Safety Letter
Air-Ground Communications
Safety Improvement Initiative

Foreword

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In 2003 the EUROCONTROL Safety Improvement Sub-Group (SISG) proposed Air-Ground Communication (AGC) Safety as a potential subject for a Safety Improvement Initiative. The AGC initiative has now been launched and will address communication issues identified in the Runway Incursion and Level Bust Safety Improvement Initiatives as well as other issues of concern such as callsign confusion, undetected simultaneous transmissions and prolonged loss of communications (PLOC).

The EUROCONTROL AGC Safety Study was published in January 2004 as part of the "Initial Evaluation" phase of the AGC Safety Initiative. The objective of the study was to examine incident report data related to air-ground communication and to identify significant safety issues, hazardous scenarios, causal factors, and potential prevention strategies. The study brought together a range of initiatives and studies to provide a wider and overall picture of the air ground communication problem for pilots of commercially operated aircraft and air traffic controllers.

This Safety Letter reviews the findings of the AGC Safety Study as a prelude to the next steps in the AGC Safety Improvement Initiative – a further study into the causes of AGC errors, assessment of the safety risks, the formulation of initial recommendations will be followed by dedicated workshops in 2005.

Air-Ground Communication (AGC) Incidents

Air-ground communication problems account for around 23% of all ATC occurrences and frequently have a high-risk potential - these incidents have a wide range of causes most of which are not new.

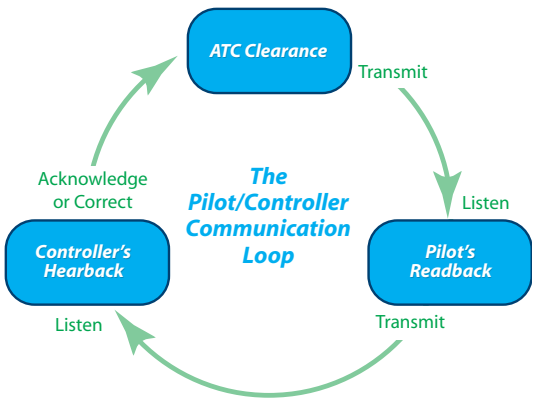

Figure 1
The Pilot/Controller Communication Loop

The ideal communication flow between pilot and controller is, in theory, a straightforward and simple process. Adequate communication requires that the recipient receives, understands and is able to act upon the information gained. The controller issues a clear instruction to the pilot, the pilot reads back this instruction correctly and executes the instructions as intended by the controller. There are at least two safeguards – read back and hear back. Frequently a third safeguard is added – confirmation.

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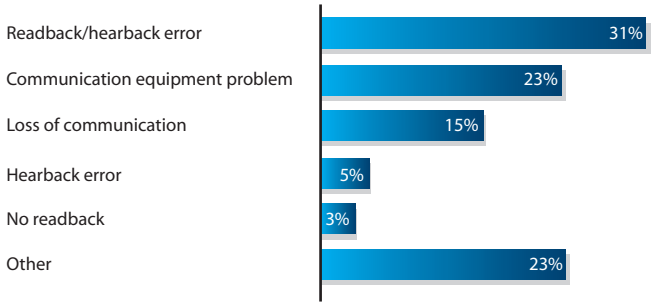
Studies show that readback/hearback errors are the most common type of generic communication problem.

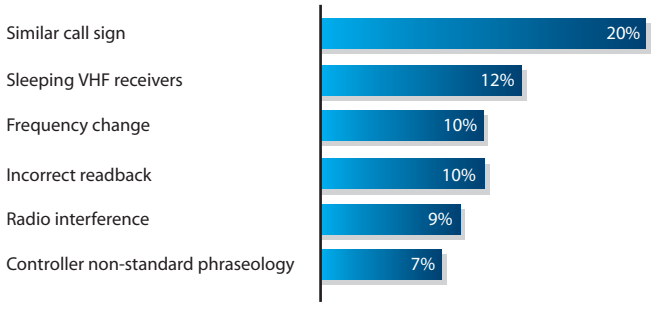
Generic Communication Problems



Causal Factors

Studies have also found that more than one factor could be assigned to a single occurrence. The two most commonly occurring factors in the analysed data were 'Similar call sign' and 'Sleeping VHF receivers' .

Top-six causal factors



A recipe for confusion?

In 1998, an Australian Confidential Aviation Incident Report (CAIR) complained that the following aircraft were on the same frequency simultaneously: New Zealand 88, Qantas 28, Qantas 88, Qantas 188, Air Nippon 828 and Air Nippon 888

(Source: BASI, 1998b)

Callsign Confusion

As air traffic numbers increase, there is evidence worldwide to show that incidents attributed to callsign confusion are also increasing. The Aviation Safety Reporting System (ASRS) receives a large number of reports regarding call-sign similarities and confusion each year. Whilst most reports relate to minor deviations of a clearance, others relate to incidents that have resulted in either a serious loss of separation or near midair collisions. The French SCTA report around 800 reports by ATCOs on Callsign confusion among which there are around 100 incidents per year with at least one cause attributed to callsign confusion. Furthermore, callsign confusion was the cause of 16% of level bust incidents according to the UK NATS.

ICAO Doc. 8585 recommends that:

"In the interest of safety, simple procedures should be developed by states and aircraft operating agencies for detecting, reporting and eliminating those call signs which, because of their similarities to other call signs, may cause confusion or mistakes in identification"

The likelihood of a callsign confusion incident can be reduced by:

- Following recommendations laid down in ICAO Annex 10 & Doc 8585
- Using full calls signs in readbacks
- Informing pilots of similar call signs on same frequency

Undetected Simultaneous Transmission

'Blocked transmissions' usualy relate to incidents when a pilot acknowledges an instruction intended for another aircraft and might block the readback by the aircraft for which the instruction was originally intended. These multiple simultaneous transmissions are not always detected by the controller or the pilots involved. Blocked transmissions can also be caused by a busy frequency or a 'stuck mike'.

Several AIRPROX incidents have been recorded due to a pilot reading incorrectly a clearance back at the same time as the 'intended' pilot. As modern technical systems tend to transmit the best signal only, the error goes undetected by ATC because the second transmission is hidden.

The frequency of undetected simultaneous transmissions can be reduced by:

- ANSPs providing controllers with detailed information on RTF cross-coupling and Best Signal Selection functionality, how it should be used and the problems inherent in the system;
- ANSPs, Aircraft Operators and Regulators promoting strict RTF discipline, including rigorous read back – hear back process;
- Third parties on a communication channel to be encouraged to call out "blocked" in case of detected simultaneous transmission;
- ANSPs and Regulators monitoring the (Undetected) Simultaneous Transmissions Events;

Prolonged Loss of Communications

The findings of the AGC Safety Study showed that of the 444 analyzed reported incidents, 139 resulted in a prolonged loss of communications.

Prolonged loss of communication (PLOC) may be caused by a simple error such as keying the wrong frequency, too low headphone or loudspeaker volume, or due to a verbal ATC mistake or misunderstanding. Alternatively it may be that ***'sleeping VHF receiver'*** may be the cause - a loss of communication in which the VHF frequency becomes silent for a period of time not picking up transmissions from other aircraft or ATC. Normal reception is usually restored once the microphone is keyed and a transmission is made, however, the safety implications are evident and obvious. The AGC Safety Study found that of those incident reports that specified sleeping VHF receivers as a causal factor, around 15% occurred during the approach phase of flight and over 50% during the cruise phase. However, it is important to note that the number of occurrences attributed to a 'Sleeping VHF receiver' could actually be higher than recorded in the analyzed data as it may be that those incidents attributed to other factors could actually be caused by 'Sleeping VHF receivers'.

It seems that the problem of sleeping VHF receivers is not yet widely recognised throughout the aviation industry and although a software refit may solve this problem in the future, there is no certain technical solution at the present time. However, it is important that both pilots and controllers are made aware of the problem and its potential consequences.

Although one of the consequences is clearly the safety implications, some concerns were expressed during the Safety Improvement Sub-Group meetings regarding the associated security aspects of aircraft flying with a loss of communication.

'sleeping VHF receiver' Incident?

ATC attempted to call an aircraft a number of times, but received no reply. Eventually, the crew responded and two-way communication was re-established. The crew reported they noted the RT was quiet, consequently they momentarily pressed the TX switch. The crew believed the fault to be a 'sleeping VHF receiver'.

(Source: Eurocontrol AGC Safety Study)

Summary

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It is evident that there are recurring themes related to communication incidents such as blocked transmissions, readback and hearback errors, callsign confusion, and sleeping VHF receivers. This is reinforced by the findings of the various existing studies. If the rate of air-ground communications incidents is to be reduced, it is important that ANSPs and aircraft operators are aware of these issues and what can be done to reduce the likelihood of an AGC incident.

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Visit our Website: ***www.eurocontrol.int/safety***

AGC safety - Causes and Recommendations Study

In September 2004, EUROCONTROL began a new study to carry out detailed analysis of causal factors and elaboration of recommendations addressing the following high risk areas: Callsign Confusion, Sleeping VHF Receivers, Frequency Change, Simultaneous Transmission, Radio Interference and Phraseology.

The study will build on the earlier AGC Safety Study and begin with a reporting campaign to collect incident data from aircraft operators and ANSPs over a 3 month period.

Part of this study will be the collection of incident data related to air-ground communication problems from European Air Navigation Service Providers and Airlines in order to better understand air-ground communication occurrences and to identify potential prevention strategies.

EUROCONTROL has commissioned the National Aerospace Laboratory NLR to conduct and manage a reporting campaign on air-ground communication safety occurrences. This will be a confidential reporting campaign. The project team will need detailed data on air-ground communication occurrences from flight crew and air traffic controllers who have been involved in an air-ground communication occurrence. This will not affect in any way the current normal reporting arrangements.

How to report an occurence?

An electronic reporting form is available at *http://www.nlr.nl/public/hosted-sites/A2Gcom/*

When to report an occurence?

The reporting campaign will run from: 25 October 2004 through 1 February 2005.