



**General Civil Aviation Authority**  
**Air Accident Investigation Department**  
**Abu Dhabi, UAE**  
**02/2010**

**FINAL REPORT**

**On**

**AIRCRAFT INCIDENT INVESTIGATION**

Ground Collision During Parking

of the

National Air Services  
Gulfstream GIV-X (G450), Registration N452NS  
Dubai International Airport,  
United Arab Emirates

Feb. 28<sup>th</sup>, 2010



## **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, and in conformity with ICAO Annex 13 to the Chicago Convention.*

*The sole objective of this investigation is to prevent aircraft accidents and incidents. It is not the purpose of this activity to apportion blame or liability.*

*As per paragraph 6.1 in Annex 13, the format of this report is adapted from the Final Report Format as laid down in the Appendix to Annex 13, certain subheadings in the Factual Information heading were skipped since they are either not investigated or not been considered as contributing factors.*

## FACTUAL INFORMATION

### HISTORY OF THE FLIGHT

On Feb. 28<sup>th</sup>, 2010, and during its way to park at Bay E43 at Dubai International Airport entering from taxiway P, the lift hand winglet of a Gulfstream G450 Aircraft, registration mark N452NS collided with the right hand winglet of a parking Gulfstream G200 (Galaxy) aircraft.

The marshaller directed the Pilot-In-Command (PIC) to enter straight ahead and to the left of the centreline. On its way to the parking point, the Aircraft should pass between two parking aircraft, Challenger 604 located to its right side and a Galaxy to the left. The Aircraft was taxiing under the direction signals of the marshaller who was communicating with a wing walker positioning beneath the Aircraft left winglet. The position of the marshaller was initially straight ahead of the cockpit until the Aircraft approached the parking aircraft.

The Aircraft passed the Challenger 604 normally. The thump up signal of the left hand wing walker was accompanying the Aircraft movement until the moment when the left hand wing walker replaced his thump up signal by a right hand turn signal indicating to the marshaller that the Aircraft need to turn rapidly to the right in order to avoid touching the Galaxy aircraft. The marshaller conveyed that message to the cockpit while he was moving towards his left, directing the Aircraft to right hand turn.

The Aircraft started turning until its winglet became at 2 to 3 meters away from the winglet of the parking aircraft, at that moment the wing walker raised a stop signal to the marshaller who conveyed it to the cockpit, the crew didn't notice that signal and the Aircraft continued its slow motion until the crew felt a shuddering noise where the PIC applied the brakes to stop the Aircraft immediately.

### INJURIES TO PERSONS

Injuries	Crew	Passengers	Total in Aircraft	Others
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	0	0	0	0
None	2	0	2	0
<b>TOTAL</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>

### DAMAGE TO AIRCRAFT

The left winglet leading edge assembly surface sustained minor scratches and gouge along outboard side.



## **OTHER DAMAGE**

The trailing edge of right hand winglet of the parking galaxy torn out at the mid span area of around 50 cm in length.

## **PERSONNEL INFORMATION**

### Pilot in Command

Date of Birth: Jan 1<sup>st</sup>, 1963.

License Type: Airline Transport Pilot, Airplane Multiengine Land.

License No.: 3230044

Last issue Date: May 22<sup>nd</sup> 2009.

Medical certificate: issued on Oct. 7<sup>th</sup> 2009.

### First Officer

Date of Birth: Oct. 29<sup>th</sup> 1950.

License Type: Airline Transport Pilot, Airplane Multiengine Land.

License No.: 2636704

Last issue Date: March 2<sup>nd</sup> 2008.

Medical certificate: issued on Feb. 17<sup>th</sup> 2010.

### Marshaller

The marshaller joined Dubai Airports approximately 17 months before the Incident date. He got 3 months training including hand marshalling and non-standard aircraft parking. The last training was completed in November 2009 for the airside operations including marshalling.

### Wing Walker

The wing walker joined Dubai Airports on November 25<sup>th</sup> 2007. He got 3 months training for marshalling followed by 3-months work with a senior marshaller. He completed his last training in November 2009 in airside operations including marshalling.

## **AIRCRAFT INFORMATION**

Manufacturer: Gulfstream Aerospace

Type: GIV-X (G450)

MSN: 4094



Registration: N452NS  
State of Reg.: The United States of America  
C of A Date of Issue: August 15<sup>th</sup>, 2007  
C of R Date of Issue: December 12<sup>th</sup>, 2007

The Aircraft was leased by Wilmington Trust Company to NAS under a lease agreement that was accepted by the General Authority of Civil Aviation of Saudi Arabia on April 30<sup>th</sup>, 2008.

### **AERODROME INFORMATION**

Dubai International Airport has a mix of 144 aircraft parking stands and associated facilities in line with the airline operations at the airport. The airfield consists of a number of parking aprons offering contact and remote stands: The Bravo (B) apron is to the south and east of Concourse 1 and 2 and consists of stands B1-B27. The Foxtrot (F) apron is to the north and west of Concourse 1 and 2 and consists of stands F1-F14 and F16- 27. The Golf (G) apron is to the west of the main concourse facilities and consists of G1–G8. The Charlie (C) Apron is located to the west of the airfield and stands are numbered C1-C40. The Echo (E) apron, serving Terminal 2, cargo operators, general aviation and Emirates flying school, contains stands E1-E43.

### **ORGANIZATIONAL AND MANAGEMENT INFORMATION**

#### **Aircraft Operator**

National Air Services who is authorised to conduct operations under NAS or NetJests Middle East is based in Jeddah, the Kingdom of Saudi Arabia and certificated pursuant to 14 code of Presidency of Civil Aviation/Federal Regulations (CFR) Section 119.21 (a)(5). Air Operator Certificate (AOC) Number 004 was issued by the General Authority of Civil Aviation to NAS on December 31<sup>st</sup>, 2009 with expiry date on December 31<sup>st</sup>, 2014 which authorises NAS to conduct On-Demand operations in Common Carriage.

#### **Aerodrome Operator**

Airside operations including apron management at Dubai International Airport is the responsibility of Airside Operations in Dubai Airports. Aircraft stands are allocated by the Stands Allocation Officer.

All stands are provided with Visual Docking Guidance System (VDGS) which are operated by Airside Operations in accordance with the technical manual and Stand Management procedure. Marshalling is usually provided by Airside Operations in the event of VDGS failure, Low Visibility Operations and use of multi centreline stands.

In the event that a marshaller is required (e.g. VDGS failure or Non standard parking where permitted), the stand allocator shall ensure that the marshaller is aware via trunk radio informing them of aircraft type and parking location.

The Non-Standard parking is not defined in the operating procedures of Dubai International Airports, therefore there were no clear criteria of the pertinent conditions that cause the parking to be Non-Standard and what are the limitations in such parking.

In Section 4 of the Dubai Airports Marshalls Training document (Chapter 6, edition January 2009) "Preparation for the Manoeuvres", it is stated that:



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*“Did you know that it is good practice to always ensure that you arrive at the allocated parking area in plenty of time to assess the prevailing conditions before the arrival of the aircraft? Carrying out a rushed job is unsafe and might even lead to an accident!*

*Factors to be aware of include:*

- *That there is sufficient space to carry out the intended manoeuvre- consider the current weather conditions, hail stones, rain, wind direction, etc;*
- *Assistance from a second or third marshaller may be necessary, and it is important to ensure that eye contact is maintained at all times with the lead marshaller;*
- *That the pilot will be able to see you (the lead marshaller), at all times;*
- *That there is adequate wingtip clearance between parked aircraft or with other objects, such as floodlight columns, parked vehicles, etc. This should not be less than 20% of wing span when self manoeuvring or 4.5m for nose-in push back stands for all aircraft types;”*

In section 5 “Good Practices”, it is stated that:

*“Safety is the most important aspect whilst marshalling an aircraft. Always decide beforehand how you intend to marshal the aircraft. The pilot is more likely to ignore you and park the aircraft in the wrong position if you are hesitant and show signs of uncertainty with your signals.*

- *If you are unsure in any way about the intended manoeuvre - DO NOT CARRY IT OUT.*
- *It is vitally important to know that If, during the marshalling sequence, there is a likelihood of an incident - STOP THE AIRCRAFT!*
- *If the aircraft cannot be safely manoeuvred, it must be stopped and subsequently towed to its correct parking position. Do not be frightened to request the help and use of a tug.*
- *If it is considered unsafe to marshal an aircraft on your own, always ask for the assistance of a second or third marshaller.”*

In section 8 “Aircraft Manoeuvres”, it is stated that:

*“It is important to note that the pilot is responsible for the safety of the aircraft, and if they believes or thinks the manoeuvres you are indicating are unsafe, they will refuse to carry them out.*

*Did you know that the pilot is under no obligation to follow a marshaller’s signal if they so chooses?*

*Note: pilots will also be less likely to follow your instructions if you are not confident with your signals.”*

## **ADDITIONAL INFORMATION**

Appendix 1 to this report shows the Incident layout as perceived and described by the PIC, F/O, marshaller and wing walker.

### PIC Statement

During his interview, the PIC stated that while the Aircraft was taxiing on taxiway P, he observed marshaller in position directs him into parking. His positioning indicated to the for the the crew to taxi straight ahead towards him to the left of parking line between/behind a parking Galaxy aircraft on the left and a Challenger aircraft on the right. There was a wing walker positioned at the Galaxy’s right wing and the Challenger left wing. The Aircraft taxied forward following the marshaller signals



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and glance 2 to 3 times out the captain's left window to observe the wing walker on that indicating a steady thump up. During the forward taxi, the marshaller was positioned straight ahead and the PIC was getting verbal confirmation from the F/O that the right wing walker had seen the Aircraft cleared the Challenger's wing. Shortly after clearing the Challenger's wing, the marshaller began drifting to his left, the PIC's right, to turn the Aircraft as otherwise the PIC said that he lost sight of the marshaller. The position for a marshaller is either straight ahead or sometimes to the captain's side to ensure he is seen. The PIC added that: shortly after beginning the right turn, the crew felt a shudder go through the Aircraft; the PIC applied the brakes to stop.

The PIC added: "only after stopping ourselves did we observe the marshaller indicate for us to stop . When the marshaller began drifting to his left/my right I wasn't able to glance towards the left wing walker so don't know if signalled for the marshaller to stop us before winglet contact or not, or even with his new/changing positioning if he could see his wing walker on that side. At no time did the marshaller indicate to us where he ultimately wanted to park us, as is the norm. It is assumed to be where he is standing, but from the time he began moving his intentions for us became unclear because his first position indicated that the plan was to simply pull up and stop somewhere behind the right of the Galaxy and next to the Challenger".

#### F/O Statement

The F/O stated that the marshaller and a right hand wing walker signalled to move forward, at the same time he, the marshaller, started walking backwards and to his left. The right side of the G450 was clear of the Challenger. With the sideways movement of the marshaller, a right turn was initiated, as we started moving right a "shuddering" was felt in the Aircraft, the Aircraft was stopped and brakes applied. The F/O added that: at no time did the marshaller signal a stop. As it was a congested area our taxi speed was below a walking pace, i.e. very slow.

#### Marshaller's Statement

The marshaller stated that he was planning to park the Aircraft at Bay E43 which was a multiple aircraft parking bay. He called a wing walker to give him wingtips from his right hand side where a Global Express (Galaxy) aircraft was parking. The wing walker was giving thumbs-up signal which meant that it was clear. When the Aircraft came near to Global Express around 6-7 meters, the wing walker gave him left turn (Aircraft right turn) signal. The marshaller started left turn signal. Captain was turning slow to left (right turn) side and moving ahead fast. It was 1-2 meters far from Global Express winglet when the wing walker gave the marshaller stop signal.

The marshaller added: I also gave stop but it was too late for captain to stop the Aircraft. G4 hit the winglet of Global express on right side of me. I realise that the signals took time. Like the wing walker gave me stop. I follow him, I gave stop to the captain and he followed me. Captain was late to stop the Aircraft. I also realised that the time distance which we were having was not enough to communicate. I also realised that the captain stop the Aircraft but it was still rolling forward for a second. The result was Global Express winglet was damaged and G4 was not damaged. The Incident happened because of the speed of Aircraft G4.

#### Wing walker Statement

The wing walker stated that he was requested by the marshaller to proceed to Bay E43 for wing tip clearance for Aircraft type G4. On this Bay there was 3 other aircraft parking, left side Galaxy, right side Challenger 60, in front of that Falcon 750. The marshaller was planning to park this G4 in centre line to keep distance to other aircraft. For this we need to bring the Aircraft between the Galaxy and

Challenger and turn it to right then left (Zig Zag). The wing walker he was right side to the marshaller near front side of the Galaxy wing. G4 was approaching to the Bay, it was straight and I gave the marshaller clearance and signal to turn left (right turn). The marshaller was giving turning signals, but Aircraft was moving fast, turning was not proper.

Then, the wing walker added, I observed from distance of 2 to 3 m that the Aircraft needed more turn, I gave turn signal. The marshaller continued turning but Aircraft turning was not successful. The wing walker added: I gave stop two meters away from Galaxy, when I gave a stop, immediately the marshaller gave stop. When the captain was stopping, the Aircraft nose wheel rolled and slips forward and then the Aircraft hit the Galaxy right side winglet.

## ANALYSIS

### PARKING PRACTICE

When the Aircraft entered into the parking area, the marshaller was planning to pass it between two other parking aircraft which were separated by approximately 26 meters. The wing span of the Incident Aircraft is 23.72 meters, so the initial indication to the marshaller and the wing walker was that they could bring the Aircraft to the parking point between the two parking Aircraft safely.

To do this, the Aircraft was required to manoeuvre on a *zigzag* path since its entry path was not aligned with the mid span line that separates the wing tips of the other two parking aircraft.

That movement required a fast uninterruptable communication amongst the various parties: i.e. the cockpit, the marshaller and the wing walker. To have this done safely, the Aircraft speed should be managed in order to manoeuvre with less risk, none of the involved parties revealed that slowing signals were communicated to the cockpit.

### COMMUNICATIONS AMONGST THE PERSONS

During the Aircraft taxi, and when became more proximate to the Galaxy aircraft, a right turn signal was sent by the wing walker to the marshaller who conveyed that message to the cockpit while he was moving to the right side of the cockpit towards the final stop point.

In his statement, the PIC revealed that he missed the sight of the marshaller for a while since the marshaller was standing at a place invisible to left seat. At that critical phase the communication should have been more concentrated and frequent, or the Aircraft should have been stopped for further distance estimations. The PIC also stated that he didn't see any message from the marshaller to stop before they felt the shudder and stop the Aircraft by himself.

On the other hand, the marshaller and the wing walker were still having dual communication, but the communication with the cockpit was being only done with the marshaller. In such congested parking areas, and close tight distances. The marshaller and the wing walker were perceiving the Aircraft going in a speed faster than the normal speed, that should lead them to signal the crew to stop for more safety assurance.

The initial position of the marshaller which was ahead of the Aircraft nose indicated that the marshaller was standing at the final stop point, when he moved to the right of the cockpit the scenario changed suddenly. The radius of the turn was not consistent with that initially estimated, all were not considered especially when knowing that any communication system requires time starting from the moment of sending, then processing which include the human perception embodied by the PIC and the Aircraft mechanical response, the feedback was also late as evidenced by the continuous closure to the Galaxy aircraft to the moment of wingtips touch.

### **HUMAN FACTORS IN THE AIRCRAFT PARKING**

Although the airside operations, including apron management, is the responsibility of the airside controllers, the PIC, or the pilot flying, has to judge the situation and then to determine whether to continue taxiing or to stop and re-assess before final decision is made, therefore it is the final responsibility of the PIC, or pilot flying, to park the Aircraft.

Before proceeding with marshalling the Aircraft, the marshaller shall be capable to evaluate the parking area, the stand location as well as the Aircraft situation. He shall also be capable of realising the taxiing speed and has an adequate communication with the cockpit by using well defined signals. In the Incident, the risk management of parking the Aircraft was not done properly. The hazards were not identified and the distances were not perceived on a way that might help in the risk assessment.

### **MARSHALLING PROCEDURE**

Although the non-standard parking hints were educated to the marshallers through training syllabus, no non-standard procedures were in place. That might leave the requirements to be without proper official guidance with proper continuous assessment and revising.

The management role in non-standard parking risk assessment was not clearly set, parking was left to the individual's judgment and then was more vulnerable to human factors aspects.

## **CONCLUSIONS**

### **FINDINGS**

- The crewmembers possess the necessary flight crew certificates and licences as per the ICAO Annex 1.
- The marshaller and wing walker possess properly issued airfield operations authorisations.
- The communication amongst the PIC, F/Os, marshaller and wing walker was not adequate.
- Non-standard parking procedure and guidance was not set properly.



## PROBABLE CAUSE

The Air Accident Investigation Department determines that the probable cause of the ground collision Incident was the inadequate communication amongst the cockpit crew, the marshaller and the wing walker.

Contributing factors to the Incident were:

- The pilot's and marshaller misperception to the situation and distances.
- The absence of written and well-defined procedures for aircraft marshalling in non-standard parking.

## RECOMMENDATIONS

The Air Accident Investigation Department recommends that:

### **The operator should-**

Enhance his procedure to ensure that situational awareness of the pilots is more coherent with the actual case, pilots shouldn't be more relying on marshallers if they are suspect the presence of parking hazards.

### **Dubai Airports Company should-**

#### **SR 07/2011**

Enhance training of the marshallers and increase their awareness to the stand allocation before commencing the aircraft marshalling.

#### **SR 08/2011**

Establish procedures for marshalling an aircraft in non-standard parking areas.

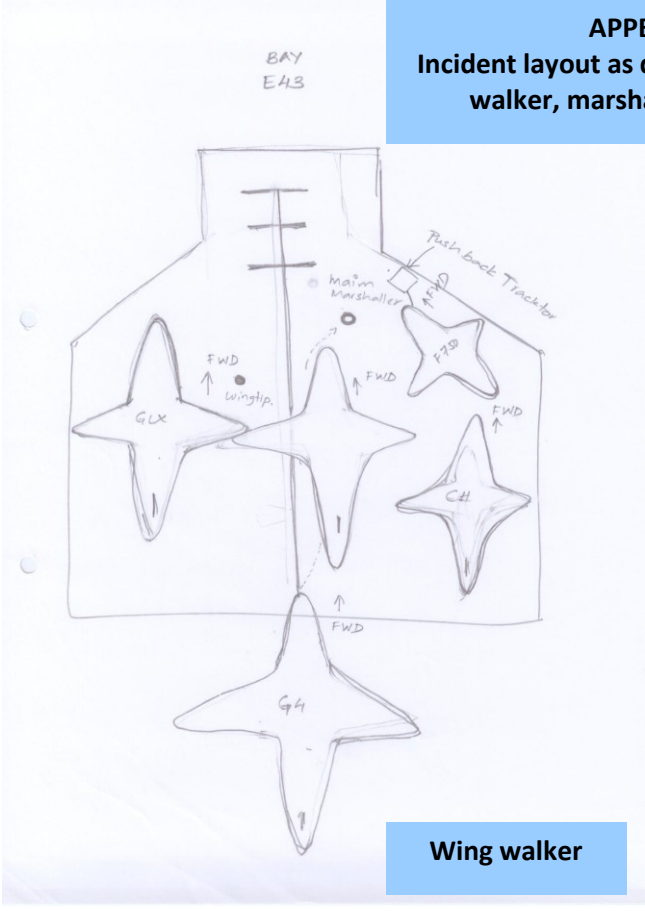
### **Dubai Civil Aviation Authority-**

#### **SR 09/2011**

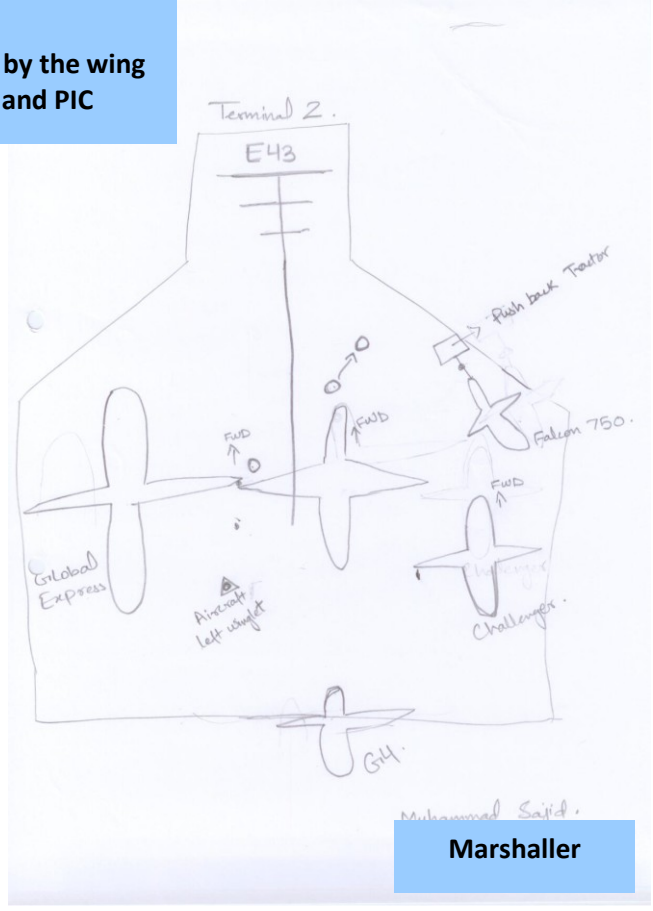
To enhance its oversight on aircraft marshalling activities and make sure that best practices are contained in the aerodrome operator's relevant manuals.

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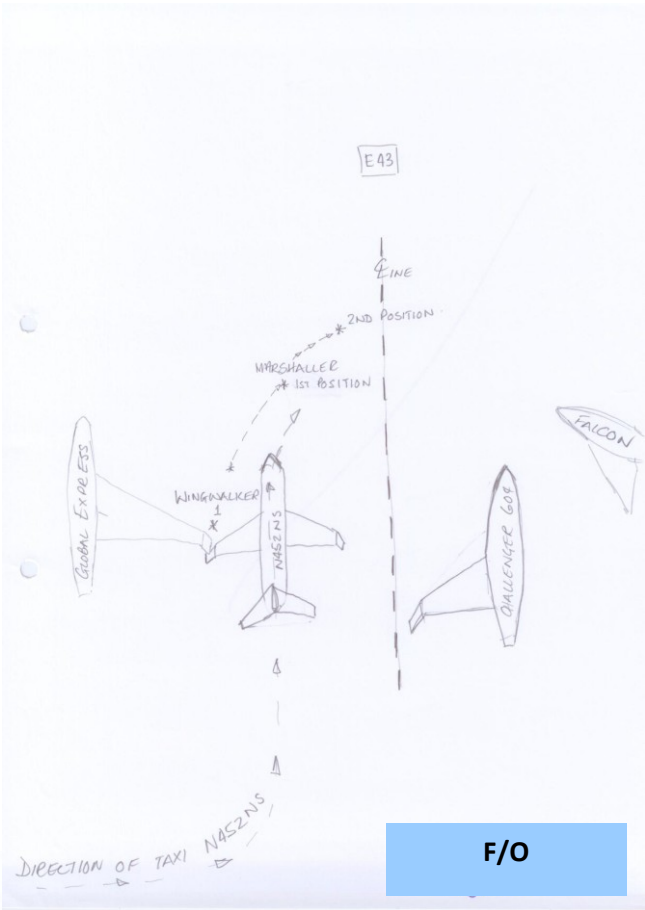
**APPENDIX 1**  
**Incident layout as described by the wing walker, marshaller, F/O and PIC**



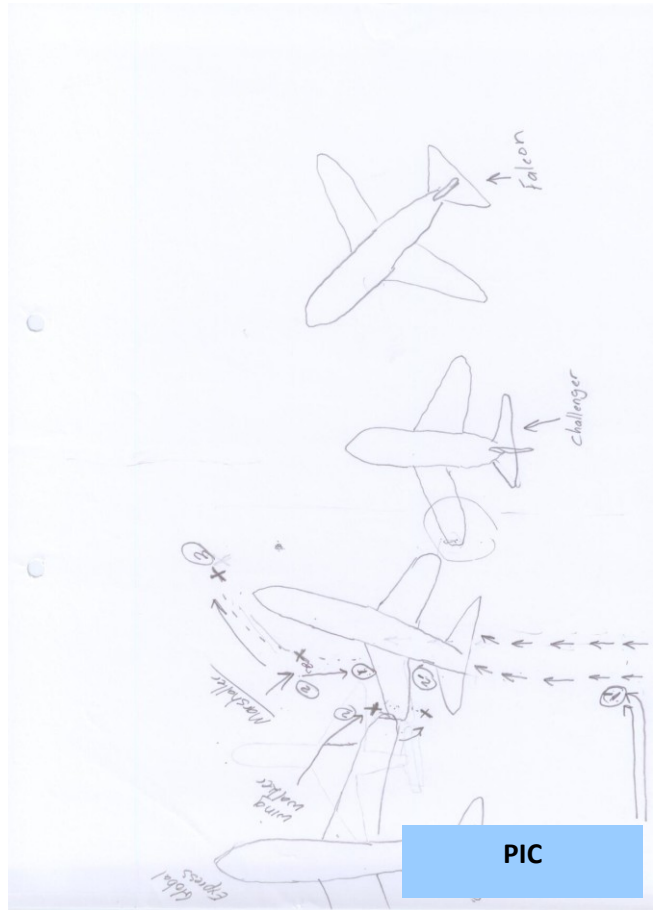
**Wing walker**



Muhammad Saïd  
**Marshaller**



**F/O**



**PIC**