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Summary

In 1989 the United Kingdom Civil Aviation Authority (CAA) commissioned the Applied Psychology Unit at Cranfield Institute of Technology to conduct an investigation in order to determine:

(i) The most effective means by which passengers could be encouraged to pay more attention to safety procedures.

(ii) The effectiveness of the method currently adopted by operators of communicating safety information to passengers and to assess its effectiveness for conveying important safety procedures.

The investigation comprised of a passenger survey conducted using a self-completion questionnaire and two separate simulated pre-warned ditching situations on board a stationary aircraft.

One hundred and sixty six passengers responded to the questionnaire survey which investigated the influence of passenger attitudes towards the safety briefing, their perceptions of the role of cabin attendants and their perceptions of the severity of aircraft emergencies on their motivation to attend to safety procedures.

Passengers' opinions of the effectiveness of possible alternative introductions to the safety briefing indicated that an approach in which passengers are informed of the importance of their knowing how to carry out safety procedures, would be more likely to encourage attention to the safety briefing and the safety card. The cabin attendants were perceived to be primarily responsible for passenger safety in an emergency, suggesting that the lack of attention to safety information on the part of some passengers may be attributable to a belief that they need not assume responsibility for their own safety.

Previous findings that passengers tend to underestimate their chances of survival in aircraft accidents (Ref 1) were supported by passengers' relatively low perceptions of their survival chances in eight individual aircraft emergency situations. There is a need to make passengers more aware that their survival chances are higher than they currently perceive them to be, and to emphasise that the use of safety equipment may influence their survival in an emergency, if passengers are to be successfully encouraged to pay more attention to safety procedures.

Almost 80% of passengers thought that the operators should encourage passengers to be more safety conscious. The passengers suggested ways in which this could be achieved and these included tighter control over the stowage and quantity of cabin baggage, the banning of smoking, alcohol and duty free goods, making safety briefings more interesting or varied and the promotion of safety education.

In both the simulated pre-warned ditchings, volunteers boarded a stationary aircraft and were given a safety briefing. An emergency situation was simulated and the volunteers were instructed to put on their lifejackets, and then to brace for an emergency landing.

Volunteers' knowledge of the less complicated safety briefing and card information such as the location of the oxygen masks and when and how to inflate the lifejacket, was generally high. However, volunteers' knowledge of more complex procedures, such as the correct

method of donning the lifejacket and of operating the overwing and main exits, was more limited. A visual demonstration was shown to significantly increase the likelihood that volunteers would know the correct method of operation of the oxygen mask, the correct method of donning the lifejacket and that they could adopt an effective brace position. A comparison of lifejacket donning times indicated that volunteers who donned their lifejacket four hours after having seen a standard safety briefing were not significantly slower than those who donned the jackets 5–10 minutes after the briefing. Volunteers' opinions indicated that emphasis on the importance of volunteers knowing how to operate items of safety equipment in briefings would not put the majority of passengers off flying and would be likely to increase attention to safety briefings.

A number of human factors problems were identified as affecting volunteers' ability to carry out safety procedures quickly and effectively. For example, the lack of specific information (in all of the briefings investigated) led to problems in locating and retrieving the lifejacket from under the seat. Inadequate instructions led to the loss of valuable time as passengers tried to find out how to open the lifejacket container and identify the inside and outside of the jacket. These problems indicate the need for more specific information to be included in the safety briefing and on the card to ensure that the correct method of operating safety equipment and the appropriate procedures to adopt are obvious to passengers.

Although air travel was considered by passengers to be the safest form of transport, aircraft accidents were perceived to be less survivable than accidents involving other forms of transport. In order to improve the accuracy of passengers' perceptions of aircraft accident survivability a more realistic image of aircraft safety is required. The public need to be made aware through the media that the majority of aircraft accidents are survivable and the information contained in safety briefings and on safety cards may save their lives.

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Overview

The 1990 amendments to the 1989 Air Navigation Order (ANO) (Ref 2; Appendix 1) require operators to inform passengers of the correct safety procedures to adopt in an emergency situation. Operators meet the requirements of the ANO by presenting a safety briefing to passengers prior to take-off and also by making a safety card available to all passengers. Unfortunately, there is a tendency for some passengers to pay little attention to this safety information. This can be due, for example, to frequent flying which may lead some passengers to think that they know all the safety procedures for all aircraft types. However, some aircraft accident reports contradict this belief, as passengers are often unable to carry out safety procedures quickly and may have problems in operating items of safety equipment correctly in an emergency. In the most serious accidents this can lead to unnecessary loss of life.

Awareness of the problems of passenger attention to, and knowledge of, safety procedures led in 1989 to the United Kingdom Civil Aviation Authority (CAA) commissioning the Applied Psychology Unit at Cranfield to conduct an investigation in order to determine:

(i) The most effective means by which passengers could be encouraged to pay more attention to safety procedures.

(ii) The effectiveness of the method currently adopted by operators of communicating safety information to passengers and to assess its effectiveness for conveying important safety procedures.

The results of this investigation are described in this Paper which comprises three separate studies, written in the form of two separate reports. The studies described in the two reports are briefly outlined as follows:

REPORT 1

Study 1: Passenger Survey

The first report describes a self-completion questionnaire used in a postal survey of passengers who had recently flown for either business or leisure purposes. The objectives of the study were to examine the influence of passengers' attitudes towards safety briefings and to determine the most effective ways in which passengers could be encouraged to pay increased attention to safety briefings and cards. Passengers' opinions of a range of aviation issues, including current safety briefings, the role of cabin attendants and their perceptions of aircraft accident survivability were obtained.

REPORT 2

The second report describes two separate studies which are referred to throughout the report as the Safety Card Tests and Safety Briefing Tests.

Study 2: Safety Card Tests

An experimental study was conducted in order to examine the effectiveness of airline safety cards for conveying safety procedures to passengers. Volunteer members of the public were recruited to take part in a pre-warned ditching which was simulated on board a stationary

aircraft. Participants were required to carry out some of the procedures demonstrated in briefings or illustrated on safety cards. The simulated ditching allowed the identification of any human factors problems experienced by participants as they carried out the procedures.

Study 3: Safety Briefing Tests

In the Safety Briefing Tests a second pre-warned ditching situation was simulated in order to investigate the influence of varying the introduction to safety briefings on participants' performance of safety procedures. The study also enabled an assessment of the relative ease with which participants were able to carry out the procedures. In addition, participants' perceptions of the relative safety of air travel compared with other forms of transport were obtained.

Finally, the conclusions and recommendations of the research programme described in the three studies are presented at the end of the second report.

Report 1 Passenger Survey

1 INTRODUCTION TO STUDY ONE: PASSENGER SURVEY

1.1 Legislation

The 1990 amendment to Article 36 of the 1989 Air Navigation Order (ANO) (Ref 2, Appendix 1) specifies:

'The commander of an aircraft registered in the United Kingdom shall take all reasonable steps to ensure –

(a) before the aircraft takes off on any flight, that all passengers are made familiar with the position and method of use of emergency exits, safety belts (with diagonal shoulder strap where required to be carried), safety harnesses and (where required to be carried) oxygen equipment, lifejackets and the floor path lighting system and all other devices required by or under this Order and intended for use by passengers individually in the case of an emergency occurring to the aircraft; and

(b) that in an emergency during a flight, all passengers are instructed in the emergency action which they should take.'

In addition, it is a requirement of the 1990 amended Article 13 (5) of the 1989 ANO (Ref 2, Appendix 1) that:

'The position of equipment provided for emergency use shall be indicated by clear markings in or on the aircraft. In particular in every public transport aircraft registered in the United Kingdom there shall be –

(a) provided individually for each passenger; or

(b) if the Authority so permits in writing, exhibited in a prominent position in every passenger compartment –

a notice relevant to the aircraft in question containing pictorial:

(i) instructions on the brace position to be adopted in the event of an emergency landing;

(ii) instructions on the method of use of the safety belts and safety harnesses as appropriate;

(iii) information as to where emergency exits are to be found and instructions as to how they are to be used;

(iv) information as to where the lifejackets, escape slides, liferafts and oxygen masks, if required to be provided by paragraph (2) of this article, are to be found and instructions as to how they are to be used.

Operators meet the requirements of the 1990 amendments to the 1989 ANO (Ref 2, Appendix 1) by presenting information regarding safety equipment and appropriate procedures in the form of a safety briefing prior to take-off and on a safety card which is made available to all passengers. However, it has been reported that many passengers overestimate their knowledge of these safety procedures (Refs 1 and 3), and fail to pay attention to either safety briefings or cards. As a result, when an accident occurs passengers are often unable to locate and operate safety equipment quickly and effectively and, in the most serious accidents this can lead to loss of life.

1.2 Safety information and passenger attention

A number of operators have attempted to improve passenger attention and to convey safety information more effectively using video safety briefings rather than a live demonstration by cabin attendants. Although there may be differences in the method of presentation of safety briefings, the content and user friendly manner in which this information is conveyed to passengers varies little between operators. This may generate a feeling of familiarity with the briefings and may also give regular travellers the impression that they know all the safety information. The effectiveness of current, and possible alternative, styles of introducing and presenting safety briefings have not been assessed in previous research. For example, the possible advantages or disadvantages (for encouraging passenger attention to the safety briefing) of using video briefings, or an introduction to the briefing by the Captain, or emphasising the fact that safety equipment and exit configuration may not be the same on all aircraft, have not been evaluated. Some of these alternative styles of briefing are evaluated in the second part of this report.

A lack of responsibility for their own safety may explain why some passengers pay little attention to safety procedures. This may partly be due to the presence of cabin attendants who are highly trained in safety procedures in order to maintain the safety of the aircraft and those on board. The 1990 amendments to the 1989 ANO (Ref 2, Appendix 1) specify that the primary responsibility of cabin attendants is the safety of passengers. Although they are required to assign a higher priority to tasks involving safety issues, the duties of cabin attendants are extremely varied and in addition to informing passengers of safety procedures, includes serving meals, selling duty free goods and looking after passengers with special needs or requirements. The relative importance passengers assign to different cabin attendant tasks may indicate the extent to which cabin attendants are perceived to be responsible for passenger safety. These perceptions may give some indication of the extent to which a belief that cabin attendants will always be there to help in an emergency contributes to passengers failing to attend to safety information.

Some passengers may perceive their chances of surviving an aircraft accident are extremely low and believe there is little they can do to save themselves in an emergency (Ref 1) or alternatively they may believe that 'it won't happen to them'. For example, in a telephone survey in 1979, Johnson (Ref 1) reported a tendency for passengers to be pessimistic about their survival chances in aircraft accidents.

However, statistics indicate that 90% of all accidents are survivable (Refs 4 and 5), that is, the impact forces involved are within human tolerance for at least some of the occupants. In addition, 70% of all passengers in aircraft accidents are involved in accidents in which there are no fatalities. A further 10% of passengers survive

accidents in which some fatalities do occur (personal communication from Frank Taylor based on an update of accident statistics between 1955–1989; Refs 4 and 5). It can be the delays associated with the evacuation of all passengers in the event of a ditching or fire which can lead to fatalities rather than the impact itself. For example, evidence from accidents involving fire, such as occurred at Manchester in 1985, indicates that the majority of people who have died as a result of fire have done so in accidents where few have died as a result of the impact (Ref 6).

It is important to determine whether passengers recognise that some aircraft accidents are more survivable than others, and if so, how likely they perceive their chances of surviving a variety of aircraft accidents to be. As passengers' perceptions of accident survivability are likely to influence their attentional behaviour, this may have implications for the design and content of safety briefings and cards and for possible alternative methods of conveying safety information.

Passengers' lack of attention towards safety procedures is a problem of concern to the aviation industry, and the UK Flight Safety Committee has in recent years raised their concerns with the CAA. As a result the Air Travellers' Code was issued by the CAA in the Spring of 1990 (see Appendix 2). The opportunity was taken in this study to seek passengers' views on whether they thought operators should encourage passengers to be more safety conscious, and if so, how this could be achieved.

One possible alternative method for conveying safety information could be to include details of general safety procedures with flight tickets. Operators currently print information regarding baggage and other restrictions on tickets. The extent to which passengers were aware of the information included with their tickets was identified in this survey to explore the potential benefits of this source of information dissemination.

Passengers vary greatly in their flying experience and this may affect their attentional behaviour, opinions on content and style of presentation of safety briefings, perceptions of their survival chances in an accident and their awareness of the need to be informed regarding safety procedures. For example, frequent flyers, business passengers and those who fly alone are less likely to pay attention to briefings (Refs 1 and 3). Young male passengers have also been reported to be less likely to pay attention to briefings (Ref 3) possibly due to a tendency for some young men to project an image of themselves to others as being unconcerned about possible risks. Consequently, individual characteristics will be examined to determine whether they influence passenger attitudes towards safety procedures.

1.3 Objectives

The objectives of the survey were to examine the influence of passengers' attitudes toward the safety briefing and to determine the most effective ways in which passengers could be encouraged to pay increased attention to both the safety briefing and safety card. The following passenger attitudes, opinions and perceptions were examined:

(i) passengers' opinions of safety briefings and of the likely effectiveness of possible alternative styles of introduction and presentation of briefings;

(ii) passengers' perceptions of the role of cabin attendants;

(iii) passengers' perceptions of the severity of a range of potential aircraft emergencies and the influence these perceptions would have on their behaviour;

(iv) opinions of the methods which operators could use to encourage passengers to be more safety conscious;

(v) passenger awareness of safety information included with flight tickets; and

(vi) the influence of individual differences between passengers (for example, age, sex, main purpose and frequency of air travel) on their attitudes towards safety briefings and cards and on their perceptions of the primary responsibilities of cabin attendants.

2 METHOD

A self-completion questionnaire was distributed through travel agents to air travellers.

2.1 Questionnaire design

The objectives described in Section 1.3 were examined in the Questionnaire which is described as follows.

2.1.1 *Alternative introductions to the safety briefing*

Possible alternative styles of introducing the briefing were included in the Questionnaire to ascertain passengers' opinions on their likely effectiveness as this may be of benefit for the decision-making process regarding possible changes to briefings. The alternative introductions were:

(1) introduction by the Captain;

(2) video briefing;

(3) cabin attendants being more interested in presenting the safety briefing;

(4) telling passengers that paying attention can save their lives in an emergency;

(5) telling passengers that evidence shows that paying attention can save their lives in an emergency; and

(6) telling passengers that as the safety equipment on this aircraft may differ from that on other aircraft it is in their own best interests to pay attention.

2.1.2 *The role of the cabin attendants*

Passengers were asked to rank a number of cabin attendant tasks in order of importance. The tasks listed are described as follows (but were not necessarily asked in the order shown):

Being responsible for passengers' safety in an emergency;

Helping passengers in an emergency;

Serving meals and drinks;

Selling duty free goods;

Informing passengers of safety procedures;

Looking after passengers that become ill;

Making sure passengers keep to rules (eg smoking);

Being pleasant to passengers; and

Looking after passengers needs.

2.1.3 *Passengers' perceptions of the severity of aircraft emergency situations*

The questionnaire described eight scenarios of technically survivable aircraft emergencies based on real emergency situations. Passengers estimated (in percentage terms) their chances of surviving each emergency. Passengers' perceived chances of survival in each emergency scenario were compared with the average actual survival of passengers involved in the real emergency situations over a ten year period between 1981 and 1990 (Ref 7). This allowed a direct comparison between passengers' perceived survival chances and the average actual survival of passengers in the real emergencies.

2.1.4 *Methods which operators could use to encourage passengers to be more safety conscious*

Passengers were asked whether operators should encourage passengers to be more safety conscious. Passengers answering affirmatively were then asked for suggestions regarding possible ways this could be achieved.

2.1.5 *Passengers' awareness of safety information*

Enclosing safety information with tickets, for example, the CAA Air Travellers' Code (Appendix 2), has been suggested as a possible way to inform passengers of safety procedures prior to take off. A number of operators enclose some details of safety information and baggage restrictions with or on flight tickets. Passengers were asked if they were aware of any such information on their tickets, to determine how effective this might be as a means of conveying safety information.

2.1.6 *Individual characteristics of passengers*

Finally, passengers were asked to indicate their age, marital status, how often they had flown in the last two years and the main purpose of their air travel.

2.2 Administration of the questionnaire

Twelve travel agents agreed to help with the research programme and of the 880 questionnaires delivered to these travel agents 636 questionnaires were distributed to passengers.

3 RESULTS

3.1 Sample achieved

One hundred and sixty six questionnaires were returned representing a sample size of 26.1% of the questionnaires distributed. The response rate is slightly lower

than average for a postal survey but may be due to the length of the questionnaire and sensitive nature of some questions. As for all postal surveys, the response rate may include some bias due to possible different experiences and interests between the passengers who responded to the survey and those who did not.

3.1.1 *Passengers*

Passengers' age ranged between 17 and 74 years with a mean of 42.6 years. Seventy two per cent of passengers were male and 28% female. All but one passenger (99.4%) had flown before with 58.2% flying mainly for business and 41.2% mainly for holiday reasons.

3.2 Passengers' opinions on the effectiveness of alternative introductions to the safety briefing

The alternative introductions to the briefing were rated by passengers according to the extent to which they were considered to be likely to encourage passengers to pay more attention. Table 1 shows the order in which passengers considered the introductions to be most effective.

Table 1 Percentage of passengers rating each introduction to the safety briefing on how likely it would be to encourage passengers to pay more attention

	Very Likely	*Likely*	*Neither Likely nor Unlikely*	*Unlikely*	*Very Unlikely*
Telling passengers that as the safety equipment on this aircraft may differ from that on other aircraft it is in their own best interests to pay attention	35.5	43.4	10.8	3.6	3.6
Cabin attendants being more interested in presenting the safety briefing	27.7	39.8	19.3	7.8	1.2
Telling passengers that evidence shows that paying attention can save their lives in an emergency	27.7	38.6	19.9	7.8	2.4
Telling passengers that paying attention can save their lives in an emergency	25.3	36.7	22.9	11.4	1.2
Introduction by the Captain	21.1	33.7	21.7	15.1	4.8
Video briefing	16.3	33.7	22.3	18.7	6.6

NOTE: Due to a small percentage of missing responses to this question, the percentage of participants rating the effectiveness of each briefing type does not add up to one hundred per cent.

Table 1 shows that the introduction considered by 35.5% of passengers to be very likely to encourage attention to the safety briefing was 'Telling passengers that as the safety equipment on this aircraft may differ from that on other aircraft it is in their own best interests to pay attention'. Only 16.3% of passengers thought the use of a video would be very likely to encourage passengers to pay more attention to briefings although with frequent use of video the novelty value may deteriorate. However, since a limited number of aircraft had video equipment installed at the time of the survey it is likely that many of the passengers had not seen a video briefing.

Analysis was conducted (using correlations and t-tests) to investigate whether a relationship existed between individual characteristics of passengers and their opinions of the possible effectiveness of alternative styles of presenting briefings. A number of significant results were observed. An 'Introduction by the Captain' was considered to be significantly more likely to motivate passengers to pay attention by infrequent ($r=.1460$, $p<.05$[1]) rather than frequent flyers.

Holiday passengers were significantly more likely (t[2]$=-2.51$, $p<.025$) than business passengers to think that 'Telling passengers that evidence shows that paying attention can save their lives in an emergency' would be likely to motivate passengers to pay attention.

'Telling passengers that paying attention can save their lives in an emergency' was considered to be significantly more likely by holiday passengers ($t=-2.96$, $p<.01$) to encourage attention.

3.3 The role of cabin attendants

Passengers were asked to rank cabin attendant tasks in order of priority. The tasks ranked as the three most important, and the percentage of passengers ranking them as first, second and third most important tasks are shown in Table 2.

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1 The 'r' value is obtained when using correlations and indicates the strength of the concomitant variation of paired measures. The accompanying 'p' value refers to the means by which we decide whether observed differences reflect true differences or arose because of sampling error. In the text, the 'p' value indicates the likelihood of the observed value being due to chance factors rather than a genuine difference between the paired measures.

2 The t-test is used to establish whether any statistically significant differences exist between the sample means of the data obtained from two conditions. Whether the 't' value is sufficiently large to achieve significance will be influenced by the differences between the means, the variability in the data and also the number of cases per condition.

Table 2 The cabin attendant tasks ranked by the passengers as being the first, second and third most important (figures show percentage of passengers giving each ranking)

	1	2	3
Being responsible for passengers safety in an emergency	41.6	24.1	11.4
Helping passengers in an emergency	18.7	42.2	20.1
Informing passengers of safety procedures	19.9	10.8	28.3
Looking after passengers needs	15.7	5.4	9.0
Making sure that passengers keep to rules	7.2	4.8	8.4
Looking after passengers who become ill	3.6	4.2	8.4
Being pleasant to passengers	1.8	1.2	4.8
Serving meals and drinks	1.2	2.4	4.8
Selling duty free goods	0.6	0.6	1.2

NOTE: Some participants ranked more than one task of equal importance with the consequence that the percentages assigned to each column do not add up to one hundred per cent.

It can be seen from Table 2 that 41.6% of passengers considered 'Being responsible for passengers safety in an emergency' to be the most important task and 24.1% of passengers considered it to be the second most important task. In total 65.7% of passengers thought this was one of the two most important tasks.

'Helping passengers in an emergency' was rated as either the most important or the second most important task by 60.9% of passengers. 'Informing passengers of safety procedures' was rated as either the first or second most important task by 30.7% of passengers.

Analysis (using t-tests, correlations and chi-square) revealed a number of relationships between individual characteristics of passengers and their perceptions of the role of cabin attendants. For example, informing passengers of safety procedures, was considered to be of lower priority by males ($t=2.25$, $p<.05$), business passengers ($t=3.83$, $p<.001$) and more frequent flyers ($r=.2599$, $p<.001$). However, as males were observed to be significantly more likely to fly for business (chi-square[3] $=19.83$, $p<.001$) and more regularly ($r=.3097$, $p<.001$) than females, the inter-relationship between these factors is likely to partly explain this difference. Younger passengers placed less importance on cabin attendants being responsible for passengers in an emergency ($r=.1409$, $p<.05$) than older passengers.

Serving meals and drinks was considered more important by business ($t=-2.41$, $p<.025$) and younger passengers ($r=.1687$, $p<.025$). However, younger passengers placed less importance on cabin attendants being responsible for passengers in an emergency ($r=.1409$, $p<.05$) and on looking after passengers who become ill ($r=.2156$, $p<.01$).

[3] Chi-square is a statistical technique applied to qualitatively different categories of data in order to compare how the cases which fall into each category differ from that expected by chance.

3.4 Passengers' perceptions of their survival chances in the emergency scenarios

Passengers perceived they had between 52% and 75% probability of surviving the potential accident situations described in the eight emergency scenarios. This indicates that some emergency situations were perceived by passengers to be more survivable than others. Table 3 shows passengers' perceived order of severity of the eight emergency situations based on the probability of their survival.

Table 3 Mean perceived survival chances of passengers and average survival of those involved in the real emergency situation (figures in percentages)

	Perceived survival chances	Average actual survival*
Explosion	52.20	55.91
Ditching	52.51	66.14
Severe turbulence	64.36	99.39
Emergency landing	68.25	95.99
Hijack	69.43	74.58
Birdstrike	70.24	95.12
Aborted take-off	71.11	97.54
Toilet fire	75.60	71.80

* Average actual survival is based on the percentage of passengers surviving each type of incident on scheduled and non-scheduled passenger aircraft worldwide in the ten year period between 1981–90 (Ref 7).

Table 3 indicates the explosion and ditching scenarios were perceived to be the least survivable with only slightly more than a 50% chance of survival. It can be seen from Table 3 that passengers' perceived order of severity of the scenarios did not coincide with the averaged order of severity of the real emergencies. Table 3 also shows that passengers' perceptions of their survival chances in seven of the emergency scenarios were lower than in the real situations.

3.5 Methods which operators could use to encourage passengers to be more safety conscious

In response to the question 'Should operators encourage passengers to be more safety conscious', 78.92% of passengers agreed and only 19.88% disagreed, although 9% considered that the operators themselves should be more safety conscious, for example, 3.61% stated that operators should invest in better safety systems. Passengers suggested a number of methods which operators could use in order to encourage passengers to be more safety conscious. The most commonly suggested methods or issues, and the percentage of passengers suggesting each method or issue, are shown in Table 4.

Table 4 Methods which operators could use to encourage passengers to be more safety conscious

	Percentage of passengers suggesting each method
Reviewing the safety briefing	15.67
Tighter control of cabin baggage	13.25
Safety information in the departure lounge informing passengers what to do in an emergency eg videos, posters	7.83
Banning smoking	7.23
No duty free goods	6.02
Safety leaflet with tickets, at check-in or departure lounge	4.82
More interested approach by cabin attendants	4.22
Video briefing	4.22
More detailed safety leaflets	4.21
By investing in better aircraft safety systems	3.61
Making sure that passengers can find and know how to use safety equipment	3.61

It can also be seen from Table 4 that the issues considered to be most important by passengers were reviewing the way in which briefings are presented, tighter control over the amount and correct stowage of cabin baggage, availability of safety information in the departure lounge and banning of smoking and restrictions on the carriage and sale of duty free goods. The variety of issues raised suggests that some passengers would like to see greater emphasis on safety by the operators.

3.6 Passenger awareness of safety information included with flight tickets

More than half the passengers (52.41%) were aware that some safety information is included with flight tickets. Information most frequently identified (by 47.59%) related to the carriage of restricted articles. Table 5 gives full details of safety information reported by passengers as being enclosed with their tickets.

Table 5 Passengers' awareness of safety information included with flight tickets (figures in percentages)

	Percentage of passengers aware of safety information with flight tickets
Restricted articles	47.59
Baggage size and weight	4.82
Compensation and disclaimers	3.61
Smoking restrictions	1.20
Regulations on transportation of animals	1.20
No personal stereos/radios	0.60
Do not leave baggage unattended	0.60
Health eg pregnancy	0.60
Conditions of entry on aircraft	0.60
Use of lighters	0.60

It can be seen from Table 5 that passenger awareness of any details other than restricted articles enclosed with their flight tickets was very low, suggesting that any attempt to increase passenger safety awareness by enclosing safety information with tickets may be of limited benefit.

4 DISCUSSION

4.1 Passenger opinions on the effectiveness of alternative introductions to the safety briefing (see Table 1)

Passengers' opinions of the proposed alternative styles of introducing the briefings tended to be favourable, suggesting that change in presentation style would be likely to increase passenger attention possibly due to its novelty value. The introduction of the briefing considered to be most effective for encouraging attention emphasised to passengers that it would be in their own best interests to pay attention as the safety equipment may differ between aircraft. This implies that many passengers may think the safety equipment on all aircraft operates in the same manner although those sampled may have been more aware of these differences.

Although some operators make certain that cabin attendants ensure that passengers pay attention to briefings, other operators have introduced the briefing with the statement 'we are required to .....' which may be self-defeating and unlikely to encourage passenger attention. The importance of all cabin attendants emphasising the value of briefing information was considered to be of benefit by those who had previously experienced an aircraft emergency. This suggests their experiences had made them appreciate the importance of safety procedures for assisting their survival. These passengers appeared to believe they would have been more inclined to pay attention to safety information prior to the emergency occurring, if cabin attendants had been more convincing in their manner.

Holiday passengers thought attention to the briefing would be increased if passengers were told that paying attention could save their lives in an emergency. As the majority of holiday passengers tend to fly infrequently, they will have less cumulative knowledge of safety procedures than more frequent flyers (Ref 3) and may be less aware of the benefits of knowing how to use safety equipment. Emphasis on the importance of safety information is therefore likely to encourage the attention of these less frequent flyers.

An introduction to the briefing by the Captain was considered by passengers to be one of the least effective alternatives in this survey. Interestingly, this contrasts with the results of the Safety Briefing Tests described in the second report in this Paper (and also in Ref 8) which suggested that some reduction in the time taken by passengers to don lifejackets may be possible if the Captain presented or introduced the briefing. Less frequent passengers thought a briefing given by the Captain would be effective suggesting these passengers would be likely to pay attention to a briefing given by an authoritative figure such as the Captain. The same study also gives some consideration to how much emphasis can be placed on safety briefing information without frightening passengers.

The use of video briefings was considered by passengers to be the least effective of the alternative briefings suggested. However, this is not necessarily based on experience of viewing videos as the number of passengers who had seen video briefings was not established. Videos can provide information that cannot be readily demonstrated by cabin attendants, for example, brace position, exit operation and slide deployment and use of flotation equipment. The video briefing is a relatively new innovation currently used by some operators and may be considered to be interesting by some passengers because of its novelty value but it may be no more likely than current briefings given by cabin attendants to command the attention of the majority of passengers.

4.2 The role of cabin attendants (refer to Table 2)

The two cabin attendant tasks considered to be most important by passengers were those which involved ensuring the safety of passengers in an emergency ('Being responsible for passengers safety in an emergency' and 'Helping passengers in an emergency'). The emphasis on the importance of these two tasks supports the view that cabin attendants are perceived to be responsible for the safety of passengers. One of the dilemmas is that their very presence may imply to many passengers that they do not need to take responsibility for their own safety.

'Informing passengers of safety procedures' was considered to be the third most important task. Cabin attendants may perceive this to be one of their primary tasks, but the order in which these tasks were ranked suggests that passengers do not consider they should assume responsibility for their own safety. This may be due to some of the reasons why they fail to pay attention to safety information expressed in Section 1.2 (for example, low perceptions of survival chances or a feeling of 'it won't happen to me').

4.3 Passengers' perceptions of their survival chances in the emergency scenarios (refer to Table 3)

The variations observed among passengers' perceptions of their survival chances in the eight potential accident scenarios indicates that some aircraft emergencies were perceived to be more survivable than others. However, passengers' perceptions of their survival chances (which ranged between 52% and 75%) were lower than the

average actual survival of passengers involved in seven of the eight real emergency situations on which the scenarios were based. Interestingly, passengers' perceptions of their survival chances for severe turbulence, aborted take off, emergency landing and birdstrike (which were the least threatening of the real situations) were considerably lower than the average passengers' survival.

The survey results support the previous finding (Ref 1) that passengers' underestimation of their survival chances is likely to contribute to their failure to pay attention to safety procedures. As described in Section 1.2 (Refs 4 and 5), passenger awareness that most aircraft accidents are survivable needs to be increased. This has important implications for design, content and presentation of safety information. A more active approach to briefings is needed (see Section 4.1) in which emphasis is placed on the fact that an ability to implement safety procedures quickly and correctly is likely to increase a passenger's chances of survival in an emergency. In addition, other methods which could be used by the aviation industry for increasing passenger safety education are discussed in Section 4.4.

4.4 Methods which the operators could use to encourage passengers to be more safety conscious (see Table 4)

Almost 80% of passengers agreed that operators should encourage passengers to be more safety conscious (although only 3.61% of these stated that the operators themselves should be more safety conscious by investing in better safety systems and making aircraft safer).

Passengers' suggestions regarding methods which operators could use to encourage passengers to take safety more seriously were extremely varied and indicate the majority of passengers in this survey were concerned about safety issues. **Most suggestions made by passengers focused on possible changes that could be made to briefings to make them more varied, interesting and less routine.** Ideas for how this could be achieved included a more interested approach by cabin attendants (4.22%), a video briefing (4.22%), more detailed safety leaflets (4.21%), or safety leaflets prior to boarding (4.82%), for example, at check-in or in the departure lounge. The provision of leaflets at check-in or in the departure lounge would present enormous logistical problems for operators. For example, substantial supplies of leaflets for all aircraft types would need to be maintained and in the event of last minute aircraft changes the wrong leaflets may be distributed. However, the quantity and variety of these suggestions implies that passengers feel operators could improve their presentation of safety information and that this is an issue which needs to be addressed by operators.

More than 13% of passengers expressed concern about the quantity of hand baggage and the correct stowage of hand baggage, suggesting that they believe operators should exercise stricter control over baggage restrictions to improve safety within the cabin.

The need for passenger education was also identified as being important. Departure lounge information was suggested by passengers as one way in which air travellers could be educated about safety procedures and might be a constructive way for passengers to spend their time whilst waiting to board aircraft. For example, leaflets, posters, or videos, could be made available to passengers, although care would need to be taken to ensure information provided was not specific to aircraft or equipment type. A question and answer format could be used to inform passengers of correct procedures to adopt in an emergency, and reasons why these procedures are important. Alternatively, a computerised game could provide a particularly interesting and effective way in

which to educate children about cabin safety. However, implementation of such methods of passenger education would necessitate the full co-operation of airport authorities and operators and would require substantial financial commitment by the aviation industry.

The availability of items of safety equipment (such as emergency exits and lifejackets) in the departure lounge was suggested by some passengers as providing the opportunity for pre-flight practical experience of the correct method of operation of safety equipment. This would give passengers the advantage of practising the correct method of operation of novel safety equipment in a low stress situation which tends to lead to better task performance than in stressful situations (Ref 9).

However, the problems associated with the provision and maintenance of a 'safety centre' in each airport terminal, equipped with a range of aircraft doors, lifejackets, oxygen masks, etc, for all aircraft types, would appear to be insurmountable in the forseeable future. In addition, each centre would need to be staffed by trained personnel who would have to ensure that equipment was operated correctly and with a minimum of risk to untrained passengers. The accidental injury of any passenger or incorrect interpretation of training could result in litigation which may be counter-productive.

Another suggestion was to provide training for regular passengers so that they could assist cabin attendants in an emergency. This idea has some merit if passengers are properly briefed but they are unlikely to receive the rigorous training given to cabin attendants possibly resulting in inappropriate actions which could jeopardise safety. For this reason a better alternative would be to utilise trained personnel or supernumerary crew by seating them by the self-help overwing exits. This practice has already been adopted by some operators.

Some passengers made suggestions which operators could adopt in order to be more safety conscious. For example, 6% of passengers felt the carriage of alcohol on aircraft represented a fire hazard and that the sale of such duty free items should be restricted. Seven per cent of passengers stated that operators should ban smoking, however, reasons of comfort and not just safety were given for this ban. In addition, a few passengers raised the issues of increasing seating space and legroom in order to improve access to emergency exits. This last item has already been addressed in the CAA change to requirements in Airworthiness Notice 79.

4.5 Passenger awareness of safety information included with flight tickets (refer to Table 5)

Apart from information on restricted articles there is little safety information included with flight tickets. The passenger baggage allowance is usually written on flight tickets and some tickets contain details of insurance liabilities. Interestingly, less than half the passengers (47.59%) reported that information regarding restricted items of baggage, such as aerosols and firearms, were printed on flight tickets. Nearly 5% thought details of baggage size and weight were included, but very few passengers were aware of any other items.

Some 58% of passengers in this survey reported flying mainly for business reasons. Business passengers fly more regularly than holiday passengers (Ref 3) and so may be less likely to examine their tickets carefully due to familiarity. However, enclosing some safety details, such as the CAA Air Travellers' Code (Appendix 2), with flight tickets may be a potentially useful source for conveying information to the less frequent traveller.

Report 2 Safety Card and Safety Briefing Tests

1 INTRODUCTION TO STUDIES TWO AND THREE: SAFETY CARD AND SAFETY BRIEFING TESTS

1.1 Reasons for passengers' inattentive behaviour

As described on page 2 in Section 1.1 of the Passenger Survey report (Report 1), operators present safety information to passengers in the form of a safety briefing given prior to take-off and on a safety card. However, many passengers overestimate their knowledge of these safety procedures (Refs 1 and 3), and fail to pay attention to either safety briefings or cards.

In Section 1.2 of the Passenger Survey report (and also in Refs 1 and 3) a number of reasons have been identified as contributing to passengers failing to pay attention to the safety information. For example, passengers may think that the safety features are the same on all aircraft, that they know all the information as they have seen it before, or that there is no need to know how to operate safety equipment as the cabin attendants will always be there to help them. Another important reason for passengers failing to pay attention is that they tend to underestimate their chances of surviving an aircraft accident (Refs 1 and 3). This underestimation of their survival chances in accidents can have serious consequences for passengers' attentional behaviour. For example, Johnson (Ref 1) expressed concern that if passengers believe that the procedures will not save them in an emergency they are unlikely to pay attention to the safety information.

1.2 Safety cards

Safety cards are designed to convey pictorial information regarding items of safety equipment such as the oxygen mask, the operation of emergency exits and donning of lifejackets, in a linguistically free manner to enable passengers of all nationalities to understand the correct procedures. However, words are included on some cards to supplement pictorial information. The illustrations on different safety cards vary considerably in complexity ranging from simple diagrams to colour photographs but there is no scientific evidence regarding whether complex illustrations or simple diagrams are more informative to passengers in conveying safety procedures.

1.3 Safety briefings

The dilemma facing anyone responsible for designing a safety briefing is how to inform passengers, without alarming them unnecessarily, of the procedures which they might need to carry out in an emergency, and which if correctly carried out could save their lives. Too much emphasis on the importance of knowing how to operate emergency exits or how to don lifejackets could scare nervous or infrequent passengers to such an extent that they may be reluctant to fly. Not enough emphasis on the importance of knowing such procedures may partly explain why many passengers are unable to operate items of safety equipment quickly and correctly when an accident occurs. Clearly, passengers need to improve their knowledge of safety procedures if they are to increase their chances

of survival in an accident. As many passengers fail to pay attention to the current safety briefings this suggests that changes may need to be made to the content and manner of presentation of existing briefings to encourage passenger attention. It is also possible that this would improve the likelihood that passengers will be able to operate items of safety equipment quickly and correctly.

Even if passengers have been attentive to the safety briefing, on a long haul flight they may have difficulty in recalling the correct manner in which to operate novel items of safety equipment which they saw demonstrated several hours earlier. On some aircraft, when there are less than 50 passengers on board, there may only be one cabin attendant and it may not be possible to give the passengers both a visual and a verbal demonstration of the safety equipment. Consequently, passengers who receive only a verbal safety briefing may be at a disadvantage in an emergency due to the lack of a visual explanation of items such as the location of emergency exits, use of oxygen masks, or donning of lifejackets.

Some operators have made changes to both the presentation format and content of safety briefings through the use of videos. Video briefings may encourage passenger attention until the novelty wears off. However, these briefings are usually presented in a manner designed to allay the fears of passengers. The long term effects of video briefings on passengers' attentional behaviour and on their ability to carry out safety procedures are unknown.

To date, there has been a reluctance on the part of some operators to emphasise the importance of paying attention to safety procedures possibly due to a concern that passengers might be alarmed. The effect of emphasising the importance of passengers focusing their attention on safety information is unknown. For example, it may be beneficial to passengers to indicate that safety features may vary on different aircraft. Alternatively, the Captain could emphasise the importance of paying attention to the briefing. These alternatives were examined in this research programme.

1.4 Information sources and perceptions of air safety

As described in Section 1.1 on page 15, previous research has suggested that passengers tend to underestimate their chances of surviving an aircraft accident (Refs 1 and 3). In order to correct this pessimistic view of air travel it is important to identify information sources primarily used by passengers in forming their perceptions of their survival chances, so that the information sources themselves can be corrected. It is also important to determine passengers' perceptions regarding the relative safety of air travel compared to other forms of transport. This could have implications for the way in which the information sources can be correctly informed with regard to the survivability of aircraft accidents.

1.5 Summary

There would appear to be a shortfall between the information which is presented by the operators and the knowledge which is gained by passengers. This report investigates the possible shortfalls in passengers' knowledge of safety procedures in order to determine the extent to which current safety briefings and cards effectively convey safety information to passengers. One way in which this can be achieved is by examining the extent to which passengers are able to carry out safety procedures from information available to them. This would allow any procedures which passengers find difficult to carry out, and reasons for any possible difficulties, to be identified.

This report describes an experimental research programme conducted for the Civil Aviation Authority (CAA) by the Applied Psychology Unit at Cranfield. The research programme investigated volunteers' comprehension of safety procedures demonstrated in briefings and illustrated on cards and their ability to perform some safety procedures. The effect of varying the content of safety information presented in briefings was also examined. The objectives of the research programme were:

Objectives:

(1) To determine the effectiveness of current safety cards for conveying safety information.

(2) To investigate the effect of varying the content of safety briefing information on passenger attention and ability to carry out safety procedures.

The research programme design involved two independent series of experimental tests. *They are referred to in this report as Safety Card Tests and Safety Briefing Tests.* For both series of tests, the same emergency situation was simulated on board a stationary Trident aircraft sited on the airfield at Cranfield. Volunteers took part in groups of fifteen and were only permitted to participate in one of the tests. The ability of volunteers to correctly operate seat belts, don lifejackets and adopt the brace position from safety information was recorded.

2 METHOD

2.1 Safety Card Tests

To investigate the effectiveness of the safety cards, one of four different cards was made available to each group of volunteers. The four safety cards selected for evaluation were modelled on those used by British operators. The illustrations on these cards ranged in complexity from simple diagrams to colour photographs. Symbols indicating correct procedures were included on all four cards, although the meaning of these symbols was only explained on one card. On two cards some of the illustrated procedures were explained by words. The four cards are briefly described:

Card 1 Simple diagrams – some symbols but no words.

Card 2 Diagrams – some symbols explained by words.

Card 3 Diagrams with some words explaining procedures.

Card 4 Photographs with some words explaining procedures.

To ensure that all information contained on the cards was directly applicable to the Trident aircraft it was necessary to modify the exit illustrations on all four cards.

2.1.1 *Questionnaire design*

A questionnaire was designed to assess volunteers' knowledge of additional safety procedures illustrated on the cards. For example, the location and method of operation of oxygen masks, inflation of lifejackets, operation of overwing and main exits and use of escape slides. Volunteers also provided information as to their age, sex and frequency and purpose of air travel.

2.2 Safety Briefing Tests

To investigate the effect of varying the content of safety briefing information, one of five alternative safety briefings were given to each volunteer group. The five safety briefings were:

(i) *Standard Briefing:* A standard safety briefing as required by a UK operator to provide baseline data of the current level of passenger ability to carry out safety procedures 5–10 minutes after a briefing.

(ii) *Delayed Response:* A standard safety briefing as for (i) above but with a four hour delay before volunteers were required to carry out safety procedures.

(iii) *No Demonstration:* A standard safety briefing as given by a UK operator but with no visual demonstration of safety equipment or exit location by a cabin attendant. Volunteers carried out safety procedures 5–10 minutes after the briefing.

(iv) *Modified Briefing:* A standard safety briefing, as in (i) above, but with the inclusion of the sentence 'As the safety equipment on this aircraft may differ from that on other aircraft it is in your own best interest to pay attention.' Volunteers were asked to carry out safety procedures 5–10 minutes after the briefing.

(v) *Captain's Briefing:* As in (i) above, but with the entire safety briefing spoken by the Captain. Volunteers carried out safety procedures 5–10 minutes later.

2.2.1 *Questionnaire design*

Volunteers completed a questionnaire designed to assess the ease or difficulty with which they were able to carry out safety procedures. The questionnaire also identified volunteers' opinions of briefings, their attitudes towards air safety and their perceptions of the relative safety of air travel.

2.3 Data acquisition

Knowledge of emergency procedures illustrated on safety cards and included in briefings were assessed using data obtained from:

(i) video cameras used to film the volunteers during the entire simulated emergency;

(ii) observational assessments (recorded during the test) of the volunteers' performance of safety procedures;

(iii) self-completion questionnaires.

2.4 Knowledge of safety card and briefing information

Knowledge and comprehension of safety card and briefing information were assessed according to:

(i) the ability of each volunteer to locate, remove and put on a lifejacket quickly and correctly;

(ii) the ability of volunteers to operate seat belts correctly and adopt an appropriate brace position;

(iii) volunteers' answers to questions on the method of use of oxygen masks, lifejackets, location and operation of exits and use of the emergency slides.

2.5 Procedure

Volunteer members of the public were recruited by local advertising to participate in the tests for an attendance fee. Every endeavour was made to recruit volunteers who were proportionately representative of air travellers in terms of sex, age and main purpose of flight (Ref 10). A stationary Trident aircraft at Cranfield was used to introduce realism. Once aboard the Trident, volunteers were given a safety briefing by a member of the research team trained and dressed as a cabin attendant.

The procedure for the two series of tests will be described separately.

2.5.1 *Safety Card Tests*

Prior to each test, lifejackets were located in the underseat stowage containers in the Trident. The lifejacket installation evaluated in these tests was that in existence prior to Appendix 27 of AN 12 (1981) – (Appendix 3 of this report). AN 12 requires that consideration should be given to the method of removing the lifejacket from its stowage position during seat approval and that it should be possible to retrieve the lifejacket with the seatbelt fastened. All seat belts were tightened or loosened randomly to such an extent that all passengers would be required to adjust them to ensure a snug fit when fastened.

Volunteers were randomly assigned to one of four independent groups to allow the effectiveness of each card to be investigated, that is, each group of volunteers saw one safety card only. Volunteers were also randomly assigned to seats on the aircraft and wore vests indicating their seat number. All volunteers were briefed as to the nature of the study, that is, it concerned aviation safety and that they would have to carry out safety procedures aboard a stationary aircraft. Volunteers were then escorted to the airfield and seated aboard the Trident aircraft.

Once seated, volunteers were given a pre-flight safety briefing by the cabin attendant in which their attention was drawn to the safety card. During the briefing the cabin attendant demonstrated how to fasten, adjust and unfasten a seat belt, how to use the oxygen mask, and how to don and tie the lifejacket tapes. After the briefing, the cabin attendant ensured that each passenger had correctly fastened and appropriately adjusted the seat belt.

Volunteers then heard the sound of taped engine noise for a three minute period. This was followed by a taped announcement, in which they were warned that the Captain was preparing for an emergency landing on water and that they were required to don lifejackets as quickly as possible. When volunteers had successfully donned their lifejackets, they were given the command to 'brace'. The cabin attendant then recorded how each volunteer had braced.
Volunteers were then instructed to leave the aircraft. Once outside the aircraft the manner in which volunteers had donned lifejackets was recorded. Any problems that volunteers had experienced in locating or removing lifejackets from under the seats were also recorded. Volunteers then removed their lifejackets and completed the questionnaire.

During a debriefing session the cabin attendant demonstrated the correct manner in which the lifejacket should be donned. Finally, volunteers were given a factsheet containing information about aircraft safety procedures.

2.5.2 *Safety Briefing Tests*

Volunteers were randomly assigned to the experimental groups and then seated aboard the Trident aircraft. Each experimental group was then given one of five alternative safety briefings. A safety card used in the Safety Card Tests was also made available to all volunteers.

Volunteers in four of the groups were given a safety briefing in which the cabin attendant demonstrated how to operate a seat belt, an oxygen mask and a lifejacket. Volunteers in the remaining group (No Demonstration) heard only a taped briefing and were not given a visual demonstration of the operation of safety equipment by the cabin attendant. After the briefing, the cabin attendant checked that each volunteer had correctly fastened and appropriately adjusted their seat belt.

Volunteers in four of the groups then heard the taped sound of an aircraft engine for three minutes. Volunteers in the other group (Delayed Response) heard the engine noise for one minute before it was switched off. These volunteers were then asked to leave the aircraft and returned four hours later to continue the rest of the test. On their return to the Unit, the volunteers were allocated the same seats as they had been given earlier in the day. Once seated on board the aircraft with their seat belts fastened, they received no further safety briefing, but heard the sound of engine noise for three minutes.

After this three minute period, volunteers in all five groups heard the engine noise give way to silence simulating an engine failure. The volunteers were then prepared for the same emergency ditching situation that was simulated in the Safety Card Tests. That is, they had to don lifejackets and brace themselves.

After completing the simulated emergency, volunteers were instructed to leave the aircraft in an orderly manner. As they left the aircraft, the manner in which they had donned lifejackets was recorded using a video camera. Any problems experienced by volunteers in locating and donning lifejackets were recorded. Volunteers then removed their lifejackets and completed a questionnaire before being debriefed. During debriefing, the cabin attendant demonstrated the correct manner in which the lifejacket should be donned. Finally, volunteers were given a copy of the CAA Air Travellers' Code (Appendix 2).

3 RESULTS

The results from the two series of tests will be described separately.

3.1 Safety Card Tests

3.1.1 *Volunteers*

Three hundred volunteers were recruited for these tests which took place between May and July 1989. Their mean age was 30 years, 73.67% were male, 93% had flown before; 25% mainly for business and 66% for leisure. The sex of the volunteers and their main purpose of flight approximated that of passengers using Gatwick airport. However, the mean age of the volunteers was slightly younger than that of Gatwick passengers which was approximately 35–36 years (Ref 10).

Individual differences of the volunteers were examined to ensure that any observed variation between the groups was a function of the safety card available and not due to any individual characteristics. One significant difference was observed ($F=3.67$, $p<.05$[4]) with volunteers who saw Card 2 being significantly younger (27.6 years) than those who saw Card 4 (32.2 years). However, no significant differences were observed between group 2 and group 4 in ability to carry out any of the procedures. Therefore, this age differential cannot be considered to have contributed to differences in the effectiveness of the cards.

3.1.2 *Examination of the safety card*

Ninety three per cent of volunteers claimed to have looked at the card during the tests. No significant differences were observed between the four groups.

3.1.3 *Volunteers' comprehension of safety card information*

Volunteers' comprehension of procedures illustrated on cards was assessed according to their ability to locate, remove and put on lifejackets, operate seat belts and adopt a brace position (as described in Section 2.4, parts (i) and (ii) on page 19).

(i) *Lifejacket donning*

Each volunteer had to locate and remove a lifejacket from under their seat, extract it from its container, and then put it on. The overall time taken to don the lifejacket was recorded and divided into the time taken to find the lifejacket and time taken to don the lifejacket. The time taken to put on the lifejacket was taken from the point when each volunteer was seated holding the lifejacket in its container in front of them.

Table 3.1 gives the mean time taken for each group to locate and remove the lifejacket, put on the lifejacket and the total time taken to carry out this procedure.

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[4] The F ratio is obtained by performing the technique of Analysis of Variance in order to establish whether any statistically significant differences exist between the data from a number of conditions. Whether the F ratio is sufficiently large to achieve significance will be influenced by the variability in the data and also by the number of conditions and replications of the test. In the text, the value of F is followed by a p value indicating the likelihood of the difference being due to chance factors rather than a genuine difference.

Table 3.1 Mean times taken (in seconds) to don lifejackets

	Combined Total	*Card Group* 1	2	3	4
Mean time taken to locate and remove lifejacket	16.48	15.08	16.57	16.52	17.75
Mean time taken to put on lifejacket	43.39	40.93*	46.64*	42.15	43.84
Total mean time taken to locate, remove and put on lifejacket	59.58	55.89	63.25	58.13	61.05

* Groups significantly different from one another at p<.05 level

Table 3.1 shows that volunteers in group 1 were significantly quicker ($F=2.81$, $p<.05$) in putting on their lifejackets than those in group 2. Table 3.2 indicates the percentage of volunteers who reported problems in locating or removing the lifejacket and the manner in which the lifejacket was donned.

Table 3.2 Percentage of volunteers experiencing problems in locating and removing the lifejacket and the manner in which it was donned

	Card Group 1	2	3	4
Experienced a problem in locating or removing lifejacket	64.00*	32.00	46.67	44.00
Tied tapes over the top of lifejacket	46.67	49.33	50.67	50.67
Tied tapes in a double bow	57.33	38.67	34.67	46.67
Tied tapes tightly	69.33	65.33	57.33	69.33

*Group significantly different from other groups at p<.05 level

Table 3.2 shows that significantly more volunteers in group 1 ($F=5.47$, $p<.05$) had a problem in locating or removing the lifejacket than those in the other groups. Table 3.2 also shows that approximately 50% of volunteers tied the tapes over the top of the lifejacket, less than half tied the tapes in a double bow, and approximately two thirds tied the tapes tightly.

(ii) *Seat belt operation*

Four volunteers (1.33%) were unable to adjust their seat belt without assistance and one volunteer (0.33%) was unable to unfasten the seat belt without assistance. There were no significant differences in the ability of volunteers in each group to operate the seat belt.

(iii) *Brace position*

Table 3.3 summarises the type of brace position adopted by volunteers in each group.

Table 3.3 Percentage of volunteers adopting a brace position

	Overall	*Card Group*			
	%	*1*	*2*	*3*	*4*
Adopted brace position shown on safety card available	32.67	10.67+	36.00†	61.33*†	22.67
Adopted an alternative brace position	93.00	88.67	96.00	94.67	94.67

* Group significantly different from other groups at p<.01 level
\+ Group significantly different from groups marked † at p<.05 level

Table 3.3 shows that a significantly higher percentage of volunteers in group 3 than those in the other groups adopted a brace position illustrated on the card available to them ($F=18.94$, $p<.05$). However, when all brace positions adopted by volunteers were included in the analysis, there were no significant differences between the four groups in the percentage of volunteers who braced. A total of 7% of all volunteers did not brace. The brace position adopted by the greatest percentage of volunteers (33%) was to bend forward with both hands on the back of the head. Although this position was similar to those shown on three cards, it was not actually shown on any card used in these tests.

3.1.4 *Volunteers' knowledge of questionnaire items*

Volunteers' knowledge or understanding of the location and operation of oxygen masks, lifejackets, exits and emergency slides were assessed according to their answers to questionnaire items. These are reported as follows:

(i) *Oxygen Masks*

There were no significant differences between the four groups in their knowledge of oxygen mask information. Although more than 96% of all volunteers knew where the oxygen mask was located and 85% correctly stated that it should be placed over the nose and mouth, only 36% of all volunteers knew the correct manner in which to activate the oxygen supply.

(ii) *Lifejackets*

Eighty nine per cent of all volunteers correctly stated that they would inflate their lifejacket on leaving the aircraft or after leaving the aircraft and 90% knew how to inflate their lifejacket. There were no significant differences observed between the four groups in their knowledge of this information.

(iii) *Operation of overwing and main exits*

Forty per cent of all volunteers knew how many rows of seats they were away from their nearest exit. Although 41% of all volunteers believed that they would be able to open an overwing exit quickly in an emergency, only 22% were able to correctly describe the overwing exit illustrated on the safety card. Similarly, 45.67% of all volunteers considered that they would be able to open a main exit quickly in an emergency, but only 8.33% were able to describe the correct operation of the main exit illustrated on the safety card available to them.

(iv) *Differences in comprehension and perceptions between males and females*

Analysis (using t-tests and chi-square) indicated that females took significantly longer to find their lifejackets than males ($t=-2.86$, $p<.01$). The total time taken to find and put on the lifejacket was also longer for females ($t=2.94$, $p<.01$). Females were less likely to tie the tapes tightly than males (chi-square=29.185, $p<.001$). Males were more likely to know the correct way to get down to the ground from the overwing exit (chi-square=10.786, $p<.001$).

Females were more likely to know that hand baggage should not be carried onto the slide (chi-square=13.056, $p<.001$) and as could be expected, that high heels should be removed before boarding the slide (chi-square=12.877, $p<.001$).

However, males were more likely to travel for business reasons (chi-square=17.785, $p<.001$) and more frequently than females ($t=3.46$, $p<.001$).

3.2 Safety Briefing Tests

3.2.1 *Volunteers*

One hundred and sixty two volunteers took part in these tests which took place between April and June 1990. Their mean age was 31.4 years, 67% were male, 89% had flown before, 26.5% mainly for business and 63% for leisure. Volunteers were proportionately representative of passengers using Gatwick Airport in terms of their sex and main purpose of flight, but the mean age was slightly younger than the estimated age (35–36 years) of Gatwick passengers (Ref 10).

Analysis of the individual characteristics of volunteers revealed no significant differences between the five briefing groups.

3.2.2 *Volunteers' comprehension of safety briefing information*

Volunteers' comprehension of safety briefing information was assessed according to their ability to don lifejackets, operate seat belts and adopt a brace position.

(i) *Lifejacket donning*

As in the safety card tests, volunteers had to locate and remove the lifejacket from under the seat, extract it from its container, and then put it on. The mean times taken for each briefing group to locate, remove and put on lifejackets, and the total donning times are summarised in Table 3.4.

Table 3.4 Mean times taken in seconds to don lifejackets

	Briefing Groups				
	Standard Briefing	*Delayed Response*	*No Demons-tration*	*Modified Briefing*	*Captain's Briefing*
Mean time taken to locate and remove lifejacket	16.32	19.26	14.39	13.23	11.52
Mean time taken to put on lifejacket	44.65	45.19	45.91	42.68	39.32
Total mean time taken to locate, remove and put on lifejacket	60.97	64.45*	57.27	55.90	50.84*

* groups significantly different from each other at p<.05 level

Table 3.4 shows that the total time taken to don the lifejacket was significantly slower ($F= 2.77$, $p<.05$) for volunteers in the Delayed Response group than for those who had heard the Captain's Briefing.

The percentage of volunteers in each group who took longer than 15 seconds to perform this task and the manner in which they put on the lifejackets was recorded. It was considered that volunteers experienced problems if they took longer than 15 seconds to locate and remove the lifejacket. Table 3.5 summarised the percentage of volunteers in each group who took longer than 15 seconds to locate and remove the lifejacket and the manner in which the lifejacket was donned.

Table 3.5 Percentage of volunteers who took more than 15 seconds to locate and remove their lifejacket and the manner in which it was donned

	Briefing Groups				
	Standard Briefing	*Delayed Response*	*No Demons-tration*	*Modified Briefing*	*Captain's Briefing*
Took longer than 15 seconds to locate and remove lifejacket	38.2	58.1*	27.2+	27.3+	22.6+
Tied tapes in a double bow	70.6+	64.5+	18.2*	51.5+	67.7+
Tied tapes over top of lifejacket	17.6+	25.8	51.5*	27.3+	25.8
Tied tapes tightly	29.4	29.0	9.1	30.3	16.1

* group significantly different from groups marked + at p<.05 level

Table 3.5 shows that a significantly greater percentage of volunteers ($F = 2.82$, $p<.05$) in the Delayed Response group took longer than 15 seconds to locate and remove their lifejacket than those in the No Demonstration, Modified Briefing or Captain's Briefing groups. A significantly lower percentage ($F = 7.04$, $p<.05$) of volunteers in the No Demonstration group tied the lifejacket tapes in a double bow than those in the other four groups. A significantly greater percentage of volunteers in the No Demonstration group ($F=2.71$, $p<.05$) tied the tapes over the top of the lifejacket than those in the Standard or Modified Briefing groups.

(ii) *Seat belt operation*

Four volunteers (2.47%) had problems adjusting their seat belts and one (0.6%) had difficulty unfastening the seat belt. These volunteers were helped by either a fellow volunteer or the cabin attendant to complete these tasks. No significant differences were observed between the groups.

(iii) *Brace position*

Table 3.6 shows the percentage of volunteers in each group and the type of brace position adopted.

Table 3.6 Percentage of volunteers in each group by the type of brace position adopted

	Briefing Groups				
	Standard Briefing	*Delayed Response*	*No Demons-tration*	*Modified Briefing*	*Captain's Briefing*
Adopted brace position shown on card	29.4	32.3	33.3	24.2	45.2
Adopted brace position shown on alternative card	5.9	6.5	0.0	12.1	0.0
Braced with hands on head	61.8+	54.8+	24.2*	54.5+	54.8
Failed to adopt a brace position	2.9+	6.5+	42.4*	9.1+	0.0+

* group significantly different from groups marked + at $p<.05$ level

No significant differences were observed in the percentage of passengers in each briefing group who adopted the brace position illustrated on the card. Table 3.6 shows that the most commonly adopted position was to place both hands on the back of the head. This position was adopted by a significantly lower percentage of volunteers in the No Demonstration group ($F = 3.00$, $p<.05$) than those in the Standard, Delayed Response or Modified Briefing groups. A significantly greater percentage of volunteers in the No Demonstration group ($F = 11.24$, $p<.05$) than in the other groups failed to brace.

3.2.3 *Volunteers' knowledge of questionnaire items*

Volunteers' knowledge of some aspects of safety briefing information were assessed according to their answers to questionnaire items. Their knowledge or understanding of the method of operation of oxygen masks and lifejackets were investigated and reported as follows:

(i) *Oxygen masks*

A significantly lower percentage ($F= 4.77$, $p<.05$) of volunteers in the No Demonstration group than in the other groups knew the correct method of activating the oxygen supply. Only 9.1% of this group answered this question correctly compared with 33.55% of all the volunteers in the remaining groups.

(ii) *Lifejackets*

A significantly lower percentage of volunteers ($F= 4.00$, $p<.05$) in the Standard Briefing group correctly stated that they would inflate their lifejacket on or after leaving the aircraft than those in the No Demonstration and the Captain's Briefing groups. In total, 89.7% of all volunteers knew when they should inflate their lifejacket and 88.68% knew how to inflate their lifejacket.

(iii) *Ease of operation of safety procedures*

The extent of problems experienced by volunteers in operating seat belts, locating, removing and donning lifejackets and adopting brace positions were also identified. No significant differences were observed between the five groups in the percentage of volunteers who stated that they found it difficult or extremely difficult to carry out these procedures. Ten percent of all volunteers stated that they had difficulty adjusting their seat belts. The procedures which many passengers found most difficult to carry out were those which were necessary for donning the lifejacket. Forty four per cent of volunteers had difficulty locating the lifejacket, 47% had difficulty removing it from under the seat and 41.4% tying the lifejacket tapes correctly. In addition, 10.5% of volunteers had difficulty adopting a brace position.

(iv) *Volunteers' opinions of safety briefings*

Volunteers in the groups given the Standard, Modified and Captain's Briefing were significantly more likely ($F= 4.77$, $p<.05$) to consider that the briefing they had heard would encourage passenger attention than those in the Delayed Response or the No Demonstration groups.

Volunteers' opinions of current safety briefings and the effect of emphasising the importance of safety procedures in order to encourage passenger attention were also obtained from a questionnaire. Only a small percentage (6.6%) of all these volunteers thought that current briefings frighten passengers. However, 14% of volunteers stated that they would be put off flying if it was emphasised, as in the Modified Briefing, that it was in their best interest to pay attention to the briefing as safety equipment may differ between aircraft.

Analysis, using correlations and t-tests, indicated that business passengers ($t=-2.99$, $p<.01$) and those who were least worried about flying ($r=.2119$, $p<.01$) were unlikely to pay attention to current briefings.

(v) *Information sources and perceptions of air safety*

Personal experience was considered to be the most useful information source in forming opinions of air safety. Almost 76% of volunteers considered personal experience to be useful with television being considered to be the next most useful source (69.1%). Information films and official sources, for example, government statistics, were considered to be the least useful.

Travel in passenger aircraft was perceived to be the safest form of transport and car travel to be the least safe. A total of 92% of volunteers considered that travel in a passenger aircraft was safe compared with only 38.3% for car travel. However, accidents in aircraft were considered to be the least survivable. Only 36.4% of volunteers thought that they would be likely to survive an accident in an aircraft compared with 68.5% in a bus and 53.7% in a car. Volunteers' assessments of the relative safety of the alternative forms of transport and their perceptions of the likelihood of surviving an accident in each form of transport are summarised in Table 3.8.

Table 3.8 Percentage of volunteers and their perceptions of the relative safety of different forms of transport

	Percentage considering safe	*Percentage likely to survive an accident*
Passenger aircraft	92.0	36.4
Train	90.7	67.9
Car	38.3	53.7
Coach	51.9	52.5
Bus	68.5	68.5
Ferry	61.3	38.3

4 DISCUSSION

The two series of tests will be discussed separately.

4.1 Safety Card Tests

4.1.1 *Examination of the safety card*

An extremely high percentage of volunteers (93%) stated that they had looked at the safety card in these tests. This high percentage far exceeds the 59.7% who claim to look at the card on most flights, a figure considered to be an overestimation of the actual frequency as it was based on self-reports from passengers (Ref 3). Volunteers in these tests knew that they would be expected to

carry out some safety procedures on board an aircraft. Consequently, the high percentage who claimed to have looked at the card in these tests should not be viewed as being representative of the frequency with which the travelling public would read cards.

4.1.2 *Knowledge and comprehension of safety card information*

Generally, volunteers' knowledge of safety card information was high for the less complicated aspects of safety procedures on all four cards. For example, location of oxygen masks, brace position and how and when to inflate lifejackets. However, when asked to describe the method of operation of the exits or when required to don lifejackets, volunteers were less aware of the correct procedures.

Simpler concepts appear to have been more easily understood by volunteers than more complicated operations which were more difficult for them to interpret. These findings support previous research (Refs 1 and 3) which has suggested that passengers tend to overestimate their understanding of safety card and briefing information.

Volunteers' ability to carry out safety procedures, and their knowledge of the location and method of operation of equipment illustrated on the card indicated that no one card was more effective overall for conveying information. However, there were differences between the four cards in effectiveness for conveying particular items of safety information to volunteers. These will be discussed in the relevant sections.

(i) *Lifejacket donning*

There were no differences between the four groups regarding their knowledge of how and when to inflate the lifejacket with approximately 90% of volunteers correctly answering these questions. However, volunteers were less able to correctly don the lifejacket. Only 44.3% of volunteers tied the tapes in a double bow which would ensure that they would not become loosened in the water, 49.3% tied the tapes over the top of the jacket which would have hindered its inflation. Although 65.33% of volunteers tied their lifejackets tightly, only approximately half the volunteers tied the tapes tight enough to ensure that the jacket would keep their heads above water.

All four cards showed the location of the lifejacket under the seat, but none clearly showed the method of release. Forty six per cent of volunteers stated that they had a problem in locating and removing the lifejacket from under the seat with significantly more volunteers who saw Card 1 (simple diagrams) than those who saw the other three cards, experiencing difficulties. These difficulties may have been slightly exacerbated by the pre AN 12 (Appendix 3) lifejacket installed on the Trident aircraft.

Despite this, volunteers who saw Card 1 put on their lifejackets more quickly than those in the other three groups, and significantly more quickly than those who saw Card 2. Volunteers were required to put on lifejackets whilst seated. It should be possible for passengers to don lifejackets whilst seated and Card 1 was the only card to show a passenger donning a lifejacket in this manner. This suggests that it is of greater informative value to passengers if illustrations on cards and in safety briefings show a seated person putting on the lifejacket. However, this would clearly lead to problems in briefings unless shown on a video.

The total mean times (59.58 seconds) taken by volunteers to locate, remove and don lifejackets shows that given the current information available, passengers could have problems in carrying out these procedures quickly. This may not be a problem in a pre-warned ditching but could have implications in an unplanned emergency.

Although all volunteers managed to don lifejackets, it would appear that current safety briefings and cards may not provide the majority of passengers with sufficient practical knowledge to enable them to put on lifejackets correctly.

Problems were experienced by some volunteers who were unable to remove the lifejacket without undoing their seat belt, (which they did not always remember to fasten again), and did not know that they had to pull a tag to remove the lifejacket from under the seat. A number of volunteers did not undo the tag, but pulled the container (with some difficulty) sideways out of its pouch. Almost 4% were surprised to find a plastic container and did not realise that this contained the lifejacket. Some found that once they had released the container from under the seat it fell on the floor and could roll out of reach leading to problems in retrieving it. In a few cases (when they were unaware of what had happened) volunteers thought that they did not have a lifejacket.

As a result of these problems, 21.2% of volunteers felt that the location of the lifejacket, the method of release from under the seat, and the type of container were not adequately explained in either the briefing or on the card. Some volunteers who experienced difficulty in reaching and removing the lifejacket whilst wearing a seat belt questioned the suitability of the under seat stowage.

Volunteers also experienced difficulty in putting on the lifejacket correctly in a seated position. Almost 6% stated that they had a problem in tying the lifejacket tapes whilst seated, for example, the tapes often became entangled with the seat belt. The problems experienced by volunteers in donning lifejackets and their opinions of the information available to them are further discussed in section 4.2.2. part (iii) on page 35.

(ii) *Seat belt operation*

A demonstration of the method of fastening, adjusting and unfastening seat belts was included in the briefings given by the cabin attendant, and was also illustrated on the card. However, five of the 300 volunteers had problems adjusting or unfastening their seat belts. This indicates that it is important to demonstrate seat belt operation in the briefing as well as on the card. There were no significant differences between the four cards available and the ability of volunteers to operate seat belts.

(iii) *Brace position*

There were no significant differences in the percentage of volunteers in each group adopting a brace position. There was a tendency for volunteers to place their hands together when they braced. For example, the most commonly adopted brace position (by 33.33% of volunteers) was to place

both hands on the back of the head. As this position was not illustrated on any of the safety cards this may suggest that if passengers are to brace, less effort is required to recall a correct position if both hands are shown together.

Volunteers stated that they found the different brace position illustrations confusing. For example, they did not realise that some positions represented what passengers should do if there was a seat, or no seat, in front of them. Six per cent of volunteers said that they found it confusing when shown several ways of bracing and reported that they did not know what to do with their arms, legs, or seat backs. These results suggest that to minimise confusion, whenever practical, only one brace position should be illustrated on the card. A further 3.3% of volunteers stated that there was not enough room to brace in the position illustrated on the card given the 30 inch seat pitch on the aircraft.

4.1.3 *Volunteers' knowledge of questionnaire items*

(i) *Oxygen masks*

The safety card available did not lead to any observed significant differences in volunteers' knowledge of oxygen mask information. However, only 36.33% of volunteers stated that it was necessary to tug on the mask to activate the oxygen supply. Twenty six per cent of volunteers thought oxygen was automatically activated by normal breathing and 25.67% were unable to answer this question. As the operation of oxygen masks is a feature of most briefings, this suggests the action of tugging the mask is not sufficiently emphasised in either briefings or on cards. Although three cards clearly showed arrows pointing downwards indicating the need to tug the mask, this may have been interpreted by volunteers as an action needed simply to don the mask. The importance of tugging masks to activate the oxygen supply would appear to be difficult to convey pictorially to naïve passengers and greater emphasis may be needed in briefings. Alternatively, the inclusion of brief statements, such as, 'pull to activate', on the card may be required to clarify the need for this action.

(ii) *Overwing exit*

Volunteers' estimates of their ability to open the overwing exit (41%) was considerably higher than the 22% who correctly described the procedure suggesting that volunteers overestimated their knowledge and ability.

Only Card 4 showed passengers sliding off the wing and a high percentage (62.67%) of volunteers in this group (although not significantly so) stated that this was the correct method of descent.

Some 6.61% of volunteers stated that the diagrams on the card were confusing, too small, too detailed or lacked written explanation. Fourteen per cent of volunteers felt that instructions were likely to be more difficult in reality than they appeared on the card, for example, the exit might be heavier, more awkward, or passengers may be crowded around the exit.

(iii) *Main exit*

Almost half the volunteers (45.67%) thought that they would be able to open the main exit quickly, but only 8.33% were able to correctly describe the procedure. This supports the view that many volunteers overestimate their ability (Refs 1 and 3) and endorses the need for clear and easily comprehended exit placards as currently required by the Air Navigation Order.

Five per cent of volunteers found the main exit diagrams confusing. A few volunteers assumed that they would have time to work out any instructions on the exit in an emergency. Only 6.34% of volunteers recognised that the exit operation was likely to be more difficult in a real situation, for example, if the cabin was smoke-filled or dark or the exit crowded.

(iv) *Comprehension of exit operation*

Safety cards are designed to convey a considerable amount of pictorial information which is novel for passengers. The results suggest that too much reliance is placed on passengers' ability to accurately interpret and understand these illustrations. Passengers may misinterpret information, for example, they may not know which diagram refers to which type of exit, or be unable to recall how exits operate in the confusion of an emergency. This suggests that the exit location and operation diagrams should be on the same side of the safety card. It is important that if different types of exits are provided, their exact location and their respective operating instructions are obvious. Safety cards are designed by people who are familiar with safety equipment. A naïve person should be consulted during card design to ensure that illustrations are easily comprehended.

Illustrations with few, or no, words are designed to cross international language barriers and give passengers an equal opportunity to understand safety information. As a result illustrations may appear to be complicated or confusing. It may be of added benefit to include brief statements, for example, 'pull down' or 'push outwards' but excessive use of words may detract from illustrations and confuse passengers.

Failure to assume responsibility for their own safety may be a result of the manner in which passengers are presented with safety information. There was a tendency for some volunteers not to pay attention to exit information as they felt a trained cabin attendant, someone stronger than they were, or someone nearer to the exit would open it. Diagrams depicting a female figure opening an exit may show that a female is capable of opening the exit but could be misinterpreted. For example, if the figure is shown in uniform, this could imply that the exit will be opened by trained personnel. These findings suggest that the importance of all passengers knowing and being able to carry out these procedures should be emphasised.

(v) *Differences in comprehension and perceptions between males and females*

Females took longer than males to locate and don lifejackets and had more problems in tying them correctly. It is unlikely that strength or lack of technical knowledge could explain these differences. A general tendency for

some females to rely on a dominant partner or informed person to help in an emergency may be a contributory factor. However, male volunteers in these tests flew more frequently and more for business than females which may explain some differences between the sexes in their ability to don the lifejacket correctly.

A higher proportion of females knew that hand baggage should not be carried onto the slide. Not surprisingly females were more aware that high heeled shoes should be removed probably because this precaution is more directly applicable to them.

4.2 Safety Briefing Tests

4.2.1 *Volunteers' ability to carry out safety procedures*

Some significant differences were observed between the five briefing groups in their ability to carry out safety procedures correctly.

(i) *Lifejacket donning*

A comparison between volunteers who donned lifejackets 5–10 minutes after a standard briefing, and those who donned their lifejackets four hours later, indicated that the latter group were marginally slower at donning lifejackets. As these two groups were given identical briefings this suggests that if passengers are required to don lifejackets four hours after a briefing this may not significantly slow down their ability to don lifejackets.

The Captain's Briefing resulted in the shortest times for donning lifejackets. This briefing also led to a significantly faster total time for donning lifejackets ($p<.05$) than when lifejackets were donned four hours after a briefing. These results suggest that some reduction in time to don lifejackets may be possible if briefings were presented in a more authoritative manner by the Captain. However, this would create problems for pilot workload if the Captain were required to give the whole safety briefing.

If passengers are to don lifejackets with ease more specific information may be required regarding exact location, stowage and correct method of donning. This is discussed more fully in Section 4.2.2, part (iii) on page 35.

A significantly lower percentage ($p<.05$) of volunteers in the No Demonstration group tied lifejacket tapes in a double bow than those in the other groups. These volunteers tied the tapes over the top of the lifejacket significantly more frequently ($p<.05$) than those given the Standard or Modified Briefing. Although a visual demonstration may not be attended to by all passengers, these results suggest that the lack of a visual demonstration will significantly affect passengers' ability to carry out these procedures correctly. The presence of a cabin attendant during the briefing may have a reinforcing effect on passengers' attention. The effectiveness of video briefings may also be increased if augmented by the presence of a cabin attendant demonstrating some aspects of safety procedures, for example, pointing out location of exits.

(ii) *Seat belt operation*

With the exception of those in the No Demonstration group, all volunteers were given a demonstration of how to fasten, adjust and unfasten seat belts. The method of operating seat belts was also illustrated on the card. Despite this information, four volunteers needed help in adjusting their seat belt and one needed help to unfasten it. Although there were no significant differences between the five groups in problems experienced, there was a tendency for volunteers in the Delayed Response group to have more difficulty adjusting their seat belts. The results suggest that the lack of a visual demonstration of seat belt operation did not significantly affect the ability of volunteers to carry out this procedure.

(iii) *Brace position*

No significant differences were observed between the five briefings and the percentage of volunteers adopting a brace position. Although the brace position was not demonstrated to any group, significantly more volunteers in the No Demonstration group did not brace. This suggests that the lack of visual demonstration can significantly reduce passengers' ability to carry out safety procedures not included in briefings. This is possibly due to the passengers heightened safety awareness brought about by the presence of cabin attendants as described in Section 4.2.1, part (i) on page 33.

The most commonly adopted brace position was to place both hands on the back of the head. This position was adopted by between 54% and 61% of volunteers in the groups given a visual safety briefing and may be a natural position for many passengers. Interestingly, this position was also adopted by 33% of volunteers in the safety card tests. A significantly lower percentage ($p<.05$) of volunteers in the No Demonstration group (24.2%) adopted this position than those in the Standard, Delayed Response and Modified Briefing groups. This position was similar to one recommended as optimal following a recent computer simulation of an aircraft accident (Ref 11). However this analysis was limited and further research would be required to investigate the influence of variable factors such as seat type and configuration, passenger size and impact conditions before an optimal brace position should be recommended. Should this brace position prove to be the most effective it should be relatively easy to encourage passengers to adopt it, or alternatively passengers' awareness of a more effective brace position will need to be raised.

4.2.2 *Volunteers' knowledge of questionnaire items*

(i) *Oxygen masks*

Volunteers in the No Demonstration group were significantly less likely to know how to activate the oxygen supply than those in the other groups. This supports the view that a visual demonstration given by cabin attendants is very likely to increase the chances of passengers being able to correctly carry out this procedure.

(ii) *Lifejackets*

Those given the Standard Briefing were significantly less likely ($p<.05$) to inflate their lifejackets on or after leaving the aircraft than those in the Captain's Briefing or No Demonstration groups. No significant difference was observed for the Modified Briefing group, therefore it is unlikely that this difference could be due to novelty effect alone. The low correct response rate for the Standard Briefing may be due to familiarity which may have led volunteers to be inattentive.

(iii) *Ease of operation of safety procedures*

There were no significant differences between the five groups and difficulties experienced by volunteers in carrying out safety procedures. Only 2–3% of volunteers experienced difficulty fastening or unfastening seat belts. Adjusting the seat belt was difficult or extremely difficult for 9.9% of volunteers.

Locating, removing and donning lifejackets caused the most problems for volunteers and their comments generally support those of volunteers in the Safety Card Tests. Almost 44% had difficulty locating lifejackets and 47% had difficulty removing them from under the seat. Although the location of the lifejacket was shown on the card, 17.3% of volunteers stated that there was no information on how to release it from under the seat and that this should be explained to passengers, 6.2% thought that the pull tag should be more visible, or that the need to pull a tag should be explained. Ten per cent of volunteers did not expect the lifejacket to be in a container and 4.3% found it difficult to retrieve the container whilst seated with the seat belt on. Five per cent had to undo their seat belt to retrieve the container, 13.6% stated that the container rolled onto the floor and 10.5% did not know how to open the container once they had retrieved it.

Eight per cent of volunteers had difficulty identifying the inside and outside of the lifejacket which slowed down the time taken to don the lifejacket. For example, some lifejackets were labelled 'FRONT', but when donned in the correct manner, the word 'FRONT' appeared on the shoulders behind the back of the head. One style of lifejacket could be worn either way round which some volunteers found confusing.

Forty one per cent of volunteers found it difficult to tie lifejacket tapes. Due to lack of space it was difficult to cross tapes behind the back when seated. Sometimes tapes became entangled with seat belts making it awkward for volunteers and tying tapes tightly whilst seated with seat belt fastened was also extremely difficult (as described in Section 4.1.2, (i)) on page 29. Some volunteers attempted to overcome this problem by standing up but did not always remember to fasten their seat belts again, an error which might have fatal consequences in an emergency. A number of volunteers (13.6%) stated that the need to fasten the lifejacket tapes tightly and in a double bow was not made clear to them.

It is apparent from problems experienced by volunteers in both series of tests that if passengers are to be able to don lifejackets quickly and correctly they may need more specific information. For example, the exact location

and method of stowage of the lifejacket and why it is important to fasten the tapes tightly and in a double bow. If it had been emphasised that this was important for their survival, more volunteers may have tied the lifejacket in this manner. Without any explanation volunteers (or passengers) are unlikely to expend what they may consider to be unnecessary effort, when in fact these actions may save their lives. Three cards used in the Safety Card Tests showed children wearing lifejackets which had tapes tied over the top of the lifejacket. This may have led some volunteers to believe that their own lifejacket should be fastened in this manner.

If passengers are expected to don lifejackets whilst seated, it would be more informative if briefings showed a seated person donning a lifejacket. This was suggested by volunteers in the tests but would not be possible to achieve in a briefing given by cabin attendants although it may be effectively shown using a video. Some volunteers stated that the likelihood of passengers being able to don lifejackets, open overwing exits and carry out other safety procedures correctly would be increased if they were given the opportunity of trying out these procedures, for example, in an airport departure lounge safety centre. For a fuller discussion of the advantages and disadvantages of airport safety centres please refer back to Section 4.4 on page 14 of the Passenger Survey (Report 1) and to Ref 12.

Ten per cent of volunteers had difficulty in adopting a brace position. A third of these were in the No Demonstration group and more of these volunteers failed to brace than in other groups. A small percentage of volunteers described problems such as cramped conditions (1.2%), lack of explanation of the brace position (1.9%) and discomfort caused by the items attached to the lifejacket (1.2%).

(iv) *Passenger opinions of safety briefings*

Significant differences were observed between volunteers in the five briefing groups regarding whether they considered the safety briefing they had been given would encourage passenger attention. Volunteers in the No Demonstration group were significantly less likely ($p<.05$) than those in the Standard, Modified or Captain's Briefing groups to consider that the briefing they had heard would encourage passenger attention. This group also had a generally poorer knowledge of how to activate the oxygen supply, don lifejackets correctly and brace.

A significantly higher percentage (73%) of volunteers ($p<.05$) given the Modified Briefing, than those in the Delayed Response group thought the briefing they had been given would encourage passenger attention. However, the briefing given to the Delayed Response group was the same as for the Standard Briefing group. No significant differences were observed between the opinions of volunteers in the Standard and Modified Briefing groups. This suggests that the four hour delay in assessing the briefing may explain the poor perceptions of its effectiveness held by this group.

The Modified Briefing stated 'as the safety equipment on this aircraft may differ from that on other aircraft it is in your own best interest to pay attention to the safety briefing' and led to some slightly better performances by volunteers in carrying out safety procedures. As only 14.2% of volunteers

considered that passengers would be frightened by this briefing this suggests that emphasising the importance of briefings may improve passenger attention and ability to carry out safety procedures. As the inclusion of these particular statements would appear to be unlikely to discourage the vast majority of passengers from flying, these findings may help to reduce the concern expressed by operators regarding emphasising the importance of safety procedures. Interestingly, only 58% of volunteers given the authoritative Captain's Briefing thought that this would encourage passenger attention. This was slightly lower than the 61.8% who thought that the Standard Briefing they had been given would encourage attention.

Volunteers in these tests who claimed to pay the least attention to briefings were males, business passengers and more frequent flyers. These results confirm previous research findings (Refs 1 and 3).

(v) *Information sources and perceptions of air safety*

Personal experience was considered the most useful source of information for forming opinions of air safety. However, the vast majority of volunteers had not previously experienced an aircraft emergency. Television, information films and newspapers also contributed largely to volunteers' perceptions of air safety. Radio and official statistics were considered to be the least useful information sources. If passengers' perceptions are to be accurate it is important that the media present an improved image of the safety of air travel.

Volunteers perceived air travel to be the safest form of transport, that is, safer than travel by train, bus, ferry, coach and car. However, aircraft accidents were considered to be the least survivable. Almost one third of volunteers (32.7%) thought they would be unlikely to survive an aircraft accident.

Although car travel was perceived to be the least safe form of transport, 53% of volunteers thought they would be likely to survive a car accident, giving it a moderate perceived survivability. Bus travel was perceived to be safe by 68.5% of volunteers, but bus accidents were considered to be the most survivable, with the same percentage (68.5%) believing they would be likely to survive a bus accident. As the majority of aircraft accidents are survivable (Refs 1, 4 and 5) it is necessary that this fact be made clear to passengers if perceptions are to be changed. The advantage of the media is that it provides an opportunity to convey accurate information about air safety to the public in a non-threatening situation, for example, in the comfort and security of their own home.

5 CONCLUSIONS

1 Passengers' opinions of the effectiveness of possible alternative introductions to the safety briefing suggest that an active approach to passengers as individuals, in which they are informed of the importance of their individually knowing the safety procedures, is likely to encourage attention to the safety briefing and card.

2 Passengers believe the primary duties of cabin attendants are to be responsible for their safety and to help them in an emergency. Unfortunately, this may contribute to a belief by many passengers that they do not need to take any responsibility for their own safety.

3 There is a tendency for passengers to be pessimistic about their survival chances in aircraft emergency situations. It is important to increase passenger awareness of the survivability of most aircraft accidents as underestimation of survival chances could contribute to passengers' failure to pay attention to safety briefings and cards.

4 About 80% of passengers believe operators should encourage passengers to be more safety conscious. A wide variety of suggestions were made indicating that many passengers are currently concerned about a number of safety issues such as safety briefings and safety information, passenger education, the quantity and correct stowage of hand baggage, and restrictions on smoking, alcohol and the carriage of duty free goods.

5 Volunteers' knowledge of information on the four safety cards was generally high for less complicated aspects of safety procedures, such as location of oxygen masks, brace position and inflation of lifejackets. However, volunteers' knowledge of more complex safety procedures such as exit operation was more limited.

6 The four safety cards effectively conveyed most procedures involved in donning lifejackets. However, volunteers experienced problems in locating and removing lifejackets from under seats and a number of volunteers had problems correctly fastening lifejackets. This suggests that more specific information is needed either in briefings or cards to ensure that passengers can don lifejackets correctly and quickly.

7 Multi-lingual illustrations on safety cards are designed to cross language barriers and give maximum information to passengers, but may be open to misinterpretation. The inclusion of brief statements on cards to describe actions which are difficult to convey pictorially may clarify some information.

8 It is important that all passengers know how to carry out safety procedures. Passenger attention should be drawn to the fact that their understanding of the content of safety briefings and cards could save their lives.

9 Safety card information needs to be in a format which is easily understood by passengers. Card designers should consult non-aviation personnel to ensure that naïve passengers can comprehend novel information. Further research is required to ensure that sufficient information is available to passengers to enable them to carry out safety procedures correctly, for example, opening the overwing exit.

10 Volunteers who donned their lifejackets four hours after a standard safety briefing were not significantly slower at donning lifejackets than those who put them on 5–10 minutes after an identical safety briefing. This suggests that passengers' ability to don lifejackets quickly after a safety briefing does not necessarily significantly decrease as flight length increases.

11 Passengers' understanding and awareness of the correct safety procedures would appear to be improved by a visual briefing given by a cabin attendant.

12 Problems experienced by volunteers suggest that novel items of safety equipment which are intended to be used by passengers should be designed to ensure that their correct method of operation is obvious.

13 Emphasis on the importance of passengers understanding safety information may frighten a small percentage of passengers but is also likely to lead to improvements in their ability to carry out safety procedures correctly. The briefing which emphasised that 'as the safety equipment may differ between different aircraft, it is in your own best interest to pay attention' was considered by volunteers to be the most likely of those examined to encourage passenger attention.

14 Personal experience and the media were the most influential information sources for forming passengers' opinions of air safety. As media information contributes strongly to passengers' opinions of air safety it is important that the media image of air travel is accurate.

15 Air travel was perceived to be the safest form of transport but also the least survivable in an accident. As the majority of aircraft accidents are survivable it is important that this fact is made clear to passengers.

6 RECOMMENDATIONS

1 Operators and ticketing agencies should include passenger safety information, similar to that contained in the CAA's Air Travellers' Code, with flight tickets.

2 Aircraft operators and Airport Authorities should consider the provision of additional methods for conveying safety information to the travelling public.

3 Operators should adopt a more positive approach to the pre-flight briefing of passengers. Briefings should not be introduced with the statement that operators are required to provide such information. The serving of drinks, and the handing out of newspapers, magazines, menus, headsets, etc, should not take place during the safety briefing.

4 Operators should actively promote ways to encourage passengers to pay attention to the safety briefing and to study safety cards. Passengers' attention should be drawn to the fact that their understanding of safety briefings and cards may enable them successfully to carry out safety related actions, in differing emergency situations, requiring for example, exit operation resulting in their safe evacuation from the aircraft.

5 Operators should actively promote methods for enhancing passengers' safety awareness. This may be possible to achieve by emphasising the importance of all passengers understanding the safety procedures or by clarification of the reasons for safety regulations.

6 The presence of cabin attendants during safety briefings emphasises the importance of safety procedures to passengers. In the case of video briefings operators should ensure that cabin attendants are clearly visible to all passengers during the briefing. When conducting operations with only one cabin attendant, it is recommended that operators should make every effort to ensure that a visual briefing is given to all passengers.

7 Safety cards should be designed to convey specific explanation of complex procedures in a clear and concise manner. Safety card designers should consult non-aviation personnel to ensure that all safety procedures on card illustrations can be understood by naïve passengers.

8 Safety equipment should be designed in such a manner that the correct method of operation is obvious to all potential users.

9 As the majority of aircraft accidents are survivable it is important that the media image of air safety is improved to ensure that this fact is made clear to the public. The media should be encouraged by all sectors of the aviation industry to promote the low occurrence of aircraft accidents and subsequent high percentage of aircraft accident survivability

7 REFERENCES

1 Johnson, D A An investigation of factors affecting aircraft passenger attention to safety information presentations, Interaction Research Corporation, Report IRC–79–1, for the Federal Aviation Administration, August 1979, Contract No. DOT–FA78WA–4095.

2 Air Navigation Order, 1989 as amended in 1990: in Shawcross and Beaumont – Air Law, Volume 3, 1991, P Martin and E de M.Martin, Butterworths, London.

3 Fennell, P J, Harris, J R and Muir, H C Passenger knowledge of airline safety information, College of Aeronautics Report No: 9111, Cranfield Institute of Technology, 1988.

4 Taylor, A F Fire, fuel and survival: a study of transport aircraft accidents, 1955–1975, Advisory Group for Aerospace Research and Development, AGARD–CP–166, Conference Proceedings, 1975.

5 Taylor, A F Aircraft Fires – A study of transport accidents from 1975 to the present, Advisory Group for Aerospace Research and Development, AGARD–CP–467, Aircraft Fire Safety Conference Proceedings, October 1989.

6 Taylor, A F Accident Statistics, Paper presented at the Royal Aeronautical Society Symposium on Passenger Cabin Safety, 29th October 1986.

7 CAP479, World Airline Accident Summary, Vol 2, 1976–1991, Civil Aviation Authority, London.

8 Fennell P J and Muir H C Passenger Safety Information: Comprehension of airline safety briefings and cards, Cranfield Institute of Technology Report for the Civil Aviation Authority, 1992.

9 Fisher S Chapter 6, pp 93–109, Stress and Strategy, 1986, Lawrence Erlbaum Associates Ltd, London.

10 BAA Pax Fax – 1989/90. BAA Consultancy, Gatwick Airport.

11 Wallace, W A, Rowles, J M and Haidar, R Computer simulation of impact and correlation with body injuries, paper given at the European Cabin Safety Conference, Gatwick, September 1990.

12 Fennell, P J and Muir, H C Passenger Safety Information: A survey of attitudes towards airline safety information, Cranfield Institute of Technology Report for the Civil Aviation Authority, 1992.

Appendix 1

Taken from the Air Navigation Order (1989); as amended in 1990:

Article 13 Equipment of aircraft

(5) The position of equipment provided for emergency use shall be indicated by clear markings in or on the aircraft. In particular in every public transport aircraft registered in the United Kingdom there shall be:

(a) provided individually for each passenger; or

(b) if the Authority so permits in writing, exhibited in a prominent position in every passenger compartment:

a notice relevant to the aircraft in question containing pictorial:

(i) instructions on the brace position to be adopted in the event of an emergency landing;

(ii) instructions on the method of use of the safety belts and safety harnesses as appropriate;

(iii) information as to where emergency exits are to be found and instructions as to how they are to be used; and

(iv) information as to where the lifejackets, escape slides, liferafts and oxygen masks, if required to be provided by paragraph (2) of this article, are to be found and instructions as to how they are to be used.

Article 19 Composition of crew of aircraft

(7) (a) This paragraph applies to any flight for the purpose of public transport by an aircraft registered in the United Kingdom:

(i) on which is carried 20 or more passengers; or

(ii) which may in accordance with its certificate of airworthiness carry more than 35 passengers and on which at least one passenger is carried.

(b) The crew of an aircraft on a flight to which this paragraph applies shall include cabin attendants carried for the purposes of performing in the interests of the safety of passengers, duties to be assigned by the operator or the commander of the aircraft but who shall not act as members of the flight crew.

(c) On a flight to which this paragraph applies, there shall be carried not less than one cabin attendant for every 50, or fraction of 50 passenger seats installed in the aircraft:

Provided that the number of cabin attendants calculated in accordance with this sub-paragraph need not be carried where the Authority has granted written permission to the operator to carry a lesser number on that flight and the operator carries the number specified in that permission and complies with any other terms and conditions subject to which such permission is granted.

(8) If it appears to it to be expedient to do so in the interests of safety, the Authority may direct any particular operator of any aircraft registered in the United Kingdom that the aircraft operated by him or any such aircraft shall not fly in such circumstances as the Authority may specify unless those aircraft carry in addition to the cabin attendants required to be carried therein by the foregoing provisions of this article such additional persons as cabin attendants as it may specify in the direction.

Article 36 Passenger briefing by commander

The commander of an aircraft registered in the United Kingdom shall take all reasonable steps to ensure:

(a) before the aircraft takes off on any flight, that all passengers are made familiar with the position and method of use of emergency exits, safety belts (with diagonal shoulder strap where required to be carried), safety harnesses and (where required to be carried) oxygen equipment, lifejackets and the floor path lighting system and all other devices required by or under this Order and intended for use by passengers individually in the case of an emergency occurring to the aircraft; and

(b) that in an emergency during a flight, all passengers are instructed in the emergency action which they should take.

The Captain has legal powers to maintain good order on the flight and a passenger's failure to comply with his lawful commands could lead to prosecution.

When can I smoke during the flight?

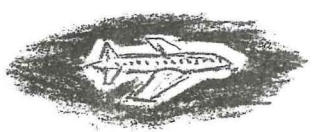
You must not smoke when boarding or leaving an aircraft; when the aircraft is on the ground, or when the 'no smoking' sign is on. Smoking is not permitted in aircraft toilets, in designated 'no smoking' areas, or when standing or moving around on board.

In-flight fires have been caused by careless smokers, and some airlines now operate a total ban on smoking during the flight.

Why should I listen to the safety briefing?

Both the safety briefing and the safety information card provide you with information on exits, lifejackets, oxygen equipment and safety belts which could save your life.

Aircraft differ in design, emergency equipment and cabin layout, and it is important for your personal safety that you should know what to do and where to go in an emergency. It could make all the difference to you and your family.



Why should I wear my seat belt?

Seat belts are provided to protect you from injury at times when the aircraft may suddenly change direction, and you are recommended to wear them throughout the flight. You might like to loosen your seat belt slightly while the 'seat belt' sign is off.

You must wear your seat belt at all times when the 'seat belt' sign is on. This includes the take-off and landing portions of your flight, and times when air turbulence is expected.

At the end of the flight you should stay in your seat and not undo your seat belt until the aircraft has finally stopped and the 'seat belt' sign has been switched off.

Where can I get further advice about air travel?

Your travel agent or the airline you are travelling with will be able to answer most of your questions. Or you can write to:

Cabin Safety Co-ordinator
Flight Operations Department
Civil Aviation Authority
Aviation House
Gatwick Airport South
West Sussex RH6 0YR

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THE AIR *Travellers'* CODE

Whether you fly regularly as a business passenger, or only once or twice a year on holiday, this leaflet explains some of the safety and security rules that exist to protect you and your fellow passengers.

Failure to observe the rules could endanger you, the aircraft and all its occupants. It could also lead to legal action being taken.

Public safety information from the Civil Aviation Authority

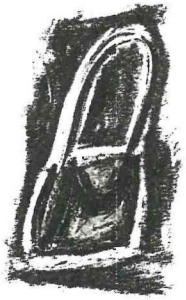
CAA

How much baggage can I take into the cabin?

Cabin baggage must be small enough to fit into the approved stowage spaces - either in the overhead luggage bins or underneath the seat in front. Failure to use these spaces could lead to passengers being struck and injured by loose items of baggage if the aircraft changes direction suddenly.

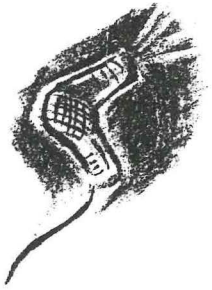
It is vitally important that in an emergency, aisles and exits are not blocked with baggage. Items that will not fit into the approved luggage spaces must be stowed in the hold.

In an emergency, leave your cabin baggage, including duty free goods, behind.



What security precautions should I take with my baggage?

The best personal security is to pack your own bags and never let them out of your sight until you have checked them in at the airport. That way, you will know what is in them. Never agree to carry packages for other people or check-in someone else's bags. Try to avoid using bags that can be tampered with, such as ones with outside zip pockets.



Security checks on baggage will be quicker if:

- ✔ electrical items (hairdryers, radios or cassette players) are kept to a minimum and carried in your hand baggage. The airline may refuse to carry hold baggage if undeclared items are found in it;
- ✔ gifts are left unwrapped so they can be examined;
- ✔ cameras do not contain film so they can be searched.

What am I allowed to carry in my baggage?

There are legal requirements covering items regarded as 'dangerous goods' as well as items which may not be carried for security reasons.

Generally, you must not take on board:

- ✗ Firearms of any type including toys;
- ✗ Knives or other implements, with more than three-inch blades;
- ✗ Explosives; fireworks, flares, toy gun caps, non-safety matches;
- ✗ Gases; camping or compressed gas cylinders, tear gas, mace or CS gas devices;
- ✗ Flammable materials: lighter fuel, paints, thinners, fire lighters, petrol;
- ✗ Poisons, weedkillers, insecticides;
- ✗ Corrosives; filled car batteries, mercury;

But you can take the following on board:

- ✔ wines and spirits in containers of up to 5 litres;
- ✔ medicinal or toilet items (including aerosols) such as hair sprays, deodorants, perfumes and after shaves, in containers up to 500 ml or 500 gr each, to a total of 2 kilos/2 litres;
- ✔ gas-powered hair curlers (1 per person), providing the safety cover is fitted at all times. Separate refills are not permitted;
- ✔ safety matches or a lighter when carried on the person. The lighter can have only absorbed liquid or liquified gas fuel. Refills are not permitted;
- ✔ battery powered wheelchairs, but special conditions apply and you must contact the airline in advance to make the required arrangements.

You can contact any airline for further advice on dangerous goods, or write to the Civil Aviation Authority's Dangerous Goods Section at the address overleaf.

How much can I drink before or during the flight?

It is against the law to be drunk on an aircraft. You could face a fine of up to £2,000, or two years in prison (or both) for drunken and disorderly conduct.

Drunken passengers have been known to create serious safety hazards by interfering with the smooth running of the aircraft, as well as being a nuisance to fellow passengers and a danger to themselves in an emergency.

If you drink too much before your flight, the airline may not allow you to board the aircraft and will stamp your ticket 'Refused Boarding'. This means that most other airlines will also refuse to carry you. You will have to make your own way home, and will not be entitled to a refund.

Passengers becoming drunk during the flight can expect to be met by the Police on arrival. If necessary, drunken passengers can be off-loaded at any airport en route.

Appendix 3

Taken from:

AIRWORTHINESS NOTICE No. 12
APPENDIX No. 27

Issue 1

2 October 1981

Stowage and Accessibility of Lifejackets

1 An enquiry into an accident to a UK passenger transport aircraft revealed that some passengers experienced difficulty in obtaining the valise containing the lifejacket (hereinafter referred to as the 'valise') which was stowed underneath their seat. Subsequent investigation showed that because the stowage pouch, in which the valise was retained, was not positioned close to the front edge of the seat pan, difficulty arose for some passengers in locating and releasing the valise.

2 Attention of operators and manufacturers is drawn to the need for careful interpretation of the requirements for accessibility of safety equipment* as they relate to the occupants of aircraft, and particularly passengers, having ready and easy access to the valise during all phases of the flight. These requirements apply not only to the initial certification of the aeroplane type but also to modifications to seats, seating arrangements, and equipment stowage arrangements.

3 Interpretation of the requirement for ease of accessibility will in most installation necessitate the valises, when stowed under seats, being located near to the front edge of the seat pan, arranged so as to allow the occupant of the seat readily to remove the valise from the stowage pouch, which may be a two handed operation, in the shortest possible time. The method for removing the valise from the stowage pouch should, therefore, not necessitate any extensive body movement by a seated passenger with safety belt fastened. Furthermore, the possibility of the valise being ejected or falling from its stowage pouch onto the cabin floor either during normal operation or in an emergency should be minimal.

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*JAR 25.1411, Section D, Chapter D6–1, 3.13, and Section K, Chapter K6–1, 2.14, Section G, Chapter G6–1, 2.17.