سلطنة عُمان
وزارة النقل والاتصالات وتقنية المعلومات
Sultanate of Oman
Ministry of Transport, Communications and Information Technology

Oman Transport Safety Bureau

Preliminary Report

OTSB Case File No: AIFN-006/10/2024

Salam Air A321-235N Ground Proximity Warning System (GPWS) Serious Incident

Operator: Salam Air
Make and Model: Airbus A321-251N
Nationality and Registration Marks: Omani, A40-OXG
Location of the Occurrence: MCT, 20 Nautical Miles 230 Degrees from Muscat VOR
State of Occurrence: Sultanate of Oman
Date of Occurrence: 30th September 2024, 12:15 UTC
Date of Publication: 30th October 2024

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Purpose of the Investigation

The investigation was conducted by Oman Transport Safety Bureau (OTSB) pursuant to Civil Aviation Law (CAL) 76/2019 Chapter 10, and in compliance with the Civil Aviation Regulation CAR-13 -, Sub Part CAR 13.070: Instituting and Conducting of Investigations as State of Occurrence, Accidents or Incidents in the Sultanate of Oman.

The sole objective of the investigation is to prevent future aircraft accidents and incidents and not to apportion blame or liability. Oman Transport Safety Bureau issued this preliminary Report in accordance with the National and International standards and Industry best practice.

Unless otherwise mentioned, all times in this report are Coordinated Universal Time (UTC). Local Time in the Sultanate of Oman is UTC plus (+) 4 hours. Photos and figures used in this report were taken from different sources and adjusted from the original for the sole purpose of improving clarity of the report.

This Report will be publicly available once published at: http://www.mtcit.gov.om

Abbreviations Descriptions

°	Degree
AAIS	Air Accident Investigation Section
AMSL	Above Mean Sea level
AFL	Actual Flight Level
AAI	Air Accident Investigations
ANSIC	Air Navigation Service Incident Coordination
AOC	Air Operating Certificate
ATC	Air Traffic Control
ATCO	Air Traffic Controller
BEA	Bureau d'enquêtes et d'analyses pour la sécurité de l'aviation civile
CAA	Civil Aviation Authority
CAL	Civil Aviation Law
CVR	Cockpit Voice Recorder
DFDR	Digital Flight Data Recording
EGPWS	Enhanced Ground Proximity Warning System
FDM	Flight Data Monitoring
FIR	Flight information Region
FL	Flight level
FO	First Officer
FPL	Flight Plan
FPM	Feet Per Minute
Ft	Feet
GPWS	Ground Proximity Warning System
ICAO	International Civil Aviation Organization
IIC	Investigator-In-Charge
IMC	Instrument Meteorological Condition
ILS	Instrument Landing System
KTS	Knots
LPC	License Proficiency Check

MATSOP	Manual of Air Traffic Standard Operating Procedures
MCT	Muscat
MEM	Memory Item
MSA	Minimum Safety Altitude
ND	Navigation Display
OOMS	Muscat International Airport
OOSA	Salalah International Airport
OPC	Operator Proficiency Check
OTSB	Oman Transport Safety Bureau
PF	Pilot Flying
PM	Pilot Monitoring
RADAR	Radio Detection and Ranging
ROD	Rate of Descent
RWY	Runway
SOP	Standard Operating Procedures
TAWS	Terrain Avoidance Warning System
VMC	Visual meteorological Conditions
VOR	VHF Omni Directional Range
V/S	Vertical Speed

Synopsis

Oman Transport Safety Bureau (OTSB) was notified of the occurrence by the Operator, Salam Air, through OTSB email on the 1st October 2024 at 10:05 LT. The incident occurred on the 30th September 2024 at 12:15 UTC.

On the 30th September 2024 at 07:15 UTC, Salam Air aircraft OMS104 with registration marks A4O-OXG, an Airbus A321-251N departed from Salalah International Airport (OOSA), Sultanate of Oman, on a domestic scheduled flight with intended destination Muscat International Airport (OOMS).

The aircraft tracked inbound MCT for ILS Runway 08L. The crew of OMS104 established communication with MCT Approach ATCO and identified the traffic as OMS104 and informed him that they are descending ALT One-One Thousand Ft passing FL180. Then the crew of OMS104 requested left heading 340° for self-position on final which was approved.

While approaching 8000 ft, ATCO cleared the flight crew of aircraft OMS104 to descend to 4000 ft visually. The flight crew of aircraft OMS104 maintained 8000 ft till visual and then commenced with the descend to 4000 ft when they were visual with the terrain. Furthermore, the flight crew of aircraft OMS104 corrected the heading to 355° to be further away from the terrain flying in the valley visually and closer to 4000 ft. The crew started reducing the speed to green dot to minimize the Rate of Descend. While descending to 4000 ft the flight crew of aircraft OMS104 they received an EGPWS caution “terrain ahead” warning to which they levelled off with Vertical speed of 0 even though they were visually clear away from terrain by more than 2000 ft AGL. Flying level at green dot, the EGPWS warning triggered to pull up terrain to which the crew applied the memory items as trained and ATC was advised. Then the crew started climbing and they requested vectors for ILS RWY 08L. Normal operations thereafter. All procedures were followed and the safe conduct of the flight was ensured and the aircraft landed safely at OOMS.

The OTSB instituted an investigation and classified the occurrence as a Serious Incident requiring investigation. The following parties were notified:

- State of Design and Manufacturer of Airbus A321-251N France-Bureau d'enquêtes et d'analyses pour la sécurité de l'aviation civile (BEA), French Safety Investigation Authority.
- International Civil Aviation Organization (ICAO).
- State of Operator and Registry-Sultanate of Oman Civil Aviation Authority (CAA)

In line with OTSB Investigation procedures, the Director of OTSB appointed an Investigator-In-Charge (IIC) and an investigation team to assist the IIC with the investigation. The following investigation authorities are involved in the investigation by appointing accredited representatives and advisor to the investigation:
State of Design and Manufacturer of Airbus A321-251N France-Bureau d'enquêtes et d'analyses pour la sécurité de l'aviation civile (BEA)

After the investigation is completed, OTSB will release and publish the Final Report. The Final Report will be made public at the below link:

http://www.mtcit.gov.om.

1. Factual Information.

1.1. History of the Flight.

1.1.1. On the 30th September 2024 at the time 12:15 UTC, Salam Air aircraft (OMS104) with registration marks A4O-OXG, an Airbus A321-251N departed from Salalah International Airport (OOSA), Sultanate of Oman on a domestic scheduled flight inbound with intended landing destination at Muscat International Airport (OOMS),

1.1.2 At the time 12:11:00 the flight crew of aircraft OMS104 reported to Approach Controller (ATCO) that they were descending to ALT 11000 Ft passing FL180. ATCO replied to the flight crew of aircraft OMS104 to continue as cleared then flight crew asked about their sequence for landing, ATCO replied number one.

1.1.3 At the time 12:12:51 the flight crew of aircraft OMS104 contacted ATCO and requested for left heading 340° for self-positioning which was approved. At 12:13:05 a further descent clearance to 8000ft by ATCO was given.

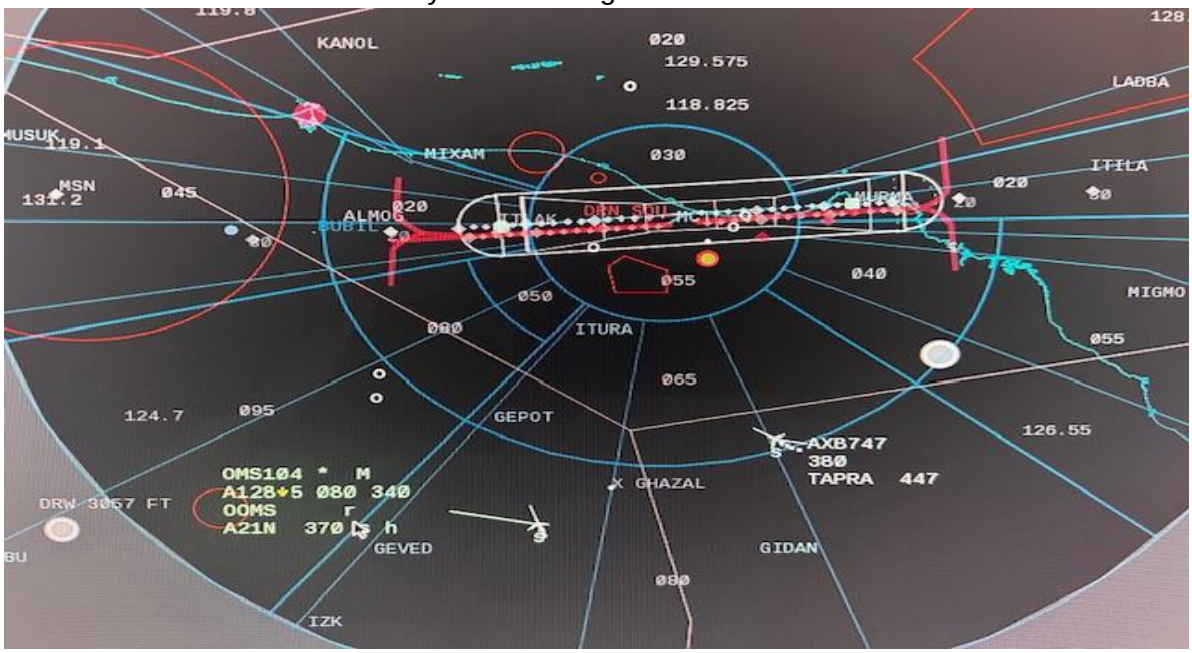


Figure 1: showing aircraft OMS104 observed on radar passing through 12800ft descending to 8000 Ft at ROD 500 feet per minute (FPM) (Source: DGAN)

1.1.4 At the time 12:13:08, the crew of aircraft OMS104 acknowledged and replied to ATCO, “Copied descend 8000 ft and left heading 340°”. It was heard during the ATC playback the (Transmission overlapped/not clear) frequency was blocked or jammed.

1.1.5 At the time 12:13:27, the flight crew of aircraft OMS104 informed ATCO that they have been blocked (Transmission overlapped/not clear). At the time 12:13:46, the flight crew of aircraft OMS104 asked ATCO to confirm left heading 340° approved? (Transmission overlapped/not clear was heard during playback).

1.1.6 At the time 12:14:17, ATCO received a call from TWR ATCO informing him that someone is calling him and ATCO realized that the frequency was blocked. At the time 12:14:22,

the crew of aircraft OMS104 asked ATCO how do you read and ATCO replied “5 by 5 descend 8000”.

1.1.7 At the time 12:14:30, the flight crew of aircraft OMS104 acknowledged the clearance from ATCO to descend to 8000 Ft and heading 340° as previously requested.

1.1.8 At the time 12:14:37, ATCO replied to the flight crew of aircraft OMS104 and asked them how do they read because the ATCO has already approved their request once. At the time 12:14:40, the flight crew of aircraft OMS104 replied that they were not very sure because they had static on the frequency due weather and they just wanted to reconfirm.

1.1.9 At the time 12:14:47, ATCO asked the flight crew of aircraft OMS104 if they are happy, he can give them to descend visually. At the time 12:14:54, the flight crew of aircraft OMS104 acknowledged by saying “Ok we'll take the visual in a bit”, we just clearing some weather as of right now we'll advise once ready.

1.1.10 At the time 12:15:02 ATCO acknowledged “Charlie-Charlie”. At the time 12:15:07, ATCO asked the flight crew of aircraft OMS104 if they were able for waypoint ILILA after ILILA to ITLAK no objection.

1.1.11 At the time 12:15:14, the flight crew of aircraft OMS104 informed ATCO that they are staying on heading 340° and they will advise once they are visual to commence visual positioning. ATCO responded and acknowledgement the request.

Figure 2: showing aircraft OMS104 observed on radar passing through 9500Ft at a ROD3300 FPM descending to 8000Ft (Source: DGAN)

Figure 3: showing aircraft OMS104 observed on radar passing through 8500 Ft at ROD 1600 FPM descending to 8000 Ft (Source: DGAN)

1.1.12 The flight crew of flight OMS104 maintained 8000 Ft till visual, after that the flight crew of aircraft OMS104 commenced further descent to 4000 Ft. At the time 12:18:23, the flight crew of aircraft OMS104 informed ATCO that they are taking heading 355°, which was then acknowledged by the ATCO by stating “no objection self-position for final and no objection turn to the right or left”.

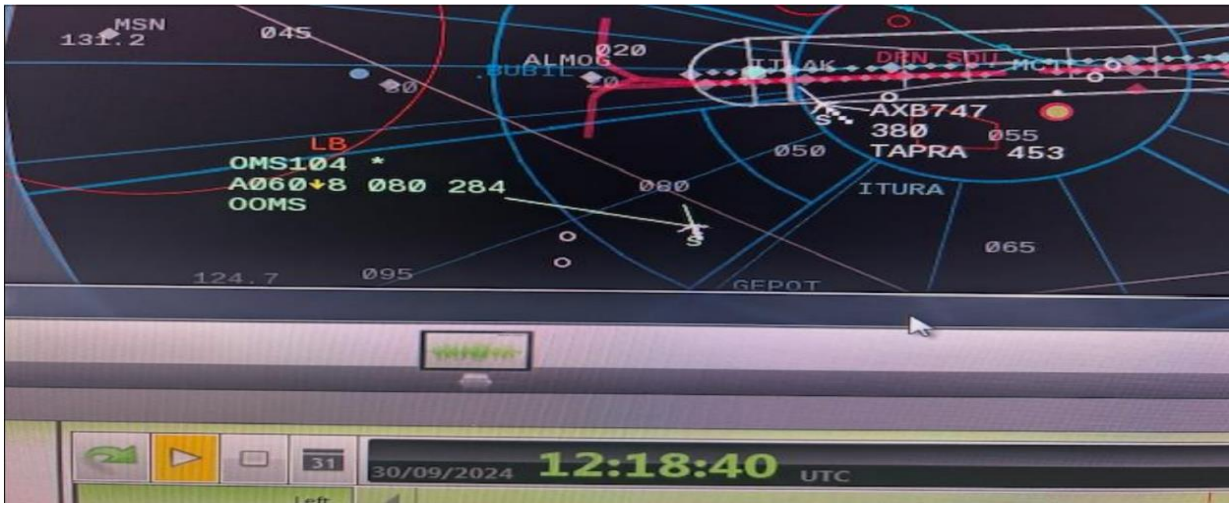


Figure 4: showing aircraft OMS104 observed on radar on passing through 6000ft ROD of 800 FPM de scending to 4000 Ft(Source: DGAN)

1.1.13 As per the aircraft Flight Data Monitoring (FDM) recording between 12:15:00 and 12:20:00 the aircraft OMS104 got EGPWS caution message “terrain ahead” and the flight crew of aircraft OMS104 selected vertical speed to zero while flying level at green dot.

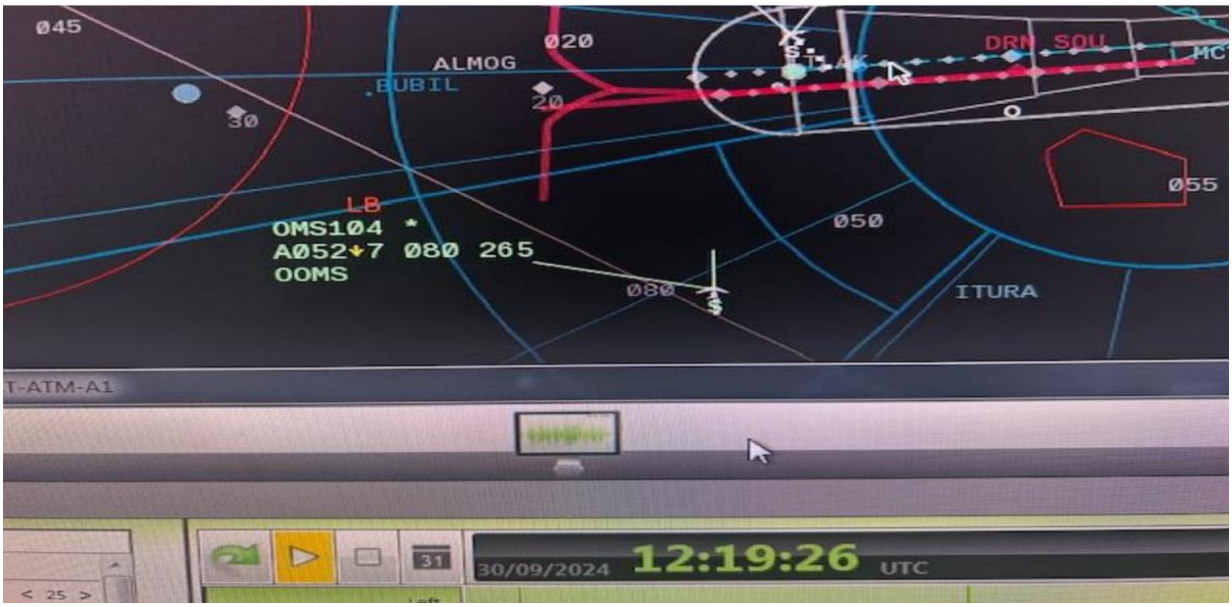


Figure 5: showing aircraft OMS104 observed on radar descending through 5200ft at ROD of 700FPM descending to 4000 Ft (Source: DGAN)

1.1.14 At the time 12:19:30 the EGPWS warning triggered to "Pull Up terrain" to which the flight crew of aircraft OMS104 applied memory action procedures and the flight crew of aircraft OMS104 advised ATCO.

1.1.15 At 12:20:02 the crew set climb to above Minimum Safety Altitude (MSA) 8000 Ft and they requested vectors for ILS 08L and normal ops thereafter. All procedures were followed and the safe conduct of the flight was always ensured.

Figure 6: showing aircraft OMS104 observed on radar passing through 6800 Ft at ROC of 3900FPM climbing to 8000 Ft (Source: DGAN)

1.1.16 On the decent, the flight crew of aircraft OMS104 during the interview stated that they shallowed the rate of descent (ROD) by decelerating. The flight crew of aircraft OMS104 leveled off at around 5500 Ft as they were in VMC condition with the terrain clearly insight and with sufficient clearance (more than 2000 Ft above).

1.1.17 The flight crew of aircraft OMS104 reported that they performed the GPWS warning memory items. The flight crew of aircraft OMS104 requested radar vectors for RWY08L approach which was granted by the ATCO and the flight continued for a safe landing without further issues.

1.2 Injuries to Persons

Injuries	Pilot	Cabin Crew	Passengers	Total on Board	Other
Fatal	-	-	-	-	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
No Injuries	2	5	224	231	-
Total	2	5	224	231	-

Note: Other, means people on the ground.

1.3. Damage to Aircraft.

1.3.1 There was no damage reported.

1.4. Other Damage.

1.4.1 No other damages were reported

1.5. Personnel Information:

1.5.1 Captain:

Nationality	Indian		
Medical validity	24.03.2025	Licence type	ATPL
Licence validity	30.04.2028	Type endorsed	Yes
Ratings	A320 -PIC. Multi Engines, Instrument Rating		
English Language Proficiency	Level 6, 01.05.2023		
LPC Issue Date	13.07.2024	OPC Issue Date	21-12-2023
LPC Expiry Date	TBA	OPC Expiry Date	TBA

Flying experience:

Total hours	6084:01
Last 24 hrs	03:21
Last 7 days	15:26
Last 30 days	61:28
Last 90 days	192:18

1.5.2 First Officer:

Nationality	Omani		
Medical validity	Expiry: 27-09-2027	Licence type	Commercial Pilot Aeroplane
Licence validity	31.01.2028	Type endorsed	Yes
Ratings	A320 Co-pilot, Multi Engines, Instrument Rating		
English Language Proficiency	Level 5, 28 January 2028		
LPC Issue Date	25.07.2024	OPC Issue Date	21-12-2023
LPC Expiry Date	TBA	OPC Expiry Date	TBA

Flying experience:

Total hours	1258:37
Last 24 hrs	03:21
Last 7 days	12:17
Last 30 days	57:07
Last 90 days	189:16

1.5.4 Air Traffic Controller:

Nationality	Omani		
Medical validity	19th May 2025	Licence type	Air Traffic Controller
Licence validity	30th April 2027	Type endorsed	Yes
Ratings	APP, APP RDR	ELP Level, Last test 27th Aug 2023	Level 5

1.5.4.1 The ATCO was issued with ratings to allow operating as a controller at OOMS as ADC, APP, Area RDR/INDRA. The last proficiency test was conducted on 12 February 2024.

1.5.4.2 The ATCO medical assessment was conducted on 1st May 2024 and the ATCO issued a Class three (3) medical certificate on 2nd May 2024 with an expiry date of 19th May 2025.

1.6 Airframe Information:

1.6.1 The Airbus A321 family is a series of narrow-body airlines developed and produced by Airbus. The A320 was launched in March 1984, first flew on 22nd February 1987, and was introduced in April 1988 by France. The first member of the family was followed by the stretched A321 (first delivered in January 1994) The A320 is 37.6 m (123 ft) long and can accommodate 150 to 186 passengers. The 44.5 m (146 ft) A321 offers 185 to 230 seats. The Airbus A321-251N has CFM LEAP 1A engines.

Manufacturer/Model	Airbus A321-251N	
Aircraft Type	A321-251N	
Serial Number	8353	
Year of Manufacture	2018	
Total Airframe Hours (At Time of Incident)	10348:24	
Last Inspection (Date & Hours (TSN))	29-SEP-2024	10340
Last Inspection Airframe Cycles (CSN)	5260	
Hours Since Last Inspection	8	
Type of inspection preformed	1A Check	
CRS Issue Date	29-Sep-2024	
C of A (First/initial Issue Date)	30-Aug-2018	
C of A (Expiry Date)	06-Jun-2025	
C of R (Issue Date) (Present Owner)	07-Jun-2023	
Type of Fuel Used	MOBIL JET A1	
Operating Category	II-Transport (passenger)	
Previous Accidents	None	

Engine 1:

Manufacturer/Model	CFM/ LEAP-1A
Serial Number	59C195
Part Number	LEAP1A-32
Hours Since New	2561:54
Hours Since Overhaul	Not Applicable (New Engine)
Hours since last shop visit	Not Applicable
Cycles Available Before Next Shop Visit	8743 FC
Oil type	NYCO TURBONYCOIL 600

Engine 2:

Manufacturer/Model	CFM/ LEAP-1A
Serial Number	59C199
Part Number	LEAP1A-32
Hours Since New	2561:54
Hours Since Overhaul	Not Applicable (New Engine)
Hours since last shop visit	Not Applicable
Cycles Available Before Next Shop Visit	8743 FC
Oil type	NYCO TURBONYCOIL 600

1.7 Meteorological Information:

1.7.1 The weather below was obtained from the FDM (See Appendix A):

Wind Direction	010°	Wind Speed	03 kts	Visibility	More than 10km
Temperature	30°C	Cloud Cover	2500ft (SCT025)	Cloud Base	9000ft (BKN090)
Dew Point	25°C	QNH	1009 HPA		

1.7.2 The weather information below is from the Meteorological Routine Aerodrome Report (METAR) on the 30th October 2024 at 12:00 UTC:

Wind Direction	070°	Wind Speed	05 kts	Visibility	More that 10km
Temperature	30°C	Cloud Cover	2500ft (SCT025)	Cloud Base	9000ft (BKN090)
Dew Point	25°C	QNH	1008 HPA		

1.7.3 Satellite Image

Satellite show convective cloud over area may be CB cloud as showed in figures 7 and 8. Expected low cloud and convective cloud over the area and during time of incident Figure 7. Convective cloud can be found CB extend up to 3900ft associated with Thundershower rain, downdraft wind, wind shear and turbulence.

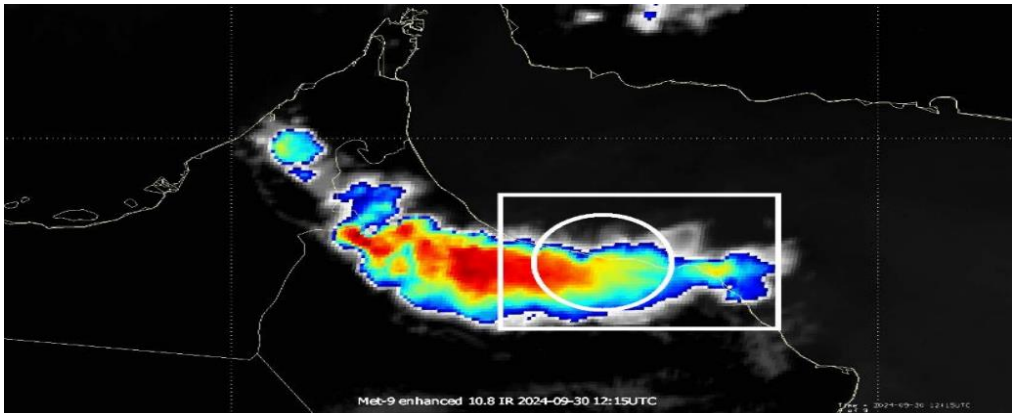


Figure 7: showing satellite image at the time 1200Z on the 30th September 2024

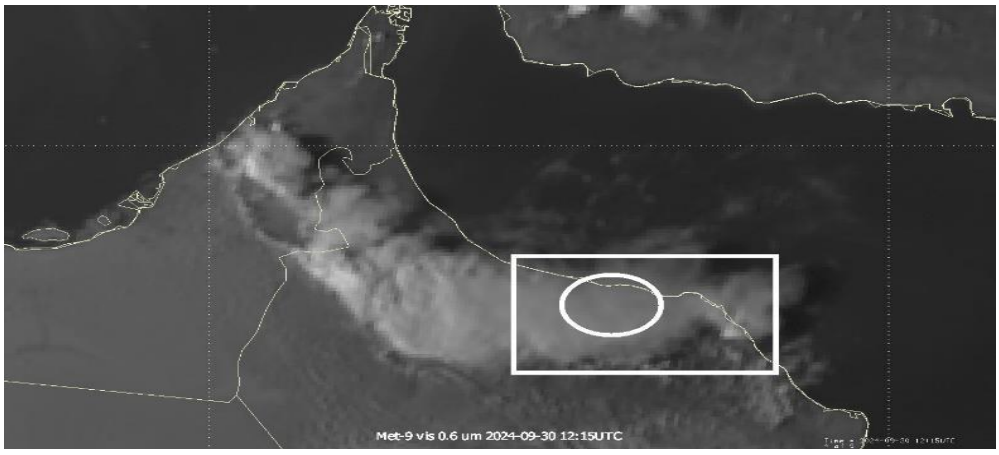


Figure 8: showing satellite image at the time 1200Z on the 30th September 2024

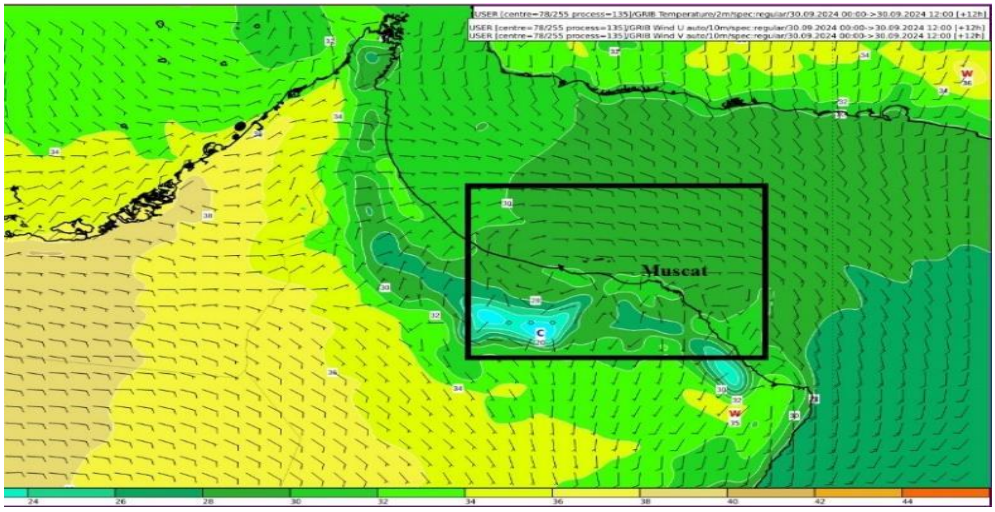


Figure 9: showing temperature and winds at the time 1200Z on the 30th September 2024

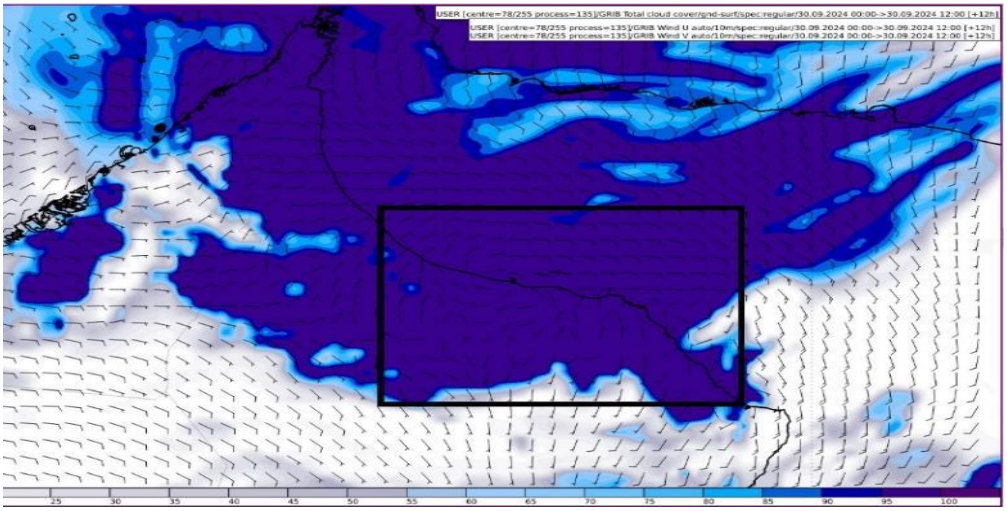


Figure 10: showing clouds with wind at the time 1200Z on the 30th September 2024

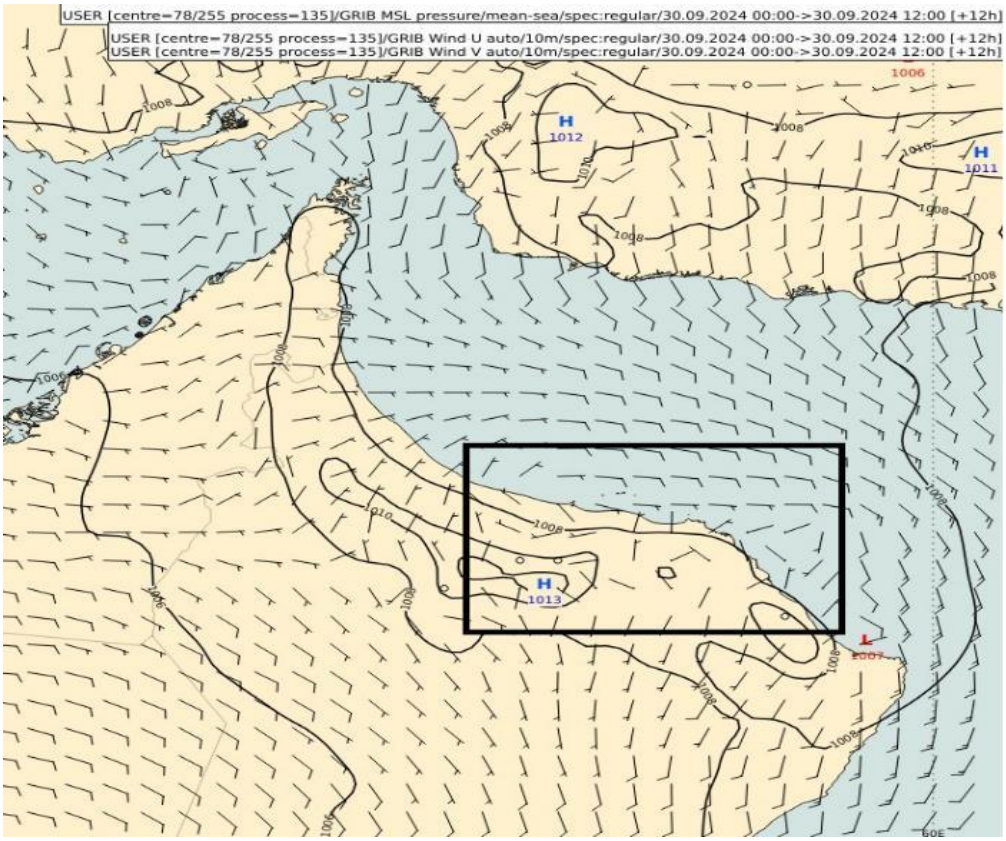


Figure 11: showing pressure with wind at the time 1200Z on the 30th September 2024

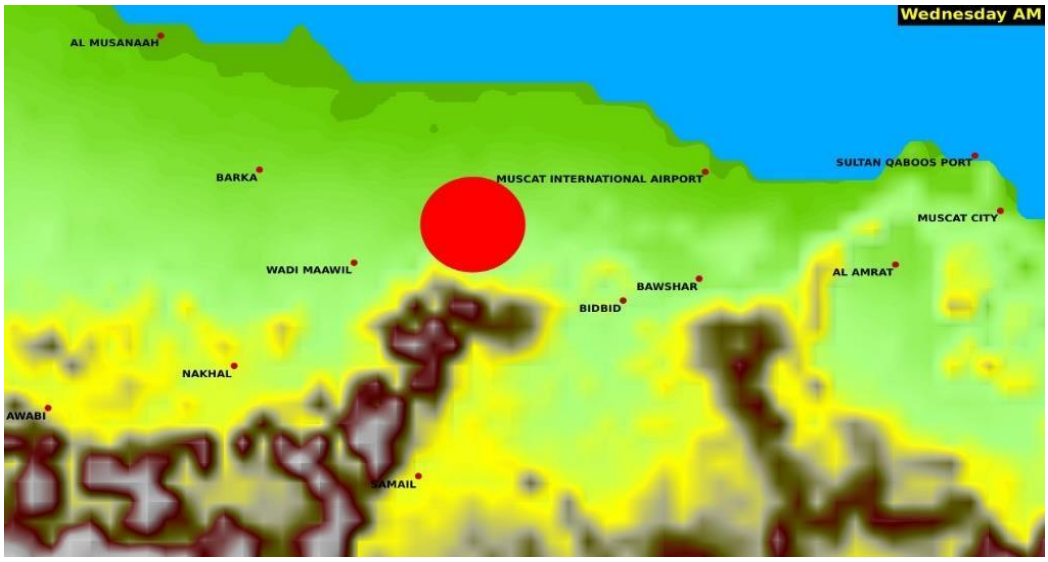


Figure 12: showing position of incident 23.415395N 057.992873 E(see red circle)

1.7.4 Ssignificant weather condition was observed from the satellite image during the time of the incident over Oman FIR especially over Alhajar mountain during time at (1215UTC) and covering the position of incident aircraft.

There was convective cloud around in the location of the incident and expected type of CB clouds which was extended up to 12000m (39000ft) approximately and associated thundershower rain, hail, downdraft, strong variable winds, strong windshear, lighting and air turbulence.

1.7.5 According to the CAA weather report, a weather warning SEGMET over the incident location23.23.04N 058.00.5 E was issued. The warning SEGMET was about the expected CB cloud covering the incident location.

1.8 Aids to Navigation.

1.8.1 The aircraft was equipped with standard navigation equipment as approved by the Oman CAA. There were no records indicating that the navigation system was unserviceable prior to the serious incident.

1.9 Communications.

1.9.1 The aircraft was equipped with standard communication systems as approved by the Oman CAA. No defects that could render the communication system unserviceable were recorded before the flight.

1.10 Aerodrome Information.

1.10.1 Departure Aerodrome:

ICAO designation	Salalah International Airport (OOSA)
Aerodrome co-ordinates	N17 02.3 E054 05.5
Aerodrome elevation	73 feet
Runway designations	07/25
Runway dimensions	3997m / 45m
Runway used	07
Category for Rescue Fire Fighting	9
Approach facilities	ILS/RNAV APP
Aerodrome status	Licensed Airport (Open)

1.10.2 Destination Aerodrome:

ICAO designation	Muscat International Airport (OOMS)	
Aerodrome co-ordinates	23°35′36″N 058°17′04″E	
Aerodrome elevation	25 feet (ft)mean sea level (MSL)	
Runway designations	08R/26L	08L/26R
Runway dimensions	4080 x 60 M	4000 x60 M
Runway used	08L	
Category for Rescue Fire Fighting	CAT 10	
Approach facilities	ILS, RNP, VOR, Runway Lights, PAPI's	
Aerodrome status	Licensed Airport (Open)	

1.11 Flight Recorders.

1.11.1 The aircraft is fitted with the Digital Flight Data Recording (DFDR), Flight Data Monitoring (FDM) and the Cockpit Voice Recording (CVR). OTSB will be relying on Flight Data Monitoring (FDM) and other flight information data such as Air Traffic Services (ATS) communication recording to assist in the investigation. Figures below indicate the flight overview of the for aircraft parameters as per the FDM for OMS104.

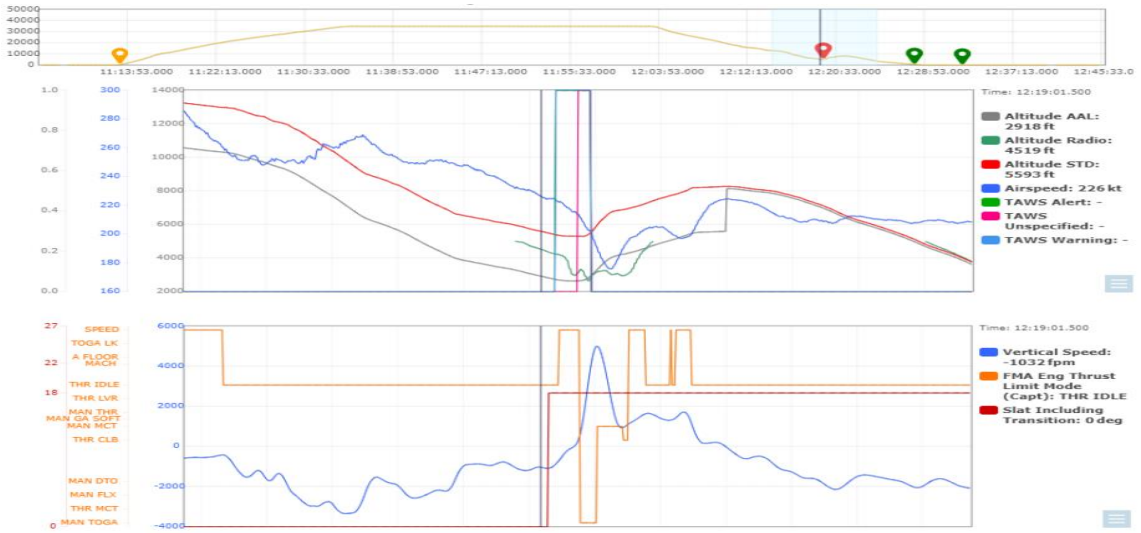


Figure 13 indicates TAWS warning, Vertical Speed and Thrust Mode (OMS104)

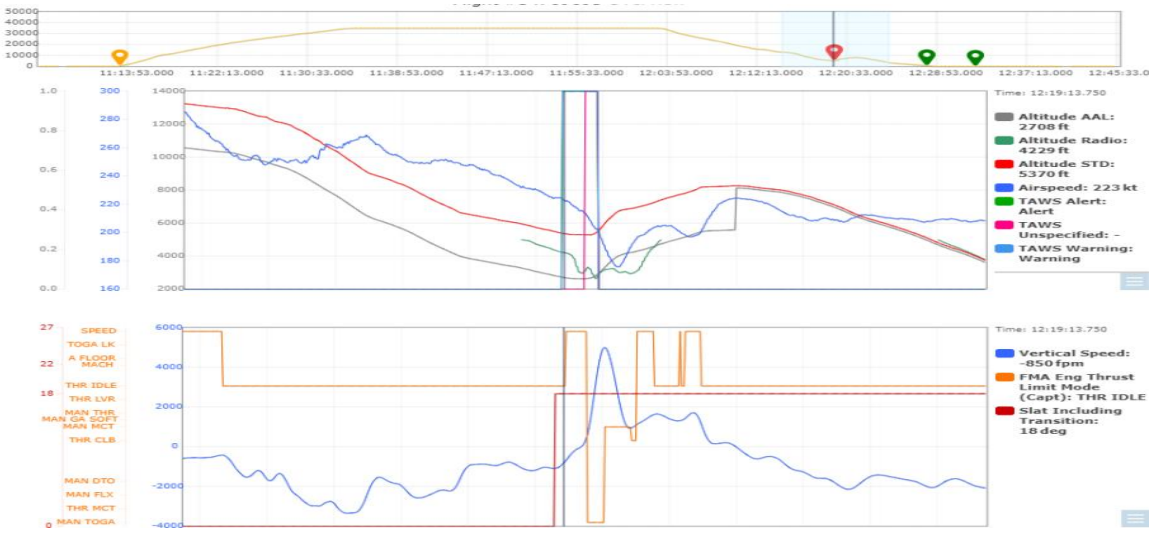


Figure 14 indicates TAWS warning, Vertical Speed, Thrust Mode and Config 1 selected (OMS104)

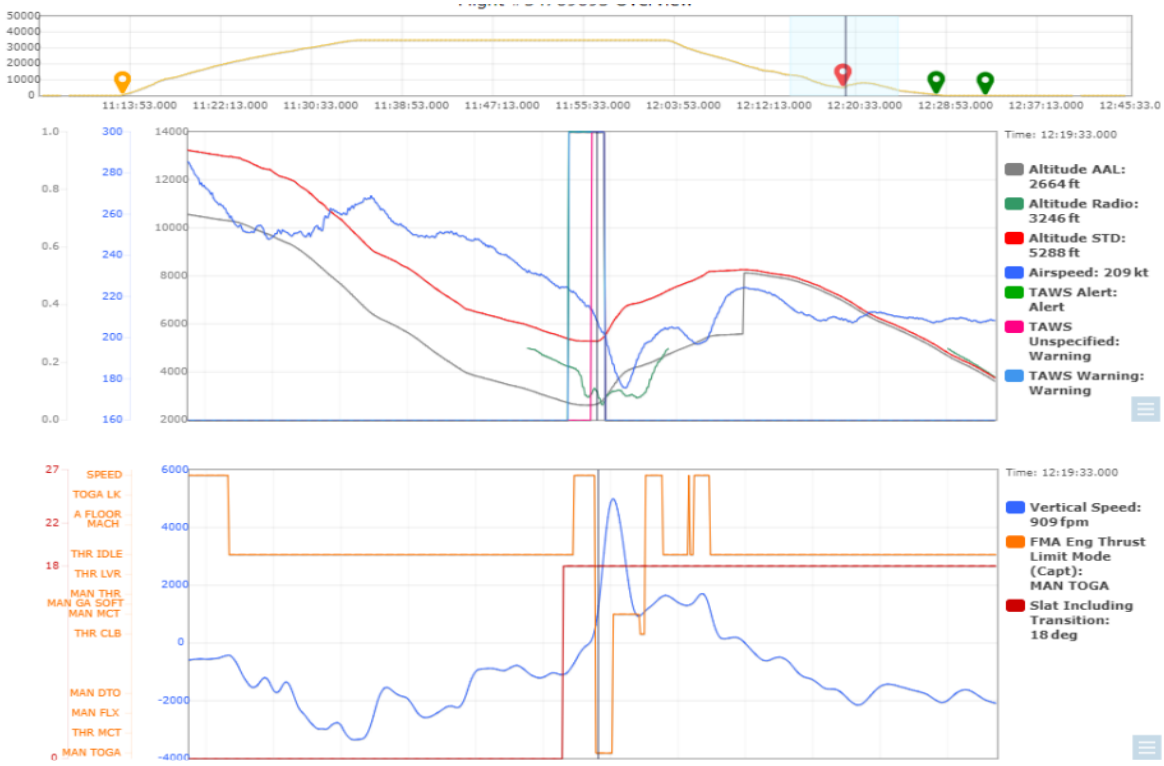


Figure 15: indicates GPWS recovery Action (OMS104)

1.12 Wreckage and Impact Information.

1.12.1 Not relevant to this incident.

1.13 Medical and Pathological Information.

1.13.1 Not relevant to this incident.

1.14 Fire.

1.14.1 Not relevant to the incident.

1.15 Survival Aspects.

1.15.1 Not relevant to the incident.

1.16 Tests and Research.

1.16.1 To be discussed in the final report.

1.17 Organizational and Management Information.

1.17.1 Aircraft OMS104 was operating as a scheduled domestic passenger flight.

1.17.2 The operator, Salam Air is issued an Air Operating Certificate (AOC) by the State of Registry and State of Operator, The Sultanate of Oman, CAA since 25th June 2019. The Expiry date is as per applicable Sultanate of Oman Regulations, which states that the certificate is valid until suspended or revoked. The certificate certifies that the SALAM AIR (S.A.O.C) is authorized to perform commercial air operations; as defined in the operations specifications, in accordance with all applicable manuals and all the applicable Sultanate of Oman Regulations.

1.18 Additional Information

1.18.1 Salam Air Airlines: A320/A321 FLIGHT CREW OPERATING MANUAL
FLIGHT CREW OPERATING MANUAL
PROCEDURES ABNORMAL AND EMERGENCY PROCEDURES

[MEM] EGPWS CAUTIONS

- "TERRAIN TERRAIN" - "TOO LOW TERRAIN" - "CAUTION TERRAIN" - "CAUTION OBSTACLE"
- □ During night or IMC:

Simultaneously:

AP.....OFF PITCH.....PULL UP

L2
Pull to full backstick and maintain in that position.
L1

THRUST LEVERS..... TOGA SPEED BRAKES lever.....CHECK RETRACTED BANK..... WINGS LEVEL or ADJUST

L2
Aircraft obtain the best climb performance when the wings are as level as possible. The flight crew can adjust bank while climbing, provided that turning is the safest action.
L1
Note: For some airports, the operator may define a specific procedure.

DO NOT CHANGE CONFIGURATION (SLATS/FLAPS, GEAR) UNTIL CLEAR OF OB-STACLE.

- □ During daylight and VMC, with terrain and obstacles clearly in sight:

FLIGHT PATH.....ADJUST

L2
Adjust pitch, bank and thrust to silence the alert.
L1
Note: For some airports, the operator may define a specific procedure.
"SINK RATE"
 Above 1 000 ft AAL in IMC or above 500 ft AAL in VMC:

FLIGHT PATH.....ADJUST

L2
Adjust pitch and thrust to silence the alert.
L1
Below 1 000 ft AAL in IMC or below 500 ft AAL in VMC:

1.18.2 Salam Air Airlines A320/A321 FLIGHT CREW OPERATING MANUAL
AIRCRAFT SYSTEMS SURVEILLANCE
GPWS - DESCRIPTION

OVERVIEW

The purpose of the Ground Proximity Warning System (GPWS) is to warn the flight crew of potentially hazardous situations, such as a collision with terrain. It detects terrain collision threats and triggers applicable aural and visual indications.
The GPWS includes:
- Five basic modes active up to radio height of 2 500 ft.
• Excessive rate of descent (Mode 1)
• Excessive terrain closure rate (Mode 2)
• Altitude loss after take-off or go-around (Mode 3)
• Terrain clearance not sufficient, if not in landing configuration (Mode 4)
• Excessive descent below the glide slope (Mode 5).
- A predictive GPWS function, based on a GPWS database, to display terrain information.
It can be provided:
• By Honeywell through Enhanced GPWS (EGPWS)
• By ACSS as Ground Collision Avoidance System (GCAS), through T2CAS or T3CAS.
The predictive GPWS is composed of:
• Mandatory functions such as the Forward Looking Terrain Alerting function
• Optional functions such as the obstacle database.
Note: The terrain data are displayed on the ND and the brightness is controlled via the weather radar brightness control knob. If the weather radar brightness was set to low (due to bad weather) and a terrain alert occurs, then the brightness of the terrain display will also be low.

PRINCIPLE

The GPWS computes the geometric altitude of the aircraft by using:
- Pressure altitude
- Radio altitude
- Temperature
- Barometric references
- GPS altitude for predictive GPWS
-The GPWS computes the geometric altitude of the aircraft by using:
- Pressure altitude

- Radio altitude
- Temperature
- Barometric references
- GPS altitude for predictive GPWS
- Data from the GPWS database for predictive GPWS.

MODE 1 : EXCESSIVE RATE OF DESCENT

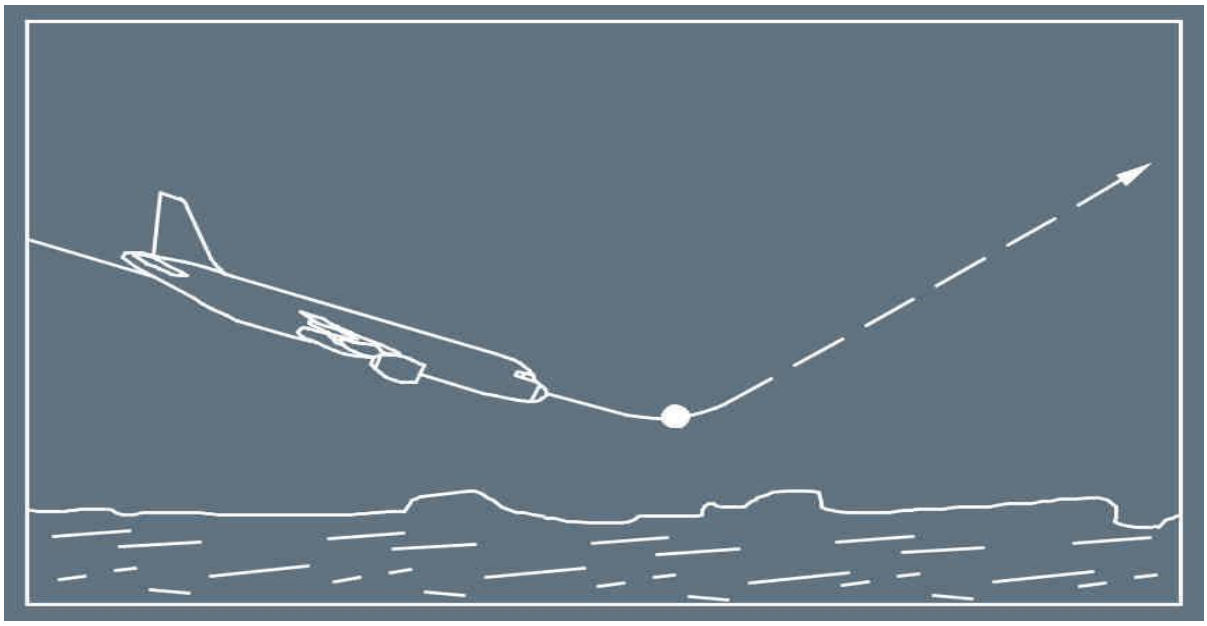
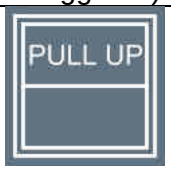


Figure 16 showing Mode 1 excessive rate of descent

Mode 1 triggers aural and visual alerts about excessive rates of descent, based on the radio height, and the rate of descent of the aircraft.
Mode 1 is active for all phases of the flight.

	CAUTION	**CAUTION**
AURAL ALERT	"SINK RATE, SINK RATE"	"PULL UP" (repeated as long as MODE 1 is triggered)
VISUAL ALERT	 The GPWS amber lights come on	 The PULL UP red lights come on

MODE 2 : EXCESSIVE TERRAIN CLOSURE RATE

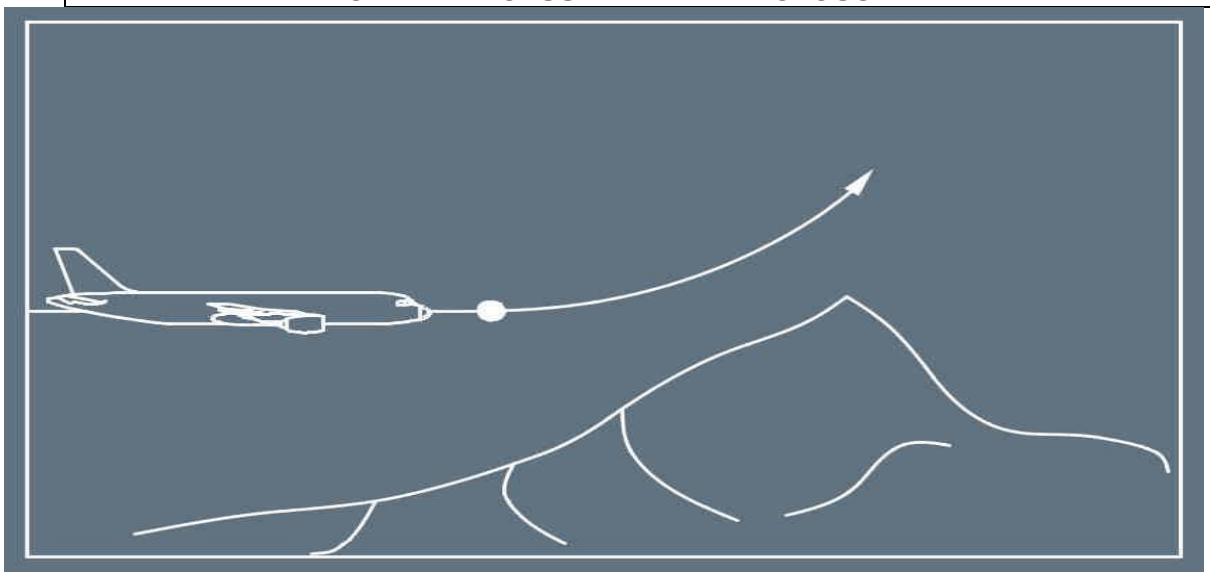


Figure 17 showing Mode 2 excessive terrain closure rate

Mode 2 triggers aural and visual alerts, based on the landing gear/flaps configuration of the aircraft, the radio height, and the RA rate of change.
There are two types of Mode 2 alerts, Mode 2A (active during climb, cruise, and initial approach), and Mode 2B (active during approach and 60 s after take-off).

1.18.3 Salam Air OPERATING PROCEDURES FLIGHT PREPARATION INSTRUCTIONS
Visual Approach Minima (Appendix 1 to CAR-OPS 1.430 (k))
A Visual approach is an approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed in visual reference to the terrain.
The visual approach requires ATC approval, and the minima shall be the lowest of :
a) Associated non-precision approach; or
b) Cloud ceiling of at least MSA and reported visibility shall not be less than 5 km.
A pilot, on an instrument approach, may revert to a visual approach:
a) If it is required by ATC separation procedures. ATC may also require the sighting and/or following of an airplane on approach to the same or adjacent runway. The Commander of the aircraft shall be responsible for ensuring that the spacing from a preceding aircraft of a heavier wake turbulence category is acceptable. If it is determined that additional spacing is required, the flight crew shall inform the ATC accordingly, stating their requirements.
b) If it becomes more efficient to continue with the visual approach rather than complete the full instrument approach procedure.
Anytime a visual approach is flown, the following points shall be highlighted in addition to the requirements of a normal approach briefing:
a) The Missed Approach Procedure;
b) Terrain awareness including the possibility of GPWS alerts;
c) The required visual references must be maintained throughout the approach, including runway presentation on the final approach;

d) Significance of meteorological and/or terrain conditions that may cause optical illusions. Where possible, instrument approach aids should be utilized for approach guidance

1.19 Useful or Effective Investigation Techniques.

1.19.1 To be discussed in the final report.

2. Analysis

2.1 To be discussed in the final report.

3 Conclusions

3.1 General

The investigation is on-going and OTSB will be looking into other aspects of this serious incident investigation which may or may not have safety implications.

3.2 Findings

3.2.1To be discussed in the final report.

3.3 Causes and Contributing Factors

3.3.1 To be discussed in the final report.

4 Safety Recommendations

4.1 The Investigation is still on-going.

5. APPENDICES

5.1 Weather Information from the Aircraft Flight Date Monitoring (FDM)-Appendix A

Appendix A

Datetime:	2024-09-30 12:50:00Z
Generalisation:	010°/3kts
Observation Cycle:	13
Wind Direction:	10 degrees
Wind Speed:	3 knots
Visibility:	greater than 10000 meters
Temperature:	86.0 °F | 30.0 °C
Dew Point:	77.0 °F | 25.0 °C
Barometric Pressure:	1009.0 mb
Sky Conditions:	scattered clouds at 2500 feet; broken clouds at 9000 feet
Report Date & Time:	2024-09-30 12:50:00Z
METAR Report:	OOMS 301250Z 01003KT 320V040 9999 SCT025 BKN090 30/25 Q1009 NOSIG