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

Oman Transport Safety Bureau

Serious Incident

– Final Report –

OTSB Case File No: IIFN/001/07/2022

TCAS Resolution Advisory between a Saudi Arabian Boeing777 and a Salam Air Airbus320 in the Muscat FIR

Operator: Salam Air
Make and Model: Airbus 320neo
Nationality and Registration Marks: Oman A4O-OVH

Operator: Saudi Arabian Airlines
Make and Model: Boeing 777
Nationality and Registration marks: Saudi Arabia HZ-AK73

Location of the Occurrence: Muscat Flight Information Region
State of Occurrence: Sultanate of Oman
Date of Occurrence: 4th July 2022
Date of Publication:19th July 2023

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Purpose of the Investigation

The investigation was conducted by the Air Accident Investigation Section of the Oman Transport Safety Bureau pursuant to Civil Aviation Law 76/2019 Chapter 10, and in compliance with the Civil Aviation Regulation CAR-13 - Aircraft Accident & Incident Investigation & Reporting Procedures. The investigation was in conformance with the standards and recommended practices in Annex 13 - Aircraft Accident and Incident Investigation to the Convention on International Civil Aviation. The Investigation was conducted independently and without prejudice.

The sole objective of the investigation and the Final Report is to prevent future aircraft accidents and serious incidents. It is not the purpose of this activity to apportion blame or liability. Oman Transport Safety Bureau issued this Final Report in accordance with the national and international standards, and industry best practice. Consultation with applicable stakeholders, and consideration of their comments, took place prior to the publication of this report.

The Final Report will be publicly available at: -

http://www.mtcit.gov.om

Oman Transport Safety Bureau

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1. Occurrence Details

		OMS598	SVA985
a) Occurrence File No.		IIFN/001/072022	
b) The identifying abbreviation		SINCID	
c) Manufacturer, model, nationality and registration marks of the aircraft		Airbus 320 Omani A4O-OVH	Boeing 777 Saudi HZ-AK73
d) Name of operator of the aircraft		Salam Air flight OMS598	Saudi Arabian Airlines flight SVA985
e) License /Nationality:	Captain	ATPL/ Bahraini	ATPL /Saudi
	First Officer	ATPL/ Omani	CPL / Saudi
f) Date and time (UTC) of the occurrence;		04 July 2022 at 03:42	
g) Last point of departure and point of intended landing;		From Khartoum, Sudan to Muscat, Oman	From Hyderabad, India to Riyadh, Saudi Arabia
h) State of Occurrence		Sultanate of Oman	
i) Position of the aircraft with reference to some easily defined geographical point and latitude and longitude;		Over reporting point EGVAN at about 100 NM west of Muscat, Sultanate of Oman	
j) Total number of crew		6	3
k) Total number of passengers		160	2
l) Aboard, fatally or seriously injured:		None	
m) Others, fatally or seriously injured:		None	
n) Description of the incident and the extent of damage to the aircraft as far as is known;		TCAS Resolution Advisory (RA) between flight SVA985 and flight OMS598-with no damage to property or environment.	

o) Presence and description of dangerous goods on board the aircraft.	None

Table 1. Occurrence details

Abbreviations

AAIS	Air Accident Investigation Section
AFL	Actual Flight Level
AIP	Aeronautical Information Publication
APW	Area Proximity Warning
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ASST	Assistant
CAA	Civil Aviation Authority
CFL	Cleared Flight Level
CR	Central radar
CVR	Cockpit voice recorder
ER	East radar
FL	Flight level
FMS	Flight Management System
FPL	Flight plan
ICAO	International Civil Aviation Organization
IIC	Investigator-in-charge
JD	Jeddah
Kt	Knot(s)(airspeed/wind speed unit)
LB	Level Bust
LOA	Letter of Agreement
MATSOP	Manual of Air Traffic Services Operational Procedures
MCT	VHF Omnidirectional Range Navigational aid (VOR) serving Muscat, Oman (OOMS)
MNM	Minimum
MSAW	Minimum Safe Altitude Warning
NTSB	National Transportation Safety Board
NM	Nautical Mile
OBSV	Observation
OMS	Mazoon (Salam Air)
OOMS	Muscat International Airport

PF	Pilot Flying
PM	Pilot Monitoring
RA	Resolution Advisory
RBL	Range Bearing Line
RDR	Radar
ROC	Rate of climb
ROD	Rate of descent
RVSM	Reduced Vertical Separation Minima
RWY26R	Runway 26 right
SEP	Separation
SQK	Squawk
STCA	Short Term Conflict Alert
SVA	Saudi (Saudi Arabian Airlines)
TCAS	Traffic Collision Avoidance System
TOD	Top of Descent
UAE	United Arab Emirates
UTC	Universal Time Coordinated

Indra System Safety net Alert Abbreviation		
STCA	Short Term Conflict Alert	"Yellow" Prediction "Red" Violation
AW	Minimum Safe Altitude Warning (MSAW)	
W	RVSM	
LB	Level Burst	"Yellow" CFL not matching AFL "Red" CFL not matching Mode-S flight level
HG	Heading conformance	
MC	Medium Term Conflict Detection	
RO	Route off	
SQ	SSR Code Conformance alert	

Figure 1 -Indra System Safety Net Alert Abbreviations

2. Synopsis

Oman Transport Safety Bureau (OTSB) was notified of a serious incident by the Air Navigation Safety Investigation Coordinator in the Oman Civil Aviation Authority (CAA) and the Aviation Investigation Bureau (AIB) in the Kingdom of Saudi Arabia (KSA) through the OTSB email-OTSB@mtcit.gov.om. The OTSB classified the occurrence as a serious incident, instituted an investigation and notified the following interested parties:

- The AIB of Kingdom of Saudi Arabia as the State of Operator and Registry of the B777.
- The National Transportation Safety Board (NTSB) of the United States of America, as the State of Design and the State of Manufacture of the Boeing 777;
- The Bureau d'Enquetes et d'Analyses (BEA) of France, as the State of Design and the State of Manufacture of the Airbus 320; and
- The International Civil Aviation Organization (ICAO).

An investigation Team was formed in line with the ICAO Annex13 obligations of the Sultanate of Oman being the State of Occurrence. The AIB of the Kingdom of Saudi Arabia assigned a non-traveling Accredited Representative (ACCREP) and an adviser to assist in the investigation. After the Investigation, this Final Report is issued on 19th July 2023 and will be made public at the below link: -

mtcit@mtcit.gov.om

Unless otherwise mentioned, all times in this report are UTC. Local Time in The Sultanate of Oman is UTC plus 4 hours. Photos and figures used in this report were obtained from CAA Air Traffic Control Indra radar playback system and adjusted from the original for the sole purpose of improving the clarity of the report. Modifications to images used in this Report are limited to cropping, magnification, file compression, or enhancement of color, brightness, contrast or insertion of text boxes, arrows or lines.

Brief Description of the Occurrence: -

A loss of separation occurred after OMS598 was given a clearance by the controller to descend initially FL310 followed by another clearance to descend to FL350 due to converging traffic SVA985 that was maintaining FL340 but OMS598 continued to descend to FL340 then climbed to FL350 which led to both aircraft reporting TCAS RA.

4. Factual Information

4.1 History of Flight

Flight SVA985 was a scheduled flight which departed Hyderabad, India for King Khaled International Airport (OERK) in Riyadh, Saudi Arabia. Flight OMS598 was a scheduled flight which departed Khartoum International Airport for Muscat International Airport (OOMS) in the Sultanate of Oman. Salam Air flight OMS598 was at FL370 when it entered the Sultanate of Oman airspace via reporting point MIDGU (eastbound). The incident occurred in Muscat Flight Information Region (FIR), Central Sector during daytime at approximately 100 NM west of Muscat and abeam reporting point EGVAN. An

incident report was not received from Salam Air until it was requested. At the time of the incident, the ATCO controlled nine aircraft. In both aircraft, the Captain was the pilot monitoring (PM) and the First Officer was the pilot flying (PF).

Flight SVA985 established contact with the Muscat FIR Central Radar (CR) controller after being transferred by the East Radar (ER) controller. The flight maintained FL340 and was instructed to report exit point LUDID. Flight OMS598 maintained FL370 when it established first contact with the CR controller. OMS598 was instructed to reset the squawk to 6556, and given the flight plan (FPL) route to Muscat, and runway 26R in use.

Subsequently at 03:37:36, flight OMS598 was instructed by the CR controller to descend to FL310 and to be levelled by reporting point EGVAN. The flight crew entered FL310 on their FMS without engaging the descent. In return, Mode S from flight OMS598 showed on the controller`s Extended Label tool as FL310 which is the flight level that was manually selected in the FMS by the crew but not yet engaged. OMS598 opted to maintain FL370 to the top of descent point at which they planned to commence the descent.

To avoid the conflict situation, two minutes later at 03:39:59, the ATCO instructed flight OMS598 “OMS598 descend to FL350 now”. Flight OMS598 read back the clearance. The clearance given to flight OMS598 to descend to FL350 was in order to keep flight OMS598 above flight SVA985. Flight OMS598 descended and maintained FL350,11 NM prior to reporting point EGVAN. The first officer, who was the Pilot Flying (PF), checked with the Captain who was the Pilot Monitoring (PM), if the initial clearance to pass reporting point EGVAN at FL310 was still valid. The flight crew agreed on the validity of that clearance. At 03:42:20, OMS598 Captain reported to the CR controller descending to FL310 First Officer had already initiated the descent and had left FL350 as stated by the flight crew.

However, Muscat ACC radar showed the flight OMS598 was still at FL350 due to the delay on the radar antenna which rotated every 10 seconds except for the radar located in Jaalan, which rotated every 15 seconds. At that time SVA985 at FL340 was approaching EGVAN reporting point (westbound). At 03:42:26 the CR controller requested flight OMS598 to stop and to maintain FL350 now. Flight crew OMS598 read back “maintain FL350”, but the crew took around 30 seconds to insert on the FMS FL350. At 03:42:32, OMS598 replied to the controller “maintain FL350”, and to expect lower after crossing traffic. Flight OMS598 acknowledged by saying roger. Noticing on the radar OMS598 out of FL350, the ATCO instructed the flight crew at 03:42:56 while passing FL345 as follow: “stop maintain stop level 350”. The flight crew entered FL350 on their FMS while passing FL343 at 2400 fpm rate of descent. OMS598 replied the controller:

"climbing back to FL350". The ATCO issued an avoiding heading of 190 to flight OMS598. Flight OMS598 acknowledged and complied accordingly.

The ATCO also gave an avoiding heading of 320 to flight SVA985, but at 03:43:35 flight SVA985 reported to the CR controller a TCAS TR. Then flight OMS598 also reported a TCAS RA. The horizontal separation was infringed (4.98 NM), and the vertical separation was achieved as flight OMS598 was climbing through FL347 and flight SVA985 was descending through FL337. Thereafter, both flights reported clear of conflict.

4.1.1 According to the interview with Salam Air flight crew:

1. The setting of TCAS range for both flight crew members was at a range that did not show any conflicting traffic until just before reporting the TCAS RA.
2. When OMS598 received a clearance to maintain FL350 at 03:42:26, the flight crew did not report their departure from that level, instead they reported "maintain FL350".
3. The autopilot climb rate was at a slow rate, and almost zero when transiting from descent to climb. Hence, the flight crew had disengaged the autopilot and climbed the aircraft manually, in order to have a better rate of climb.

4.1.2 Flight Data Monitoring (FDM) data from flight OMS598

1. Data from the Salam Air A320 Flight Data recording. Salam Air provided the altitude data from the A320 flight data recording from 03:39:00 to 03:45:01. According to the data, at 03:39:00, the aircraft was at FL370 as selected in the FMS. At 03:39:17, FL310 was selected in the FMS. The aircraft remained at FL370 until 3:40:29 when the aircraft began descending. Between 03:40:30 and 03:40:37, the FMS setting was changed to FL350. The aircraft reached FL350 at 03:41:12. At 03:41:39, the FMS setting was changed to FL310. At 03:42:28, the aircraft began a descent. At 03:42:52, when the aircraft had reached FL341 in descent, the FMS setting was changed to FL350. Positive climb from FL341 was noted at about 03:43:00. The aircraft reached FL350 at about 03:43:40. The aircraft remained at FL350 until the end of the submitted data (03:45:01). The A320 flight data altitude trace was consistent with the event descriptions provided by the OMS598 flight crew and the air traffic controllers.
2. The TCAS RA activated at 34,280 ft during the descent. The TCAS TA activated 12 seconds prior to the TCAS RA as well as 8 seconds after;

3. TCAS Climb advisory was followed by a “DO NOT DESCEND” 13 seconds later; the autopilot was recorded as disengaged 2 seconds after the first resolution advisory.
4. The TCAS RA change of vertical speed was 4310 ft/min.

4.2 Injuries to Persons

Nil

4.3 Damage to Aircraft.

Nil

4.4 Other Damage

Nil

4.5 Personnel Information

4.5.1 Flight SVA985 flight crew

4.5.1.1 Pilot-in-command

4.5.1.1.1 Information:

- Nationality : Saudi Arabia
- Age : 56
- License Type : ATPL
- Class (Issue date) : 02/12/2015
- English Language Proficiency Level (expiry date): 20/03/2025
- Medical certificate class (issue/expiry date) : Class1 Medical Validity-20/10/2021-31/10/2022

4.5.1.1.2 Flight experience

- Total hours on type : 5341 hours
- Hours on type last 90 days : 276.52 hours
- Hours on type last 28 days : 98.52 hours
- Hours on type last 7 days : 40.23 hours

- Hours on type last 24 hours : 5.03 hours
- Total flying hours of all types : 15818 hours

4.5.1.2 First officer

4.5.1.2.1 Information

- Nationality : Saudi Arabia
- Age : 55
- License Type : CPL
- Class (Issued/expiry date) : 09/12/2019-22/12/2022
- English Language Proficiency Level (expiry date): 10/11/2022
- Medical certificate class (issued/expiry date) : Class 1 Medical Validity- 02/11/2021- 30/11/2022

4.5.1.2.2 Flight experience

- Total hours on type : 10510 hours
- Hours on type last 90 days : 251 hours
- Hours on type last 28 days : 88 hours
- Hours on type last 7 days : 34.17 hours
- Hours on type last 24 hours : 5.03 hours
- Total flying hours of all types : 13041 hours

4.5.2 Flight OMS598 flight crew

4.5.2.1 Pilot-in-command

4.5.2.1.1 Information: The pilot-in-command joined SalamAir in February 2017

- Nationality : Bahraini
- Age : 34
- License Type : ATPL
- Class (Issued/expiry date) : 10/07/2012-30/09/2024
- English Language Proficiency Level (expiry date): Level 5 valid till 11/03/2026
- Medical certificate class (issued/expiry date) : Class 1 Medical Validity 09/03/2022 to 28/03/2023

4.5.2.1.2 Flight experience

- Total hours on type : 4787 hours
- Hours on type as a Captain : 520 hours
- Hours on type last 90 days : 213:08
- Hours on type last 28 days : 85:28
- Hours on type last 7 days : 28:31
- Hours on type last 24 hours : 8:31
- Total flying hours of all types : 4947 hours

4.5.2.2 First officer

4.5.2.2.1 Information: The first officer joined SalamAir in November 2020

- Nationality : Omani
- Age : 39
- License Type : CPL
- Class (expiry date) : 18/05/2025
- English Language Proficiency Level (expiry date): Level 4 valid until 23/12/2022-
- Medical certificate class (expiry date) : Class 1 Medical Validity until22/12/2022

4.5.2.2.2 Flight experience

- Total hours on type : 800 hours
- Hours on type last 90 days : 252:50
- Hours on type last 28 days : 76:28
- Hours on type last 7 days : 18:25
- Hours on type last 24 hours : 8:31
- Total flying hours of all types : 1032 hours

In accordance to the flight crew roster, this was their second sector of the day, after a delay of 45 minutes in Khartoum, Sudan.

4.5.3 The air traffic controller (CR sector)

4.5.3.1 Information: The controller joined CAA-ATC on 17/02/2088

- Nationality : Omani

- Age : 48
- License Type : Area Radar Control
- Class (Issued/expiry date) : TC-28/02/2023
- English Language Proficiency Level (expiry date): Level 4 valid till 23/12-2022
- Medical certificate class (issued/expiry date) : Class 1 Medical Validity 01/02/-2023
- Last proficiency :16/01/2022

4.6 Aircraft Information

4.6.1 General data

4.6.1.1 Salaam Air flight OMS598

Airbus A320 NEO

- The aircraft was dispatched serviceable, and in an airworthy condition;
- Refuelling was carried out in Khartoum;
- The flight crew were properly licensed, medically fit and in accordance to the roster the crew were adequately rested to operate the flight; and
- The OMS598 flight crew were planning to descend once they reach their point of descent prior to reporting point EGVAN.

4.6.1.2 Saudi Arabian Airlines flight SVA985

Boeing777

4.6.2 Aircraft systems

Both aircrafts were equipped with the required communications and navigational equipment.

4.7 Meteorological Information

Visual meteorological conditions (VMC) prevailed. The serious incident occurred in daylight.

4.8 Aids to Navigation

There were no known deficiencies of the air navigation facilities relevant to the occurrence.

4.9 Communication

The radio communications between the flight crews and the ATC controllers were recorded by ground based automatic voice recording equipment for the duration of the flight and successfully retrieved and transcribed. The quality of the aircraft`s recorded transmissions was good. The radar recordings were also available for the investigation together with the extracts of full transcripts mentioned in the Appendix.

Time	Content
03:37:32	Flight OMS598 was at FL370, Central Radar cleared OMS598 to descend to FL310 and to be levelled by reporting point EGVAN.
03:38:27	OMS598 selected FL310 but did not initiate the descent. As a result, the radar Mode S showed FL310 while OMS598 was still maintaining FL370.
03:38:38	A yellow Level Bust (LB) indication appeared on the OMS598 label on the ACC radar.
03:39:52	The CR controller cleared flight OMS598 to “descend to FL350 NOW”.
03:40:00	Flight OMS598 FMS showed FL310 was selected.
03:40:02	The yellow LB cleared from the ACC radar screen.
03:41:38	Flight OMS598 descended from FL370 and maintained FL350.
03:41:46	A red LB appeared on the target of flight OMS598.
03:42:20	Flight OMS598 reported to the CR controller descending to FL310.
03:42:26	The CR controller instructed flight OMS598 stop or maintain FL350 now. Flight OMS598 read back maintaining FL350.
03:42:29	Flight OMS598 Mode S showed FL310.
03:42:32	The CR controller for a second time instructed flight OMS598 to “maintain FL350”.
03:42:35	The CR controller informed flight OMS598 to expect lower after crossing traffic.
03:42:39	Flight OMS598 acknowledged by saying roger and while the radar was showing descend continuation.

Time	Content
03:42:56	The CR Controller for the third time instructed flight OMS598 to “stop maintainFL350”
03:42:58	Flight OMS598 Mode S showed selection of FL350.
03:43:00	Flight OMS598 reached FL341.
03:43:05	Flight OMS598 advised the controller: climbing FL350. The climb rate was 400 ft/min, then 500 ft/min, and then 900 ft/min.
03:43:08	The CR controller gave an avoidance heading of 190 degrees to flight OMS598.
03:43:10	Flight OMS598 initiated a climb to FL350 passing through FL342.
03:43:31	The CR Controller gave an avoidance heading of 320 to flight SVA985.
03:43:34	Flight SVA985 reported a TCAS RA encounter. Flight OMS598 was climbing passing through FL344 with a climb rate of 500 ft/min.
03:43:38	Flight OMS598 also reported a TCAS RA. Flight SVA985 started a descent from FL340 with a descent rate of 500 ft/min. Flight OMS598 rate of climb was 900 ft/min.
03:43:47	Flight OMS598 on climb passed through FL347, ROC = 1700 ft/min. Flight SVA985 on descent passed through FL337, ROD = 1300 ft/min. Minimum separation distance was 4.98 NM
03:44:08	Flight SVA985 reported clear of traffic at FL337.
03:44:34	Flight OMS598 reported clear of traffic at FL355.

Table 2. Radar Records of the Central Radar Position

4.10 Aerodrome Information

4.11 Flight Recorders

The CVRs were not retrieved from either of the two aircraft. Salam Air (flight OMS598) provided their internal occurrence report, which contained a flight data recording summary.

4.12 Wreckage and Impact Information

The aircrafts were undamaged.

4.13 Medical and Pathological Information

There were no evidence that physiological or psychological factors, nor incapacitation, had affected the performance of both flight crews.

4.14 Fire

There was no evidence of fire.

4.15 Survival Aspects

Not relevant to this occurrence.

4.16 Tests and Research

No tests or research were required to be conducted as a result of this occurrence.

4.17 Organisational and Management Information

Salam Air commenced operations in 2017 in compliance with an air operator certificate (AOC) issued from CAA of the Sultanate of Oman and Saudi Arabian Airlines commenced operations in 1945 in compliance with an air operator certificate (AOC)issued from CAA of Saudi Arabia.

4.18 Additional Information

There was no other factual information that was relevant to the circumstances leading up to the occurrence.

4.19 Useful or Effective Investigation Techniques

The investigation was carried out in accordance with the Sultanate of Oman Civil Aviation Law 76/2019 Chapter10 and the Civil Aviation Regulation 13, and approved policies and procedures of the Air Accident Investigation Sector, and in accordance with the Standards and Recommended practices of Annex13 to the Chicago Convention.

5.Analysis

1. The ATC controller`s workload was assessed as moderate with normal complexity. He had nine aircraft at the time with most of the aircraft on the airways.
2. Since flight OMS598 was to descend to Muscat, the controller initially instructed flight OMS598 to descend to FL310 and to be levelled by reporting point EGVAN, in order to prepare flight OMS598 for further descent to Muscat.
3. Traffic checking in via reporting point MIDGU for descent to Muscat conflict with many airways in the central sector and usually controllers would descend this traffic early to keep them clear of traffic.
4. The controller realized that the flight OMS598 descent from FL370 to FL310 would conflict with flight SVA985 maintaining FL340. Subsequently, the controller acted to find a vertical separation of 1000 ft between the flights by clearing flight OMS598 to stop descent at FL350 and adding the expression “now” (“descend to FL350 now”). The expression “now” had no influence on the separation outcome, as there was vertical separation even if flight OMS598 started the descent at that time or later.
5. In general, ATCOs use the expression “now” to direct a flight crew for immediate action. In this case, the ATCO seemed to have used this expression to tell OMS598 flight crew that the previous clearance ("descent FL310 to be levelled by EGVAN”) is no longer in effect and now they should descend to FL350.
6. According to Chapter 12 of ICAO PANS-ATM (Doc 4444, Air Traffic Management), related to phraseologies, the following message may be used by a controller to show urgency: “immediately”.
7. The OMS598 flight crew understood the ATC clearance “descend to FL350 now” as a need to leave FL370 without delay.
8. At 03:41:46, red LB warning was triggered on the controller`s Indra radar display on flight OMS598 as there was a mismatch between the level that flight OMS598 was maintaining FL350 in compliance with the level that was entered by the controller and the level that was entered into the FMS (FL310) as per the following figure: -

Figure 2- 03:41:46: screenshot from Indra Radar display

9. The red LB is a defensive tool which warned the controller regarding the mismatch of flight levels by appearing red LB on the screen and has an option of an audio sound, which had been switched off by the management.
10. Flight OMS598 descended and maintained FL350. When the flight reached their point of descend at 03:42:20, OMS598 informed ATC that they were descending to FL310.

Figure 3- 03:42:20: screenshot from Indra Radar- Extended tool function displaying flight OMS598 Mode S

11. Flight OMS598 was still showing on the controller`s radar screen maintaining FL350, due to the radar antenna which rotated every 10 seconds except for the radar located in Jaalan it rotated every 15 seconds, although actually flight OMS598 had initiated the descent.
12. Flight OMS598 did not inform the controller that FL350 had been vacated and that the flight was already on descent. Instead, OMS598 read back “maintain FL350”.
13. At 03:42:26, the controller instructed flight OMS598 to “stop maintain FL350”. Flight OMS598 acknowledged, but flight OMS598 had already initiated the descent from FL350 for FL310 descending as per the following figure: -

Figure 4- 03:42:26: screenshot from Indra Radar display

14. Therefore, there was a gap of 40 seconds from the time the red LB warning (03:41:46) appeared on the radar target from flight OMS598 to the time the controller instructed flight OMS598 to “stop maintain FL350” (03:42:26). During this time, there was silence on the radio frequency and no coordination actions were heard at the controller`s position.
15. Mode S receiver on the controller`s radar display of flight OMS598 was still displaying FMS FL310.
16. Again, for a second time, the controller instructed flight OMS598 to “stop maintain FL350” and to expect lower after crossing traffic and flight OMS598 replied roger while continuing to descend with a rate of 300 ft/min then 800 ft/min then 1500 ft to 1400 – 1700 ft/min as flight OMS598 was on an open descent.
17. The three seconds between the CR controller`s first clearance and second clearance to stop and maintain FL350 was due to the radio frequency being blocked by the radio transmission of another flight (KQA311).
18. The traffic information provided by the controller contained limited information “expect lower after crossing traffic”and did not provide details of the conflicting traffic (reference: procedures of Chapter 12 of ICAO PANS-ATM (Doc 4444, Air Traffic Management).
19. During the interview, the flight crew of OMS598 stated that they did not receive any traffic information from the controller and did not observe any traffic on the TCAS range due to the setting of the TCAS range that was selected. Therefore, the crew of flight OMS598 were unaware of the conflicting traffic.
20. Subsequently, the yellow STCA radar warning appeared on radar with the red MC, which indicated that there was a conflict between the two flights (OMS598 and SVA985).

21. For the third time, the controller instructed flight OMS598 to “stop maintain FL350” and the flight crew acknowledged “We are climbing FL350 OMS598”. By that time, flight OMS598 had reached FL341.
22. Flight OMS598 initiated a climb, but the climb rate was very low.
23. During the interview, the flight crew stated that the climb rate was low or almost zero, until they disengaged the auto pilot and flew the aircraft manually. At this time, the flight crew was able to observe the conflicting traffic on TCAS.
24. As the converging distance between flight OMS598 and flight SVA985 was 16 NM closing, the controller issued an avoiding heading of 190 degrees to flight OMS598 in order to keep flight OMS598 clear of SVA985 as per the following figure: -

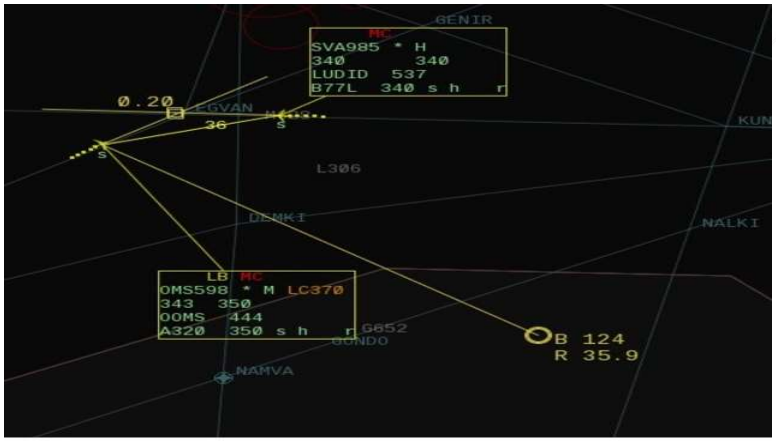

Figure 5:-Screen shot from Indra radar playback

25. Thereafter, the controller issued an avoiding heading of 320 degrees to flight SVA985, but flight SVA985 reported at the same time a TCAS TR. The controller instructed the crew to report once clear of conflict as per the following figure: -

Figure 6:-Screen shot from Indra radar playback

26. Flight OMS598 also reported a TCAS RA and the controller instructed the crew to report once clear of conflict as per the following figure: -

Figure 7:-Screen shot from Indra radar playback

27. Vertical separation was achieved as OMS598 was on climb passing through FL347 for FL350, rate of climb was 1700 ft/min, and SVA985 was on descent to FL337, rate of descent was 1300 ft/min, RBL =4.98 min. separation.0.38nm as per the following figure:

Figure 8:-Screen shot from Indra radar playback

28. Both traffic reported clear of conflict as flight OMS598 was maintaining FL355 and flight SVA985 descended to FL337 then climbed back to FL340.
29. Later, when the controller asked the OMS598 flight crew for reason for not complying with the ATC clearance to maintain FL350, the OMS598 crew explained that after descending to FL350 they assumed that the clearance to pass reporting point EGVAN at FL310 was still valid, and therefore, they continued the descent.
30. This incident was not reported by Salam Air until requested to do so.
31. In accordance to the Oman AIP (21 Oct 2022), there was a discrepancy for designation of Z515, eastbound traffic destination Oman northern airports only to

expect FL330 or below at reporting point MIDGU, but the estimate was passed and accepted by Muscat Controller at FL370 and traffic checked in over MIDGU at FL370. During the investigation, it was revealed that the INDRA non-interactive playback (to observe actual controller`s actions on the radar) was not available and only the interactive (a radar playback). As a result, the controller`s actions on the radar position while controlling could not be replayed and investigated further.

6.Conclusions

6.1 General

From the available evidence, the following findings, causes and contributing factors were determined with respect to this serious incident. These shall not be read as apportioning blame or liability to any organization or individual. To serve the objective of this Investigation, the following sections are included in the Conclusions heading:

6.2 Findings

1. Both flight crews were licensed, qualified and medically fit and adequately rested for their respective flights.
2. There was no evidence of any defect or malfunction in the aircraft that could have contributed to the incident.
3. Salam Air did not notify the occurrence to OTSB neither CAA.
4. The controller was appropriately licensed, qualified and medically fit.
5. The controller`s clearance to flight OMS598 to descend to FL350 created a confusion in relation to the initial clearance to descend to FL310 and to be levelled by reporting point EGVAN.
6. The controller used a clearance that cancelled a previous clearance and amended the assigned flight level using phraseology descend FL350 now.
7. The flight crew of OMS598 thought the initial clearance to descend to FL310 to be levelled by EGVAN still applied and flight crew OMS598 reported to controller descending to FL310.
8. The controller repeated to flight OMS598 to “stop maintain FL350” while leaving FL350 and the flight OMS598 crew acknowledged but ended up descending to FL310.
9. The red LB radar warning appeared on radar for 34 seconds indicating that the contradiction between the level entered by the controller and the level entered into the FMS of flight OMS598.

10. During the interview, the controller stated that extra workload was created by giving an early descent to traffic checking in via reporting point MIDGU to Muscat, in order to keep the traffic clear and below crossing and converging traffic from different airways (north-south-east and west).
11. After the incident, the supervisor asked the CR controller whether he was willing to continue working and the controller agreed to continue working.
12. The MATSOP was outdated and did not reflect the current procedures.
13. Only one hard copy of the MATSOP was available at Muscat ACC.
14. The audible warning used to warn ATCOs of discrepancies between the assigned level and the selection in the FMS had been switched off.
15. Interactive playback of the Indra Radar was not available.
16. The ATCO did not use the expression “immediately” when instructing flight OMS598 to regain FL350 and only limited traffic information was given to flight OMS598.

6.3 Causes and Contributing Factors

1. Flight crew OMS598 decision of following an ATC clearance that was given earlier by the controller, although some doubt as to whether the initial ATC clearance provided by the controller still applied. However, the flight crew of OMS598 decided to follow the earlier clearance instead of asking for a clarification from the ATC.
2. Deliverance of an ATC clearance that generated some misunderstanding for OMS598 flight crew.
3. Use of an unwarranted expression (“now”) that added some confusion to the clearance message.
4. Crew Resource Management (CRM) gradient, which was manifested through the first officer not challenging the pilot-in-command about the misunderstanding.
5. The OMS598 flight crew were late to comply with ATC instructions as received and acknowledged.
6. Inadequate monitoring and scanning setting of the flight OMS598 TCAS range. Therefore, the OMS598 flight crew was unable to note the conflicting traffic (flight SVA985) at an early stage.
7. ATC did not warn the flight crew of the discrepancy with their selected flight level in the FMS.
8. The controller provided limited traffic information regarding the conflicting flight paths of SVA985 and OMS598.
9. Non-use of a function within the ATC radar to provide an audible warning in case of incorrect level selection by the flight crew in their FMS.

10. The ATCO did not use the expression “immediately” upon recognizing the OMS598 flight level deviation to draw the attention of the flight crew to the need to act promptly.

7. Safety Recommendations

7.1 General

The safety recommendations listed below are based on the conclusions listed above in part 6 of this Report.

7.2 Safety Actions Taken by CAA During the Time of the Investigation

- On 5 Oct 2022, the Director of Air Traffic Control issued a permanent hand down Item HDI/021/22/OPS to all ACC/TWR/MCC controllers addressing the availability of Electronic Documents.
- Latest MUSCAT-JEDDAH LOA was signed by both parties on 6 Oct 2022. On 4 Oct 2022, the Director of Air Traffic Control issued a permanent hand down item HDI/021/20/OPS to all ACC/TWR/MCC controllers addressing Muscat/Jeddah LOA effective 6 Oct 2022.

7.3 Final Report Safety Recommendations

7.3.1 Safety recommendations addressed to Salam Air

SR01/2023

1.Flight crew OMS598 decision of following an ATC clearance that was given earlier by the controller, although some doubt as to whether the initial ATC clearance provided by the controller still applied. However, the flight crew of OMS598 decided to follow the earlier clearance instead of asking for a clarification from the ATC. The OMS598 flight crew were late to comply with ATC instructions as received and acknowledged.

Therefore, Oman Transport Safety Bureau recommends that Salam Air provides suitable training to Salam Air crew by reinforcing the following elements: -

Vigilance in ATC communication, not only to read back the clearance but to reflect to the actual phase of compliance. Report to the controller when unable to comply with ATC instructions.

SR02/2023

Crew Resource Management (CRM) gradient, which was manifested through the first officer not challenging the pilot-in-command about the misunderstanding.

Therefore, Oman Transport Safety Bureau recommends that Salam Air provides suitable training to Salam Air First Officer by reinforcing the assertiveness of the first officer (CRM).

SR03/2023

Salam Air to amend the SOPs regarding the maximum rate of climb/descend while flying in RVSM when close to other traffic.

SR04/2023

Inadequate monitoring and scanning setting of the flight OMS598 TCAS range. Therefore, the OMS598 flight crew was unable to note the conflicting traffic (flight SVA985) at an early stage.

Therefore, OTSB recommends that Salam Air provides suitable training to Salam Air crew best practices in the selection of TCAS range and sessions that addresses the challenges with a focus on improving the performance on monitoring and scanning the TCAS in accordance to the A320 FCOM Manual scenarios in the simulator.

SR05/2023

The occurrence to be shared with all flight crew as a lesson learnt.

SR06/2023

This incident was not reported by Salam Air until requested to do so.

Therefore OTSB, requests Salam Air to comply with CAR-13 in reporting incidents without delay.

7.3.2 Safety recommendations addressed to the Civil Aviation Authority of the Sultanate of Oman

SR07/2023

The MATSOP was outdated and did not reflect the current procedures

Therefore, OTSB recommends that CAA develops a process to update and revise MATSOP-Edition 2.0 effective since 17 of October 2016 - in order to reflect current procedures.

SR08/2023

Latest MUSCAT-JEDDAH LOA was signed by both parties on 6 Oct 2022.On 4 Oct 2022, the Director of Air Traffic Control issued a permanent hand down item HDI/021/20/OPS to all ACC/TWR/MCC controllers addressing Muscat/Jeddah LOA effective 6 Oct 2022.

Therefore, OTSB recommends to CAA revise and update the AIP in order to reflect the permanent issued Hand Down Items and to implement a process to ensure consistency between the ATCO document and the AIP.

SR09/2023

Non-use of a function within the ATC radar to provide an audible warning in case of incorrect level selection by the flight crew in their FMS.

Therefore, OTSB recommends CAA to consider activating the red LB audible warning for conflicting traffic.

SR10/2023

This incident was not reported by Salam Air until requested to do so.

Therefore, OTSB recommends CAA to follow up with Salam Air in complying with CAR-13 in reporting incidents without delay.

SR11/2023

Interactive playback of the Indra Radar was not available.

Therefore, OTSB recommends CAA to assess the possibility of restoring interactive radar playback as an important tool in investigations.

8.Appendices

8.1 Central Position Transcript and Radar Screenshots.
8.2 MATSOP Findings.
8.3 Flight Plans

8.1 Central Position -Transcript & Radar Screenshots & Analysis

Assistant-CWP GG -Central & South FDEO- Line 32

02:16:00 JD: - OMS598

MUSCAT ASST.: -OMS598 go ahead squawk

JD: -0123

MUSCAT ASST: -MIDGU time

02:42:10 MUSCAT assistant receives estimate of SVA985 from Mumbai as follows: SVA985

PARAR 03:00 Level 340

JD: - 03:36

MUSCAT ASST: -what level

JD: -370

MUSCAT ASST: -0336 and stand by for level

JD: -level 370

MUSCAT ASST: -stand by please

MUSCAT ASST: -ok MIDGU 0336 level 370

JD: -shukran شكرا

MUSCAT ASST.: -afwan عفوا

OMS598 (EST of OMS598 was received from Jeddah): OMS598 SQK 0123 MIDGU 03:36 FL370

03:01:30

MUSCAT ASST: - Muscat

JD ASST.: -muscat asalamalaikum السلام عليكم

MUSCAT ASST.: -waalaikum salam وعليكم السلام

JD ASST: -OMS598 level 370

MUSCAT ASST: -level 370

JD ASST.: -yes level 370

(Jeddah calls Muscat informing that OMS598 is coming at FL370)

Bravo Position: -

02:59:34 SVA985: MUSCAT عليكم السلام SVA985 maintaining FL340 approaching position PARAR

02:59:45 BR: Station calling

02:59:46 SVA985: 985 maintaining FL340 approaching PARAR

02:59:52BR: SVA89 eh 985 squawk 4751

02:59:56 SVA985: Confirm squawk SVA985

02:59:59 BR: 4751

03:00:02 SVA: ...751

03:01:10 SVA985 passes south abeam PARAR

03:30:02 BR: SVA985 MUSCAT 124.7

03:30:06 SVA985: 124.7 SVA985

Area Control

Central Radar Position

03:30:20 SVA985: MUSCAT Salam alaykum عليكم السلام SVA987 correction 985 FL340 (flying on

M628)

03:30:26 CR: SVA985 waalykum asalam وعليكم السلام next report LUDID

03:30:30 SVA985: position LUDID 985

03:32:25 OMS598: MUSCAT asalam alaykum عليكم السلام OMS598 FL370 approaching MIGDU

03:32:40 CR: OMS598 reset SQK 6556

03:32:49 OMS598: SQK 6556 OMS598

03:35:09 CR: OMS598 identified maintain FL 370 clear FPL route MUSCAT 26R in use

RDR OBSV.OMS598 approaching position MIDGU

03:35:17 OMS598: maintain 370 and FPL route to MUSCAT RWY26R in use OMS598

03:35:39 RDR OBSV. OMS598 abeam MIGDU maintaining FL370

03:37:32 CR: OMS598 descend FL 310 to be levelled by EGVAN

03:37:40 OMS598: aaaa descend FL……310 say again level by which point

03:37:45 CR: EGVAN

03:37:46 OMS598: point EGVAN OMS598

RDR OBSV.OMS598 flying on Z515

03:37:50 RDR OBSV.SVA985 was over TULBU

03:38:26 RDR OBSV.CR used the RBL tool between SVA985 & OMS598 it indicated 86.8nm min.

sep.1.74nm

03:38:27RDR OBSV.OMS598 MODE S showing level 310

On ambient: -a conversation was heard but couldn't be identified

03:38:38RDR OBSV. yellow LB appeared on OMS598 maintaining FL370 after was given to

descend to FL310

RDR OBSV.The minimum separation distance between OMS598 & SVA598 over point EGVAN is

showing 0.34nm

03:39:42RDR OBSV.CR moving the cursor on the screen.

03:39:52 CR: Nawras OMS598 descend FL350 now

03:40:00

OMS598: descend FL350 now OMS598

RDR OBSV.OMS598 was still maintaining FL370

03:40:00 RDR OBSV.MODE S showing FL310

03:40:02 RDR OBSV. OMS598 maintaining FL370 yellow LB on OMS598 cleared from the screen

03:40:22 RDR OBSV. OMS598 vacating FL370 on descent passing through FL369 rod 400

03:40:58 RDR OBSV.OMS598 descending through FL358, ROD= 2200 abeam KATAK

03:41:38 RDR OBSV.OMS598 reached and maintained FL350

03:41:46 RDR OBSV: - Red LB appeared on the target of OMS598 as there is a mismatch

between the level entered by CR controller (FL350) and the level entered on the OMS598

FMS(FL310)

Ambient: -Conversation heard but couldn't be identified

03:42:20 OMS598: - OMS598 descending FL310

03:42:26 - CR: OMS598 stop or maintain FL 350 now

RDR OBSV.OMS598 still maintaining FL350

03:42:29 RDR OBSV.OMS598 MODE S showing FL310

03:42:32 -OMS598: maintain FL 350 OMS598

03:42:35 - CR: expect lower after crossing traffic

03:42:38 - OMS598: roger OMS598

03:42:39 - OMS598 observed leaving FL350 on descent with a rate of 300ft then 800ft then

1500ft-1400ft-1700ft with a minimum separation of 0.49nm

RDR OBSV. same time OMS598 observed leaving FL350 on descent while reading back roger

03:42:48 KQA311D: MUSCAT radar good morning Kenya 311D passing FL280 climbing level 290

03:42:51 RDR OBSV. yellow STCA was activated between OMS598 descending through FL346,

ROD=1400 and SVA985 maintaining FL340, RBL=18.5nm min sep.0.33

03:42:56 - CR: OMS598 stop maintain stop level 350 maintain FL34….. 350

RDR OBSV. OMS598 was descending through FL345 rate 1700ft and SVA985 maintaining FL340

and min.sep.0.33

03:42:58 RDR OBSV.OMS598 MODE S showing maintaining FL350

03:43:02 RDR OBSV: -Red MC appeared on both targets- OMS598 FL341

03:43:04 RDR OBSV.

03:43:05 - OMS598: We are climbing FL350 OMS598

RDR OBSV.03:43:05-OMS598 descending through FL341, ROD= 1800, RBL =16.5(the climb of

OMS598 was not showing due to the speed rotation of the radar antenna)

03:43:08 - CR: Turn right now heading 1……90

03:43:10 -RDR OBSV.OMS598 started climbing through FL342, ROC=300 then increased to

1200ft

03:43:11 RDR OBSV.OMS598 started to climb (though arrow showing descend but OMS598 has

leftFL341 passing through FL342

03:43:15 - OMS598: right heading 190 OMS598

03:43:15

RDR OBSV. the given heading did not match the heading shown by the CR cursor 123-124)

03:43:21 - KQA311D: MUSCAT KQA311D

RDR OBSV.OMS598 climbing through FL343, ROC=400, RBL=12.42nm min sep.0.19nm

03:43:27 - CR: Stand by

RDR OBSV.SVA985 maintaining FL340, OMS598 on climb through FL343, ROC=400, SEP.0.27

03:43:31 - CR: SVA985 turn right heading 320

03:43:34 - SVA985: TR encounter

RDR OBSV.OMS598 on climb passing through FL344 at a rate of 500ft while SVA985 was still

maintaining FL340

03:43:38 OMS598: TCAS RA OMS598

RDR OBSV.SVA985 left FL340 on descent passing through FL339, ROD= 500, and OMS598 was

climbing through FL345, ROC=900, RBL=8.23 MIN SEP.0.27

03:43:46

RDR OBSV.OMS598 on climb passing through FL347, ROC=1700 & SVA985 on descent passing

through FL337, ROD= 1300, RBL =6.02 min sep.0.34

03:43:47 RDR OBSV. Red MC went on, OMS598 on climb passing through FL347, ROC=1700 &

SVA985 on descent passing through FL337, ROD= 1300, RBL =4.98 min sep.0.38-vertical

separation achieved

03:43:48 RDR OBSV. Red STCA went on, OMS598 on climb passing through FL347, ROC=1700 &

SVA985 on descent passing through FL337, ROD= 1300, RBL =4.98 min sep.0.38-Vertical

separation achieved

03:43:50-RDR OBSV.OMS598 still on climb passing through FL352 rate 3200ft and SVA985 on

descent passing FL337 rate 1200ft with a minimum separation of 4.98nm

03:43:51

OMS598 on climb passing through FL352, ROC=3200 and SVA985 on descent passing through

FL337, ROD= 1200, RBL =4.06 min sep.0.44

03:43:55 SVA985: MUSCAT SVA985

03:43:56 RDR OBSV. red STCA cleared from the screen OMS598 started turning to the right

03:43:59 - CR: SVA985 go ahead

RDR OBSV.OMS598 was observed turning right

03:44:01 SVA985: we`re in TR encounter with the traffic

03:44:05 CR: roger report when clear

03:44:08 SVA985: we`re clear

03:44:12 SVA985: aaaaaa advise kind of traffic please SVA985

03:44:28 CR: OMS598 A320

03:44:28 RDR OBSV.OMS598 MODE S showing FL350

03:44:34 - OMS598: OMS598 clear of traffic (controller did not acknowledge)

03:45:10 OMS598: OMS598 confirm descend 350

RDR OBSV.OMS598 busted FL350 maintaining FL356

03:45:15 CR: OMS598 resume own navigation direct LAKLU descend FL160

03:45:21 OMS598: own navigation direct LAKLU to descend FL160 OMS598

03:46:10 CR: OMS598 MUSCAT

03:46:12 OMS598: go ahead

03:46:14 CR: was previously given level 350 to maintain level 350 any reason you descend

level 340

RDR OBSV.OMS598 still on a heading to the south

03:46:15RDR OBSV.OMS598 maintaining FL350

03:46:22 OMS598: aaaa initially we were cleared descend FL310 maintain by GIVNO and then

further we were cleared descend now 350 so we assumed level 310 still applied

03:46:38 CR: -and I gave you to stop level 350 I gave you another clearance to stop level 350

03:46:47 OMS598: -aaaa roger now I read back I think descend now 350 so miss communication

happened

03:46:58 CR: roger and you are not monitoring your screen your radar

03:47:03 OMS598: yes, I was monitoring and then we received TA we started that climb before

the second radio call but the aircraft took some time to transition from the descend to climb

RDR OBSV.OMS598 observed on a southerly heading crossing other airways

03:47:18 - CR: Roger

03:48:50 CR: -SVA985 contact UAE control 12825 مع السلامة massallama

03:48:56 SVA985: -12825 SVA985

03:53:40 CR: -OMS598 contact radar 12.12 مع السلامة massallama (wrong frequency)

03:53:47 OMS598: -aaaaaaa121.2 OMS 598 مع السلامة massallama

8.2 MATSOP Findings

The MATSOP is outdated and does not reflect the current procedures as per the following: -

- Section (1.1.1) West Sector was mentioned instead of Central Sector.
- Section (1.1.3) Central Sector map of the controlled area is not updated including new fix/reporting points and new or removed airways as per the following: -
  - The missing fix/reporting points are: MIDGU, MEMTO, ITKUN, GOGMI, DOLFI, EMISO, KUNRA, BOTAM, ELIVA, IVAKU, LOPIL, DESPI, KOBIM, KUNGO, GENIR, KATAK.
  - New airway for descending traffic into UAE Southern airports is: (TULBU - KUNGO - DOLFI –SODEX.
  - New airway for traffic departing Muscat International Airport to land at or overfly UAE South exiting Muscat airspace VIA ITRAX.
  - The route (TARDI - L223 - LAKLU) no longer exists.
  - The route (TOKRA – L306 – LAKLU) no longer exists.
- As for the Central Sector map, due to the changes to the area of responsibility of Central Sector, the transfer points of controlled aircraft to Middle sector have changed.
- The transfer of reporting points with contiguous ATSU (UAE Control) have also changed (i.e. MEMTO to be added including the new routes and fix points).
- The required crossing flight level at ITRAX and SODEX for descending traffic currently is (F180 or below)
- New UAE ACC Unites (Yankee / Romeo) are not mentioned.

- The new entry reporting point (MIDGO) with contiguous ATSU (Jeddah Control) need to be included and the new routes associated with this point.
- The reporting point (TOKRA) with contiguous ATSU (Jeddah Control) is no longer with Central Sector (now with Middle Sector).
- The Central Sector boundary map need to be updated.
- Section (2.1.2) in MATSOP, East Sector to be replaced with Alfa/Bravo Sector.
- Section (2.1.3, 2.1.4 and 2.1.5) South Controller/South Planner to be replaced by Middle
- Controller/Middle Planner.
- Section (2.2.2, 2.2.3 and 2.2.4) South Controller/South Planner to be replaced by Middle
- Controller/Middle Planner.
- Section (2.4.2) descending traffic to MUSAP, the correct level is F250 or below (instead
- of F270)
- Section (2.5) Sohar Airport procedure for inbound and outbound traffic within Central
- Sector need to be updated.
- Section (4.2.2) point EGTAL to be replaced with DENDA as reporting point with Tehran
- ACC
- Section (4.3.1) the sectors (East and South) need to be replaced by sectors (Bravo and
- Middle).
- Section (4.3.2) in MATSOP, the correction is that the Central Controller can climb departing traffic from UAE Southbound up to F290 or lower (instead of F320) without coordination with Middle controller.
- Section (4.3.2) in MATSOP, the correction is that the Central Controller can climb departing traffic from UAE Southbound up to F290 or lower (instead of F320) without coordination with Middle controller.

8.3 Flight Plans

03-07-22 20:41:19 lat.

CMA3844 032041

FF OOMMZQZX

032041 HSSSZPZX

(FPL-OMS598-IS

-A320/M-SDFGHIRWY/B1L

-HSSK2310

-N0463F350 DCT PASIL UM562 PSD/N0459F370 UM562 MIPOL G660 JDW T532 BOXEB Q216 TUKVU Y214 KUTNA M440 MIDGU Z515 PUTSO N685 LAKLU G216 MCT DCT

-OOMS0401 OMFJ OOSH

-PBN/A1B1C1D1L1O1S2T1 DOF/220703 EET/OEJD0107 OOMM0326 SEL/HSAE OPR/SACAM AIR PER/C RALT/OMAL RMK/TCAS

-E/0510 P/TBN R/UVE S/PDMJ J/LFUV D/04 149 GREEN A/WHITE GREEN N/PAX FLT C/MOHANED)

03-07-22 21:00:18 lat.

CMA3903 032100

FF OOMMZQZX

032100 HSSSZPZX

(CHG-OMS598-HSSK2310-OOMS-DOF/220703

-18/PBN/A1B1C1D1L1O1S2T1 DOF/220703 REG/A4OOVH EET/OEJD0107 OOMM0326

SEL/HSAE OPR/SACAM AIR PER/C RALT/OMAL RMK/TCAS)

03-07-22 19:08:36 lat.

CMA3523 031908

FF OOMMZQZX

031908 EDDFSVAX

(FPL-SVA985-IS

-B77L/H-SDE2E3FGHIJ1J4J5LM1ORVWXYZ/LB1D1

-VOHS0030

-N0503F340 DCT HIA W28 GGB Z5 BEKUT/M084F340 N571 SUGID/M084F360 N571 PARAR/N0499F360 M628 AMBAG M321 KIA DCT

-OERK0359 OEDF

-PBN/A1B1C1D1L1O1S1 NAV/RNP2 COM/CPDLC DAT/1FANSP2PDC DOF/220704 REG/HZAK73 EET/VABF0021 OOMM0152 OMAE0242 OEJD0251 SEL/PSFM OPR/SVA PER/D RMK/TCAS