

論文

A Similar Call-sign Confusion and Prevention Strategy

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ABSTRACT

비행 편수의 증가 추세는 관제 밀집도를 높여 항공관제사와 조종사간 communication 실수를 유발할 수 있는데 특히 호출 부호(Call Sign)의 혼동, 착각에 의한 경우가 많은 것으로 나타나고 있다. 항공 관제사와 조종사간의 communication 실수는 항공기 고도 위반, 활주로 침범, CFIT, 공중 충돌, Near Miss로 인한 위험 상황을 초래할 수 있다. 본 연구는 민간 항공사에 근무하는 조종사들의 유사 콜사인에 대한 혼동 정도와 위험성 인식을 설문 조사하였으며 이를 분석하여 방지 대책을 모색하였다. 국내 조종사와 외국인 조종사의 혼동 정도와 위험성 인식의 차이는 나타나지 않았으며 공항이 위치한 국가에 따라 혼동 정도의 차이가 있었다. 동일 항공사에서 나타나는 유사 콜사인은 자체 해결 가능하였지만 타 항공사와의 유사 콜사인을 해결하는 데는 한계가 있어 관계 기관의 적극적인 중재가 요구된다.

Key Words : Similar Call-sign(유사호출부호), Communication error(의사소통오류), Midair Collision(공중충돌), ATC(항공교통관제), Readback/hearback(복창),

I. Introduction

Call sign confusion problems often give rise to both potential and actual flight safety incidents. Previously, it had been difficult to quantify the extent to which confusion caused by similar Radio Telephone Frequency (RTF) call signs had contributed to incidents or, if left undetected, may have caused an incident. Call sign confusion can be either aural or visual, or both. Aural confusion can occur between flight crew and controller and sometimes between different flight crews.

Definition of similar call sign in this study is two of three digits are same, especially last

digit is same. Similar time is 20 minutes in domestic flights and 40 minutes in international flights.

During the two-year period 2004 and 2005, National Air Traffic Services (NATS) received 437 reports from its Air Traffic Controllers regarding aircraft RTF call signs that were similar enough to cause confusion, communication error and increased workload for both pilots and controllers. (Mike E. 2006)

A study of the 437 reports has revealed that 88% of reports concerned call sign allocation by the same operator. And 81% of all reports contain only numbers in the call sign. This type of call sign format is carried by 65% of flights. In addition, 15% of reports include the use of numbers plus one letter.

'K' airlines has some similar call signs within its own schedule flights, too. Some of schedule flights with similar call signs have been in the same airspace at the same time.

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Therefore, some of flight crew has been reported the problems of similar call sign. However, serious hazard of the call sign confusion by similar call sign was not recognized. The similar call signs of schedule flights should be reviewed for preventing misfortune. This study is on the prevention against call sign confusion. The company's similar call signs status will be reviewed with flight crew survey. After analyzing the status of similar call signs, the recommendations will be issued. The immediate actions which required for winter schedules of 2008 and long term tasks are discussed in conclusion.

II. Objectives and scope

The objective of the present study is to give a synthesis of the issues related to the call sign confusion by similar call sign. The study aims to identify similar call sign, hazardous scenarios and potential prevention strategies concerning air-ground communication safety. Air-ground communication is defined by ICAO as a two-way communication between aircraft and stations or locations on the surface of the earth (ICAO, 2001). Communication can be defined as a process by which information is exchanged between individuals through a common system of symbols, signs, or behaviors in order to affect change. The present study is limited to the similar call sign with in 'K' airlines flights.

III. Analysis method

The accident cases in NTSB database and FOR(Flight Operation Report) of 'K' airlines were reviewed. And questionnaires were conducted to the flight crew involving problems related to similar call sign. Questionnaires were organized with what the flight crew's experience of similar call sign, effects on ATC and similar call signs within 'K' airlines flight. These data were analyzed and found the correlation between each factor.

Questionnaires were collected and analyzed the 1,335 of Korean pilots' and 141 of foreign pilots'.

IV. Cases of Call-sign Confusion

4.1. Case in same airline

03 Jun 08, KE928 and KE938 was flying over Chinese and Russian airspace on the route at a time. The call sign confusion occurred between the controller and the flight crew. Time separation or call sign should be changed for preventing ATC violation or altitude deviation.

4.2. Case between different airlines

The KE701 and OZ701 has been operated simultaneously at ICN. The ATC controllers, delivery, ramp, GND and tower, were confused due to similar call sign. It could be hazard to flight safety.

V. Laboratory study

Within the EUROCONTROL Safety Improvement Sub-Group (SISG) the Air-Ground Communication Safety has been proposed as a potential subject for a Safety Improvement Initiative. The objective of the present study is to give a synthesis of the issues related to the aviation air-ground communication safety in support of the SISG activities. For this purpose a total of 444 incidents related to air-ground communications between controllers and pilots are analyzed in this report. The identified incidents occurred during the years 2002-2003 (August). The analyzed incidents are representative for the situation in Europe. This report provides an analysis of the 444 incidents related to air-ground communication between controllers and pilots. Studies conducted in the early 90s of day to day pilot-controller communications using voice tapes showed an extremely low error rate

(Cardosi, 1994). It was shown that less than one percent of all voice communications examined resulted in a communication error. The controller or pilot corrected the majority (60-80%) of these errors. It was estimated that for the analyzed period and fleet of operational aircraft, a total of 183 million instructions/clearances were given to the pilots. With the total number occurrences of 444 this results in a rate of 2.4 communication related occurrences per million instructions/clearances given.

Fig 1. shows that readback/hearback errors were the most common type of generic communication problems found in the data sample. Similar results were reported in previous studies using ASRS data (e.g. Cardosi, Falzarano, and Han, 1999).

Readback/hearback errors were the most common generic communication problem found in this study.

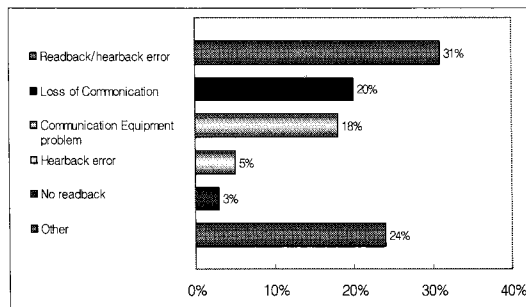


Fig 1. Generic communication problems

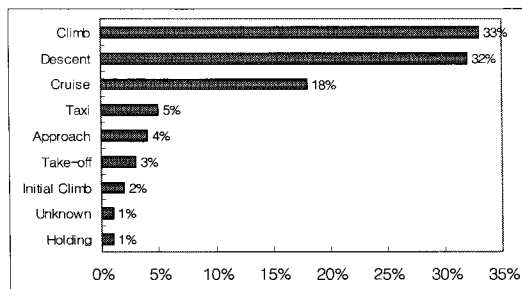


Fig 2 Distribution of readback/hearback errors by flight phase

Fig 2. shows the distribution of readback/hearback errors by flight phase. The

vast majority (65%) of all readback /hearback errors occurred during the climb and descent phase. Another large part (18%) took place during the cruise phase.

The factors that contributed to readback /hearback errors are shown in Fig 3.

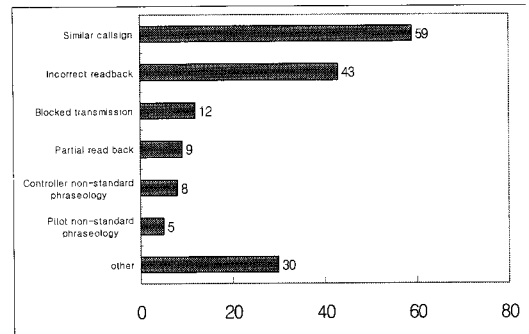


Fig 3. Factors in readback/hearback errors

By far the most common cited factor was the 'similar call sign' and 'incorrect readback'. This last factor is of course somewhat trivial in the category of readback/hearback errors also interesting are the use of non-standard phraseology by both the controllers and the pilots.

VI. Analysis of Survey

1,477 of surveys were collected. Total of flight crew is 2,278(Korean pilot: 1,984, Foreign pilot: 294). Most of pilots have experienced the call sign confusion. And more than half of the flight crew made mistakes due to call sign confusion.

Table 111. Experience of similar call sign

		Foreign	Korean Pilots			Total
		Pilots	CAPT	F/O	ETC	
Experienced call sign confusion during flight	many times	9	47	42	1	99
	often	80	328	371	27	806
	sometimes	31	189	231	5	456
	rare	14	35	40	3	92
	none	8	10	3	3	24
Total		142	609	687	39	1477

Most of the flight crew thought that the call sign confusion might cause ATC problem such as altitude deviation, wrong sequence and near miss in midair.

Table 112. Callsign confusion & ATC problem

		Foreign	Korean Pilots			Total
		Pilots	CAPT	F/O	ETC	
Callsign confusion may cause ATC problem	very much	48	189	156	3	376
	much	38	240	287	17	582
	somewhat	40	147	223	14	424
	rare	16	27	38	3	84
	none	0	6	3	2	11
Total		142	609	687	39	1477

And the table 3. shows that primary causal factor of the call sign confusion is similar call sign.(88%) It reveals that similar call sign should be treated as a big threat in ATC communication.

Table 113. Causal factors in Callsign confusion

		Foreign	Korean Pilots			Total
		Pilots	CAPT	F/O	ETC	
Causal factors in Call sign confusion	poor comm	23	31	52	4	110
	similar callsign	107	552	610	31	1306
	heavy traffic	12	25	16	2	55
	poor radio	0	1	3	2	6
Total		142	609	687	39	1477

The flight crew answered how much the digits made them confuse in ATC, digit 2 vs. 3, 2 vs. 4 and 3 vs. 6. The Korean pilots are confused more than 47.5% and foreign pilots are confused 57% at digit 2 vs. 3. For digit 2 vs. 3, the Korean pilots 28.9%, the foreign pilots 25%. For digit 3 vs. 6, the Korean pilots 16.8%, foreign pilots 15%. Therefore, the pilots are more confused with digit 2 and 3. The countries which cause the callsign confusion more often are China, Thailand, India and Korea. Especially, foreign pilots answered that it was Korea. More than half of the pilots do not want that the suffix is added to callsign.

Table 4. Confusing Rate (%)

Digit	korean	Foreign	Mean
2 vs 3	47.5	57	52.25
2 vs 4	28.9	25	26.95
3 vs 6	16.8	15	15.90

VII. Conclusion

A first step in reducing the incidence of communication problems is to understand why and how they happen. In the past a number of studies have been conducted on the subject of pilot-controller communication errors. The vast majority of these studies were conducted in the United States (e.g., Grayson and Billings, 1981; Monan, 1983; Monan, 1986; Morrison and Wright, 1989; Morrow, Lee, and Rodvold, 1993; Cardosi, Falzarano, and Han, 1999; Cardosi, and Yost, 2001). It is possible that some of the older studies do not reflect the current situation in air transport regarding air-ground communication.

Second step is that similar call signs have to be reviewed and modified by schedule management team. Lots of similar call signs were shown and most of the pilots worried about the similar call signs of company. Before an airline discuss similar call sign problems with ATC authorities, the airline has to adjust its own similar call signs. The 'K' Airline adjusted similar call sign in company already.

Third step is that the company has to inform the similar call signs in same air route and/or at same time to the all flight crew. The flight crew has to be recognized the problem of similar call sign and pays attention during flight. Company may not resolve all of the problems.

The similar call signs that mentioned above should be adjusted as soon as practical. However, some of the similar call signs may not be adjusted due to any reason. If the flight crew recognizes the similar call sign, report to company and information must be updated periodically.

The last step is that the 'Company Scheduling Guidance' should be reviewed and similar call sign confusion with other airlines has to be discussed with ATC authorities in advance.

Further more, similar call sign problems has to be studied by language, country and error type.

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