INCIDENT

Aircraft Type and Registration:	Jetstream 3202, G-BYRA
No & Type of Engines:	2 Garrett Airesearch TPE331-12UHR-701H turboprop engines
Year of Manufacture:	1989
Date & Time (UTC):	16 November 2005 at 1542 hrs
Location:	Inverness Airport, Scotland
Type of Flight:	Public Transport (Passenger)
Persons on Board:	Crew - 3 Passengers - 4
Injuries:	Crew - None Passengers - None
Nature of Damage:	Hydraulic fluid loss during approach
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	31 years
Commander's Flying Experience:	4,104 hours (of which 1,738 were on type) Last 90 days - 185 hours Last 28 days - 79 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

Whilst in flight, the left wheel brake pressure gauge suffered a failure which caused it to permanently indicate 2,000 psi. This led the crew to believe that the wheel brake might be locked 'on' during the landing. During the same flight, a failure of the pressure delivery pipe from the left hydraulic pump resulted in the total loss of the aircraft's hydraulic systems, but only after the crew fully deployed the flaps and extended the landing gear. The aircraft carried out an uneventful landing, but without the nose wheel steering and main wheel braking systems being available, and came to a halt on the runway.

History of flight

On approach to Inverness, whilst completing the approach checklist, the flight crew noticed that the left brake pressure gauge was reading full scale deflection, 2,000 psi. Fearful that the left wheel brake might be locked 'on', they carried out a go-around, with the intention of addressing this problem prior to attempting a landing. The flight crew closed the hydraulic Low Pressure (LP) cocks, to lower the system pressure, but with zero hydraulic pressure in the system, the left wheel brake pressure indicator still read 2,000 psi. The circuit breaker for the indicator was pulled and reset, but with no effect. Hydraulic power was then restored and the flight crew briefed the cabin crew on the possibility that the landing may be made with the left wheel brake

locked 'on'. During the preparations for landing, a passenger reported purple fluid leaking from the left wing. The flight crew selected the landing gear DOWN and the flaps to FULL, after which the hydraulic system pressure indications dropped to zero and the hydraulic pumps could be heard cavitating. After confirming that the landing gear was down and locked, the flight crew called for the passengers to assume the brace position in preparation for the landing. The aircraft touched down gently and, despite the lack of nose wheel steering, the aircraft was able to track the runway heading and was brought to a halt, on the runway, using propeller reverse pitch and the parking brake. After shutdown, the fire service reported that fluid was leaking from the left engine; the aircraft occupants were then evacuated through the left passenger door without injury.

Description of the hydraulic system

The BAe Jetstream 3202 is a development of the Jetstream 31 series of aircraft, and is designed with manually operated flying controls. It is a twin turboprop passenger aircraft certified to carry up to 19 passengers. The hydraulic system of the aircraft has two modes of supply, NORMAL and EMERGENCY. Both the NORMAL and EMERGENCY systems are supplied from a common reservoir which is fitted with a divider plate, which allows both systems to be serviced from a common point. The plate ensures that, in the event of a leak in the NORMAL system, sufficient fluid remains in the EMERGENCY system to operate essential services. The NORMAL system is pressurised by two engine driven pumps and operates all of the aircraft's hydraulic services. The EMERGENCY system allows the hydraulic operation of the landing gear and flaps through the use of a hand pump adjacent to the pilots' seats.

Examination

An inspection of the aircraft was carried out by engineers from the operator's maintenance organisation. The left wheel brake pressure gauge was found to have failed at full scale deflection, and was replaced. The loss of hydraulic fluid was due to the failure of the pressure delivery pipe union which attached this pipe to the left hydraulic pump. It was not possible to carry out a detailed inspection of the failed pipe and union, as they had been discarded during the rectification process. It was not established if the failure of the indicator was connected with the subsequent failure of the pipe union. The aircraft's records confirmed that no recent maintenance activity had been carried out on this system and that no defects had been observed during routine inspections of the relevant area.