

FOR LESS INJURIES AFTER EMERGENCY EVACUATION

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ABSTRACT

Since the beginning of 1990s several accidents accompanying emergency evacuations have happened in Japan, causing some passengers seriously injured. In view of a social impact of these accidents on passengers, a task force composed of cabin safety specialists, aircraft engineers etc., was created to make recommendations on safety measures intending less injuries after emergency evacuation from large airplanes. As a result several recommendations have been developed on safety information to be delivered to passengers, exit row seating, communications media, etc. This paper briefly presents these recommendations as well as other safety measures developed by the task force.

EMERGENCY EVACUATIONS IN JAPAN

As summarized in Table 1, five(5) evacuations were carried out in Japan during the past seven(7) years starting 1990. Since several evacuations happened in a short period and not a small number of passengers were injured, whether seriously or not, public concern drastically increased over the evacuation events.

TASK FORCE ESTABLISHED IN 1993

Soon after the fourth accident happened in May 1993, the Civil Aviation Bureau of Japan (JCAB) formed a task force to review what happened during evacuations and to make recommendations so that the number of injuries might be reduced to the extent possible when another evacuation happens. It was the view of the task force that there might be several kind of countermeasures to this end, for instance; the improvement of escape slide design, the improvement of crew training on occupant survival and so on. Of many countermeasures, the task force concentrated on the improvement of the passenger briefing systems. From this aspect, review was made on what kind of information should be provided to passengers by seat back cards, pre-flight briefings, videos or other means. As a result of the review of the accidents as well as survey on passenger briefing systems of foreign operators, the task force developed a standard package of information for inclusion in seat back cards and videos, as indicated in Table 2. In accordance with the standard package of information developed by the task force, the JCAB in July 1993 requested each Japanese airline to improve its safety information leaflets and instruction videos. Remarkable improvements were made in instruction videos, in which how to use an escape slide properly is demonstrated and is explained clearly. The importance of assistance provided at the bottom of escape slide as well as the importance of quick run away from the

aircraft are emphasized.

ANOTHER TASK FORCE ESTABLISHED IN 1996

When another accident happened in 1996 with many injuries caused by emergency evacuation, it was generally recognized that a rather comprehensive review was necessary to reduce the number of injuries and hence increase public confidence on aviation safety. Not only aviation specialists but also other field specialists such as travel agent and people working for mass media were invited to a member of the new task force. Following review of the emergency evacuation procedures currently in use by Japanese operators and foreign operators as well as survey of foreign state's regulations on the subject, task force made recommendations on the following four items.

- (1) Assistant from an occupant of an exit seat.
- (2) Cooperation with travel agency
- (3) Safety information to be provided concerning evacuation
- (4) Safety information other than that of evacuation

Assistant from an Occupant of an Exit Seat

Some Japanese operators had already introduced the exit seat system in their evacuation procedures. However since there were differences in procedures and concept between operators, it is considered necessary to develop the definition of an exit seat for a smooth introduction by every operator. Following survey of the exit seat system in use by foreign operators, the task force developed the definition, as schematically shown in Figure 1. In addition the task force determined the role of the exit seat occupants. The task force was of the opinion that there are some tasks that should be performed by the cabin crew themselves and therefore should not be transferred to the exit seat occupants. For instance judgment as to whether the exit door should be opened or not should remain as one of the cabin crew's duties. As a result, the role of an exit seat occupant was confined to the followings:

- (1) keep other passengers clear from the emergency exit door until crew members have completely opened it,
- (2) at the bottom of the slide, assist other passengers in standing up and getting off an escape slide immediately after reaching the ground,
- (3) give a loud announcement in order that passengers leave the aircraft immediately after sliding down, and
- (4) perform other tasks considered necessary and given by the crewmembers.

In accordance with the above recommendations, Japanese operators introduced the exit seat system on April 1, 1998.

Cooperation with Travel Agency

Although not so popular as was before, group traveling is still widely conducted in Japan. A group traveling is normally accompanied by an attendant dispatched from travel agency, who can perform special tasks when emergency situation happens. In view of this, the task force recommended that a cooperation program be developed between operators and travel agencies so that emergency

evacuation training can be provided to travel attendants.

Review of Safety Information concerning Evacuations

The task force made another review of evacuations happened in Japan and made comparison of information contained in seat cards and videos between operators. As a result the task force was of the opinion that the standard information package developed in 1993 by the previous task force is still valid. However, some improvements were considered necessary to be incorporated into safety information provided by operators as follows:

- 1) In an emergency evacuation it is crucial to leave any cabin baggage, including duty free goods, behind. However in the actual evacuations happened in Japan, many passengers took their personal belongings with them while they went down the slide. Therefore a clear indication is considered necessary to ensure that passengers should leave any cabin baggage in an emergency evacuation.
- 2) There are some differences in the sliding position shown in videos between operators. To eliminate any confusion caused by such differences, a standardized position was considered necessary to be developed. In this regard an emphasize was placed on keeping the upper body upright with the arms extended forward so that balance can be maintained while sliding down. This position was recommended for use in videos.

Safety Information other than That of Evacuation

A pamphlet was developed to provide a comprehensive cabin safety information to passengers. It is compiled in question-and-answer style touching upon the subject of carry-on baggage, electric or electronic devices, fire or smoke, the brace position, decompression and oxygen mask, seat belt, ditching and life vests, emergency evacuation, exit row seating. This pamphlet was distributed to operators, travel agents, and other related companies for use in the training. In addition it was recommended that safety information be included in operator's periodic magazines, and any periodicals issued by travel agents and their association. Furthermore, the task force recommended that safety information be distributed through any travel related documents such as itinerary, guide book, etc.

Safeguards for Disabled People

The task force reviewed the current system from the aspect of disabled people, namely a visually handicapped person and an auditory handicapped person. The videos programs use the finger language (Japanese only) and the superimposed dialogue as well as audible messages for those who need hearing aids. Even though information leaflet in Braille is provided to a sightless person, individual guidance from cabin attendant is also provided as required. The task force, following review, concluded that individual guidance from cabin attendant is essential and therefore will be still required in the future in addition to written information in Braille, which is also considered necessary to be improved.

NEW PROCEDURES IN PLACE

On June 14, 1998, MD-11 airplane operated by a Japanese operator landed at the Ninoy Aquino International Airport in Manila and swerved to the left of the runway until its nose wheel got stuck and the airplane came into a full stop. Then emergency evacuation ensued. Although 24 passengers out of 248 people onboard were slightly injured, evacuation was carried out in a smooth way since the concept of exit seating was well demonstrated by the cabin crews and the passengers. It is worth noting that one sightless person was able to slide down smoothly with the help extended by a passenger at the bottom of the slide. The airplane has three exit seats associated with L3 door only. However, assistance was also provided by passengers who did not occupy the exit seats but first came to the exit door immediately after evacuation began.

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Chairman: Ms. Yoko KITANO, Japan Women's Association of Aeronautics

Member: Ms. Kayo AOYAMA, Announcer

Member: Mr. Kaoru SOTOMURA, Japanese Travel Industry Association

Member: Mr. Hiroo SAKAI, Tourist Service Co.

Member: Mr. Masayuki NONOMURA, Japan Travel Bureau

Member: Mr. Shinya KANAZAWA, Japan Airlines

Member: Mr. Kazuhiko NAKAE, Japan Airlines

Member: Mr. Makoto ITAGAKI, Japan Airlines

Member: Mr. Kohjiro MARUO, All Nippon Airways

Member: Mr. Tetuo ITAKURA, All Nippon Airways

Member: Mr. Yasuyuki BABA, Japan Air System

Member: Capt. Shozoh YOKOYAMA, Japan Air System

Member: Capt. Itirou FUNABASHI, Japan Air System

Member: Mr. Susumu KASUYA, Japan Airlines

Member: Mr. Yuzou SHIMOJYO, Japan Airlines

Member: Ms. Yoshino IIZUKA, All Nippon Airways

Member: Ms. Chizuko YOSHIDA, Japan Air Systems

Member: Capt. Fumitaka TAKEDA, Japan Airlines

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REFERENCE

1997, "Interim Report of the Task Force on Emergency Evacuation,"(Japanese) Civil Aviation Bureau, Ministry of Transport.

1998, "Final Report of the Task Force on Emergency Evacuation,"(Japanese)

Civil Aviation Bureau, Ministry of Transport and the Association of Air Transport Engineering and Research.

TABLE 1 Summary of Emergency Evacuations Happened in Japan

[NO. 1]

Date: March 24, 1990
Place: New Tokyo International Airport (Narita)
Airplane Model: L-1011
Description: A hard landing was made due to the windshear and a large amount of fuel was spilled out from No.1 tank. Then an evacuation was executed. Because of a strong wind blowing, the slides did not stay in a stable position. So most of the passengers were not able to keep their normal sliding attitude and many people were consequently injured when impacting on the ground.
Serious injuries: two (2) passengers; one suffered fracture/dislocation of the left ankle joint and another suffered avulsion/fracture of the major tubercle of the right humerus.
Minor injuries: 48 people suffered from bruise, sprain, graze, etc.

[NO.2]

Date: September 19, 1991
Place: New Tokyo International Airport (Narita)
Airplane Model: B-747
Description: After departing from Narita airport to New York (JFK) airport, the airplane returned to Narita airport because of the cockpit indication showing engine problems. Since fires were identified around No.2 engine after the airplane landed, an evacuation was conducted as soon as the airplane stopped on the taxiway. It was raining at the rate of 11mm per hour. Passengers reported that the slides were slippery due to rain.
Serious injuries: eight (8) passengers; five (5) with thorax compression fracture, two (2) with bruise and one with a bone fracture of the leg joint.

[NO.3]

Date: April 18, 1993
Place: Hanamaki Airport
Airplane Model: DC-9-41
Description: The airplane carrying 72 passengers and 5 crew from Nagoya made a hard landing at its destination Hanamaki airport, causing damages to the right wing inboard spar and resulting in a fuel spill and an eventual fire. An emergency evacuation was carried out in a strong wind blowing.
Serious injuries: 3 people; one with compression fracture of 12th thoracic vertebra, one with rib fracture, and another with cervical

Minor injuries: sprain and thoracic vertebra.
50 people; mostly sprain or bruise.

[NO.4]

Date: May 2, 1993
Place: Tokyo International Airport (Haneda)
Airplane Model: B747-400
Description: The cabin and cockpit of the airplane were filled with white smoke during taxiing after landing at Haneda Airport. As soon as the airplane stopped near the parking spot, an evacuation was executed. It was at night and rainy (10mm/hr)

Serious injuries: nine (9) passengers; most people sustained bone fracture, such as the compression fracture of thoracic or lumbar vertebra.

Minor injuries: one hundred and eight (108) people.

Testimony indicated that about 20 % of passengers slid down with their belongings.

[NO.5]

Date: September 13, 1996
Place: New Tokyo International Airport (Narita)
Airplane Model: B747-400
Description: During take-off run a trouble with No.4 engine happened, causing a rejected take-off. The captain, upon receipt of the report from a cabin attendant that dark smoke is recognized from No4 engine and that an amount of fuel is spilling out from the right wing edge, decided to order an emergency evacuation.

Major injuries: three (3) people

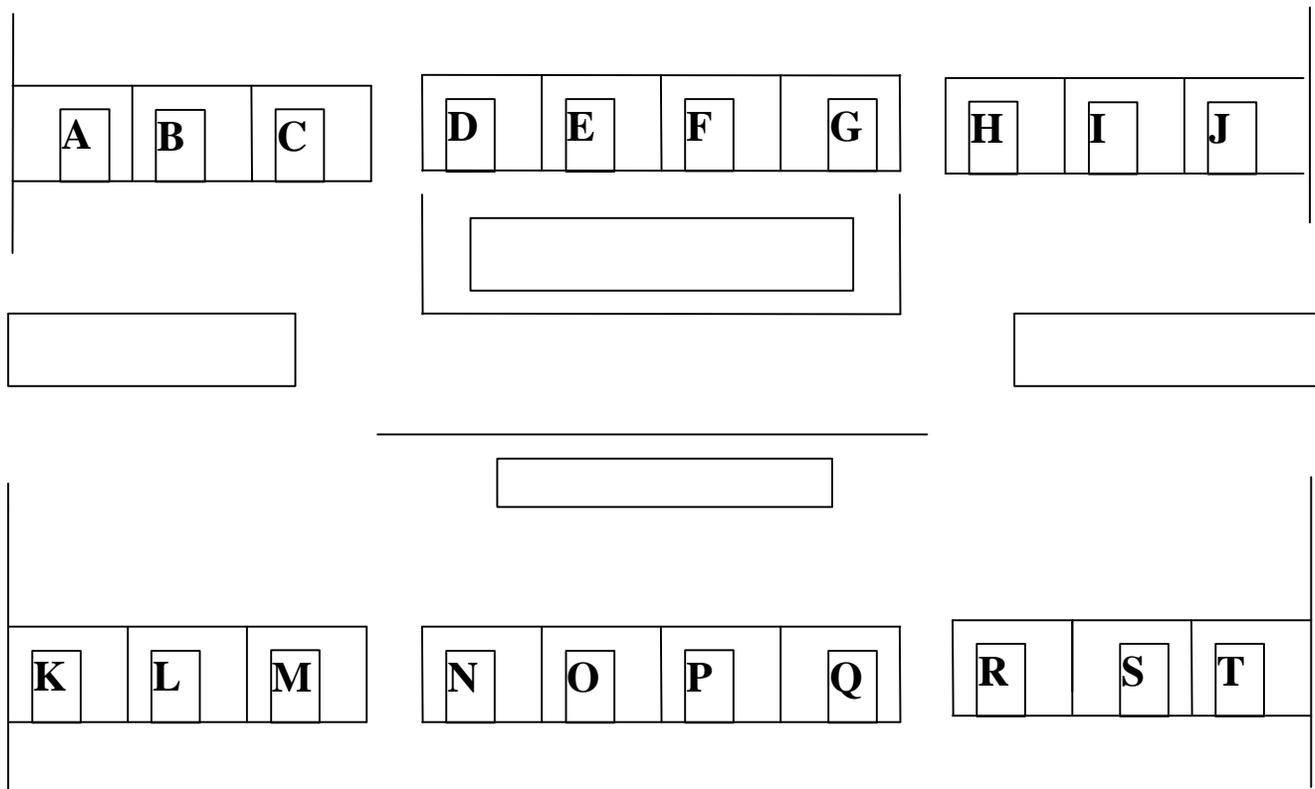
Minor injuries: twenty-one (21) people

TABLE 2 Standard Package of Information

ITEM	CONTENTS	VIDEO
SEAT BELT	1) How to fasten and unfasten belt	#
	2) To keep belt fastened while seated	#
LIFE VEST	1) Location	#
	2) How to use and when to inflate vest	#
	3) Life vest for infant	
OXYGEN MASK	1) Automatic deployment of mask when decompression	#
	2) How to use mask	#
	3) Stop smoking	
CARRY-ON BAGGAGE	1) Where to stow baggage	#
	2) How to stow baggage	
SEAT	Position of seat back and tray during take-off and landing	
BRACING POSITION	Bracing position in emergency	#
EVACUATION	1) To observe crew's instructions	
	2) To leave baggage behind	
	3) To take off high-heeled shoes	
	4) Path marking and exit marking	#
	5) To stay low in smoke	
	6) How to open exit doors	
	7) Not to open exit doors near fire	
	8) How to slide down	#
	9) To help at the bottom of slide and move away from aircraft	#
	10) How to use life-raft	
SMOKING	No smoking in toilets and on aisle	#
Portable Electrical Device	To switch off portable telephones at any stage and other restriction of use	#

#: Information should be included in the video projector

FIGURE 1



An exit seat means each seat that has a direct access to an exit and that is located rearward of the aisle connecting the left exit and the right exit. Those seat behind partition, galley, or lavatory are not regarded as an exit seat. In the above figure, those seats marked with “K”, “L”, “M”, “R”, “S”, and “T” are defined as an exit seat and others are not.