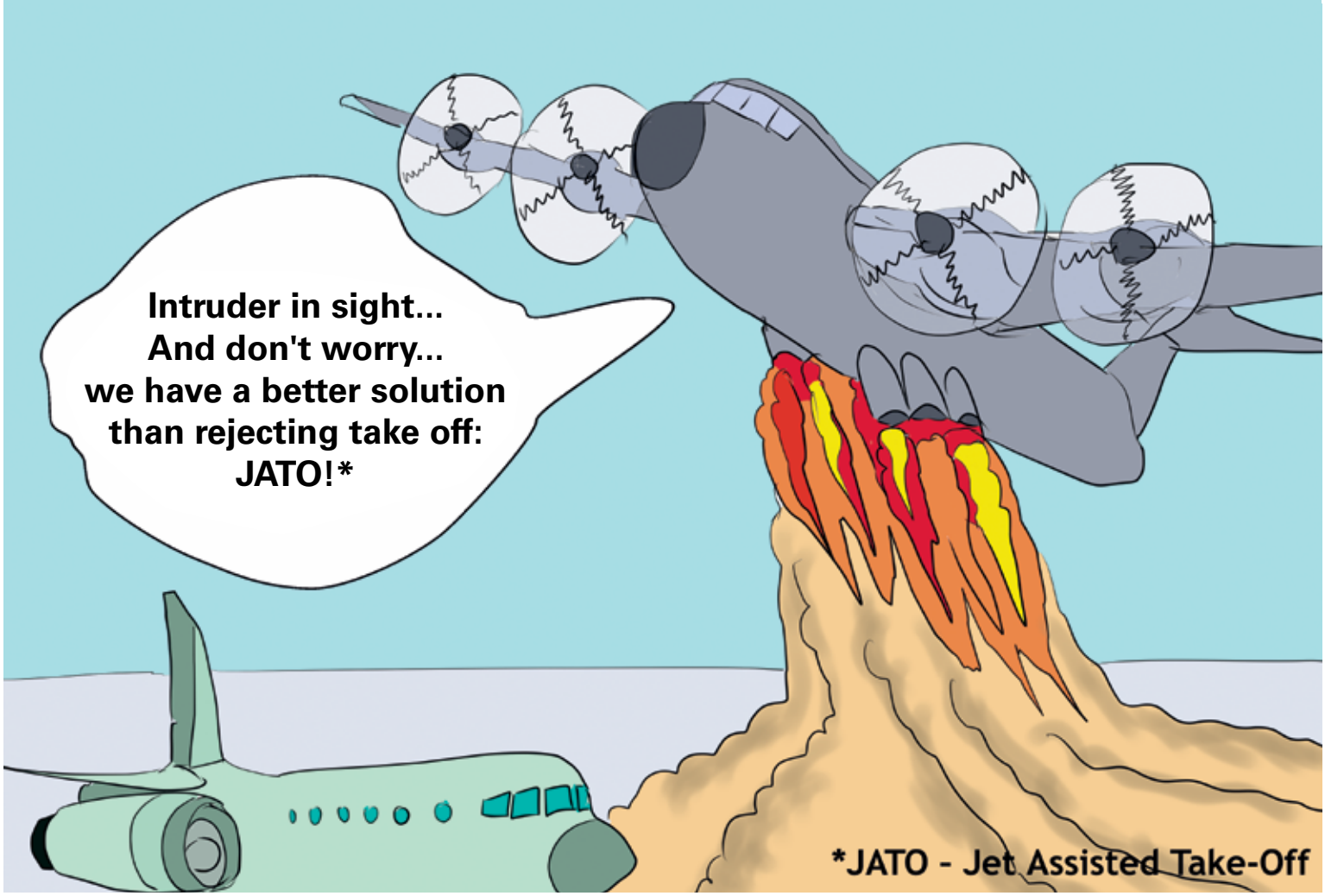
TO KNOW WHAT TO INSTRUCT WHEN!

by Captain Wolfgang Starke

ICAO document 4444 (PANS-ATM) clearly states the phraseology for rejecting a take-off or a landing. But as a controller, do you know when it is a good idea to use it? There is no way a controller can assess the risks of a rejected take-off or a go around from low altitude from outside the aircraft. What is missing in this ICAO document is some clear and unambiguous phraseology for passing essential information to aircraft which are at high speed on an active runway or on short final. Of course some appropriate training would be an essential prerequisite for the use of such new phraseology.



When ICAO developed a manual on Ground Based Safety Nets, both IFALPA (International Federation of Airline Pilots' Associations) and IFATCA (International Federation of Air Traffic Controllers' Associations) asked how an Air Traffic Controller (ATCO) is expected to react upon receiving a warning of from such systems. How can an ATCO safely, unambiguously and quickly pass essential information to pilots in a situation that is developing extremely quickly?

In ICAO's Document 4444, the PANS-ATM, there is phraseology on how to instruct an aircraft to reject take-off or landing. This phraseology is either "callsign, STOP IMMEDIATELY or "callsign, GO AROUND". Of course, the final decision on whether to reject a take-off or to initiate a go around lies with the pilot in command of that aircraft. He is expected to evaluate the situation and determine the safest course of action.

But how can a pilot in command evaluate a situation when he cannot necessarily know the reason for such an instruction or know whether a safety net alert is the reason behind the ATC instruction?

Imagine a wide body aircraft accelerating for take-off to begin a long-haul flight. Aircraft weight is high, kinetic energy as result of speed and mass is tremendous. Now the pilots are instructed to reject take-off a couple of knots below take-off decision speed (V1). A rejected take-off in that situation is a high-risk manoeuvre! As long as the aircraft is flyable, in most situations it is safer to continue the take-off.

Shifting into the head of that particular pilot in command, he will need to make a quick decision. He may use a very abbreviated version of the FORDEC-technique. This is an acronym which leads him through the decision-making process. The acronym is decoded as Facts, Options, Risks / Benefits, Decision, Execution and Check.

Now let us follow this sequence:

FACTS:
Speed and Energy are high, ATC-instruction to reject the take-off is received when slightly below V1.

OPTIONS:
Follow the instruction or continue take-off.

RISKS:
The risks involved in a high speed rejected take-off are well known, but risk of a continued take-off is completely unknown (as we do not know why that instruction has been given).

How do we make the right decision now?

A situation exactly like this happened to a crew of a Boeing 767 performing their take-off for a transatlantic flight in May 2015. They got their take off clearance, set the thrust and began to accelerate. During the take off roll, a heavy jet approaching on the parallel runway pulled up for a go around. As the departure track and the missed approach track did not diverge, the ATCO almost immediately instructed the 767 to reject the take-off. The crew followed the instruction four seconds later. Highest speed recorded from the flight data recorder was however 165 knots, which was 14 knots above take-off decision speed.

The incident did not result in a runway excursion or any injuries, luckily the runway was long enough to allow a safe stop even from above V1. However, the aircraft brakes and tyres needed some attention and the flight got cancelled that day. Still, it was a safe outcome for that situation – but a shorter runway could have been more dramatic.

As the weather was pretty good with excellent visibility and no cloud below 5000 feet, continuing the take-off and then doing one's own visual separation between the two aircraft would still have been likely the safer option.

The purpose of the story is not to be critical of the ATCO or the pilot but rather to illustrate how a situation can develop even though everyone is following procedures and no one is making a mistake. The problem just lies in the fact that the ATCO cannot judge the safest course of action from outside the aircraft and the pilot does not know what has happened to cause the controller to issue such an instruction. Both sides are missing essential information for appropriate decision making. In this particular case the design of approach and departure procedures has obviously been inappropriate but that is not a matter for this article.

While a high speed rejected take-off is accepted as a relatively high risk manoeuvre, a go around is usually seen as the safer option compared to a risky landing.

Still, we see numerous accidents resulting from 'simple' go-arounds like the recent crash of Flydubai 981 or the crash of Afriqiyah Flight 771. Both of these crashes had a number of contributing factors leading to the disastrous end. However, as an ATCO, can you check the contributing factors prior instructing the crew to go around? How can you know or judge the risk of a go around when instructing a crew to make one?

Let's now imagine an aircraft attempting to land on a long runway. With the aircraft on short final, the ATCO sees a runway incursion by a car about 2500 metres down the runway. If you instruct the crew to go around, the risk of an inappropriate and possibly fatal go around is present. Or the crew is sent on a go around with possibly very little fuel remaining putting the pilots into a stressful situation and increasing the chance of follow-up mistakes or a rushed approach.

An alternative could be to pass information to the crew about the incursion, such as the relative runway position and let the pilot in command decide whether it is safer

to go around or land based on the time available for decision making and operational aspects such as aircraft type, mass, fuel remaining etc. However, this may be too much information to give in way too little time and also the time available for pilots to assess options might be too short. However, the option of going around would still exist but the possibility to continuing to landing would be added.

There are discussions about exactly this question when thinking about details of introduction of various ground based safety nets. However, these discussions are neither mature nor have they found good answers yet.

For the runway incursion case described, in a heavy Boeing 747 I would expect the crew to judge the go around safer but thinking about a light commuter aircraft like the Bombardier DHC8-Q400 it could be safer to land on the first 2000 metres as the landing distance required is typically less than 1500 metres.

Still there are two problems. On the one hand there are simply no procedures allowing a pilot to land on a runway while a runway incursion is taking place. Even if this might be the safer course of action in some rare situations, it is simply not allowed for in existing procedures.

On the other hand we do not have phraseology to communicate all the information. To develop that kind of phraseology would be a large piece of work. For a situation where seconds really do count, phraseology needs to be extremely concise and strictly unambiguous. Passing a lot of information quickly and still being precise is not easy. Another possibility would be for a controller to offer alternatives. When British Airways Flight 38 approaching a landing at Heathrow suffered a dual engine failure and crashed short of the runway the tower controller instructed the following aircraft to either swing to the parallel runway or to go around. He just stated "if you can, swing runway 27R". This instruction enabled the crew to quickly assess their options and decide the best course of action for them.

There is no quick fix to this problem. Of course the best way is to have safe procedures in place which do not bring pilots or controllers into a situation where such hard decisions have to be made. But aviation is very dynamic and no one can always foresee every single situation that might happen.

What is important is that controllers are aware of the risks and implications of manoeuvres like a rejected take-off or a go around and give instructions on these manoeuvres very carefully. And pilots sometimes need to be reminded that it is their primary responsibility to not just follow every instruction but to always evaluate the situation, decide the safest course of action and then apply the techniques they have learned.

Aviation is not and will never be a black and white thing!

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