AAIS Case Reference: 06/2013

AIR ACCIDENT INVESTIGATION SECTOR

PRELIMINARY

SERIOUS INCIDENT INVESTIGATION REPORT

LOSS OF SEPARATION

UAEAF BAE Hawk
Emirates Airlines Boeing 777
AIRPROX Category A – Risk of Collision
12th February 2013

General Civil Aviation Authority
of
United Arab Emirates

Serious Incident Brief:

GCAA AAI Report No.:	06/2013
Operator:	1. UAEAF
	2. Emirates Airlines
Aircraft Type and Registration:	1. BAE Hawk
	2. Boeing B777-300 A6-EBD
Date and Time (UTC):	12th February, 2013, 07:37:16 UTC
Place of Occurrence:	Inside Dubai Control Zone (CTR) near Dubai International Airport [OMDB] runway 12R
Class of Airspace:	Class D
Type of Flight:	1. Military special mission exercise
	2. Scheduled Passenger Transport (OMDB to LTBA)
Persons on Board:	1. UAEAF Crew
	2. Total 431 persons (3 flight crewmembers, 14 cabin crew and 414 passengers)
Injuries:	None
Nature of Damage:	No known damage to either Aircraft

The General Civil Aviation Authority (GCAA) was notified of the serious incident on 12th February 2013 and initiated the investigation.

The United Arab Emirates (UAE) Air Accident Investigation Sector (AAIS) of the GCAA is leading the investigation and will issue the Final Report.

As the other party involved in this AIRPROX is from the Military, the UAEAF will also conduct an internal investigation separate to the GCAA AAIS.

Notes:

1. All times in this Report are Coordinated Universal Time (UTC)
2. The word "Aircraft" in this Report refers to both aircraft involved in the serious incident
3. The word "Team" in this Report refers to the Investigation Team

OBJECTIVE

This Investigation is performed in accordance with the UAE Federal Act No 20 of 1991, promulgating the Civil Aviation Law, Chapter VII, Aircraft Accidents, Article 48, CAR Part III Chapter 3 and in conformity with Annex 13 to the Convention on International Civil Aviation.

The sole objective of this Investigation is to prevent aircraft accidents and incidents by identifying and reducing safety-related risk. It is not the purpose of this activity to apportion blame or liability.

The information contained in this Preliminary Report is derived from the factual information gathered during the ongoing Investigation of the occurrence. Later interim reports or the Final Report may contain altered information in case that new evidence appears during the ongoing Investigation that requires changes to the information depicted in this Report.

Any specific safety issues identified during the course of this Investigation will be advised to all parties through the GCAA Safety Recommendations (SR) procedure.

Reports are publicly available from:

http://www.gcaa.gov.ae/en/epublication/pages/investigationreport.aspx

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ABBREVIATIONS

AAIS	UAE GCAA Air Accident Investigation Sector
ACAS	Airborne Collision Avoidance System
AGL	Above Ground Level
ASR	Air Safety Report
ATC	Air Traffic Control
CAR	UAE Civil Aviation Regulation
CAS	Computed Air Speed
CAPT	Captain
CTA	Control Area
CTR	Control Zone
CVR	Cockpit Voice Recorder
DFDR	Digital Flight Data Recorder
DWC	Dubai World Central
FDR	Flight Data Recorder
FIR	Flight Information Region
FL	Flight Level
FO	First Officer
FPL	Flight Plan
PM	Pilot Monitoring
Ft	Feet
GCAA	UAE General Civil Aviation Authority
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
L	Left
LTBA	Istanbul Atatürk Airport
OMDB	Dubai International Airport
OMDM	Al Minhad Air Base
OMDW	Al Maktoum International Airport
No.	Number
NM	Nautical Miles
PF	Pilot Flying
PM	Pilot Monitoring
QAR	Quick Access Recorder
R	Right
RA	Resolution Advisory
RWY	Runway
TA	Traffic Advisory
TCAS	Traffic Alert and Collision Avoidance System
UAE	United Arab Emirates
UAEAF	United Arab Emirates Air Force
UTC	Co-ordinated Universal Time
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

ADREP Occurrence Category [1]

Primary:

MAC: Airprox/ ACAS alert/ loss of separation/ (near) midair collisions - Airprox, ACAS alerts, loss of separation as well as near collisions or collisions between aircraft in flight.

Secondary:

LALT: Low altitude operations - Collision or near collision with obstacles/objects/terrain while intentionally operating near the surface (excludes takeoff or landing phases).

[1] The ADREP Occurrence category taxonomy is a set of terms used by ICAO to categorize aircraft accidents and incidents and allow safety trend analysis on these categories. The ADREP Occurrence category taxonomy is part of the ICAO accident reporting system (ADREP).

SYNOPSIS

On 12th February 2013, at 07:37:16 UTC[2], a UAEAF BAE Hawk approaching Dubai International Airport at low level and high speed requested to transit the aerodrome's control zone on a heading of approximately 300°, at a reflex angle to the to the runway 12L vector centerline approaching from the south.

The Hawk was observed on radar on several occasions causing an airspace infringement while transiting through the airspace control areas [CTA] and Control Zones [CTR[3]] surrounding Dubai Emirate prior to entering the OMDB CTR.

For reasons which are under investigation, the BAE Hawk was transmitting on a different frequency than required to communicate with the Dubai air traffic controllers responsible for the sector the aircraft requested to transit through.

The BAE Hawk was observed on radar transiting through the CTR's.

Dubai Air Traffic Control (ATC) was subsequently not in communication with the Hawk and had not been advised of the flight planned tasking although the aircraft was observed on radar and the transponder[4] was squawking in mode C.

Immediately prior to Dubai Tower being informed that the BAE Hawk was operating in the Dubai CTR, the Dubai aerodrome controllers had cleared a Boeing 777 to take off on the active runway. The civil aircraft was airborne and accelerating to a safe climb speed when the civil aircraft climb profile and the BAE Hawk interception angle coincided causing a Breakdown of Separation (BOS) to occur[5]

The Hawk performed a rapid evasive maneuver to avoid crossing the runway centerline and intersecting the civil aircraft's climb profile.

The Hawk was airborne for 37 minutes prior to the event and had been observed on radar entering and exiting various control zones in close proximity to the Dubai and Al Maktoum control zones.

The Boeing 777 continued on to the scheduled destination. The BAE Hawk returned to OMDM.

A Category 'A' AIRPROX/ loss of separation serious incident was notified to the GCAA following the occurrence.

[2] All times are UTC.

[3] A control zone (CTR) in aviation is a volume of controlled airspace, normally around an airport, which extends from the surface to a specified upper limit

[4] A transponder]) is an electronic device that produces a response when it receives a radio-frequency interrogation

[5] A failure to establish or maintain the specified separation standard between aircraft which are being provided with an air traffic service.

1 FACTUAL INFORMATION

1.1 History of the Flight

A United Arab Emirates Air Force BAE Hawk [military fast jet] had earlier taken off from the adjacent military Al Minhad Air Base at approximately 07:00 and was in radio contact with Dubai Approach Control Unit (Minhad Radar Sector) located at Al Maktoum International Airport [OMDW].

A scheduled departure of a B777 passenger aircraft bound for Istanbul was cleared for takeoff from RWY 12R by Dubai Tower Air South at approximately 07:35. At approximately the same time the, the UAEAF BAE Hawk was approximately 12nm from RWY 12R on an interception heading across the Dubai airport RWY 12R centerline travelling at 360kts [185 meters per second], at approximately 500 feet AGL,

As the initial investigation indicates that the flight plan of the Hawk aircraft was not coordinated with Dubai Approach Control Unit at Al Maktoum International Airport [OMDW], contact was made with Al Minhad Air Base ATC [OMDM], requesting the routing of the Hawk. At this point and during the time that the BAE Hawk was operating through OMDW and OMDB airspace several radar contacts had been confirmed as the BAE Hawk transponder was squawking in Mode C.

The airspace that the Hawk aircraft was operating in prior to the loss of separation/AIRPROX[6] is Class D where the requirement is for all aircraft to have continuous two way radio communication with the relevant ATC units.

At 07:36, seven seconds after the B777 was given clearance to commence take off, and one minute sixteen seconds before the AIRPROX, the BAE Hawk was flying towards OMDB airport from a location near OMDW at 360kts, the crew contacted the Minhad Radar controller requesting clearance to climb to 2000ft to transit OMDB.

This request was denied by the controller and the fast jet crew was advised to contact Dubai Tower Air North, in control of OMDB RWY 12L, on frequency 118.75 Mhz to get clearance to overfly the Dubai aerodrome. The time was 07:36. The BAE Hawk attempted to contact Dubai Tower Air North at 07:37:05 11 secs before the AIRPROX.

The Minhad Radar controller informed the BAE Hawk to contact Dubai Tower immediately on 118.75 Mhz. The data indicates that OMDB TWR – frequency 118.75 – Air North was in control of OMDB RWY 12L arrivals. OMDB TWR – frequency 119.5 – Air South- was in control of departures on RWY 12R and the B777.

At 07:36, the B777 had commenced its take off roll on RWY 12R and was airborne at 07:37 with a ground speed of 185kts.

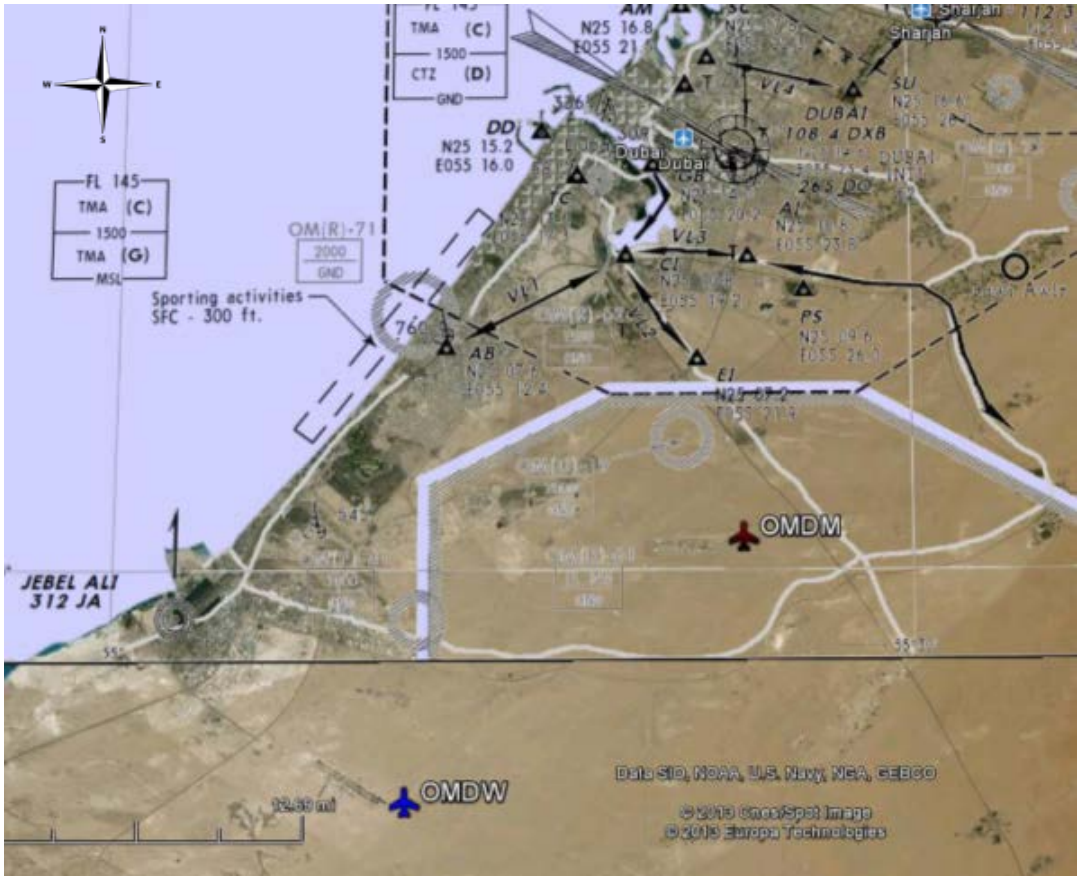
Due to a concern of the two aircraft losing separation Dubai Tower Air South informed the crew of the B777 just after rotation of the fast moving traffic at two miles, tracking north at 500 ft. At this stage of the B777 initial climb, it was not possible to take any avoidance action.

At 07:37:16, the BAE Hawk performed a rapid avoiding maneuver/hard turn to the left when the loss of separation between the two aircraft was recognized.

The B777 crew reported observing a Traffic Alert and Collision Avoidance System [TCAS] Traffic Advisory [TA] on the Navigation Display [ND], The B777 crew was unable to locate the other traffic visually.

[6] An AIRPROX is a situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised. (ICAO Doc 4444: PANS-ATM).

Following the BAE Hawk avoidance maneuver, the aircraft was tracked heading in a southerly direction towards OMDM. Communication with Dubai Tower Air North was established and the pilot was instructed to verify the aircraft's intentions. The crew advised the aircraft would return to OMDM.



Overview map 1 - Dubai Controlled Airspace

The Hawk flew through OMDW CTR at 07:34:17 at an estimated 360 kts and at 500ft AGL heading due north. The AIRPROX occurred at 07:37:16 in close proximity to the departures runway in use at OMDB.

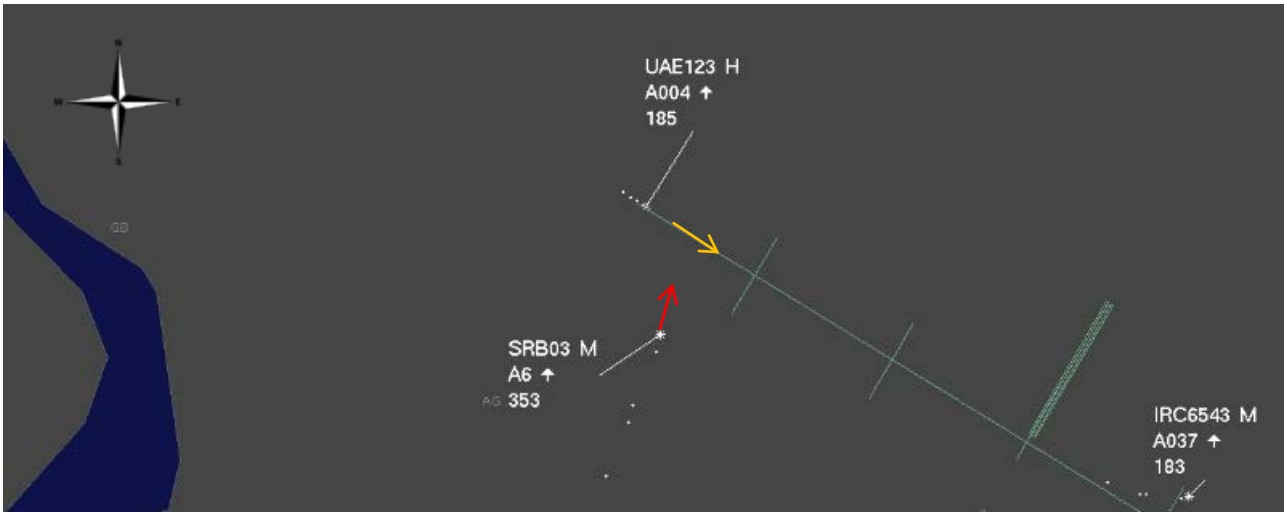


Figure 2 - Hawk Approach to RWY 12L

Figure 1 above and Figure 2 below are radar display snapshots of the Hawk traveling north. Immediately prior the Hawk's evasive manoeuvre, the ground speed is 353kts.

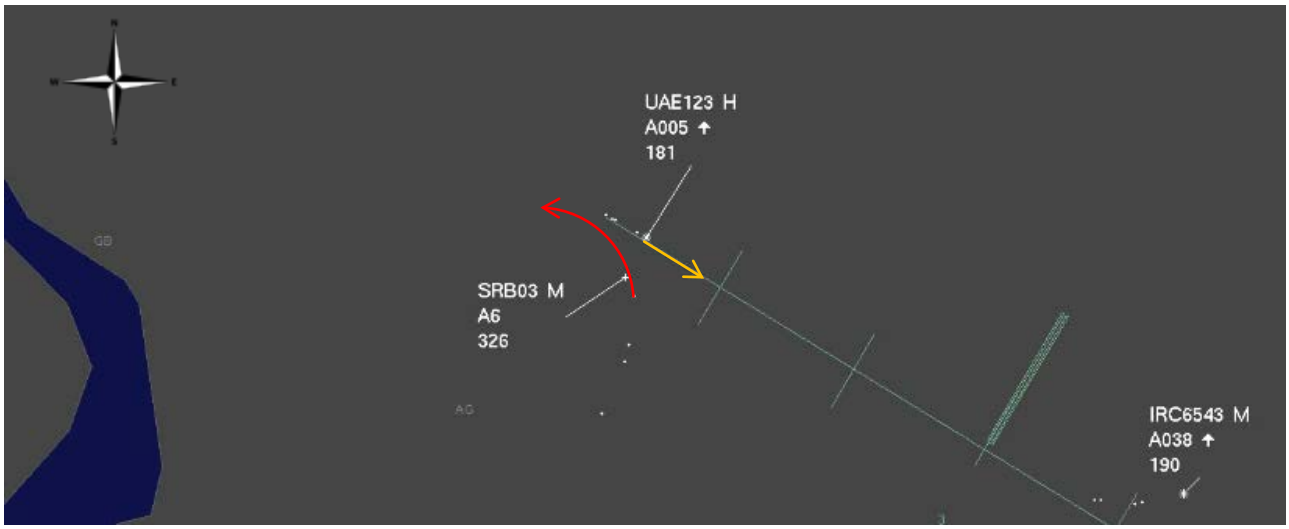


Figure 3 - Hawk Evasive Manoeuvre

i The yellow arrow indicates the direction of travel of the Boeing 777
ii The red arrow indicates the direction of travel of the BAE Hawk
iii The plan projection is a radar screen shot of the OMDB RWY 12L vicinity to the south and west of the aerodrome
iv No scale is included, however the linear horizontal distance between the two aircraft in Fig above is 0.3 nm, or 1822 ft.

Timeframe from 07:37:16 is as follows:

› Time 07:37:16
› UAE123 rotated from RWY 12R with GS of 188kts and is climbing through 500ft AGL.
› The BAE Hawk had 0.3nm (1822 ft) horizontal separation from UAE123
› Vertical separation is estimated at 100 feet
› The Hawk performed a left hand turn, climbing 100 ft before the aircraft was observed to track due south from RWY12R towards OMDM.
› The closure speed was approximately 595 ft/s with a minimum lateral separation distance of 0.3 nm/1822 ft.

Based on the data, when the Hawk maneuvers to the left of UAE123, the Hawk was less that 3.5 seconds from intercepting the climb profile of UAE123, the departing traffic on RWY12L.

1.2 Injuries to Persons

Injuries	Flight Crew	Cabin Crew	Other Flight Crew Onboard	Passengers	Total Onboard	Others
Fatal	0	0	0	0	0	0
Serious	0	0	0	0	0	0
Minor	0	0	0	0	0	0
None	3	14	0	414	431	1
TOTAL	3	14	0	414	431	1(UAEAF)

1.3 Damage to Aircraft

There was no damage to the aircraft.

1.4 Other Damage

None.

1.5 Personnel Information

1.5.1 The UAEAF information will be coordinated with the Flight Safety Department of the UAEAF

1.5.2 The B777 flight crew licences were valid for the aircraft type.

1.5.3 The Captain was the PF with the FO as the pilot monitoring. Also in the cockpit was a Standard Audit Captain, seated on the observer's seat. Other members of the crew consisted of 14 cabin crew.

1.6 Aircraft Information

Note: The aircraft pictures are not to scale

1.6.1 **UAEAF BAE Hawk 102**

A two-seat advanced jet trainer

BAE Hawk

1.6.2 **Boeing 777**

Boeing 777

Manufacturer :	Boeing
Type :	B777-300ER
Registration :	A6-EBD
MSN :	33501
Engine Manufacturer and Model General Electric	GE90-115B
C of A Date Expiry :	15th May 2013
C of R Date of Issue :	16th May 2005 (Transport Passenger)

1.6.3 **B777 TCAS equipment information**

1.6.3.1 The B777 involved was fitted with TCAS version 7.1. The data from the computer memory was successfully retrieved.

1.6.3.2 The recorded data from the Honeywell TCAS unit confirmed the TA noted by the flight crew's ASR.

There was no TCAS Resolution Advisory for this event as the aircraft was below the normal operating height for the TCAS[7]

1.7 Meteorological Information

The weather forecast for both airports, OMDW and OMDB, during the event was CAVOK .

METAR/SPECI from OMDB, Dubai International Airport (United Arab Emirates).
12/02/2013 08:00-> METAR OMDB 120800Z 15009KT 130V190 CAVOK 27/13 Q1014 NOSIG=
12/02/2013 07:00-> METAR OMDB 120700Z 15010KT CAVOK 26/14 Q1015 NOSIG=

METAR/SPECI from OMDW, Al Maktoum International Airport (United Arab Emirates).
12/02/2013 08:00-> METAR OMDW 120800Z 17012KT CAVOK 27/13 Q1015 NOSIG=
12/02/2013 07:00-> METAR OMDW 120700Z 18013KT 8000 NSC 25/15 Q1016 NOSIG=

1.8 Aids to Navigation

Not applicable to the investigation.

1.9 Communications

1.9.1 – Controlled Airspace around the Dubai [OMBD] area.

Several CTR's are conjoined in the areas surrounding Dubai. They are adjacent. OMDW to the south and OMDB to the north with OMDM, controlling the military airspace between the two CTR's, offset to the east.

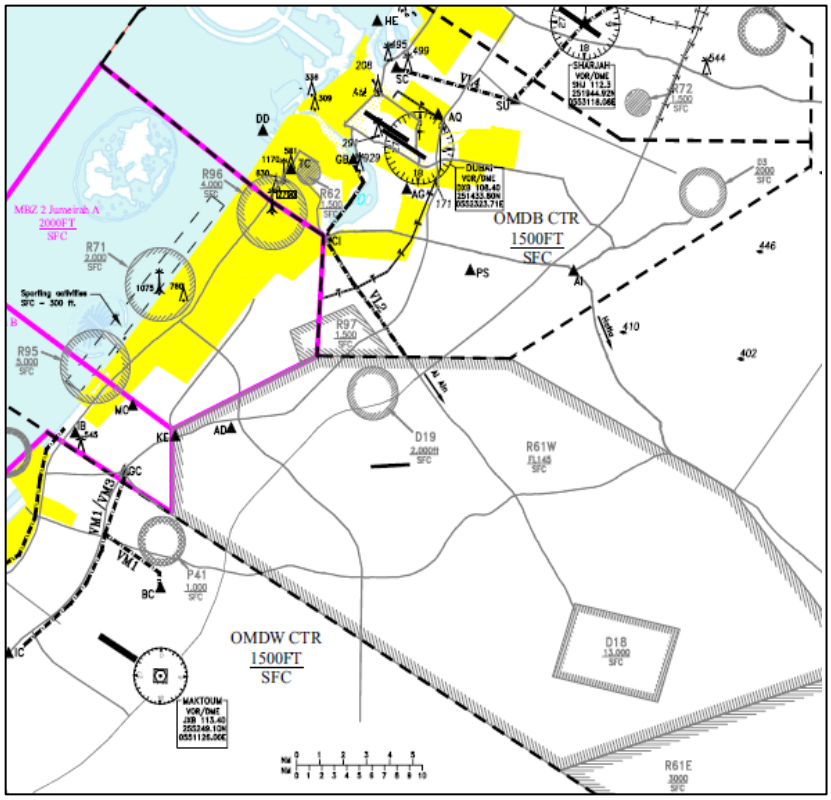


Figure 4 - OMDB Controlled Airspace

[7] The mode S transponder is fully operational and the TCAS will operate normally and issue the appropriate interrogations and perform all tracking functions. TCAS will issue traffic advisories only (TA) below approximately 1000ft AGL to avoid spurious warnings and possible flight deck confusion at critical flight phases.

1.9.2 ATC Units Involved:

- Dubai Approach Control - Minhad Radar sector (civil)
- Minhad Air Base Tower (military)
- Combined UAE Military Control [Al Nahyan/Air Defence Operation Centre]
- OMDB ATC Tower – Air North and Air South
- OMDW ATC Tower (civil)

1.10 Aerodrome Information

Not applicable

1.11 Flight Recorders

1.11.1. Quick Access Recorder data was retrieved for the flight.

1.11.2. The CVR and the DFDR from the B777 was not requested

1.12 Wreckage and Impact Information

Not Applicable

1.13 Medical and Pathological Information

Not applicable

1.14 Fire

No fire was reported for the event.

1.15 Survival Aspects

Not applicable

1.16 Tests and Research

Not applicable

1.17 Organizational and Management Information

Global Aerospace Logistics [GAL], the military ATC provider at OMDM and all other concerned civil ATC units have been requested to verify the coordination and flight planning processes for military traffic on special operations and confirm the handling and management of unidentified traffic coordination procedures.

1.18 Additional Information

1.18.1 Loss of Separation/AIRPROX

An AIRPROX is a situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised. (ICAO Doc 4444: PANS-ATM).

The available AIRPROX classification categories are:

- **A** - **Risk of collision.** The risk classification of an aircraft proximity in which serious risk of collision has existed. An **A** AIRPROX may or may not be deemed to be a Serious Incident as defined by ICAO Annex 13.
- **B** - **Safety not assured.** The risk classification of an aircraft proximity in which the safety of the aircraft may have been compromised.
- **C** - **No risk of collision.** The risk classification of an aircraft proximity in which no risk of collision has existed.
- **D** - **Risk not determined.** The risk classification of an aircraft proximity in which insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination.

1.18.2 Air Safety Report

The B777 crew filled an Air Safety Report [ASR] for the event indicating the TCAS distance between the aircraft had reduced to 100 feet vertical and 200 meters lateral based on the TA warning information.

1.18.3 UAE Airspace Classification

Control Zones in the UAE is classified as Airspace Class D which ICAO Annex 11 defines as:

> Class D: IFR and VFR flights are permitted and all flights are provided with air traffic control service, IFR flights are separated from other IFR flights and receive traffic information in respect of VFR flights, VFR flights receive traffic information in respect of all other flights.

1.18.4 Independent UAEAF Investigation

The UAE Air Force Safety Team are conducting a parallel safety investigation

1.18.5 ATC Separation

The BAE Hawk (VFR) and UAE123 (IFR) were not required to be separated but ATC had limited time to pass traffic information in a timely manner as required in Class D airspace.

1.18.6 Airspace Classification Chart.

Refer to GCAA eAIP effective for April 2013 for further information.

ENR 1.4 ATS AIRSPACE CLASSIFICATION

1.4.1 Airspace classes used in the EMIRATES FIR are illustrated below.

Note: The lower level of airways vary and is not necessarily the 4500 FT or 2500 FT as illustrated.

ENR 1.4 AIRSPACE CLASSIFICATIONS								
Class	Type of Flight	Separation provided	Service Provided	VMC visibility and distance from cloud minima	Speed limitation	Radio communications required	ATC clearance	Used in the UAE
A	IFR only	All aircraft	Air traffic control service	Not applicable	Not applicable	Continuous two - way	Yes	Yes
B	IFR	All aircraft	Air traffic control service	Not applicable	Not applicable	Continuous two - way	Yes	No
	VFR	All aircraft	Air traffic control service	8 KM at and above 3050 M (10000 FT) AMSL 5 KM below 3050 M (10000 FT) AMSL Clear of cloud	Not applicable	Continuous two - way	Yes	No
C	IFR	IFR from IFR IFR from VFR	Air traffic control service	Not applicable	Not applicable	Continuous two - way	Yes	Yes
	VFR	VFR from IFR	1) Air traffic control service for separation from IFR 2) VFR / VFR traffic information (and traffic avoidance on request)	8 KM at and above 3050 M (10000 FT) AMSL 5 KM below 3050 M (10000 FT) AMSL 1500 M horizontal: 300 M vertical distance from cloud	250 KT IAS below 3050 M (10000 FT) AMSL	Continuous two - way	Yes	Yes
D	IFR	IFR from IFR	Air traffic control service including traffic information about VFR flights (and traffic avoidance advice on request)	Not applicable	250 KT IAS below 3050 M (10000 FT) AMSL	Continuous two - way	Yes	Yes
	VFR	NIL	IFR / VFR and VFR / VFR traffic information (and traffic avoidance advice on request)	8 KM at and above 3050 M (10000 FT) AMSL 5KM below 3050 M (10000 FT) AMSL 1500 M horizontal: 300 M vertical distance from cloud	250 KT IAS below 3050 M (10000 FT) AMSL	Continuous two - way	Yes	Yes

ONGOING INVESTIGATION

The GCAA AAIS will provide updates on the investigation in line with the recommendations of ICAO Annex 13.

If no cause has been identified within 12 months of this accident, an Interim Accident Report will be published to update on the progress of the investigation.

Any specific safety issues identified during the course of the investigation will be advised to all parties through the GCAA Safety Recommendations (SR) procedures.

Upon completion of the factual data collection, analysis, determination of the findings, causes and contributing factors associated with the investigation's conclusions, the Air Accident Investigation Sector will determine which safety recommendations are required. These will be detailed in the Final Investigation report which will be published.