McDonnell Douglas MD11, N1756

AAIB Bulletin No: 2/2000 Ref: EW/G99/10/09 Category: 1.1

Aircraft Type and Registration:	McDonnell Douglas MD11, N1756
No & Type of Engines:	3 General Electric CF6-80 turbofan engines
Year of Manufacture:	1992
Date & Time (UTC):	10 October 1999 at 0830 hrs
Location:	London Heathrow Airport
Type of Flight:	Public Transport (Passenger)
Persons on Board:	Crew - 15 - Passengers - 212
Injuries:	Crew - None - Passengers - None
Nature of Damage:	Scuff and scratch marks to starboard engine nacelle
	Impact damage to body of Transit van
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	50 years
Commander's Flying Experience:	17,250 hours (of which 400 were on type)
	Last 90 days - 107 hours
	Last 28 days - 45 hours
Information Source:	Metropolitan Police investigation report plus Aircraft Accident Report Form submitted by the Commander and telephone enquiries

AGNIS/PAPA stand guidance systems

The AGNIS (Azimuth Guidance for Nose-In Stands) system has two vertical, parallel light bars. Both appear green in colour when the aircraft is on the stand centreline but if the aircraft is displaced to the left or right then the light on that side turns red, inviting the pilot to turn towards the green light to regain the centreline. AGNIS does not provide any stopping guidance. The PAPA system (Parallax Aircraft Parking Aid) provides this through a slotted black marker board mounted to one side of the AGNIS lights. Behind the board a white fluorescent light shines through the slot and appears to traverse the slot as the aircraft moves forward. Marks on the board identify the correct alignment of the light for varying aircraft types. The operating principle of PAPA requires the board to be offset from the AGNIS and so the pilot must alternate his view from one aid to the other whilst parking. The PAPA boards may have several markers for different aircraft types and

more than one mark for aircraft of the same basic type (eg Boeing 747-400 and Boeing 747-SP). Consequently, the pilot must read the board markings carefully to ensure that the appropriate white marker line is identified. The AGNIS and PAPA lights are sensitive to pilot position and can only be interpreted accurately by the pilot occupying the left seat. Consequently, when self-parking, pilots occupying the right hand or centre seats are unable to interpret either aid with confidence.

History of flight

The aircraft had completed an uneventful scheduled flight from Miami. The commander had operated to Heathrow several times but he could not remember using stand K23 before. He was used to receiving marshalling assistance when parking on a stand at Heathrow but on this occasion there was no marshaller. The stand area appeared to him to be clear of obstructions and he followed the AGNIS stand entry guidance lights which aligned the aircraft with the stand centreline. He was "waiting for the light to turn red" indicating to him when to stop but the light did not turn red. He stopped the aircraft when he was unhappy to continue forward and shutdown the engines. After shutdown he was informed that the aircraft's right engine had collided with a ground vehicle. The aircraft had over-run the parking position by 15.75 metres (51.6 feet) and pushed the van approximately 6 feet sideways with its right engine nacelle.

Ground crew activity

The operator's 'crew chief-ramp' arrived at stand K23 before the aircraft but all the available parking spaces were either occupied or obstructed so he decided to park his van close to the head of the stand in what he described as 'a relatively safe position'. A movement area assistant, a Heathrow Airport Limited (HAL) employee, was waiting on an adjacent stand to marshal another of the operator's aircraft when he heard on his personal radio that the MD11 assigned to stand K23 was to self-park. He approached the operator's 'crew chief-ramp' and asked if this was correct. The crew chief said that he had been told by his management that all the operator's aircraft were self-parking that day and he asked the movement area assistant to check if that was correct information. The movement area assistant contacted 'tarmac control' to check if it was correct (tarmac control is the callsign of the Airfield Operations Support Unit which is staffed by HAL employees). He was informed that it was correct; all the operator's aircraft would be self parking, but only on the Kilo stands.

The operator's 'crew chief-ramp' switched on the AGNIS and PAPA guidance systems before collecting from his van the chocks and safety pins he intended to fit when the aircraft parked, and positioned himself close to where the nose wheels should have stopped. He watched the aircraft turn on to the stand and line-up with the centreline but it did not stop at the designated mark. As soon as he realised that it was going to over-run the mark he ran under the aircraft and into the airside roadway to make himself visible to the Captain. From the roadway he signalled with his hands for the aircraft to stop, which it did.

Stand modification programme

An Operational Safety Instruction (OSI), number 16 of 1999 dated 27 September which received 'full' distribution, stated that:

> *'As part of Heathrow Airport Limited's ongoing program of ramp safety improvements, work is currently underway to consolidate all safety related equipment on aircraft stands into one common location. A key component of this*

program is the relocation of Stand Entry Guidance ON/OFF buttons from inside terminal buildings to outside at ramp level. In conjunction with this work, HAL are also introducing a new procedure to visually warn pilots of aircraft taxiing onto stand of a hazardous situation (e.g. a vehicle driving onto the stand) which may require the aircraft to be brought to an immediate stop. The works are to be carried out in phases which will be promulgated by separate notices. Works already completed are to stands ***K14-K21 inclusive****. The new system becomes available on these stands ONLY with effect from 1 October 1999.'*

The first phase of this programme was the relocation of stand entry guidance ON/OFF buttons from inside the terminal buildings to outside at ramp level. The operator's ramp agent or dispatcher would then have to go to the head of the stand to activate the guidance system and in the process carry out an inspection to ensure the stand was in a safe condition to accept the inbound aircraft. The second phase was the installation of emergency stop buttons at ramp level which, when operated, would illuminate a STOP sign within the stand entry guidance system.

Stand parking policy

The accident occurred on the first day of a planned change of policy for the operator's aircraft from marshalling to self-parking procedures on the Kilo stands. The decision to use self parking procedures followed publication of OSI 16/99 and discussions between Heathrow Airport Limited (HAL) and some of the Terminal 3 user airlines, including the operator.

Other stand guidance systems

There are stand entry guidance systems in common use which have only one cluster of lights. The 'Safedock' and 'Safegate' systems have different centreline guidance mechanisms but both have very similar indications for closure rate and stopping position. Above the centreline guidance lights are multifunction text displays which initially indicate the chosen aircraft type for which the lights have been adjusted. Below or beside the centreline guidance lights are two vertical, parallel groups of lights. As the aircraft approaches the correct parking position, closure rate information is given by lights which illuminate in pairs from the bottom upwards. When the aircraft reaches the required position the word STOP appears in red. Other systems such as APIS (Aircraft Parking and Information System) also have one cluster of lights for centreline guidance, a thermometer type of indicator for distance to go and a text display of the word "STOP" when the aircraft reaches the correct position.

Comment

The AGNIS/PAPA combination is not uncommon; it is in use at other major European airports such as Amsterdam, Copenhagen and Frankfurt. However, the commander was from Miami where stand guidance systems are little used, marshalling being the normal procedure. Marshalling had also been used at the conclusion of his previous flights to Heathrow. He anticipated marshalling at Heathrow and did not discover that he would be required to self-park until he arrived at the stand. It is likely that the commander had at some time previously used a single point system such as 'Safegate' and did not appreciate the fundamental differences between single point stand guidance

systems and the AGNIS/PAPA combination which requires the pilot to keep switching his view from one aid to the other.

If, before commencing descent for Heathrow, the commander was warned that he would be required to use self-parking procedures, he could have briefed himself and his crew using the Jeppesen Manual. Page 10-9H of the Manual entry for London Heathrow described the stand entry guidance systems in use at the airport and how to use the AGNIS/PAPA combination. Nevertheless, the presence of the obstructing vehicle on the apron should have been clear to the co-pilot for it was on his side of the aircraft and in front of the right wing. The 'crew chief-ramp's dilemma about where to park his vehicle is a common problem because of congestion around the stands but parking on the cleared area of the stand was both unwise and an infringement of airport regulations.

Although stand K23 was not a modified stand in accordance with the terms of OSI 16/99, the stand entry guidance controls had been installed at ramp level and so the stand was exempt from phase 1 of the safety improvement programme. However, phase 2 of the programme, the installation of emergency over-ride buttons and new "STOP" signs at pilot eye level, had not been incorporated on stand K23. Nevertheless, the operator's crew chief-ramp could have avoided running under the aircraft by going to the stand entry guidance controls and switching off the AGNIS/PAPA systems.