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**Australian Transport Safety Bureau**

# Take-offs without runway lighting involving Embraer ERJ-135 VH-JTG

Tamworth Airport, New South Wales, 19 and 28 August 2016

**ATSB Transport Safety Report**  
Aviation Occurrence Investigation  
AO-2016-108  
Final – 17 January 2017

Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

#### **Publishing information**

**Published by:** Australian Transport Safety Bureau  
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#### **Addendum**

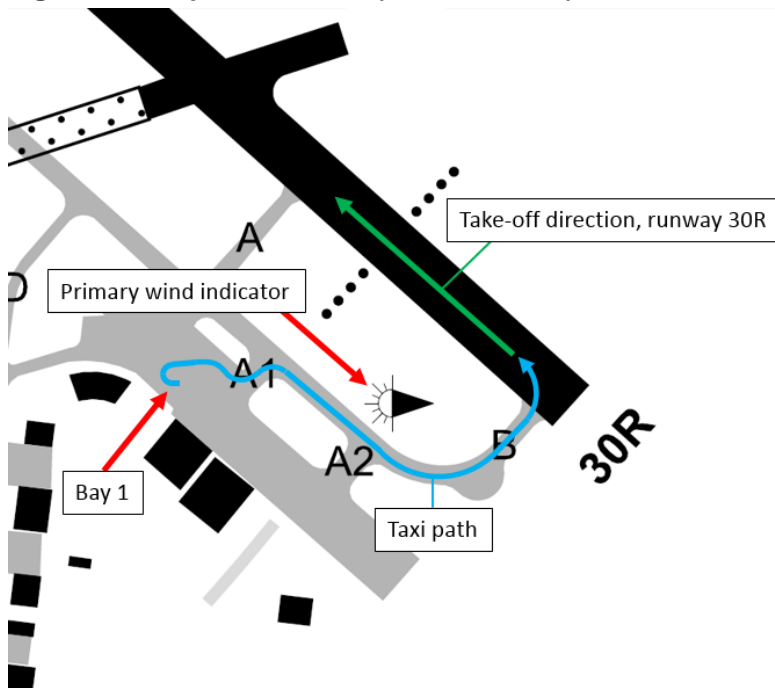
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# Take-offs without runway lighting involving Embraer ERJ-135, VH-JTG

## What happened

On 19 August 2016, a JetGo Australia Embraer EMB-135LR, registered VH-JTG (JTG), operated scheduled passenger flight JG65 from Tamworth, New South Wales (NSW), to Brisbane, Queensland (Qld). At 2104 Eastern Standard Time (EST), the aircraft began to taxi from parking bay 1 to runway 30 right (30R) with the taxiway and runway lights not activated (Figure 1). At 2107, the captain taxied the aircraft onto the runway and immediately began the take-off run. During the take-off run, at a speed of about 70 knots, the first officer detected the runway lights were not illuminated and activated them using the pilot activated lighting (PAL) (Figure 2). The flight crew continued the take-off.

Figure 1: Taxi path overview (both incidents)



Source: Airservices Australia, modified by ATSB

Figure 2: Take-off run of JTG on 19 August showing runway lights not activated (left) and then activated (right)



Source: Airport Operator

On 28 August 2016, the same aircraft operated scheduled passenger flight JG65 from Tamworth to Brisbane. At 1937, the aircraft began to taxi from parking bay 1 to runway 30R. As the aircraft taxied, the runway and taxiway lights extinguished (Figure 3). The flight crew continued to taxi, lined up on runway 30R and selected the aircraft landing lights on. At 1940, 48 seconds after lining up, the aircraft began the take-off run and departed runway 30R with the runway lights not activated.

No persons were injured and the aircraft was not damaged in the incidents.

**Figure 3: JTG taxiing on 28 August with runway lights illuminated (left) and then extinguished (right)**



Source: Airport Operator

### ***Runway and taxiway lighting***

The taxiway and runway lighting at Tamworth Airport was controlled by a PAL system combined with an aerodrome frequency response unit (AFRU), known as AFRU + PAL. To activate the lights, pilots were required to transmit a sequence of three transmissions on the common traffic advisory frequency (CTAF). Each transmission was to have a maximum duration of 1 second with the break between transmissions being a maximum of 1 second. On receipt of the appropriate transmission sequence, the airport lights were activated and the AFRU broadcast the automatic message: 'Tamworth Airport CTAF, runway lighting on' on the Tamworth CTAF.

Once the AFRU + PAL system was activated, the airport lighting remained on for 30 minutes. If it was reactivated during this period, the lighting would remain on for 30 minutes from the time of reactivation. 10 minutes prior to the end of the 30-minute activation period, the primary wind indicator (windsock) lights commence flashing to warn users that the airport lighting is about to extinguish (Figure 4). In addition, an automated message 'Tamworth Airport CTAF, lights 10 minutes remaining' was broadcast on the CTAF to advise 10 minutes of runway lighting remaining.

**Figure 4: Flashing primary wind indicator showing the windsock illuminated when the runway lights were active (left) and not illuminated (right)**



Source: Airport Operator

On 19 August, at 2039, the AFRU broadcast ‘Tamworth Airport CTAF, lights 10 minutes remaining’, the lights then extinguished at 2049. At 2107, during the take-off run of JTG, the first officer broadcast an AFRU + PAL activation sequence on the Tamworth CTAF and the runway lights illuminated.

On 28 August, at 1928, the AFRU broadcast ‘Tamworth Airport CTAF, lights 10 minutes remaining’, the lights then extinguished at 1938. At 2007, an AFRU + PAL activation sequence was broadcast by another aircraft and the runway lights illuminated.

There was no indication that the AFRU + PAL system was malfunctioning on the nights of the incidents.

### ***Captain comments***

The same pilot was operating as captain of JTG during both incidents. The captain provided the following comments:

- The captain did not notice that the runway lights were extinguished during either incident and were not aware until notified after each incident.
- The taxiway lights at Tamworth are of the recessed centreline type. The taxi from bay 1 to runway 30R is over a rise. Therefore, only three to four taxiway lights are normally visible from the point at which you turn onto the taxiway. The captain remarked that the raised type taxiway side lights found at other airports are more easily visible.
- Wind information for pre-flight planning is obtained through the flight crew electronic flight bag or automatic weather information service (AWIS). Therefore, they will only observe the windsock as a back-up, if it is available and close.
- During turn-around between flights, the flight crew do not wear headsets and will not hear the 10 minutes remaining broadcast if it occurs during this time.
- The responsibility for ensuring the airport lighting would be active was not assigned to either flight crewmember. There was no procedure for ensuring the airport lighting would be illuminated for the departure.
- Both incidents occurred at the end of long duty days, so fatigue may have been a factor.

### ***First officer comments – 19 August***

The first officer of the 19 August incident provided the following comments:

- The tiller in the Embraer 135 is located on the captain’s side. Therefore the first officer always acts as pilot monitoring<sup>1</sup> (PM) during taxi. The taxi from bay 1 to runway 30R is short and a period of intense workload. During this time, the first officer did not look outside the cockpit.
- The first officer did not look outside of the cockpit until the aircraft began moving during the take-off run. Once they looked outside, they immediately felt that something was not right. About five seconds later, the first officer detected that the runway lights were not illuminated.
- The first officer was PM for this flight. As PM, they were able to quickly activate the PAL and resolve the issue, and did not consider aborting the take-off.
- The first officer used the take-off data card for wind information and did not look at the windsock prior to departure.

### ***First officer comments – 28 August***

The first officer of the 28 August incident provided the following comments:

- The first officer did not notice that the runway lights were extinguished and was not aware until notified after the incident.

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<sup>1</sup> Pilot Flying (PF) and Pilot Monitoring (PM) are procedurally assigned roles with specifically assigned duties at specific stages of a flight. The PF does most of the flying, except in defined circumstances; such as planning for descent, approach and landing. The PM carries out support duties and monitors the PF’s actions and the aircraft’s flight path.

- The primary wind indicator at Tamworth is situated so that it is illuminated by light from the adjacent apron lighting and a red obstacle light is located above the windsock. On subsequent flights to Tamworth, the first officer has observed that this gives the appearance of the windsock being illuminated when the runway lighting is extinguished (Figure 4).

### ***Aircraft lighting***

The Embraer 135 is fitted with three landing lights and two taxi lights. The combination of these lights provides a substantial amount of illumination in front of the aircraft.

The taxi lights are used from the beginning of taxi until after departure. Prior to commencing the take-off run, the landing lights are also selected on. The landing lights provide considerably more illumination than the taxi lights.

All flight crew described the aircraft lighting as extremely effective at illuminating the runway ahead of the aircraft and reported no controllability issues during the take-off runs.

### ***Parking apron lighting***

Prior to both incidents, the aircraft parked at bay 1 for the embarkation of passengers (Figure 5). This bay is substantially lit by apron floodlights. These lights are not part of the PAL system and remain illuminated when the PAL system extinguishes the runway and taxiway lights.

All three flight crew commented that the apron lighting degraded night-vision and the short taxi from bay 1 to runway 30R did not allow time for eyes to adjust to the dark surrounds of the runway.

**Figure 5: JTG parked at bay 1**



Source: Airport Operator

### ***Environmental conditions***

Last light<sup>2</sup> on 19 August 2016 occurred at 1757, three hours and ten minutes before the take-off. At 2017, the moon was 19 degrees above the horizon and about 99 per cent visible. There was a clear sky.

Last light on 28 August 2016 occurred at 1802, one hour and 38 minutes before the take-off. The moon was below the horizon and the sky was clear.

<sup>2</sup> Last light: the time when the centre of the sun is at an angle of 6° below the horizon following sunset. At this time, large objects are not definable but may be seen and the brightest stars are visible under clear atmospheric conditions. Last light can also be referred to as the end of evening civil twilight.

## ATSB comment

Two different PAL systems exist at Australian airports, PAL and AFRU + PAL. The activation sequence for each system is different.

CTAF recordings for the period surrounding each incident showed multiple unsuccessful attempts by other aircraft to activate the AFRU + PAL using the sequence of transmissions for a PAL system.

[AIP ERSA INTRO paragraphs 23.4 and 23.5](#) detail the differences between the two systems and the correct transmission sequence to activate each system.

While this did not contribute to the incidents, pilots are reminded to be familiar with the identification and use of the different systems.

## Safety Analysis

The illumination provided by the aircraft taxi and landing lights made it difficult to detect that the PAL was not activated. Due to the rise on the taxiway, the crew would only have been able to see a few lights ahead of the aircraft, and these would have been illuminated by the aircraft lights. Adding to this, both crew did not have an expectation that the lights may have been extinguished as the cues available did not assist. The auditory 10-minute PAL extinguishing warning could not be heard without headphones, and the windsock flashing light warning was not noticed as the crew obtained wind information using the flight crew electronic flight bag or AWIS.

As the company standard operating procedures did not assign a task of ensuring the runway lights were selected on to a specific role prior to taxi, there was also no procedural prompt to the crew.

The short taxi with a high workload further reduced the chance of detection.

## Findings

- The crew did not activate the airport lighting and did not detect that the lighting was off prior to the take-off run.
- Available lighting from the aircraft taxi and landing lights, a lack of crew expectation, a short taxi with high workload, and no assigned role or procedure to check for runway lighting resulted in the crew not detecting the lack of runway lights.

## Safety action

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

### ***Aircraft operator***

As a result of these incidents, the aircraft operator has advised the ATSB that they are taking the following safety actions:

#### ***Changes to procedures***

- When activating the aircraft taxi lights the pilots must ensure that they confirm the status of the PAL.
- When conducting night operations at an unmanned airport, the pilots must activate the PAL or AFRU + PAL by keying the microphone on the appropriate frequency unless the aircraft immediately ahead has already done so. For example, if the aircraft 10 minutes ahead has turned the lights on it will not be necessary to activate the lights again as the lights will normally remain on for a period of 30 to 60 minutes depending upon the installation.
- If no traffic is evident then the pilots must activate the PAL prior to taxi for departure and within 15 nm of the aerodrome and whilst above the lowest safe altitude for arrival.

## Safety message

These incidents demonstrate the impact workload stress can have on operations. The short taxi created a high workload situation which impacted on the flight crews' ability to detect the extinguished runway lighting.

The incident on the 28 August also highlights the hazards associated with change blindness, inattention blindness and expectation bias.

Change blindness occurs when a person does not notice that something is different about the visual environment relative to before the change. Research has shown that in some cases, quite dramatic changes are not detected, particularly if changes occur when the observer is not looking at the relevant part of the visual environment at the time. In this incident the flight crew did not detect the runway lights extinguish during taxi prior to departure.

The Transport Canada article [Deadly Omissions](#) includes further information on change blindness, inattention blindness and expectation bias.

## General details

### Occurrence details – 19 August 2016

Date and time:	19 August 2016 – 2107 EST	
Occurrence category:	Incident	
Primary occurrence type:	Runway event	
Location:	Tamworth Airport, New South Wales	
	Latitude: 31° 05.030' S	Longitude: 150° 50.800' E

### Aircraft details – 19 August 2016

Manufacturer and model:	Embraer - Empresa Brasileira De Aeronautica EMB-135LR	
Registration:	VH-JTG	
Operator:	JetGo Australia	
Serial number:	145687	
Type of operation:	Air transport low capacity - Passenger	
Persons on board:	Crew – 3	Passengers – 29
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	



### Occurrence details – 28 August 2016

Date and time:	28 August 2016 – 1940 EST	
Occurrence category:	Incident	
Primary occurrence type:	Runway event	
Location:	Tamworth Airport, New South Wales	
	Latitude: 31° 05.030' S	Longitude: 150° 50.800' E

### Aircraft details – 28 August 2016

Manufacturer and model:	Embraer - Empresa Brasileira De Aeronautica EMB-135LR	
Registration:	VH-JTG	
Operator:	JetGo Australia	
Serial number:	145687	
Type of operation:	Air transport low capacity - Passenger	
Persons on board:	Crew – 3	Passengers – 23
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

## About the ATSB

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

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

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

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

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

## About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.