

No: 6/88

Ref: EW/C1056

Category: 1b

Aircraft Type and Registration: Piper PA-31-310 Navajo, G-TISH

No & Type of Engines: 2 Lycoming TIO-540-A2B piston engines

Year of Manufacture: 1970

Date and Time (UTC): 21 January 1988 at 0753 hrs

Location: Tees-side Airport, County Durham

Type of Flight: Scheduled passenger

Persons on Board: Crew - 1 Passengers - 2

Injuries: Crew - None Passengers - None

Nature of Damage: Aircraft nose, nose undercarriage and propellers damaged

Commander's Licence: Commercial Pilot's Licence

Commander's Age: 43 years

Commander's Total Flying Experience: 3620 hours (of which approximately 1000 were on type)

Information Source: AAIB Field Investigation

At 0630 hrs, on Thursday 21 January, the commander arrived at Humberside Airport to operate the 0715 scheduled flight to Glasgow, via Tees-side. Having self briefed and completed the normal preflight administration, he carried out an external check of the aircraft by torchlight. It was noted that the underside of the right wing around, and to the rear of, the main landing gear was extensively covered with dirt and hydraulic fluid. As it had been like this for some time, being the consequence of previous hydraulic leaks, he did not investigate it further.

The aircraft departed at 0707 hrs and, at about 50 feet agl, the landing gear selector was moved to the UP position. The three green gear down lights extinguished, but the transit light lit and remained on and the selector did not return as expected to the neutral position. A selection to neutral followed by a further up selection was made with no effect. The selector was then moved to the DOWN position. A short while after, the right main gear green light came on, indicating that the right main gear had locked down. It was felt that this was due to the airflow rather than hydraulic pressure. The selector was put to neutral and the aircraft flown past the control tower for a visual inspection, all three legs appeared to be in the down position. As the base maintenance facility was at Tees-side the commander, after consultation with his company, elected to fly there with the gear in this state.

During the transit, at 4500 feet in VMC, the selector was put to the DOWN position and the aircraft

yawed two or three times. The left main gear green light came on, indicating that the left main gear had also locked down. Having achieved this an attempt was made to lock the nose gear down by using the emergency handpump. The DOWN selection was confirmed and the pump handle was extended. The commander stated that the pump felt stiff and so, as he was unable to move the handle more than about an inch, he restowed it and replaced the cover. The selector was then returned to the neutral position.

One of the passengers was called forward and appraised of the situation. He was rebriefed on the emergency procedures and told that the rear door was to be the first choice of exit. He was also told that he and his fellow passenger should occupy the two rear seats on the righthand side directly opposite the door.

The weather at Tees-side at 0750 was;

Surface wind	230°/13 kt
Visibility	30 km
Weather	Nil
Cloud	1 okta at 4000 feet
Temperature	+3°C
Dew point	-0°C
QNH	1002 mb

The aircraft was positioned for a visual approach to runway 23. On short finals the Master Switch was selected OFF. Before touchdown, at 0753 hrs, both propellers were feathered and the engines shut down. The nose gear collapsed rearwards when it was lowered onto the runway, and the aircraft came to rest after about a further 100 metres, in a nose down attitude slightly to the right of the centreline. The commander supervised the evacuation which went as planned and was accomplished within 10 seconds of the aircraft coming to rest. The crash vehicles arrived about 35 seconds later, their approach having been hampered by ice on the taxiways and an inability to use grassed areas which were waterlogged.

The hydraulic system, provided solely to actuate the gear, consisted of two engine driven pumps taking fluid from a stack pipe in a sealed reservoir within the hydraulic power pack. The fluid below the stack pipe supplied the emergency system which was intended to be pressurised by the hand pump.

After the accident the powerpack reservoir fluid level was found to be below the stackpipe, providing fluid to the emergency system but not the engine driven pumps. Although the emergency system had sufficient hydraulic fluid available, it had failed to lock the nose gear down.

The aircraft was placed on jacks and the emergency system was used to repeatedly lock and unlock the nose gear without revealing any defects.

The seal on the righthand engine hydraulic pressure filter (Purolator) was found to have extruded causing a leak from this point. Both filter bowls were wire locked; and, if correctly assembled, should not have exhibited a gap between the bowl and the filter body. However, the righthand filter had a gap

of 0.054 inches, and the lefthand filter a gap of 0.032 inches. The righthand filter seal was unsupported in the gap which was caused by the seal not seating in its correct location but remaining trapped between parallel faces of the filter body and bowl. A total of three righthand filter seal leaks had occurred over the last month.

Damage was confined to the nose structure of the aircraft. A temporary repair was undertaken which allowed the aircraft to be ferried, with the undercarriage down, to an overhaul agency for further investigation and repair.

A bench check of the hydraulic power pack and of individual components in the system did not reveal any relevant defects, although a small accumulation of fine debris, compatible with the age of the aircraft, was found in the power pack reservoir.