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BEA

Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile

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N°CHRONO /BEA/3467

Subject: Submission to the final report related to the **accident to the SOCATA - TBM700 registered N900KN on 5th September 2014 near Kingston (Jamaica)**

Yr/ref: your email November 3, 2017

Dir Sir,

Thank you for giving us the opportunity to review and comment the draft final report on the aforementioned accident. I noticed that several comments raised in my letter (ref BEA 3037) were taken into account.

However, the BEA is convinced that it's very important to add in the conclusion that the pilot did not react (neither asking emergency descent to ATC, nor with the individual O2 protection) to the visual and aural warnings. It's important to highlight this point in the conclusion because, even with different or improved procedure, the event would have ended up in the same way.

I would appreciate you to append these comments to the final report as per Annex 13 paragraph 6.3

I remain at your disposal for any further information you may require.

Best regards,

Safety Investigator

Thierry LOO



French accredited representative

Table 1 – BEA comments.

Item	Page	Draft Final Report references FACTUAL	proposed text/comments	justification
1.1	3	The left seat was occupied by a male seated with his back straight, while the right seat occupant's torso and head were slouched against the fuselage aft of the right cockpit window	The left seat was occupied by a male seated with his back straight, while the right seat occupant could not be seen	Status from Systems group Chairman's DRAFT factual report March,23 2016 §D.1
1.2	3	Neither occupant was wearing an oxygen mask.	The pilot is not wearing an oxygen mask, while the right seat occupant could not be seen	If the right seat occupant is not visible, Her mask is not visible either
1.3	4	The pilot, age 68, held a commercial pilot certificate with ratings for airplane single-engine land and instrument airplane.	To fly the TBM the pilot should have pass a high altitude endorsement (we should add it on the report)	
1.4	4	Before he purchased the accident airplane, the pilot had owned two other Daher-Socata TBM700 airplanes, a TBM700 "A" model (N51HT) and a TBM850 "Legacy" model (N51LG). According to a service center, the pilot purchased the A model in 1994 and accumulated about 2,700 flight hours in the airplane. He subsequently purchased the TBM850 model, which he flew for about 1,250 hours before buying the accident airplane in April 2014.	Before he purchased the accident airplane, the pilot had owned two other Daher-Socata TBM700 airplanes, a TBM700 "A" model (N51HT) and a TBM850 "Legacy" model (N51LG). According to a service center, the pilot purchased the A model in 1994 and accumulated about 2,700 flight hours in the airplane. He subsequently purchased the TBM850 model (without G1000 avionics suite) , which he flew for about 1,250 hours before buying the accident airplane in April 2014.	His previous TBM was without G1000 avionics suite.
1.5	5	During inspections, the pilot's friend observed him physically open the door to the oxygen bottle and verify that the oxygen cylinder's valve was on. The pilot further used a gauge in the cockpit to confirm the flow of oxygen after he turned the cockpit oxygen switch on and tested the oxygen masks.	1) This is not the standard procedure : how can we express that the use of personalized procedures doesn't ensure a safety level equivalent to the supplier's given procedures. 2) In addition how can we explain that following the witness procedure description the O2 switch was found in the off position	The proper procedure to test the front oxygen masks (BEFORE STARTING ENGINE procedure #43- Front oxygen maskschecked) is described in ZODIAC AEROSPACE document "quick donning mask-regulator MC10-[]-[] series – operating and maintenance instructions" §6.2 by pressing the regulator "PRESS TO TEST" control knob for 1 second and hearing a hissing sound through the audio system.

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1.6	6	According to the POH, when the BLEED switch is set to AUTO, a "ground fan provides cabin air	According to the POH, when the BLEED switch is set to AUTO, a "ground fan cools down engine bleed air through the main heat exchanger	the ground fan is only used to cool down engine bleed air through the main heat exchanger when the aircraft is on ground Refer to systems group chairman's factual report (March, 23 2016) for complete description
1.7	6	Cabin Pressurization Control Panel	Cabin Pressurization Control System	Correct title
1.8	6	When the airplane climbs above 13,500 ft msl, the cabin altitude will not exceed 10,000 ft msl or a differential pressure of 6.2 psi.	When the airplane climbs above 13,500 ft msl, the cabin altitude will not exceed 10,000 ft msl or a differential pressure of 6.0 psi .	Correct value is 6.0psi
1.9	8	The airplane was equipped with a cockpit door,	The airplane was equipped with a pilot door,	Misleading: a cockpit door is a door between cockpit and cabin
1.10	8	but the door's position (open or closed) during the accident flight could not be determined.	To be deleted	The aircraft flew from 8.30 to 10.00 at FL280, which would have not been possible with an opened door due to cabin leak. so the door was most surely in closed position. A red DOOR CAS message would illuminate in case of an opened door
1.11	8	, the cabin altitude will continue to increase until it equalizes with the ambient pressure.	, the cabin altitude will continue to increase until it equalizes with the ambient altitude .	Confusion between altitude and pressure. Similar editorial errors were found in the document
1.12	9	The flight crew emergency oxygen system is comprised of two oxygen masks with smoke goggles and is manually controlled by a normally-closed OXYGEN switch-operated valve that must be turned ON by the pilot in order for the system to supply oxygen to the masks	The flight crew emergency oxygen system is comprised of two oxygen masks with smoke goggles and is manually controlled by a OXYGEN switch-operated valve that must be turned ON by the pilot during the BEFORE STARTING ENGINE procedure in order for the system to supply oxygen to the masks	Reference to the POH procedure to be added
1.13	9	As long as the valve mounted on the physical oxygen cylinder is open and the OXYGEN switch is in the ON position, both flight crewmembers will receive oxygen as they breathe.	As long as the valve mounted on the physical oxygen cylinder is opened during PREFLIGHT INSPECTION procedure and the OXYGEN switch is set in the ON position during the BEFORE STARTING ENGINE procedure, both flight crewmembers will receive oxygen as they breathe.if they wear Oxygen mask.	Reference to the POH procedure to be added

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1.14	9	The flight crew masks are secured in stowage cups located behind the cockpit seats, and each mask is equipped with a microphone, a three-position selector, and a button labeled PRESS TO TEST. To don a cockpit oxygen mask, the occupant must reach behind the opposite seat, remove the mask from its stowage cup, depress two vanes on the mask to inflate the harness, and then place it over their nose and mouth.	We should add : The regulation of these masks imposes a donning time of 5s (FAR 23 1447). This donning time has been check for certification	
1.15	9	Preflight Inspection checklist 13 - Rear R.H. karman [wing root fairing] - Oxygen cylinder – Open - Oxygen quantity – Checked 14 – Oxygen pressure – Checked 23 – Pilots OXYGEN switch - OFF	PREFLIGHT INSPECTION procedure 13 - Rear R.H. karman [wing root fairing] - Oxygen cylinder – OPEN - Oxygen quantity – Checked 14 – Oxygen pressure – Checked	This instruction “23 – Pilots OXYGEN switch – OFF” is not part of PREFLIGHT INSPECTION – R.H.wing (V) procedure (see POH page 4.3.8) but of PREFLIGHT INSPECTION – cockpit(I) procedure (POH page 4.3.3) that is 5 pages before
1.16	9	Before Starting Engine checklist 10 – MICRO/MASK micro inverter - MICRO 42 – Pilot's OXYGEN switch – ON 43 – Front oxygen masks – Checked	BEFORE STARTING ENGINE procedure 10 – MICRO/MASK micro inverter - MICRO 42 – Pilot's OXYGEN switch – ON 43 – Front oxygen masks – Checked	Pilot's OXYGEN switch was found on OFF position The task#42 was not completed
1.17	9	After Starting Engine checklist: 4 – Oxygen supply – Available for the planned flight	AFTER STARTING ENGINE procedure: 4 – Oxygen supply – Available for the planned flight. (see tables of paragraph "IN-FLIGHT	Missing text

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			AVAILABLE OXYGEN QUANTITY” in Chapter 4.4 and Chapter 7.10 for a FAR 135 type operation)	
1.18	10	Emergency Procedures Checklist According to the POH, the Emergency Descent procedures are as follows: 1 – Throttle – Flight IDLE 2 – OXYGEN – USE if necessary 3 – DESCENT - from - 10° to - 20° The POH also includes an Emergency Descent procedure for a Maximum Range Descent using the following procedures: 1 – Throttle – CUT OFF 2 – Flaps – UP 3 – Landing gear control – UP 4 – IAS - 120 KIAS 5 – Oxygen – USE if necessary	Emergency Procedures According to the POH, the EMERGENCY DESCENTS procedures are as follows MAXIMUM RATE DESCENT 1 – Throttle – Flight IDLE 2 – OXYGEN – USE if necessary 3 – DESCENT – attitude - from - 10° to - 20° <u>Procedure in smooth air</u> 6 - Speed 266 KIAS <u>Procedure in rough air or in case of structure problem:</u> 10 Maintain - IAS ≤ 178kts MAXIMUM RANGE DESCENT 1 – Throttle – CUT OFF 2 – Flaps – UP 3 – Landing gear control – UP 4 – SPEED IAS - 120 KIAS 5 – Oxygen – USE if necessary check oxygen duration before reaching 12000ft and check flow to passengers	Missing text
1.19	10	The pilot must depress the corresponding red or amber light to terminate the warning tone and light indication.	The pilot must depress the corresponding red or amber light to terminate the warning tone.	The light indication is still ON after pilot acknowledgement as long as the condition is still present refer to POH section 3 EMERGENCY PROCEDURES §3.1 general
1.20	10	The 656-page POH includes a 96 page emergency procedure section and a 98 page normal procedure section.	The POH includes a emergency procedure section (section 3) clearly identified and a normal procedure section	The POH clearly separates normal and emergency procedures. It's written and approved (mrgency section) by FAA andEASA

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1.21	10	Four separate pressurization system procedures are included in the emergency section, each of which corresponds to one of the following four CAS messages: BLEED TEMP, BLEED OFF, CABIN ALTITUDE, and CABIN DIFF PRESS.	six pressurization system procedures are included in the emergency section, 3 with red CAS message BLEED TEMP, , CABIN ALTITUDE, and CABIN DIFF PRESS 1 with amber CAS message BLEED OFF	Text to be completed
1.22	10	A BLEED TEMP message on the CAS indicates an overheat of the bleed air system, which can lead to a termination of bleed air into the cabin and an amber warning and BLEED OFF CAS message. In the event of a "BLEED TEMP" indication, the pilot is instructed to do the following:	A red BLEED TEMP CAS message associated with a master warning and AURAL warning indicates an overheat of the bleed air system, which can lead to a termination of bleed air into the cabin with an amber BLEED OFF CAS message associated a master caution and an aural warning In the event of a "BLEED TEMP" indication, the pilot is instructed to do the following:	Text to be completed
1.23	11	When the BLEED OFF indication appears, the pilot is instructed to: 1 – CHECK BLEED switch position and – CORRECT 2 – If possible, reduce power 3 – BLEED switch – OFF/RST (Reset) 4 – BLEED switch – AUTO 5 – If warning BLEED OFF displayed: 6 – Limit flight altitude to maintain cabin altitude < 10,000 feet 7 – If necessary (no oxygen available) – EMERGENCY DESCENT 8 – Continue flight	When the BLEED OFF amber CAS message indication appears, the pilot is instructed to: 1 – CHECK BLEED switch position and – CORRECT 2 – If possible, reduce power FLY THE AIRPLANE 3 – BLEED switch – OFF/RST (Reset) 4 – BLEED switch – AUTO 5 – If warning BLEED OFF displayed: 6 – Limit flight altitude to maintain cabin altitude < 10,000 feet 7 – If necessary (no oxygen available) – EMERGENCY DESCENT	Text to be completed

Item	Page	Draft Final Report references FACTUAL	proposed text/comments	justification
			8 – Continue flight	
1.24	11	A CABIN ALTITUDE indication will appear when the cabin altitude exceeds 10,000 ft $\pm$ 500 ft. The POH instructs the pilot to complete the following procedure in the event of this indication: 1 – Pressurization indicator – CHECK If cabin altitude is greater than 10,000 feet $\pm$ 500 feet: 2 – OXYGEN – USE, if necessary 3 – BLEED switch – CHECK AUTO 4 – DUMP switch – CHECK UNDER GUARD 5 – EMERGENCY RAM AIR control knob – CHECK PUSHED 6 – Limit flight altitude to maintain cabin altitude < 10,000 feet 7 – If necessary – EMERGENCY DESCENT	A red CABIN ALTITUDE CAS message associated with a master warning and aural warning will appear when the cabin altitude exceeds 10,000 ft $\pm$ 500 ft. The POH instructs the pilot to complete the following procedure in the event of this indication: 1 – Pressurization indicator – CHECK If cabin altitude is greater than 10,000 feet $\pm$ 500 feet: 2 – OXYGEN – USE, if necessary FLY THE AIRPLANE 3 – BLEED switch – CHECK AUTO 4 – DUMP switch – CHECK UNDER GUARD 5 – EMERGENCY RAM AIR control knob – CHECK PUSHED 6 – Limit flight altitude to maintain cabin altitude < 10,000 feet 7 – If necessary – EMERGENCY DESCENT	Text to be completed
1.25	11	A CABIN DIFF PRESS message will appear if the cabin pressure differential is over 6.4 psi $\pm$ 0.2 psi. The POH instructs the pilot to complete the following procedure in the event of this indication: 1 – Pressurization indicator – CHECK If pressure change is greater than 6.4 PSI $\pm$ 0.2 PSI: 2 – BLEED switch – OFF/RST	to be deleted	Not related with the accident

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		3 – Oxygen – Use, if necessary		
1.26	12	A manufacturer's test pilot reported that, without pilot intervention, while in cruise with the autopilot engaged, if the engine shuts down due to fuel exhaustion, the airplane will transition to battery power, and the autopilot will remain engaged. The battery could power the autopilot for about 1 hour. However, without engine power, the airplane will decelerate and increase its angle of attack as the autopilot continues to attempt to maintain altitude. Once the stall warning is triggered, the autopilot will disconnect and not re-engage.	Flying steady at FL250, the autopilot must have been engaged at ALT mode. When the engine shut down due to fuel starvation, the angle of attack increased. When The stall warning was reached the autopilot disengaged and the aircraft dived	If the engine shuts down the AP will try to keep the altitude then the angle of attack will increase until stall (and AP disconnection)
1.27	13	When the airplane is airborne, the GASC controls the aperture of the OFV in order to maintain a cabin altitude rate of change of +525 fpm in climb or -525 fpm in descent.	When the airplane is airborne, the GASC controls the aperture of the OFV in order to reach the target cabin altitude at an optimized controlled rate	The accident airplane was a TBM900 not a TBM 850
1.28	14	The switch is designed to open at 315° F	The switch is designed to open at 315° C +/- 5°C and close at 295°C +/-5°C	To be completed
1.29	15	Two of the three switches passed functional testing, but it was later determined that the third switch had been improperly field tested.	BEA to comment	What is it referred to?
1.30	16	<u>Hypoxia</u>	14CFR61.31 (g)Additional training required for operating pressurized aircraft capable of operating at high altitudes. The flight training must include at least the following subjects:	Some emergency procedures have to be known by heart. For example, facing an engine failure, the pilot doesn't read a POH. Excessive cabin altitude involves Pilot and pax protection

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			(i) Normal cruise flight operations while operating above 25,000 feet MSL; (ii) Proper emergency procedures for simulated rapid decompression without actually depressurizing the aircraft; and (iii) Emergency descent procedures	
1.31	17	, the airplane manufacturer issued a service bulletin to address the reports of BLEED OFF CAS messages and nuisance shutdowns of the airplane's pressurization system	We suggest to delete this sentence and rather to use the text of the SB	
1.32	17	The service bulletin implements a GASC software revision and a wiring adjustment that causes the FCISOV to remain open and continue the flow of bleed air into the cabin after the OTSW contact state is detected as OPEN.	The service bulletin implements a GASC software revision and a wiring adjustment in order to Maximize the bleed availability. the pilot will continue to receive the visual CAS warning message and aural warning alarm	
1.33	17	About 1 hour 40 minutes into the flight and while cruising at flight level (FL) 280, the pilot notified air traffic control (ATC) of an abnormal indication in the airplane and requested a descent to FL180. The responding controller instructed the pilot to descend to FL250 and turn left 30°, and the pilot acknowledged and complied with; he then again requested a lower altitude. Although the pilot declined emergency handling and did not specify the nature of the problem, the controller independently determined that the flight had encountered a pressurization issue and immediately coordinated with	As 1.4	How did the controller identify a pressurization problem? If the controller identified "a pressurization issue why didn't he cleared the airplane to a lower altitude (FL100) where pressurization is not necessary.

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		another ATC facility to clear nearby traffic. The controller then issued instructions to the pilot to descend to FL200 and change course		
1.34	17	neither occupant was wearing an oxygen mask.	The pilot is not wearing an oxygen mask, showing that he didn't react as expected : declare an emergency, put his mask on and descent to a lower altitude	basic airmanship for any pilot flying a pressurized aircraft
1.35	18	These faults indicated that the overheat thermal switch (OTSW), which was associated with overheat protection for the pressurization system, had activated, resulting in a shutdown of the engine bleed air supply to the cabin pressurization system	These faults indicated that the overheat thermal switch (OTSW), which was associated with overheat protection, had activated, resulting in a shutdown of the engine bleed air supply to the cabin pressurization system	Text to be clarified
1.36	18	Without a bleed air supply to maintain selected cabin pressure, the cabin altitude (and, thus, the pressure) would have increased to the altitude of the outside environment over a period of about 4 minutes.	Without a bleed air supply to maintain selected cabin pressure, the cabin altitude would have increased to the altitude of the outside environment over a period of at least 4 minutes.	This estimation of 4 mn is made assuming the A/C leak corresponds to production acceptance limit (worst case scenario)
1.37	18	The pilot was known to routinely monitor cabin altitude while flying in the airplane and in his previous pressurized airplanes	Testimonies indicate that the pilot was known to routinely monitor cabin altitude while flying in the airplane and in his previous pressurized airplanes. Nevertheless he did not apply the normal nor emergency POH procedures the day of the accident	

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1.38	18	Based on his instrument scanning practices and the airplane's aural warning system, he likely would have observed any CAS message at or near its onset.	Based on his instrument scanning practices and the airplane's aural warning system, he likely would have observed any CAS message at or near its onset. But he actually did not identify them nor apply the emergency POH procedures.	
1.39	18	Thus, the CAS messages and the associated alerts were likely the precipitating event for the pilot's call to ATC requesting a lower altitude.	Thus, the CAS messages and the associated alerts were likely the precipitating event for the pilot's call to ATC requesting a lower altitude. However, the pilot didn't declare an emergency situation, nor asks for a safe flight level (FL100) and conformed to the ATC instruction (FL250)	
1.40	18	While the pilot was likely not familiar with the physiological effects of hypoxia	The was supposed to be familiar with hypoxia	the pilot completed a high altitude training which contains a specific theoretical course about Hypoxia High altitude and physiological problems at increased altitude.
1.41	18	However, review of the 656-page pilot's operating handbook (POH) for the airplane found that, of the four emergency checklist procedures in the POH that corresponded to pressurization system-related CAS messages, only one procedure included a step to don the oxygen mask, and it was only a suggestion, not a mandatory step.	However, review of the pilot's operating handbook (POH) for the airplane found that, of the four emergency checklist procedures in the POH that corresponded to pressurization system-related CAS messages two procedures suggest to use the O2 by donning the mask. To cope with the objective , the pilot oxygen switch must have been set to ON during the BEFORE STARTING ENGINE procedure. It was not the case during the accident flight.	In addition I don't understand why we should indicate the number of page of the POH?
1.42	18	The combined lack of emergency guidance to immediately don an oxygen mask and the rapid increase in the cabin altitude significantly increased the risk of hypoxia, a condition resistant to self-diagnosis, especially for a person who has not recently experienced its effects in	The lack of awareness despite the 3 visual alarms combined with aural alarms to immediately don an oxygen mask increased the risk of hypoxia. In addition the O2 switch was in the off position	Text to be clarified

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		a controlled environment such as an altitude chamber		
1.43	18	Ultimately, the pilot had less than 4 minutes to detect the pressurization system failure CAS messages, report the problem to ATC, locate the proper procedures in a voluminous operating handbook, and complete each procedure; all while suffering from an insidious and mentally impairing condition that decreased his cognitive performance over time	This § to be deleted	Following the 3 visual alarms combined with aural alarms, the pilot should have protect himself (pressurization issue at FL280 basic knowledge of a high altitude pilot reminded by training completed the week before accident) and don the oxygen masks, then inform ATC and execute an emergency descent .
1.44	19	The OTSW from the accident airplane passed several of the manufacturer's functional tests despite the presence of internal corrosion from sea water, which indicates that the unit likely operated normally during the accident flight.	The OTSW from the accident airplane passed several of the manufacturer's functional tests despite the presence of internal corrosion from sea water.	OTSW trip is unlikely in such condition of flight . see Systems Group Chairman Factual Report
1.45	19	Further investigation determined that the pressurization system design forced the GASC to unnecessarily discontinue the flow of bleed air into the cabin if the bleed air temperature exceeded an initial threshold and didn't subsequently fall below a secondary threshold within 30 seconds . As a result of this accident and the ensuing investigation, the airplane manufacturer made changes to the programming of the GASC and to the airplane's wiring, which were designed to	As per design, the bleed air flow shut down to protect the structural integrity of the airplane, the system and consequently the passengers in case of overheat detection. As the result of this accident and the ensuing investigation, the airplane and system manufacturers made software modification of the GASC and to the wiring in the airplane in order to Maximize the bleed availability	Text to be clarified

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		reduce the potential for the GASC to shut off the flow of bleed air into the cabin.		
1.46	19	The pilot reportedly was diligent in completing preflight inspections and checklists and would likely have verified that the oxygen tank valve was on and the cockpit oxygen switch was in the ON position before departing on the flight	To be deleted	The pilot's way of testing the oxygen masks described by the pilot's friend is not compliant with the manufacturer procedure. Use of personalized procedures don't ensure a safety level equivalent to the supplier's given procedures. The normal BEFORE STARTING ENGINE was not properly completed as the oxygen switch was found on OFF position. The emergency BLEED TEMP, BLEED OFF and CABIN ALTITUDE procedures were not followed by the pilot
1.47	19	The investigation could not determine why the cockpit oxygen switch was turned off; however, because the oxygen masks were found still stowed, it would not have made a difference in this accident.	The normal BEFORE STARTING ENGINE mandates that the pilot turn the oxygen switch to the "ON" position. This checklist procedure was not completed by the pilot-in-command. Consequently, oxygen was not available to the pilot-in-command or the front passenger. Further, the passenger oxygen masks would not have automatically deployed, which could have provided the pilot-in-command with yet another indication that he needed to turn the oxygen switch "On" and don his oxygen mask.	The normal BEFORE STARTING ENGINE asks to turn the oxygen switch on ON position, so this procedure was not completed by the pilot. The flight crew masks were not recovered – see§ Oxygen switch examination
1.48	19	<u>Probable cause</u> The design of the cabin pressurization system, which made it prone to unnecessary shutdown, combined with a checklist design that prioritized troubleshooting over ensuring that the pilot was sufficiently protected from hypoxia. This resulted in a loss of cabin pressure that rendered the pilot and passenger unconscious during cruise flight, and eventually led to an inflight loss	The system failure to detect an erroneous alarm (overheat) led to an increase of the cabin altitude. The consecutive loss of consciousness by hypoxia during cruise resulted in a loss of control due to fuel exhaustion over the open ocean. The loss of consciousness can be explained by a poor reaction to abnormal and emergency situations in spite of training the week before the accident and mandatory	

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		of power due to fuel exhaustion over the open ocean	POH procedures, which made it prone to the following factors: •The inadequate pilot actions to the different warning messages, •the inappropriate request to ATC and •the lack of reactions to ATC clearances resulted in a loss of consciousness by hypoxia." A regular high altitude training and the presence of a QRH in the plane may have contributed to better crew execution of preflight procedures and better reaction to the situation.	

Table 2 – Liebherr additional comment

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1.48	19	Probable cause The design of the cabin pressurization system, which made it prone to unnecessary shutdown, combined with a checklist design that prioritized troubleshooting over ensuring that the pilot was sufficiently protected from hypoxia. This resulted in a loss of cabin pressure that rendered the pilot and passenger unconscious during cruise flight, and eventually led to an inflight loss of power due to fuel exhaustion over the open ocean	The system detection of (overheat) alarm, led to an increase of the cabin altitude. The consecutive loss of consciousness by hypoxia during cruise resulted in a loss of control due to fuel exhaustion over the open ocean. The loss of consciousness can be explained by a poor reaction to abnormal and emergency situations in spite of training the week before the accident and mandatory POH procedures, which made it prone to the following factors: •The inadequate pilot actions to the different warning messages, •the inappropriate request to ATC and	

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			•the lack of reactions to ATC clearances resulted in a loss of consciousness by hypoxia." A regular high altitude training and the presence of a QRH in the plane may have contributed to better crew execution of preflight procedures and better reaction to the situation.	