Another tool in the kit

by Max Bezzina

In a TMA somewhere in Europe:

Approach: "Tango X-ray Yankee zero five tree, descend to flight level eight zero."
TXY053: "Roger, descending to flight level eight zero, Tango X-ray Yankee zero five tree."

After a while as the controller observes the Mode C of TXY053 passing FL79 and descending:
Approach: "Tango X-ray Yankee zero five tree confirm maintaining flight level eight zero, traffic in the holding stack at your seven o'clock one thousand feet below your cleared flight level."
TXY053: "TCAS RA, Tango X-ray Yankee zero five tree."

Around the same time in another TMA not so far away from the first:

Approach: "Victor Zulu Alpha seven seven six, descend to flight level eight zero."
VZA776: "Roger, descending to flight level eight zero, Victor Zulu Alpha seven seven six."

After a moment, when the VZA was still passing FL100 in the descent, the controller checks the vertical stack list and notices that the aircraft selected flight level, as input by the pilot, is FL 60.
Approach: "Victor Zulu Alpha seven seven six, check selected level.
Cleared level is flight level eight zero."
VZA776: "Eeeh, Roger, stopping descent at flight level eight zero, Victor Zulu Alpha seven seven six.

There are several reasons why a level bust can happen, and some of the other articles in this issue of HindSight either talk directly about these, or recount situations where level busts (nearly) happened and then analyse some of the reasons why they did with the aim of learning for the future.

Likewise, there are several ways for us in the aviation community to prevent level busts from happening and (when they happen anyhow) to help us to recover as quickly as possible and avoid a dangerous situation developing.

It is worth mentioning some of the items in our tool kit for prevention and recovery:

- The proper definition of design and procedures governing the airspace.
- The ATC and aircraft operator's standard operating procedures.
- Radio discipline and appropriate phraseology.
- Training and awareness of the issue.
- Team work, vigilance and situational awareness.

In the VZA case above, we saw yet another tool in the kit that can assist with the prevention - the display at the controller's position of the downlinked selected flight level set on board the aircraft.

This is possible when the air traffic control system in use supports the processing and display of Mode S enhanced surveillance (EHS) and more specifically of the downlink aircraft parameter [DAP] – Selected Flight Level / Altitude (SFL or ALT SEL). Now, I am not an engineer, so I'll stop with the technical description while (I think) I am still on top! However, I decided to try and find out whether the display of Mode S EHS SFL actually helps reduce level busts and I discovered the following:

The European Action Plan for the prevention of level busts, dated July 2004, asks air navigation service providers [ANSPs] to consider the introduction of Mode S Selected Altitude display. I found that only two or possibly three European ANSPs have actually introduced this but that all of them reported a significant (in some cases of the order of 25%) decrease in level busts following the implementation.

Also, I found that in general, the controllers working with systems where Mode S SFL is adequately displayed at their working position are happy with this feature and feel that it is of major benefit to safety.

I then asked IFATCA if they had any concerns about the introduction of an SFL display to controllers and I was told that they had nothing against SFL display but that before implementing such a system an ANSP should study its implications for the system and the controller in a holistic way. Issues considered should include:

- The best way to display the data to controllers.
- Prioritisation between warnings (STCA, TCAS, APW, route deviation, etc. etc.) so as to avoid data overload and any conflict between alerts, warnings and systems

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After finishing training, he spent the first 7 years of his ATC career as ATCO at Maastricht UAC. He then moved into ATC continuation training and was also Eurocontrol's team leader for e-learning.

Max has many interests. Relating to ATC he is particularly interested in the role of the human within the broader ATM system.

- Legal responsibility issues such as what is the status of the information presented (operational, trial or for information only?) and what are the consequences of using, or not using, such information.
- Ensuring that controllers appreciate that the SFL function displays intent-based information and that there may be circumstances when an aircraft will not fly to its selected level such as when it is being flown manually or when an incorrect altimeter sub-scale setting has been used in the cockpit.

There are many reasons why level busts can occur. There are equally many ways in which the ATC and the flying communities can prevent them from happening.

In one specific implementation about which I was informed, all the potential technical and operational issues described above seem to have been addressed. The ANSP in question also sought to clarify that, in terms of legal responsibility, the checking of the SFL display was not mandatory but that it was encouraged as an additional way to prompt early prevention of possible level busts. This ANSP also provided detailed briefings to the controllers on the policy and on the tools which were being introduced. As a result, Enhanced Mode S was well received and has provided significant safety benefits by reducing the incidence of level busts, which had previously been identified as one of their major safety risks.

So, if we have good examples of implementations which contribute to significant reductions in the occurrence of level busts, why is this technology not in more widespread use? Certainly, EHS capability cannot appear on all aircraft straight away and there are bound to be significant costs for an ANSP to install such a system. Within the scope of this article, I chose not to investigate further the reasons behind the lack of implementation. However, what is important to note is that we already have enough operational evidence to show that the properly-implemented display of SFL for controllers can significantly reduce level busts.

In conclusion, there are many reasons why level busts can occur. There are equally many ways in which the ATC and the flying communities can prevent them from happening. Most of these measures are complimentary and the use of one should not exclude the other. Now we have another: the real-time display of aircraft selected flight level to the controller. It is not the panacea for level bust, but could be another significant means of prevention. In my opinion controllers should lobby for its installation in their working environment and ANSPs should endeavour to install it appropriately as quickly as possible. Safety is at stake.

Editorial comment

Max quite rightly recommends that we add this tool to our level bust prevention kit. He also mentions most of the issues that will need to be addressed before it can be successfully introduced.

Max also stresses that the Mode S EHS SFL is a representation only of apparent flight crew **intent** – which of course is why it must not be used as a basis for separation, but as a valuable 'early warning system'. The procedure for use of SFL must be 'fail safe' and must recognise that such downlinked aircraft intent cannot be regarded as 100% accurate.

But we are reminded that the use of SFL data is already proving beneficial in reducing level busts despite the fact that it is not provided by all aircraft. You can benefit from the experience of the pioneers, so what are you waiting for?! ■