Australian Government
Australian Transport Safety Bureau

Runway excursion involving GippsAero GA8, VH-IDM

Whitsunday Airport (Shute Harbour), Queensland on 2 November 2024

ATSB Transport Safety Report
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Addendum

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Investigation summary

What happened

On 2 November 2024, a GippsAero GA8-TC Airvan, registered VH-IDM and operated by Wave Air, was being used to conduct a scenic flight from Whitsunday Airport (Shute Harbour), Queensland. On board were a pilot and 7 passengers. During the landing the aircraft departed the upwind end of the runway before entering marshy ground and coming to a stop in a ditch. Neither the pilot nor any of the passengers were injured and the aircraft was substantially damaged.

What the ATSB found

The ATSB identified that the aircraft's approach was above profile with a high airspeed and the pilot had an incorrect understanding of the required approach speed. Subsequently, the pilot did not initiate a go-around, resulting in a landing beyond the planned touchdown point. Additionally, despite having sufficient landing distance remaining, the pilot did not apply sufficient braking to prevent the aircraft departing the runway

It was also determined that the training, supervision and checking flights conducted by Wave Air did not identify that an excessive approach speed was routinely being used by the pilot. Additionally, the pilot's initial training was not fully completed, and they were not assessed on several abnormal and emergency procedures prior to operating unsupervised.

The ATSB also identified that Wave Air's weight and balance system used an incorrect empty weight moment arm to calculate the aircraft's centre of gravity, and passengers were not weighed in accordance with its procedures. Finally, it was determined that the decision height for assessing whether an aircraft met Wave Air's stabilised approach criteria was too low.

What has been done as a result

Wave Air has taken the following proactive safety action:

- The operations manual was modified to require that the stabilised approach criteria be met by 300 ft above airport elevation in visual meteorological conditions and 500 ft in when operating under instrument flight rules.
- The empty weight moment arm of the aircraft was corrected in the weight and balance system and the data of other aircraft was reviewed.
- Passenger scales have been serviced and made accessible for routine passenger weighing in accordance with the operator's procedure.
- The training and checking manual has been updated to more precisely detail training criteria.
- A new head of training and checking has been appointed.
- Pilots are required to complete examinations prior to commencing in command under supervision (ICUS) training and operating unsupervised.
- Updates have been made to the remedial training processes.
- 6-month flight reviews are now required for all pilots.

Safety message

Pilots should always be prepared to promptly execute a go-around if an approach for landing does not proceed as expected. Accurate knowledge of the aircraft's reference speeds, in addition to having pre-determined stabilised approach criteria, assist the assessment of whether an approach should be discontinued. Furthermore, routine practice of this manoeuvre will ensure that it can be performed safely when needed.

Contents

The occurrence

On 2 November 2024, a GippsAero GA8-TC Airvan, registered VH-IDM and operated by Wave Air, was being used to conduct a scenic flight with a pilot and 7 passengers on board. At 1120 local time, the aircraft departed from Whitsunday Airport (Shute Harbour), Queensland in-company[1] with another of the operator's aircraft as part of the same tour (Figure 1). Approximately one hour after departure, the 2 aircraft returned to the airport, joining the base leg of the circuit for a landing on runway 32.[2] VH-IDM was leading the company and the pilot made positional broadcasts on behalf of both aircraft on the common traffic advisory frequency (CTAF).

Figure 1: Scenic flight route

Source: Google Earth, annotated by the ATSB

The airport did not have a dedicated Bureau of Meteorology (BoM) weather station, however the pilot recalled a cloud base at about 2,500 ft above ground level (AGL) and a 3–5 kt wind. Footage of the windsock at the time showed a light headwind on runway 32.

The pilot advised that, as the aircraft proceeded on the final approach to landing, they intended to maintain an airspeed of 80 kt and a flight path to arrive at the runway past the displaced threshold due to trees in the runway undershoot (see the section titled *Whitsunday Airport (Shute Harbour)*). However, the pilot reported that the aircraft did not descend as expected, resulting in it being above the intended approach path. In response, the pilot lowered the nose to increase the descent rate and regain the approach path, but as a result the airspeed increased from 80 to 90 kt.

At about this time, the trailing company aircraft contacted the pilot on the company frequency to request that they roll through to the end of the runway to exit after landing rather than backtracking. This was to avoid obstructing their landing. Because VH-IDM could only broadcast on one of its 2 radios, the pilot selected the standby frequency (that was selected to the company

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1 In-company: a group of aircraft that navigate and communicate as a single unit. Each aircraft self-separates from other aircraft within the group.

2 Runway number: the number represents the magnetic heading of the runway.

frequency) on that radio, replied that they would roll through, and then reselected the CTAF frequency.

The aircraft continued the approach (Figure 2), remaining above the desired approach path while the airspeed varied between 85–95 kt. The aircraft passed over the displaced threshold of the runway at approximately 100 ft AGL. The pilot commenced the flare about 300 m beyond the displaced threshold, at an airspeed of approximately 90 kt. The aircraft then floated for about 640 m before touching down at a groundspeed of 65 kt with 370 m of runway remaining. The pilot recalled that throughout the approach and landing they did not consider conducting a go-around[3] and were focused on landing the aircraft.

Figure 2: VH-IDM flight path and landing roll

Source: Google Earth, annotated by the ATSB

After touching down, the pilot retracted the flaps and recalled attempting to apply full braking pressure. They further recalled that the brakes did not perform as expected and they were unable to bring the aircraft to a stop. Subsequently, veering slightly right, the aircraft departed the end of the runway at a groundspeed of 24 kt. The aircraft travelled briefly across grass before entering marshy ground and coming to rest in a ditch, as the propellor struck the ground. Neither the pilot nor any of the passengers were injured and the aircraft received damage to the propellor and firewall (Figure 3)

3 Go-around: a standard aircraft manoeuvre that discontinues an approach to landing.

Figure 3: VH-IDM damage

Source: Wave Air

After verbally confirming with the passengers that they were uninjured, the pilot advised the pilot of the trailing company aircraft via radio of the accident, before exiting and assisting the passengers to evacuate the aircraft. The trailing aircraft landed at approximately the same time as VH-IDM came to a stop and taxied to the terminal after confirming the safety of the pilot and passengers of VH-IDM.

Context

Pilot information

The pilot held a commercial pilot licence (aeroplane) issued in 2020 and a class 1 aviation medical certificate. They had accumulated 1,103 hours, of which 15 hours were operating the GA8-TC Airvan and 225 hours were operating the non-turbocharged GA8 Airvan. In the previous 90 days, the pilot had accumulated 170 hours, all in the GA8 and GA8-TC. The pilot had been flying with the operator since June 2024 and had flown almost exclusively from Whitsunday Airport (Shute Harbour). The pilot had last conducted a flight review as part of an instrument proficiency check in December 2022.

While the pilot reported having limited sleep in the 24 and 48 hours prior to the accident, the ATSB examined the possible effect of fatigue and determined that they were not experiencing a level of fatigue known to affect performance.

Aircraft information

General information

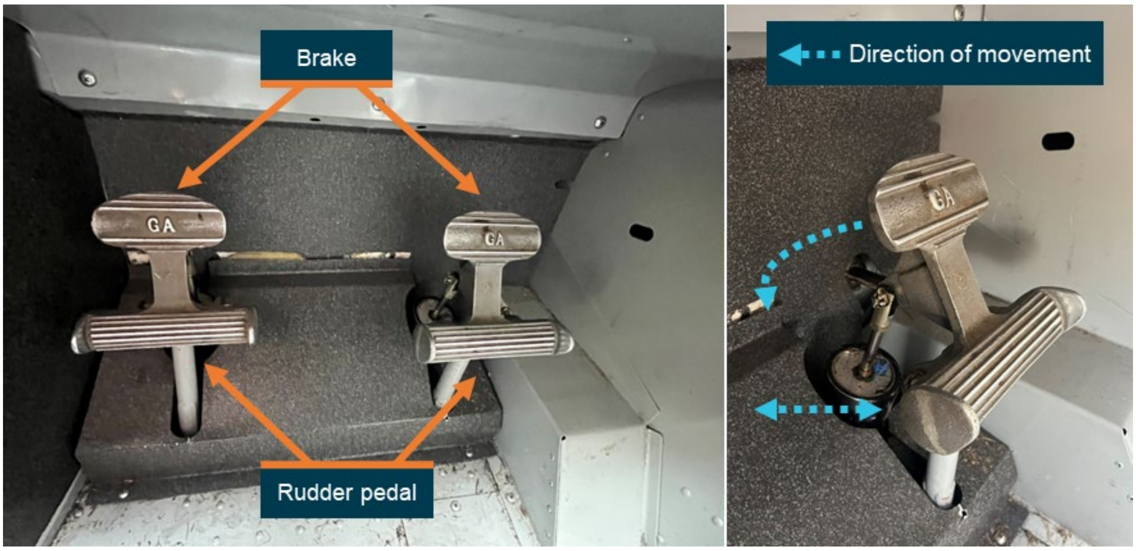
VH-IDM was a GippsAero GA8-TC Airvan fitted with a Lycoming TIO-540-AH1A turbocharged piston engine. The aircraft was manufactured and first registered in 2009 and at the time of the accident had accumulated 1,240 hours total time in service.

A service bulletin that allowed an increased maximum take-off weight of 1,905 kg and maximum landing weight of 1,860 kg had been completed on the aircraft. The aircraft was being maintained in accordance with the GA8-TC-320 maintenance schedule. A periodic inspection had been completed the morning of the accident and the maintenance release showed no outstanding items. The accident flight was the first flight following the inspection. The pilot advised that a different aircraft had originally been scheduled to be used for the occurrence flight, however the operator substituted VH-IDM at the 'last minute'.

Brake system

The aircraft's brake system included toe brakes incorporated into the rudder pedals. Each rudder pedal was connected hydraulically to a brake unit on the corresponding main landing gear wheel and was engaged by applying pressure to the top of the pedal (Figure 4). During flight, a pilot's feet rested on the floor in contact with the lower part of the rudder pedals to control the rudder. On the ground, a pilot would move their feet up on the pedal so that the top of the foot could be used to apply brake pressure. The heel was then used to maintain rudder control and nosewheel ground steering.

Figure 4: GA8-TC rudder pedals and brakes



Source: ATSB

The pilot did not report any issues with the braking performance of the aircraft prior to take-off, and the ATSB was advised that no fault was found with the brakes during the post-accident inspection. Additionally, there were no marks observed on the runway to indicate that the wheels had locked up and the aircraft had skidded. The pilot also advised that their seat position had been adjusted appropriately and that all controls, including the rudder pedals, could be used effectively.

Whitsunday Airport (Shute Harbour)

Whitsunday Airport (Shute Harbour) was a privately-owned, uncertified airport (aircraft landing area) located in hilly terrain onshore from the Whitsunday Islands. The airport had a single sealed runway 14/32, which was 1,410 m long and 15 m wide (Figure 5). Runway 32 had a displaced threshold due to trees in the undershoot, which reduced the runway available for landing to 1,310 m. The displaced threshold and departure end of the runway were at elevations of approximately 80 ft and 20 ft respectively, giving it a downslope of approximately 1.4%.

Figure 5: Whitsunday Airport runway environment

Source: Google Earth and passenger video footage, annotated by the ATSB

The airport’s management published a V*isiting pilot*’s *guide* that provided information regarding operating at the airport and procedures for approaching and departing each runway. The arrival procedure for runway 32 specified that:

> A straight in approach requires a slight right hand dog leg on final to maintain terrain clearance. After following the centre of Shute Harbour water in towards the valley, a right hand dogleg should be made prior to crossing Shute Harbour Road. When necessary to join base for runway 32, keep south of the Shute Harbour Jetty. Land after the displace threshold - this applies to both ends.

The airport management also had a website which contained the above information but also included detail that the:

> Touchdown aiming point (Displaced Landing Threshold) is no shorter than the windsock on the lefthand side of the runway.

The pilot advised that landing on runway 32 required modifications to a standard approach. Firstly, as described in the pilot’s guide, high terrain to the south-west required an oblique approach before aligning with the runway centreline to maintain terrain clearance. Secondly, trees near the arrival end of the runway necessitated a higher approach and could result in visual contact with the displaced threshold being lost. Lastly, due to the downslope of the runway it was necessary to touch down as early as possible to avoid an extended float. The pilot advised that due to the combination of the trees and the downslope they were required to get over the trees and then ‘chop the power’. The pilot of the trailing company aircraft provided similar advice regarding these considerations when landing on runway 32.

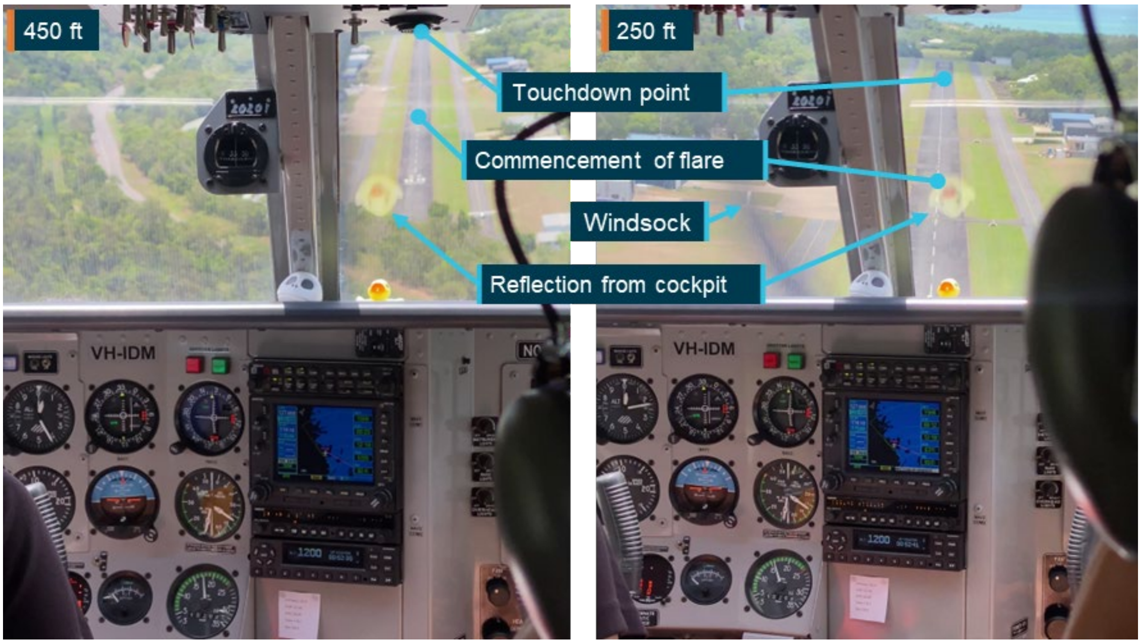
As an uncertified airport, Whitsunday Airport was not required to comply with any obstacle or terrain clearance standards. The Civil Aviation Safety Authority (CASA) Advisory Circular (AC) 91-02 *Guidelines for aeroplanes with MTOW not exceeding 5,700 kg - suitable places to take off and land* provided guidance for pilots when determining the effect of obstacles on, and in the vicinity of, an uncertified aerodrome:

> Pilots should be aware that uncertified aerodromes may declare an available runway length that begins and ends directly at an obstacle. Common examples might be small trees at the beginning or the end of the runway surface.
>
> During landing, high ground or obstructions in the approach area can cause a pilot to adopt a higher than normal approach path to avoid the obstacle, but still achieve a touchdown early in the available runway length…In all cases, the likely outcome is a long landing and the subsequent psychological effect of continuing a landing from an unusual situation outside the experience of the pilot.

Recorded data

VH-IDM was equipped with ADS-B out capability however flight data was not available for the approach and landing portion of the flight. Two passengers took video recordings of the landing and runway excursion on their mobile phones. Both passengers were seated on the right of the aircraft, one in the first row behind the pilot, and the second one row further back. The recordings showed the view through the front of the aircraft, as well as sections of the instrument panel and certain actions conducted by the pilot (Figure 6).

Figure 6: Passenger video footage



Note: Altitude is above mean sea level (AMSL). Adjustment of 30 ft applied to aircraft altimeter.
Source: Passenger video annotated by the ATSB

From the passengers' videos, the ATSB was able to determine the flight path and speed of the aircraft throughout the approach and landing. While the pilot advised their intended aim point was just past the displaced threshold, the aircraft maintained an average descent path of approximately 7° towards a landing spot 300 m beyond the displaced threshold. Overhead the displaced threshold, the aircraft was approximately 100 ft above ground level. Throughout the approach, the navigation unit displayed the groundspeed as between 90–95 kt. The airspeed indicator was also periodically visible and showed readings up to 95 kt.

After the commencement of the flare, the aircraft floated for approximately 640 m. During the float, the aircraft decelerated and with about 560 m of runway remaining was at the landing approach speed of 71 kt (see the section titled Landing Performance). Subsequently, the main wheels contacted the ground with approximately 370 m of runway remaining at a groundspeed of 65 kt. The aircraft took 18 seconds to reach the end of the runway, during which the groundspeed slowed from 65 kt to 24 kt.

The pilot was observed to reduce the throttle at several points during the final approach with the last reduction observed just prior to the flare. This indicated the approach was conducted with some power. The pilot was also observed to interact with the radio unit during the final approach, which was likely when responding to the trailing aircraft. The video confirmed that the flaps were set to 38° for landing and were retracted immediately upon touchdown. Also on touchdown, the pilot's feet moved upwards on the rudder pedals and pressure was applied against the pedals during the landing roll. However, it could not be ascertained whether the pressure was maintained throughout the landing roll, or whether the pressure was being applied to the top of the pedals to apply brakes or to the bottom of the pedals for rudder and steering.

Weight and balance

Software

The operator used a third-party system to calculate the weight and balance for each flight. In the system, each aircraft was configured with the weight and moment arm[4] when empty. Subsequently, for each flight, the fuel onboard, the pilot and passengers' weights and their seating positions were recorded to calculate both the weight and centre of gravity of the aircraft at take-off and landing. The system would provide an alert if the limits prescribed in the aircraft flight manual (AFM) were exceeded. A paper copy of the weight and balance calculation was provided to the pilot before each flight.

Aircraft empty weight

VH-IDM was last weighed on 12 August 2024 and the empty weight was determined to be 1,058 kg, with an empty weight moment arm of 1,202 mm. The operator advised that the aircraft was weighed in the freight configuration, therefore they added the weight of the operational equipment required for passenger carrying from the AFM, establishing the weight as 1,110.6 kg. The operator further advised that to provide a safety margin, a higher weight of 1,134 kg was configured in the system.

The ATSB identified that the empty weight moment arm was not adjusted to account for the added passenger operational items, with the freight configuration arm of 1,202 mm being used. Additionally, the operator had inadvertently added the weight of one passenger seat to each row, rather than 2. The ATSB calculated that the actual empty weight of VH-IDM in passenger configuration was 1,131.3 kg, with an empty weight moment arm of 1,275 mm. This was 2.7 kg less than the empty weight and 73 mm aft of the empty weight moment arm compared to that configured in the operator's weight and balance system (Table 1).

Table 1: Operator vs ATSB empty weight and arm

Item	Operator weight (kg)	ATSB-calculated weight (kg)	ATSB-calculated moment arm (mm)
Aircraft empty weight (freight)	1,058	1,058	1,202
Passenger operational equipment	52.6	73.3	2,329
Aircraft empty weight (passenger)	1,110.6 (1,134 used)	1,131.3	1,275

Passenger weights

The operator's standard operating procedures (SOPs) required that in determining the weight and balance of an aircraft:

> Actual weights will be determined by weighing all occupants, equipment and other baggage.

The operator's website also required that:

> Full names and exact weights per passenger must be advised when booking due to flight weight availability.

The passengers reported that their weight was requested at the time of booking, but they were not weighed prior to the flight.

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4 Moment arm: the horizontal distance from a reference datum to the centre of gravity of an item.

The CASA Multi-part AC 121-05, AC 133-04 and AC 135-08 – *Passenger crew and baggage weights* described acceptable weight calculation methods that could be defined in operating procedures. The circular stated that:

> The use of actual weights is the most accurate method of maximising payload capacity. Appropriately calibrated weighing scales should be used. Actual weighing is more commonly used by Part 133 and 135 operators. This is, in part, due to the smaller number of passengers being carried, which makes this option less disruptive than it is for Part 121 operators.
>
> Operators should have procedures to identify when passenger-declared weights are not appropriate, such as when operating close to limitations. Under these circumstances, the use of actual weights may be required to ensure limitations are not exceeded.
>
> Passenger-declared weights have inherent inaccuracies as passengers may not know their actual weight, especially when fully dressed. An adjustment allowance should be added to any passenger-declared weight, as a factor or a fixed additional amount.

Take-off and landing weight

The ATSB requested actual weights from the pilot and passengers including the baggage they took with them on the flight. Using this information, in conjunction with the revised empty weight and moment arm, the take-off and landing weight and balance of the aircraft was calculated and compared to that calculated by the operator (Table 2).

Table 2: Operator- vs ATSB-calculated take-off and landing weight – accident flight

Item	Operator-calculated weight (kg)	Operator-calculated moment arm (mm)	ATSB-calculated weight (kg)	ATSB-calculated moment arm (mm)
Aircraft empty weight	1,134	1,202	1,131	1,275
Row 1 (pilot row)	117	965	122	965
Row 2	135	1,772	132	1,772
Row 3	148	2,523	154	2,523
Row 4	150	3,247	146	3,247
Fuel	215	1,715	215	1,715
Take-off weight (Maximum 1,905 kg) (Allowable moment arm range 1,446 mm – 1,626 mm)	**1,899**	**1,550**	**1,900**	**1,592**
Fuel Used	41	1,715	41	1,715
Landing weight (Maximum 1,860 kg) (Allowable moment arm range 1,435 mm – 1,626 mm)	**1,858**	**1,547**	**1,859**	**1,589**

While the take-off and landing weight differed by 1 kg, the actual moment arm was 42 mm aft of that calculated by the operator. This was still less than the maximum of 1,626 mm specified in the AFM. However, the ATSB identified loading scenarios where the operator’s configuration would present the weight and balance as acceptable, when the actual moment arm was aft of this limit (Table 3).

Table 3: Operator- vs ATSB-calculated take-off weight – aft centre of gravity limit scenario

Item	Operator-calculated weight (kg)	Operator-calculated moment arm (mm)	ATSB-calculated weight (kg)	ATSB-calculated moment arm (mm)
Aircraft empty weight	1,134	1,202	1,131	1,275
Row 1 (pilot row)	96	965	96	965
Row 2	100	1,772	100	1,772
Row 3	100	2,523	100	2,523
Row 4	259	3,247	259	3,247
Fuel	215	1,715	215	1,715
Take-off weight (Maximum 1,905 kg) (Allowable moment arm range 1,448 mm – 1,626 mm)	**1,904**	**1,625**	**1,901**	**1,670 (44 mm aft of the allowable limit)**

Pilot training

Operator proficiency check

Prior to conducting scenic flights unsupervised, the operator's SOPs required the pilot to successfully complete an operator proficiency check (OPC). The flight component of the OPC was conducted without passengers and provided an assessment of the pilot's competency in normal, abnormal and emergency procedures when operating the aircraft.

Upon starting with the operator, the pilot conducted a one-hour supervised flight in a non-turbocharged GA8 with the head of flying operations (HOFO),[5] where initial handling training was conducted. This was the pilot's first flight operating a GA8. The pilot recalled that the flight included conducting steep turns, stall recovery and several circuits on runway 14 at Whitsunday Airport. They reported being uncertain whether a go-around or a short field landing was conducted during that flight. The pilot also did not recall that they had practiced applying maximum braking, nor that they had done so subsequently.

At the conclusion of the flight, the HOFO completed an OPC assessment, which recorded that several items had been assessed as 'competent' including a go-around and a short field landing. However, several items were marked as 'not yet competent' including low-level flying, flapless landing, basic instrument flying, engine failure and forced landing and aircraft system malfunctions as these items were not conducted during the flight. While the OPC was not completed, no subsequent OPC was conducted prior to the pilot operating unsupervised.

The operator advised the ATSB that due to the nature of some of the flight sequences, a flight training organisation (FTO) had been engaged to conduct OPCs. The FTO had last conducted training and assessment for a group of the operator's pilots in March 2024, prior to the accident pilot's commencement with the operator. The operator further advised that due to the timing of their commencement, the pilot had not conducted an OPC with the FTO and that this was an oversight.

5 The same person held the roles of HOFO and the head of training and checking for the operator.

Line training and line check

The operator's line training consisted of a series of flights with a supervising pilot, with passengers on board. Following line training, a line check was conducted, after which a pilot could operate unsupervised if an OPC had also been completed. Training records and the pilot's logbook showed that 9 supervised flights totalling 9.9 hours were conducted in June 2024 prior to a line check flight. The flights were supervised by 3 different pilots including the HOFO. Following a line check conducted by the HOFO, the pilot commenced operating unsupervised.

General emergency training

The operator required the pilot to successfully complete a general emergency procedures competency check for the aircraft type being flown. This consisted of ground-based topics and an in-water practical component. While training records were not available, both the operator and the pilot recalled that the ground-based training had been completed. However, the in-water practical component was not conducted. The operator advised that the most recent in-water training session had occurred in May 2024, prior to the pilot commencing, and that this was also an oversight.

The pilot reported that they had completed in-water practical training with 2 previous operators, initially in August/September 2022 and subsequently in September/October 2023. They also completed the training with the current operator after the accident and advised that the training provided by all operators involved donning and inflating a lifejacket while in water. They also reported that the while the training conducted by the previous operators was conducted in a swimming pool, the training with the current operator was conducted in open water and included carrying an injured passenger and discussion of survival skills.

Differences training

The SOPs required that differences training was conducted prior to operating an aircraft of the same type with performance differences. Additional training was therefore required prior to operating a turbocharged GA8-TC, such as VH-IDM, when initial training had been conducted in a non-turbocharged GA8.

The operator had provided documentation to the pilot on the differences in operating the GA8-TC and a supervised flight was conducted with the HOFO in October 2024, prior to operating the aircraft type unsupervised.

Recognition of prior learning

The operator's procedures allowed flight crew members who had completed training with other operators to be eligible for recognition of prior learning (RPL). The procedures further advised that the training needed to have been completed within the previous 6 months, and could be applied to the following training events:

- general emergency training
- differences training
- line training.

Approach speed

The operator reported that pilots were taught to conduct the final approach to land at an airspeed of 70 kt with 500 ft/min descent rate. They also advised that there was no difference between the approach and landing speeds when operating the GA8 compared to the GA8-TC. Additionally, the operator's SOPs stated that:

> During the approach phase the pilot-in-command shall ensure that the aircraft is flown at the approach speeds (V_{REF}) provided in the Aircraft Flight Manual for the aircraft being flown.

The FTO advised that pilots were taught and assessed in the non-turbocharged GA8 on establishing a reference airspeed (V_{REF})[6] of 71 kt on final as per the AFM. They also advised that no training or assessment had been conducted in the GA8-TC.

The pilot reported that they considered 80 kt as the appropriate final approach speed. However, they also stated that, following discussions with other pilots after the accident, they now understood that 70–75 kt was an appropriate final approach speed. The ATSB was also advised that the pilot had been observed landing long on previous occasions, however this had not been communicated to the operator or discussed with the pilot.

The pilot of the trailing aircraft reported they typically aimed for 80 kt on final and were ‘happy to get it down to about 75 [kt] on runway 32’. They also reported that for a short field landing they used 70–75 kt on final.

Landing Performance

The AFM provided performance charts to calculate the expected landing distance and ground roll. At a landing weight of 1,860 kg with a runway slope of −1.4% and the atmospheric conditions present at the time of the accident, the expected landing distance required was calculated to be 480 m, including a ground roll of 210 m. The AFM further described the reference speed and technique for achieving this performance:

- airspeed at 50 ft of 71 kt
- power off, 7° approach profile
- 38° (full) flap
- aircraft approaches with idle power at the given airspeed appropriate to weight
- after touch down maximum wheel braking is used to bring the aircraft to a stop
- for maximum braking effectiveness the wing flaps should be retracted and back pressure applied to the control column.

The AFM also stated that:

> Care must be taken to ensure airspeed is accurately maintained during the final landing approach. Timely and appropriate use of power should be exercised to maintain the desired flight path and airspeed. Excessively high approach speeds will result in prolonged floating and increased landing distance.

The AFM also provided performance charts for a 3° approach angle with power. In this circumstance the landing distance was expected to be higher due to the lower approach angle, with the ground roll remaining approximately the same.

Stabilised approach criteria

The operator’s procedures specified that aircraft should be on a stabilised approach as early as practical on the final approach path and that the following criteria were required for an approach to be stable:

- the aircraft is on (or close to) the correct flight path, only small changes in heading and pitch being required to maintain that path
- the aircraft speed is not more than Vref + 20 kt and not less than Vref
- the aircraft is in the proper landing configuration (except that full flap should not be selected until committed to land)

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6 Reference Landing Approach Speed: the airspeed equal to 1.3 stall speed, and is the airspeed used on approach down to 50 ft above the runway when determining landing distances.

- sink rate is maximum 1,000 ft/min
- power setting appropriate to the configuration but not below any minimum power for approach specified in the Aircraft Flight Manual
- all briefings and checklist items have been performed.

In visual conditions, if these criteria were exceeded below 100 ft above airport elevation, the pilot was required to execute a go-around.

The ATSB calculated that if an aircraft was 20 kt above the landing reference speed at the 100 ft decision height, in a power off 7° approach descent, the pilot had 2.7 seconds to reduce their speed to the landing reference speed. By comparison, a decision height of 300 ft would increase this time to 13.3 seconds while a decision height of 500 ft would increase the time to 23.9 seconds.

CASA provided guidance in AC 91-02 on initiating go-arounds in response to an unstable approach, stating that:

> Pilot training emphasises that a safe landing is the result of a stabilised approach. If pre-determined stabilised approach criteria are exceeded, then a safe landing is not assured. The decision to execute a go-around should be made as early as possible to maximise the safety outcome. At the conclusion of an effective go-around, the pilot will then have an opportunity to consider what options are available to conclude the flight.

Additionally, the Flight Safety Australia article *Quantifying the go-around* (CASA, 2021) highlighted the importance of practicing go-arounds:

> It's not enough to pass the test and fly a go-around only every couple of years when tasked by an instructor. Consciously ask yourself if you're in the slot, judging your aeroplane's state and trend all the way down final. By quantifying your performance, you can make the go-around decision before you are at the highest risk of loss of control.
>
> Going around is as natural a part of flying as landing itself – or it will be, if you evaluate landing criteria every time and occasionally practice the go-around task.

The pilot advised that, in addition to not considering a go-around during this approach, they could not recall having previously conducted a go-around outside of training.

Related occurrences

The ATSB occurrence database contained 200 other reported occurrences of runway excursions during landing in Australia between January 2021 and December 2024. Of these, 12 resulted in injuries to the pilot and/or passengers, including 2 where the injuries were serious.

Included in these occurrences were 2 other runway excursions involving a GA8 Airvan, both of which were investigated by the ATSB:

Runway overrun involving GippsAero GA8, VH-WSB on 26 December 2021 (AO-2022-001)

During the landing, the aircraft floated significantly beyond the intended landing point. The pilot did not recognise the risk of a runway overrun and did not conduct a go-around or apply sufficient braking to stop the aircraft on the remaining runway.

Runway excursion involving GippsAero GA8, VH-TBU on 6 April 2023 (AO-2023-016)

During the landing, the aircraft floated for a significant time and touched down approximately halfway down the runway, with insufficient remaining runway to stop. While the pilot recognised opportunities to conduct a go-around when they determined they were not on the correct approach profile, this was not conducted.

Safety analysis

Pilot actions

Approach and landing

During the approach to land, the aircraft's flight path was significantly above that intended, with an aim point approximately one third down the runway. While the deviation was likely influenced by the associated terrain and obstacles, the pilot had conducted this approach regularly and was familiar with the required approach path to land safely. The deviation was also possibly influenced by distraction when interacting with the radio to respond to the pilot of the trailing aircraft and by implied pressure to minimise the time spent on the runway.

Attempting to regain the intended flight path, the pilot lowered the nose, but did not reduce the power to idle. Subsequently, the aircraft's airspeed increased to approximately 95 kt. While the pilot planned 80 kt as the airspeed on final, the approach airspeed required by the operator was 70–71 kt. This approach speed was also the reference landing approach speed (Vref) in the aircraft flight manual (AFM). Therefore, the aircraft's airspeed deviation was about 24 kt.

While recognising that the aircraft was above the intended flight path and faster than the intended airspeed, the pilot continued the approach. The operator's procedures required a go-around to be conducted when the aircraft was not on the correct flight path or was more than 20 kt faster than the landing approach speed below 100 ft. While the airspeed was within this limit based on the pilot's incorrect understanding that the approach speed was 80 kt, the aircraft was not on the correct flight path and therefore a go-around was required. However, the pilot did not consider a go-around and commenced the flare well beyond the planned touchdown point at a high airspeed. Due to the high airspeed and the downslope of the runway, the aircraft floated significantly before touching down with less than a third of the runway remaining.

Contributing factor

The aircraft's approach was above profile with a high airspeed and the pilot had an incorrect understanding of the required approach speed. Subsequently, the pilot did not initiate a go-around, resulting in a landing beyond the planned touchdown point.

Landing roll and braking

Despite the reduced runway available, performance calculations determined that sufficient runway remained for the aircraft to stop if maximum braking was applied. However, although the pilot was observed retracting the flap and applying pressure to the rudder pedals, the aircraft did not decelerate as expected. Given the braking system was functional prior to take-off and after the accident and there was no indication that the aircraft skidded, maximum braking application was likely not conducted effectively. Subsequently, due to the insufficient braking, the aircraft departed the end of the runway.

Contributing factor

Despite having adequate landing distance remaining, the pilot did not apply sufficient braking to prevent the aircraft departing the runway.

Training and assessment

Initial training

The ATSB considered the effect of the training the pilot received from the operator prior to the accident. Given the elapsed time since their last flight review, additional training from a flight training organisation would have given them opportunity to practice procedures such as go-arounds and short field landings. In addition, the operator did not complete the operator proficiency check and as a result the pilot was not assessed on several abnormal and emergency procedures in the GA8. However, the pilot was assessed as competent in both go-arounds and short field landings during the initial handling training and had completed a number of line training flights that would have given them time to practice basic handling skills.

The general emergency training required an in-water practical exercise that was not conducted. While recognition of prior learning was able to be applied to this training event, training with another operator was completed more than 6 months prior and so was not applicable. However, given the pilot had received this training twice in the preceding 26 months from other operators and the training was similar, it was likely that the pilot was competent in this area.

Other factor that increased risk

The pilot's initial training was not fully completed, and they were not assessed on several abnormal and emergency procedures prior to operating unsupervised.

Approach speed

The pilot had received initial handling training and conducted line training flights supervised by 3 different pilots. They had also passed a line training check and had recently received differences training in the GA8-TC. Notwithstanding this, the pilot's pattern of using the incorrect approach speed was not identified or corrected.

Contributing factor

The training, supervision and checking flights conducted by Wave Air did not identify that an excessive approach speed was routinely being used by the pilot during the final approach to land. (Safety issue)

Weight and balance

The ATSB determined that the empty weight for the aircraft was calculated incorrectly, however as the operator had increased the weight in the system as a safety buffer, this did not have an effect. Additionally, the empty weight moment arm used to calculate if the aircraft's centre of gravity was within the allowable limits, was not adjusted for the additional operational items. As a result, the system calculated the aircraft's centre of gravity forward of the actual position. While the actual weight and centre of gravity of the accident flight was within limits for both take-off and landing, the incorrect empty weight moment arm permitted the aircraft to be loaded in a way that the centre of gravity was aft of the limit, while presenting to the pilot as within.

Furthermore, passengers were not weighed prior to flight and instead passenger-declared weights were used. This was not in accordance with the operator's procedures and was not recommended when operating close to the weight limitations of the aircraft.

Other factor that increased risk

Wave Air's weight and balance system used an incorrect empty weight moment arm to calculate the aircraft's centre of gravity, and passengers were not weighed in accordance with their procedures. (Safety issue)

Stabilised approach criteria

It was determined that the decision height for assessing if the aircraft met the operator's stabilised approach criteria was too low. As in this case, where an aircraft's airspeed was 20 kt faster than Vref at 100 ft (the decision height), it was very unlikely that the aircraft could be slowed to the reference landing approach speed in 2.7 seconds, most likely leading to a go-around.

While go-arounds are a normal aspect of flying, as stated in AC 91-02, 'the decision to execute a go-around should be made as early as possible to maximise the safety outcome'. However, in this case the pilot did not consider the operator's stabilised approach criteria in their decision-making.

Other factor that increased risk

The decision height for assessing whether an aircraft met Wave Air's stabilised approach criteria was too low. (Safety issue)

Findings

ATSB investigation report findings focus on safety factors (that is, events and conditions that increase risk). Safety factors include 'contributing factors' and 'other factors that increased risk' (that is, factors that did not meet the definition of a contributing factor for this occurrence but were still considered important to include in the report for the purpose of increasing awareness and enhancing safety). In addition 'other findings' may be included to provide important information about topics other than safety factors.

Safety issues are highlighted in bold to emphasise their importance. A safety issue is a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operating environment at a specific point in time.

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

From the evidence available, the following findings are made with respect to the runway excursion involving GippsAero GA8-TC, VH-IDM, at Whitsunday Airport (Shute Harbour), Queensland on 2 November 2024.

Contributing factors

- The aircraft's approach was above profile with a high airspeed and the pilot had an incorrect understanding of the required approach speed. Subsequently, the pilot did not initiate a go-around, resulting in a landing beyond the planned touchdown point.
- Despite having adequate landing distance remaining, the pilot did not apply sufficient braking to prevent the aircraft departing the runway.
- **The training, supervision and checking flights conducted by Wave Air did not identify that an excessive approach speed was routinely being used by the pilot during the final approach to land.** (Safety issue)

Other factors that increased risk

- The pilot's initial training was not fully completed, and they were not assessed on several abnormal and emergency procedures prior to operating unsupervised.
- **Wave Air's weight and balance system used an incorrect empty weight moment arm to calculate the aircraft's centre of gravity, and passengers were not weighed in accordance with their procedures.** (Safety issue)
- **The decision height for assessing whether an aircraft met Wave Air's stabilised approach criteria was too low.** (Safety issue)

Safety issues and actions

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues. The ATSB expects relevant organisations will address all safety issues an investigation identifies.

Depending on the level of risk of a safety issue, the extent of corrective action taken by the relevant organisation(s), or the desirability of directing a broad safety message to the Aviation industry, the ATSB may issue a formal safety recommendation or safety advisory notice as part of the final report.

All of the directly involved parties are invited to provide submissions to this draft report. As part of that process, each organisation is asked to communicate what safety actions, if any, they have carried out or are planning to carry out in relation to each safety issue relevant to their organisation.

The initial public version of these safety issues and actions will be provided separately on the ATSB website on release of the final investigation report, to facilitate monitoring by interested parties. Where relevant, the safety issues and actions will be updated on the ATSB website after the release of the final report as further information about safety action comes to hand.

Training and assessment of approach speed

Safety issue description

The training, supervision and checking flights conducted by Wave Air did not identify that an excessive approach speed was routinely being used by the pilot during the final approach to land.

Issue number:	AO-2024-056-SI-01
Issue owner:	Wave Air
Transport function:	Aviation: Air transport
Current issue status:	Closed – Adequately addressed
Issue status justification:	Changes introduced to the operator's training program, and the appointment of a new head of training and checking, should ensure that knowledge gaps, including those associated with approach and landing procedures, are now identified and corrected.

Proactive safety action taken by Wave Air

Action number:	AO-2024-056-PSA-322
Action organisation:	Wave Air
Action status:	Closed

Wave Air conducted several actions in response to this issue:

- The training and checking manual has been updated to more precisely detail training criteria.
- A new head of training and checking has been appointed.
- Pilots are required to complete examinations prior to commencing ICUS training and unsupervised operation.
- The remedial training processes were updated.
- 6-month flight reviews are now required for all pilots.

Weight and balance calculation

Safety issue description

Wave Air's weight and balance system used an incorrect empty weight moment arm to calculate the aircraft's centre of gravity, and passengers were not weighed in accordance with their procedures.

Issue number:	AO-2024-056-SI-02
Issue owner:	Wave Air
Transport function:	Aviation: Air transport
Current issue status:	Closed – Adequately addressed
Issue status justification:	Wave Air corrected the empty weight moment arm of the aircraft in the weight and balance system. It also reviewed the data of other aircraft in the system to ensure accuracy against published figures. In conjunction with the re-introduction of passenger weighing procedures, this will enable accurate weight and balance assessments for flights going forward.

Proactive safety action taken by Wave Air

Action number:	AO-2024-056-PSA-321
Action organisation:	Wave Air
Action status:	Closed

Wave Air corrected the empty weight moment arm of the aircraft in the weight and balance system. It also reviewed the data of other aircraft in the system to ensure accuracy against published figures. Additionally, the operator's passenger scales have been serviced and returned to the check-in area to be routinely used to weigh passengers as per the operator’s procedures.

Stabilised approach decision height

Safety issue description

The decision height for assessing whether an aircraft met Wave Air’s stabilised approach criteria was too low.

Issue number:	AO-2024-056-SI-03
Issue owner:	Wave Air
Transport function:	Aviation: Air transport
Current issue status:	Closed – Adequately addressed
Issue status justification:	The operator’s action to raise the stabilised approach decision height significantly increases the time available to reduce excess airspeed and the distance from the ground/obstacles during a go-around.

Proactive safety action taken by Wave Air

Action number:	AO-2024-056-PSA-318
Action organisation:	Wave Air
Action status:	Closed

Wave Air modified its operations manual to require that stabilised approach criteria were to be met by 300 ft above airport elevation in visual meteorological conditions and 500 ft when operating under the instrument flight rules.

General details

Occurrence details

Date and time:	2 November 2024 – 1221 Eastern Standard Time	
Occurrence class:	Accident	
Occurrence categories:	Runway excursion	
Location:	Whitsunday Airport (Shute Harbour), Queensland	
	Latitude: 20.2783° S	Longitude: 148.7556° E

Aircraft details

Manufacturer and model:	GippsAero GA8-TC320	
Registration:	VH-IDM	
Operator:	Wave Air	
Serial number:	GA8-TC 320-08-137	
Type of operation:	Part 135 Australian air transport operations - Smaller aeroplanes - Standard Part 135	
Activity:	Commercial air transport-Non-scheduled-Joyflights / sightseeing charters	
Departure:	Whitsunday Airport (Shute Harbour), Queensland	
Destination:	Whitsunday Airport (Shute Harbour), Queensland	
Persons on board:	Crew – 1	Passengers – 7
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Substantial	

Glossary

AC	Advisory circular
AFM	Aircraft flight manual
AGL	Above ground level
BoM	Bureau of Meteorology
CASA	Civil Aviation Safety Authority
CTAF	Common traffic advisory frequency
FTO	Flight training organisation
HOFO	Head of flying operations
ICUS	In command under supervision
OPC	Operator proficiency check
RPL	Recognition of prior learning
SOPs	Standard operating procedures
V_{REF}	Reference landing approach speed

Sources and submissions

Sources of information

The sources of information during the investigation included:

- the pilot and passengers of the accident flight and another company pilot
- the operator
- Whitsunday Airport (Shute Harbour)
- Civil Aviation Safety Authority
- Bureau of Meteorology
- Airservices Australia
- the engaged flight training organisation
- aircraft insurance company
- video footage of the accident flight and other photographs and videos taken on the day of the accident

References

Civil Aviation Safety Authority (2022). *Guidelines for aeroplanes with MTOW not exceeding 5 700 kg - suitable places to take off and land* (advisory circular AC 91-02 v1.2), https://www.casa.gov.au/guidelines-aeroplanes-mtow-not-exceeding-5-700-kg-suitable-places-take-and-land, CASA, accessed 11 December 2024.

Civil Aviation Safety Authority (2022). *Passenger crew and baggage weights* (multi-part advisory circular AC 121-05, AC 133-04 and AC 135-08- Version 1.1), https://www.casa.gov.au/sites/default/files/2021-08/multi-part-advisory-circular-121-05-ac-133-04-ac-135-08-passenger-crew-baggage-weights.pdf, CASA, accessed 7 January 2024.

Civil Aviation Safety Authority (2021). *Flight Safety Australia: Quantifying the go-around*, https://www.flightsafetyaustralia.com/2021/04/quantifying-the-go-around, CASA, accessed 16 December 2024.

Submissions

Under section 26 of the *Transport Safety Investigation Act 2003*, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. That section allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the following directly involved parties:

- the pilot and operator
- Whitsunday Airport (Shute Harbour)
- Civil Aviation Safety Authority

Submissions were received from:

- the pilot
- the operator

The submissions were reviewed and, where considered appropriate, the text of the report was amended accordingly.

Australian Transport Safety Bureau

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. It is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers.

The ATSB's purpose is to improve the safety of, and public confidence in, aviation, rail and marine transport through:

- independent investigation of transport accidents and other safety occurrences
- safety data recording, analysis and research
- 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, as well as participating in overseas investigations involving Australian-registered aircraft and ships. It prioritises investigations that have the potential to deliver the greatest public benefit through improvements to transport safety.

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

Purpose of safety investigations

The objective of a safety investigation is to enhance transport safety. This is done through:

- identifying safety issues and facilitating safety action to address those issues
- providing information about occurrences and their associated safety factors to facilitate learning within the transport industry.

It is not a function of the ATSB to apportion blame or provide a means for determining 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. The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

Terminology

An explanation of terminology used in ATSB investigation reports is available on the ATSB website. This includes terms such as occurrence, contributing factor, other factor that increased risk, and safety issue.