Frizzing level: Approximately 10000 feet.

Icing: None.

Turbulence: Light topographic turbulence between ground level and 500 feet.

Wind at ground: South at 10 knots.

Wind at loft:	500 feet	200° / 20 knot.
	1000 feet	210° / 25 knot.
	2000 feet	210° / 25 knot.
	3000 feet	220° / 25 knot.

Temperature and humidity:

	Temperature	Dug point	Relative humidity	Absolute humidity
Surface:	9° C	9° C	97%	7,3 g/kg
500 ft:	10° C	7° C	82%	6,5 g/kg
1000 ft:	11° C	6° C	71%	6,3 g/kg
2000 ft:	11° C	4° C	62%	5,5 g/kg
3000 ft:	12° C	0° C	47%	4,3 g/kg

1.7.2 TAF

291200 TAF-FC eksb 291200z 291221 18012kt cavok tempo 1921 4000 br nsc=
291500 TAF-FC eksb 291500z 291523 16010kt 9000 sct012 becmg 1719 4000 br tempo 2123 2000=

EDDH 291720Z 17007KT CAVOK 11/08 Q1008 NOSIG=
EDDH 291750Z 17007KT CAVOK 11/08 Q1008 NOSIG=
EDDH 291820Z 17006KT CAVOK 11/08 Q1008 NOSIG=
EDDH 291850Z 16006KT CAVOK 11/07 Q1008 NOSIG=

1.7.3 METAR

291450 METAR eksb 291450z 16007kt cavok 10/10 q1007=
291550 METAR eksb 291550z 17007kt cavok 11/10 q1007=
291650 METAR eksb 291650z 17007kt cavok 10/10 q1007=
291850 METAR eksb 291850z 18005kt cavok 10/10 q1007=

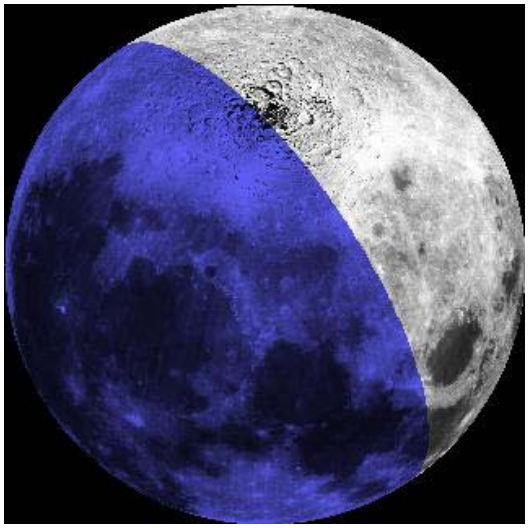
METAR EDDH:
EDDH 291200Z 291322 17010KT CAVOK=
EDDH 291500Z 291601 16010KT CAVOK BECMG 2301 4000 RA BKN007=

1.7.4 Natural light condition

The Moon was 2° 29’ 4’’ above the horizon. The position of the Moon was 221° 46’ 13’’ relative to North (GEO). November 29th, 2000 was three days after new Moon.

At the time of the accident, the Moon was very low above the horizon in the direction SW. The Moon was very thin and could probably only have been limited visible near its position above the horizon.

The Sun was at the time of the accident 23° 0’ 49’’ below the horizon close to the limit of astronomical twilight, which is the limit, where the natural light from the sky is stronger than the light from the Sun.



View of the Moon seen from the Earth (from the accident site at the time of the accident).

At the time of the accident, a witness had at the accident area, observed the weather conditions as dark night good visibility, no precipitations and a light wind from southwest.

1.8 Aids to navigation

The VOR Alsie was used during the flight. The VOR ID vas 'ALS'. The VOR operated H24 on the frequency 114.70 MHz. The position was 54° 54' 19.49'' N 009° 59' 36.16'' E. There were no reports of malfunction at the time of the accident.

1.9 Communications

The pilot communicated with Soenderborg TWR on the frequency 119,450 MHz. The communication was recorded on tape. The quality of the recording was good and was used in the investigation. A transcript was made.

1.10 Aerodrome information

Soenderborg Airport was located at the position 54° 57' 51.72'' N 009° 47' 30.23'' E (ARP). The airport elevation was 24 feet above MSL. The airport had two runway directions, runway 14 and runway 32. The runway dimensions were 1797 x 30 meter. The runway surface was made of asphalt. There were runway lights, approach lights and PAPI. The runway direction of runway 14 was 139.2 MAG and 139.4 GEO. The airport had ATC tower control and a control zone. The sea (Lillebaelt) was approximately 10 nm southeast of the airport. That area was dark during night.

1.11 Flight recorders

Not required, none installed.

1.12 Wreckage and impact information

The accident site was approximately 300 meters south of 'Skovmose' at the position N54° 52,121' E010° 01,542'. The depth of the water was approximately 5 meters. The distance from beginning of runway 14 to

the accident site was approximately 10 nm and the direction was approximately 126° (GEO).

The wreckage and all non-floating parts were found within a radius of 30 meters on the seabed. The floating parts were found over a 1 km coastline off 'Skovmose'. The aircraft was broken into many pieces. The wreckage was recovered and transported to the AAIB hanger for the closer investigation.

The artificial horizon was found at the accident site. (See below). The artificial horizon was locked at a 120° bank to the left. The pitch could be moved between 10° up and 20° down.

The turn indicator was found at the accident site. (See below). The indicator showed a left turn. The instrument was locked in that position. The indication was maximum left turn at mechanical limit.

The succeeding investigations of the wreckage were conducted at the AAIB hangar.

The engine and the propel.
The aircraft engine and the propel were examinated. The examination revealed that the engine was running at the time of the accident.

Flight controls.
The connection from the cockpit to the control surfaces was broken in many places. These fractions were all the result of the accident. All control surfaces were recovered near the main wreckage. The flaps system was also broken at the accident. The flaps electrical motor and its gearbox and actuator indicated that the flaps position was up at the time of the accident. The upper part of the vertical stabilizer was bended to the right. The outboard part of the left horizontal stabilizer was bended rearward and torn off the attachment.

Wings.
Both wings were bended rearwards. Almost all the skin of the wings had left the main beams. The right main beam was bended backwards and had made imprint in the fuselage. Both main beams were broken near the attachment to the fuselage. The tip of the left main beam was at the top twisted forward and at the bottom twisted backward.

NIGHT V.F.R. equipment.
The required NIGHT-VFR equipment described in the Flight Manual was located.

The aircraft.
All major parts of the aircraft were located at the accident site.

The technical defects discovered during the investigation occurred at the accident.

Other information.
A dead and injured eider (bird) was found at the coastline. A sharp instrument had apparently hit the bird. The bird was sent to an examination for the purpose to rule out a bird strike. The result of the examination was that the bird was dead before the sharp instrument hit it.

No bird parts were found in the aircraft. There were no traces of blood on the propel.
A bird strike was ruled out.

1.13 Medical and pathological information.
After the accident, an autopsy was performed on the pilot. No alcohol, medicine or carbon monoxide was found. No medical deficiencies were found.

1.14 Fire
There was no fire.

1.15 Survival aspects
The aircraft was separated into many parts. This indicated that at the time of the accident the speed of the aircraft was high. The seatbelts were pulled through the attachment to the fuselage. The accident was not survivable.

1.16 Test and research
None.

1.17 Organization and management information
The Danish Civil Aviation Administration (CAA) has regulated flight over Danish territory and with Danish aircraft. The rules are described in 'BL 5-19 VFR-NAT flyvning med flyvemaskine'.

The licence and ratings are regulated according to JAR-FCL.

A similar set of rules for VFR-NIGHT cross-country flight existed in Germany (LuftPersV, § 83).

These rules stated that pilots without instrument rating should hold VFR-NIGHT-Rating. In order to hold a VFR-NIGHT-Rating, the pilot should as a minimum hold a PPL and a CVFR-Rating. The training for the VFR-NIGHT-Rating consisted of a minimum of 5 hours school-flight and 10 take-offs and landings under night VMC conditions. Further more, at least two cross country flights over a distance of not less than 50 km under VMC night conditions.

1.18 Additional information

The phenomenon 'Spatial Disorientation' has been described in the book 'Aviation Medicine, written by Marskal Sir Geoffrey Dhenn. Type I and type II is described in the captor 'Dynamics of the Orientation Error Accidents'.

DYNAMICS OF THE ORIENTATION ERROR ACCIDENT

Just as the illusory perceptions embraced within the term 'spatial disorientation' are protean, so are the ways in which the perceptual errors lead to loss of control and orientation error accidents. *Figure 20.1* attempts to illustrate the dynamics of the disorientation accident. The reader's attention is drawn first to the classification of disorientation into two types: Type I, in which the aviator does not appreciate that his perception of aircraft orientation is incorrect, and Type II, the more common form of disorientation, in which the aviator experiences perceptual conflict.

Type I disorientation is the greater hazard to flight safety. The pilot who bases his control of the aircraft on false cues may soon lose control and be left with insufficient time or altitude to regain control, even if he has the skill to re-establish his orientation from instruments or other veridical cues. However, loss of control *per se* is not necessarily a feature of the orientation error accident, though control is inappropriate in all incidents. The pilot who flies his aircraft into the ground

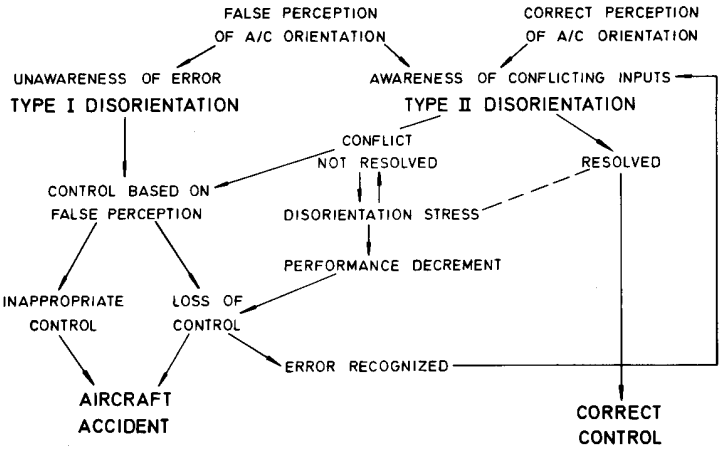


Figure 20.1 – Diagrammatic representation of how Types I and II disorientation can affect the pilot's control of the aircraft.

because of, say, an erroneous perception of pitch attitude on accelerating during a 'missed approach' manoeuvre, or because of an erroneous perception of ground clearance, has not lost control of his aircraft, for, given the sudden realization of his error, he could take appropriate action. Nevertheless, it is a disturbing fact, that many, perhaps the majority, of orientation error accidents are due to Type I disorientation in which the pilot did not realize that he was disorientated.

In contrast, only a small fraction of Type II disorientation incidents lead to an aircraft accident. Commonly, the perceptual conflict is resolved and control of the aircraft is based on the correct interpretation of reliable (usually instrument) cues. Only rarely is the perceptual and motor function of the aviator so impaired by the conflict – 'disorientation stress' is perhaps a better term – that control is jeopardized. The manner in which 'disorientation stress' degrades performance is considered in some detail later in this chapter; suffice it is to say that it may

lead: (1) to the acceptance of erroneous cues and their use in aircraft control; (2) to disturbance of motor function with inappropriate or inadequate control responses; and (3) to impairment of higher mental function so that errors of judgment are made.

Thus infrequently, though not insignificantly, the Type II disorientation may, either of itself or in synergism with other stresses of the flight environment, lead to a Type I incident, with its attendant high probability of an aircraft accident. Disorientation stress can also bring about a complete breakdown in skilled behaviour such that the pilot capitulates and gives up trying to resolve the sensory conflict. Other incidents have been described in which the pilot 'freezes' at the controls and is apparently incapable of making any corrective movement.

1.19 Useful or effective investigation techniques

None.

2. Analysis

The pilot was approved by the German authorities to operate VFR-NIGHT near an airport, and to operate VFR-NIGHT-cross-country flights. The light conditions near an airport are usually better than the light conditions on a cross-country flight. It is usually easier to navigate near an airport. VFR-NIGHT-cross-country-flight is different from VFR-NIGHT-flight near an airport. The possibility to navigate using only visual reference such as a clearly defined horizon and the visual landscape is depending on the weather conditions, the natural light, the area over flown, light from cities and roads. All outside visual references can disappear, if the aircraft passes over the sea or unpopulated areas. The only remaining means of navigation are then the flight instruments (special the artificial horizon) and the navigation instruments. The accident flight was a VFR-NIGHT-cross-country-flight passing over the sea in darkness.

The natural light at the time of the accident was limited. It was three days after new Moon and the Moon was low above the horizon at a southwest direction. The clouds 2/8-3/8 (few) ac had a cloud base at approximately 8000 feet.

The German authorities had approved the aircraft to Private VFR Flight. The aircraft was equipped with suitable instrumentation to conduct VFR flight. The aircraft was equipped to operate VFR-NIGHT-flight according to the requirement stated in the Flight Manual. The aircraft was not approved to operate according to IFR.

After take-off from runway 14, the aircraft was heading approximately 137°-139°. As the aircraft climbed, it entered the stronger winds from southwest and the aircraft started to drift to the left (drift angle of 16°-18°). The aircraft drifted towards ALS VOR and away from the extended centreline.

The heading and vertical speed was almost stabile, while the aircraft was climbing from 700 feet towards 2900 feet. Except, when the pilot was communicating with ATC (17:11:19 hrs to 17:11:40 hrs).
After 17:12:11 hrs, neither the heading nor the vertical speed was stabile. At that time, the aircraft was over the south part of the island Als. The view in the flight-direction was over the sea and in complete darkness with no clear natural horizon. At that time, the aircraft started an unintended descent. The only instrument available to determinate the aircraft attitude was the artificial horizon, but the pilot did not have sufficient instrument training to handle the situation. At the same time, the pilot should have started a right turn to be established on ALS VOR radial 190°, but the pilot started a left turn instead. It is considered possible that the pilot suffered from ’Spatial Disorientation’ at that point and this could be the reason for the loss of control (LOC).

At 17:13:07 hrs, the aircraft turned to the right and had a rate of descent of more than 5250 feet/minute. The ground speed increased to approximately 469 knots. The witness description of the position of the navigation lights and the radar data indicated that the aircraft was inverted prior to the accident (approximately the last 30 seconds of flight). It is possible that the pilot tried to decrease the airspeed by

pulling back in the wheel, but as the aircraft was inverted, the result was an increase of airspeed. The artificial horizon found at the accident site indicated also a 120° bank to the left, and that the aircraft was inverted at the time of the accident.

The analysis of radar data indicated large variations in aircraft track. (See appendix X-Y-Radar Data).

The large variation in aircraft track was more than the +/- 10° expected for pilots with PPL. The variation indicates that the pilot did not have sufficient directional control shortly after take-off.

VFR-NIGHT-flights into areas in completely darkness e.g. over the sea will normally not have a distinctive natural horizon. Without the natural distinctive horizon, it will not be possible to determinate the attitude of the aircraft, except if the flight instruments are being used as reference (in particular the artificial horizon).

It is likely that the bending of left main beam tip is the result of left aileron had been moved down into the airstreams at the high speed forcing the trailing edge up and the leading edge down. The result would be the opposite of what was intended (instead of a bank to the right, the result would be a bank to the left). This effect of high-speed aileron behaviour would make the control of the aircraft difficult.

The Danish Civil Aviation Administration had made regulations on the VFR-NIGHT operation. The rules are stated in BL 5-19. The training is regulated according to JAR-FCL.

The German Authorities had made national rules for VFR-NIGHT operations and training.

3. Conclusions

3.1 Findings

3.1.1 The pilot had licence to operate VFR-NIGHT in the vicinity of an airport.

3.1.2 The pilot had licence op operate VFR-NIGHT-cross-country.

3.1.3 The pilot did not have instrument rating.

3.1.4 The aircraft was approved to private VFR flight.

3.1.5 According to the Flight Manual, the aircraft was approved to VFR-NIGHT operations.

3.1.6 The engine was running at the time of the accident.

3.1.7 After take-off from runway 14, the aircraft started to drift to the left away from the extended centreline.

3.1.8 The pilot had problems with simultaneous directional control and radio communication.

3.1.9 The natural light was limited.

3.1.10 The pilot lost the visual references, when the aircraft was at the southern part of the island Als.

3.1.11 The pilot did not have enough instrument flight experience to handle the aircraft, when operating in areas with reduced visual references.

3.1.12 The pilot suffered from spatial disorientation and lost the control with the aircraft.

3.1.13 The aircraft started a descent with a rate of more than 5250 feet/minute.

3.1.14 The groundspeed increased to approximately 469 knot.

3.1.15 The aircraft was inverted at the time of the accident.
3.1.16 The accident happened, when the aircraft hit the sea at a bank angle of 120° to the left.
3.1.17 The medical and pathological examination did not reveal any factors to the accident.
3.1.18 The technical examination and investigation of the aircraft did not reveal any factors to the accident.

3.2 Factors
3.2.1 The pilot lost the visual references, when the aircraft was at the southern part of the island Als.
3.2.2 The natural light was limited.
3.2.3 The pilot did not have enough instrument flight experience to handle the aircraft, when operating in areas with reduced visual references.
3.2.4 The pilot suffered from spatial disorientation and lost the control with the aircraft.
3.2.5 The aircraft started a descent with a rate of more than 5250 feet/minute.
3.2.6 The groundspeed increased to approximately 469 knot.
3.2.7 The aircraft was inverted at the time of the accident.

3.3 Summary
The pilot lost visual reference when the aircraft approached the sea (Lillebaelt) in complete darkness. The pilot did not have instrument experience. He was spatial disorientated and the aircraft was inverted. The aircraft began a descent and the speed increased. The pilot was probably trying to correct the over speed by pulling back the steering wheel, which resulted in an increased over speed and rapid descent. The aircraft hit the water and was destroyed.

4. Recommendations
The AAIB has not issued any recommendations following this accident.

5. Appendices

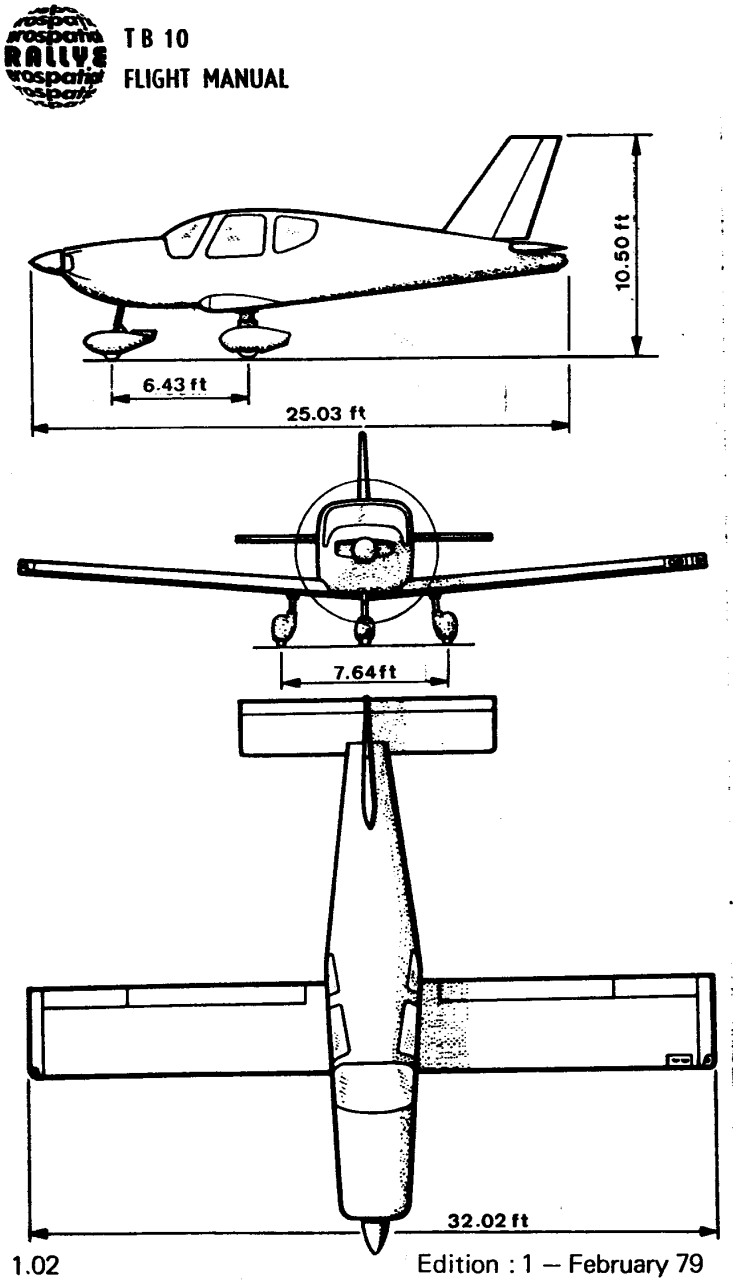
Appendix A: Drawing of TB10

Appendix B: Radar data. 1 unit = 1 nm.

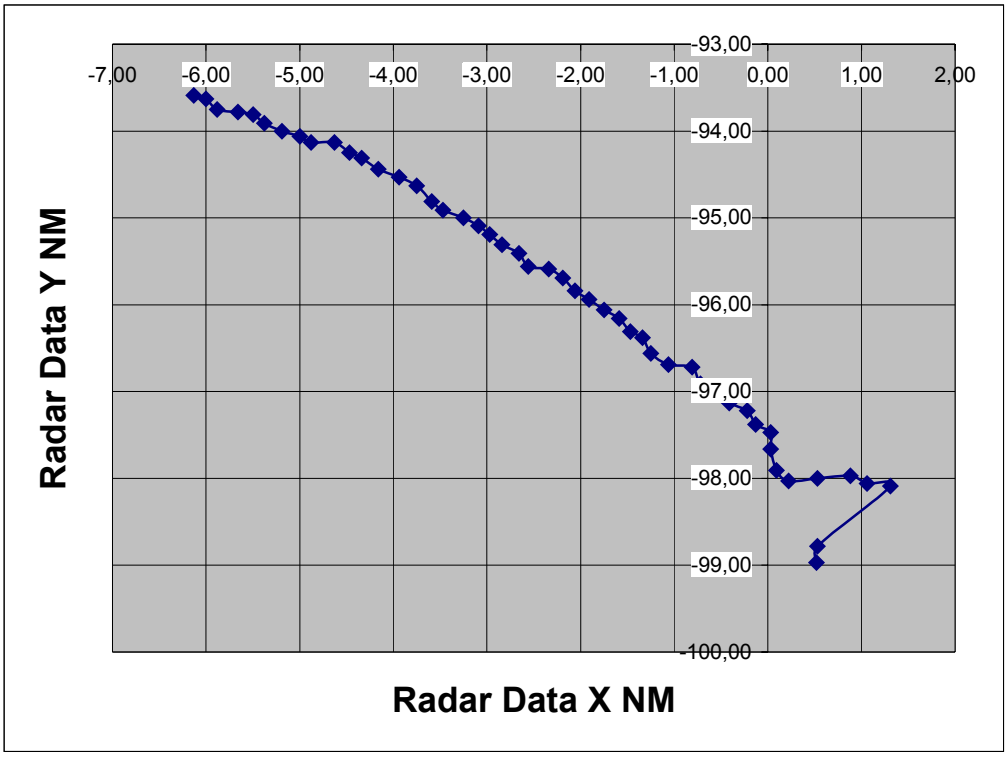
Appendix C: Mode A Altitude. Y is the altitude in 100 feet. X time in 1/10 second.

Appendix D: The aircraft track.

Appendix A: Drawing of TB10

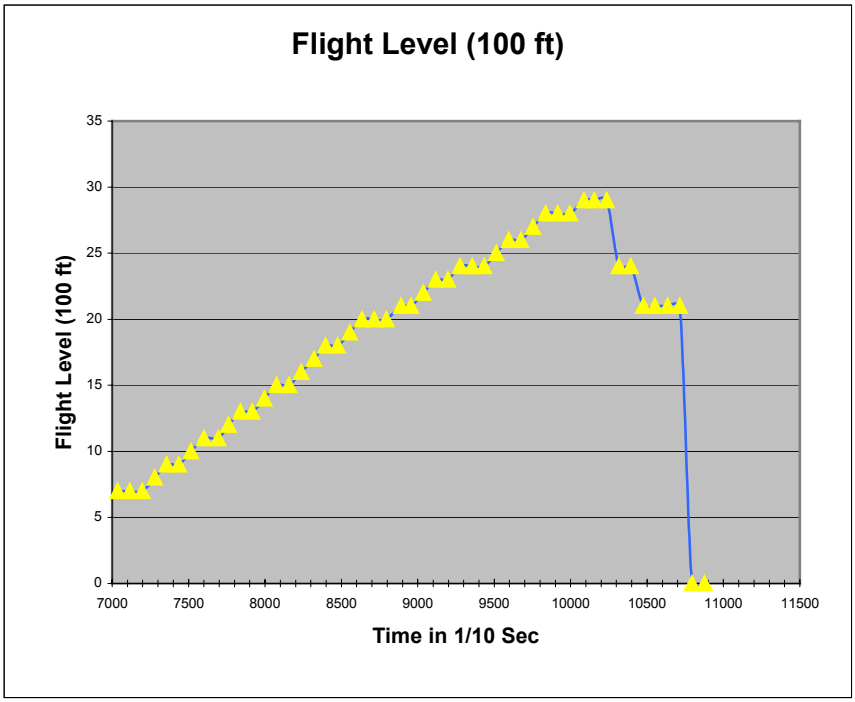


Appendix B: Radar data. 1 unit = 1 nm.



Between 17:07:07 hrs and 17:08:05 hrs the average was TT 113,3° +/- 18,6°
between 17:08:05 hrs and 17:09:07 hrs the average was TT 118,3° +/- 24,2°
between 17:09:07 hrs and 17:10:04 hrs the average was TT 127,0° +/- 17,1°
between 17:10:04 hrs and 17:11:07 hrs the average was TT 124,1° +/- 21,8°
between 17:11:07 hrs and 17:12:04 hrs the average was TT 127,9° +/- 29,0°
between 17:12:04 hrs and 17:13:07 hrs the average was TT 129,4° +/- 47,8° and
between 17:13:07 hrs and 17:13:23 hrs the average was TT 169,4° +/- 65,9°.

Appendix C: Mode A Altitude. Y is the altitude in 100 feet. X time in 1/10 second.



Appendix D: The aircraft track.