

## **AIRCRAFT ACCIDENT REPORT** (Ref. N0 1/2018)

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### **Report on the Accident of Aircraft Registration Number VP-BZE, blown off its parking position on 27th December 2017**

**This report has been issued to enhance safety.**  
*NON-ICAO ANNEX 13 Investigation*

The sole objective of this investigation is the prevention of similar accidents and incidents in the future. This investigation does not aim to assign fault or blame, and the reporting process should not be used to determine liability.





BAAI.

C/O Ministry for Tourism

233 Republic Street

Valletta VLT 1116.

15<sup>th</sup> February 2019

Hon. Minister Konrad Mizzi,

I have the pleasure to submit the final report on the circumstances of the accident to the Dassault Falcon 7X Reg No. VP-BZE which happened on the 27<sup>th</sup> of December 2017 at Luqa Airport, Park 4, stand 2.

Sincerely yours

Frank Zammit

Chief Investigator of Air Accidents

## Report Number 1/2018

### NON-ICAO ANNEX 13 INVESTIGATION

Place of accident:	Apron 4, Malta International Airport
Date and time:	27th December 2017
Number of persons on board:	Nil
Number of fatalities or injuries:	Nil

### Aircraft Details

Registered owner/operator:	Flying Lion's Co., Ltd.
Type:	Dassault Falcon 7X
Registration:	VP-BZE
Country of registration: Territory)	Bermuda (British Overseas

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## Introduction.

BAAI was informed about the accident at 20.46 UTC by MIA and the investigators reached the accident site at approximately 21.25 UTC.

ICAO ANNEX 13 states that an investigation is obligatory in the following circumstance:

- *An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked.*

Although an ICAO Annex 13 investigation was not required, BAAI conduct this safety investigation with the sole objective of preventing similar accidents and incidents in the future.

EU Regulation 996/2010. Article 5, Paragraph 4:

- *Safety investigation authorities may decide to investigate incidents other than those referred to in paragraphs 1 and 2, as well as accidents or serious incidents to other types of aircraft, in accordance with the national legislation of the Member States, when they expect to draw safety lessons from them.*



*Fig.1. The result of the accident.*

## Summary:

On the 27th of December 2017 at approximately 20.30 UTC, a Dassault Falcon 7X registration number VP-BZE departed the stand, rolled down the slope on the north-western edge of Park 4, went through the airport perimeter fence, crossed the road and crashed into the building across the road, where it came to a halt. At the time of the accident, there was no one on board and the aircraft was not being tended to. It was dark with patches of rain; the surface wind on Runway 05, which is close to Park 4, was reported to be ranging between 220°–230°, gusting to 35 kts.

Evidence from the site of the accident suggests that the Aircraft was chocked on the Nose-Wheel and the Left Main-Gear only, leaving the right Main-Gear un-chocked.

Four (4) Safety Recommendations are made relating to securing an Aircraft in adverse weather conditions.

### **Aircraft accident: 27 December 2017 Wind Charts for RWY 05 provided by the Met Office.**

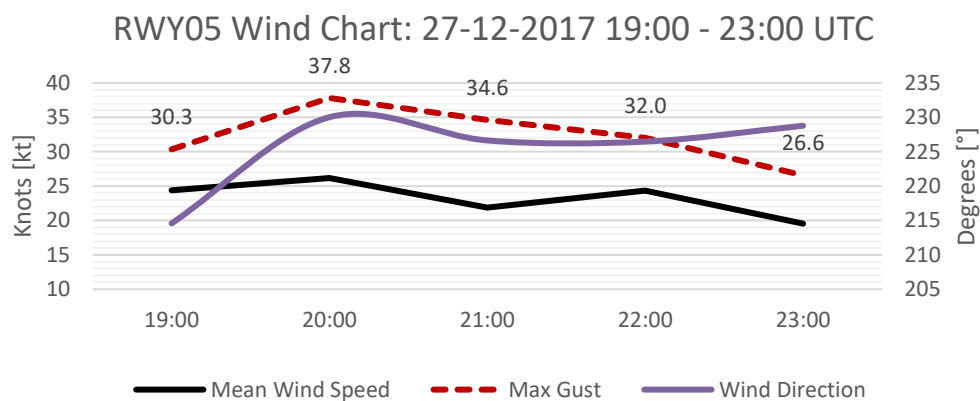


Fig. 2. The atmospheric conditions on RWY05 which is close to PARK4.

**Aircraft VP-BZE landed on 26<sup>th</sup> December 2017 at 13:25Z, with blocks-on at 13:29Z.**

## 1.0 Factual Information.

**1.1 The Accident:** The aircraft parking position was stand 2 on Park 4 that is located at approximately 35° 51' 18.4" N, 14° 28' 2.9" E, Aircraft heading 9.5° (true north). At the time of the accident, the wind was blowing from the port rear quarter of the aircraft that tended to propel the aircraft forward and rotate it anticlockwise in the direction of the wind, due to the natural weather-cocking effect caused by the fin (Empennage).



Fig. 3. Schematic of the aircraft motion during the accident.

Note 1. Fig 4 Shows photographs of the position of the chocks as found on-site indicate that the aircraft was chocked on the outer wheel of the port undercarriage and at the nose gear. Tyre marks consistent with the motion of the aircraft as captured on CCTV (Appendix B) and the wheel dimensions and pair combination were observed.



(A) Falcon 7X Nose Gear

(B) Tyre Marks on the left main Gear

(C) Measured angle of turn

Fig. 4B. Photographs of the chocks as found on-site

**1.2** This effect became sufficiently strong to castor the nose wheel and deflect it anticlockwise. The aircraft rotated to the left on its outer tyre on the port undercarriage, with the two nose wheel tyres narrowly missing their chocks. The rotation continued up to a point where the angle between the tyre and chock became acute enough to dislodge the front chock (*Left Main-Gear Fig 4 B*), a movement that left the aircraft completely free. The aircraft, by this time, had

gained sufficient momentum to roll several feet upwind, weather-cocking in the process at the mercy of the wind. According to the CCTV footage (*Appendix B*) and the recorded tyre marks, the aircraft subsequently swung right, exiting Park 4 at its north-western edge, rolling down the slope, scraping the extended roof of the High Voltage Distribution Centre (building) with its port winglet and hitting a low structure with its starboard outer main undercarriage door before it advanced through the airport fence.



*Fig.5. A photograph showing how the left winglet missed the High Voltage Distribution Centre wall by approximately 4 centimetres.*

## 2.0 Investigation

### 2.1 Part 1:

The first part of the investigation concentrated on airport security, including access gates and the integrity of the airport perimeter. There was no evidence to suggest that there were any unauthorised persons or activity in the vicinity of the aircraft at the time of the accident.

### 2.2 Part 2:

Part 2 of the investigation dealt with the dynamics of the accident and the manufacturer's recommended procedures.

#### 2.2.1 Parking and Securing the Dassault Falcon 7X:

During the on-site investigation, the Captain confirmed that on the day preceding the accident, 26th December, the aircrew had parked the aircraft with the Park Brakes OFF in accordance with the standard practice for this type of aircraft. The ground handlers confirmed that they provided their standard service which included placing chocks on the nose-wheel and the left main-gear.



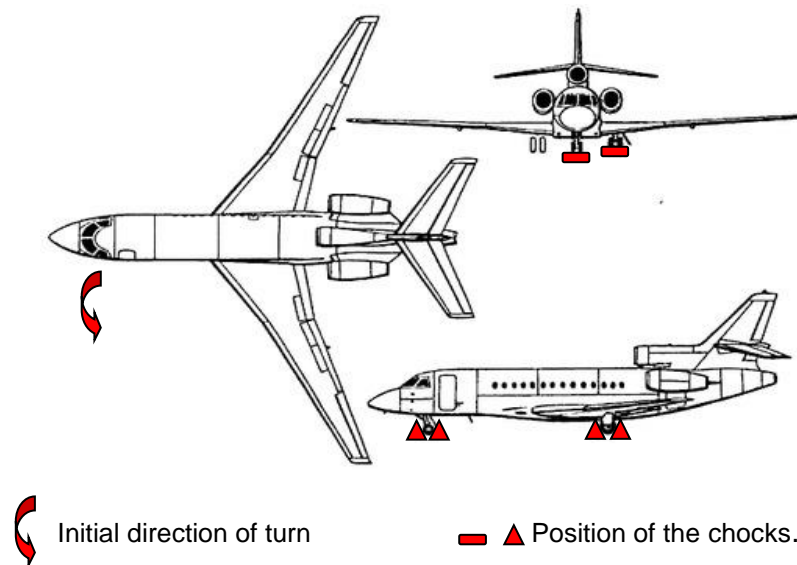


Fig.6. Diagram intended to offer a general idea of the manner in which the aircraft was chocked. It does not represent the exact position of the chocks. The aircraft involved in the accident was only chocked on the nose wheel and the left undercarriage

The aircraft’s technical manual states: “With chocks in place, release the parking brakes after engine shutdown. However, on pilot decision or when chocks are not available, set the park brake to 1st detent for a short stop duration (not exceeding 2 hours) and to 2nd detent otherwise”. Ref. Dassault Falcon 7X Technical Manual.

The 2nd detent position is designed to provide parking brakes for longer durations, not exceeding 18 hours. After 18 hours, the hydraulic accumulator charge would be exhausted, rendering the park brakes ineffective. The Dassault standard procedure recommended that the aircraft should be parked with the parking brakes off when the relevant devices are used to keep the airplane at parking stand.

*Note 2. The optimum restraint available for an aircraft can only be provided by its wheel brakes, if selected “ON”. When selected “OFF”, other means of securing the aircraft are available and must be used correctly.*

### 2.2.2 Extracts from the manufacturer’s documentation:

The Aircraft Maintenance Manual (AMM) provides guidance for parking the aircraft. The information below is an abstract from the AMM. It is good to note that this manual does not form part of the Ship’s Library and the crew do not have access to the AMM.

**AIRCRAFT MAINTENANCE MANUAL - TASK 10-10-00-910-801 - PARKING OF THE AIRCRAFT**

*This task is performed if:*

- the aircraft must stay outdoors for a long period of time (see Note),
- the aircraft must stay outdoors at night,
- the aircraft is exposed to strong wind or snow.

[...]

WHEEL CHOCKS (QTY: 6)

[...]

- B. Make sure that the aircraft is on its wheels.
- C. Make sure that the aircraft is pointed into the wind.
- D. Put the wheel chocks in position.
- E. Make sure that the slats, flaps, airbrakes and spoilers are retracted.
- F. Make sure that the horizontal stabilizer (9500CH) is in the 0° position.
- G. Move all the ground support equipment away from the aircraft.
- H. In the cockpit:
  - make sure that the park brake handle (804GC) (fig. 1) is released,

[...]

## **AIRCRAFT MAINTENANCE MANUAL - SDS 32-42-00 - EMERGENCY / PARK BRAKE SYSTEM**

[...]

### **Park Braking:**

- provides sufficient brake pressure with the park brake handle in the second “notch” position to maintain the aircraft in a stationary position for up to 18 hours, using the park brake accumulator stored pressure.

(Clarified with Dassault at Capt. suggestion in his reaction to the Draft Report) Dassault claim that this information is also recalled in the “Ground Servicing Manual” (GSM) which is intended to provide the flight crew with useful information for servicing the aircraft on the ground. However, the only reference to CHOCKS on the GSM is found in the TOOLS AND EQUIPMENT section which may not be clear enough to underline the importance of having all six wheels chocked. Dassault claim that the procedure of how to secure an aircraft for a long stay, is also covered to during the Aircraft Type Rating Course.

*Extract from the Ground Servicing Manual.*

### PARKING

#### **WARNING**

**DURING THE PREFLIGHT INSPECTION FOLLOWING AIRCRAFT PARKING AND MOORING, ALL THE MOORING EQUIPMENT ITEMS MUST BE REMOVED. MAKE SURE THAT ALL BLANKED OFF OPENINGS ARE FREE OF FOREIGN OBJECTS. SPECIAL ATTENTION**

**MUST BE PAID TO THE TOTAL AND STATIC PRESSURE PORTS.**

*This task is applicable if:*

- the aircraft has to remain outdoors for a long period,
- the aircraft has to remain outdoors at night, the aircraft is exposed to strong wind or snow.

#### **TOOLS AND EQUIPMENT**

- All the parking equipment is contained in the onboard kit (refer to

- section 6 for location).

Wheel chocks.

Qty: 6

**2.2.3.** The Dassault Falcon 7X has one of the lowest weight to volume ratios in the industry; in addition, the aircraft was parked with the parking brake off (*as per procedure*), lightly loaded with fuel (*10600 lbs were in the tanks*) and without payload. Under these conditions, the wheel to pavement friction was already rendered extremely low; it was further reduced by the prevailing wet and slippery conditions that made using other means for securing the aircraft according to aircraft manufacturer recommendations essential.

### **2.3 Alternative means of securing a non-hangered Dassault Falcon 7X.**

*Note 3. Chocks should be positioned parallel to the wheel axle and only lightly touching the tyres. However, this may not be applicable during aircraft loading due to the constant shifting of the centre of gravity and also since the footprint of the tyres will increase in correspondence to the progressive increase in the total weight.*

*Note 4. In the event of high wind conditions, additional measures recommended by the manufacturer should be considered to secure the aircraft.*

2.3.1 With the park brakes selected “OFF”, chocks and tie-downs are the only remaining means available to restrain an aircraft against unintentional movement on ramps with little or no slope. The appropriate chocks, in terms of number, installations, and placement is essential for the safety of apron and parking areas, especially if the aircraft is to be left unattended. Under adverse weather conditions, especially in high gusting winds, improper application or placement of chocks may result in accidental movement of a parked aircraft.

2.3.2 A 3-point tie-down facility to minimise the possibility of movement of a parked, non-hangered aircraft due to high winds is also provided for the Dassault Falcon 7X. Airport authorities confirmed that they had never received a request to provide a parking stand with a tie-down facility. According to the Dassault Technical Manual, the tie-down facility is to be used in “HIGH WIND” conditions but it does not stipulate exactly what HIGH WIND conditions are. The fact that a stand with a tie-down facility was not requested, suggests that the forecasted atmospheric conditions were not considered to pose a problem. Another possibility for not considering mooring the aircraft is the fact that (*As pointed out by the Capt in his reaction to the Draft Report*) there is no maintenance company in Malta that has the approval of the Bermuda Civil Aviation Authority to perform the essential engineering procedure.



Fig. 7. Show the Nose-Wheel chocks as they were found after the accident.



Fig. 8A. Example of properly placed Chocks on the nose-wheel.

**2.3.3** The distance between the chocks, tyre marks and the fact that the nose-wheel chocks were still almost parallel to each other, suggests that the position they were placed in when securing the aircraft was not disturbed by the movement of the aircraft. (Fig.7). This suggests that the nose-wheel chocks were not blocking the nose-wheel from moving as they were intended to do.

Dassault Falcon 7X (*nose-wheel footprint measurements provided by Dassault*)

*Distance A: 26.5 cm*

*Distance B: 41 cm*

*Chocks are triangular / one face = 15 cm*

*Note: Nose wheel diameter does not conform to the chocks dimensions on this diagram.*

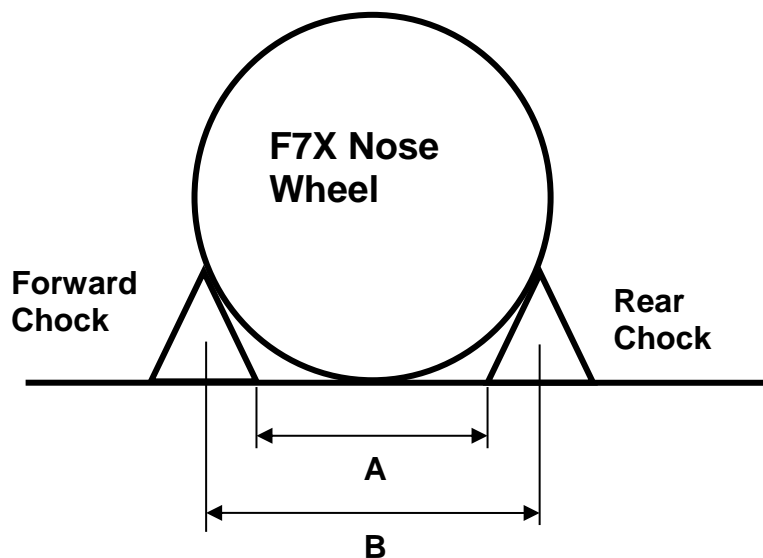


Fig 8B

*Note 6. Chocks placed as shown in the example (Fig.8A&B) would not allow the nose-wheel to castor. The actual distance between the chocks at the base (equivalent to the distance "A" on the diagram) was measured to be 43cm.*

## **2.4 Communication and Coordination.**

2.4.1 Extracts from an email received from the ground service provider:

- *Upon arrival, [ground service provider] provided its standard services including CHOCKS on L/H Main Gear and N/L Gear. Crew were asked if any additional services were required. Lavatory servicing and Potable Water were requested and provided. Additional CHOCKS were readily available should they have been requested.*

2.4.2 To guard against danger before it materialises, a proactive approach and good communications are fundamental. This could prevent a build-up of small but significant errors from adding up. Claims by the handling agent that they would have provided additional chocks “*should they have been requested*”, suggests that there was very little effective communication and coordination between the crew and the ground handlers.

## **2.5 Situational awareness.**

2.5.1 The forecast (for 27th December) predicted progressive deterioration of weather conditions, with gusting winds up to 40Kts – 74.0 Km/h (*VRB30G40KT*). The applicable TAFs were issued on 26th December; thus, the essential information would have been available for the crew and the ground service providers. The ground handlers confirmed that a weather briefing was neither offered to the crew nor requested by the crew.

## **3.0 Conclusions**

**3.1** The aircraft moved from its parking position because of the strong localised wind. This caused the nose wheel to castor sufficiently to allow the aircraft to rotate and escape its chocks. In most investigations of accidents, the fact that in hindsight and with time to consider everything seems easy and crystal clear must be kept in mind. This accident was different from most accidents, as it did not present the crew or the ground handlers with an overwhelming situation. There was plenty of time to do an appropriate walk around the aircraft to make sure that the recommended procedures were followed and that the aircraft was adequately secured for a long stay.

**3.2** According to information received from Dassault (*Ref Paragraph 2.2.2*), if the airplane is to remain outdoors for a long period **or** at night **or** is exposed to strong winds or snow, all six (6) wheels should be chocked. However, The GSM does not contain a procedure that clearly states that all 6 wheels should be chocked.

**3.3** In this accident, at most 3 wheels were chocked, even though the crew had every opportunity to ask for all wheels to be chocked (*Ref Paragraph 2.3.2*). On the day of the accident the ground handlers could have taken the initiative to check that all aircraft left under their care were adequately secured for the weather conditions of the day and if need be, add another set of chocks on the right main gear.

**3.4** Attempts by BAAI to talk to the Captain about his actions and decisions on the matter remained unsuccessful, as he did not return our phone calls or respond to our emails. Consequently, BAAI did not have the opportunity to find out if the crew were in actual fact aware that the aircraft should have been securely chocked on all 6 wheels.

**3.5** This accident was investigated with the intent of carefully examining all factors which may have contributed to this accident and the circumstance within which it had taken place. The strong localised wind is what moved the aircraft from its parking position, but unintentional errors and oversights may have been contributory factors. Combined efforts by the crew and ground handlers, establishing better lines of communication and paying more attention to detail, may have prevented this accident from happening.

## 4.0 Recommendations.

4.1 In order to help prevent similar occurrences, 4 Safety Recommendations are made:

1. All aircraft should be chocked on the port and starboard main under-carriage and the nose wheel when the park brakes are selected “off” and the aircraft is left unattended.
2. Ground service providers should amend their standard services to include all items in *Recommendation 1* for aircraft parked outdoors for an extended period of time.
3. Crews should be aware of and strictly adhere to the recommended standard procedures, unless the recommended standard procedure in the *Ground Servicing Manual* is less restrictive than the Airport or CAD recommended procedures. In such cases the most restrictive shall apply.
4. It is recommended that Dassault clarify the meaning of “High Wind” in the Dassault Falcon 7X Technical Manual.

## Glossary of Terms

AMM	Aircraft Maintenance Manual
BECMG	Becoming.
CB	Thunderstorm Storm Cloud.
EU	European Union.
G	Gusting
GSM	Ground Servicing Manual
ICAO	International Civil Aviation Organisation.
Km	kilometres.
Kt	Knot.
lb	Pounds.
MIA	Malta International Airport.
PRO	Probability.
RWY	Runway.
SCT	Scattered.
SHRA	Showers of Rain
TAF	Terminal Area Forecast.
TCU	Towering Cumulus.
TEMPO	Temporarily
TS	Thunderstorm
UTC	Coordinated Universal Time.
VRB	variable
Z	Zulu Time. (UTC)



# Appendix A

## Weather Forecast (TAFs)

**Aircraft VP-BZE landed on the 26<sup>th</sup> December 2017 at 13:25Z, with blocks-on at 13:29Z.**

The weather forecast for the 27<sup>th</sup> of December: Progressively deteriorating weather conditions with a strong southwesterly wind gusting up to 40kts. Visibility;10Km reducing to 7Km in rain and reducing further to 3KM in Thunderstorms.

### TAF (*Terminal Area Forecast*)

TAF LMML 260500Z 2606/2706 26012KT 9999 SCT020 =

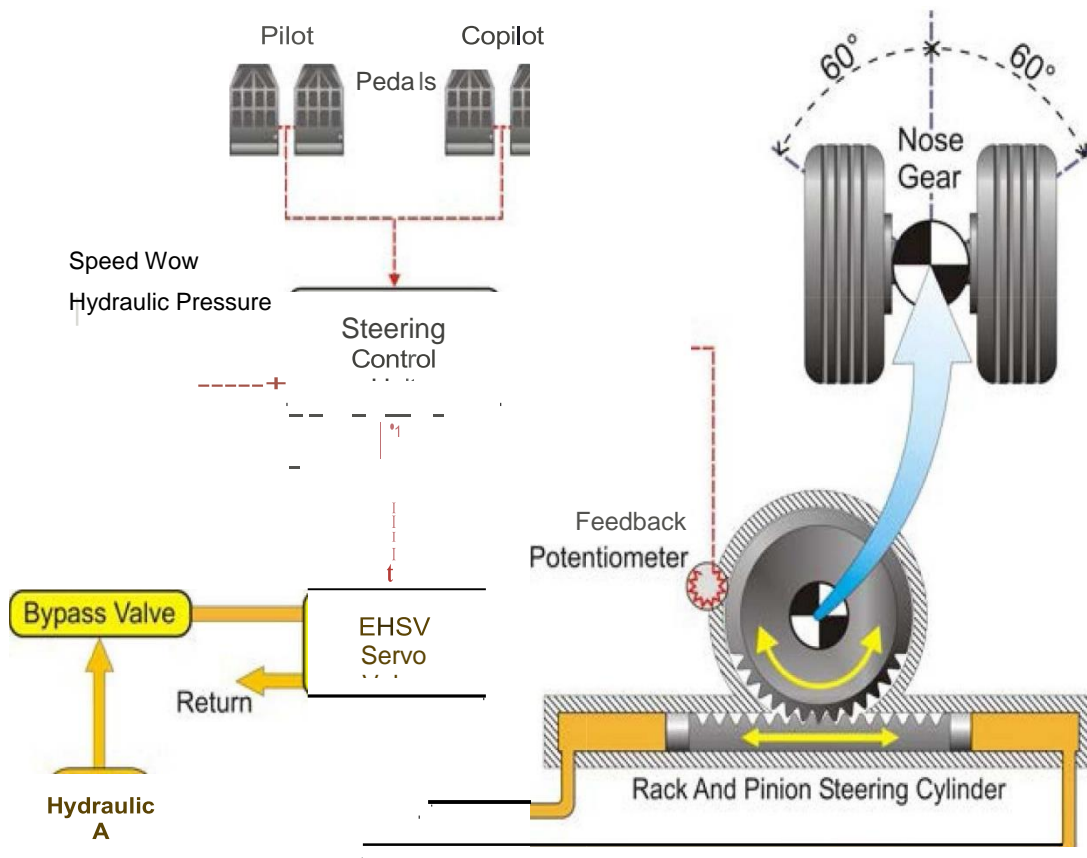
TAF LMML 261100Z 2612/2712 26014KT 9999 BKN038 BECMG 2707/2710  
25020G30KT =

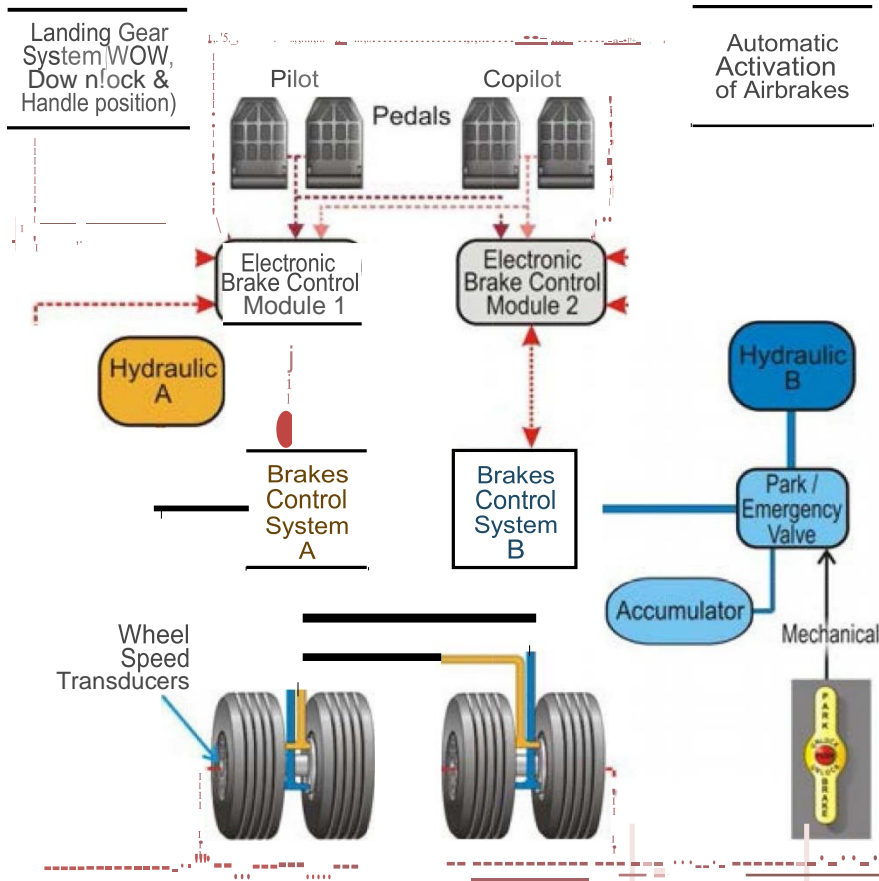
TAF LMML 261700Z 2618/2718 26013KT 9999 BKN038 BECMG 2705/2708  
25018G28KT BECMG 2711/2714 25024G38KT =

TAF LMML 262300Z 2700/2724 23015KT 9999 SCT025 BECMG 2705/2708  
23018G28KT TEMPO 2711/2714 25024G38KT =

TAF LMML 271700Z 2718/2818 24020G30KT 9999 SCT025 BKN045 PROB40 2718/2722  
7000 RA TEMPO 2722/2809 7000 SHRA SCT020TCU PROB30 TEMPO 2722/2807  
VRB30G40KT 3000 TSRA BKN020CB BECMG 2802/2805 28018G28KT BECMG 2808/2811  
28014KT BECMG 2814/2817 28020G30KT TEMPO 2814/2818 7000 SHRA BKN030TCU  
PROB30 TEMPO 2814/2818 VRB30G40KT 3000 TSRA BKN030CB

**NOSE WHEEL STEERING SYSTEM - PRINCIPLE DIAGRAM**





**BRAKE SYSTEM - PRINCIPLE DIAGRAM**