FLYING THE WRONG SID - WHY DOES IT HAPPEN?

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"On April 29, 2001, an MD-83 was on a flight from Vancouver to Seattle, taking off on runway 08R of Vancouver International Airport. When the clearance delivery controller issued the clearance he incorrectly gave a Standard Instrument Departure (SID) RICHMOND 6. However he wrote down the correct SID, VANCOUVER 2, on both the digital and paper strip. The tower controller, seeing VANCOUVER 2 on his strip, assumed that the Alaska airlines MD-83 would follow that SID. After take-off, the MD-83 turned right to a heading of 140 degrees as called for by the RICHMOND 6 SID. The MD-83 now came into a conflict with a DASH-8 which had taken off ahead, also on a RICHMOND 6 SID. The tower controller noticed the conflict and instructed the MD-83 to turn left. The separation had reduced to 2 nm whereas 3 nm is required." Source: NLR-ATSI Air Safety Database.

A Standard Instrument Departure (SID) is an IFR departure procedure that provides a transition from the runway end to the en-route airway structure. There are many operational advantages in using SIDs, both for the pilot and for the air traffic controller. For the pilot, a relatively complicated route segment may be loaded from a database and flown using the Flight Management System (FMS), whilst being assured of proper clearance from obstacles, ground or other traffic. Air Traffic Control may clear the aircraft for the SID, thereby reducing the need for further instructions during the initial climb phase of the aircraft, greatly reducing the controller/pilot workload and frequency congestion. SIDs are first and foremost designed to comply with obstacle clearance requirements, but are also often optimised to satisfy ATC requirements and may serve as minimum noise routings as well. Small deviations from the assigned SID occur on almost every SID flown. This is quite normal and poses no immediate threat to flight safety. However large deviations from the assigned SID or flying the wrong SID can be hazardous and may lead (and have led!) to:

- Close proximity to terrain or obstacles.
- Close proximity to other aircraft.
- Airspace violations.

There are many different reasons why an aircraft significantly deviates from an assigned SID. A recent study conducted by the NLR-Air Transport Safety Institute showed that there are 38 different causal factors that are associated with significant SID deviations. However this study also clearly showed that by far the most important factor is that the pilots used the wrong SID, accounting for 20% of the analysed occurrences. Flying the wrong SID can be a very hazardous situation, especially when there are multiple take-off operations in place (e.g. parallel departures).

Let us consider SID blunders more closely. Why would a pilot use the wrong SID? Again there is no single causal factor. However, there are some that are more important than others as they occur much more frequently. The NLR-Air Transport Safety Institute safety study showed that similar-sounding SID names are often involved in cases where the pilots used the wrong SID. This should not come as a big surprise when there are other SIDs available with a similar-sounding name. Often the difference is only a single letter or number. For instance ELBA 5B looks very much the same as ELBA 5C and can easily lead to mistakes when selecting either one. When using the FMS NAV mode for flying the SID the pilot selects the SID from the FMS database. Depending on the type of FMS, a list of runways is presented which has to be selected first, after which a list of corresponding SIDs is given. It is also possible that a list of SIDs is listed first which are automatically linked to the corresponding runway. It is often impossible for the pilots to realise that they are flying a wrong SID: in the cockpit all instruments indicate that the aircraft is exactly on

the pre-defined route! Usually ATC notices such errors much earlier than pilots. The following example illustrates the problem clearly:

"Before departure the crew received ATC clearance from Rwy 12, PEPOT 1F SID. It was read back to ATC as IPLOT 1F without any correction from the controller. After departure, ATC monitored the departure well and took corrective action without delay when the controller noticed that the aircraft was flying the wrong SID. The SID should have been PEPOT 1F. Because of the prompt action by ATC no conflict with other traffic happened. IPLOT and PEPOT sound very similar when heard by radio."

This last example also shows another important factor identified in many occurrences related to flying the wrong SID. That is the readback/hearback error in which the pilot reads back the incorrect SID and the controller fails to notice this. This is a classic air-ground communication error. In the above example, the pilots were cleared for the PEPOT 1F SID but read back the IPLOT 1F SID, which was not noticed by the controller.

Another classic error related to flying the wrong SID is crew expectation, as shown in the next example.

"The planned SID for the flight was a DAKE departure, as had been used for years for this runway. After departure ATC informed the crew that they were supposed to fly ELBA SID, as this had been the cleared departure. The crew stated that their minds had been set for a DAKE departure and that they did not change the SID in the FMS."

Clearly the crew expected to fly a particular SID, as they had always done for this runway. When the controller instructs a completely different SID the crew fails to notice and often reads back the correct SID. The controller will only notice that the crew are flying the wrong SID after they have taken off.

Finally, another important factor is illustrated by the following example.

"An ELBO 1A SID for Rwy 25R was inserted into FMC according to the operational flight plan. This was also passed by the clearance delivery. However when the aircraft was taxiing to Rwy 25R the departure runway was changed to 25L with a BEKO 1F SID. The pilot not flying forgot to change the ELBO 1A SID that was originally programmed into the FMS. The aircraft flew the SID of Rwy 25R after takeoff."

Late changes of the SID or departure runway are another important factor related to flying the wrong SID. In the example above, the pilot not only needs to change the runway/SID in the FMS. He also has to make new take-off performance calculations for the new runway. Often the SID is completely forgotten in this process and the FMS uses the originally programmed SID.

As shown in this brief article there are several reasons why pilots use the wrong SID. In many cases the pilots play a crucial role. However, controllers can also be part of the chain of events resulting in the wrong SID being flown.

(NOTE: In some of the examples the names of the SIDS and runways have been changed due to the confidentially of the original data. However, all examples are based on real cases).