INCIDENT

Aircraft Type and Registration:	Boeing 777-268ER, HZ-AKC
No & Type of Engines:	2 General Electric GE90-90B turbofan engines
Year of Manufacture:	1997
Date & Time (UTC):	11 February 2009 at 1810 hrs
Location:	Stand 319, London Heathrow Airport
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 14 Passengers - 114
Injuries:	Crew - None Passengers - None
Nature of Damage:	Minor damage to door L2
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	49 years
Commander's Flying Experience:	15,065 hours (of which 6,029 were on type) Last 90 days - 181 hours Last 28 days - 50 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

The aircraft was parked on Stand 319, with the parking brake set and the passengers disembarking, when the aircraft began to roll backwards. Pressure in the parking brake system had dissipated causing a loss of brake application. The right hydraulic system AC electric pump was activated and this reinstated the hydraulic brake pressure, which brought the aircraft to a stop.

A failure of the parking brake valve was identified as the cause of the loss of hydraulic pressure in the parking brake system.

History of the flight

The aircraft arrived on Stand 319 at London Heathrow Airport and stopped in the correct parking position. The parking brake was selected ON and both main engines were shut down, with the Auxiliary Power Unit supplying the aircraft electrical and environmental services. The ground engineer connected his headset to the aircraft intercom system and noted that the amber 'parking brake set' light on the nose landing gear was illuminated.

The normal operating procedure when an aircraft is parked on a stand is for wheel chocks to be placed in front of and behind the nose landing gear wheels. Due to two stand changes, the chocks, which were supplied by the ground handling agent, did not arrive. The ground engineer asked the aircraft commander if positioning the jetty to the aircraft and disembarking the passengers with

the brakes set, without chocks in place, was acceptable. The commander ensured that the parking brake was ON and that the Engine Indicating and Crew Alerting System (EICAS) message confirming this was displayed. He then agreed to the ground engineer's request and the jetty was placed against door L2 in the normal way. The door was opened and disembarkation of the passengers was commenced.

When approximately 10 passengers and all of the crew were left onboard, the aircraft began to move slowly backwards. The ground engineer notified the operator's maintenance manager, who was on the jetty, of the movement. He boarded the aircraft and entered the flight deck. Both pilots were in their seats carrying out post-flight activity and were unaware that the aircraft was moving. The maintenance manager selected the right hydraulic system to AUTO, which activated the right hydraulic system AC electric pump; this re-pressurised the right hydraulic system, applied the parking brake and stopped the aircraft. The aircraft had moved backwards approximately two metres, exposing the open door. The jetty structure made contact with the side of the door causing a minor abrasion to its surface.

Parking brake system

The parking brake utilises hydraulic pressure supplied by the right hydraulic system. The nominal 3,000 psi pressure is provided by an engine-driven hydraulic pump mounted on the right engine accessory gearbox. With the engine shut down, a hydraulic accumulator maintains pressure in the parking brake system. A secondary source of hydraulic pressure can be provided by a pump powered by the aircraft's AC electrical system. A brake pressure indicator gauge is located on the flight deck below the commander's Primary Flight Display (PFD) screen. This allows the crew to monitor the system and accumulator pressure. The gauge is also fitted with a BRAKE SOURCE caption which illuminates when there is no pump pressure. Two non-return valves and an accumulator isolation valve are designed to prevent hydraulic fluid leaking back into the system and pressure being lost.

Maintenance action

The aircraft was taken out of service and engineers using the Boeing Fault Isolation Manual determined that the parking brake valve was defective. The valve component was changed and a pressure decay test was carried out. The test was successful, which confirmed the failure of the original valve. The engineers were informed that there may have been a previous problem with loss of accumulator pressure on the aircraft but this could not be verified.

Safety action

Following the incident, the operator introduced a requirement that their engineering vehicle would carry a set of chocks when attending an aircraft that was parking on a stand, in addition to the ones provided by the ground handling agent.

Analysis

The flight crew had applied the parking brake, confirmed that the brake was set and that the accumulator pressure was normal with the BRAKE SOURCE light extinguished. There was no requirement to continuously monitor the indicator and no audio alert if pressure in the accumulator reduced. With the post-flight activity, the crew did not notice the loss of pressure or the gentle aircraft movement. The maintenance manager's prompt action in activating the right hydraulic system AC electric pump prevented any further rearwards movement of the aircraft.

The parking brake valve was identified as the cause of the pressure loss in the right hydraulic system. This incident illustrated the need for wheel chocks to be in place when an aircraft is parked. The operator has instigated a safety action to ensure that wheel chocks are always available when one of their aircraft arrives on stand.