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Safety recommendation: ***AIC 19-R21/18-1002***

Addressed to: Avions de Transport Regional (ATR) Limited

Date issued: 27th July 2019

Investigation link: ***AIC 18-1002***

Action status: Issued

Introduction

On 28th July 2018, at 23:37 UTC[1] (10:37 local time) an Avions de Transport Regional, ATR72-500 registered YJ-AV71 (AV71), operated by Air Vanuatu Operations Limited was on a scheduled flight from Whitegrass Airport, Tanna to Bauerfield Airport, Port Vila. During its landing roll, the aircraft lost directional control and veered off, towards the left of runway 29, and collided with two unoccupied Britten-Norman Islander Aircraft. The ATR had 39 passengers and four crew; two pilots and two Cabin Crew. No injuries were reported.

This occurrence was formally notified to the PNG Accident Investigation Commission (AIC) on 28th July 2018 with the request from the Director Civil Aviation Authority of Vanuatu (CAAV) for the PNG AIC to conduct the investigation. The CAAV delegated the whole of the investigation to the PNG AIC in accordance with *Annex 13 Paragraph 5.1*.

The PNG Minister for Civil Aviation approved the Commission to accept the delegated investigation and dispatch a team of investigators to Vanuatu as soon as possible. Investigators arrived at the accident site on Sunday afternoon 29th July 2018 and immediately commenced the on-site investigation. The investigation was fully supported by AIC staff in Port Moresby including the resources of the AIC's flight recorder laboratory.

Both the States of Manufacture of the Aircraft and the Engine participated as accredited representatives to the investigation. The manufacturer of the aircraft, ATR, and the engine, Pratt & Whitney Canada (P&WC) were involved as advisors to their respective accredited representatives.

In the absence of an independent investigation authority, the Director of the CAAV, represented the State of Operator, Registry and Occurrence undertook to provide guidelines on applicable Republic of Vanuatu Civil Aviation Occurrence Investigation Legislation. However, where possible the conduct of the investigation was to be in accordance with the PNG legislation, the *AIC Policy and Procedures*, and at all times in accordance with *ICAO Annex 13*.

Occurrence

While enroute at 16,000 ft and about 60 nm from Port Vila, the flight crew noticed the No. 2 engine (right engine) *Interstage Turbine Temperature (ITT)* gauge increase rapidly and subsequently exceed its normal operating limits with the Master Caution visual and aural warnings being triggered.

Both the crew and passengers reported hearing loud banging noises from the right side of the aircraft. Some passengers reported seeing white flashes in the cabin. The investigation determined that the noises were as a result of the No. 2 engine compressor stalling.

1 The 24-hour clock, in Coordinated Universal Time (UTC), is used in this report to describe the local time as specific events occurred. Local time in the area of the accident, Vanuatu Time (VUT) is UTC + 11 hours.

At 23:20:54, the Senior Cabin Crew (SCC) was notified of the engine abnormality by the PIC via the crew interphone system. The SCC subsequently notified the flight crew that there was smoke entering the cabin from the right side of the cabin. The PIC broadcasted a *MAYDAY* and notified Vila Air Traffic Control (ATC) of their descent intentions. The pilots commenced the descent and proceeded to complete their checklist.

About 6 minutes after the first abnormal engine event, the No. 2 engine *oil low pressure warning* alert activated on the *Crew Alert Panel*. The pilots referred to the '*QRH*[2] *Engine Oil Low pressure'* checklist and subsequently shut down the No. 2 engine. The rest of the descent and the landing was conducted with the No. 2 engine inoperative.

Recorded data showed that one second after touchdown, both power levers were set to maximum reverse thrust. They were subsequently advanced back to Ground Idle after one second then after a further ground roll of about 200 metres the power levers were returned to reverse thrust.

The aircraft did not have hydraulically powered nosewheel steering and main-wheel brakes. Rudder authority, for ground aerodynamic steering was substantially limited because the switch for manual operation was not set to the appropriate setting. Reverse thrust was applied during the landing roll, which induced a significant left yaw resulting in the subsequent runway excursion.

Safety Deficiency description

During the '*ELECTRICAL SMOKE'* checklist actions, the crew were referred to the '*ACW*[3] *GEN 1+2 LOSS*' checklist *(See attachment 1).* The aircraft was on descent, more than 20 nm from the aerodrome and was not yet within the appropriate speed range to be configured for landing. Therefore, the PIC instructed the copilot to 'skip' the '*before landing section*' of the checklist. That section contains essential action items for the configuration of the aircraft, such as the *landing gear* extension and *flap* selection. The crew subsequently returned to that section of the checklist and completed it when the aircraft was within 5 nm of the aerodrome and the speed had fallen to within the appropriate range.

The pilots did not refer to the normal '*BEFORE LANDING'* checklist *(See attachment 2),* which also contained the above action items and additional essential action and check items, including the rudder *Travel Limiting Unit (TLU)*. The investigation determined that they substituted the normal '*BEFORE LANDING'* checklist with the '*ACW GEN 1+2 LOSS'* checklist, before landing section.

As a result, the *QRH* did not draw the pilots' attention to check the *TLU indicator* and *switch* to ensure they had set it to the *low speed mode*. The *TLU* remained in the *high-speed mode,* which restricted rudder deflection to only +/- 4° instead of the its normal full available deflection of +/- 27°. In the absence of hydraulic steering capabilities, aerodynamic steering on the ground was absolutely necessary. However, the extremely limited rudder authority rendered aerodynamic control negligible.

Recommendation number *AIC 19-R21/18-1002* to Avions de Transport Regional (ATR) Limited

The PNG Accident Investigation Commission recommends that ATR should ensure that the either:

1. The rudder *Travel Limitation Unit (TLU) Low Speed* check, along with other essential check and action items, is included in the before landing section of the *'Alternating Current Wild (ACW) GEN 1+2 LOSS'* checklist, and every abnormality and emergency checklist that has gear and flap extension procedures; or

2. the *Quick Reference Handbook (QRH)* contains appropriate information that informs the crew that the *before landing sections* of the '*ACW GEN 1+2 LOSS'* checklist and other abnormality and emergency checklist is not a substitute for the normal '*Before landing'* checklist.

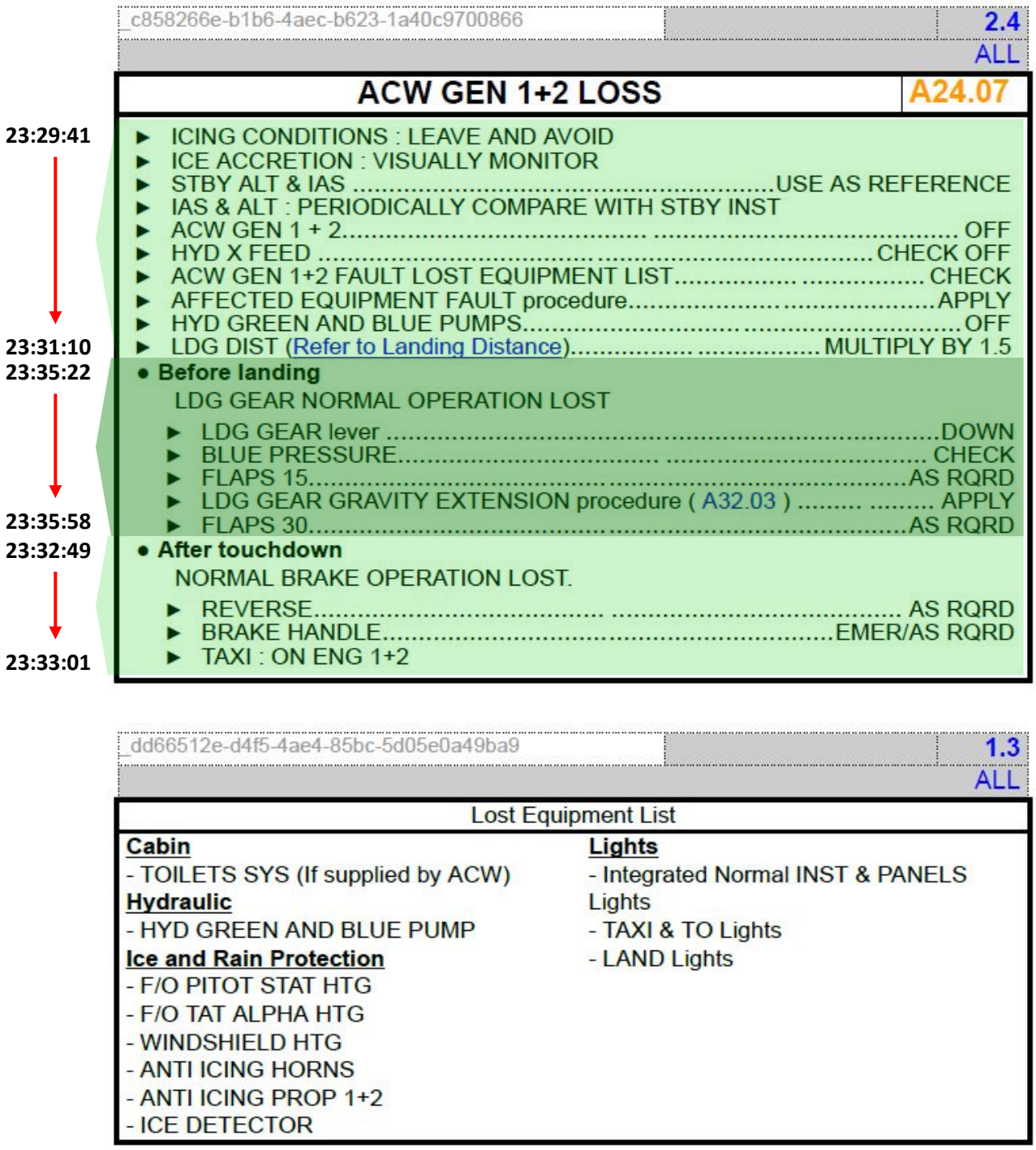
Action requested

The AIC requests that ATR note recommendation *AIC 19-R21/18-1002*, and provide a response to the AIC within 90 days of the issue date, and explain (including evidence) how ATR has addressed the safety deficiency identified in the safety recommendation. Status **ACTIVE.**

2 QRH: *Quick Reference Handbook* checklist

3 ACW: *Alternating Current Wild* means that the **alternating current** that is frequency **wild**, meaning as the generator speeds up or slows down, the frequency of the alternating current actually changes.

ATTACHMENT 1: *ACW GEN 1/2 LOSS* CHECKLIST



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ALL

ACW GEN 1+2 LOSS A24.07

23:29:41
- ICING CONDITIONS : LEAVE AND AVOID
- ICE ACCRETION : VISUALLY MONITOR
- STBY ALT & IAS .....USE AS REFERENCE
- IAS & ALT : PERIODICALLY COMPARE WITH STBY INST
- ACW GEN 1 + 2..... ..... OFF
- HYD X FEED .....CHECK OFF
- ACW GEN 1+2 FAULT LOST EQUIPMENT LIST..... ..... CHECK
- AFFECTED EQUIPMENT FAULT procedure.....APPLY
- HYD GREEN AND BLUE PUMPS.....OFF

23:31:10
- LDG DIST (Refer to Landing Distance)..... ..... MULTIPLY BY 1.5

23:35:22
- **Before landing**

LDG GEAR NORMAL OPERATION LOST
- LDG GEAR lever .....DOWN
- BLUE PRESSURE..... ..... CHECK
- FLAPS 15.....AS RQRD
- LDG GEAR GRAVITY EXTENSION procedure (A32.03) .... APPLY

23:35:58
- FLAPS 30.....AS RQRD

23:32:49
- **After touchdown**

NORMAL BRAKE OPERATION LOST.
- REVERSE..... ..... AS RQRD
- BRAKE HANDLE.....EMER/AS RQRD

23:33:01
- TAXI : ON ENG 1+2

_dd66512e-d4f5-4ae4-85bc-5d05e0a49ba9 1.3

ALL

Lost Equipment List

Cabin
- TOILETS SYS (If supplied by ACW)

Hydraulic
- HYD GREEN AND BLUE PUMP

Ice and Rain Protection
- F/O PITOT STAT HTG
- F/O TAT ALPHA HTG
- WINDSHIELD HTG
- ANTI ICING HORNS
- ANTI ICING PROP 1+2
- ICE DETECTOR

Lights
- Integrated Normal INST & PANELS Lights
- TAXI & TO Lights
- LAND Lights

AIC Note: Pale green highlighting added by the AIC to identify the area of checklist completed.

Dark green highlighting added by the AIC to identify the area of checklist action delayed.

ATTACHMENT 2: *BEFORE LANDING CHECKLIST*

16 Before Landing

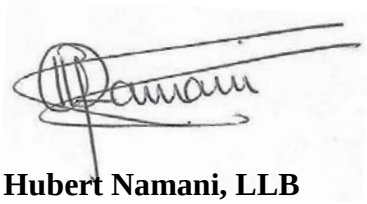
_eab6f18c-1073-423a-956c-a6c68f46b435 4.2

ALL

PF	PM
When Passing Deceleration Point ▶ PL 1+2..... ..... RETARD AS RQRD	
At Appropriate Speed ▶ FLAPS 15.....ORDER	▶ FLAPS..... ..... 15°
At Appropriate Speed ▶ LDG GEAR DOWN..... ..... ORDER	▶ LDG GEAR .... DOWN ▶ TLU LO SPEED..... .....CHECK ON ▶ PWR MGT..... .....TO ▶ TAXI & T.O lights ....ON ▶ LDG GEAR .....MONITOR *Announce Gear when locked.* ▶ ICING AOA ....AS RQRD **Note** *Icing AOA must remain ON for a landing under icing conditions. Make sure that the aircraft is clean and out of icing conditions before resetting icing AOA for a landing under normal conditions. Refer to ADVERSE WEATHER.*

CAPT	F/O
▶ CABIN CREW REPORT.....OBTAIN	

PF	PM
At Appropriate Speed ▶ FLAPS 30.....ORDER	▶ FLAPS..... ..... 30°
▶ BEFORE LDG C/L .... ORDER	▶ BEFORE LDG C/L .... PERFORM
Note *In the case of turbulence CL must be set to 100% OVRD to help maintain approach speed.*	**Note** *In the case of turbulence CL must be set to 100% OVRD to help maintain approach speed.*



Hubert Namani, LLB

Chief Commissioner

27th July 2019