Accident Investigation Board Norway HSLB

**REPORT**

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SL REP: 64/2003
Date: 17 december 2003

All times given in this report is local time (UTC + 1), unless otherwise stated.

| | |
|---|---|
| Aircraft | |
| -type & reg.: | Piaggio P180 Avanti, I-FXRB |
| -year of manuf.: | 2000 |
| -2 engines: | Pratt & Whitney PT6A-66 |
| Operator: | FOXAIR S.p.A – Bologna, Italy |
| Radio call sign: | FXR 18B |
| Date and time: | December 31 2002, at time 1259 |
| Location: | Runway 19R at Oslo airport Gardermoen (ENGM) |
| Type of occurrence: | Serious incident, the crew lost directional control during the initial part of the take-off. The aircraft went off the RWY |
| Type of flight: | Commercial, non scheduled |
| Weather conditions: | VISIBILITY 2000, WIND CALM, FOG PATCHES, S200<br>B400 T M23/M25 Q1014 TEMPO FREEZING FOG<br>BRAKING ACTION GOOD<br>SPECI ENGM 311201Z 23001KT 4000 BCFG FEW000<br>SCT001 M23/M26 Q1016 TEMPO 0800 FZFG |
| Light conditions: | Daylight |
| Flight conditions: | VMC |
| Flight plan: | IFR |
| No. of persons onboard: | 2 |
| Injuries: | None |
| Aircraft damage: | Left tire of front landing gear flat and the relevant rim was damaged. The rear door of the front landing gear compartment was missing. Indentations and missing paint on the propellers. FOD damage to both engines. Hinges buckled on the front door of the left main gear compartment. |
| Other damage: | None |
| Commander | |
| -sex/age: | Male 44 years old |
| -licence: | Italian ATPL |
| -flying experience: | Total flying time 3 000 hours of which 700 hours are on the P180 |

| | |
|---|---|
| First officer | |
| -sex/age: | Male 29 years old |
| -licence: | Italian CPL |
| -flying experience: | Total flying time 2 350 hours of which 365 hours are on the P180 |
| Information sources: | Report from Oslo Airport Gardermoen (OSL) including Notification Form from the Commander and the company FOXAIR S.p.A "RELAZIONE SULL'INCONVIENTE GRAVE" and AAI/B's own investigation. |

## SUMMARY

During a Take Off (T/O) run at Gardermoen airport, the directional control of the aircraft was lost. The aircraft left the runway and entered snowbanks at the side of runway. The mass and balance of the aircraft were within the range limits. The center of gravity was close to the rear limit. The crew were properly licensed and trained.

The flight was planned to proceed from Oslo airport Gardermoen (ENGM) Norway to Biggin Hill (EGKB) England. The crew taxied the aircraft normally to the refueling bay and switched off the engines. Once the refueling was completed the engines were restarted. During the following taxiing, just as the aircraft was turning on to TWY C3 the "STEER FAIL" light came on. The crew stopped the aircraft and disconnected the steering equipment, then switched it on again in "TAXI" position checking that it was functioning properly before proceeding to TWY A7 (see the Attachment no 1. AD 2 ENGM 2 – 2.).

After receiving clearance from TWR to use RWY 19R the aircraft backtracked to this RWY end. Having reached this position, the crew decided to taxi quickly up to around the speed of 40 kt in order to check whether the aircraft's direction could be controlled on the ground. This test run was comprehended by the TWR controller as an aborted T/O. Once this check had been carried out, the aircraft was backtracked to T/O position at RWY 19R. The aircraft was lined up to await T/O clearance.

Clearance was requested from TWR, which was granted, to move forward to the touchdown area in order to start the T/O run from there, in the belief that the RWY friction conditions were better on this stretch of the RWY. At this point T/O commenced with the power levers being pushed forward to achieve an equal torque reading on both engines of 1 600 lb/ft before releasing the brakes, then bringing the levers into T/O power, generating a torque of 2 100 lb/ft on both engines.

When the speed of 60 kt had been reached, the steering cut out and the direction of the aircraft began to sway about $10^{o}$ right and left in relation to the runway direction without the Commander succeeding in his attempt with maximum rudder deflection to control the aircraft. The Commander set the power levers to "IDLE", then after swaying another 2 or 3 times, the aircraft swung right round to the left in the direction of approximately $45^{o}$ from the RWY direction. When passing the RWY edge the aircraft continued turning until it was almost pointing in the opposite direction to which it was moving. The aircraft left the RWY about halfway between the TWY A7 and A6, skidding to the right. It continued skidding for about 50 m on the side of the runway which was covered by about 1 m of snow until the aircraft came to a stand still in the direction of $020^{o} – 030^{o}$. Once the aircraft had stopped, the crew switched of the engines and left the aircraft.

The duty TWR controller reports:

> "I was responsible for the operations of both runways, TWR east and TWR west because of low traffic load. FXR 18B was parked on the west side (General Aviation) and the aircraft was cleared RWY 19R for T/O. When the aircraft was taxiing to the RWY end to use full RWY length for T/O. The aircraft turned around at the end (A9) where T/O clearance was requested. T/O clearance was given. Approximately in position A7 on the RWY, FXR 18R report that the departure has been abandoned, I ask "are you going to make another attempt", which the crew stated was the intention. The aircraft is taxied to a position a little north of A7. The crew stated a new T/O will be started from this position. FXR 18R received a new T/O clearance, and the T/O was started. When the aircraft passes A7, there is a heading change to the left and the aircraft leaves the RWY. The crash-alarm button was pressed immediately and a full emergency mobilization was activated."

Regarding the RWY state. Information available to the crew was: Braking action Good. For details see Attatchment no. 2 "2002 REPORT FOR THE WEST RUNWAY".

The company has made an investigation of the incident. From this report:

> "STEERING SYSTEM"
>
> After a fault was indicated when taxiing from the refueling bay to the runway, the steering system does not seem to have had any further problems. This is also confirmed by the fact that after the indication of the fault was removed, the aircraft taxied on numerous occasions and changed direction at least twice to line up with the runway 19R without the crew reporting any problems in its operation.
> In addition to this, following the accident, during preparations for the transfer flight to Genoa, various tests involving taxiing at speed were carried out without any signs of defective behavior, or of any behavior at all likely to adversely affect to ability to control the aircraft's direction. Even during the transfer flight, which took place in two stages, there were no problems reported with the steering system.
> This indicates that the system was operation properly during takeoff.
>
> PROBABLE COURSE OF EVENTS
>
> From the items of information gathered it seems that during takeoff, the crew, after exceeding a speed of 60 kts and then cutting out the steering system, decided to abort the manoeuvre due to the lack of ability to control the aircraft's direction. Reducing the power may have triggered a temporary asymmetrical thrust, which gave rise to the swaying motion in different directions. It was not possible to counteract this swaying because:
> 1) the steering system was disengaged.
> 2) the rudder's effectiveness was reduced as the aircraft was decelerating.
>
> This meant that the crew was not able to effectively regain directional control and therefore, the aircraft followed the trajectory leading it off the runway.

DISCUSSION AND PROBABLE CAUSES

1) The runway's grip was presumably adequate to guarantee normal takeoff, as was confirmed by the decision to take off. It is obvious, however, that there was considerable indecision on the pilot's part about carrying out the manoeuvre, which was actually repeated.
2) Aborting the takeoff manoeuvre and then decelerating put the pilot in an unusual situation, as he usually only finds himself in a similar situation during landing, when he is prepared and ready to handle it. In the case in point, the need to slow down caught the pilot by surprise, who then hesitated, unable to decide whether to proceed with or abort takeoff.
3) Proceeding with takeoff would have probably allowed better control over the aircraft's direction, as the increase in speed increases the rudder's effectiveness, which is also confirmed by the evidence from the other three crews that the company employed at the same airport and in the same conditions over the period of those same days.
4) Aborting takeoff, because of the asymmetrical thrust it causes and the loss of the rudder's effectiveness, turned out to be a decision, which only aggravated the inability to control the direction, which the crew tried to correct.
5) The lack of weight on the front (or nose) landing gear almost certainly did not benefit the ability to control the aircraft's direction, especially with the steering equipment disengaged.
6) It is worth noting too the passive reaction of the crew in tackling and counteracting the effect of this incident, highlighted by the recurring theme in the written reports of the contaminated runway, which has not been confirmed by the evidence which has come to light.

CONCLUSIONS

It seems therefore that the cause of the incident can be attributed to the crew's indecision in reacting to the loss of directional control, due to the fact that it was an unusual situation, not handled previously in training.

A better definition of the scenario where takeoff is aborted would definitely have allowed a decision to be taken promptly and therefore, a better handling of deceleration. It would seem, however, that in the standard training provided for the P180 aborting takeoff is presented and tried out only in situations where there are engine problems. It would be appropriate instead to define and demonstrate the cases where it is preferable to proceed with takeoff, reserving the option of aborting takeoff for all others."

## COMMENTS FROM THE ACCIDENT BOARD

The runway report and the actual weather indicates acceptable condition for operation of a Piaggio P180 Avanti aircraft. As the AAIB/N did not perform any investigation on the incident site, the board are accepting the conclusions made by the company investigation.

ENCLOSURES:

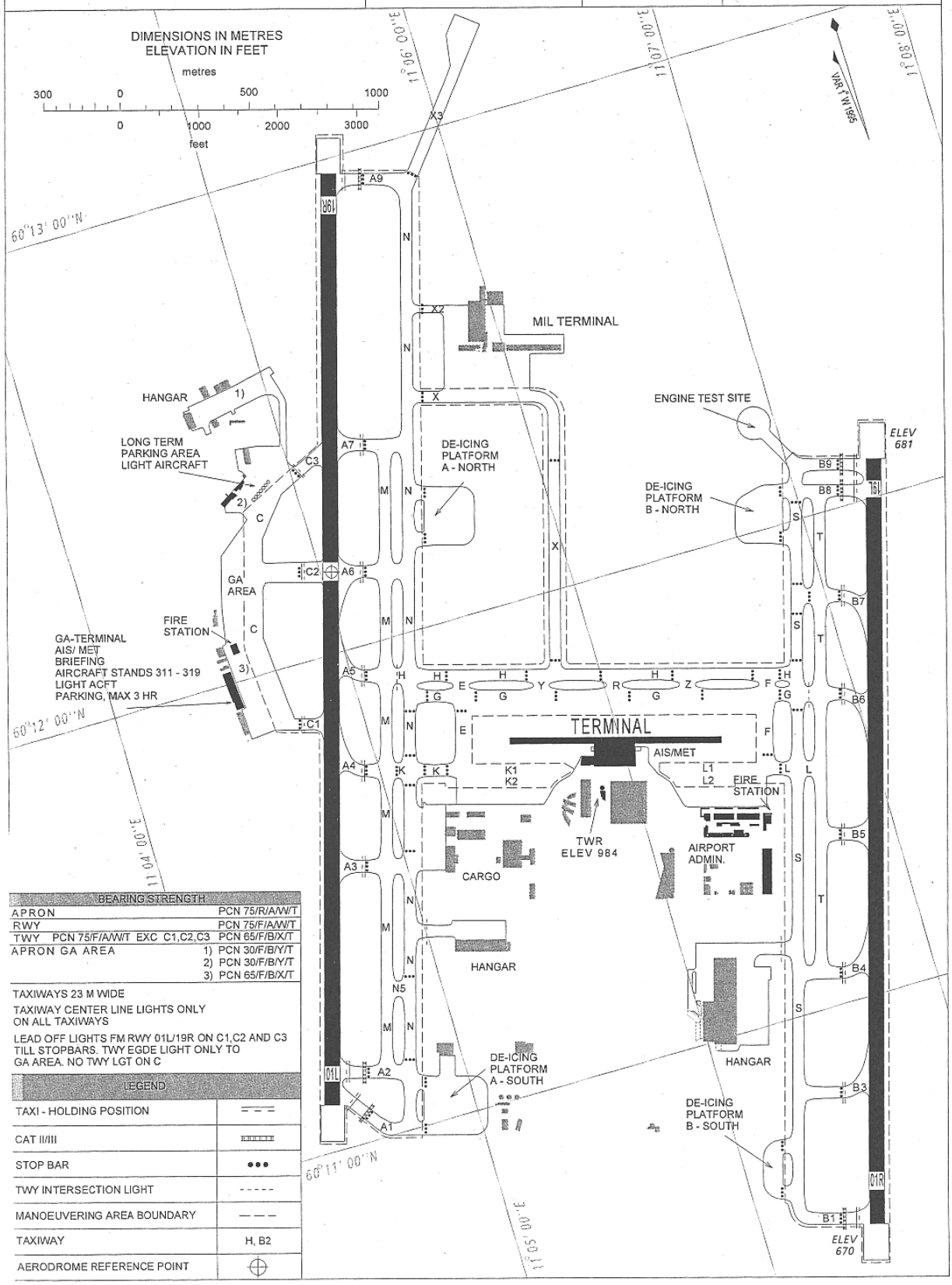
| | | |
|---|---|---|
| ATTACHMENT | No. 1: | AD 2 ENGM 2 – 2 |
| " | No. 2: | 2002 REPORT FOR THE WEST RUNWAY |
| " | No. 3: | I-FXRB in position off the RWY |

# AERODROME GROUND MOVEMENT CHART

APRON ELEV 673 FT

| | |
|---|---|
| TWR ( W ) | 118.300 MHz |
| TWR ( E ) | 120.100 MHz |
| GND ( N ) | 121.925 MHz |
| CLR | 121.600 MHz |

## OSLO GARDERMOEN
NORWAY




| BEARING STRENGTH | |
|---|---|
| APRON | PCN 75/R/A/W/T |
| RWY | PCN 75/F/A/W/T |
| TWY PCN 75/F/A/W/T EXC C1,C2,C3 | PCN 65/F/B/X/T |
| APRON GA AREA | 1) PCN 30/F/B/Y/T |
| | 2) PCN 30/F/B/Y/T |
| | 3) PCN 65/F/B/X/T |

TAXIWAYS 23 M WIDE

TAXIWAY CENTER LINE LIGHTS ONLY ON ALL TAXIWAYS

LEAD OFF LIGHTS FM RWY 01L/19R ON C1,C2 AND C3 TILL STOPBARS. TWY EGDE LIGHT ONLY TO GA AREA. NO TWY LGT ON C

| LEGEND | |
|---|---|
| TAXI - HOLDING POSITION | |
| CAT II/III | |
| STOP BAR | |
| TWY INTERSECTION LIGHT | |
| MANOEUVERING AREA BOUNDARY | |
| TAXIWAY | H, B2 |
| AERODROME REFERENCE POINT | |

CHANGES: DE-ICING AREAS EXPANDED.TAXIWAY M AND T EXTENDED. EDITORIAL.

# 2002 REPORT FOR THE WEST RUNWAY

Completed in triplicate
Submitted to the airport administration and control tower

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| AIRPORT | | | A | ENGM | Measuring device: | | | |
| MONTH/DAY/TIME (UTC) | | | B | December | B | 31 | B | 12:07 |
| RUNWAY (Lowest threshold number) | | | C | 01 | C | | C | |
| CLEARED LENGTH OF RUNWAY (if shorter than normal) | | | D | | D | | D | |
| CLEARED WIDTH OF RUNWAY (if smaller than normal, specify displacement from CL.) | | | E | | | | | |
| RUNWAY CONDITIONS (Specified for each third of the runway starting from the lowest threshold no.)<br><br>Nil-CLEAR AND DRY<br>1 – DAMP<br>2 – WET or water puddles<br>3 – RIME and FROST COVERED (Usually less than 1 mm)<br>4 – DRY SNOW<br>5 – WET SNOW<br>6 – SLUSH<br>7 – ICE<br>8 – COMPACTED OR ROLLED SNOW<br>9 – FROZEN RUTS OR RIDGES | | | F | 3 | F | 9 | F | 3 |
| AVERAGE DEPTH (mm) OF SNOW, ICE, ETC. (Specified for each third of the runway) | | | G | | G | | G | |
| BRAKING EFFECT (Specified for each third of the runway) | | Measured 3-7 m L | H | 42 | | 58 | | 63 |
| MEASURED/ CALCULATED COEFFICIENT | ACCEPTED BRAKING EFFECT | Measured 3-7 m R | | 40 | | 51 | | 65 |
| 0.40 and higher | GOOD 5 | CENTRE LINE | | | | | | |
| 0.36-0.39 | MEDIUM GOOD 4 | | | | | | | |
| 0.30-0.35 | MEDIUM 3 | TOTAL | | 82 | | 107 | | 128 |
| 0.26-0.29 | MEDIUM POOR 2 | | | | | | | |
| 0.25 AND LOWER | POOR 1 | Average – Sum/2 | | 41 | | 53 | | 64,00 |
| | CANNOT BE MEASURED 9 | | | | | | | |
| | | Sum/3 | | | | | | |
| CRITICAL SNOW RIDGES (Specified by height and distance from the side of the runway. L = left, R = right, I.R. = both sides. Unit for height 1 cm. Distance in m.) | | | J | | J | | J | |
| RUNWAY LIGHTS (Covered or missing light is indicated by "YES", with an indication of the side: L, R or LR). | | | K | | K | | K | |
| CLEARED SNOW (Indicate the extent according to length/width (m). If the whole runway has been cleared, write "TOTAL"). | | | L | | L | | L | |
| CLEARING ASSUMED COMPLETED AT (time) (UTC) | | | M | | M | | M | |
| TAXIWAYS (If cannot be used, write "NO". Code symbol or as in point F) | | | N | 4/7 | N | | N | |
| SNOW RIDGES ALONG THE TAXIWAYS (Specify if | | | P | | P | | P | |

ATTACHMENT NO. 3