Air-Ground Communications Briefing Note
1- General

1. Introduction

1.1. Until datalink communication comes into widespread use, air traffic control (ATC) will depend primarily upon voice communications, which are affected by various factors. Communications problems can result in hazardous situations and have been significant direct or indirect factors in a number of aircraft accidents and incidents.

1.2. Aircraft operators and Air Navigation Service Providers (ANSPs) cooperate closely to achieve high productivity (e.g. optimising traffic flow through an airport or airspace); like pilots and air traffic controllers (ATCOs), they also share a common interest in maintaining a high level of safety.

1.3. A first step in reducing the incidence of communications problems is to understand why and how they happen. In the past, a number of studies of the causes of communication breakdown have been conducted in Europe and in North America. This briefing note refers to the findings of the most recent study, carried out in 2005 for EUROCONTROL by the Dutch National Aerospace Laboratory (NLR)[1].

1.4. This briefing note is the first of a series of five[2] which address the main factors affecting pilot-controller voice communications. It provides an overview of these factors and makes some general recommendations. There is also a short section dealing with emergency communications.

1.5. These five briefing notes are intended to be used by airline and air traffic management (ATM) training and safety managers in preparing awareness and training material. They will also be useful for private study by individual pilots and ATCOs.

1.6. One way of using safety information of this sort is to relate the information to local examples. Using the briefing notes in this way to highlight situations which are well known within the organisation has proved a highly effective alternative to treating them as isolated study packages.

2. Statistical background

2.1. The NLR report referred to above examined 535 occurrences of communication problems in European airspace reported during the period from 1 March 2004 to 1 April 2005. Undoubtedly, many more communications problems occurred during this period, but were either not reported or were not available to NLR. Also, many reports lacked important details which would have enabled a more complete study of cause and effect.

2.2. More than one quarter of reported problems involved loss of communication. Other main problem types included read-back/hear-back error and communication equipment problems.

2.3. The main reported consequences of the communication problems were prolonged loss of communication (PLOC), altitude deviation, loss of separation, wrong aircraft accepting clearance, instruction issued to wrong aircraft, heading deviation and runway transgression (including runway incursion).

2.4. The most common contributory factors identified were similar call sign, frequency change, radio equipment malfunction (air), radio interference, content of message inaccurate or incomplete, radio equipment malfunction (ground), frequency congestion, sleeping vhf receivers and pilot distraction.

1- Air-Ground Communication Safety Study: Causes and Recommendations
2- See Section 14

3. Pilot-controller communication loop

3.1. Communications between controllers and pilots can be improved by the mutual understanding of each other's operating environment and of the communication process itself.

3.2. The responsibilities of the pilot and controller overlap in many areas and provide backup.

3.3. The pilot-controller confirmation/correction process is a "loop" that ensures effective communication (Figure 1[3]).

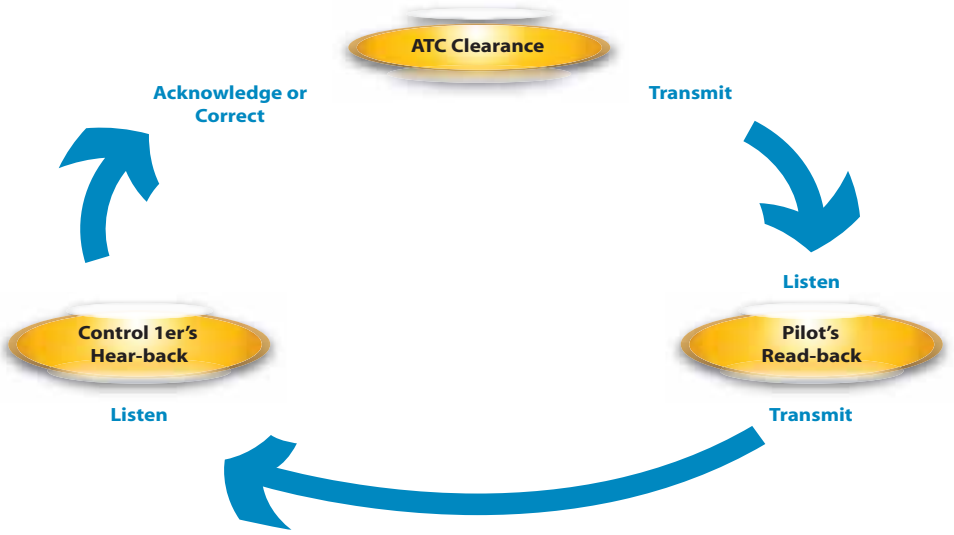

Figure 1 - The pilot / controller communication loop

3.4. During normal situations, but especially when adverse factors are likely to affect communication, the confirmation/correction process is a line of defence against communication errors.

4. Use of aircraft equipment

4.1. The ICAO Standard (Annex 6, Part 1, paragraph 6.20) requires the use of boom or throat microphones below transition altitude. JAR-OPS 1 contains a requirement for carriage of headset and boom microphone (JAR-OPS 1.652(s) for IFR operations, and JAR-OPS 1.650(p) for VFR), but there is no requirement for their use.

4.2. The JAA Operational Procedures Study Group consider that, for the purposes of:

- reliable two-way radio communication,
- ensuring that hands are kept free for other tasks, and
- good-quality voice recording,

the headset should be worn at all times below transition altitude or 10,000 feet, where the workload and number of radio exchanges are high.

3- Figure 1 and much of the subsequent information relating to Human Factors is based on information contained in Airbus Industrie Approach and Landing Briefing Note 2.3 - Effective Pilot/Controller Communications.

4.3. A recent Notice of Proposed Amendment (NPA) to JAR-OPS 1 introduces a new requirement to address this anomaly:

"Each flight crew member required to be on flight deck duty shall wear the headset with boom microphone required by JAR-OPS 1.650(p) and/or 1.652(s) on the ground and in flight below transition altitude or 10,000 feet, which ever is higher, and whenever deemed necessary by the commander, in order to have it available for use for all voice communications with Air Traffic Services."

5. Cross-checking on the flight deck

5.1. The first line of defence is the cross-checking process that exists on the flight deck between the pilot flying (PF) and the pilot not flying (PNF) (pilot monitoring).

5.2. Most airlines employ standard procedures for setting and cross-checking vital pieces of information, for example change of flight level or altitude. The following procedure, typical of many airlines, shows how this is done in the case of setting cleared altitude:

(a) when the autopilot is engaged, the PF sets the cleared altitude;
(b) when the autopilot is not engaged, the PNF sets the cleared altitude.

Each altitude setting triggers a cross-check:
(c) the PF calls out the altitude set;
(d) the PNF checks what has been set and announces the value of the altitude.

5.3. This procedure allows any discrepancy in what was heard by the pilots or in the setting made to be resolved without delay. Similar procedures are prescribed for other operations, for example, change of heading, altimeter setting or RTF frequency.

5.4. The procedure in use within an airline must be standardised, clearly stated in the operations manual, reinforced during training and adhered to by all pilots.

4 - NPA-OPS 49 (JAR-OPS 1) Use of Headset dated 1 November 2005

6. Effective communications

6.1. Pilots and controllers are involved equally in the air traffic management (ATM) system.

6.2. Achieving effective radio communications involves many factors that should not be considered in isolation. Many factors are interrelated and more than one factor is usually involved in a breakdown of the communication loop[5].

Human factors

6.3. Effective communication is achieved when the message transmitted by one party is correctly interpreted and understood by the other party.

6.4. Crew resource management (CRM) (for flight crew) and team resource management (TRM) (for controllers) highlight the relevance of the context and expectation in communication. Nevertheless, expectations may introduce a bias in the effectiveness of the communication.

6.5. High workload, fatigue, distractions, interruptions and conflicts are among the factors that may adversely affect pilot-controller communications and result in:

(a) incomplete communication;
(b) omission of call sign or use of an incorrect call sign;
(c) use of non-standard phraseology;
(d) failure to hear or to respond; and,
(e) failure to implement effectively a confirmation or correction.

Language and communication

6.6. People do not always pronance their own language in the same way as each other and this is equally true for second languages. Standard phraseology is intended to overcome these basic shortcomings.

6.7. The first priority of any communication is to establish an operational context that defines the following elements:

(a) Purpose – clearance, instruction, statement or proposal, question or request, confirmation;
(b) When – immediately, anticipate, expect;
(c) What and How – altitude (climb, descend, maintain), heading (left, right), airspeed; and,
(d) Where – (at […] waypoint).

6.8. The construction of the initial and subsequent message(s) should support this operational context by:

(a) following the chronological order of the actions;
(b) grouping instructions and numbers related to each action; and,
(c) limiting the number of instructions in the transmission.

6.9. The intonation, the speed of speaking and the placement and duration of pauses may affect the understanding of a communication.

5 - Refer to Briefing Note AGC 5 – Radio discipline

Mastering the language

6.10. CRM studies show that language differences on the flight deck are a greater obstacle to safety than cultural differences.

6.11. Because English has become a shared language in aviation, an effort has been initiated to improve the English-language skills of pilots and controllers worldwide. Nevertheless, even pilots and controllers for whom English is the native language may not understand all words spoken in English, because of regional accents or dialects.

6.12. In many regions of the world language differences generate other communication difficulties. For example, controllers using both English (for communication with international flights) and the country's official language (for communication with domestic flights) hinder some flight crews from achieving the desired level of situational awareness (loss of "party-line communications").

Non-standard phraseology

6.13. Non-standard phraseology is a major obstacle to effective communications.

6.14. Standard phraseology in pilot-controller communication is intended to be universally understood.

6.15. Standard phraseology helps lessen the ambiguities of spoken language and thus facilitates a common understanding among speakers:

(a) of different native languages; or,
(b) of the same native language, but who use, pronounce or understand words differently.

6.16. Non-standard phraseology or the omission of key words may completely change the meaning of the intended message, resulting in potential conflicts.

6.17. For example, any message containing a number should indicate what the number refers to (e.g. a flight level, a heading or an airspeed). Including key words prevents erroneous interpretation and allows an effective read-back/hear-back.

6.18. Particular care is necessary when certain levels are referred to because of the high incidence of confusion between, for example, FL100 and FL110.

6.19. Non-standard phraseology is sometimes adopted unilaterally by national or local air traffic services, or is used by pilots or controllers in an attempt to alleviate these problems; however, standard phraseology minimises the potential for misunderstanding.

Building situational awareness

6.20. Radio communications should contribute to the pilot's and the controller's situational awareness, which may be enhanced if they provide each other with advance information.

Frequency congestion

6.21. Frequency congestion significantly affects the flow of communications, especially during approach and landing phases at high-density airports, and demands enhanced vigilance by pilots and by controllers.

Omission of call sign

6.22. Omitting the call sign or using an incorrect call sign jeopardises effective read-back/hear-back.

Omission of read-back or inadequate read-back

6.23. ICAO Annex 11[6] requires that the safety-related part(s) of any clearance or instruction be read back to the air traffic controller.

6.24. The pilot's read-back must be complete and clear to ensure a complete and correct understanding by the controller.

6.25. The action of reading back a clearance gives the controller an opportunity to confirm that the message has been correctly received, and if necessary, to correct any errors.

6.26. Full read-back should never be replaced by the use of a term such as "Roger" or "Copied".

6.27. Similarly, a controller should not use terms such as "Roger" to acknowledge a message requiring a definite answer (e.g. acknowledging a pilot's statement that an altitude or speed restriction cannot be met).

Failure to correct faulty read-back

6.28. The absence of an acknowledgement or a correction following a clearance read-back is perceived by most flight crews as an implicit confirmation of the read-back.

6.29. The absence of acknowledgement by the controller is usually the result of frequency congestion and the need for the controller to issue clearances to several aircraft in succession.

6.30. An uncorrected erroneous read-back (known as a hear-back error) may lead to a deviation from the intended clearance and may not be detected until the controller observes the deviation on his/her radar display.

6.31. Less than required vertical or horizontal separation (and an AIRPROX) is often the result of hear-back errors.

Expectations

6.32. Bias in understanding a communication can affect pilots and controllers.

6.33. The bias of expectation can lead to:

(a) transposing the numbers contained in a clearance (e.g. a flight level) to what was expected, based on experience or routine; and,

(b) shifting a clearance or instruction from one parameter to another (e.g. perceiving a clearance to maintain a 280° heading as a clearance to climb/descend and maintain flight level 280).

6 - Refer to ICAO Annex 11 Chapter 3 Section 3.7.3.

Failure to request confirmation or clarification

6.34. Misunderstandings may include half-heard words or guessed-at numbers.

6.35. The potential for misunderstanding numbers increases when an ATC clearance contains more than two instructions.

6.36. Reluctance to seek confirmation may cause pilots to:
(a) Accept an inadequate instruction (over-reliance on ATC); or,
(b) Determine for themselves the most probable interpretation.

6.37. Failing to request clarification may cause flight crew to believe erroneously that they have received an expected clearance (e.g. clearance to climb to a requested level).

Failure to question instructions

6.38. Failing to question an instruction can cause a crew to accept an altitude clearance below the minimum safe altitude (MSA) or a heading that places the aircraft on collision course with another.

If there is any doubt as to the content of a clearance, or its meaning is not clearly understood, pilots must obtain clarification or confirmation.

Taking another aircraft's clearance or instruction

6.39. Problems often occur because a pilot accidentally takes a clearance intended for another aircraft.

6.40. This usually occurs when two aircraft with similar-sounding call signs are on the same RTF frequency[7] and are likely to receive similar instructions, or the call sign is blocked by another transmission.

6.41. When pilots of aircraft with similar-sounding call signs omit the call sign on read-back, or when simultaneous read-backs are made by both pilots, the error may go unnoticed by the pilots and the controller.

Filtering communications

6.42. Because of other flight deck duties, pilots tend to filter communications, hearing primarily communications that begin with their aircraft call sign and not hearing most other communications.

6.43. For workload reasons, controllers may also filter communications (e.g. not hearing or responding to a pilot read-back preparing to issue clearances/instructions to other aircraft, or ensuring internal coordination).

6.44. To maintain situational awareness, this filtering process should be adapted, according to the flight phase, for more effective listening. For example:

(a) whenever on an active runway (e.g. while back-tracking or when lining up in preparation for takeoff) or when conducting a final approach to an assigned runway, pilot's should listen and give attention to all communications related to this runway; and
(b) when operating in congested airspace the pilots should listen and give attention to all communications related to clearances to climb or descend to, or through, their flight level.

7 - Refer to briefing note AGC 2 – Call sign confusion.

Timeliness of communications

6.45. Deviation from an ATC clearance may be required for operational reasons (e.g. TCAS manoeuvres, a heading deviation or altitude deviation for weather avoidance, or an inability to meet a restriction).

6.46. Controllers need time to accommodate these deviations; therefore ATC should be notified as early as possible.

Blocked or simultaneous transmissions

6.47. Blocked or simultaneous transmissions are a common cause of communication breakdown.[8]

6.48. Blocked transmissions are often the result of not immediately releasing the push-to-talk switch after a communication.

6.49. Simultaneous transmission by two stations (two aircraft or one aircraft and ATC) results in one of the two (or both) transmissions being blocked and going unheard by the other stations (or being heard as a buzzing sound or a squeal).

6.50. Radio interference can have a similar effect to that of blocked or simultaneous transmissions in preventing a message from being heard.

6.51. The absence of a read-back from the pilot should be treated as a blocked transmission and prompt a request to the pilot to repeat or confirm the message.

6.52. In practice, most pilots are unlikely to treat the absence of a hear-back acknowledgement from the controller as evidence of a blocked transmission, and only question the controller if they are uncertain that the read-back was correct or have other reasons to suspect a blocked transmission.

6.53. Although not an official procedure, some pilots make a practice of alerting controllers and other pilots to an apparent blocked or garbled transmission by saying "Blocked" immediately afterwards.

Loss of communication

6.54. Clearly, loss of communication is a dangerous occurrence.[9] Since 11 September 2001 it has assumed a new significance, as controllers are unable to distinguish between communication failure and potentially sinister causes. Loss of communication can result from a number of causes, for example:

(a) wrong frequency assigned by ATC;
(b) pilot misheard frequency assignment;
(c) pilot mis-set radio controls;
(d) radio failure;
(e) radio interference.

6.55. In recent years, an increasing number of incidents have been reported which cannot be ascribed to any of the above causes. These occurrences are usually referred to as "sleeping receivers".

8 - Refer to briefing note AGC 4 – Blocked transmission.
9 - Refer to briefing note AGC 3 – Loss of communication.

7. Emergency communication

7.1. When flight crew are confronted with an abnormal situation whilst in flight, they normally prioritise their immediate actions in the following order.

- **A**viate;
- **N**avigate;
- **C**ommunicate.

Aviate

7.2. The pilot's immediate priority is to ensure the safe flight path and condition of the aircraft. This not only includes the flying of the aircraft but also the completion of checklist drills. The safe flight path may even include the initiation of a controlled rapid descent.

7.3. In order to maintain the correct balance of workload, the flight crew normally distribute the responsibilities between the available crew members. For a modern two-crew flight deck, one flight crew member takes responsibility for the flight path of the aircraft and all radio communications while the other flight crew member carries out any checklist actions.

7.4. When there is a problem, the workload during the first moments is high and the flight crew may elect to inform air traffic control immediately by the most direct means. This normally entails the use of an initial call incorporating the word "standby" (e.g. "Houston, (call sign), we've got a problem – standby".)

Navigate

7.5. The flight crew will decide on whether to continue the flight to destination, initiate a diversion or just place the aircraft in a safe flying position. The decision to divert may be immediate but normally it will require coordination with air traffic control and other parties.

Communicate

7.6. Pilots believing themselves to be facing an emergency situation should declare an emergency as soon as possible and cancel it later if the situation allows.

7.7. The correct method of communicating this information to ATC is by using the prefix "MAYDAY, MAYDAY, MAYDAY" or "PAN PAN, PAN PAN, PAN PAN" as appropriate. This procedure, which is an international standard, is the single most effective means of alerting the controller to the need to give priority to the message that will follow.

Controller response to emergency situation

7.8. Controllers should recognise that, when faced with an emergency situation, the flight crew's most important needs are:

- **T**ime;
- **A**irspace; and,
- **S**ilence.

7.9. The controller's response to the emergency situation could be patterned after a memory aid such as ASSIST[10]:

- **A**cknowledge the call.
- **S**eparate the aircraft from other traffic. Give it room to manoeuvre.
- **S**ilence – on the frequency. Where possible, change the frequency for other traffic, or provide a separate frequency – this prevents unnecessary clutter for the pilots.
- **I**nform those who need to know and those who can help; inform others as appropriate.
- **S**upport the pilots in any way possible – start to think of alternative routings, etc.
- **T**ime - Give the pilots time to collect their thoughts, don't harass them for information. Time produces good decisions.

7.10 EUROCONTROL has produced guidelines for controller training in handling unusual or emergency situations which contain much useful information and advice, including sample checklists for various types of emergency.

8. Training programme

8.1. Training programmes on pilot-controller communications should strive to involve both flight crew and ATC personnel in joint meetings to discuss operational issues, and in joint flight/ATC simulator sessions, to promote a mutual understanding of each other's working environment.

8.2. Training sessions should include the following:

(a) modern flight decks (e.g. flight management system reprogramming) and ATC equipment (e.g. absence of primary returns, such as weather, on modern radar displays);
(b) operational flying requirements (e.g. aircraft climb, descent and deceleration characteristics, performance, limitations) and ATC requirements (e.g. optimum use of airspace and runways, traffic deconfliction, etc.);
(c) standard procedures used by pilots and controllers.

8.3. Special emphasis should be placed on pilot-controller communications and task management during emergency situations.

8.4. Ideally, pilots and controllers would participate in each other's resource training (CRM and TRM).

8.5. Operators and ANSPs should provide resources for self-improvement in the use of the English language.

9. Safety reporting

9.1. Investigation and analysis of safety occurrences is essential for the development of measures to prevent recurrence. Risk analysis allows resources to be targeted in the most effective way.

9.2. To be fully effective, detailed reporting of all safety occurrences is necessary, whether or not this is required by national regulations. This is most likely to occur where the national and company safety culture encourages open reporting and protects the confidentiality of the reporter.

10 - The ASSIST concept was first employed by ATC at Amsterdam Schiphol Airport.
11 - Guidelines for Controller Training in the Handling of Unusual/Emergency Situations.

9.3. Analysis of trends revealed by safety reports allows safety managers to decide whether specific measures have been effective. Trend analysis also allows safety managers to detect new areas of concern as soon as they arise. Important safety information uncovered as a result may be shared with other operators and ANSPs.

9.4. A detailed discussion of the issues involved may be found in the relevant EUROCONTROL Level Bust Toolkit Briefing Notes[12].

10. Recommendations for aircraft operators

10.1. Maintain a continuous review of standard operating procedures (SOPs). Encourage discussion within the airline (including criticism and suggestions) to ensure that SOPs are practicable and effectve and that pilots understand the dangers of violation.

10.2. Ensure that training emphasises the need for pilots to observe sound and standard communications procedures in accordance with ICAO and national regulation, following the recommendations contained in these briefing notes.

10.3. Ensure that all flight crew observe SOPs.

10.4. Facilitate and promote practices for sharing the mutual understanding of professional characteristics between flight crews and controllers, including regular meetings, visits and familiarisation flights.

10.5. Work to encourage a positive, open safety culture within your airline. Encourage flight crew to report safety occurrences and inform flight crew of action taken following their reports.

10.6. In encouraging incident reporting, an anonymous reporting system is very effective. However, a confidential system leads to a more straightforward and satisfactory investigations because it allows the investigator to make contact with the reporter in order to clarify any points and to go deeper into the investigation.

10.7. Foster a sense of trust within the team that reports made in confidence will not be divulged except where required in accordance with national law. Team members may be reluctant to admit mistakes if they fear punishment or loss of status in the eyes of their colleagues.

10.8. In conducting an investigation into an incident, bear in mind the stricture contained in ICAO Annex 13 that "The sole objective of the investigation of an accident or incident shall be the prevention of accidents and incidents. It is not the purpose of this activity to apportion blame or liability."

10.9. The results of the investigation should be issued in a report describing the relevant facts that led to the incident and suggesting recommendations in order to avoid similar occurrences. Feedback should be provided to those who were involved in the incident but also to people who were not involved and who can learn from the incident.

12 - EUROCONTROL Level Bust Briefing Note Ops 7 – Safety Reporting: Operators and ATM3 – Safety Reporting: Air Traffic Management

11. Recommendations for flight crew

11.1. Always use headsets during times of high RTF loading. Always wear a headset when members of the flight crew are involved in other tasks and may not be monitoring the RTF.

11.2. Always observe company SOPs, including standard communications procedures. Insist that other crew members on your flight also follow SOPs.

11.3. Inform managers immediately if SOPs appear to be inefficient or inappropriate in certain situations.

11.4. Whenever a hazardous situation arises, consider informing air traffic control using the standard keywords "MAYDAY" or "PAN PAN" as appropriate.

11.5. Do not delay declaring an emergency; it can always be cancelled later if the situation does not to warrant it.

11.6. Always report safety occurrences whether or not they directly involve you, using the local mandatory or voluntary reporting system as appropriate.

11.7. Cooperate in the analysis of incidents. In this way you can make a positive contribution to safety.

12. Recommendations for air navigation service providers

12.1. Insist on adherence to standard communications procedures by all controllers.

12.2. Ensure that training for managers and staff is effective in explaining and promoting safe working practices.

12.3. Facilitate and promote practices for sharing the mutual understanding of professional characteristics between flight crews and controllers, including regular meetings, visits and familiarisation flights.

12.4. In encouraging incident reporting, an anonymous reporting system is very effective. However, a confidential system leads to a more straightforward and satisfactory investigation because it allows the investigator to make contact with the reporter in order to clarify any points and to go deeper into the investigation.

12.5. Foster a sense of trust within the team that reports made in confidence will not be divulged except where required in accordance with national law. Team members may be reluctant to admit mistakes if they fear punishment or loss of status in the eyes of their colleagues.

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13. Recommendations for controllers

13.1. Always follow standard procedures, including standard communications procedures.

13.2. When under pressure to get the job done (e.g. to increase the number of aircraft movements at your airport), resist the temptation to cut corners (e.g. reduce separation). Such practices reduce the safety margins for aircraft and so increase the likelihood of an incident.

13.3. Notify your supervisor or manager of any element of a procedure that makes it difficult to implement safely or efficiently.

13.4. Be prepared for dealing with an aircraft emergency using a checklist or mnemonic such as ASSIST[13].

13.5. Always report safety occurrences whether or not they directly involve you, using the local mandatory or voluntary reporting system as appropriate.

13.6. Cooperate in the analysis of incidents. In this way you can make a positive contribution to safety.

14. Resources

Other Air-Ground Communication (AGC) Briefing Notes

14.1. There are five AGC Briefing Notes in this series, of equal applicability to Flight Operations and Air Traffic Management:

- No 1: General;
- No 2: Call sign confusion;
- No 3: Loss of communication;
- No 4: Blocked transmissions; and,
- No 5: Radio discipline.

Access to resources

14.2. Most of the resources listed may be accessed free of charge from the Internet. Exceptions are:

- ICAO documents, which may be purchased direct from ICAO;
- Certain Flight Safety Foundation (FSF) documents, which may be purchased direct from FSF;
- Certain documents produced by the Joint Aviation Authorities, which may be purchased from JAA.

Regulatory resources

14.3. Documents produced by regulatory authorities such as ICAO, JAA and national aviation authorities are subject to amendment. Reference should be made to the current version of the document to establish the effect of any subsequent amendment.

- ICAO Annex 10 – Aeronautical Telecommunications, Volume II – Communication Procedures including those with PANS status;
- ICAO Annex 11 – Air Traffic Services;
- ICAO Doc 4444 – Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM);

12 - EUROCONTROL Level Bust Briefing Note Ops 7 – Safety Reporting: Operators and ATM3 – Safety Reporting: Air Traffic Management

- ICAO Doc 8168 – Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS), Volume I – Flight Procedures;
- ICAO Doc 8585 – Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services;
- ICAO Doc 9432 – Manual of Radiotelephony;
- JAR-OPS 1 – Commercial Air Transport (Aeroplanes).

Emergency communications

- EUROCONTROL – Guidelines for Controller Training in the Handling of Unusual/Emergency Situations;
- EUROCONTROL – Best practice draft: Runway Sterilisation;
- UK CAA – CAP 745: Aircraft Emergencies – Considerations for Air Traffic Controllers;
- UK CAA – AIC 51/99: VHF Radio Telephony Emergency Communications;
- UK NATS – Aircraft Emergencies: Considerations for Controllers.

Other resources

- EUROCONTROL – Air-Ground Communication Safety Study: An Analysis of Pilot-Controller Communications;
- EUROCONTROL – Air-Ground Communication Safety Study: Causes and Recommendations;
- FAA Report – An Analysis of Ground Controller-Pilot Voice Communications;
- FSF Accident Prevention Volume 47 No 6 – My Own Mouth shall Condemn Me;
- UK CAA Aeronautical Information Circular (AIC) 107/2000 – Call sign Confusion;
- UK CAA Safety Sense – RT Discipline (for Pilots & ATC);
- UK CAA – Flight Operations Department Communication 11/2000 – Understanding and Interpreting Phraseology and Procedures used by Air Traffic Services Providers;
- UK CAA CAP 704 – Aircraft Call Sign Confusion Evaluation Safety Study (ACCESS);
- UK CAA CAP710 – On the Level.