Serious Incident

Aircraft Type and Registration:	Airbus A320-214, G-EZGY	
No & Type of Engines:	2 CFM56-5B4/3 turbofan engines	
Year of Manufacture:	2018 (Serial no: 8,385)	
Date & Time (UTC):	19 June 2024 at 1955 hrs	
Location:	Kerkira Airport, Corfu	
Type of Flight:	Commercial Air Transport (Passenger)	
Persons on Board:	Crew - 6	Passengers - 174
Injuries:	Crew - None	Passengers - None
Nature of Damage:	None	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	40 years	
Commander's Flying Experience:	5,303 hours (of which 5,047 were on type) Last 90 days - 213 hours Last 28 days - 77 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

Synopsis

Following a stable approach flown by the co-pilot, the aircraft drifted high on short finals leading to a deeper than expected landing. The commander took control and applied full power to initiate a baulked landing go-around before realising the co-pilot had engaged reverse thrust when the mainwheels touched down. The Airbus A320 Flight Crew Techniques Manual (FCTM) directs pilots '*must not initiate a go-around after the selection of thrust reversers.*' Having unwittingly commenced a go-around after reverse thrust selection, the commander experienced startle and surprise. This led to hesitation in deciding whether to continue or reject the go-around. During this period of startle and surprise the commander cycled the thrust levers between full power (TOGA[1]), maximum reverse thrust (REV MAX) and back to TOGA before finally reselecting REV MAX and maximum manual braking to reject the go-around.

The aircraft came to a halt approximately 340 m before the end of the runway.

After precautionary maintenance action for a possible heavy landing, the aircraft was released back to service. The Hellenic State Investigation Authority (HARSIA) later delegated the Serious Incident investigation to the AAIB.

Footnote

[1] Takeoff and go-around thrust setting.

History of the flight

The aircraft was configured with FLAPS FULL for a night landing on Runway 34 at Kerkira Airport, Corfu (CFU). Following a stable approach flown by the co-pilot, the aircraft drifted high on short finals due to an early and protracted flare which led to a deeper than expected landing at the end of the touchdown zone (TDZ). The co-pilot reported that darkness, coupled with the lack of runway centreline lighting made it more difficult to judge the final approach and to discern TDZ markings during the flare. Nonetheless, assessing that the landing would occur within the designated zone he selected REV IDLE when he felt the mainwheels touch down.

The commander's assessment differed; he judged the aircraft passed the last TDZ marker at a very late stage in the flare. The operator's policy was that a go-around should be flown if an aircraft's mainwheels were not on the runway before the end of the TDZ. Accordingly, the commander called "I have control" and selected TOGA thrust to initiate a baulked landing go-around. At the point when he took control and instinctively selected TOGA, the commander was unaware the co-pilot had already selected reverse idle thrust (REV IDLE)[2]. By the time he realised he had advanced the thrust levers from REV IDLE, rather than IDLE[3], they were already at the TOGA stop.

The Airbus A320 FCTM directs pilots '*must not initiate a go-around after the selection of thrust reversers.*' Aware of the FCTM direction but having already selected TOGA, the commander experienced startle and surprise leading to hesitation as to whether to continue with the go-around or reject the takeoff. His level of startle and surprise was further raised when the master warning[4] tone sounded because TOGA had been selected while full flap was still deployed. During this period of startle and surprise he briefly cycled the thrust levers from TOGA to maximum reverse thrust (REV MAX) and back to TOGA. There was a further brief thrust reduction on both levers before the commander finally reselected REV MAX and applied maximum manual braking to reject the baulked landing go-around.

The co-pilot stated that he did not sense any significant aircraft acceleration after the commander had selected TOGA for the second time. He became rapidly and increasingly concerned that there was insufficient runway remaining to take off and called "stop." He then independently applied maximum manual braking. While he could not recollect doing so, the recorded data showed he also applied a nose-down input on the side stick at the same time. This input was nulled because the commander kept his sidestick priority button pressed after taking control.

The co-pilot's "stop" call was approximately coincident with the commander also calling "stop", making a final selection of REV MAX and applying maximum manual braking.

Footnote

[2] Airbus standard operating procedures do not include a requirement for Pilot Flying (PF) to make a callout when reverse thrust has been selected.
[3] Likely because of tactile feedback from the thrust levers as they moved out of the reverse thrust detent.
[4] Takeoff configuration warning.

The aircraft came to a halt on the runway, approximately 340 m before the end. Following an external inspection of the aircraft by the emergency services it was taxied to stand under its own power.

The commander assessed the touchdown had been firmer than normal but after an engineering check procedure for a possible heavy landing, the aircraft was released for flight and the incident crew flew it back to the UK as planned.

Recorded information

The FDR and CVR recordings of the incident were not preserved following the incident[5]. However, flight data recordings from the Flight Data Interface Management Unit Quick Access Recorder (QAR) and the Digital ACMS Recorder (DAR) functions were available[6]. The QAR contains the same parametric data on the FDR and the DAR is a configurable data frame. The operator of G-EZGY had configured the DAR data to include parameters that identified when the sidestick pushbuttons were pressed, and which sidestick had priority.

The loss of the CVR recording meant that the investigation was reliant on the recollection of the flight crew as to what communications had occurred during the baulked landing and subsequent stopping of the aircraft.

Summary of recorded information

The approach to Runway 34 appeared normal, with FLAPS FULL selected and autobrake MEDIUM set. At about 1,800 ft aal the autopilot was disengaged. The aircraft remained stabilised on the RNP approach at an airspeed of about 138 KCAS. The recorded data during the approach showed that the wind direction was variable at less than 4 kt.

The aircraft flew over the runway threshold at a height of about 55 ft agl which coincided with the flare initiation. The pitch attitude of the aircraft gradually increased from 3° nose-up and when the aircraft was at about 20 ft agl (Figure 1 Point A) the pitch attitude was 4°, which coincided with the thrust levers being retarded to the idle position, which disengaged the auto thrust system. Further aft sidestick inputs were applied by the co-pilot and at about 10 ft agl the pitch attitude was just over 5°. The pitch attitude then started to reduce slightly but a further aft sidestick input was applied, causing the nose to pitch back up slightly (Figure 1 Point B). The pitch up commands caused the descent rate to decrease and remain stable at about 250 fpm for three seconds. The aircraft subsequently touched down at 130 KCAS and at about 660 m from the Runway 34 threshold, which was on, or just after[7], the final TDZ marker (Figure 2). The thrust levers were then quickly retarded to the REV IDLE position and the thrust reverser doors opened.

Footnote

[5] The State of Occurrence advised the AAIB approximately two weeks after the occurrence date that they would not be investigating the incident. The AAIB then became aware that the FDR and CVR had been overwritten.

[6] The QAR and DAR recordings are stored on a removeable media card fitted to the FDIMU and may be wirelessly transmitted from the aircraft.

[7] Positional data tolerances meant the exact touchdown point could not be precisely determined.

As the thrust levers had been retarded to the REV IDLE position by the co-pilot, the commander had almost simultaneously selected his sidestick priority pushbutton. This was followed by the thrust levers being quickly advanced to the TOGA position (Figure 1 Point C and Figure 2). The thrust reverser doors then closed (they had been in transit between their closed and open positions for about two seconds). The aircraft at this point had de-rotated with the weight settling on the nose gear. The thrust levers remained in the TOGA position for three seconds while the commander applied aft sidestick, stabilising the nose-up pitch at 1°.

The thrust levers were then briefly retarded to REV MAX before being quickly moved back to TOGA (Figure 1 Point D and Figure 2). This caused the thrust reverser doors to open briefly and then close. A master warning (red warning) was also activated because the aircraft was not in the takeoff configuration, with full flap still deployed.

After a further three seconds both thrust levers were again briefly retarded, with the right lever recorded as being between the flex takeoff / max continuous thrust (FLX MCT) detent and the TOGA stop, and the left thrust lever between the maximum climb (CL) detent and the idle stop. The levers were then advanced back to the TOGA position for less than one second before being fully retarded to REV MAX, and maximum manual braking was applied (Figure 1 Point E and Figure 2). The aircraft's airspeed was 129 KCAS (groundspeed 132 kt) and it was approximately 1,400 m from the runway threshold, with about 915 m of runway remaining.

As the aircraft started to de-rotate from 5° nose-up pitch, the commander had briefly moved his sidestick from a forward position to slightly aft of neutral, which coincided with the co-pilot applying forward sidestick for about two seconds (Figure 1 Point F). The commander had continued to select his sidestick priority pushbutton and therefore the simultaneous control inputs were not summed.

As the aircraft decelerated a master caution was presented, which was related to the auto thrust having been disconnected. At a groundspeed of about 50 kt the thrust levers were moved to the REV IDLE position, but maximum manual braking continued to be applied until the aircraft came to a full stop. It was about 1,970 m from the runway threshold, with about 340 m of runway remaining (Figure 2). The brake temperatures thereafter continued to increase and three minutes later a brake overheat warning occurred, with the brakes reaching a maximum temperature of just less than 500°C. The maximum recorded normal load during the landing was just less than 1.7 g and the flaps had remained in the FLAPS FULL position.

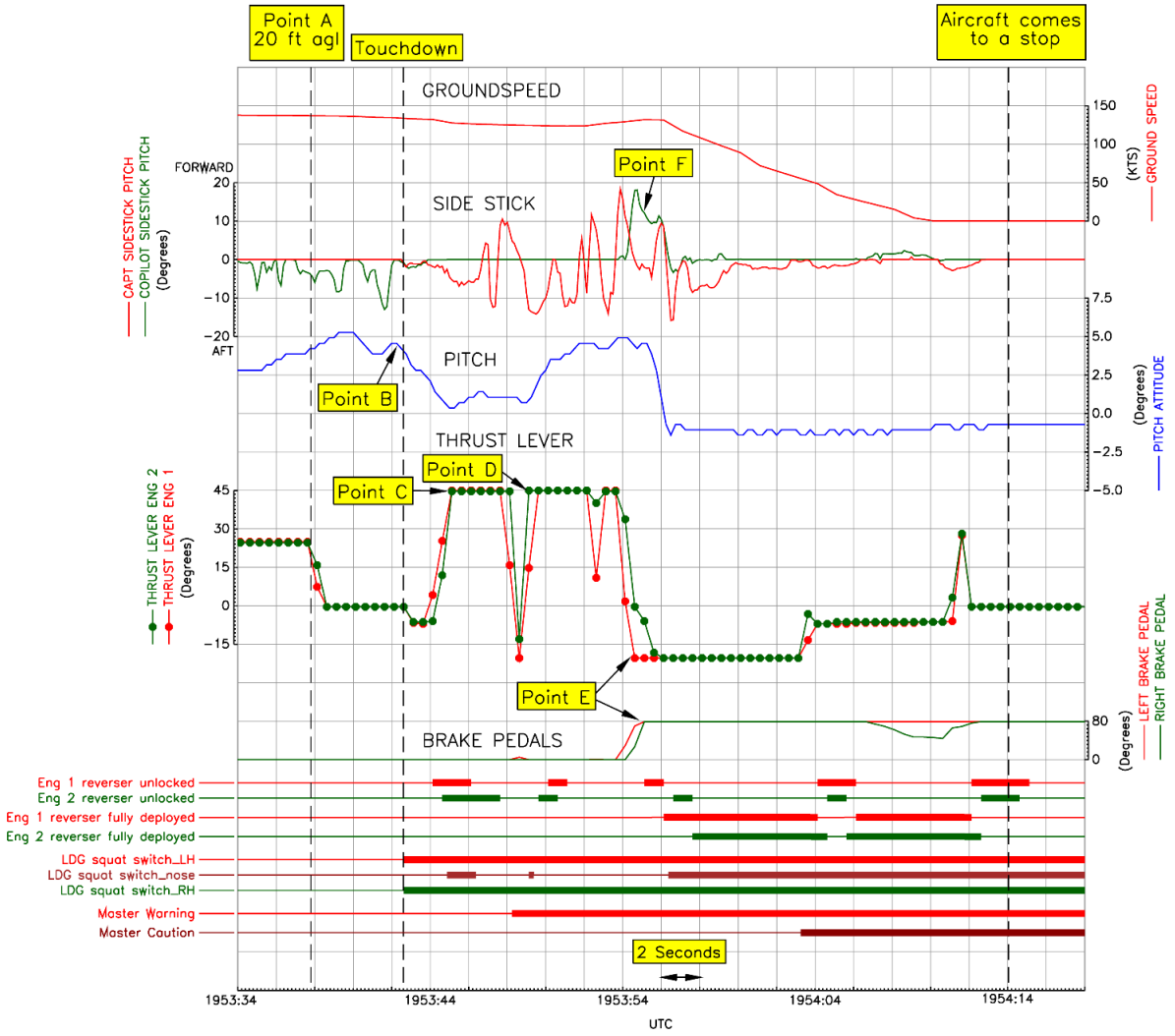


Figure 1

Touchdown and rejected takeoff

Figure 2

Overview of CFU showing key points during the landing
(Image ©2024 Airbus)

Personnel

While he had not flown a baulked landing go-around in an A320 family aircraft before, the commander had previously practised them in the A320 simulator, including ones initiated after mainwheel touchdown. He observed that on the incident flight he had likely not detected the selection of thrust reverse by the co-pilot because his attention had been focused outside on assessing whether the landing would be achieved within the TDZ.

The commander was aware of a previous Serious Incident involving CS-TNV, an A320 aircraft at Copenhagen/Kastrup Airport in 2022[8]. The commander of CS-TNV experienced significant handling difficulties resulting from asymmetric thrust reverser deployment following a baulked landing go-around initiated after the selection of reverse thrust. G-EZGY's commander considered that awareness of this as a potential risk for continuing with the go-around was an additional negative performance shaping factor during the period of surprise and startle experienced during this incident.

It is likely that the co-pilot also experienced startle and surprise following the commander's initiation of a go-around due to his own perception of a safely executed landing.

Airfield information

CFU is a coastal airfield with limited approach lighting on Runway 34 due to the final approach being largely over water (Figure 2). On Runway 34 there is only one set of TDZ markings beyond the target touchdown point whereas on Runway 16 there are two sets. The threshold on Runway 34 is inset by 59 m resulting in a total landing distance available of 2,314 m. The Runway 34 PAPIs are positioned to the left of the TDZ aiming markers, 415 m from the runway threshold. The end of the Runway 34 TDZ is 620 m from the threshold and is marked at night by 'S*imple Touchdown zone lights*' (Figure 3).

Footnote

[8] Serious Incident to CS-TNV (Airbus A320-214) in Copenhagen/Kastrup (EKCH) on 8-4-2022. Available at Report 2022-150 [accessed 10 March 2025].

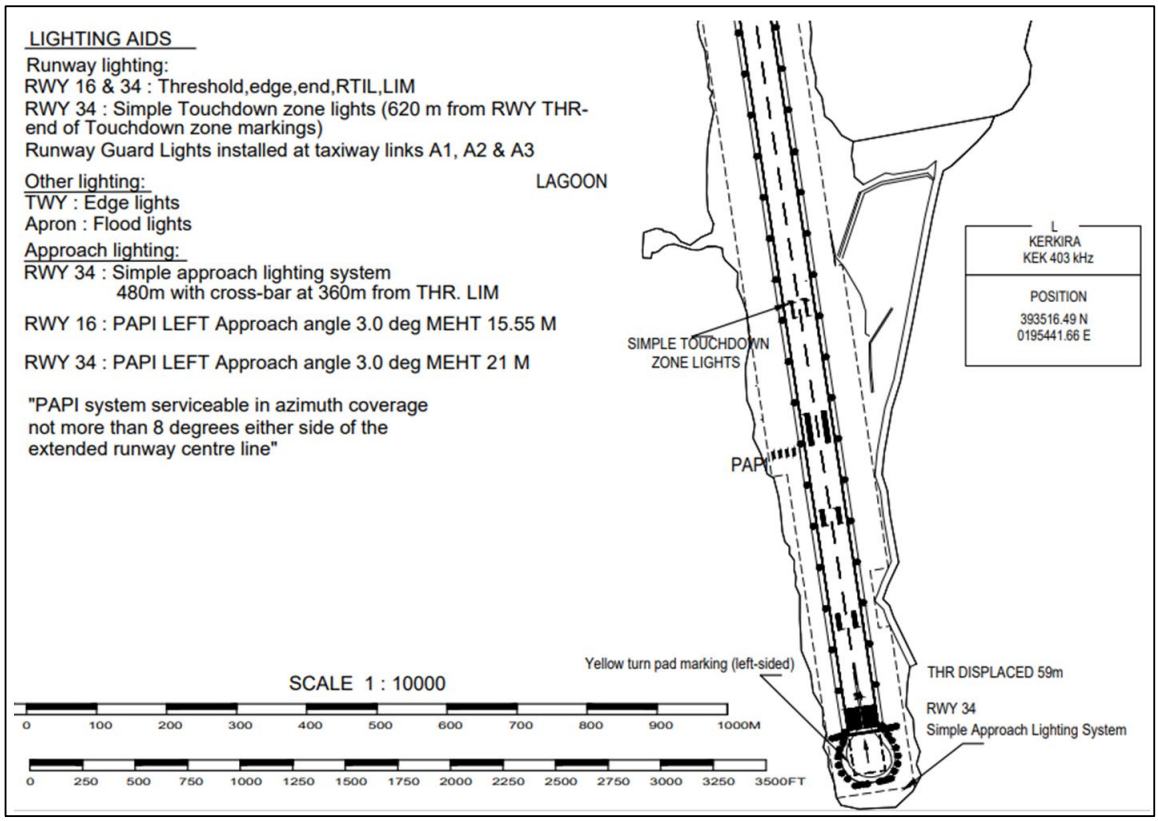


Figure 3

Extract from the LGKR airfield chart (reproduced from AIP Greece)

CFU is categorized by the operator as '*a Category B restricted airport, which is further defined as an airport with complexity and threat levels that require specified restrictions but do not require an aerodrome visit or specific training*.' Due to '*circling approaches, unusual local weather conditions* [and] *terrain*' considerations, pilots classified as '*inexperienced'* in accordance with the operator's Operations Manual are not permitted to operate into CFU. Both pilots exceeded the operator's minimum experience level requirements to operate into CFU. The Threat and Error Management (TEM) section of the operator's guidance to pilots (CCI[9]) operating into CFU described a higher risk of deep landings on Runway 34 due to displaced touchdown aiming point markers and only one set of markings beyond the TDZ aiming point (Figure 4).

Footnote

[9] Company and Crew Information.

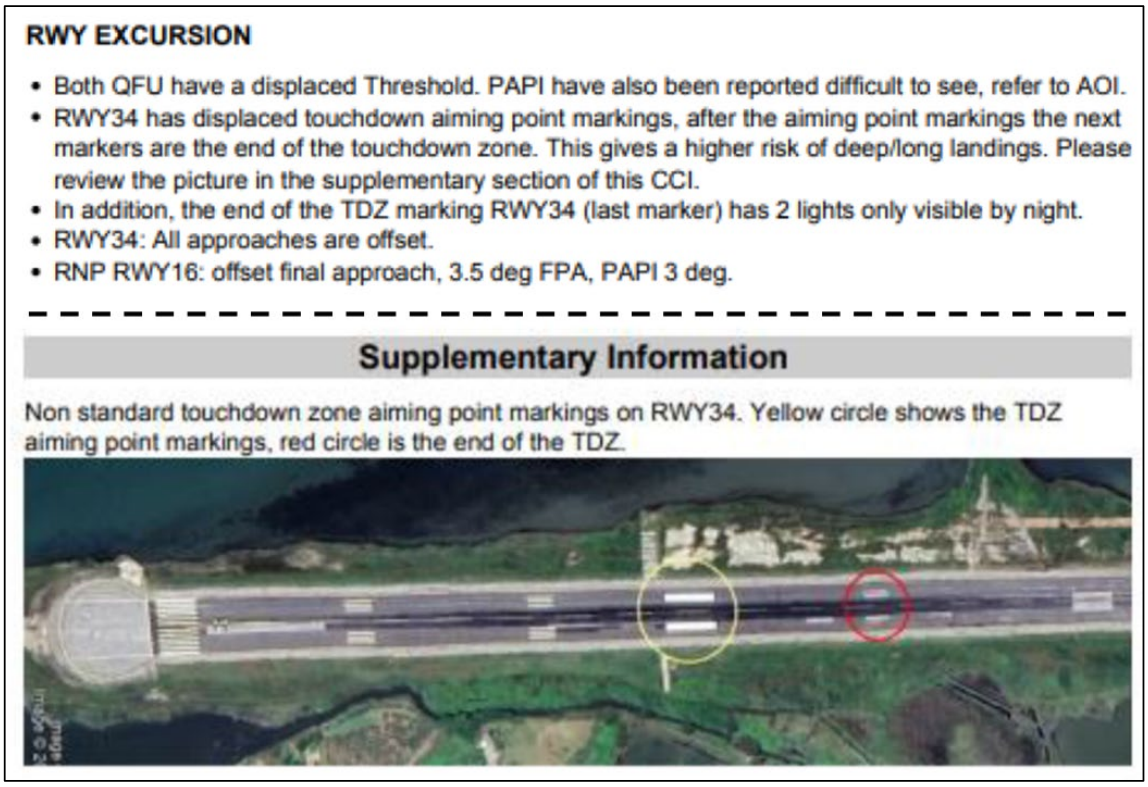


Figure 4

Extract from the operator's CCI TEM guidance for pilots operating into CFU
(Reproduced from the operator's internal safety report)

Aircraft performance

Computations using the manufacturer's standard performance calculation software, based on a landing weight of 61,400 kg and using the reported wind of 290°/3 kt[10], indicated the factored stop margin[11] using medium autobrake would have been approximately 700 m. Using the same calculation parameters but assuming maximum manual braking gave a calculated stop margin of approximately 1,100 m. During their pre-landing preparation, the flight crew used a combination of more pessimistic inputs of wind component and landing weight, giving estimated stop margins with medium autobrake of between 380 and 515 m.

At the investigation's request the aircraft manufacturer conducted a 'what if' scenario analysis to determine what obstacle clearance might have been achieved had the go-around not been cancelled. The manufacturer's modelling used the prevailing parameters from the point at which maximum braking was applied and assumed the standard operating procedures (SOP), of rotating the aircraft at V_{APP}[12] and selecting FLAP 3 once safely airborne, were followed. Their modelling indicated the aircraft would have lifted off approximately 600 m from the end of the runway and would have cleared the first relevant obstacles on the go-around flight path by approximately 250 ft.

Footnote

[10] LGKR 191950Z METAR recorded 3 minutes before G-EZGY touchdown.
[11] Total landing distance available minus 115% of the calculated landing distance required.
[12] Approach speed.

Other information

Airbus operational procedures

Guidance for the conduct of go-arounds in the Airbus A320 family of aircraft is contained within the Flight Crew Operating Manual (FCOM) and the FCTM. The FCOM directs that a normal go-around is initiated by PF calling '*GO AROUND – FLAPS*' at which point Pilot Monitoring (PM) selects one stage less flap. For the incident approach that would have meant reducing flaps from FLAPS FULL to FLAPS 3. Airbus advised the investigation that a baulked landing go-around, otherwise referred to as a '*go-around near the ground*,' should follow the same basic procedure as for a normal go-around, albeit the reduction in flap setting should only be made when '*the aircraft is safely established in the go-around*' (Figure 5). The FCTM also directs flight crew to disregard transient configuration warnings if the aircraft is on the runway with TOGA selected.

GO-AROUND NEAR THE GROUND

The PF must not initiate a go-around after the selection of the thrust reversers. If the PF initiates a go-around, the flight crew must complete the go-around maneuver.

If the flight crew performs a go-around near the ground, they should take into account the following:

- The PF should avoid excessive rotation rate, in order to prevent a tailstrike. For more information *Refer to PR-NP-SOP-250 Tail Strike Avoidance*
- If the engines are at idle when the go-around is initiated, the engines can take a few seconds to spool up and the flight crew may need to maintain the pitch until the aircraft speed increases up to VAPP
- A temporary landing gear contact with the runway is acceptable
- Only when the aircraft is safely established in the go-around, the flight crew retracts flaps one step and the landing gear.

Note: If the aircraft is on the runway when the PF applies TOGA thrust, CONFIG warnings may transiently trigger. The flight crew should disregard these alerts.

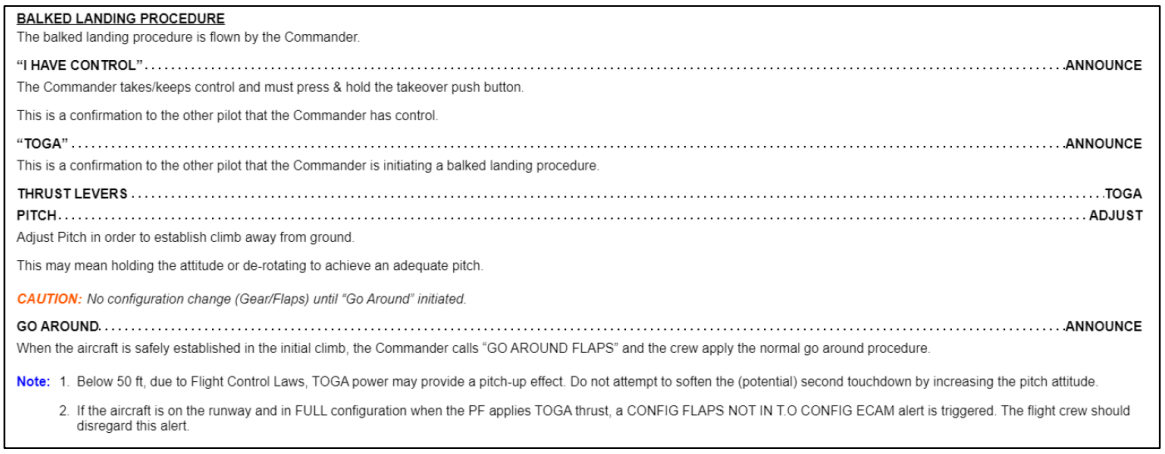
Figure 5

Airbus FCTM extract outlining the considerations for a go-around near the ground

The operator's Operations Manual Part B (OMB)[13] includes modified procedure callouts for a baulked landing (Figure 6) of, '*I HAVE CONTROL*,' followed by '*TOGA'* and finally '*GO AROUND FLAPS*' once safely established in the initial climb.

Footnote

[13] OMB2.3.20.1.



BALKED LANDING PROCEDURE

The balked landing procedure is flown by the Commander.

"I HAVE CONTROL" ..... **ANNOUNCE**

The Commander takes/keeps control and must press & hold the takeover push button.

This is a confirmation to the other pilot that the Commander has control.

"TOGA" ..... **ANNOUNCE**

This is a confirmation to the other pilot that the Commander is initiating a balked landing procedure.

THRUST LEVERS ..... **TOGA**

PITCH ..... **ADJUST**

Adjust Pitch in order to establish climb away from ground.

This may mean holding the attitude or de-rotating to achieve an adequate pitch.

CAUTION: *No configuration change (Gear/Flaps) until "Go Around" initiated.*

GO AROUND ..... **ANNOUNCE**

When the aircraft is safely established in the initial climb, the Commander calls "GO AROUND FLAPS" and the crew apply the normal go around procedure.

Note: 1. Below 50 ft, due to Flight Control Laws, TOGA power may provide a pitch-up effect. Do not attempt to soften the (potential) second touchdown by increasing the pitch attitude.

2. If the aircraft is on the runway and in FULL configuration when the PF applies TOGA thrust, a CONFIG FLAPS NOT IN T.O CONFIG ECAM alert is triggered. The flight crew should disregard this alert.

Figure 6

Baulked landing procedure extracted from the operator's OMB

Organisational information

While the State of Occurrence was Greece, HARSIA delegated the investigation to the AAIB because the UK was the State of Registration.

Operator's safety intent

After this Serious Incident the operator intended to take the following action:

- To liaise with CFU on the siting of the Runway 34 PAPI lights and TDZ aiming point markings and to enquire whether these could be repositioned 300 m from the threshold, '*as per EASA regulation*.'
- To review the CFU airport risk assessment and re-assess whether sufficient mitigations are in place to manage the runway excursion risk associated with the non-standard position of the aiming point markers on Runway 34.
- To review the company's baulked landing procedure.
- To share details of the event with its pilot community through the medium of safety publications.

Manufacturer's safety communications

The aircraft manufacturer's '*contribution'* report to the investigation contained links to three resources relating to the handling and risks associated with go-arounds after thrust reverser selection. The first resource was an article[14] highlighting the '*risk of non-availability of maximum thrust on one or more engines, if the associated reversers do not stow*.' The second was an article[15] highlighting that '*the SOP for landing states that as soon as the flight crew selects reverse thrust, they must perform a full-stop landing*' and that '*in-*

Footnote

[14] Available at Safety First magazine - issue 14 [accessed 27 February 2025].

[15] Available at Thrust Reverser Selection is a Decision to Stop | Safety First [accessed 27 February 2025].

service data shows that there is still a risk exposure with flight crews deciding to perform a go-around after the thrust reversers were selected.' The third resource was a video[16] focusing on go-arounds, which included a reminder about the risk associated with a go-around after reversers selection.

Analysis

This baulked landing go-around rapidly developed into a Serious Incident due to startle and surprise leading to hesitation in deciding whether to reject or continue the go-around. The lack of CVR data meant the described sequence of calls between commander and co-pilot during the incident was based on individual recollection and could not be definitively aligned with the QAR/DAR data. While it was not possible to determine precisely where the aircraft's mainwheel touched down, it was likely on or just after the final TDZ marker.

In the final moments of the approach the commander and co-pilot made different assessments of their position relative to the TDZ. The co-pilot believed that touchdown had occurred within the designated zone but the commander assessed the aircraft as still being airborne passing the last TDZ markings. This lack of a shared mental model likely contributed to the initial startle and surprise for both pilots.

In following the operator's OMB procedure, calling "I have control, TOGA" and pressing his sidestick priority button, the commander ensured a clear and unambiguous takeover of the controls. The co-pilot understood the commander's intent to go-around but later called STOP because he thought the engines were not responding fast enough to assure it. By keeping his sidestick button pressed when lowering the nose, the commander nulled the co-pilot's corresponding pitch down input, likely preventing a heavier nosewheel touchdown.

When the commander took control and selected TOGA to initiate the go-around he had a firm plan in mind. With his hand already committed to the action of rapidly advancing the thrust levers, tactile feedback as the levers came out of the reverse thrust detent alerted him too late to the co-pilot's earlier selection of REV IDLE. The commander found himself unwittingly in contravention of FCTM guidance for go-arounds near the ground. He was faced with conflicting choices, accept the FCTM divergence and commit to the go-around or cancel it with reducing distance ahead within which to stop. While the configuration warning could have been expected on the runway with TOGA and full flap selected, it was nevertheless a negative performance shaping factor during the period of startle and surprise. During this time, the commander instinctively reacted by selecting REV MAX before cognitively restoring TOGA to continue the go-around.

Having re-committed to the go-around, the risk of asymmetric thrust reverser deployment[17] caused the commander to question whether the risk of continuing with the go-around was greater than the risk of runway excursion if he rejected the takeoff. With that risk in mind and concerned that the engines were not spooling up fast enough to guarantee a successful takeoff, he made a final decision to cancel the go-around. This was approximately contemporaneous with the co-pilot calling STOP and applying the brakes himself.

Footnote

[16] Available at airbus-win.com/wp-content/uploads/2023/09/go-around-v3-en-1.mp4 [accessed 27 February 2025].

[17] As experienced in the CS-TNV incident.

Analysis by the manufacturer indicated it was likely the aircraft would have cleared close-in obstacles by at least 250 ft if the takeoff had been continued.

Conclusion

After a stabilised approach, a protracted flare resulted in the aircraft touching down around the end of the TDZ. Each pilot had a different appreciation of where the touchdown occurred, leading to startle and surprise for both parties when the other's actions were not as expected. While this confusion introduced hesitation and uncertainty into the decision-making process, the pilots' mental models re-aligned when the lack of perceivable acceleration caused them each to question the viability of continuing with the go-around. Almost contemporaneously both pilots called "stop" while initiating maximum braking and the aircraft came to a full stop within the runway length remaining ahead.