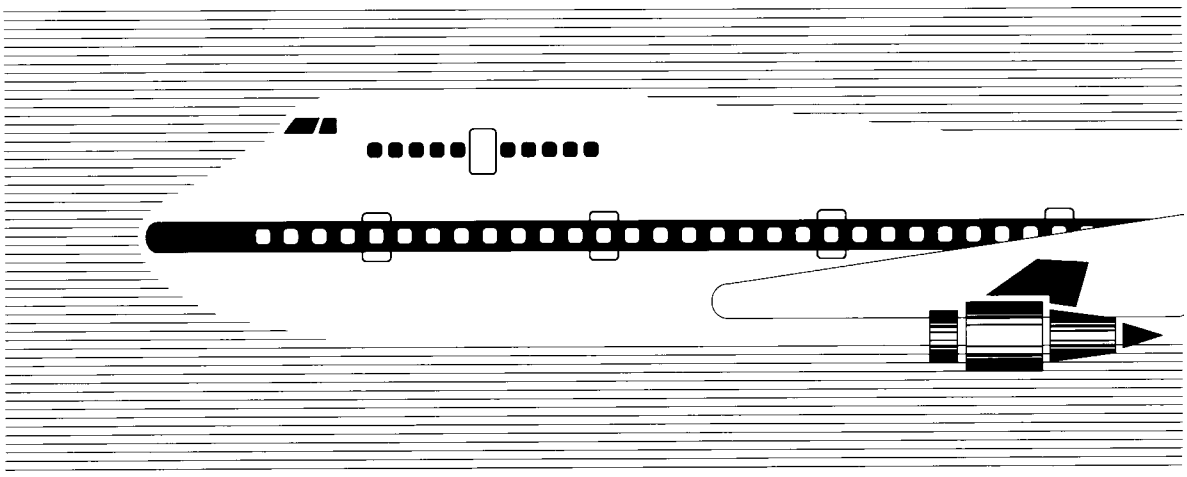
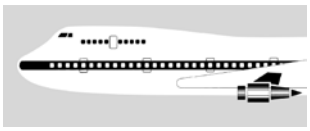
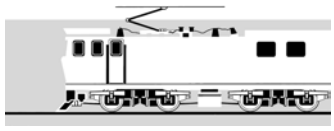


AVIATION OCCURRENCE REPORT

02-006 Partenavia P68B ZK-ZSP, engine power loss and off-field landing, 5 km southwest of Wairoa 15 May 2002


TRANSPORT ACCIDENT INVESTIGATION COMMISSION
NEW ZEALAND

The Transport Accident Investigation Commission is an independent Crown entity established to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in the future. Accordingly it is inappropriate that reports should be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

The Commission may make recommendations to improve transport safety. The cost of implementing any recommendation must always be balanced against its benefits. Such analysis is a matter for the regulator and the industry.

Report 02-006

Partenavia P68B

ZK-ZSP

engine power loss and off-field landing

5 km southwest of Wairoa

15 May 2002

Abstract

On Wednesday 15 May 2002, at about 0918, ZK-ZSP, a Partenavia P68B, was on a scheduled flight from Gisborne to Napier, when its right engine lost power because of fuel starvation. The aeroplane was 5 km from Wairoa, at 5000 feet and in cloud, at the time. On board were 4 passengers and the pilot.

Although sufficient fuel was on board the aeroplane, the fuel was not made available to the engine. The propeller was not feathered and the aeroplane, unable to maintain its height, descended until it broke clear of the cloud, near the coastline. The pilot landed the aeroplane safely on a metalled road. There were no injuries, and the aeroplane was undamaged.

Safety issues identified were:

- inadvertent tank-to-tank fuel transfer
- stiff fuel selector knobs
- the adequacy of the aircrew licensing written examination system.

Safety recommendations addressing these issues were made to the Director of Civil Aviation.

ZK-ZSP after the precautionary landing

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Abbreviations

ADF	automatic direction finder
amsl	above mean sea level
CAA	Civil Aviation Authority
DME	distance measuring equipment
GPS	global positioning system
IFR	instrument flight rules
IMC	instrument meteorological conditions
km	kilometre(s)
m	metre(s)
NDB	non-directional beacon
nm	nautical mile(s)
UTC	Coordinated Universal Time
VHF	very high frequency
VOR	very high frequency omni-directional radio range

Data Summary

Aircraft registration:	ZK-ZSP
Type and serial number:	Partenavia P68B, 129
Number and type of engines:	2 Lycoming IO-360-A1B6
Year of manufacture:	1978
Operator:	Sunair Aviation Limited
Date and time:	15 May 2002, at 0918[1]
Location:	5 km southwest of Wairoa latitude: 39° 04.1′ south longitude: 177° 24.2′ east
Type of flight:	air transport
Persons on board:	crew: 1 passengers: 4
Injuries:	crew: nil passengers: nil
Nature of damage:	nil
Pilot's licence:	Commercial Pilot Licence (Aeroplane)
Pilot's age:	25
Pilot's total flying experience:	1404 hours (90 hours on type)
Investigator-in-charge	K A Mathews

[1] Times in this report are New Zealand Standard Time (UTC + 12 hours) and are expressed in the 24-hour mode.

1 Factual Information

1.1 History of the flight

1.1.1 On Wednesday 15 May 2002, at about 0918, ZK-ZSP, a Partenavia P68B (call sign Sunair 12P), was on a scheduled flight from Gisborne to Napier at 5000 feet in instrument meteorological conditions (IMC) when, 3 nautical miles (nm) south of Wairoa, its right engine lost power. On board were 4 passengers and the pilot.

1.1.2 The pilot had refuelled ZK-ZSP the previous evening at Gisborne Aerodrome with 162 litres of fuel, and later reported the aeroplane had about 160 litres of fuel in the left tank and 150 litres in the right tank after the refuelling. The pilot then flew the aeroplane to Napier Aerodrome where it remained overnight. The flight time to Napier was about 0.7 hours. The aeroplane burned an average of 80 litres of fuel per hour (40 litres for each engine), which was the fuel consumption rate used for flight planning.

1.1.3 The pilot said she had retired at about 2130 on the night of 14 May. On the morning of 15 May she had arrived at Napier Aerodrome at about 0645 to pre-flight ZK-ZSP and plan a return flight to Gisborne. She said she had felt her usual self that day. She said she dipped the fuel tanks and measured 170 litres of fuel in the left tank and 85 litres in the right tank. She said because of aeroplane weight restrictions out of Napier and Gisborne, and because the right fuel tank provided over 2 hours endurance for the right engine, she elected not to add fuel to the right tank and reduce the fuel imbalance. The normal return flight time was about 1.4 hours.

1.1.4 The aeroplane departed from Napier Aerodrome at 0751, about 23 kilograms (kg) under its maximum permitted take-off weight of 1990 kg, with 4 passengers on board. The aeroplane landed at Gisborne Aerodrome at 0835, having flown 0.7 hours. The pilot did not refuel the aeroplane at Gisborne or dip the fuel tanks, but calculated the fuel remaining to be about 142 litres in the left tank and 57 litres in the right tank, being sufficient for the flight.

1.1.5 The aeroplane took off from Gisborne Aerodrome at 0856, about 125 kg under its maximum permitted take-off weight, and with 4 different passengers on board. The pilot said that during the climb she noticed the left wing was very heavy and that she had to use an "uncomfortable" amount of aileron control to keep the wings level. Application of trim did not lessen the heaviness. She considered crossfeeding (selecting the right engine to the left fuel tank) to reduce fuel weight in the left tank. Normal operating procedure was to run the left engine on the left fuel tank and the right engine on the right fuel tank. The pilot said she elected not to attempt any crossfeeding during the climb because she was operating the aeroplane during a busy phase of flight, and also because she understood company policy did not allow crossfeeding.

1.1.6 The pilot, troubled by the heavy left wing, contacted another company pilot by radio and asked him if he had encountered the same problem in the aeroplane. She said the other company pilot replied that he had made a technical log entry and said the chief pilot had recently been crossfeeding during flight in ZK-ZSP because of a fuel imbalance, and that the company was going to issue a notice about the situation. The pilot said she had not previously been aware pilots had been crossfeeding to reduce fuel imbalances. She said because she believed there was sufficient fuel in the right tank to complete the flight, she was not concerned about the need to crossfeed.

1.1.7 ZK-ZSP climbed to its cruising altitude where the pilot levelled the aeroplane for the cruise. The pilot said she had monitored the aeroplane fuel quantity gauges and was aware they indicated a fuel imbalance, with a low right fuel tank reading, but said she did not trust the readings because she believed aircraft fuel gauges were generally unreliable.

1.1.8 The aeroplane was mostly in IMC, but was clear of cloud as it passed over Wairoa. The aeroplane entered cloud again a short time later as it crossed the Wairoa NDB (non-directional beacon) by the coast, and then flew out over the ocean. The pilot advised Napier Tower she was overhead the Wairoa NDB at 5000 feet. Napier Tower responded, advising there was no reported IFR (instrument flight rules) traffic and that Sunair 12P was cleared to enter controlled airspace descending to 3000 feet, and to report at 20 DME (distance measuring equipment) Napier.

1.1.9 Shortly after crossing the NDB, the aeroplane's right engine lost power, accompanied by a strong right yaw. The pilot recalled seeing a "quite low" fuel quantity indication on the right fuel quantity gauge and an over half-full indication on the left fuel gauge, around the time of the power loss.

1.1.10 The pilot did not respond to the descent clearance issued by Napier Tower, so after 18 seconds the controller called Sunair 12P again. The pilot responded, "Sunair one two papa, ah, would like to make a Pan Pan Pan call please. We are at 32 Napier DME this time."

1.1.11 The aeroplane had begun to lose altitude, so the pilot disengaged the automatic pilot to hand fly the aeroplane. She said she found the aeroplane unstable and difficult to control, and went through the emergency drills. She said the left engine was producing full power, but even at the best single engine rate of climb speed[2] the aeroplane continued to descend. The pilot elected not to feather the right propeller, because the engine began to surge and she thought it might regain power.

1.1.12 Twenty-five seconds after the urgency (Pan) call, the pilot made a distress call, "Sunair one two papa, Mayday, Mayday, Mayday, we are at 31 Napier DME, ah, [unreadable words]".

1.1.13 Napier Tower responded to the pilot's distress call and tried to re-establish contact with her. A helicopter pilot flying towards Wairoa offered to assist and to keep a listening watch. Napier Tower was unable to understand any further communications from the pilot, so the controller asked the helicopter pilot to relay. The helicopter pilot responded, "……I think they're saying they've lost engines or losing engine power and they're doing their best to make towards Wairoa, so we'll track via the coastline from 10 miles south".

1.1.14 The pilot said she could not trim the aeroplane, and had to apply considerable pressure to the control column to control the aeroplane and maintain the blue line air speed. As the aeroplane descended, the pilot kept her left hand on the control column, and put her right hand on the left engine fuel selector knob (see Figure 2) positioned on the cockpit overhead panel, to select crossfeed (the opposite fuel tank). She said she could not turn the fuel selector knob and took her left hand off the control column and used both hands on the selector knob. She found the selector very stiff to operate. She selected the left engine to the right fuel tank and took control again. A short time later the left engine began to vibrate, so she realised she had selected the wrong selector knob. She again put both hands on the fuel selector knob and reselected the left engine to the left fuel tank to restore power. The pilot said she was under considerable stress during the ordeal, and each time she took her hands off the control column the aeroplane lost more height, which caused her additional stress. She said because the left engine was again running normally she elected not to attempt any further crossfeeding and to concentrate on flying the aeroplane. She still did not feather the right propeller (in accordance with standard emergency procedures), but left it windmilling. During this time the aeroplane was descending in IMC.

1.1.15 The pilot was concerned the left engine may also develop a problem, and because the ADF (Automatic Direction Finder) was tuned to the Wairoa NDB, the pilot elected to fly towards Wairoa Aerodrome, the nearest suitable landing area. Wairoa did not have a DME so the pilot reselected Wairoa on the GPS (Global Positioning System) for distance readout. The aeroplane was over the ocean at the time, but because the aeroplane was in IMC, the pilot was concerned

[2] Indicated by a blue line on the aircraft airspeed indicator.

about the minimum safe altitude and the aeroplane's exact position in relation to the coastline. The pilot said the passengers had become really uncomfortable and were making a lot of noise, which caused her further stress.

1.1.16 The pilot concentrated on tracking directly to the Wairoa NDB, because the aeroplane was still in cloud and descending. A GPS readout indicated the aeroplane was about 3 nm from Wairoa Aerodrome. Two minutes and 51 seconds after the distress call, the pilot advised Napier Tower, "… 3 miles from Wairoa this time. We are going towards the coast in case we need to ditch."

1.1.17 As the aeroplane passed through about 1500 feet above mean sea level (amsl) and crossed the coast south of the NDB, it descended out of the cloud. The pilot looked to her left and saw the coastline. She said that although the aeroplane was capable of maintaining the lower altitude she elected to continue descending, and turned parallel to the coastline to establish her exact position. She planned to fly to Wairoa Aerodrome after she had established her position. Because there were rain showers in the area and some low misty patches, with reduced visibility of about 5 km, the pilot became concerned about terrain clearance away from the coast and having to traverse rolling terrain to the aerodrome.

1.1.18 The pilot saw a long straight metalled road parallel to and near the coastline, which she considered suitable for a landing. Because of the weather conditions and a concern the left engine may develop a problem, the pilot elected to carry out a precautionary landing on the road. The aeroplane landed safely and its occupants were uninjured. Shortly afterwards, the helicopter pilot who had been tracking the pilot's progress landed near the aeroplane. The passengers were taken to Wairoa Aerodrome in a private vehicle and then flown to Napier in another company aircraft.

1.2 Damage to aircraft

1.2.1 The aircraft was undamaged.

1.3 Pilot information

1.3.1 The pilot was aged 25. She held a Commercial Pilot Licence (Aeroplane), issued on 10 January 1997, and a Class 1 Medical Certificate valid until 28 October 2002. She was a C category instructor. She completed her professional pilot training at Ardmore. Her various multi-engine aeroplane type ratings included the Partenavia P68B, Beechcraft BE76, Piper PA23, PA31 and PA44. She had flown a total of 1403 hours, including 90 hours in the Partenavia P68. Her total multi-engine aeroplane experience amounted to 309 hours, including 29 hours dual instruction and 197 hours as pilot-in-command.

1.3.2 In the 7-day period before the incident the pilot had flown 9.2 hours. In the 30-day period she had flown 31.4 hours. In the 90-day period she had flown 47 hours.

1.3.3 Following her initial multi-engine training and rating on the Beechcraft BE76 on 23 June 1997, the pilot was issued a Partenavia P68 rating on 12 April 2000. On 10 May 2000 the pilot was granted a Piper PA44 rating. A different instructor granted each rating.

1.3.4 The pilot passed her flight test for the initial issue of an aeroplane multi-engine single-pilot instrument rating in a Piper PA44, on 15 May 2000.

1.3.5 After gaining her instrument rating, the pilot received 30 hours of "right-seat" multi-engine experience in a Piper PA31, before being issued with a type rating on 14 September 2000 by a further instructor. She gained another 28 hours co-pilot experience in the PA31 before flying for the operator.

1.3.6 The operator initially employed the pilot on a casual basis in March 2001, and an independent flight examiner first assessed her on 17 March 2001. The assessments included a Biennial Flight Review, a route assessment, an operational competency assessment and an instrument rating renewal, in a Partenavia P68. The assessments included simulated engine failures and asymmetric flight (one engine inoperative). The examiner later commented that he was impressed with the pilot's performance during the assessments.

1.3.7 On 21 June 2001 another instructor issued the pilot a Piper PA23 rating. On 18 October 2001 the independent flight examiner carried out a routine IFR operational competency assessment of the pilot in a PA23. The assessments again included simulated engine failures and asymmetric flight.

1.3.8 In January 2002 the pilot went overseas for a week. After her return there was no flying available, so she left again for overseas in mid-March. Shortly after she arrived overseas the operator offered her a position to work 2 days each week, primarily for the return Napier to Gisborne flights. The pilot returned around the end of March to take up the position. Occasionally she flew to Tauranga, Rotorua and Hamilton. She worked each Tuesday and Wednesday, her preferred working days.

1.3.9 On 28 March 2002, after her re-employment, the independent flight examiner assessed the pilot on the route from Tauranga to Hamilton in a Partenavia P68. A comment on the assessment record stated: "route well briefed and flown." No areas of concern were noted. She flew with a senior company pilot on the Napier to Gisborne route, but was not given a specific route assessment.

1.3.10 The pilot also completed a Biennial Flight Review, an operational competency assessment, and an instrument rating renewal on 28 March 2002, in a Partenavia P68, with the independent flight examiner. The assessments included simulated engine failures and asymmetric flight. A comment on the assessment record noted: "VMCA [minimum control speed] rusty – but now OK." The examiner later advised that most pilots were "rusty" with their engine failure procedures during the early part of an assessment, and noted the pilot had not flown for some time. He thought the pilot was an average pilot. He had discussed the use of crossfeed with the pilot and assessed that she was familiar with the procedure. He said he put pilots through extra engine failure drills during assessments to sharpen their skills.

1.3.11 The pilot had sat numerous theory examinations to obtain her pilot's licences and instrument rating, including Airline Transport Pilot Licence examinations. Of the 6 Private Pilot Licence examinations (including Aeronautical Radio Telephone Practices), she passed 4 after 2 attempts each. She passed the aeroplane Technical Knowledge examination on her 3rd attempt. She did not pass the Flight Navigation examination after one attempt, but went on and passed the Commercial Pilot Licence Flight Navigation examination on her 2nd attempt, which was then credited as a pass for her Private Pilot Licence.

1.3.12 Of the 6 Commercial Pilot Licence examinations, she passed 3 on her first attempt. She passed the Flight Navigation General examination on her 2nd attempt, the aeroplane General Aircraft Technical Knowledge examination on her 3rd attempt, and the aeroplane Principles of Flight and Performance examination on her 5th attempt.

1.3.13 Of the 3 examinations for an instrument rating, she passed one on her first attempt. She passed the Instruments and Navigation Aids examination on her 2nd attempt, and the Flight Navigation IFR examination on her 6th attempt.

1.3.14 Of the 7 Airline Transport Pilot Licence examinations, she passed 2 on her first attempt. She passed the Meteorology, Flight Planning and Air Law examinations after 2 attempts each. She passed the Advanced Aerodynamics, Performance and Systems Knowledge examination on her 3rd attempt. She passed the Flight Navigation General examination on her 5th attempt.

1.3.15 The pilot advised that the reason she did not pass any of the Private Pilot Licence written examinations on her first attempt, was because she had only attended half of her training course when she had to withdraw for personal reasons, and was unable to cancel the examination sittings at short notice.

1.3.16 The pilot said that she found the Commercial Pilot Licence examinations challenging, and had pursued further instruction in areas where she did not have proper course materials.

1.3.17 The pilot also advised that scheduling time to sit examinations along with work commitments can be difficult, and that evening or weekend sittings should be available. She believed her overall examination performance would have improved if she had a better examination technique and a better means of self-testing. She said she had opted to prepare herself for most examinations by a self-study programme.

1.3.18 The pilot said that in August 2001 she had attended a full time Metroliner ground course, and that she had passed the 3 examinations well the first time.

1.4 Aircraft information

1.4.1 ZK-ZSP was a Partenavia P68B, serial number 129, constructed in Italy in 1978. The aircraft was a light, twin-engine, high-wing, 6-seat aeroplane of conventional design, fitted with fixed tricycle undercarriage. Lycoming IO-360-A1B6 engines were fitted to the aeroplane.

1.4.2 ZK-ZSP had been issued a non-terminating Airworthiness Certificate in the standard category, and was approved for air transport operations.

1.4.3 Aircraft records showed ZK-ZSP had been maintained in accordance with the operator's approved maintenance programme. At the time of the incident the aeroplane had amassed 3687.3 airframe hours. The last maintenance check was a 200-hour inspection completed on 19 April 2002 at 3659.4 airframe hours. The next check, a 50-hour inspection, was due at 3709.4 hours.

1.4.4 The normal aircraft fuel system consisted of 2 main integral fuel tanks, with one tank situated in each wing. Each tank had a capacity of 201 litres. The left tank normally fed the left engine, and the right tank normally fed the right engine. The fuel system was not designed to allow one engine to feed from both fuel tanks simultaneously, but was designed so one tank could feed both engines, if necessary. The fuel system was not designed to allow a tank-to-tank fuel transfer. (see Figure 1).

1.4.5 ZK-ZSP was fitted with auxiliary outboard fuel tanks situated near each wing tip. These tanks did not normally contain any fuel, and were rarely used. The tanks could only have fuel added to them and be used with the prior authorisation of the operator's maintenance manager. On the day of the incident the pilot was not using the auxiliary tanks, which were empty.

1.4.6 For the normal fuel system, a 3-position fuel selector valve was situated in each wing. Two rotary fuel selector knobs on the cockpit overhead panel allowed pilot selection of the corresponding fuel valves (see Figure 2). The knobs were connected to the fuel valves by control cables. Each fuel selector valve allowed normal on, crossfeed, and off fuel tank selections. For normal operation, the left engine fuel knob was selected to "LH Tank", which selected the left fuel valve to feed the left engine from the left fuel tank. Correspondingly, the right engine fuel knob was normally selected to "RH Tank", which selected the right fuel valve to feed the right engine from the right fuel tank.

1.4.7 The left engine could run off the right fuel tank, by rotating the left engine selector knob to the "Right Tank" position (crossfeed), which positioned the left selector valve accordingly. The right engine could run off the left fuel tank, by rotating the right engine selector knob to the "Left Tank" position (crossfeed), which positioned the right selector valve accordingly. The fuel selector valves had detents to signal the appropriate valve selection. The cockpit selector

knobs did not have corresponding detents and the fuel valve detents were not usually discernable during rotation of the knobs. The system relied on visual checking of the selector knob placard markings for correct fuel tank selection, which was a coarse setting.

1.4.8 According to the maintenance schedule the fuel valves had to be checked for "condition and operation" every 100 flying hours. The worksheets for the most recent maintenance check, the 200-hour inspection, recorded that the valves had been checked. The aircraft manufacturer had issued Service Instruction number 7 detailing how the correct synchronisation between the fuel selector knobs and the fuel selector valves should be checked and established. The instruction said incorrect synchronisation could also be indicated by a fuel flow between the fuel tanks, either on the ground or in the air, and may be because of control cable stretch.

1.4.9 The operator advised that Partenavia aircraft could transfer fuel from one fuel tank to the other when parked overnight on uneven ground, and said ZK-ZSP was known to do this. The operator said the aeroplane was not previously known to transfer fuel between tanks in-flight. Other Partenavia operators also advised the P68 could transfer fuel between tanks when parked overnight on uneven ground. A company pilot who flew ZK-ZSP on 13 May said he had not noticed anything untoward with the aeroplane that day, or noticed any in-flight fuel transfer.

1.4.10 The operator's chief pilot advised he had flown ZK-ZSP on 7 May 2002. He said the aeroplane had been parked most of the day and a fuel imbalance between the fuel tanks had occurred. He said he had used crossfeed during flight later that day to help correct the fuel imbalance.

1.4.11 The pilot advised that the operator had not passed on any information about inadvertent fuel transfer in the aircraft to the pilots.

1.4.12 The day before the incident (14 May) was the first time the pilot had flown ZK-ZSP since 23 April 2002. She could not recall previously experiencing any fuel imbalance. On 14 May she flew the aeroplane from Hamilton to Napier and then to Gisborne, where she refuelled the aeroplane. She said that before leaving Hamilton the aeroplane fuel tanks had balanced fuel quantities, but at Gisborne she noticed that, after dipping the tanks, the left tank contained more fuel than the right tank. At that stage the aeroplane had flown about 1.7 hours, with some time on the ground at Napier, since leaving Hamilton. The pilot later said nothing suggested to her that fuel might have transferred from the right tank to the left. Rather, she considered the right engine used more fuel than the left engine and made a technical log entry, stating the right engine on ZK-ZSP consumed more fuel than the left engine.

1.4.13 The operator advised the Partenavia P68 aircraft could be safely operated at its maximum approved weight of 1990 kg when taking off from sealed runways 600 m in length, or greater. For shorter runways, pilots were required to consult the aircraft performance charts to determine the permitted take-off weight. The aircraft performance charts showed ZK-ZSP could take off at its maximum approved weight from both Napier and Gisborne Aerodromes. The flight manual showed the aircraft was capable of maintaining around 5000 feet with one engine inoperative and secured, at its weight, at the time the engine lost power.

1.5 Aids to navigation

1.5.1 The aircraft had an avionics suite for IFR flight. This included ADF, DME, GPS and VOR (very high frequency omni-directional radio range) equipment.

1.5.2 The aids to navigation at Gisborne and Napier Aerodromes included DME, NDB and VOR.

1.5.3 An NDB positioned on the coast 2.7 nm from Wairoa Aerodrome provided for navigation and instrument approaches to the aerodrome. The Partenavia P68 could descend to 560 feet amsl at the NDB for a straight in approach, or 890 feet amsl for a circling approach, if the visibility was 5 km or greater.

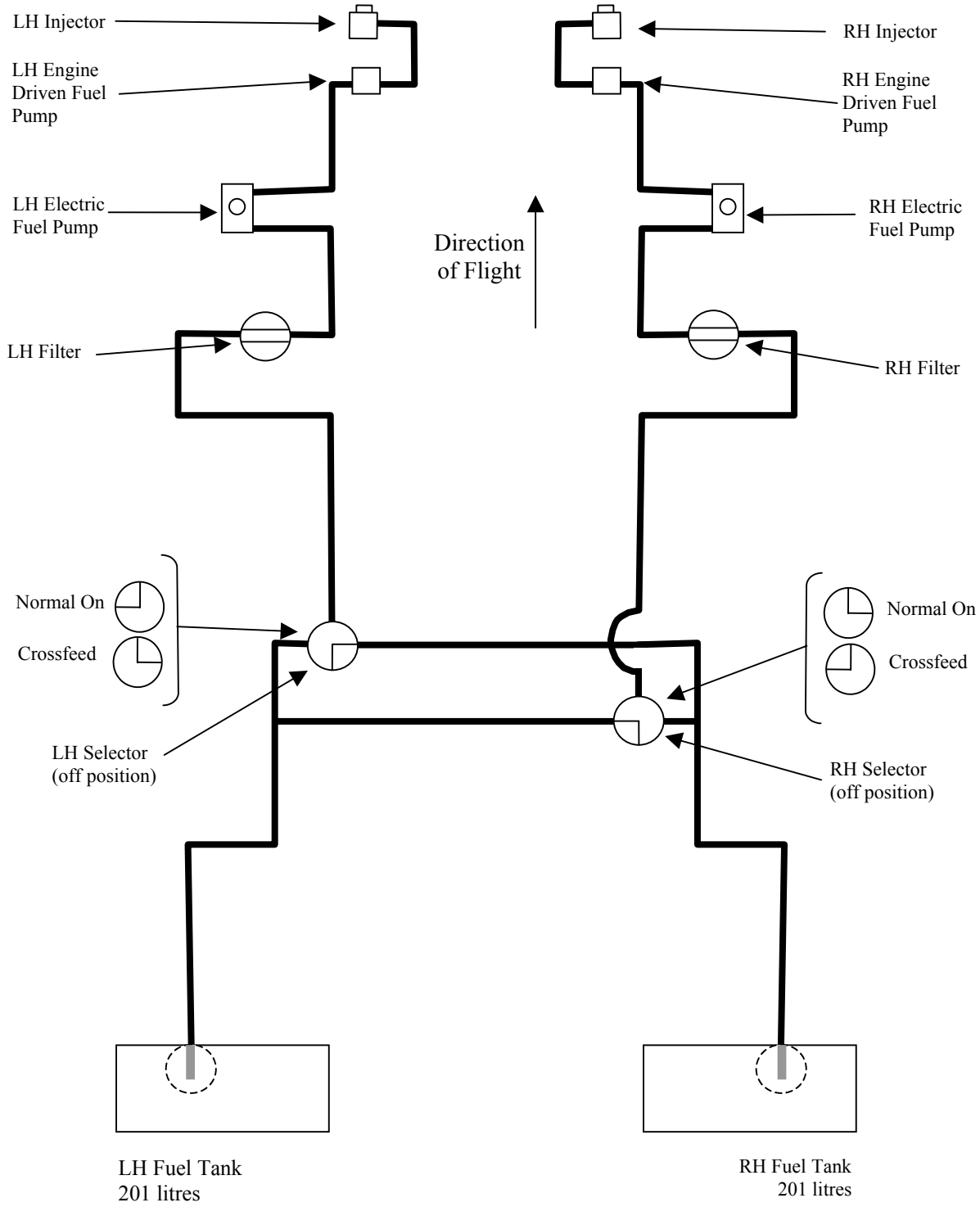

Figure 1
Normal Fuel System Schematic

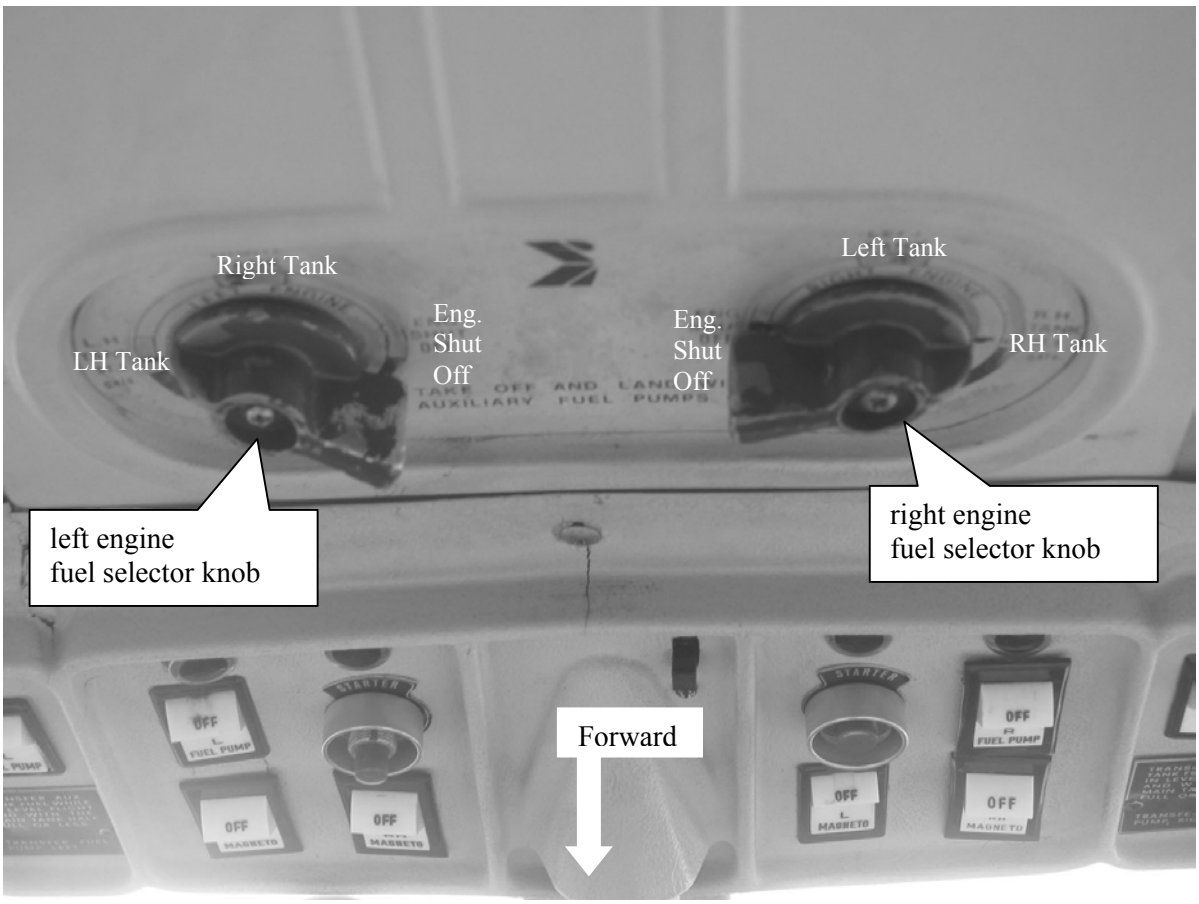

Figure 2
Cockpit Overhead Fuel Selector Knobs (markings enhanced for clarity)

1.5.4 The minimum safe altitude was 2500 feet between Napier and Wairoa, and 4400 feet between Wairoa to Gisborne.

1.6 Communication

1.6.1 The aircraft was equipped with VHF (very high frequency) transceivers for normal air to air and air to ground communication.

1.7 Aerodrome information

1.7.1 Gisborne and Napier Aerodromes each had bitumen main runways 1310 m long.

1.7.2 Wairoa Aerodrome had a bitumen main runway 914 m long. A grass portion extended its length to 1371 m.

1.8 Flight recorders

1.8.1 The aircraft was not equipped with any flight recorders, nor was it required to be.

1.9 Tests and research

1.9.1 On the afternoon of the incident, the Commission examined the aircraft where it had landed on the road. There was no evidence of any aircraft defects and no evidence of any fuel leaks. Both propellers were unfeathered.

1.9.2 The aeroplane cockpit left fuel tank quantity gauge registered just under full. The right fuel tank quantity gauge registered empty. The fuel tank quantities were measured using the aircraft dipstick. The left fuel tank contained 180 litres of fuel, and the right fuel tank was empty.

1.9.3 The right fuel tank was refuelled with 80 litres of fuel. The cockpit fuel quantity gauge readings were then rechecked and the right fuel gauge registered around 40% full.

1.9.4 The right engine fuel selector knob was found pointing to the right tank position. The left engine fuel selector knob was pointing toward the left tank position, but displaced towards the right tank position.

1.9.5 The engines were started and ground run. Both engines ran normally. The ignition system on each engine functioned satisfactorily.

1.9.6 After establishing that the engines and other aircraft systems functioned normally, the operator flew ZK-ZSP to Tauranga. The aeroplane took off from the metalled road and landed at Tauranga Aerodrome uneventfully. The flight took just over one hour, during which time the operator used the aircraft crossfeed, and later said that it and the fuel system operated normally.

1.9.7 The next day, 16 May, at Tauranga, the independent flight examiner loaded the aeroplane to its maximum authorised weight of 1990 kg and climbed it to 2000 feet overhead Tauranga Aerodrome for testing. The ambient temperature was 10^{o} Celsius; about the same ambient temperature ZK-ZSP encountered the previous day during the incident. With the right propeller feathered and the left engine at cruise power setting, the aeroplane maintained its altitude satisfactorily. When the right propeller was allowed to windmill the aeroplane descended at 100 feet per minute. The aeroplane was flown for about 45 minutes and each engine consumed about 30 litres of fuel. No fault was found with the fuel crossfeed system, but the examiner found the fuel control knobs stiff to operate. He thought the fuel quantity gauges were accurate, and said the Partenavia P68 gauges were generally quite accurate.

1.9.8 On 17 May the aeroplane fuel system was checked against the manufacturer's Service Instruction number 7. The check indicated the fuel valves were rigged correctly and synchronised with the cockpit fuel selector knobs. The fuel selector knobs could be moved some degrees past their normal "LH Tank" and "RH Tank" placard positions. Both fuel selector knobs were found to be very stiff and difficult to operate. They could not be rotated readily using only the thumb and forefinger. The selector knobs in another P68 were checked and they could be operated readily with the thumb and forefinger.

1.9.9 On 21 May the left fuel selector valve in ZK-ZSP was independently tested for the Commission. The test results stated the valve appeared to be correctly rigged and synchronised with the cockpit left engine fuel selector knob, in accordance with Service Instruction number 7. The selector knob rotation was found to be stiff because of binding of the selector control cable, but was determined to be still operational.

1.9.10 With the left engine cockpit fuel selector knob pointing to the engine shut-off position mark, no fuel flow occurred. As the selector knob was rotated counter-clockwise, toward the right tank position, fuel flow from both the right tank and left tank occurred, until the knob reached 15^{o} past the right tank position mark. At that point fuel only flowed from the right tank. With continued rotation of the selector knob toward the left tank position, the fuel flow from both fuel tanks resumed. The fuel flow from both fuel tanks continued until the selector knob reached the limit of its travel, 17^{o} past the left tank position mark. At that point, fuel flowed from the left tank only. Fuel flow from both fuel tanks would occur with as little as 4^{o} of loss of synchronisation between the selector knob indications and the fuel selector valve.

1.9.11 Both fuel tank quantity indicators were checked and found serviceable.

1.10 Organisational and management information

The operator

1.10.1 The operator used an independent flight-testing organisation for 6-monthly pilot assessments and other pilot checks.

1.10.2 The operator's Managing Director and the Chief Pilot advised there was no policy against crossfeeding fuel during flight. The Operations Manual did not contain any such information, but did refer to auxiliary fuel tank use. The Quick Reference Handbook carried in ZK-ZSP contained procedures for fuel crossfeeding.

1.10.3 The Managing Director and the Chief Pilot advised they held no concerns about the pilot's training. They believed, given her background and experience, her previous experience flying for the operator, and her recent assessments by the independent flight examiner, that she was adequately trained and competent for her flying role.

The safety authority

1.10.4 The pilot licensing requirements were set by the Civil Aviation Authority (CAA) and were contained in the Civil Aviation Rules and Advisory Circulars. An independent organisation carried out the personnel examination functions, by delegation from the CAA. The delegation specified how the organisation should carry out the regulatory functions.

1.10.5 All pilot licence and rating written subject examinations had a 70% pass mark and were valid for life, except Air Law, which was valid for 5 years. A fee applied for sitting each examination.

1.10.6 Candidates could re-sit each written subject an unlimited number of times in order to pass it. There were no criteria in place that took into account candidates having multiple examination attempts, such as, for example, altering the standard after each failed attempt.

1.10.7 To help address the issue of candidates having repeated examination attempts and failures, in November 1997 CAA required the independent organisation to apply an examination "cooling off" period. Candidates who failed a written subject 3 times within 3 months, could not re-sit that subject again until 3 months after their last attempt. The organisation subsequently renamed the "cooling off" period "retraining", but there was no requirement for candidates to undertake any retraining.

1.10.8 The independent organisation sent knowledge deficiency reports to candidates after each written examination attempt. The system for generating the reports was automated in 1996. Candidate knowledge deficiency reports were available to flight examiners for scrutiny prior to a flight test, but there was no requirement for candidates to have demonstrated competency in the deficient areas prior to the flight test.

1.10.9 CAA advised it was examining the Civil Aviation Rules requirements regarding personnel licensing written subject examinations, with a view to making some amendments. The proposed amendments could require candidates to have demonstrated competency in their reported areas of knowledge deficiency, prior to taking a flight test. Any rule amendments could also re-introduce a finite life for each written examination credit.

1.11 Additional information

1.11.1 The United Kingdom (UK) Air Accident Investigation Bureau (AAIB) issued Bulletin number 5/2002 in May 2002. The bulletin reported on a Partenavia P68TC accident that occurred in the UK on 3 June 2001. The bulletin identified an in-flight tank-to-tank fuel transfer had occurred, which had contributed to the accident. AAIB testing showed that with either fuel valve incorrectly positioned, tank-to-tank fuel transfer could occur during flight or on the ground.

1.11.2 The AAIB Bulletin included the following statement:

> On 1 March 2002 Vulcanair [the aircraft manufacturer] informed the AAIB of the forthcoming issue of a Service Bulletin. The Bulletin would advise all P68 owners and operators of the possibility of inadvertent fuel transfer from one tank to another and consequential engine problems, due to a lack of correct synchronisation between the fuel selector knob in the cockpit and the fuel selector valve in the wing. It would also include further details of how to perform checks on the rigging of the fuel control system to obtain perfect synchronisation between the fuel selector knob in the cockpit and the fuel selector valve.

1.11.3 On 23 May 2002 the Commission advised the aircraft manufacturer of the incident involving ZK-ZSP and enquired about the pending Service Bulletin. On 25 July 2002 the manufacturer issued Service Bulletin 113, which addressed specific reports of malfunction or improper fuel selector valve control system rigging, and updated the maintenance procedures of the fuel selector control system, to ensure its correct operation.

2 Analysis

2.1 This incident occurred because a chain of avoidable events linked together. The events ranged from the aircraft fuel system itself, to the management of the fuel system, and to the handling of the emergency. Any break in a link could have prevented the incident. Although no one was injured or any property damaged, the outcome could have been significantly worse.

2.2 ZK-ZSP was known to be prone to inadvertent tank-to-tank fuel transfer when parked for a period of time, though the pilot said she unaware of the problem. According to the manufacturer's maintenance instructions, this indicated there might have been incorrect synchronisation between the fuel valves and the cockpit fuel selector knobs. Although the aircraft records showed the fuel valves had been checked at the last servicing, the operator could have had the system checked further, because of the fuel transfer, and potentially could have corrected the problem.

2.3 The tests after the incident showed that even though the fuel selector knobs and fuel valves synchronisation was rigged in accordance with the manufacturer's instructions, this did not guarantee the ideal synchronisation necessary to prevent inadvertent tank-to-tank fuel transfer. The tests showed that as little as 4^{o} loss of synchronisation could allow a fuel transfer. Any intermediate fuel selector valve position allowed significant fuel transfer. The normal fuel selector knob placard markings were out of synchronisation with the fuel valves by up to 17^{o}. The placard markings were a coarse visual setting that when the selector knobs were rotated to the various markings, did not necessarily provide the ideal synchronisation between the fuel knobs and selector valves. Thus, with the fuel selector knobs in the normal placard-indicated on position (LH Tank and RH tank), some inter tank fuel transfer could occur.

2.4 Although the fuel valves had detents signalling each selection, the fuel selector knobs did not have corresponding detents. Pilots could not normally feel the valve detents when rotating the fuel selector knobs, but relied on visually checking the selection on the fuel placard. This was a coarse visual selection, but one that relied on ideal system rigging. Over time, normal control cable wear and stretch would allow some mis-rigging to occur.

2.5 Pilots did not normally move the fuel selector knobs, and the pilot said she had visually checked the knobs were selected to the normal on positions, without moving them. The knobs were difficult to operate because of control cable binding, and the pilot was unable to rotate the left engine selector knob with only her right hand. When the knob stiffness developed is unclear, but it may have gone unnoticed, or been ignored, for some time. The knobs should have been free to operate with only the thumb and forefinger, enabling pilots to readily rotate the fuel selector knobs.

2.6 If the pilot could have readily rotated the fuel selector knobs with her right hand only, she could have maintained control of the aeroplane with her left hand while endeavouring to correctly select the proper fuel crossfeed position. The fuel selector knob stiffness was a contributing factor to the incident, in that it hindered the pilot's ability to restore power to the right engine during the emergency situation, when the pilot was struggling to maintain control.

2.7 The day before the incident, the pilot had concerns that the right engine had consumed more fuel than the left engine. Subsequent tests though, showed both engines consumed fuel at a similar rate. The fuel system was designed to not allow one engine to feed from both fuel tanks at the same time. The in-flight fuel imbalance had resulted from a fuel transfer from the right tank to the left tank. Prior to the pilot's flight that day, someone had probably moved the left engine fuel selector knob away from its usual position. Even though the knob probably pointed to about the normal "LH Tank" placard position, it was probably out of synchronisation with the selector valve by 17° or more, thus allowing a significant transfer of fuel from the right tank to the left tank. The selector knob remained untouched by the pilot, in that position, until the right engine lost power.

2.8 The issue of inadvertent tank-to-tank fuel transfer was raised by the AAIB after its investigation into a Partenavia P68 accident on 3 June 2001. Following correspondence with the AAIB and the aircraft manufacturer, the Commission made a recommendation to the CAA to address the problem of inadvertent tank-to-tank fuel transfer, and the issue of fuel selector knob stiffness.

2.9 At Gisborne the day before the incident, the pilot had an opportunity to have analysed the fuel imbalance after the flight from Hamilton and Napier, and could have determined it was caused by a tank-to-tank fuel transfer. She reported the aeroplane had 160 litres of fuel in the left tank and 150 litres in the right tank after it was refuelled at Gisborne. After a 0.7-hour flight, and being parked overnight at Napier, the left fuel tank gained about 10 litres of fuel and the right tank had used about 65 litres. With the normal fuel consumption rate and no fuel transfer, the left fuel tank should have contained about 132 litres and the right tank about 122 litres. Therefore, the left tank had about 38 litres of fuel added to it over that period by transfer from the right tank. The increase in fuel in the left tank should have clearly indicated to the pilot a tank-to-tank fuel transfer.

2.10 On the morning of the incident the pilot could have added about 32 litres of fuel to the right tank at Napier, bringing the aeroplane up to its maximum permitted weight. This would have reduced the imbalance to about 53 litres, and could have enabled the aeroplane to reach Napier Aerodrome. The pilot could also have drained some fuel out of the left tank. The pilot said she believed aeroplane weight restrictions for take-off from Napier prevented her from adding any more fuel. The aeroplane, however, was only about 23 kg under its maximum weight when it took off, and there was no restriction on the aeroplane taking off from Napier Aerodrome at its maximum permitted weight.

2.11 The pilot took off from Napier with a fuel imbalance of about 85 litres between the fuel tanks. Pilots would not usually take-off in a light twin-engine aeroplane with such an imbalance. During the flight to Gisborne, fuel continued to transfer from the right fuel tank to the left, increasing the imbalance. With the left wing being much heavier than the right, the aeroplane left wing was probably lower than the right and the aeroplane out of balance, which would have exacerbated the fuel transfer.

2.12 Throughout the flight to Gisborne the pilot mostly used the automatic pilot, and consequently may not have been aware of the left wing becoming steadily heavier, and of the automatic pilot using excessive aileron control to keep the wings level. The fuel quantity gauges though, were prominent analogue gauges, which subsequent tests showed to be accurate. The pilot was aware of the gauge readings, but dismissed the information because she believed fuel gauges were unreliable. Given the initial aeroplane fuel imbalance and heavy left wing, it would have been prudent to have taken heed of the gauges.

2.13 At Gisborne the pilot had the opportunity to have accurately determined the aeroplane fuel quantity, and to have added additional fuel to meet the necessary requirements. She elected instead to rely on estimating the fuel quantity, rather than on determining the exact amount of fuel by dipping the fuel tanks. Given the pilot's concern that the right engine used excessive fuel, her distrust of aircraft fuel quantity gauges, and knowing there was a significant fuel imbalance before departure, her action at Gisborne was unaccountable. If necessary, she could have added up to around 187 litres of fuel to the aeroplane, and taken off at the maximum permitted aircraft weight. Had she dipped the fuel tanks, she could have discovered the right tank contained probably as little as 21 litres of fuel, being insufficient for the flight to Napier, and that the left tank probably contained up to 183 litres[3]. A simple calculation would have shown that during the previous hour, a significant amount of fuel had transferred from the right tank to the left tank.

2.14 After take-off from Gisborne, it is not surprising the pilot had difficulty keeping the wings level with such a large fuel imbalance. The pilot's radio call and discussion with another company pilot showed she was concerned about the problem, and that she believed a fuel imbalance was the cause of the heavy wing, and not because of another problem. Given her concern, and the difficulty she had in keeping the wings level, it would have been prudent for her to have returned to Gisborne and determined the exact reason for the excessively heavy left wing.

2.15 Up to the point when the right engine lost power, the pilot had the opportunity to crossfeed fuel from the left fuel tank to the right engine. She said she elected not to crossfeed because, during the departure and the initial climb at least, she was operating the aeroplane during a busy phase of flight. She also believed there was sufficient fuel in the right tank, and she thought the operator did not allow crossfeeding. Had she chosen to crossfeed, ample fuel was available to complete the flight. Even though the fuel selector knobs were stiff to operate, the pilot should have been able to turn the right engine selector knob, before she was subjected to the stress of coping with an emergency. A good time for the pilot to have attempted crossfeeding was after the aircraft was established in the climb or at the top of its climb.

2.16 The pilot may have misinterpreted the operator's written instructions regarding the use of auxiliary fuel, as applying to crossfeed use. However, the operator's instructions clearly referred to auxiliary fuel use only, and the flight examiner had discussed crossfeeding with the pilot during the recent check. After the power loss the pilot did attempt to crossfeed, albeit too late, and in the reverse of that required.

2.17 Up to the point the right engine lost power from fuel starvation, the pilot had received many cues about the developing situation, but did not act on them. This suggested the pilot lacked basic aircraft knowledge and understanding.

2.18 After the right engine lost power, with the aeroplane difficult to control, and with agitated passengers, the pilot was understandably subjected to increased stress. This could account for her error of selecting the left engine to the empty right fuel tank, despite the clear markings on the fuel selector knob placard. Once the left engine began to falter she realised her error and rectified it. Because of the stiffness of the left fuel selector knob, and the difficulty she had in controlling the aeroplane, she elected not to attempt any further crossfeeding. To select the right engine to the left fuel tank the pilot should have rotated the right fuel selector knob to the "Left Tank" position.

2.19 The pilot said she did not feather the right propeller, because she hoped the engine would either regain power or she could restore power to it. However, the pilot was aware the power loss had occurred because of fuel starvation, so unless fuel was supplied to the engine it could not regain power. With a windmilling propeller, the aeroplane was unable to maintain altitude because of the increased drag, and it steadily descended. If the pilot had followed standard engine failure procedures and feathered the right propeller, the aeroplane should have been able to descend safely to its cleared altitude of 3000 feet, maintained that altitude and continued to Napier.

[3] Estimated by working back from the end point, plus averaging and interpolation from the end and start points.

2.20 The pilot turned the aeroplane towards the Wairoa NDB and descended in cloud towards the coastline and rising terrain. This was in order to establish her position, and probably in the knowledge the aeroplane had been clear of cloud when it passed over Wairoa. However, the pilot had no knowledge of the existing cloud base at the NDB, or whether the aeroplane would descend out of cloud before it reached the NDB. Fortunately, the aeroplane broke out of the cloud at about 1500 feet, as it crossed the coast, and just before it reached the NDB. This was 1000 feet below the minimum safe altitude on the Wairoa to Napier track, and 500 feet lower than the minimum holding altitude at the NDB, and the instrument approach commencement altitude. If the aeroplane had still been in cloud at the NDB, the pilot would have had no option but to have orbited at the NDB and descended until the aeroplane broke clear of cloud, or to have attempted the approach. With the stress of the emergency, the pilot appeared to have not thought through the implications of still being in cloud after reaching the NDB in a descending aircraft, in proximity to rising terrain. Potentially, the aeroplane could have collided with the terrain near the NDB.

2.21 The pilot said she turned the aeroplane left toward the coastline after clearing the cloud, to establish her exact position. However, she knew the NDB was directly ahead, and about 3 nm from Wairoa Aerodrome. After crossing the NDB visually, she could have safely continued descending the aeroplane to 560 feet for a straight in approach to Wairoa Aerodrome, or 890 feet for a circling approach. The pilot said the aeroplane was capable of maintaining about 1500 feet, with the propeller windmilling, so tracking directly to the aerodrome from the NDB was a practicable option that would have taken less than 2 minutes. The pilot said she was concerned about drizzle, some patchy cloud and reduced visibility between her and the aerodrome, which she reported as being about 3 km to 5 km. This, though, should not have prevented the aeroplane from safely reaching the aerodrome. Given the stress of the situation, the pilot may have developed a mindset of wanting to land the aeroplane as soon as possible after gaining visual reference.

Human performance

2.22 The use of the term “mistake” in this section is intended in its human performance context to help analyse why certain events occurred. A mistake, which can be knowledge-based, is a type of error. An error can be defined as those occasions when a planned sequence of mental or physical activities does not achieve its intended outcome, which cannot be attributed to some chance event.

2.23 The pilot made a number of mistakes that contributed to this incident. These mistakes ranged from unawareness and improper fuel management, which led to the incident, to the mishandling of the emergency situation after the power loss.

2.24 These mistakes could suggest the pilot was inadequately trained for multi-engine aeroplane operations, that her overall aircraft and operational knowledge was deficient, or that she normally operated near her peak cognitive capacity.

2.25 A number of the mistakes probably occurred because of the stress of the emergency situation. With the additional cognitive arousal because of the emergency, the pilot’s performance level sharply degraded to the point where she was only able to cope with maintaining control of the aeroplane. If the pilot was operating near the peak of her cognitive capacity by flying on instruments in IMC, or by just flying the aeroplane normally, she was probably unable to think and plan constructively, or even apply what she had been taught, after the emergency occurred. This load, or task, shedding, is a normal response in an emergency situation. The degree of load shedding can vary between individuals, and can vary according to the emergency.

2.26 A number of the mistakes occurred, however, when the pilot was not under undue stress, suggesting a lack of knowledge or training. If a lackadaisical attitude existed it would have exacerbated the problem. Practically, the pilot had passed the required flight and instrument checks on various multi-engined aeroplanes, with various flight instructors and examiners, over

several years. Her most recent check was with the independent flight examiner 2 months before the incident, which she had passed. She had also flown a reasonable number of hours in various multi-engined aeroplanes to consolidate her learning, and was familiar with the operation. This would, therefore, indicate that practically, she was adequately trained and checked for the task, and that she had met the minimum standards required.

2.27 The pilot had considerable difficulty passing the required written examinations, from the Private Pilot Licence level, and instrument rating, to the Airline Transport Pilot Licence level. On a number of occasions she had multiple attempts to pass certain subjects. Of the examinations passed, a number were passed at about the minimum level. This demonstrated the difficulty she had with recalling and processing information, which could account for the knowledge based mistakes she made. Under stressful situations, such as emergencies, the pilot's ability to recall and process information would be further diminished, which could have led to her less than optimal performance.

2.28 The warning signals about the pilot's inability to adequately recall and process information were evident early in her flying career, when she repeatedly demonstrated difficulty in passing written examinations. The warning signals should also have raised questions about her suitability for becoming a pilot. There was no system in place, however, that prevented candidates from re-sitting examinations over and over again to eventually pass them, and there were no criteria that adjusted the benchmark after each failed attempt.

2.29 By being able to repeatedly re-sit examinations in order to pass them, the purpose for examinations can be subverted, and it can alter the basis upon which the assessment is being conducted. A candidate can simply get better at passing an examination by repeating it, which is known as the "practice effect". A candidate could ultimately pass a written examination after multiple attempts, without a good knowledge of the subject, and having frustrated the examination process. One objective of the examination process should be to screen out unsuitable candidates.

2.30 In 1997 the CAA had introduced a "cooling off" system to be applied to candidates, which limited the number of examination attempts a candidate could have within a 3-month period. This, though, did not address the broader issue of a person's ultimate suitability to hold a pilot's licence or rating. Even though the "cooling off" period was renamed "retraining", there was no provision for candidates to receive further training before being eligible to re-sit examinations.

2.31 Apart from one examination topic, which was valid for 5 years, examination credits were normally valid for life. CAA was examining the issue of whether a life should be applied to examination credits, and whether a candidate should have to obtain the necessary credits within a specific time period. If introduced, this initiative could go some way to addressing the problem of candidates with a poor ability to process and recall information, of eventually passing examinations by the "practice effect".

2.32 Although knowledge deficiency reports were sent to candidates after written examinations, there was no requirement for candidates to have demonstrated knowledge in the deficient areas before being issued a licence or rating. CAA was also examining this issue. If candidates had to demonstrate a suitable knowledge in their deficient areas, this could augment any advantages of having a life on examination credits.

2.33 CAA should also examine the policy and procedures for written examination construction, and the criteria that are applied to multiple examination re-sits. Any examination should be conducted with a view to making some adjustments to these areas, in recognition of the "practice effect".

2.34 Operators could also take initiative by asking pilot applicants to show on their resumes, or during an interview, their written examination record. This would give operators the ability to discuss any potential areas of weakness, and they could more effectively determine a pilot's suitability for a particular operation.

3 Findings

Findings and safety recommendations are in order of development and not in order of priority.

3.1 The aircraft records showed ZK-ZSP had been maintained in accordance with its approved maintenance schedule.

3.2 The aeroplane was suitable and approved for the operation.

3.3 The aeroplane lost power in its right engine because of fuel starvation, following inadvertent fuel transfer from the right fuel tank to the left tank.

3.4 The fuel in the left fuel tank was not made available to the right engine.

3.5 The aeroplane could not maintain its height (above about 1500 feet) with a windmilling right propeller.

3.6 Had the propeller been feathered, the aeroplane was capable of safe cruise flight with one engine inoperative, at its weight and the altitudes flown on the day of the incident.

3.7 The transfer of fuel from the right fuel tank to the left tank was caused by a loss of synchronisation between the left fuel selector valve and the left engine fuel selector knob placard.

3.8 The current manufacturer's maintenance instructions did not ensure ideal fuel selector system rigging, to achieve the necessary synchronisation between the fuel valves and the cockpit fuel selector knob placards.

3.9 An inadvertent tank-to-tank fuel transfer could occur with either fuel selector valve in an intermediate position.

3.10 The stiffness of the cockpit fuel selector knobs prevented the pilot from readily rotating either knob to an alternate fuel setting, and hindered her ability to restore power to the right engine.

3.11 The operator, aware that the aeroplane had a fuel transfer problem after being parked for some time, could have had the fuel system rigging rechecked. This action could have revealed the loss of synchronisation and selector knobs stiffness, and the problems could potentially have been corrected before the incident.

3.12 The pilot was fit, correctly licensed and rated for the flight.

3.13 The pilot's mismanagement of the aircraft fuel system led to the power loss.

3.14 The pilot made a series of mistakes, which could be explained by an overall lack of knowledge, and an inability to recall, process and apply information adequately.

3.15 The stress of the emergency probably triggered a rapid drop in the pilot's performance level, which hindered her ability to correctly manage the emergency after the power loss.

3.16 The current aircrew licensing examination system was not robust enough to disqualify candidates who demonstrated an ongoing unsuitability to hold a pilot's licence, by their inability to cognitively recall and process information.

4 Safety Recommendations

4.1 On 27 May 2002 the Commission recommended to the Director of Civil Aviation that he:

4.1.1 immediately advise all New Zealand Partenavia P68 operators about the potential for inadvertent tank-to-tank fuel transfer, and to ensure ease of movement of the cockpit fuel selector knobs. On receipt of the pending Vulcanair P68 service bulletin, require operators to implement the actions recommended, to obtain the necessary synchronisation between the cockpit fuel selector knobs and wing fuel selector valves. (033/02)

4.2 On 6 June 2002, the Director of Civil Aviation responded, in part:

> The CAA is assessing the aircraft manufacturer's Service Instruction Number 7, which describes the maintenance procedure to ensure correct valve rigging. The CAA intends to mandate compliance with this service instruction by the issue of an airworthiness directive, effective 27 June 2002. This airworthiness directive will also require operators to ensure ease of movement of the cockpit fuel selectors, and caution operators about the potential for inadvertent tank-to-tank fuel transfer.
>
> On receipt of the pending Vulcanair P68 Service Bulletin, the CAA will assess this for airworthiness directive action.

4.3 On 27 June 2002 the CAA issued Airworthiness Directive DCA/P68/40, and on 29 August 2002 it issued Airworthiness Directive DCA/P68/40A, addressing the above matters.

4.4 On 20 November 2002 the Commission recommended to the Director of Civil Aviation that he:

4.4.1 enhance the policy and procedures for aircrew licensing written examinations, their purpose and construction, and the criteria that is applied to examination re-sits, so the "practice effect" does not undermine the examination process. (051/02)

4.5 On 31 October 2002 the Director of Civil Aviation had responded to the preliminary safety recommendation accepting it. The recommendation remained unchanged and became final. The Director's response to the preliminary recommendation has been accepted as the final response and states, in part:

> The Director will accept the recommendation as worded in that the current review of Rule Part 61 addresses these matters and a Notice of Proposed Rule Making is currently being drafted for public consultation in accordance with the requirements of the Civil Aviation Act.

Approved for publication 27 November 2002

Hon. W P Jeffries
Chief Commissioner

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01-012 Robinson R44 Astro, ZK-HTK, collision with terrain, Urewera National Park, 3 December 2001

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