Air-Ground Communications Briefing Note
2- Call sign confusion

1. Introduction

1.1. The use of similar call signs by aircraft operating in the same area on the same RTF frequency often gives rise to potential and actual flight safety incidents. This hazard is usually referred to as "call sign confusion".

1.2. The danger of an aircraft taking and acting on a clearance intended for another is obvious. The following are some of the potential outcomes of such a situation:

(a) the aircraft takes up a heading or routing intended for another;
(b) the aircraft commences a climb or descent to a level to which it has not been cleared;
(c) the aircraft leaves the appropriate RTF frequency;
(d) in responding to a message, the aircraft blocks a transmission from the intended recipient;
(e) the intended recipient does not receive the clearance, and fails to take up the desired heading or routing, or fails to climb or descent to the cleared level;
(f) the controller misunderstands the intentions of aircraft under his/her control;
(g) the controller issues a clearance to the wrong aircraft, and/or fails to issue a clearance to the intended aircraft;
(h) the workload of controllers and pilots is increased because of the necessity to resolve the confusion.

1.3. Any of the above situations could result in a loss of separation, a level bust, an AIRPROX, or a mid-air collision.

1.4. The purpose of this briefing note is to recommend the best courses of action in order to minimise the risk of call sign confusion.

1.5. This briefing note draws heavily on the studies referred to in Section 2 below.

2. Statistical data

UK CAA

2.1. The UK CAA reported[1] that, out of a total of 5,625 safety occurrences notified to them during 1997, 175 involved call sign confusion.

2.2. In the same year, the ACCESS[2] initiative collected a total of 482 reports of call sign similarity filed by pilots and air traffic controllers in UK. 217 of these involved actual confusion, including 99 where ATC were actually confused. 353 involved increased controller workload by reducing controllers' thinking time, and increasing RTF usage time.

French ATM services

2.3. During 2003, about 800 safety occurrence reports concerning similar call signs were collected by air traffic management (ATM) Services in France. These included 100 or so incidents having a direct impact on air traffic safety and leading to very unsafe situations (AIRPROX, Short-Term Conflict Alert (STCA) alerts, level busts and clearance misunderstandings).

EUROCONTROL/NLR

2.4. In cooperation with the Dutch National Research Laboratory (NLR), EUROCONTROL studied 444 occurrences in which there were problems with communication between controller and pilot. All these occurrences were classified as "incidents[4]".

2.5. The above occurrences were classified according to their consequences. 70 were classified as "wrong aircraft accepting clearance", 92 as "altitude deviation[5]", 30 as "loss of separation", 25 as "runway transgression", 20 as "heading or track deviation" and 5 as "instruction issued to wrong aircraft". Contributory factors in these incidents included "similar call sign" (87 cases), "incorrect read-back" (44) and "non-standard controller phraseology" (32).

2.6. A second, wider study[6] also conducted by NLR found that the contributory factors most often cited in communication problems involving similar call signs were related to human factors:
(a) controller accent (34%);
(b) controller speech rate (28%);
(c) pilot distraction (25%);
(d) pilot expectation (22%);
(e) pilot fatigue (20%).

2.7. Two factors which are also common are frequency congestion (28%) and blocked transmissions (30%).

3. Aircraft call signs

3.1. Before proceeding with an examination of the call sign confusion problem the rules governing the use of aircraft call signs will be reviewed. These rules are laid down in ICAO Annex 10[7]. The relevant paragraphs are summarised below.

3.2. Three different types of aircraft call sign may be encountered, as follows:

Type (a) The characters corresponding to the registration marking of the aircraft (e.g. ABCDE). The name of the aircraft manufacturer or model may be used as a prefix (e.g. AIRBUS ABCDE);

Type (b) The telephony designator[8] of the aircraft operating agency, followed by the last four characters of the registration marking of the aircraft (e.g. RUSHAIR BCDE);

Type (c) The telephony designator of the aircraft operating agency, followed by the flight identification (e.g. RUSHAIR 1234).

3.3. The full call sign must be used when establishing communications.

3.4. After satisfactory communication has been established, abbreviated call signs may be used provided that no confusion is likely to arise; however, an aircraft must use its full call sign until the abbreviated call sign has been used by the ground station.

1- CAP 701 – Aviation Safety Review 1990-1999
2 - CAP 704 – Aircraft Call Sign Confusion Evaluation Safety Study. A summary of this report may be found in UK CAA Aircraft Information Circular (AIC) 107/2000
3 - Air-Ground Communication Safety Study: An Analysis of Pilot-Controller Communications
4 - An incident is defined in ICAO Annex 13 as an occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation
5 - In this study, an altitude deviation was defined as a departure from, or failure to attain, an altitude assigned by ATC
6 - Air-Ground Communication Safety Study: Causes and Recommendations
7 - ICAO Annex 10, Volume II, Section 5.2.1.7
8 - The telephony designators referred to in (b) and (c) are contained in ICAO Doc 8585 — Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services

3.5. Call signs may be abbreviated only in the manner shown below. Examples of full and abbreviated call signs are shown on Table 1 below.

Table 1 – Examples of full call signs and abbreviated call signs

	Type (a)		Type (b)	Type (c)
Full call sign	ABCDE	AIRBUS ABCDE	RUSHAIR ABCDE	RUSHAIR 1234
Abbreviated call sign	ADE or ACDE	AIRBUS DE or AIRBUS CDE	RUSHAIR DE or RUSHAIR CDE	No abbreviated form.

Type (a) The first character of the registration and at least the last two characters of the full call sign (the name of the aircraft manufacturer or model may be used in place of the first character);

Type (b) The telephony designator of the aircraft operating agency, followed by at least the last two characters of the call sign;

Type (c) No abbreviated form.

3.6. Most airline call signs belong to type (c) for which there is no abbreviation. Therefore, abbreviations such as "RUSHAIR 34" are not permissible.

3.7. An aircraft is not permitted to change its call sign during flight, except temporarily on the instruction of an air traffic control unit in the interests of safety.

3.8. In order to avoid any possible confusion, when issuing ATC clearances and reading back such clearances, controllers and pilots must always add the call sign of the aircraft to which the clearance applies.

4. Numeric v. alphanumeric call signs

4.1. Many airlines continue to use their IATA commercial flight numbers as call sign suffixes. However, because they tend to be allocated in batches of sequential and very similar numbers, call sign confusion occurs.

4.2. Several airlines have switched to alphanumeric call signs reasonably successfully in recent years. However, if every operator adopts alphanumeric call signs, the limited choices available within the maximum of 4 elements allowed within a call sign suffix means that call sign confusion, similar to the existing numeric system, is likely to result.

4.3. Before changing to an effective all-alphanumeric call sign system, which involves a significant amount of work, it is recommended that operators review their existing numeric call sign system to deconflict any similar numeric call signs. Where there is no solution to those call signs that have a potential for numeric confusion, alphanumeric call signs can be adopted.

5. Selection of call signs

5.1. The best defence against call sign confusion consists in eliminating, or reducing to an absolute minimum, the chance of having two (or more) aircraft with phonetically similar call signs on the same RTF frequency at the same time.

5.2. To be effective, such a strategy requires action on a regional and international basis. Call sign suffixes must be allocated according to a deliberate, coordinated policy that prevents a confliction arising in the first place.

5.3. Until such a strategy is in place, aircraft operators should attempt to assign call signs in such a way that confliction with their own and other scheduled traffic does not arise.

5.4. Where commercial flight numbers are not used, operators should ensure that airport information systems can cope with the conversion of RTF call signs (for ATC use) to commercial flight numbers (for passenger and airport use).

5.5. Practical experience, reinforced by the reports referred to in Section 2 above, suggests that certain formats are especially likely to lead to confusion. Examples are: number sequences beginning with a low number; long number sequences (four or more); repeated digits; and letter sequences which correspond with the last two letters of the destination ICAO location indicator. Examples are given in recommendations 6.3-6.7 below.

6. Recommendations for aircraft operators

6.1. Avoid the use of similar numeric call signs within the company. Effectively, this means, do not use commercial flight numbers as call signs.

6.2. Coordinate with other operators to reduce to a minimum any similar numeric and alphanumeric elements of call signs.

6.3. Start flight number element sequences with a higher number (e.g. 6).

6.4. Do not repeatedly use call signs involving four digits and, wherever possible, use no more than three digits.

6.5. Do not use the same digit repeated (e.g. RUSHAIR 555).

6.6. If alphanumeric suffixes are to be used, coordinate letter combinations with other airspace and airport users.

6.7. Do not use alphanumeric call signs which correspond to the last two letters of the destination's ICAO location indicator (e.g. RUSHAIR 25LL for a flight inbound to London Heathrow).

6.8. Use some numeric and some alphanumeric call signs (rather than all numeric or all alphanumeric).

6.9. If similarly numbered call signs are inevitable, allow a significant time and/or geographical split between aircraft using similar call signs.

6.10. When useful capacity in the allocation of call signs has been reached, apply for and use a second company call sign designator.

6.11. Do not use similar/reversed digits/letters in alphanumeric call signs (e.g. RUSHAIR 87MB and RUSHAIR 78BM).

6.12. Implement a call sign deconfliction programme within your airline, to review and if necessary amend call signs.

7. Recommendations for flight crew

7.1. 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.

7.2. Do not clip transmissions.

7.3. Use full RTF call signs at all times, unless call sign abbreviation has been introduced by ATC.

7.4. Use correct RTF procedures and discipline at all times.

7.5. If in doubt about an ATC instruction, do not use readback for confirmation. Instead, positively confirm instructions with ATC. This procedure should also be followed if any doubt about a clearance exists between flight crew members.

7.6. Question unexpected instructions for any stage of flight.

7.7. Take extra care when members of the flight crew are involved in other tasks and may not be monitoring the RTF.

7.8. At critical stages of flight actively monitor ATC instructions and compliance with them.

7.9. Advise ATC if any of the following situations is observed:
(a) two or more aircraft with similar call signs are on the RTF frequency;
(b) it is suspected that an aircraft has taken a clearance not intended for it;
(c) it is suspected that another aircraft has misinterpreted an instruction;
(d) a blocked transmission is observed.

7.10. Although not an official procedure, many pilots hearing that two transmissions block each other call out "Blocked", after which all transmitting parties try once more to pass their messages.

7.11. After a flight where an actual or potential call sign confusion incident is observed, file a report using the national mandatory incident reporting system or voluntary incident reporting system as appropriate.

8. Recommendations for air navigation service providers

8.1. Ensure that aircraft operators are made aware of any actual or potential call sign confusion reported by air traffic controllers.

9. Recommendations for air traffic controllers

9.1. Use correct RTF phraseology, procedures and discipline at all times.

9.2. Do not clip transmissions.

9.3. Ensure clearances are read back correctly. Do not use read-back time to execute other tasks.

9.4. Monitor flight crew compliance with RTF call sign use.

9.5. Take extra care when language difficulties may exist.

9.6. Advise adjacent sectors/airports if it is felt that potential confusion may exist between aircraft likely to enter their airspace.

9.7. Warn the pilots of aircraft on the same RTF frequency having similar call signs that call sign confusion may occur. If necessary, instruct one or both aircraft to use alternative call signs while they are on the frequency.

9.8. A transmission could be blocked when two or more aircraft are responding to the same clearance. Typically the controller would hear a partial or garbled readback. 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.

9.9. Where an actual or potential call sign confusion incident is observed, file a report using the national mandatory incident reporting system or voluntary incident reporting system as appropriate.

10. Resources

Other Air-Ground Communication (AGC) Briefing Notes

10.1. 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

10.2. 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

10.3. 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 8585 – Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services;
- 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 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 CAP 701 Aviation Safety review 1990-1991;
- UK CAA CAP 704 – Aircraft Call Sign Confusion Evaluation Safety Study (ACCESS).