

SYNOPSIS

OPERATOR : AERO SURVEYS LTD
(STARBOW)

MANUFACTURER : AVIONS DE TRANSPORT REGIONAL
(ATR)

MODEL : ATR 72 - 212A

NATIONALITY OF ACTUAL OWNER : IRELAND

NATIONALITY OF REGISTERED OWNER: GHANA

REGISTRATION MARK : 9G – SBF

PLACE OF ACCIDENT : KOTOKA INTERNATIONAL AIRPORT
ACCRA, GHANA (DGAA)

DATE OF ACCIDENT : 25 NOVEMBER 2017 AT 1220 HRS GMT

Notifications

A preliminary investigation team from GCAA conducted investigations on the same day at the accident site after the accident to examine, inspect and collect data and documentation from the aircraft to later enhance investigation.

Notification of the accident was dispatched on 26 November 2017 by Ghana Civil Aviation Authority to the following agencies in accordance with the requirements of Annex 13:

- a. Ministry of Aviation – Ghana
- b. Aviation Civile – France
- c. Transportation Safety Board – Canada
- d. Pratt and Whitney – Canada
- e. Aircraft Manufacturer – ATR
- f. The Accident Investigation Bureau – ICAO
- g. BEA – Bureau d’Enquetes et d’Analyses – France

Investigative Authority

The Ministry of Aviation pursuant to sub-section 13.6 of the Ghana Civil Aviation Amendment Act, 2016 (Act 906) constituted a five-member committee to investigate the accident. An invitation was extended to other stakeholders as per ICAO Annex 13.

The members of the investigation committee are as follows:

Air Commodore Nana Krakue (Rtd)	Chairman
Wing Commander Emmanuel Akatue (Rtd)	Safety Consultant
Group Captain Godfried Sackey Parker	Pilot
Squadron Leader Christopher Gaddah	Pilot/ Safety Officer
Mr Edward Agbodjan	Ministry of Aviation

Terms of Reference for Investigation Committee:

1. Establish the probable cause(s) of the accident.
2. Determine the extent of fatalities and injuries if any.
3. Establish the extent of losses or damage to property.
4. Consider other issues relevant to the interest of safety.
5. Make recommendations to forestall any future occurrence.
6. Come out with a preliminary report within 30 working days.

Releasing Authority

The report will be released by the Ministry of Aviation, Ghana.

Brief History Leading to the Accident

Flight IKM 104 was planned for departure to Kumasi from Accra. At approximately 1214hrs it was cleared to taxi to position on runway 21 and give way to Emirates which was backtracking to exit at the threshold of runway 21. Flight IKM 104 therefore gave way to the Emirates by taxiing onto the displaced threshold at runway 21. Reported visibility was 10km, however it had started drizzling by the time Flight IKM 104 started taxiing.

After the Emirates exited the active runway, IKM 104 was cleared for takeoff at about 1218hrs. During the takeoff run, the captain's seat inadvertently moved backwards. The captain handed over control to the co-pilot, which was duly acknowledged. Shortly after, the aircraft veered off

the runway and finally came to a stop about 600m from the edge of the runway after impacting the airport inner perimeter fence. The airport emergency response was activated.

One passenger was seriously injured and four others sustained minor injuries. There was substantial damage to the aircraft propellers, undercarriage and fuselage. The Precision Approach Path Indicator (PAPI) and the inner perimeter fence were also damaged.

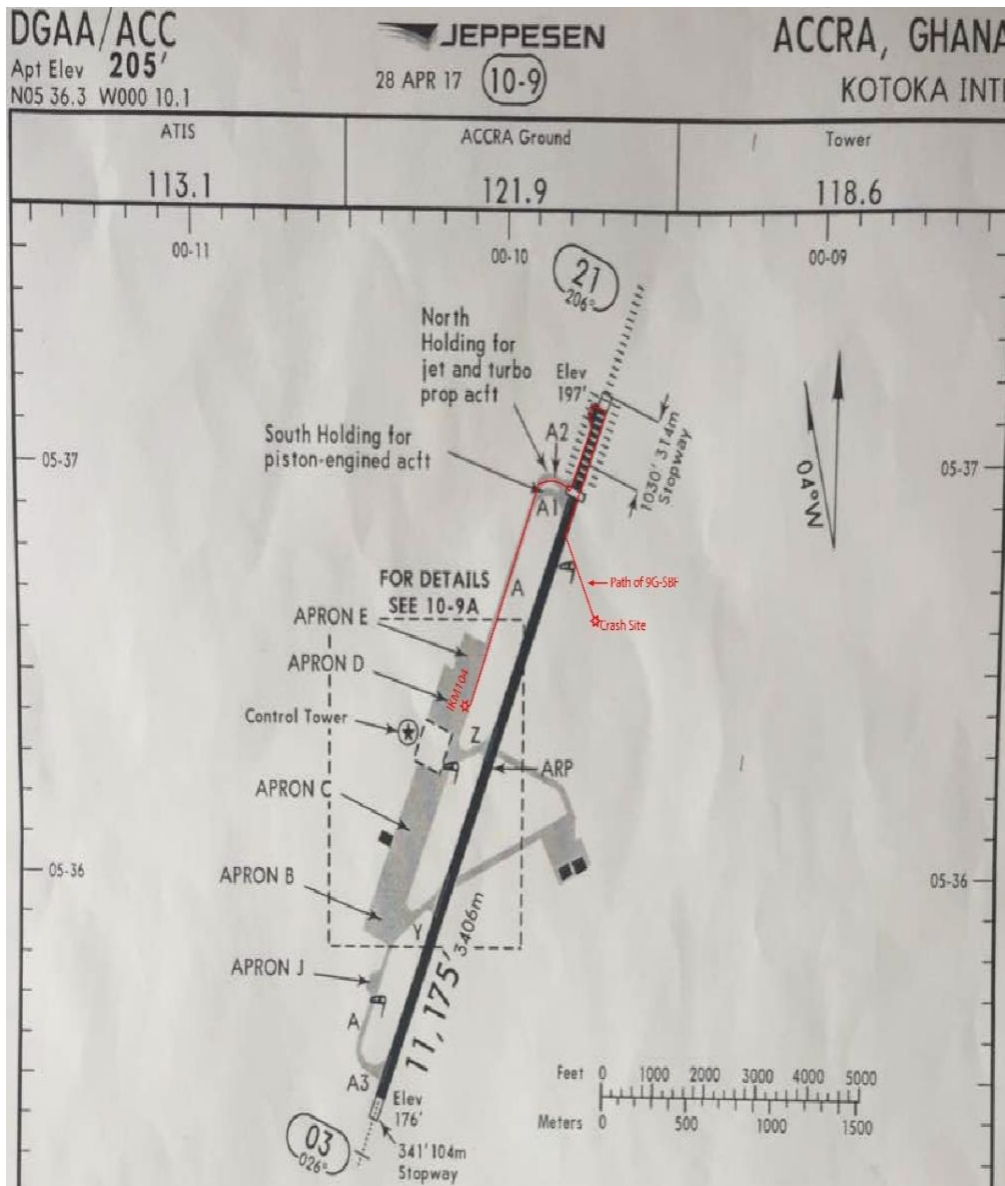


Figure 1: IKM 104 Path



Figure 2: Aircraft at impact Site

1.0 FACTUAL INFORMATION

1.1 Background

9G-SBF was leased from NAC Aviation, Ireland. The aircraft arrived in Ghana on Wednesday 22 November 2017 from Denmark after a scheduled 4-year maintenance. As part of the aircraft type inclusion certification, demonstration flights were conducted under the supervision of GCAA on Thursday 23 November 2017 and Friday 24 November 2017.

Starbow commenced commercial flights to Tamale and Takoradi on Friday 24 November 2017. On Saturday 25 November 2017 three flights were scheduled, two to Kumasi and one to Takoradi. The first flight to Kumasi and back was uneventful.

The second flight to Kumasi, IKM 104, was scheduled to depart at 1200 hours GMT. There were 60 passengers plus 3 infants and 5 crew on board the aircraft. Flight IKM 104 was cleared for taxi at approximately 1214 hours GMT via flight plan route and to maintain runway heading after takeoff for 6NM then turn right enroute to Kumasi. During the takeoff the aircraft veered off the runway to the left and came to a stop after impacting the fence at approximately 1220 hours GMT. The passengers were all successfully evacuated. There were no fatalities but five passengers were injured.

Kotoka International Airport (DGAA) is located in Accra, Ghana on latitude and longitude N 5° 36.26' / W 000° 10. 05' with an elevation of 205 feet MSL and a variation of 3°.

1.2 Injury to Persons

One passenger suffered serious injury requiring surgery later. Four other passengers with minor injuries were treated and discharged at the airport clinic.

1.3 Damage to Aircraft

The aircraft undercarriage, fuselage, engines and propellers sustained substantial damage.



Figure 3: Damages on various parts of Aircraft

1.4 Damage to Other Items

The aircraft's right main landing gear ran over the inner PAPI light (lettered D in figure 4) destroying it completely. In addition, about 30 meters of the aerodrome inner perimeter fence was also damaged.

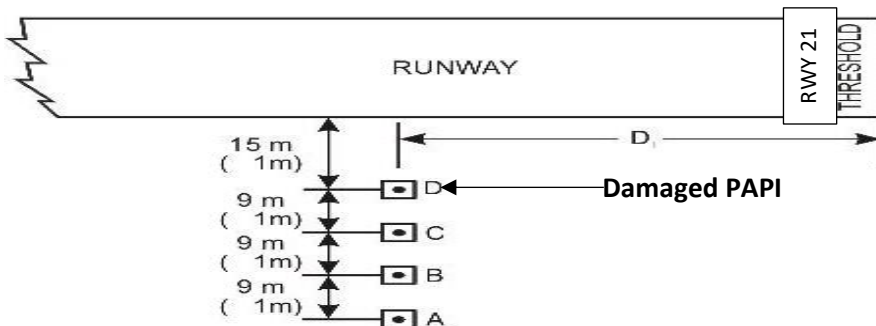


Figure 4: PAPI diagram

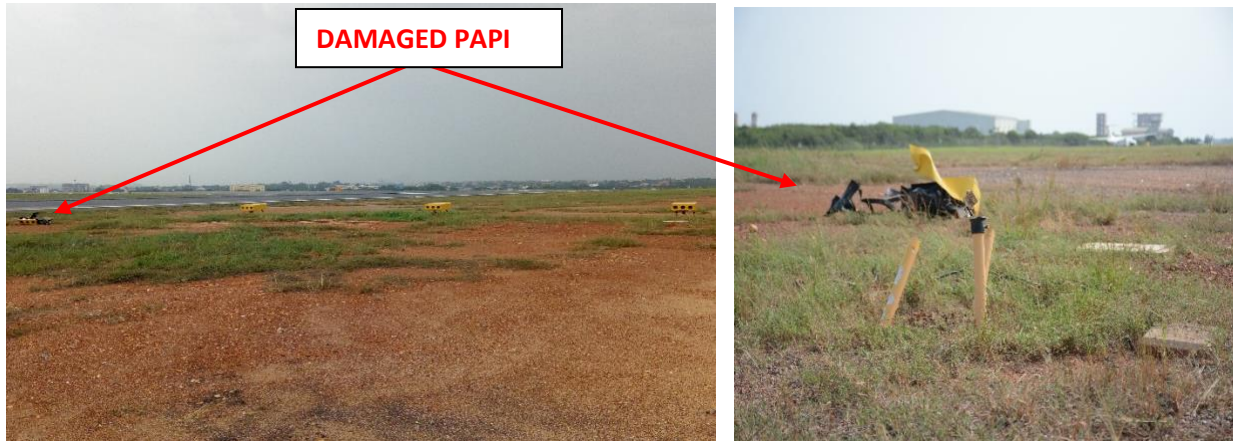


Figure 5: Damaged PAPI

1.5 Personnel Information

1.5.1 Captain

Nationality	:	Ghanaian
Gender	:	Male
Age	:	36
Licence type	:	Airline Transport Pilots Licence (ATPL).
Validity	:	10 October 2021
Instrument Rating	:	06 November 2018
Operator proficiency check	:	05 December 2016
Licence Proficiency check	:	07 November 2017
Medical certificate Expiry	:	03 October 2018
Aircraft Rating	:	LET 410, Beechcraft 1900, ATR 42-300, ATR 72-500, Embraer 170 Jet ATR 72-200
Total hours	:	6,500hours
Total on ATR 42/72	:	5400hours

1.5.2 First Officer

Nationality	:	Ghanaian
Gender	:	Male
Age	:	39
Licence type	:	Airline Transport Pilots Licence (ATPL).
Validity	:	31 May 2025
Instrument Rating	:	28 October 2018
Operator proficiency check	:	-

Licence Proficiency check	:	29 October 2017
Medical certificate Expiry	:	09 May 2018
Aircraft Rating	:	LET 410, ATR 72-500
Total hours	:	2,700 hours
Total on ATR 42/72	:	1,450 hours

The FO was previously employed by FLY 540 as a FO on the ATR 72. His last flight with FLY 540 was in January 2014. He flew the Piper Seminole in March 2014 to obtain his ATPL and did not fly again until he was employed by Aero Surveys Ltd in July of 2017. The accident occurred during his first day on the job as a FO having flown only one hour twelve minutes the morning before the leg that resulted in the accident.

1.5.3 Third Pilot

Nationality	:	French
Gender	:	Male
Age	:	25
Licence type	:	Airline Transport Pilots Licence (ATPL).
Validity	:	03 February 2018
Instrument Rating	:	23 October 2018
Operator proficiency check	:	-
Licence Proficiency check	:	24 October 2017
Medical certificate	:	07 July 2018
Aircraft Rating	:	ATR 42-300, ATR 72-500
Total hours	:	1,850 hours
Total on ATR 42/72	:	750hours

1.5.4 Purser

Nationality	:	Ghanaian
Gender	:	Female
Age	:	39
Licence type	:	Cabin Crew Member
Validity	:	31 October 2022
Aircraft Rating	:	ATR 72 500, AVRO
Medical certificate	:	19 September 2018
Training	:	CRM, DGs, Fire Fighting, First Aid.

1.5.5 Cabin Attendant

Nationality	:	Ghanaian
Gender	:	Female
Age	:	22
Licence type	:	Cabin Crew Member
Validity	:	17 November 2026
Aircraft Rating	:	ATR 72 200/500, AVRO
Medical certificate	:	17 May 2018
Training	:	CRM, DGs, Human Factors, First Aid.

1.5.6 Air Traffic Controller

The duty air traffic controller has been with Ghana Civil Aviation Authority for the past 7 years. He was recruited to Air Traffic Services department in 2010 as an Air Traffic Controller Trainee. He completed his ab-initio training at the Ghana Civil Aviation Training Academy in December 2010 after which he served the organisation between 2011 and 2013 as an air traffic controller assistant. He completed his aerodrome and approach procedural course in June 2013 in South Africa. After an on the job training in aerodrome, he received rating in April 2014 at the Kotoka International Airport. In September 2014 he was transferred to Tamale Airport where he was rated as an approach controller in December 2014. He worked as an approach controller in Tamale between December 2014 and November 2016 before being transferred to KIA where he has been working as an Aerodrome Controller.

1.6 Aircraft Information

1.6.1 General Information

Make and Model	:	ATR 72-212A
Serial Number	:	743
Registration	:	9G-SBF
Date of Registration	:	17 November 2017
Airworthiness Certificate	:	17 November 2017 – 5 January 2018.
Registered Owner	:	Aero Surveys Ltd
Actual owner	:	NAC Aviation Ltd, Ireland.

Total hours flown : 16,827.10 hours
 Total cycles : 15,684 cycles.
 1C check : 5 June 2008 @ 3,592.11 hours /3,397 cycles.
 2C check : 17 April 2010 @ 8,422.07 hours/ 8,142 cycles.
 3C check : 19 Feb 2011 @ 10,986.26 hours/ 10,455 cycles.
 4C check : 12 May 2014 @ 15,334.57 hours/ 14,393 cycles.

The last major check on the aircraft was completed on 23 June 2017 @ 16,823.26 hours and 15,682 cycles. The last major maintenance which resulted in a change of Number 1 power plant was completed on 10 November 2017@ 16,827.10 hours over 15,684 cycles.

1.6.2 Power Plant

Manufacturer : Pratt & Whitney.
 Make and model : PW 127F
 HSI interval : 4000 hours.

	<i>Engine 1</i>	<i>Engine 2</i>
Serial Number	PCE-EB0094	PCE-EB0273
Date of installation	10 Nov 2017	6 Jan 2014
Total hours since registration	12540.90	10747.20
Last major maintenance	HIS	Overhaul

1.6.3 Propellers

Manufacturer : Hamilton Sundstrand.
 Make and Model : 568F-1
 Serial Numbers : FR20070152 – engine 1
 FR20070153 – engine 2
 Date of installation : 12 May 2017.

Total hours since manufacture are not available due to poor record keeping by owners before NAC Aviation. The propeller blades were removed for overhaul and reinstalled.

1.6.4 Airworthiness, Weight & Balance

The aircraft had just come out of a 4-year major check and was airworthy prior to the flight. It had one outstanding Airworthiness Directive (AD) which was due on 30 December 2018 affecting both pilot and co-pilot seats. The AD was issued by EASA on 16 December 2016 to address the inadvertent movement of the cockpit seat. The AD was effective on 30 December 2016 and due on 30 December 2018. During the 4-year check, a works order was raised during the check for the implementation of the AD but it was not carried out Prior to the AD.

ATR had previously issued two AOMs on 2 April 2014 and 27 July 2016 advising operators on how to address the inadvertent seat movement, pending the final fix of the defect. A third AOM was also issued on 19 December 2016 on the same subject. The three AOMs were based on the SBs issued by the seat manufacture, IPECO. The AOMs and AD are attached as Appendix B-E of the report. ATR OEB is requesting the flight crew to ensure their seat is locked properly. In fact, even without AD embodied, as soon as the seat is locked, it will not move. The Purpose of the AD is to limit the backward travel movement due to improper seat locking.

The weight and balance sheet for the flight was checked and found to be okay.

1.7 Meteorological Information

The METAR issued at 1200Z read; wind 270°07KTS and variable between 230 and 300 degrees, unlimited visibility, clouds few at 2800 feet, temperature 30°C, dew point 23°C, QNH 1012 with no significant weather. At about 1214 hours it had started drizzling at the airport and by 1218 hours the entire airfield was engulfed in heavy rain and strong winds. The wind issued to Flight IKM 104 by ATC for takeoff was 100° 17 knots.

1.8 Aids to Navigation

The accident occurred in day light with all airport navigational aids available. The ILS, VOR, Radar were available. The PAPI was working normally together with the Runway End Identifier Lights (REILs) and Runway Lights.

1.9 Communication

There were adequate communication resources between Air Traffic control, RFFS and all major stake holders. The crew was in constant communication with the tower prior to the accident.

1.10 Aerodrome Information

KIA aerodrome serves both domestic and international operators and passengers. The airport has one runway 21/03 with length 11,174 ft and elevation of 205. The aerodrome is covered by fire and rescue capabilities of CAT 10 standard but rated CAT 9. See diagram below.

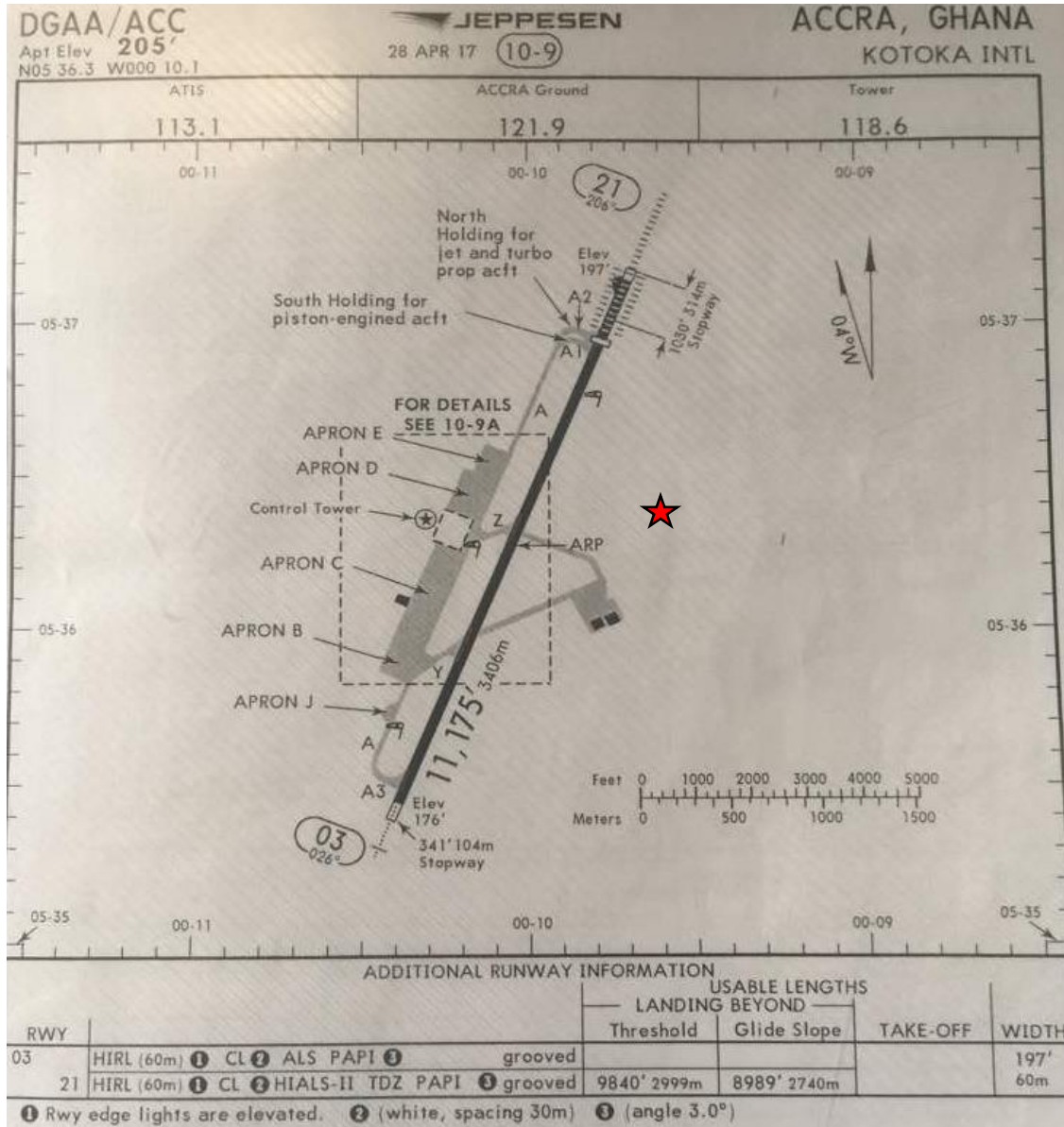


Figure 6: Airport Diagram

★ Incident site.

1.11 Flight Recorders

1.11.1 Flight Data Recorder

The Flight Data Recorder (FDR) was found in good condition and was sent to BEA in France for readout. The readout and decoding was observed by two members of the Investigation Committee and a representative of ATR.

The FDR parameter plots relevant to the event are attached as figures 14-17.



Figure 7: Flight Data Recorder

Manufacturer	:	L3 Communications
Model	:	FA2100
Part Number	:	2100 – 4043 – 00
Serial Number	:	000181814

1.11.2 Cockpit Voice Recorder

The Cockpit Voice Recorder (CVR) was found in good condition and was sent to BEA in France for readout. The readout and decoding was observed by two members of the investigation committee and a representative of ATR.

The technical report on the FDR and CVR readout is attached as Appendix G.



Figure 8: Cockpit Voice Recorder

Manufacturer	:	Fairchild Aviation Recorders
Model	:	A200S
Part Number	:	S200 – 0012 – 00
Serial Number	:	00549

1.11.3 Quick Access Recorder

The Quick Access Recorder was removed and sent to ATR for download and decoding.



Figure 9: Quick Access Recorder

1.12 Wreckage and Impact Information

The accident occurred on latitude N 05° 36'31'' and longitude W 000° 09'51'' approximately 160m east of the centre line of RWY 21 and 600m from the point where the aircraft exited the runway. The aircraft impacted the airport inner perimeter fence with both engines running. Considerable visible damage was done to the propeller blades on both engines with debris scattered within a 100m radius of the aircraft. The undercarriage sustained some damage and part of the inner perimeter fence was also damaged. Aircraft impact debris is illustrated in figure 10.



Figure 10: Aircraft impact debris distribution pattern



Figure 11: Debris of Damaged Propeller

1.13 Medical and Pathological Information

Nil.

1.14 Fire

There was no fire following the accident. The RFFS together with the Air Force Fire Department were on site.

1.15 Survival Aspects

The runway excursion was survived by all persons on board.

1.16 Test and Research

The seat was sent to IPECO for further examination and rotational test. The result is attached as Appendix H.

1.17 Organisational and Management Information

1.17.1 Aero Survey Limited (Starbow)

1.17.1.1 History

Aero Survey Limited was certified in 2007 to perform domestic air shuttle services. They operated two Embraer EMB 110 Bandeirante. In 2011, the airline changed ownership and modified its operations to include domestic scheduled flights with the brand name Starbow. It began operations on 26 September 2011 providing domestic transport services with the BAE 146 – 300 aircraft.

In June 2015 Starbow supplemented its operations with a wet leased ATR 72 aircraft operated by SwiftAir S.A. In December 2017 the company ceased operating the BAE 146 – 300 and deregistered the last aircraft on 13 December 2017. Starbow entered into an agreement with NAC Aviation, Ireland, to dry lease two ATR 72 – 212A. The first aircraft, 9G-SBF was received on 22 November 2017 and the second was to arrive at a later date.

1.17.1.2 Organisational Charts

The company and flight operations organisational charts are as shown below.

1.17.1.2.1 Company

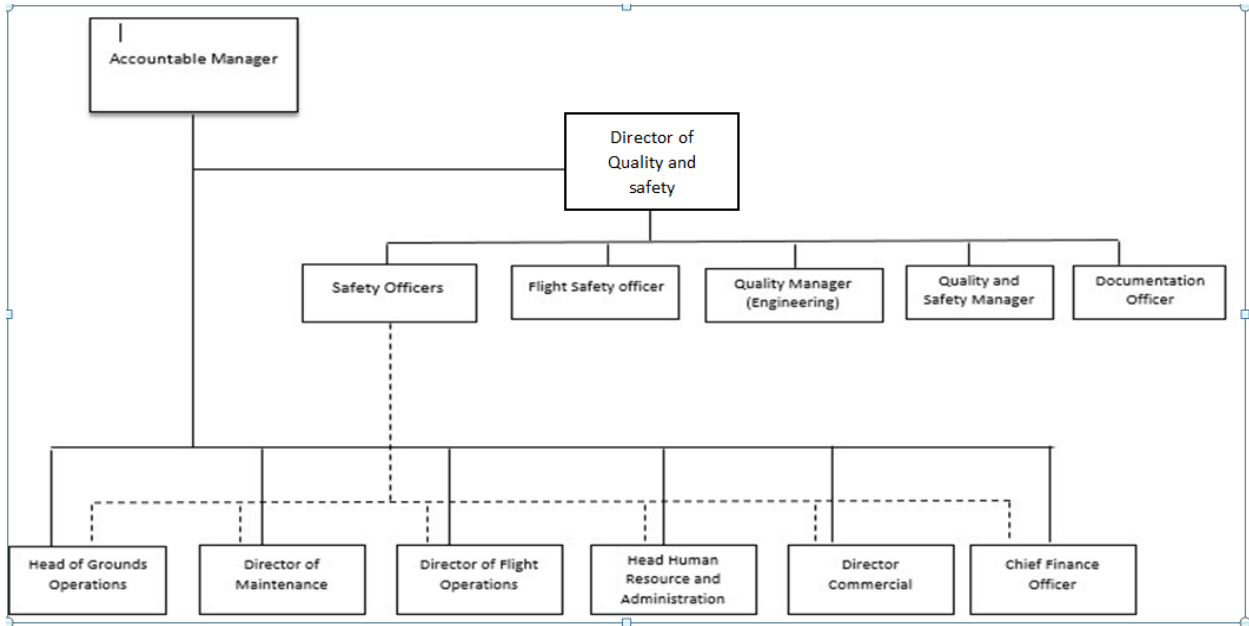


Figure 12: Company

1.17.1.2.2 Flight Operations

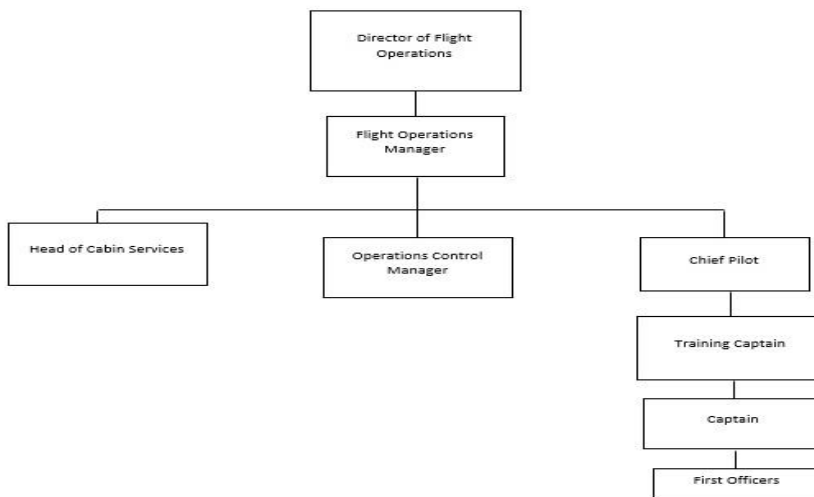


Figure 13: Flight Operations

Currently, the captain holds the positions of Director of Flight Operations, Chief Pilot and Training Captain.

1.18 Additional Information

Nil.

1.19 Useful or Effective Investigation Techniques

Nil.

2.0 ANALYSIS

2.1 FDR/ CVR (refer to *figures 18 to 21*)

1. IKM 104 was scheduled for departure to Kumasi at 1200 hours.
2. The weather was VFR, however conditions changed rapidly to IMC due to heavy rain. No weather warning was issued by ATC.
3. IKM 104 was cleared for taxi via A and A2 to backtrack on the displaced threshold to make way for Emirates to exit the runway at A1 which the crew complied.
4. The crew were not heard performing any checks except, “gustlock” before takeoff.
5. At about 63 knots, a sound is heard on the CVR indicative of a seat movement which is consistent with the captain’s report that his seat moved backwards inadvertently to the aft stop position and failed to lock. The captain handed over controls to the co-pilot which was acknowledged.
6. Crew was not aware that the aircraft was going off the runway during the takeoff until the aircraft was almost at the edge of the runway. At this point the storm had hit the airfield, it had started raining heavily and the windshield wipers were operating at maximum speed.
7. On realising that the aircraft was going off the runway, the crew initiated action to abort the takeoff by bringing the power levers to ground idle and tried to maintain directional control with the rudder. However, reverse thrust was not selected.
8. The aircraft reached 94 knots before decelerating gradually and thereafter impacted the inner perimeter fence with both engines running.

2.1.1 Operational Analysis

1. The takeoff run was initiated just as the airport was being engulfed in thundery rain.
2. The wind information from ATC was 100° at 17knots.
3. The crew was in a hurry to takeoff ahead of the incoming storm.
4. The captain handed over controls to the co-pilot after the inadvertent movement of his seat, which appeared to have occurred around 63 knots. The same crew had experienced a

similar inadvertent seat movement on their morning flight from Kumasi to Accra in which the captain handed over control to the co-pilot and the co-pilot continued the takeoff without any incident.

5. On this Flight IKM 104, at the time the captain handed over controls to the co-pilot, the aircraft was left off centreline and heading approximately 6° off.
6. The entire takeoff run up to the point of runway exit was done on one half of the runway.
7. The crew appeared to have lost situational awareness during the takeoff run.
8. Before initiating the takeoff, the crew should have anticipated the effect of the rain and winds from the storm and their priority should have been to ensure that the aircraft was properly aligned on the centreline and taken the necessary corrective measures to ensure that the aircraft remained on the centreline during the roll.
9. There was poor crew resource management in the entire flight. The captain performed most of the activities in the cockpit and the crew did not follow the company SOPs. For instance;
 - a. Radio communications with ATC was handled solely by the captain.
 - b. The taxi was done by the captain and followed the track shown in *figure 14*. The aircraft barely stayed on the centre line throughout the taxi.
 - c. No reading of checklist or pre-departure brief was heard prior to the take off.
 - d. Aircraft positioned for takeoff on the left side of runway centreline.
 - e. No call outs were heard during the takeoff run.
10. In addition to normal braking, selection of emergency brakes and use of reverse thrust could have decelerated the aircraft faster and prevented the collision of the aircraft with the inner perimeter fence.
11. The captain's seat inadvertently moved during the takeoff because it was not properly locked. It was the captain's responsibility to ensure that his seat was properly locked prior to take off as recommended by ATR in its AOMs. Starbow should have incorporated the recommendations in the AOMs into their SOPs and ensured compliance by their pilots.



Figure 14: FDR Flight Path

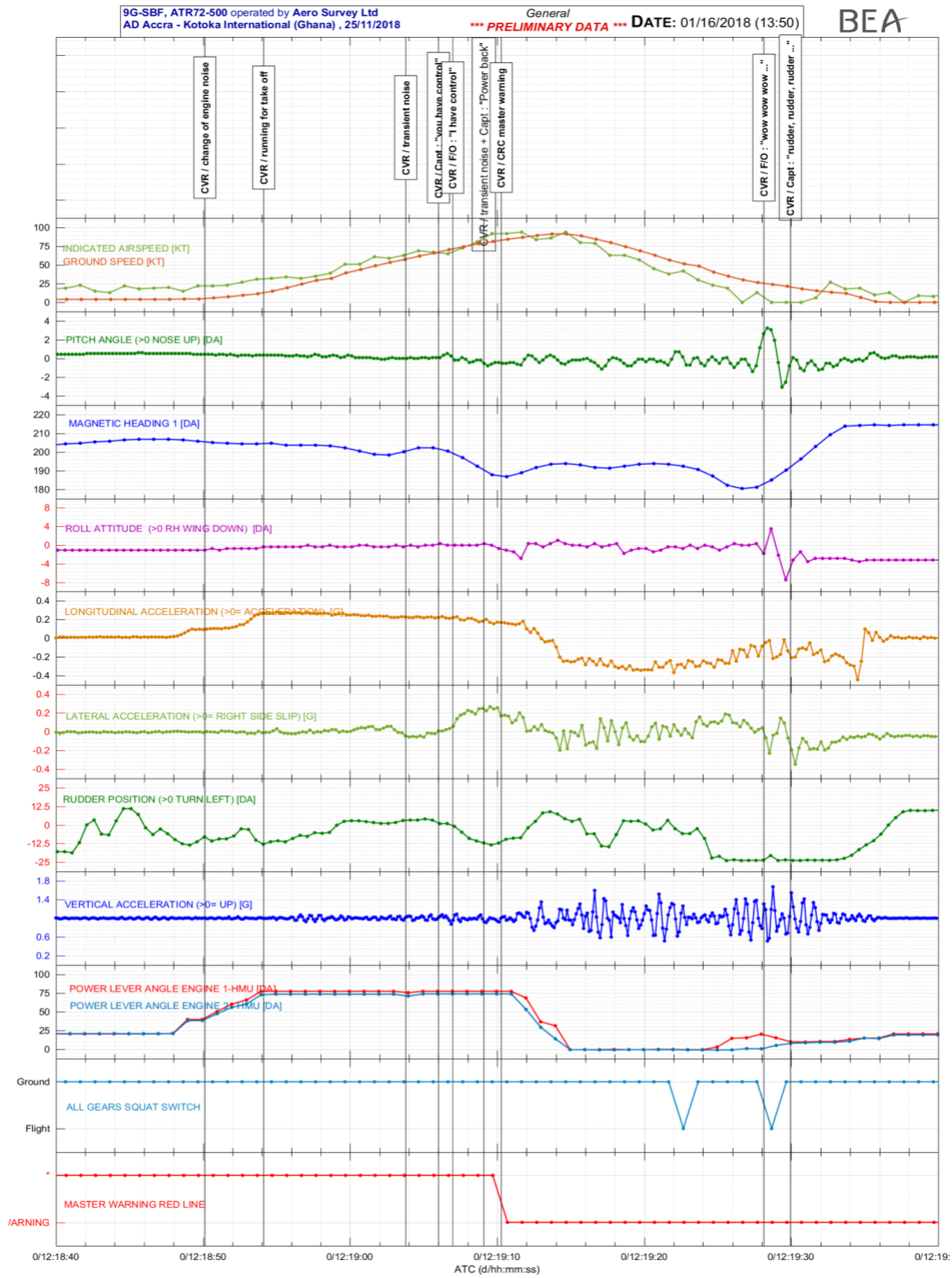


Figure 15: FDR Graph General

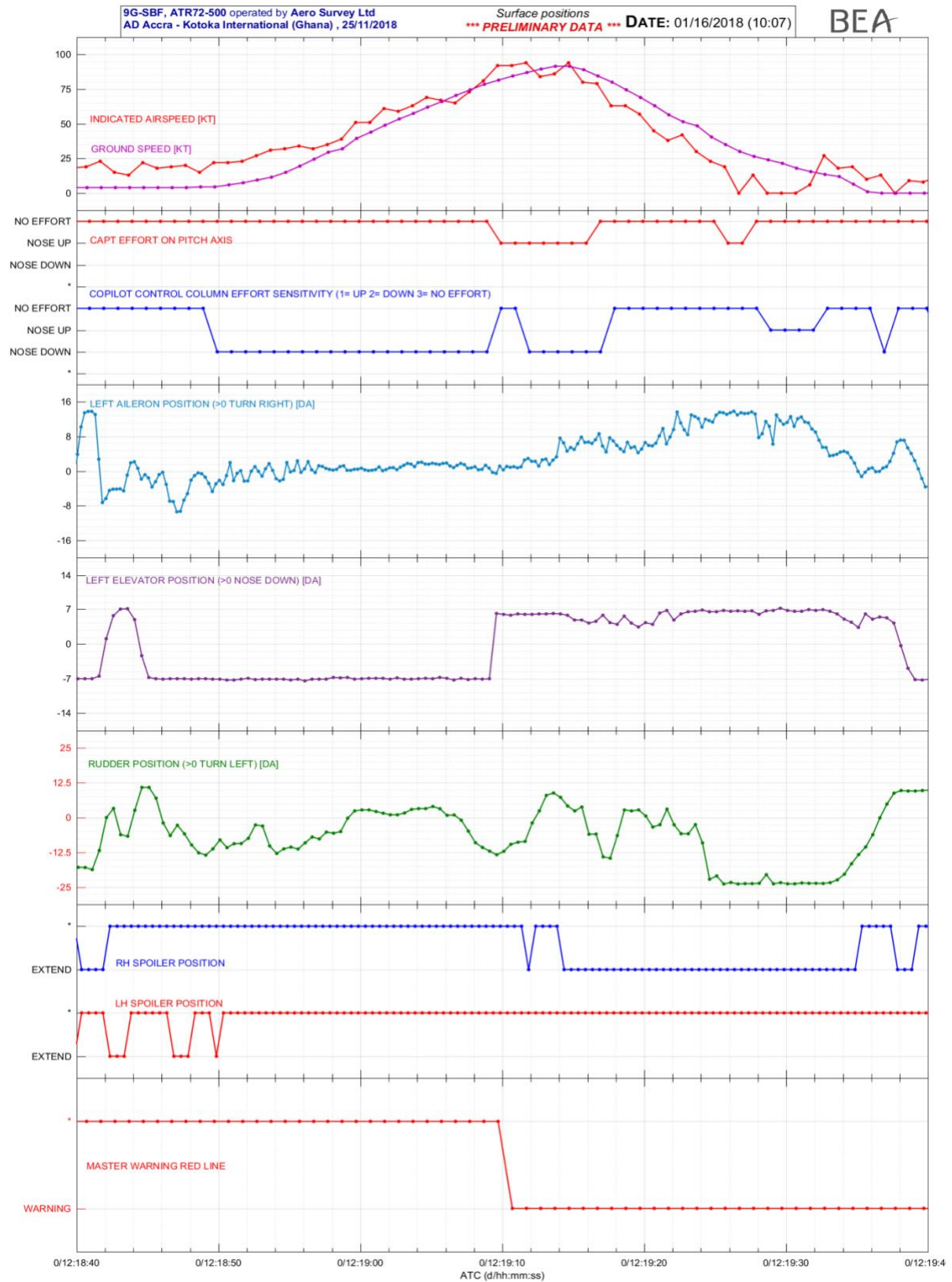


Figure 16: FDR Graph Commands

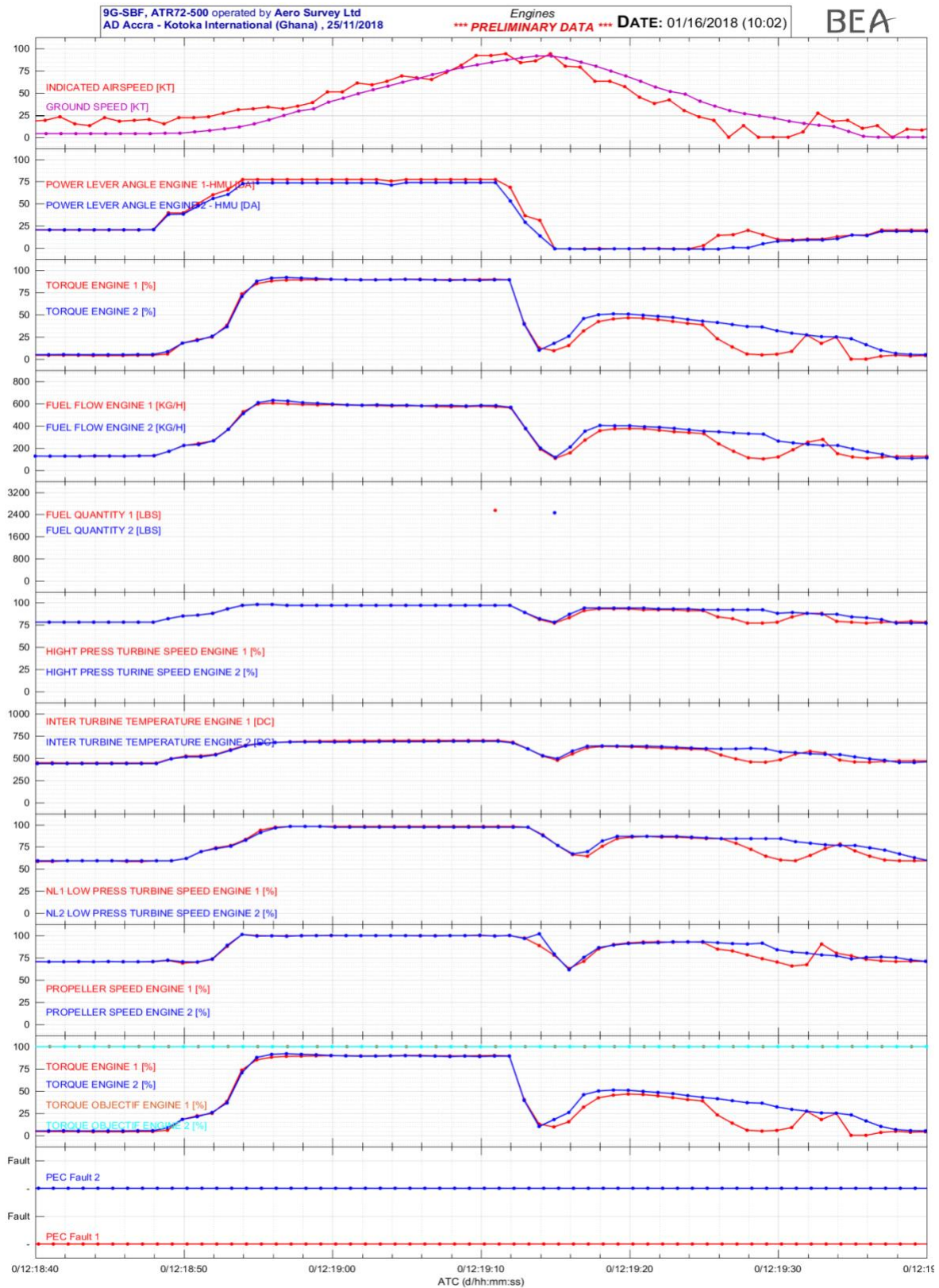


Figure 17: FDR Graph Engines

2.2 Maintenance

1. During the 4-year check, a job card was raised for the implementation of EASA AD No 2016-0256 in respect of the captain and co-pilot's seats. However, the work was deferred and the status remained open with due date 30 December 2018. The AD highlighted the need to secure and lock the seat in its required position. Even though the due date of the AD was 30 December 2018, given that this was a new aircraft type inclusion, the operator had the opportunity for the modification to be implemented prior to taking delivery of the aircraft from NAC.
2. The GCAA certification team became aware of the non-implementation of the AD during their inspection. Since this was a new aircraft type inclusion the CAA should have advised the operator to take the opportunity to implement the AD prior to the issuance of the certificate of airworthiness.
3. An initial examination of the seats after the accident revealed the following;
 - a. A broken spring on the right horizontal track locks system of the captain's seat as shown in figure 18.
 - b. Both alignment washers (packers) were not in place on the captain's seat. (*Refer to figure 20*)
4. In the case of the co-pilot's seat, all springs and washers were intact. Also, while all other springs looked black (*refer to figure 19*), that on the captain's seat looked ash in colour (*refer to figure 18*), an indication that the broken spring may have been replaced during maintenance.
5. Further examination and rotational test on the seat by IPECO revealed the following;
 - a. Roll back of the seat is impossible when the pins are correctly locked into the rails. Thus the seat was unlocked during take-off roll.
 - b. A substantial rotational play is present on this seat. This play seems to be the cause of the difficulties of stopping a roll back from an unlocked position.
 - c. The cause of the rotational play could not be identified.
 - d. The failure of the right spring may have contributed to the fact that the roll back was not stopped during take-off roll.
 - e. The incorrect fitting assembly of the spring (missing washers) may have contributed to the failure of the right spring. “

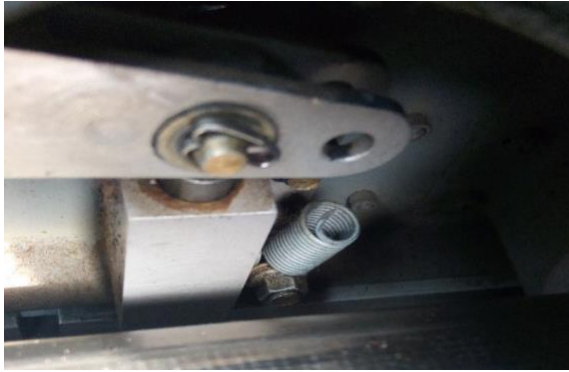


Figure 18: Broken Spring on Captain Seat



Figure 19: Normal Spring



Figure 20: Missing Washer(Packers) on Captains Seat

Washers (Packers)

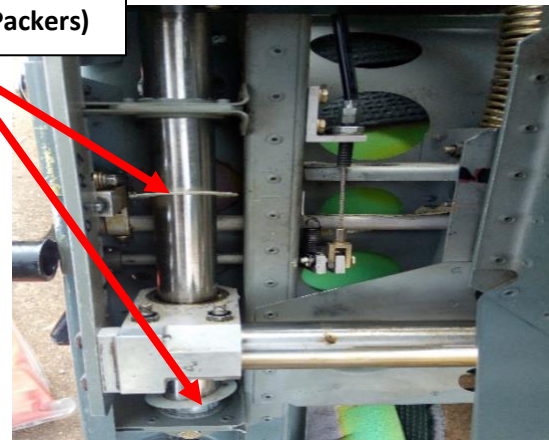


Figure 21: Washers (Packers)

2.3 Post Accident Actions

1. The Duty Air Traffic Controller activated emergency rescue actions. Three fire trucks were dispatched to the scene from the RFFS plus another fire truck from the Air Force Base. The RFFS arrived at the scene after four minutes. An ambulance and a pickup vehicle were also dispatched by the RFFS to the scene. Another ambulance from the Airport Clinic with a medical team was dispatched to the scene. Efforts were made to rescue passengers in the rain using the fire tender.

2. Passengers disembarked through the rear service door with the assistance of the RFFS who provided a ladder. The disembarkation and movement of passengers to the holding area at the RFFS lasted over 40 minutes. Passengers should have been evacuated quickly out of the aircraft instead of holding them in the aircraft and disembarking them as and when vehicles became available.

3. The operator failed to provide transport and other services to the passengers at the accident scene and thereafter. The operator appeared unfamiliar with their responsibilities in respect of post-accident passenger handling.
4. Vehicular movement to and from the accident scene was extremely difficult due to the soggy nature of the terrain. A fire tender got stuck at some point during the evacuation.
5. Preliminary investigation of aircraft accidents in Ghana, handled by the GCAA, is on an adhoc basis under the direction of the Director Safety Regulations and the GCAA accident investigations Coordinator. There was no toxicology test and no post-accident physical medical examination was conducted on the crew because this was not requested by the preliminary investigation team (PIT). The PIT did not provide a list of possible witnesses and their contact details. This caused delays in locating witnesses to appear before the committee. GCAA should develop adequate procedure for handling preliminary investigations.

3.0 CONCLUSION

3.1 Contributory Factors

Factors that contributed to the accident include the following;

1. The rain storm that affected the airfield during the takeoff.
2. Loss of situational awareness in the takeoff process.
3. Inadvertent movement of the captain's seat.
4. Improper procedure in aborting the takeoff.
5. Poor crew resource management.

3.2 Causal Factors

It is the opinion of the committee that the causal factors which led to the accident include;

1. Loss of situational awareness on the part of the cockpit crew, leading to runway excursion.
2. Failure by the crew to execute correct procedure in aborting the takeoff.

3.3 FINDINGS

3.3.1 Operational

1. The aircraft had just arrived from a major check in Germany and Denmark.
2. The crew were qualified on the aircraft.
3. The captain and FO had 5,400 and 1,450 hours on type respectively. The third crew member had 750 hours on type.
4. The captain had flown a total of 23 hours 30 minutes in five days prior to the accident including the ferry flight from Denmark, and was due to take his mandatory rest the following day.
5. The Captain was PF and FO was PNF

6. There were sixty passengers, three infants and five crew on board at the time of the accident.
7. The weather was VFR, however conditions changed rapidly to IMC due to heavy rain. No weather warning was issued by ATC. The wind information from ATC was 100° at 17knots.
8. IKM 104 was cleared to taxi via A and A2 to backtrack on the displaced threshold and make way for Emirates to exit the runway at A1 which the crew complied.
9. The crew were not heard performing any cockpit checks, except gustlock before takeoff.
10. Just before the takeoff, the airport was engulfed in thundery rain due to the storm, necessitating operation of the aircraft's wind shield wipers at max speed.
11. Take off was initiated from the left side of the centre line and an attempt was made to realign the aircraft, thereafter the aircraft veered left and continued in that direction until it finally exited the runway.
12. At about 63 knots, the captain's seat moved backwards inadvertently to the aft stop position and failed to lock. The captain handed over controls to the co-pilot which was acknowledged.
13. At the time of handing over controls, the aircraft was heading approximately 6° off its intended path.
14. At approximately 80 knots, the crew initiated action to abort the takeoff by bringing the power levers to ground idle and tried to maintain directional control with the rudder. However, reverse thrust was not selected.
15. The aircraft reached 94knots before decelerating gradually.
16. The aircraft hit the inner PAPI light (lettered D in figure 4) and continued on its path until it impacted the airport inner perimeter fence and came to a stop.
17. Both engines were shut down, the aircraft was secured by the crew and the captain ordered for deplanement.
18. The captain did not address the passengers.
19. ATC activated emergency response procedures and informed the crew.

20. The RFFS responded and assisted with the safe evacuation of the passengers.
21. The Airport Clinic dispatched an ambulance and medical staff to the scene to assist.
22. There was one serious injury that required surgery later and four minor injuries.

3.3.2 Maintenance

23. An AD on the ATR 72 crew seat inadvertent movement during various phases of flight was issued by EASA effective 30 December 2016 and due 30 December 2018.
24. The AD was applicable to both captain and co-pilot seats of 9G-SBF and had not been implemented prior to the accident.
25. On inspection after the accident;
 - a. The right horizontal track lock system spring on the Captain's seat was found broken. The broken spring was ash in colour whereas all other springs on both captain and co-pilot seats were dark. (*Figure 18*).
 - b. Two seats-to-groove alignment washers (packers) on the captain's seat were not in place.
26. No operational procedure had been developed by the operator for handling the inadvertent seat movement pending the final fix.

3.3.3 Airport Operations

27. RFFS called the airport clinic 10 minutes after ATC triggered the emergency.
28. The ambulance from the airport clinic arrived late at the site, over 14 minutes after ATC triggered the emergency.
29. The ambulance located at the fire station was unserviceable on the day in question.
30. The RFFS arrived at the accident site after four minutes which is beyond the recommended 2-3 minutes response time.
31. RFFS fire tenders were used to convey passengers from the accident site to the fire station.

32. Vehicular movement to the accident scene was difficult due to the soggy nature of the ground.

3.3.4 Operator

33. The Captain holds several important positions that has a potential to lead to high workload.

34. The airline had not developed its own procedures in line with the recommendations of ATR's AOMs to deal with the safety issues of the crew seat inadvertent movement during takeoff or other critical phases of flight.

35. After the accident the crew took several minutes to disembark the passengers rather than evacuate, even though they had no way of knowing if there was any imminent danger such as fire.

SAFETY RECOMMENDATIONS

1. The operator should ensure that the AD No 2016-0256 is effected on all subsequent ATRs they add to their fleet.
2. Starbow should organise a re-training of its crew to include the following:
 - a. CRM.
 - b. Aborted/rejected takeoff procedures.
 - c. Passenger evacuation procedures.
3. Pilots should exercise extra caution when taking off in adverse weather conditions.
4. Starbow should always evaluate the implementation of all ADs and SBs conclusively and ensure that the recommendations contained therein are incorporated in the company's SOPs and maintenance procedures and that all personnel are familiar and comply.
5. GACL should ensure that operators have the necessary agreements with ground handlers to provide transport for uninjured passengers in case of an accident at the airside as per Part 7 of the Airport Services Manual.
6. The inner perimeter access road should be extended from the RFFS station to the beginning of runway 21 and tarred to aid vehicular movement in emergency situations.

APPENDICES

Appendix A – Notification of Aircraft Accident

Ghana Civil



Aviation Authority

Our ref: SRD /AIG/30

26th November, 2017

Your ref:

Director General D'Aviation Civil
51 Rue Henry FARMAN
75720 PARIS 6^{dis} 15
FRANCE

ATTN: Patrick.Gandil@aviation-civile.gouv.fr

Dear Sir,

NOTIFICATION OF AIRCRAFT ACCIDENT

=====

Please find below details about Civil Aircraft Accident which occurred soon after commencement of take-off roll at Kotoka International Airport (KIA) in the Republic of Ghana.

- a) **ACCID**
- b) **Type of Aircraft/Reg.** : ATR72-212A / 9G-SBF
- c) **Name of Operator** : Aero Surveys Ltd. (Starbow)
- d) **Pilot- in- Command** : [REDACTED]
- e) **Date and Time of Accident** : 25th November, 2017 at 12:38 GMT (Local Time)
- f) **Last point of departure and point of intended landing** : Kotoka International Airport-Accra/Kumasi
- g) **Location of Accident** : On ground (Kotoka International Airport -Accra)
- h) **Number of crew and Passengers** : 05 Crew (03 Cockpit/02 cabin) and 63 passengers on board.
- i) **Nature of the Accident** : During take-off roll and before the aircraft gathered speed to reach 70 knots, the captain's seat suddenly moved full backwards violently and shifted to the left. Whilst controlling the aircraft with the nose wheel steering, the violent seat movement led to the captain turning the tiller to the left causing the aircraft to veer off/excure the runway. The Captain could not gain control of the aircraft until it came to a stop close to the perimeter fence after efforts by the Co-pilot to retard the power levers. After procedures to secure the aircraft was performed, the passengers were disembarked with five (5) injured.

Ghana Civil



Aviation Authority

Our ref:

Your ref:

- j) **Indication to what extent investigation would be conducted :** Investigation by Independent Investigation body set-up by the Ministry of Aviation.
- k) **Physical Characteristics of the Incident area:** Rainy day with wet runway conditions.
- l) **Identification of originating Authority:** Ghana Civil Aviation Authority, Accra- Ghana.
For additional information Contact
Mr. Daniel Acquah, Director Safety Regulation.
Telephone: +233 30 255 0298
Mobile: +233-202224051
Fax: +233 30 277 3293
E-mail: dacquah@gcaa.com.gh

SIGNED BY

DANIEL ACQUAH
DIRECTOR, SAFETY REGULATION
FOR: DIRECTOR-GENERAL

Cc: Senior Investigator
Air Investigation Branch
Transport Safety Board
Fax: +1-819-953-9586
Email: Beverly.harvey@tsb.ca

Pratt and Whitney
100 Marie-Victorin
Longueuil, Quebec
J41A1 Canada
Email: cfirst@pwc.ca

ATR
1, Allee Pierre Nadot
31712 BLAGNAC cedex
FRANCE.
Fax: +33 (0) 05.62.21.62.11

Ghana Civil



Aviation Authority

Our ref:
Your ref:

The Accident Investigation Bureau
999 University Street, Montreal Quebec
Canada H3C 5H7
Fax: +1 (514) 954-6077
Tel: +1 (514) 954-8219
Email: AIGInbox@icao.int

BEA – Bureau d'Enquêtes et d'Analyses
Batiment 153, 200 rue de Paris
Zone Sub
Aéroport du Bourget
F – 93352 Le Bourget cedex
France
Tel: +33 1 49 92 72 00
Fax: +33 1 49 92 72 03
Email: com@bea-fr.org

Private Mail Bag
Kotoka International Airport
Accra, Ghana

Tel: (233)-(30) 2776171
Fax: (233)-(30) 2773293
E-mail: info@gcaa.com.gh

Site: ACCXYF
AFTN: DGAAYFYX
Website: www.gcaa.com.gh

Safety & Security, Our Priority

Appendix B – AOM 1 issued 2 April 2014**ALL OPERATORS MESSAGE**

Date: 02nd April 2014

Ref AOM: 42/72/2014/04 issue 1

This AOM is for information only and does not give instructions to Operators. It advises Operators of matters, which are currently, either under investigation or dealt with by ATR. However, Operators may consider initiating their own action. This AOM may be re-issued to inform Operators of the closing action (Service Bulletin, No action required, etc...).

Aircraft model: ATR42 & ATR72 all models

ATA: 25

SUBJECT: Equipment / Furnishing – Inadvertent cockpit seat movement

REASON

The aim of this AOM is to inform ATR operators that inadvertent cockpit seats movements during flight and ground phases have been reported. Investigations are currently conducted by IPECO (seat manufacturer) to address the root cause of the issue, since inadvertent cockpit seat movement may lead to potential unsafe condition if it occurs during take-off phase.

DESCRIPTION

Results of investigations conducted up to the date of this AOM are the following:

- When the seat is adequately adjusted/locked (3 pins of the horizontal locking system are fully engaged inside the associated track lock pin holes), inadvertent cockpit seat movement cannot occur. ATR decided to issue specific Operation Engineering Bulletin (OEB) (included in the FCOM) detailing the operational procedure to confirm that the cockpit seats are fully locked after seat adjustment. This OEB :
 - Is available in the last revision (December 2013) of the FCOM for ATR72 equipped with MOD 5948.
 - Will be available for all other ATR models before the end of the year through normal revision process or temporary revision if needed.
- Some in-service cases are suspected to be due to inappropriate maintenance actions. For this reason, IPECO decided to update the related CMMs to add and give more details on some particular points. IPECO has already sent Service Information Letters to inform Operators about the CMM modifications.

**ALL OPERATORS MESSAGE**

Date: 02nd April 2014

Ref AOM: 42/72/2014/04 issue 1

RECOMMENDATION

To address the potential unsafe condition until adequate final fix is available, ATR recommends Operators:

- To follow the FCOM operational procedure described in the Operation Engineering Bulletin attached hereto.
- To take into account the CMM modifications provided by IPECO in the SILs attached hereto.

REFERENCE DOCUMENTS

- ATR Operation Engineering Bulletin here attached
- IPECO SIL 1174 issue 01 dated 24th March 2014 here attached
- IPECO SIL 1175 issue 01 dated 24th March 2014 here attached
- IPECO SIL 1176 issue 01 dated 24th March 2014 here attached

A handwritten signature in black ink, appearing to read 'D. CAILHOL', is written over a faint, circular stamp or watermark.

D. CAILHOL
ATR Continued Airworthiness Director
Email: continued.airworthiness@atr.fr



SERVICE INFORMATION LETTER 1174

EASA PART 21 SUBPART G APPROVAL NO UK. 21G.2071

TO: IPECO AIRCRAFT CREW SEAT CUSTOMERS

FROM: IPECO TECHNICAL DEPARTMENT

APPLICATION

Ipeco Pilot and Co-Pilot crew seats of the following part numbers, installed in the ATR42/72 aircraft.

Pilot Seat P/N

3A063-0079-01-*
3A063-0079-02-*
3A063-0079-03-*

Co-Pilot Seat P/N

3A063-0080-01-*
3A063-0080-02-*
3A063-0080-03-*

-* Indicates seat configuration control number

SUBJECT

Additional maintenance information.

REASON

To clarify disassembly and assembly instructions as a result of a customer incident report about unwanted horizontal movement of the seat.

APPLICABLE DOCUMENTS

Ipeco Component Maintenance Manual 25-11-21 (SM634).

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Date: 24th March 2014
Issue: 1
Page: 1 of 10

MATERIAL COST AND AVAILABILITY

Refer to IPECO Sales Department or IPECO INC for current cost information applicable to this Service Information Letter.

Instructions for ordering

Purchase Order to be issued to:

Ipeco
Sales Department
Aviation Way
Southend-on-Sea
Essex
SS2 6UN
England

TELEPHONE: 01702 549371
E-MAIL: sales@ipeco.co.uk

Parts will be available 4-6 weeks on acceptance of the purchase order.

Operators in the North American market should order from:

IPECO INC
2275 Jefferson Street
Torrance
California 90501
USA

TELEPHONE: 310-783-4700
E-MAIL: sales@ipecoinc.com

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INFORMATION

Add the procedures that follow to the Repair section of CMM 25-11-21.

Replacement of the Tension Springs

NOTE: The seat must be removed from the aircraft before you do the procedures that follow.

CAUTION: IF ONE TENSION SPRING (IPL FIG. 5, ITEM 135) IS REPLACED WITH NEW, MAKE SURE THAT BOTH TENSION SPRINGS (IPL FIG. 5, ITEM 135) ARE REPLACED WITH NEW.

1. Remove one tension spring (IPL Fig. 5, item 135) from each lever (IPL Fig. 5, item 162) as follows (see Figure 1):
 - a. Remove one nut (IPL Fig. 5, item 132).
 - b. Remove one washer (IPL Fig. 5, item 129).
 - c. Remove one end of the tension spring (IPL Fig. 5, item 135).
 - d. Remove one washer (IPL Fig. 5, item 126).
 - e. Remove the other end of the tension spring (IPL Fig. 5, item 135) from the lever (IPL Fig. 5, item 162).

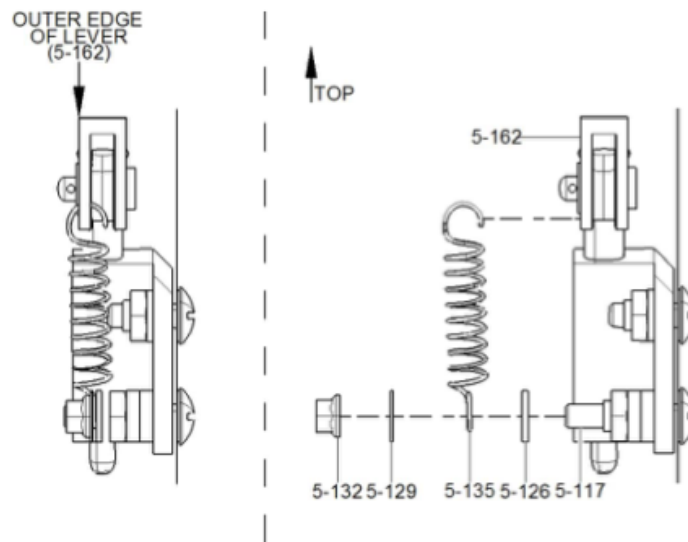


Figure 1
Tension Spring

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CAUTION: DO NOT TWIST THE END LOOP OF THE NEW TENSION SPRING (IPL FIG. 5, ITEM 135). THIS MAY CAUSE DAMAGE TO THE TENSION SPRING (IPL FIG. 5, ITEM 135).

2. Crop one end of the new tension spring (IPL Fig. 5, item 135) as shown in Figure 2.
3. Install one tension spring (IPL Fig. 5, item 135) onto each lever (IPL Fig. 5, item 162) as follows (see Figure 1):
 - a. Put the cropped end of the tension spring (IPL Fig. 5, item 135) onto the lever (IPL Fig. 5, item 162) as shown in Figure 1.

NOTE: Make sure that the tension spring (IPL Fig. 5, item 135) is put into the hole on the outer edge of the lever (IPL Fig. 5, item 162).

- b. Install one washer (IPL Fig. 5, item 126) onto the bolt (IPL Fig. 5, item 117).
- c. Install the other end of the tension spring (IPL Fig. 5, item 135) onto the bolt (IPL Fig. 5, item 117).
- d. Install one washer (IPL Fig. 5, item 129) onto the bolt (IPL Fig. 5, item 117).
- e. Install one nut (IPL Fig. 5, item 132).

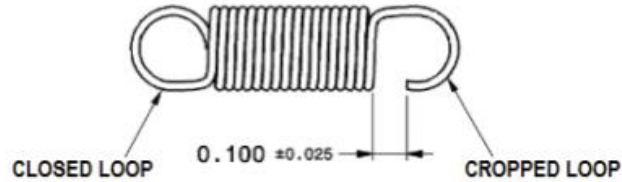


Figure 2
Cropped Spring

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Add the procedures that follow to the Assembly section of CMM 25-11-21, paragraph 8.B.8. (page 709).

NOTE: If one or more tension springs (IPL Fig. 5, item 135) is replaced with new, refer to Repair section for the installation procedure.

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Add the procedures that follow to the Check section of CMM 25-11-21, CHECK 2 (page 502).

Eccentric Pivot

1. If the occupant of the seat thinks that there is free movement between the column and the base structure during vertical adjustment of the seat, adjust the eccentric pivot (IPL Fig. 8, item 39) as follows:

CAUTION: DO NOT OVER TIGHTEN THE ECCENTRIC PIVOT (IPL FIG. 8, ITEM 39). THIS WILL HAVE AN UNWANTED EFFECT ON THE VERTICAL ADJUSTMENT OF THE SEAT.

- a. Turn the eccentric pivot (IPL Fig. 8, item 39) clockwise as shown in Figure 3.
2. If the occupant of the seat thinks that the seat does not move easily during vertical adjustment of the seat, adjust the eccentric pivot (IPL Fig. 8, item 39) as follows:
- a. Turn the eccentric pivot (IPL Fig. 8, item 39) counterclockwise.

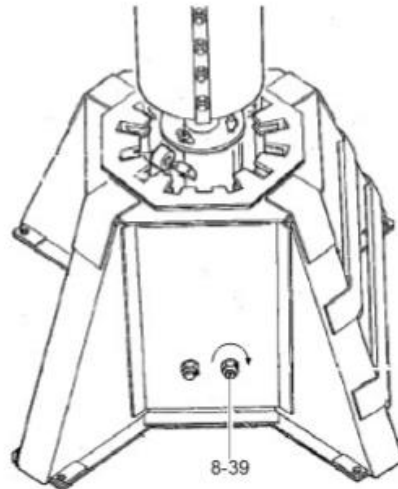


Figure 3
Eccentric Pivot

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Date: 24th March 2014
Issue: 1
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Add the procedures that follow to the Check section of CMM 25-11-21, CHECK 2 (page 502).

Free Movement

Fore/Aft Movement

Identify the correct stops/packers as follows:

Fig/item	Description	Quantity
IPL Fig. 3, item 63	Stop 1/32" THK	4
IPL Fig. 3, item 72	Packer 0.020" THK	A/R

CAUTION: MAKE SURE THAT THERE IS NO DAMAGE TO STOPS (IPL FIG. 3, ITEM 63). THIS COULD CAUSE UNWANTED FORE/AFT MOVEMENT. REPLACE ANY DAMAGED STOPS (IPL FIG. 3, ITEM 63).

CAUTION: MAKE SURE THAT THERE IS NO DAMAGE TO PACKERS (IPL FIG. 3, ITEM 72). THIS COULD CAUSE UNWANTED FORE/AFT MOVEMENT. REPLACE ANY DAMAGED PACKERS (IPL FIG. 3, ITEM 72).

1. If the occupant of the seat thinks that there is free movement during fore/aft adjustment of the seat, do the following:
 - a. Put one packer (IPL Fig. 3, item 72) onto each tube (IPL Fig. 3, item 18) as shown in Figure 4.

NOTE: Packers (IPL Fig. 3, item 72) can be added to each end of the tube (IPL Fig. 3, item 18) as required.
 - b. Continue to add packers (IPL Fig. 3, item 72) until there is no more fore/aft free movement.
2. Make sure that the seat locks into the first and last holes of fore/aft movement.
3. If the seat does not lock in the first and/or the last hole of fore/aft movement, do the following:
 - a. Remove one packer (IPL Fig. 3, item 72) from each tube (IPL Fig. 3, item 18).

NOTE: Continue to remove packers (IPL Fig. 3, item 72) until the seat can lock into the first and last holes of fore/aft movement.

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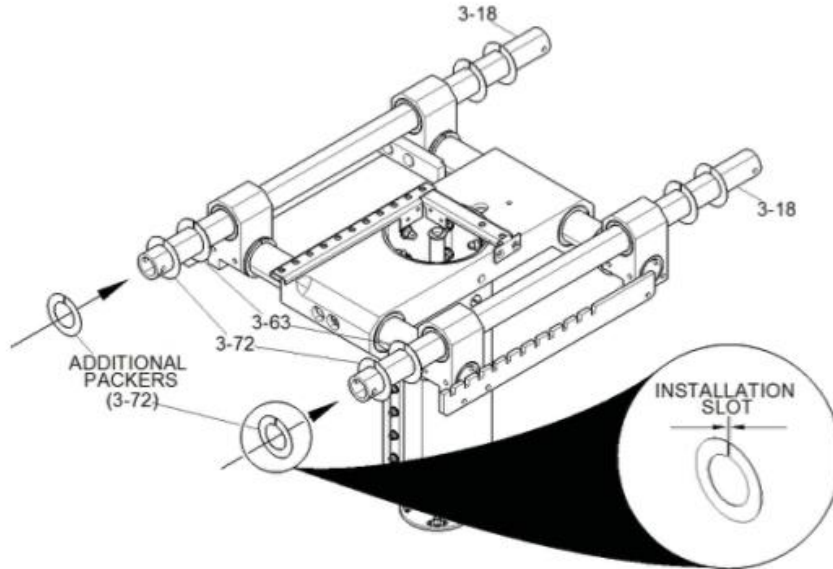


Figure 4
Additional Packers

Lateral Movement

Identify the correct packers as follows:

Fig/item	Description	Quantity
IPL Fig. 3, item 66	Packer 1/32" THK	4
IPL Fig. 3, item 69	Packer 0.020" THK	A/R

CAUTION: MAKE SURE THAT THERE IS NO DAMAGE TO PACKERS (IPL FIG. 3, ITEM 66). THIS COULD CAUSE UNWANTED LATERAL MOVEMENT. REPLACE ANY DAMAGED PACKERS (IPL FIG. 3, ITEM 66).

CAUTION: MAKE SURE THAT THERE IS NO DAMAGE TO PACKERS (IPL FIG. 3, ITEM 69). THIS COULD CAUSE UNWANTED LATERAL MOVEMENT. REPLACE ANY DAMAGED PACKERS (IPL FIG. 3, ITEM 69).

1. If the occupant of the seat thinks that there is free movement during the lateral adjustment of the seat, do the following:

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- a. Put one packer (IPL Fig. 3, item 69) onto each tube (IPL Fig. 9, item 105) as shown in Figure 5.

NOTE: The bearing housing assemblies (IPL Fig. 9, item 57) do not need to be removed to add packers (IPL Fig. 3, item 69).

NOTE: Packers (IPL Fig. 3, item 69) can be added to each end of the tube (IPL Fig. 9, item 105) as required.

- b. Continue to add packers (IPL Fig. 3, item 69) until there is no more lateral free movement.
2. Make sure that the seat locks into the first and last holes of lateral movement.
 3. If the seat does not lock in the first and/or the last hole of lateral movement, do the following:
 - a. Remove one packer (IPL Fig. 3, item 69) from the tube (IPL Fig. 9, item 105).

NOTE: Continue to remove packers (IPL Fig. 3, item 69) until the seat can lock into the first and last holes of lateral movement.

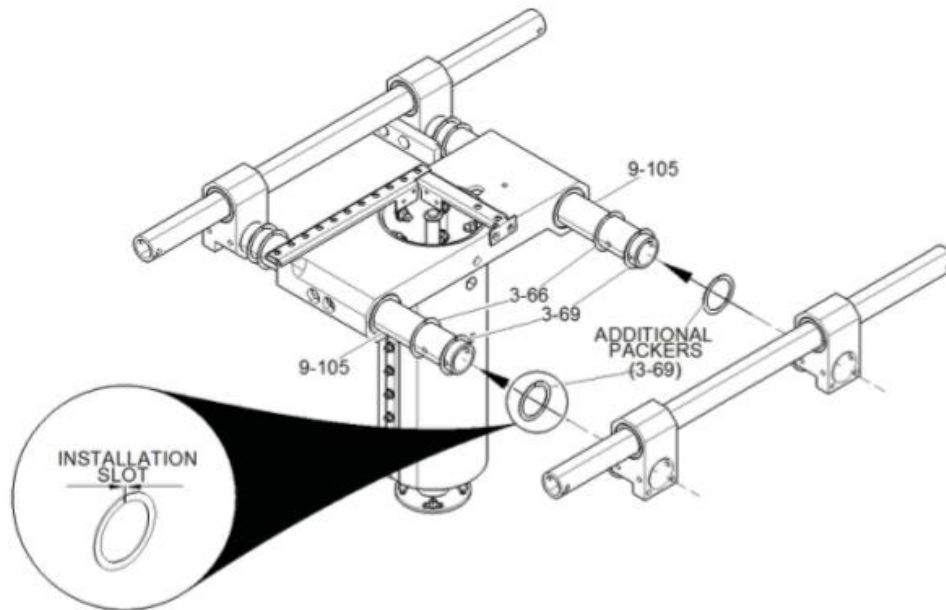


Figure 5
Additional Packers

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ACTION

This Service Information Letter is to be inserted in Component Maintenance Manual 25-11-21 (SM634).

COMPLETION

This Service Information Letter is to be removed from Component Maintenance Manual 25-11-21 (SM634) at revision 19.

Contact Ipeco if any additional information or assistance is required:

Ipeco
Product Support
Aviation Way
Southend-on-Sea
Essex
SS2 6UN
ENGLAND

TELEPHONE: 01702 549371
EMAIL: Productsupport@ipeco.co.uk

COMPILED BY:



H. FANCE – PRODUCT SUPPORT DEVELOPMENT

APPROVED BY:



W. BARNES – PRODUCT SUPPORT MANAGER

S.I.L. Number 1174
Date: 24th March 2014
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Appendix C – AOM issued 27 July 2016
ALL OPERATORS MESSAGE

Date: 27th July 2016

Ref. AOM: 42/72/2014/04 issue 2

This AOM is for information only and does not give instructions to Operators. It advises Operators of matters, which are currently, either under investigation or dealt with by ATR. However, Operators may consider initiating their own action. This AOM may be re-issued to inform Operators of the closing action (Service Bulletin, No action required, etc...).

Aircraft model: ATR42 & ATR72 all models

ATA: 25

SUBJECT: Equipment / Furnishing – Inadvertent cockpit seat movement

APPLICABILITY

ATR42 and ATR72 aeroplanes, all certified models, all manufacturer serial numbers PRE MOD 7373 or 7374 or PRE SB ATR42-25-0191 or SB ATR72-25-1157

REASON

The aim of this AOM is to inform ATR operators that inadvertent cockpit seats movements during flight and ground phases have been reported. Investigations have been conducted by IPECO (seat manufacturer) to address the root cause of the issue, since inadvertent cockpit seat movement may lead to potential unsafe condition if it occurs during take-off phase.

This AOM is revised to inform operators about the availability of the final fix enabling to address the inadvertent cockpit seat movement.

DESCRIPTION

Investigations evidenced that, when the seat is adequately adjusted/locked (3 pins of the horizontal locking system are fully engaged inside the associated track lock pin holes), inadvertent cockpit seat movement cannot occur. ATR decided to issue specific Operation Engineering Bulletin (OEB) (included in the FCOM) detailing the operational procedure for the operator to confirm that the cockpit seats are fully locked after seat adjustment. This OEB:

- Is available in the last revision (December 2013) of the FCOM for ATR72 equipped with MOD 5948.
- Is available for all other ATR models in the last revisions (normal revision or temporary revision) of the FCOMs.

Some in-service cases were suspected to be due to inappropriate maintenance actions. For this reason, IPECO decided to update the related CMMs to add and give more details on certain particular points. IPECO has already sent Service Information Letters to inform Operators about the CMM modifications.

AOM: 42/72/2014/04 issue 2

1/3



ALL OPERATORS MESSAGE

Date: 27th July 2016

Ref. AOM: 42/72/2014/04 issue 2

The final fix proposed by IPECO and agreed by ATR consists in:

- Replacement of the current tension springs by more powerful ones,
- Replacement of the current horizontal track lock rails by new ones with chamfers added for each track lock position in order to help pins to go easily into track lock holes.
- Modification of the tension springs lower fixation to avoid tension spring-end clamping, by adding a specific spacer.

This modification will be directly introduced on the ATR final assembly line through modification 7373 or 7374 application as from MSN 1213 ATR42 & MSN 1367 ATR72.

The modification will have to be performed for in service aircraft through application of SB ATR42-25-0191 or SB ATR72-25-1157 and associated IPECO VSBs 63-25-08 or 63-25-09 or 63-25-10 as applicable to seat model.

The modification application will induce a seat part number change.

ATR informs operators that the embodiment of the modification is planned to be mandated by an EASA Airworthiness Directive.


RECOMMENDATION

To address the potential unsafe condition until adequate final fix is available, ATR recommends Operators:

- To follow the FCOM operational procedure described in the Operation Engineering Bulletin attached hereto, and
- To take into account the CMM modifications provided by IPECO in the SILs attached, and
- To embody at first opportunity the final fix through application of dedicated ATR SB ATR42-25-0191 or SB ATR72-25-1157 and associated IPECO VSBs 63-25-08 or 63-25-09 or 63-25-10 as applicable to seat model.

REFERENCE DOCUMENTS

- ATR Operation Engineering Bulletin here attached. OEB N° 29 for FCOM ATR 42 200/300/320 and OEB N° 19 for all others FCOMs
- ATR Service Bulletin ATR42-25-0191 Original issue dated 04th July 2016 here attached
- ATR Service Bulletin ATR72-25-1157 Original issue dated 04th July 2016 here attached
- IPECO SIL 1174 issue 01 dated 24th March 2014
- IPECO SIL 1175 issue 01 dated 24th March 2014
- IPECO SIL 1176 issue 01 dated 24th March 2014
- IPECO VSB 63-25-08 Original issue dated 31st May 2016
- IPECO VSB 63-25-09 Original issue dated 31st May 2016
- IPECO VSB 63-25-10 Original issue dated 31st May 2016

	OPERATIONS ENGINEERING BULLETINS		3.12.39		
			P 1	001	
	O.E.B. N° 19		Issued by DT/V	DEC 13	

AA

SUBJECT :Untimely Pilot seat unlocking.

1 - Reason for issue

Several events of uncontrolled pilot seat movements have been reported: during takeoff, climb, landing or taxi phases, one of the pilot seats unlocked and moved backward to the aft stop position.

2 - ATR action

Tests are in progress to find the root cause of the issue and define an adequate fix.

3 - Procedure

Before each takeoff and landing, and after each adjustment of the seat, the pilot should ensure that the seat is correctly locked in a secure position. ATR recommends the pilot applies on the seat a pressure/input in the longitudinal direction in order to confirm that the seat is properly locked.

Note that if the seat is not properly locked, that is to say if locking pins and adjacent holes in the tracks are not aligned, the seat may slide back to the rear stop position; in such a case, the PF function must immediately be transferred to the other pilot.

Appendix D – AOM 3 issued 19 December 2016**ALL OPERATORS MESSAGE**Date: 19th December 2016Ref. AOM: 42/72/2014/04 issue 3

This AOM is for information only and does not give instructions to Operators. It advises Operators of matters, which are currently, either under investigation or dealt with by ATR. However, Operators may consider initiating their own action. This AOM may be re-issued to inform Operators of the closing action (Service Bulletin, No action required, etc...).

Aircraft model: ATR42 & ATR72 all models**ATA: 25****SUBJECT: Equipment / Furnishing – Inadvertent cockpit seat movement – EASA AD 2016-0256****APPLICABILITY**

ATR42 and ATR72 aeroplanes, all certified models, all manufacturer serial numbers PRE MOD 7373 or 7374 or PRE SB ATR42-25-0191 or SB ATR72-25-1157

REASON

The aim of this AOM is to inform ATR operators that inadvertent cockpit seats movements during flight and ground phases have been reported. Investigations have been conducted by IPECO (seat manufacturer) to address the root cause of the issue, since inadvertent cockpit seat movement may lead to potential unsafe condition if it occurs during take-off phase.

This AOM is revised at issue 02 to inform operators about the availability of the final fix enabling to address the inadvertent cockpit seat movement.

This AOM is revised at issue 03 to inform operators that EASA issued Airworthiness Directive (AD) EASA AD No.: 2016-0256 which mandates the embodiment of final fix within 24 months after the 30th December 2016.

DESCRIPTION

Investigations evidenced that, when the seat is adequately adjusted/locked (3 pins of the horizontal locking system are fully engaged inside the associated track lock pin holes), inadvertent cockpit seat movement cannot occur. ATR decided to issue specific Operation Engineering Bulletin (OEB) (included in the FCOM) detailing the operational procedure for the operator to confirm that the cockpit seats are fully locked after seat adjustment. This OEB:

- Is available in the last revision (December 2013) of the FCOM for ATR72 equipped with MOD 5948.
- Is available for all other ATR models in the last revisions (normal revision or temporary revision) of the FCOMs.

AOM: 42/72/2014/04 issue 3

1/3



ALL OPERATORS MESSAGE

Date: 19th December 2016

Ref. AOM: 42/72/2014/04 issue 3

Some in-service cases were suspected to be due to inappropriate maintenance actions. For this reason, IPECO decided to update the related CMMs to add and give more details on certain particular points. IPECO has already sent Service Information Letters to inform Operators about the CMM modifications.

The final fix proposed by IPECO and agreed by ATR consists in:

- Replacement of the current tension springs by more powerful ones,
- Replacement of the current horizontal track lock rails by new ones with chamfers added for each track lock position in order to help pins to go easily into track lock holes.
- Modification of the tension springs lower fixation to avoid tension spring-end clamping, by adding a specific spacer.

This modification will be directly introduced on the ATR final assembly line through modification 7373 or 7374 application as from MSN 1213 ATR42 & MSN 1367 ATR72.

The modification will have to be performed for in service aircraft through application of SB ATR42-25-0191 or SB ATR72-25-1157 and associated IPECO VSBs 063-25-08 or 063-25-09 or 063-25-10 as applicable to seat model.

The modification application will induce a seat part number change.

ATR informs operators that the embodiment of the modification is rendered mandatory through EASA AD 2016-0256.

RECOMMENDATION

To address the potential unsafe condition, ATR recommends Operators:

- To follow the FCOM operational procedure described in the Operation Engineering Bulletin attached hereto, and
- To take into account the CMM modifications provided by IPECO in the SILs attached, and
- To embody before 30th December 2018 the final fix mandated by the EASA AD 2016-0256 through application of dedicated ATR SB ATR42-25-0191 or SB ATR72-25-1157 and associated IPECO VSBs 063-25-08 or 063-25-09 or 063-25-10 as applicable to seat model.

REFERENCE DOCUMENTS

- EASA AD 2016-0256
- ATR Operation Engineering Bulletin here attached. OEB N° 29 for FCOM ATR 42 200/300/320 and OEB N° 19 for all others FCOMs
- ATR Service Bulletin ATR42-25-0191 Original issue dated 04th July 2016 here attached
- ATR Service Bulletin ATR72-25-1157 Original issue dated 04th July 2016 here attached
- IPECO SIL 1174 issue 01 dated 24th March 2014
- IPECO SIL 1175 issue 01 dated 24th March 2014

AOM: 42/72/2014/04 issue 3

2/3



ALL OPERATORS MESSAGE

Date: 19th December 2016

Ref. AOM: 42/72/2014/04 issue 3

- IPECO SIL 1176 issue 01 dated 24th March 2014
- IPECO VSB 063-25-08 Original issue dated 31st May 2016
- IPECO VSB 063-25-09 Original issue dated 31st May 2016
- IPECO VSB 063-25-10 Original issue dated 31st May 2016

A handwritten signature in black ink, appearing to read 'D. CAILHOL', is positioned above the name.

D. CAILHOL

ATR Head of Continued Airworthiness
Email: continued.airworthiness@atr-aircraft.com

Appendix E – EASA AD No 2016-0256 issued 16 December 2016

EASA AD No.: 2016-0256



Airworthiness Directive

AD No.: 2016-0256

Issued: 16 December 2016

Note: This Airworthiness Directive (AD) is issued by EASA, acting in accordance with Regulation (EC) 216/2008 on behalf of the European Union, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation.

This AD is issued in accordance with Regulation (EU) 748/2012, Part 21.A.3B. In accordance with Regulation (EU) 1321/2014 Annex I, Part M.A.301, the continuing airworthiness of an aircraft shall be ensured by accomplishing any applicable ADs. Consequently, no person may operate an aircraft to which an AD applies, except in accordance with the requirements of that AD, unless otherwise specified by the Agency [Regulation (EU) 1321/2014 Annex I, Part M.A.303] or agreed with the Authority of the State of Registry [Regulation (EC) 216/2008, Article 14(4) exemption].

Design Approval Holder's Name:

IPECO HOLDING Ltd

Type/Model designation(s):

Type 3A063 flight crew seats

Effective Date: 30 December 2016

ETSO Authorisations: Civil Aviation Authority (CAA) of the United Kingdom (UK) Approval numbers, E12862, E12863 and E13323

Foreign AD: Not applicable

Supersedure: None

ATA 25 – Equipment / Furnishings – Pilot and Co-pilot Seats – Modification

Manufacturer(s):

IPECO Holding Ltd (previously IPECO Europe Ltd)

Applicability:

Type 3A063 pilot and co-pilot seats, identified by Part Number (P/N) in Appendix 1 of this AD, all serial numbers.

These seats are known to be installed on, but not limited to, ATR-GIE Avions de Transport Régional ATR 42 and ATR 72 aeroplanes.

Reason:

Occurrences have been reported of pilot/co-pilot unexpected rearward movement during take-off and landing. Investigations determined that horizontal guide block wear, presence of burrs on horizontal centre track, and horizontal track lock system weakness (spring tension too low) were various causes which contributed to the seat not being correctly locked.

This condition, if not corrected, could lead to further cases of unwanted flight crew seat movement, possibly resulting in reduced control of the aeroplane.



EASA AD No.: 2016-0256

To address this potential unsafe condition, IPECO improved the quality control on the final assembly line and issued Service Bulletin (SB) 063-25-08, SB 063-25-09 and SB 063-25-10, providing modification instructions.

For the reason described above, this AD requires modification of the affected seats and subsequent re-identification with a new P/N.

Required Action(s) and Compliance Time(s):

Required as indicated, unless accomplished previously:

Note 1: For the purpose of this AD, an affected seat is a seat having a P/N identified as "old P/N" in Appendix 1 of this AD.

Note 2: IPECO SB 063-25-08, SB 063-25-09 and SB 063-25-10 are collectively referred to as "the applicable SB" in this AD.

Note 3: For the purpose of this AD, Group 1 are aeroplanes that, on the effective date of this AD, have an affected seat (see Note 1 of this AD) installed. Group 2 are aeroplanes that, on the effective date of this AD, do not have an affected seat (see Note 1 of this AD) installed.

(1) For Group 1 aeroplanes: Within 2 years after the effective date of this AD, modify and re-identify each affected seat (see Note 1 of this AD) in accordance with the instructions of the applicable SB (see Note 2 of this AD).

(2) Do not install (see Note 4 of this AD) an affected seat (see Note 1 of this AD) on any aeroplane, as required by paragraph (2.1) or (2.2) of this AD, as applicable.

(2.1) Group 1 aeroplanes (see Note 3 of this AD): After modification of that aeroplane as required by paragraph (1) of this AD.

(2.2) Group 2 aeroplanes (see Note 3 of this AD): From the effective date of this AD.

Note 4: For the purpose of this AD, removal of a seat from an aeroplane and subsequent re-installation of that seat on that same aeroplane is not "installation" as specified in paragraph (2) of this AD.

Note 5: For affected ATR aeroplanes, ATR issued SB ATR42-25-0191 and ATR72-25-1157, referencing the applicable IPECO SBs, and providing instructions to modify an aeroplane by installation of modified (new, or re-identified) seats.

Ref. Publications:

IPECO SB 063-25-08 original issue dated 31 May 2016.

IPECO SB 063-25-09 original issue dated 31 May 2016.

IPECO SB 063-25-10 original issue dated 31 May 2016.



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Page 2 of 6

EASA AD No.: 2016-0256

The use of later approved revisions of these documents is acceptable for compliance with the requirements of this AD.

Remarks:

1. If requested and appropriately substantiated, EASA can approve Alternative Methods of Compliance for this AD.
2. This AD was posted on 24 October 2016 as PAD 16-152 for consultation until 21 November 2016. The Comment Response Document can be found at <http://ad.easa.europa.eu>.
3. Enquiries regarding this AD should be referred to the EASA Safety Information Section, Certification Directorate. E-mail: ADs@easa.europa.eu.
4. For any question concerning the technical content of the requirements in this PAD, please contact: IPECO Holdings Limited,
Aviation Way, Southend On Sea, Essex SS2 6UN, United Kingdom,
Telephone: +44 1702 209211, Fax: +44 1702 540782,
E-mail: Customersupport@ipeco.com.



EASA AD No.: 2016-0256

Appendix 1 – Affected Seat P/N

This Appendix list all the affected seat P/N (column "Old P/N") and the P/N after the modification required by paragraph (1) of this AD (column "New P/N").

Table 1 – IPECO SB 063-25-08

Pilot Seats		Co-pilot Seats	
Old P/N	New P/N	Old P/N	New P/N
3A063-0033-01-1	3A063-0033-01-1Z	3A063-0034-01-1	3A063-0034-01-1Z
3A063-0033-01-2	3A063-0033-01-2Z	3A063-0034-01-2	3A063-0034-01-2Z
3A063-0033-01-3	3A063-0033-01-3Z	3A063-0034-01-3	3A063-0034-01-3Z
3A063-0033-01-4	3A063-0033-01-4Z	3A063-0034-01-4	3A063-0034-01-4Z
3A063-0033-01-5	3A063-0033-01-6	3A063-0034-01-5	3A063-0034-01-6
3A063-0033-02-1	3A063-0033-02-1Z	3A063-0034-02-1	3A063-0034-02-1Z
3A063-0033-02-2	3A063-0033-02-2Z	3A063-0034-02-2	3A063-0034-02-2Z
3A063-0033-02-3	3A063-0033-02-3Z	3A063-0034-02-3	3A063-0034-02-3Z
3A063-0033-02-4	3A063-0033-02-4Z	3A063-0034-02-4	3A063-0034-02-4Z
3A063-0033-02-5	3A063-0033-02-6	3A063-0034-02-5	3A063-0034-02-6



EASA AD No.: 2016-0256

Table 2 – IPECO SB 063-25-09

Pilot Seats		Co-pilot Seats	
Old P/N	New P/N	Old P/N	New P/N
3A063-0035-01-1	3A063-0035-01-1Z	3A063-0036-01-1	3A063-0036-01-1Z
3A063-0035-01-2	3A063-0035-01-2Z	3A063-0036-01-2	3A063-0036-01-2Z
3A063-0035-01-3	3A063-0035-01-3Z	3A063-0036-01-3	3A063-0036-01-3Z
3A063-0035-01-4	3A063-0035-01-4Z	3A063-0036-01-4	3A063-0036-01-4Z
3A063-0035-01-5	3A063-0035-01-6	3A063-0036-01-5	3A063-0036-01-6
3A063-0035-02-1	3A063-0035-02-1Z	3A063-0036-02-1	3A063-0036-02-1Z
3A063-0035-02-2	3A063-0035-02-2Z	3A063-0036-02-2	3A063-0036-02-2Z
3A063-0035-02-3	3A063-0035-02-3Z	3A063-0036-02-3	3A063-0036-02-3Z
3A063-0035-02-4	3A063-0035-02-4Z	3A063-0036-02-4	3A063-0036-02-4Z
3A063-0035-02-5	3A063-0035-02-6	3A063-0036-02-5	3A063-0036-02-6
3A063-0035-03-1	3A063-0035-03-1Z	3A063-0036-03-1	3A063-0036-03-1Z
3A063-0035-03-2	3A063-0035-03-2Z	3A063-0036-03-2	3A063-0036-03-2Z
3A063-0035-03-3	3A063-0035-03-3Z	3A063-0036-03-3	3A063-0036-03-3Z
3A063-0035-03-4	3A063-0035-03-4Z	3A063-0036-03-4	3A063-0036-03-4Z
3A063-0035-03-5	3A063-0035-03-6	3A063-0036-03-5	3A063-0036-03-6
3A063-0035-04-1	3A063-0035-04-1Z	3A063-0036-04-1	3A063-0036-04-1Z
3A063-0035-04-2	3A063-0035-04-2Z	3A063-0036-04-2	3A063-0036-04-2Z
3A063-0035-04-3	3A063-0035-04-3Z	3A063-0036-04-3	3A063-0036-04-3Z
3A063-0035-04-4	3A063-0035-04-4Z	3A063-0036-04-4	3A063-0036-04-4Z
3A063-0035-04-5	3A063-0035-04-6	3A063-0036-04-5	3A063-0036-04-6
3A063-0035-05-1	3A063-0035-05-1Z	3A063-0036-05-1	3A063-0036-05-1Z
3A063-0035-05-2	3A063-0035-05-2Z	3A063-0036-05-2	3A063-0036-05-2Z
3A063-0035-05-3	3A063-0035-05-3Z	3A063-0036-05-3	3A063-0036-05-3Z
3A063-0035-05-4	3A063-0035-05-4Z	3A063-0036-05-4	3A063-0036-05-4Z
3A063-0035-05-5	3A063-0035-05-6	3A063-0036-05-5	3A063-0036-05-6
3A063-0037-01-1	3A063-0037-01-1Z	3A063-0038-01-1	3A063-0038-01-1Z
3A063-0037-01-2	3A063-0037-01-2Z	3A063-0038-01-2	3A063-0038-01-2Z
3A063-0037-01-3	3A063-0037-01-3Z	3A063-0038-01-3	3A063-0038-01-3Z
3A063-0037-01-4	3A063-0037-01-4Z	3A063-0038-01-4	3A063-0038-01-4Z
3A063-0037-01-5	3A063-0037-01-6	3A063-0038-01-5	3A063-0038-01-6



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EASA AD No.: 2016-0256

Table 3 – IPECO SB 063-25-10

Pilot Seats		Co-pilot Seats	
Old P/N	New P/N	Old P/N	New P/N
3A063-0079-01-1	3A063-0079-01-1Z	3A063-0080-01-1	3A063-0080-01-1Z
3A063-0079-01-2	3A063-0079-01-2Z	3A063-0080-01-2	3A063-0080-01-2Z
3A063-0079-01-3	3A063-0079-01-3Z	3A063-0080-01-3	3A063-0080-01-3Z
3A063-0079-01-4	3A063-0079-01-5	3A063-0080-01-4	3A063-0080-01-5
3A063-0079-02-1	3A063-0079-02-1Z	3A063-0080-02-1	3A063-0080-02-1Z
3A063-0079-02-2	3A063-0079-02-2Z	3A063-0080-02-2	3A063-0080-02-2Z
3A063-0079-02-3	3A063-0079-02-3Z	3A063-0080-02-3	3A063-0080-02-3Z
3A063-0079-02-4	3A063-0079-02-5	3A063-0080-02-4	3A063-0080-02-5
3A063-0079-03-1	3A063-0079-03-1Z	3A063-0080-03-1	3A063-0080-03-1Z
3A063-0079-03-2	3A063-0079-03-2Z	3A063-0080-03-2	3A063-0080-03-2Z
3A063-0079-03-3	3A063-0079-03-3Z	3A063-0080-03-3	3A063-0080-03-3Z
3A063-0079-03-4	3A063-0079-03-5	3A063-0080-03-4	3A063-0080-03-5



Appendix F – Transcript of ATC VHF Communication



TRANSCRIPT OF IKM 104, ATR72 (REG) 9GSBF SKIDDING OFF RUNWAY 21 ON ROLLING FOR TAKE-OFF FOR KUMASI (OPERATOR—STARBOW) (25/11/17)

TIME	UNIT	TEXT
12:02:07	AFW 215	ACCRA TOWER GOOD AFTERNOON AFW 215 ILS RWY 21
:22	TWR	AFW 215 CONTINUE APPROACH REPORT 4 MILES FINAL
	AFW 215	EEH 215
:28	TWR	UAE 787 YOU KINDLY CONTINUE TO STANDBY I HAVE THREE (3) ARRIVALS
	UAE 787	UAE 787 STANDING BY
12:03:14	TWR	AFW 215 CLEARED TO LAND RWY 21 WIND 190/13 KTS
:16	AFW 215	THANK YOU VERY MUCH WE CLEARED TO LAND RWY 21 AFW215
12:05:44	TWR	AFW 215 LANDED 05 EXIT YANKEY AND HOLD BEHIND THE B737
	AFW 215	EXIT YANKEY AND HOLD BEHIND B737 AFW215
12:08:00	TWR	AFW 215 YOU CONTINUE TAXI TO ECHO BAY
	IKM 104	ACCRA IKM 104
12:10:42	TWR	SAO 490 CLEARED TO LAND RWY 21 WIND 160/08 KTS
12:11:00	SAO 490	CLEARED TO LAND RWY 21 SAO 490
12:11:14	IKM 104	ACCRA TOWER IKM 104
:16	TWR	IKM 104 STAND-BY
:20	TWR	IKM 104 GO AHEAD
:25	IKM 104	OK WE REQUEST START TO KUMASI LEVEL 100.WE HAVE A TOTAL OF 68 ON BOARD AND ENDURANCE WE HAVE 3HRS AND 30 MINUTES
12:11:35	TWR	START UP APPROVED QNH 1012 TEMPERATURE 30 RWY 21 IN USE.
	IKM 104	RWY 21 IN USE START UP APPROVED RWY 21 IKM 104
	TWR	SAO 490 LANDED 11 EXIT YANKEY TO CHARLIE BAY
12:13:22	TWR	UAE 787 CONTINUE TAXI AND HOLD ON YANKEY
	UAE 787	CONTINUE TAXI AND HOLD ON YANKEY UAE 787
12:13:37	IKM 104	TWR IKM 104 READY FOR TAXI
12:14:02	TWR	IKM 104 YOU TAXI TO HOLDING POINT RWY 21 EXPECT DELAY ON DEPARTURE DUE UAE 787 BACKTRACKING ON RUNWAY
:15	IKM 104	OK WE TAXI TO HOLDING POINT RWY 21 IKM 104
12:14:40	TWR	UAE 787 AFTER KENYA DEPARTS YOU WILL BE BACKTRACKING RWY 21 TO STAND 5
	UAE 787	AFTER DEPARTING AIRCRAFT CLEARED BACKTRACK AND STAND D5 UAE 787
12:15:00	TWR	UAE 787 YOU ENTER AND BACKTRACK RWY 21
:04	TWR	IKM 104 YOU ENTER AND BACKTRACK RWY 21
:13	IKM 104	IKM 104 TO ENTER AND BACKTRCK RWY 21
	TWR	IKM 104 COPY ATC
	IKM 104	IKM 104 GO AHEAD



TRANSCRIPT OF IKM 104, ATR72 (REG) 9GSBF SKIDDING OFF RUNWAY 21 ON ROLLING FOR TAKE-OFF FOR KUMASI (OPERATOR—STARBOW) (25/11/17)

12:15:20	TWR	IKM 104 CLEARED TO KUMASI FLIGHT PLAN ROUTE FL100 DEPARTURE RWY 21 MAINTAIN RWY HEADING 6NM RIGHT TURN SQUAWK 5704
:36	IKM 104	CLEARED TO KUMASI FL100 VIA FLIGHT PLAN ROUTE AFTER DEPARTURE RWY 21 RWY HEADING 6 MILES RIGHT TURN SQUAWK 5704
:46	TWR	IKM 104 READBACK CORRECT
12:18:28	TWR	IKM 104 CLEARED TAKE OFF RWY 21 WIND 100/17 KTS
:33	IKM 104	CLEARED TAKE OFF RWY 21 IKM 104
12:20:05	TWR	IKM 104 EMERGENCY PERSONNEL CURRENTLY MOVING TO YOUR SIDE
:17	TWR	IKM 104 ONCE AGAIN EMERGENCY PERSONNEL MOVING TO YOUR SIDE
12:21:17	IKM 104	SOPNEB IKM 104
12:21:25	TWR	ALL STATIONS ON THIS FREQUENCY STANDBY DELAY NOT DETERMINED DUE TO EMERGENCY
12:24:06		CONFIRM DUE TO BAD WEATHER
:15	TWR	NEGATIVE AIRCRAFT JUST SKIDDED OFF THE RUNWAY
:24		CONFIRM DEPARTING OR ARRIVING TRAFFIC SKIDDED OFF THE RUNWAY
:33	TWR	STATION CALLING
:40	ETH 920	JUST WONDERING ETH 920 CONFIRM DEPARTING TRAFFIC JUST SKIDDED OFF THE RUNWAY
12:25:45	TWR	AFFIRM IT SKIDDED OFF THE RUNWAY; EMERGENCY PERSONNEL ARE ALL OVER THE PLACE TRYING TO SORT THEM OUT; WILL ADVISE WHEN YOU WILL BE ABLE TO START

OSEI-BONSU KWANING

For: DIRECTOR AIR TRAFFIC MANAGEMENT

Appendix G – Technical Report on Flight Recorders

BEA2017-0673_tec02
Date of issue : 16 January 2018

Technical document

FDR and CVR Readout

Final report

Accident on **25th November 2017**
at **AD Accra - Kotoka International (Ghana)**
to the **Fixed wing ATR72 - 500**
registered **9G-SBF**
operated by **Aero Survey Ltd**

BEA

Ministère de la Transition écologique et Solidaire

Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile

Foreword

This document and the photographs and technical information contained herein are subject to the laws relating to communication and confidentiality embodied in European Regulation 996 of 20 October 2010.

The conclusions of this document are based on the work undertaken by the BEA (Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile). They should not be used to prejudge the final conclusions of the safety investigation.

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Glossary

CVR	Cockpit Voice Recorder
CAM	Cockpit Area Microphone
FDR	Flight Data Recorder
WPS	Words per second

1 - EQUIPEMENT EXAMINED

	FDR	CVR
		
Manufacturer	L-3Com FA2100	LORAL A200S
Part number	2100-4043-00	S200-0012-00
Serial number	000181814	00549

Attendees:

- 2 investigators from the Investigation Committee of Ghana
- 4 BEA investigators
- 1 ATR technical advisor

The aircraft was equipped with two flight recorders. The recorders were brought to the BEA premises by Ghana investigators on January 15th, 2018.

2 - WORK PERFORMED

2.1. CVR readout

The recorder was in good external condition. It was decided to carry out a direct read out with the manufacturer's official readout equipment (LORAL test panel A860 associated to DAPU). The A860 supplied the unit and the DAPU was used to replay in analogic format the digital data stored in the CVR. It was then proceeded to the digitisation (22 kHz – 16 bit) of the data using a professional sound card (Lynx Two C).

A multitrack audio project was built using Samplitude® software in order to replay all the recovered audio files (6 files) and to produce a preliminary transcript.



2.2. FDR readout

The recorder was in good external condition. It was decided to carry out a direct read out with the manufacturer's official download equipment (ROC7 station / ROSE software).



3 - RESULTS

3.1. CVR

The SSCVR download produced the following files:

- "9G-SBF_A200S_SN549_TK1_HQ.wav" containing Passenger Address announcement, 3rd crew member channel (when available), and CVR time code signal (FSK). The duration was 30 min 36 s.
- "9G-SBF_A200S_SN549_TK2_HQ.wav" containing First officer microphones (headset, hand set, Oxygen mask) and radio communication recording. The duration was 30 min 36 s.
- "9G-SBF_A200S_SN549_TK3_HQ.wav" containing Captain Microphones (headset, hand set, Oxygen mask) and radio communication recording. The duration was 30 min 36 s.
- "9G-SBF_A200S_SN549_TK4_HQ.wav" containing the recording of the CAM (Cockpit Area Microphone) signal. The duration was 30 min 36 s.
- "9G-SBF_A200S_SN549_MIXED_SQ.wav" containing a mix of the TK1 to TK3 channels. The duration was 2 h 02 min 20 s.

- "9G-SBF_A200S_SN549_CAM SQ.wav" containing the recording of the CAM (Cockpit Area Microphone) signal. The duration was 2 h 02 min 20 s.

The CVR time code (FSK) was decoded in order to retrieve the UTC time. The result was not consistent with the time of the event; the ATC transcript time was then used to synchronise the audio data (See the view of the Samplitude® audio project in appendix 1).

The event was recorded. Only the CAM track (SQ and HQ) provided crew speech. A preliminary transcript was performed by the BEA and Ghanaian investigators.

3.2. FDR

The FDR download was successful. A compressed .fdr file and the associated decompressed file .pak file were generated.

The synchronization level was good and around 117 hours of flight data were recorded. The raw data were decoded using the 128 WPS aircraft manufacturer's dataframe referenced *V2b conf1*. The dataframe was provided by ATR. A set of plots of validated parameters is available in appendix.

The recordings contain the data relative to the event.

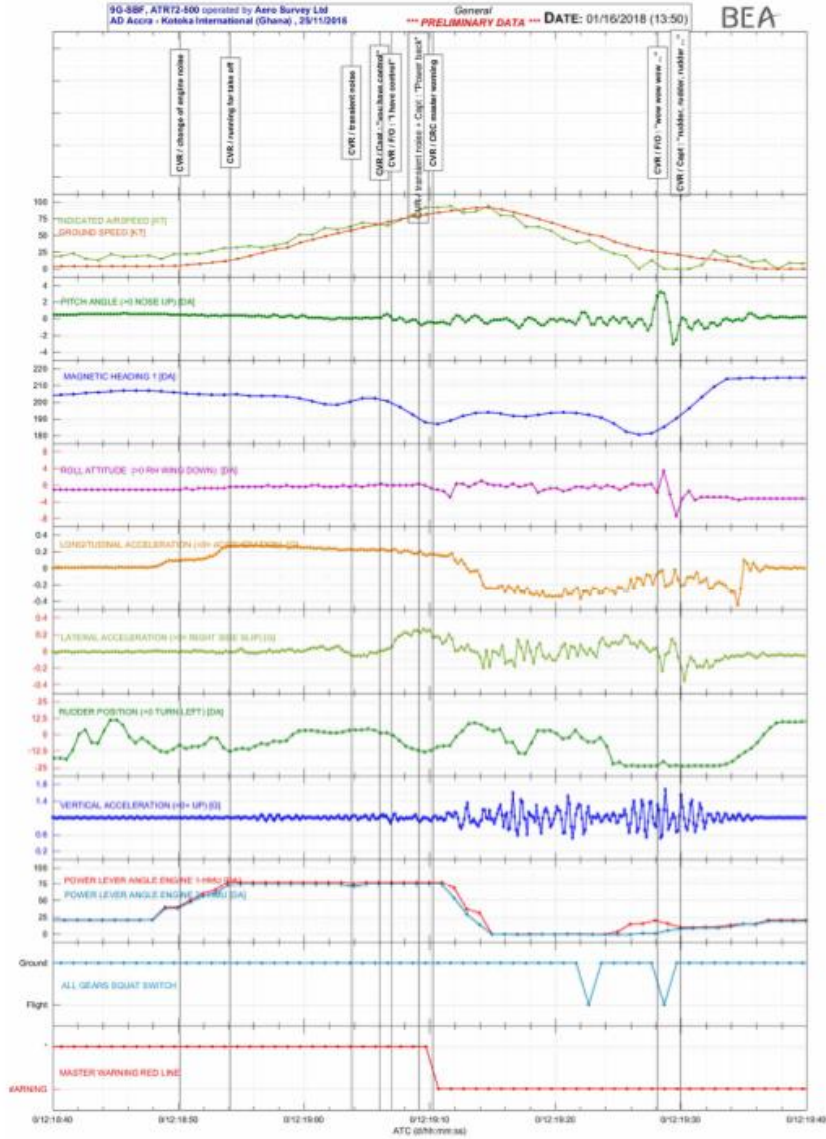
3.3. FDR and CVR synchronisation

CVR and FDR recordings were synchronized using the Master Warning parameter and VHF communications. ATC time was chosen as reference time.

3.4. FDR plots and listing

FDR parameters relevant for the event were validated (consistency and quality checks). Plots of validated FDR parameters are available in appendix 2 and an excel listing was also generated.

The following plot shows main CVR events identified by Ghana investigators superimposed over FDR parameters plot.



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In addition to this report, the following information was provided to the safety Investigation Committee of Ghana:

- the FDR raw file
- a listing of FDR parameters
- a flight path in Kmz format (Google Earth)
- the dataframe V2b conf 1 (ATR service letter)
- the 6 CVR audio files
- a copy of the listening session form
- a copy of the preliminary CVR transcript (V01).

Appendices

Appendix 1 : CVR multi-tracks audio project

Appendix 2 : FDR Plots

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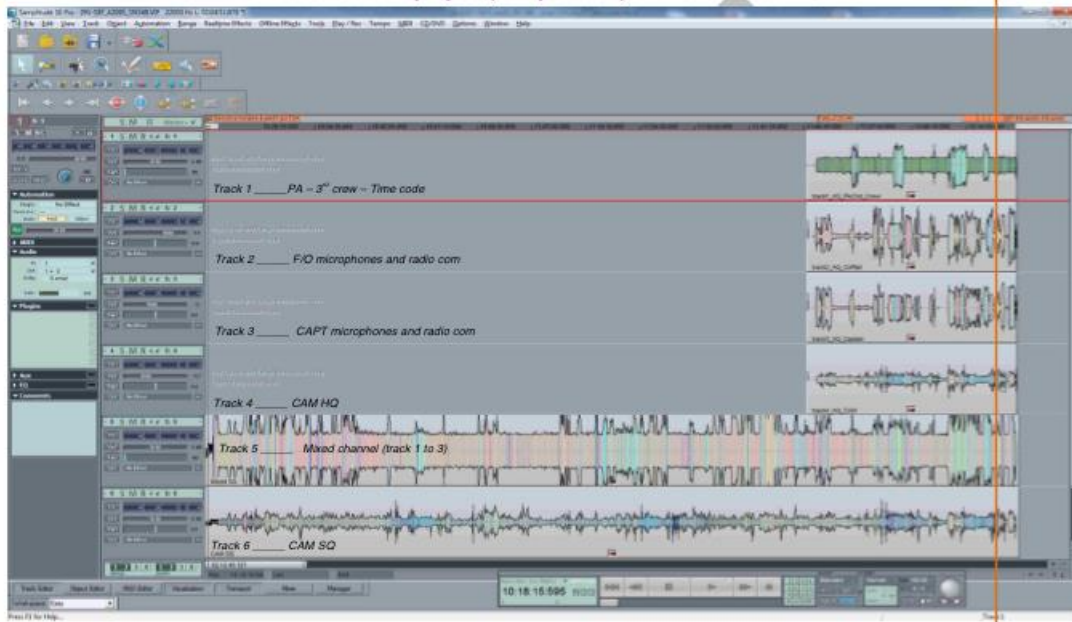
BEA2017-0673_tec02 / 9G-SBF - 16 January 2018

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APPENDIX 1 : CVR multi-tracks audio project (Samplitude®) / Wave form overview

Noise similar to a runway excursion event



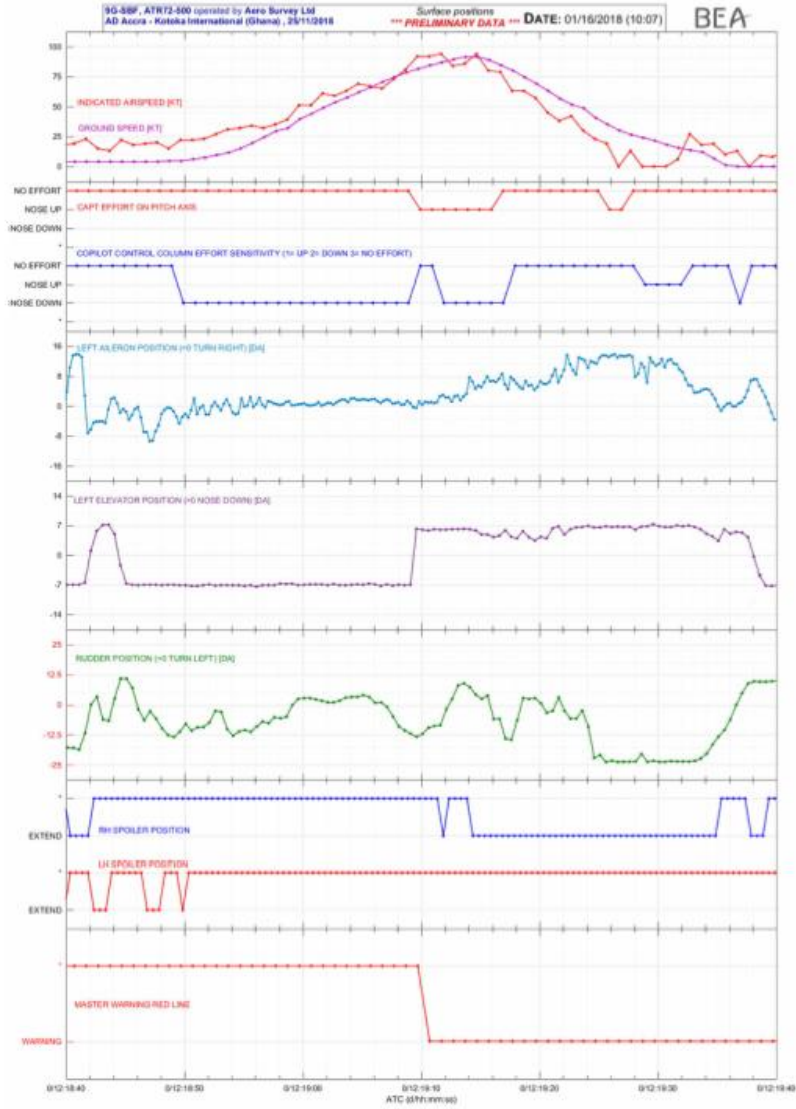
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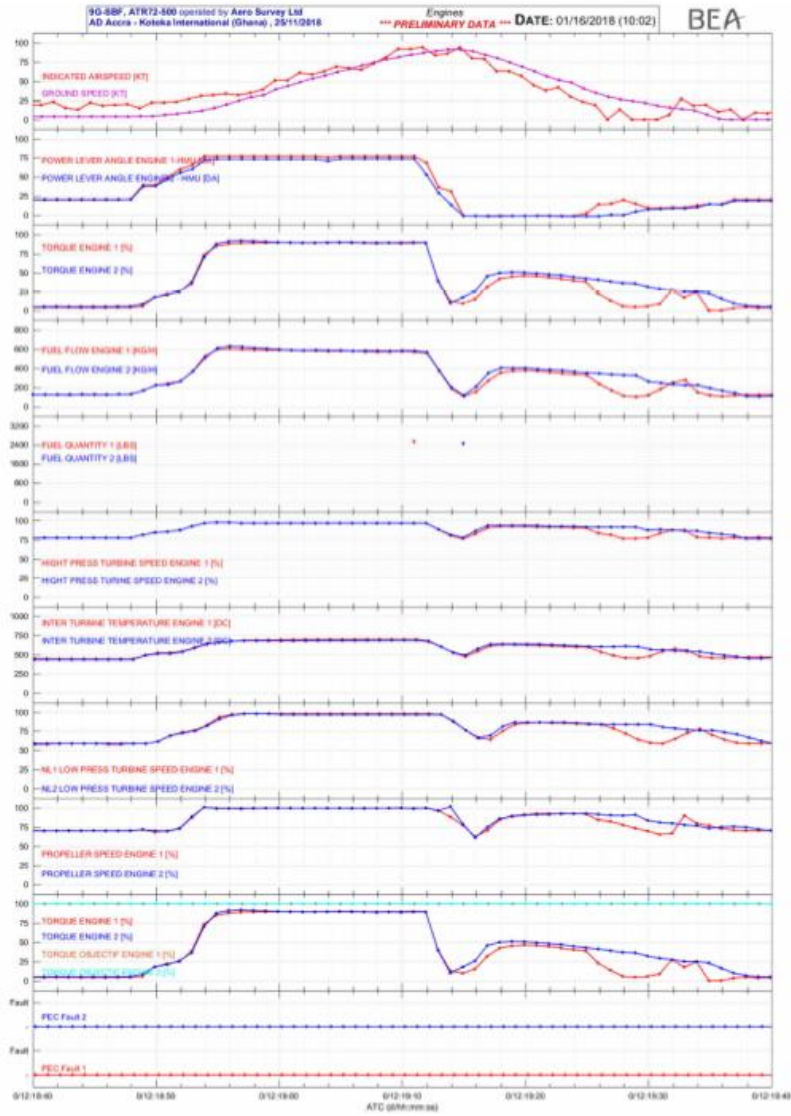


APPENDIX 2 : FDR Plots



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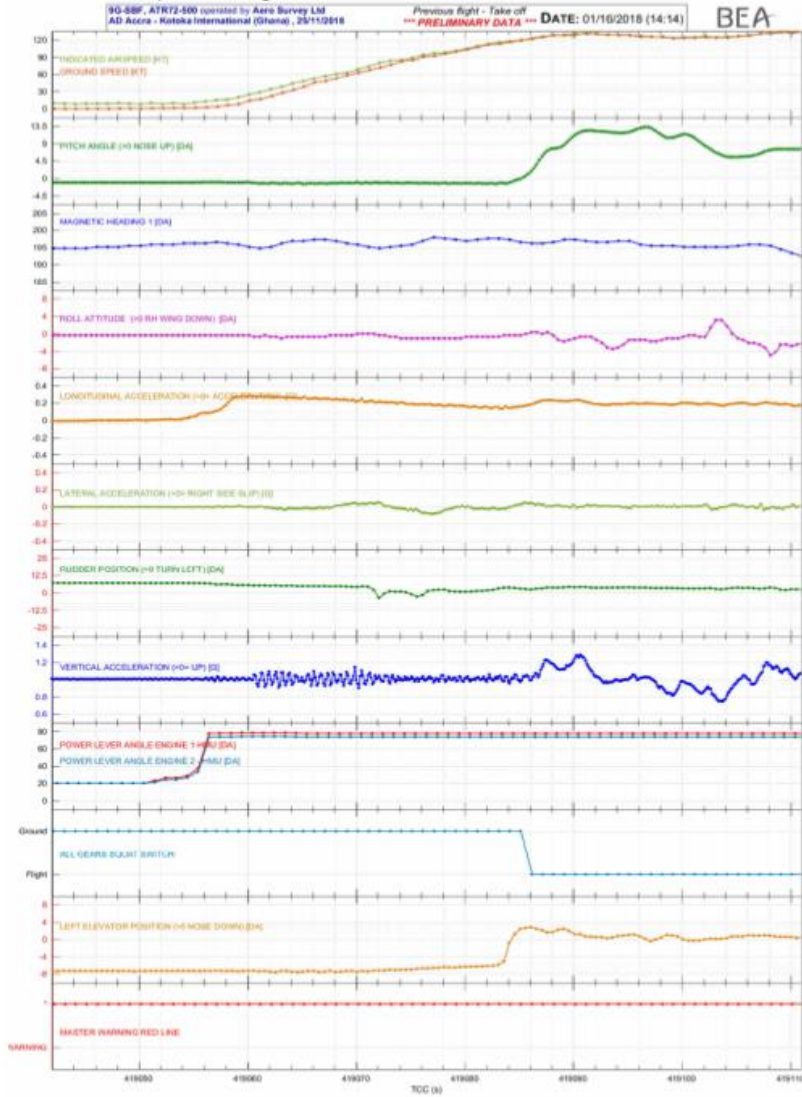
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FDR data from previous flight



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Appendix H – Captain’s Seat Examination

BEA2017-0673_tec04
Date of issue: 11 May 2018

Technical document

Left seat examination

Preliminary report

Restricted release to the safety investigation members

Technical assistance for Ghana AIB

Accident on **25th November 2017**
at **AD Accra - Kotoka International (Ghana)**
to the **ATR72 - 200 - 212A**
registered **9G-SBF**
operated by **Starbow**

BEA

Ministère de la Transition écologique et Solidaire

Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile

Foreword

This document and the photographs and technical information contained herein are subject to the laws relating to communication and confidentiality embodied in European Regulation 996 of 20 October 2010.

The conclusions of this document are based on the work undertaken by the BEA (Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile). They should not be used to prejudge the final conclusions of the safety investigation.

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1 - EQUIPEMENT EXAMINED



Manufacturer	Ipeco
Part number	3A063-0079-03-4
Serial number	46345

Circumstances and objectives of the examination:

Pilots reported that the seat of the captain rolled back and sideward to the left lateral position during take-off roll. The objective of the examination is to assess the damages of the seat, and understand why it rolled all the way back.

Date: 06/03/2018 - 07/03/2018

Place: Ipeco (Southend on Sea, UK)

Attendees:

Ipeco	Bill Barnes
	Andrew Sibun
	Daniel Stone
	Dan Saunders
	+2
AAIB	Andrew Cox
BEA	Matthieu Clavel
ATR	Paul Jouas
	François Poupin
Nordic Aviation Capital	Andy Richardson

Findings:

- Roll back is impossible when the pins are correctly locked into the rails. Thus the seat was unlocked during take-off roll.
- SB 063-25-10 improves locking of pins when the seat is pushed backward from an unlocked position. However, this SB does not completely solve the problem in the case of the accidented seat.
- A substantial rotational play is present on this seat. This play seems to be the cause of the difficulties of stopping a roll back from an unlocked position (misalignment of the locking pins while a side load is applied).
- The missing packers have little impact on the rotational play of this seat.
- The cause of the rotational play could not be identified.
- The failure of the right spring may have contributed to the fact that the roll back was not stopped during take-off roll.
- The incorrect fitting assembly of the spring may have contributed to the failure of the right spring.

2 - TECHNICAL DESCRIPTION OF THE SEAT

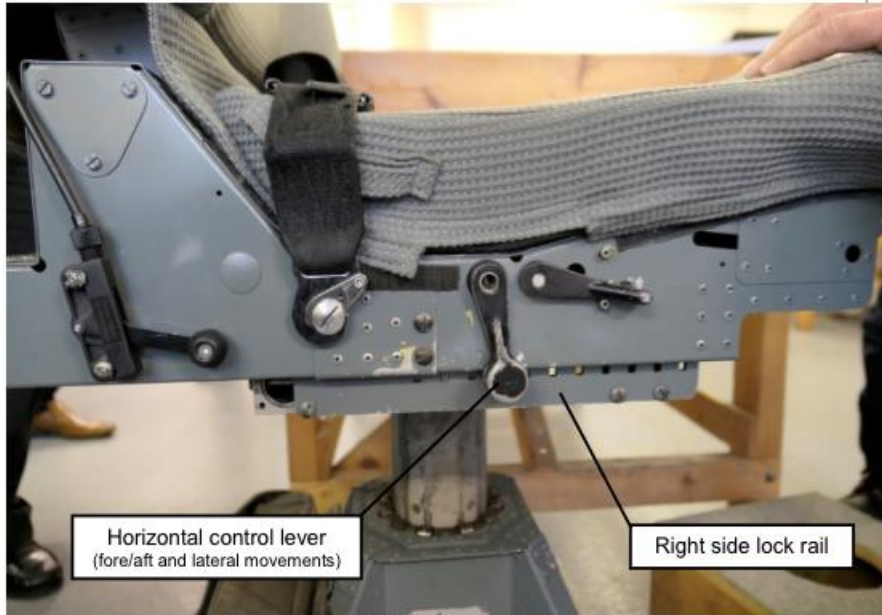


Figure 1 : Right side of the seat

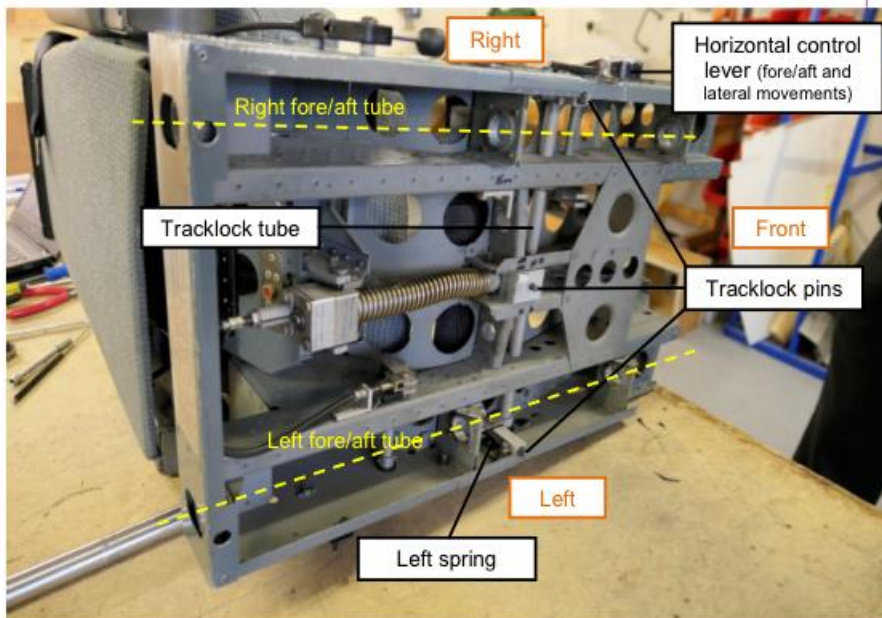


Figure 2 : Seat pan structure (view from below)

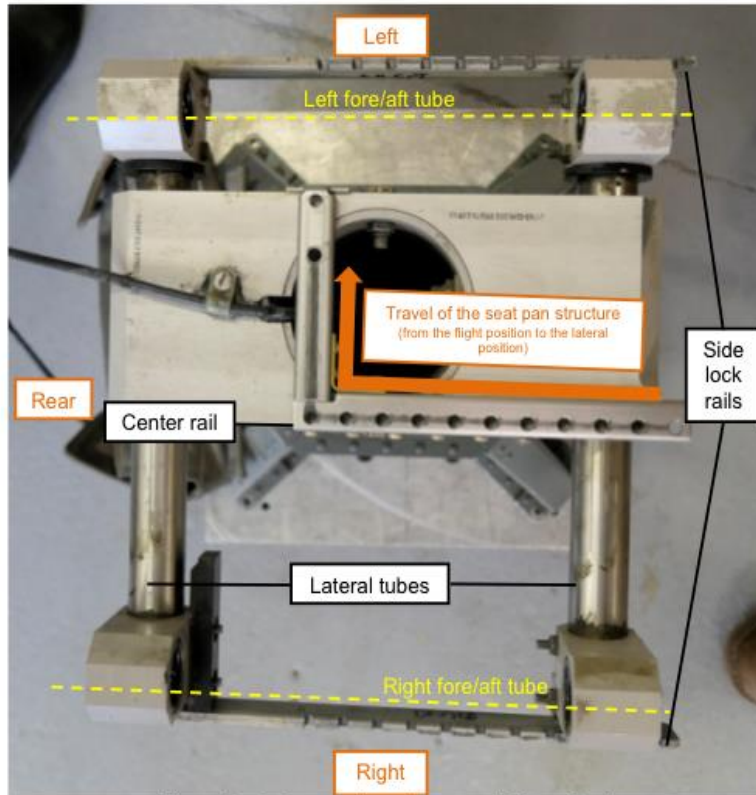


Figure 3 : Column and carrier assembly (top view)

3 - DESCRIPTION OF SB 063-25-10

This Service Bulletin implements three main modifications:

- o Increase stiffness of springs:

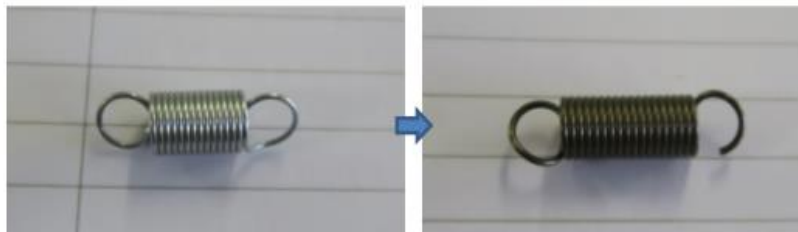


Figure 4 : Pre-mod spring

Figure 5 : Post-mod spring

- o Add chamfers on side lock rails:

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Figure 6 : Pre-mod side lock rail



Figure 7 : Post-mod side lock rail

- o Modify spring fitting assembly:

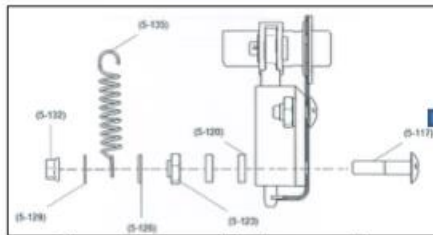


Figure 8 : Pre-mod fitting assembly

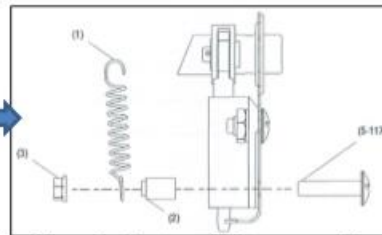


Figure 9 : Post-mod fitting assembly

The two first modifications aim at facilitating the locking action of the pins in the event of an unlocked seat rolling backward.

4 - WORK PERFORMED

4.1. Visual examination

The right spring is broken (Figure 11). Ipeco indicates that the system is designed to function with one spring, though the overall stiffness will be decreased with one spring.



Figure 10 : Left spring



Figure 11 : Right spring

The right spring has been fitted between the hollow nut (5-123) and the thin washer (5-129), with the washer (5-126) on the incorrect side of the hollow nut (Figures 12 & 13).

The hollow nut was found to have remnants of wire within it.

This incorrect assembly may have contributed to a partial clamping of the spring attachment and thus to its failure.

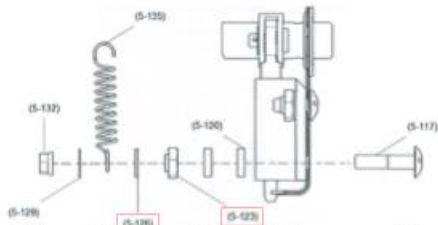


Figure 12 : Pre-mod spring fitting assembly

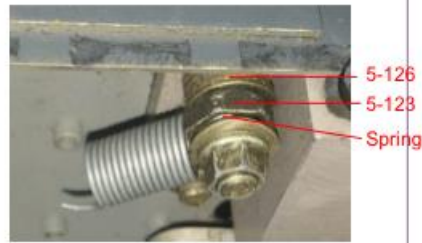


Figure 13 : Right spring assembly

Traces of interference are observed between carrier assembly and left fore/aft tube guide (Figures 14 & 15).



Figure 14 : Fretting on carrier assembly



Figure 15 : Fretting on left fore/aft tube guide

A bump is observed on the bottom front left seat pan structure (Figure 16).

Component Maintenance Manual 25-11-21 requires fore/aft and lateral movement checks and asks to add packers until there is no more free movement (Figure 17). On the accidented seat, packers are missing on both the fore/aft and lateral tubes.



Figure 16 : Bump on seat pan structure

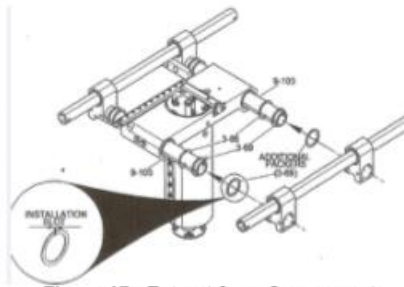


Figure 17 : Extract from Component Maintenance Manual

4.2. "Roll back" test

After reassembly of the seat, a rotation play is observed between the upper seat and the fixed column.

When pushed rightward and backward (see Figure 19) from an unlocked position (pins not locked into the rails), the seat moves all the way back and sideward to the lateral position (see orange arrow on figure 3). This operation will be referred as the "roll back" test in this document.

The "roll back" test is performed with a weight of 96 pounds on the seat. The same results is achieved.

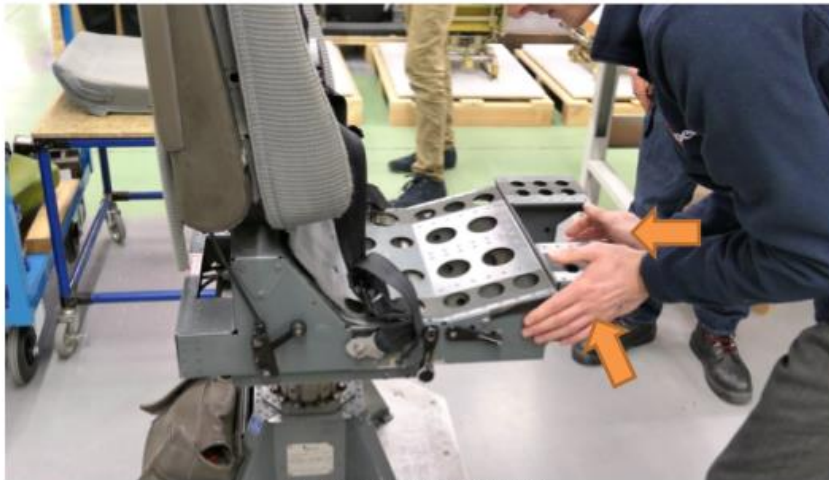


Figure 18 : "Roll back" test

4.3. Rotational measurement

This measurement is performed by Ipeco after manufacturing of a seat. A lateral force of 15 pounds is applied on each side of the seat (Figure 20), and the overall displacement is measured. This is a measure of the rotational play of the seat pan structure with respect to the column assembly.

A rotational measurement is performed on the accidented seat. The measure is 0.119 inch. For comparison, it was 0.035 after manufacturing. The rotational play was tripled during the life in service of the seat.

Additional packers are added where they were missing, in accordance with Component Maintenance Manual 25-11-21. Rotational movement is measured with new packers installed : 0.105 inch. The difference with the last measure of 0.119 inch is not significant. The missing packers have thus little impact on the rotational play of this seat.

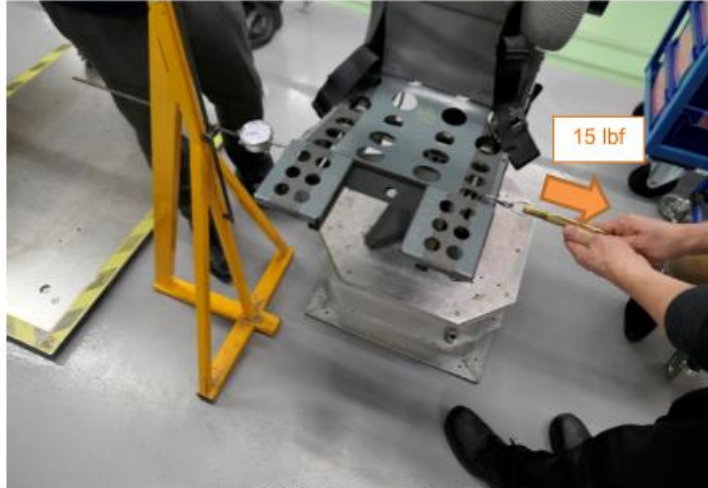


Figure 19 : Rotational measurement

The rotational play is illustrated below. Pictures on Figures 21 and 22 were taken while pushing on the left side of the seat pan (like in "roll-back" test, Fig. 19). It shows how the lock pins are not aligned.



Figure 20 : Left side lock pin



Figure 21 : Right side lock pin

4.4. Test with two pre-mod springs

The broken right spring is removed in replaced by a new pre-mod spring. A "roll back" test is performed. Roll back is slightly less easily achieved, though still possible.

4.5. Test with implemented SB

The SB 063-25-10 is implemented on the accidented seat. A "roll back" test is performed. Roll back demands a very strong lateral load to be achieved, though it is still possible.

Rotational measurement with implemented SB is performed. The result (0.114 inch) is similar to the pre-mod rotational measurement (0.119 inch).

A "roll back" test is performed after removing the right post-mod spring. The roll back is slightly easier.

5 - RESULTS

- Roll back is impossible when the pins are correctly locked into the rails. Thus the seat was unlocked during take-off roll.
- SB 063-25-10 improves locking of pins when the seat is pushed backward from an unlocked position. However, this SB does not completely solve the problem in the case of the accidented seat.
- A substantial rotational play is present on this seat. This play seems to be the cause of the difficulties of stopping a roll back from an unlocked position (misalignment of the locking pins while a side load is applied).
- The missing packers have little impact on the rotational play of this seat.
- The cause of the rotational play could not be identified.
- The failure of the right spring may have contributed to the fact that the roll back was not stopped during take-off roll.
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