

DATA SUMMARY

LOCATION

Date and time	Thursday, 20 April 2010; 03:59 local time¹
Site	Zaragoza airport (Spain)

AIRCRAFT

Registration	UR-82029
Type and model	ANTONOV 124-100
Operator	Antonov Design Bureau

Engines

Type and model	PROGRESS (Lotarev) D18T
Serial Number	2

CREW

	Pilot in command	Copilot
Age	56 years old	42 years old
Licence	ATPL	CPL
Total flight hours	10,621 h	1,638 h
Flight hours on the type	5,781 h	1,178 h

INJURIES

	Fatal	Serious	Minor/None
Crew			16
Passengers			
Third persons			

DAMAGE

Aircraft	Minor
Third parties	Apron lighting tower

FLIGHT DATA

Operation	Commercial air transport – Cargo
Phase of flight	Taxi

REPORT

Date of approval	28th June 2012
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¹ All times in this report are local. To obtain UTC, subtract two hours from local time.

1. FACTUAL INFORMATION

1.1. History of the flight

The aircraft took off from the Gostomel Airport (Kiev, Ukraine) en route to the Zaragoza airport (Spain).

At 01:53, the crew contacted the Zaragoza Tower, which subsequently cleared them to land on runway 30R.

The landing occurred without incident and the aircraft left the runway via taxiway A1, where a follow-me car was waiting for it.

The aircraft followed the car via taxiway TA and C2-2 to the parking apron. The aircraft exceeded the dimensions of the available parking stands at the airport, so it was assigned to parking stands O and N. On previous occasions, before parking stands were made available for B747 aircraft, these stands had been used for B747-type aircraft.

The B747 stands were in use that night.

Once the aircraft reached the apron, the marshaller exited the car to provide parking instructions to the aircraft. The crew followed the indications given by the marshaller but during the maneuver, the left wingtip struck the number 6 light tower on the apron. The aircraft continued forward and struck the number 7 light tower, damaging the navigation light at the end of the wing, at which point the aircraft was stopped.

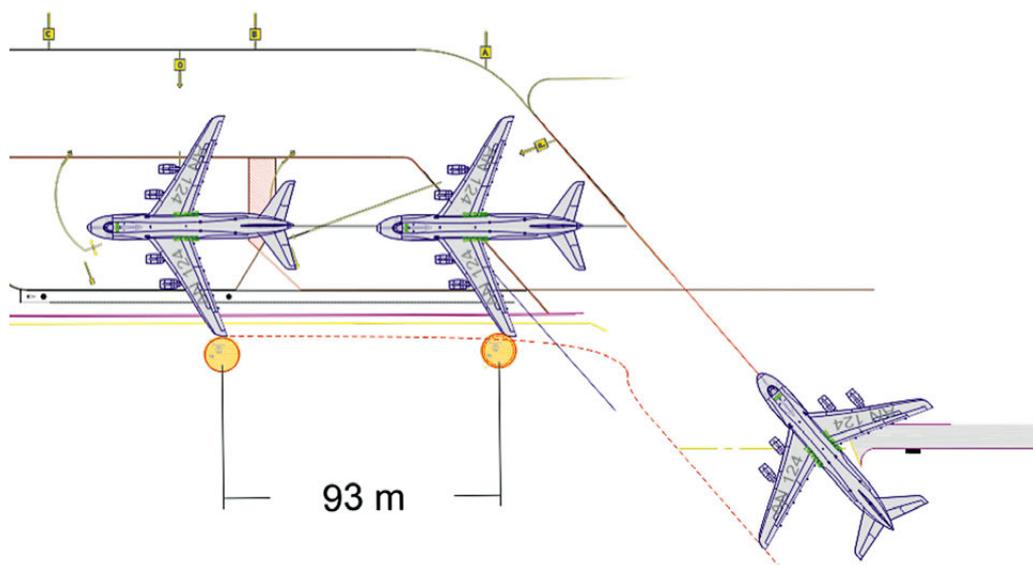


Figure 1. Path taken by the aircraft to the parking stand



Figure 2. Damage suffered by the aircraft

1.2. Injuries to persons

Injuries	Crew	Passengers	Total on aircraft	Third persons
Fatal				
Serious				
Minor				N/A
None	16		16	N/A
TOTAL	16		16	

1.3. Personnel information

1.3.1. Captain

The captain of the aircraft, age 56, had an airline transport pilot license issued by the Ukrainian authority, as well as an Antonov 124-100 rating. He had a class 1 medical certificate with a VLN restriction, meaning he was required to wear corrective lenses to correct near-sightedness.

The captain had a total of 10,621 flight hours, of which 5,781 had been as captain on that type of aircraft. He had been on duty for 6 hours and 10 minutes at the time of the incident.

1.3.2. *Copilot*

The copilot, age 42, had a commercial pilot license issued by the Ukrainian authority and was rated as a copilot on the Antonov 124-100. He had a class 1 medical certificate.

He had a total of 1,638 flight hours, of which 1,178 had been on the type. He had been on duty for 6 hours and 10 minutes at the time of the incident.

1.3.3. *Flight navigator*

The flight navigator, age 46, had a Ukrainian flight navigator's license and was rated on the Antonov 124-100. He had a class 1 medical certificate.

1.3.4. *Movement area operations technician*

The movement area operations technician, or marshaller, who guided the aircraft was 52 years old. He had 30 years of experience on the job.

That afternoon he had gone on duty at 15:00. He had been scheduled to go off duty at 23:15, but he stayed on to guide the flights that were scheduled to arrive during the night.

There was no activity at the airport from 22:35 until the arrival of the Antonov.

1.4. **Aircraft information**

1.4.1. *General*

The Antonov 124 is a large airplane used mainly for cargo operations. It is manufactured in Ukraine.

The airplane is powered by four ZMKB D18T turbofan engines.

It has a wingspan of 73.3 m, a length of 69.1 m and a height of 20.78 m.

1.4.2. *Condition of aircraft and maintenance*

The Antonov 124-100 aircraft, registration UR-82029, was manufactured in 1991 with serial number 19530502630. It had 16,010 flight hours and 3,935 cycles.

1.5. Meteorological conditions

The landing took place at night. VMC conditions prevailed. The wind was from 270° at 5 kt.

1.6. Communications

The aircraft was transferred to the Zaragoza Control Tower at 01:53. At 01:54, the aircraft contacted the tower to report it was lined up on final. It was cleared to land.

At 01:55 the tower informed the marshaller of the aircraft's arrival. The marshaller requested clearance to proceed on taxiway TA to A1. He also requested that airport operations energize the light towers next to taxiway C2-2.

After the aircraft landed, at 01:59, the crew was instructed to leave the runway at the end to the right and informed that a follow-me car was waiting for it on taxiway TA.

At 02:02 the crew confirmed that it had the follow-me car in sight and signed off with the tower.

For his part, the marshaller contacted airport operations to request that they energize the lights on the apron.

1.7. Aerodrome information

The Zaragoza Airport has two runways, 12L/30R and 12R/30L. The first one measures 3,032 × 45 m and the second 3,718 × 45 m.

According to the information in the AIP, the airport has no parking stands for an Antonov 124 aircraft. There are a total of 16 parking stands on the commercial aviation apron, of which two, J and K, are for B747-400 aircraft.

Appendix 1 shows a map of the parking stands on the apron as shown in the AIP.

1.8. Flight recorders

The aircraft was equipped with a flight data recorder and a cockpit voice recorder. Both were recovered in good condition and the information contained in them was extracted in cooperation with the Ukrainian civil aviation authority.

1.8.1. *Flight data recorder*

The flight recorder was a Tester-M model, made in Ukraine. Its serial number was 0512612.

It had a recording capacity of 30 hours and 256 parameters.

The information contained in the FDR revealed that the taxi phase to parking in Zaragoza was uneventful and took place at a normal taxi speed.

1.8.2. *Cockpit voice recorders*

The cockpit voice recorder was a P-507-3BC model, serial number 015620. It recorded up to 2 hours and 30 minutes on four channels.

The cockpit voice recorder contained information from the approach, landing and taxi phases at Zaragoza, as well as the communications with ATC.

At the end of the recording, an engineer onboard was heard exclaiming "Look out! To the left!"

No communications were recorded between the crew and the marshaller.

1.9. **Wreckage and impact information**

Part of the aircraft's left wingtip was broken off as a result of the impact with the light tower on the apron, which itself had been scratched by the impact.

Signs of a second impact were also evident on the navigation light on the same wing. This impact took place when the aircraft struck the second light tower.

1.10. **Additional information**

1.10.1. *Dimensions of a B747-400 aircraft*

A B747-400 has the following dimensions:

- Wingspan: 64.4 m.
- Length: 70.66 m.
- Height: 19.4 m.

The Antonov 124-100 is larger, measuring 1.56 m less in length, 1.38 m more in height and 9 m more in wingspan.

The Zaragoza Airport has two parking stands for B747-400 aircraft.

1.10.2. *Documentation on the safety of operations in the movement area*

1.10.2.1. ICAO Airport Services Manual. Part 8. Airport Operational Services

This document lists recommendations for operating an airport. In Chapter 10, "Apron Management and Safety", instructions are given regarding vehicle activities and movements on the apron.

This chapter explains different ways to regulate services on the apron. Specifically, point 10.5, APRON MANAGEMENT FUNCTIONS, provides instructions on the use of the apron.

10.5.1. *Aircraft stand allocation*

Overall responsibility for allocating stands to aircraft lies with the airport operator, though for reasons of operational convenience and efficiency a preferential system should be established for allocating stands to users. The instructions should clearly state which stands may be used and by which aircraft or type of aircraft.

10.5.2. *Aircraft parking/docking guidance system*

Lists the requirements for the guidance system depending on the parking accuracy required and on the type of aircraft involved.

This section states that the apron guidance system provided will depend upon the accuracy of parking required and type of aircraft operating. The simplest form of stand guidance where precise accuracy is not required will comprise stand identification and centre line paint markings with an arrow to indicate the position in which the aircraft should be brought to test.

10.5.3. *Marshalling service*

Specifies that an airport marshaling service should be provided where self-help guidance systems do not exist or are unserviceable and where guidance to aircraft parking is required to avoid a safety hazard or to make the most efficient use of available parking space. It also specifies that proper training arrangements should exist for marshallers and only those who have demonstrated satisfactory

competence should be permitted to marshal aircraft. Where airport marshaling is provided, comprehensive instructions should be written for marshallers, including:

- a) The absolute necessity for using only authorized signals (Copies of these should be displayed at suitable points);
- b) the need to ensure that the stand to be used is clear of fixed and mobile obstructions;
- c) the circumstances in which single man marshalling may be used and the occasions when assistance of wingtip men should be employed; and
- d) the action to be taken in the event of aircraft damage occurring during marshalling.

1.10.2.2. AENA instructions

Procedure for marshalling activities in the movement area at the Zaragoza Airport

The Zaragoza Airport published document ZA-OP, Procedure for marshalling activities in the movement area, on 17/07/09.

This document lists a series of rules for the daily activities of movement area technicians, including the signs to be made to aircraft captains, so as to allow for safe movements on the apron.

In this regard, the document states that "Signs [are to be made] to captains to indicate the stand previously allocated by the operations center".

As for the allocation of stands, it states that:

"Normally, cargo aircraft will use stands H-I-J-K, passenger aircraft D-E-F-G, and other aircraft A-B-C for general aviation (until the special apron becomes available) and Panair. Stands L-M-N-O are reserved for cargo or long-stay general aviation flights. Special attention must be paid to ensure that crews and all apron personnel in general wear high-visibility clothing, as per regulations".

In various places the document makes reference to apron safety regulations and lists as one of the duties of marshallers to enforce said regulations.

2008 Apron Safety Regulations

In the introduction, the apron safety regulations state:

"The Apron Safety Regulations were born out of Aena's concern over the safe and efficient conduct of ground operations. Airport aprons pose numerous hazards to people, and as such they require clear rules and procedures that ensure safe, fluid

and efficient operations. These rules and procedures are listed in this document. This edition includes Amendment 6 to the Apron Safety Regulations. All vehicle drivers are urgently required to become familiar with this new edition of the Regulations”.

In point A1. General it states:

“These regulations are applicable throughout an airport’s restricted area and are complemented by Operational Instructions and local procedures that Airport Management must communicate to those companies or entities that work within the airport complex”.

“Airport Management may, based on the Airport’s characteristics and after conducting a safety study and risk analysis, establish procedures that differ from those considered herein and specify those conditions and limitations applicable in each case, as appropriate”.

In point A2. Basic Safety Rules, instructions are given for the movement of vehicles on the apron and for the separation between these vehicles and moving aircraft and the safety zone, which must be clear from vehicles and people during engine start-ups and aircraft parking operations. It also gives instructions for refueling aircraft.

The document does not include specific instructions for the marshalling service as pertains to its task to guide aircraft to the stand.

Zaragoza airport new procedure and measures taken in other airports

Due to this incident the Zaragoza airport authorities developed a parking procedure for aircraft bigger than the stand assigned.

The procedure, in force on the 16th of December 2010, establishes some instructions for the wide-body aircraft taxi and for the parking of aircrafts at stands designed for smaller ones.

It states that the airport counts on two B747-400 stands and the standard practice is programming flights just for those two stands. Otherwise every staff involved will be informed, a safety study will be carried out using simulations of the in and out maneuvers and the maneuvers of those stands will be signaled paint.

Since the most common aircraft type which flies to the airport is the B747-400 simulations were done for the in and out maneuvers for this aircraft type.

Additionally, training courses were given to all the movement area technicians.

After asking Zaragoza airport authorities, it was confirmed their intention to expand the procedure, that already exists, for another kind of aircraft which operate at the airport.

On the other hand, Aena is going to inform every airport in Spain so that they include in their procedures the parking of aircrafts with a superior category than the assigned stand, develop the required analysis and adopt the appropriate measures.

2. ANALYSIS

2.1. Selecting a stand for aircraft

According to the AIP, there are no stands at the Zaragoza Airport for aircraft of the type involved in the incident, an Antonov 124-100. The stands with similar characteristics are those used for the Boeing 747-400, stands J and K, which on the day of the event were in use.

In light of the lack of available stands, it was decided to use two stands, O and N, sized for aircraft no larger than an A300 and B727, respectively, to park the aircraft.

According to information provided by the airport, this same practice had been used before to park a B747.

Under these conditions, the horizontal markings on the stands did not provide adequate indications for positioning the aircraft, since its orientation and dimensions did not correspond to those for which stands O and N had been designed.

On this occasion, allocating a stand that did not accommodate the size of the aircraft meant taking a risk that was not properly evaluated by studying the dimensions of the aircraft and the space available on the apron. Such an evaluation to ensure the safety of the operation would have been prudent, especially in light of the fact that it was not the first time this practice was used to park an aircraft. In any case, such a practice is not supported either by international guidelines or by internal airport procedures which take into account different types of aircraft, and as such its use should be restricted as much as possible.

2.2. Aircraft parking maneuver

The aircraft landed on runway 30R and left the runway via taxiway A1 at the end of the runway. A follow-me car was waiting for it on this taxiway, which the aircraft followed on taxiways AT and C 2-2 toward the apron.

When the aircraft reached the apron, the crew saw how the marshaller exited the vehicle and gave them indications to approach the far left of the apron.

There was no stand centerline in that area, and as a result neither the crew nor the marshaller knew for sure what path the aircraft had to take.

It is likely that the marshaller, who was highly experienced, had guided other aircraft with similar dimensions, like the B747, and was using the same references that he might have used for those aircraft.

In this case, and given that the Antonov 124-100 has a larger wingspan (9 m, or 4.5 m on each side), if those same references had been used, it is possible that the clearance needed to avoid colliding with the light towers was not properly calculated.

Another consideration is the fact that the maneuver took place at night, at around 2:00 am, and even though the lights in the parking area were energized, the nighttime nature of the operation could have affected the visibility. In addition, the aircraft's 73.3 m wingspan means that a single person located at the airplane's centerline cannot properly estimate the separation between the wingtip and any obstacles. To this we must add the fact that the marshaller's shift had been extended beyond his normal workday.

From the cockpit, the crew of the aircraft cannot discern the lateral clearance with obstacles, and the collisions that occurred were of insufficient magnitude to clearly alert the crew.

Had a wingtip man been present at the wingtip in addition to the marshaller, there is a chance that the clearance could have been increased so to avoid the impact with the light tower.

2.3. Corrective measures

Due to the accident, a procedure was developed by Zaragoza airport to parking aircraft with a superior category than the assigned stand. The studies and simulations were restricted to aircraft type B747-700 since it was the most frequent one flying to the airport. This measure, together with the intention of the Zaragoza airport authorities to expand the study to every aircraft which can fly to that airport, would be adequate to avoid similar event at it.

On the other hand, this measure is local and it doesn't take into account other airports where similar situations could happen, with the risks it means. Therefore, a general procedure should be considered for every airport with similar problems. Following this point, Aena is going to inform every airport so that they include in their procedures the

parking of aircrafts with a superior category than the assigned stand, develop the required analysis and adopt the appropriate measures. It should strengthen this line of action, and therefore issued a safety recommendation.

3. CONCLUSION

3.1. Findings

- The aircraft was properly certified to conduct the flight.
- The crew was properly certified to conduct the flight.
- The aircraft landed without incident at the Zaragoza Airport.
- The stand assigned to the aircraft could not accommodate its dimensions, and therefore there were no horizontal markings that could be used to guide it.
- The aircraft arrived at night.
- The parking area lights were requested to be turned on.
- A single marshaller guided the aircraft into the stands.
- The aircraft's dimensions made it difficult to ascertain the clearance between the wingtip and obstacles.
- From its position, the crew could not determine the lateral clearance that existed.

3.2. Causes

The incident occurred when an attempt was made to park an aircraft at an assigned stand that was unsuitable given the aircraft's dimensions, and that did not have guidance markings.

4. SAFETY RECOMMENDATIONS

REC 14/12. It is recommended that Aena restrict as much as possible the practice of parking an aircraft in a stand that is not properly marked and sized for the aircraft's dimensions. In those cases in which this practice is employed, a specific procedure should be developed that defines the risks present and the criteria to be used by personnel and means to mitigate said risks.

APPENDIX 1
Stand at the Zaragoza Airport

AIP
ESPAÑA

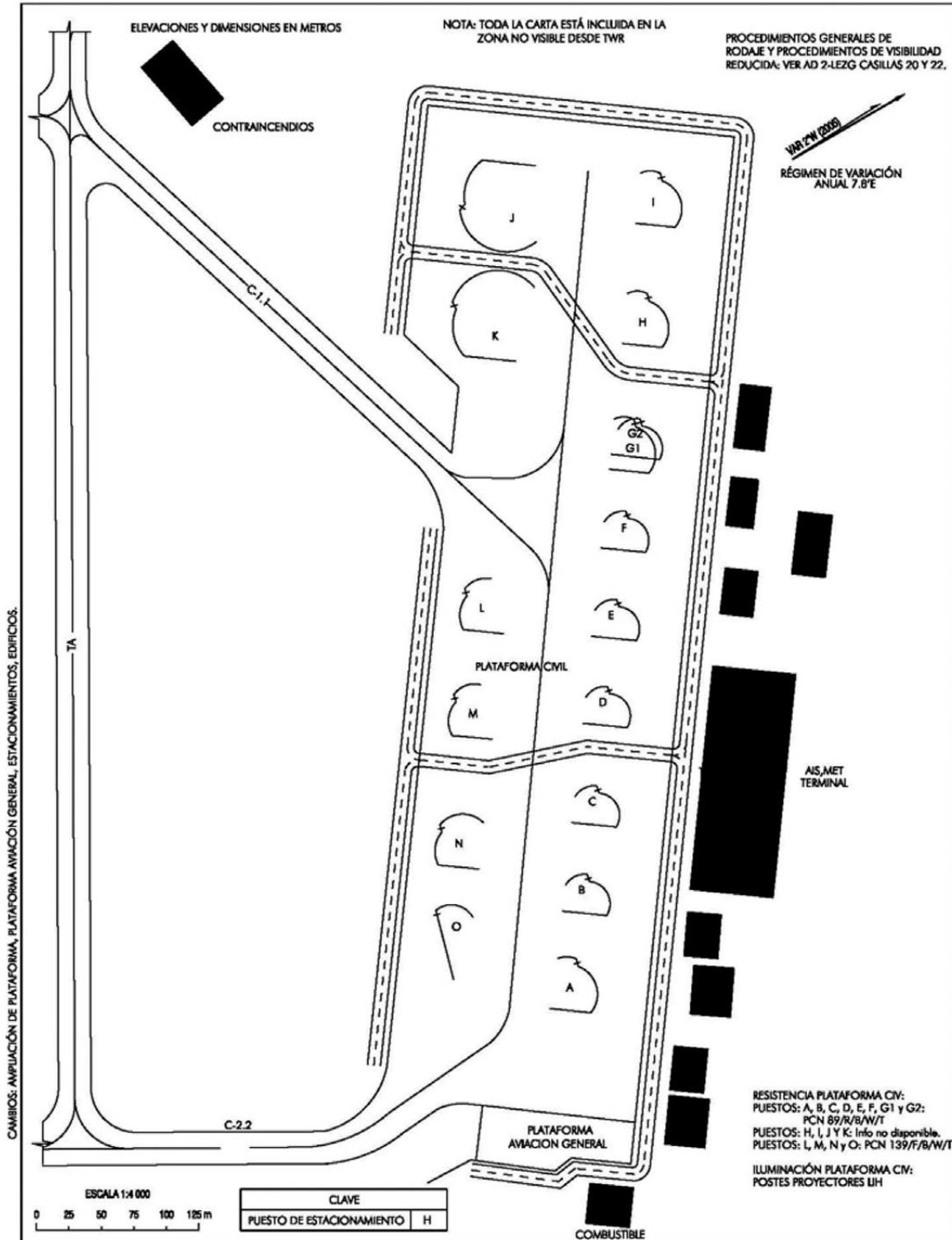
AD 2-LEZG PDC 1.1
05-JUN-08

PLANO DE ESTACIONAMIENTO
Y ATRAQUE DE AERONAVES-OACI

ELEV
PLATAFORMA CIV
296 m

TWR 122.10
GMC 118.10

ZARAGOZA



AIS-ESPAÑA

AMDT 171/08