

Air-Ground Communications Briefing Note

4- Blocked transmissions

1. Introduction

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- 1.1. With the steady growth of air traffic worldwide there is a corresponding increase in the incidence of blocked or simultaneous transmissions. These frequently result in dangerous situations developing, especially when they go undetected.
 - 1.2. Simultaneous transmission by two stations results in one of the two (or both) transmissions being blocked and unheard by the other stations (or being heard as a buzzing sound or as a squeal).
 - 1.3. Radio interference caused by unauthorised transmissions or breakthrough from commercial stations can have a similar effect, causing reception difficulties or the loss of all or part of a message.
 - 1.4. Possible dangerous outcomes include the following:
 - (a) a flight takes a clearance intended for another flight and takes action, e.g. alters heading or level, with resultant loss of separation;
 - (b) a flight misses all or part of a clearance intended for it and maintains its level and/or heading, bringing it into conflict with other flights;
 - (c) a controller assumes that a message received is from a different flight and issues inappropriate instructions;
 - (d) a controller fails to note error in read back (including wrong call sign) and does not correct the error (hear back error);
 - (e) unacceptable delay in establishing RTF contact or in issuing a clearance or passing a message;
 - (f) the workload of controllers and pilots is increased due to the necessity to resolve the confusion.
 - 1.5. The high volume of air traffic has made necessary various ATC procedures and technical activities which may increase the probability of simultaneous transmission.

2. Simultaneous transmission

- 2.1. The operation of large numbers of aircraft in the same airspace increases the likelihood of simultaneous transmission, especially when the volume of traffic approaches the maximum handling capacity of the controller.
- 2.2. Where an RTF frequency is congested, pilots feel obliged to transmit as soon as they believe a previous transmission is complete in order to get their message across. This often leads to simultaneous transmissions.
- 2.3. The use of multiple RTF frequencies by the same controller can increase the chance of simultaneous transmission if pilots on different RTF frequencies are unaware of each other's transmissions.
- 2.4. Band-boxing of sectors has a similar effect to the use of multiple RTF frequencies (paragraph 2.3) because the different sectors are normally controlled on different RTF frequencies.
- 2.5. Cross-coupling of RTF frequencies is often employed to improve pilot and controller situational awareness: transmissions on one frequency are simultaneously retransmitted on the second. However cross-coupling can give rise to enhanced probability of simultaneous transmission due to the increased number of audible transmissions.

- 2.6. Best Signal Selection (BSS) is sometimes employed within air traffic control units to prevent two simultaneous transmissions from corrupting each other so that neither is intelligible. BSS compares the strength of simultaneous transmissions and automatically suppresses the weaker. Because the controller does not hear the weaker transmission it is likely that the simultaneous transmission will go undetected.
- 2.7. Where similar call signs are in use, there is an increased probability of the wrong aircraft taking a clearance, especially if the call sign is blocked or garbled. Similarly, a controller may not detect a read-back error if the transmission is partially blocked. The use of similar call signs greatly increases the probability that a call taken by the wrong aircraft will go undetected.
- 2.8. Blocked transmissions may also result if the push-to-talk switch is not immediately released after a communication.
- 2.9. An excessive pause in a message (i.e. holding the push-to-talk switch while preparing the next item of the transmission) may lead others to believe that the transmission is complete; this may result in the response or part of another message being blocked.
- 2.10. The absence of a read-back from the pilot should be treated as a blocked transmission and prompt a request to repeat or confirm the message.
- 2.11. 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.
- 2.12. Although not 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. This practice should be encouraged.

3. Radio interference

- 3.1. "Radio interference" is the term used to describe a range of different situations in which transmissions other than those from authorised users of an RTF frequency interfere with radio reception.
- 3.2. Radio interference often comes from commercial stations on the ground. These occurrences, which are very annoying to pilots, can make communication with controllers difficult or even impossible. This form of interference may result when an unauthorised transmitter is established on a frequency close to the aeronautical frequency, or on one of its sub-harmonic frequencies.
- 3.3. Radio interference can also result from a variety of legal but unintended sources, ranging from the familiar static generated in thunderstorm clouds to break-through from ground-based two-way radio systems.
- 3.4. In unusual propagation conditions, transmissions from authorised aeronautical transmitters may interfere with transmissions from stations which are well beyond its protected range.
- 3.5. Finally, there have been rare occasions when an unauthorised station has made malicious transmissions on an aeronautical frequency, presumably with the intention of misleading pilots. This form of interference is usually fairly obvious because the transmissions lack credibility due to their non-standard timing, content

or form; however, such transmissions made at critical stages, e.g. during the take-off run, can have potentially very dangerous consequences.

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- 3.6. In many cases, ATC receivers are not affected by radio interference, because their antennas are close to the ground and are screened from the source of the interference.
 - 3.7. In most cases of radio interference the short-term remedy is to change frequency. On notification that a frequency is unusable, ATC will assign a new frequency. However, in extreme cases, aircraft may not be able to hear the assigned frequency. In this case, aircraft should request instructions on another listed frequency for the facility in use.
 - 3.8. Careful adjustment of the radio squelch control may reduce the effect of interference.
 - 3.9. All cases of radio interference should be reported using the national mandatory occurrence reporting scheme.
 - 3.10. Cases of malicious interference should be investigated by the police, with the objective of identifying and prosecuting the culprit.
 - 3.11. Interference from other sources should also be reported to ATC, who should pass the information on to the appropriate national authorities so that the source of interference can be detected and arrangements made to prevent recurrence.

4. General recommendations

- 4.1. Whenever there is a busy frequency or there are aircraft with similar call sign on the same frequency, both pilots and controllers should be aware of blocked transmissions. A stuck microphone can lead to blocked transmissions and can be prevented by the use of anti-blocking devices.
- 4.2. Until technological solutions are identified and introduced, strict observance of standard RTF procedures and phraseology, including rigorous application of the read-back – hear-back process, will remain the best defence against simultaneous transmissions and will also aid the correct interpretation of messages in conditions of radio interference.
- 4.3. ANSPs should review the RTF communication equipment and operating procedures in use in their units to identify any shortcomings which may increase the risk of simultaneous transmission.
- 4.4. Air traffic controllers must be familiar with the characteristics and limitations of the RTF equipment they operate. In particular, they must have detailed information on RTF cross-coupling and BSS functionality if used, including the process itself, how it should be used and the problems inherent in the system.

5. Recommendations for aircraft operators

- 5.1. Review radio equipment fitted to aircraft in your fleet and install anti-blocking devices if appropriate.
- 5.2. Insist on high standards of RTF discipline by flight crew.
- 5.3. Ensure that flight crew training programmes stress the causes and dangers of blocked and simultaneous transmissions.

6. Recommendations for flight crew

Blocked and Simultaneous Transmissions

- 6.1. Always use headsets during times of high RTF loading.
- 6.2. Use correct RTF phraseology¹, procedures and discipline at all times.
- 6.3. Do not clip transmissions.
- 6.4. Use full RTF call sign at all times.
- 6.5. Release press-to-transmit switch between elements of a message.
- 6.6. Listen carefully before you transmit to ensure that you do not block another transmission.
- 6.7. If any part of a message for you is garbled or unclear, request confirmation or clarification.
- 6.8. If in doubt about an ATC instruction, do not use read-back for confirmation. Instead, positively confirm instructions with ATC. This procedure should also be followed if any doubt exists between flight crew members.
- 6.9. Question unexpected instructions for any stage of flight.
- 6.10. Take extra care when members of the flight crew are involved in other tasks and may not be monitoring the RTF.
- 6.11. Take care to ensure that you do not take a message intended for another aircraft. Listen carefully to the call sign and if it is unclear, request confirmation.
- 6.12. If you hear an apparently blocked or garbled transmissions, call "Blocked" immediately afterwards to warn the pilots and controller involved.
- 6.13. After a flight where a blocked or simultaneous transmission is observed, file a report using the national mandatory incident reporting system or voluntary incident reporting system as appropriate.

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- 6.14. On observing any radio interference, note the nature and effect of the interference, time and position of commencement, time and position where the interference ceased, and any other factors that would help the authorities to identify the source.
 - 6.15. If the squelch control is adjusted to reduce the effect of interference, take care to ensure that transmissions from ATC or other aircraft are not cut out.
 - 6.16. Always report any radio interference experienced whether or not it affected safe operation.
 - 6.17. If in your opinion interference affects safe aircraft operation, request a frequency change. If the interference prevents satisfactory communication with your assigned ATC unit, request instructions using another listed frequency.
 - 6.18. When conditions permit, pass on full information concerning interference to the ATC unit affected. Additionally, report the incident to your national authority using the mandatory occurrence reporting scheme.

7. Recommendations for air navigation service providers

- 7.1. Review the RTF communication equipment and operating procedures in use in your units to ensure that the correct balance between the benefits and shortcomings of systems such as cross-coupling and BSS is maintained.
- 7.2. In the case of coupling multiple RTF channels, priority should be given to duplex (allowing audible simultaneous transmission) against simplex coupling.
- 7.3. If a controller is providing ATS for two or more areas, the relevant channels must be located on the controller working position being used. Preferably, channels should be cross-coupled to prevent simultaneous transmissions by aircraft.
- 7.4. Future systems should include technology that warns the controller in the event of a simultaneous transmission.
- 7.5. Ensure high standards of RTF discipline by air traffic controllers.

8. Recommendations for air traffic controllers

Blocked and simultaneous transmissions

- 8.1. Ensure that you are familiar with the characteristics and limitations of the RTF equipment you operate. In particular, you should have detailed information on RTF cross-coupling and BSS functionality if used, including the process itself, how it should be used and the problems inherent in the system.

- 8.2. Use correct RTF phraseology², procedures and discipline at all times.
- 8.3. Do not clip transmissions.
- 8.4. Ensure clearances are read back correctly. Do not use read-back time to execute other tasks.
- 8.5. Monitor flight crew compliance with RTF call sign use.
- 8.6. Take extra care when language difficulties may exist.
- 8.7. When collapsing or de-collapsing sectors, communicate the frequency plan to the adjacent centres/positions and monitor the closed frequencies for the transitional period.
- 8.8. If a blocked transmission is suspected, ensure that both aircraft retransmit their messages and confirm carefully that a clearance has not been taken by an aircraft for which it was not intended.
- 8.9. Where a blocked or simultaneous transmission is observed, file a report using the national mandatory incident reporting system or voluntary incident reporting system as appropriate.
- 8.10. When collapsing or de-collapsing sectors, the frequency plan should be communicated to the adjacent centres/positions and the closed frequencies should be monitored for the transitional period;

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- 8.11. On observing or being informed of radio interference, arrange for transfer of affected aircraft to another RTF frequency.
- 8.12. When conditions permit, request full details of the incident, including the nature and effect of the interference, time and position of commencement and time and position where the interference ceased.
- 8.13. Report any radio interference to the appropriate national authorities, which in the case of malicious interference should be the police.
- 8.14. Also report any radio interference incidents using your national mandatory incident reporting scheme.

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9. Resources

Other Air-Ground Communication (AGC) Briefing Notes

- 9.1. There are six 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

- 9.2. 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

- 9.3. 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, Chapter 5 – Aeronautical Mobile Service Voice Communications, Section 5.2.1.7;
 - ICAO Doc 9432 – Manual of Radiotelephony.

Training material and incident reports

- FSF ALAR Toolkit – Briefing Note 2.3 – Effective Pilot/Controller Communications.

Other resources

- EUROCONTROL – Air-Ground Communication Safety Study: An Analysis of Pilot-Controller Occurrences;
- 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)