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Australian Transport Safety Bureau

Hard landing, involving a PA28RT, Piper Arrow, VH-ADU

Mangalore Airport, Victoria, 17 June 2014

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Aviation Occurrence Investigation
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Addendum

Page	Change	Date

Hard landing, involving a PA28RT, Piper Arrow, VH-ADU

What happened

A PA28RT Piper Arrow aircraft

Source: Airliners.net: Darren Wilson

On 17 June, 2014 a PA28RT-201 Piper Arrow aircraft, registered VH-ADU (ADU), was returning to Mangalore Airport, Victoria for the final leg of a dual navigation exercise. The aircraft was being flown by a student pilot, monitored by an instructor. A second student pilot was observing from the back seat.

The aircraft had departed Mangalore about three hours earlier, and had overflown both Tocumwal and Finley (New South Wales) airports. The training flight had included several practice diversions, some low level navigation and also lost procedures training.

As the cloud base was still quite low in the area, the flight was unable to continue as planned into Albury, New South Wales, and instead, diverted directly back to Mangalore. The weather at Mangalore was fine with a light southerly wind.

As the aircraft approached Mangalore, the instructor asked the student to conduct a straight-in approach onto runway 18. The instructor had previously demonstrated this procedure, but this was the student's first attempt at flying this type of approach himself.

At about 1,500 ft above ground level, the student extended the landing gear, and at about 1,000 ft, selected the second stage of flap. The airspeed at this stage was about 80 knots. The student reported that the elevator felt heavy; but due to the stress he was experiencing, did not realise that the aircraft was incorrectly trimmed in a nose-down position. The instructor asked the student to confirm that the trim was correctly set, and he was advised that it was. The last stage of flap was selected on short final.

Some mechanical turbulence from a line of trees under the approach (Figure 1) caused the wings to roll, however the student was satisfied that the approach was still on profile.

As the student reduced power and commenced the flare[1], he reported using too much back pressure on the control column, resulting in the aircraft ballooning about 10 ft above the runway. The instructor called "taking over" but had not gained full control of the aircraft before the student relinquished his control, resulting in the aircraft rapidly dropping its nose.

The instructor reported needing to exert a great deal of force when attempting to return the nose to the landing position. He felt that although the aircraft had lost some airspeed during the balloon, that if assisted by a small amount of power, it still had sufficient speed to safely land. Just as he had pulled the nose back to almost level, the stall warning sounded, and the aircraft landed heavily on all three wheels.

Immediately after the heavy landing, with about 70 knots of airspeed remaining, the aircraft bounced, and the instructor initiated a go-around. When the aircraft was stable, he handed control back to the student, who flew most of the circuit. The student was apprehensive about another landing and during the flare, the aircraft ballooned again. The instructor took over control and completed a full stop landing on runway 18.

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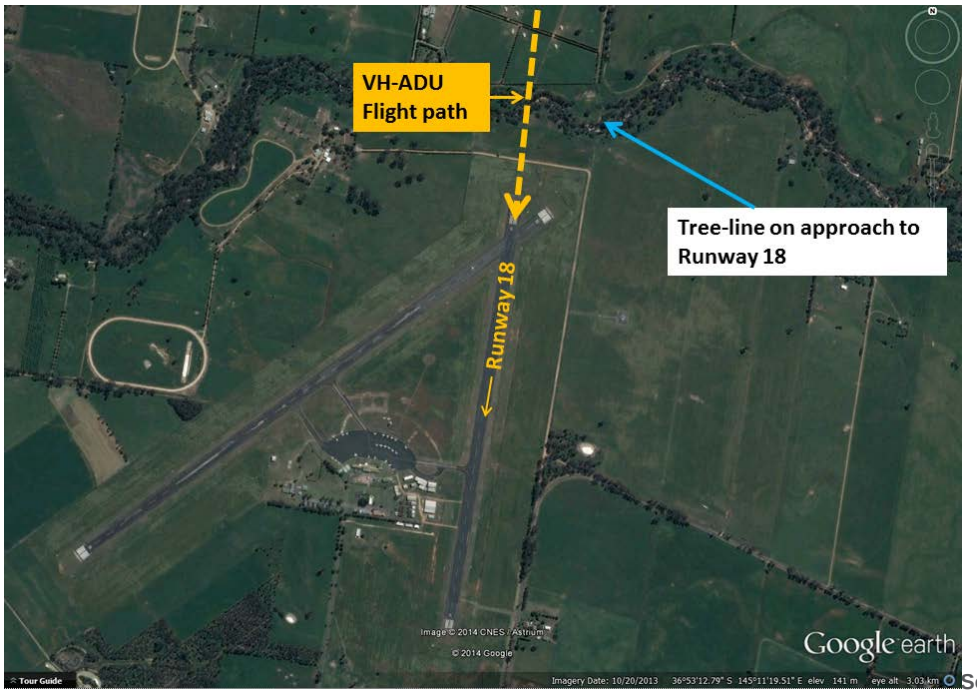
[1] Final nose-up pitch of landing aeroplane to reduce rate of descent to approximately zero at touchdown

Figure 1: Mangalore Airport Runway 18



Source: Google earth

Neither the crew nor passenger was injured; however the aircraft sustained damage to the wing near the wing root, the engine mounts and the nose wheel assembly.

Instructor comments

The instructor held a Grade 2 Instructor Rating (A), having accrued over 1,080 instructing hours.

He commented that had the aircraft nose been in a better position when he took control during the first balloon, he would have initiated a go-around. He did not rate the occurrence landing as particularly heavy, but felt to err on the side of safety; the aircraft should be inspected by an engineer.

He reported that the elevator controls still felt very heavy during the second landing, and that power was required to assist during this phase. He commented that ADU is heavier than the other two T-Tail Arrows on the flight line.

Student comments

The student had about 148 hours total flying time, with about 13 hours on the Piper Arrow aircraft. This was the first time he had flown ADU and reported it as being a lot heavier in the elevator than the others Piper Arrows he had flown.

He also reported that he was feeling some degree of stress, as the navigation exercise had been intense, with a high workload, and low cloud. He felt that due to the tension in his arms, he had not realised the aircraft was incorrectly trimmed until he had removed his hands from the control column, and the nose dropped.

He suggested that an instructor should have full control of the aircraft before giving the 'taking over' command so that at least one person had full control of the aircraft at all times.

Operator comments

The operator report noted some discrepancies between the instructor and student pilot recollection of events. However they both reported that the elevator on that day was particularly heavy. Two other instructors at the flying school had reported ADU as being notably heavier in the elevator than the other Piper Arrows on the line.

The operator noted that in the past 12 months, there had been no entries placed in the aircraft maintenance release, or reports via the company's internal maintenance notification form.

The report also noted the instructor reported a restriction in aft movement of ADU's control column on that day, and with the nose pointing down, the instructor was unable to apply power.

The anti-servo tab, which serves to make the controls feel heavier and increase stability, was inspected and found to be serviceable.

Independent Engineering report

A subsequent independent engineering report was conducted. The aircraft was inspected in accordance with the PA28RT-201 service manual. All components of the elevator and trim systems were found serviceable and within limits.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Flying school

As a result of this occurrence, the flying school management has advised the ATSB that they are taking the following safety actions:

Reinforcement of procedures to operational personnel

Operational management will reinforce the correct handover / takeover procedure to all flying staff.

Maintenance reporting

A briefing will be given to all staff regarding aircraft unserviceability reporting procedures.

Safety message

On this occasion there was a short delay between the instructor issuing the command 'taking over", and being in a position to be able to fully take command. The student's response in relinquishing control was swift, giving the incorrectly trimmed aircraft an opportunity to be in a nose down position close to the ground.

The United States Department of Transportation, Federal Aviation Administration *Aviation Instructor's Handbook 2008 (*p 8-9) devotes a section to the Positive Exchange of Flight Controls.

This publication states that numerous accidents have occurred due to a lack of communication or misunderstanding regarding who had actual control of the aircraft, particularly between students and flight instructors. It continues on to say during flight training, there must always be a clear understanding between students and flight instructors about who has control of the aircraft. It promotes a positive three steep process for the exchange of flight controls including a visual check to see that the other person actually has the flight controls. Flight instructors should always guard the controls, and be prepared, as pilot in command, to take control of the aircraft.

Further reading is available at:

www.faa.gov/regulations_policies/handbooks_manuals/aviation/aviation_instructors_handbook/media/faa-h-8083-9a.pdf

The Civil Aviation Safety Authority (CASA) *Flight Instructor Manual (2) (2007)– Aeroplane,* directs instructors to repeatedly practice the "handing over and taking over" drills, in the early air sequences, to prevent any confusion on who is manipulating the controls.

The CASA *Flight Instructor Manual* is available at:

www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_90300

General details

Occurrence details

Date and time:	17 June 2014 – 1300 EST	
Occurrence category:	Accident	
Primary occurrence type:	Hard landing	
Location:	Mangalore Airport, Victoria	
	Latitude: 36° 53.30' S	Longitude: 145° 11.05' E

Aircraft details

Manufacturer and model:	Piper Aircraft Corporation PA 28RT-201	
Registration:	VH-ADU	
Serial number:	28R-8018063	
Type of operation:	Flying training - dual	
Persons on board:	Crew – 2	Passengers – 1
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Substantial	

About the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in

order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.