SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-40

AIRCRAFT INCIDENT SHORT REPORT

CA18/3/2/1301: Left main landing gear fault indication after retraction of the landing gear.

Date and time	**:**	2 January 2020 at 1600Z
Location	**:**	Cape Town International Airport (FACT), Western Cape Province
Aircraft registration	**:**	TC-JNI
Aircraft manufacturer and model	**:**	Airbus A330-343
Last point of departure	**:**	FACT
Next point of intended landing	**:**	Istanbul International Airport (LTFM) Turkey
Location of incident site with reference to easily defined geographical points (GPS readings if possible)	**:**	South 33°58'08.58" East 018°36.06'00" at an elevation of 203 feet.
Meteorological information	**:**	Surface wind 190˚ at 22kt, temp 22˚ and dew point 16˚, CAVOK
Type of operation	**:**	Part 121
Persons on-board	**:**	2+11+292
Injuries	**:**	None
Damage to aircraft	**:**	None

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose of the Investigation:

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (2011), this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and ***not to apportion blame or liability.***

Investigations process:

The incident was notified to the Accident and Incident Investigations Division (AIID) on 1 January 2020. The AIID did not dispatch to the incident site. The AIID conducted a desktop investigation. The investigators co-ordinated with the operator according to CAR Part 12 and investigation procedures. In terms of ICAO Annex 13, notifications were sent to the Turkish Transport Safety Investigation Centre (TSIC), which did not respond to the notification sent to them; the French Bureau d'Enquêtes et d'Analyses (BEA) and Airbus (manufacturer) which both indicated that the accredited Representative and Airbus technical advisor would not be useful given the nature of the incident. The AIID of the South African Civil Aviation Authority (SACAA) is leading the investigation as the Republic of South Africa is the State of Occurrence.

Disclaimer:

1. SYNOPSIS

1.1 On 2 January 2020 at approximately 1554Z, an Airbus A330-343 aircraft with registration TC-JNI departed Cape Town International Airport (FACT) on a scheduled passenger commercial flight to Istanbul International Airport (LTFM). On-board the aircraft were two flight crew members, 11 cabin crew members and 292 passengers.

1.2 It was reported that after rotation, the landing gear lever was selected up, however, the landing gear failed to retract. This was followed by the left gear fault error message on the Electric Centralised Aircraft Monitoring (ECAM) panel. Upon noticing this, the crew had notified the air traffic control (ATC) of the technical problem and requested to fly a holding race-course pattern above Robben Island while trying to resolve the technical problem/fault.

1.3 The crew was unsuccessful in resolving the problem/fault, and after 2 hours in the holding race course pattern, the aircraft was diverted to O.R. Tambo International Airport (FAOR) where its technical facility had the required equipment to resolve the problem.

1.4 The aircraft landed uneventfully at FAOR and the passengers disembarked safely. Upon inspection, it was reported that the proximity sensor was at 8.40 millimetres (mm), which was 0.10mm above the maximum limit of 8.30mm (the limit is between 7.70mm and 8.30mm). No injuries were reported as a result of this incident.

1.5 The investigation revealed that after take-off, the landing gear had failed to retract, and this was followed by the ECAM warning message (landing gear retraction fault) in the cockpit. The ECAM warning message appeared as a result of the right-side (in-board) pitch trimmer proximity sensor of the left gear, which was out of limit, probably due to damage on the pitch trimmer proximity switch sensor/target as a result of wear and tear.

2 FACTUAL INFORMATION

2.1 On Thursday, 2 January 2020 at 1554Z, an Airbus A330-343 aircraft with registration TC-JNI, took off from Cape Town International Airport (FACT) Runway 19 on a scheduled commercial passenger flight (flight THY45T) to Istanbul International Airport (LTFM) in Turkey. On-board the aircraft were two flight crew members, 11 cabin crew members and 292 passengers. The flight was conducted under the provisions of Part 121 of the Civil Aviation Regulations (CAR) 2011 as amended.

2.2 The pilot who was seated on the left seat (captain) was the pilot flying (PF), and the pilot seated on the right seat (first officer) was the pilot monitoring (PM). The aircraft engines were started without fault under the supervision of the ground engineer who was in communication with the PM. The captain reported that after take-off from FACT on Runway 19, the crew went through the after take-off checklist during which the landing gear lever was moved to the "UP" or retracted position, however, the left gear (L/G) retraction fault indication appeared on the Electric Centralised Aircraft Monitoring (ECAM) panel. Upon noticing this, the PM notified the air traffic control (ATC) of the anomaly with the landing gear and requested permission to fly a holding race course pattern above Robben Island at 8000 feet above ground level (AGL) with the landing gear extended while mitigating the fault.

2.3 The landing gear troubleshooting checklist was referenced, which required a computer reset, as well as landing gear control interface unit (LGCIU1) and LGCIU2 reset. However, the landing gear remained in the extended position.

2.4 The captain then informed Mid-state Operations Control Centre (MOCC) and Integrated Operations Control Centre (IOCC) about their problem during the holding racecourse pattern over Robben Island's Very High Frequency Omni Directional Range (VOR). From the communication with MOCC and IOCC, it was then decided that the aircraft should return to FACT after reaching the required landing weight of 175 000 kilograms (kg).

2.5 ATC had originally been informed by the flight crew that the holding racecourse pattern time would be 3 hours; however, after 2 hours in the holding racecourse pattern, IOCC requested that the flight crew divert to O.R. Tambo International Airport (FAOR) as it had the required technical equipment to resolve the problem. After receiving the new operational flight plan (OFP), the flight crew diverted to FAOR and landed safely with a normal landing configuration, as well as with a below maximum landing weight. According to the flight log, the total flight (including the racecourse holding pattern time) lasted 4.20 hours.

2.6 On Flight Aware radar, the aircraft could be seen holding a racecourse pattern overhead Robben Island before setting course for FAOR while cruising at 20 000 feet above mean sea level (AMSL) and landed safely at 2018Z without further events. There were no reported damages to the aircraft, and no injuries were reported as a result of this incident.

2.7 The flight was conducted under instrument flight rules (IFR) by day, with fine weather conditions prevailing. The incident occurred in the FACT airspace at Global Positioning System (GPS) co-ordinates determined to be South 33°58'08.58" East 018°36.06'00" at an elevation of 203 feet above mean see level (AMSL).

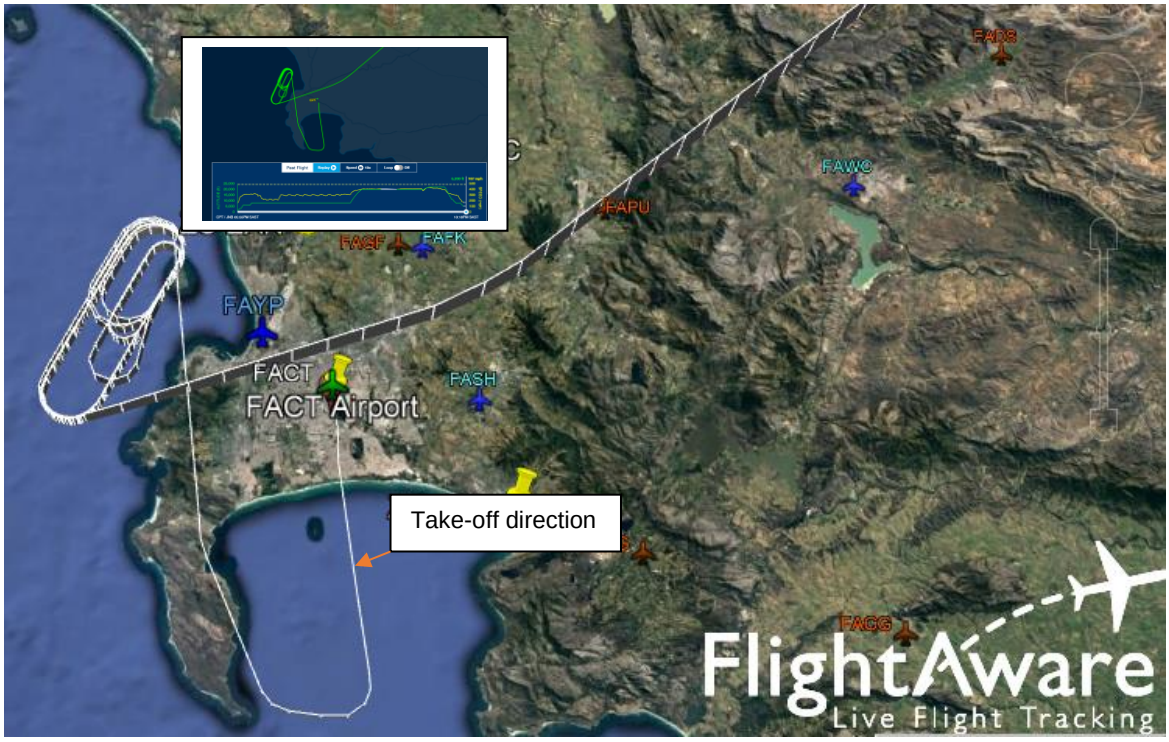

Figure 1: The aircraft's flight path after take-off from FACT. (Source: Flight Aware)

Figure 2: The filed image of the incident aircraft. (Source: www.Jetphotos.com)

3 INVESTIGATION

3.1 The operator conducted a fault-finding exercise post-incident after the aircraft was towed to the maintenance hangar and placed on hydraulic jacks. It was recorded on the defect log that the landing gear retraction fault after take-off was in line with what was registered on the ECAM and by the crew. Each landing gear system is fitted with two pitch trimmers proximity sensors 30GA1(31GA1) and 30GA2(31GA2) mounted on the bracket.

3.2 According to the troubleshooting manual (32-30-00-810-815A rev 56), the following were listed as main *Landing Gear Left/Right Pitch Trimmer Fault 1* possible causes:

- damage to the pitch trimmer proximity switch sensor/target
- pitch trimmer mechanism
- hydraulic fuse on the pitch trimmer manifold
- blockage in the pitch trimmer hydraulic supply line

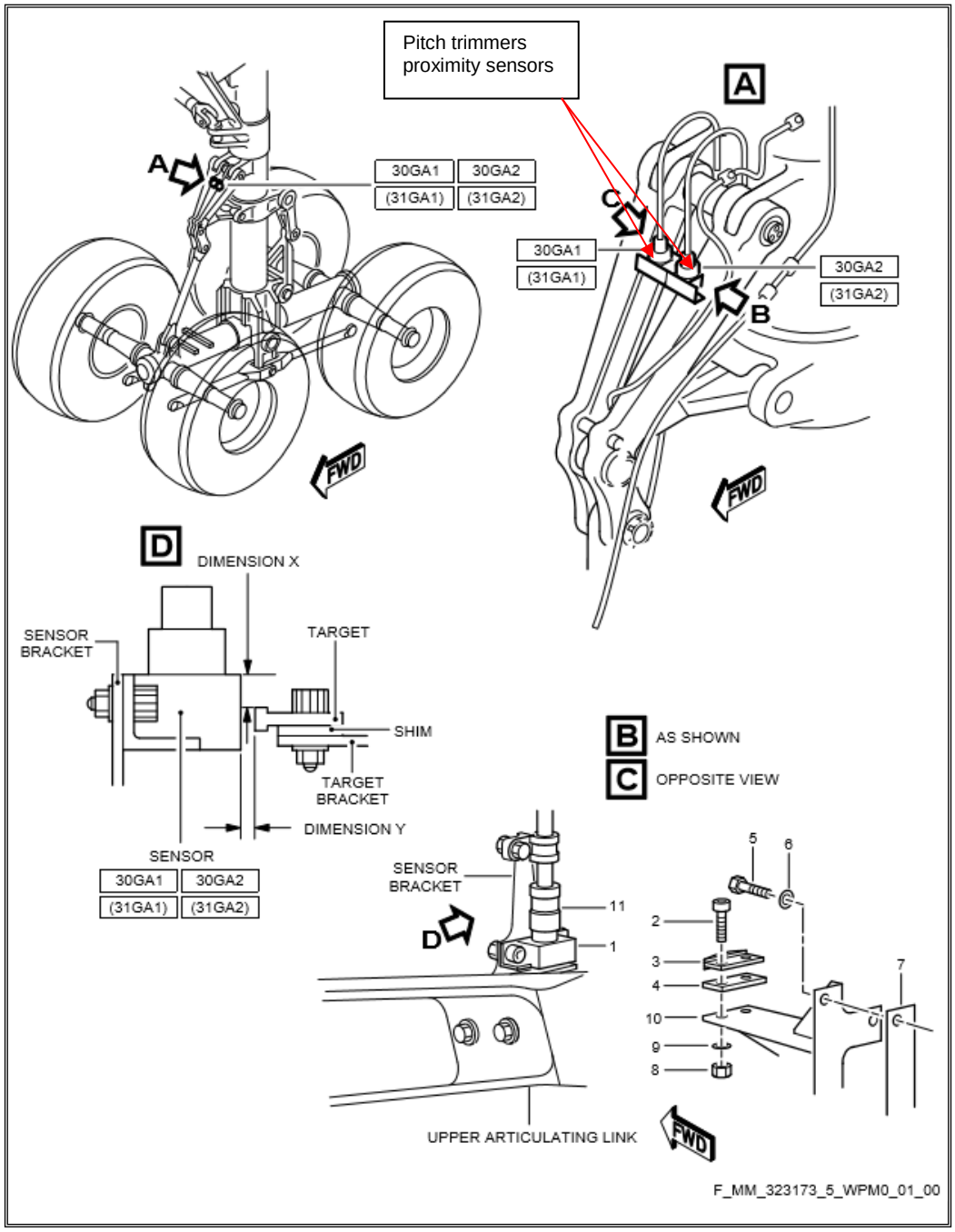

Figure 3: The schematic diagram of the location of the main landing gear pitch trimmer proximity sensors 31GA1 and 31GA2. (Source: Airbus AMM 32-31-73-820-804-A)

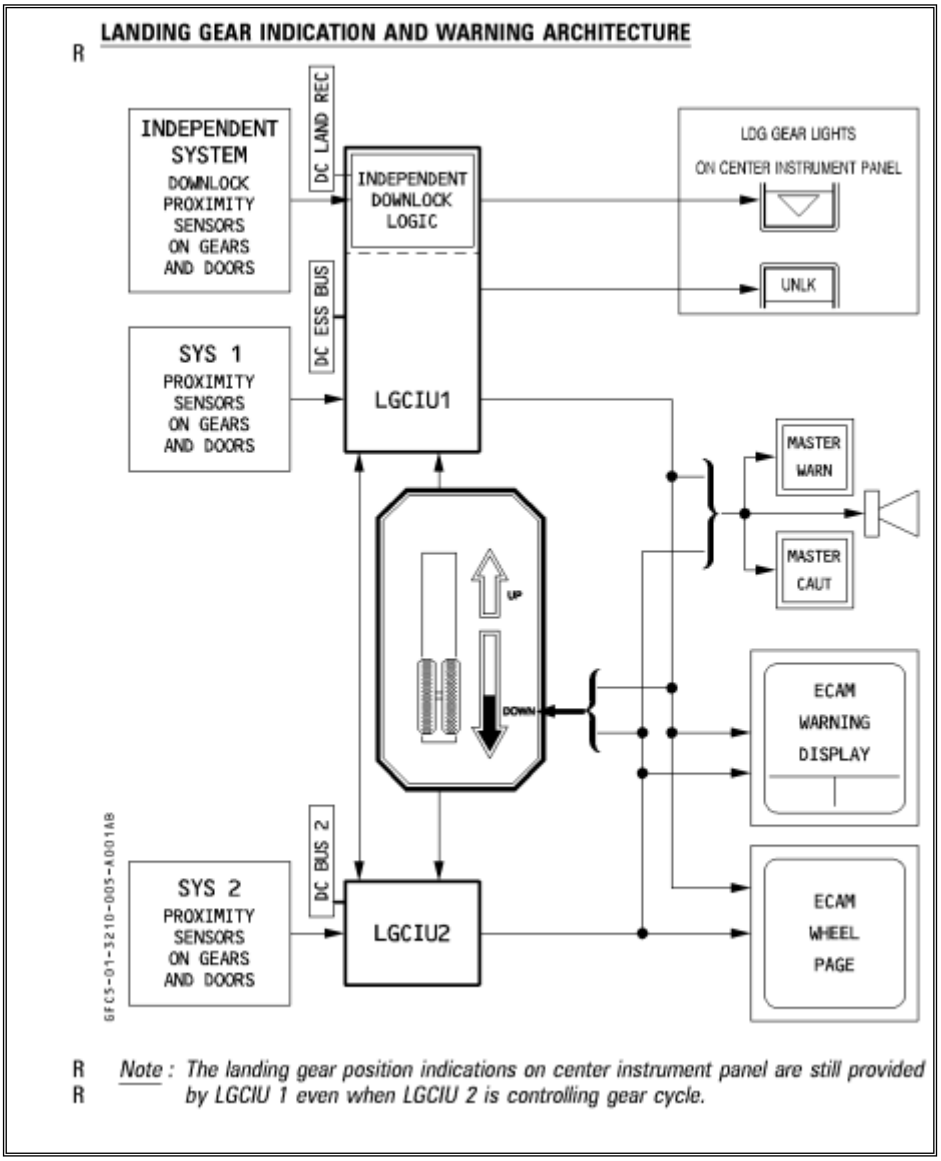

Figure 4: The landing indication and warning architecture illustration. (Source: A330 POH)

3.3 The engineers used the troubleshooting manual (TSM) *Ref: 32-30-00-810-815-A* for fault finding. According to the TSM, the fault symptoms associated with L/G Retraction Fault warning are as follows:

Fault Symptom

Fault message(s)			
ATA Ref	Message	Source	Class
32-11-15	TRIMMER-PITCH-MLG R (5009GM)	LGCIU2	1

Warning(s)/Malfunction(s)		
ATA Ref	Message	Type
32-30	L/G RETRACT	Inop System
32-30	L/G RETRACTION FAULT	EWD Warning(s)

Possible associated Warning(s)/Malfunction(s)		
ATA Ref	Message	Type
32-31	L/G - Hydraulic Leak	OBSV

Figure 5: The fault sympton warning message. (Source: TSM 32-30-00-810-815-A)

3.4 The landing gear retraction and extension test was carried out by the engineers and they had identified the same left gear fault indication that the crew had reported, which kept on appearing on the ECAM. A decision to measure both sensors on the left leg was made and the in-board (right hand) proximity sensor measured in accordance with (IAW) the maintenance manual (MM) Part -32-31-73-820-804-A was found to be out of limit. The proximity sensor was measured and found to be 8.40mm out of limit which was 0.10mm above the maximum limit of 8.30mm (the limit should be between 7.70mm and 8.30mm).

The following tasks were recorded in the *maintenance task log 054085*:

- The engineers put the aircraft on jacks
- The extension and retraction tests were performed
- Following the tests, it was discovered that the pitch trimmers 31GA1 and 32GA2 were out of limit on the left landing gear leg
- The engineers then adjusted the right-side (in-board) pitch trimmer proximity sensor on the left landing gear
- Landing gear extension and retraction tests were performed and found to be satisfactory
- The landing gear operated within an acceptable limit and was signed out

3.5 The aircraft was released back to service on 3 January 2020 without any further landing gear-related defects.

3.6 The last inspection carried out on the aircraft was a base maintenance undertaken on 24 December 2019 at 42 901.28 airframe hours. The aircraft was issued a Certificate of Release to Service on 24 December 2019. The work carried out was recorded on work orders 2295119, 2295120 and 2295121. The approved maintenance programme used was revision 028 dated 2 September 2019.

3.7 The Certificate of Airworthiness was issued on 4 October 2013. The Airworthiness Review Certificate was issued on 29 March 2019 with an expiry date of 29 March 2020.

3.8 The Certificate of Registration with the present owner was issued on 19 October 2010.

3.9 The operator was in possession of the Operation Specification for Commercial Air Transport and the aircraft was duly authorised to operate worldwide as category A1 (passenger). At the time of the incident, the operator was awaiting issuance of the Foreign Operator's Permit (FOP), however, the operator was issued a letter from the Department of Transport (Dot) authorising that schedule services shall continue uninterrupted. The FOP was later issued on 10 February 2020 with an expiry date of 9 February 2021.

3.10 The investigation revealed that after take-off, the landing gear had failed to retract, and this was followed by the ECAM warning message (landing gear retraction fault) in the cockpit. The ECAM warning message appeared as a result of the right-side (in-board) pitch trimmer proximity sensor of the left gear which was out of limit, probably due to damage on the pitch trimmer proximity switch sensor/target as a result of wear and tear.

4. PROBABLE CAUSES/CONTRIBUTING FACTORS

4.1 The cause of the pitch trimmer being out of limit was probably due to the damaged pitch trimmer proximity switch sensor/target as a result of wear and tear.

5. REFERENCES USED IN THE REPORT

5.1 TSM (32-30-00-810-815A rev 56)
5.2 AMM 32-31-73-820-804-A
5.3 Flight Aware
5.4 Pilot questionnaire
5.5 Aircraft maintenance log 054085.

6. SAFETY RECOMMENDATION

6.1 None.

7. ORGANISATION

7.1 None.

8. SAFETY MESSAGE

8.1 None.

This Report is issued by:

Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa