

Final Report

GULFSTREAM G450, REGISTRATION T7-977 RUNWAY OVERRUN AT SELETAR AIRPORT

19 September 2025

TIB/AAI/CAS.253

Transport Safety Investigation Bureau
Ministry of Transport
Singapore

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The Transport Safety Investigation Bureau of Singapore

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ABBREVIATIONS

ATC	Air Traffic Control
CVR	Cockpit Voice Recorder
FDR	Flight Data Recorder
FE	Flight Engineer
MLG	Main Landing Gear
MRO	Maintenance, Repair and Overhaul Organisation
NLG	Nose Landing Gear
OMM	Operations Maintenance Manual
PF	Pilot Flying
PIC	Pilot-in-Command
PM	Pilot Monitoring
RTS	Return to Service
RWC	Runway Controller
SIC	Second-in-Command
TL	Technical Log

SYNOPSIS

On 19 September 2025, as a Gulfstream G450 aircraft was rolling for take-off on Runway 21 at Seletar Airport, the flight crew noticed the airspeed indication in the cockpit was abnormal and aborted the take-off. The aircraft came to a stop off the end of the runway.

The Transport Safety Investigation Bureau of Singapore classified this occurrence as a serious incident.

FLIGHT DETAILS

Aircraft type	:	Gulfstream GIX-X (G450)
Operator	:	Aegle Aviation Limited
Aircraft registration	:	T7-977
Date and time of incident	:	19 September 2025, 1841 hours
Location of occurrence	:	Runway 21, Seletar Airport
Type of flight	:	Unscheduled
Persons on board	:	3

1 **FACTUAL INFORMATION**

All times used in this report are Singapore Local Time. Singapore Local Time is eight hours ahead of Coordinated Universal Time (UTC).

1.1 History of the flight

1.1.1 Following maintenance work in the hangar of a Maintenance, Repair and Overhaul (MRO) facility at Seletar Airport, a Gulfstream G450 aircraft was released to service on 19 September 2025 and was towed to the apron at about 1630 hrs. It was scheduled to depart Seletar Airport at 1800 hrs for Sultan Hasanuddin International Airport, Makassar, Indonesia. The aircraft would pick up the aircraft owner and 12 other passengers in Makassar before continuing to Jakarta, Indonesia¹.

1.1.2 Three persons were to be on board for the departure from Seletar Airport: two flight crew members (a captain as Pilot-in-Command (PIC) and another captain as Second-in-Command (SIC)) and a Flight Engineer² (FE).

1.1.3 The FE came to Singapore one day earlier, 18 September 2025, to oversee the aircraft's release to service (RTS) on 19 September 2025 following the completion of maintenance work by the MRO. Before the aircraft was moved out of the hangar, the FE removed the external protective covers from the standby pitot probe, three static ports and two total air temperature (TAT) probes.

1.1.4 On 19 September 2025, the PIC and SIC commenced duty³ at about 1055 hrs and 1045 hrs respectively in Jakarta⁴ (0955 hrs and 0945 hrs Jakarta time). The maximum permitted flight duty period was 16 hours, i.e. the PIC and SIC could work up to 0255 hrs and 0245 hrs on 20 September 2025 respectively. The PIC and SIC arrived in Singapore Changi Airport via a commercial flight at

¹ The Singapore-Makassar flight would take about 3 hours and the Makassar-Jakarta flight about 2 hours 15 minutes. Assuming a ground time in Makassar of 30 minutes just to pick up the aircraft owner and the other passengers, it is estimated that the flight crew would arrive in Jakarta at 2345 hrs (5 hours 45 minutes after departure at 1800 hrs from Singapore).

² The FE would be seated in the cockpit.

³ In accordance with the operator's Operations Maintenance Manual, deadheading and positioning time are considered duty time. Therefore, the commercial flight from Jakarta to Singapore Changi Airport and ground transport to Seletar Airport formed part of their duty period.

⁴ The PIC and SIC did not have any flying duty since 26 August 2025 and had ample rest prior to commencing duty in Jakarta.

about 1620 hrs. They reached Seletar Airport at about 1700 hrs⁵ via ground transport.

- 1.1.5 The operator's Operations Maintenance Manual (OMM) required the PIC⁶ to carry out a preflight inspection or to delegate the preflight inspection to the co-pilot. The checklist for the exterior preflight inspection includes ensuring that all protective covers, including the pitot probe covers, are removed and checking for foreign object debris (FOD) in, and corrosion on, the pitot probes.
- 1.1.6 Before the departure, the FE checked the landing gear of the aircraft to ensure that landing gear pins had been removed. Thereafter, the FE also did a quick walk-around check of the aircraft⁷.
- 1.1.7 The FE informed the flight crew that he had carried out a quick walk-around check⁸, and that the aircraft was serviceable. Both the PIC and SIC did not perform an exterior preflight inspection and both stated that it was common company practice for the FE to complete the exterior walkaround check when two pilots and an engineer were present.
- 1.1.8 For the departure, the PIC was the Pilot Flying (PF) and the SIC the Pilot Monitoring (PM).
- 1.1.9 After completing the cockpit preflight check, the flight crew contacted Air Traffic Control (ATC) to request for engine start and taxi clearance. While taxiing on Taxiway WP towards the runway holding point on Taxiway W1, the Runway Controller (RWC) instructed the flight crew to line up on Runway 21, provided the surface wind information as 210° at 3 knots, and issued the take-off clearance.
- 1.1.10 At 1840:03 hrs, the flight crew commenced the take-off roll. During the take-off roll, the flight crew saw the airspeed increased gradually to about 40 knots and then remained at around 40 knots for a short while. The airspeed then

⁵ The PIC and SIC were scheduled to arrive Seletar Airport at 1600 hrs but there was a delay to the Jakarta-Singapore flight. According to the flight crew, despite the delay, they were not under time pressure and were not rushing for departure.

⁶ According to the flight crew, they did not receive a copy of the OMM (see paragraph 2.3.4).

⁷ According to the FE, this quick walk-around check was a general visual inspection of the aircraft. This quick walk-around check would not qualify as a preflight inspection referred to in paragraph 1.1.5. The operator did not require the FE to carry out such a quick walk-around check and did not provide a checklist for such a walk-around check.

⁸ There was no requirement for the FE to inform the flight crew of the quick walk-around check that he had carried out.

increased rapidly to about 70 knots and then decreased back to about 40 knots⁹.

- 1.1.11 Upon noticing the abnormal fluctuation in airspeed indication, the SIC called for an aborted take-off. The PIC acknowledged the call and immediately reduced engine thrust, applied brakes and deployed thrust reversers. However, all these could not prevent the aircraft from overrunning the paved area of the runway and clearway (see paragraph 1.7.1).
- 1.1.12 The aircraft's nose landing gear (NLG) was immobilised in the grass area (see **Figure 1**) beyond the clearway while the main landing gear (MLG) was still on the clearway.



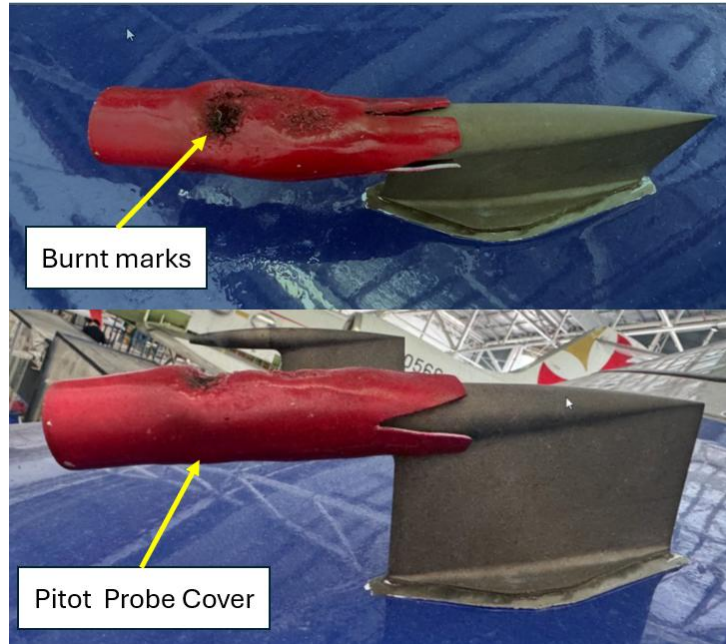
(Source: operator)

Figure 1: NLG immobilised in the grass area beyond the runway

- 1.1.13 Post-occurrence inspection found that the left-hand side (LH) pitot probe cover was still installed (see **Figure 2**). The right-hand side (RH) pitot probe cover was found on the ground near the aircraft where it stopped. There were no streamers¹⁰ attached to the covers for the LH and RH pitot probes.

⁹ According to the flight data recorder (FDR) data, the airspeed recorded between 1840:15 hrs and 1840:35 hrs increased gradually from about 30 knots to 72.5 knots. During the same period, the groundspeed increased rapidly from 24 knots to 144 knots.

¹⁰ Streamers are attached to probe and static port covers to remind a flight crew or ground personnel that the covers must be removed before flight. See paragraph 1.6.2.4.

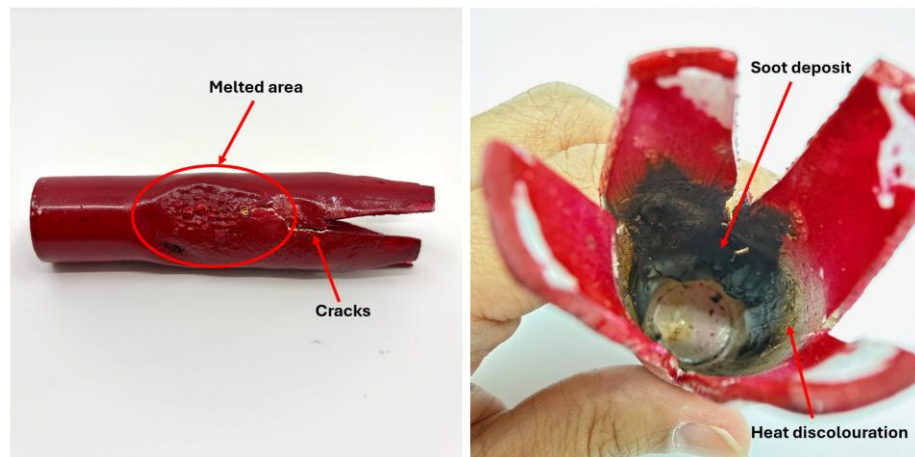


(Source: operator)

Figure 2: Cover for the LH pitot probe

- 1.2 Injuries to persons
 - 1.2.1 There was no injury to any person.
- 1.3 Damage to aircraft
 - 1.3.1 Landing gears
 - 1.3.1.1 The aircraft's NLG was not damaged. The aircraft's right MLG tyres were deflated, but the MLG was otherwise not damaged.
 - 1.3.2 Pitot probes
 - 1.3.2.1 There was no damage to the LH and RH pitot probes arising from the occurrence, but the post-occurrence inspection found pre-existing surface corrosion and a chip on the body of the LH pitot probe, and pre-existing surface corrosion on the RH pitot probe.

- (a) The pitot probe cover still installed on the LH pitot probe had a burnt mark and had melted (see Figure 2) and stuck onto the pitot probe¹¹.
- (b) The RH pitot probe cover had melted (see **Figure 3**). Some residue from the melted pitot probe cover was stuck to the RH pitot probe (see **Figure 4**).



(Source: TSIB) (Annotation: TSIB)

Figure 3: Melted RH pitot probe cover



(Source: operator) (Annotation: TSIB)

Figure 4: Residue from the pitot probe cover stuck on the RH pitot probe

¹¹ Pitot probes are heated to prevent icing in-flight.

1.4 Other damage

1.4.1 Nil

1.5 Personnel information

1.5.1 PIC

Age	55
Licence type	Airline Transport Pilot Licence
Issuing authority	Federal Aviation Administration
Licence validity	Valid till 25 November 2025
Medical certificate	Class 1
Medical certificate validity	Valid till 25 November 2025
Medical operational proviso	Nil
Last Base Check date	16 June 2025
Last Line Check date	16 June 2025
Total flying hours	14,700 hours
Aircraft types flown	Gulfstream G450, G550, McDonnell Douglas DC/MD-90, Boeing 737 Classic, Fokker F27, Embraer EMB-505, Boeing 747, Boeing 737NG
Total hours on type	90 hours
Flying in last 90 days	90 hours
Flying in last 7 days	0 hour
Flying in last 24 hours	0 hour
Duty time ¹² in last 48 hours	7 hours 46 minutes
Rest period ¹³ in last 48 hours	40 hours 14 minutes

1.5.2 SIC

Age	58
Licence type	Airline Transport Pilot Licence
Issuing authority	Federal Aviation Administration
Licence validity	Valid till 31 January 2026
Medical certificate	Class 1
Medical certificate validity	Valid till 31 January 2026

¹² This refers to any continuous period during which a crew member is required to carry out any task associated with the business of the operator.

¹³ This refers to the period during which the crew was off duty and available for rest, including sleep and other non-duty activities.

Medical operational proviso	Nil
Last Base Check date	7 March 2025
Last Line Check date	7 March 2025
Total flying hours	13,000 hours
Aircraft types flown	Gulfstream G450, CASA C-212, Fokker 50, Fokker F28, Embraer Legacy 650, Beechcraft Premier 1, Embraer Phenom 300
Total hours on type	1300 hours
Flying in last 90 days	93 hours
Flying in last 7 days	0 hour
Flying in last 24 hours	0 hour
Duty time in last 48 hours	7 hours 56 minutes
Rest period in last 48 hours	40 hours 4 minutes

1.5.3 Flight Engineer

Age	53
Qualification	Engineer B1
Total experience	32 years
Time on duty	11 hours 41 minutes
Duty time in last 48 hours	21 hours 41 minutes
Rest period in last 48 hours	26 hours 19 minutes

1.6 Aircraft information

1.6.1 Aircraft maintenance

1.6.1.1 The aircraft underwent maintenance work in the hangar of the MRO at Seletar Airport from 25 August 2025 to 19 September 2025. The maintenance work comprised the replacement of both engines and the rectification of several aircraft defects identified during maintenance. The maintenance records did not indicate any work on the aircraft's pitot-static system.

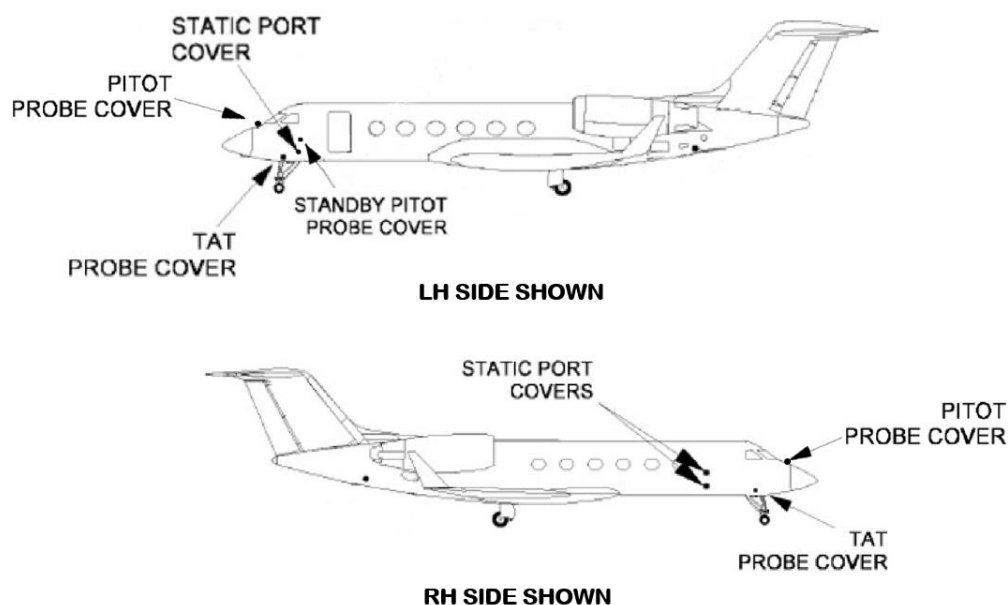
1.6.1.2 The FE handed over the aircraft to the MRO on 25 August 2025. Before the handover, the FE installed the protective covers on the LH and RH pitot probes, standby pitot probe, three static ports and two TAT probes. After the handover of the aircraft to the MRO, the FE returned to Indonesia.

1.6.1.3 On the afternoon of 19 September 2025, after the MRO had issued a RTS certificate and while the aircraft was still in the MRO's hangar, the FE inspected

the areas where maintenance had been carried out by the MRO and the general condition of the aircraft¹⁴. The inspection took about 10 minutes. The FE did not use any checklist for this inspection. During this inspection, the FE removed the standby pitot probe cover, the three static port covers, and the two TAT probe covers and kept the covers in a compartment in the aircraft door. He did not remove the LH and RH pitot probe covers¹⁵.

1.6.2 Pitot probes and static ports

1.6.2.1 The aircraft had two pitot probes, one standby pitot probe, three static ports and two TAT probes. **Figure 5** shows the location of these probes and static ports.



(Source: aircraft manufacturer) (Annotation: TSIB)

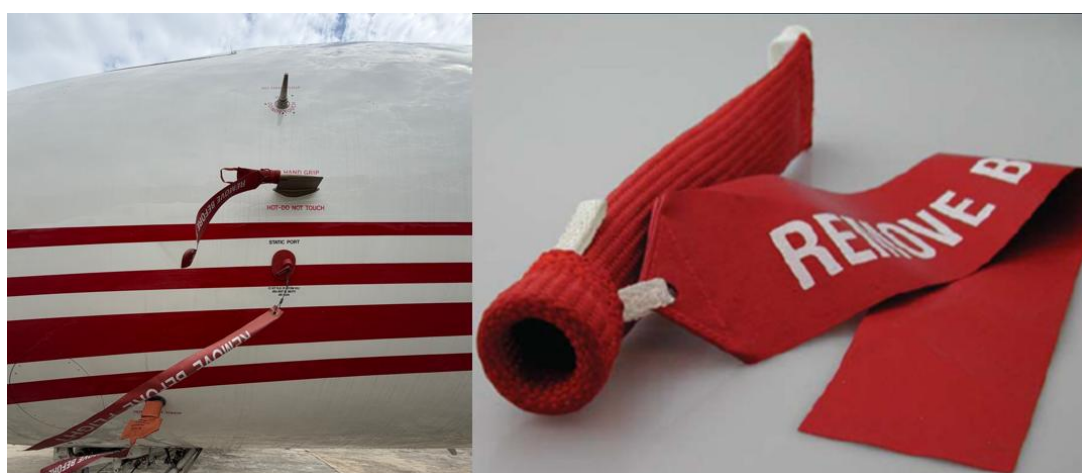
Figure 5: Location of the various probe and static port covers

1.6.2.2 Such probes and static ports are important aircraft equipment for sensing the air pressure and temperature outside the aircraft. The aircraft's air data system computes flight parameters (e.g. airspeed, altitude, vertical speed) basing on the air pressure and temperature data collected by these probes and static ports.

¹⁴ The operator did not require a flight engineer or any other staff to carry out an inspection following aircraft RTS by an MRO, much less provide a checklist for such inspection.

¹⁵ The LH and RH pitot probes require the use of a stepladder for access.

- 1.6.2.3 In particular, the pitot probe is a forward-facing sensor for measuring total air pressure. Comparing this total air pressure with the ambient air static pressure from the static ports allows the airspeed to be computed by the air data system.
- 1.6.2.4 Blockage of the pitot probes or static ports will result in erroneous computation of flight parameters. Thus, when an aircraft is on ground for a prolonged period, these pitot probes and static ports must be covered to prevent ingestion of debris pieces and building of nests inside the pitot probes and static ports by insects. Streamers are normally attached to the pitot probe and static port covers as a visual enhancement to remind a flight crew or ground personnel that the covers must be removed before flight (see **Figure 6**).



(Source: aircraft manufacturer)

Figure 6: Typical pitot probe cover with streamer

- 1.6.2.5 The set of protective covers carried on board the aircraft were manufacturer-approved except for the LH, RH and standby pitot probes. According to the FE, the aircraft did not come with pitot probe covers when the aircraft owner acquired the aircraft in March 2025. The FE fabricated the covers for the three pitot probes himself, but he did not include any streamer. The FE fabricated the probe covers without referencing any technical specifications (e.g. material, dimension, temperature rating as recommended by the aircraft manufacturer).
- 1.7 Aerodrome information
- 1.7.1 Seletar Airport has one paved runway strip that is 1956m x 150m. Runway 21 is 1836m x 46m with a paved clearway, which is 60m x 150m, after the runway. The reciprocal runway, Runway 03, has identical dimensions.

- 1.8 Flight recorders
 - 1.8.1 The aircraft flight data recorder (FDR) and cockpit voice recorder (CVR) were removed for readout by the TSIB.
- 1.9 Medical and pathological information
 - 1.9.1 The flight crew and the FE were sent for medical toxicological tests. There was no evidence that the flight crew and the FE were under the influence of drugs or alcohol at the time of the occurrence.
- 1.10 Additional information
 - 1.10.1 Scheduled departure time
 - 1.10.1.1 Initially, the MRO scheduled the aircraft RTS at 1500 hrs on 19 September 2025 and the aircraft departure time was scheduled at 1800 hrs.
 - 1.10.1.2 Through the FE, the aircraft owner had requested earlier RTS (at 1000 hrs and then at 1300 hrs on 19 September 2025), but the MRO was unable to accommodate the requests.

2 ANALYSIS

The investigation looked into the following:

- (a) Abnormal airspeed indication during take-off roll
- (b) Removal of probe and protective covers following RTS
- (c) Preflight inspection
- (d) Visibility of pitot probe cover

2.1 Abnormal airspeed indication during take-off roll

2.1.1 During the take-off roll, the flight crew observed an abnormal airspeed indication. Post-occurrence inspection found that the cover for the LH pitot probe was found on the pitot probe and had not been removed for the flight. The RH pitot probe cover was found on the ground near the aircraft where it stopped. The heat damage to the RH pitot probe cover and the melted residue observed on the RH pitot probe (see paragraph 1.3.2.1(b)) suggest that the cover for the RH pitot probe had also not been removed before the flight and had dislodged during the overrun.

2.1.2 With the LH and RH pitot probes covered, the pitot probes were unable to provide valid air pressure data for the aircraft's air data system to compute the airspeed, thus the abnormal airspeed indication observed by the flight crew.

2.2 Removal of probe and protective covers following RTS

2.2.1 On the afternoon of 19 September 2025, after the MRO had issued a RTS certificate and while the aircraft was still in the MRO's hangar, the FE inspected the areas where maintenance had been carried out by the MRO. The FE also carried out an inspection of the general condition of the aircraft. The operator did not require a flight engineer or any other staff to carry out an inspection following aircraft RTS by an MRO.

2.2.2 While the FE was inspecting the general condition of the aircraft, he removed the protective covers for the standby pitot probe, the three static ports, and the two TAT probes. He did not remove the covers for the LH and RH pitot probes. According to the operator's OMM, the responsibility for ensuring the aircraft was ready for flight was the PIC's. The preflight inspection checklist, which was

available to the flight crew, provided details on the external checks and specified that all protective covers were to be removed.

2.2.3 The FE could not explain why he did not remove the covers for the LH and RH pitot probes. The investigation team could only suspect that the FE was trying to be helpful by removing the probe and port covers that were easily within reach, to lessen the work of the flight crew when they eventually conducted the preflight inspection. He did not remove the covers for the LH and RH pitot probes as they were not within easy reach (access to these probes requires the use of a stepladder).

2.2.4 The operator did not have a systematic way whereby the installation or removal status of the covers for the probes and static ports was tracked. Without such a procedure, there is a risk, as shown in this occurrence, that the covers will not be removed prior to a flight.

2.3 Preflight inspection

2.3.1 The operator's OMM required the PIC to carry out a preflight inspection or to delegate the preflight inspection to the co-pilot. The manual does not state that this inspection can be delegated to any other personnel. The checklist for the PIC's exterior preflight inspection includes ensuring that all the protective covers, including the pitot probe covers, are removed. Additional requirements pertaining to the pitot probes were for the flight crew to check for FOD in, and corrosion on, the pitot probes.

2.3.2 However, the PIC did not personally conduct nor delegate the exterior preflight inspection to the SIC. Had the PIC or SIC duly done so, either of them could have noticed that the covers for the LH and RH pitot probes were not removed.

2.3.3 The FE mentioned to the PIC that he did a quick walk-around check. The PIC stated that it was a common practice for the FE to assist by conducting the exterior inspection. The investigation team opines that, while the PIC believed that such a common practice satisfied the OMM requirements of exterior preflight inspection, this common practice was not in accordance with the requirements of the OMM. This is a classic example of an unapproved practice becoming an operational norm.

2.3.4 The flight crew claimed that they had not been issued a copy of the OMM by the operator. The operator had provided a hyperlink to a file sharing system for

flight crew members to access the OMM. Although the operator required an email reply from all its flight crew and flight engineers to acknowledge that they had downloaded a copy of the OMM, the operator was not able to produce evidence of such an acknowledgement from the PIC and SIC.

2.4 Visibility of pitot probe cover

2.4.1 The pitot probe covers installed on the aircraft were fabricated by the FE and did not conform to the aircraft manufacturer's standards. They were also not equipped with streamers, which would enhance their visibility.

2.4.2 The LH and RH pitot probes were located outside and in front of the cockpit. They were relatively high up on the fuselage and required the use of a stepladder for access. A stepladder was available in the aircraft's cargo area but was not used during the FE's walk-around check. When these pitot probes are covered and the covers do not have streamers attached, the covers may not be noticeable from the ground level.

2.4.3 The occurrence reiterates the importance of using probe covers that conform to manufacturer's standards. Although pitot probe protective covers are for use on ground, their design specification, material suitability and visibility are safety significant because they are installed on components that provide air data inputs to the aircraft's airspeed indication system. More importantly, missing the removal of protective covers before flight would result in erroneous air data being presented to pilots.

3 CONCLUSIONS

From the information gathered, the following findings are made. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

- 3.1 The flight crew aborted the take-off after noticing that the airspeed indication in the cockpit was abnormal. The aircraft came to a stop off the end of the runway.
- 3.2 The abnormal airspeed indication was a result of the blockage of the left-hand (LH) and right-hand (RH) pitot probes.
- 3.3 The flight crew did not carry out a preflight inspection prior to departure and the covers for these pitot probes were not removed before the flight.
- 3.4 The operator did not have a systematic way to track the installation or removal status of the covers for the probes and static ports.
- 3.5 The aircraft was not equipped with proper covers for the LH and RH pitot probes. These covers did not have streamers for enhancing their visibility with a view to reminding a flight crew or ground personnel that the covers must be removed before flight.

4 SAFETY ACTIONS

Arising from discussions with the investigation team, the organisation has taken the following safety action.

4.1 The operator has on 16 February 2026 issued a flight operations notice:

- (a) To remind flight crews that it is mandatory for them to conduct preflight inspection independently of any inspection performed by other personnel; and
- (b) To instruct flight crews to record in the technical log, after completing the preflight inspection, that the preflight check had been carried out. (The operator plans to incorporate this instruction in the OMM in the fourth quarter of 2026.)

5 SAFETY RECOMMENDATIONS

A safety recommendation is for the purpose of preventive action and shall in no case create a presumption of blame or liability.

It is recommended that:

- 5.1 The operator establish a systematic way to track and account for the installation of aircraft probe and static port covers and, prior to a flight, the removal of these covers. [TSIB Recommendation RA-2026-008]
- 5.2 The operator use only manufacturer-approved pitot probe covers, or equivalent devices fitted with prominent streamers or flags. [TSIB Recommendation RA-2026-009]