Airline Cabin Crew
A Career Manual

Airline Cabin Crew
A Career Manual

Joynath Victor De
Formerly, Assistant Manager (In-flight Services)
Indian Airlines

Tata McGraw Hill Education Private Limited
NEW DELHI

McGraw-Hill Offices

New Delhi New York St Louis San Francisco Auckland Bogotá Caracas
Kuala Lumpur Lisbon London Madrid Mexico City Milan Montreal
San Juan Santiago Singapore Sydney Tokyo Toronto

Published by the Tata McGraw Hill Education Private Limited,
7 West Patel Nagar, New Delhi 110 008.

Airline Cabin Crew: A Career Manual

This edition can be exported from India only by the publishers,
Tata McGraw-Hill Education Private Limited

ISBN-13: 978-0-07-014489-7
ISBN-10: 0-07-014489-3

Vice President and Managing Director—McGraw-Hill Education: Asia Pacific Region: *Ajay Shukla*
Head—Higher Education Publishing and Marketing: *Vibha Mahajan*
Publishing Manager—B&E/HSSL: *Tapas K Maji*
Assistant Sponsoring Editor: *Hemant K Jha*
Assistant Manager (Editorial Services): *Anubha Srivastava*
Senior Production Manager: *Manohar Lal*
Production Executive: *Atul Gupta*
Deputy Marketing Manager: *Vijay S Jagannathan*
Senior Product Specialist: *Daisy Sachdeva*
General Manager—Production: *Rajender P Ghansela*
Assistant General Manager—Production: *B L Dogra*

Typeset at The Composers, 260, C.A. Apt., Paschim Vihar, New Delhi 110 063 and printed at
Sheel Printers Pvt. Ltd., D-132, Hoisery Complex, Phase-II, Noida

Cover Design: K Anoop

Cover Printer: Sheel Printers

RZLYYRDCRBBLD

The McGraw·Hill Companies

All that I am or ever hope to be, I owe to my angel Mother.
—Abraham Lincoln

I dedicate this humble proposition to my Mother.
—Joynath Victor De

Foreword

In this world of competition, capped with recession, choosing a profession is very difficult. Many of us want to pursue a career of our childhood dream without knowing the pros and cons of it. Even if we succeed to get a job, in line with our dream, at a later date we may find very little satisfaction in the job we are doing. This often happens when we are not fully informed of the job, more so the ugly side of it.

Many young people dream of a profession, which along with remuneration, will hold some adventure, thrill and is unusual from the regular day-to-day monotony. An airline job is one such.

Mr. De in his book has brought out an honest picture of one of the glamorous professions associated with airlines.

In this book, through case study and examples, details of the cabin crew career have been elaborated upon. A study of the book will make every aspirant for this profession to know what lies ahead and will not be disillusioned, once he/she actually enters the job. This will also be a practical guidebook for those who are already in this profession.

The vast experience of Mr. De with one of the largest airlines of India has been shared in simple language for every reader to understand.

This book will be a good guide for the youngsters who want to embrace the profession of a Cabin Crew.

PK Chattopadhyay

Joint Director General of Civil Aviation (Retd.)

PREFACE

From time immemorial, man has wished for wings to fly like birds to have unbound access of movement in the sky. Just as the limitless sky, their eagerness to fly was boundless, reuslting in justification of saying 'where there is a will—there is a way'. This dream came true and one day man indeed began flying.

Although many people think that human flight began with the aircraft in the early 1900s, people had already been flying for some 200 years before that. Even **Leonardo da Vinci** nurtured this dream and had sketched some illustrations to explain a hang glider design.

Sketch of a Hang Glider by Leonardo da Vinci

This book is, however, intended to furnish adequate knowledge to all aspiring cabin crew to understand the job aspired for distinctly and to decide thereafter whether it suits them and is preferred by them. At the same time, it could as well act as a guidebook for those who are already in the profession and intend to advance their career.

In addition to making the reader evaluate his/her liking for the profession and to decide about its suitability for him/her and plump for joining it thereafter, this book elaborates upon the job and duties of cabin crew and suggests the means, procedures and methods that are to be adopted to make them fit for this extraordinary career.

By adopting the prescribed measures, one is expected to adapt to any **public relation oriented job** in general and the **cabin crew** profession in particular.

This book not only assists the reader in becoming knowledgeable about the profession of a cabin crew but also comprehensively details concept about the duties and functioning of various departments of an airline, which is essential for employment in other departments of several different airlines.

This book also provides an advantage to those who get selected for the initial training of any airline, by the virtue of their having beforehand, knowledge of many essential details about the subject.

Since DGCA (Directorate Genral of Civil Aviation), under the Ministry of Civil Aviation, Government of India, the highest authority concerning civil aviation in India, has authenticated that no aircraft registered in India shall be operated for public transportation unless at least a predetermined number of cabin crew are on board, it can be very well believed that the requirement of cabin crew would continue to increase as long as new aircraft are joining the Indian aviation industry under the banner of present and incoming airlines.

Present day demand for moving fast compels people to adopt the mode of flying. Depending on this assessment, it would not be improper to apprehend that the aviation industry would flourish further by catering to transportation needs of more passengers in days to come.

It is amazing to perceive that each aircraft needs about four to five sets of cabin crfew members each day for operating its daily flights. As such, one can apprehend the required number of cabin crew with the inevitable arrival of bountiful number of multifarious aircraft to join the fleets of increasing number of airlines.

In any cabin crew recruiting interview, the inevitable question comes – "*Why you want to join as a cabin crew*". And, the instant reply, as taught by the candidate's institute or otherwise– "*I like to meet different types of people; I like to travel; I like to look after the passenger's wellbeing; I like them to have a comfortable journey; I dreamt for this career since childhood etc.*" Don't you think all these are shots in the dark? Since your childhood, did you ever know about flights or aircraft or in that matter a job of cabin crew? If not, you should not say that? You should speak with appropriate knowledge and authority in your interview and for that you have to acquire the same.

I consider it is my prerogative to warn you that the job and duty of a cabin crew (as is discussed in the book) is not that what it appears to a lay person. The main belief of such persons is that cabin crew members are bearers in sky, who serve food and look after the comfort of the passengers. With all practicalities, the actual paramount duty of the cabin crew is to look after the safety of the passengers on board and it is not an easy job. You have to have or acquire certain qualities (again discussed in the book) essential to be a cabin crew member.

Having said that, I would like to tell you – this is truly a wonderful profession. You meet the cream amongst personalities and celebrities, enjoy the charm of flying (which no ground personnel of any airlines can feel), see places that might be out of bounds for plenty of others, stay in luxurious hotels, etc. You have no transportation problem as the airlines provide air-conditioned transport for you to work in an air-conditioned aircraft – a facility, the crew of earlier time missed. To summarize it is a fabulously enjoyable and extremely well paid profession, if it suits you.

To be a Cabin Crewmember

1. *A person shall comply and an operator shall ensure that each of them*
   (a) Is not less than 18 years of age
   (b) Has passed 10+2 examination at the minimum

(c) Has passed in the initial medical examination and has been found medically fit to discharge duties as Cabin Crew as specified in the Operations Manual
(d) Remains medically fit as in (c) above
(e) Is competent to perform the duties as a Cabin Crew as specified in the Operations Manual

2. *Each Cabin Crew shall successfully undergo the following training programme duly approved by the Director General of Civil Aviation:-*
(a) Initial Training
(b) Type Training – before operating any particular type of Aircraft
(c) Differences Training – before flying different variant of a particular type of Aircraft
(d) Familiarisation Flights
(e) Recurrent Training – covering the actions assigned to each crew member in evacuation and appropriate normal and emergency procedures and drills relevant to the type(s) and/or variant of aircraft, every 12 calendar months
(f) Extensive Refresher Training for absent from flying duties for more than 6 months.

3. *An operator shall ensure that each Cabin Crew member:-*
Is subjected to of 'Proficiency Checks' in carrying out safety and emergency duties after completion of the initial training by the approved Instructors, having qualifications, specified by the Director General of Civil Aviation.

4. *No Cabin Crew shall perform duties on more than 3 types of aircraft*
All aforesaid verbatim, are to make the reader have a feel of aviation and to make them understand the requirement of the Director General of Civil Aviation, regarding the number of cabin crew required in an aircraft, the eligibility to be a cabin crew, the training and the various checks they have to cope up with as – Cabin Crew.

By way of advice, it may be stated that it is absolutely essential to be conversant with the pros and cons of your desired career in advance, than to get involved in it and experience a rude shakeup from a 'rosy future' dream. Do acquire detailed knowledge beforehand through reading material or other media to fathom the subject entirely and explicity, to avoid any untoward disappointment, cropping up afterwards.

Wish you the very best in your career!

Joynath Victor De

Acknowledgements

This is customary that the author of a book acknowledges the deed of those who have contributed in his endeavour, but, in this case, it is a heartfelt submission of my gratitude.

Undoubtedly, my foremost indebtedness must be expressed to my friend Mr. Subhabrata Chakrabarti of Tata McGraw-Hill, the benevolent gentleman, without whom the book would never have materialised.

Next in the list should be my son Mr. Lionel Pratap De, who provided bountiful considerable help with computer applications, text corrections and useful suggestions, and my wife Mrs. Chhanda De, who dogmatically insisted that I must finish the book while providing with every help that furthered this objective.

Beyond this too much of family affair, I must express my gratitude to Mr. PK Chattopadhyay, Joint Director General of Civil Aviation (Retd.), who not only has kindly written the 'Foreword' for the book but also obliged me with numerous invaluable suggestions for it, Mr. Sujit Ghosh, Dy. General Manager (Eng.)(Retd.), Indian Airlines, who has supplied many valuable suggestions on ATR aircraft, Mr. Sanjiv Bose, who encouraged me to continue with the venture and the whole team of Tata McGraw-Hill in general and Ms. Vibha Mahajan, Mr. Tapas Kumar Maji, Mr. Kannath Prakash, Ms. Anubha Srivastava, Mr. Manohar Lal and Mr. Hemant Jha of it in particular – who were instrumental for the publication of the book. I am certain, without these people's active cooperation, you would not have ever seen this text.

I would be thankful if the persons related to this subject/profession could kindly intimate any and every point that they find unsuitable or controversial in this book. I would accept their justified verdict, count it as further knowledge in the subject for me, and implement those in future editions of this book.

It will be my best reward, if the readers could achieve even a little help in their career through this humble representation of this immeasurable subject.

I wish outstanding success in career to all the readers, with every prayer for their dream-come-true future.

Joynath Victor De

Contents

1

Routine of Cabin Crew

1.1 Cabin Crew

Cabin crew, a part of the 'Flying Crew', refers to all the cabin attendants assigned duties in the cabin of an aircraft.

1.1.1 Do's and Don'ts for Cabin Crew

This chapter familiarises the aspirant cabin crew about various assignments and duties that they are stipulated to perform at different stages of their duty period and simultaneously outlines the basic concept of their 'work life'. The reader may call it an abstraction of cabin crew's basic work schedule.

Every individual airline has its own options of choosing from this context in part or full. Therefore, different airlines might slightly diverge from the stated schedule. However, the basic procedure described remains more or less the same. As this is an extensive and important subject matter, the topic is segmented into *four* portions in accordance with three main phases of the cabin crew's duty and their expected behaviour, viz.:

(i) From residence to aircraft and aircraft to residence.
(ii) From aircraft to the hotel (for night halt), staying in the hotel and from the hotel to aircraft.
(iii) Inside the aircraft &
(iv) Behavioural requirements.

This segmentation is done intentionally and purposefully to highlight the doings and duties at each stage in detail, so that the readers understand the subject explicitly.

1.2 From Residence to Aircraft and Aircraft to Residence

This part describes the episode, which takes place from the time a cabin crew is picked up from his/her residence till he/she reaches the aircraft for the flight and again, starting from the aircraft to his/her residence after the flight.

It apprises the aspirant cabin crew of their expected ideal behaviour and manners during the transportation period, when to be ready for pickup, the norms to be observed during pickup, reporting and being briefed for the flight, reporting for the 'pre-flight medical check' and about adhering to security, customs and immigration, excise and airport regulation.

Between the period of reaching the airport and finally boarding the aircraft for their flight, the cabin crew members are required to fulfill certain obligations and to carry out some assignments. These duties are collectively known as 'Pre-Flight Duties'. Similarly, the duties between the time of completion of their flight and leaving the airport are collectively known as 'Post-Flight Duties'. To fulfill these obligations, crew members are to reach the airport earlier than the time of departure of their flight and leave the airport after their flight, by specific periods.

1.2.1 Pickup

More or less, every airline provides a vehicle to pick up cabin crew members from their residence for their flight/duty and drop them back at their residence after the flight/duty. This vehicle is called 'Crew Transport'. Airlines provide this facility to crew members because they are essentially to reach the airport at a specific time known as 'Reporting Time' for that particular flight. (Refer to 1.2.3–"Reporting Time").

Individual airlines determine their schedule of operation of flights and hence set the 'Departure Time' of their flights as per their rationalisation. The reader might have noticed that the time of departure of one flight is separate from another and can apprehend that the reaching time of the crew at the airport for individual flights would obviously be different. If the airlines allow the crew members to report individually, there remains the risk of an occasional delay of a crew member reporting late, which consequently would delay the departure of the flight. No airline in the world would ever accept a risk of delay in departure of a flight due to crew reaching the airport late, or for that matter, due to any reason whatever. For every airline, a delay in departure of a flight is very undesirable and all of them strive to maintain an 'On Time Performance' on which they are awarded a worldwide gradation for service of excellence.

Secondly, the aforementioned reporting time could be at an odd hour and arranging a personal vehicle or using a public vehicle might neither be safe nor feasible.

Furthermore, every airline requires that its crew members (attired in immaculate airline-uniform) remain daisy fresh to enable them to render high class service on board the flight to their valued customers/passengers. The airlines thus furnish them the transportation facility.

The crew transport, at any time, might pickup more than one set of crew members and all these crew members might not essentially be operating the same flight. As such, every picked up crew member's reporting time at the airport might not be the same, but would be fairly close. Realising this fact and to maintain etiquette, the crew transport should not be made to wait/delayed, even by a minimum period. Anyone's delaying the crew transport might cause boundless loss to another crew member who is using the same transport for his/her pickup and consequently effect his/her flight.

1.2.2 Pickup Time

The Pickup Time for a crew member of a flight is the time when the airline picks up the crew member from his/her residence for that particular flight.

Pickup time depends on the reporting time (Refer to 1.2.3 "Reporting Time") at the airport, which in turn depends on the departure time of the flight. The pickup time simultaneously depends on the distance of the individual crew member's residence from the airport.

Each flight has its individual Departure Time at which it begins moving off from the bay. As mentioned previously, the crew members have to reach the airport earlier than that time to carry out their pre-flight duties. The time at which the crew members reach the reporting point at the airport for a particular flight is the Reporting Time for that particular flight. This means that the

CASE STUDY 1

Ms. Kankana, cabin crew of Kolkata base of Bravo Airways was quite sad because she could not acquire leave to attend her sister's marriage at Delhi.

Finding no alternative, she opted to operate the morning Delhi flight BN-941 (the crew of which incidentally stays overnight at Delhi to operate back the next morning flight BN-942 from there) on the day of the marriage, so that she could at least attend the ceremony at night. Her request for the flight was considered with sympathy and her name appeared in the Crew Roster (the duty schedule for crew members) for the Delhi flight on the day of marriage.

She packed her suitcase with all care, anticipating all the moments of her stay with the family, including her gift packet and finally rang her brother to pick her from Delhi airport itself, so that she loses no time to reach her home for the ceremony.

The crew transport picked her up on time in the wee hours of the morning. The car was supposed to pick up another two crew members after her.

The transport honked at Ms. Pragati Roy's residence upon which her ayah appeared after five minutes to convey that memsahib's alarm clock did not ring, but that she was getting ready and would be down within five minutes. The five minutes turned to fifteen. Understanding the reason of Ms. Kankana's exigency and thus bound by humanity the driver honked frantically violating all norms. On this, the maid reappeared and placed the memsahib's baggage in the car boot and announced that she was wearing her shoes and would be down in two minutes. These two minutes had again become five minutes and ultimately the 'memsashib' boarded the transport. The transport rushed with all speed to pick up Mr. Nirmal Mehta.

Mr. Mehta was, however, ready and indicated by flashing a torch from his fifth floor apartment that he is coming down. From the transport, the crew members heard lots of commotion for about ten minutes before the 'durwanji' could open the main gate for the fifth floor sahib to go out for duty.

Ms Kankana reached the airport to find that the Delhi flight had already taxied out for takeoff.

Could any quantum of repentance and consolation expressed compensate the horrendous mental agony of Ms. Kankana or fulfill her loss that occurred due to some crew member's inconsiderate and irresponsible acts?

whole set of crew members for a particular flight normally reaches the airport at a fixed time, viz. the Reporting Time.

As per normal practice, the crew transport picks up the crew member residing farthest from the airport first and as it travels towards the airport, it picks up the other crew members on its way in sequence. Following this norm, it is simple to understand that the period spent in the crew transport,

known as Transportation Time, is more for the crew member residing far from the airport than those residing near the airport (the most for the farthest and least for the nearest). As such, the time of pick up for a specific flight, varies from crew member to crew member and depends on the distance he/she resides from the airport.

The airline intimates the anticipated duration of transportation to individual crew members at the time of joining. It becomes the duty of the individual crew member to calculate the Pickup Time, basing on the airport reporting time. For example, if the duration of transportation intimated by the Airline is one hour and the reporting time at the airport is 06:15 hr., the pickup time would then be 05:15 hr.

1.2.3 Reporting Time

As stated earlier, the 'Reporting Time' is the time at which individual crew members should present themselves at a particular point at the airport. This particular point or place is known as Movement Control or Cabin Crew Briefing (Refer to 1.2.9–"At the Movement Control").

Normally, the reporting time is ahead (preceded) from the departure time of the flight by 35 minutes for domestic and 45 minutes for international flights. Assuming the departure time of a flight is 08:00 hr., the reporting time as per the said statement would then be 07:25 hr., if it is a domestic flight and 07:15 hr., if it is an international flight.

Individual airlines may advance the 'Reporting Time' as per their liking but cannot retard it. The pickup time in this case (as per the calculation given in 1.2.2–"Pickup Time") would thus be 06:25 hr., for the first instance (viz. domestic flights) and 06:15 hr., for the second (viz. international flights).

1.2.4 At the Pick-up Time

The crew member should be fully prepared at the pickup time. Cleaning, shaving, hair styling, dressing in uniform, makeup etc. would have to be completed before boarding the crew transport. If so necessary, (*say, in case of the transport reaching late*) reduce the time of reaching the transport from your apartment to the least, say by waiting near the gate (*which Mr. Mehta in Case Study 1 did not do*). It is much better, if the crew members chalk out a 'check list' at their leisure, carefully thinking and jotting down the items to be done, refer and adhere to it before every pick up. Certainly, the procedure would minimise, if not totally abolish the mistakes, which might have cropped up in normal circumstances due to the crew member's negligence or arisen out of haste.

1.2.5 Placing Baggage

All baggage except the vanity case should be placed in the car boot. This act not only helps to achieve more space and comfort inside the transport cabin, but also evinces one's etiquette and consideration towards the fellow crew members.

The joining crew member should take care not to damage other baggage already in the boot, while keeping his/her bag/baggage. Just imagine, what could happen to the oranges that another crew member is carrying for his/her family, by placement of a 25 kg suitcase over its basket by the joining crew member.

1.2.6 Wishing

The joining cabin crew member should wish other crew members already in the transport, individually, adding sir/madam accordingly. The occupants of the transport will sanction this gesture of the joining crew member as a courtesy, a token of respect and personified recognition that they will certainly relish and reciprocate.

At a later stage, when a crew member has gained considerable acquaintance with the others, a collective wishing would not be objectionable.

In addition, the joining cabin crew member should introduce himself/herself in case he/she does not know any of the occupants.

The use of sir and madam should be prolonged for an indefinite period and the crew member shall realise its advantage in the days to come.

1.2.7 Talking in Transport

A new crew member is expected to answer all the questions politely and to refrain from initiating and getting involved in long conversations as far as possible. The crew members may possibly find that if they speak less, they are considered rude and/or snobbish, and if they converse more they are presumed as oversmart.

Therefore, the crew members have to use their tact to strike a balance.

For example, they should not go on narrating the way Baichung has scored the goal last evening, stopping just short of demonstrating it practically and sparing others from being kicked in the process. Also, they should not keep so quiet (just because they are advised to talk less) that when another crew member sitting next, asks about the school he/she had studied in, he/ she gets no reply.

At a later stage, conversation relating to duty, work procedure and even some gossip would be passable.

The crew members should always remember to control and maintain the pitch of their voice however sweet a voice they might think they have.

The crew member should realise and rationalise the mood of the person to whom he/she is speaking.

The person might be thinking whether he has locked the window of his empty apartment and the crew member is overwhelmingly describing the size and the heavenly preparation of the lobster that he/she had in that posh restaurant last night, in the form of a running commentary.

1.2.8 On Reaching the Airport

It is the responsibility of each crew member to ensure that his/her baggage is on board the aircraft, by adopting their airline's conventional system viz. by either handing those over to the crew baggage porter or carrying those personally.

If the airline provides the facility of a crew baggage porter who carries the crew's baggage to the aircraft, the crew members are only to confirm that the proper flight number has been marked on their baggage. In case the airline does not extend the mentioned facility they are to carry their baggage personally to the aircraft.

It is reiterated that in either of the cases, it, however, remains the duty of the individual crew member to ensure that his/her baggage reaches on board the aircraft on time.

At this stage, it would not be out of place to warn the aspiring cabin crew that they must keep their baggage, imperatively in locked condition, every time during its transit and as far as possible inside their hotel room. This prevents

- their loosing its contents and
- security hazard

In absence of proper locking, their baggage could be implanted with some kind of contraband item(s) without their notice and/or knowledge. In case, any such object is detected in their baggage and if they cannot firmly establish (which is truly impossible in practice) that they are nowhere related with the presence of such object(s) in their baggage, the repercussion and the resultant charges would be extremely insidious on their future life, professional as well as personal. As far as their professional career is concerned, it is most likely to be bleak, as the government authorities would frame grave criminal charges against them. Simultaneously, their airline shall initiate appropriate disciplinary actions against them for violating security regulation.

The only intention of mentioning all these dreadful consequences is to acquaint the crew members about the reason against keeping their baggage in open condition and the probable repercussions in case of not adhering to the advice.

Crew members must thank the driver of the crew transport as a courtesy.

Crew members must ensure to display their Picture Identity Card (PIC) perceptibly. It is possible that they might be accosted and could be verbally reproved by the authorities for non-compliance of the same.

1.2.9 Movement Control

'Movement Control' or 'Cabin Crew Briefing' is the place where the cabin crew members get informed about various aspects of the flight that they would be undertaking. Similarly, the cockpit crew receives briefing at 'Flight Dispatch'.

1.2.9A Briefing

At the Movement Control, the cabin crew members receive briefing regarding:

- ***Change of Departure Time of the Flight (if any) with its Reason(s):*** Movement Control staff normally and mostly try to inform the crew members about any known or anticipated delay in departure of their flight before they (the crew members) leave their residence. This is because as soon as the crew members report at the Movement Control, their duty period begins and owing to their 'Flight & Duty Time Limitation' (FDTL) (Refer to "**Flight and Duty Time Limitation and Rest Period**) they thereafter could only be used for a specific period. If the delay is long enough, that might make the crew members unusable to operate the flight. In that case, the Movement Control personnel have to find a fresh set of crew members as a replacement for the already arrived set of crew members and might be liable to furnish suitable and justified reasoning for not informing the crew members earlier. However, the same might not be viable for unforeseen delays that may crop up later than the crew members' leaving their residence.

In the latter case, the crew members, on their arrival at the Movement Control, get notified about the extent of the delay, categorically with reason(s).

The Movement Control staff should convey the reason to the crew members on a mandatory basis because the crew members in turn have to reply suitably to maximum number of passengers on board the aircraft, who would incontrovertibly question about the cause of the occurred delay.

- ***The 'Registration Number' of the Aircraft Operating the Flight:*** In connection with the present topic and for knowledge sake, it may be understood that each aircraft in the world has one specific and individual 'Registration Number'. All aircraft registered in India under the Directorate General of Civil Aviation bears "VT-" and is followed by any three English alphabets. Collectively, this forms the aircraft's individual registration number viz. 'VT-ANZ', 'VT-CRS' etc. The sequence of these three English alphabets is never the same, which affects the separation in individual aircraft's registration number.
- ***The Names of the Crew Members Operating the Flight:*** "Flight Departure Board" at the Movement Control displays the names of the crew members operating a particular flight and might be different from the list reflected in the published 'Crew Duty Roster' due to various reasons and/or exigencies.

The '**Flying Crew Duty Roster**' (commonly known as '**Roster**') is the schedule, provided to every crew member in advance, periodically (normally weekly). This schedule foretells the individual crew member to transpire the flight he/she would be operating on a particular day. The roster is supplied well in advance enabling the crew to negotiate with their other commitments, accordingly. However, the roster only suggests the crew names in anticipation and thus is a proposition only, which might be needed to be altered due to the non-availability of the proposed crew member on the particular day, for some cropped up reason(s). A change in the published 'Roster' could happen due to various reasons viz.

EXAMPLE

(a) *Say, as per the published roster Capt. Surjakanta Singh is commanding flight BN 312 on 06/12/08. On 05/12/08 he develops a stomach ailment with high temperature and reports sick. Then, another commander, say Capt. Anish Guha, who is available to operate a flight, replaces him. In that case, although the published roster had the name of Capt. Surjakanta Singh as the commander, the Movement Control Board will display the name of Capt. Anish Guha as the commander.*

(b) *Say, Miss Kanika Bhattacharjee finds her mother very sick and had reported her inability in operating her 'Roster Flight'. In similar way as in the above mentioned case, say Ms. Anjella replaces her.*

(c) *Say, Flight Purser Mr. Sanat Kadikar has attended too much of an overnight party and felt not justified/fit to operate his Roster Flight next afternoon. He informs Movement Control accordingly (obviously furnishing some false excuse), and say, Ms. Korina Gupta replaces him.*

The three abovementioned hypothetical but 'practically probable' cases confirm that the list of the crew members published in the roster does not always tally with the final list of crew members, displayed on the Movement Control Board due to various reasons.

The 'Roster Section' of the department affects these day-to-day changes and makes the final list. However, there are a few last minute absenteeism(s). The Movement Control staff takes care of these.

- ***Whether or not, the aircraft is parked and if not, when it would be expected to be parked and its reason:*** This 'reason' may vary due to causes starting from late arrival of the incoming flight and thus the delayed availability of the aircraft to operate the present flight to the aircraft having technical fault (commonly known as 'snag') to non-availability of parking space etc.
- ***The Bay Number, at which the aircraft is or would be positioned:*** 'Bay' is the block of land within the tarmac on which an aircraft parks for the purpose of its on-ground treatment.

Even after knowing the registration number of their aircraft, the crew members operating a flight coming out of the 'Terminal Building' could not be certain of the specific aircraft they are

flying in, as there might be a number of the same type of aircraft (similar looking) positioned on the tarmac. As such, they should be acquainted with the exact bay number on which their aircraft is parked. Running from pillar to post (from one aircraft to the other in this case) will cost them the precious time to reach the aircraft on or before the scheduled 'Aircraft Reaching Time' for performing their 'On-Board Pre-flight Duties'.

- ***Whether or not to report for 'Pre-Flight Medical':*** Although the departure board reflects the notification about reporting for 'Pre-Flight Medical Test' (Refer to 1.2.9C-"Reporting for Pre-Flight Medical"–if so advised/briefed by Movement control or observed from the departure board) for a specific set of cabin crew, it is most likely that movement control staff reiterates the same to the cabin crew members, otherwise, there remains a chance that the cabin crew members might report not viewing the notification, later. However, no crew member would be able to elude the consequences and due repercussions with such a flimsy excuse. It remains one of the infallible duties of every cabin crew to find out whether they are or not to undergo the 'Pre-Flight Medical Test' before each flight.

  Also, when the act would be detected by the doctor from his/her records that a particular cabin crew member had not undergone the 'Pre-Flight Medical Test', the doctor would convey the finding to the authorities and they would prevent the concerned crew to operate the flight unless, the particular cabin crew undergoes and passes the test.
- ***Change in operating route pattern (if any) with its reason(s):*** Owing to various reasons, the airline could change the scheduled route pattern of a flight if that suits the airline's exigencies. For example, some of the various requirements could be:

EXAMPLE

(i) ***Flying some stranded passengers from an intermediate station to their destination:*** *Say, a flight from Kolkata to Dibrugarh is diverted (the process of proceeding to an alternative airfield than the one scheduled) to Tezpur due to bad weather en route and got grounded (declared unfit for flying due to technical fault) there. Now, the airline has to send engineering staff and spare parts (known respectively as 'Man & Material' in technical term) to Tezpur. In addition, they have to fly the stranded passengers from Tezpur to Dibrugarh.*

The problem could easily be solved by operating a fresh aircraft and crew to Tezpur, although it would be quite a costly proposition. Again, in that case, a series of flights might have to be delayed because the requisitioned aircraft for this additional flight might have been scheduled for operating the aforementioned flights.

As such, instead of adopting this easy solution and sending a fresh aircraft to meet the situation, the airline could divert/reroute the next day's Kolkata–Dibrugarh–Kolkata flight via Tezpur—rescheduling the sectors to Kolkata–Tezpur–Dibrugarh– Kolkata.

This flight would carry the man and material along with Kolkata–Dibrugarh passengers from Kolkata, off-load man & material at Tezpur, take aboard the previous day's stranded passengers for Dibrugarh and fly to Dibrugarh. The scheduled Dibrugarh–Kolkata flight would have to operate a little behind schedule, in that case. This delay could again be minimized with the cooperation of the ground staff at Tezpur and Dibrugarh by expediting the departure.

(ii) ***The Airline might have some stranded passengers to be flown to their destination.*** *Say, the Kolkata–Bhubaneswar flight could not take off due to bad weather over Bhubaneswar. Similar to the aforesaid case, the stranded passengers could be flown by a fresh aircraft*

dispatched from Kolkata to Bhubaneswar when the weather clears or the Kolkata–Hyderabad flight could be made to operate in Kolkata–Bhubaneswar–Hyderabad sector which would solve the problem as in the abovementioned case and would be suitable to the airline financially.

Such changes in the route pattern or the change of sectors is essentially to be intimated to the crew members with its reason(s). Providing the reason is imperative, as described in the earlier mentioned case of delay in departure of flights.

CASE STUDY 2

On a winter evening, flight BN-629, an Airbus A300, from Delhi to Kolkata departed on schedule. About 35 minutes from the flight's landing it was informed by the Air Traffic Control (ATC) Kolkata that the visibility is gradually reducing. As the present visibility notified was quite above the margin for landing, the commander decided to pursue the landing.

While approaching Kolkata airport, they were intimated that they are 'No. 2' in the Landing Sequence and the 'No. 1' aircraft another airline flight from Chennai, would be touching down shortly.

With a brief pause, they were intimated again that the landing aircraft had had a tire burst and blocked the runway.

As the extent of delay in clearing the runway could not be ascertained immediately and the visibility to land on the alternative runway was below the minima (less than the prescribed minimum) while in addition, the visibility was gradually decreasing, the commander of BN-629 decided to divert to Lucknow.

The intention was notified to Kolkata ATC and to the airline's flight operations at Kolkata, for their necessary actions.

Before landing at Lucknow, the flight engineer of the flight observed a slight fall in hydraulic pressure and subsequently, the ground engineer at Lucknow confirmed the presence of a hydraulic leak, after landing. The ground engineer intimated the detection and the resultant grounding of the aircraft to Kolkata and Delhi base of the airline and summoned for man & material.

After much intercommunication amongst the bases, it was decided that the morning flight BN-361 from Kolkata would carry the man & material and the flight would do an unscheduled landing (such landings are called Technical Landing) at Lucknow to off-load the man & material and to carry the willing passengers back to Delhi, for flying them to Kolkata, later.

Next morning, the movement control staff informed the cabin crew members of flight BN-361 about the change in route pattern from 'Kolkata–

Delhi' to 'Kolkata Lucknow–Delhi', with its reason.

The episode ended with a comedy. The Announcement In-charge, Ms. Surekha, reached the airport late and rushed for the flight missing out the briefing. She was in such a commotion to regularise her pre-flight duties inside the aircraft that she had missed due to late coming—that when the Flying Time was conveyed to her, she did not even realise that the flight time from Kolkata to Delhi could never be one hour ten minutes and announced, " The flight to Delhi will take one hour ten minutes."

The passengers had a good laugh at her cost.

1.2.9B Checking individual Pigeon Coupe

Crew members should check their individual pigeon coupe (Ref Glossary) for circulars, latest technical information, official letter(s) etc. for them, from the airline. It would be better if they form a habit of checking their pigeon coupe before going on a flight and again after reaching back from a flight, as there might be some documents of utmost importance that were put in the Pigeon Coupe while they were on their flights, requiring their immediate attention.

EXAMPLE

For example, before the flight a crew member might receive a technical bulletin that the airline had relocated one particular emergency equipment in the aircraft he/she is flying in, or an informative circular, that the airline has altered the text of the announcement with immediate effect. Again, after the flight, the crew member might receive a letter from the Departmental Head that he/she has to meet the Sectional Head after the flight without fail. This letter might have been put in his/her pigeon coupe after he/she had left for his/her flight.

1.2.9C Reporting for Pre-Flight Medical (if so advised/briefed by Movement Control or Observed from the Departure Board)

The crew members are required to be free from the influence of alcohol, narcotics, sedatives etc. and even from medicines containing a higher percentage of alcohol, during their flight/duty.

They are not to consume any alcoholic beverage within twelve hours from the beginning of their flight/duty.

They are even restricted from donating blood within twenty-four hours from the beginning of their flight/duty.

The purpose of the 'Pre-Flight Medical Check' is to confirm that every individual crew member is fully fit and is free from the aforementioned particulars during their flight/duty. The airline doctor checks and certifies that the individual person is fit to operate a flight or to be on duty.

The test procedure is carried out on each cockpit crew before the flight everyday and on the set of cabin crew operating any one flight (picked up at random from the day's flights) every day, on mandatory basis.

The Procedure of Pre-Flight Medical Check The Doctor In-charge, in case of slightest suspicion that the crew is not fully fit or might be having alcohol in his breath or blood carries out a 'Breathalyzer Test'.

A fresh and packed glass vial containing certain chemical powder is unwrapped in front of the crew member and the person is asked to blow through it. Any trace of alcohol will turn the colour of the chemical from white to bluish green. If the chemical changes its colour, it confirms the presence of alcohol in the person's breath. The crew member is then allowed with time to freshen up and the test is repeated on him/her.

In between the first and the second test on the concerned crew member, the test is carried out with the same group of vials on a person who is a confirmed teetotaler, to be apodictic that the vials are flawless. Naturally, on this test on the teetotaler, the colour of the chemical powder would be expected to remain white, if the vials are not defective.

On repetition of the test on the concerned crew member, if the second result shows positive again, the crew member is barred from operating the flight or doing any duty. A pro forma is then filled up reflecting the whole episode, systematically, and the crew member, the doctor and a competent authority from the airline (as a witness) sign the document. Two samples of blood of the concerned crew member are extracted thereafter. The blood sample bottles are then sealed and signed by the three aforementioned persons and sent to the pathological laboratory for detecting the content/percentage of alcohol in the blood sample.

The airline frames suitable administrative charges and initiates appropriate disciplinary actions against the crew member thereafter.

1.2.9D Negotiating Security, Customs and Excise Checks

It is mandatory that the crew members should reach the aircraft, passing through the security checking enclosure. The crew members should extend maximum cooperation to the security personnel and comply with all their (Security Personnel's) justified asking, including request to any Crew Member to open and reveal the contents of his/her handbag/vanity case.

The security check is carried out for the safety of the passengers, crew members and the aircraft and is beneficial for all. It should be realised and accepted without any prejudice that in their asking, the security personnel are merely doing their duty and as such, it becomes the crew's moral obligation to accede to their demands.

The security personnel possess all the authority to prevent any crew member from passing out of the enclosure and from operating a flight in the course of their duty and initiation of such uncalled for situation should be avoided.

While discussing the security regulations, it is important and justified to perceive that it is very common for the crew members (especially cabin crew) to be approached by some known or semi-known person(s) (might be a frequent traveller or who might have met him/her at a social gathering) with a request to carry letters or parcels for them.

The episode starts like:

"Hello Miss! How are you? Seeing you after a long time. Remember, we met in the party of Mr. Zulfiker? Flying to Bangalore? Oh! That solves a big problem for me. Do me a fovour please. Can you please carry this packet for me to Bangalore? These documents must be submitted by 11:30 hr today for a lucrative tender I am trying to acquire. I will ring up my agent at Bangalore and he will collect it from your hotel itself. You see, I could have reached it myself but I have to be in an urgent meeting today. However, I am flying by the evening flight and it would be wonderful if we could have dinner together tonight. I know you have a regulation against carrying any packet, but thank God, we are not truly unknown after all."

The crew members should never fall for such pranks and pleadings and firmly say 'no' to such proposals. It must be grasped that if they are detected with such packets containing some contraband item(s) (if at all), no one would ever believe that the packet and its contents do not belong to them and they would have to face the consequences. (Refer to 1.2.8–"On Reaching the Airport"–regarding keeping crew baggage locked)

In the same way the crew members adhere to the security regulation, they are to uphold the customs, immigration, excise and airport regulation with equal rigidity, if not with more vehemence, as the resultant outcome in these cases could be expected to be a shade tougher–obviously depending on the gravity of the offence. Please grasp it in a better way from 'Case Study 3' below.

CASE STUDY 3

Majority of crew members night stopping on international flights buy something or the other. Even the government authorities know about the fact and they take a lenient view so far as the, purchase remains within a reasonable limit. When someone oversteps this allowance for any due reason whatever, the consequences become hazardous. The following happening would clarify and provide a concrete example for you to grasp this statement in a clearer way.

Ms. Nandini, Ms. Alka and Ms. Mansukhani night halt at Dubai and operate back to base after two days.

Ms. Nandini bought a bedcover, two deodorants, one medium-sized perfume and a saucepan. The authorities simply glanced at the items and let her pass.

Ms. Alka had purchased a suitcase, 4 perfumes, 2 saris, 5 dresses and a cheap camera. The officer on duty asked her why had she brought all those items, knowing quite well that those are not permitted. Ms. Alka explained that she had purchased a few of those for herself and others are to be gifted to her family members and this was her first international flight. The officer showed a deliberately made rigid face (perhaps to conceal his laughter, seeing a genuine scare on her face) issued a few unofficial words of warning and passed her.

Ms. Mansukhani's three new suitcases contained two Nikon cameras, one Rolex and one Omega wrist watches, six gold bangles, one laptop computer, two diamond rings, fifteen bottles of perfumes and three bottles Scotch whisky neatly wrapped and concealed by twenty two new saris.

The same question as that of Ms. Alka was asked to her to justify her purchase of such huge number of items. Taking the cue from Ms. Alka, she articulated the same answer as she expected that she will receive similar warning from the officer and would be allowed to pass through also. The officer instead summoned his supervisor.

The officers, who handle such cases everyday, were not impressed by Ms. Mansukhani's statement, pleadings, requests, apologies, promises and tearful break-down. They quite well

realised that the substantive purpose of such purchase was business (crudely called 'smuggling'). The items were confiscated, she was charged legally and ultimately the authorities recovered a hefty penalty from her, later.

The airline in their turn and deed had put her off from all duties including flight duties with immediate effect, initiated a fact-finding enquiry and judged her guilty. The enquiry committee recommended the ultimate punishment of retrenching her from the services of the airline. Later, with much pleading and apologising the verdict was subsided. However, the airline lowered her salary scale by a number of retrogrades, she was banned to operate international flights and lost her seniority and retrial benefits considerably.

1.2.9E Maintaining Aircraft Reporting Time

Cabin crew members must reach the aircraft within a stipulated time from the time of reporting at the Movement Control to affect their Pre-flight duties inside the aircraft. They should not waste time by getting involved in other unofficial or personal tasks. In that case, their pre-flight duties inside the aircraft would be hampered and in addition, the commander and/or the cabin crew in-charge could ask them to substantiate for the delay along with an adverse report to the airline management that in turn might reflect adversely on the cabin crew member concerned.

1.2.10 On Reaching the Crew Member's Base Station After the Flight

On reaching the base station after the flight, cabin crew members still remain obligated to do some jobs and complete certain formalities.

After the passengers disembark, they have to tidy up the cabin by collecting the pillows, blankets and other articles that they had supplied earlier to the passengers, help the Galley In-charge to handover the items that were taken charge of, to the catering staff and acquire the clearance before leaving the aircraft.

It looks decent when a crew member joins others to leave the aircraft together as a team. Occasionally, due to some exigency, he/she might leave the aircraft early–only and only after obtaining such permission from the commander and the cabin crew in-charge. Cabin crew members should refrain form making it a habit.

However, crew members could leave the airport only after reporting at the Movement Control and confirming that they have no further duty to perform.

1.2.11 On Reaching Home

A crew member should thank and wish the other crew members that are there in the transport, collect their baggage and thank the driver.

1.3 From the Aircraft to the Hotel (for Night Halt/Outstation Stay), Staying in the Hotel and from the Hotel to the Aircraft

The following text covers the period from the time crew members leave the aircraft for the hotel and subsequently, from there to arrive at the aircraft for the outgoing flight, after availing their stopover.

This section describes the part, when the cabin crew members are required to stay in a hotel for an overnight stay (commonly called Night Stop), after completion of their flight.

This stay becomes inevitable when the airline finds that there is no other way they can utilise the crew members further or bring them back to their base station. This might arise because the remaining period of duty (if any) might not be sufficient to operate any other sector or to return to the base station of the crew members due to their FDTL.

The same might also happen when the set of night stopping crew could operate a flight next day—which is beneficial for the airline or the airline is unable to provide another set of crew for the purpose.

Before proceeding further, it will be better to discuss and clarify the topic of 'Flight and Duty Time Limitation' (FDTL) in detail.

Flight and Duty Time Limitation and Rest Period

Like any other working person, flying crew members comprising of cockpit and cabin crew members, also gradually become tired during the course of their duty and the resultant fatigue sets on them.

Fatigue

Fatigue, for flying crew, is that degree of tiredness that leads to an impaired ability to fly/discharge their duties accurately and/or to take correct decision(s).

The rules herein provide enough coverage so that the fatigue generating during a flight or gathered in the course of total duty period for any crew member does not endanger the safety of the flight and is notified as 'Flight and Duty Time Limitation' (FDTL).

In other words, FDTL is the ultimate period, until which a crew member of a particular category could be expected to be fit to discharge his/her individual duty, with accuracy.

This period varies for different categories of crew members viz. pilots, flight engineers, cabin crew and other crew members. The maximum permissible 'Duty Period' and the consequent post duty 'Rest Period' for individual categories is well demarcated by the Directorate General of Civil Aviation.

In accordance with the provision aforementioned, it remains the responsibility of the airline not to allow crew members to remain on duty, and the responsibility of every individual crew member not to remain on duty personally, in such condition(s) that endangers the safety of the aircraft and/or its occupants by violating FDTL.

From the previously mentioned statement, it is obvious that the period defined in the FDTL for the cockpit crew would be shorter than that of the cabin crew because of the precedence/importance in degree of responsibility and the subtlety of the nature of their job and is maintained in practice either.

The DGCA has issued circulars AIC 28/1992 and CAR Section 7, Series J, Part I – regarding FDTL in respect of the cockpit crew and cabin crew respectively.

In normal practice, the FDTL of cabin crew members restricts them from flying beyond eight hours or to stay on duty beyond eleven hours, whichever is first.

This period varies for individual airlines. Although the airlines can reduce the FDTL period prescribed by DGCA, but none of them can supersede the same.

Flight Duty Time

This is the total period commencing from the time of reporting at the airport for the purpose of operating a flight and ending with the termination of a flight or a series of flights (Chokes on plus 15 minutes).

The counting of the flight duty time begins 35 minutes in case of a domestic flight and 45 minutes in case of an international flight from the 'Scheduled Departure Time' of the flight and ends after 30 minutes in case of a domestic flight and 45 minutes in case of an international flight from the 'Landing Time' of the flight.

For example, a cabin crew is undertaking a domestic flight at 06:00 hr. He/She must land at or before 15:55 hr. following maximum FDTL as per the normal practice.

Clarification of the above Statement

The cabin crew member is on duty at 05:25 hr. (35mins before departure time)

The cabin crew member can be on duty until 16:25 hr (Duty period max. 11.00 hours)

(In other words The Cabin Crew Member must be off at 16:25 hr.)

The cabin crew member must land by 15:55 hr. (On duty for 30 minutes after landing)

Similarly, for an international flight scheduled to depart at 09:00 hr., the landing time with maximum utilisation of FDTL should be at 18:30 hr.

Flight Time

The total time from the moment the aircraft first taxies out under its own power for the purpose of take off to the moment it comes to rest at the end of the flight.

Rest Period

This is the period, during which a cabin crew member is not assigned any duty.

It is the responsibility of the crew members to make optimum utilisation of the rest period accredited by the airline to prevent cumulative rest deficits.

Rest period of the cabin crew members varies with the landing time of their previous flight.

Cabin crew, once off, could not be used on the same calendar day.

In no circumstances, can any cabin crew member be utilised for seven consecutive days.

1.3.1 Reporting at the Movement Control After the Flight at the Night Stopping Station

After coming out of the aircraft with the commander's and cabin crew in-charge's permission, cabin crew members are to report to the Movement Control of the station (if it has such facility). The de-briefing at the Movement Control is exactly similar to that of their home base station.

After receiving clearance from the Movement Control staff, they should board the crew transport for the hotel, ensuring their baggage is in the transport.

1.3.2 At the Hotel

All Airlines accommodate the crew members in best possible hotels as per availability.

During the crew member's stay at the hotel, many persons observe them and their behaviour because of the glamorous profession they have. In reciprocation, they are expected to achieve a high degree of appreciation through their action, personal presentation, interaction, dressing,

manners and etiquette. They should perceive that they are staying not only as normal guests of the hotel but in addition, as representatives of their airline.

They may try to adopt and comply with the guidelines given below for a satisfactory outcome.

On Reaching the Hotel

The crew members must personally ensure that their baggage are off-loaded from the transport because they themselves are responsible for their baggage. It could be possible that there might be other crew members in the same transport that might be dropping them before proceeding to their destination. If the crew members getting down do not show their baggage to the hotel porter, some of these might be left behind in the transport.

Again, please perceive that in practice it is extremely difficult and troublesome to relocate and get back the baggage once it gets misplaced. It requires excessive communication with various officials that the crew member would naturally not like after a tiring flight. Moreover, there is no guarantee that it would be retraced.

At the Reception Counter

At the reception counter, they should fill up the hotel register/form and await their turn for the allocation of rooms. The rooms are normally allocated as per the preference of seniority and it is expected that a crew member should wait until his/her seniors have selected their rooms.

Before Leaving the Reception Counter

Cabin crew must find out the 'Checking out Time' from the commander or the cabin crew in-charge. This is thoroughly essential.

Crew members are required to be present at the reception lounge, fully prepared to leave the hotel at this pre-determined and/or pre-intimated time viz. 'checking out time'. Any individual crew cannot expect the whole set of crew to wait for him/her at the checking out time and get delayed in reaching the airport for the flight.

Although unwanted, occasionally this does happen in practice. A marginal period is normally granted to the latecomer. However, no crew member should test this tolerance of others and/or make it habitual. The resultant outcome of this act of delay might range from payment of taxi fare by the individual crew member for reaching the airport on his/her own, delaying the flight, missing the flight and consequential disciplinary action taken by the airline for delaying or missing the flight.

Crew members should note down the room numbers of other crew members for contacting them, officially or otherwise.

For example, it may happen that a cabin crew falls sick and needs assistance. Who could be better than his/her in-charge/commander? Again, a crew member might require informing about any untoward happening to his/her in-charge/commander on official basis, because the cabin crew in-charge/commander is responsible for the set of the cabin crew. If the Crew Member does not know the person's room number, how could he/she do so?

Again, crew members might not like to pass the whole night-stopping period alone and for that reason, they should have the room numbers of other crew members to contact them and plan their collective programme accordingly.

Keeping the Uniform Ready

It is advisable to keep the uniform for the out going flight fully ready. The airlines might ask the crew members to leave earlier than their schedule departure time, for operational or any other reasons, at any time.

EXAMPLE

Suppose the scheduled departure of a set of crew members was at 18:00 hr. Based on that, they were advised to leave the hotel at 16:30 hr. The hotel housekeeping staff had promised to supply the washed uniform at 15:00 hr. As it happen, the crew members operating another flight came under FDTL and became unusable for their flight departing at 14:00 hr. The Movement Control personnel, considering the circumstances, interchanged the set of crew of the flights and advised the set of crew who were supposed to operate the flight departing at 18:00 hr. to operate the flight departing at 14:00 hr. and the set who were under FDTL to operate the flight departing at 18:00 hr.

This means that the crew members who were to leave the hotel at 16:30 hr. and to receive their uniforms at 15:00 hr. are to leave the hotel at 12:30 hr. and need their uniform by 11:00 hr., now. Shall they then get ready for the flight or go in pursuit of the housekeeping staff for their uniform? It indeed would be a chaotic situation then. Therefore, it is always better to keep the uniform in readiness at the earliest and be in peace.

CASE STUDY 4

On 5th. January morning, the tired crew of flight no. BN-784 checked into Hotel Seaface at Mumbai to have a well-deserved rest after their six-hour flight. The cabin crew in-charge, Mr. Raghavan, intimated that they would checkout from the hotel on 7th. January, at 04:35 hr.- to operate flight BN-723 to Kolkata.

After the exhausting overnight flight, some of the crew members moved to their rooms for sleep and some went to the coffee shop for a breakfast before entering their rooms for an undisturbed sleep until early evening.

In the evening, Mr. Raghavan visited his relative's place, returned to the hotel after a couple of drinks, a hearty dinner and went to sleep almost immediately to compensate the further needed rest. The telephone in his room rang about 04:40 hr. The caller announced "Good morning, sir! This is Sulekha. No one is down yet. Is the flight late?"

Raghavan was thunderstruck and pondered that how could he have overslept for so long. It has never happened in 31 years of his career. Then he realized the fact and informed his overenthusiastic crew, Ms. Sulekha that they leave on 7th. and not today.

On 7th morning, the crew members were down at the lounge on time except Ms. Neema. The crew transport arrived—still no sign of Ms. Neema. Capt. Mathur a Delhi base commander who was also supposed to fly to Kolkata as a passenger by BN-723 also came down and still no sign of Ms.

Neema. Her room telephone remained unanswered. About 04:50 hr., the hotel's bell boy was sent up to knock (read bang) on her door. He came down and revealed that the memsahib said she was coming down in 5 minutes as she has just woke up.

At 05:00 hr. the crew left the hotel leaving a message for Ms. Neema to come to the airport on her own.

She finally reached when the aircraft doors were about to close and operated the flight.

A few days later Mr. Raghavan received a call from one of the top brass of the Airline's Employees Association who curtly informed him that he has made a mistake by harassing a member of the association and if he repeats the same act in future, he would be suitably taken care of. The caller was Mr. Rajesh Yadav, husband of Ms. Neema.

The crew members should perceive clearly that the airline possesses all the authority to alter the flight of any individual crew member or a set of crew members at any time, owing to operational exigencies or because of justified reasons, obviously and essentially upholding their FDTL.

Putting Wake-up Call

Crew Members should not forget to register 'wake-up call' for the early morning flights.

They should allow sufficient time for getting prepared, settling their hotel bills and remaining *fully* prepared to leave the hotel at the checking out time.

It is better to add a little extra time to the abovementioned periods while registering the wake-up call, to avoid the tension of being left behind for not being ready at the departure time.

Crew members are to follow the procedures mentioned in 1.2.5 to 1.2.9 analogously to reach the aircraft for the outbound flight.

1.3.2A About the Hotels

At this stage, it would be advantageous to know about the hotels and their facilities. As it is indispensable that the crew members must avail a good rest, the airlines in their own interest, endeavour to ensure the same by accommodating the crew members at the best available hotels. The hotels are so complete with facilities that the crew members hardly feel any need to step out of the hotel for any item they might require.

Staying in such hotels renders a superb experience of luxury and comfort that forms an additional attraction of this job. Some of the facilities of these hotels are charted below for the benefit of the aspiring cabin crew members to mentally visualise the standard of the hotel.

To Remain Fit and Fresh

Airlines expects the crew members to be fresh and fully fit for the outgoing flight. The airline expects them to remain thoroughly active throughout the flight that they operate after the night stop and those might be long ones indeed. Adequate sleep and rest are essential for operating such flights. It is the responsibility of every crew member to use the opportunity to rest fully and reduce the risk of fatigue.

The crew members can acquire the needed rest, undisturbed, at the hotel and must avail the opportunity to the best. Actually, they should chalk out their programme in such a way that it gives them the wanted and needed rest as well as entertainment, so that they do not find the night stop boring. Crew members consult with each other and plan their programme accordingly. Any crew member has the liberty to detach from the gathering, whenever he/she feels as such and go on to his/her own course of action or avail rest.

Persisting at the Best of Health

Every airline desires that its crew members keep absolutely fresh and fit for operating a flight. To propound this, it is advisable that crew members should do some exercise ranging from visiting the hotel gym and/or taking a walk during their night stops and avail extensive rest. The hotel gym possesses the latest equipment and provides the assistance and advice of trainers.

Again, for staying fit, the crew members might consider a little swimming in the pool available at the hotel. The pool at the hotel is hygienic, cleaned to perfection and maintained at their best. The guests of the hotel receive the assistance of a trainer/lifesaver at these pools.

Furthermore, the crew members must watch their diet for staying within their prescribed weight limit. To suit their purpose, apart from the room service, there are a number of restaurants and coffee shops available within the hotel to suit their chosen and preferred diet.

Various type of food viz. Indian, Continental, Chinese and others are available in different restaurants of the hotel.

In the coffee shop, food is available round the clock.

Again, most of the hotels render a set menu of food comprising of soup, vegetarian/non-vegetarian main course and a sweet dish at a very reasonable price, exclusively for the crew members. In addition to this, most of the hotels impart a discount on their food and beverage prices for the crew members.

For mixing pleasure with exercise the crew members can visit the hotel disco.

For a quiet time, the crew members find a TV set in their air-conditioned and attached-bath rooms.

1.3.2B Behaviour at the Hotels

Crew members stay at the hotels as staff of their airline and not as individual guests. They are required to maintain their mannerism at their best to uphold the prestige of the airline, their own family and themselves.

Every airline has several 'Misconduct Rules' amongst their regulations and the crew members are to abided by these, while representing their airline. For this, they may follow the guidelines mentioned below. However, they should realise that no amount of guidelines can transform individual etiquette and manners towards betterment unless, the person exerts his/her internal desire and determination explicitly, to do so.

Crew members should:

- allow others a chance to precede him/her, as far as possible.
- show their baggage to the bell-boy to get those offloaded from the transport and to ensure its reaching their room without hassle.
- talk politely to the hotel staff for any information, for requesting for a change of room, for ordering food or for any other requirement in relation to their stay in the hotel.
- thank the staff serving them and tip appropriately.
- dress up, but not so casually that it becomes an eyesore to others and refrain from loitering in reception hall and restaurants, wearing such dresses.
- check their bills at the cash counter, and in case of any discrepancy point it out and settle it rationally (firmly if required) without raising their voice or losing their temper.
- adhere to the regulation of the hotel while entertaining a guest inside their rooms, regarding such person's stay there.
- make incontrovertibly sure, not to carry any hotel property with them while checking out. In detection of any such, the effect can be very damaging and long lasting.

- register their complaints (if any) regarding any deficiency about hotel service/facility in a matter-of-fact style to the appropriate authority, keeping own and their airline's dignity in mind.
- ensure that there is no initiation of any complaint from the hotel to the airline, involving them.

1.4 Inside the Aircraft

This is the most interesting part of cabin crew's duty as their actual job begins and ends within this locale.

This portion introduces cabin crew members to the core of their job and duties. Before closure of the aircraft doors, they are to coordinate, cooperate and interact with other ground staff about the passengers, but after the closure of the doors, the feelings they experience are similar to those of a sailor when his ship leaves the port.

Although each category's duties are well defined and suitably demarcated, the coordination between the categories remains obligatory and even important. As such, the sense of belonging for the passengers do not amplify to the brim.

After closing of the aircraft doors, the feeling of responsibility that the passenger's well-being, satisfaction and safety are uninterruptedly theirs, come in their minds and they sense a joy, feel elated and get in a mindset to perform at their best, till the passengers disembark at their destination.

1.4.1 On Reaching the Aircraft

Report Individually to the Cockpit

Each cabin crew member is required to report to the cockpit, wish and introduce himself/herself to the cockpit crew.

Report to the Cabin Crew In-charge

Thereafter, they are to report to the cabin crew in-charge, repeat the aforementioned procedure and each receive their individual 'Duty Station' commonly known as 'Station' Refer to 4.11–"Cabin Crew Stations"—chapter 4 and the galley they are working in Refer to 4.9—"The Galleys"—chapter 4, "Cabin Familiarisation and Catering Equipment Used for Passenger Service."

In this connection, cabin crew may perceive that each of them procure one duty station and each station is normally near one exit of the aircraft. There is a seat for the cabin crew allocated at each station.

A number of emergency equipment are located in the vicinity of each station in addition with a few essential amenities to facilitate the working of the posted cabin crew Refer to 4.11—"Cabin Crew Stations"—chapter 4.

Checking Emergency Equipment

The cabin crew after being allocated with his/her station must first check the emergency equipment of the station and report the findings to the cabin crew in-charge.

In case, any cabin crew member detects any fault, he/she shall report the fault to the cabin crew in-charge. The cabin crew in-charge in turn would report the same to the departure engineer through the Cabin Defect Report Book (CDR Book).

The CDR Book is placed on board for reporting the defects (technically known as 'Snags') of any technical device and equipment, meant for the cabin crew use, duly vouched by the commander of the flight.

On this reporting, the engineering staff will attend the defect/snag reported and rectify it. After rectification of the snag, the cabin crew of the station shall check the equipment/device again, and when satisfied, shall report to the cabin crew in-charge that all emergency equipment at the station is now serviceable.

Reporting at the Galley

'Galley', concisely, could be described as the place where the items needed for 'passenger service' is stowed Refer to 4.9—"The Galleys"—chapter 4.

One or more cabin crew renders the passenger service under a galley in-charge, from each galley. Cabin crew members should report to the galley in-charge of his/her allocated galley and start preparing for the passenger service as per his/her (the galley in-charge's) guidance.

In this context, it may be clarified that although the duty of each cabin crew of each galley is quite well demarcated, the concept that one cabin crew should ***not*** attend to the request of a passenger, which falls within his/her efficacy/reach, simply because the passenger is not within his/her theoretically demarcated territory, is *totally incorrect.*

Every cabin crew must envisage that the passenger service is a challenge that has to be negotiated with a spirited team effort by the cabin crew team and each individual cabin crew is a member of such team.

Preparation for Passenger Service

Say, before take-off, the cabin crew members are to purvey cold/hot towels first, juice packets thereafter and finally toffees to the passengers.

They should stack the towels on the serving trays, splash ice-water (in summer days) or hot water (in winter days) with eau-de-cologne on them to soak, neatly arrange the juice packets and finally pour the toffees from the packet on the serving trays, to remain prepared for the service. In that way, they do not lose any time before serving those, once the passengers are seated. This is known as pre-flight service preparation.

Checking the Neatness of the Uniform

Cabin crew members should check the neatness of their uniform periodically, whenever time permits. This is a 'blue-chip' habit that they should religiously adopt and maintain. They will realise the superlative effect of the habit throughout their career and even thereafter. They would find it quite beneficial at every stage of their life—while on duty or otherwise.

Duties of Cabin Crew at Transit Stations

Transit stations are the airports where the aircraft lands before landing at the flight's destination station. Cabin crew should look after the passengers remaining on board for flying further (transit passengers). While inside the aircraft cabin on ground, obviously, the passengers still remain their honoured guests and stay under their charge.

During this period, the passengers might experience some necessities like having a glass of water, a pillow, some newspapers and/or magazines, etc. The cabin crew members are to ensure that they are not deprived from receiving these items.

It may happen that certain items the passengers are asking for (say a cup of hot coffee) might not be possible for the crew to serve because of non-availability of 'galley power' (aircraft electrical power supply in galleys) for heating water. In such cases, the cabin crew members should render suitable regret/apology and explain the reason of their inability to the passengers.

However, the most important reason of their presence in the cabin and to remain observant is to restrict smoking inside the cabin, while on ground.

Latching of Galley Items

Cabin crew members must ensure in coordination with the galley in-charge that every piece of galley items is latched to be immovable. In case any of the galley items is not properly secured, it could get dislodged and damage itself, mess up the galley and might act in contrary in accessing an unobstructed passage, so importantly needed for evacuation in emergency condition Refer to 5.3.1B—"Checks and Duties to be Preformed in the Galley"— chapter 5.

Checking Cabin for Preparedness

Cabin crew members should check the cabin for readiness in coordination with the others. Check that

- all the passengers have fastened their seat belts,
- the seat backs are upright,
- all aisles and passages are clear/unobstructed (for reaching the emergency exits),
- the hat rack doors are properly latched,
- baggage, if not placed in the overhead racks are properly placed not to restrict the passenger movement in case of a needed evacuation, etc. Refer to 5.3.1A—"Checks and Duties to be Performed in the Passenger Cabin"— chapter 5.

Occupying Individual Station

Cabin crew must occupy the seat provided for them at their station (not any other seat), fasten their individual seat belt and shoulder harnesses during takeoff, landing and turbulent weather (while the 'Fasten Seat Belt' sign remains On).

Meeting Passenger Demands

Cabin crew should try to meet all passenger demands as soon as possible. This means—they should not leave the job in hand pending—to be done a little later—as another passenger might ask for something else, the next moment and in this way, the workload might blow out of size, ultimately making it difficult to manange.

Passengers are fully justified to become irritated when they fail to receive the barest necessities within a reasonable period. This irritated attitude might psychologically lead them to become deliberately 'difficult' and they might continue to demand for one thing or the other in series, then. As such, and to avoid this untoward situation, it is advisable to quash the possibility of its initiation at the root itself by satisfying their want at the earliest. In that way, the crew would certainly achieve appreciation from the passengers.

Exerting Precautions during Service

Cabin crew should exert utmost care to prevent toppling up of liquid contents of beakers over the passengers.

In certain short sectors, serving mixed tea/coffee (Pre-mixed tea/coffee liquor, milk and sugar) in beakers becomes essential due to shortage of time. In addition, water and cold drinks are essentially served in beakers.

For this sort of service, about 12 to 15 beakers are arranged in rows on serving trays and offered to passengers.

Cabin crew should exert excessive care not to topple the contents of the beakers over the valued guests owing to haste, due to turbulence or for any other reason. The passengers might judge the act, although understandably accidental, as the cabin crew's inefficiency and express their grievance to the airline. In the process, the cabin crew might be embarrassed and the airline might lose a great deal of goodwill.

Cabin crew should be exceptionally careful while pouring hot liquids for passengers or offering the same to them. All the aforementioned results show up in these cases similarly. On top of that, there remains a possibility of subjecting the person(s) to a burn/scald injury, which is very undesirable.

Talking to Passengers

Cabin crew should face the passengers and establish eye contact while conversing or serving them, otherwise the act would reflect badly on them and might be considered as a sign of ignorance towards the person. Again, while offering the food tray, if the cabin crew looks at something, someone or somewhere else not only, the passenger view the act similarly, but in addition, the crew member might misplace the tray somewhere other than the table.

Cabin crew should maintain a vigil to detect if any job is left incomplete or for any scope of doing something further.

It is reiterated that the job of each cabin crew is more or less demarcated, but it is not justified to take a vow not to do a job because it is the job of one cabin crew and does not fall within the working periphery of another.

Helping other Cabin Crew

This certainly facilitates every cabin crew and others normally reciprocate the same with analogous deeds. The exploit pays off in the long run indeed Refer to 3.4—"Interaction with other cabin crew"—chapter 3.

Airlines & Passengers

Every airline accepts that the passengers are always right. As such, cabin crew members should not get involved in any kind of argument with them. If at all necessary, they might convey their rational views with considerable politeness.

They should perceive that the passengers are the 'paymasters' of the airline and in turn, the airline is their paymaster. The airline, quite naturally would be obligated towards the passengers and that tilts the steelyard beam in their favour. As such, it is better to fulfill the demands of the passengers to the maximum extent possible.

Cabin crew must be absolutely certain to be in possession of sufficient material to counter the aforementioned 'obligation' (read 'charge') as a part along with much reserved resources, to make their stand understood (if at all) by the airline, if such untoward happening in the form of 'Disciplinary Proceeding' and/or 'Departmental Inquiry' becomes inevitable.

However, it is strongly recommended that the initiation of such incidence should be eschewed altogether, if not really impossible. In such cases, the cabin crew's attitude and tact could help evade those untoward situations provided he/she could enforce practicality over his/her sentiment even though it is not easy to accept any irrationality.

Reporting of Happenings

Report every unusual happening to the cabin crew in-charge who because of his/her designation, has all the rights to transpire of every happening inside the cabin, as he/she would be answerable for all those happenings and/or for the deeds of every cabin crew in that respect to the airline management Refer to 3.3—"Interaction with the cabin crew In-charge"—chapter 3.

Reporting of any happening to the commander must be done in coordination with the cabin crew in-charge.

Catering Clearance at the Destination Station

After landing at the 'Destination Station', help the cabin crew in-charge or the galley in-charge to acquire the necessary clearance from the catering staff regarding returning of all prior-accepted catering equipment from the departure station.

To reiterate, the catering items (equipment and provision) are to be checked and procured from the catering officials of the departure station of the flight under 'Acceptance Signature'. In reciprocation, on arrival at the destination station, the same should be handed over to the catering staff. They in turn, would check and tally the items and issue an initialed clearance certificate to the cabin crew, when satisfied.

Thanking Crew Members

It is a normal courtesy to thank the entire team of crew members after the flight, with which the crew member had discharged his/her duty for the tenure of the flight.

1.5 General Behavioural Requirements of Cabin Crew

The Cabin crew are the representatives of the airline to the passengers and are expected to provide a quality of service that should be lauded by them (the passengers) to be superb and heartfelt. Their effort should make the passengers feel as if they are indeed the guests in the house (read aircraft) of a close friend (read airline). For achieving such realisations out of passengers' mind and heart, the cabin crew are necessarily to elevate their qualities, capabilities and potential to the highest degree, if not to total perfection. The following guidelines should help them in this endeavour:

1.5.1 Cabin Crew Behaviour

Polite behaviour is one of the most essential qualities expected from cabin crew members. It is essential for them to perceive that the air travellers are sophisticated persons and belong to high society. In most of the cases, they possess money, qualification and intelligence and/or all the three, otherwise they could possibly not have boarded an aircraft.

To clarify, when they are flying, they are paying quite a substantial fare. If they are paying the fare on their own, they are bound to be rich. In addition, if they are traveling on their organisation's account, they must be having such designation for which their organisation is obligated to pay for their flying. Moreover, such designation could only be acquired through a good qualification. Again, for both the previously mentioned criteria, quite a high degree of intelligence has to be an incontrovertible factor. In addition to all these rationalisations cited, they are the paymasters. As such and to enjoy their flight, it is fully justified for them to expect polite behaviour from the staff of the airline, of which cabin crew is a part either.

As their expectation (enjoying their flight) and a cabin crew's motivation (to make them enjoy their flight) both converge towards the same goal, it becomes even more essential to be polite.

A Smile

This act could always earn a friend and would help you at each/every stage of your life in general and at your work place in particular. The smile personifies 'I am happy to see you' without a single word being articulated and perhaps no amount of vocabulary could be its equivalent or represent it better, internationally. Refer to Chapter 8, "Body Language of Cabin Crew".

Listening to Others

It is always better to be a good listener. Passengers view the cabin crew as the representative of the airline aboard. They narrate their cause of dissatisfaction to the cabin crew (which might not have

generated from any cabin crew), anticipating a fair solution of their grievance without realising the limitation of power of the cabin crew.

The cabin crew possibly could not do justice to the aggrieved person because of non-availability of adequate authority and power in their possession but certainly could minimise the same by listening to their complaint with sympathy and patience, advising accordingly. As such, a tolerant hearing would be appreciable. Refer to Chapter 6, "Understanding the Psychology and Expectations of the Passengers and the Expected Behaviour of Cabin Crew".

Speaking to Passengers

Cabin crew should explain all queries of passengers with limited vocabulary. Speak politely, neither too much nor too less. On violating this guideline, they might be considered as 'verbose' in the first instance and 'proud' in the second.

However, they must answer as many questions as possible, without raising the pitch of their voice to show their integrity and interest in the conversation. Refer to 1.2.7–"Talking in Transport".

Learning from Seniors

Cabin crew should ask questions and show their eagerness and integrity to learn their subject/job from their seniors. It is normal human psychology that people feel happy to acquaint others with the knowledge they possess. Analogously, when a senior cabin crew is asked for any clarification he/she is elated to explain the topic asked, by receiving an opportunity to divulge his/her knowledge, thus proving how commendable he/she is in his/her profession.

Seeking Clarification from Other Department Staff

Cabin crew should converse enthusiastically with other department staff to learn about their department, about the nature of job they do and about their adopted method(s) of handling those jobs.

The acquired knowledge might be of little importance to them currently, but no one can ever substantiate the possibility of a tremendous opportunity/opening in the form of a promotion would not arrive for the concerned cabin crew from that department in future. If/when, it supervenes, the cabin crew would then encompass, understand and appreciate the utility of his/her current deeds.

Cabin crew members should never hesitate to ask, clarify and learn about the procedure of doing a particular job with which they are not so conversant, which may range from filling up of customs form to visiting the airline doctor or to obtain their due 'Annual Passage Ticket'.

Sleeping or Dozing in Duty

Cabin crew should not sleep or doze off during their duty period. They are required to be fresh and fully fit for their flight or series of flights, for which the airline grants much of rest period. Moreover, they should be prepared for any unanticipated emergency condition that might crop up at any time and for which they are so meticulously trained.

Furthermore, in such situation, the honoured guests of the airline might derive an adverse impression about the cabin crew and quite likely form an opinion that the cabin crew are not bothered and are deliberately neglecting them and thus misestimate the cabin crew's capabilities.

Consider Other Employee's Difficulty

Although, cabin crew should show their eagerness to provide help and/or to learn/clarify from others but should be careful not to intrude in other employee's job.

At that moment, the approached employee might be getting irritated for failing to apply the befitting procedure to handle the job in hand and might be trying to concentrate further on it. Any

type of approach, casual or serious, at that time, shall naturally move his/her mind from the concerned subject matter. He/She would very justifiably consider the action as spontaneous interference.

Making Noise

Cabin crew should not sing, indulge in loud gabfest amongst each other, play cards, read newspaper etc. during their duty. All these will categorically generate the previously mentioned adverse effects on the passengers. In addition to those, the passengers would presume that the cabin crew members are ill-mannered and would hold the airline (and probably the crew member's family) responsible for sanctioning them undue liberty and indulgence and for not enforcing suitable corrective measure(s).

If the cabin crew analyzes the situation mentally, he/she would certainly be able to grasp that these prospects create a swingeing effect on his/her career, personal and professional life and on the goodwill of the airline.

Alcoholic Drinks

Consumption of any alcoholic drink is not permitted during the duty period or within twelve hours period prior to the 'departure time' or 'duty commencing time'.

Airlines are at a liberty to enforce a breathalyser (an instrument to confirm the presence of alcohol in the breath of a person) test and/or a blood sample check on any/all crew members at any time during the crew member's duty period. The procedure has been elaborated in 1.2.9C – "Reporting for Pre-flight Medical—if so advised/briefed by Movement Control or observed form the departure board".

A heavy consumption of alcohol, even before twelve hours from the 'departure time' or 'duty commencing time', could still show up its presence in breath or blood because of the gargantuan quantity of its consumption. Cabin crew must fix the time limit and restrict the quantity of alcohol consumption keeping the departure time or duty commencement time in consideration.

Pilfering Airline's Property

Airline's items are never to be taken out of the airline's premises, in any circumstances, no matter how small may the item be.

1.5.2 Customs, Airport and Security Regulation

Crew members must adhere to customs, security and airport regulation with extreme rigidity to safeguard the prestige of the airline and that of themselves. Violation of any kind might be considered grave and affected against the violator, to the extent of 'criminal offence'.

Courtesy towards Others

Cabin crew should wait on all occasions, for his/her turn and should not thrust forward, depriving and annoying others, even if such facilities are bestowed on them officially.

For example, when the crew members pass through the security check, the officials realising their exigency pass them before the waiting passengers on a priority basis and the passengers even do not mind the deed. Crew members are fully justified to avail such bestowed chances.

Photo Identity Card (PIC)

Cabin crew should not ever lend or misuse their Photo Identity Card (PIC) provided by the Government of India and their airline.

The PIC, as the name suggests, displays a photograph of the owner. The PIC of cabin crew members entitles them an unrestricted movement in any airport during their duty period.

The trained eyes of the security officials would not normally miss its use (read misuse) by another person. Furthermore, if such misuse were detected, the 'owner' and the 'user' both would face grave criminal charges.

As such, cabin crew members are to strictly refrain from such mentioned misuse, playfully or otherwise.

Entering Restricted Zones

The type of PIC issued to the crew members enable them to move unrestrictedly inside the terminal building and to reach the aircraft at any airport.

Although the cabin crew members are entitled to enter certain 'restricted places' during their duty they should never enter some restricted places like customs enclosure, immigration, bond room etc. without proper authorisation. They should not avail such undue advantage of their possessing the PIC in any circumstance.

Damaging Airline Property

Cabin crew members should not willfully damage any property of the airline and exert appropriate precaution to prevent the same. In such cases, the airlines have all the authority and could very justifiably frame appropriate charge(s) against them.

Carriage of Letter/Packet

Never carry any letter or packet, for and from any person, known or unknown to you as advised earlier.

CASE STUDY 5

Mr. Imran Siddique, a Mumbai based Flight Purser, departing at 05:45 hr., on flight BN-593, woke up late and had an altercation with his wife for not waking him up on time. By the time he could be ready, he missed the crew transport and had to reach the airport, spending Rs. 275/-.

There, he found the crew baggage of the flight BN-593 had already been dispatched to the aircraft. However, he got his bag marked and personally advised the crew baggage porter to reach it at the earliest and if necessary separately, to his aircraft.

The porter having his hands full carried the bag along with another flight's baggage. Flight BN-593 had to be delayed for Mr. Siddique's bag and he received a rebuke from Capt. A.S. Rao, the Commander of his flight.

All these consequential happenings were enough for Mr. Siddique to sulk, and to vent his anger he decided to do something harmful to the airline.

Once the meal service was over, he sent the other two cabin crew Ms. Sujita and Ms. Bala, working in the galley, under him, to another galley. While alone in the galley, he took out everything from one of the ovens and switched it 'on' setting the timer for 45 minutes. Then, he collected a huge bundle of steel cutlery from the trays, took them to the adjacent toilet and dumped them inside the commode. Thereafter, he shoved some packed toilet paper rolls and a few tissue paper boxes in the commode and flushed repeatedly to drain it.

The Oven went on getting heated and luckily, the circuit breaker popped out to cut-off the power and prevented an inevitable fire hazard. The overheated oven became unserviceable. He did not report any thing about it and moved to the hotel with other crew members.

When the catering staff at Bangalore opened the oven, a gigantic quantity of dense burnt oil (that dripped on the base of the oven earlier from the food packets) smoke belched out from the red-hot oven.

Catering staff reported the matter to the engineering personnel who checked the oven, observed the 'popped out' circuit breaker, noticed the non-reporting of any overheating and found it unserviceable.

On rationalizing, the cause was decided to be 'over taxing' of the oven. The question arose that whether it was a human error or a technical fault. Again, it was vague that when the oven had become faulty (due to any of these aforementioned reasons), why the same was not reported? The engineer then rationalised in his thought that if it was not a technical fault, it has to be a human error and on top of it when it was not reported, he concluded it to be deliberate.

In the mean time, the sewage staff, while draining out the waste from the toilet adjacent to the above mentioned galley, found a blockage in the outlet and informed the engineering foreman. The flushing unit was dismantled to recover plentiful steel cutlery and some unpacked toilet paper rolls along with tissue boxes.

It reinforced the earlier conclusion that someone had done it deliberately, because such a huge quantity of recovered items could not have been accumulated otherwise.

Furthermore, as passengers cannot have access to so many steel cutlery and as there is no reason for them to be involved in such sabotaging act, that further pointed out that it had to be a cabin crew, who did it.

The engineering department in coordination with the Flight Movement Section contacted the cabin crew in-charge of BN-593 at their hotel and found that Mr. Siddique was the galley in-charge of the concerned galley.

Mr. Siddique, when contacted, stated that the oven worked fine all through the flight and he had no knowledge of its turning unserviceable. He also conveyed his ignorance about the presence of the steel cutlery and about anyone who had thrown them in the commode. It irked him, when the engineering personnel tried to rationalise the matter with him and he quite rudely informed them that he does not wish to be disturbed during his rest period and if they (the engineering personnel) have anything to substantiate, they

should do so, through his departmental head at Mumbai.

With this provocative and insulting statement, Mr. Siddique had added another misdeed to his earlier offence.

Normally, the engineering department would not have proceeded further and would have dropped the matter (forgotten), remarking 'inconclusive'. Now, being provoked, they went ahead with a full-scale fact finding procedure, prepared their case and arranged an inquiry through interdepartmental communications.

On receiving communication from Bangalore, the Departmental Head of Mr. Siddique, advised him to submit his comments on the subject, in writing.

On complying with the instruction, he was consequently summoned to appear before an enquiry committee on a later date.

Before the Enquiry Board, Mr. Siddique merely reiterated his written statement and denied that he had misused any equipment (viz. the oven and cutlery) and conveyed that he had no knowledge of anyone dropping any such items in the commode. He argued that how could he have committed such acts, as alleged, without being noticed by someone or the other and most importantly why would he indulge in such act when he has no motive against the airline, which is providing him bread and butter.

Capt. A.S. Rao, the Commander of flight BN-593, stated in his witness that he had rebuked Mr. Siddique for reaching the aircraft late and for delaying the flight's departure due to late arrival of his bag.

More or less identical statements from Ms. Sujita and Ms. Bala, the other two cabin crew members working in the galley under Mr. Siddique, and appearing as witnesses then, revealed that they were sent off to another galley by Mr. Siddique. Although the unusual advice had surprised them, because they were supposed to remain in the galley to attend passenger calls, they obeyed the instruction of their senior cabin crew.

Mr. S.K. Chatterjee, from the Personnel Department, then brought up the topic of his coming late to the airport and questioned him about its reason(s). He also pointed out that when not 'charged', why did Mr. Siddique reveal that he was 'alleged' to participate in some misdeeds.

In reply to Mr. Chatterjee's offensives, Mr. Siddique narrated the whole episode from his getting up late and committed that he was in a bad temper for which he wished to be left alone in the galley.

Mr. Chatterjee took the cue from here again and argued that Ms. Sujita and Ms. Bala were removed purposefully from the galley by Mr. Siddique, only for the purpose of his staying alone in the galley for performing his sabotaging act without being observed by anyone. Moreover, this last statement of Mr. Siddique contradicts his earlier argument 'that he could have been noticed by someone if he would have had done such act' and does not hold well. As such, it becomes obvious that he only had performed the act, intentionally and deliberately.

Mr. Siddique had no answer to protest the charge except to stick to his statement that he did not do any misdeed.

Mr. Chatterjee further argued that many steel cutlery were detected from the toilet that was next to this particular galley. There is every possibility that those cutlery were fetched from this

particular galley only. Again, only a cabin crew can materialise such act, because only he/she has access to such a huge number of cutlery. Again, such a lot of cutlery could be accumulated only if someone stays alone in the galley, which Mr. Siddique had deliberately arranged.

Mr. Siddique once again just denied the charges without submitting any argument.

Finally, Mr. Kapra from engineering department with the help of finer technical details and supporting verse from the engineering manual established that neither could the oven have acquired such high temperature nor such fault in the oven could have developed if the oven not had been worked in empty condition.

He pointed out that taxing the oven is one thing and working the oven in empty condition and thus overheating it is another. The latter is deliberate and thoroughly against all recommendations. He also submitted the report from the engineer who had examined the unserviceable oven and furnished the rationalised result of his findings for the Enquiry Board. He also submitted the written statement from the catering in-charge that when they had opened the oven they found it extremely hot, smoke was emitting from it and it was totally empty.

Mr. Siddique simply broke down at this point, admitted all his deeds (read misdeeds), and submitted his unconditional apologies for all he did.

He was suitably reprimanded and quite a handsome amount was deducted from his salary for intentionally damaging the airline's property.

Glossary

1. ***Airport Reporting Time*** This is the time at which the crew members reach the airport (Movement Control) for a flight.
2. ***Crew Baggage Porter*** These are the staff engaged by the airlines to transport the baggage of the crew members.
3. ***Crew List*** This is the list of the crew members actually operating a specific flight.
4. ***Crew Security Check*** This is the check imposed on crew members to prevent carriage of contraband item(s) to the aircraft.
5. ***Departure Time of Flights*** This is the time at which the aircraft, operating a particular flight moves off from the departure gate.
6. ***Deviation of Route Pattern*** This is the change in route pattern from the scheduled route pattern of a flight.
7. ***Movement Control / Cabin Crew Briefing*** This is the place where interaction about the concerned flight between cabin crew and ground staff of flight operations department, takes place.
8. ***Parking Bay & its Number*** Parking bay is a portion of the airfield where the aircraft are parked for the purpose of loading or off-loading its contents. Each parking bay has its individual number known as 'Bay Number.'
9. ***Pickup Time*** This is the time at which an individual crew member is to be picked up from his/her residence for a flight.

10. ***Picture Identity Card*** This is the personal identity card, displaying the picture of the user, issued by the airline and /or DGCA authorities.
11. ***Pigeon Coup*** The airline provides these small lockers (somewhat similar to domestic letterboxes) to every individual crew member with their name written on it for receiving official documents from the airline.
12. ***Post-Flight Duties*** The duties to be carried out by individual crew members between the time of coming out from the aircraft to boarding the crew transport, after operating a flight.
13. ***Pre-Flight Duties*** The duties to be carried out by individual crew members between the reporting time at the airport and the departure of the flight.
14. ***Pre-flight Medical*** This is the medical check, carried out upon crew members before a flight, to confirm their absolute fitness and ability to carry out their assignment.
15. ***Registration Number of Aircraft*** A specific number comprising of a combination of English letters and /or numerical digits allotted to one specific aircraft.
16. ***Security Enclosure*** This is the enclosed arena where security check is carried out
17. ***Snag*** This is the un-serviciability or technical fault of aircraft or equipment.
18. ***Transportation Time*** The time an individual crew member passes inside the transport. This is the period between the pickup time and the airport reaching time for an individual crew member.

Questionnaire

1. Some of the Pre-flight duties of cabin crew at the airport include:
(a) Thank the crew transport driver and report at the Movement Control.
(b) Check in the baggage at Movement Control and proceed to the aircraft directly.
(c) Display your PIC, receive Briefing from the Movement Control staff
(d) Both (a) and (c) are correct.

2. Inside the crew transport you are to:
(a) Talk about your duties and responsibilities, throughout
(b) Keep a little reserved, but ready to reply to all that is asked, politely.
(c) Talk about your experience regarding the incidence of a drunken passenger.
(d) Do not talk at all in order to allow the crew to be in peace.

3. What is the Pickup time for a cabin crew operating an international flight when his/her transportation time is 85 minutes and the departure time is 07:35 hr.?
(a) 05:25 hr
(b) 05:30 hrs
(c) 05:35 hrs
(d) 05:40 hr

4. **What is the airport reporting time for a cabin crew operating a domestic flight, departing at 09:10 hr.?**
   (a) 08:25 hr.
   (b) 08:35 hrs
   (c) 08:40 hr.
   (d) 08:45 hr.

5. **What is the departure time of a domestic flight for which a cabin crew gets picked up at 04:20 hr. when his/her transportation time is 130 minutes.**
   (a) 06:50 hr.
   (b) 07:05 hr.
   (c) 07:20 hr.
   (d) 06:45 hr.

6. **At your pickup time you shall**
   (a) Just wake up from your sleep.
   (b) Feel too tired after a game of tennis and a little swimming.
   (c) Be fully ready and spend minimum time before boarding the crew transport.
   (d) Board the crew transport leaving behind your baggage in order to expedite proceedings.

7. **On reaching the Airport, a cabin crew's immediate duty is to:**
   (a) Display the PIC, demark his/her baggage and report to Movement Control.
   (b) Display the PIC, Report for pre-flight medical and proceed to the aircraft.
   (c) As in (a) and to thank the driver of the crew transport.
   (d) As in (c), but after collecting a letter to be delivered at your destination station.

8. **On reporting at the Movement Control the staff briefs you about:**
   (a) Final crew list, registration of your aircraft, delay in departure (if any)
   (b) As in (a) and bay no., change of route (if any), report for Pre-flt. Medical (if so)
   (c) Both (a) and (b) are correct.
   (d) As in (c) and gives you the passenger figure of your flight also.

9. **What is the reason that the Movement Control staff briefs you about the reason of the delay in departure of your flight or the reason for change of route pattern?**
   (a) So that, you can plan to enjoy this extra available time undisturbed.
   (b) Because you have to divulge the information to the customers, whenever asked.
   (c) So that you can ask your cousin to meet you at the airport of diversion.
   (d) So that you can check the 'emergency equipment', thoroughly.

10. **Individual Pigeon Coupe has to be checked before going on a flight and again after coming back from a flight because:**
    (a) There might be some important notification(s), supplied while you were on flight.
    (b) The notes you get from your colleagues have to be affected at the earliest.
    (c) There might be some instruction(s) to be carried out immediately after landing.
    (d) Both (a) and (c) are correct.

2

Departments of Airlines and Cabin Crew's Interaction with these

DEPARTMENTS OF AIRLINES: AN INTRODUCTION

Every airline has several departments and each of these has specific jobs of their own. All these departments are required to coordinate amongst themselves for a smooth functioning of the airline. In absence of, or in case of 'not so efficient' functioning of any of the departments, the airlines cannot impress their business effectively to flourish. In other words, the teamwork and not any individual department's best effort and top-notch efficiency can cause any airline to operate creditably.

Every department has to exert its maximum efficiency to elevate the integral standard of the airline. Slackness from any of the departments would positively reduce the overall/collective efficiency of the airline considerably, relegating its name, fame and goodwill.

Some important departments of the airlines and their functions are discussed hereafter in this chapter.

2.1 In-Flight Services Department

This department could be segregated in two sections that comprises of two categories of employees viz. cabin crew and catering section staff.

The duty of cabin crew members is to look after the passenger service on board the flights and the duty of catering section staff is to reach all needed supplies for the mentioned 'passenger service' before the departure of the flight.

2.1.1A Specific Duties of Cabin Crew

Welcoming the Passengers When guests come to a family's home, they are first welcomed into the house at the doorstep. Each cabin crew member should realise that the passengers are the guests of their airline and they, as the representatives of the airline, are the hosts to these guests.

Welcoming the passengers with politeness and a smile makes them feel that their presence is truly relished, they are indeed wanted, are in good hands and would be able to enjoy the sight unseen viz. the flight. This welcoming at the doorstep of the aircraft thus gives a first hand impression of the aforementioned points to the passengers and that affects to win their heart at the first instance.

Making Passengers Comfortable Practically, passengers stay in tension till they are on board the aircraft because after undergoing various formalities at the airport, they still go on conjecturing about some further formalities ('problems' from passenger's point of view) that might crop up and ultimately disallow them to fly. A fraction of this tension remains even after boarding the aircraft and the cabin crew are required to soothe out a part of this last trace of the tension through their deeds while welcoming the guests. This could be fulfilled by–

- relieving them of the burden of their jacket,
- helping them stow their bag or finding a suitable space for that purpose,
- pointing out their seat and
- moving the seat belts apart (these are normally placed crossed on the seats) for them to sit down.

When they are comfortably seated, the cabin crew should serve them wet towels (with ice-water in summer and hot water in winter) scented with eau-de-cologne, a welcome drink (chilled soft drinks or juice in summer and readymade tea/coffee in winter, as sufficient time is not available to serve tea/coffee in grand style, as indicated in chapter one). They might serve some toffees later substantiating the airline's policy.

Human psychology indicates that these deeds normally cut off the last trace/part of tension from the person as desired and makes the passenger debonair.

Serving Food to Passengers Serving an enjoyable and time-befitting meal to the passengers is one of the most essential criteria of every reputed airline. Both the sayings, "The best way to reach a person's heart is through the person's stomach" and "A hungry man is an angry man" (which is equally correct for women) are truly decorous for the airlines.

Fortunately, the airlines grasp the fact and react accordingly to honour both the phrases. Cabin crew might observe in practice that many passengers have so much fascination for the airline foodstuff that they even avoid the possibility of having food at home or at a hotels or restaurants after the flight. Keeping this criterion in consideration, the airlines pickup their foodstuff exclusively from the highly reputed caterers. The cabin crew members are to present these foodstuffs with best of their charm and manners, to the gourmets.

In addition, the cabin crew members are to correctly decide the timings of their service and allow sufficient time for the guests to enjoy their meal.

EXAMPLE

For example, if they hurry up with their service, they might be serving the ice cream when the passengers possibly have not finished even one-fourth of their main course, and/or possibly start pouring tea/coffee when the passengers might be just finishing the main course. This would cause the ice cream to melt away in the first instance and tea/coffee to turn lukewarm in the second case. In all probability, both the items might be found more or less at the same temperature when their guests try them. On the other hand, if they delay in presenting the bread sticks or the hot rolls, the soup that they had already poured, might turn lukewarm and transform to ditch water in taste.

Attending to Passenger's Needs This assignment can again be compared with a person's treatment with the guests at their house. While entertaining their guests at home as a laudable host, the host finds out about the guest's needs and likings from time to time. Creditable cabin crew members value and treat their passengers analogously.

However, they should not overdo it in the process so that their guests misconstrue the 'finding about their needs from time to time' as 'nagging and/or irritating'.

For example, suppose a cabin crew has served a steaming cup of coffee to a passenger and tried to find out how the coffee is after fifteen seconds, the person would naturally be irritated as he/she could not possibly have sipped it by then. Again, after serving the coffee if the cabin crew member approaches the person to enquire whether he/she would like to have a few biscuits (mind it, the person has just finished the sumptuous dinner), the person would certainly feel pestered and would be angry (instead of irritated) in this instance.

Again, as no part of the on-board service could be kept pending, for being done later, there is hardly any scope of relaxation for cabin crew (in that respect for any crew member) during the entire period of any flight. In an office, the file(s) could be left behind to be completed next day, but in this case, all their services have to be dispensed by the cabin crew, within the available time of the flight, with all certainty.

Taking Care of Passenger's Sickness on Board A person can be sick at any time and becoming sick on board is nothing abnormal. The range of sickness could vary from an ordinary airsickness or a first flight fear to a major one like heart attack or a diabetic coma. Any person feeling uncomfortable, whatever the nature of the sickness may be, tends to depend on someone in general and the cabin crew on board in particular and desires a looking after, care and sympathy. The crew members must provide all these supports at the earliest. If they can attend to the passenger immediately and demonstrate their confidence and sympathetic approach towards the passenger's feelings, they may be assured that they have cured the generality of the uneasiness.

Each cabin crew is trained in first aid on a mandatory basis to act in accordance with the situational demands. The topic is elaborated later, in the First Aid chapter.

Looking after Passenger Safety It may be highlighted here that, although looking after the comfort of the passengers is one of the essential duties of the cabin crew, but the same should not be regarded as the most important and paramount one, as is commonly and wrongly accepted by the majority of people. However, looking after the safety of the passengers during an emergency situation has got to be considered the most important and requisite factor of the cabin crew's duty and responsibility.

In an emergency situation, if the cabin crew members do not come up to the expected/exalted standard and/or lack in any way to perform their stipulated duty, the result might be far reaching and might even turn fatal. In such untoward situations (emergency), the question of life and death of the passengers remain very dependent on the ability and efficiency of the cabin crew members, who in turn remain duty bound to safeguard the passengers in such extremity.

May it be perceived that, if the evacuation of passengers becomes inevitable, the same has to be completed within an extremely short and specific period viz. ninety seconds. On mulling over the

statement, it can be ascertained how difficult and tough it would be to transform the said requirement into practice.

2.1.1B Specific Needs of Cabin Crew

For complying with all the said duties effectively, cabin crew members are to remain fresh and more importantly fully fit on board. An unfit crew member should never undertake any flight duty because by failing to discharge his/her duties on board, in a state of unfitness, the crew member increases the work load of the other fit crew members of the flight, as there is no scope of keeping any job pending/incomplete on board, in anticipation to be finished later (as mentioned above). In addition to that, the person in such condition literally becomes a liability on the remaining crew members indeed, as he/she might be required to be looked after or medically attended, on board. This factor does not occur with similar seriousness for the ground staff and essentially is of more importance for crew members.

The aforesaid statements are intended to make the reader fathom at this stage that the duty of cabin crew is not that easy and rosy in practice, as appears from the glamorous outer view of this specific job.

It can be emphasised that at the time of emergency, the cabin crew members cannot be considered as one insignificant category of staff of the airline, as normally and wrongly underrated by a section of unwitting airlines' personnel and many of the general public. In that situation, the lives of the passengers remain dependent on them (the cabin crew members) and their efficiency. The situation then demands the cabin crew to be entirely duty-bound, coolheaded, active and brave. In addition to this, his/her clear thinking and spontaneous decision-making would be coveted to cope with such situations, befittingly. Failing to reflect the mentioned qualities would result in the situation to retrogress against the cabin crew team because the already tensed passengers might turn panicky and the matter might get out of control then. Certainly, this is much undesired.

CASE STUDY 6

Flight BN-594 from Bangalore to Kolkata was delayed by two hours because of non-availability of the operating aircraft. The incoming aircraft, which was supposed to operate the flight was several hours behind schedule and had not even taken off from Chennai due to cyclonic weather there. To restrain further delay, the engineering staff at Bangalore toiled hard to rectify the prevailing snag of a grounded aircraft and towed it to the bay for the flight.

After the pre-flight preparation (loading of cargo, mail, passenger baggage, catering items etc.), the passengers boarded the aircraft and were seated. It was a full flight (full load of passengers) that day as a lot of crew members were traveling back to their base after completing their periodical training at the airlines training school at Bangalore.

The doors were closed and the welcoming announcement was completed.

The left engine of the aircraft was started while the safety demonstration was in progress. The cabin crew in-charge Mr. Surya Narayan Mullick, who was looking casually at the demonstration noticed the left hand windows suddenly turned orange. Being a senior purser of the airline, he immediately realised that a fire has broken out on the left side of the aircraft.

The announcing cabin crew noticed the happening also and she stopped the announcement abruptly to allow the cabin crew in-charge to make the appropriate announcement, essential in such situation.

Understanding that panic would break-out within moments Mr. Mullick took the microphone and announced in a calm voice, "Ladies and Gentlemen! Be calm and remain seated until further instruction. Nothing serious has happened. We are responding appropriately to defuse the irregularities. Please await further announcement" and continuing for the cabin crew, "All cabin crew, standby at your stations." While making this announcement he observed the colour of the windows had changed back to black and understood that the fire has subsided or extinguished.

Although the passengers complied with Mr. Mullick's instruction, but one of crew members traveling as passenger, a high official of the airline, without realising that neither was he acting as a crew member nor was he in uniform, got up from his seat, shouting, "Remain calm and quiet. Nothing has happened. cabin crew–open the emergency exits". This spoilt the whole scene, passengers, seeing a fellow passenger shouting and getting up from the seat were panicked and without realising the meaning of the vocabulary (read—loud cry), started getting up from their seats.

In the cockpit, Capt. D.K. Rekhi, the commander of the flight, duly received the signal about the initiation of fire through the sensors located inside the left engine, performed the 'Fire Drill' for the left engine and announced over the public address system overriding all other communications, to evacuate the passengers utilising the right hand exits only (as there remained a possibility of the fire still existing on the left side of the aircraft and so the procedure would be unsafe for passenger evacuation from that side).

Mr. Mullick was in a dilemma. He could literally see that the fire had gone out and as such, it was not essential to evacuate the passengers over the slide. On the other hand, it was his paramount obligation to comply with every order of the commander, immediately and without any question, in that situation. After a momentary hesitation, he decided to execute the commander's order.

However, his scrupling paid off because as soon as he laid his hand on the door control handle to unlock the door the commander announced, "Cabin crew, postpone evacuation procedure, standby for normal operation of the doors". Continuing his announcement, he reassured the passengers that no danger is existing any further and hence there is no cause for any concern.

The ground staff commissioned the stairs on to the right hand side exits of the aircraft and the passengers disembarked and were transported to the airport lounge by the awaiting coaches.

As revealed by the engineers, the probable cause of the fire was likely

from burning out of a small quantity of engine fluid that was accumulated in the engine sump and was not wiped off in haste to deliver the aircraft at the earliest.

The crew members assembled in the crew rest room of the airline and were discussing about the happening when the previously mentioned high official approached Mr. Mullick and curtly informed him, "I am going to initiate an enquiry as soon as we reach the base. After all these years of service, you did nothing and I had to take over. What is the use of having you on board when you cannot discharge your duty without others' help? You cannot expect a set of crew members flying as passengers everyday with you."

Mr. Mullick, a Senior Purser of the airline was a no-nonsense person and was not accustomed to be subjected to such rebukes and false accusations. He was a Check Purser and even his instructors appreciated his superb job knowledge. Furthermore, no one had ever accused him of evading or not fulfilling his duties and responsibilities.

Seething inside, he firmly pointed out that it was his (Mr. Mullick's) announcement that kept the passengers calm, and, it was his (the high official's) deeds that had made them leave their seats and initiate the panic. In addition, he would much prefer to fly without those passengers-cum-crew members, who overstep their authority and spread unwanted commotion in a semi-emergency situation. He would be much better off with his own efficiency and judgement in any untoward situation without the aforementioned type of crew member's presence, help and worthless actions. He dogmatized that he had complied with all the orders of his commander adding his judgement alongside applying his sense of duty and rationatility and that had prevented the unnecessary opening of the chute. Furthermore, in the enquiry, whenever arranged, he would certainly be revealing that two pieces of his (the high official's) baggage were stowed in front of the aft right door. It would not be at all difficult for him (Mr. Mullick) to prove that he (the high official) had placed the baggage perceiving fully well that the doors are compulsorily to remain fully unobstructed and readily accessible and had thus, deliberately endangered the safety factor. Moreover, if he (Mr. Mullick) chooses to make such reporting before the enquiry board, the resultant outcome would not create a comfortable predicament for his (the high official's) status.

Such reporting would also put the aft galley in-charge Ms. Kher in trouble who had permitted him to commit such misdeed. Probably, she had been impressed by his towering designation, which, however, would not suppress the gravity of her own deed (read misdeed) and projected consideration.

As it appears, that the matter was never raised later, quite deliberately, as Mr. Mullick did not hear any further trace of mentioning of the topic, thereafter.

However, poor Surya Narayan still faced a violent verbal rebuke, not from the Airline, but from his wife. It was about the bleeding scratches he had received on his left arm from the panic stricken airhostess, working with him in the forward galley, the girlfriend of the commander of the flight.

The reader, at this stage, may initiate a mental review and assess him/herself honestly of possessing the previously mentioned qualities before aspiring to be a cabin crew. Please *do* grasp that these are simply the words of enlightenment and *do not* opine that these are intended or directed to purvey discouragement of any sort, to you or your efforts to become an airline cabin crew.

2.1.2A Specific Duties of Catering Section Staff

The duties of the second section of employees of this department viz. 'Catering Section' staff are to reach the supplies needed for the mentioned 'Passenger Service' before the departure of the flight. With the help of items such as:

- Foodstuff
- Beverage
- Equipment needed for passenger service
- News papers and magazines
- Pillows and blankets, etc.

the cabin crew are to look after the comfort of the honoured guests of the airline on board the aircraft.

On being knowledgeable about the duties of cabin crew and those of the catering personnel, it can be rationalised that the best effort from both the categories are imperative for rendering a crackerjack service to the passengers. If catering section staff fails to load the adequate supply, the cabin crew would not be able to execute a commendable passenger service. On the other hand, if the cabin crew with the satiated supply from the catering section do not perform adequately, the motive behind such creditable supply becomes useless.

This example fully endorses and upholds the statement made in 2.1 ("Departments of Airlines"). in this regard. Teamwork is most desired and essential to upgrade the 'service quality' of any airline.

2.2 Commercial Department

This department looks after the following:

- ***Passenger Ticketing:*** The two words the reader sees to describe this duty, actually do not give them the faintest idea of their depth. This is a job for skilled persons. Offering the suitable options to satisfy the exact demand of the customer/passenger is quite difficult and calls for a high standard of capability. The following hypothetical episode would give the reader some idea about the seriousness of the job.

A Hypothetical Episode

Passenger: I want to fly to Bangalore on the eighth of this month from Kolkata.
Ticketing Agent: Certainly, sir! Please be seated. (After consulting his computer) Possibly, you would like to travel in the executive class sir?
Passenger: No, I would like an economy class seat.
Ticketing Agent: Actually, we have four flights to Bangalore sir, leaving Kolkata at 06:00 hr., 10:40 hr., 15:00 hr. and 19:20 hr., but on eighth, all the economy class seats of 10:40 hr. flight are already booked. I can issue a 'chance seat' ticket on that flight to you.
Passenger: No, I must have a confirmed booking.

Ticketing Agent: In that case, you can select from any one of the other three flights, sir.
Passenger: You see, I would like to return on the same day to Kolkata.
Ticketing Agent: In that case sir, (again after consulting his computer) I suggest you avail the morning flight at 06:30 hr. and return by the flight leaving Bangalore at 16:30 hr. or 20:00 hr.
Passenger: I do not think I can get up from sleep that early in the morning.
Ticketing Agent: Then sir, you may fly by 15:00 hr. flight from Kolkata and return by the flight leaving Bangalore at 20:00 hr.
Passenger: I don't suppose my work will be done if I fly by the 15:00 hr. flight as the office would be closed before I reach.
Ticketing Agent: Sir! In that case I think the best alternative for you is to fly in the executive class by the 10:40 hr. flight from Kolkata and return in the economy class, either by the 16:30 hr. or by the 20:00 hr. flight from Bangalore. I can issue you confirmed seat on both the flights right now. However, sir, I am quite sure that you would want to upgrade your ticket for your return journey to Kolkata after experiencing our executive class service.


The passenger ultimately purchased the tickets as per the ticketing agent's last suggestion.

From the mentioned conversation, the readers can make out what kind of patience, skill and capability does a top notch ticketing agent or a convincing sales representative possesses.

They need to convince each probable passenger/customer that their service is incomparably better than that of the others. To establish the justification of the statement, he/she might have to explain about the facilities they offer, from biggest to big, best to good and small to smallest over and over again.

They need to pursue each of the problems, solve and win most (if not all) of them.

While drawing out the tickets, the ticketing agent/staff has to inform the customer about the total charge for the ticket(s), find out about the customer's mode of payment; would he/she prefer vegetarian or; non-vegetarian food on board etc.

- ***Passenger Baggage Handling:*** Passenger baggage handling does not only mean to accept the baggage during the passenger's checking in time.

  Weighing the baggage, if needed, charging 'excess baggage charge', labeling these with proper 'destination station', consigning these at the appropriate place in the 'aircraft's baggage hold' (along with other pieces that are to be offloaded at the same destination station), offloading these at the proper destination station and delivering these to the legitimate claimants etc. are also the parts of this assignment.
- ***Cargo and Mail Handling:*** As every airline has its goal set for their profit, they have to transport freight, mail, cargo, newspapers etc. in addition to flying the passengers.

  Receiving, arranging their carriage and delivering these at the destination station are amongst the duties of this department.
- ***Checking-in Passengers:*** Accepting the passengers on the flight, entering their names in the 'passenger list', issuing them the 'boarding card' with their preferred seat number, handling their baggage as aforementioned etc. are included in this task.

- ***Taking Care of Passengers on Ground:*** As long as the passengers stay on ground, the staff members of this department looks after them. They are to render fullest attention towards the handicapped and 'wheel chair or stretcher bound passengers'.

  In addition, they are to take care of the unaccompanied minor children from the time they check in until they board the aircraft and the cabin crew members takeover the charge from them.

  In case of delay in flight departure, they arrange to make periodical informatory announcements and coordinate to furnish suitable meals to the passengers considering the duration and the time of occurrence of the delay.
- ***Ushering Passengers into the Aircraft:*** Commercial department staff advise the passengers to proceed to the security enclosure once their checking-in is complete and when the flight is ready for departure. They usher the passengers to the aircraft by surface transport or through aerobridge, keep account of and ensure their boarding the aircraft.
- ***Loading Passenger Baggage, Mail and Cargo in the Aircraft:*** This is not as easy a task as it appears from the simplicity of the words. Each item has to be placed in the baggage hold after carefully ascertaining its weight, destination, etc.

EXAMPLE

For example, a baggage for Dibrugarh is placed with the baggage meant for Guahati and offloaded at Guahati due to the carelessness of the loading staff first, and the offloading staff thereafter. As a result, the owner of the baggage would not only be inconvenienced on reaching Dibrugarh, but might even choose to claim a handsome compensation from the airline for the problem he/she has faced, in addition.

This sort of act makes the airline lose the trust and goodwill of their customers, which is thoroughly undesirable. The employees necessarily should remain extremely careful to eschew such situation.

However, even after exerting much precaution it is not very uncommon to find the baggage misplaced. On such occasions, the airline locates the missing baggage and reaches it to its proper destination at the earliest, on priority basis.

- ***Making Load Sheet:*** Load sheet (also called 'Trim Sheet') is the numeric-graphical chart that reflects the weight balancing of the aircraft taking into account every individual item on board.

  Weight of all items and persons present in the aircraft, howsoever small or big it might be (viz. weight of fuel, oil, baggage, freight, mail, food, beverage, passengers, crew members etc.) are taken stock of and their placement is adjusted in such a way that the 'centre of gravity' of the loaded aircraft stays situated at the pre-designated point.

  This 'weight placement chart' represented through words, digits and graphs is called the load sheet/trim sheet.
- ***Giving Delivery of Passenger Baggage, Mail and Cargo at the Destination Station:*** At each station the baggage, mail, freight, etc., meant for the station are offloaded, transported to the terminal building or the cargo complex and is delivered to its legitimate claimant by the staff of this department.

Usually, the commercial department forms the largest department (according to number of staff) in the airline as the staff have to be posted at most of the stations wherever the airline operates (for the rest of the stations the airline recruit handling agents) to man the airports and as well as its city offices. At each station, a number of staff are posted under a station manager. The number of these personnel depends on and is directly proportionate to the number of flights the station has to handle and on the station's passenger density.

At certain larger stations where the workload is considerably high, an airport manager remains in-charge and looks after the working at the airport. He/she remains under the station manager who normally stays at the city office.

The staff and officers of this department are the first ones who meet the passengers and it becomes incumbent on them to create exclusive impressions to win the hearts of the traveling public through their interactions.

This first meeting between the customer and the airline's staff is of extreme importance because much of the business success, upgrading of image and bettering of goodwill of the airline depends on this protocol. As such, these interactions are comparable with, if not regarded to be having parity with, 'love at first sight'.

The action and behaviour of the staff and officers of this department calls for the skill to mould a prospective passenger, wishing to fly for the first time, to feel from the heart to come back again, so that, in the process, the airline finds a regular customer. On the other hand, if the aforementioned actions are reversed and if even one passenger is assumed lost per day as a result of ineffective or not-so-good interaction, the airline would lose in crores per annum.

To counteract the said ineffectiveness, essentially, every airline arranges for extensive training and refresher courses periodically for the staff and officers of each department in general and those with public contact, in particular.

Furthermore, the impression created by this department on the flying public are to be polished, rectified (if required) and bettered subsequently by the cabin crew on board the flight. The process could be depicted as: ***"A person reports to undertake a flight and a charmed friend of the airline disembarks from the flight".***

2.3 Operations Department

This Department looks after everything relating to the operation of flights.

Only a senior executive pilot, normally called 'General Manager (Operations)'/'Operations Manager', categorically heads the department that comprises two categories of personnel viz. flying crew and ground staff of flight operations.

'Flying Crew' consist of cockpit crew members. However, in some airlines, in case it does not have an 'In Flight Services' (IFS) Department, the cabin crew members also come under this department.

2.3.1A Ground Staff of Operations Department

The 'Chief of Flight Operations' heads the ground personnel of this department, and renders all help to the departmental head regarding the functioning of the department. The other duties of the chief of flight operations are to look after the training of various categories of ground personnel of the department, looking after the administration of the department, furnishing the annual personal appraisal reports of ground personnel etc. The chief of flight operations remains under the General Manager (Operations)/Operations Manager and is answerable to him/her for everything.

The flight operations officers of this department are required to communicate with the aircraft and ground stations over the radio telephone (RT) and the airlines train them about the procedure and techniques of doing so. These officers also receive training on flight planning and supply the

flight plan along with the relevant weather reports to the commander of every flight, before its departure.

2.3.1B Important Responsibilities of Ground Staff of Operations Department

Some of the important duties and responsibilities of the operations department personnel are detailed below.

'On Time Reaching' of the Crew at the Airport to Operate Their Flight Every Airline desires that their flights should operate on time and as per the schedule as this deed ensures the best result in achieving the goodwill of the flying fraternity. In addition, this "on time performance" of the flights is one of the factors which affects the selection of an airline for the prestigious award of "Best Airline". For these reasons, every department puts in their best efforts to fulfill their share of duty to avoid their department's involvement with the delay in departure of any flight. These individual efforts of the departments amalgamate and materialise the "On Time Performance".

That the crew members should reach the airport not beyond their reporting time, is the first criteria of upholding the said 'on time performance'. Although this responsibility remains chiefly on the transport section, the staff of this department monitor the reaching of the crew members carefully and initiate suitable action(s) to minimise the delay, if not to nullify the same.

It may be reiterated that a full complement of cockpit crew and at least the minimum designated number of cabin crew has to be provided for every flight. The same is complied, arranged and rendered by this department at the scheduled time for every flight's departure.

Conveying the Crew Members, Prior Intimation Regarding Change of Flight Departure It may be reiterated that every category of crew members has a time limitation to stay on duty followed by adequate rest period in the form of "Flight and Duty Time Limitation" (FDTL) for that particular category, pre-determined by the DGCA.

The countdown of FDTL period begins from the time crew members report at the Airport/ Movement Control. The operations department staff inform the concerned crew members individually regarding any anticipated delay in departure of their flight at their residence so that the crew members do not report at the airport and countdown of their FDTL does not start.

The movement control staff obviously like to have the crew members available on duty for the maximum duration and for that, they exert best efforts to see that the crew member's FDTL period remains untouched/intact.

In spite of aforementioned effort, in certain exigency, when replacement of a crew member or a set of crew members becomes inevitable, this department complies with the same.

Arranging Replacement for the Scheduled Crew Member In case He/She Becomes Unavailable If any crew member is not available for his/her duty due to whatever reason, the staff of this department arrange a replacement for the absent crew member.

Crew member may report the aforementioned non-availability at any time, ranging from an earlier day to just before the departure of the flight.

For example, a crew member operating a flight at a later date and understanding his/her inability to do so due to sickness of a family member, could report the same on an earlier date. Again, a crew member while climbing up the stairs at the airport for his/her flight could sprain an ankle and could report sick, thus becoming unavailable.

On both occasions, the replacement has to be arranged accordingly or the flight has to be operated with less complement of cabin crew (obviously upholding the minimum cabin crew limitation) to avoid or minimise the delay in departure of the flight.

Making Periodical Flight Schedule for the Crew The duties/flights of crew members are to be carefully contrived in advance. Various factors are required to be considered before allotting flights to crew members. The chart reflecting the duty of crew members is called 'Crew Flight Duty Roster', 'Crew Roster' or simply 'Roster'. The personnel of this department prepare this chart.

Normally, the roster is published for a pre-determined period (weekly, fortnightly or monthly) and is reached to each crew member well in advance from its effective date. This process enables individual crew member to plan and adjust their other commitments earlier and segregate their professional period accordingly. Preparing this crew roster is quite an onerous task and demands much concentration and rationalisation as explained below.

As stated earlier, every category of crew members has their FDTL and cannot be utilised after a certain period daily, weekly and monthly.

EXAMPLE

For example, say a pilot could be used for 4 hours a day, 20 hours a week and 60 hours a month. Although he/she can fly for 4 hours a day, he/she would not be allotted with 4 hours of flight for six consecutive days (making the 7th day off) because he/she cannot fly for 24 hours a week as per the above mentioned restriction. Again, if he/she is utilised for 20 hours a week from the beginning of a month, he/she would not be available for the last week of the month as he/she would then have completed his/her monthly quota of 60 hours in the first three weeks.

To satisfy this criterion, while preparing their flight schedule, consideration should be extended on the number of hours (the period) the person has already flown and on the number of hours (the period) remaining available for the person to fly.

Again, the 'flying hours' are to be equalised at its best because the crew members receive their handsome 'flying allowance' on the basis of the 'flying hours' only, which normally amounts to more than their monthly salary. On this criterion, the airline cannot afford to show discrepancies amongst the crew members of the same category, working under homogeneous working conditions, because that would be labelled as favouritism then. However, in practice, hour-by-hour equalisation becomes impossible and a small difference in flying hours inevitably stays. No crew member views this factor seriously because it is expected that the differential period would be adjusted in the next month.

EXAMPLE

For example, if one of the two commanders of an airline flies for 53 hours, whereas the other flies for 58 hours in June, it is expected that the first commander would be allotted about 58 hours and the second about 53 hours of flying in July.

Furthermore, the number of days of flying has to be equalised at its best. It cannot be expected either by the airline or by the crew members that one crew member flies for less number of days to cover his/her monthly quota of flying hours where another crew member slogs for more number of days to cover the same period. The flights having 'high flying hours' and 'low flying hours' are to be suitably and equally distributed amongst the crew members.

In addition, consideration towards a variation in sectors (routes) is also to be considered.

EXAMPLE

Say, a co-pilot is flying a sector Delhi–Lucknow–Patna–Delhi for 10 days in a month and another one Delhi–Jaipur–Udaipur–Delhi for 12 days a month. Although there is nothing wrong in it technically as the flying hours for both the Co-pilots are more or less remaining the same, but the event should preferably be avoided to reduce the monotony of the crew members for flying the same route repeatedly. All flights should be allotted to all crew members in rotation, depending on their eligibility to operate such flights.

Helping in Licence Renewal Each cockpit crew has his/her licence issued/endorsed by the DGCA that needs periodical renewal. Cockpit crew cannot undertake any flight duty if their licences, ratings etc. are not validated (made current). For this renewal, various aspects like flying, check(s), training, medical checkup etc. become necessary. The personnel of this department keep a tab on these factors and arrange these for the crew.

Fixing Date for Periodical Medical Checkup All cockpit crew members are to appear before the DGCA approved medical board, periodically, to comply with the required standard of fitness recommended by the authorities. Although it is the duty of individual crew members to appear before such medical board and get cleared before a reasonable period than his/her licence renewal date becomes due, still the personnel of this department keep a tab on the time on behalf of the crew members, arrange to comply with the necessary formalities and to make it materialise.

Securing Clearance for the Flight from Air Traffic Control (ATC), Weather Forecast from the Meteorological Office for the Flights and Briefing the Commander before Departure The officers of this department report to the Air Traffic Control (ATC) to secure the necessary clearance for the flights.

Obtaining the 'flight clearance' is mandatory for the operation of every flight. This clearance remains valid for a specific period only. If the departure is not materialised within the span of the said period, the same is required to be renewed or extended by these officers.

They also visit the meteorological office to acquire the weather reports for the Departure Station, En-route (along the route), Destination Station and the Diversion Station for every flight.

They furnish the Flight Plan, the Clearance and the Weather Report with other necessary briefings for the flight to the commander of the flight, before departure.

Providing Information About the Quantity of Fuel Necessary for a Particular Fight to Engineering Department Standard 'Sector Fuel' as communicated by the 'Technical Cell' is filled in the aircraft in normal circumstances. After completion of the pre-flight briefing, as aforementioned, the commander of the flight, being the sole in-charge and responsible for the safe operation of the flight, is liable to demand for an altered quantity of fuel as per his/her justification, depending on various factors revealed through the briefing. In such cases, the altered fuel quantity has to be relayed to the engineering shift in-charge and commercial duty officer by these officers.

Providing Technical Information for Cockpit Crew Technical bulletins for the cockpit crew are published periodically. The personnel of this department supply these to the crew members for upgradation of their precognition.

2.3.2 The Cockpit Crew

The Cockpit Crew that falls under the jurisdiction of this department consists of

- Commander (known as Captain/P1)
- Co-pilot (known as First Officer/P2)
- Flight Engineers (required for certain aircraft only)
- Navigators (required for some specific flights only), and
- Ground Engineers—known as Aircraft Maintenance Engineer (AME), when they are required for operation of certain flights, as crew members.

2.3.3 Procedure of Flight Operation

The commander takes over the charge of the aircraft from the departure AME and wherefrom it becomes his/her responsibility to fly the aircraft safely from the 'departure station' to the 'destination station', obviously being the overall in-charge of the flight, aircraft and its occupants including crew members.

In the event of generation of any abnormal situation and/or imbroglio, the commander possesses all the authority to plan and act on his/her independent judgment for the safety of the aircraft, crew and passengers. In such cases, every person on the flight (including the passengers) has to comply and uphold his/her decision in whatever may the unwanted situation be – force-landing (constraint landing on ground), ditching (landing on water surface), diversion (landing at other station than the scheduled destination station) or whatever such.

In case of incapacitation of the commander (P1), the Co-pilot (P2) takes over the charge of the all that is aforementioned.

2.4 Engineering Department

The foremost duty of this department is to furnish the aircraft in perfect flying condition at the scheduled parking bay earlier than its predetermined departure time, for operating a flight.

In addition to this, the personnel of this department do other incumbent checks, overhauling and maintenance of Engines (technically known as power plants), airframe (the fuselage, cowlings, aerofoil surfaces, landing gears etc.), auxiliary power units (APU) and various instruments of the aircraft.

2.4.1 Duties

In the process, the department undertakes duties like:

Attending to Self-Detected or Crew Reported Technical Faults Technical faults could crop up in any mechanical equipment and aircraft are no exception. The faults (technically known as snag), detected by the cockpit or cabin crew during their Pre-flight checks or during the course of the flight are reported through Pilot's Defect Report Book (PDR) and Cabin Defect Report Book (CDR) respectively. In addition to this, the engineers themselves might detect certain faults while carrying out checks on the aircraft. On all these occasions, the fault/snag has to be rectified.

However, precedence is given on the period available for rectification of the snag if it is not endangering the safety of the flight *at the slightest.* If the rectification of the snag is understood to be time consuming and it is not endangering the safety of the flight *at the slightest*, the same is normally

carried forward to be attended at night, when the aircraft would be available for much longer time. In those circumstances, the aircraft is released with the 'snag carried forward' tag, to uphold the 'on time performance'.

On the other hand, if the snag is felt to be considerable in nature, the aircraft is held back until it is rectified. The duty engineer (without whose consent signature the aircraft cannot depart) would never release the aircraft by compromising with and thus endangering the safety factor of the flight, come what may.

After the day's operation, the aircraft are generally taken to hangars where a thorough check is implied to acquire a flawless serviceability of the aircraft for the next day's flying. In case any technical fault is detected during this check and/or any such that had been reported by the commander or the cabin crew and/or had been carried forward as previously mentioned, the same is attended to and rectified at this time. This nightly check is known as 'Lay Over Check' (LOC) and remains valid for 24 hours. A fresh LOC certification is essential by the next night again, on mandatory basis for further flying of the aircraft. The AMEs sign the LOC.

Refueling of the Aircraft Every aircraft is normally refueled for flying the oncoming sector. The refuelling may take place at the time when the aircraft is parked in the morning for its first flight of the day or during the period that the aircraft stays on ground between two sectors, subsequently.

The engineering personnel receive the quantity of required fuel for the forthcoming sector through flight dispatch (at stations having such facility) or from the commander of the flight directly. They refuel the aircraft in coordination with the petroleum companies.

ATF (Air Turbine Fuel) Jet A1 fuel is used for refueling the jet aircraft.

Checking the Aircraft Before a Flight Along with the refueling, before operating a sector, the aircraft also undergoes a check for its serviceability. This check is known as pre-flight check (PFC).

If any snag is detected during the PFC at a flight originating station, the passengers are usually not brought to the aircraft until the snag is rectified. At an intermediate station, the transit passengers might be permitted to stay on board by the engineer, depending on the gravity of the snag. If its rectification needs longer period than the scheduled stoppage period (ground time) of the aircraft at the station, the next sector's departure has to be delayed and if necessity arises (if the duration of the delay is extensive), the passengers might have even to be taken to the airport lounge. Furthermore, if the duty engineer judges that seriousness of the fault is a 'major' one and the same calls for further help, in the form of 'man* and material**', he/she is at a liberty to proceed in accordance and summon such help.

In such cases, the aircraft might have to be grounded for a long period or for the night or even for a longer period until the snag is rectified. In such cases, hotel accommodation is rendered to the passengers, till the time, an alternative arrangement for flying them to their destination could be organised.

It may be reiterated that the commander of the flight is responsible for a safe flight. If his/her justification indicates against the acceptance of the aircraft, he/she possesses the final authority of doing so, even when the duty engineer had cleared the aircraft.

*Note: - the engineering personnel required as reinforcement to the normal engineering staff-force at the station.

**Note: - indicates the spare parts required for rectifying the persisting snag.

CASE STUDY 7

Flight BN-184 had originated from Mumbai and after touching Jaipur was about to land at Lucknow before ending the journey at Kolkata. It was descending for Lucknow when the co-pilot, F/O Rupinder Singh, noticed an unusual drop in the hydraulic oil pressure and drew the attention of the commander, Capt. Vishnu Prasad Yadav, to it. Capt. Yadav observed the presence of the drop, opined that it was not alarming, advised the P2 to keep an eye on the 'Oil Pressure Gauge' and to ask permission to descend further, indicating his intention to pursue landing at Lucknow.

Capt. Yadav was quite disturbed about an altercation with his girlfriend last night at Mumbai where the crew had had a night stop and had disclosed bits of the episode to his First Officer in the course of conversation.

He went back to his pondering about patching up the problem with Ms. Mandavi working in the passenger cabin. For this, he needed a place where he could talk to her in solitude and do the rituals of counseling. Only a hotel room would be ideally suitable. There is no chance of hiring a hotel room at Kolkata, as there are many known persons there, and therefore, there would be enough possibility for the act to be disclosed to many in general and probably to his wife and/or to her husband and/or both in particular. As such, he would have to wait until the next night stop together and might have to apply his charisma and/or to enforce his authority to avail the feat through the roster-making personnel.

The aircraft did a normal landing at Lucknow and the snag was reported through the Pilot's Defect Report Book (PDR Book) as per norms.

The station engineer, Mr. Jayant Kumar Bhargava checked and indeed detected a leak, though extremely feeble. As per regulation, an aircraft could be released for flight with a slow hydraulic fluid leak, if the quantity of leakage and the flying time of the sector to be flown, remains restrained within the specified limitation. Mr. Bhargava ascertained the quantity of the oil leakage for a specified period with and without the engine running. He observed that the quantity of oil leakage in both the cases was marginally within the specific limit. He was a veteran in the aviation industry with ample experience and was sanguine that the aircraft could be released on Luckniow–Kolkata sector. Still, he opted for acquiring the specialist's verdict and called up the residential number of Mr. Ratan Das, Manager, Quality Control (Engineering) of his base, at Delhi.

The manager gave a patient hearing, asked few clipped questions to address his queries, and asked Mr. Bhargava to call back after 10 minutes.

Mr. Bhargava was mentally contemplating the situation from every possible angle. Grounding the aircraft means a considerable loss for the airline as the passengers and crew

members are to be accommodated in hotels. A technical landing of another flight with man and material has to be arranged which would again incur a considerable expenditure for the airline. Most importantly, the snag being quite marginal, within the permissible range, and *would not be endangering the safety of the flight in any way.* He also pondered that had this last point remained unsatisfactory, he would have unequivocally and compulsorily grounded the aircraft, totally ignoring the 'monetary loss of the airline', part.

At Delhi, in those 10 minutes, Mr. Das referred to his manuals and computer, and when Mr. Bhargava called back, opined that it is possible to release the aircraft if the station engineer so chooses.

Mr. Bhargava's anticipated pondering about the probability of clearing the aircraft has now transformed to saturated confidence and he cleared the aircraft from Lucknow to Kolkata, topping up the hydraulic fluid tank.

Mr. Bhargava conveyed the decision to Capt. Yadav personally, as a token of courtesy developed between them owing to long time acquaintance. Capt. Yadav, however, wished to do an 'engine run-up' himself and wished Mr. Bhargava to observe the parameters. The engines were run and the outcome satisfied Mr. Bhargava, but not Capt. Yadav and he did not accept the aircraft.

Consequently, the flight was discontinued at Lucknow. Messages were sent to Delhi and Kolkata to arrange for requisite 'man and material' for rectification of the snag. The crew and the passengers were lodged in hotels.

Nothing untoward resulted. The delayed flight BN-184 took off at 13:35 hr. next afternoon for Kolkata.

Yet, F/O Rupinder Singh, the co-pilot, carried a hitch in his mind about whether the decision of his commander was justified or purposeful.

Certifying the Fitness of the Aircraft for Flying from the Departure Station to the Destination Station The DGCA authorises the ground engineers to declare and certify an aircraft fit for flying a sector. For this, they are to possess an AME licence on the specific type of aircraft they are certifying, issued by the DGCA.

The departure engineer (AME) vouches that the aircraft is technically sound to fly the forthcoming sector and remains responsible for the technical aspects and the performance of the aircraft from the engine starting time at the departure station till the engine shutting time at the destination station. He/she has to be fully satisfied with the fitness of the aircraft and then and then only, he/she certifies its fitness and clears the aircraft under his/her signature, for the flight.

Based on the departure engineer's said clearance, the commander of the flight accepts the aircraft from him/her to fly the forthcoming sector. The commander remains responsible for the manoeuvering of the aircraft for the said period and vouches so, under signature.

Carry-out the Mandatory Periodical Checks on the Aircraft Over and above the LOC and PFC, the engineering personnel carry-out certain other checks that become essential after the aircraft has done a specific period of flying (calculated in terms of number of hours). In aviation, safety factors never depend on aleatory happening. Each aircraft after flying for a predetermined period (number of hours) has to undergo a specific category of checks. More the number of hours of flying by the aircraft the more vigorous would be the category's check.

On every alternate night, an 'Alternate Night Check' is carried out on the aircraft, which remains valid for 48 hours.

On every seventh night, a weekly check is imposed.

The aircraft is subjected to another check known as 'A check' after every 500 hours of flying. During this check, no panel of the aircraft is, however, opened. The check is carried out by utilising external equipment.

The category of checks ultimately reaches to 'complete overhauling' stage. During this, the aircraft is grounded for a considerable period, components are dismantled and subjected to a meticulous observation for wear and tear, serviced, repaired or replaced as per requirement and refitted. In short, the aircraft is rejuvenated after this procedure. This check is performed after the aircraft has completed 15,000 to 20,000 flying hours or has flown for eight years, whichever comes first.

2.4.2 Other Engineering Personnel

Engineering department is manned by various categories of employees ranging from cleaners to technicians to supervisors to engineers, because this department's responsibility encompasses maintaining the cleanliness of the aircraft cabin to all the previously mentioned tasks.

As stated earlier, the departure engineer certifies that the aircraft is 'fly worthy' (safe to fly) for the oncoming sector (from the departure station to the destination station) and commits to accept the responsibility for its safe journey between the stations, under signature. In case of any untoward happening, the engineers analogous to the pilots have to face the investigation board to get absolved. This is being reiterated so that the reader can fathom the high degree of responsibility that the engineers have to bear and the physical and mental ability they are to possess in order to comply with their task.

The engineers receive the assistance from the supervisors who liaison with, and at certain times literally work along with, the technicians to complete the required 'job' (the snag rectification).

The cleaners, under the supervision of the foreman/supervisors keep the aircraft immaculately clean for the guests of the airline.

A senior executive engineer, having the designation of General Manager (Engineering)/ Engineering Manager, heads this department.

2.5 Personnel Department

This department looks after the administrative part of the airline. Although each department has its individual administrative section, they are required to at least inform, if not acquire endorsement/ approval of the personnel department, for majority of their administrative proceedings.

EXAMPLE

For example, the departmental head could normally sanction leave to employees of the department. However, this granting has to be notified to the personnel department for their information (for recording of such grant), verification (whether the concerned employee is actually due for or entitled to avail such leave) and confirmation (to intimate the parent department that the asked leave is approved). In case such leave is not due to the employee, the personnel department would convey the same to the concerned department and the grant of leave should have to be withdrawn accordingly.

The same happens for the yearly 'Air Travel Passages' entitled to the employees. As per practice, the employee's parent department forwards the application for passage to the personnel department for verification of its entitlement (whether such passage is due to the employee). If found entitled, the personnel department advices the commercial department to issue the ticket(s). On that recommendation, the commercial department issues the ticket(s).

For interline passage* the same procedure is adopted, except the that personnel department forwards the application to the concerned airline from which the passage is sought.

Although the tickets, issued to employees are supposed to be their warrant to travel, in practice, these do not empower the person with a guarantee to travel. The tickets to employees are issued on a "subject to load" basis, which implies that the employee can fly *only and only* if the seats are available (not been occupied by fare paying passengers).

2.5.1 Creation of Various Rules and Regulation

This aspect becomes essentially required to run an airline with large number of staff with various job differentiations. It is not necessary that all these rules and regulations be homogeneous for all categories of employees.

For example, the 'number of days of sick leave due per year' or the 'duty period' of crew members is not at par with that of ground staff, owing to various considered and justified reasons. On the other hand, the crew members do not have any fixed off days or might not be off on national holidays like office personnel. Similarly, the rules and regulations applicable for the machine shop employees might not possibly be applied on the crew members and vice versa and are obviously required to be outlined differently.

For the aforementioned reasons, although certain rules and regulations remain common to all the employees of the airline, creation of specific rules and regulations for individual categories of employees becomes imperative. In addition, not only creation, but also the maintenance and proper implementation of such rules and regulations becomes inevitable.

The personnel department creates the previously mentioned rules and regulations, committing to ensure that the created rule is congruously enforced on each employee of one category, without any discrepancy, partiality, egoism and vindictiveness.

For clarification, if the employees of a particular category are provided with uniform and a regulation (viz. uniform regulation) is created regarding the uniform, the rule has to be applied homogeneously on every employee of the concerned category without any exception. Any deviation towards any contingent might develop considerable discrepancies and/or natural human complex amongst the members of the category that could develop a labour unrest in the airline.

*Interline Passage: - The passage(s) issued to employees of one airline by another airline to fly its (the other airline's) routes on a reciprocal basis is known as 'Interline Passage'. This enables the employees of a domestic airline to travel the foreign routes of an international airline and the employees of an international airline to travel the domestic routes of the reciprocating domestic airline.

Upholding such homogeneity is under the purview of the personnel department.

All departmental heads possess the authority to impose punishment upto a certain level on employees of the department. However, depending on the quantum/gravity of the offence allegedly done by any employee, the matter might become inaccessible for the said officers (departmental heads) and might be required to be referred to the personnel department for their intervention and action.

Receiving passenger complaints are quite common happenings for cabin crew. The quantum of anticipated punishment depends on the nature and the degree of seriousness of a complaint and can range from a simple warning to a fact-finding inquiry and subsequent retribution. In the latter cases (the cases with higher gravity), the personnel department has imperatively to be involved.

EXAMPLE

Say, a cabin crew receives a complaint from a passenger that he/she was very late in serving food to the person, and when served, the food was opined, 'lukewarm'.

As per the administrative proceedings, the departmental head would ask the concerned cabin crew to furnish his/her comments about the complaint.

After estimating the gravity of the untoward happening from the complaint letter and the involvement and deeds of the concerned cabin crew from his/her reply, the departmental head could dispense a suitable disciplinary action (against the cabin crew.), say issuing a warning to be more careful in future as this is his his/her first offence of this nature.

In another case, say, a crew member at a particular out station, habitually reports sick to spend more time with his/her family or for whatever purpose best known to him/her. The matter would not be viewed so lightly as the above mentioned case. The concerned crew member possibly has to be banned from operating any further flight touching the particular station, at least for a considerable time.

In another case, say when a crew member is detected to be under the influence of alcohol at the departure time of his/her flight or commencement of his/her duty period, the matter could not be accepted casually. The concerned crew member, having undergone all the formalities of the pre-flight medical check (ref. chapter one) and confirmed positive beyond doubt, would be banned from operating flights or discharging duties from immediate effect. Thereafter, the airline would initiate 'disciplinary proceedings' in the form of issuing show cause notice, chargesheet and by subjecting the concerned person to appear before a 'fact finding enquiry committee'. On the recommendation of the said committee, suitable reprimand would be awarded to the person.

In the first of the mentioned cases, and/or for all such 'low gravity' cases, the departmental head is liable to take appropriate action and dispatch a copy of the case docket to the personnel department for their perusal and record. However, the last two cases, where the matter possesses a heavier gravity, cannot be resolved by the departmental head alone and has got to be referred to the personnel department.

In these sorts of cases, the prime role would be played by the personnel department.

As the Airline Management is entitled to initiate disciplinary procedure on an employee, the employees on the other hand, possess the right to challenge the justification of any action taken or the rationality of any punishment imposed by the management, which the employee considers unfair. This action, for seeking suitable clarification/justice from the airline management is known as 'Grievance Procedure' and is handled by the personnel department.

2.5.2 Some of the Other Duties of This Department

The department also looks after:

Various Welfare Benefits to which the Employees are Entitled These benefits include cooperative society, awarding long service mementos, sanctioning of house building and/or vehicle purchasing loans etc.

The Benefits to Retired Employees Arranging payment of the employee's retiral dues (viz. provident fund, gratuity and other such dues) which are payable to the employees during or after their retirement.

The Legal Matters in Which the Airline Is Entangled It is not very uncommon for the employees to take recourse to the court of law when he/she feels that the ultimate verdict of the airline over a dispute is against him/her and is intolerable. Again, the passengers or other organisations the airlines is dealing with, could sue the airline. Furthermore, the airline itself might also initiate some legal procedure to safeguard their interest. This department handles and supervises all such case proceedings.

2.6 Finance Department

Every airline runs on business principle. Neither the travelling public nor cargo senders could expect their intentions to be fulfilled without remuneration, nor would the staff agree to provide service without earning. As such, money transaction becomes inevitable. For airlines, the amount of such transaction is so huge that it calls for an individual department to take control of the money matters. The finance department is involved in all such monetary dealings, starting from multi-billion dollar aircraft purchasing to buying stationery for the office.

The decision of purchasing suitable aircraft is materialised by involving several key departments, subsequently getting their propositions affirmed by the board members of the airline and finally by achieving the approval of the concerned Ministry of the Government.

The finance department plays a very important role in all such planning and takes the leading role when the matter of payment arises.

Again, the stores and purchases department might order to purchase certain items and supply the requisitioned items to the departments asking for these, but the payment for the purchase has to be dealt with by this department.

Some Other Matters Dealt by this Department:

Paying Salary to the Employees Dispensing with the salary, allowances and other dues of the employees has to be done on time. For this, the dues of each individual employee not only have to be ascertained, but also have to be reached to him/her, even if the concerned employee is posted out of the base. Furthermore, the same has to be done within the predetermined date.

Non-fulfilment of any one of these conditions is likely to generate a labour unrest, which is truly unwanted by any airline and as such, this department handles it with much care.

Handling Cash Collection A huge amount of money is collected everyday at different offices of the airlines. This department does the accurate accounting and suitable and safe placement of the same, daily.

Paying and Recovering Loan Amount of Employees The employees are bestowed with loan facilities from the airline under different headings like house building, home renovation, purchase of two or four-wheeler vehicles etc. The maximum amount of such sanction depends on the grade and seniority of the employee and on the discretion of the management of the airline, but this department finally pays it.

Looking After the Provident Fund Accounts of the Employees After the employees get confirmed on their post of appointment, the airline deducts certain amount from their monthly salary towards building their provident fund account. This deducted amount is directly proportional to the individual's PF pay consisting of his/her basic pay and certain allowances. The PF amount saved/ contributed is augmented with a considerable amount from and on behalf of the airline and returned to the concerned employee during his/her retirement or leaving the airline along with all other dues payable to him/her.

This asset, in fact becomes a lifetime saving for the employees. However, any/all amount payable or remaining due towards the airline from the employee is recovered from this amount during the final settlement of account, when the person retires or leaves the airline.

Sanctioning Provident Fund Loan to Employees An employee can seek for a loan from the amount accumulated in his/her provident fund account. This department calculates the maximum sanctionable amount and loan until that limit is normally granted to the concerned employee. The loaned amount along with due interest is recovered from the monthly emoluments of the employee and is computed by this department.

Periodically Paying the 'Salary-Deducted Insurance Premium' of the Employees The employees are privileged with the facility of maintaining 'salary deducted insurance policies' for which the monthly premium amount is deducted from the employee's monthly salary and paid directly to the Insurance company, by this department.

2.7 Other Departments of Airlines

There are some more important departments in the airline. These departments may not be quite conversant with or may be even out of bounds for normal travelling people, but are essential for all airlines, to ensure its smooth functioning. Some such departments are cited hereunder.

2.7.1 Medical Department

It is very necessary and advantageous for every airline to provide medical treatments and benefits to all its employees in general and its crew members in particular. This 'unvarnished' statement might hurt some of the employees, but the fact remains that every crew member has got to remain cent percent fit for operating flights, thus does not apply to the staff on ground with that high a degree of rigidity. The basis of this statement has already been clarified in 2.1.1B "Specific Needs of Cabin Crew".

In addition to this, most of the airlines are gracious enough to extend the said facility to certain members of the family of the employees also.

Every airline possesses a very qualified team of doctors—efficient and highly qualified to treat any patient themselves. In addition to this, they are empowered by the airline to refer the patient(s) to eminent specialists and reputed nursing homes for exceptional treatments. Employees remain completely assured about the best possible treatment through the airline, however grave may their sickness be.

2.7.2 Transport Department

This department takes care of the transportation of:

- ***Crew Members*** – Crew members are picked up from their individual residences for flights and official duties and dropped back.
- ***Passengers*** – Passengers are reached to the aircraft from the terminal building and vice versa whenever the aircraft is parked beyond the reach of the aerobridge.

- ***Mobile Staircases***—Mobile staircases are attached to the aircraft for embarkation and disembarkation of the passengers and the crew members.
- ***Catering Equipment and Staff***—Catering personnel are reached to the aircraft for discharging their duties along with the needed equipment and provisions and returned to their section.
- ***Cargo, Mail and Passenger Baggage***—Cargo, mail and passenger baggage are delivered to and from the aircraft by trolleys.
- ***Engineering Equipment and Required Staff***—Engineering personnel are reached to the aircraft for discharging their duties along with the needed equipment and provisions and returned to the hangar.
- ***Carrying Various Personnel at odd hours*** - Certain personnel might be needed for duty at an unconventional time for operation of flights.

2.7.3 Security and Vigilance Department

As the name suggests, this department looks after the security and well-being of the staff and the passengers of the airline and safeguards against damage and pilferage of the airline properties.

The assets of every airline are quite huge and are situated at various locations. A considerable number of staff members are required to staff all these locations.

The staff of this department are to be posted:

- ***Inside the Hangars:*** To prevent theft of aircraft components and other airline properties.
- ***Inside the Passenger Lounge of the Airports:*** For x-raying and sealing the passenger's baggage and for safeguarding the passengers.
- ***At all Airlines' Establishments:*** To prevent pilferage of airline's properties, safeguard the employees and to restrict entry of undesired persons inside these premises. Gate passes are issued by the staff of this department to allow legitimate persons into the various establishment of the airline.
- ***Near the Aircraft:*** To prevent untoward incidents inside or near the aircraft and to keep up passenger safety.

Mobile checks are carried out by the officers of this department by going around and periodically supervising the staff's actions at different locations.

Posting of Staff and Officers of this Department

The staff and officers are posted at various strategic locations at every base station and major outstations.

2.7.4 Stores and Purchases Department

This department looks after the supply of all articles needed by individual departments of the airline, ranging from stationary items for running the office to uniform for the employees to components/spare parts of the aircraft etc. and is related to their purchase.

2.8 Relation and Interaction of Cabin Crew with Staff and Officers of Various Departments

The previously mentioned part of the chapter must have given the reader sufficient knowledge about the important departments of the airlines, their utility in the airline and the duties of such departments' personnel. However, the ensuing portion is incumbent upon everyone interested in aviation and is actually of paramount importance as it relates the cabin crew with all these departments.

Cabin crew members interact with the staff of some of these departments they meet in the normal course of their duties viz. operations, catering, commercial and engineering. Interaction with the staff of other departments, however, remains of much importance and for that reason, the same is dealt with and elaborated, hereunder.

2.8.1 Interaction With Catering Section Staff

Cabin crew and catering section personnel normally belong to the same department viz. 'In Flight Services'. In some airlines, the cabin crew members come under operations department and catering section personnel fall under the commercial department.

It can be reiterated that the catering section personnel are required to supply every requisite item for satisfying the passenger's needs on board and the cabin crew are to utilise those supplies to render a commendable on-board passenger service. It has to be a team effort of catering section staff on ground and cabin crew on board. Both the categories have the common and ultimate intention of satisfying the passengers and for this, one has to be compulsorily the filler of another. If catering personnel do not supply adequate quantity of equipment, provision, food, beverage, pillows, blankets, newspapers, magazines etc., the cabin crew cannot provide a top-notch service on board. Similarly, if the cabin crew do not discharge their duty appropriately on board, the effort of the catering section staff and their satiated supply of items becomes meaningless.

2.8.1A Procedure of Charge Takeover

Catering section personnel load the galleys of the aircraft with equipment and provisions. They also do up the cabin and toilet dressings to make these look attractive and neat and to remain at its best usable form, before or during the cabin crew report to the aircraft.

The cabin crew in-charge, on reaching the aircraft, allocates the responsibility of each galley to one individual cabin crew and they become the galley in-charge of the allocated galley.

The catering section departure in-charge hands over a checklist to each galley in-charge that reflects the details of the equipment and provisions supplied by the catering section in their galley. The galley in-charge tallies the items mentioned in the checklist with those actually supplied and in coordination with the catering departure in-charge makes the necessary amendments to the checklist to list the exact number or quantity of items actually supplied (not acceding to whatever is reflected on the checklist) and accepts the charge under signature.

While complying with this process, the galley in-charges are also to make necessary arrangements to acquire the items, if any, which they feel necessary for passenger service, in addition to whatever supplied.

By putting the acceptance signature on the checklist, the galley in-charge thereby endorses the complete responsibility for a satisfactory passenger service on board, with the items they possess, at the time of signing. It would not be worth to accuse the catering section later by indicating that the passenger service had lacked because of inadequate catering supply.

As such, if any deficiency is detected during checking up of the items, the same has to be topped up before accepting the charge. To comply with this, after finding out the deficiencies, the galley in-charge should make a mental note of the items in two categories viz. 'maybe needed' and 'must be acquired'. They should then ask for the supply of the previous category of items first, added by the rest thereafter from the catering section staff. *This act has a relation with 'interaction'*, as explained later.

For those articles which cabin crew feels as 'no go', meaning, without which it would be absolutely impossible to do the passenger service effectively, the cabin crew are fully entitled to demand those from the catering section.

EXAMPLE

Examples

- *If the number of food casseroles and/or the meal trays supplied are less than the number of passengers to be served,*
- *If the quantity of provisions are categorically below the minimum for serving the number of passengers on board,*
- *If the quantity of palatable water provided is less than the quantity that is anticipated to be consumed during the flight etc.*

However, this 'demanding', if it has to be done at all, has to be done at a low pitch and lower decibel voice. In all normal circumstances, this episode takes place when the passengers are boarding or already are on board and every airline categorically holds the view that their valued guests are not to be disturbed by it's quarreling* staff, for whatever reason.

Now, as far as the 'mandatory items' (the aforesaid second category items) are concerned, those could be asked with authority and catering section staff has to provide these, but for the less important but 'anticipated to be needed items' (the aforesaid first category items), necessary for a commendable passenger service, the cabin crew are to put in a request.

However, to comply with this, it is beneficial to request the catering departure in-charge for all the items at the initial stage only, keeping the option to demand, open. This procedure eliminates the possibility of ego clash between the two categories of employees of the same department viz. cabin crew and catering section staff from the 'In Flight Services' department.

Here, the *interaction ability* of the galley in-charge should guide him/her to express it effectively that he/she discerns the difficulties of the catering departure in-charge to acquire the items the galley in-charge needs. His/her expression should also make the catering staff feel how desperately he/she needs the items for no other reason than the passenger service, and what a great help, the catering in-charge would be, by supplying those.

The catering in-charge in turn would then realise that the galley in-charge is *requesting* for the items with the whole and sole intention of executing a creditable passenger service, of which he/she (the catering staff) is also a part. He/she would also grasp that the galley in-charge is not asking for the items to harass him/her in any way, but requesting for benefiting the passenger service and *over and above, he/she is spplicating for the items and not demanding them.***

On the other hand, if the galley in-charge demands all the items with authority, the ego of the catering departure in-charge might be hurt and the matter might turn problematic altogether, simply because of an unwanted misunderstanding between the catering departure in-charge and the galley in-charge.

The said good rapport would positively motivate the catering section staff to acquire the items spontaneously, including the 'anticipated to be needed' ones in addition-solving the problem of the galley in-charge.

Again, on certain occasions the catering section staff might overlook to carry out some essential duties of theirs, such as dressing up of the cabin and the toilets arising from various reasons, mainly and mostly due to shortage of time. A commendable result could be achieved by pointing out the same through polite requests and making the catering section staff perceive how nice it

*Note: - In practice, this argument turns to quarrel at certain times.

**Note: - The procedure prevent ego clash.

would be and how much more their 'done up jobs/services' would be worth, if they accomplish the required job(s), such as doing up the cabin dressings by changing the cushion covers or put the folded newspapers in the seat pockets etc. and also doing the toilet dressing by putting the toilet rolls and the tissue paper boxes in position.

However, the cabin crew should notify the matter to the cabin crew in-charge at the earliest, if such deficiencies persist in spite of their best efforts.

In addition, as the sole in-charge of the flight, the commander of the flight should be kept intimated about all the developments at all times, especially if there is an involvement of any anticipated delay in the departure of the flight, for his/her desired intervention.

CASE STUDY 8

Before the departure of the flight BN-385 from Chennai to Bombay the cabin crew in-charge Mr. N.V. Sarvanan, an executive cabin crew and a very senior flight purser from the southern region of the airline observed that the beverage trolley was not provided in his galley, as per norms. The equipment is convenient to store and retrieve the needed small catering items swiftly, and was much essential. He enquired about the trolley from Mr. S.V. Sundaram, the Sr. Manager (Catering), who incidentally was there for an "on-the-Spot check" duty. Mr. Sundaram disclosed that the southern region was regularly supplying the beverage trolley in BN-385, but the western region is not reciprocating and is sending the corresponding flight BN-386 without the item, everyday.

As a result, the southern region is running short of the item and that forced them to decide against supplying the beverage trolley in BN-385.

Mr. Sarvanan asked the Sr. Manager (Catering) to provide the beverage trolley on the flight as he disliked this high-handedness of the western region. He promised to talk to the catering authorities at Mumbai to sort out the problem and bring the trolley back positively. As Mr. Sarvanan was an officer from the same department, Mr. Sundaram decided to uphold his request and arranged to provide the trolley aboard.

At Mumbai, Mr. Sarvanan was carefully following up the actions of the catering personnel and noticed that the concerned trolley was offloaded, but not supplied back. He called the catering assistant supervising the departure of BN-386 and enquired the reason for not supplying the trolley. The supervisor informed him that Mr. Madanlal, Sr. Manager (Catering), western region had ordered not to supply the trolley on the flight.

Mr. Sarvanan understood that it was useless to argue or reason out with the catering assistant and asked him to call up his duty officer over his walkie-talkie. He further anticipated that the duty officer who obviously would not like to leave his/her comfortable chamber under normal circumstances shall especially not do

so in such a problematic condition, which his subordinate would deliberately convey to him/her over the walkie-talkie. He asked the catering assistant to pass on his name and designation and also to convey that he is reluctant to depart without the beverage trolley and the flight might get delayed in the process if the duty officer does not show up and solve the problem.

The duty officer, Mr. Rajesh Malhaotra, Manager (Catering), famous for his sugar-coated vocabulary, turned up, sulking mentally. Mr. Sarvanan conveyed that he had brought the beverage trolley on BN-385 and quite naturally expected the item on BN-386. He also notified the version of Mr. Sundaram and pointed out that if the procedure continued that way, the southern region would shortly run out of stock of beverage trolleys.

Mr. Malhotra explained that he understands the problem fully and how much he would like to supply the trolley on board, but Mr. Madanlal, the Sr. Manager (Catering) had instructed the section not to send the beverage trolley on BN-386, and how could he defy his senior officer's order? Mr. Madanlal is out of station at present and on his return, he (Mr. Malhotra) would certainly convey the problem to him and solve it.

Mr. Sarvanan understood that he was tricked, but he was not a person to take it lying down. He reported the matter to Capt. Richardson, the commander of the flight.

Capt. Richardson heard the episode and adjudged that Mr. Sarvanan's demand was truly justified. He called Mr. Malhotra inside the cockpit and tried to convince him with reasoning. During the entire one-sided conversation, Mr. Malhatra throughout simply conveyed that he is totally helpless because of Mr. Madanlal's order, otherwise how could he not comply with the request of Capt. Richardson?

Capt. Richardson, who held a much higher designation than Mr. Madanlal decided to use his rank of commander at this stage and asked Mr. Malhotra to provide the trolley at present and inform Mr. Madanlal later that the commander of BN-386 wanted the beverage trolley on board and as such it had to be provided.

Mr. Malhotra's ego was hurt, as he was to comply with the order of a higher designation person from a different department. He still denied supplying of the trolley on the pretext that Mr. Madanlal would be dissatisfied and would question him about sustaining the administrative authority of Capt. Richardson, over his own.

Capt. Richardson looked unblinkingly for a few seconds, smiled at Mr. Malhotra and said, "Well! If Capt. Richardson, the commander of BN-386 does not serve the purpose and Mr. Madanlal demands for further administrative authority, please tell him the Regional Director, Southern Region wanted the beverage trolley on-board. For your information, I am the Regional Director, Southern Region."

Mr. Malhotra was dumbstruck and did not hesitate any further to order the catering assistant to provide the beverage trolley on board BN-386.

2.8.2 With Other Department Staff

This aforementioned procedure of interaction may be followed analogously with other department staff also, whom the cabin crew members usually meet viz. operations, engineering and commercial.

2.8.2A Interaction with the Staff of the Operations Department

Movement Control staff (belonging to the operations department) and cabin crew members meet prior to every flight. It becomes quite essential that the personnel of both these categories be mutually related in a cordial bond because of their job-demands that makes them somewhat dependent on each other, similar to cabin crew and catering section staff, to a certain extent.

To clarify, the operations department staff has the authority to alter the duty of any cabin crew citing justified official exigency. This said modification might not suit the concerned cabin crew and he/she could, in turn, resort to adopt some unfair, but ultimate means to elude the modification. The statement would be clear through the following example.

Say, an airhostess Ms. Alva comes to operate flight BN-439 on Kolkata-Delhi-Kolkata sector at 06:00 hr. Anticipating that she would be back by 11:00 hr., she purchased some matinee show cinema tickets earlier.

Unfortunately for her, the Movement Control staff detects a shortage of cabin crew in another flight BN-453 operating Kolkata-Bangkok-Yangoon-Kolkata sector, departing at 07:30 hr. He also realises that the standby cabin crew members, who had come on duty at 04:30 hr. would not be able to operate BN-453 because of their FDTL but could operate BN-439, decides to utilise one of the standby crew for BN-439 and one of the initial crew of BN-439 to operate BN-453. This way both the flights could be operated with full complement of cabin crew and the FDTL of none of the crew members would be violated. As such, he asks Ms. Alva to operate BN-453 instead of her roster flight and was well within his jurisdiction to do so, in order to solve the developed problem—an operational exigency.

Hearing the plea, Ms. Alva conveys that she has urgent and unavoidable work and must get back home before 13:00 hr. and as such would not be able to operate BN-453.

The Movement Control staff toyed with her reply, opined to himself that she is trying to evade her duty by submitting a false excuse and trying to elude him. He took a stubborn stand that she has got to operate BN-453 and pointed out that she could not refuse to operate the flight as the period/duration is within her FDTL.

On this, Ms. Alva also became adamant, reported sick, reported to the airline doctor, faked a toothache, received some tablets and went back home.

However, ultimately, both the flights were operated with full complement of cabin crew as another airhostess, Ms. Sabana of BN-439 agreed to operate BN-453 and two 'standby' cabin crew members were detailed for BN-439.

The above mentioned happening transpired because of ego clash, jealousy, mode and way of asking and replying and the resultant collective misunderstanding that initiated from all these. It would have been much better if the parties had adopted the mode of lateral thinking and had resorted to rationalisation.

It is well and good, if such good sense prevails on at least one of the confronting parties if not on both, so that the unfortunate and resultant outcome is avoided. ***Here the intervention of interaction comes into picture.***

In such a case–

The Cabin Crew could realise that:

- He/she has reported for official duty,
- This has to be preferred over his/her personal problems if those are not absolutely unavoidable, and
- It would be correct to comply with the justified but insisting request of the movement control staff to satisfy the official exigencies.

The Operations Department Staff could try to explore that:

- Although he/she is asking for the change of duty for the exigencies of the airline and is thoroughly justified in his/her point, he/she could put a consideration in his/her approach and/or soften the rigidity of his/her stand,
- It might be possible that the cabin crew concerned truly might have an unavoidable commitment indeed and might not be trying to evade his firm advice,
- He could try to look at the problem with a touch of humanity and
- He could extend the desired cooperation and be a little flexible without exerting the rigid official authority.

If the cabin crew grants the aforementioned consideration, the movement control staff would possibly reciprocate in the same way, there and then or in future. This 'considerate' reputation of the concerned cabin crew might then pervade within the whole department and any polite request from him/her for any reasonable assistance out of the department's staff in future, might not possibly be turned down.

Similarly, if the movement control staff changes his/her rigid stand and gives a consideration of not executing the said change, the concerned cabin crew would willingly comply with any such advice in future.

This is simply a 'give and take' policy laced with consideration and understanding and depends on the manner of representation and the application of suitable avenues of interaction. If the cabin crew could initiate the giving part of the transaction, perhaps its reciprocation could be guaranteed and vice versa.

Cabin crew members should understand that the main purpose of their conversation with any department staff arises from their need to get some of their work done or certain problems solved through the others. So, why not do it in an easier way? A few words of appreciation and dispensing of a little polite request could indeed work wonders. Following the correct and suitable mode, they could witness their work done with speed and in a hassle free manner.

When this wonderful success precedes the departure of a flight, it positively brightens the mood of the cabin crew and they even find their on board passenger service has improved considerably because of this achieved success.

2.8.2B Interaction with the Staff of the Engineering Department

On arrival at the aircraft, the cabin crew members are required to check the emergency equipment and to report about its total serviceability to the cabin crew in-charge. While doing so, they might detect some flaws with those equipment. Again, during the pre-flight check it might be observed that some of the galley items are not locking or some of the hat-rack doors are not latching. These detected faults (commonly known as "snags") should necessarily be rectified through the engineering department staff.

CASE STUDY 9

Just before the closure of the doors of Boeing 737 on flight BN-369 from Kolkata to Agartala, only a forty minutes flight, the aft galley in-charge Ms. Pinky Verma called up the cabin crew in-charge, Mr. Sandeep Haldar at the forward galley over the intercom system and asked for a 'safaiwala' as someone had got sick on the aft toilet floor.

It was quite inconsiderate for a cabin crew with rationality to request for a 'safaiwala' at the last moment, knowing how difficult it would be for the engineering staff to arrange one, except for an unavoidable situation like this one.

Fortunately, Mr. Haldar was quite popular with the staff of the airline in general and engineering depart-ment in particular due to his docile behaviour with the staff and also because he took his transfer from the engineering department to join as a flight purser. On his request, the engineering foreman reflected a mock annoyance, but sent the 'safaiwala' in. Mr. Haldar exchanged some hurried pleasantries with him in his natural way, directed him to the aft galley and informed Ms. Verma over the intercom that the person is on his way.

The 'safaiwala' came back almost immediately, looked furious and informed Mr. Haldar that he will not clean the toilet as the memsahib did not know how to talk and told him "clean the toilet, sweeper".

Mr. Haldar tried to console him with pleasant words for sometime without any positive outcome and as the flight was getting late, he simply said- "Now that is enough. Go and clean the toilet if you don't want to get a slap."

The person went back, finished his job and while going out told Mr. Haldar, "I would never have done it hadn't it been you telling me to do it". The 'safaiwala' started down the stairs when Mr. Haldar called him back and handed over a packet that he was preparing while the person was on his job.

When the flight returned to the base that day Mr. Haldar found the person waiting for him visibly annoyed. Without any preamble, he asked Mr. Haldar, "What did you eat so far?"

Mr. Haldar patted his shoulder, calmed him down not without much difficulty and made him realise that he actually wanted to have home food and a huge lunch, and as such, preferred it this way. He is now off and could go home and eat heavily.

The packet, which Mr. Haldar had handed over earlier, contained his airline breakfast.

For the minor faults, a habitual polite approach, good-natured person-to-person interaction in a soft tone would just get their work done, but for major snags, an official reporting in writing might necessarily be done through the cabin defect report book ('CDR Book' as mentioned earlier in the chapter) duly vouched for by the commander of the flight.

The deliberate mentioning of the aforesaid procedure is to clarify the possible doubt that might have risen in the reader's mind that when the matter is reported in writing and the action is taken officially, it would inevitably be hurting the professional sentiment of the engineering staff. In that case, how could the episode be described and accepted as an appreciable process of interaction.

Incidentally, this reporting in writing by the cabin crew is not meant for any insult directed to challenge the ability of the engineering staff and the same is accepted by both the parties that way. Hence, there is no scope of initiation of any misunderstanding between the engineering staff and the cabin crew, in such CDR Book mentioning.

Actually, the procedure is adopted, as a very short time period is practically available between the snag detection/reporting and the departure of the flight.

The snag, if not considered to be endangering the safety of the flight in any way, is normally carried over to affect the on-schedule departure of the flight.

In such cases, the reporting/recording are thus simply meant to intimate the persisting snag to the engineering staff, who would be attending the aircraft during it's stopover at a base station at night, with ample time in hand to rectify the snag.

The aforesaid reporting/recording also justifies that the cabin crew had done their duty thoroughly and detected and reported the snag, which covers them in case any problem relating to the snag crops up later. The statement can be justified through the following example:

EXAMPLE

On a winter morning, the crew of BN-463 from Kolkata to Guahati was making tea for themselves in the forward galley, prior to passengers boarding the aircraft. They observed that after working for a while the water boiler was turning off automatically, but starting to re-function when switched on again, and again getting turned off after a while. They reported in writing that the galley one water boiler is intermittent.

Understanding that the boiler is at least functioning, though intermittently, and realising that the rectification would take considerable period involving a delay in departure of the flight, the engineer carried forward the snag to be attended to later.

After takeoff, the boiler packed up totally and the tea/coffee service was hampered which originated a score of complaints from the passengers.

The cabin crew went scot-free as they could prove that they had duly reported the snag in writing. No action could, however, be taken against the engineering staff either, as they could establish that their clearing the aircraft with the persisting snag did not endanger the safety of the flight and at the same time, it endorsed the airline's desired 'on time performance' factor.

The aforementioned example ratiocinates that even a reporting in writing might not be against a good interaction policy, so far as its reason is justified and beneficial.

2.8.2C Interaction with Staff of the Commercial Department

It becomes quite necessary for the cabin crew to know about the approximate number of passengers expected on board, prior to the departure of a flight, to acquire sufficient quantity of food and beverage for them.

Again, certain situations at times might demand the passengers to be brought to the aircraft a little later than scheduled. These situations might arise from reasons like staff reporting late, crew reaching the airport late or cleaning and dressing of the cabin remaining incomplete etc. Then,

the cabin crew members do not cherish the embarkation of the passengers, considering the discomfort which they (the passengers) would then suffer. In such cases, a polite conversation with the commercial departure in-charge could become necessary to make him/her realise the problem from the cabin crew's point of view that:

- *The cabin crew members are asking to bring the passengers a little later because if such is not done, it would be the guests who would suffer,*
- *The cabin crew are requesting the help to elevate the benefits of the passengers that is his/her (the commercial departure in-charge) goal and intention either, and*
- *The cabin crew members indeed are not asking the same for satisfying their whims and fancy.*

In these circumstances, he/she would readily cooperate and the imbroglio would be solved smoothly.

Alternately, if the cabin crew fail to make the commercial departure in-charge view the problem in the mentioned way, show off and make him/her perceive (rather misperceive) that the crew are domineering, the person naturally would tend to become adamant and non-cooperative. That would generate a misunderstanding, turning the matter problematic because of communication gap and improper interaction.

It should be kept in mind that the cabin crew members are overall 'public relations' personnel and their interaction quality is constantly under scan. As such, bettering the quality is to be contended with, incessantly. To do such, they should grasp whatever they judge to be good in any other person's process of interaction and put their total endeavour to adopt and use the same in their interaction. Even if they fail to acquire the quality entirely, the betterment they achieve in bits and pieces would stockpile to do them inestimable good, provide them well-felt improvement, thus a immense satisfaction and guaranteed self-confidence.

In fact, the cabin crew members should not be complacent with acquiring the interaction part in the said manner, but indeed should act similarly to adopt every creditable quality in others that they appreciate or admire, for self-improvement. They should initiate mental thought and ponder that: 'I appreciate the person because he/she possesses that quality. Then, if I acquire the same quality I would naturally be admired by others as well'. Gradually, this would form a habit within them and they could be rest assured about their unstoppable progress and overall betterment.

2.8.2D Interaction With Crew Members

This is homogeneous to all the previously mentioned interaction procedures and is much more important. An individual cabin crew member along with other crew members forms a team and they spend most of their duty period together. As such, stress is given on their interactions and the topic is segregated and discussed elaborately in the next chapter.

Glossary

1. **A.M.E.** 'Aircraft Maintenance Engineer' commonly known as Ground Engineer who authorises an aircraft to fly from one airport to another.
2. **Cabin Crew In-charge** The cabin crew who by his/her seniority and/or designation takes charge of other cabin crew members of the flight.
3. **Cabin Crew** The crew members who attend to the passenger needs inside the aircraft cabin-observe, remain responsible and also perform for their safety on board.
4. **Cargo** Any property carried on an aircraft other than mail, stores, accompanied or mishandled baggage (ICAO)

5. **Catering Equipment** The equipment provided by the catering section on board, for passenger service by the cabin crew.
6. **Catering Section** The section that arranges for all the required items and supplies those to the aircraft cabin for the comfortable journey of the passengers.
7. **Commander (P1)** The person in-charge of the flight and commonly known as the First Pilot (P1)
8. **Commercial Department** The department that looks after the ticketing, passenger checking-in, baggage handling and well-being of the passengers on ground, alongside handling mail, freight etc.
9. **Co-pilot (P2)** The person, only second to the commander of the flight and commonly known as Second Pilot (P2) or First Officer.
10. **Crew Duty Roster** This is a schedule that displays the duty chart of crew members.
11. **Customers** Persons, those have financial dealings with the company. For Airlines, these are Passengers and Freight and Mail senders
12. **Emergency Condition** A condition of distress and/or urgency that may affect the safety and/or security of the aircraft, passengers and crew members.
13. **Employee Interline Passage** The document/ticket issued to the employees of one airline by other airlines to fly as a passenger on their flights (domestic and/or international), on a reciprocal basis.
14. **Employee Passage** The document/ticket issued to the employees of the airline to fly the airline as a passenger, free or at a concessionary rate.
15. **Engineering Department** The department that looks after the technical aspects of the aircraft.
16. **FDTL** 'Flight and duty time limitation' that specifies the maximum period for a crew to be on duty and the minimum rest thereafter.
17. **Finance Department** The department that handles the monetary component of any airline.
18. **Flight Engineer** The person who provides necessary technical assistance to the pilots in the cockpit.
19. **Interaction** That allows a two-way flow of communication amongst the parties.
20. **Load Sheet** A document comprised of charts, graphs and words that displays the capacity of the aircraft, records of 'weight and balance' etc. for a particular flight.
21. **Man & Material** The staff of engineering department (man) that carries some spare parts/equipment (material) for rectification of technical problems of aircraft.
22. **Medical Section** The section that looks after the physical condition of the staff of the airline.
23. **Navigator** The person who provides necessary assistance to the pilots about navigating the flight.
24. **Operations Department** The department that looks after everything related to the operation of flights.
25. **Personnel Department** The department that looks after the administrative side of any airline.
26. **Pre-Flight Medical Checkup** The medical checks carried out on the crew members before the departure of a flight to ascertain their fitness to operate the flight.
27. **Reporting Sick** Crew members, intimating the airline authorities about their physical inability to operate a flight or discharge a duty.
28. **Snag** The technical problem in aircraft.

29. **Stores & Purchases Department** The department that organises the purchase of all items and affects their storage and distribution, necessary for the airline.
30. **Transport Section** The section that takes care of the transportation of crew, staff of the airline, passengers, passenger baggage, mail, cargo etc.
31. **Unfit Crew Members** Crew members who are unable to perform/ discharge their assigned duties normally

Questionnaire

1. For a smooth and efficient running of an airline it is necessary that
(a) The finance department must work efficiently.
(b) The commercial department must acquire more number of passengers.
(c) The cabin crew must work hard to satisfy the passengers to the best of their ability.
(d) A team work and coordination to exist amongst the departments.

2. Which of the following sets comprises the in-flight service department?
(a) Cabin crew and catering section
(b) Cabin crew and commercial department
(c) Catering section and commercial department
(d) Commercial department and operations department

3. Who passes the flight details to the passengers on board?
(a) Commercial departure in-charge
(b) Cabin crew in-charge
(c) Galley in-charge with the other cabin crew members of the galley
(d) Announcement in-charge

4. Which of the following set of items is supplied by the catering section for cabin service?
(a) Pillows, blankets, food stuff, newspapers and magazines
(b) As in (a) plus catering equipment and beverage for passenger service
(c) Pillows, emergency equipment, food stuff and eau-de-cologne
(d) As in (c) and blankets and beverage in addition

5. When should a galley in-charge ask for 'no go' items?
(a) After signing the acceptance document
(b) Before checking the items provided in the galley
(c) After requesting for 'anticipated to be necessary' items
(d) Before requesting for 'anticipated to be necessary' items

6. How is the reporting of a snag is done to engineering department?
(a) Through the cabin crew in-charge book duly signed by the commander
(b) Through the cabin defect report book duly signed by the galley in-charge
(c) Through the cabin defect report book duly signed by the commander
(d) Through the cabin defect report book duly signed by the cabin crew in-charge only

7. If the commercial staff refuses to comply with cabin crew's justified request, what should the cabin crew do?
(a) Try to explain his/her point rationally without raising the pitch of his/her voice
(b) As in (a), and report the matter to the cabin crew in-charge thereafter
(c) As in (b), and with the consent of the cabin crew in-charge report it to the commander
(d) Report the matter to the catering in-charge to be conveyed to the commander

8. What are the duties of the commercial department?
(a) To impose an exceptional impression of the airline on the customers
(b) To handle the baggage, cargo, mail etc.
(c) Check the passengers in and usher them into the aircraft
(d) All the above are correct

9. What are the duties of flight operations staff?
(a) Make flight plan and acquire weather reports
(b) Pass the passenger figure to the commercial department
(c) Brief the commander before the flight
(d) Both (a) and (c) are correct

10. What are the duties of the movement control staff?
(a) Inform the crew members about the change in route pattern without disclosing any reason
(b) Briefing the cabin crew members about their flights
(c) Informing the crew members to pass through the security enclosure
(d) All the above are correct

11. Which set of staff fall under the operations department?
(a) Pilot in command, ground staff of flight operations and navigators
(b) Ground staff of flight operations, flight engineers and catering staff
(c) As in (b) and pilots and navigators, in addition
(d) As in (a) and co-pilots and flight engineers, in addition

12. Can an AME clear an aircraft for flight with a snag?
(a) An AME can clear an aircraft by noting the snag as a 'carried forward' snag
(b) An AME cannot clear an Aircraft with any persisting snag
(c) An AME can clear an aircraft with a snag if authorised by the departmental head
(d) As in (a) and if the snag is not endangering the safety norms in any way, in addition

13. When can an AME call for man and material together?
(a) When the AME understands that the snag is beyond his limited resources
(b) When there is a shortage of manpower
(c) When there is a shortage of spare parts
(d) Whenever the aircraft has a snag

14. What are the duties of personnel department?
(a) To look after the administration of the airlines and welfare benefits of employees
(b) As in (a) and to formulate the rules and regulations of the airline, in addition
(c) Arrange cabin crew to reach the movement control and attend legal matters
(d) To keep a tag and arrange the periodical checks to be carried out on an aircraft

15. What are the duties of the finance department?

(a) To see that every crew member is duly insured and pay the monthly premium
(b) To arrange payment of salary of the employees and handle the daily money collection
(c) As in (b) and to handle the provident fund account of the employees, in addition
(d) As in (c) and hold an enquiry on an alleged misconduct of a crew member

16. Who heads the operations department?

(a) A senior executive engineer of the airline
(b) A senior executive pilot of the airline
(c) A senior executive from the administrative side of the airline
(d) Chief of the flight operations staff

3

Cabin Crew's Interaction with Other Crew Members

INTERACTION AND RELATION OF A CABIN CREW MEMBER WITH OTHER CREW MEMBERS ON BOARD: AN INTRODUCTION

In previous chapters, discussion about interaction of cabin crew with other department staff and with crew members while on ground was made. The present topic is deliberately segregated from the rest, as this part is one of the most important episodes of the cabin crew's working life.

A set of crew members operates one individual flight forming a specific team, which is designated as the 'Flying Crew' for that particular flight.

It is not essential that one set of crew members would remain unchanged to operate another flight and as such, an individual cabin crew might have to appertain with some other crew members, to form another set of flying crew for another flight.

3.1 Interaction with the Commander of the Flight

The commander of the flight is the whole, sole and supreme authority of the flight. He/she is duty bound to operate an aircraft, maintaining the 'Rules of the Air', for the safe journey of the passengers, crew members and the aircraft, at all times—from the 'Departure Airport' to the 'Destination Airport'.

The authority of the commander begins when he/she signs the aircraft papers and accepts the charge. This jurisdiction continues until the flight terminates and he/she signs off the aircraft papers.

The commander has to observe that the operation of the aircraft is transiting as per the rules of the air and as per the norms laid down by the airline. His/her decision is supreme and should neither be contradicted nor disobeyed.

A commander attains senior position in the airline because of his/her designation. The person is expected to act in a manner commensurate with his/her status and to reflect a high standard of self-discipline. He/she is also expected to inculcate similar qualities into his/her crew members so that they emit the same ethos of discipline along with necessary obedience towards the rules and regulation and their duty. To help the commander comply with all the aforementioned norms,

crew members should treat him/her with a high degree of respect and his/her instructions should be adhered to and complied with unquestionably.

For example, as per DGCA directive, only certain categories of persons can enter the cockpit/flight deck with the permission of the commander. Cabin crew members are one such benefited category. Although crew members are normally not questioned on entering the cockpit, but to display a little politeness and respect to the commander, it is desirable that the cabin crew members acquire such permission, may be casually, before entering the cockpit.

It should always be kept in mind that you are showing the respect to the designation of the commander and it does not matter whether you like or dislike him/her as a person, personally.

A polite and respectful behaviour towards the commander from a cabin crew member could earn a friendly reciprocation from the person in all natural prospects. The demeanour of the cabin crew member might affect the other crew members also, who would not only appreciate it, but might even try to follow the cabin crew member's footstep to achieve a similar result. With such demeanour, the cabin crew member furnishes a superb example of interaction norm through his/her behaviour, which is thoroughly wanted and truly appreciable.

It may happen that a cabin crew member might not mentally agree with certain decision(s) of the commander on certain occasions and feel those to be out of standard practice. Please understand that although there are many conventional and time-tested procedures and standard policies maintained in normal circumstances of flying, the commander possesses the discretion to sanction the necessary flexibility and to adopt such non-standard procedure(s) mentioned above, if he/she feels those to be essential in unusual situation(s). On those occasions, the cabin crew member should comply with the orders even against his/her liking and willingness.

Later, the concerned cabin crew member might try to learn from the commander about the rationality of that 'order' to augment his/her own knowledge. However, in such cases, the cabin crew member should carefully evade, expressing any challenging attitude through his/her behaviour either through his/her body language or through the tone of his/her voice, while acquiring such clarification(s). He/she should also refrain from pursuing the topic too deep to prevent initiation of an ego clash and/or generation of a misunderstanding.

From the said conversation, the cabin crew member might possibly observe the mainspring and the rationalisation of the commander's 'order' and might digest that the person was not incorrect, as misapprehended by him/her, earlier. Again, from this action of the cabin crew member, an inference could develop in the commander's mind and he/she might start appreciating the cabin crew member's keenness to gather knowledge.

3.2 Interaction with the Co-pilot and Other Cockpit Crew

The co-pilot is the 'Second Person in Command' of a flight. They are fully conversant with the aircraft. While flying under the commander, they accumulate all the needed experience, study the commander's duties and responsibilities and observe the commander's mode of tackling various situations. In due course, they become commanders themselves.

The co-pilot under the supervision of the commander navigates the aircraft. Any deviation from the flight path, if it so happens, has to be brought to the notice of the commander. The co-pilot also possesses the authority to monitor the working procedure and disciplinary attitude of the cabin crew and to bring all noticed irregularities to the knowledge of the commander.

In the commander's absence, the co-pilot takes control of all the authorities of the commander. As such, a comparable behaviour as with the commander (as in 3.1—"Interaction with the Commander of the Flight") should be maintained with the co-pilot and all other cockpit crew, which expectedly could result in a satisfactory outcome.

May it be grasped at this stage that all the cockpit crew are of higher ranks than cabin crew while on flight and obviously possess more authority. For that reason, they should be regarded and treated with all respect payable to their designation.

3.3 Interaction with the Cabin Crew In-charge

The Cabin Crew In-charge is appertained to every cabin and cabin crew related event, starting from welcoming the passengers to shortage of food to toilet dressing to attending to passenger falling sick on board to misbehaviour of cabin crew members with passengers and vice versa to executing emergency evacuation procedure etc.

The cabin crew in-charge is positioned at the foremost left hand station and the second senior at the rearmost left hand station, as per DGCA recommendation.

The cabin crew in-charge allocates the Duty Stations of all other cabin crew, gets the same duly approved by the commander of the flight and selects the 'Galley In-charges' and the 'Announcement In-charge'.

The cabin crew in-charge is the immediate superior to all the cabin crew on board a flight because of his/her accessed designation through promotion or natural seniority. He/she most certainly expects a commendable cabin service. In anticipation of such, the cabin crew In-charge at times can justifiably stipulate fullest support, cooperation and obedience from all cabin crew members of the flight. It remains the obligation of each cabin crew member of the flight to comply with all such instructions and extend a brimming solidarity as a team member.

For example, if a cabin crew wishes to get his/her station changed, a polite request could be made to the cabin crew in-charge and the same might be granted. However, it may be perceived that the cabin crew in-charge has the authority of granting or rejecting such request(s) as per his/her rationalisation. As such, there remains a possibility that the aforesaid request might not be sanctioned either.

A cabin crew wanting such change, on refusal of the cabin crew in-charge, may approach the commander and might get the change materialised utilising the advantage of the commander's supreme authority. The commander in turn might or might not be agreeable to supersede the authority of the cabin crew in-charge in such circumstance and might or might not affect the change. The purpose of the concerned cabin crew might or might not be fulfilled. Either way, the concerned cabin crew should fathom that by approaching the higher authority than his/her immediate senior, he/she has violated all the norms of a correct interaction and in addition, he/she has insulted a senior colleague with every certainty–which is thoroughly undesired and condemnable.

Cabin crew members should have respect for their in-charge because of his/her designation and seniority, even if not as an individual person. The total cooperation from the cabin crew members would positively generate a reciprocal feeling from the person (the in-charge) and the cabin crew members could experience the nascent bond converting into a nice and enjoyable relationship with passage of time and that might make them like the person (the cabin crew in-charge) as an individual person also.

The cabin crew members should realise that they are members of a team whose goal is to look after the honoured guests of the airline and their in-charge is the captain of this team who guides them with his/her matured experience to achieve this mentioned goal. If cabin crew members render a small effort to comply with the instructions of their in-charge, they can be assured to gain a resultant hassle free flight and pure job satisfaction, in reciprocation.

3.4 Interaction with Other Cabin Crew

It is again comparable with a team member's behaviour with other members of the team. Try observing the following guidelines for generating a superb integrity and fellow feeling.

- Every individual cabin crew member should make the others realise how much he/she values their presence in the team.

Suppose the galley in-charge of a cabin crew member reaches late to the aircraft as his/her crew transport had broken down on the way. When the cabin crew member finds time, he/she tells the galley in-charge, "Thank Goodness! You have come, otherwise I would have had to handle the galley. These difficult jobs should be handled by the seniors only."

Although galley handling might be quite easy and although the cabin crew member might be quite senior him/herself, the uttered words would improve the all-round atmosphere. However, the act might appear as fawning, but the same could be viewed from another angle and could be accepted as the cabin crew member's intelligent effort to improve the ambience. A unique interaction entails such acts.

- Cabin crew members should encourage each other to raise the team spirit. Vocal tonics, however efficient and encouraging that might be, could never match the effectiveness of practical deed and setting example that way. If a cabin crew member simply looks cheerful and is vibrant enough (a fireball) – it would be abounding to make the unspoken statement effective and would be a typical example of superb interaction.
- Cabin crew members should try to put a little extra effort than needed to complete their demarked duty and extend the same in the form of a helping hand towards others. Although every cabin crew's duties are suitably demarked and each is competent enough to complete their individual portion of the duty, still a helping hand extended by another, pleases everyone overwhelmingly.

If one cabin crew member tries and provides this little extra service, obviously after performing his/her share of duty, in due course of time, the concerned cabin crew member would not be surprised to observe that others are trying to reciprocate. In such situation, when every cabin crew is trying to help another – every cabin crew member is bound to discover the flight turning facile

and most enjoyable. The pleasure and job satisfaction derived thus would truly be immense. A cabin crew member just has to initiate the move and watch it lift off.

Cabin crew members should grasp that ***"Respect is one phenomenon, which is to be dispensed to gather".*** They are required to manifest their deference towards their seniors. They are to achieve the aforementioned calibre and they would find themselves being praised, cherished and respected.

Similarly, they are to acquire respect from their juniors. They should treat their juniors from their own experience that they have gathered as a junior Cabin Crew. They should dispense to the juniors, what they wanted to receive from their seniors in their earlier days and avoid acts that they had disliked to experience as juniors.

4

Cabin Familiarisation and Catering Equipment Used for Passenger Service

PASSENGER CABIN: AN INTRODUCTION

This chapter familiarises you with the looks and setup of the passenger cabin of an aircraft and introduces you to various catering equipment used by the cabin crew for passenger service during a flight.

4.1 The Aisle

This is the passage or the thoroughfare through which every location in the cabin could be reached.

Normally, small to medium sized aircraft (with medium passenger capacity) have one aisle, but the larger wide-bodied aircraft (with higher passenger capacity) have two such aisles. The 'two aisle' system usually (not compulsorily) provides the passengers a facility of crossing just a single seat to reach one of the aisles. This system also helps the cabin crew to serve the passengers quicker as more number of cabin crew could then perform the service.

4.2 Air-conditioning and Pressurisation

Modern aircraft fly at a high altitude for the reason that the density of air decreases with the increase of altitude and thereby the aircraft experience less obstruction from air—which results in less fuel consumption.

However, this rarefied air contains very less quantity of oxygen, quite inadequate for the survival of human beings. To counteract this deficiency of oxygen density, atmospheric air (thus oxygen) is pumped inside the passenger cabin. This procedure is known as 'Pressurisation of the Cabin'.

Again, the atmospheric temperature decreases with the increase of altitude and for passenger comfort, it becomes essential to heat up/air-condition the cabin. This air-conditioning is done by suitably adjusting the temperature of the air that is pumped inside the cabin for pressurising it.

To suit this purpose, hot air is derived from the afterburner of the engines and the cool air from the atmosphere. This mixed air is then passed through a drying chamber to segregate the water particles present in it, in other words, de-moisturising it.

The mixture of hot and cold air freed from the presence of moisture is known as 'Conditioned Air'. The conditioned air is then pumped in the cabin through the inlets located above the hat racks (Refer to 4.6 — "The Hat Racks" in this chapter).

This conditioned air mixes with the air inside the cabin and provides the requisite quantity of oxygen as well as a suitable and comfortable temperature to the passengers.

The quantity of each stream of hot and cold air for achieving a suitable temperature of the conditioned air (thus to achieve a comfortable temperature inside the cabin), is governed from the cockpit.

After circulation, the used air exits through the perforations on the side panels of the cabin, near the floor level.

4.3 Cabin Doors

It is obvious that the passenger cabin of the aircraft will have doors for normal embarkation and disembarkation of the passengers. Furthermore, these doors are used to evacuate the passengers in 'emergency situations'. For utilising the same doors in both the conditions (viz. in normal and in emergency condition), the doors are subjected through a transforming procedure by the cabin crew. This transforming process is known as 'arming–disarming' of slides.

It may be understood that there could be certain doors in the cabin, which might not be required to be utilised in normal circumstances, but certainly have to be resorted to in emergency situations.

Cabin doors consist of various components. The components, their functions and utilities are cited hereunder.

4.3.1 Door Control Handle

This is a large handle, positioned precisely in the middle of the door and is to be operated to *lock* the door in close position, or to *unlock* the door while opening it. Please understand that it simply operates the door mechanism to lock or unlock the door.

Figure 4.1 *Aircraft Door Components*

Figure 4.2 *Aircraft Door in Open Position*

4.3.2 Door Assist Handle

There are two such handles on either side of the door control handle. The left one (on your left hand when you face the door) is for opening the door after unlocking it. This is located on the left edge and a little above the mid-height of the door. The right hand one is to bring the door from its open position to the position for locking it with the help of the door control handle. This is located on the right edge of the door and is slightly below the mid-height of the door.

4.3.3 Closing & Locking, and Unlocking & Opening of the Doors

It should be clearly grasped that:

- ***For closing the Doors:*** they are to be first pulled from the open position to the close position with the help of the *door assist handle* and locked thereafter with the help of the *door control handle.*
- ***For opening the Doors:*** they are to be first unlocked with the help of the *door control handle* and to be pushed outward thereafter with the help of the *door assist handle* to the fully open position.

4.3.4 Escape Chute/Slide Pack

In all modern aircraft where the cabin floor is considerably high from the ground, one such pack is mounted towards the cabin side of the door in the vicinity of the cabin floor. These are required for evacuating passengers in emergency situations where normal disembarking facilities like stairs etc. are not available.

Figure 4.3 *Emergency Slide*

Figure 4.4 *A Duel Lane Slide*

Chutes/slides are made of tough yet flexible synthetic material that disallows the passage of air through it. Pressurised air from a built-in charging cylinder inflates the chute and the chute then forms a sliding path from the aircraft door to the ground to evacuate the passengers in emergency condition. ***When these 'Chutes' are inflated, they are known as 'Slides'.*** A hard cover houses the folded chute and these two (the chute and the cover) are collectively known as chute pack. A small viewer on the chute cover displays a gauge that reveals the pressure of air inside the charging cylinder.

The slides act as dinghies or as floating devices in case of ditching (emergency landing in sea). They are purposefully made in bright colours (yellow/orange/crimson) so that these could be identified from a long distance in the sea by rescuers.

4.3.5 The Girt Bar

The 'Girt Bar' is a metal bar attached to one end of the chute, which enables to connect that end of the chute with the cabin floor.

When the girt bar is made integrated with the cabin floor, the chute/slide is known to be in 'armed' condition and when the same is detached from the cabin floor, the chute/slide is known to be in 'disarmed' condition. This is the 'transformation' mentioned in (4.3 "Cabin Doors"). This procedure enables the chute to remain intact (not inflated) while opening of the door in normal condition otherwise inflates it while opening of the door is done in emergency condition.

On emergency opening of any door, the girt bar stays integrated to the cabin floor, meaning the girt bar side of the chute remains attached to the cabin floor (the chute remains 'armed' then). When the door is opened in this condition, the girt bar side of chute remaining attached to the floor, the chute comes out of its cover and hangs out of the cabin. Again, while such a happening takes place, the chute inflates simultaneously by the inrush of air from a built-in charging cylinder, activated by the opening of the door. This process converts the chute to slide.

Figure. 4.5 *Cabin Door with Chute Pack*

4.3.6 Arming/Disarming Lever

This lever has two positions and could be slid from one position to another. This lever is moved from its 'disarm' position to 'arm' position for 'arming' the chute/slide mounted on the door. The reverse action 'disarms' the chute. This lever is located nearly at the middle of the aircraft door inside a box or a boxed groove.

4.3.7 Safety Pin of the Arming/Disarming Lever

This protruding pin restricts the movement of the aforementioned 'arming–disarming lever'. The original position of the safety pin is in-between the two extreme ends through which the arming/

disarming lever travels and quite adjacent to its 'disarm' position. When the door is in 'disarm' condition, the safety pin stays at its original position and prevents an accidental sliding of the lever to 'arm' position (preventing an unwanted arming of the chute).

The safety pin has to be pulled out to arm the chute/slide.

After arming, the safety pin must be stowed at *another* ***pre-designed location.*** *The reason for such action is cited hereafter.*

When any *'armed'* door is opened from the *outer* side of the cabin, the 'arming–disarming' lever, owing to a prefabricated mechanism, shifts back to 'disarm' position, 'disarming' the slide in the process. Because of this–***emergency opening of the door is not possible from the outer side of the cabin.***

In case the safety pin is put back at its original position by mistake after 'arming' the slide, the pin would then prevent the arming-disarming lever's movement from 'arm' to 'disarm' position and the aforesaid pre-mechanised 'disarming' of the slide would not take place when the door would be opened from outside. In such situation, the inflation of the slide would take place unnecessarily and that might injure the ground personnel, who are opening the door from outside. (Refer to "What is chute/slide and their 'Arming—Disarming'" and "How to 'Arm–Disarm' the slides").

Again, in such condition (opening of the door from outside), the slide becomes unnecessary as the ground personnel would obviously be commissioning staircase or certain other provisions to achieve an access to the door and the same equipment should serve the purpose of passenger disembarkation, instead of the slide.

This is the reason why after arming the Chute, the safety pin ***must*** be stowed at a different pre-designed location on purpose, than its original position.

The emergency operation of the chute is ***only*** possible when the door is opened from the inner side of the cabin because when the door is opened from the outer side of the cabin the arming-disarming lever moves to the 'disarm' position (the chute acquires 'disarm' condition) and the door opening becomes a normal operation in that situation.

4.3.8 The Guest Lock

Every door has one such lock that holds the door in full open position and prevents its slamming shut by the blowing wind. This button or small lever is to be depressed to enable to move the door from its full open position to initiate its closing.

Figure 4.6 *Use of Slides after a Crush*

4.3.9 The Peep Window

This is a small window framed on the door through which the outside ground condition has essentially to be surveyed before initiating any emergency evacuation. In normal circumstances, this allows to view and monitor the signals from the ground staff who are trying to communicate with the crew members.

4.3.10 The Locking Indicator(s)

This is a slit on the door panel, normally located near the top edge of the door, which encloses a coloured placard. The colour of this placard confirms the mechanical locking of the door. When the door is in unlocked condition, the colour of the placard is red or amber and when the door is locked with the help of door control handle, the colour of the placard inside the slit changes to green. The number of such indicator(s), viz. one or two, depends on the manufacturers of the aircraft and the size of the door.

4.4 Passenger Seats

Passenger seats are placed in rows on both the sides of each aisle. These rows of seats are bolted to the cabin floor and can be detached on purpose (e.g. to accommodate stretcher cases, bar trolleys, dinghy containers etc. whenever these items become necessary to be carried on board).

Figure 4.7 *Aircraft Passenger Seat*

The armrests separating the seats can normally be moved to flush with the surface of the seats or that of the seatbacks and in some cases can even be detached enabling the seats to be clubbed together.

The seatbacks are spring-loaded and can be reclined to acquire a comfortable position. The seatback could be unlocked from its upright position with the help of a push button built on the armrest and could be pushed backwards thereafter, by leaning on the seat back. The reclining angle of the seatback can be adjusted to any comfortable position as per the user's desire. However, certain seatbacks next to emergency exits are purposefully designed not to recline, as these, at reclined position, would obstruct the concerned emergency exit, and hence delay its access, in time of need. To get the seatback to return to upright position the user has simply to remove his/her body weight from the seatback, and to press the push button on the armrest.

The rear of the seatback houses a folding table and a pocket for the use of the passenger sitting behind. However, many modern aircraft houses the table inside the armrest also. The table is used for serving food trays on it and the pocket accommodates various items like safety cards, sickness bags, newspapers, magazines etc. Passengers could use the table for supporting writing pads and the pocket to stow tidbits like spectacles, mobile phones etc.

As a very common practice, the passengers forget to collect these items from the seat pockets while deplaning. The security staff, in coordination with the cabin crew members, carry out a check after every sector and try to detect if the disembarking passengers leave behind any such items. This act serves to create a better goodwill with the passengers and in addition prevents any security hazard created by the leftover item by the passengers.

Each row of seats has one 'Passenger Service Unit (PSU)' (Refer to 4.5—"The Passenger Service Unit") and a portion of the overhead rack (generally called hat rack) for stowing their allowable hand baggage.

4.5 The Passenger Service Unit (PSU)

Each row of seats has one PSU built under the overhead hat racks. This unit comprises of items essential for the convenience and safety of the passengers. Such contents of the PSU are discussed hereunder.

Figure 4.8 *Passenger Service Unit (PSU)*

4.5.1 Air Louvres

These are the conditioned-air inlets, which allow more air to enter the cabin in addition to the general air-conditioning system to enhance the need and comfort of the passengers. Each PSU provides one air louvre per seat for the convenience of each individual passenger who can adjust the intensity or even block the flow of air totally, as per his/her desire.

4.5.2 The Signs

Two small placards viz. 'Fasten Seat Belt' and 'No Smoking', either lettered or in pictograph, are displayed on each PSU in such a way that at least one pair of the signs comes in the vision of every passenger on a mandatory basis.

These signs are illuminated along with a chime from the cockpit whenever the corresponding instruction becomes necessary to be communicated by the commander for the cabin occupants.

4.5.3 Loud Speaker

A small speaker is provided in the PSU that enables the passengers to listen to the information/instructions conveyed either by the cabin crew or by the commander over the public address system (PA system). In certain cases, the channeled music is played to the occupants through this mode.

Reputed international carriers present music and the audio part of the video programmes—channeled to all individuals through the personal earphones of the passengers, supplied by the airlines. The earphone is to be attached to the socket on the handrest of the passenger's seat. Next to the socket, there is a channel-selecting knob, which enables the passenger to select the desired channel, in addition to a volume adjuster alongside.

4.5.4 Reading Lights

Over and above the cabin lights, one reading light for each passenger is located on the PSU. These lights could be adjusted to focus on a spot desired by an individual passenger to suit his/her requirement of reading/working and could be switched on or off individually without affecting the co-passengers in any way.

4.5.5 Hostess Call Button

Each PSU has one such button. When pressed, it emits a chime and the 'call button' illuminates itself. The chime relays the message and indicates to the cabin crew that certain passenger needs some help/assistance from them. The illuminated button pinpoints the row and the exact location of the origination of the call.

On hearing the chime, cabin crew looks out, locates the illuminated call button and finds out the position of the passenger requiring help. After fulfilling the due need, the cabin crew pulls out the call button to cut-off the illumination.

Figure 4.9 *Oxygen Masks Dropping Down from PSU*

4.5.6 Emergency Oxygen Masks

The other portion of the PSU houses the passenger oxygen masks (essential in case of decompression—a rapid loss of air pressure inside the cabin) concealed by a latched door.

These doors are hinged with the aircraft structure and open automatically in case of a decompression to drop the oxygen masks. The cockpit crew can also open these doors electrically, by a switch in the cockpit. If few doors still remain unopened, these could be opened individually by the cabin crew with the help of manual release key (Refer to 7.11—"The manual Release Key")

Passengers, in such cases (when the masks hang down), are required to pull one mask each, cover his/her nose and mouth with it and breathe normally through it. An elastic band attached to the mask could hold it on the user's face for his/her hands to remain free. Pulling of any mask would activate the flow of oxygen through that particular mask or through a set of masks bunched together in the concerned PSU depending on the manufacturer's norms.

Normally, every alternate row of PSU contains an extra oxygen mask for the infants on lap. For example, for a three seat row, if 'row A' has three oxygen masks, 'row B' (the next row) would have four such masks.

4.6 The Hat Racks

These are the overhead racks, which run throughout the rows of window seats and at certain times partially over the seat beside those, to accommodate the allowable hand baggage of the passengers. These are periodically partitioned vertically so that each passenger at least procures a small piece of space nearby to stow his/her baggage. These racks have latch-able doors to prevent the stowed baggage from falling down on the passengers sitting below.

Figure 4.10 *Aircraft Toilet*

4.7 The Placards

There are several intimating signs of various designs in an aircraft. Some of these are illuminated and some are fluorescent. These placards locate the exits, thoroughfares, toilets etc. The illuminated placards are either emergency lights (Refer to 7.7—"Emergency Lights") or are somehow comparable with the emergency lights, as these also assist the passengers to reach the exit, in darkness.

4.8 The Toilets

Each toilet consists of a flushing commode, a washbasin with supply of hot/cold water and complete with a mirror. Bolting of the toilet doors illuminates the 'Toilet Occupied' sign at convenient locations in the cabin to notify other passengers to refrain from rushing to use these. Instead of the conventional 'Fasten Seat Belt' sign, the toilets have 'Return to Cabin' display that comes on simultaneously with the 'Fasten Seat Belt' sign of the cabin.

The toilet door can be opened from its outer side also by the cabin crew, when and if at all that sort of situation (e.g. passenger might have fainted inside the toilet or the passenger might not be able to open the lock of the door etc.) arises.

These toilets are normally constructed with fireproof material and in addition to that, these are fitted with 'self initiating fire extinguisher(s)' that activate by a slight rise of temperature and/or generation of smoke inside the toilet.

Figure 4.11 *Aircraft Galley*

4.9 The Galleys

The galley is the place where:

- the catering equipment and supplies are stowed;
- the food is heated;
- water is boiled for tea/coffee service
- hot liquid to be served, such as readymade tea/coffee, soup etc. is warmed.

In other wards, this is the place wherefrom the cabin crew members receive the supply of all the items for their on-board passenger service. This place is segregated from the passenger cabin by bulkheads (sort of partition walls) fixed to the aircraft fuselage. This again, could be perceived as a store chamber for passenger service items, within the limitations of the aircraft cabin.

Each galley contains a number of cupboards and drawers to accommodate various catering supplies. There are some pre-designed repositories for housing certain catering equipment in such a way that those remain unmoved even in turbulent weather. All galley equipment could be mechanically locked at their respective positions so that those do not get displaced by even very severe jolts.

There might be more than one galley in an aircraft depending on the maximum number of passengers the aircraft can carry, on the logistics of its manufacturer and the option of the airline, operating it.

4.9.1 The Ovens

These units stay fixed with the aircraft structure. Each has a door, which locks mechanically, in addition to its own latching system.

The closed-door unit thus tenders an empty space to accommodate the food to be warmed.

Cold food casseroles are supplied, stacked systematically on wire racks (commonly known as 'Oven Cages'), and are inserted inside the oven by the catering section staff initially.

After being suitably heated, the initial set of food casseroles are taken out and replaced by another set of food casseroles (which are cold and had been stacked inside the cupboards by the catering section staff due to non-availability of space inside the ovens) for warming up, by the cabin crew during the flight.

The transformed electrical power derived from the 'Aircraft Power System' heats up the foodstuff in the oven.

Each oven has a 'Timer Switch'. This is a spring-loaded circular switch, which has to be rotated manually (normally clockwise) to set the period for which the food casseroles are desired to be warmed. Owing to the tension of the spring, the 'Timer Switch' gradually rotates in the opposite direction (normally anti-clockwise) along with the passage of time and cuts the power supply automatically after the lapse of the preset time.

To operate the oven, the time period has to be carefully determined and set by the cabin crew. This period would depend on factors like—

- *Type of the food to be warmed*
- *Its quantity and*
- *The period after which the warmed up food is required for service, from the preset time.*

An 'on-off' switch, after the timer switch is set, switches on the oven. When the foodstuff has been warmed to the desired temperature, the 'on-off' switch has to be put to 'off' position as a precautionary measure, although the timer switch might have already cut the power supply.

However, it is advisable to keep tabs on the preset time period to prevent overheating of foodstuff, occurring due to non-disconnection of power supply by the timer switch, owing to mechanical malfunctioning. In such cases, the oven should be switched off manually by using the 'on-off' switch upon lapse of preset time.

The oven also furnishes a two-way option (viz. high/low) switch to control the intensity of heat, with which the foodstuff is desired to be warmed and is again to be chosen by the cabin crew.

There could be more than one oven in a galley and such number would depend on the quantum of foodstuff needed to be warmed.

4.9.2 The Water Boilers

These units are embedded in the galley and dispense boiling water. Each unit has two push button switches to put the boiler 'on' or 'off' and two amber coloured lights.

When the 'on' switch of the boiler is activated, one of the amber coloured lights comes on. It should not be presumed that the water is ready for use, as this light has appeared. This illuminated light merely indicates that the boiler has been switched on.

With the passage of time (about a minute or so), the second amber coloured light would illuminate and both the lights would continue to glow together and then only it could be received/derived that the water in the boiler has started boiling and is ready to be extracted.

During the process of taking out boiling water, if the said second light goes off, it should be taken that the temperature of the extracting water has gone below the suitable/desired temperature. Withdrawal of water should then be temporarily stopped until the light reappears. However, the light reappears within a few seconds of the stoppage of extraction.

After the necessity of hot water is accomplished or when there is no immediate need of boiling water, the boilers may be switched off by using the 'off' switch. Both the lights would then go off simultaneously.

The boiling water pours out through a faucet attached to the boiler unit.

Like all other galley equipment, there might be a number of boilers in one galley depending on the quantum of boiling water needed for the passenger service.

4.9.3 Drawers and Cupboards

There are a number of drawers and cupboards in every Galley depending on the quantity of items to be accommodated.

Each cupboard is fitted with a latch-able door and a mechanical lock to prevent its accidental opening. The cupboards accommodate bigger items like:

- Food casseroles (in addition to those placed in the ovens, to be warmed up later)
- Beverage supply like juice sachets, mineral water bottles etc.
- Tea/coffee servers, water jugs, milkpots etc.

The drawers slide back and get latched in position. The drawers house small and loose catering items like teabags, coffee powder packet, sugar sachets etc.

4.9.4 The Working Lights

These lights illuminate the 'Galley Work Table' for the cabin crew to function inside the galley when the cabin lights are either dimmed or switched off. Each of these lights have their individual switch in the respective galleys.

4.9.5 The Sinks

Each galley has at least one built-in sink for liquid waste disposal located normally on the galley tables.

4.9.6 The Waste Bins

Each galley has at least one waste bin usually located under the sink for disposing solid rubbish.

4.9.7 The Galley Switches

Each electrical device in the galley has individual 'on-off' switch for its operation. All these switches constitute and are collectively known as galley switches.

4.9.8 The Circuit Breakers

Each electrical device has its individual circuit breaker. This spring-loaded device mechanically shifts a portion of the electrical circuit to make the circuit inoperative.

In case of a faulty equipment or if there is any short circuit, the circuit breaker related to that equipment virtually pops out and the electrical circuit is broken. This precautionary mechanism not only protects the concerned equipment from getting damaged, but also prevents the possibility of a fire hazard, which could originate from such malfunction or short circuit.

4.10 Catering Section Supplied Items

Catering section supplies various items like foodstuff, beverage and equipment-required by the cabin crew for passenger service. They load the galleys with these items prior to the departure of the flight. Some of such important items amongst many others and their uses are cited below.

4.10.1 The Liquid Containers

These are popularly known as 'flasks' and utilised to accommodate hot liquids like soup, milk, readymade tea/coffee etc. that are supplied warm by the catering section for passenger service. However, the flasks are capable of containing cold liquids also.

Each of these containers has a detachable lid which could be detached for a rapid pouring of the liquids in the container. Two clips, located on the top part of the container, fix the lid to its main body.

A rubber gasket is sandwiched between the container body and its lid to restrict any spillage of the contents and in addition to maintain the temperature of the liquid inside the flask to certain extent.

It is obvious that the hot liquid would become cold with the passage of time. To recoup the temperature, each container has a built-in heating system whose socket is meant to be fitted with the pre-designed electrical outlets purveyed in the galleys. When the flask is positioned properly, its electrical socket adapts to the outlet points of the electrical system. On switching on the flask, its heating system derives the electrical power from the aircraft power supply and transforms the same to warm up the liquid inside it.

Each flask has a faucet to drain out its content.

These containers (flasks) are retained at their respective repositories by two mechanical locks.

The number of repositories and the corresponding electrical outlets for these containers in a galley depend on the maximum number of flasks required to be utilised for passenger service from that particular galley.

4.10.2 The Hot Cups

These are small jugs with built-in heating device. These could be connected to the specially designed electrical outlet in the galley for warming small quantity of liquids such as water, baby's milk even with feeding bottle, a cup of soup or readymade tea/coffee for a passenger opting to consume it boiling hot.

4.10.3 The Trolleys

Trolleys stow the preset food trays, initially put by the catering section or the caterers inside the galleys, to be rolled out with stacked up warm food casseroles on its top, for passenger service later.

Each of these rectangular containers has parallel horizontal bulged up lines throughout its length on its height based walls on both of its inner sides, which shelves the preset trays.

The size of the trays corresponds to the type of food service to be performed for meals. The big trays that can be placed three in a row can accommodate meals like breakfast, lunch and dinner and the trays that can be placed four in a row can be utilised for meals like heavy snacks and light refreshments. Depending on the size of the tray, a series of three or four trays can be accommodated on one of the aforementioned shelves (the previously mentioned horizontal protruded projections). Usually, the trolleys have 12 such projected rows. As such, 36 or 48 food trays can be housed in one trolley and can be rolled out for service at one time.

The trolleys roll on four small wheels (Figure 4.13—"Equipment Supplied by Catering Section") and have two lockable doors, one each on its lateral sides. These doors get attached to the side walls of the trolleys maintaining a full open position with the help of magnets fixed on the external side of the lateral walls of the trolley and allow two cabin crew members to simultaneously serve food from both its ends. The two foot brakes, one under each door, can immobilise the trolley, when applied by any of the two cabin crew members while serving the food to a row of passengers.

Figure 4.12 *High lift to Load Catering Equipment On Board the Aircraft*

For stowing the trolley in the galley, both the trolley doors are to be locked individually, it should then be channeled to its pre-designed repository that disallows its lateral movement, subsequently to be locked by using the foot brake and finally by engaging the mechanical locking device of the galley that in turn restricts its forward–backward (longitudinal) movement.

Figure 4.13 *Equipment Supplied by Catering Section*

4.11 Cabin Crew Stations

Cabin crew Station is the location where an individual cabin crew member is posted.

The allocated cabin crew member has to occupy the crew seat at that station as long as the 'Fasten Seat Belt' sign is on. These are normally located adjacent to emergency exits. However,

certain aircraft have some exceptions where these are not exactly adjacent to an emergency exit, but quite close to it.

Each of these stations provides certain facilities and equipment for the utilisation of the stationed/positioned cabin crew member, but not every station might have each of these items/facilities compulsorily. The absence of any such items/facilities would mean that either those are not required at that particular station or are available in the vicinity of the station. Some such equipment/facilities are discussed below.

4.11.1 Cabin Crew Seats

These are called 'Jump Seats' because the spring-loaded base of these seats folds back and flushes with its headrest as soon as the occupant leaves the seat. All these seats are fitted with a pair of seat belts, and a pair of spring-loaded self-retracting shoulder harnesses (provided as an extra safety device for cabin crew members).

All these four straps (a pair of seat belts plus a pair of shoulder harnesses) are held together by a circular metal structure with a circular rotatable disc on its top. The user should position this 'strap holding device' (the circular structure) over his/her navel by adjusting the tabs of the seat belts.

All these straps could be released simply by rotating the abovementioned top disc. The shoulder harness straps are pulled back inside their casings effortlessly by the tension of the built-in springs as soon as these are released and the opened seat belts fall down simultaneously, allowing the cabin crew to be free for action.

4.11.2 The Intercommunication System

The intercommunication system commonly known as 'Intercom' consists of a handset and some call buttons. The call buttons are located either on the cabin crew panel or on the handset itself, depending on the type of the aircraft. The number of such call buttons equals the number of stations to be called.

Figure 4.14 *Cabin Crew Jump Seat*

4.11.2A The Handsets

The handsets are used to —

- communicate with the other cabin crew stations,
- communicate with the cockpit (which is considered as another station) and
- make announcements to the passengers.

The last mentioned facility might not be available at every station for the reason mentioned earlier in (4.11 "Cabin Crew Stations").

The station calling the other station is known as the 'Caller Station' and the station it is calling is known as the 'Called Station'.

The handsets have much resemblance with the domestic telephone handsets with the exception of having a built-in 'Press to Talk Switch' (PTS) that necessarily has to be kept pressed while communicating. If this switch is not kept pressed while talking by the caller, the called station would not be able to receive the communication. However, all conversations are audible, even without pressing this button.

4.11.2B The Calling Buttons

The position of the calling buttons might be different for different types of aircraft. These would either be located on the handset itself or could be on the base for the handset on the cabin crew panel. These buttons are spring-loaded push buttons, which come back to their initial positions when released, after activating the selected system. The action of operating the call button is called 'Punching the Button'. One such button would be available to call up each cabin crew station and the cockpit.

On punching a specific button to contact a particular cabin crew station or the cockpit by the caller station, a chime is emitted and a light is illuminated at the called station. This intimates the crew members of the called station that their station is being called. Again, at the called station, the specific light illuminated (indicating that their station is being called) from a set of lights provided for that purpose, would distinctly reveal the particular station that is calling, thus pointing out the identification of the caller station.

Another button, marked 'P.A.', similar to these calling buttons, might exist at any particular station or at all stations. This button is to be punched for making announcements. However, analogous to the procedure of conversing, the 'press to talk' button has to be kept pressed all through the announcement(s) also. As long as this button would be held pressed, the announcement would be heard in the cabin, not otherwise.

Each system activated by punching the respective button would reset with the replacement of the handset on its base.

4.12 Additional Amenities Available at the Cabin Crew In-charge's Station

The cabin crew in-charge has much more responsibilities than the other cabin crew members and is justifiably bestowed with further facilities in addition to all the aforementioned facilities to discharge his/her duties, effectively. The forward left hand side station is normally occupied by the cabin crew in-charge in accordance with the directive from the DGCA. This station has the said supplementary amenities and these are cited hereunder.

4.12.1 Cabin Lighting Switches

A set of 'push button switches' is located on the cabin crew in-charge's panel, which can be utilised individually to put on or put off the corresponding row of cabin lights. The number of switches in the aforementioned set is equal to the number of rows of cabin lights. In addition, there is another set of similar looking switches to increase or decrease the intensity of different rows of lights.

EXAMPLE

For example, the 1st. and 3rd. rows of cabin lights could be kept illuminated while the 2nd. row of lights could be switched off by affecting the switch from the 1st set of switches. Again, the intensity of these two illuminating rows (viz. 1st and 3rd) could be varied by using the switch from the 2nd. set of switches.

As such, by applying the relevant switches from the two aforesaid set of switches, a collective light intensity could be achieved to suit each necessity and satisfy every mood of the passengers, viz. dining, relaxing, sleeping, conversing etc.

4.12.2 The Evacuation Command Switch (EVAC)

This switch is punched to activate the signal to command all cabin crew members to initiate the 'evacuation procedure' by the cabin crew in-charge (Refer to 9.9—"Duties of Cabin Crew after Touchdown (Landing) in Emergency Condition").

4.12.3 The Emergency Light Switch

This switch, when punched, illuminates all the 'Emergency Lights' simultaneously (Refer to 7.7—"Emergency Lights").

Figure 4.15 *Six Row Cabin Lighting*

Figure 4.16 *Only Some rows of Lights Illuminating*

4.12.4 The Music Switch

This switch puts on or off the pre-recorded music played in the cabin. Another switch/knob located near the music 'on/off' switch adjusts its volume.

4.12.5 The Water Quantity Gauge

The water, used for all purposes other than consuming, is stored in a tank normally positioned under the cabin floor. The stored water is pumped up or supplied under pressure, in the galleys and the toilets.

It is imperative to know the quantity of this stored water before undertaking any flight from a base station where the facitility to fill up the tank is available. This gauge notifies the same. On pushing an integral push button in its vicinity, a pointer or a system inside the gauge reveals the quantity of water present in the tank.

Before undertaking a flight, it is one of the mandatory duties of the cabin crew in-charge to check the water quantity present inside the tank.

The minimum acceptable quantity of water is 3/4th (or 75 percent), of the full capacity of the tank. In case, the water quantity is detected below the aforementioned level, the matter has to be reported to the departure engineer for replenishing the same.

4.12.6 The Reading Light Master Switch

Individual reading light switch on the PSU can work the respective reading light, only if this master switch is 'on'. After the passengers disembark at the destination station, this switch is punched to switch off all the reading lights left illuminated by the passengers to prevent unnecessary wastage of power. Later, the engineering personnel would put it 'on' and switch off all the reading lights through their individual switches on the PSUs.

Glossary

1. ***Arming/Disarming Lever*** The lever that attaches the girt bar to the cabin floor or detaches the same from it.
2. ***Cabin Crew Seats*** These are jump-seats fitted with seat belt and shoulder harness and are very much different from passenger seats.
3. ***Cabin Crew Station*** This is the pre-allocated position for a cabin crew to occupy the seat during takeoff, landing and turbulence.
4. ***Cabin Pressurisation*** To counter the deficiency of oxygen density due to gain in altitude, atmospheric air (thus oxygen) is pumped inside the passenger cabin. This procedure is known as 'Pressurisation' of the cabin.
5. ***Call Buttons*** These buttons are spring-loaded push buttons that come back to their previous positions after activating the desired system.
6. ***Circuit Breakers*** These electrical devices cut off the power supply by sensing any malfunction of the concerned equipment and/or that of the circuit.
7. ***Door Assist Handle*** The handles, which assist for pushing the door to open position after unlocking the door and for bringing the door from the open position for its locking.
8. ***Door Control Handle*** The large handle to lock and unlock the door.
9. ***Emergency Oxygen Masks*** These masks drop down from 'Fixed Oxygen Supply Systems' in case of pressurisation failure in the cabin.
10. ***Escape Chute/Slide*** This is a device that forms a path from the aircraft door to the ground for passenger evacuation in emergency condition.

11. ***Girt Bar*** A metal bar that attaches one side of the chute with the cabin floor for arming of the chute.
12. ***Gust Lock*** The small lever or button that prevents the aircraft door at full open position from moving back due to wind.
13. ***Intercommunication System*** This device allows communication between crew members from their individual stations.
14. ***Passenger Service Unit*** These are the units that contain certain items required for the safety and comfort of the passengers.
15. ***The Galleys*** These are the segregated portions of the cabin wherefrom cabin crew originates all passenger services.
16. ***Water Quantity Gauge*** This gauge reads and reveals the quantity of water in the storage tank of non-potable water.

Questionnaire

1. What is the air that is pumped into the aircraft cabin for pressurisation called?
(a) Atmospheric air
(b) Surface air
(c) Moisturised air
(d) Conditioned air

2. For which purpose 'Door Assist Handle' is used?
(a) For bringing the door from the open to close position
(b) For locking and unlocking the door
(c) For shifting the door to open position after unlocking it
(d) Both (a) and (c) are correct

3. What is the usage of door control handle?
(a) It 'arms' or 'disarms' the aircraft door
(b) It locks and unlocks the aircraft door
(c) It controls the movement of aircraft door
(d) Both (a) and (b) are correct

4. Why is a chute provided on board?
(a) To take the passengers out of the aircraft during normal disembarkation
(b) To make a sliding path when inflated
(c) To evacuate passengers in emergency
(d) Both (b) and (c) are correct

5. What is the function of a girt bar?
(a) The girt bar attaches one side of the chute to the aircraft cabin floor
(b) The girt bar placard changes colour to indicate that the door is locked
(c) The girt bar is used for opening and closing of the doors
(d) The girt bar inflates the chute

6. The 'arming-disarming lever' helps to:
(a) Attach or detach the girt bar
(b) Move the safety pin
(c) Change the colour of the placard
(d) Lock the door control handle

7. What is the usage of the gust lock?
(a) It helps to evacuate the passengers in case of emergency
(b) It prevents the movement of the lever from arm to disarm position
(c) It holds the door in "fully open condition" against a blowing breeze
(d) It locks the door in closed position

8. What are the uses of Passenger Service Units?
(a) It stores all items, necessary for passenger service
(b) As in (a) and in addition food can be warmed here for passenger service
(c) It provides items of facilities for safety and comfort of the passengers
(d) Both (b) and (c) are correct

9. Fixed emergency oxygen masks drop down from:
(a) The roof of the aircraft
(b) The hat racks in the cabin
(c) Passenger service units
(d) Safety pin of the arming-disarming lever

10. For which purposes are the galleys used?
(a) To stow the equipment and the beverage for passenger service
(b) To accommodate jump-seats for cabin crew members
(c) As in (a) and for stowing and warming food stuff
(d) Both (a) and (c) are correct

11. For what purpose are the circuit breakers used?
(a) To break a unit connected to a circuit
(b) To break the circuit if the connected item is malfunctioning
(c) To break a circuit having a possibility of short circuiting
(d) Both (b) and (c) are correct

12. Cabin crew stations are meant for:
(a) Cabin crew to check the neatness of their uniform, periodically
(b) Cabin crew to gather and converse
(c) Accommodate the cabin crew in-charge and galley in-charges only
(d) To be occupied by the pre-allocated cabin crew whenever the seat belt sign is 'on'

13. Which of the following set covers the items of passenger seats?
(a) A knob on the hand rest to recline the seats and a table
(b) A seat pocket at the back of the front Seat, a pair of seat belts and shoulder harness
(c) As in (a) and a pair of seat belts
(d) All the above mentioned sets

14. What is the purpose for which the EVAC switch is punched?

(a) For communicating with the cockpit crew
(b) For ordering the other cabin crew to begin emergency evacuation
(c) For instructing the cabin crew to stand-by at their station
(d) For putting off all the reading lights

15. What should be the minimum quantity of water in the under-the-floor-tank during the initiation of a flight from a base station?

(a) Full tank (100% full)
(b) Three quarter full (75% full)
(c) Half full (50% full)
(d) Quarter full (25% full)

5

Important Duties of Cabin Crew (in Normal Circumstances)

5.1 Important Duties of Cabin Crew

Over and above serving passengers, cabin crew members have various duties at different phases of a flight, in normal condition. These can be segmented as follows.

(i) Duties before takeoff.
(ii) Duties before landing.
(iii) Duties after landing.
(iv) Duties during turbulent weather.
(v) Duties towards passengers falling sick on board (if any).

5.2 The Cabin Crew Team

The team consists of a number of cabin crew members operating a particular flight headed by the *Cabin Crew In-charge (CCI)*. The cabin crew in-charge would be the senior member of the team either as per his/her service tenure and/or as per the higher designation acquired through promotion.

By virtue of his/her position and with the recommendation of the DGCA, the cabin crew in-charge occupies the *foremost left hand station* (commonly known as 1LH) in the aircraft cabin.

He/she allocates the duty stations to other cabin crew members as per his/her discretion other than that of the 2nd senior cabin crew of the team who, as per the above mentioned norm, occupies the *rearmost left hand station.*

The CCI also allocates the galley, wherefrom an individual cabin crew member would be working.

It is quite possible that there will be a number of cabin crew members working in one galley. The senior cabin crew member amongst them (as per the previously mentioned yardstick) would be the *galley in-charge.* The galley in-charge normally works within the galley. However, he/she remains empowered to depute some other cabin crew member of the galley for this job viz. galley

work. The cabin crew other than the one working inside the galley looks after the part of the cabin within the purview of the galley.

For example, say there are two galleys in an aircraft and the cabin has 20 rows of seats. In that case, the first 10 rows (1–10) are within the range of the forward galley and the last 10 rows (11–20) within the range of the aft galley. However, there exists no such rigid or official demarcation and this convenient range creation is based on the day-to-day practical experience, which has gradually become a convention.

May it be reiterated that the performance of cabin crew members is teamwork. The attitude like 'my passengers' (intending to express-'the passengers sitting within the range of my galley') and 'your passengers' (intending to express-'the passengers sitting outside the range of my galley') should never be encouraged by any cabin crew member.

For example, say a passenger occupying a seat on the last row of the range of the forward galley (as per aforesaid example, the 10th. row) asks for a cup of coffee and another passenger in the next row (the 11th row) asks for a glass of water at the same time. It is not expected that the 1st passenger (the aforementioned 'my passenger') is served by a cabin crew member working in the forward galley and not the other (the aforementioned 'your passenger' on the 11th row).

There is no such rule that recommends the cabin crew working in the galley, not do any work in the cabin and the one(s) who are working in the cabin, not to help in the galley work. However, in spite of all these, each cabin crew member has his/her well bounded responsibility owing to his/her positioning (station allocating by the CCI) in the cabin—elaborated later in the Chapter.

5.3 Duties of Cabin Crew before Takeoff

Every occupant inside an aircraft must be on his/her seat with the seat belt fastened on a mandatory basis, during:

- takeoff
- landing and
- turbulent weather

The seat belt should be fastened neither too tight nor very loose and its opening device should face outwards for it to be opened swiftly. When the seat belt sign is switched off, it is advisable to keep it loosely fastened.

The cockpit crew puts on the 'Fasten Seat Belt' sign during the three aforementioned periods. This indication (fasten seat belt sign—'on') has to be considered as an order from the commander and to be strictly adhered to, at the earliest. However, the cabin crew members would require some extra time to comply with the order as they perform a few duties/checks, before they can take their seats.

Before we proceed further and discuss the duties of the cabin crew, it will be beneficial to gather knowledge about the chute/slide positioned at every emergency door and also their 'arming' and 'disarming'.

What is Chute/Slide and their 'Arming-Disarming'

All modern passenger liners are fitted with slide chutes on every emergency door in the passenger cabin.

It may be reiterated that the chute is a device, which in an inflated condition, forms a downward sloping path from the aircraft door to the ground. Onrushing air under pressure from a charging cylinder materialises the inflation and the process transforms the chute to a slide that serves the purpose of evacuating the passengers in emergency situation. This transformation takes place with the opening of the door in 'Emergency Condition'.

You might be pondering how the opening of the door could actuate the inflation of the chute in one condition (viz. emergency) and not do the same in another condition (viz. normal). This change of condition (transformation) becomes effective by the 'arming' or the 'disarming' of the chute.

Customarily, one end of the chute remains integrated to a metal bar known as 'Girt Bar'. The attachment of the girt bar with the floor is 'Arming' and its detachment is 'Disarming' of the chute/slide.

On normal opening of the door (say, for normal passenger disembarkation) the chute remains 'disarmed' and the girt bar does not remain attached to the floor. This door-mounted chute then becomes an integral part of the door (in absence of any attachment with the floor) and goes out along with the door without any interference or blockage.

When any door is opened in emergency condition, i.e. the chute is 'armed' and the girt bar is attached to the floor, then obviously, the chute is pulled out of its casing and hangs out from the level of the aircraft floor. In addition, the opening of the door also activates a built-in charging cylinder (a cylinder containing air under pressure) and the inrush of air from this charging cylinder begins to inflate the chute simultaneously.

In case this automatic inflating system fails, pulling of a 'Manual Inflation Handle/Toggle' located in the vicinity, inflates the chute.

The inflated chute or the slide would then act as a sloping down thoroughfare (like the ones seen in the children's park that offers a sliding path to come to the ground). The passengers are required to just jump on this 'slide' and glide down to affect a speedy exit out of the aircraft that is imperatively wanted for an emergency evacuation.

At this juncture, it should be realised that we cannot forebode at which moment any emergency situation would arise and a subsequent necessity for evacuation might become indispensable because it remains totally non-established and unknown to all, except in 'anticipated emergency' conditions (Refer to 9.2—"Anticipated Emergency" and 9.3—"Unanticipated Emergency"). As such, it becomes compulsory to remain prepared for every emergency throughout the flight in general and at every take-off and landing in particular. To satisfy this need, the chutes are 'armed' after the doors are closed, before each take-off and 'disarmed' after every *normal* landing, before the opening of the doors. The slides are *not* to be 'disarmed' in the event of an emergency as the evacuation might become obligatory then. In those circumstances, the doors are essentially to be opened while the chutes are in 'armed' condition.

How to 'Arm-Disarm' the Slides

This could be done in two ways viz. manually or by 'arming-disarming lever'.

That means the girt bar could be connected with the cabin floor either physically (literally) or by moving the 'arming-disarming lever' to "arm" position for arming or reversed for disarming the chute.

The procedure differs with the type of the aircraft.

EXAMPLE

For example, the first procedure is applied for Boeing B737, whereas the second procedure is followed for Airbus A300 and A320.

Manual Arming/Disarming For connecting the girt bar physically, the bar has simply to be unclipped from the chute pack and hooked to two metal connectors (furnished for this purpose) integrated to the cabin floor. The bar has to be unhooked from the floor and clipped back with the chute pack for 'disarming' the slide.

'Arming/Disarming' through the Lever Normally, the 'arming-disarming' unit is encased in a covered grooved recess or a box that is located nearly at the middle height on the door panel.

The unit comprises of a small lever and a protruding pin. The lever could be slid from one end to the other for arming or disarming of the chute. This lever's movement is prevented by the aforementioned pin, which protrudes out of a pre-designed hole adjacent to the lever's 'disarm' position. This pin prevents an accidental and unwanted 'arming' of the chute and its resultant inflation subsequently, for an opening of the door in normal condition and is thus known as 'Safety Pin'.

To 'arm' the slide, this pin is pulled out and the 'arming-disarming lever' is slid to the 'arm' position. When this lever is moved to 'arm' position, the girt bar gets attached to the cabin floor.

When the 'arming-disarming lever' is slid to disarm position, the girt bar which had been attached to the cabin floor, while the slide was 'armed', gets detached from the floor and the normal opening of the door (as the girt bar had become an integral part of the door), becomes possible.

As long as the slide remains in 'armed' condition, the pulled out safety pin has to be stowed at *another* pre-designed location, meant for that purpose. This is compulsory because of certain norms that are reflected below.

As per the conventional and pre-mechanised system, when the ground staff from the outer side of the cabin open any 'armed' door, the 'arming-disarming lever' moves back to 'disarm' position.

If the pin is replaced at the same position (to where it was when the slide was 'disarmed'/ its original position in the pre-designed hole) and the door is opened from outside, the lever would be restricted from shifting back to 'disarm' position by this pin and would leave the chute in 'armed' condition. This would cause a useless and unwanted inflation of the chute. This might even cause grave injury to the ground staff and might even damage the equipment they are utilising. (Refer to 4.3.7—"Safety Pin of the Arming/Disarming Lever")

As such, the cabin crew has to exert utmost care on a mandatory basis to follow the mentioned pre-designated procedure to avoid the chaotic situation of inflating the chute unnecessarily.

After the slides are disarmed, the safety pin has to be replaced at its original position owing to the reason previously mentioned to prevent its accidental and unwanted arming.

5.3.1 Duties of Cabin Crew after Closing of Aircraft Doors

When all the cabin doors are closed, each cabin crew has to remain at his/her station. Complying with the command from the cockpit, each one must 'arm' the chute at the exit of their respective station and report the 'arming' (that the slide is armed) to the cabin crew in-charge. After receiving confirmation from all individual cabin crew that each individual exit's slide is 'armed', the cabin crew in-charge would subsequently report to the commander that all the slides are 'armed'.

5.3.1A Checks and Duties to be Performed in the Passenger Cabin

It may be reiterated that the cabin crew members, alloted to a particular galley, are either to perform his/her duties within the galley (the galley work) or to perform his/her/their duties in the part of the cabin within the range of the galley (the cabin work), as assigned by the galley incharge.

Cabin crew assigned for cabin work should check the part of the cabin which falls within their galley's assigned territory/range with or without the help of the galley in-charge. This part of his/her/their duties include to confirm that:

- All the emergency exits and the passage to reach these are free from the slightest obstruction of baggage or any other article, for the exits' utilisation during emergency evacuation. *This is compulsory because, if the said 'slightest obstruction' persists, that will inevitably delay the reaching of a passenger and/or a crew member to the emergency exit, which is beyond every norm of evacuation because of the 90 second period restriction.*

  It is one of the normal tendencies of the passengers to place their baggage at these empty spaces without realising the reason and purpose of keeping the vacant space. They should be advised to stow the baggage on the overhead racks or under the seat in front of them, explaining the cause of such request, if necessary.
- All the overhead hand baggage bin (hat rack) doors are latched properly, *otherwise the stowed baggage might fall down and injure some passengers.*
- Every handbag, if placed on the floor (due to non-availability of space inside the hat rack), is placed under the preceding seat, for keeping the passage clear for swift and unrestricted movement of passengers in case of emergency evacuation.
- All passengers have fastened their seat belt correctly (Refer to 5.3—"Duties of Cabin Crew before Takeoff").

- All the seatbacks are kept upright, *as the slanting seatbacks would obstruct people's movement in emergency.*
- The toilets are vacant. *If occupied, action should be taken to expedite the vacation of the toilet and the occupant's return to his/her seat.*

Figure 5.1 *Emergency Demonstration (Indicating the Location of an Emergency Door)*

Figure 5.2 *Oxygen Mask Demonstration*

When all the aforementioned items are complied with, the galley in-charge is to be reported that the 'cabin is prepared'.

To achieve compliance with all the previously mentioned points, the cabin crew should request the passengers politely, but firmly and, if required, by explaining the purpose/necessity of such request. However, if any passenger still refuses to cooperate, the matter has to be intimated to the commander immediately for his/her appropriate action.

These 'appropriate action' ranges from a polite request to cooperate to off-loading of the concerned passenger(s) from the flight.

After reporting to the galley in-charge, they should take their assigned seat at their station and fasten their seat belt and shoulder harness on mandatory basis.

5.3.1B Checks and Duties to be Performed in the Galley

The galley in-charge or the cabin crew, assigned for the galley work by the galley in-charge, is required to ensure that all the items in the galley are latched and secured. That means, to ensure that in case of any harsh juddering of the aircraft; no item should be dislodged and fall on the cabin floor to bottleneck the 'unobstructed passage' (Refer to 5.3.1A—"Checks and Duties to be Performed in the Passenger Cabin"), essential for evacuation. For this, he/she has to ensure that:

- Both the doors of each trolley are locked individually.

- The trolleys are stowed in their slots and the mechanical latches are engaged.
- Oven doors are latched and mechanically locked.
- Liquid containers/flasks are in their respective sockets and mechanically locked. If the pins of the flasks are not inserted in the socket properly-the flask would be protruding out and the mechanical locks would be difficult to engage.
- All loose and larger items are kept inside the cupboards and their (the cupboards') doors must be latched and mechanically locked.
- All the drawers must be fully closed, latched and mechanically locked.
- Each of the electrical equipment in the galley is switched off. *This is done to render maximum power for take-off by curtailing its utilisation to the maximum. Cabin lighting is dimmed to the minimum by the cabin crew in-charge for the same reason.*
- The galley curtains are opened to the extreme and are fastened with the aircraft structure to achieve an exposed thoroughfare to the emergency exits.

When all these galley jobs are completed and the appropriate report about the 'prepared' cabin' has been received from the other cabin crew members assigned in that galley who were checking the cabin part, the galley in-charge would inform the cabin crew in-charge that the galley is latched and secured and the cabin has been checked and found prepared. After the said reporting, the galley in-charge should occupy his/her seat and fasten the seat belt and the shoulder harness.

After receiving the aforementioned briefing from all the galley in-charges, the cabin crew in-charge would report to the commander of the flight that all the galleys are latched and secured and the cabin is prepared for take-off.

5.3.2 Announcement and Demonstration to be Performed by the Cabin Crew

After receiving the reporting about the 'arming' of the slides the commander would brief the cabin crew in-charge about the flight time and certain relevant details about the sector (from the departing airport to the arriving airport) to be flown.

The cabin crew in-charge in turn, would pass the said information to the pre-designated announcement in-charge.

On this briefing, the announcement in-charge would voice the airline's prescribed announcement over the PA system to welcome the passengers on board along with various specifics about the flight.

After completion of the welcome announcement, each cabin crew (except the cabin crew whose stations are behind the last row of passenger seats) are to take position at their respective stations to perform some mandatory safety demonstrations. These demonstrations reveal about the availability of certain facilities and explain the procedure of utilisation of those facilities in emergency condition. These briefings are unavoidably essential for the passengers as their (the passenger's) active participation becomes necessary in several emergency conditions.

The whole episode of the demonstrations appears as a mime act performed by the demonstrating cabin crew in synchronisation with the announcement made to explain each of their movements by the announcement in-charge.

Normally, this synchronised episode of announcement and demonstration covers topics like:

- ***Showing the locations of the emergency exits:*** *Passengers are required to locate the nearest emergency exit in case of an anticipated emergency evacuation.*

- ***Request to refer to the Safety Card:*** *Passengers should study the safety card thoroughly to get conversant with their duties in case of generation of some emergency condition.*
- ***Dropping of Oxygen Masks in case of a pressurisation failure:*** *Passengers should be conversant with the dropping of the masks and the procedure to use those in such situation.*
- ***Life Jacket drills (if necessary):*** *Demonstration regarding the use of life jackets becomes essential when the aircraft flies over the sea or the flight's take-off from the departing airport and/or the landing at the destination airport involve flying over the sea.*

Figure 5.3 Life Jacket Demonstration

EXAMPLE

For example, a flight from Kolkata to Mumbai does not involve any over the sea flying, but while landing at Mumbai the aircraft might have to do a circuit over the sea for a certain period. The life jacket demonstration for that specific period, for any eventuality, has to be done before take-off from Kolkata in anticipation.

The demonstrating cabin crew, through their body movements, which in turn synchronises with the announcement, simulate the incidents anticipated to happen during an 'emergency'. All this is done to comply with the safety regulation on a mandatory basis for the benefit of the passengers, so that they (the passengers) remain fully conversant with the drills regarding every emergency situation in which their (the passenger's) active participation might become essential.

The text of the announcement varies from one airline to another although the purpose and the utility remains the same.

5.4 Duties of Cabin Crew Before Landing

Please refer to 5.3.1A and 5.3.1B of this chapter. All that mentioned in these are to be complied with.

5.5 Duties of Cabin Crew After Landing

All cabin crew members should keep their safety straps (seat belt + shoulder harness) buckled while the aircraft is taxiing.

However, a lookout has to be initiated for locating any hat rack door that has opened due to the jerk of landing or any passenger who might have unclipped his/her seat belt and has got up to open the bin to get access to luggage etc. For the first case, the passenger nearest to the 'open door bin' is to be signalled to close the same and for the second the passenger who has got up-to sit down. When the headway speed has reduced considerably, if so necessary, the cabin crew should reach the place of occurrence, correct the disorder quickly and get back to remain present at his/her station.

Each cabin crew should remember that he/she had armed the chute after the door was closed (as mentioned in 5.3.1—"Duties of Cabin Crew after Closing of Aircraft Doors"). The arming was done as a precautionary drill in anticipation to counter an untoward situation in which passengers might be needed to be evacuated. Fortunately, now, when a proper landing has occurred and there exist no necessity of evacuation, the cabin crew are obviously required to 'disarm' the slides for 'normal opening' of the doors for disembarkation of the passengers. For this reason, when the aircraft comes to a halt-every cabin crew should essentially be at their individual station for disarming the slide.

5.5.1 Duties of Cabin Crew before Opening the Aircraft Doors

When the aircraft comes to a halt at the bay, with the command from the commander, every individual cabin crew should 'disarm' the slide of their respective door and report the same to the cabin crew in-charge. After receiving briefing (that the slide is disarmed) from all individual stations, the cabin crew in-charge would subsequently report to the commander that all the slides are disarmed.

5.6 Duties of Cabin Crew towards Passengers Falling Sick on Board

Any person may fall sick at any time and falling sick inside an aircraft is nothing uncommon or exceptional. For this purpose, every airline trains their cabin crew in first aid on a mandatory basis.

Sealed metal boxes (known as 'First Aid Kit') containing various medicines and equipment are available on board to be utilised by the cabin crew for rendering first aid. First aid kits are a part of the emergency equipment on board and are discussed in chapter seven (Emergency Equipment) of the book. Detailed discussion about its contents and their utilisations is done in chapter twelve (First Aid).

The ailment/disorder on board may range from a simple cut to a compound fracture to a heart attack of severe nature. The foremost duty of a cabin crew then is to attend to the passenger and to administer first aid immediately. Supporting the process, other cabin crew are required to assist the cabin crew administering the first aid by supplying first aid kit, oxygen cylinder and other such requisite items. If so necessary, they are also to make an announcement over the public address system invoking the help of any doctor or a trained nurse travelling on board.

As the situation demands, cabin crew thereafter remain duty bound to communicate the incidence and the episode taking place to the commander of the flight, either through the cabin crew in-charge or even directly, if so desired by the commander.

On most of the occasions, at least one doctor (if not several of them) would be available on board, who most willingly would like to attend the patient. If unfortunately no doctor or trained nurse were available, the cabin crew would have to act as per their judgment till the passenger recovers completely or is attended by a doctor after landing.

For administering first aid, the cabin crew are at a liberty to use the contents of the first aid kit, oxygen cylinders etc. as the need might demand, with the commander's knowledge and consent.

Substantiating the recommendation of the Directorate General of Civil Aviation (DGCA), every airline provides another sealed box containing various life saving medicines, injections and other advanced medical instruments on board on mandatory basis. This box is known as 'Physician's Kit' (refer to chapter twelve) and could *only* be utilised by qualified medical practitioners and trained nurses and remains out of bounds for others.

However, the commander must be kept informed through the cabin crew in-charge or even directly about the unabridged episode throughout, so that he/she might initiate requisition for

further medical reinforcement, ambulance etc. at the landing airport and/or might even divert the flight to some other airport, depending on the gravity of the situation as per his/her judgment.

It is necessary for the cabin crew to continue attending the sick person till he/she (the patient) has not fully recovered or is out of the aircraft. Cabin crew remains duty bound to provide assistance in every possible way to such passenger(s) even after his/her/their disembarkation, not only as per the airline's regulation, but also on individual's humanity factor either.

It is reiterated that the ailments might be of a wide range and the cabin crew are needed to tackle such sickness by using available medicines and/or equipment from the first aid kit.

Finally, in aforementioned situations, it is absolutely essential for the cabin crew to:

- ***Keep cool and calm***
- ***Express their eagerness to help***
- ***Show their sympathy and***
- ***Standby to extend extreme possible support to the best of their ability***

Under no circumstances should a feeling of even an infinitesimal negligence be warranted to be generated in the patient's mind.

Glossary

1. ***Announcement In-charge*** The cabin crew who is designated to make all in-flight announcements
2. ***Arming*** This is a process which attaches one end of the chute with the cabin floor.
3. ***Cabin Crew In-charge*** The cabin crew who by virtue of seniority and/or the earned designation through promotion is the senior amongst the cabin crew members of the flight.
4. ***Cabin Crew Team*** This is a set of cabin crew that operates a particular flight.
5. ***Chute/Slide*** Chute is a device which when inflated makes a sliding path from the aircraft door to the ground.
6. ***Disarming*** This is the reverse process of 'arming'.
7. ***Emergency Exit*** These are the exits through which the occupants of an aircraft could be evacuated.
8. ***First Aid Kit*** This is a sealed box containing items needed for rendering help to an ailing person.
9. ***Fixed Oxygen Masks*** These are the masks that drop down from the fixed oxygen cylinder(s) in case of pressurisation failure.
10. ***Galley In-charge*** The cabin crew who is senior amongst all in a particular galley.
11. ***Life Jacket*** This is an item that helps the wearer to float in water.
12. ***Physician Kit*** This sealed box contains advanced medical equipment and provisions- to be handled by a doctor and/or a trained nurse.
13. ***Safety Card*** This card reflects the procedures that the passengers are to comply with, in the event of an emergency.
14. ***Seat Belt*** This is a pair of belts that are attached at one end with the seat and the open ends could be joined together through a buckle to secure a person on the seat.

Questionnaire

1. What are the duties of the cabin crew in-charge?
(a) To look after the cockpit crew
(b) To look after the passengers
(c) To look after the catering personnel
(d) Both (a) and (b) are correct

2. What is a chute/slide?
(a) This creates a path from the aircraft door to the cockpit
(b) This can be armed or disarmed
(c) This, when inflated, makes a thoroughfare from the aircraft door to the ground
(d) Both (a) and (b) are correct

3. Who is the announcement in-charge?
(a) The person who makes all the announcements in an airport
(b) The person who is designated to be the in-charge of a galley
(c) The person who makes all the announcements in an aircraft
(d) The cabin crew in-charge who announces 'I am the senior'

4. What is "Arming"?
(a) Attaching the girt bar to the cabin floor
(b) Detaching the 'arming-disarming' safety pin
(c) Attaching the girt bar to the 'arming-disarming lever'
(d) Manually attaching the gust lock to the aircraft cabin floor

5. Who is the galley in-charge?
(a) The person designated by the commander to remain senior in the galley
(b) The person who allocates the galley
(c) The person who is the senior amongst the allocated cabin crew of the galley
(d) Both (b) and (c) are correct

6. What is a safety card?
(a) A card that reflects the seat number of a passenger
(b) A card that shows the crew lists and their designations
(c) A card that reflects the passenger's doings in emergency situations
(d) Both (a) and (c) are correct

7. Which are the emergency exits?
(a) All the exits of the aircraft
(b) All the exits of the aircraft cabin
(c) All the exits of embarkation and disembarkation
(d) All the doors of the aircraft cabin

8. What is a physician's kit?
(a) A sealed box that could be used by crew members for passenger treatment
(b) A sealed box that could only be used by a doctor and/or a trained nurse
(c) A sealed box that could only be used by the cabin crew in-charge
(d) As in (c), but with the consent of the commander

9. What is the use of a life jacket?
(a) It is used in case a passenger is feeling extreme cold
(b) It is used in case of a ditching
(c) It is used in case a passenger has a heart attack
(d) As in (b) and/or is used to make a person float

6

Understanding the Psychology and Expectations of the Passengers and the Expected Behaviour of Cabin Crew

6.1 Service of Cabin Crew to Satisfy Passengers

All the airlines in the world at this juncture of high competition, need the choicest people to represent their airline in the field of public relation. These personnel are required to win the heart of the travelling guests through their behaviour and working ability and attract them (the guests) towards their airline.

Those who travel by air, could understandably be distinguished as educated, sophisticated and the cream of society. It is necessary to treat them with utmost professionalism, and that makes the task of the aforementioned employees fairly challenging.

To meet this criterion, the airlines bestow the best quality training to these employees. However, the implementation of such teachings/training remain dependent on/proportionate to the individual professional attitude of every single employee, and that in turn, comprises his/her eagerness to win the situation and its materialisation. Cabin crew members come under this category of employees, executing public relation oriented duties.

To provide good service and public relation, a person has to affect the following:

- smile
- establish eye contact with the customers/passengers
- use customer's/passenger's correct name

- demonstrate respect towards the customers/passengers
- provide undivided attention to him/her
- understand the person's body language
- show respect towards colleagues and the organisation
- remain calm and quiet and be well-groomed

The reader possibly has begun thinking that if it is only this much that is required to satisfy the passengers, look after the well-being of the airline and more-so-ever when it is so simple, what could be the hitch that could prevent him/her from becoming a cabin crew? In that case, he/she would find it most puzzling to perceive that although the first two parts of his/her understanding seem to be correct, but the achievement of these features in practice does not always happen that way and besides that, it is certainly not easily accessible as he/she might be imagining.

For complying with the previously mentioned activities, a person should not only possess the aspiration to provide exceptional service, but would also need the required motivation and hard work to put the said desire into practice. Both these, the increased desire and the motivation, are generated from an understanding about the close links between better service and confidence in oneself. One might achieve these by:

- Practicing to remove some, if not all, of the causes/effects of negative stress and fatigue
- Improving one's communication skill and work power
- Knowing one's strengths and drawbacks honestly and trying to be a winner and not a loser, through his/her urge and tenacity
- Thinking only positively, and not negatively

Realise that: **The service is the feeling (good or bad) that a customer/passenger receives from a service provider/cabin crew'**.

Satisfying the passengers is actually about meeting their needs. As a cabin crew, one therefore faces the challenge of matching their (passenger's) demands. It *might not* always be possible to satisfy all their desires and on occasions, cabin crew members might indeed have to stretch to meet certain specific needs of the passengers. In order to provide good service, it is important for a cabin crew to be confident of his/her own self and depend on his/her job knowledge as well. In that way only, he/she could actually decide about the kind of relationship he/she would like to have with the passengers and how important they are to him/her.

6.2 Eagerness to Win the Situation

For this, one should have qualities like—

- understanding the situation
- quick thinking, and
- putting through effective and alternative solutions or suggestions if the entire and/or the maximum part of the person's demand remains beyond one's reach.

6.2.1 Understanding the Situation

A patient hearing to realise the passenger's needs without interruption is most essential to understand the demand and his/her temperament. Only when the customer has finished his/her representation(s), certain specific questions might be asked to satisfy one's own queries (if develop at all) to pinpoint his/her specific desire(s). In such cases, maintaining a cool and calm expression would be of extreme importance.

6.2.2 Quick Thinking

If the aforementioned demand(s) of the passenger could possibly be fulfilled totally, it is well and good and the cabin crew, in that case, takes action to comply with his/her demand(s) without delay, because any further discussion becomes unnecessary. If that does not effect, a mental note starting from the best option the cabin crew can offer in lieu of the passenger's demand in a gradual downwards sequence (from the best to the last) has to be prepared and offered.

6.2.3 Putting Through Effective Solutions

After explaining the cause of the cabin crew's inability to meet the specific demand(s) of the passenger, those aforementioned mentally prepared alternatives should be presented in lieu of his/her demand, in an identical sequence.

For example, a passenger is asking for a non-vegetarian meal, when those are all over. The choices on offer could be presented as:
Cabin crew: I am sorry sir, as I am unable to serve you non-vegetarian casserole today since all those have already been served, can I serve a vegetarian casserole? I am sure you will like it.
Passenger: I will not like it, as I cannot have a meal without a non-vegetarian dish.
Cabin crew: In that case sir, can we arrange it at the airport? After landing, you can have your meal at the airport restaurant.
Passenger: Who would like to wait at the airport after landing? I would much prefer to go home and have my meal.
Cabin crew: It is very unfortunate that we could not serve your chosen meal. However, I would certainly like you to have some bread rolls, butter, biscuits and fruits along with tea/coffee please.

Cabin crew members should find a basis for encouraging the passengers to grasp and accept their offering(s) and derive more enjoyment, pleasure and satisfaction from their (passenger's) satisfaction and for staying in their company. The success would certainly provide him/her pure job satisfaction.

Please perceive that – *a passenger is very much justified in evaluating service on his/her own personal terms and conditions and cabin crew members are committed to satisfy them.*

Based on the aforementioned statement, cabin crew members should search their souls to find out if they can honestly match and comply with the said requirement because their much needed '***job satisfaction'*** converges here. If their inner soul responds affirmatively, they could start believing that they possess the material to make a commendable cabin crew.

6.3 Cabin Crew's Actions

Too often, we feel that *it is just luck that brings success our way.* This is **not** correct. Actually, we all have our chances—some people seem to be able to utilise and avail the opportunities offered by these chances and others let them slip away. We can be our own enemies and put obstacles in the path of our success and progress by adopting the latter approach.

When a cabin crew finds a passenger in a complaining mood and/or his/her body language displays such, the cabin crew has two alternatives to act upon the situation. He/she could

either aggravate it or avert it depending on his/her intention and inclination of tackling the situation.

It is essential that the cabin crew should necessarily get a command over the situation through his/her following qualities:

- Calm and cool behaviour
- Selection of vocabulary
- Gestures
- Control over the pitch of voice

These desired actions are elaborated individually hereunder.

6.3.1 Calmness of Cabin Crew Members

As a public relations person, cabin crew members are required to assume calm composure and acquire the grit to maintain it; come what may in the form of vocabulary from the passengers/ customers or through their body language. As far as the complaint/vocabulary is concerned, cabin crew members should realise that the passenger is possibly uttering all that because their organisation viz. the Airline could not match his/her demands/expectations. The passenger is delivering the shortcomings to them, as they are the available representative of the airline at the scene. The passenger is not intending to express anything against them as individual human beings.

In such cases, the cabin crew members should try to:

- Discern the problem as theirs
- They should assume and accept that although they might or might not be the ones who have created the problem earlier, but now they are the ones, who own it
- They should become determined to solve it
- They should not feel afraid or shy of bearing the responsibility for possible mistake(s) and shortcoming(s) on the part of others in the organisation

They would evidence that the passengers are recognising their deeds and sympathising with them by realising that although it is not their error, but still they are doing all they can to put it right. The passengers will understand and accept that the fault developed is only due to some human error. On top of this, it would be commendable if the cabin crew members could keep the passengers informed, about the periodical developments and the 'progressing betterment'. This should not be impossible when the cabin crew members are trying their best to rectify the error effectively. The passengers would not only be tolerant of the cabin crew members, but would also commend and appreciate their help as would their colleagues and superiors.

6.3.2 Selection of Vocabulary

It is imperative that the cabin crew members choose their words very carefully, which should reflect that they are sympathetic and regretful for all that might have generated the passenger's displeasure and also for being unable to adequately comply with the passenger's demand for its immediate solution. Their answer should neither be tricky to hint that they are trying to prove themselve over-smart, nor humorous, nor hedging the topic.

6.3.3 Gestures

For manifesting their feelings, it is necessary that the cabin crew members should reinforce their speech with certain carefully selected body movements. Gestures, reflecting helplessness or rendering assurance could be coordinated with their vocabulary to acquire better result. On the other hand, cabin crew members must refrain from affecting body movements like shrugging or

pointing finger towards the passengers that might be perceived as indicative of being ignored and/or threatened. These performances would act as evidence against the cabin crew members' calm and cool composure, which they are trying to wear. (Refer to Chapter Eight—"Body Language of Cabin Crew").

6.3.4 Pitch of Voice

If cabin crew members raise their voice, the passenger would justifiably be annoyed apprehending that they are rude, aggressive and trying to dictate their terms on them (the passengers). On the contrary, if they speak too softly, the passenger might not understand their points and watching their body movements, might conclude that they are doing a mime act, trying to humiliate him/her and would again be irritated.

As such, the cabin crew members should maintain a pitch of voice such that they could be heard distinctly ('loud and clear' in aviation terminology) while simultaneously maintaining a pleasing tone.

6.4 How to Improve Dealings with Aggressive People

When the sun is shining work progresses smoothly. However, it is interesting to anticipate how the cabin crew members react and behave when someone criticises them, shouts at them, blames them for something they possibly have done or even not done (mistakenly or justifiably), interrupt them, keep them waiting or exploit them. Then, they become aggressive and/or enraged.

Normally, in the abovementioned conditions people react in two general ways.

- Either they go defensive becoming 'submissive'. In which case, they do not rise to the occasion to represent their justified views and points, buckle under pressure and accede to the passenger's version.
- Or, they become 'aggressive'. In that case, they attack back, putting forward their points sobly, even by stepping on and overpowering others rights in a crude fashion. At that time, they strongly and honestly believe that only their points are correct and justified.

However, instead of persons acting in any of the previously mentioned manner, viz. inferior (submissive) or superior (aggressive), a third, and much acceptable and appreciable alternative 'Assertive' is accessible. With this attitude, a person stands up for his/her own right in a way that does not contradict another's right. It predicates an honest, open and direct representation of his/her point of view, which at the same time, registers that the other person's views and justifications are comprehended, considered and not totally ignored. In these cases, the views of the other person are not fully ignored, but are simply eluded with tact because the version of the other person requires due alteration for achieving a better and desirable outcome/solution.

The Advantages of Being Assertive

- **Achieving close working relationship:** This characteristic enables people to work pleasantly and happily ***with*** another—rather than ***against*** another.
- **Achieving greater confidence in oneself:** This trait develops a strong feeling of respect and self-confidence that in turn psychologically diminishes both, the nature of one's boastfulness (aggressiveness) and hopelessness (submissiveness).

- **Finding greater confidence in others:** With this ethos, one recognises the capabilities and limitations of others, can comply by acceding to other person's potential and can depend on his/her judgments.
- **Achieving self-control:** With this quality, one can channel his/her thoughts and feelings and thereby recognise and respect the behaviour he/she honestly expects from others.
- **Saving time and energy:** With this calibre, one achieves an advantageous position because he/she can take decisions more smoothly and swiftly, based on their individual merits and save the 'dispute period'.


6.5 Positive Thinking

This quality facilitates one at all times, whether it is his/her working place or personal life.

One set of people possesses ambition, to fulfill which he/she exerts mental and physical efforts presently, distinctly realising that the corresponding result will not show up instantly and will be determined later. That means, this set of people put their endeavour now in anticipation of its result afterwards.

Another set of people also have ambition, but do not care to adopt the essential means for fulfilling their ambition, in order to currently enjoy the accessible goodies of life. That means, this set of people chooses to enjoy the available cream and neglect the required effort at present against fulfillment of his/her ambition.

There is a wide gap in between the thoughts of these two sets of people. In practice, these two factors/thoughts remains embedded in every ones mind and continuously struggle to suppress each other.

The posotive thinking would rationalize and would naturally select the first alternative adopted by the first set of people. On given a change, the negative thinking undoubtedly would prefer the second one chosen by the second category of persons.

The directive of the positive thinking that appears to be strenuous would result in a joyful aftereffect. On the other hand, the negative thinking undoubtedly would provide a scanty quantum of amusement spontaneously, but that might even end, before one begins to get amused and left engulfed by much greater degree of imbroglio.

A typical example of the said statement is mentioned at the later stage of this chapter.

Ways/Modus Operandi of Positive Thinking

- **No gain in negative thinking:** It should be realised that there is no gain in thinking negatively and/or brooding unnecessarily and/or bothering other people for it.
- **Considering the appreciable part:** It is always better to contemplate the good side of a topic than be discouraged by its darker side. One could benefit much more if he/she concentrates on the flavour and colour of a rose (the excellence of the object) than considering and paying heed to the insects in it (the inferior part it possesses).

- **Trying not to anticipate a specific result helps:** Problems should be approached with a cool mind to solve them, without considering a possible discouraging result that may or may not be their actual outcome. Brooding and worrying over a predicament is not practical.
- **Dividing specific problems into two parts:** Any problem could be divided into two parts viz.
  (a) those, for which some thing can be done (solvable by effort), &
  (b) those, for which nothing can be done (out of bounds to be solved).
  Thereafter, if the problem appears to be solvable (as in the first case abovementioned), whatever could be done has to be affected to solve it.
  However, if the problem is ineffectual and beyond redressal (as in the aforementioned second case), worrying unnecessarily about it would never fetch any dividend and might envelop a person with a feeling of impotence and incapability. In such cases, the matter is to be disregarded totally.
- **Calling upon will power:** One should mentally determine that, "this problem does not have such a level/gravity that it can be termed 'unsolvable'. I can solve it and I will do it".

All these above points could be briefly summarised as: do not think sceptically, and look at the brighter/sunny side of the problem, applying your 'positive thinking power'.

In one's job as a cabin crew, it is of utmost importance that a person thinks positively, rationally and constructively, affects a determined approach and the essentially needed effort towards any or all jobs assigned to him/her, however difficult that might be.

Even some chronic negative thinking persons have to agree that one achieves more from life when the person thinks positively. Even then, they continue along with their own mode of thinking because:

- They do not feel like initiating and/or indulging in any conscious and earnest attempt to give it a try as they strongly believe that success would never be met with, whatever the quantum of their efforts might be (the attitude then becomes ' why to try at all'), and/or
- They are reluctant to initiate their endeavour, feeling shy even before begining to give it a try, by considering and visualising about the shame they would be subjected to; from the resultant outcome if they fail; and they remain sure that failing is inevitable.


Here are some versions of negative thinking and positive thinking from people, over the homogenous subjects, to make the reader distinctly understand and distinguish the two types. The reader may note that the first category emphasises 'but', whereas the second articulates 'and'.

EXAMPLE

Examples

(i) ***Cabin crew to a passenger - who had asked for a cup of coffee***

(a) I could have served you a cup of coffee, ***but*** *you see the water boiler has broken down.*

(b) So what if the water boiler has broken down, I can still get hot water from another galley or can boil water in the hot cup ***and*** *give you a cup of coffee.*

(ii) ***Cabin crew to a passenger who has asked him/her to deliver a message to the commander requesting a favour:***

(a) I can try to reach your message to the commander if you insist, ***but*** *I am certain he would refuse to comply with your request.*

(b) I will reach your message to the commander ***and*** *request him on your behalf to kindly comply with your request,* ***and*** *I am quite hopeful that he will try to uphold it.*

(iii) ***Two airline board members in a meeting:***

(a) The negative thinking board member: A better quality of food could probably be served on our flights ***but*** *our passengers might not appreciate the added expenditure and they are quite likely to be displeased.*

(b) The Positive Thinking Board Member: A better quality of food should be introduced and served on our flights ***and*** *our cabin crew are certainly competent enough to avert the 'passenger displeasure' part likely to arise from the extra expenditure incurred on the passengers through their superb public communication skills. We should consider providing them some extra benefits* ***and*** *receive their heartfelt cooperation in reciprocation, in this regard.*

It is very normal to be discontented over things about which one can do nothing. Putting thoughts, efforts and time on such unsolvable matters and failing ultimately, would enlarge the quantum of the same if not the negative thinking in your body, soul and mind. 'Negative thinking' is like a parasite, which, if not discouraged from growing and not countered with appropriate steps for rectification or destruction, could sneak, squirm, and forcefully occupy every part of one's thoughts, whether job-oriented or personal.

EXAMPLE

For example: On a flight, a passenger asks for a blanket, all of which have already been taken by other passengers. It would be quite common for a cabin crew to breed and nurture a complaint in his/her mind about the 'useless airline' (mind that it is his/her airline) which has not supplied adequate number of blankets. In addition to this, the person would have to think about finding out a mode of evading or avoiding the request, keeping in mind at the same time how to prevent the passenger from getting dissatisfied. All these uncalled for brainwork is evoked because of and as the result of his/her negative thinking.

Instead, a 'positive thought' would have advised the person to give a try to fetch a blanket from another galley(s). If none were available still, the same positive thinking attitude would have advised him/her to inform the passenger about this non-availability of the item and conveying simultaneously that he/she is requesting the cockpit crew to increase the cabin temperature to abolish the need of the blanket. The problem would not only have been solved effectively but would also have earned the cabin crew an appreciation for his/her efforts from the passenger.

As in the first instance, the petty self-worries which could easily have been averted (as described through the second case), have now accumulated and acquired a greater dimension. This might subsequently blow up to transforming to a matter which would be out of all proportion to their relevance or importance and its aftereffect could possibly continue to linger for a considerable period.

With the aforesaid example the reader could now visualise that it would have been much better if a positive decision would have been taken by the cabin crew at the beginning itself, which would have avoided the further inflated complications at a later stage.

Try to remember that the '*positive thinking and acting*' alternative is a unique tool of assistance and an asset for a Cabin Crew, especially while dealing with complaints of dissatisfied and angry passengers.

6.6 Basic Mental Attitude

Experiences are repeated in one's life and so are one's reactions to them. It is desirable to learn and affect the creditworthy deeds and to discard the unfavorable ones, until a person builds up a set of near-perfect habits. The practice indeed helps one in the long run.

These habits/attitudes are concerned with one's own image and with one's views about himself/herself, in comparison to those of others.

Normally, as a result of this, those who encourage negative attitudes in themselves, are likely to gather negative experiences while people who hold a positive attitude about themselves would collect positive experiences.

For this reason, if one expects others to be irreproachable with him/her and he/she is a positive thinking person, he/she would most likely find them that way.

The basic psychological attitudes amongst people can be listed under four headings as cited hereunder.

Basic Psychological Attitudes

(i) **'I am alright-you are alright'**: These people work constructively on their own and also with others. They are natural pre-dominators and always the winners.

(ii) **'I am alright-you are not alright':** These people have a tendency to blame others to show them down or try to insult or humiliate others by teasing them. They develop such strong impulse and turn so desperate to subvert or defame others that they even go to the extent of providing extremely paltry service on behalf of those other people.

(iii) **'I am not alright-you are alright':** This tendency often exists in people who feel insecure, incompetent and insignificant in comparison to others. They try to either avoid people or cling like parasite to strong and/or influential people for all the assistance and favour they can extract from them to maintain their existence.

(iv) **'I am not alright-you are not alright':** This basic attitude can cause people to be confused, deeply depressed and totally unpredictable. They tend to go around in circles like a dog chasing its own tail –reaching no where, arriving at no conclusion and deriving no solution. They stubbornly cling to their own conjecture and strongly believe that the problems are meant to remain problems and can never be solved either by them or by anyone else.

From the aforesaid discussions and examples, it can be derived that:

- It is an obvious advantage to possess the 'alright' feeling about oneself and others.
- It is important to work objectively with strong determination to build up and nurture those 'alright' feelings.
- It is better to work actively to help and encourage those, of whom one thinks of possessing 'not alright' feeling by conveying appreciation and conversing to generate and subsequently develop the person's enthusiasm.
- One has to make utterly sure that he/she on no account or through none of his/her actions, would allow those of whom one possesses the 'not alright' feeling, to feel that he/she thinks that they are being troublesome and/or difficult while dealing with them or with their complaints.

It is certain that acting in accordance with these guidelines, one shall not only be successful in his/her life in general and in his/her work field in particular but would also certainly be appreciated and admired by all.

6.7 Psychology and Expectations of Passengers

Psychology and expectations of all passengers are not the same and hence not equitable. However, fortunately, some of the basic and common attitudes of air travelers, originating especially from the society they belong to, are more or less similar. For example, they wish to be recognised by everyone they come across and desire that utmost attention and importance be showered on them by all. If the cabin crew could gratify these expectations of theirs, a major step towards their goal viz. commendable passenger relations would be considered to have already been taken.

6.7.1 Addressing the Passengers by their Name

When a passenger is addressed by his/her name, the person normally accepts it as proof that the cabin crew/service provider recognises him/her and becomes immensely pleased with the self-derived thought of being acknowledged as a great and important personality comparable to celebrities.

It is nothing, but simple human psychology. One is required to capitalise on the advantage of this human article of faith.

However, while doing so, utmost precaution needs to be exerted to use the correct name of the person. In case of presence of the slightest doubt about the correctness of the name, it would be much better to use the conventional sir/madam. Everyone would justifiably find it offensive to be addressed by an incorrect name. In that case, the mentioned advantage would just turn completely contrary (would boomerang) because of one's carelessness and faulty approach.

6.7.2 Addition of Pleasantries

One should preferably add a few pleasantries along with his/her normal conversation to upgrade the passenger from 'A passenger' to 'The passenger' to brim up his/her advantage and watch how it works wonders. Addition of some pleasantries glosses over the harshness of professionalism.

It is strongly recommended to get accustomed with these and utilise them, in practice. The frequency of such pleasantries depends on factors like:

- Available time period
- One's own workload
- Consideration about the resultant inconvenience to others.

Few examples of such pleasantries are as follows:

- ***'How are you':*** *A cabin crew's wishing a passenger can be followed by these words and subsequently be added with his/her name or sir/madam. He/she should try to project an impression that he/she is concerned indeed to know the answer and not asking the same just as a superficial display in the form of a routine.*
- ***'What can I do for you':*** *This is perhaps the most commonly used term amongst the public relations persons. When a cabin crew asks this question, he/she should make sure that it carries at least a modicum of feeling/concern through his/her expression and tone. It should not seem dry or appear to be 'just say it for saying' statement. They should submit their endeavour and actions diligently in order to truly convey the meaning of their words literally.*

  Whenever a cabin crew pronounces these words, he/she should try to offer a little more than the minimum required effort if possible, but never a trifle less.
- ***'Haven't seen you for long':*** *Before one utters these words, he/she should make sure that he/she has not indeed seen the person for at least a reasonable period and primarily and most importantly has met the person earlier. Otherwise, the whole episode would turn sour and appear absurd.*
- ***'You are looking tired today - must be the hard work':*** *Before saying it spare a glance at least, if not a full and proper observation of the passenger and confirm that he/she is at least looking a bit weary and not brimming with energy and appearing fresh as a daisy.*

One should use his/her natural talent, confidence, job knowledge and wit suitably and befittingly to handle each individual situation and should not resort to repeating the words taught in training school like a parrot.

Glossary

1. ***A Service*** A service is the feeling (good or bad) that a customer/passenger receives from a service provider/cabin crew.
2. ***Aggressive condition*** When a person puts forward his/her views while suppressing others' views in a crude fashion.
3. ***Assertive condition*** When a person expresses his/her justified views while keeping in consideration the views of others.
4. ***Doings for good service and effective public relations*** Smile, establish eye contact with the passenger/customer, use his/her correct name, express respect towards the customer/passenger, provide undivided attention to him/her, understand the person's body language, express respect for colleagues and the organisation, remain calm and quiet and be well groomed.
5. ***Eagerness to win the situation*** Understanding the situation, quick thinking and putting across effective and alternate solutions or suggestions if the exact and/or total demand of the person remains beyond reach.
6. ***Effective solutions*** These are the solutions provided as alternative suggestions.
7. ***Gestures*** These are some carefully selected body movements coordinated along with one's vocabulary for manifestation of one's feelings.

8. ***Job satisfaction*** The mental enjoyment felt by any person while doing or after finishing his/her work. It develops from your liking the job/profession you are in.
9. ***Positive thinking*** Those rational thoughts that encourage one to work hard in the present, which might appear strenuous but will have joyful consequences and help fulfill his/her ambition.
10. ***Quick thinking*** When any demand of a passenger can not be fulfilled totally, quick thinking is essential to provide alternative suggestions.
11. ***Submissive condition*** When a person becomes defensive and does not express justified views.
12. ***Understanding a situation*** Cabin crew should provide a patient hearing, judge the person's temperament, ask a few questions for his/her own clarification (if any required) and maintain a calm and cool expression.

Questionnaire

1. How should an aspiring cabin crew rate a passenger?
(a) They are intelligent, educated and the cream of the society
(b) They must be handled with utmost professionalism
(c) They are always right as per the Airline's judgment
(d) All above are correct

2. If there happens to be a wrong deed by others in the airline, should the cabin crew–
(a) Perceive the problem as theirs
(b) They should be afraid of accepting the responsibility
(c) They should try wholeheartedly to solve the problem
(d) Both (a) and (c) are correct

3. How could cabin crew satisfy passengers and till what limit?
(a) Meeting their needs
(b) Matching their demands quickly
(c) As in (a) and (b), and is always possible if cabin crew works hard
(d) As in (a) and (b), but it is not always possible

4. Passenger service by a cabin crew is:
(a) It is a feeling that a passenger receives from the cabin crew
(b) As in (a) and has to be exceptional
(c) As in (a) and need not necessarily be exceptional
(d) Both (a) and (b) are correct

5. Quick thinking is:
(a) Thinking about how to evade a passenger fast
(b) Always a positive thinking
(c) Providing alternative suggestions quickly in certain specific cases
(d) All above are right

6. **Effective solutions are:**
   (a) Solutions that are effective to meet the expectations of passengers
   (b) Solutions that are provided as possible alternative suggestions
   (c) Solutions that are taught by the airline in the form of training
   (d) Solutions that are derived by the cabin crew in-charge

7. **What is job satisfaction?**
   (a) The satisfaction a cabin crew provides to passengers
   (b) The satisfaction the airline realizes while rewarding cabin crew
   (c) The satisfaction felt by cabin crew who loves his/her work from the heart
   (d) The satisfaction felt by cabin crew by skipping a part of his/her job

8. **What are the qualities that should be reflected by the behaviour of a cabin crew while dealing with the Passengers?**
   (a) All the following are correct
   (b) Calm and cool behaviour
   (c) Gesture and selection of vocabulary
   (d) Control over the pitch of voice

7

Emergency Equipment

EMERGENCY EQUIPMENT: AN INTRODUCTION

In spite of every possible precaution being taken regarding safety, it is not inconceivable to have emergency situations on board an aircraft. These situations are quite wide ranging in variety and each quite expectedly and essentially has individual actions for its restriction.

To counteract every emergency situation, each aircraft is provided with appropriate emergency equipment. The variety of emergency equipment justifiably varies with different types of aircraft and their sophistication depends on the technological advancement of the aircraft. The number of such equipment is directly proportional to the size of the aircraft or in other words, depends on the number of passengers it carries. That means, more the number of passengers, bigger the aircraft and more the number of emergency equipment. The same phenomenon holds good for emergency exits also.

7.1 Fire and Fire Fighting Equipment

Initiation of fire on board perhaps might be the worst possible emergency situation that could occur in a flying aircraft. To counter any fire hazard, various equipment like fire extinguishers, fire axe, asbestos gloves and smoke goggles etc. are supplied on board. These equipment are collectively known as fire fighting equipment.

7.1.1 Fire Extinguishers

There are various types of fire in the field of aviation. In earlier days, the aircraft featured various types of fire extinguishers to fight different types of fire (Refer to 9.14.1–"Types of Fire"). In those cases, the appropriate/suitable type of fire extinguisher for a particular type of fire would have to be fetched from the location where the manufacturer would have positioned the same. Say, there happens to be an electrical fire near the cockpit of the aircraft and the type of the fire extinguisher required to counteract the type of fire, viz. Carbon dioxide type, is positioned in the aft part of the cabin. The crew members were required to fetch the fire extinguisher from that location. This process is quite time consuming and thus undesired even though the distance to be covered in smaller aircraft is quite short. The procedure is rather ineffective for adoption in large modern

aircraft of these days. The predicaments generated from such practice has been affected with some positive thinking and resultant to which modern aircraft are fitted with such type(s) of fire extinguishers, which could be used on all types of fire.

One popular brand amongst such extinguishers is Halon 1211. This is a chemical product, and when sprayed on the fire comes out in the form of foam/vapour, envelops the origin of the fire-cutting its oxygen supply in the process-to extinguish it. At the same time, the sprayed chemical reduces the temperature and produces a reinforced and obviously a better effect.

Each fire extinguisher cylinder normally has one handle, two levers, one quantity gauge with an indicator and a spraying nozzle.

(i) ***The Carrying Handle:*** This handle is made of a non-conducting material and meant for carrying the cylinder from its stowing location to the location of the fire. While using the cylinder for fire fighting, this handle has essentially to be gripped because the cylinder then attains such low temperature that it becomes unsuitable to be touched with bare hand.

Fig. 7.1 *Halon 1211*

Fig. 7.2 *Fire extinguisher in its rig*

Table 7.1 Specifications of Halon 1211 Cylinders

Model Number	*A344T*	**C352TS*	**C354TS*	*B355T*
Size & Capacity	1.25 lbs	2.5 lbs	3 lbs	5 lbs
Shipping wt.	2.75 lbs	5.5 lbs	6 lbs	9.75 lbs
Extinguisher height	10 in	14.375 in	14.375 in	15.25 in
Width	3.625 in	4.5 in	6 in	5.75 in
Depth (Diam. in.)	2.625 in	3 in	3 in	4.25 in
Range	9-12 ft	9-15 ft	9-15 ft	9-15 ft
Discharge time	10 sec	10 sec	12 sec	10 sec
Minimum space requirements (cu. ft.)	156	312	375	624

EXAMPLE

Once, a renowned mountaineer, on top of a peak, tried to photograph the other surrounding peaks. He found it quite inconvenient with his gloved hands. He took off the gloves, photographed as desired, but to his surprise was unable to detach his finger from the shutter of his camera. However, his endeavour to disconnect his finger from the shutter was successful at last but a lump of flesh remained attached to the shutter.

The same experience given in the above example could occur if the fire extinguisher is touched with bare hand during or after its use.

(ii) ***The Levers:*** Amongst the two levers—

(a) the first lever is to break a seal that prevents the accidental and/or unwanted discharge of the extinguisher's content. As long as this lever is not operated, the second lever is useless. In certain cases, 'pullout tabs' are also provided in lieu of this lever to affect the same.

(b) the second lever is for discharging the content of the fire extinguisher through the discharge nozzle.

(ii) ***The Quantity Gauge:*** This gauge on the top part of the fire extinguisher cylinder, in a way, reveals the quantity of extinguishing chemical viz. Halon 1211 it is containing. This cylindrical gauge has a 'part green-part red' band on its periphery. A 'quantity-revealing' pointer moves over it in an arc, similar to an arm of a clock showing the markings on its dial. The cylinder is acceptable if the pointer remains within the green zone,—ensuring that sufficient quantity of content is present inside the cylinder.

Each cylinder lasts for six to eight seconds only upon *continuous* use.

After the occurrence of one fire hazard, it can never be foreboaded that another such hazard would not crop up during the remaining part of the flight as one had already occurred, and the extinguisher would not be needed for use again for the freshly developed occurrence.

An unlimited supply of extinguishers could neither be expected nor be provided on board. Extreme care must be exerted to ensure that the content is not wasted and at the same time, the fire is extinguished *totally*.

For this, while working the extinguisher, the discharge lever should be *flicked repeatedly* instead of *keeping it pressed continuously*, so that its content is discharged in small bursts and not squandered. However, the imperative criterion and motivation of the unitary operation is to achieve the confirmation about the *total* extinction of the fire.

In order to save the content of the fire extinguisher, one should never ignore nor compromise with extinguishing the fire till the last.

The expiry date of the cylinder is stenciled on its body. On or before the lapse of this expiry date, the engineering personnel, weigh the cylinder and subtracting the weight of the empty cylinder, determine the weight of (and hence the quantity of) the chemical present inside the cylinder. If the quantity of the chemical is detected to be inadequate, the chemical is replenished and the extended expiry date is stenciled freshly and if the quantity is observed to be appropriate, simply the extended expiry date is stenciled freshly, deleting the current one.

During the pre-flight check, the three following items should be confirmed for accepting the extinguisher:

- ***The seal of the cylinder is intact.***
- ***The gauge pointer is within the green band.***
- ***The expiry date of the extinguisher is valid.***

7.1.2 Fire Axe/Crash Axe

This equipment is required and provided on board

- to cut open the panels inside the aircraft cabin that are obstructing to locate the exact location of the origination of the fire (the base of the fire).
- to cut certain electrical lines, which are affected by the fire or might be responsible to spread the fire further.
- to cut open any path, for evacuation.

Fire/Crash axe has a pointed projection on one side of its handle and a sharp edge structure for cutting, on the other side (Figures 7.3 and 7.4).

Fig. 7.3 *Fire Axe/Crash Axe*

Fig. 7.4 *Fire Axe/Crash Axe*

The handle of the axe is made out of a non-conductor material and can withstand a high degree of temperature. It is also insulated to electricity and can sustain a hefty voltage of electric current. In practice, the axe is suitable enough to cut a high-tension cable carrying 24,000 volts of electricity.

To use the axe, holes are to be punched at regular interval to sketch a boundary of the portion to be cut off with the pointed side of the axe and then those holes are to be joined as per sequence, by cutting the sheet with the cutting edge of the axe. The holes are made to make the cutting process easier.

7.1.3 Asbestos Gloves

These are provided to safeguard the user's hands from the fire and enable him/her to negotiate with the high temperature emitted by very hot metal parts, which the user might have to touch during the fire fighting activity. For example, if the said metal sheet, after having been cut by the axe is to be removed or bent for locating the base of the fire, the job could easily be done with the help of the asbestos gloves (Figure 7.5).

Fig. 7.5 *Asbestos Gloves*

7.1.4 Smoke Goggles

It is essential that the crew members should remain safe to be in a position to help the passengers in any emergency. In case of fire, emitting smoke or toxic fumes, it becomes imperative for the cabin crew to safeguard their eyes, to acquire a clear view of the fire and the surroundings. To fulfill these criteria, the smoke goggles are provided aboard. These resemble the motoring goggles of olden days. A rubber strap holds these on the eyes of the user (Figure 7.6).

Fig. 7.6 *Smoke Goggles*

7.1.5 Portable Oxygen Cylinder with Full Face Mask

It may appear quite surprising that portable oxygen cylinders could be regarded as a part of fire fighting equipment although oxygen encourages the fire to propagate.

Portable oxygen cylinders with full-face mask are utilised to safeguard the cabin crew from smoke and/or toxic fumes, emitted from the fire. The full-face mask, which is connected with the 'demand regulator outlet' of the oxygen cylinder, covers the entire face of the fire fighter. This regulator ensures that oxygen is only supplied to the mask; when demanded (meaning when inhalation is done), in order to prevent any unwanted sneaking out of oxygen, which might in turn encourage the fire to grow (Refer to 7.2-(ii)–"Demand Regulator Outlet"). Breathing is then affected from a portable oxygen cylinder slung over the back of the user. Slinging of the cylinder, allows both hands of the fire fighters to remain free.

7.2 Portable Oxygen Cylinders

Each portable oxygen cylinder has

- Four outlets
- One 'on-off' valve, and
- One quantity gauge.

Three different types of masks could be fitted with these four outlets. However, only one specific type of mask could be assembled to a specific type of outlet, as elaborated below.

Fig. 7.7 *Oxygen Cylinder*

Fig. 7.8 *Oro-Nasal Mask*

(1) The Outlets Each cylinder has four outlets of three categories, which are:

(i) First Aid outlets There are two such outlets. As the name suggests, these are utilised for persons needing oxygen in the form of first aid.

From these outlets, a steady and continuous supply of oxygen flows out. The rate of flow from one of these outlets is two litres per minute and from the other is four litres per minute.

First aid type oxygen masks could only be fitted to these two outlets.

Oxygen is normally administered to a sick person from the four litres per minute outlet. Another first aid mask could be fitted to the two litres per minute outlet and could be used by a cabin crew, if necessity demands.

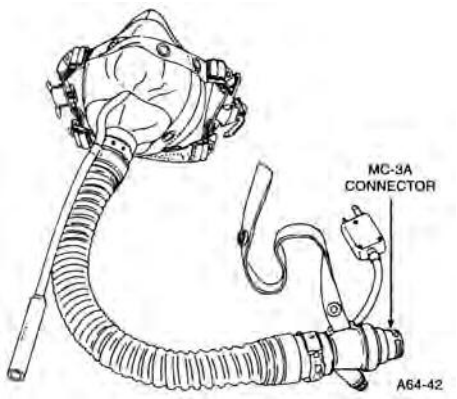


Fig. 7.9 *Oxygen mask assembly incorporating MC-3A connector*

(ii) Demand Regulator Outlet Through this outlet, oxygen is available through a regulator. This regulator allows the oxygen to flow only when it is asked for or in other words, when it is inhaled. The exhaled air is prevented to enter the cylinder because of the regulator's mechanism and also due to the pressure of oxygen inside the cylinder.

The demand regulator outlet could be connected only to a full-face mask and is used by cabin crew during fire fighting.

The full-face mask (Fig. 7.10) is tightly strapped on the user's face preventing any leakage of oxygen during the inhaling process. The possibility of any sneaking of oxygen is further restricted because it does not flow continuously. It is only available when it is inhaled and no modicum of it is thus spared in the process.

All these precautions are essentially observed because any leakage of oxygen is thoroughly unwanted during fire fighting.

(iii) Quick-donning mask outlet This outlet can only be used with the special type of masks known as 'Quick-donning mask', only used by the cockpit crew. This outlet barely has any significance for the cabin crew. However, if so needed, any of the cockpit crew could use it in the passenger cabin. In the cockpit, the quick-donning masks could be used for availing oxygen from the oxygen system provided for the cockpit crew or from portable oxygen cylinders.

Fig. 7.10 *Full Face Mask*

Fig. 7.11 *Cockpit crew's quick-donning mask*

(2) The 'On–Off' Valve Each cylinder has one cylindrical knob like the 'opening-closing' knob of a common domestic water tap. This knob is to be rotated fully to initiate the flow of oxygen.

However, even if the 'opening-closing' valve is rotated to open position, still no oxygen would flow out unless at least one mask is connected to the cylinder because of a prefabricated mechanism inside the outlets. The system/precaution protects any leakage of oxygen whether the knob is turned intentionally or turns accidentally to open position.

(3) Quantity Gauge Each cylinder has a cylindrical gauge with a pointer, which rotates in an arc on the dial of the gauge to display the *pressure* of oxygen present in the cylinder.

In normal condition, the quantity of oxygen inside the cylinder should be about 310 litres at a pressure of 1850 lbs/sq inch (pounds per square inch = p.s.i.). When Oxygen is utilised, its quantity in the cylinder reduces and thus in turn, reduces its pressure inside the cylinder.

The periphery of this Gauge has a band displaying the pressure of oxygen in the cylinder in p.s.i. Part of this band is marked green and also has markings from zero onwards at every hundred (viz. 0, 100, 200 etc.) units.

The rotating pointer of the marked gauge, senses this reduction of pressure, rotates anticlockwise from its original position (when it was showing the maximum pressure) towards the minimum pressure, and in the process, displays the pressure of oxygen inside the cylinder at that moment.

During the pre-flight check, the oxygen cylinder is acceptable only if the pointer of the Gauge is within the aforementioned green zone.

It is advisable to refrain from using the cylinder, when the pressure reduces to 100 p.s.i. unless such usage become imperative. This is because, if the pressure of oxygen inside the cylinder becomes equal to or falls below the atmospheric pressure, the atmospheric air containing moisture would pass into the cylinder and would corrode the inner wall of the cylinder making it unusable.

(4) Strap Each portable oxygen cylinder has a strap attached to it, which enables the user to sling (hang) it on his/her back allowing his/her hands to remain free.

7.3 Oxygen Masks

There are three types of Oxygen Masks available in the aircraft.

(i) First Aid Type These masks cover the nose and mouth of the user and as such, are commonly known as 'oro-nasal' masks.

The mask is connected with the oxygen cylinder by a pipeline having a bag inbetween (between the connecting point of the pipeline with the cylinder and the mask). The connector/connecting device, attached to one end of the pipeline is to be inserted in the first aid outlet of the cylinder and to be rotated thereafter (similar to attaching a domestic electric bulb in its holder) to attach the pipeline with the cylinder. The inserted connecting device deactivates the one-way check valve inside the cylinder outlet (which so far was preventing the outflow of oxygen) and enables oxygen to flow out. The purpose of the bag is to confirm the flow of oxygen in the mask. The part of the bag towards the mask side is squeezed to block the oxygen flow from the cylinder and the bag bulges-indicating that the flow of oxygen is transpiring. This flow of oxygen into the mask must be confirmed before it is fixed on the patient's face. The mask can be held on the persons face by the help of an elastic band (Fig. 7.8).

(ii) Full Face Type These masks (Fig. 7.10) cover the whole face of the user (crew-member) while fighting the fire with smoke and/or toxic fumes in particular.

The mask could be adjusted on the face with the help of the tabs of the straps in a way so that no aperture exists between the mask and the face. This is to prevent the interchange of 'oxygen available through the mask' and 'the smoke and fumes in the surroundings'.

The vision is allowed through a built-in perspex glass window on the mask that excludes the utilisation of Smoke Goggles in such occasions.

(iii) Quick-Donning Type The operating cockpit crew and other occupants of the cockpit, like the observers and/or the supernumerary cockpit crew members use these masks. These special type of masks that look like baseball catcher's masks, derive their name from the fact that these could be worn within a fraction of a second to acquire oxygen from the system meant for the cockpit crew. These could also be connected with the quick-donning mask outlet of portable oxygen cylinders.

It should be grasped from the abovementioned elaborations that four persons could avail oxygen from one portable oxygen cylinder, simultaneously.

7.4 Utilisation and Acceptance of Portable Oxygen Cylinders

There are two main utilisations of oxygen cylinders on board, viz.

- To be used by cabin crew to safeguard themselves from smoke and toxic fumes during fire fighting, and
- To be used to administer oxygen to sick persons for first aid purpose.

It is, however, possible that the sick person and a cabin crew could use one oxygen cylinder at the same time.

Like all other emergency equipment, the number of oxygen cylinders on board an aircraft depends on the capacity of occupants of the aircraft. More the number of occupants more would be the number of oxygen cylinders.

On the pre-flight check, the following items should be confirmed for accepting oxygen cylinders:

- That the 'on–off' knob is fully closed.
- That the pointer of the gauge is in the 'green' zone.

7.5 First Aid Kit and Physicians Kit

Every cabin crew is trained in first aid on a mandatory basis for attending to passenger sickness and/or injuries.

First aid kits contain various medicines and equipment and are supplied on board for cabin crew members to utilise these supplied provisions for rendering necessary treatment to the occupant(s) who need it.

First aid is such action that either cures, or at least restricts the illness from aggravating further, till the time a qualified medical practitioner attends the sick person.

However, if the sickness or the injury is of a major nature, the cabin crew could make an announcement to seek the cooperation and help of a doctor travelling aboard.

The physicians kit contains various life-saving medicines and sophisticated medical equipment. If any doctor or a trained nurse is available on board, he/she alone can have recourse to the physicians kit. These are packed analogously to the first aid kits.

Both these kits are sealed metal boxes, normally painted in bottle green with a white cross on it. These boxes are stowed to withstand jerky conditions and remain unmoved from their location in turbulence. The contents are packed inside the boxes in such a way that they remain unbroken and usable even after experiencing violent judder. The medical officer of the airline maintains the validity and the quantity of the contents of each box.

Engineering personnel furnish the box to the medical officer. He/she in turn deposits the relevant medicines and other equipment – carefully observing their usability/quality (the expiry date) and quantity. A list of contents with supplied quantity and a 'user's form' (in triplicate) are also packed inside the box. The box is then wire-sealed by the engineering personnel in front of the medical officer and a label signed by the medical officer, indicating the expiry date of the kit, is pasted on top of it. These kits are a part of emergency equipment of the aircraft and stored in engineering stores. The engineering staff replace these whenever the existing kit on board the aircraft has been reported used. For further information about these kits and their contents refer to the First Aid chapter (Chapter twelve).

7.6 Megaphones

Megaphones magnify the intensity of voice and are needed to guide the passengers in emergency situations and for addressing passengers in case of failure of the public address system. These are detachable, battery operated, independent units.

A built-in circular knob controls the magnitude of the voice that could be adjusted to be free from feed-back noise. A button/lever, known as 'press to talk button', on the megaphone is to be kept pressed throughout, while speaking through it. A strap is provided to hang the megaphone from the user's shoulder that enables his/her hands to remain free.

Fig. 7.12 *The megaphone*

These are powered by dry cells (torch batteries) which are periodically tested for usability by engineering staff. During their pre-flight check, cabin crew members are required to check the serviceability of the megaphones by flicking the PTT button a few times and hearing the 'kit-kit' sound generated in the process.

7.7 Emergency Lights

Emergency lights are meant to provide at least the minimum visibility to guide the passengers to the emergency exits in case of power failure. Emergency lights are of various types, such as:

- Ceiling lights
- Exit placards
- Door exit lights
- Galley lights
- Exit signs
- Floor path lights etc.

Emergency lights are of different shapes and sizes for different aircraft, but serve the sole intention of the abovementioned requirement. These lights illuminate on two systems viz.

- By aircraft electrical power from generators (when available)
- By built-in chargeable batteries (that get charged and stay charged by using aircraft electrical power again) when the aircraft electrical power fails.

Fig. 7.13 *Emergency light*

Each of the above mentioned systems illuminate a separate set of bulbs.

When the power is available from the aircraft power system (from generators), it illuminates one set of bulbs in the emergency light. When there is no power available from the aircraft power system, the chargeable batteries (remaining fully charged by deriving power from aircraft power system so far it could) takes over and illuminates the other (the 2nd) set of bulbs.

As such both these set of bulbs would never be illuminated simultaneously.

Some of these lights are fixed and some could even be removed to be used as torches.

In addition, there are external emergency lights to guide the passengers during and after emergency evacuation, in darkness.

These lights would come on

- automatically, with the failure of the aircraft electrical power,
- when switched on from the cockpit, and
- When switched on from the cabin crew in-charge's panel.

7.8 Emergency Exits

There are several emergency exits in an aircraft. The number of such exits depends on the 'passenger carrying capacity' of the aircraft and varies directly in proportion to the same. That means more the number of passengers, more the number of emergency exits.

In *normal* conditions, amongst these exits, some are used for passenger embarkation and disembarkation, some for catering and engineering services and some are not even used. However, *all* of these exits are utilised for evacuation in emergency situation.

The mandatory criterion and recognition of every emergency exit is: *'Emergency exits should imperatively be able to be opened from the inner side of the aircraft cabin and as well as from the outer side of it'.*

May it be reiterated that in all modern aircraft, each emergency exit is fitted with inflatable chute/slide for speedy exit of passengers and crew members in emergency situation.

When any 'armed' exit is opened from the outer side of the cabin, the slide automatically gets 'disarmed' and a normal opening of the door takes place as discussed in "What is Chute/Slide and their 'Arming-Disarming'"– and "How to 'Arm-Disarm the Slides" in Chapter 5.

Fig. 7.14 *Aircraft emergency exit sign*

Fig. 7.15 *Emergency Exit*

Certain bigger doors even have 'pneumatic assistance'. When those privileged doors are tried to be opened from the cabin side in 'armed' condition, the doors possessing the said facility of assistance of pneumatic pressure would move to 'open' position effortlessly. In that case, as the cabin crew member moves the door control handle slightly, indicating his/her intention of opening the door in 'armed' condition, the 'pneumatic assistance' takes over and completes the job for the cabin crew.

Some of these bigger doors are even fitted with 'Duel Lane Slide' allowing two passengers to slide down at the same time as discussed in 4.3.4–"Escape Chute/Slide Pack", concerning doors/ emergency exits.

7.9 Emergency Radio Beacons (E.R.B.)

These are portable transmitters with liquid activated battery and spring-loaded self-erecting antenna. When activated, these ERBs transmit 'homing-in distress signal' on two frequencies viz. 121.5 and 243.0 MHz, simultaneously.

These cylindrical beacons (about 20 inches long and 3 inches in diameter) have a small hole on the lower portion of their bodies. To activate the battery of the ERB, it has to be immersed in any type of liquid until this hole is submerged under the liquid's surface. A special bag to hold any liquid to satisfy the purpose of immersion of the said hole on the ERB for its use on ground is also supplied with it.

The antenna of the ERB is held back with its body by a liquid-soluble tape located below the level of the aforesaid small hole. When the ERB is immersed in any liquid for activation, the tape holding back the antenna dissolves and the spring-loaded antenna is erected.

Three conditions are needed to be satisfied for the ERB to work. If any one of these is not fulfilled initially, or removed after the activation of the battery, the transmitter would stop functioning. Those conditions are:

- **The antenna has to be in erect position.**
- **The small hole on the ERB's body has to be submerged in any type of liquid.**
- **The ERB has to be positioned in such a way that it makes an angle of 60 degrees or more with the horizontal level. That means, to make the ERB functional it has to be placed vertically or within a range of 30 degrees from the vertical.**

Fig. 7.16 *ERB*

Fig. 7.17 *Dinghy with Canopy*

About 18 metre long cord is supplied attached with the ERB. During ditching (emergency landing in water), the free end of the cord is to be tied to the dinghy before throwing the radio beacon in water. The ERBs are floatable on water in a way that the mentioned hole remains immersed and the antenna remains, within a range of 30 degrees from the vertical that satisfies all the aforesaid conditions for its functioning.

7.10 Life Jackets

All overseas flights are to carry life jackets on a mandatory basis. However, the current regulation demands that the life jackets are required to be provided even for operating certain airports, which involves flying over the sea either before landing at those airports or after taking off from those. To comply with this condition, the life jackets, now-a-days, are placed on each aircraft permanently to operate any and every flight/route, irrespective of overseas flight.

Neatly folded life jacket is packed inside a casing and one such pack is stowed under each passenger seat.

These synthetic-material-made vests have two chambers, purposefully made to provide partial floatability at least, in case of a leakage of air from one of the chambers.

There are two 'charging cylinders' attached to the jacket, each to inflate one aforementioned chamber. One triggering cord from each cylinder hangs in front of the jacket. When any of the cords is pulled, the concerned 'charging cylinder' is activated and the air under pressure from the cylinder inflates the corresponding chamber to which it is connected.

Fig. 7.18 *An inflated life jacket*

Fig. 7.19 *An un-inflated life jacket*

There are two nozzles, each fitted with a 'one-way valve', one for each chamber. These allow the air to enter the chambers, but prevent its exit. After being inflated, if the air leaks out from any of the chambers, the same can be replenished by blowing through the respective nozzle.

A whistle is provided with each life jacket for attracting the attention of others.

There is a 'water-activated battery', which illuminates a small light attached to the life jacket. As soon as the user gets into water, the battery activates and the light bulb illuminates. This helps to locate the user in darkness.

The colour of the life jackets is intentionally made very bright, so that these could be located from far. The colour of the passenger life jackets is usually bright yellow and that for the crew members is bright orange/crimson.

The life jackets are to be inflated *only* when the user has come out of the aircraft, for the simple reason that the inflated life jackets might get harmed by any jagged and protruding metal parts of the damaged aircraft, turning it unusable. The infant's life jackets, however, should be inflated as soon as the same is worn, because in case the infant slips into water accidentally during evacuation, it shall still be floating.

7.11 The Manual Release Key

These are pins about one and half inch long with a handle and are utilised to open the PSU doors to enable the housed Oxygen Masks to drop. The pin is to be inserted in the prefabricated small hole on the PSU door to untangle its latch.

Glossary

1. ***Emergency equipment*** These items provided on board an aircraft, help to counteract an emergency situation.
2. ***Fire-fighting equipment*** These items help to combat a developed fire.

3. ***Fire extinguishers*** These cylinders contain fire-extinguishing chemicals and spray it on the fire to extinguish it.
4. ***Fire axe/Crash axe*** These cutting tools help to cut desired items during fire fighting and/or evacuation.
5. ***Asbestos gloves*** These gloves made of asbestos wool help to hold items with high temperature during fire fighting.
6. ***Smoke goggles*** These goggles protect the eyes of fire fighters from smoke and/or toxic fumes.
7. ***Portable oxygen cylinder*** These cylinders contain pure oxygen and supply it for first aid purposes and for fire fighting.
8. ***Oxygen masks*** These are the masks, through which, persons receive oxygen from its container.
9. ***First-aid kit*** These kits contain basic medicines and equipment for treating sick persons.
10. ***Physicians kit*** These kits contain advanced medicines and medical equipment, which could only be handled by a doctor or a trained nurse for treating a sick persons.
11. ***Megaphone*** These self-contained units amplify the magnitude of sound and are used for directing the passengers in emergency conditions and in case of failure of PA system.
12. ***Emergency lights*** These lights supply minimum illumination to reach an Emergency Exit in darkness.
13. ***Emergency exits*** These are exits used for evacuation of the occupants in emergency condition.
14. ***Emergency Radio Beacon*** These are self-contained radio transmitters that transmit radio signals through distress frequencies.
15. ***Life jackets*** These floating devices help the wearer to stay afloat in water.
16. ***Life Rafts/Dinghies*** These inflated rafts carry the occupants of the aircraft after emergency landing in sea (ditching).

Questionnaire

1. Fire-fighting equipment consists of:
(a) Fire extinguisher, fire axe, smoke goggles
(b) As in (a) and asbestos gloves and oxygen cylinder with full-face mask
(c) Fire extinguisher, fire axe, smoke goggles and megaphone
(d) As in (c) and oxygen cylinder with oro-nasal mask

2. Fire extinguishers have:
(a) Four outlets – each to be used for different types of fire
(b) One discharge nozzle , a carry handle, an 'on-off' valve and a discharge lever
(c) One discharge nozzle, a discharge lever and a lever to break the seal
(d) As in (c) and a carry handle and a quantity gauge

3. The Quantity Gauge of a fire extinguisher
(a) Has a green-red band on its periphery that is divided in units of hundreds (100, 200 ...)
(b) Has a green-red band on its periphery along with a rotating indicator

(c) As in (b) and is of a rectangular shape
(d) Both (a) and (b) are correct

4. The fire axe has:
(a) One pointed side, a metal handle and a cutting edge
(b) One pointed side, a cutting edge and a handle that can withstand temperature
(c) As in (a) and can withstand a high voltage of electricity and temperature
(d) As in (b) and also can withstand a high voltage of electricity

5. During fire fighting the cabin crew would not need smoke goggles if he/she is using:
(a) Rayban Sunglass
(b) An oro-nasal mask
(c) Full-face mask
(d) A quick-donning mask

6. The full-face mask is connected with:
(a) Demand regulator outlet
(b) Quick donning mask outlet
(c) First-aid outlet
(d) None of the above is correct

7. What happens if the 'on-off' valve of an oxygen cylinder is left open by mistake for a long time?
(a) Oxygen leaks out and the pressure of the cylinder comes down to 0 p.s.i.
(b) Oxygen leaks out and the pressure of the cylinder comes down to 100 p.s.i.
(c) As in (b) and the cylinder becomes unusable
(d) No effect

8. Which 'outlet and mask' set would be used for administering oxygen to a sick passenger?
(a) First-aid outlet with 4 l. per minute flow with oro-nasal mask
(b) Demand regulator outlet with 2 l. per minute flow
(c) First aid outlet with 4 l. per minute flow with quick-donning mask
(d) First aid outlet with 2 l. per minute flow with oro-nasal mask

9. Which items are to be checked on a fire extinguisher for acceptance?
(a) The seal is broken and the indicator is in the green zone with valid date
(b) The seal is not broken and the indicator is in the green zone
(c) As in (b) and the expiry date has not been crossed
(d) The seal is intact and the indicator is in the red zone with valid date

10. A First-aid kit
(a) Contains sophisticated medical equipment that can only be used by a doctor
(b) Contains equipment and medicines that could be used by cabin crew
(c) As in (b) and supplied on board in a sealed box by the engineering department
(d) As in (b) and supplied on board in a sealed box by the medical section

11. A Megaphone
(a) Operates with aircraft electrical power and used in case of emergency
(b) Operates with its own power and is effective when PTT button is not used
(c) Operates with its own power and used in case of emergency
(d) As in (c) and for passing information to passengers in case of power failure

12. A Physician's kit
(a) Is a sealed box containing sophisticated medical equipment
(b) Is an unsealed box containing sophisticated medical equipment
(c) As in (a) and to be handled by a doctor and/or by a trained nurse
(d) Is a sealed box containing sophisticated medical equipment to be used by crew

13. An Emergency light has:
(a) Two sets of bulbs and both sets come 'on' with aircraft power failure
(b) Two sets of bulbs and a chargeable battery and could be detached
(c) As in (a), a chargeable battery and could not be detached
(d) As in (b) and only one set of bulbs illuminate, whatever the condition might be

14. The main criterion of an Emergency exit is that:
(a) It could be opened from both its sides (outside and inside of the cabin)
(b) It must have a pneumatic assistance
(c) It must have an electrical assistance
(d) All the above are correct

15. An Emergency Radio Beacon will only work:
(a) If the hole is immersed in any liquid and if its antenna is erect
(b) If the hole is immersed in any liquid and the ERB is kept flat on ground
(c) As in (a) and the ERB is placed within a range of 30 degrees from the horizontal
(d) As in (a) and the ERB is placed within a range of 30 degrees from the vertical

16. A life jacket:
(a) Has 2 charging cylinders, 1 whistle and 1 liquid activated battery
(b) Has 2 chambers to be inflated and a light bulb
(c) Has to be inflated inside the cabin only for the infants
(d) All above are correct

17. A Manual Release Key is for:
(a) Opening the cockpit door when it is locked from the cabin side
(b) Opening the PSU doors that are not opened
(c) Opening the toilet door when it is locked from inside
(d) Locking the main doors from outside while leaving the aircraft at base stations

8

Body Language of Cabin Crew

8.1 What is 'Body Language'

Body language could be described as the language we all speak, but very few understand. It is the sort of message you receive when you watch a silent film or a television programme with the sound off. Body language tells you more about what people really mean to reveal than all the words could express through any spoken language in the world.

At any given moment, a person's brain assumes a specific attitude and communicates the same to various parts of his/her body, which in turn, responds with the corresponding actions or expressions that constitute body language. Many of these gestures and signals sent out by the body communicate certain message(s) to the surrounding people without an individual consciously realising it.

Body language includes movements, posture, style of sitting, arm movements, facial expressions, eye movements, way of walking etc. Apparently, even very small movements and ordinary gestures that pass almost unnoticed are of much importance as far as their value in relation to body language is concerned.

It is one criterion and quite simple to interpret the body language of other people but it is quite difficult to be able to master and gain command over one's own body language to emphasize importance of the message being communicated.

The words used by different cabin crew on any particular subject might often be homogeneous, but whether the cabin crew are good or bad in their role, successful or not, depends substantially on their body language. That means, a number of cabin crew with analogous efficiency quotient could be graded and differentiated through the quality of their body language and their command over it.

If a person could master how to speak/transmit a commendable body language honestly, he/she could indeed open the doors to a new world of communication.

8.2 Truthfulness of Body Language

During conversation with people, it is possible to ascertain whether a person is lying, bored, impatient, agreeable or not etc., through certain symptoms/signals emitted by those persons in

the form of body language. On scrutinising and analysing the said symptoms, one can decide whether the said persons are nervous, angry, worried or filled with other such emotions.

The importance and advantage of these symptoms to cabin crew members on board a flight is immense and obvious, as in that case, they could read the line of thinking and/or the intention(s) of the passengers and be poised with predetermined suitable reply and/or action to counteract those. In addition, he/she could also ascertain the temperament, emotion and intention of the passengers through their gestures.

Do remember that ***words could lie, but body language seldom would.***

8.3 Different Body Language for Different Persons

There are a number of differences and distinctive characteristics in the body language of different people from different cultures.

EXAMPLE

- *In France, people often greet each other with a handshake and a kiss on the cheek, whereas it is quite common for people to exchange compliments by giving a polite smile and a simple nod only, without even touching each other in various other parts of the world.*
- *In certain parts of India the nod of head expresses 'No' rather than the customary 'Yes'.*
- *In India and few other countries, it is considered quite fitting, if young women lower their eyes while talking to men. However, lowered eyes are interpreted and/or apprehended as a denoting insecurity and unreliability in various other parts of the world.*

As cabin crew members deal with many passengers of various nationalities, there remains a feasibility of unwillingly and at the same time unwittingly giving a person an impression of rudeness, unfriendliness or even offence — unless they are thoroughly aware of those traditions. If cabin crew members are not familiar with the said custom(s), it is better for them to restrict their body language to the minimum and conveniently express only their politeness and offer a smile, which is universally and unanimously accepted as a sign of friendlines.

8.4 Conscious Body Language

All the aforementioned examples of body language of persons of different nationalities and/or with different cultural background are expressed through unconscious actions of the performer.

However, there are some expressions in conscious body language, say, in the form of hand gestures that are followed analogously throughout the world. A few examples of which are:

EXAMPLE

- ***A raised finger or hand*** *– indicates that you want to speak.*
- ***A finger to the lips*** *– asking to keep quiet.*
- ***Pointing a finger to the clock*** *– conveying warning about time.*
- ***Cupping the palm behind the ear*** *– I cannot hear you.*

8.5 Unconscious Body Language

The above examples show how we could express certain feelings through our body movements without articulating. However, our body parts involuntarily coordinate with our thoughts to initiate certain uncontrolled and unrealized movements. The signals thus emitted are the unconscious body language. It is this unconscious body language that is most interesting and significant while interpreting other people's moods, attitudes and intentions. Few examples of such are:

EXAMPLE

- ***Dilation of eye pupils*** *– indicates aroused interest.*
- ***Raised shoulders*** *– shows tensed attitude.*
- ***Touching nose/mouth*** *– reveals uncertainties.*
- ***Tilting the head to one side*** *- expresses interest or intent of listening.*

8.6 How to Interpret Body Language

While reading body language, one should not just watch for one single detail/indication and impulsively draw a lot of conclusions from it. For example:

EXAMPLE

- ***If someone touches his/her nose and partly covers the mouth whilst talking*** *– one could interpret and assume this action is expressing 'uncertainty' as per the example cited above but in reality, the person might be about to sneeze.*
- ***If a person has folded the arms*** *– one could conclude that the person is 'closed' and not interested in any further conversation, but again, it could simply mean that he/she is feeling cold.*

On the other hand:

EXAMPLE

- ***If some one is sitting with folded arms, crossed ankles, raised shoulders, lowered hands, scowling face, drooping mouth, contracted eye pupils and eyebrows drawn together*** *during a conversation – one can be substantially confirmed that he/she is rather displeased with the person conversing and/or the whole episode because <u>all</u> the above-mentioned indications are pointing towards the similar and singular conclusion as said above.*

As such, considering only one redundant signal and arriving at a conclusion might be proved a judgemental error and might lead one to a false understanding. In order to be reasonably sure, at

least three signals should be studied, analysed and confirmed to be matching and converging towards the same conclusion.

8.7 Some Important Elements of Body Language

This section covers some of the most important 'single signals' in body language and gives the readers guidance, so that they can be more aware of their own and other people's body language.

8.7.1 The Eyes

The size of the pupil affects a considerable expression of the face and quite closely relates to expressing and/or identifying certain body language yielded message.

It is well-known that the size of the pupil varies with the intensity of light–growing bigger in darkness and contracting in brightness. It is also an established fact that there is a direct link and a proportional variation between pupil size and interest. More the interest the bigger would be the pupil size as reflected in 8.5–"Unconscious Body Language". From these two examples, it can be concluded that the dilation of pupil reveals at least more than one aspect of our consideration/ interest.

Again, people have different eye sizes and different size pupils. This factor has also got to be taken into account while considering the pupil size. Very wide pupils in one person could actually indicate a lesser interest than much smaller pupils in another, depending on the pupil size they possess.

As the intensity of light could be instrumental to create a big difference–a very interested person could show smaller pupils in a brightly lit place and might quite wrongly be interpreted as having abated interest.

Observing and discerning of pupil size is immensely vital for a cabin crew because it would indicate how satisfied their passengers are. Do not just read the pupil size in an isolated modus operandi or for considering only one aspect of the case, but read it together with the position of the mouth and eyebrows to correctly evaluate the person's inner thoughts/feelings and anticipate his/her reactions.

8.7.2 The Position of the Shoulders and the Head

As a rule, normally people would raise their shoulders when tense and lower them when relaxed.

A raised head may signify

- *openness,*
- *interest,*
- a *winner's attitude, and*
- *having control over the situation.*

A lowered head can indicate

- *doubt,*
- *defeat,*
- *contempt,*
- *dissatisfaction,*
- *fear, and*
- *insecurity.*

A head tilted sideways may reflect

- *interest,*
- *curiosity or flirting intention.*

8.8 Posture

Body language signals can be understood and analysed by observing and evaluating people's posture. This is explained through some concrete examples cited hereunder.

8.9 Clear Signals and Double Signals

A 'clear signal' is transmitted when a person's thoughts and words tally. That means, he/she emits certain signals through his/her gestures, which corroborates that the person is thinking in the same way as he/she is articulating. When such happening occurs, the body tends to form a straight line from head to ankle.

On the contrary, a 'double signal' could be anticipated when there is a disagreement between a person's thoughts and vocabulary. In that case, the line between head and ankle would be broken or bent in some way or the other substantiating the mentioned guideline.

8.9.1 Examples of Clear Signals

All the described postures in the following lines convey a clear signal. That means there is an agreement between thoughts and vocabulary in these cases.

- ***Standing upright:*** *Any person in control of a situation, whose thoughts and expressed message are in agreement, would tend to stand in this way. This would indicate that the person knows his/her job, enjoys the work and has no hidden motives in his/her communication.*
- ***Forward leaning stance:*** *A person, who wants to dominate others and/or desires to voice a predetermined and insistent statement, would have this type of stance of leaning from the ankle and not from the waist. The stance might be noticed in cases of a team leader wishing to push his/her decision through a meeting.*
- ***Leaning backwards stance:*** *The leaning back from the ankle and again not from the waist stance indicates a person is in a defensive or reticent frame of mind. He/she would then possess-'I insist on occupying this seat' or 'I am not going to spend any more money before Diwali' type of attitude.*

8.9.2 Examples of Double Signals

All the following postures reflect 'double signals'. That means, there is no agreement between thoughts and words in these cases. What he/she is articulating is not what he/she is actually thinking.

- ***Leaning back from the waist posture:*** *A split posture of leaning back from the waist indicates very clearly a 'holding back' mood. A shy and uncertain person shows this posture.*
- ***Forward bending posture from the waist:*** *This is observed when a person gives a friendly squeeze or a kiss on the cheek. The unconscious bend adequately indicates the politeness of the person and that there is nothing but friendship in that body contact.*

  One might descry this sort of act in the action of a waiter in a restaurant, offering an exaggerated degree of service. You also can find such gesture from an employee who has a request to make to the boss to receive some favour.

When a passenger adopts this stance and declines an estimable offer from a cabin crew, he/she indicates to remain open to further persuasion. Perhaps he/she is enjoying and wanting the episode to continue or repeat.

- ***Standing with expanded chest posture:*** *This sort of posture is often seen in people who are small and affect to appear big. They unconsciously try to inflate themselves to seem and feel important. One can find this sort of posture in petty employees who strut-pace up and down, trying to throw their non-existant self-imagined heavyweight on others, remaining under the illusion that he/she is being acknowledged by others in the same way as he/she is personally imagining.*

8.10 Caution to be Observed while Reading Body Language

Never forget that while cabin crew members are reading the body language of the passengers, they (the passengers) in turn are reading theirs. As a cabin crew, one is constantly being watched and judged by:

- ***one's face,***
- ***one's voice, and***
- ***one's body language.***

So, if a cabin crew raises his/her shoulders, lowers his/her head, appears impatient and speaks in a monotonous voice and pitch, the passengers would read and rate his/her standard to be 'poor' and in that case the result of their analysis from his/her body language would be:

- ***He/she does not like his/her work,***
- ***He/she is stressed,***
- ***He/she does not have control of the situation,***
- ***He/she is not friendly,***
- ***He/she does not respect others, especially them (passengers), and***
- ***He/she is not helpful and if he/she helps at all, he/she does it unwillingly.***

All these signs are quite undesirable to display and cabin crew members should endeavour not to transmit such signals to their honoured guests such that they rate them at the aforementioned standard. They should neither acquire, nor reflect, nor even dream of possessing any such qualities and must banish these with diligent effort. However, if they indeed possess the same by any chance, they should at least make sure that the same are not allowed to be detected by the passengers, from their body language.

8.11 Pacing the Cabin

Cabin crew members should acquire the habit of pacing the cabin, so that the passengers realise that they are receiving the attendant's fullest attention and the cabin crew members are indeed interested to detect and fulfill their needs because they (cabin crew) like them.

A small turn of the body, a direct eye contact, a friendly nod would transmit enough of body language that would say, 'I have seen you, just give me a moment, I will be with you' and that would be all that is desideratum to create a complete volte-face, commendable impression and comfortable atmosphere.

Cabin crew members should make sure to refrain from acting like a knotty hotel receptionist or a waiter-displaying so called 'professional busyness' by looking everywhere else other than at the indispensable customers to carefully avoid their summoning signals.

Glossary

1. ***Body language*** Body language is the language conveyed through one's movements and spoken without articulating a word.
2. ***Clear signals*** These are the indications emitted by a person that are in affirmation with his/her thoughts.
3. ***Conscious body language*** This is one category of common body language that is expressed intentionally.
4. ***Double signals*** These are the indications emitted by a person that are in disagreement with his/her thoughts.
5. ***Posture*** This is the relative position of body parts that expresses one's mental and physical attitude for a desired effect.
6. ***Unconscious body language*** This is a category of common body language that is expressed in an uncontrolled and unconscious way.

Questionnaire

1. Body Language is:
(a) A language that every one speaks and few understand
(b) A language that never lies
(c) A language that is observed and not heard
(d) All above are correct

2. Body Language:
(a) Varies from person to person
(b) Varies with different culture and different groups of people
(c) Both (a) and (b) are correct
(d) Is rigidly fixed and spoken by all in one similar way and that is why it is true

3. Which of the following set represents 'Conscious body language'?
(a) A finger to the lips, raised shoulders, cupping the hand behind the ear
(b) A raised finger or hand, pointing a finger to the clock, a finger to the lips
(c) Dilation of eye pupils, pointing a finger to the clock, a raised finger or hand
(d) Raised shoulders, dilation of eye pupils, tilting the head to one side

4. While correctly interpreting a person's body language shall one:
(a) Consider any one signal and impulsively come to a conclusion
(b) Notice as many signals as possible that converge to come to a conclusion
(c) Notice as many signals as possible that diverge to come to a conclusion
(d) Both (a) and (b) are correct

5. A lowered head may signify:
(a) Doubt, defeat, interest, contempt, insecurity, flirting intentions
(b) Defeat, fear, insecurity, openness, contempt
(c) Doubt, defeat, contempt, dissatisfaction, fear, insecurity
(d) Interest, control over the situation, contempt, fear, openness

6. The standing upright posture indicates:
(a) The person knows his/her job, has a control of the situation
(b) As in (a) and has no hidden motives in his/her communication
(c) As in (b) and whose thoughts and expressed message are in agreement
(d) As in (b), would tend to stand in this way and dominate others

7. Leaning back from the waist posture indicates:
(a) Politeness of the person
(b) A 'holding back' mood from a shy and uncertain person
(c) A person affects to appear big
(d) A person who offers an exaggerated degree of service

8. If a cabin crew raises his/her shoulders, lowers his/her head, appears impatient and speaks in a monotonous voice and pitch, the passengers would rate him/her as:
(a) He/she does not have control of the situation and does not respect them
(b) He/she does not like his/her work, is not helpful willingly, and not friendly
(c) He/she is friendly, is stressed and has control of the situation
(d) Both (a) and (b) are correct

9

Emergency Conditions and Cabin Crew's Duty During Emergency Situations

CASE STUDY 10

Flight BN-506 was a long hopping flight. Originating from Kolkata, it touched Bhubaneshwar, Vishakhapatnam and Vijaywada before landing at its destination station, Hyderabad.

The aircraft, an Avro HS748 operating the flight took off ten minutes behind schedule from Kolkata, at 0910 hr.

While making tea for the Commander, Capt. Biman Choudhury, and the Co-pilot, F/O Sanat Panigrahi, the Flight Purser, Mr. Shyam Kr. Rai was brooding about the ordeal he had to face to acquire this flight, simply because his friend A/H Ms. Manju Thapa happened to be the other cabin crew member of the flight. The night duty staff of the movement control had very reluctantly drafted him on the flight, seemingly unable to get another cabin crew.

The weather on the first two sectors was not quite bad, although scattered turbulent cloud provided occasional bounce. In Vishakhapatanam-Vijaywada sector the weather deteriorated indeed and the aircraft tossed and turned violently, the seat belt sign remained 'on' throughout the sector and the food service had to be cancelled. The aircraft, however, made a safe landing at Vijaywada.

Before the departure of the flight, Vijaywada ATC intimated that Hyderabad is having an overcast sky with low cumulus clouds and a cross wind—whose speed was ranging from 15 to 20 knots.

Mr. Rai overheard the transmission and as he had a good rapport with Capt. Choudhury, asked, "Going, Captain?" The reply was, "Why not?"

After takeoff, the commander asked Mr. Rai to finish the passenger service within 30 minutes and report that every passenger had fastened his/her seat belt, ensuring the same personally, after the service.

The fasten seat belt sign came on after 30 minutes, as predicted. Both the cabin crew checked that each of the passengers had fastened their seat belts, reported the same to the commander and fastened their own seat belts.

The aircraft, thereafter, went through what appeared unending tossing, turning and violent jolting. The jolts came in series with irregular magnitude, gap and duration. The aircraft shuddered throughout, as if in tremendous pain, but maintained its course.

After a while, the engine note reduced and the aircraft started descending, still jolting severely. It broke out of cloud quite low with a considerably clear ground visibility and the bouncing reduced quite a lot. The undercarriage was lowered and it locked with a thud.

Accordingly, Mr. Rai did the landing announcement from the cabin crew station at the aft of the cabin.

The aircraft continued its approach and just before touchdown, it sort of dived and with a severe thud from the nose wheel, bounced back in the air. The speed had reduced a lot and the aircraft trying to land bounced on its main wheels twice or thrice and went in a nose down attitude, with a screeching sound that continued until it came to rest.

Flight Purser, Mr. Rai was quite experienced. He reasoned out the possibilities within his mind and immediately anticipated that the nose wheel must have collapsed and had caused the aircraft to acquire the tail-up attitude. Instantly, he assessed that the evacuation of the passengers would not be possible through the aft exit, as it was too high from the ground.

Within a split second, he surveyed for development of any fire and found its absence. He used the PA system and advised the passengers that there was nothing serious and they were to remain on their seats until further announcement.

He swiftly moved forward and on his way found the air hostess injured by a bag that had fallen on her left foot and made her immobile. Conti-nuing to move, he passed through the galley and while opening the forward exit asked the pilots if they were all right. By the time he received the reply in affirmative, he had already opened the forward emergency door.

The door seal was so near to the ground that he had no difficulty in placing the catering equipment box under it and improvising a stair. He went back to the cabin and asked the passengers to come out serially but swiftly.

In the meantime, the fire tenders, ambulances and vehicles carrying airline personnel mostly from the engineering department, reached the crashed aircraft.

One of the last passengers coming out of the aircraft informed Mr. Rai that

they were quite all right and he should go back to help the injured air hostess. He waited until the last of the out-rushing passengers came out of the aircraft, went in and supported Ms. Thapa out of the aircraft. By then, more airline vehicles with personnel and most importantly, the airlines doctor had arrived. The doctor took charge, examined Ms. Thapa and sent her in an ambulance for X-ray after wrapping a crepe bandage on her already swelling ankle.

Passengers proceeded to the terminal building by airline coaches. When only the airlines personnel were left at the scene, Mr. Rai had time to look at the nose of the aircraft. He was stunned to see that the nose landing gear was missing altogether.

After three days, the crew members returned to their base at Kolkata. A preliminary departmental enquiry took place in which each crew member was directed to submit their individual observations in writing in addition to their verbal statements and replies before the enquiry board.

Ten days thereafter, the crew members were summoned to Hyderabad to appear before an enquiry board constituted by authorities, mainly from the department of Air Safety of the Ministry of Civil Aviation, airlines personnel from the department of Air Safety and Engineering and a senior Dy. General Manager from the Operations departments.

Surprise awaited Mr. Rai at the enquiry room. After the preliminary introduction and exchange of pleasantries, the Chairman of the Board asked what Mr. Rai thought he had done as his duty after the crash. The Board members listened patiently as Mr. Rai narrated all he had actually done. Then the Chairman produced a few sheets of paper from his file and asked him to study those. It was the statement of the commander, which indicated that the commander himself did everything starting from making an announcement to the passengers, opening the exit and placing the catering equipment box to improvise as the stair for evacuating the passengers.

The Chairman of the Board looked at the speechless and spellbound Mr. Rai. He smiled and was immediately joined by the other Board members in the act and conveyed, "Don't worry. We have dug out the truth. We talked to the passengers also, because they are the most neutral witnesses and they supported your version."

Mr. Rai came out and met one of the engineers from the airline whom he knew from his earlier visits to Hyderabad. The person took him to the engineering department's office and showed him the photographs taken by the authorities of the air safety department. Then, he revealed the findings detected by the authorities. Just before landing, a sudden gust of wind forced the aircraft's nose downwards and before the pilot could react, the nose wheel had hit the runway with such a tremendous force that the runway was dug up and the nose wheel wrenched out of the fuselage. The aircraft then went on bouncing on its still available main wheels and finally came to rest on its nose.

The commander lost his command, flew as co-pilot for a period, and after corrective training and checks, has restored his command.

CASE STUDY 11

The Boeing 737-200, operating from Vishakhapatanam to Chennai was on its final approach. The cabin crew in-charge Ms. Maniratnam had briefed the Commander, Capt. R.L. D'Souza that the cabin was ready for landing and had occupied her station.

In the cockpit, Capt. D'Souza ordered "Gear down". In one swift movement, the Co-pilot, F/O N.K.S. Reddy moved the protruding gear lever in front of him to its down position and expectedly watched the indicator lights.

On this day, to his surprise, F/O Reddy observed the central red light (representing the nose landing gear) and the right red light (representing the right main landing gear) had changed to green, but the left red light (representing the left main landing gear) remained red (ref. Note 1*).

This indication hinted that the left undercarriage might not have extended fully and/or not locked in position and thus, presented a possibility of danger of collapsing during touch down.

Before F/O Reddy could draw his attention, Capt D'Souza noticed the anomaly. Without a second thought, he told the co-pilot, "Going round" and started to gain altitude. F/O Reddy passed on the decision to the ATC and asked permission to climb up and hold. The ATC, anticipating that something had gone wrong, cleared the aircraft to hold at four thousand feet.

On the holding pattern (circling near the airport), Capt. D'Souza took the public address system and intimated the passengers that there would be little delay in landing as they were asked to hold near the airport. He cautiously and deliberately avoided giving any reason for the holding because that might have panicked the passengers.

He called Ms. Maniratnam inside the cockpit and asked her to check whether the mechanical indicators for the main landing gears were indicating that they were fully down, and locked (ref. Note 2+).

---

*__Note 1: The Gear down operation:__ There are three small red indicator lights, representing two main wheels and the nose wheel, located in the vicinity of the gear lever. Immediately below each red light, is a similar looking green light. As soon as the gear lever is moved from its upper position, the red lights illuminate indicating that the 'gear down' process is in progress. As each gear goes down and gets locked, the corresponding red light goes off and the corresponding green light illuminates. When the three red lights change to three green ones, it is perceived that all the three landing gears are down and locked.

+__Note 2: Mechanical Indicators and the Checks:__ In Boeing 737-200, there is a peephole/viewer on the cabin floor (in the aisle), laterally inline to the undercarriage's 'down and locked' position, for finding out whether the main landing gears are down and locked. When observed through the viewer, two red lines, one on each landing gear, can be seen. When the undercarriage is fully down and locked, the line on it is a continuous line and when it is not down fully and/or unlocked, the line appears broken. Provision of this device reinforces the safety measure. This 'double-check' (physical check along with the light indications), when becomes necessary, confirms whether any particular landing gear is fully extended and locked. The viewer on the aisle remains covered by a separate piece of carpet analogous to the carpet covering the other part of the aisle, purposefully, so that it could be removed effortlessly to get access of the viewer.

As ordered by the commander, Ms. Maniratnam took Flight Purser Mr. D.N. Raju with her and removed the carpet, covering the viewer. She had to clean the viewer, which was covered by a lot of dust. She peeped through the viewer, observed very minutely and became certain that both the red lines were perfectly straight and positively not broken. To confirm her observation, she asked Mr. Raju to have a look too. Mr. Raju also conveyed his analogous observation result.

Ms. Maniratnam went back to the cockpit and reported that the mechanical indicators are evincing that the main landing gears are down and locked.

Capt. D'Souza thought over the problem and anticipated that the cockpit indicator might have just turned faulty, but firmly decided to exert every precaution that was necessary to face the situation and to an emergency landing with all preparation.

He contacted the Chennai ATC, informed them that he doubted that the left landing gear might not have fully extended and locked. He asked them to observe the left landing gear when he flies in front of the control tower and intimate in case they find any irregularity. He flew abeam the tower, tugged hard at the joystick to pull up the aircraft sharply and with a jerk, expecting the manoeuvre could get the undercarriage extended fully and get locked. However, the Chennai ATC reported 'negative irregularity' on their observation.

He called Ms. Maniratnam inside the cockpit again and informed her of the situation (briefing about the type of emergency). He asked her to prepare the cabin for an emergency landing at the earliest and to report compliance immediately after completion. He also briefed that the right hand side exits might not be available for evacuation of the passengers.

Ms. Maniratnam systematically performed the task in collaboration with other cabin crewmembers and in a short duration, reported that the cabin was ready for emergency landing.

Capt. D'Souza, in the meantime, had transmitted to the ATC and conveyed his decision of making an emergency landing, and the ATC in turn, had made all necessary preparations for the same on ground. Every essential help like fire tenders, ambulances and other aids in the form of man and material required for meeting such emergency were ready at the airport. With clearance from the ATC, Capt. D'Souza approached the threshold and touched down as lightly as he could. Fortunately, no disastrous incidence happened and the aircraft taxied to the terminal building without any problem, thus validating Capt. D'Souza's anticipation, about the faulty cockpit gear indicator in the cockpit.

The learning that could be derived from the aforesaid incidence is that " **In flight, never take a risk and or neglect even a minor problem that possibly might or actually might not endanger the safety factor relating to the aircraft, passengers and crew members**".

9.1 Types of Emergency*

There can be various types of emergency situations which may be divided in two general categories, viz.

(i) Anticipated emergency condition and
(ii) Unanticipated emergency condition.

The difference between these categories is that for the first category, the crew members have prior knowledge and briefing about the oncoming happening and they remain prepared to counter it when it actually occurs. This is not so for the second category. As far as the second category is concerned, the happenings take place instantaneously without any prior warning and indication. When the first category event occurs, the crew members may possibly act as per the received briefings, but for the second category happening, although a priority has to be given to the instructions from the commander or the cabin crew in-charge, if any at all, but in the absence of any such, they have to act totally on their own judgment.

A commendable cabin crew should be prepared for emergency condition, whether it actually occurs or not, at every moment of a flight in general and during all takeoffs and landings in particular.

9.2 Anticipated Emergency

As the name suggests and as stated above, in situations under this category, the cabin crew members transpire that such emergency condition might arise, prior to its anticipated occurrence and being pre-briefed to that effect, are expectedly prepared for such conditions. In these cases, the commander briefs the cabin crew in-charge on the following items:

- Type of emergency and/or the preparations to be made.
- Flight time available before the emergency, as anticipated, takes place.
- The specific exits, which are *not* to be utilised (non-operational).

The cabin crew in-charge, subsequently and accordingly briefs the other cabin crew members.

9.3 Unanticipated Emergency

These pitfalls arise all of a sudden and the cabin crew members are required to act on their own judgment in absence of any order/instruction from the commander or the cabin crew in-charge.

9.4 Emergency Evacuation

This is the action of vacating the aircraft when such necessity arises out of development of an emergency condition. For this, two conditions have to be essentially satisfied before commencing the emergency evacuation. The conditions are:

- ***The aircraft must be on ground, and***
- ***The aircraft must have stopped moving (is stationary).***

Individual cabin crew could initiate the evacuation with the command from the cockpit, from the cabin crew in-charge, or on his/her self-judgment, (that such evacuation is absolutely necessary). Before the evacuation, the suitability of the outside ground condition where the passengers would

*__Note:__ The two previously stated incidents, narrated through case studies 10 & 11, are examples of the two types of emergencies.

be sliding down, is to be ascertained. This said suitability expresses that the place should *not* be

- ***Infested with rough pebbles and/or boulders,***
- ***Strewn with jagged metal and/or glass pieces,***
- ***Adjacent to an overhang or ditch,*** **and most importantly**
- ***In the proximity of any fire.***

Incase these conditions are judged absent, the concerned door(s) should then be opened in '***armed***' condition, for evacuation. The chute would then be inflated automatically. If it does not, it could be and must be inflated manually.

The passengers should be directed to leave behind their hand baggage and jump on the inflated chute and slide down.

The crew members should expedite the process at best they can, avoiding all commotion and stampede.

There must be a systematic, periodical and streamlined flow of people throughout the evacuation operation.

Make sure that no passenger hesitates to jump on the slide restricting and bringing all others behind him/her to a standstill and thus hampering the said streamline flow.

9.5 Stipulated Composure and Other Qualities of Cabin Crew During Emergency Situation

Please perceive unequivocally and unambiguously before deciding to become a cabin crew that although the cabin crew on a flight are meant to look after the comfort of the passengers, their ***foremost duty*** is to ensure their (the passengers') safety in emergency situation. There cannot be any quantum of looking after, better than rendering them safety that cabin crew can offer or passengers can expect. To be able to provide such service, the cabin crew members need to possess

- ***Courage,***
- ***A cool and composed mind,***
- ***Command over vocabulary and pitch of voice,***
- ***An impassive facial expression, and***
- ***Appropriately controlled swift movements.***

These qualities of cabin crew members provide the much needed and well-deserved confidence to passengers. These qualities would also influence the passengers to realise that the cabin crew members are trained and efficient and they (the passengers) are in safe hands.

Contrary to this, if the crew members panic in emergency situations, not only would they be unable to render the requisite help to others, but also they themselves would then become a liability on others. The said behaviour is totally unacceptable and unwanted from a cabin crew and it is regarded as total disqualification.

Figure 9.1 *Inflated Slide in Use*

Keeping these in mind and before aspiring to begin a career as a cabin crew, the readers should deem seriously and mentally visualise themselves in these untoward situations, be true to themselves, analyse, assess and evaluate themselves and confirm thereafter that they would be able to surmount the situation and could act according to the demands of the circumstances. They should not cheat themselves and jeopardizes the lives of those people who would be relying on them in that situation and most essentially that of their own lives.

However, if they are disciplined, duty bound and not panicky, it is expected that they would continue nurturing these qualities and would revealing the same at the time of necessity in the way a paramount cabin crew arts.

9.6 Duties of the Cabin Crew In-charge During Anticipated Emergency Evacuation

After receiving the briefing from the commander, as in 9.2–"Anticipated Emergency", the cabin crew in-charge has to perform certain duties systematically, in coordination with all other cabin crew members of the flight. These are detailed below.

- Brief all other cabin crew about the emergency situation and adjure them to perform their respective duties incumbent in such exigency.
- Switch on all cabin lights to *maximum* intensity to facilitate visibility-enabling the cabin crew to perform their duties effectively.
- Make an announcement over the PA (public address) system for the benefit of the passengers. The model announcement and the points to be covered in the announcement are as follows:
  - *There is a chance of development of an untoward situation (carefully eliminating the word 'emergency' to avoid panic) and the passengers might have to be evacuated after landing.*
  - *Each cabin crew is thoroughly trained to counter the situation. They are going to guide the passengers to safety. The total operation will be completed within a very short period. Passengers are required to just comply with the cabin crew's instructions unquestioningly and swiftly.*
  - *The aircraft is so designed and is carrying all such equipment that could be needed to encounter the situation.*
  - *Each passenger should locate the emergency exit, nearest to his/her seat.*
  - *They should refer to the safety card, already placed in the seat pocket in front of them, and follow the instructions mentioned in that.*
  - *They must extinguish cigarettes. (In case of a non-smoking flight, this part should be avoided).*
  - *The seat belt has to be fastened preferably by placing some sort of soft padding such as folded jacket, blanket, cushion etc. between the body and the seat belt.*
  - *The seatback should be made upright.*
  - *The necktie, if worn, is to be removed and the shirt collar button to be unfastened.*
  - *Denture/false teeth, if any, shoes and any sharp objects carried in person is to be removed and stowed suitably.*
  - *A 'brace position' has to be taken when the 'no smoking' sign is flashed repeatedly with a chime and an announcement to that regard is made just before the touch down. The passengers are to remain in that position until the aircraft comes to a stand still.*
  - *The seat belt must not be opened until the aircraft becomes stationary.*
  - *The passengers are to reach the nearest exit in a queue and subsequently, jump-sit on to the inflated chute and slide down.*
  - *No hand baggage of whatever nature and of whatever importance should be carried.*
  - *The passengers should move away from the aircraft and stay in groups after getting out of the aircraft.*

- *There is no reason and need to be tensed. Passengers would be taken out of the aircraft within seconds and would certainly be safe.*
- *The cabin crew members are thoroughly trained and efficient to handle the situation.* (This part is reiterated intentionally in this text as this portion has to be announced repeatedly to instill additional confidence in passengers).

- Stow away all the loose items inside the galley cupboards and drawers and subsequently latch and lock their doors mechanically.
- Lock all trolley doors and engage the mechanical locks for those.
- Engage the mechanical locks for the flasks (the liquid containers).
- Latch all the oven doors and engage the mechanical locks for those.
- Double-check that all the available mechanical locks for every item in the galley are 'on'.
- Switch off all electrical equipment and pull out the circuit breakers.
- Move the galley curtains to open position and secure them with the aircraft structure.
- Physically check that the passengers have complied with the instructions given through the PA system in coordination with the other cabin crew members assigned to the galley.
- Check that all the exit passages are clear and unobstructed.
- Check that the toilets are vacant. If not, instruct the occupant to expedite to get back to his/her seat. Lock the toilet doors from outside, when vacant.
- Secure the megaphone (might be needed later to provide instructions to the passengers).
- Keep the emergency radio beacon handy (to be subsequently carried along, especially if the landing is not in an airfield).
- Keep the first aid kit, physician's kit and own serviceable torch handy.
- After receiving the briefing about the readiness of the galley(s) and the cabin from other galley in-charges, reduce the intensity of the cabin lighting to the minimum.
- Report to the commander that the cabin is fully prepared for landing.
- Take his/her own station and fasten the seat belt and the shoulder harness.
- Just before the touch down, the cockpit crew would flash the 'no smoking' sign, repeatedly. Announce 'Take brace position' twice or thrice, over the PA system at that time.

The invalid/handicapped persons are to be evacuated last. Although the act sounds and in fact, is truly inhuman indeed, however, the same has to be complied with to evacuate maximum number of passengers, without bottlenecking thje process of evacuation.

It would be a matter of utmost importance and practical compliance that the appearance of every cabin crew should reflect a brimming confidence to achieve trust from the excited and panic-stricken passengers. The effect would be totally opposite if they (the cabin crew) appear dull and display lack of self-confidence and job knowledge.

9.7 Duties of Other Cabin Crew in Case of Evacuation

These are the very same as the duties performed by the cabin crew members during every takeoff and landing as mentioned in 5.3.1A–"Checks and Duties to be Performed in the Passenger Cabin" and 5.3.1B–"Checks and Duties to be Performed in the Galley" but only discharged with much strict alertness in this case.

9.8 Duties of Cabin Crew in Case of Ditching (Landing on Water Surface)

Over and above all that is mentioned earlier in 9.6–"Duties of Cabin Crew In-charge During Anticipated Emergency Evacuation" and 9.7–"Duties of Other Cabin Crew in Case of Evacuation, cabin crew members are to check and ensure that:

- Each passenger has put on his/her life jacket.
  (The life jackets are to be inflated **only** *when the user has gone out of the aircraft. However, the life jacket of each infant must be inflated soon after wearing).*
- Maximum amount of water, drinkable fluids and eatables are carried along.

9.9 Duties of Cabin Crew After Touch Down (Landing) in Case of 'Emergency'

- Cabin crew members have to wait until the aircraft comes to a stand still.
- The commander or the cabin crew in-charge would give the instruction to begin evacuation through 'EVAC'. However, individual cabin crew can initiate the evacuation on their own, in case they judge that the same (the evacuation) is absolutely essential.
- Before beginning to evacuate, the outside condition should be checked for suitability (which construes the absence of strewed jagged metal pieces, rough pebbles, overhangs and fire as narrated in 9.4–"Emergency Evacuation") through the small window (peep window) on the exit. If any of these mentioned items are present, the exit might have to be rated as unusable and the evacuation has to be restricted through the particular exit. In this case, the exit approaching passengers have to be directed to another available/serviceable exit.
- If the previously mentioned conditions are satisfied, the exit is suitable for evacuation and it should be opened in '*armed*' condition, then. With the opening of the exit, the chute would hang down from and out of the door seal and would start inflating simultaneously. The slide would be fully inflated and ready for use within a few seconds. Soon, the chute is fully inflated, the cabin crew have to stand aside the door and instruct the passengers to sit-jump on the slide (the inflated chute) on their hips, assuming a 'straightened-leg sitting' posture (as displayed on the safety card) and slide down. It would be essential to constitute a steady stream of passengers, maintaining a little gap in-between each of them at the same time.
- Voice vocal instructions like 'hurry up', 'move fast', 'jump and slide' etc. (the positive commands) continuously and refrain from uttering 'don't wait', 'don't delay' etc. (the negative commands).

Figure 9.2 *Ditching*

- Invalid or handicapped passengers have to be evacuated after other passengers have been evacuated in order to expedite the evacuation procedure and evacuate maximum number of passengers.
- See that the flow of passengers is not disrupted by any of them-hesitating to jump and slide. A gentle push under the waist level may be executed onto such persons for the similar reason given in the previous point.
- If the slide-pressure appears to have reduced, evacuation through that particular door has to be discontinued. Obstruct the door physically and direct the approaching passengers to other operational doors.
- A thorough search has to be executed for any passenger being left inside the aircraft, before the crew members leave the aircraft.
- Passengers are to be regrouped at a considerable distance from the aircraft.
- First aid has to be administered, if needed.

9.10 Duties for Evacuation in Case of Ditching

In case of ditching (landing on water surface), the slides would act as dinghies. Passengers have to simply step into the dinghy instead of sliding.

- Each of these dinghies has a specific capacity and it can carry only a certain number of passengers at its maximum. When the number of passengers reaches *one short* of the full/ maximum capacity of the dinghy, cabin crew member has to stop further boarding and direct the approaching passengers to another exit/dinghy.
- Ensure that each person has inflated his/her life jacket as soon as he/she has come out of the aircraft.
- Load the previously mentioned emergency equipment, food, water bottles and liquid containers that were kept handy earlier for the purpose.
- Load the emergency radio beacon if the station has any of these. This is unequivocally essential in this happening (in case of ditching).
- Detach the dinghy from the aircraft fuselage by pulling the detach handle (located in the proximity of the door-at the floor level) and board the dinghy, making the capacity of the dinghy to maximum.
  (The cabin crew's boarding is inevitable and for this reason only, one less passenger from the maximum capacity of the dinghy was loaded earlier.)
- Row the dinghy away from the aircraft at the best possible speed.
- Stay near the other dinghies and if possible, tie all the dinghies loosely (*to avoid friction amongst the dinghies*) together *(to remain near each other).*

9.11 Jammed Doors

If any serviceable door does not open with the pneumatic assistance or otherwise, hard push and utmost force should be exerted to overpower the jammed door, open. However, if the door remains unmoved even then, the passengers should be guided to other serviceable doors without wasting time.

9.12 Unanticipated Emergency Evacuation

In case of unanticipated emergency situation, the normal duties already complied with in regard to galley and cabin preparation, whenever the 'fasten seat belt' sign was switched on mandatory

basis (viz. before takeoff, before landing and during turbulent weather, as stated in 5.3.1A–"Checks and Duties to be Performed in the Passenger Cabin" and 5.3.1B–"Checks and Duties to be Performed in the Galley"), would come in exceptionally handy, as far as the cabin preparation part of this present situation is concerned. However, any prior briefing, as that of anticipated emergency condition, would obviously be absent in this case.

In this situation (unanticipated emergency condition) also, the commander or the cabin crew in-charge might convey the order for initiating the evacuation through 'evacuation command system' (EVAC system).

When the commander or the cabin crew in-charge punches the EVAC switch it originates an 'audio (beep) visual (flashing lights) signal' instructing the cabin crew to actuate the evacuation procedure.

- Individual cabin crew could also originate the evacuation procedure on his/her own, in absence of any such instruction through the EVAC. The needed authority and conditions for adopting such procedure has been discussed in 9.9–"Duties of Cabin Crew After Touch Down (Landing) in Emergency Condition–(2nd point)".

9.13 Duties of Cabin Crew During Depressurisation

It is well-known that with the increase of altitude the density of air decreases and thus the quantity of oxygen rarefies. This rarefaction of oxygen becomes alarming when the cabin altitude rises above 14000 ft. (commonly known as safe altitude) and human beings start experiencing breathing problem along with other physical discomforts. To counter this rarefaction of oxygen and passenger discomfort, all modern aircraft's cabin is pumped with sufficient quantity of 'conditioned air' and hence oxygen (Refer to 4.2–"Air-conditioning and Pressurization"). This process is known as 'pressurization of the cabin'.

Again, as the altitude increases, the atmospheric temperature decreases. For this reason, for modern airliners the cabin has to be heated to counter this problem/deficiency.

When an aircraft flies at a higher altitude than the safe altitude (viz. 14000 ft.), the deficiency of oxygen and low temperature are counteracted by pumping in a mixture of hot and cold air, after deducting the moisture from it (the conditioned air) (Refer to 4.2–"Air-conditioning and Pressurization"). This pressurised conditioned air thus simulates the condition inside the cabin to make the cabin's condition homogeneous to the atmospheric condition of a lower level than the safe altitude. This means that although the aircraft is actually flying at a higher altitude than the safe altitude, the cabin condition is maintained or simulated to correspond to that of an atmospheric altitude-lower than the safe altitude. The corresponding altitude at which the cabin is maintained/simulated is known as 'cabin altitude'.

For example, if an aircraft is flying at an altitude of 31000 ft. and the cabin condition is simulated to be analogous to the atmospheric condition existing at 8000 ft, the cabin altitude would then be 8000 ft.

Any leakage of this pressurised air from the cabin gives rise to the predicament of 'Depressurisation'. The quantity of leakage could be segmented in three categories in general, viz.

- ***Slow depressurisation.***

- ***Window crack leakage***
- ***Rapid decompression***

Each of these are discussed and elaborated hereafter.

9.13.1 Slow Depressurisation

These are small openings/gaps, wherefrom the air leaks out of the cabin at a very small rate signalling an indication for the cockpit crew. Although the matter is not very alarming, but ***in aviation-no chance involving safety is ever taken.*** In this situation, as a precautionary measure:

- The commander would brief the cabin crew in-charge (who in turn would pass the same to other cabin crew members) about such occurrence and put the 'fasten seat belt' and 'no smoking' signs 'on'.
- Cabin crew would ensure that all passengers have complied with the aforesaid instructions and would also check that all the seatbacks are made upright.

9.13.2 Window Crack Leakage

The cabin crew normally detects this particular problem. Counteractions taken are:

- The cabin crew members inform the commander immediately.
- The cabin crew members move the passengers away by at least two rows from the row of the cracked window.
- The cockpit crew, switch on the 'fasten seat belt' and 'no smoking' signs.

Figure 9.3 *Hole - in an Aircraft cabin Window*

9.13.3 Rapid Decompression

This is the most alarming amongst the three and calls for prudent and prompt actions. This happens quite suddenly. The cabin would turn misty because of condensed water particles generated due to sudden fall in temperature. Passengers and crew would hear a loud bang and experience a severe ear pain, breathing discomfort etc.

The following happenings will take place in the cabin:

- The 'fasten seat belt' and 'no smoking' signs would come on and the passengers are to comply with the instructions immediately.

- The passenger service unit (PSU) doors would open of its own due to fall of pressure or would be opened electrically from the cockpit and the oxygen masks would drop down. Passengers are to pull a mask each, cover his/her nose and mouth with it and breathe normally, as elaborated in 4.5.6–"Emergency Oxygen Masks".
- The commander would put the aircraft in a steep dive in order to attain the safe altitude (viz. 14000 ft.) at the earliest.
- The cabin crew are required to occupy his/her seat or the nearest vacant seat in case he/she is serving in the cabin and is distanced from his/her seat, fasten the seat belt, pull an oxygen mask and breathe through it. In case of non-availability of a vacant seat, the cabin crew should take a deep breath through a spare mask (remains available even if all the seats are occupied), reach his/her station, fasten the seat belt and shoulder harness and breathe through the oxygen mask available at the station analogously to that of all passenger seats.
- Subsequently and after receiving instruction from the commander, the cabin crew armed with portable oxygen cylinder and manual release key would move round the cabin to confirm if any of the passengers require more oxygen (due to tension or so) or any other help and provide such.
- Thereafter, the galley and cabin has to be fully prepared for the landing (which could not have been done earlier due to the occurred emergency and absence of time).

Figure 9.4 *Dropping of Oxygen Masks due to Pressurisation Failure*

9.14 Occurrence of Fire on Board and Fire Fighting

'Action' is the first and the only word for fire fighting. Every fire has got to be restricted and extinguished at the earliest. With the passage of every fraction of a second that the fire is allowed to spread, the degree of danger increases considerably.

There is no worse hazard one can imagine than be in a burning aircraft, whether on ground or in flight. As such, in this situation-reporting, asking for help, communication, etc. would have to be done simultaneously, while putting in maximum effort to extinguish the fire.

Figure 9.5 *Smoke with Fire in Aircraft cabin*

9.14.1 Types of Fire

The nature of the Fire in an aircraft cabin can be segregated into three categories, viz.

- ***General fire,***
- ***Oil-fuel fire, and***
- ***Electrical fire.***

These are elaborated individually below:

- **General fire:** Passenger falling asleep while smoking might start burning of the blanket and a simple fire might occur. Glowing cigarette kept at the corner of the toilet basin might fall on the toilet paper roll below with a bounce of the aircraft and generate a fire. Both these incidents are examples of a general fire.
- **Oil-Fuel Fire:** Cabin crew, smoking inside the galley keeping the oily oven open, might initiate a fire inside the oven. Smoking inside or near an aircraft eluding the cabin crew and ground staff, while the aircraft is being refueled, might again give rise to such happening. The fire originated from such or in other words, from oil or fuel could be categorised as oil-fuel fire.
- **Electrical Fire:** Short circuit, as in every other place, might happen inside the aircraft also and could ignite a fire. Cabin crew, taxing any electrical equipment beyond limit, could also give rise to this situation. The fire ensuing from such basis could be categorised as electrical fire.

Figure 9.6 *Fire from Cigarette*

9.14.2 Extinction of Fire

Origination and continuation of every fire essentially requires the presence of all the three following items, viz.

- ***Material***
- ***Heat***
- ***Oxygen***

If *any one* of the three items is unavailable to fire, it can neither originate nor continue. Again, if *any one* of the three items is removed from an already burning fire, it will be positively extinguished.

If the previously mentioned examples of fire hazard are reviewed, it could be concluded that:

- If the material, say the blanket, would not have been there near the cigarette, the fire could not have initiated. This proves that a material or an inflammable item is essential for the generation of fire. If the material could subsequently be removed, 'the cause of occurrence'/ 'the process of burning' of the fire could be accepted to have been removed.
- Again, if water is poured on the burning blanket, the fire would get killed due to lack of the needed heat/temperature for the fire to persist.
- If the burning blanket is just stamped with shoes, the small fire would get extinguished because the requisite oxygen supply for the fire had than been barred/disallowed.

9.14.3 Locating the Fire

For fire fighting, it is essential and the matter of utmost importance-to pinpoint the fountainhead or the base of the fire first and fast.

A huge supply of fire fighting equipment cannot practically be provided in an aircraft because of factors like the upsurge in weight, loss of profit related space etc. As such, it is desirable that the minimum portion from the provided 'limited-but-adequate' supply should be utilised to extinguish the fire because it can never be predicted with certainty that other unwanted, but possible reccurrence of the initiation of fire would not take place during the remaining part of the flight period. For this reason, locating the exact origin of the fire is of utmost importance, so that the content of the fire extinguisher could only be discharged at that point (the base of the fire) and not sprayed all over the non-essential part of the fire structure.

To prevent the misuse of the content, it should be discharged in short bursts-keeping a vigil on the intensity of the lambent and avoiding the spraying of the same area repeatedly. Spraying the already sprayed portion unnecessarily would result in unwanted wastage of the extinguishing chemical.

However, for saving the content of the fire extinguisher or for that matter for any other reason whatsoever, the fire must *never* be left sulking. It has to be extinguished *totally*. Do remember that '***The fire has got to be doused and not drowsed'***.

9.14.4 Fire Fighting by Cabin Crew

The cabin crew as a fire fighter has got to keep him/herself safe in the first place because if the cabin crew/fire fighter becomes ineffective/injured, who would fight the fire then?

To affect this 'keeping safe' factor, several auxiliary fire fighting equipment and protective gear are made available to the cabin crew. Discussion of all such equipment has been done in chapter seven, in detail.

A cabin crew should fight the fire with alacrity that could be best mustered by him/her. For this, the necessary guidelines are as follows:

- Cabin crew member has to acquire the fire extinguisher from the nearest available location.
- He/she has to locate the base of the fire. If it is not visible, the cabin crew might have to remove the obstruction/screen by cutting it open with the help of fire axe (also known as crash axe).
- After and/or during the cutting procedure, the cabin crew might have to touch, hold and/or bend some metal structures, turned hot by the fire and in such cases, he/she has to use the asbestos gloves.

- Hold the fire extinguisher by its carrying handle only-because during its use, the temperature of the cylinder goes well below the mark bearable by human skin.
- Break the protective seal with the help of the lever meant for that purpose or pull out the tab, as the system of the fire extinguisher might be.
- Aim at the base of the fire and discharge the content *in short bursts.* (The reasons why only short bursts are to be applied are in point 9.14.3–"Locating the Fire").
- Extinguish the fire **entirely**.

9.14.5 Duties of Other Cabin Crew—Not Fighting the Fire

The cabin crew members, other than the ones fighting the fire, are to perform the job of the twelfth man in a cricket team. They are to anticipate and furnish all the requisite help needed by the fire fighter and at the same time to look after the safety of the passengers, especially those near the fire. For this, they are to coordinate amongst themselves and to comply with the following jobs.

- Communicate the happening, relating its magnitude and dilution to the commander of the flight either through the cabin crew in-charge or directly over the intercom, if so desired by the commander, periodically.
- Shift the passengers from the vicinity of the fire-affected zone.
- Remove all emergency equipment from the vicinity of the aforementioned location.
- Furnish or arrange to keep ready further supply of fire extinguishers, fire axes, portable oxygen cylinders, full-face masks, asbestos gloves and first aid kits, etc. as anticipated to be required.
- Strict vigilance is to be enforced to observe that none of the passengers is smoking despite the 'no smoking' sign having been switched on from the cockpit (only if it is a smoking flight otherwise the sign remains 'on' throughout the flight).
- Close the air louvres (air inlets), so that fresh oxygen does not aggravate the fire.
- Pull out all the circuit breakers, if any such are located near the area of occurrence, as a precautionary measure.
- Provide wet towels and advise the passengers to breathe through these to prevent inhalation of smoke and/or toxic fumes.
- Provide first aid to persons requiring it.

9.14.6 Presence of Smoke and/or Fire in the Toilets

All modern aircraft toilets are constructed with fireproof material to minimise this problem. In addition to this, the toilets are fitted with their individual fire extinguisher which activates with the rise of temperature or initiation of smoke inside the toilet.

This sort of happening normally occurs because of some non-law-abiding and errant persons, who without realising the gravity of a fire hazard in a flying aircraft, smoke inside the toilet.

In addition to all the aforementioned safety devices effective in the toilets, an audio-visual warning system originates from each individual toilet to alert the crew and to pinpoint the concerned/affected toilet. When the cabin crew members receive such audio-visual signals, they remain duty-bound to investigate the cause of such warning irrespective of whether the fire had initiated actually or if it was a false alarm. In both the cases, they are required to probe thoroughly to detect whether any fire is persisting. Incase of detection of any fire, they are to take requisite action as stated earlier to fight and extinguish the fire.

The louvre of the particular toilet is to be blocked and its door is to be locked from outside and kept in that condition, until the aircraft reaches its destination.

The said audio-visual indication system should be reset, so that it turns effective once again and could emit similar indications in case of a reccurrence of the fire during the remaining part of the flight. However, through the process of resetting, one particular indication would not get reset and shall stay so to indicate the happening to the engineering personnel on ground.

Later, at a base station, the engineering personnel would essentially carry out a thorough check to detect and rectify the damage (if any), replace the auto fire extinguisher of the toilet (if found used) and also redress the warning system.

For every such happening, the commander and the cabin crew in-charge should be intimated and the happening should be recorded in the 'cabin defect report book' (CDRbook). (The CDRbook: Discussed in 1.4.1–"On Reaching the Aircraft" (*Checking Emergency Equipment*)).

9.15 Bomb Scare on Board

It may be grasped that any and every suspicious object, unclaimed by the occupants of the aircraft in flight or on ground should be treated as a suspected explosive article irrespective of it actually is or not. From the time of locating such objects, the same would be referred to as 'explosive', whether it is in reality or not, so that one initiates and continues accepting the object as an explosive in his/her mind, which becomes thoroughly necessary to follow in practice.

Most of the explosive devices used in the field of aviation are ***normally*** made effective by any of the following devices:

- **Time Fuse:** In this device – a connector advances towards the other with passage of time and executes the explosion when they make contact and complete the circuit at the preset time (or after the preset period). The explosive of this typical category is commonly known as 'Time Bomb'.
- **Attitude Fuse:** In this device, two chemical solutions are separated by a partition. Any changed attitude of the explosive would allow the solutions to jump the partition and synthesise to affect the detonation.
- **Pull-Trigger Fuse:** In this device, the explosive's trigger is made to attach to its base (on the surface it is kept), by a hook/tackle. If the explosive is tried to be moved, the trigger gets pulled and it explodes.

If any of the cabin crew locates any such unidentified object, he/she must report this 'detection' to the cabin crew in-charge and/or the commander, compulsorily. The object will have to be treated as an explosive from that very moment.

It then becomes essential to move the explosive to a place inside the aircraft cabin (as there is no provision to throw it out of the aircraft), where, if it explodes, the damage created would be of minimum gravity. This place/location inside the aircraft cabin is known as 'Least Risk Zone'.

9.15.1 The Least Risk Zone

Separate types of aircraft have their individual and particular 'least risk zone'. Necessarily, this zone has to be so located that the place remains the furthest from the

- ***Fuel carrying pipelines,***
- ***Hydraulic fluid pipelines,***
- ***Aircraft control cables, and***
- ***The fuel tank (****most essential****)***

For majority of the aircraft this zone lies near the ***aft starboard side*** (right side of the aircraft) ***door***.

9.15.2 Shifting of the Explosive

Assuming that the 'least risk zone' is indeed at the aft right door for the type of aircraft one is flying in and the explosive is found on a passenger seat near the front of the cabin, the cabin crew has to move the explosive to the LRZ. However, before the explosive is moved, it has to be determined whether there exists any attachment between the explosive and the surface that supports it (its base). If the explosive is attached to its base, it will then be impossible to shift the explosive anywhere.

9.15.3 Check to Determine—If the Explosive is Attached to its Base

To determine this, slide a hard card/board (a safety card would be ideal) between the explosive and the base on which it is placed. Do refrain from forcing the card to pass through as the necessity for this probing is to ascertain the presence of any pull-trigger fuse/device attached to the explosive. If there is any such fuse attached to the explosive and the card is forced through, it will agitate the trigger and detonate the explosive immediately. The card is to be pushed lightly and carefully. If it passes clean through, one can be indubitably sure about the absence of a pull-trigger system.

It may be reiterated that if the card is obstructed, the cabin crew should never try to exert any further force because the obstruction to the movement of the card would be a clear indication of the presence of a 'pull trigger fuse' and in such condition, it would *not* be possible to move the explosive.

The needed and further actions of the cabin crew bifurcate at this juncture.

9.15.3A Deeds of Cabin Crew—If the Card Passes

Passing through of the card unequivocally proves that there is no pull trigger device attached to the explosive and it is possible to move the explosive to the least risk zone. In such cases and assuming the LRZ is near the aft right exit:

- Move the passengers occupying the last three rows of seats to other seats. If the seats are not available, those unfortunate passengers might have to sit on the cabin floor. (***Reason:*** At least they would be away from the explosion zone and be safer from the splinters, if the explosive detonates).
- 'Disarm' the door (the aft right exit). (***Reason:*** The chute would not at least inflate and create further problem along with that of the explosion. Also, it could possibly be used for evacuation, subject to its remaining usable, and incase such need arises).
- All Emergency Equipment has to be removed from the vicinity of the door to avail their utility later, if so needed.
- The nearest galley is to be latched, locked and the circuit breakers pulled out as a precautionary measure.
- Build a platform using the available baggage up to a suitable height depending on the type of the aircraft. Normally, this height is about 1.5 ft. to 2.0 ft. from the cabin floor for the moderately high ceiling aircraft. (***Reason:*** The intensity of explosion would not exert its total 'knock off effect' on the cabin floor then).
- Lift the explosive very carefully, exerting utmost care not to change its attitude. (***Reason:*** Changing the attitude of any explosive with the 'attitude fuse device' would trigger the explosion). Carry it to the 'least risk zone' and place it on the pre-constructed platform.
- Secure the explosive with the cabin wall or the door to immobilise it by using adhesive tapes. (Adhesive bandage from the first aid kit would be ideal for this purpose).

- Thereafter, cover the explosive with plastic sheets to prevent it from getting damped. Getting wet might well give rise to the cause of occurrence of explosion. ('Blanket covers' or polythene carry bags could effectively be used).

Subsequently, cover the explosive with plenty of *wet* blankets/soft materials. (***Reason:*** Wet blankets would not dampen the explosive because of presence of polythene sheets and simultaneously would minimise the force of ejection of splinters from the explosive. In addition, the wet blankets would achieve a cooling effect to reduce the possibility of any fire hazard, at the same time).

- Finally, construct a barrier with the seat cushions, enveloping the whole assembly including the platform, till the cabin ceiling to obstruct the splinters further.

Care should be exerted regarding not utilising any hard items to construct the barrier, as those hard objects might then be acting as projectiles/splinters themselves, when the explosion occurs.

9.15.3B Duties of Cabin Crew—If the Card Does not Pass

Not passing of the card confirms that a hook/pull-trigger device is attached to the explosive and it would certainly not be possible to move the explosive. In that case, every step as stated in 9.15.3A–"Deeds of Cabin Crew—if the card passes" is to be performed with an exception of building the platform and moving the explosive from the location of its detection.

9.16 Hijacking

Trying to defuse or at least minimise the situation with tact is the foremost duty of the cabin crew members in case of hijacking. Cabin crew members should remember that the wellbeing of the passengers and crew members has to be the paramount consideration. Any small misdeed from any one of them could jeopardize the safety of the occupants.

The commander's instructions have to be complied with unquestionably and in seriatim.

Non-compliance of any demand from the hijackers could irritate them. This is thoroughly unwanted and cabin crew should meticulously avoid such deeds.

The cabin crew members should try and purchase as much time as possible.

The cabin crew members should offer food and extra sweetened drinks to the hijackers while exerting considerable care not to irritate them (the hijackers) with their (cabin crew's) insistence in order to make the hijackers consume the offered food and drinks.

Only after authenticating about the congeniality of their mood, the cabin crew members might try talking to the hijackers about their family, place they live their childhood etc., involving sentiment.

The cabin crew members should positively and deliberately refrain from talking about their (the hijackers') faith, creed and principle for being involved in their present act.

Cabin crew members may try to plead for the release of all passengers first and if it is not agreeable to them (the hijackers), they could appeal for the release of at least the children, old and infirm passengers and those needing medical attention.

Glossary

1. ***Anticipated Emergency*** In case of emergency condition of this category the crew members have the precognition of the happening, can be prepared in anticipation and even receive a briefing about counteracting such emergency condition.

2. ***Decompression*** This is a sudden and massive decrease of aircraft cabin pressure due to leakage of air.
3. ***Depressurisation*** This is the leakage of conditioned air from the aircraft cabin.
4. ***Ditching*** This is an abnormal landing on water surface caused by the development of an in-flight emergency.
5. ***Emergency Evacuation*** This is the action of vacating the aircraft when such necessity arises out of development of an emergency condition.
6. ***Emergency Landing*** This is an unscheduled landing caused by the development of an in-flight emergency.
7. ***Explosive*** Items, those are capable of exploding or tending to explode.
8. ***Negative Commands*** These are the indirect instructions like 'do not do this', 'do not do that' etc.
9. ***Positive Commands*** These are the directions issued to do something directly, like 'do this', 'do that' etc.
10. ***Unanticipated Emergency*** Emergency condition of this category comes suddenly without any warning or briefing and cabin crew are to counteract these on their own, in absence of any order from the commander or the cabin crew in-charge.

Questionnaire

1. In an anticipated emergency, a cabin crew:
(a) Shall receive a briefing
(b) As in (a) and cannot take any decision contrary to that
(c) As in (a) and can take a decision in case such is unavoidable
(d) Shall not receive any instruction and has to act as per own judgement

2. Emergency evacuation has to be started:
(a) Immediately the aircraft touches down
(b) Only after receiving an order from the commander or the cabin crew in-charge
(c) Immediately after the aircraft comes to a halt
(d) None of the above is correct

3. Incase of ditching:
(a) The cabin crew shall distribute the life jackets
(b) Allow the passengers to slide down the chute
(c) Allow only a stipulated number of passengers to board the dinghy
(d) All the above are correct

4. When is an invalid Passenger evacuated?
(a) First
(b) Last
(c) Any time in between whenever his/her turn comes
(d) After the crew members

5. In case of a slow leakage/depressurisation:
(a) The fasten seat belt and no smoking signs shall come on
(b) As in (a) and oxygen masks will drop down

(c) Cabin shall turn misty
(d) All the above are correct

6. Fire can be extinguished by preventing:
(a) Oxygen from reaching the fire
(b) Removing the heat or in other words, by reducing the temperature
(c) Removing the burning material from the fire
(d) Any of the above

7. Incase of a decompression the cabin crew serving in the cabin should:
(a) Occupy the nearest seat, fasten seat belt and use the available oxygen mask
(b) Prepare the galley for emergency landing
(c) Complete the passenger service
(d) All the above are incorrect

8. Fire should be extinguished by:
(a) Spraying the base of the fire
(b) As in (a) and in short bursts
(c) As in (a) and continuously
(d) As in (b) and while holding the fire extinguisher's body

9. Incase of a fire in the toilet:
(a) Cabin crew need not pay any attention as it will extinguish automatically
(b) Cabin crew will not know about the happening as the toilet doors are closed
(c) Cabin crew need not bother as the toilets are made of fire-proof material
(d) None of the above is correct

10. In case an unidentified object is found on board:
(a) The cabin crew should pay much heed to it and inform the security personnel
(b) The cabin crew should accept it as a probable explosive
(c) As in (b) and shift it to the least risk zone immediately
(d) As in (b) and shift it to the least risk zone after confirming no pull trigger fuse

11. The unidentified object or the probable explosive:
(a) Should be covered with wet blankets directly to cool it
(b) Should be shifted near the cockpit
(c) Should be sprayed with fire extinguishing chemical in order to cool it
(d) None of the above is correct

12. In case of hijacking:
(a) The cabin crew should force the hijacker to consume food and beverage
(b) Should not discuss the hijacker's faith, creed and principle for his/her act
(c) Should take immediate action and plead for release of passengers
(d) All the above are correct

10

Components, Controls and Instruments of the Aircraft

10.1 Introductory Advice

In this Chapter, various components of the aircraft and their utilities are discussed. In order to explain one of them and/or its utilisation, mentioning about some other component(s) and/or some specific terms/definitions becomes essential.

The elaboration of the second category of the mentioned components/terms have been complied with and explained in the later part of the chapter and also in chapter eleven. As such, it is advisable to study both the chapters fully to be conversant with all the terms and definitions in a better way.

10.2 Components of Aircraft

Modern aircraft have numerous components and various sophisticated instruments. Some of the basic and important ones are cited and discussed below.

10.2.1 Fuselage

It is the central body or the main structure of the aircraft to which other surfaces like wings, tail plain, undercarriage, etc. are attached. This part of the aircraft structure, which spans from its nose to tail, accommodates the pilot cabin (cockpit), the passenger cabin and the cargo hold(s).

For suiting the demands of its purpose, obviously, the said structure cannot be constructed with solid metal. The primary requirement is to simultaneously acquire a strong and a lightweight structure. To satisfy both these conditions, it is built following a concept that is comparable to that of the human body.

In the case of a human body, flesh and skin cover the skeleton, whereas in the case of fuselage the skeleton is the framework made out of wood or metal alloy that is subsequently covered by fabric or metal alloy sheets; analogous to the flesh and skin of the human body.

The said concept satisfies both the previously mentioned conditions and gives the fuselage the desired structural shape and the strength for satisfying the purpose of its requirement.

Various other fitments, such as wings, undercarriage and control surfaces are accreted to the fuselage.

Even the engine is commonly mounted on the nose part of the fuselage in case of single engine aircraft.

10.2.2 Cockpit

This is the part of the fuselage meant to accommodate the pilot and other cockpit crew and is equipped with all the equipment and instruments that are needed to fly the aircraft.

10.2.3 Wings

The wings are attached horizontally towards the forward section of the fuselage. The periphery/side of the wings that is integrated to the fuselage is called the 'root of the wing'/'wing root' and the edge or the extreme end of the wing, farthest from the wing root, is called the 'tip of the wing'/'wing tip'.

The forward longitudinal side (the lengthwise side) of the wings that faces the air during the movement of the aircraft, is called the 'leading edge', while the rear longitudinal side of the wings, which accommodates the ailerons and the flaps (farthest from the forward edge) is called the 'trailing edge' of the wings.

The lateral (breadth-wise) cross section or the profile of the wings has an aerofoil shape (Refer to Figure 11.2 – "Wing Aerofoil Section") and possesses a typical aerodynamic quality. This quality enables the wings to acquire the necessary aerodynamic lift to support a heavier-than-air aircraft while moving through air, which makes the aircraft fly (Refer to 11.2.1 – "The Lift" and 11.4 – "Why the Aircraft Flies").

The structural construction of the wings follows the same principle as that of the fuselage and hence, is not a solid piece, again. In case of wings also, fabric or metal alloy sheeting respectively covers the wood or the metal alloy framework, respectively. Normally, the empty space inside the wing structure accommodates the fuel for flying the aircraft, or in other words, acts as a fuel tank.

10.2.4 The Tail Section

The tail section, also known as 'empennage', is composed of four components viz. tail plane/horizontal stabiliser, elevators, fin/vertical stabiliser and rudder.

All these four segments of the tail section are again not solid metal pieces, but a framework covered with sheet job analogous to those of fuselage and wings as described earlier and which follow their principle homogeneously.

10.2.4A Tail Plane/Horizontal Stabiliser

The tail plane is an immovable airfoil structure of the tail section that is assembled almost horizontally on the fuselage as that of the wings, which provides stability in pitching. Both the coupled elevators are attached equidistant from its middle, to constitute the tail plane. The tail plain could be trimmed from the cockpit.

10.2.4B Fin/Vertical Stabiliser

This immovable component of the tail section is assembled perpendicularly (vertically) to the fuselage at the middle of the tail plane. The rudder is hinged to its trailing edge.

10.2.5 The Flight Controls

Flight controls of an aircraft are the devices/ mechanisms that control the trajectory of an aircraft around its three axes. These are aileron, elevator and rudder.

10.2.5A Ailerons

The ailerons are one of the primary and wing-related flight control surfaces. These movable components are hinged at their own longitudinal fore end and are attached to the trailing edge of each wing to complete the formation of the wings. These could be raised or depressed by moving the 'stick' (Refer to 10.2.9 – "Stick/Control Column".) in the cockpit.

The ailerons are interlinked and by virtue of this interlinking, the movement of both the ailerons is simultaneous. The ailerons move in a way such that when one aileron on one wing goes up the other on the other wing goes down.

When the stick is moved to the right, it causes the right aileron to rise and the left to dip. Moving the stick to the opposite side, reverses the effect.

When the right aileron rises, it presents an abated angle of attack to the airflow which diminishes the 'Lift' acting on the right wing. At the same time, the dipped left aileron on the left wing then offers a dilated angle of attack to the airflow, which amplifies the lift acting on the left wing. Resultant to this variation of 'lift' (the lifting forces) acting on the wings, the right wing dips and the left wing goes up–following the principle of a steelyard (weighing balance). The difference in the two happenings is that in case of a steelyard, unequal weights tilt the bar of the balance, whereas in the other case the unequal forces acting on wings materialise the same effect. With the rising of the left wing and the consequent and simultaneous dipping of the right wing, the aircraft rolls or in other words, rotates towards the right, around an imaginary *longitudinal axis* passing through its nose and tail. This movement of the aircraft is known as rolling or banking (Refer to 11.3.4 – "Rolling").

As long as the stick is held towards the right, the rolling/banking continues to happen towards the right.

A total inverse effect of rolling/banking towards the right (above case) is possible, by displacing the stick towards the left side, when the rolling/banking will happen towards the left side.

Over and above the basic/primary effect of rolling, the ailerons render a secondary effect called yawing (Refer to 11.3.5 – "Yawing"). This occurs due to the unequal resistance produced by the ailerons owing to their upped and dipped positions, which subsequently create an unequal 'drag' (Refer to 11.2.2 – "The Drag") on the wings and evokes a yawing effect.

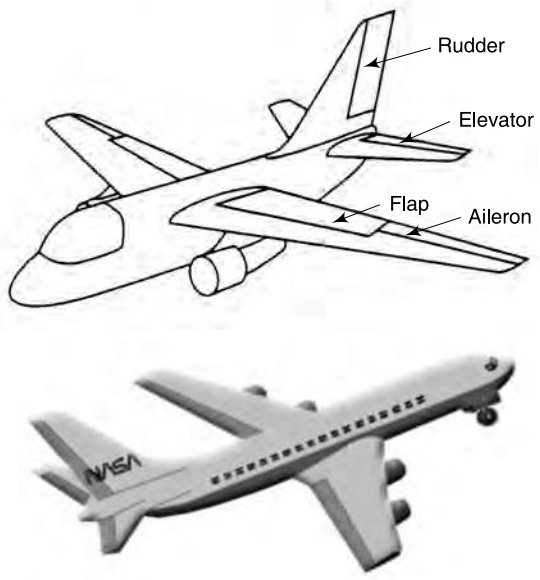


Figure 10.1 *Basic Control Surfaces*

10.2.5B Flaps

The flaps, attached to the trailing edge of the wings between the Ailerons and the fuselage are one of the auxiliary movable controls that form the wings. These could only be lowered simultaneously below the wing's surface, through a control (flap lever) in the cockpit. The extent of its lowering is measured by the angle, which the lowered flaps form with the wings. This is communicated or taken as 'Flaps lowered to such and such degree'. For example, 'Flaps 15' means that the flaps are lowered to form an angle of 15 degrees with the wings.

The interesting technicality about the flaps is that these provide lift more than the drag (Lift>Drag) when lowered by a smaller angle needed during takeoff, and produce drag more than the lift (Drag>Lift) when lowered by larger degrees needed during landing.

At certain times during takeoff the flaps might be but on through a lower angle to obtain the extra lift, simultaneously considering about the drag it evokes, which hampers/obstructs the acceleration of the moving aircraft.

However, the flaps are put on through various settings to suit the various phases of Landing and thereafter viz.

- *During descent*
- *Approach to land*
- *Final landing approach, and*
- *After touchdown rolling (moving on ground)*

Suitable lowering of the flaps, evokes the drag and provides the advantage of approach for landing at a steeper inclination/gradient with a reduced velocity/speed.

10.2.5C Elevators

This primary and movable control surface produces the pitching movement of the aircraft on its lateral axis. The forward longitudinal edge of the elevators is hinged to the trailing edge of the tail plane and can be moved up and down by the forward-backward displacement of the stick from the cockpit. The attachment of the elevators to the tail plane is exactly similar to that of the

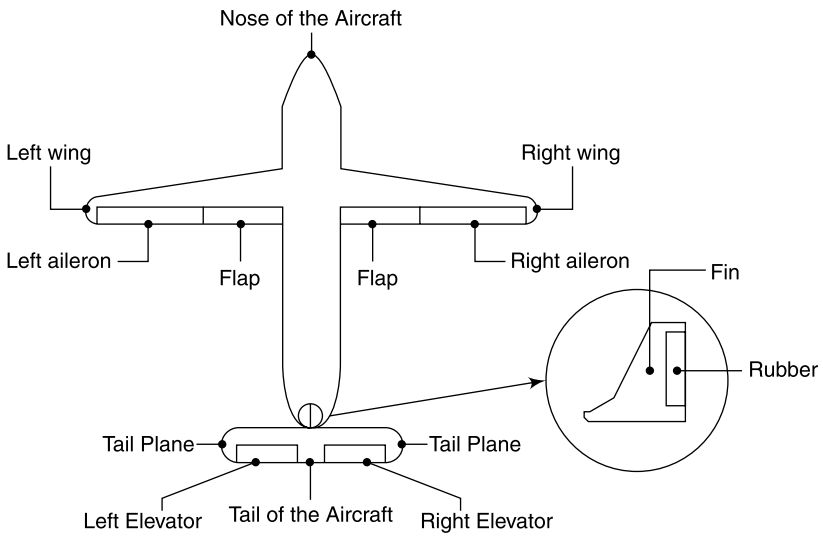


Figure 10.2 *Different parts of the Aircraft*

ailerons to the wings. However, the difference remains that in case of elevators, the movements are synchronised; that means both the elevators simultaneously either go up or go down.

When the stick is pulled backwards (towards the flier), the elevators erect and exert obstruction to the flow of air. This obstructed airflow, in turn, generates a pressure on the tail section of the aircraft. Resultant to this generated pressure, the aircraft pivots around an imaginary line passing through the aircraft's centre of gravity on its lateral axis. The tail of the aircraft goes down, the nose directs upwards and the aircraft climbs (goes upwards/gains altitude). As long as the stick is held in the previously mentioned position, the process continues to occur.

A totally inverse effect takes place when the stick is pushed forward (away from the flier).

It can thus be said that the elevators are instrumental in making the vertical movement of the tail plane and as such that of the entire aircraft, thereby causing the aircraft to climb or descend. This vertical movement of the Aircraft ('nose down-tail up' and vice versa) is known as 'Pitching' (Refer to 11.3.3 – "Pitching").

10.2.5D Rudder

This is a primary, vertical and movable control at the tail section, whose leading edge is hinged to the trailing edge of the fin, in a way analogous to that of the ailerons to the wings and elevators to the tail plane.

Movement of the rudder bar/pedal, located near the cockpit floor in front of the flier and accessible by his/her foot, actuates the rudder.

The rudder diverges to the right when the right side of the rudder bar/pedal is pushed forward (away from the flier/toward the nose of the aircraft). At this acquired position, the rudder obstructs the airflow passing through the right side of the aircraft, which in turn puts an opposing pressure on the rudder. Resultant to this last said pressure, the tail section turns around an imaginary line passing perpendicularly to the aircraft and through its centre of gravity (the vertical axis of the aircraft) towards the left, and simultaneously the nose turns towards the right. This horizontal turning of the aircraft is known as yawing (Refer to 11.3.5 – "Yawing").

A totally inverse effect is obtained by pushing the left side of the rudder bar/left rudder pedal, forward.

Beside the aforesaid effect, the rudder produces a secondary effect of rolling. While yawing, the displacement of the outer side of the wing (the wing tip) through air is obviously more than that of the inner side of the wing (the wing root). Due to this, the air speed experienced by the wing tip is more than that of the wing root. As a result of this, more lift is thus experienced by the wing tip than by the wing root, producing a rolling effect and the aircraft tends to bank.

The rudder can also actuate to turn the aircraft on ground for smaller aircraft at any speed and for bigger aircraft at lower speeds only.

10.2.6 Undercarriage

The undercarriage is required to manoeuvre the aircraft on ground. It consists of two supporting devices:

- ***The main landing gear, and***
- ***The nose landing gear or tail wheel-in older version of the aircraft***

The first mentioned pair of supporting devices, i.e., the main landing gear, is attached to the underside of the forward part of the fuselage, normally below the wings and is fitted with wheels to roll the aircraft on ground. Normally, the undercarriage are built with shock absorbing mechanisms to minimise the impact of touchdown (landing).

Figure 10.3 *Tricycle Undercarriage*

Figure 10.4 *Main Landing Gear*

Although fixed type of undercarriage still exist but all passenger liners have retractable undercarriage. In the latter type, the undercarriage lifts up after takeoff into the prefabricated housing, either inside the fuselage or inside the wings. The retracted undercarriage has essentially to be brought down before landing. The obvious advantage of the retractable type undercarriage is that it has no scope of offering any extra drag to the flying aircraft due to its presence, as in case of a fixed undercarriage. The refractable undercarriage gives a much better streamlined configuration to the aircraft.

As an aircraft cannot be stationary and stay balanced only on the main landing gear, another essential supporting device fitted with wheel is necessarily provided.

This latter supporting device is either mounted at the extreme rear end of the fuselage (known as 'Tail Wheel' which is not retractable) or mounted under the nose part of the fuselage (known as 'Nose Landing Gear' and can be retracted). The aircraft fitted with nose landing gear is known to be fitted with a 'Tricycle Undercarriage'. The aircraft fitted with tricycle undercarriage have an advantage over those fitted with tail wheel is that it provides better cockpit visibility during takeoff and landing, as the aircraft acquires a near-horizontal attitude then.

10.2.7 Wheel Brakes

Except some basic trainer type aircraft, the rest are fitted with wheel brakes. These are provided only for the main landing gear and are applied for three basic manoeuvrings of the aircraft on ground viz.

- ***To stop it***
- ***To reduce its speed, and***
- ***To turn it***

The brake pedals are purposefully mounted on the rudder bar in the cockpit to achieve an easier turning of the aircraft on ground. In 10.2.5D – "Rudder", it was observed how the right rudder pedal is to be pushed forward to obtain a right turn of the aircraft. Now, when the right brake pedal is also pressed along with the right rudder pedal on ground, the right brake jams the movement of the right wheel(s), while the free left wheel(s) move clockwise in an arc having the right wheel(s) as its centre point, and thus, the aircraft receives more assistance/reinforced power, to execute a right turn.

The reverse happens through an opposite manoeuvring, viz. when the left rudder pedal is pushed forward and the left brake pedal is jammed simultaneously. The aircraft then executes a left turn.

10.2.8 Engine

The engine supplies the required power to the aircraft to move forward and is therefore also known as the 'Power Plant'. For single engine aircraft, the engine is frequently mounted on the nose of the fuselage, while in case of multi-engine aircraft, the engines are commonly attached to the wings. There are aircraft, which have the engines mounted on their tail part also. However, though the engines might be positioned at any of the previously mentioned locations, the sole intention and utilisation of the engines, i.e. to supply power to the aircraft to move forward remains unaffected.

Every aircraft engine has its propeller, which rotates to provide the air stream to initiate the needed 'thrust' for flying the aircraft. For 'internal combustion' and 'turboprop' engines, the propellers are positioned outside the engine cover and are discretely visible. For 'turbojet' or 'turbofan' engines, the whole system remains within the engine casing.

The internal combustion engines use petrol, while the turbo prop, turbo jet or turbo fan engines use aviation kerosene as fuel.

Figure 10.5 *Engine Cross Section*

Figure 10.6 *Engine Size*

In case of jet engines, the first stage of compression is done by a set of rotor blades (that serve the purpose of the propellers) known as fan. The air drawn in by the fan is compressed in the compression stage and enters the combustion chamber. Here, the combustion of the mixture of compressed air and the injected fuel takes place and the burnt/exhaust gases pass out through the turbines with tremendous force that provides the required thrust to the aircraft for its forward movement. The principle of the said movement of the exhaust gas and the forward movement of the aircraft is comparable to that of a balloon that is freed (let go) after blowing.

10.2.8.1 Propeller

This is a rotating aerofoil structure cranked by the aircraft engine. The engine shaft torque (twisting or rotating force) converts to generate forward thrust by the rotating propeller blades that move the aircraft forward. The direction of the achieved thrust is almost perpendicular to the plane of rotation of the propeller, which is also known as 'Air Screw'. If the propeller rotates vertically, the thrust achieved for the aircraft's movement is horizontal.

Figure 10.7 *Aircraft Engine with Propeller*

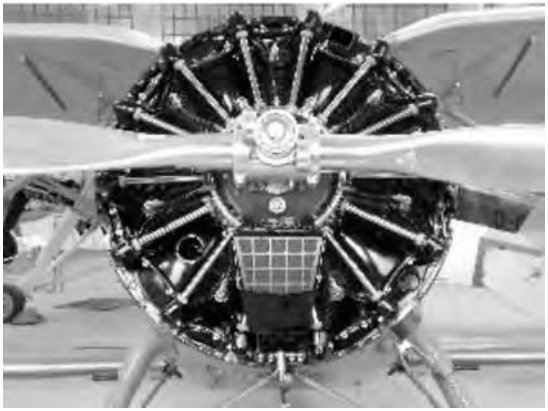


Figure 10.8 *Radial Engine*

10.2.9 Stick/Control Column

The stick, commonly known as 'Joystick', is located at the middle and in front of the flier's seat. The flier keeps his/her legs one on each side of the stick. While on flight, the movement of the stick towards the nose or towards the tail (meaning pushed away or pulled towards the flier respectively, with a longitudinal movement), moves the elevators up or down respectively causing the aircraft to descend or to climb, respectively again. The said stick movement thus causes the pitching effect of the aircraft.

The lateral (side-to-side) movement of the stick, operates the ailerons and produces the rolling effect of the aircraft.

Figure 10.9 *Conventional Joystick*

10.2.10 Throttles

The throttle(s) control and regulate the power of aircraft engine(s) and thus provide the required thrust for the aircraft movement. These possess the same utility as of an automobile's accelerator or a boat's throttle.

Basically, the throttle controls the amount of fuel or fuel-air mixture that is fed to the engines. These are levers that can be pushed forward (away from the flier/towards the nose of the aircraft) to supply more fuel-air mixture to the engine(s) to increase power and are pulled back from its advanced position (towards the flier) later, to reduce the power. Each engine has its individual throttle.

When the throttle is pushed forward, the rate of revolution of the engine shaft and hence; that of the propeller/fan goes up, and thus the power output increases-providing more thrust to the aircraft.

The same is reversed with an opposite action, that is, when the throttle, which was earlier set to provide more power or, in other words, was advanced towards the nose of the aircraft is pulled back towards the flier.

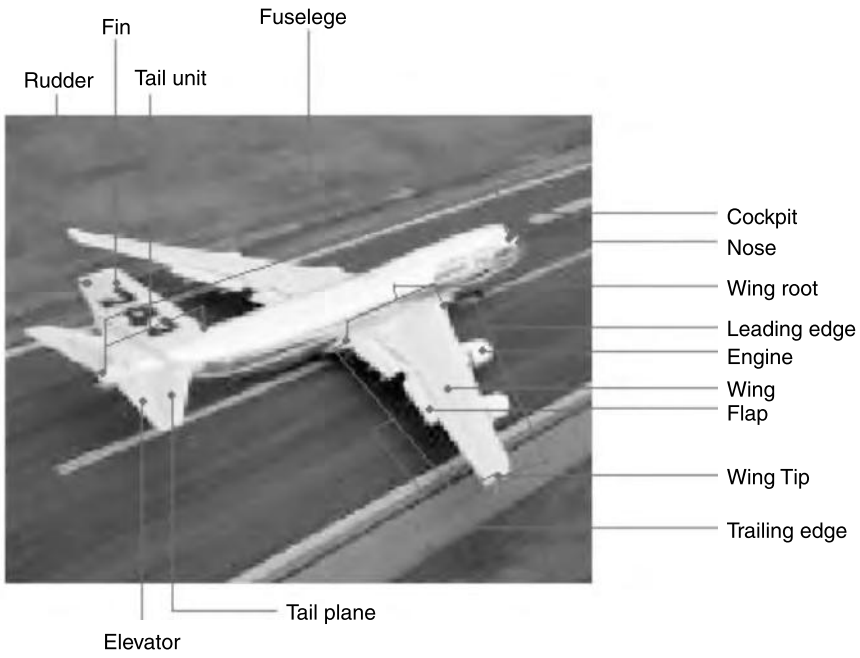


Figure 10.10 *Aircraft Familiarisation*

10.2.11 Auxiliary Power Unit (APU)

This unit generates AC/DC power that is utilised for the functioning of the systems like air-conditioning, hydraulics, electrical and avionics, in the absence of power supply from the engines and/or the external sources. In addition, this is used for starting the engines and provides limited thrust to the aircraft, in case of emergency.

10.2.12 Escape Hatch

This is an easily removable portion/cover on the fuselage structure of the aircraft, available to allow a speedy exit for passengers and crew members, in emergency.

10.2.13 Escape Slide

This inflatable device constructs a sloping path from the aircraft door to the ground for a speedy exit of the passengers and crew members from the aircraft during emergency evacuation.

10.2.14 Safety Harness/Seat Belt

These are a set of straps that hold the occupant on the aircraft seat.

10.2.15 Landing Light

These are the lights, from which high intensity beams fall in front of the aircraft for a clear view of the runway, while coming in for landing, moving for takeoff and during taxing.

Figure 10.11 *Landing Lights*

These light beams also serve the purpose of indicating the presence of the aircraft to the pilots of other aircraft and helps in scaring away the birds near the flight path, at low altitudes.

10.2.16 Thrust Reverser

This device, placed in the tail pipe of a turbo jet engine, deflects some portion of the exhaust gases that was directing towards the opposite direction to that of the motion of the aircraft to render the necessary force to move the aircraft forward, towards the direction of the movement of the aircraft to oppose its movement, while on ground, to reduce the speed of the aircraft. The normal exhaust gases that would have provided the forward motion or the 'thrust' to the aircraft, is reversed by this mechanism/process to affect a 'drag' instead. The process, known as thrust reversal, can be achieved by moving the thrust reverser levers (one for each engine like throttles) in the cockpit.

Though they are not necessary for landing, the reason thrust reversers are so common is that they significantly reduce the distance needed to land an aircraft. Not only does this mean that the aircraft fitted with thrust-reversing engines can land on shorter runways and at smaller airports, but the mechanism also greatly reduces the time needed to stop the aircraft before it can begin its taxi to the gate without excessive use of the wheel brakes.

Figure 10.12 *Thrust Reverser*

Figure 10.13 *Air Speed Indicator*

10.3 The Instruments

These are the mechanisms, which reveal the attitude, altitude, position and functioning of different components of the aircraft at any instant. All aircraft are fitted with a number of instruments amongst which some are mandatory and the rest vary and depend on the type and degree of the technological advancement of the aircraft.

The instruments furnish information about the conditions and attitude of the aircraft in flight as well as on ground.

The information outputs conventionally consisting of speed, height, direction, details of engine condition, etc. and are revealed by appropriate instruments.

Some of the important instruments are elaborated below.

10.3.1 Air Speed Indicator (ASI)

Airspeed is the speed of an aircraft in relation to its surrounding air mass.

Contradictory to the suggestion put forth by its name, this instrument *does not* actually do the recording of the aircraft speed, although it reports the speed.

When the aircraft moves forward, the air in front of it tries to restrict its movement by exerting a pressure on it. The 'sensor' of the ASI, feels this varying pressure arising from the corresponding

speed and rotates a pointer accordingly on the dial of the instrument.

At a particular speed, the sensor feels a specific pressure, which in turn creates a corresponding rotational displacement of the pointer to a specific position on the dial of the instrument. The dial of the gauge is calibrated to reflect the corresponding speed, at the specific pressure the sensor is feeling, at that instant. Higher the speed, greater would be the pressure and more would be the said rotational displacement of the pointer and vice versa.

In other words, there would be one specific position of the speed-recording pointer for one particular speed of the aircraft that corresponds to one specifically experienced pressure, at a particular instant and as such, the rotating pointer thus directly displays the speed of the aircraft at any specific instant.

The dial of the instrument is calibrated to display the speed in either 'miles per hour' (mph) or in 'knots' (nautical miles per hour).

Figure 10.14 *Altimeter*

10.3.2 Altimeter

This instrument utilises the principle of an Aneroid barometer that the atmospheric air pressure reduces with the increase of height/altitude and vice versa. The instrument normally reports the height at which the aircraft is flying over the mean sea level. The instrument senses the change of pressure with variation in altitude and notifies a specific pressure in terms of the corresponding altitude on the purposefully calibrated dial of the instrument.

The dial of the instrument is calibrated to display the height per 100 feet through a pointer, which rotates in an arc over the instrument's dial. The height of the landing airfield is required to be substituted in this instrument prior to landing. This instrument can also be adjusted to report the height of the aircraft over that of the airfield it had taken off from, instead of the height over mean sea level.

Figure 10.15 *Directional Indicator*

10.3.3 Compass

This instrument notifies the bearing or the direction towards which the aircraft is moving on ground or during the flight.

10.3.4 Directional Indicator

This instrument enables the flier to fly towards any desired direction by setting the direction (the course) in the instrument.

Where the compass indicates the direction towards which the aircraft is flying, the directional indicator steers the aircraft to fly towards the preset direction.

10.3.5 Engine Revolution Indicator

This instrument is popularly known as RPM Indicator (revolution per minute indicator) and reveals the number of revolutions the propeller/fan is making per minute.

10.3.6 Turn and Side Slip Indicator

This instrument reveals the rate of turn and amount of slip on either side that the aircraft is experiencing. The rate of turn indicator uses a rate gyro and has a pointer that manifests the turn of the aircraft. The movement of a ball, immersed in a liquid in a curved tube indicates the amount of slip.

Calibration on the dial of the instrument indicates the 'rate of turn' viz. rate 1, rate 2, rate 3 and rate 4. If an aircraft turns a full circle (360 degrees) in 120 seconds (meaning 3 degrees/second) the turn would be called rate 1 turn.

The ball in liquid filled curved tube is nothing but a simple 'spirit level' that reveals if the aircraft is 'slipping' into the turn or 'skidding' out of a turn. The ball remains at the centre in case of a coordinated turn.

10.3.7 Rate of Climb Indicator

When an aircraft is ascending (gaining height) or descending (losing height), this instrument reveals at which rate the aircraft is doing so. This instrument notifies how many 100 feet the aircraft is gaining or losing per minute.

10.3.8 Artificial Horizon

This instrument reveals the attitude of a flying aircraft in relation to the horizon and becomes essential at night or when the horizon is obscured. The blue portion of the dial of the instrument denotes the sky and the black/brown part represents the ground/Earth.

Figure 10.16 *Artificial Horizon*

10.3.9 Oil Pressure Gauge

This instrument notifies the pressure in pounds per square inch (psi) of the oil circulating inside the Engine.

10.3.10 Fuel Quantity Gauge

This instrument reveals only the *usable* quantity of fuel present/remaining in the fuel tank. Some amount of fuel, known as 'unutilised fuel', which cannot be utilised for flying the aircraft due to the structural configuration of the fuel tank, is not considered and revealed by the gauge.

The dial is calibrated to display from empty to full tank fuel. The pointer moving on the dial in an arc displays the quantity of fuel in either kilogram or in pound present/remaining in the tank at any particular time.

10.3.11 Weather Radar

The device provides information about distant objects by using radio waves. The device is fitted on the nose of the aircraft and supplies the necessary and useful information about the en-route weather conditions and turbulent clouds within a wide area ahead of the aircraft. Presence of the device enables the pilot to discriminate between safe and potentially turbulent areas in cloud formation in advance and to select a cleaner and comfortable flight route.

Such devices based on ground and used by the meteorological department personnel, supply information about the current weather conditions that range from upper wind locations to possibility of a thunderstorm.

10.3.12 Black Box

In spite of its name, this orange colour box contains the 'Crash Data Recorder' and the 'Voice Data Recorder', can withstand a very heavy impact (the impact of an aircraft crash), very high temperature (heat generated from the fire originated due to the crash), and can record various parameters.

10.3.13 Circuit Breakers

This device cuts off the electrical circuit (similar to electrical fuse) sensing an overload or short circuit by pushing out a spring loaded plunger. The movement of the plunger is known as its 'popping out' and the whole mechanism is popularly known as 'CB'.

Figure 10.17 *Weather Radar*

Glossary

1. ***Ailerons*** The ailerons are primary and wing-related flight control surfaces. These are hinged to the trailing edge of each wing.
2. ***Airspeed Indicator*** This indicator reveals the speed of the aircraft in either miles per hour (mph) or in knots (nautical miles per hour).
3. ***Altimeter*** This instrument normally reports the height at which the aircraft is flying over the mean sea level.
4. ***Auxiliary Power Unit*** This unit generates AC/DC power that is utilised for the functioning of certain aircraft systems.
5. ***Cockpit*** This is the part of the fuselage meant to accommodate the pilot and other cockpit crew and is equipped with all the equipment and instruments that are needed to fly the aircraft.
6. ***Compass*** This instrument notifies the bearing or the direction towards which the aircraft is moving on ground or in flight.
7. ***Directional Indicator*** This instrument enables the flier to fly towards any desired direction by setting the direction (the course) in the instrument.
8. ***Elevators*** This primary and movable control surface produces the movement of the aircraft on its lateral axis. These are hinged to the trailing edge of the tail plane.
9. ***Engine*** The engine supplies the required power to the aircraft to move forward, and thus, is also known as 'power plant'.
10. ***Fin (Vertical Stabiliser)*** This is a fixed vertical or little inclined airfoil section attached longitudinally to the rear portion of the aircraft. The rudder is hinged to it.
11. ***Flaps*** The flaps are one of the auxiliary movable controls that form the wings. These are attached to the trailing edge of the wings between the ailerons and the Fuselage.
12. ***Fuel Quantity Gauge*** This instrument reveals only the usable quantity of fuel present/remaining in the fuel tank.

13. ***Fuselage*** It is the central body or the main structure of the aircraft that accommodates crew, passengers and cargo, and to which wings, tail section, undercarriage, etc. are attached.
14. ***Propellers (Propeller Blades)*** This is a rotating aerofoil structure cranked by the aircraft engine to generate forward thrust, which moves the aircraft forward.
15. ***Rate of Climb Indicator*** This instrument reveals at what rate the aircraft is gaining or losing altitude per minute.
16. ***RPM Indicator*** This instrument reveals the number of revolutions the propeller/fan is making.
17. ***Rudder*** This is a vertical and movable control at the tail section, hinged to the fin, which turns the aircraft around an imaginary line passing perpendicularly to the aircraft.
18. ***Stick/Control Column*** This is a lever or a pillar-supporting handgrip semi-wheel that controls the aileron and elevator movements.
19. ***Tail Plane (Horizontal Stabiliser)*** The tail plane is an immovable airfoil structure of the tail section that is assembled almost horizontally on the fuselage. It has elevators attached to it.
20. ***Throttle*** The throttle(s) control and regulate the power of aircraft engine(s) and thus provide the required thrust for aircraft's movement.
21. ***Thrust Reverser*** This device deflects some portion of the exhaust gases towards the direction in which the aircraft is moving, while on ground, to reduce the speed of the aircraft.
22. ***Undercarriage*** This part supports an aircraft and is required for its manoeuvring, on ground.
23. ***Weather Radar*** The device provides information about distant objects by using radio waves and supplies the necessary and useful information about the en-route weather conditions and turbulent clouds within a wide area ahead of the aircraft.
24. ***Wing*** It is the part of a heavier than air aircraft, which produces aerodynamic lift to support the aircraft in flight and counters the forces of gravity.

Questionnaire

1. What is a fuselage?
(a) The part of the aircraft that accommodates the galley.
(b) The part of the aircraft that accommodates the tail section.
(c) The part of the aircraft that accommodates the elevator.
(d) All the above are correct.

2. The tail section accommodates the set
(a) Fin, aileron & elevators.
(b) Elevators, rudder & fin.
(c) Radar, elevator & vertical stabiliser.
(d) Horizontal stabiliser, wings & elevators.

3. The ailerons
(a) Bank the aircraft, give a pitching effect & move up and down harmoniously.
(b) Are movable surfaces, bank the aircraft & while one moves up, the other moves down.
(c) One moves up, while the other moves down, bank & help the aircraft to lose altitude.
(d) Are fixed aerofoil structures that gives a rolling effect to the aircraft.

4. The flaps
(a) Can only be lowered below the wing surface & help during takeoff and landing.
(b) Are fixed in the fin & provide extra lift during takeoff.
(c) Are fixed in the wings & govern the pitching.
(d) Provide extra lift during takeoff & landing.

5. The Elevators
(a) Move one up and one down, bank & help the aircraft to lose altitude.
(b) Are harmoniously movable surfaces that affect a vertical position difference.
(c) Are fixed in the fin & provide extra lift during takeoff.
(d) None of the above is correct.

6. The undercarriage
(a) Is required to manoeuvre the aircraft on ground.
(b) Is required to support the aircraft on ground.
(c) Is fitted with wheels, skids or floats.
(d) All the above are correct.

7. The Control Column
(a) Is the aerofoil surface that controls the flight path of the aircraft.
(b) Is also known as the joystick and is located in front of the pilot's seat.
(c) Governs the Up-Down movement & banking manoeuvring of the aircraft.
(d) Both (b) and (c) are correct.

8. The Thrust Reverser
(a) Reverses the direction of the flow of the exhaust gas after landing.
(b) Reverses the direction of the drag and decreases the speed of the aircraft.
(c) Are placed in the tail pipe of a turbo jet engine and affects a drag after landing.
(d) Both (a) and (c) are correct.

9. The Air Speed Indicator:
(a) This instrument actually records the aircraft speed.
(b) It senses a pressure due to the movement of the aircraft.
(c) This instrument actually records the speed of the aircraft in relation to altitude.
(d) Both (a) and (b) are correct.

10. The Directional Indicator:
(a) This instrument actually records the direction of the aircraft.
(b) This instrument flies the aircraft in a pre-selected direction.

(c) This instrument actually directs the Instruments of the aircraft.
(d) All above are correct.

11. The Weather Radar:
(a) This is hinged to the vertical stabiliser.
(b) This gives the indications about weather behind the aircraft.
(c) This is located in front of the cockpit and works on radio waves.
(d) Both (b) and (c) are correct.

11

How Aircraft Flies Through Air (Basic Theory of Flight) and Some Common Aviation Terminologies

BASIC THEORY OF FLIGHT: AN INTRODUCTION

An airplane moves forward because of the power supplied by its engine or the pull it receives from an external source in case of gliders. By virtue of its movement through air, an aircraft experiences four forces acting on it and those four forces provide the aircraft the ability to fly.

While accepting that the said four forces are instrumental in aircraft flying, it may be argued that the same forces act similarly on many other objects that move through air, but certainly, all those objects do not fly. Here, the typical property of an aerofoil configuration, possessed by the wings comes into consideration and becomes virtually responsible for the flying of an aircraft.

11.1 The Aerofoil Configuration

Aerofoil/Airfoil structure has a typical shape by the virtue of which, when such shaped objects move through a fluid, derives a larger component of force, normal or perpendicular to the direction of its motion.

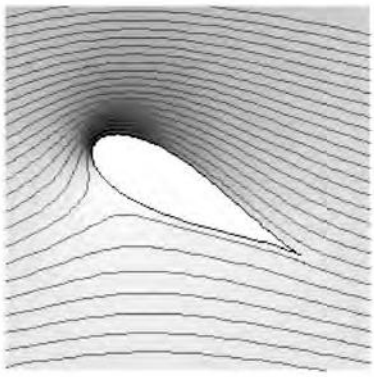
An aircraft contains aerofoil surfaces in the form of wings, ailerons, elevators, rudder etc. that possess the essential and most wanted '**aerodynamic characteristic**' that makes the aircraft fly.

How the resultant of the four forces mentioned above tends to make an aircraft fly is discussed in 11.4 – "Why the Aircraft Flies".

11.1.1 Shapes of Aerofoil Section

The shape of aerofoil structures vary depending on its requirement and utilisation.

From Figure 11.1–"Symmetrical Aerofoil Section", which represents the aerofoil configuration of tail planes, elevators, fin, rudder and propeller/turbine blades, it can be observed that the shape of this form of aerofoil sections is perfectly symmetrical. Whereas from Figure 11.2–"Wing Aerofoil Section", which represents the aerofoil configuration of the wings, it can be apprehended that it is not symmetrical and its shape is very much distinguishable from the previously mentioned aerofoil structures/shapes (viz. Figure 11.1–"Symmetrical Aerofoil Section").



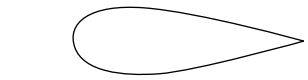
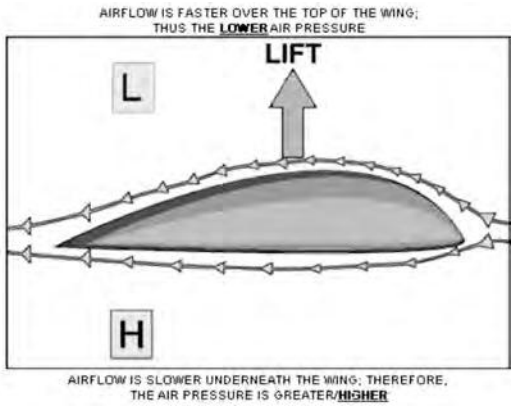


Figure 11.1 *Symmetrical Aerofoil Section*



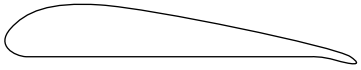


Figure 11.2 *Wing Aerofoil Section*

From the profile (the cross-sectional view) of the wings, as displayed through Figure 11.2–"Wing Aerofoil Section", it can be observed that the distance from the middle point of its leading edge to its trailing edge is more via its upper surface than that its lower surface. The utility of such typical shape, which provides the desired aerodynamic property to fly an aeroplane is elaborated in 11.4 – "Why the Aircraft Flies".

11.2 The Forces Acting on the Aircraft

The aerodynamic forces are the forces that act on a body while it moves through any gaseous medium.

When an aircraft is in motion, four forces–which are Lift, Drag, Thrust and Weight act on it in four different directions. Each is elaborated individually.

11.2.1 The Lift

Lift is the component of aerodynamic forces that opposes the gravitational force acting on the wings, and because of the exemplary aerofoil design of the wings, pulls it (and thus the entire aircraft) upwards. The lift always affects perpendicularly to the direction of the flow of air the moving body experiences.

11.2.2 The Drag

The air in front of a flying aircraft offers a resistance to its forward movement, as a result of which the aircraft experiences a backward pull/drag. The drag is the component of the aerodynamic forces that pulls the aircraft backwards. This force always acts parallel and opposite to the relative airflow.

11.2.3 The Thrust

The engine of the aircraft provides the required power for its forward movement. The propellers (which also possess aerofoil shape) when rotated by the engine throw a mass of air to the rear of the aircraft. In simpler terms, they draw air from the front of the aircraft and throw it backwards (just opposite to the action of a domestic fan), with a force. The opposite reaction of this force, generated from the backward thrown air, moves the aircraft forward. As such, thrust is the component of the aerodynamic forces that moves the aircraft forward. The thrust acts along an imaginary straight line passing through the tail and nose of the aircraft in the forward direction.

11.2.4 The Weight

The gravitational force acting on an aircraft depends on the weight of the aircraft, and the word 'weight' is used to represent this component of the aerodynamic forces which acts vertically downwards from the aircraft. The more the heaviness/weight of the aircraft, the more would be the gravitational force – 'weight' acting on the aircraft.

11.2.5 The Equilibrium

Amongst the previously mentioned four components of the aerodynamic forces, when the pair of forces acting in the opposite directions neutralise/nullify each other (that means: lift = weight and thrust = drag) the level flying aircraft is stated to be in equilibrium.

11.2.6 The Centre of Gravity of an Aircraft

This may be defined to be the point at which, if an Aircraft was pivoted, it (the aircraft) would remain perfectly balanced.

11.3 Movement of Aircraft in Air

11.3.1 Chord Line

This imaginary line joins the centres of the leading and trailing edge of an aerofoil section.

11.3.2 The Angle of Attack

This is the acute angle between the chord line and the direction of the relative airflow hitting an aerofoil section because of its movement through air.

11.3.3 Pitching

This is the rotational movement of the aircraft about its *lateral axis* (that is, about an imaginary line passing through the centre of gravity of the aircraft, breadth wise). Through this movement, when the nose goes up, the tail goes down and vice versa.

11.3.4 Rolling

This is the rotational movement of the aircraft about its *longitudinal axis* (that is, about an imaginary line passing through the centre of gravity of the aircraft, lengthwise). Through this movement, one wing tip goes up while the other goes down.

11.3.5 Yawing

This is the rotational movement of the aircraft about its *vertical axis* (that is, about an imaginary line passing through the centre of gravity of the aircraft, vertically). Through this movement, when the nose moves towards the right, the tail section moves towards the left and vice versa.

11.4 Why the Aircraft Flies

When an aircraft moves forward by the power provided by its engine(s), the leading edge of its wings hits the air on its path. The struck air in the process thus splits/branches off. One stream of the said air flows over the top surface of the wings (Path ACB in Figure 11.3–"Forces Acting on a Flying Aircraft") while the other (the remainder) flows under the bottom surface of the wings (Path ADB in Figure 11.3–"Forces Acting on a Flying Aircraft").

Now, the consideration should be focused on the utility of the aerofoil configuration designed purposefully for the wings (Refer to 11.1–"The Aerofoil Configuration").

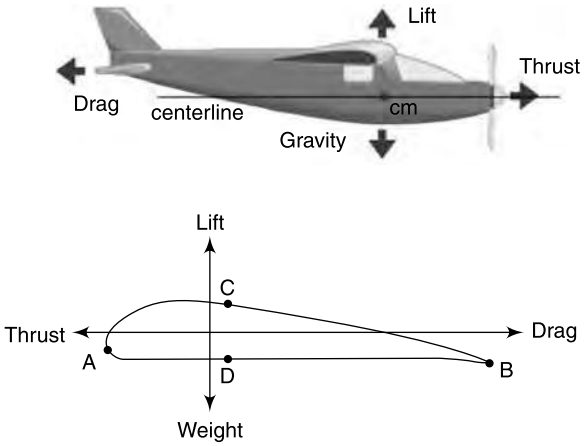


Figure 11.3 *Forces Acting on a Flying Aircraft*

It could be observed that the aerofoil configuration/design of the wings as in Figure 11.2 – "Wing Aerofoil Section" is non-symmetrical and the distance from A to B via C (meaning the upper surface of the wings) is *longer* than the distance from A to B via D (meaning the lower surface of the wings) (as in Figure 11.3–"Forces Acting on a Flying Aircraft"). As such, the air hitting the leading edge of the wings (at point A) would have to travel a longer distance to reach the trailing edge of the wings (point B) while flowing over the wings than the distance while flowing under the wings. Because of this phenomenon, there would be a creation of lesser density of air on the upper part of the wing than its lower part. By the virtue of this unequal density, the pressure of the air over the upper surface of the wings would then be lesser than that on the lower surface of the wings.

Again, due to this unequal pressure, the air passing under the aerofoil section of the wings (with higher density) possessing an increased pressure, exerts an upward push on the wings. Similarly, the air passing over the upper surface of the wings (with lower density), possessing a lower pressure, provides an upward sucking/pulling effect on the wings. Both these said forces act on the wings simultaneously. The combined effect of these forces acting on the two surfaces of the wings provides a lifting effect to the wings, or in other words, collectively constitutes the force – 'lift', which actuates the wings and thus the entire aircraft, upwards. It may be noted that the aforementioned sucking/pulling effect happens to be much greater than the said pushing effect.

By the virtue of the power supplied by its engine, the speed/velocity of the aircraft goes on increasing gradually causing its acceleration. With this acceleration, the forces acting on the upper and lower surfaces of the wings (the combined force) go on increasing proportionately. This means, the more the speed/velocity, the more would be the knock-on effect of the combined force on the wings, and thus on the whole aircraft. Finally, at a certain speed, this combined raising/elevating force (the collective 'lift' force) supersedes/overcomes the force acting downwards on the aircraft because of the weight/heaviness of the aircraft (the 'weight' force). At the instant when the 'lift' force becomes greater than the 'weight' force, the aircraft leaves the ground and is airborne.

11.5 Some Common/Important Aviation Terms

- **Aerodrome:** An airfield that possesses runway, taxi track, apron/tarmac, terminal building and aircraft maintenance facilities along with renders air traffic control (ATC) regulated arrival/departure facilies for the flights.
- **Air Carrier:** A person or organisation legally authorised to fly passengers and/or freight.
- **Air Pocket:** This is a patch of air with a different density than its surroundings in an aircraft's flight path, which causes the Aircraft to lose height suddenly. The air pocket can also produce a reverse effect.
- **Air Traffic Control (ATC):** This is the service rendered by the appropriate authorities which governs and maintains a safe and systematic flow of air-traffic.
- **Aircraft:** These include any object that can fly through air by its own buoyancy or by the action of air on its surfaces like airplanes, helicopters, gliders and balloons. Its definition as per ICAO is: "*Any machine that can derive support in the atmosphere from the reaction of the air other than the reaction of the air against the earth's surface.*" This definition justifiably excludes hovercraft from the category of aircraft.
- **Aircraft Engine:** This machine gives movement to the aircraft. In other words, this machine provides the power to the aircraft to move and as such, is known as the 'Power Plant' also. Propeller is not included in this because it is rotated by the engine's machineries to materialsie/ affect the movement of the aircraft.
- **Aircraft Operating Manual:** As per ICAO, its definition is: "*A manual, acceptable to the State of Operator, containing normal, abnormal and emergency procedures, check list, limitation, performance information, details of the aircraft system and other material relevant to the operation of aircraft.*"
- **Airworthy:** An aircraft or its equipment is said to be airworthy when the same is certified by a competent authority to be fit for flight.
- **Altitude:** The vertical distance of an object over the mean sea level at any time/instant is called its altitude at that time/instant.
- **Altitude Sickness:** These are the sicknesses experienced by persons when they are under 'reduced barometric pressure' condition and/or subjected to less quantity of oxygen.
- **Avionics:** This is the section of aviation in which application of electronics/electronic devices are involved with aviation. In other words, avionic is aviation electronics.
- **Bad Weather:** These are the conditions under which flying becomes difficult and/or semi-safe and/or ineffectual due to poor visibility, low and/or turbulent clouds, gusty wind, etc.
- **Baggage:** The personal belongings of the passengers and the crew members carried in an aircraft in coordination with the operator.
- **Basic Operating Weight:** This is the empty weight of the aircraft added with the weight of its usable fuel and liquids in the pipelines, and the collective weight of the operating cockpit crew-members.
- **Before Flight Check (cabin crew):** Before Flight Check (cabin crew), also called pre-flight check (cabin crew), are the checks carried out by cabin crew before the departure of flights. The check includes checking of emergency equipment, catering equipment, quantity and quality of food and beverage, cleanliness and dressings of the cabin and toilet(s) etc.
- **Belly Landing:** This is the landing of an aircraft with retracted or partially down undercarriage.
- **Bleed Air:** The compressed air bled from the turbine engine to pressurise and to maintain the temperature of the aircraft cabin is known as 'Bleed Air'.

- **Break-even Load Factor:** This is the percentage of load of passengers and Freight necessary to be carried on board in relation to the full capacity of the same that could have been put on board to obtain 'no profit-no loss' operating condition.
- **Bulkhead:** This is a vertical partition, perpendicular to the longitudinal axis of the fuselage, which is utilised to divide the fuselage structure in parts and/or to strengthen the said structure and/or to support the items needed to be placed between the floor and the roof.
- **Cabin:** This is the portion of the fuselage utilised to accommodate the passengers.
- **Cabin Altitude:** In a pressurised aircraft, the pressure inside the cabin at any instant corresponds to the atmospheric pressure at a certain altitude. The corresponding altitude is the 'Cabin Altitude' of the aircraft at that instant.
- **Cabin Crew:** The set of crew members that attend to passengers inside the aircraft (viz. flight pursers, airhostesses, flight attendants etc.) are called cabin crew.
- **Check Flight:** This is the flight in which a crew member is assessed for his/her professional efficiency/proficiency on board.
- **Combi:** The type of aircraft that are designed to carry a combination of passengers and freight is called a 'combi aircraft'.
- **Commercial Air Transport Operation:** Operation of any aircraft that involves carriage of passenger and/or freight and/or mail against suitable remuneration.
- **Commercial Aviation:** This is the operation of commercial aircraft for business/profit making activity under ICAO.
- **Cruising Altitude:** This is the level at which the aircraft flies parallel to the earth's surface with a specific engine power setting-to achieve equilibrium. The aircraft then moves with its earlier acquired momentum. The cruising altitude has to be acquired in coordination with the air traffic control (ATC).

Figure 11.4 *Combi Door*

- **Cruising Speed:** This is the speed maintained by the aircraft while at cruising altitude.
- **Decompression:** This is a sudden and heavy fall in cabin pressure caused when some component of the aircraft like door, window or cockpit windshield gives way. This could generate fatal decompression sickness in which Nitrogen bubbles are evolved inside human body because of exposure to less atmospheric pressure.
- **Dispatch:** The supervising activities to make ready and send aircraft on its next flight.
- **Ditching:** This is the procedure of landing an aircraft in water in emergency.
- **Ditching Drill:** These are a set of actions performed by the passengers and the crew members before and after the ditching operation.
- **Diversion:** This is the procedure of rerouting the aircraft in flight to a station other than the destination station due to weather conditions, developed snag or any other reason apprehended necessary by the commander of the flight.
- **Emergency:** This is the development of a distress or urgency condition that could jeopardise the safety and/or the security of the aircraft, and/or the passengers, and/or the crew members.
- **Emergency Landing:** This is an unscheduled landing caused by the development of an in-flight emergency condition.
- **Empty Weight:** This is the weight of an aircraft with all its fixed equipment, ballast, full capacity of hydraulic fluid in the reservoir and unusable fuel and oil in pipelines only.

- **Escape Hatch:** This is an easily removable portion/cover on the structure and/or the fuselage of an aircraft, available for exit of passengers and the crew members in emergency.
- **Escape Chute/Escape Slide:** With the opening of door and/or hatch, these inflatable devices form a path for passengers and crew members, to affect a speedy exit from the aircraft.
- **ETA:** This is the abbreviation of 'Estimated Time of Arrival' of a flight.
- **First Officer:** The pilot who is the second-in-command of an aircraft is called a First Officer or a co-pilot.
- **First Pilot:** The pilot who is in charge or in command of the flight is called the First Pilot or the commander of the aircraft.
- **Flight Coupons:** These are the pages of the air travel permits (ticket).
- **Glide:** This is a regulated descent of any havier than air aeronautical vehicle with zero or negligible engine power.
- **Greenwich Mean Time (GMT):** This is the curve of the equatorial, measured westward, met between the Greenwich antemeridian and meridian of the mean Sun. It is also called Zulu Time.

  Conversion of Indian Standard Time (IST) is fortunately very easy as GMT is behind IST by five hours and thirty minutes. (The GMT can readily be obtained from any IST set watch by simply reversing the pointing side of the needles of the watch. For example 20:30 IST would be 15:00 GMT.)
- **Gross Weight:** This is the total weight of the aircraft including the weight of oil, fuel, passengers, crew members, freight and mail carried by it.
- **Ground Crew:** The group of personnel engaged in maintaining, servicing, repairing and preparing the aircraft for its flight.
- **Ground Equipment:** This is the collective term for the supporting machineries that are needed for maintaining, servicing, loading and towing the aircraft.
- **Head Wind/Tail Wind:** If the aircraft is experiencing a wind flow from a direction opposite the direction of its motion, it is said to be flying through a 'head wind'.
  Analogously, when the direction of the wind flow is in the same direction as the motion of the aircraft, it is said to be flying with a 'tail wind'.
- **Instruments:** These are the mechanisms that reveal the attitude, altitude, position and functioning of different components of the aircraft at any instant.
- **International Civil Aviation Organisation (ICAO):** This is the organisation/body under the sponsorship of United Nations (UN) that boosts and nurtures the principles and techniques of 'International Air Navigation' along with the development of civil air transportation.
- **Jet Aircraft:** These are the aircraft powered by one or more gas turbine engines.
- **Knot:** The knot is a speed of one nautical mile per hour.
- **Log Book:** The book in which a systematic recording of activities of the aircraft or that of individual crew member is done.
- **Mach number/Mc. number:** This is the ratio of the speed of the aircraft to the speed of sound.
- **Maximum Payload:** This is the payload limit certified in terms of passenger and/or cargo for a transport aircraft.
- **Mockup:** This is the actual/full size imitation structure (a model) of a cockpit, a cabin or a whole aircraft that performs every function of a real-flying aircraft in seriatim, except literally flying. These are mainly utilised to train the flying crew (viz. pilots, flight engineers and cabin crew).
- **Plexiglas:** This is the trade name for transparent acrylic plastic sheets that are utilised for cockpit windshield and cabin and cockpit windows.

- **Sides of Aircraft:** Remaining within the range of the fuselage and facing towards the nose of the aircraft, the left side of the aircraft is its 'port side' and the right side, its 'starboard side".
- **Subsonic/Supersonic Aircraft:** If the Mc. number is more than 'one', that means that the speed of the aircraft is more than that of sound and the aircraft is a supersonic aircraft. For subsonic aircraft, the Mc. number is less than 'one'.
- **Takeoff Weight:** This is the weight of the aircraft at the instant of its leaving the ground.
- **Taxiing:** This is the movement and manoeuvreing of the aircraft on ground, under its own power.
- **Terminal Building:** The building that accommodates, fulfills the necessities and supports the movements of air passengers.
- **Trunk Routes:** These routes connect the major cities and/or offer more passenger and/or revenue.

Questionnaire

1. **An Aircraft moves forward because of**
   (a) Some form of power supply
   (b) The propeller's or fan's rotation
   (c) Force 'thrust' is more than force 'drag'
   (d) All above are correct
2. **An aircraft flies when**
   (a) Thrust > Weight and Lift > Drag
   (b) Lift > Weight and Drag > Thrust
   (c) Thrust > Drag and Lift > Weight
   (d) (a) and (c) are correct
3. **The state of equilibrium is achieved when**
   (a) Lift = Weight and Thrust = Drag
   (b) Lift > Weight and Thrust = Drag
   (c) Thrust = Drag and Weight > Lift
   (d) Lift > Weight and Thrust > Drag
4. **The aircraft flies because while it moves through air**
   (a) More air passes over the upper surface of the wing than its lower part
   (b) Less air passes over the upper surface of the wing than its lower part
   (c) Because the wing possesses an airfoil shape
   (d) Both (b) and (c) are correct
5. **What would be IST for 16:30 h. GMT?**
   (a) 21:30 hr.
   (b) 22:00 hr.
   (c) 11:00 hr.
   (d) 10:00 hr.

12

First Aid

FIRST AID: AN INTRODUCTION

Any person may fall sick at any place and at any time. In accordance to this, falling sick inside an aircraft cannot be ruled out and is nothing uncommon/exceptional. Such situations do arise, though occasionally, on board an aircraft and demand preliminary medical attention or first aid be administered to the sick person. For this reason, every airline trains their cabin crew members in first aid on a mandatory basis.

The disorder on board may range from a simple cut to a fracture or a heart attack and it becomes one of the foremost duties of the cabin crew to attend to the passenger(s) and administer first aid immediately. It may be grasped that the knowledge of first aid not only avails a cabin crew on board, but proves beneficial in his/her everyday life also.

For administering first aid, the 'First Aid Kits' are supplied on board. Each of these kits contains basic and essential medicines and medical instruments, which are to be utilised by the cabin crew when such situation/demand crops up.

However, another kit containing sophisticated medicines, injections and medical instruments is also provided on board on a mandatory basis. It can *only and exceptionally* be handled by qualified medical practitioners and is known as 'Physician Kit'.

Various ailments, their symptoms and their treatments along with the expected action from the cabin crew are elaborately discussed in this chapter.

CASE STUDY 12

After the dinner service on flight BN-783 from Chennai to Mumbai the cabin crew in-charge Mr. Trilokeswar Srivastava started writing his flight report.

A chime sounded and a light appeared on the Purser Station panel indicating that the cabin crew from the aft galley wants to contact him. He picked up the handset of the

intercommunication system and heard the frantic voice of Ms. Madhumanti saying, "Sir! A passenger here has become very ill. Please come immediately". In his mind, Mr. Srivastava became quite annoyed as every cabin crew is trained on first aid and their respective duties in such circum-stances are very well defined. In this case, he expected Ms. Madhumanti to deal with the situation on her own by the virtue of her long tenure as an air hostess.

However, he did not waste any time, informed the other cabin crew of his galley to inform the Commander that a passenger had fallen very ill and he was proceeding to inspect the situation.

He reached the scene and found a crowd had gathered surrounding a seat occupied by a hefty passenger, holding his chest apparently writhing with pain. He curtly asked the gathered passengers to return to their seats vacating the scene. Although, normally he was quite courteous but on this occasion found no reason to be so, as he was dealing with some curious onlookers at a time that apparently was an emergency situation. On observing the scene, he volleyed a series of orders to the three aft galley cabin crew present there, "Madhu! Announce for a doctor and for observing no smoking; Banerjee! Bring oxygen cylinder and FA; mask; Aparna! Bring first aid kit and physician kit immediately."

He requested the only other occupant of the row, a woman, to shift to a seat across the aisle and she obliged instantly.

He loosened the tie of the passenger and opened the collar button of his shirt. Slowly and with every care, he lowered the passenger to a lying position and opened the air louvres of the row to the fullest.

In the mean time, Flight Purser Banerjee had brought the portable oxygen cylinder and mask and had swiftly fixed the mask to the cylinder, opened the 'on-off' valve, confirmed that the oxygen was flowing and had put the mask covering the passenger's face.

The announcement of Ms. Madhumanti had fetched 15 doctors and a senior doctor amongst them was already checking the pulse of the patient.

Mr. Srivastava intimated him that they are in possession of various life saving drugs and some sophisticated medical equipment on board for their use. One of the gathered doctors, opened the physician kit and handed over a pair of stethoscope to the senior doctor identified by then to be Colonel (Dr.) Adhikari. Dr. Adhikari examined the patient with the supplied instrument and within a minute asked for a Coramine injection.

The other doctors tried to locate the injection, but could not find it.

Dr. Adhikari was becoming restless and soon after declared that there was no heartbeat and asked another doctor to perform the heart massage. The LA-IF resuscitator was connected to the oxygen cylinder and the heart massage procedure initiated immediately. The process continued but the heartbeat did not reappear.

At this instant, the Coramine injection was located, but was of no use. A Russian doctor came forward and asked if she could get a syringe with a long needle so that she could inject Coramine inside the heart directly. Unfortunately, even that was not available.

The lady passenger, who was shifted from the row earlier, fainted and provided the doctors to do

something. She was the wife of the deceased.

Mr. Srivastava could have complained against the three aft galley cabin crew, but chose to discuss and analyse the episode in coordination with them thinking that they had done at least a part of their duty and there was no point in reprimanding them. He pointed out that they should have acted before passing information that would have saved much time and all three agreed accordingly and promised to act as per the advice in future.

Although the flight report had a mention of the incident, it was not thoroughly against the aft galley cabin crew.

The lesson that can be derived from the incident is that human beings might possess sophisticated equipment, ample qualifications, and abundant workforce, can only provide tries to save life but cannot render life.

12.1 What is First Aid

First aid is the treatment given to a person immediately after his/her suffering an injury or showing understandable symptoms of some illness, either to cure it completely or to at least prevent it from aggravating, until the person could be attended by a doctor.

To administer first aid, it becomes essential to identify the nature of injury/illness. This can only be achieved by carefully observing and analysing the symptoms revealed by the patient and attending to him/her skillfully thereafter.

12.2 General Duties of Cabin Crew for Administering First Aid

While administering first aid, cabin crew are to follow certain general principles as cited below. These are to be adopted in addition to any and/or all treatments rendered by the cabin crew and to be followed as a conventional practice and guideline.

- Act at the earliest and do all that is needful systematically in the appropriate sequence from first to last.
- Cabin crew members should not panic and if they ever do, the same should not in the least be revealed through their appearance, action and body language.
- Reassure the patient throughout the treatment and periodically thereafter.
- Do not allow others to crowd around the patient unnecessarily.
- Do not overdo things. Stick to basic treatments to save the person's life and/or to prevent his/her condition from aggravating and/or worsening.
- Solicit help from a doctor or a qualified nurse travelling aboard. Make an announcement over the PA system for invoking such succour.
- Follow up the case till it does not become absolutely indispensable to do so.
- Keep the commander and the cabin crew in-charge informed periodically about the happenings/developments throughout the episode.

12.2.1 Soliciting Help from a Doctor on Board

An announcement should be made over the PA System to seek help of a doctor or a trained nurse travelling on board. Usually, at least one doctor is available aboard (if not a number of them) and most of them are more than eager to attend to the patient and help the cabin crew in such situation.

In such cases, when a doctor or a trained nurse is available, the cabin crew are required to

abide by their mandate and render all possible support such as furnishing the physician kit, administering oxygen to the patient, etc.

12.2.2 Needed Follow-ups After Giving First Aid

If no doctor is available on board to vouch for the complete recovery of the patient or if the cabin crew is not sure about the same, the patient should be observed/attended throughout until a doctor attends to him/her or he/she is transported to a hospital at the next station, as the situation may be.

12.3 Ailments Arising from Flights

Passengers suffer from a few ailments while undertaking a flight because of their inability to accept and to adjust to certain environmental conditions during the flight and due to the excitement of flying. Especially, the passengers travelling by air for the first time complain chiefly of nausea, vomiting, problem in breathing, etc. arising out of *'first flight fear'* and tension. This category of passengers chiefly consists of pregnant women and very young children.

12.3.1 Air Sickness

In most of the cases, this ailment generates from the psychological attitude of the passengers and emanates thereafter by being reinforced by tension, heat, food consumption, etc.

12.3.1A Symptoms and Signs

The passenger

- *might experience nausea and giddiness,*
- *might vomit,*
- *may sweat profusely, and*
- *may show facial pallor.*

12.3.1B Treatment

- *Open the air louvre and direct the airflow towards the passenger's face.*
- *Loosen all tight clothing, specially necktie and collar button.*
- *Wipe the passenger's face and forehead with cold damp towel.*
- *One tablet of Avomine may be administered.*
- *Supply a number of 'air sickness bags' and a wad of tissues for his/her use.*
- *Advice the passenger to consume one tablet of Avomine one hour before the departure of the flight he/she undertakes next as the effect of Avomine tablets begin only after a certain period.*

12.3.2 Ear Ache

This is one of the common ailments amongst air travelers and occurs due to change of cabin pressure during climbing, and more often, during descent.

Passengers may also experience ear ache due to the presence of cerumen/earwax or even because of injury inside the ear.

12.3.2A Treatment

- *Passenger is to be served with something to chew like toffees.*
- *Advice him/her to massage behind and below the earlobe.*
- *Administer any 'ear drop'.*
- *Administer an Aspirin tablet.*

12.3.2B Precautions

Probing for any foreign body inside the ear is totally discouraged and should never be tried. A doctor should attend to the passenger at the earliest in such a cases.

12.4 Effect of Decompression on Passengers

Decompression at a high altitude is considered to be a major emergency condition. As stated in 9.13.3–"Rapid Decompression", decompression occurs due to a sudden and rapid loss of pressurisation inside the cabin. This creates a deficiency of requisite oxygen for human body. To counter this terrible situation, oxygen masks drop down for every passenger. Each of them is to pull one such and breathe through it. At the same time, the aircraft is made to dive down to a safe altitude viz. 14,000 ft.

Due to this decompression or a sudden decrease in surrounding pressure inside the passenger cabin, the air in the hollow organs of the body tends to bulge the organs and bubble out in body fluids, adversely affecting the body. The magnitude of this effect would depend on and would be directly proportional to the quantum of severity and the duration of the 'decompression situation'.

12.4A Symptoms and Signs

- *Patient would complain of experiencing severe pain in the abdomen, ears and the body joints.*
- *Swelling of the abdominal region could be observed.*
- *Passengers with less power of resistance might even become unconscious.*

12.4B Treatments

- *Keep the patient warm by tucking blankets around him/her.*
- *Administer oxygen immediately ® immediately.*
- *Impart treatment for shock, senselessness and hypoxia (mentioned later in the chapter) depending on the gravity of the case.*

12.5 Hypoxia

This ailment initiates when the brain and the body tissues receive an abated supply of oxygen than the requisite quantity for the proper functioning of the organs.

12.5A Symptoms and Signs

- *The patient would show a lack of interest in surrounding affairs.*
- *He/she would have a lack of energy and vigour.*
- *The patient would display erratic behaviour on negligible happening, at certain time.*
- *The patient would complain of giddiness and blurred vision.*
- *Breathing of the patient would be rapid and would become irregular later.*
- *The lips and nails of the patient would turn pale or bluish.*
- *His/her pulse would be rapid but weak.*
- *Unconsciousness at a later stage cannot be ruled out.*

12.5B Treatments

- *Impart general treatment for unconsciousness.*
- *Administer oxygen.*

- *Recline the seatback.*
- *Arrange for the patient to be attended by a doctor at the earliest.*

12.6 Toothache

This horrendous pain is perhaps the worst possible suffering that a human can experience. It becomes most essential to divert the passenger's attention from the pain.

12.6A Treatments

- *Provide him/her with an Aspirin tablet viz. Saridon, Codopyrin, etc.*
- *He/she should be advised to look outside the window or to read magazines or newspaper to deflect his/her attention from the pain.*

12.7 Injuries

A passenger could be injured on board or might carry an earlier injury which possibly has aggravated on board. In both cases, the patient has to be attended with first aid by the cabin crew.

There might be several varieties of such injuries amongst which some are discussed below.

12.8 Bleeding

This can be categorised in two prominent types viz. *'external' and 'internal'.*

The type of bleeding, which transpires from an injury or wound on the visible surface of the body and could be medicated directly is known as 'External Bleeding'.

Again, there may be bleeding from several organs inside the body like lungs, stomach, etc. that neither could be viewed nor could be accessed without operating on the body. This type of bleeding is referred to as 'Internal Bleeding'.

12.8.1 External Bleeding

This can occur from a cut by a sharp object, a puncture by a pointed object, a hit by a projectile, by a collision etc. even inside the cabin. The injury would be superficial and be viewed directly.

12.8.1A Treatments

- *Apply direct pressure on the point of origination of the bleeding.*
- *If direct pressure fails to arrest the bleeding, put indirect pressure on the arteries or veins leading to the bleeding point.*
- *Apply a 'Tourniquet' if so required to the bleeding part.*
- *Apply ice directly or an ice pack at the site of bleeding.*

12.8.2 Internal Bleeding

Curing internal bleeding perhaps does not come under the purview of first aid. However, a temporary relief should at least be provided to the suffering person.

12.8.2A Symptoms and Signs

- *The patient appears pale.*
- *His/her pulse is rapid.*
- *The patient gasps for breath.*
- *His/her skin is cold and clammy.*

- *The patient shows signs of restlessness and feels very thirsty.*
- *The patient could become unconscious.*

12.8.2B Treatments

- *Provide general treatment for shock (Refer to 12.14.1–"Shock")*
- *The patient must be treated by a doctor or might have to be transported to a hospital at the next station.*

12.8.3 Bleeding from Ear

This might occur due to any local injury that might be superficial and the bleeding point could be visible, or the local injury might be concealed in the inner part of the ear and the bleeding point might not be visible. This might also ensue because of a head injury.

12.8.3A Treatments

- *Lay the patient down with the head slightly raised and turned to the side of the bleeding ear.*
- *Place an absorbent padding under the ear to soak the blood.*

12.8.3B Precautions

Do not plug the ear in order to stop the bleeding.

12.8.4 Nose Bleeding

Causes of happening of this ailment are the same as mentioned in 12.8.3–"Bleeding From Ear".

12.8.4A Treatments

- *Make the patient sit upright with the head tilted slightly forward.*
- *Keep the nose bridge tightly pinched for at least 10 minutes. Do not loosen the pinch in between this period to investigate whether the bleeding has actually stopped.*
- *Put ice pack on the nose.*
- *Loosen tight clothing around neck, chest and waist.*
- *Advise the patient to breathe through the mouth.*

12.8.4B Precautions

- **Do not plug the nose in order to stop the bleeding.**
- **Advise the patient not to blow the nose even when the bleeding had seized.**

12.9 Bruises

These have similar causes as cited in the case of external bleeding (as in 12.8.1–"External Bleeding") with the exception that in this case, the person may be had struck by a blunt object instead of a sharp one.

12.9A Symptoms and Signs

- *Patients complain of pain at and around the location of the bruise.*
- *Bruised part swells up and turns bluish or blackish.*

12.9B Treatments

- *Put an ice pack on the bruised part.*
- *Bandage the bruised part.*
- *Administer an Aspirin tablet.*

12.10 Wounds

Passengers could manifest wounds, which might have occurred lately or be old ones that might have aggravated on board. These can be of various types viz. an abrasion, an incision, a skin puncture, a laceration, a contusion etc.

All these types of wounds bleed.

12.10A Treatments

- *If possible, raise the wounded part to decrease the blood flow to the part.*
- *Expose the wound by removing any clothing, covering it.*
- *Expunge the easily removable foreign objects.*
- *Dress and tie a bandage on the wound.*
- *Immobilise the part with the help of a sling, if necessary.*
- *Administer an Aspirin tablet.*

12.10B Precautions

- **Do not probe any object embedded deeply in order to extract it.**
- **If any object is deeply embedded in the wound and also protruding out from the wound, the bandage should be tied over two improvised padding placed one on each side of the protruding object high enough to disallow the bandage to touch the object.**

12.11 Burns and Scalds

Though it is quite unlikely and unwanted for the passengers to suffer burn or scald on board, the same may still occur.

However, cabin crew themselves are much more susceptible to be affected with these ailments. These are very painful and are extremely vulnerable to infection.

12.11A Symptoms and Signs

- *The person is in great pain.*
- *Blisters appear on the skin of the affected zone.*
- *Symptoms of shock could be noticed due to loss of blood plasma.*

12.11B Treatments

- *Cabin crew attending to such cases must wash his/her own hands with soap and rinse with Dettol or Savlon thereafter, before touching the affected zone.*
- *Rinse the part with flowing ice water or chilled water.*
- *The affected part should be covered with clean and sterilized dressing.*
- *The part should be immobilised.*
- *The person might have to be treated for shock.*

12.11C Precautions

- **If any clothing has got stuck to the affected part, it must not be pulled out.**

12.12 Fracture and Sprain

Sprains could be treated with basic first aid to subside the pain by administering a tablet containing Aspirin, but the fractures are to be dealt with much more care, seriousness and professionalism.

12.12A Symptoms and Signs

- *Acute pain at and around the affected part.*
- *The part shows swelling, tenderness and/or deformity.*
- *The part can hardly be moved.*
- *The temperature of the affected zone would be higher than that of the other parts of the body.*
- *The texture and continuity of the bone could be felt to be coarse.*

12.12B Treatments

- *Support the part with the help of a splint and immobilise the same by tying a bandage including the splint.*
- *In case the bone is protruding out of the skin, bandage it with the precaution cited in 12.10B–"Precautions". The bandage should not touch the bone.*
- *Administer a pain-killing tablet.*
- *General treatment for shock should be rendered.*
- *Arrangement for the patient to be attended at the earliest by a medical practitioner is to be made.*
- *Transportation of the patient to a hospital might become necessary.*

12.13 Head Injury

Head injury should be attended to immediately because it could be fatal with the passage of time depending on the gravity of the injury.

12.13A Symptoms and Signs

- *The person complains of unsteadiness and/or dizziness.*
- *The person could become unconscious.*
- *The person might vomit and might experience convulsion.*
- *Bleeding from scalp, ear and nose could be observed.*
- *A lower pulse rate of the person might be observed.*

12.13B Treatments

- *Make the person lie down with the head slightly raised.*
- *Treat for bleeding as stated in 12.8.1A–"Treatments".*
- *Arrange for the person to be attended to at the earliest by a medical practitioner.*

12.13C Precautions

- **No stimulant should be rendered to the person.**

12.14 Psychosomatic Ailments

These ailments generate psychological as well as physical effects in the patient. These sort of ailments comprise of shock, fainting, hysteria, convulsions etc. and the treatments stipulate application of first aid along with psychological counseling.

12.14.1 Shock

This ailment emanates from depression of all the vital functions of one's body and mind. This commonly occurs when a person is gripped with a sudden danger of considerable magnitude, viz. an emergency situation and/or injury.

12.14.1A Symptoms and Signs

- *The person experiences giddiness and might faint.*
- *The person feels thirsty.*
- *His/her skin becomes pale, cold and clammy.*
- *His/her pulse becomes very rapid.*
- *The person experiences breathing problem.*
- *The person sojourns in tension and might vomit.*

12.14.1B Treatments

- *The patient should be laid down on his/her back with the head tilted to one side.*
- *If the patient has no injury, raise his/her feet slightly. In case he/she has any head injury, raise the head a little.*
- *Loosen clothing around throat, chest and neck.*
- *Tuck him/her in blankets to keep warm.*
- *Small sips of water might be given at short intervals.*

12.14.1C Precautions

- **The patient should not be provided with nor be allowed to consume any 'stimulant'.**

12.14.2 Unconsciousness or Faints

Cabin crew members have to be quite careful in these situations as the patients remain in no condition to express/describe his/her sufferings or disorders. In other words, the patient cannot articulate any symptom. As such, only the emitted symptoms are to be observed and analysed carefully, so that, appropriate action(s) can be taken.

12.14.2A Treatments

- *The patient should be laid down with his/her head lowered down slightly.*
- *Loosen tight clothing.*
- *Sprinkle cold water on his/her face and direct the air louvres towards the patient's head and face.*
- *Administer Ammonia Inhalation (smelling salt).*

12.15 Ailments Related to Respiratory System

Two types of respiratory ailments are commonly observed on board.

In the first one, adequate supply of oxygen could not be acquired by the body due to restriction in the breathing system, viz. the food consumed might have choked the wind pipe or a fractured nose or ribs might have created congestion in breathing. This subsequently might generate *asphyxia.*

The second case is just the opposite of the aforesaid first case. In this, the body procures more quantity of oxygen due to rapid breathing or due to continuous administration of oxygen for a long time, which reduces the carbon dioxide level in the body and produces *hyperventilation.*

12.15.1 Asphyxia

This might turn fatal if the cause of restriction of breathing is not removed instantaneously and adequate supply of oxygen to the body is not restored. As such, an immediate action is absolutely essential in this case.

12.15.1A Symptoms and Signs

- *The patient complains or shows signs of not being able to breathe properly (viz. gasping).*
- *He/she feels dizzy and might even faint.*
- *The pulse of the patient rises rapidly first and becomes slow, feeble and irregular thereafter.*
- *His/her lips, nose and fingers turn bluish.*
- *The patient shows signs of restlessness and would feel frightened.*

12.15.1B Treatments

- *Extricate the cause of choking immediately, if possible.*
- *If any foreign object (like food particles or such) is stuck in the wind passage, slap the patient quite firmly between the shoulder blades.*
- *The patient's tongue should be prevented from falling back.*
- *Turn his/her face to one side.*
- *Cover the patient with blanket or sheet.*
- *Administer artificial respiration if the breathing stops.*
- *Oxygen should be administered after the revival of the patient.*

12.15.2 Hyperventilation

As stated in 12.15–"Ailments Related to Respiratory System", this happens due to intake of excessive oxygen, because of which the patient has trouble in breathing. In other words, this is caused by the excessive loss of carbon dioxide from the body.

12.15.2A Symptoms and Signs

- *The breathing of the patient becomes shallow, rapid and irregular.*
- *He/she experiences tingling and numbness of lips, cheek and fingers.*
- *The patient becomes excited, frightened and nervous.*
- *He/she might experience lightheadedness, giddiness and blurring of vision.*
- *The patient might also faint.*

12.15.2B Treatments

- *If conscious, ask the patient to hold his/her breath or to breathe at a slower rate inside a clean 'air sickness bag' in order to inhale more carbon dioxide and less oxygen. This process affects the gradual restoration of carbon dioxide and brings about the balanced level of carbon dioxide and oxygen, necessary in the body.*
- *Reassure the patient through counseling to ease his/her tension and excitement.*

12.15.2C Precautions

- **Totally refrain from administering oxygen to the patient in this case.**

12.16 Diabetic Coma

Diabetes occurs due to high level of sugar in the body. The patients are not allowed to consume sugar in their food intake, which result in a raise in their 'blood sugar' level. Persons suffering from diabetes are required to furnish prior intimation to the airline about their ailment, so that the airline in turn could arrange special diet for them. Presently, in most of the airlines, such diabetic meal is available on board whenever a major meal service is involved, irrespective of reporting of any diabetic case.

12.16A Symptoms and Signs

- *Loss of consciousness sets in very gradually and slowly.*
- *Skin of the patient becomes very dry.*
- *His/her breathing becomes shallow.*
- *Patient's breath smells of 'acetone' (a sweetish smell).*

12.16B Treatments

- *Administer general treatment for 'unconsciousness'.*
- *Arrange for the patient to be attended by a doctor at the earliest.*

12.16C Precautions

- **Do not give any food or drink containing sugar in any form to the patient.**

12.17 Hypoglycemic Coma

This is just the opposite of diabetic Coma. In this ailment, the blood sugar level of the patient goes below the normal level and the patient is required to consume excessive quantity of sugar with his/her food and drink. The aforementioned condition mostly occurs when the intake of insulin or other medication for the patient's diabetic condition becomes disproportionate to his/her body's need.

12.17A Symptoms and Signs

- *The patient experiences a sudden onset of unconsciousness.*
- *The patient's skin becomes cold and clammy.*
- *The patient's breathing becomes deep and it would not have the smell of acetone.*

12.17B Treatments

- *Apply general treatments for 'unconsciousness'.*
- *If the patient is conscious, give him/her food and drinks with extra sugar.*
- *Arrange for the patient to be attended by a doctor at the earliest.*

12.17C Precautions

- **Exert utmost care to differentiate between the case of hypoglycemic coma and a case of diabetic coma.**

The two are absolutely antithesis of each other. If the treatment for one of these were in any way administered to the patient actually suffering from the other, the outcome would be fatal in most of the cases.

12.18 Epilepsy

This could happen to persons of all ages but commonly observed in young people. This disorder occurs normally in three stages.

12.18A Symptoms and Signs

1. Stage One: The patient feels and realises the approach of the attack through auditory and urinary sensations and he/she might convey the same to the cabin crew.

2. Stage Two:

(a) *The fit and convulsion actually starts at this stage.*
(b) *The patient might start howling followed by unconsciousness.*
(c) *Jerky convulsions and uncontrolled movement of the limbs occur.*
(d) *The patient might clench his/her teeth and bite the tongue.*
(e) *Frothing appears at the mouth.*
(f) *Loss of control over urine and bowel might happen.*

3. Stage Three:

(a) *The patient becomes exhausted and falls asleep and subsequently go into deep sleep.*

12.18B Treatments

- *Remove all the objects that could cause injury to the patient, from his/her vicinity.*
- *The tongue of the patient should be prevented from being bitten by placing the handle of a spoon wrapped in a clean handkerchief in between the rows of teeth of the patient.*
- *The patient should be prevented from falling down and getting injured.*
- *Periodically wipe the froth from the mouth.*

12.18C Precautions

- **Avoid trying to restrain the movements of the patient forcibly.**
- **Maintain a watch throughout until the patient recovers fully.**

12.19 Heart Attack

This ailment could range from a mild one (Angina Pectoris) to a severe one (Coronary occlusion). In both the occasions, the patient would be imperatively necessiating and must be provided with utmost and immediate care and attention. Cabin crew members are to be prompt with their actions because this ailment tends to be fatal with wastage of time. Earlier the treatment, better would be the result.

12.19A Symptoms and Signs

- *The patient experiences a very severe pain shooting from the chest to the left shoulder and further to the left arm.*
- *The patient sweats profusely.*
- *The patient gasps for breath and would be restless.*
- *The patient's face becomes pale and the nails turn bluish.*
- *He/she would feel nauseous and might vomit.*
- *The patient's pulse is either very slow or very rapid (not normal).*
- *The patient might lose consciousness.*

12.19B Treatments

- *The patient should be restricted from making even the slightest movement (as far as possible) and indulging in exertion of any kind.*
- *Recline the seatback to make the patient comfortable.*
- *Loosen all tight clothing around the neck, chest and waist.*
- *Direct the 'air louvres' towards his/her face.*
- *Administer oxygen immediately.*
- *A doctor must attend to the patient at the earliest. Such arrangements must be made.*

12.20 Stroke

This occurs when a blood vessel in the brain ruptures or is clotted. It usually transpires to elderly persons suffering from blood pressure and hypertension though young people may also suffer from it.

12.20A Symptoms and Signs

- *The patient experiences a sudden weakness and numbness which might immediately be followed by loss of consciousness.*
- *Part of the body could become paralysed.*
- *The patient might loose control over urinary bladder.*
- *The pulse of the patient would show surprising anomalies by being either slow but strong, or weak and rapid.*
- *The patient would breathe deeply and/or snore in unconsciousness.*

12.20B Treatments

- *Recline the seatback of the patient.*
- *The patient should not be allowed to move and/or exert even the least bit and is to be covered with a blanket.*
- *Administer oxygen immediately.*
- *Arrangement should be made for the patient to be attended by a doctor at the earliest.*

12.21 Intoxication

A passenger might board a flight in inebriated condition or might acquire such condition, eluding the cabin crew, on board.

The cabin crew should be careful enough not to hurt his/her feelings and at the same time prevent him/her from being a source of nuisance on board, disturbing the co-passengers.

Severe cases of intoxication might even demand first aid.

12.21A Symptoms and Signs

- *The stench of alcohol is present in the person's breath.*
- *The pupils are dilated with reddening of the eyes.*
- *The speech of the patient is slurred, high pitched and he/she tends to talk excessively.*
- *The patient might sleep or loose consciousness after some time.*

12.21B Treatments

- *Wipe the face of the patient with towel soaked in ice water.*
- *Administer 'smelling salt'.*
- *Administer oxygen, if needed.*

12.21C Precautions

A doctor at the next station or even in the flight should positively attend to the passenger. The decision about the continuation of the person's onward journey beyond the next station should have to be taken by the Commander of the flight in coordination with the doctor's view and opinion.

12.22 Poisoning

This could initiate from various factors including the food the passenger has consumed on board (food poisoning). The symptoms vary on the potency and the quantity of the poisonous substance consumed by the person.

12.22A Symptoms and Signs

- *The patient reacts with violent nausea and vomiting.*
- *The patient experiences severe pain in the abdomen.*
- *The patient experiences muscular cramps.*
- *The patient might feel restless or drowsy and might pass into a coma.*

12.22B Treatments

- *Force the person to consume an emetic. In absence of regular emetic, the patient must be made to consume a huge quantity of warm salt water repeatedly to make him/her vomit.*
- *Do not induce vomiting if the poison consumed is of corrosive nature.*
- *Arrangement should be made for the patient to be attended by a doctor at the earliest.*

12.23 Normal Contents of First Aid Kit

The contents of first aid kits may vary in their number or brand, but usually remain the same. The list of items is as follows:

Table 12.1 Items of First Aid Kit

S. No.	*Items*	*To Counter/Required For*
	Medicines	
1.	Air sickness tablets	*Air Sickness, nausea, vomiting etc.*
2.	Baralgan tablets	*Severe abdominal pain etc.*
3.	Mexaform	*Stomach trouble like dysentery, diarrhoea, severe abdominal pain etc.*
4.	Saridon tablets (Aspirin)	*Ache and Pain*
5.	Sodamint tablets	*Indigestion, hyperacidity etc.*
6.	Halazone tablets	*Water purifying tablets*
7.	Liquid coramine drops	*Weak pulse and respiration*
8.	Smelling salt	*Fainting, exhaustion and depression*
9.	Dettol (antiseptic lotion)	*For cleaning and disinfecting wounds and equipment*
10.	Burnol	*Antiseptic soothing paste for burns*
11.	Terramycin eye ointment	*Infection, irritation and injury to eyes*
12.	Nasivion nasal drops	*For nasal ailments*
	Materials	
13.	Roller bandages	*To retain dressing in position*
14.	Triangular bandages	*To use as sling*
15.	Absorbent cotton wool	*To clean wounds and to act as padding*
16.	Absorbent lint	*Absorbent cotton or linen for wiping fluids*
17.	Absorbent gauze	*Linen for absorbing fluids*
18.	Adhesive plaster	*To retain the dressing on small cut or wound*
19.	Adhesive strips	*For small cuts*
20.	Safety pins	*To fix the end of the bandages*

(*Contd*)

(*Contd*)

21.	Wire splints	*For immobilising broken bones*
	Equipment	
22.	Tourniquet	*To choke bleeding*
23.	Pair of scissors	*To cut items as per requirement*
24.	Artery forceps	*To stop arterial bleeding*
25.	LA-IF Resuscitator	*For administering artificial respiration*

12.24 Normal Contents of Physician's Kit

Injections:

1. *Injection Deriphylin*
2. *Injection Paraldehyde*
3. *Injection Fortwin*
4. *Injection Syntometrin*
5. *Injection Adrenaline*
6. *Injection Largactil*
7. *Injection Micoren*
8. *Injection Gardenal Sodium*
9. *Injection Decadron Phosphate*
10. *Sorbitrate Tablets*

Instruments:

1. *Thermometer*
2. *Disposable syringes*
3. *Stethoscope*
4. *Blood Pressure measuring instrument (Sphygmomanometer)*

Precaution:

A doctor or a trained nurse alone is authorised to use the Physician Kit.

Questionnaire

1. **What is first aid?**
   (a) This is relief administered to a sick or ailing person.
   (b) This is a kind of treatment which disallows the ailment to increase.
   (c) This is not necessarily to be administered by a doctor or a trained nurse.
   (d) All the above are correct.
2. **For administering First Aid, Cabin Crew should:**
   (a) Take all appropriate actions as needed, systematically.
   (b) Keep the Commander and the Cabin Crew In-charge informed about the episode.
   (c) Ask and accept help from a Doctor or a Trained Nurse travelling aboard.
   (d) All above are correct.

3. Ear ache can develop on board because of:
(a) First flier's fear
(b) Change in cabin pressure
(c) Food chewed by the passenger
(d) All the above are correct.

4. 'Hypoxia' happens when:
(a) The body tissues receive less quantity of carbon dioxide.
(b) The body tissues receive less quantity of oxygen.
(c) As in (b) and for proper functioning of the body organs.
(d) As in (a) and for the proper functioning of the respiratory system.

5. Bleeding could be:
(a) Visible inevitably
(b) Of two types–internal and external
(c) Stopped by applying direct pressure on the wound of all types
(d) All the above are correct.

6. In order to stop nose bleeding:
(a) Patient to sit upright with head tilted downwards and apply ice pack.
(b) Pinch the nose for ten minutes, periodically checking if the bleeding has stopped
(c) Plug the nose
(d) Both (a) and (b) are correct

7. In case of a bruise:
(a) The person would complain about pain around the injury.
(b) The bruised part would swell up.
(c) The person would complain about breathing difficulty.
(d) Both (a) and (b) are correct

8. For a case of scalding, the cabin crew should:
(a) Rinse the portion with running water
(b) Treat the patient for 'shock'.
(c) Wash their hands on a mandatory basis before touching the affected part.
(d) All the above are correct.

9. The symptoms that reveal a fracture or a sprain are:
(a) The temperature of the affected part will be more than the other body parts.
(b) The part would show swelling, tenderness and/or deformity
(c) The person, if conscious, will report acute pain at and around the affected part.
(d) All the above are correct.

10. The treatments for fracture or a sprain:
(a) If any bone is protruding out, bandage the part tightly touching the bone.
(b) To make the part immobilised.

(c) To give the person food and drinks with more sugar.
(d) All the above are correct.

11. The symptoms that reveal a 'head injury' are:
(a) Bleeding from scalp, ear and nose
(b) The person could become unconscious.
(c) The person would complain of feeling unsteadiness and/or dizziness.
(d) All the above are correct.

12. Treatments for shock are:
(a) To tuck him/her in blankets, for keeping the person warm.
(b) As in (a) and to loosen the clothing around the person's throat, chest and neck.
(c) Give the person plenty of water to drink.
(d) All the above are correct.

13. The symptoms that reveal 'asphyxia' are:
(a) The patient would show signs of restlessness and would feel frightened.
(b) As in (a) and his/her lips, nose and fingers would turn bluish.
(c) As in (b) and he/she would feel dizzy and might even faint.
(d) The patient would be vomiting.

14. The symptoms that reveal 'diabetic coma' are:
(a) Patient's breath would have a smell of 'acetone' (a sweetish smell).
(b) As in (a) and loss of consciousness would set in very fast.
(c) Skin of the patient would become cold and clammy.
(d) As in (c) and his/her breathing would become shallow.

15. The treatments for heart attack are:
(a) Recline the seatback to make the patient comfortable.
(b) As in (a) and loosen all tight clothing around the neck, chest and waist.
(c) As in (b) and direct the 'air louvres' towards his/her face.
(d) As in (c) and administer oxygen immediately.

16. The treatments for intoxication are:
(a) Wipe the face of the patient with towel soaked in ice water.
(b) Administer 'smelling salt'.
(c) Administer oxygen, if needed
(d) All the above are correct

13

History of Civil Aviation

HISTORY OF CIVIL AVIATION

13.1 The Wright Brothers

Following Lilienthal's principles of jumping before flying, the brothers, acceptedly the pioneers of civil aviation built and tested a series of kite and glider designs from 1900 to 1902. Thereafter they attempted to build a powered design. The gliders worked, but not to the expectations of the Wrights. Their first glider, launched in 1900, had only about half the lift they anticipated. Their second glider, built the next year, performed even worse.

Instead of giving up, the Wrights constructed their personal wind tunnel along with sophisticated devices to measure lift and drag on about 200 wing designs that they created. Through this procedure, they corrected their earlier mistakes in calculations regarding drag and lift. They produced another glider design, which they flew in 1902. It performed far better than the previous models. It received all the benefits of their hard work and paid rich dividend for the rigorous system of designing, wind-tunnel testing of models and flight testing of full-size prototypes. The Wrights not only built a working aircraft, but also helped advance the modern branch of aeronautical science and technology.

The Wrights appear to be the ***first design team*** to make serious efforts, study and attempts to simultaneously solve the power and control problems. Both problems proved utterly difficult, but they remained persistent. Eventually, they designed and built an engine that could provide the needed power and solved the control problem through a system known as "wing warping". This method worked well at the low airspeeds their designs were to fly at and proved to be a major advancement towards today's 'ailerons'. While many aviation pioneers appeared to leave 'safety' largely to chance, the Wrights' design was greatly inclined towards the need to self-teachings to fly without unreasonable risk to life and limb by surviving possible crashes.

The Wrights made the ***first sustained, controlled and powered heavier-than-air flight*** at Kill Devil Hills, North Carolina, a town five miles from Kitty Hawk, North Carolina on December 17, 1903.

Orville Wright's first flight of 121 feet (37 m) in 12 seconds was recorded in a famous photograph. In the fourth flight on the same day, **Wilbur Wright** flew 852 feet (260 m) in 59 seconds. The flights were witnessed by four lifesavers and a boy from the village that made them the ***first public to observe flights*** and certainly the first well-documented ones.

The telegram station that the Wright brothers used for sending their message of successful, sustained, powered flight has now been converted to a restaurant named "The Black Pelican."

13.2 Other Early Flights

Gustave Whitehead claimed that he had flown a powered aircraft on August 14, 1901 but he failed to produce any document for the flight. Later, a replica of his 'Number 21' was flown successfully.

Lyman Gilmore also claimed to have achieved success on May 15, 1902.

Richard Pearse constructed a monoplane that he successfully flew on March 31, 1903 but ended in a crash-landing.

Karl Jatho conducted a short motorised flight in August 1903. His wing design and airspeed did not allow his control surfaces to act properly to control the aircraft.

Preston Watson in 1903, made his initial flights at the east of Scotland, but due to lack of photographic or documentary evidence, the claim was not considered valid.

The **Wright brothers** conducted numerous additional public flights (more than 80) in 1904 and 1905 from Huffman Prairie in Dayton, Ohio. They invited friends, neighbours and newspaper reporters to fly, although a few availed the opportunity.

Alberto Santos-Dumont made a public flight on September 13, 1906 in Paris. He used a Canard Elevator and wing-warping and covered a distance of 221 m (725 ft). Since the plane did not need headwinds or catapults to take off, this flight is considered by many, as the first and true powered flight.

Henry Farman and **John William Dunne** were also working separately on powered flying machines. In January 1908, Farman won the Grand Prix d'Aviation with a machine that flew for 1 km, although by that time many longer flights had already been made.

On May 14, 1908 the **Wright brothers** made what is accepted to be the ***first two-person aircraft flight***, with **Charlie Furnas** as a passenger.

Thérèse Peltier, on 8 July, 1908, became the ***first woman to fly as a passenger*** in an airplane when she made a flight of 656 feet with **Léon Delagrance** in Milan, Italy.

Thomas Selfridge became the ***first person killed*** in a powered aircraft on September 17, 1908, when **Orville** crashed his two-passenger plane during military tests at Fort Myer in Virginia.

On July 25, 1909 Frenchman **Louis Blériot** became the ***first person to cross the English Channel*** in an aircraft. His flight from Calais to Dover lasted 37 minutes. The flight followed the development of his Blériot XI monoplane, which he used successfully for crossing the English channel and received a prize of £1000 from the London Daily Mail.

Controversy over who gets credit for the invention of the aircraft has been fuelled by Pearse's and Jatho's essentially non-existent efforts to inform the popular press; by the Wrights' secrecy while their patent was prepared; by the pride of nations; and by the number of firsts made possible by the basic invention.

Traian Vuia (1872 – 1950) had claimed to have built the first self-propelled, heavier-than-air aircraft that could take off independently, without a headwind and entirely using its own power.

In October 1905, the **Wright brothers** had a sustained flight of 39 minutes, circling over Huffman Prairie, covering 24.5 miles (39 km).

In 1907 (Cornu, France), the Focke FA-61 (Germany, 1936) was the ***first helicopter*** known to have risen off the ground.

In the beginning of the 21st century, subsonic aviation focused on eliminating the pilot in favor of remotely operated or completely autonomous vehicles. Several Unmanned Aerial Vehicles (UAVs) have been developed. In April 2001, the unmanned aircraft Global Hawk flew from Edwards AFB in the US to Australia non-stop and unrefuelled. It was the longest point-to-point flight ever undertaken by an unmanned aircraft. It took 23 hours and 23 minutes to cover the distance. The ***first totally autonomous flight across the atlantic*** by a computer-controlled model aircraft took place in October 2003.

13.3 Modern Flying

In commercial aviation, the early 21st century saw the end of an era with the retirement of its only supersonic aircraft '***Concorde***'. Supersonic flight was not very commercially viable as the planes were required to fly mostly over the oceans if they wanted to break the sound barrier. Concorde also was fuel hungry and could carry a limited amount of passengers due to its highly streamlined design. Nevertheless, it seems to have made a significant operating profit for British Airways.

Despite this setback, and the general slowing of progress, it is generally agreed that the 21st century will be a bright one for aviation. Planes and rockets offer unique capabilities in terms of speed and carrying capacity that should not be underestimated. As long as there is a need for people to get to places quickly, there will be a need for aviation.

The obvious limits are future energy development and global warming. It does not appear to be possible to decrease the fuel consumption of aircraft as much as that of cars or of global space heating.

13.4 History of Boeing

13.4.1 Boeing Before 1950s

Boeing was incorporated in Seattle, Washington by William E. Boeing on July 15, 1916, as "Pacific Aero Products Co." It operated the maiden flight of one of the two "B&W" seaplanes built with the assistance of George Conrad Westervelt, a US navy engineer. On May 9, 1917, the company became the "Boeing Airplane Company".

Figure 13.1 *The Boeing 314 Clipper*

In 1927, Boeing created an airline, named Boeing Air Transport (BAT). A year later, BAT, as well as Pacific Air Transport and Boeing Airplane Company merged into a single corporation. The company changed its name to United Aircraft and Transport Corporation in 1929 and acquired Pratt & Whitney, Hamilton Standard Propeller Company, and Chance Vought.

United Aircraft then purchased National Air Transport in 1930. The Air Mail Act of 1934 prohibited airlines and manufacturers from being under the same corporate umbrella, so the company split into three smaller companies viz. Boeing Airplane Company, United Airlines, and United Aircraft Corporation.

Shortly after, an agreement was reached with Pan American World Airways (Pan Am) to develop and build a commercial flying boat that would be able to carry passengers on trans-oceanic routes. The first flight of the Boeing 314 Clipper was in June 1938. It was the largest civil aircraft of its time and could carry 90 passengers on day flights and of 40 passengers on night flights. One year later, the first regular passenger service from the United States to the United Kingdom was inaugurated. Pan Am started operating to destinations all over the world with the Boeing 314.

In 1938, Boeing completed work on the Model 307 Stratoliner. This was the world's ***first pressurised-cabin transport aircraft***, and it was capable of cruising at an altitude of 20,000 feet above mean sea level,—well above most weather disturbances that created turbulence of the flights.

After World War II, the company sold its Stratocruiser, a luxurious four-engine commercial airliner developed from the B-29.

Figure 13.2 *Boeing 377 Stratocruiser*

13.4.2 Boeing in 1950s

In 1958, Boeing began delivering its **B707**, the United States' first commercial jet airliner in response to the British De Havilland **'Comet'**, French Sud Aviation **'Caravelle'** and Soviet Tupolev **'Tu-104 Camel'**; which were the world's ***first generation of commercial jet aircraft***.

With the B707, a four-engine, 156-passenger airliner, the US became leader in commercial jet manufacture. A few years later, Boeing added a second version of this aircraft, the B720 which was slightly faster, but had a shorter range. A few years later Boeing introduced the B727, another commercial jet airliner of similar size, which had three engines and was designed to operate on medium-range routes. The B727 was very successful and immediately well accepted as a comfortable and reliable aircraft by travelling public, crews, and airlines. Although production of B727 was discontinued in 1984, at the turn of the millennium nearly 1,300 B727s were still in service with various airlines around the world.

13.4.3 Boeing in 1960s

In 1967, Boeing introduced another short/medium-range airliner, the twin-engine B737. It has become since then the ***best-selling commercial jet aircraft*** in aviation history.

13.4.4 Boeing in 1970s

The beginning of the 1970s saw Boeing in a new crisis. The 'Apollo Program' in which Boeing had participated significantly during the preceding decade was almost entirely cancelled. Once more, Boeing hoped to compensate sales with its commercial airliners. At that time, however, there was a heavy recession in the airlines industry so that Boeing did not receive one single order for more than one year. Boeing's bet for the future, the new B747, was delayed in production and engendered much higher costs than had been foretold. In 1971, the US Congress decided to stop the financial

support for the development of the supersonic 2707 that was Boeing's answer to the British-French Concorde, forcing the company to discontinue the project. In January 1970, the first B747, a four-engine long-range airliner, flew its first commercial flight. This famous aircraft completely changed the concept of flying, with its 450-passenger seating capacity and its upper deck. Until 2001, Boeing had been the only aircraft manufacturer to offer such an airliner and has delivered nearly 1,400 units. (Airbus offers the A380, which is now the largest operational airliner).

13.4.5 Boeing in 1980s

In 1983, the economic situation began to improve. Boeing assembled its 1,000th B737 passenger airliner. As the density of passenger air traffic increased, competition was harder, mainly from a European newcomer in commercial airliner manufacturing, Airbus. Boeing had to offer new aircraft and developed the single-aisle B757, the larger, twin-aisle B767, and upgraded versions of the B737. An important project of these years was the 'Space Shuttle'. Boeing was the first contractor for the International Space Station.

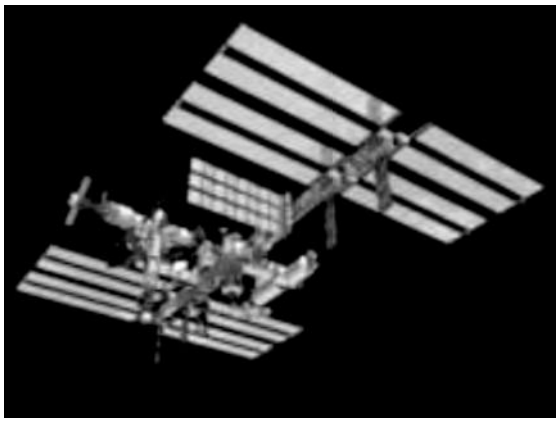


Figure 13.3 *International Space Station*

13.4.6 Boeing in 1990s

In April 1994, Boeing introduced its most modern commercial jet aircraft, the twin-engine B777, with a seating capacity of between 300 and 400 passengers in a standard three class layout to serve in between the B767 and the B747.

This fly-by-wire aircraft reached an important milestone by being the first airliner to be designed entirely by using CAD techniques. Also in the mid-1990s, the company developed the "Next-Generation" B737 (B737NG). It has since become the fastest-selling version of the B737 in history.

In 1996, Boeing acquired Rockwell's aerospace and defense units. These Rockwell paraphernalia became a subsidiary of Boeing and renamed Boeing North American Inc. In August of the next year, Boeing merged with McDonnell Douglas to form the 'Boeing Company'.

13.4.7 Boeing in 2000s

In recent years Boeing has faced increasing challenge from Airbus, which offers some commonality between models (reducing maintenance and training costs) and the latest fly-by-wire technology. From the 1970s, Airbus has increased its variety of aircraft to such a level that they can offer a matching aircraft in almost every class that Boeing does.

In September 2001, Boeing moved its corporate headquarters from Seattle to Chicago.

On October 10, 2001, Boeing lost to its rival Lockheed Martin in the fierce competition for the multi-billion dollar 'Joint Strike Fighter' contract. Boeing's entry, the X-32, was rejected in favor of Lockheed's F-35 entrant.

In 2004, Boeing discontinued production of the B757 after producing 1055 aircraft, with the last one going to Shanghai Airlines in China. More advanced, stretched versions of the B737 were beginning to compete against the B757, and the new B787-3 filled some of the top end of the B757 market. Also, that year, Boeing announced that the B717, the last civil aircraft to be designed by

McDonnell-Douglas, would cease production by 2006. Boeing continues to serve as the prime contractor on the International Space Station and has built several of the major components.

After several decades of numerous successes, Boeing lost ground to Europe's Airbus and subsequently lost its position as market leader in 2003. Multiple Boeing projects were pursued and then canceled. The Sonic Cruiser was among these projects. The Boeing Sonic Cruiser was launched in 2001 along with a new advertising campaign to promote its new motto, "Forever New Frontiers", and rehabilitate its image. Boeing is now focused on the newly-launched 'B787 Dreamliner' as a platform of total fleet rejuvenation, which has benefited from strong sales success at the expense of Airbus' competing offerings.

On August 2, 2005 Boeing sold its Rocketdyne rocket engine division to Pratt & Whitney.

In May 2005, Boeing announced its intent to form a joint venture, United Launch Alliance with its competitor Lockheed Martin. The new venture could be the largest provider of rocket launch services to the US government. The joint venture gained regulatory approval and completed the formation on December 1, 2006.

Recently, Boeing has launched a new aircraft; the B787 Dreamliner, and four new aircraft variants; ultra-long-range B777-200LR, B737-900ER, B737-700ER and B747-8. On May 1, 2006, Boeing announced that it had reached a definitive agreement to purchase Aviall, Inc. based at Dallas, Texas for $1.7 billion and retain $350 million in debt. Aviall, Inc. and its subsidiaries, Aviall Services, Inc. and ILS shall become a wholly owned subsidiary of Boeing Commercial Aviation Services (BCAS).

13.5 Airbus History

In the 1960s, European aircraft manufacturers competed with each other as much as the American giants. In the mid-1960s, tentative negotiations commenced regarding a European collaborative approach. ***'Airbus Industrie'*** began as a consortium of European aviation firms to compete with American companies such as Boeing, McDonnell Douglas, and Lockheed.

In September 1967, the German, French and British governments signed a Memorandum of Understanding (MoU) to start development of the 300 seat Airbus A300. This was the second major joint aircraft programme in Europe followed by the Concorde, for which no ongoing consortium was devised.

In the following months of this agreement, both the French and British governments expressed doubts about the aircraft. The problem was the requirement for a new engine (to be developed by Rolls-Royce, the RB207). In December 1968, the French and British partner companies, Sud Aviation and Hawker Siddeley proposed a revised configuration, the 250 seat Airbus A250. Renamed the A300B, the aircraft would not require new engines and would simultaneously reduce development costs.

In 1969, the British government shocked its partners by withdrawing from the project. Given the participation by Hawker Siddeley up to that point, France and Germany were reluctant to take over their wing design. Thus, the British company was allowed to continue as a major subcontractor. In 1978, Britain rejoined the consortium when British Aerospace (merged Hawker Siddeley and BAC) purchased 20% share of the company.

13.5.1 Formation of Airbus

Airbus Industrie was formally set up in 1970 following an agreement between Sud-Aviation (France) and Deutsche Airbus, itself a German aerospace consortium consisting of Bölkow, Dornier,

Flugzeug-Union Süd, HFB, Messerschmitt, TG Siebelwerke, and VFW. The grouping was joined by CASA of Spain in 1971. Each company would deliver its sections as fully equipped, ready to fly items. The name "Airbus" was taken from a non-proprietary term used by the airline industry in the 1960s to refer to a commercial aircraft of a certain size and range for this term was linguistically acceptable to the French.

In 1972, the A300 made its maiden flight and the first production model, the A300B2 entered service in 1974. By 1979, there were 81 aircraft in service. It was the launch of the A320 in 1981 that established Airbus as a major figure in the aircraft market.

It was a fairly loose alliance, but that changed shortly after major defence mergers in 2000. Daimle-Chrysler Aerospace (successor to Deutsche Airbus), Aérospatiale-Matra (successor to Sud-Aviation) and CASA merged to form EADS. In 2001, BAE Systems (formerly British Aerospace) and EADS formed the **Airbus Integrated Company** to coincide with the development of the new Airbus A380 which seats 555 passengers and is the world's largest commercial passenger jet from the time it entered service.

14

A – Z of Interview

A – Z OF INTERVIEW: AN INTRODUCTION

The knowledge and qualification gathered throughout a person's life is valueless – if not utilised. Again, for its utilisation/application, an occupation and/or a subsequent change of occupation is essential. In addition, for acquiring an occupation or for its change, securing an interview call becomes necessary. To begin your professional career, especially in the field of aviation, securing an interview is a primary ramification, next only to or similar to gaining education.

Discussions about various aspects of interviews are presented in this chapter.

14.1 Missing/Skipping any Interview

Whether you finally accept a job or not, you should never allow any interview call to pass unattended. Again, attending only for name's sake is not the criteria, you should attend each such call with the best of your preparation and research. None of these mentioned deeds is ever wasted. Your '*preparation'* gives you practice and additional knowledge (however scanty or whichever topic that may cover). Furthermore, you may not be much interested in the job offered by a particular company today, but who knows, you might be interested for another job, offered by the same company later. You will find the '*research'* that you are doing on the company now, immensely useful and helpful then.

Above all, the more you appear in interviews, the more you are practiced, more you are prepared, and more is your confidence level. This *'confidence level'* in turn will reduce your anxiety quotient considerably during an interview because you become rather accustomed in appearing in these.

14.2 Securing an Interview

This can be segmented into two parts viz.

- *To find information regarding existence of the job vacancy*
- *To send application in anticipation to receive an interview call*

14.2.1 Finding Information Regarding Vacancy

There are numerous sources of receiving such information. Amongst these are:

- *Media:* Classified advertisements about vacancies are notified regularly through TV channels, newspapers etc. From these the suitable ones can be chosen.
- *Company Website:* These days, majority of the companies have their own websites, which reflect existence of vacancies in their organisation.
- *Internet:* You can search for and locate suitable information by surfing the internet.
- *Employment Exchange/Employment Agencies:* You are to submit the personal bio-data/résumé with your job preference, and the agency will provide assistance in locating such vacancies against suitable charge.

14.2.2 Sending Your Application

This involves several steps:

- *Preparing your application*
- *Writing your application*
- *Addressing your application*
- *Preparing your bio-data/résumé*
- *Make the application look attractive*

14.2.2A Preparing Your Application

Preparing an application calls for much attention and care.

When you prepare your application you do not simply write, "I want the job", attach a copy of your résumé and send it to the company expecting and accepting the same to be 'the application'. If you were to lose, you would rather be trying to adopt such an approach the job!

Your application should not simply reveal your educational and professional background, how good you were in your previous organisation (if any), what distinctions you have in various extra-curricular activities with its degree of proficiency. In addition to all that is mentioned above, a well-written presentation should contain something extra to create a favourable impression on the prospective employer and to give him/her psychological encouragement to consider you as a commendable candidate.

An application has two parts viz. a cover letter and a résumé. These are elaborated below.

14.2.2B Writing Letter of Application

Writing applications involve two styles viz. personal and impersonal.

1. Personal Style: This refers to - *"I had passed out from the school, I joined the engineering college, I was considered as a top grade student there, etc."*

When and if you write in this style, you would notice the use of 'I' almost twice in a line. This is likely to suggest 'egoism' to the prospective employer. He/she might misinterpret the same as your immodesty and this thought might develop an undesired predicament in the person's mind against you.

2. Impersonal Style: This style presents information differently: *"Passed out from the school to join engineering college and was among the top ranking students".*

This type is easier to write and better to interpret. The text of the above-mentioned part acts as a covering letter to your résumé and essentially discloses the motive behind your application and clarifies your desideratum/stand, fully.

It should include your stronger qualities, which the officials of the company find most suitable for the organisation.

To successfully present this point, you are to indulge in some research on the company to gather adequate information about it (discussed later in the chapter) which you will find immensely advantageous during the interview too.

14.3.2C "Addressing" Your Application

Normally, in their notification the company mentions the designation of the person to whom to address the application in their notification. In absence of any specific designator, it is better to address your application to the top brass of the organisation (viz. President/CEO, CMD or such). The person might not have anything to do in relation to your job, but your application in this case would be reached to the concerned authority by the top person, eliciting a favourable effect and that would most certainly carry extra weight, because it would then be coming from the overlord.

14.3.2D Your Bio-data/Résumé

You should necessarily attach your résumé separately, along with your application. If you try to combine the two, it will look cumbersome and the facts you are trying to reveal might not be highlighted properly.

Your résumé should be specific and accurate. It is most common to list your better qualities in a chronological form, beginning with the best and coming downwards. You should give preference to the qualifications that make you most suitable to the company and allot precedence to them for listing.

For example, when you have a commendable educational background and a brief technical experience, you mention your educational qualifications first.

Jotting down your qualifications (educational/job related) and experience should always be from the highest/best.

For example, if you joined an engineering firm as a technician in January 1998, got promoted to the post of supervisor in August 2001, and held the post of Deputy Manager from June 2006, you should write:

- *June 2006 until date: holding the post of Deputy Manager*
- *August 2001 to May 2006: worked in supervisory capacity*
- *January 1998 to July 2001: worked as a technician*

You should write your name, address and contact telephone number first and in that order.

If you have worked in various organisations before seeking the job you are applying to, put the period of working on the left followed by the name of the company and end with the position/rank.

EXAMPLE

For example:
January 1998 to August 2000: Deputy Manager (In Flight Services) - Eagle Airlines
June 1980 to December 1998: Senior Flight Purser (In Flight Services) – Asian Airways and so on.

Job Specification: Following this, give your job specification. You will find this to be quite tough, but this is most important and unavoidable. As such, first jot down a draft of whatever you have done during the tenure with your earlier companies. Select the best of these points that you find valuable/relevant for the job you are now applying for and reflect those starting from the most useful, downward.

The topics to be covered for this purpose should include:

- Any unusual responsibility that was bestowed upon you and successfully borne by you
- If you have devised any procedure which was found profitable for the company,
- If you can show that you were promoted in quick succession and the company had agreeably raised your salary and perks.

EXAMPLE

For example, if you are applying for a job of 'In Flight Supervisor' with Happy Landing Airlines and you could identify two deeds worth mentioning, which had taken place during your tenure with the previous airlines you had worked with. Say –

- *you had devised a pro-forma checklist, which made it very convenient for the cabin crew to check the supplied catering items before departure of a flight, and*
- *you have saved the lives of 53 passengers during a crash landing at Lucknow.*

Here, you should enlist the first case later than the second one, as your job details. Although you have done commendable work in both the cases, it is, however, the second one, which is much more important in comparison to the first.

Again, if this is not your first job and you are switching over to another job, there could be two reasons for such an act of yours.

1. *You are finding the job you are trying for, better in certain respects (perhaps the salary is higher/or the job satisfaction as you expect is better) and as such you are leaving the present company.*
2. *The present company is no longer requiring your services and retrenching you as the company might be reducing the number of employees or they are not happy with the way you are discharging your duties.*

In both the above-mentioned conditions, you are required to inform your prospective employer about the reason(s) and impress the person at the same time.

For the first case you can mention the reasons straight, as you have every right to do so for your future betterment.

Representing the second type of happening is quite tricky. In this, you would feel it arduous to mention that it was your fault for which you were sacked. This reason will neither gratify the person nor fulfill your purpose. As such, you have to be more diplomatic. You could write:

Reason For Leaving the Earlier Company: The job needed different skills than those possessed by me.

This will disclose that you are shifting from a job and at the same time will not dwell on whether you are leaving the job on your own or the company sacked you because of your unsatisfactory work, or your boss did not like your face, or any other reason.

Educational Qualification: List these the same way as you have done earlier – from the best downwards. This means, if you have acquired an engineering degree after completing school and college education, mention the engineering degree first followed by college education, and finally the school education.

Extra Curricular Activities: Although your educational and professional qualifications have paramount effect on your securing an interview and in that respect a profession/job, this part of your profile has ample role to play in the same.

Extra curricular activities impress the prospective employer and enable him/her to analyse you psychologically and view/judge you mentally. While representing these activities, exert all and similar care that you have while describing your other qualifications in the application.

14.2.2E Make Your Application Look Attractive

Last but not the least, you must exert excessive care to make your application look alluring to convey an untold story about you and/or your methodical approach towards any/every deed. Beside verity and neatness of your application, the way you fold your application reflects about the said quality of yours and has much significance.

You should take care in folding the application, exactly in three equal parts and place it inside the envelope in such a way that the addressee's details (name, address, etc. as reflected on top left corner of your application) are revealed as soon as the application is taken out of the envelope.

14.3 What is An Interview?

An interview is a conversation in which a probable employer tries to measure the magnitude of knowledge and the suitability of the candidate in relation to the job in concern, and the aspiring candidate exerts best effort to make evident his/her capability regarding the same.

Basing on the said definition, you can derive that the prospective employers do possess more authority than the candidate. However, this derivation should not dishearten the candidate in any way, especially if he/she has made the needed preparation fully. His/her preparation might even be better than that of the interviewer. In fact, this happens in majority of cases in practice, as the urge for accessing success encourages the candidate to prime himself/herself to the best, and does not apply analogously to the interviewer. As such, this is the supreme reason why such 'preparation' is the bottom-line for the candidate. Concisely, the candidate overcomes the advantage possessed by the interviewer for being on the 'hot seat' through his/her 'preparation'.

14.4 Preparation for Interview

You should commence your preparation well in advance in anticipation, even before receiving the interview call. Please realise that the more you prepare the more you polish your knowledge and lessen the fear of the interview. The topic is discussed in detail later in the chapter.

14.5 Fear of Interview

Butterflies flutter inside the stomach of almost every candidate before the interview. This is very natural and one should not get alarmed or even take notice of it. The feeling is comparable to that of a person waiting for the announcement of result of a million dollar lotto, although there remains a little difference between the two. There is nothing and absolutely nothing a person can do about the second case. However, he/she can certainly prepare for the first, to lessen, if not totally abolish, the fear of interview.

The preparation predicates to remove the fear of interview from the candidate's mind is essential and has no alternative.

14.5.1 Some Common Fears and their Solutions

Table 14.1

S.No.	*The Fear*	*Solution*
01.	What if I do not know the answer to the question they ask?	(i) If you have prepared well, why shall you not know the answer? *For example, if you are appearing for the interview for cabin crew, the interviewer could ask you about the number of engines in Boeing 747, just to assess your interest in aviation, and you should know the answer.* (ii) The interviewer(s) also accept that the candidates cannot answer every question. If you can reply 8 out of 10 questions, it should be truly satisfactory. This certainly does not suggest that you slacken your preparation. You must prepare to answer 10 out of 10 questions. (iii) You should try to improvise a reply using your quick thinking, wit and skill. *In an interview, the interviewer asked a candidate who was from Darjeeling what he thinks is extraordinary about Darjeeling. The candidate cited one suggestion after the other, but when none of these could satiate the interviewers, he finally added that the fog in Darjeeling resembles that in London. There was laughter from the interview board, which indicated they liked the improvised reply.*
02.	What if they ask about my experience and I possess none?	No one can have experience without working literally. If the concerned interview is for your first job and that was represented through your résumé, the interviewer cannot and should not expect you to have any experience. When the company has called you, knowing the fact from your résumé, it is most likely that they are interested in your other qualities like knowledge, skill, wit, smartness, body language etc. If you could excel in these areas, there should not be any problem in your not having any experience.
03.	How shall I tell them that my previous employer has actually sacked me from my job?	It is very natural to shift from one job to the other. With gain of experience, you become eligible to receive more salary, benefits and authority. However, in the concerned case, you are not much welcome to furnish the actual reason for your job switch and have to reply with tact. The reply could be analogous to your writing in your résumé the cause of leaving your earlier job as in 14.2.2D––"Your Bio-data/Resume". You can say, "*It was not a fitting slot for me*". This via media representation would cover the part truthfully.

(*Contd.*)

Table 14.1 (*Contd.*)

S.No.	*The Fear*	*Solution*
		In addition, you are perhaps arming yourself with a letter of recommendation from the authorities of your previous company. Fortunately, in majority of the cases, the company does not mention the true reason of finding you unsuitable and the fact that they are sacking you. They do their last hand shake with dignity, consideration and sympathy and even wish you 'good luck' for your future. This letter from your previous employer will help you in this predicament to give a reason for leaving the past job, while not actually revealing the retrenchment.
04.	I believe that I am under/over qualified for the job. Will they raise any objection about it?	In both the cases, the fear is complex oriented. You are suffering from inferiority complex for the first and superiority complex for the second, if this fear is growing inside you. For the first instance, you may envisage: *"I might not have sufficient qualifications, but I am hard working, have an urge to learn and am disciplined enough to obey the superiors. I certainly will not find any difficulty to learn and cope with the job effectively."* For the second, you may ponder that *"As I will find the job easy, I shall find out accessible avenues to complete the job accurately within a shorter period and propose the mode implemented for adoption to superior authorities. In return, they would elevate me to a higher post/rank, which will uphold my eligibility and justify the worth of my qualification."* Positive and effective thinking on either occasion would help you to overcome the complexes inside you, whether inferior or superior. (Refer to chapter six for further details about 'complexes')
05.	I am too restless and twitchy when I am nervous and/or tensed. How shall I control this during the interview?	You should realise that certain body movements are essential to express some specific points effectively. If you decide to sit bolt upright, to control your nervousness and/or restlessness and spend better part of the interview on concentrating about how to rectify the same, how can you expect to pay attention to the proceedings of the interview, understand the questions asked and reply them? You will be able to overcome the problem gradually, if you mentally persuade yourself to control (and certainly not freeze) your body movements by making you grasp that when you have made your preparations well, why shall you be nervous at all? For further details, refer to chapter eight concerning body language.

14.6 Researching for the Interview

The research covers a major part of your preparation and demands explicit endeavour from you.

EXAMPLE

Say, you are going on a holiday to Sikkim. What you can do is to board an aeroplane to land at Bagdogra airport, go to Gangtok, see Rhumtek monastery, orchid garden and enjoy the panoramic view of Mount Kanchenjunga and Mount Siniolchu, return to Bagdogra and fly back home. When you come back, people could ask whether you have visited Nathu-la pass, how did you enjoy Chhangu Lake, did you visit Pelling, have you seen this, have you done that and you

answer all in the negative. This is only because you did not bother to find out before your departure about what more Sikkim has to offer other than Gangtok.

If you are uncomfortable with the word 'research', which conjures up an image of a scholarly person with spectacles, the lenses of which resembles the bottom of a heavy bottle to you, try accepting that it simply means accumulating extensive information.

The process of finding out detailed and extensive information about anything is researching it; whether that be Sikkim or the company in which you are appearing for an interview.

14.6.1 Why Research

You must gather as much information as you can (the utmost) about every nooks and crannies of the company. The more information you accumulate, the more conversant you are with the company, resulting in a more comfortable, fearless and determined 'you' during the interview.

Research arms you to establish a general, but major idea whether you would like to join the company prior to your appearing in the interview. However, it may be reiterated that you must never ignore and lose a chance to appear in an interview, whether you intend to accept the job or not. This is elaborated later in the chapter.

14.6.2 What to Research

The question could be answered in one sentence: "All; whatever you can" and the version is correct and true.

Some important and unavoidable topics are mentioned below for your convenience and for better understanding of the topic. However, do not ignore any further/extra guidelines than those listed below, even if you feel they may be irrelevant. If needed, you will find no difficulty in suitably and opportunistically presenting these during the interview and replying to every question thoroughly, distinctly and without any hesitation.

During your research you must collect:

- *A brief history of the company*
- *Information regarding the type of business they do and their credibility*
- *Their business associates*
- *Their needs and how best you fit in the picture*
- *Their financial condition*
- *The facilities they offer to the employees*
- *The products they offer, etc.*

1. Finding the Need of the Company (what they want) and how Best you can Assist them:

When a company hires a person they expect him/her to contribute to the betterment of the company. On this point, you will have to agree that they are totally justified to do so in order to select the best person from whom they expect to avail the utmost assistance. If you want to be that '***best person***', you have to anticipate their need thoroughly first and should subsequently be able to describe distinctly how best you could fit in the slot they are trying to fill up.

You can prepare for the first part through your research and for the second one by rehearsing vigorously during your preparation period.

EXAMPLE

Suppose you are appearing for an interview of cabin crew and you have found through research that some of the existing cabin crew of the airlines are not very proficient with conversing in English and that the airlines is searching for an avenue to overcome this deficiency in order to improve this locale.

During the concerned interview, with every possibility the interviewers would ask you what you propose to better the passenger service. While replying you can say whatever you have rehearsed and memorised for narrating. Put your triumph card thereafter and, add that you expect that your colleagues will enhance their proficiency in English conversation by talking to you and you shall provide your utmost cooperation to better their capability. Add that you further expect that it will be useful to elevate customer relations considerably.

This little extra effort should put you in the esteemed zone as you are suggesting something well desired by the airlines as they are searching a means to rectify the shortcoming.

2. Finding out about the Financial Condition of the Company:

Finding out about the financial condition of the company is necessary for two reasons; firstly to give due consideration about joining it and secondly, for putting through your suggestion(s) for its improvement/rectification accordingly, during your interview.

(A) If the company were solvent, you would naturally love to join it, but if it were not, you would think thrice before joining it.

(B) To reply to any question involving the financial status of the company you have to think and prepare the reply in the light of the company's solvency.

Supposing the company is *not* very stable financially and if you suggest further expenditure, for whatever improvement for the company, your reply will boomerang on you without any consideration of your good and genuine intention.

3. Finding the Profitability of the Company:

You have to find out how profit making the company is, because bed-rocking on that only you have to prepare a reply for your interview. You have two alternatives to decide this:

(A) If the company is *not* making a profit, you have to suggest what you would like the company to do to isolate/discard certain expenditures that they are incurring at present.

EXAMPLE

Suppose you are appearing for an interview for cabin crew and you have found out that one of the caterers is charging exorbitantly and supplying food adequate in quantity, but substandard in quality. The passengers are quite unhappy and made their displeasure known to the airlines.

In that case, you may suggest that the airlines could negotiate with the caterer by highlighting the previously mentioned representations to supply an improved quality of foodstuff at a lower rate than those at present, on the bargain of reducing the quantity of foodstuff.

The deal should materialise, as no caterer would ever wish to lose an airline contract and especially when it is receiving an opportunity of reducing the quantity of food.

On the other hand, the passengers would be happy to receive at least something to eat than receiving some inconsumable rubbish and that will certainly improve their rapport with the airlines.

(B) Contrary to the abovementioned point, if the company is making good profit you should propose to include certain items to facilitate the customers to build up an enhanced and long lasting good will.

EXAMPLE

As an aspiring cabin crew, you should consider the betterment of the passengers. In that case and upholding such concern, you may propose the airline to deploy certain machinery to make the aircraft cabin cold in summer and warm it in winter before passenger embarkation. Though this moderate effort would incur the airline, however, an extra expenditure, the airline shall find the proposition beneficial and accept it readily, as they would then expect to record an increased number of passengers.

4. Finding out if Some 'Leading Products' of the Company are Selling Well:

For this:

(A) You have to find details about the products of the company followed by an extensive market survey regarding those products, to suggest some specific modes to increase their sale, during the interview.

(B) Again, if the selling of products is encouraging you should propose some other specific means of elevating the sale of products to soar further.

EXAMPLE

In this concerned field, as far as airlines are concerned, they offer two saleable products viz. 'seats to passengers' and 'cargo space' to freight senders. In these days of tough competition, although the airlines get some proportion or the other of the consolidated volume of both the abovementioned products, but each of the airlines wishes to acquire the same in excess.

Your suggestion(s) during the interview should include the mode to achieve the goal further and at the same time sketch your role/part in the suggested mode.

If you are attending an interview for cabin crew, you are already aware of their duties through Chapter One and about self-improvement through Chapter Six. Now, you have just to select your points, add a little extra from your own self and deliver it before the interview board. It will be a unique piece of submission and bound to impress the interview board.

5. Finding out about the Company Culture:

It is quite necessary to recognise the workplace you are aspiring to join and for this, you have to find someone who is either an employee of the company or has sufficient knowledge of the company that you intend to join. You might have to run from pillar to post to get your work done, which you may consider as a supplement to your research.

You should try to acquire all details about the following points from the person you have searched out and everything further.

(A) *Interaction between the Employees:* You should find out whether it is *cordial* (where along with business affair conversations, you could add a few personal and informal words) or it is *clipped and stiff* (where you could speak nothing, but company affairs).

(B) *Addressing another Employee:* Whether it would be mandatory to use sir/madam strictly for your bosses or can you use Mr./Mrs./Miss occasionally before their surname also. Similarly, could you use the first names of your colleagues inside the office premises at all?

(C) *Type of Dresses Worn in the Organisation:* Whether the employees can wear casual clothes like trousers with full sleeve shirts or safari suits etc. or it has to be formal where a tie is mandatory or a business suit is essential.

(D) *Working Hours and Available Break:* Find out the working hours and the break/rest period allowed by the company. Position yourself mentally to work in such condition; be true to yourself and decide whether the condition suits you fully.

(E) *Chances of Promotion, if any, and its frequency:* You must confirm whether it is your hard work and efficiency that counts and/or are your dealing and flattering the boss(es) that is essential for your promotion. If the key words are, "seniority-cum-suitability", be fully clarified about the extremely vague term "suitability".

Make sure that the conditions and the acts you have to perform suit your mentality and you can bear and uphold these in practice to be suitable as per the wish of the management of the company.

You can unearth some of the company culture from the company's website also, but that will not fully reveal the exact environment or will not disclose any concrete/true happening that had taken place in the company earlier in detail. For a real image you have not only to extract the relevant information from the website but also cross-check it in the light of the information received from the previously mentioned person having knowledge of the company.

6. Benefits Offered by the Company:

You should also find out about the various facilities offered by the company, such as:

(A) *Transportation:* Would the company pick you up from and drop you back at your residence.

Cabin crew members receive this facility and find it advantageous in many ways for them and the airlines.

(B) *Free or Subsidised Food:* Supplying food, free of cost or at a subsidised rate is a part of the company's welfare scheme that keeps the employees gratified, and who in turn try to make the company satisfied.

Cabin crew receives this facility on board from the airlines.

(C) *Provision of Recreation Room/Rest Lobby:* This is necessary for the employees to enjoy their break periods and get refreshed to resume work with vigour.

Cabin crew members get this in certain airlines operating longer routes. For the airlines operating smaller sectors, the cabin crew members neither find any time for rest nor do they need the same, as they are off after a comparatively short duty period.

(D) *Club or Health Club Membership:* This is again a part of welfare schemes. Certain companies make their executives corporate members of renowned clubs on company's account, where they find the opportunity to interact with their counterparts from other companies and improve the stake of their individual company. The company also bestows similar facility of health clubs to certain employees to keep fit and to look after the interest of the company better.

Cabin crew members receive the facilities of health club in most of the hotels they stay during their layover, upholding the abovementioned logic.

14.7 About Your Skill

Some interviewees suffer with a fear that compels them to ponder, "What is the benefit of attending the interview as I do not have any *skill*?" This thought is absurd and baseless as pronouncing the concerned statement by substituting the letter 'i' of its last word with 'u'.

Persons encouraging such thoughts are thoroughly irrational and doing injustice to their capabilities. Every human being has some skill or the other, however scanty it may be.

EXAMPLE

A person begging on the street might possess a skill to paint and decorate earthenware. It is again possible that the person does not know about possessing the skill, or even if he/she does, he/she is not paying any heed to utilise it and is thus wasting it.

From this example you may infer that in all normal circumstances, every person has a skill or the other and "not possessing the skill" is not the factor, but "not utilising the skill" is the major criterion. As such, if you are not trying to recognise your skills, you are doing injustice to yourself.

14.7.1 Recognising Your Skill

Sit down at a quiet and undisturbed place and start thinking casually about the incidents that had happened in your life. It would not be necessary to recollect the incidents serially as they happened as long as you could remember the happenings only.

During this process, jot down any of your action, worth noting (however small that may be), which had helped you in any way (may that be cycling, drawing, calculating, boxing or saving a child from fire). You will find the list becoming lengthier, and at the end when you become tired of thinking further, you will find the list has acquired a considerable size.

Pick up the best ten from the list as per your judgment. These are the items which reflect your skill. You must recognise these and do justice to yourself and your skills.

14.7.2 Developing Your Skills

On the aforesaid point you may argue that – possibly, I know cycling but how could that be counted as a skill when I can hardly cycle for 50 m. in a field. I certainly cannot cycle on a busy road. No doubt, you have the skill of cycling, but indeed, you are not a skilled cyclist.

EXAMPLE

You have many experienced football players in your club. They all play football and they are all experienced. Are they as esteemed and/or as experienced as Maradona or Pele? This is the difference between "experience" and "expertise".

Again, these players of your club might be as God gifted as many others, but do they rise to the same exceptional levels of the mentioned two? They do not. This is simply because Pele and Maradona had nurtured and elevated their 'God gifted skill' to 'exceptional skill' through harder practice than the others did.

Following the same example, if you start cycling with grit and determination, perhaps you can reach the exalted peak in the field of cycling that these 'legends' of football had attained in their own field. Who can foretell that you would not be winning an olympic medal? If at all that does not come true, who can stop you from cycling on a busy road? Moreover, if you had reached that far, you have elevated yourself from 'having a skill of cycling' to a 'skilled cyclist'.

As such, all that is needed for this transformation are practice, consistency and hard work. All these collectively could again only be developed through your determination for self-improvement.

EXAMPLE

A Bengali gentleman in an airline was due for promotion to officer's rank. What virtually obstructed the process was his incapability of writing in English. The person was reluctant to lose and fought it out.

He purchased a Bengali to English dictionary, went on writing letters to anyone he could think of in Bengali and then translating the letter painstakingly in English consulting the dictionary. Some people ignored his letter, some made fun of him, some just said 'good', but some appreciated his sincere attitude and sympathetically pointed out his mistakes, corrected them accordingly and said 'well-done'.

A year later, the airlines recognised his efforts through his representations and promoted him to the officer's rank.

There is another set of skills through which others recognise you. This includes your *attitude*– the way you behave with people–rude, polite, extra polite, sarcastic, humorous, boastful, etc., and your *working process*–the way you do your deeds–whether you are systematic, haphazard, misplacing things, etc. Amongst these two sets, you could enhance the commendable ones further by using the previously mentioned methods viz. polishing, implementing accuracy, etc. and can raise and better the others from its root level that will benefit you in future.

While improving your skills, pick the ones that come to you naturally or those that others appreciate in you. It is obvious that you will succeed easily with these. The success would uplift your morale and you will undoubtedly find it easier/interesting to try improve the other ones.

14.8 Capabilities

Interviewers generally measure your capabilities simultaneously with your skills. You may be surprised to realise that while you were working for the improvement of your skills, you have also, either improved or acquired the needed capabilities as a knee-jerk reaction.

Some prominent capabilities are:

- *Adaptability:* Expectedly, you have improved your attitude and behaviour with people, learnt naturally to soften your stand to enforce/implement your unitary theory and process for doing any job or solving any problem, started paying heed to others' advice and suggestions, have started adopting their mode of working for solving problems and have become attained with them (ref chapter six). All these prove collectively and truly that you have become adaptable.
- *Problem Solving:* When you are adaptable (which you are as clarified from the previous argument), naturally you start honouring others' suggestions and learning from them. In the

process you gradually build up your personal arsenal with the learnt modus operandi and become skillful and proficient enough to solve the problems on your own. Hence, you have become a problem solver as well.

- *Flexibility:* Now, when people accept you as adaptable and a problem solver, you possess various avenues of solving a problem. You are now competent enough to propose many different modes for solving any problem even if others do not appreciate the first method you suggest. This process continues until the group derives an 'all accepted' avenue. This 'all' includes you along with others. This proves you are flexible because if you would not have been flexible the group could not have established the final decision and could not have had you in the team.
- *Ability and Willingness to Learn:* This point needs no further explanation/clarification because if you would not have developed these qualities, you could not have reached till here.

14.9 What the Interviewers Look For

During an interview, the interviewers test certain characteristics that they expect you to possess for fitting into the vacant slot. They anticipate that you would discharge your duty in a way that the company could overcome the deficiency it was experiencing in the absence of a person and for which they have initiated the recruiting process.

In addition, it is quite natural that the company will look forward to select the best person in its own interest as it is the paymaster.

These are the reasons for which the interviewers ask you questions and assess the boundary of your cognition in general and the specific job related knowledge/skill in particular. The company through the interviewer or the interview board (consisting of a number of interviewers) would try to assess and identify the qualities you possess, such as:

- *Your Communication Skills:* This reflects how you can explain a topic through your knowledge and express it verbally.

EXAMPLE

Say, there are two professors teaching the same subject. One amongst them is over qualified for the job and the other has adequate qualification. Survey reveals that the latter is more acceptable as a teacher to the students. Why is it so? The reason is that though the preceding professor might have immense knowledge and qualification, but is unable to give vent to his/her knowledge. He thus remains handicapped to explain the topics to the students lucidly because of his/her deficiency in expressing/communicating.

This explicitly suggests that the students favour the latter professor with comparatively less qualification because of his better communication skills.

- *Whether you are a Group Person:* You might be having more than adequate qualification/ knowledge for the job, but can you work as a member of the company's team?
  To assess this quality, the interviewer(s) shall make you a member of the covey amongst the candidates and from your interaction with others, shall derive how much of a team person you are.
- *Your Sense of Responsibility:* This is to judge whether you are fit to accept responsibility. Many qualified/over qualified persons are not bold enough to come forward to accept a responsibility

and thereby miss many opportunities that come their way to ameliorate their career. People respect and depend on a person if they trust that the person possesses a sense of responsibility.

- *Your Self Assurance and Confidence:* You are required to manifest to the interviewer(s) that you have confidence, self-belief and determination to muster sufficient power to go all out and complete your assigned job.

  As such, you are required to utilise your will power/grit to demonstrate such qualities.
- *Your Enthusiasm:* In the interview if you act timid or hesitant, it would reflect that you are not motivated and dashing.

  Show your energy, bold attitude, activeness, aggressive but rational approach towards replying to the interviewer(s) questions vocally and through your body language.
- *Your Initiative and Improvising Power:* You must prove that you are interested indeed and ready to do all you can to help the company. Utilise your knowledge to offer as many avenues as possible to solve any problem given to you in the form of questions by the interviewer(s).
- *Your Capacity as a Problem Solver:* In this test you would be provided with a hypothetical problem, normally in relation to the job you are aspiring for. You would be required to solve the problem, utilising the conventional or your improvised method.

  However, doing well at the previously mentioned assessments/tests, you are already a capable person and thus a good problem solver.
- *Your Aptitude:* This quality assesses whether you indeed have an interest in a specific job or able to do the job effortlessly through your knack for the job.

  It is for sure that an uninterested person cannot accurately complete a job. In that case, the person finishes it, if at all, just for the sake of finishing it and the completed job lacks the finer texture. The said 'unwillingness' develops because
  - *Either the person fails to detect the exact avenue to do it, or*
  - *He/she does not possess the knack to do it.*

  Your knack/aptitude shows up through the result of your attempt to complete a job when you do not know the process to do the job. In other words, it is your natural capacity regarding the concerned job. However, this again could be bettered through unmoved determination.

EXAMPLE

For example, for the selection of pilots in Indian Air Force the candidates are subjected to 'Pilot's Aptitude Test' (PAT).

This is a once-in-a-lifetime opportunity and obviously available to each of the candidates for the first time.

In this test, a few of the candidates do well and are selected and the rest are rejected.

This test is carried out to determine the aptitude of the candidates to become an Air Force pilot and only those who possess this natural quality to fly or try doggedly are selected.

- *Your Leadership Quality:* During 'group discussion', you should reflect your boldness with enthusiasm through your communication, obviously maintaining etiquette and manners, to indicate that you are the best and can lead from the front. Your actions here would initiate the interviewer(s) to focus his/her/their attention on you to decide the selection in your favour.

The more you better these qualities through your preparation and practice the better are your chances for standing in the forefront amongst the elite/successful candidates.

14.10 Your Presentation Packet

With these words, do not take off for the market or start pondering what you should buy for the interviewer; should it be expensive, what colour of the suit length he/she might prefer or should it be a TV or a CD player? Your 'presentation packet' is nothing of this sort. This is simply a folder having flaps on the inner side to hold certain important documents that reveal much about you and which you are going to present to the interviewer(s) soon after you introduce yourself to him/her/them.

You should submit only the xerox of all the documents inside the folder as you would cede it to the interviewer or the chairman of the interview board for his/her/their ready reference.

The folder need not be expensive, but has to be clean, neat, without any crease and of any colour. Place the essential documents inside each flap. The documents should comprise copies of your résumé, letters of recommendation, list of references, etc. These pages are to remain unstapled.

14.11 The Interviewer's First Impression of You

When any person meets another, each of them starts forming a mental opinion about the other. This gradually turns into a firm idea with the passage of time. In addition, although factually the impression could be modulated, but virtually it is intractable. Therefore, it is always better to create a creditable impression on the other person in the first meeting. The same happens in the case of a candidate and the interviewer(s).

However, as the interviewer is on the 'hot seat', the derived impression of his/her is more valuable than that of the candidate. As such, you as a candidate, have to create an estimable effect on the person on the other side of the table through your articulation and energetic motivation. This is your 'image building'; make the best of it.

14.12 Your Dressing

Dressing epitomizes your choice, affinity, personality, standard and certain psychological characteristics. This plays one of the most creditable roles for 'image building' especially on the first meeting, and this is unavoidably important. You may impress your would-be superior (who may be your interviewer now) at this instant or might erase the misjudgment(s) that he/she has developed in his/her mind on meeting you for the first time (during the interview), later. The second option remains tougher than the first because changing an opinion (especially adverse) is much more difficult. Therefore, it is better to acquire a better impression on the first meeting, that is, during the interview itself.

However, if you cannot acquire a favourable opinion at the first meeting, it remains on your capability and charm to achieve it in future, though with difficulty.

As such, you need to be prudent to dress attractively and decently and exert best care to ensure a benign effect on the person through that. You should impel the person to appreciate you and let his/her decision be arbitrated in your favour.

However, if you could achieve the favourable result through your dressing, it will mould the interviewer to crystallise an opinion of your characteristics and that would be positive and more-than-desired.

Two words of advice:

1. *Until you receive your 'appointment letter', it would be much better to wear more formal and conservative dresses for being assessed as worthy.*
2. *Whatever the kind of dress you might put on, those must be clean and well ironed. Expensive attire of best quality if noticed crumpled/wrinkled, creates a poor impression and opine a person-plebeian.*

14.12.1 Suggestions about Dressing

Whatever you wear to dress up should suit you and make you feel comfortable. You better not wear an expensive new shoe that pinches your foot, a tight fitting collar that chokes you, such a tight shirt that if you take a deep breathe, the shirt loses a button, a new fancy wrist watch and glance at it every half a minute and so on.

14.12.1A Dressing Suggestions for Gentlemen

Suit: Darker colour business suit with light colour shirt is a praiseworthy choice. Colour of the suit could vary between steel grey, charcoal, navy blue, royal blue, bottle green, etc. Avoid wearing the brownish shades with regard to suits. Suit might be plain or pin striped of mildly contrasting colours.

Shirt: Light colour plain or striped, button down shirt with little broad and hard collar could be worn. If you wear striped shirt, it is desirable to wear a plain tie. However, white shirt remains the most favoured. Do not wear a T-shirt or a 'party going' dazzling shirt.

Tie: The colour of the tie should be darker than the shirt. It may be plain (if the shirt happens to be striped or designed one) or conservatively patterned. Do not wear bow ties for interviews.

Shoes: Black shoes with hard soles and hard toes are the best. Do not wear sneakers, strapped chappals, tennis shoes or white or light coloured fancy shoes. Avoid wearing brown or dark tan colour shoes with suit of any bluish/blackish/greenish shade. A belt, if worn, should match the shoes. Do not wear distorted and worn-off-sole shoes. The shoes must be gleaming.

Jewellery: One simple ring on each hand is passable. Do not wear huge stone set fancy rings. You must strictly avoid piercing of any kind. You can wear a not-so-prominent matching set of cufflinks and tie pin if you like.

Perfume: You can use deodorants and after shave lotion carefully selecting a mild scent. Some interviewers might be allergic to strong odours. Perfume and eau-de-cologne (especially with strong scent) are not recommended and should preferably be avoided. To comply with the suggestion do not compromise with body odour.

General Grooming: Get a neat haircut a day or two before the interview. Your hair should not be disheveled. Comb it before entering the interview room. Shape and trim your beard and moustache delicately, if worn. Brush your teeth between smoking and entering the interview room.

14.12.1B Dressing Suggestions for Ladies

Suit: Dark colour (navy blue, royal blue, charcoal, steel grey, black or brown) skirt with full sleeves, white or matching lighter coloured blouse would be ideal. The skirt should fall a little below the knee. The neckline of the blouse should not be deep. Wearing trousers and jackets is not preferred. You can wear a jacket of same material as the skirt or a blazer with skirt and blouse.

You can wear a conservative salwar-suit with a matching plain dupatta. The salwar suit should not be strikingly embroidered or with mirror work.

You can also wear a borderless plain silk or heavy synthetic sari of soothing colour, preferably with matching blouse. Wear the shoes before draping your sari for adjusting the height of the sari and ensure that the fall remains nominally above the floor and not above your shoes.

It is expected that the interview would be held between mid morning and evening and because of that, colours like red, orange, violet, shocking pink etc. are taboo even if you have a very fair complexion. If you have a dark complexion, avoid colours like light green, light blue, off-white etc. as these would make you appear darker.

Shoes: Black pumps are ideal. You can wear brown or dark tan pumps to match the colour of your dress. Do not wear chappals, tennis shoes, boots or strapped chappals, etc. Shoes should have a medium high heel and must be immaculately polished. Do not use disfigured/out-of-shape and worn-out-soled shoes. Do not wear any white or fancy colour shoes.

Jewellery: One ring per hand is ideal. You can wear two thin or one medium size bangle on one hand and a non-ornamental wrist watch on the other. Medium or small size rings or studs could be worn on the ears. Avoid wearing dangling ear ornaments or wearing ornaments on only one ear. A nose pin with small stone is permissible. You can wear a medium to semi thick chain with a simple locket but make sure that it is tucked in and does not dangle over your dress.

Make-up: You must necessarily use a small amount of make-up. Avoid using too much mascara, heavy eye shadow and bright lipstick and nail polish. Use deodorant and a touch of perfume of light fragrance. Comb your hair neatly and use mouth freshener a little before entering the interview room.

14.13 Twenty Golden Suggestions for Appearing in Interviews

1. Get to know the Company's Office and Its Employees

- Visit the place of interview a day or two before your interview.
- Travel by the same mode of transport from your residence that you will be using on the interview day.
- Observe and clock the period you take to reach the office.
- Walk up to the rest room, inspect yourself as you intend to do on the interview day, walk down to the reception desk and note down this period also to calculate the period you consumed to reach from your residence to the reception desk.
- Locate and mark the interview room.
- Sit down casually and be watchful to note the behaviour and to read the body language of the employees to understand them better.

All these are to elevate your punctuality which it is mandatory to maintain.

2. Getting Ready

- You should start getting ready about an hour earlier. That means, add one hour to the period that you take to get ready normally.

3. Keep Your Dress Arranged

- Check and arrange the dress, items of personal effect, required and important documents etc. and keep them handy.
- Polish your shoes until they gleam.
- Brush the suit and iron it, if required.

4. Complete Your Morning Rituals

- Shaving immaculately is essential for gentlemen. If you wear beards and moustaches, you must shape and trim these to perfection along with your hair.
- Take a bath to feel fresh from morning sluggishness.

5. Departure from Residence

- Add 15 minutes to the period you have calculated earlier for reaching the reception desk from your residence.
- Leave home keeping this period at your disposal from the reporting time of the interview.

6. During Transportation

- Relax during your transportation from home to the company's office by listening to music and thinking about the good time you will have after securing the job. This will encourage you mentally and will raise your urge to win over the interviewers.

7. Enter the Office

- From the entrance of the office go to the rest room and survey your smile and looks.

8. Reporting at the Desk

- Report to the receptionist, about 15 minutes before the time of the interview.

9. While Waiting

- While waiting for your call, encourage yourself by mentally visualising about succeeding in the interview and securing the job.
- Continue with this thought and keep cool to avoid undesired mental tension and depression if the waiting is extended. However, do not be so engrossed in your reverie that you miss hearing your call.

10. Mobile Phone

- Positively switch off your mobile phone or pager before entering the interview room. Leave your water bottle behind if you are carrying one.

11. Your Greeting

- Greet and wish the interviewer(s) and get yourself introduced. In case you are facing an interview board, carefully observe the composition of the group (i.e. one lady or more ladies, one gentleman or more gentlemen, no lady or no gentleman, etc.) and then wish accordingly.

Say if there are only five gentlemen, you should not start with "Good afternoon ladies and gentlemen" as there is no lady at all.

12. Taking your Seat

- Do not sit down before the interviewer does so or any of the board members ask you to sit down.

13. Your Articulation

- Speak in a voice that is clearly audible (loud and clear) with variation in the tone (not monotonous).

- You must radiate determination through your articulation.
- Speak with energy to put across your message "I am here to succeed" and reinforce it with your attitude and your body language.

14. Eye Contact

- Establish eye contact to reflect your confidence.
- Smile frequently to achieve friendliness with the interviewer(s).Your smile would prove infectious and the interviewer(s) would smile back.

15. Placing your Briefcase

- Keep your briefcase on your lap (not on the table by any means).
- Sit with your hands on the hand rest of the chair (in absence of hand rest, on your brief case, but never on the table), leaning forward slightly towards the interviewer to display your attentiveness and eagerness on the conversation.

16. Offering your Presentation Packet

- Hand over your presentation packet to the interviewer or to the chairman of the interview board.

17. Show your Sense of Humour

- Reduce the tenseness in the atmosphere with light and selective humour.

In a meeting between the management and the workers' union when an acceptable accord could not be reached despite repeated propositions and counter propositions, the atmosphere started to heat up the groups on either side of the table. At that juncture, the chairman of the company light heartedly conferred, "Well! Let us debate for some more time and I am sure we will find a solution. After all, my heart is not as black as my skin!". This dissolved the growing tension.

18. Display your Charm

- Infuse your conversation with charm so that the interviewer(s) like you.
- Understand that only if you like them will they like you.

19. Display of Nervousness

- Do not display frigidity or restlessness, which could be judged as nervousness or misunderstood to mean that the interviewer(s) had succeeded in unsettling you and making you uncomfortable.

20. Maintaining Required Silence

- Silence is golden.
- Never speak to interrupt the interviewer.
- Use silence in your favour by passing a little time before replying to put more gravity in your answer and to put your wording in order.

14.14 Memorising is not the 'Shortcut' Process for Interviews

Words of Advice

Do not daydream and assume that the interviewers will ask only the questions jotted down below and if you only memorise the following lines, you could answer all the questions during the interview. In reality, it is far different. Please grasp that there are innumerable questions that the interviewer could ask and they are beyond the scope of listing through any text.

Fortunately, we find some typical/common type of questions asked in most of the interviews. Again, do not believe that if you memorise the answers to these questions you shall win the interview as you possibly had done for your academic qualifications. The prime difference is that you had a bound syllabus for your educational qualification and in this case, the boundary is undefined.

EXAMPLE

A gentleman did his graduation from a Hindi medium college. In spite of his educational qualification his capability of speaking English was limited to 'Yes', 'No' and 'Very-Good'.

This gentleman somehow managed to acquire an interview call through his very influential maternal uncle who in turn understanding his nephew's problem, also arranged an employee of the company to teach the man adequate spoken English, necessary for the interview.

The arranged "teacher" worked unsuccessfully to educate the candidate in spoken English and conveyed his failure to the chairman of the company.

As the power of the candidate's uncle was one of the prime factors and the only factor of consideration in this case, it was decided that only four simple questions, that too in an arranged sequence, would be asked to the candidate during the interview. The same briefing was passed to the officer who was to act as the interviewer and the chairman personally made sure that the gentleman understands the episode fully and also its purpose.

The virtually delighted "teacher" taught his not-so-worthy pupil:-

As you enter the interview room, look at the interviewer and say "Good Morning, sir".

He will ask, "What is your name?" Tell them your name.

Then he will ask you, "What is your age?" Say, "30 years."

Then he will ask you "How many years have you been working in this field?" Say, "7 years."

Then he will ask you, "Which language do you know, Hindi or English?" Say, "Both."

On the day of the interview, the pre-designated interviewer fell sick and the company hurriedly arranged a lady as replacement. She was briefed extensively about the particular candidate, the exact questions to be asked and their sequence.

On call, the candidate entered the room, looked straight to the lady's face and with a big smile said, "Good Morning, sir".

This possibly upset the lady, but she continued with her questionnaire and put through the next question as per sequence, "What is your name?"

Immediately came the reply, "Tell them your name."

The lady nearly fainted. Although with great effort, she maintained her composure, but mixed up the sequence of the questionnaire and asked, "How long have you been working in this field?"

The reply was, "30 years."

The lady doubted whether she had heard the answer correctly and asked,
"What is your age then?"
The ready answer was, "7 years."
The interviewer's sufferance broke down and she barked, "Are you mad or am I?"
Pat came the reply, "Both."

The moral of the episode is –

"*Never expect to win any interview even if you know the exact questions that would be asked and even their exact sequence – by memorising its answers, however gifted you might be and/or however strong your information could be.*"

14.15 Some Common Questions, Their Analysis and Model Reply

To make the following text clearer and understandable the question-answers are based on hypothetical interview, where the aspiring candidate is currently working in the commercial department of Sovereign Airlines as a ground staff and appearing for an interview for the job of cabin crew in Sterling Airways. However, the episode could be suitably transformed to fit into other interviews also.

1. Question: Tell us Something About Yourself

Analysis: You know very well that whatever you put through to answer this question is already reflected though your résumé. The question asked intends to grasp and weigh your conversational power and observe your body language simultaneously. Your ability of time management also comes under scan. For example, if you take one minute to answer the question, you can possibly describe only some of your educational qualifications. On the other hand, if you take 10 minutes the interviewer(s) would take that as bragging.

By all means, the question provides you enough opportunity to narrate some of your chief skills. As an intermediate and suitable mode, you may speak for approximately 2 minutes on the topic. Give them, wherefrom you are, about your schooling, your higher education, your extra curricular activities and your past and present job experience, if any.

Model Reply: I am from Darjeeling and have done my schooling from there. I had represented my school in football and hockey. My graduation was from St. Joseph's College and I was a prefect in my college. I had joined Sovereign Airlines as a commercial assistant in August 2002 and received promotion to senior commercial assistant in January 2005.

2. Question: I Understand that you are Doing Quite Well in your Present Job. Why do you Want to Switch your Job?

Analysis: This is quite a tricky question. In this, you have to make the interviewer see distinctly what you look forward to achieve in the job you are aspiring to. You also have to point out in which way(s) you get benefited through this job and at the same time rationalise in which way(s) the company benefits by employing you.

Model Reply: In my childhood, I hardly had the opportunity of seeing an aeroplane, but whenever I saw one, I desired to fly in it. The intention never deserted me and in contrary had amplified after joining Sovereign Airlines.

At present, Sovereign Airlines is saturated with cabin crew members and there is no chance of any vacancy in near future. As such, when I saw your advertisement last month I decided to utilise the opportunity to become a cabin crew.

I whole-heartedly believe that the skill of public relation that I have acquired during my tenure with Sovereign Airlines will come profusely useful in this profession also.

I categorically believe that this job could fulfill my paramount intention of flying, visiting places, and last but not the least, the salary and perquisites you offer are much more attractive than my present job.

With my tremendous eagerness for the job and prior experience I trust that we will find our relationship mutually beneficial.

3. Question: When you can leave one company to join the other how can we trust that you will stick here? We shall have to bear a substantial amount towards your training and that will be a useless expenditure for the company if you leave.

Analysis: The point/doubt expressed has much logic and justification behind it. To employ and train an employee, the organisation has to spend a lot of money, which they consider as an investment and hence the company certainly possesses the right to look forward to recover the same in the form of the employee's deeds towards the company for a considerable duration in future.

To answer the question, you have to choose an intermediate path and mould the topic in your favour through your reply.

Model Reply: As you rightly pointed out sir/madam, job switching by any employee is not beneficial for the company although it is quite common and natural. At the same time, we have to consider the reasons why anyone switches his/her job. The switching of job is to procure better monetary benefits and/or job-satisfaction, which a person is not possibly receiving in the present job and is confident of finding in the job for which he/she is aspiring. In case a person has no such motives, then his/her leaving any company would be betraying the company.

In my case, job switching has strong and indisputable reasons. Although I like public relations and am quite satisfied with my present job, but would still like to switch because I possess an overwhelming desire to become a cabin crew. At the same time, my gathered public relation skills shall not go waste and will be useful for Sterling Airways if I could join it. Furthermore, my job satisfaction will saturate through meeting various people and in addition I would be able to visit numerous places. However, the strongest of all these reasons is that it will satisfy my passion for flying. All these satisfactions put together will motivate me to work harder.

From the functioning of Sterling Airways and its asking, I gather that anyone who works hard in this organisation is rewarded. I am targeting the same and aspire to achieve it.

In such case, when the company appreciates and rewards me in addition to my aforesaid reasons of joining your airways I find no rationality in switching the job from Sterling Airways.

4. Question: As per you, what is your greatest quality that could be accepted as beneficial for our organisation?

Analysis: With this question, you are again getting a chance to reveal some more of your skills and must grab the opportunity.

Model Reply: In my opinion, I possess some good qualities, amongst which I would select working with vigour and consistency as the best.

I do not feel mentally happy until I finish a job. I approach any job assigned to me with positive attitude and fullest intention to complete it. Normally, it works out well and if it does not, I continue my efforts applying various alternative methods until I am successful.

I remember that on 7th July, 2004-Supreme Airlines' evening flight to Delhi was delayed. I stayed back beyond my normal duty period and went on replying to the queries of the stranded passengers until the flight took off after midnight. My colleagues had left much earlier, but I strongly doubt whether they felt the immense pleasure as I did that night, toiling but finishing my duty successfully.

I am certain that you would appreciate and agree with my view that with such job completion the company progresses and benefits.

5. Question: What do you think is the opinion of Supreme Airlines about you?

Analysis: With this question, you receive yet another chance to highlight your qualities. You must avail this opportunity as on earlier occasions.

Model Reply: The superior authorities of Supreme Airlines are quite happy with my deeds. On the next day of my previously cited incident, the Airport Manager had called me in his office and had commended me for my work. My departmental head also praised me. She possibly has mentioned about my diligence on the reference letter she has issued me.

6. Question: What is your ultimate aim concerning your career?

Analysis: You achieve this unique chance to highlight the objective that you deem to acquire in your career. You should not daydream and convey whatever you have dreamt. You should base your reply on practicality and rationality. Although there is nothing called 'impossible' if you exert appropriate tries using available skills, still refrain from furnishing an unrealistic reply because that might make the interviewer(s) suspect that you boast and/or are over confident and/or stay under illusion.

Model Reply: From my gathered knowledge about Sterling Airways, I understand that a part of the Board of Management consists of senior representatives from various departments of the airline including the In Flight Services department. As such and adducing past occurrences, it can be evidenced that the coveted post could be filled up by a member of the cabin crew also.

I sincerely trust that the company will benefit from my previously mentioned work ethic and in turn, it will positively bestow opportunities on me to climb up the promotional ladder to reach the top one day.

7. Question: How does stress affect you and how do you handle it?

Analysis: This question is to find out about some of your deficiencies. Every human being feels tensed, whatever its quantum may be, to begin a job. For example, a driver with a new licence remains more tensed than an experienced one. Again, the said experienced driver shall feel overwrought while driving through a narrow and congested road than a less crowded road. This is a common experience felt by normal human beings and nothing is there to get alarmed about it. However, every person experiences fatigue with an extended period of work, feels stressed and

in that process the person's endurance to bear stress shows up. As such, while replying to this question, if you say, 'I am never stressed' the interviewer would understand that the candidate is concealing the facts and that is indeed not preferred. For this reason, you have to agree that you feel stressed, but know how to deal with it.

Model Reply: I feel a little tensed before commencing a job, but control or overcome it by utilising the period between acquiring and starting the job, by planning the procedure to negotiate the job and getting down to work as quickly as possible.

As soon as I begin the job, I put my undivided concentration on it and even if I tense up then, I do not feel it.

Naturally, I too get tired and fatigued working hard for a long period, but get the better of it through my mental determination and the pleasure that I derive from the smooth progress of the job.

8. Question: What are your weaknesses and drawbacks?

Analysis: In this area also, you should better accept that you possess weaknesses, as no human being is without these. While replying, you should rather suggest the modes which you propose for self-improvement instead of highlighting your deficiencies. This will reflect that you agree that you contain weaknesses, but you can also identify them and are already employing the means to remove these. Do remember that you have already furnished your creditable qualities while replying to earlier questions and must not contradict your statement(s) now.

Model Reply: Before I start a job, I spend a little time to plan to complete it. Thereafter, when I proceed with the job I want to receive the result quickly. This haste, in certain circumstances, transforms into impatience. I wrongly start feeling that the job is taking a longer time and I should have finished it earlier. However, it is merely the eagerness to view the expected meritorious outcome of my work.

However, I realise that it is not appreciable to be impatient. To overcome my drawbacks and better my concentration, I have started doing meditation and yoga and am already improving in curbing my impatience.

9. Question: What is your greatest strength?

Analysis: This is a further chance to speak out about your skills and qualities. Enforce the previously mentioned precautions of not repeating and contradicting the already revealed ones. Ensure the qualities/skills you describe here should outline the way they could help the organisation.

Model Reply: In my opinion, my greatest strength is to give a rationalised and consistent approach to every problem and determine the easiest and most effective way to solve it.

EXAMPLE

I can recollect that one of my colleagues in Sovereign Airlines was getting tired answering queries of a very demanding customer. Finding him restless and about to lose his cool, I intervened and encouraged the prospective passenger to ask more questions and gave him an impression that I would not be tired of replying to his questions and it would be difficult for him to shake me off. The person stopped short after a few more questions and decided to purchase the ticket.

10. Question: Can you adjust in a team or do you like to work individually?

Analysis: Even if you like to work individually accepting the total responsibility and have the capability to complete an assignment, do remember that teamwork is more convenient and result oriented in these days of competition. The proverb says, "Two brains are better than one" and in reality the statement holds good. You remain well protected against physical and mental fatigue and receive a psychological boost to perform better while working in a group than working all by yourself.

Model Reply: Although I am eligible enough to handle a problem individually, I hanker for a group activity and a team effort to complete an assignment. I have verified the fact on numerous occasions and would like to cite one amongst those as example.

EXAMPLE

One evening a lady reached the Sovereign Airlines counter at Kolkata, and conveyed that she had received a telephone call that her son is very sick at Debradun and she has to travel to Delhi immediately.

At that instant, just ten minutes were left for the departure of the last flight to Delhi and passenger check-in had already been closed. Amongst the staff members two were making the load-sheet for the flight and the rest were buttoning up the jobs like arranging the ticket counterfoils, sending the remaining pieces of the baggage to the aircraft, providing the data to the load-sheet makers etc.

Hearing the lady's predicament we postponed our individual assignments and some one made the ticket for the lady, some one else checked in her name in the passenger list, another person took care of her baggage and sent those to the aircraft and some other person provided the altered data to the load-sheet makers. Within minutes, the lady was ushered into the aircraft and the flight took off on schedule with renewed load-sheet.

We did not stop there. With permission of the Airport Manager, Kolkata we sent a message, intimating our Delhi airport staff to arrange and render her the best possible help for her journey from Delhi airport to Debradun.

The task either could not have been finished if all of us would not have tried it as a team or the flight would have been delayed. In addition, I am aspiring for a cabin crew's job and I understand that the completion of cabin crew's duties depends on teamwork. Furthermore, I maintain discipline, carry out assignments as per the advices of my superiors along with others and am a team person indeed.

11. Question: Tell us something about our airlines.

Analysis: This is where your assiduous research pays. You have done an extensive research on the organisation and have a substantial knowledge about it. Therefore, you find no problem in replying to this question.

Model Reply: Sterling Airways is perhaps the third largest organisation in Indian aviation. It carried more than 12,60,000 passengers between January and December last year, the second highest number of passengers carried by any other airline of the country. This is the achievement of 12,500 ground staff and 800 flying crew members under your able management.

Although no net profit appeared on the balance sheet of the past year because of purchase of 17 Boeing 737-700 and 12 Airbus A320s, the airlines has accrued its assets considerably.

12. Question: What is your idea about the duties of the personnel for which you are aspiring?

Analysis: For this question, again your research is invaluable.
Along with the information regarding the company, you must have acquired a crystal-clear idea about the details of the duties that you are to perform. Moreover, you must have opined about your job by this time and mentally ensured that it will suit you in all respects and you will derive satisfaction while discharging your duties (the job satisfaction). In addition, by now, you must be mentally prepared and arranged your anticipated duties in sequence, as per their importance.

Model Reply: As per the general survey of common people, the cabin crew members are there on board to serve food and look after the needs and comfort of the passengers.

I have gone further to acquire detailed information about the job to satisfy my queries and now am sanguine that I will receive immense pleasure and satisfaction out of my duties as a cabin crew.

While undergoing such research, I perceived that concern for the safety of the passengers in general and that in an emergency in particular, is the paramount duty of every cabin crew.

13. Question: Do you have any idea regarding the period of duty for the job vacancy we are trying to fill up and do you think that it will suit you in case we recruit you?

Analysis: This is another chance to demonstrate your knowledge about the company and in addition, towards the job you are aspiring for.

By now, you certainly understand the extreme importance of researching that you have done earlier. The seed you have planted is bearing its fruit now and you deserve to savour it. From your research, you must have found out your working period and now have to express it explicitly.

Model Reply: Airline services are quite similar to the community services. It is comparable to emergency services like water supply, electricity supply, fire service, medical and hospital service, newspaper service, etc.

Cabin crew members are 24 hr. employees of the airlines and have no fixed timing for their duty. The duty period varies and depends on the operational time of the flight that they operate.

However, there is a limitation of duty period considering the fatigue accumulated by the crew members. It will suit me fine.

Although I try to maintain scheduled activity, but the attraction of the job supersedes it by far and I feel this diverse schedule would provide a new and enjoyable experience and would cut down the monotony of life.

14. Question: In your opinion, what do we offer that our customers like the most?

Analysis: This is to test your knowledge about the product the company offers to people. If you do not know these or did not care to find the list of these during your research you cannot identify the best of these. You have to present these now.

Refrain from comparing the drawbacks of the company you are working at present for highlighting the merit of the company for which you are aspiring now. Degrading your present company would reflect an image that you do not have respect for your present organisation and/or like to let it down in order to highlight the comparative merit of the organisation you are

aspiring for. In that case, the interviewer(s) would consider your act as fawning and that might generate a negative impression of you.

Model Reply: There are numerous qualities of Sterling Airways appreciated by its customers. In my opinion and through my gathered knowledge, including even from the passengers of Sovereign Airlines, the best amongst those is the on-time performance of Sterling Airways.

This has indeed helped to build up a tremendous rapport and goodwill between the airways and its customers.

Questionnaire

1. **How can an Interview be secured?**
   (a) From media
   (b) From company website
   (c) From internet
   (d) All above are correct
2. **For preparing your application for a job, you should:**
   (a) Write your educational qualification, attach your résumé and send it.
   (b) Put something extra than the educational qualification also.
   (c) As in (b) and send it to the top executive of the company in case of no addressee.
   (d) As in (b) and only put your bio-data in the letter to make it look attractive.
3. **An Interview is:**
   (a) A conversation between the employer and the candidate
   (b) As in (a) and in this the magnitude of knowledge of the candidate is measured
   (c) As in (a) and in this the candidate has an advantage
   (d) All above are correct
4. **To overcome the fear of the interview the candidate should:**
   (a) Show his/her boldness
   (b) Apply his body-language to prove he/she is very smart
   (c) Answer the questions with trickery
   (d) All above are incorrect
5. **The uses of researching are:**
   (a) To gather more information about the company
   (b) To become more comfortable, fearless and determined
   (c) Both (a) & (b) are correct
   (d) As in (b) and to get introduced to the interviewers
6. **Why is finding the financial position of the company essential?**
   (a) For your own purpose
   (b) For suggesting appropriate improvements
   (c) For suggesting expensive improvements
   (d) Both (a) & (b) are correct
7. **Why should you find out if certain leading product of the company is not selling well?**
   (a) To suggest improvement about its sale
   (b) To understand the financial condition of the company

(c) To advice discontinuation of the product
(d) All the above are correct

8. Why should you find about the company's culture?
(a) To find out if their interactions are liked by you
(b) To find out if their working hours suit you
(c) To find out if their promotional avenues suit you
(d) All the above are correct

9. Capability includes:
(a) Listening and accepting other's rational suggestions
(b) Trying to learn further
(c) Valuing your suggestions as 'the best'
(d) Both (a) & (b) are correct

10. Your 'presentation packet' is:
(a) Certain important documents that reveal much about you
(b) Your speech that you deliver during group discussion
(c) Some presentation you do to introduce yourself
(d) Some presentation you offer as gift

Appendix

A

Aircraft Airbus

Airbus A380

Figure AA.1 *Airbus A380*

Figure AA.2 *Airbus A380 Landing*

AA.1.1 Description & Future

The Airbus A380 so far is the world's only twin-deck, four-aisle airliner. The A380 is the most advanced, spacious and efficient airliner ever conceived. When it entered service in 2006, the A380 had set a completely new dimension in air travel.

A380 production started in January 2002. Assembly of the first flying A380 began at the end of May 2004.

Certification of the A380 with Rolls-Royce Trent 900 engines was planned for December 2006. The first aircraft was delivered to Singapore Airlines (The launch customer for A380) by the end of December 2006. Qantas received the first deliveries in the fourth quarter of 2007.

The first flight with the General Electric/Pratt & Whitney Engine Alliance GP7200 was scheduled for July 2006. Deliveries of the A380 with the GP7200 engines began in late 2007 to launch customer, Emirates.

AA.1.1A Airbus A380 Superjumbo Twin-Deck, Twin-Aisle Airliner

Airbus has announced the development of an all-new design Superjumbo Airbus A380, which is the world's first twin-deck, twin-aisle airliner. The advantages of the superjumbo A380 include lower fuel burn per seat and lower operating costs per seat.

AA.1.1B First Flight

The first flying aircraft MSN01 F-WWOW will remain the property of Airbus. At the first flight on April 27, 2005, the A380 took off at a weight of 421,000 kg, the highest ever of any civil airliner till date. During the flight, which took the aircraft around South West France, the six crew members explored the aircraft's flight envelope as expected. They made an initial evaluation of the comfort levels in both the main and upper decks, confirming that the cabin was very quiet and the ride was smooth.

Future models will include the shortened, A380-700 with 480 seats and the stretched A380–900 with 656 seats. (The -700, -800, and -900 designations were chosen to reflect that the A380 should enter service as a "fully developed aircraft" to suit every demand and that the basic models would not be soon replaced by more improved variants).

Figure AA.3 *A380 Lounge*

Figure AA.4 *Landing Approach of A380*

Figure AA.5 *Interior of A380*

Figure AA.6 *A380 Parking*

AA.1.1C Fuselage

The A380 has a twin deck (upper and lower) configuration and is constructed with new, lighter, even tougher material for the first time on a civil airliner, after intensive trials. The upper fuselage shell of the A380 is fashioned from GLARE, a laminate alternating layers of aluminium and glass-fibre reinforced adhesive. In addition to being some ten per cent less dense than aluminium for a well-desired 'weight-saving' of around 800 kg, GLARE has proven superior in terms of fatigue as well as fire and damage resistance. Patria of Finland supplies the16 Wing Spoilers that the aircraft has.

AA.1.1D Engines

Rolls-Royce delivered the Trent 900 engine in February 2004, which is certificated at a whooping 80,000 lb thrust, a rating considerably higher than the requirement at entry into service. Goodrich supplies the Engine Sensor System for Trent 900.

The Trent 900 entered service in March 2006 with Singapore Airlines and has also been selected by Qantas, Virgin Atlantic and Lufthansa, giving it a 48 per cent share of firm and option orders.

Developed under a joint venture of Pratt & Whitney and General Electric, the GP7200 is benifitted by improved technology, mastered by America's two largest jet powerplant manufacturers. Pratt & Whitney is responsible for the GP7200's low-pressure system, including its large main fan with highly swept titanium blades – a key element in the engine's low noise output. General Electric developed the core section for the GP7200, which specialises in lowering jet engine emissions, boosting its operational efficiency. Air France, Emirates, FedEx and International Lease Finance Corporation are the Airbus customers that select the GP2700 for their A380s.

Hispano-Suiza will provide the FADEC (Full Authority Digital Electronic Control) system for the GP7200.

AA.1.1E Landing Gear

The 22 wheel Goodrich landing gear consists of two under-wing struts, each with four wheels; two central under-fuselage struts, each with six wheels; and a twin nose wheel (Refer to Figure AA.6– 'A380 Parking'). Each landing gear supports about 167t weight. The nose landing gear is supplied by Messier-Dowty, with 350 bar hydraulic pressure. Messier-Bugatti supplies the braking and steering systems. Smiths Aerospace supplies the landing gear extension and retraction system. The load on the airport runways and aprons are almost of similar magnitude as that of a B747. ELDEC of Lynnwood, Washington, supplies the landing gear proximity sensing system.

The aircraft can complete a 180° turn within a radius of 56.5 m, which is within the width dimension of standard runways viz. 60 m.

AA.1.1F Flight Deck

Thales Avionics developed and supplied the eight high-format, high-resolution, 150 mm x 200 mm (6 in × 8 in) Liquid Crystal Displays and is to provide the digital Head-Up Display (HUD). Honeywell of USA provides the next generation Flight Management System, which will have increased data handling speed and a graphical user interface with pop-up menus and cursor control, rather than a text-based interface. Honeywell also supplies the Satellite Communications System. Goodrich provides Air Data Systems. Rockwell Collins supplies Communications Systems Including VHF and HF radios and multi-mode receivers. Northrop Grumman is selected to provide the LTN-101E Inertial Navigation System. Smiths Industries furnishes the Video Management Unit, which will include the display from cockpit door and Cabin Surveillance Systems. L-3 Aviation Recorders of Florida supplies the Flight Data and Cockpit Voice Recorders.

Figure AA.7 *Airbus A380 Cockpit*

Figure AA.8 *A380 Taxiing*

Figure AA.9 *A380 Luxury*

Figure AA.10 *A380 Cockpit*

Figure AA.11 *A380 Flying*

AA.1.1G Upper and Lower Decks

The A380 has twin-aisle cabins on the upper and lower decks with 49 % more floor space for 35 % higher seating capacity. A three-class layout provides 555 seats. A typical upper deck layout provides 96 business and 103 economy class seats. The main deck (lower deck) provides 22 first class seats and 334 economy class seats.

Two stairwells link the passenger decks. A lifting system between passenger decks provides access for passengers with limited mobility. There is also a cargo hoist linking the two passenger decks. The size of the A380 makes possible a number of configurations and passenger facilities.

Figure AA.12 *A380 Luxury*

There are eight full size doors on both sides of the aircraft. On either side, there are two doors on the main deck and one door on the upper deck forward of the wing that can be used simultaneously for embarking or disembarking passengers.

Two hold loading belts, one at the forward end and one at the rear end under the fuselage serve simultaneously for speedy baggage transfer.

Matsushita Avionics Systems supplies its next-generation eX2 Inflight Entertainment System.

AA.1.2 Performance

The 555 seat Airbus A380–800, with a non-stop range of 8,000 nm, was launched in December 2000. The aircraft entered production in January 2002. First flight (with the Rolls-Royce engines) took place from Blagnac Airport, Toulouse, in April 2005.

Maximum operating speed is Mach 0.89 and the range is 15,000 km or 8000 nautical miles with the maximum number of passengers, a full load.

The turnaround time at the airport terminal, including passenger disembarking, cleaning, restocking and embarking the passengers for the next flight is a minimum of 90 mins.

There are ten fuel tanks that can be refuelled in 40 mins.

Figure AA.13 *Gigantism of A380*

Figure AA.14 *A380 Flying Through Rough Weather*

AA.1.3 Various Important Specifications of A380

Developing Nation:	Europe
Manufacturer/Designer:	EADS / Airbus Industries
First Flight:	April 27, 2005 F-WWOW
First passengers flight:	September 4, 2006 (500 passengers)
First Delivery:	Spring 2006
First Operational:	2006 A380-800 passengers aircraft
Crew:	2
Passengers:	555 in three-class
Cabin Length:	50.68 m
Fuselage Diameter:	7.14 m
Max. Cabin Width Main Deck:	6.58 m
Max. Cabin Width Upper Deck:	5.92 m
Cargo volume:	171 m^3, (38 LD3 containers)
Wing Span:	79.8 m
Wing Area:	845 m^2
Wing sweep:	33.5 degrees
Length:	73 m
Height:	24.1 m
Engine (s):	4 Rolls-Royce Trent 900 or 4 GP 7200 Turbofans with 311 kN thrust
Weight:	– Empty:276,800 Kg – Zero fuel weight: 361,000 Kg – Internal fuel:310,000 litres – Max. payload: 66,400 Kg
Max. Take off weight:	560,000 Kg
Max. Landing weight:	386,000 Kg
Cruise Speed:	902 km/h
Max. Speed:	945 km/h
Service ceiling:	13,106 m
Max. Range:	15,000 km

The take-off length is **2,900 m** at maximum weight at sea level, ISA +15° conditions and the initial cruise altitude is **35,000 ft.**

Figure AA.15 *A380 Economy*

Figure AA.16 *A380 (Double Decker) Flying*

AA.1.4 A380-800F Freighter Version

The A380 is the first major commercial airliner programme with a freighter version being co-developed as part of the new aircraft launch. The A380-800F could transport 150 t of freight using standard, interlineable containers and pallets. The full payload range of the A380-800 F is 5,600 nm. Launch customers are FedEx (ten aircraft) and Emirates (two) and first deliveries were in 2008.

The A380 freighter has three decks of standard containers, accessible simultaneously through five doors, and offers more payload and more range capability than current freighters.

AA.1.5 Orders so far Acquired by Airbus for A380

Other probable derivatives of the A380 are an extended range version, A380-800R and a stretched version A380-900.

16 customers have announced firm orders for total 159-A380 airliners. The paramount ones are detailed below.

A380 order book (Important Customers)	
Emirates	- 41 A380-861 + 2 A380F
Lufthansa	- 15 A380
Qantas	- 12 A380-841
Air France	- 10 A380-861
Federal Express	- 10 A380-800F
Singapore Airlines	- 10 A380-841
Kingfisher Airlines	- 5 A380

Airbus A300

AA.2.1 Specifics

Figure AA.17 *Lufthansa A300B4–600*

Manufacturer	EADS (Airbus S.A.S.)
Maiden flight	1972-10-28
Introduced	1974-05-30 with Air France
Primary users	United Parcel Service (52) FedEx (49) American Airlines (34) Japan Airlines (23)
Produced	1974-2007
Number built	552
Variants	A300-600ST Beluga Airbus A310
Developing nation:	Europe
Manufacturer/designer:	EADS - Airbus Industries
Production line:	Toulouse-Blagnac, France
Type Aircraft:	Medium range wide body airliner
First flight:	A300B1, October 28th, 1972. F-WUAB
First delivery:	May 23, 1974 by Air France

AA.2.2 About the Aircraft

The Airbus A300 is a short to medium range widebody aircraft. Launched in 1972, it was the first twin-engined wide body aircraft in the world, and the first aircraft created by the Airbus Consortium of European Aerospace Companies, which is now fully owned by EADS. Airbus Industries was formed in 1970 as a multinational effort between Germany, England and France to create high-capacity twin-jet transports (this developed into the A300).

Today Airbus Industries is the world's second largest manufacturer of civil airliners.

Figure AA.18 *A300*

Two prototype A300B1s were built. The first of these flew from Toulouse, France on October 28, 1972; the second on February 5 the next year. General Electric CF6 supplied the Engines (Power Plant) for initial A300s. Following the prototype A300B1s was the 2.65 m longer A300B2, the first production version, which first flew in April 1974. The B2 entered service with Air France on May 23, 1974.

Airbus A300 Zero-G: converted for astronaut training by Novespace, Sogerma and CNES (French space travel agency).

Production of the A300B2/B4 ceased in May 1984 with manufacturer switching to the improved A300-600.

By the end of June 2006 a total of 561 A300s had been ordered and 552 delivered.

AA.2.3 Development History

American Airlines, in 1966, required an aircraft for its busy short to medium range routes such as US transcontinental flights with a passenger capacity of 250 to 300 seated in a twin-aisle configuration, and fitted with two engines, with the capability of carrying full passengers without penalty from high altitude airports like Denver. French president Charles de Gaulle resented the US domination of civil aviation and wanted a European airliner that could compete with American designs. Concorde was part of the answer, designed for intercontinental routes; the other was the A300, designed to meet the US domestic requirements.

In September 1967 the British, French and German governments signed a Memorandum of Understanding (MoU) to start development of the 300 seat Airbus A300. An earlier announcement had been made in July 1967, but had been complicated by the British government's refusal to back British Aircraft Corporation's (BAC) proposed competitor, a development of the BAC 1-11, and instead supported the Airbus Aircraft.

In the months following this agreement, both the French and British governments expressed doubts about the aircraft. Another problem was the requirement for a new engine to be developed by Rolls-Royce, the RB207. In December 1968, the French (Sud-Aviation) and British (Hawker-Siddeley) partner companies proposed a revised configuration, the 250 seat Airbus A250. Renamed the A300B the aircraft would not require new engines, thereby reducing development costs. To attract potential US customers, American General Electric CF6-50 engines powered the A300 instead of the British RB207. The British government was upset and withdrew from the venture. However, the British firm Hawker-Siddeley stayed on as a contractor, developing the wings for

the A300, which were pivotal in later versions' impressive performance from short domestic to long intercontinental flights. (Years later, through British Aerospace, the UK reentered the consortium.)

Airbus Industrie was formally set up in 1970 following an agreement between Aérospatiale (France), the antecedents to Deutsche Aerospace (Germany) (joined by CASA of Spain in 1971). Each company would deliver its sections as fully equipped, ready-to- fly items.

In 1972, the A300 made its maiden flight. The first production model, the A300B2, entered service in 1974. Initially the success of the consortium was poor but by 1979 there were 81 aircraft in service. It was the launch of the A320 in 1981 that established Airbus as a major player in the aircraft market–the aircraft had over 400 orders before it first flew, compared to 15 for the A300 in 1972.

The A300 is the first airliner to use just-in-time manufacturing techniques. Complete aircraft sections were manufactured by consortium partners all over Europe. These were airlifted to the final assembly line in Toulouse by a fleet of Boeing 377-derived Aero Spacelines Super Guppy aircraft. Originally devised as a way to share the work among Airbus's partners without the expense of two assembly lines, it turned out to be a more efficient way of building airplanes (more flexible and at reduced costs) as opposed to building the whole airplane at one site. This fact was not lost on Boeing, which, over thirty years later, decided to manufacture the Boeing 787 in this manner, using outsized B747s to ferry wings and other parts from Japan.

Figure AA.19 *A300 Super Transporter*

Figure AA.20 *Rough Weather Flying of A300*

The A300 literally entrenched European cooperation in aviation. Its first flight was commemorated on a French three-Franc stamp.

AA.2.4 Technology

Airbus partners employed the latest technology, some derived from the Concorde. While entering into service in 1974, the A300 was very advanced and consequently influenced the future subsonic airliner designs. The technological highlights include:

- Advanced wings by de Havilland (later BAE Systems) with:
  - Supercritical airfoil section for economical performance
  - Advanced aerodynamically efficient flight controls
- 222-inch diameter circular fuselage section for 8-abreast passenger seating and wide enough for 2 LD3 cargo containers side-by-side

- Structures made from metal billets, reducing weight
- First airliner to be fitted with wind shear protection
- Advanced autopilots capable of flying the aircraft from climb-out to landing
- Electrically controlled braking system.

Later, A300s incorporated other advanced features such as:

- 2-man crew by automating the flight engineer's functions, an industry first
- Glass cockpit flight instruments
- Extensive use of composites for an aircraft of its era
- Center-of-gravity control by shifting around fuel
- The first airliner to use wing fences for better aerodynamics.

All these made the A300 a perfect substitute for the wide body trijets such as McDonnell Douglas DC-10 and Lockheed L-1011 for short to medium routes. In the early versions, Airbus even used the same engines and similar major systems as the DC-10.

AA.2.5 In-service

After the launch, sales of the A300 were lean for a few years, with most orders going to airlines that had an obligation to order the locally-made product; notably Air France and Lufthansa. At one stage, Airbus had 16 "whitetail" A300s; ready-for-sale but unsold aircraft, sitting on the tarmac.

Indian Airlines was the world's first domestic airline to purchase the A300. Some were flying for the airline till very recently.

Figure AA.21 *A300 Taxiing*

Figure AA.22 *A300 Touching Down*

In 1977, US carrier Eastern Air Lines leased four A300s as an in-service trial. They observed that the A300 consumed 30% less fuel than their fleet of Tristars and were so impressed that they ordered 23 of the type. This was followed by an order from Pan Am. From then on, the A300 family sold well, eventually reaching the current total of more than 858 on order or delivered.

The aircraft found particular favour with Asian airlines, being bought by Japan Air System, Korean Air, Thai Airways International, Singapore Airlines, Malaysia Airlines, Philippine Airlines, Garuda Indonesia, China Airlines, Pakistan International Airlines, Indian Airlines, Trans Australia Airlines and many others. As Asia was not restricted by the FAA 60-minutes ruling for twin-engine airliners which existed at the time, Asian airlines used A300s for routes across Bay of Bengal and South China Sea. By 1981, Airbus was growing rapidly, with over 300 aircraft sold and options for 200 more planes for over forty airlines.

The A300 provided Airbus the wanted experience of competitively manufacturing and selling airliners.

The A300 is reaching the end of its market life and is now mainly sold as a dedicated freighter. The largest freight operator of the A300 in the United States is Federal Express, which, in January 2006, had 95 A300/310 aircraft. United Parcel Service (UPS) also has started using freighter versions of the A300. The A300 has enjoyed renewed interest in the secondhand market for conversion to freighters. The Freighter versions, either new-build A300-600s or converted ex-passenger A300-600s, A300B2s and B4s, account for most of the world freighter fleet after the Boeing B747 freighter. The basic fuselage of the A300 was later stretched (A330 and A340), shrunk (A310), or modified into derivatives (A300-600ST–Beluga Super Transporter).

Figure AA.23 *A300B1**

Figure AA.24 *A300 Taking Off*

Figure AA.25 *A300 Economy Class Cabin*

In March 2006, Airbus announced the closure of the A300/A310 line making them the first Airbus aircraft to be discontinued. The final airframe (an A300-600) was delivered in July 2007 and Airbus has announced a support package to keep A300s flying commercially until at least 2025.

*This A300B1 was the first Airbus ever to enter service with an airline. It has been used as a fire brigade training structure at Brussels national airport since 1990 and was destroyed on July 9, 2003.

AA.2.6 Variants

AA.2.6A A300B1

Only two were built: the first prototype and a second aircraft which was later sold for airline service and has now been scrapped. It had accommodation for 259 passengers with a maximum weight of 132,000 kg and two General Electric CF6-50A engines of 220 kN thrust.

AA.2.6B A300B2

The first production version. Powered by CF6 or Pratt & Whitney JT9D engines of between 227 and 236 kN thrust, it entered service with Air France in May 1974.

- A300B2-100: 137 Metric Ton MTOW
- A300B2-200: 142 Metric Ton MTOW, with Kruger flaps
- A300B2-300: Increased Maximum Landing Weight/Maximum Zero Fuel Weight

Cockpit crew:	Two pilots and a flight engineer
Passengers single class:	270 - 336
Passengers two class:	20 business class 230 economy class
Cabin length:	40.70 m
Cabin diameter:	5.28 m
Cargo volume:	Maine deck 304.6 m^3 Under floor 70.8 m^3 Total load 391.4 m^3
LD3 containers in belly:	20
Standard 2.24 m × 3.17 m pallets:	In belly 4, with 8 LD3 Containers. Main cargo deck of freighter 21
Wing area:	260 m^2
Wing sweep:	28 degrees
Fuselage length:	53.62 m
Fuselage diameter:	5.64 m
Height:	16.53 m
Engines:	Two General Electric CF6-50Cs rated 227 kN Two Pratt & Whitney JT9D-9 Turbofans rated 236 kN
Weight:	Empty: 85,910 Kg Max. payload: 37,980 Kg
Max. take off weight:	136.985 Kg
Max. landing weight:	130.000 Kg
Cruise speed:	854 km/h
Max. speed:	889 km/h
Service ceiling:	10,058 m
Max. range:	6,300 km

AA.2.6C A300B4

The major production version features a central fuel tank for increased fuel capacity (47,500 kg). Production of the B2 and B4 totaled 248.

- A300B4-100: 150 Metric Ton MTOW
- A300B4-200: 165 Metric Ton MTOW

AA.2.6D A300B4-203FF, -220FF, or A300B2-203FF

An A300 with a "forward-facing" crew compartment. The world's first 2-crew wide body airliner. Includes some of the -600's digital avionics. First saw service with Garuda, VASP, Tunisair and Karair/Finnair.

AA.2.6E A300C4

Convertible freighter version, with a large cargo door on the port side.

AA.2.6F A300-600

Referred to during development as the A300B4-600, this version is the same length as the B2 and B4, but has increased space because it uses the A310 rear fuselage and tail. It has higher power CF6-80 or Pratt & Whitney PW4000 engines and entered service in 1988. It is available in both passenger and freight versions. A total of 330 A300-600s have been sold.

AA.2.6G A300-600ST

Commonly referred to as the Beluga or "Airbus Super Transporter," these five airframes are used by Airbus to ferry parts between the company's disparate manufacturing facilities, thus enabling workshare distribution. They replaced the four Aero Spacelines Super Guppys previously used by Airbus.

AA.2.6H A300-600R

The increased range -600, achieved by an additional trim fuel tank in the tail.

AA.2.6I A300-600 Convertible

Passenger/cargo version.

Figure AA.26 *A300 in Flight*

Figure AA.27 *A300 Cockpit*

AA.2.7 Specifications

Measurement	*A300B4*	*A300-600R*	*A300-600F*
Length	54.08 m or 177' 3"		
Span	44.85 m or 147' 2"		
Height	16.62 m or 54' 6"		
Weight empty	90,060 kg or198,132 lb		81,900 kg or 180,700 lb
MTOW	165,900 kg or 364,980 lbs.		170,500 kg or 375,100 lb
Cruising speed	mach 0.80		

contd.

contd.

Maximum speed	mach 0.82		
Range fully loaded	6,670 km or 5,300 nm		2,950 nm
Max. fuel capacity		18,000 USG or 68,150 litres	
Engines		CF6-80C2 or PW4156	
Cockpit Crew	Two		

AA.2.8 Incidents

- **27 June, 1976**: **Air France Flight 139**, originating in **Tel Aviv, Israel** and carrying **248** passengers and a crew of **12** took off from **Athens, Greece**, headed for **Paris, France**. The flight was hijacked by terrorists, and was eventually flown **to Entebbe Airport (now known as Entebbe International Airport) in Uganda.**
- **1988**: **Iran Air Flight 655** was shot down by the **USS Vincennes** in the **Persian Gulf** after being mistaken for an attacking **Iranian F-14 Tomcat**, killing all **290** passengers and crew.
- **26 April, 1994**: **China Airlines** (**Taiwan**) A300-600 crashed at the end of runway at **Nagoya, Japan,** killing all **15** crew and **249 of 264** passengers on board.
- **26 September, 1997**: **Garuda Indonesia Flight 152** crashed while landing at **Medan, Indonesia** killing **234** aboard.
- **16 February, 1998**: **China Airlines** (**Taiwan**) A300-600 crashed into residential area close to **CKS International Airport near Taipei, Taiwan**. All **196** people onboard were killed, including Taiwan's central bank president. **Six** people on the ground were also killed.
- **24 December 1999**: **Indian Airlines flight IC 814** from **Kathmandu, Nepal** to **New Delhi** was hijacked to **Kandahar, Afganistan**. **1** fatality.
- **12 November, 2001**: **American Airlines, Flight 587** crashed into the **Belle Harbor** neighborhood of **Queens, New York** shortly after takeoff from **John F. Kennedy International Airport.** All **260** people on board were killed, along with **5** people on the ground. The official NTSB report of 26 October, 2004 stated the cause of the crash was the overuse of the rudder to counter wake turbulence (causing the tail to eventually break off).

22 November, 2003: **European Air Transport OO-DLL**, operating on behalf of **DHL**, was hit by an **SA-7 'Grail' missile** after take-off from **Baghdad International Airport**. The airplane rapidly lost all hydraulic pressure and thus controls. The crew found that after extending the landing gear to create more drag, they could pilot the plane using differences in engine thrust and managed to land the plane with minimal further damage. The plane was later repaired and offered for sale.

Figure AA.28 *A300 Super Guppy Transport in Flight*

AA.2.9 18 Airbus A300B2/B4 Written-off by Accidents

- **March 17, 1982**. **F-BVGK** Airbus A300B4-203 **Air France** crashed during take-off at **Sana'a, Yemen. Zero** fatalities / **124** on board.
- **December 18, 1983**. **OY-KAA** Airbus A300B4-120 **Malaysian Airline System** crashed during final approach in heavy rain at **Kuala Lumpur in Malaysia**. **Zero** fatalities / **247** on board.

- **September 29, 1986**. **VT-ELV** Airbus A300B2-1C **Indian Airlines** crashed in take-off after collision with a bird at **Chennai, India. Zero** fatalities / **196** on board.
- **September 21, 1987**. **SU-BCA** Airbus A300B4-203 **Egypt Air** during touch-and-go training touched down 700 m past the runway threshold at **Luxor, Egypt** *5* fatalities / *5* on board.
- **July 3, 1988**. **EP-IBU** Airbus A300B2-203 **Iran Air** shot-down en route in the **Strait of Hormuz** by missiles fired by the **US Navy cruiser USS Vincennes**. **290** fatalities / **290** on board.
- **September 28, 1992. AP-BCP** Airbus A300B4-203 **PIA-Pakistan International Airways.** The Airbus A300 crashed into a steep cloud-covered hillside 20 km from **Kathmandu, Nepal**.
- **April 24, 1993**. **F-BUAE** Airbus A300B2-1C **Air Inter** hit light pole during pushback at **Montpellier-Frejorgues Airport, France**; damaged beyond repair. **Zero** fatalities / **324** on board.
- **November 15, 1993**. **VT-EDV** Airbus A300B2-101 **Indian Airlines** executed forced landing in an open paddy field about 23 kilometres from **Tirupati airport, India. Zero** fatalities / **262** on board.
- **October 22, 1994**. **HS-THO** Airbus A300B4-103 **Thai Airways International** hit by an **MD-11 Thai Airways** during an engine run-up at **Bangkok International Airport, Thailand**. The Airbus A300 was damaged beyond repair.
- **December 26, 1994**. **F-GBEC** Airbus A300B2-1C **Air France.** This Airbus was **hijacked** by 4 members of the **Groupe Islamique Armée.** The aircraft was stormed, causing substantial damage to the cockpit at **Marseille-Marignane Airport, France. 7** fatalities / **170** on board.
- **May 17, 1996**. **TC-ALP** Airbus A300B4-203 **Air Alfa.** Cabin fire on ground; the Airbus burned out at **Istanbul, Turkey**. **Zero** fatalities / **?** on board.
- **September 26, 1997**. **PK-GAI** Airbus A300B4-220 **Garuda Indonesia Airways** crashed 32 km from **Medan Indonesia**. **234** fatalities / **234** on board.
- **February 2, 2000**. **EP-IBR** Airbus A300B2-203 **Iran Air.** Collision on the ground with a **C-130 Hercules,** both Aircraft were destroyed by fire, **Tehran, Iran. Zero** fatalities / **?** on board.
- **February 12, 2000**. **TU-TAT** Airbus A300B4-203 **Air Afrique,** written-off at **Dakar, Senegal** after undercarriage problems during taxiing, a fire broke out and the A300 fuselage was damaged. **Zero** fatalities / **182** on board.
- **October 17, 2001 AP-BCJ** Airbus A300B4-203 **PIA-Pakistan International Airways,** written-off at **Dubai, United Arabs Emirates.** The right hand main gear collapsed as it touched down. **Zero** fatalities / **205** on board.
- **March 8, 2002**. **VT-EFW** Airbus A300B2-101 **Indian Airlines** at **Delhi-Indira Gandhi International Airport, India,** a maintenance crew lost control of the aircraft and it went straight through the airport perimeter wall next to the hangars. The nose wheel collapsed and the aircraft nose dived into the ground. **Zero** fatalities / *5* on board.
- **November 22, 2003**. **OO-DLL** Airbus A300B4-203F **European Air Transport for DHL** hit by a **SAM-7 surface-to-air missile** while climbing through 8000 feet shortly after departure from **Baghdad, Iraq**. The missile struck the wing and penetrated the no. 1A fuel tank. Fuel ignited, burning away a large portion of the wing. The pilots landed the A300 safely. **Zero** fatalities / **3** on board.
- **March 1, 2004**. **AP-BBA** Airbus A300B4-203 **PIA-Pakistan International Airways** suffered serious damage to its undercarriage and engines when it aborted a take-off from **Jeddah** due to nose gear tyre failures. **Zero** fatalities /**?** on board.

AA.2.10 Airbus A300B2/B4 & A300-600 Notable Civil Operators

44 – Federal Express	12 – Saudia - Saudi Arab Airlines
38 – UPS	10 – Japan Air system
33 – American Airlines	10 – Korean Air
21 – Thai Airways	09 - Onur Air
19 - Japan Air Lines Domestic	08 - Egypt Air
14 - Lufthansa	08 - Qatar Airways
13 - China Eastern	07 - PIA-Pakistan International Airways
12 - China airlines	05 - Indian Airlines

Airbus A310

Figure AA.29 *Royal Jordanian A310-300*

Type	Airliner
Manufacturer	Airbus
Maiden flight	1982-04-03
Introduced	April 1983 with Lufthansa and Swissair
Status	Production to cease in 2007, along with the A300
Primaryusers	FedEx (59) Air India (19) Pakistan International Airlines (13) Air Transat (11)
Number built	255
Variants	A310 MRTT CC-150 Polaris

AA.3.1 Specifics

The Airbus A310 is a medium to long-range wide body airliner manufactured by Airbus. It was the second model to be introduced by Airbus after the A300.

AA.3.2 The History

The A310 is a shortened derivative of the Airbus A300. Perhaps the greatest attribute of the A310 is that of range. The A310-300's range exceeds all A300 models except the A300-600. This quality has led to the aircraft being used extensively on Trans-atlantic routes. The A300 and A310 introduced the concept of commonality which has become one of the Airbus family's greatest marketing points. A300-600 and A310 pilots can qualify for the other aircraft with only one day of training.

The Airbus A310 twin-engine wide-bodied airliners have been built since 1981. Although the A310 has a shorter fuselage than the A300 aircraft, but it maintains the same 5.64 m fuselage diameter. The A310 is a 200 seater aircraft with low operating costs. The large fuselage diameter allows the aircraft to carry industry standard LD3 cargo containers side by side under floor.

The A310 is reaching the end of its market life as a passenger and cargo aircraft. The production of A310 (along with the A300) had ceased in July 2007.

Although production of the A310 had been scheduled to cease in July 2005, at the end of 1998 there had been 260 A310 orders, of which 255 were delivered.

The aircraft was formally launched in July 1978 for Lufthansa and Swissair. A further developed version of the A300, the aircraft was initially designated the A300 B10, a "baby" A300. The main differences in the two aircraft are:

- **Shortened fuselage** - same cross-section, providing capacity of about 200.
- **Redesigned wing** - designed by British Aerospace who rejoined Airbus consortium.
- **Smaller Vertical Fin**

The A310 is marketed as an excellent introduction to wide body operations for developing airlines. Further orders for the A310 are unlikely.

AA.3.3 Variants

There is one variant of the A310 that was launched in 1978 with introduction into service in 1983. There are several versions of the A310.

Figure AA.30 *A310 in Flight*

Figure AA.31 *A310 Taxiing*

Figure AA.32 *A310 Touching Down*

Figure AA.33 *A310 Cabin*

AA.3.3A A310-200

A310 Airbus versions include the basic A310-200. The first A310 was the 162nd Airbus off the production line, the aircraft made its maiden flight in April 1982 powered by Pratt & Whitney JT9D engines. The -200 entered service with Swissair and Lufthansa a year later.

The Airbus A310-200F freighter aircraft is a conversion by the EADS Company, Elbe Flugzeugwerke GmbH (EFW), based in Dresden, Germany. EFW has the capacity to carry out 14 aircraft conversions per year.

AA.3.3B A310-200C

The A310-200C convertible passenger/freighter first entered service with Dutch operator **Martinair** in 1984. The seats can be removed and cargo placed on the main deck.

AA.3.3C A310-300

First flown in July 1985, the -300 has an increased MTOW (Maximum Take-off Weight) and an increase in range provided by additional centre and horizontal stabilizer (trim-tank) fuel tanks. This model also introduced wingtip fences to improve aerodynamic efficiency, a feature that has since been retrofitted to some -200s. The aircraft entered service in 1986, again with Swissair. No production freighters of the A310 were produced. Operators such as FedEx instead adapt ex-airline A310s into freighters. EADS and EFW have also delivered the A310-300F conversion of the extended range A310-300 passenger aircraft.

Figure AA.34 *A British Caledonian Airbus A310-200, circa 1984*

AA.3.3D A310-300C

This is the convertible version of this plane. The seats can be removed and cargo placed on the main deck.

AA.3.3E A310 MRTT

A310 MRTT: The A310 has long been operated by many of the world's airforces as a pure transport, however some are now being converted to the "**Multi Role Tanker Transport**" configuration by EADS, providing an aerial refueling capability. Six have been ordered; four by the German Luftwaffe and two by the Canadian Forces.

Figure AA.35 *A310 Landing*

AA.3.4 Descriptions

Developing nation:	Europe
Manufacturer/designer:	EADS - Airbus Industries
Production line:	Toulouse-Blagnac, France
Type Aircraft:	Medium to long range wide body airliner
First Flight:	• A310-200, April 3, 1982. (F-WZLH) • A310-300, July 8, 1985. (F-WWCA)
First Delivery:	• A310-200, April 1983, Lufthansa • A310-200C, November 1984, Martinair • A310-300, December 1985, Wardair

Figure AA.36 *A310 on Landing Approach*

Figure AA.37 *A310 Cockpit*

AA.3.5 Specifications

Measurement	*A310-200*	*A310-300*
Crew	2 Pilots	2 Pilots
Passengers	220 2 class	220 2 class
Empty weight	176,312 lb (80,142 kg)	183,300 lb (83,100 kg)
Maximum Take-off Weight	312,342 lb (141,974 kg)	361,600 lb (164,000 kg)
Fuel capacity	14,603 US gal (55,200 litres)	19,940 US gal (75,470 litres)
Operating range	6,800 km (3,670 nm)	9,600 km (5,200 nm)
Cruising speed	Mach 0.80	Mach 0.80
Maximum speed	Mach 0.83	Mach 0.83
Ceiling	41,000 ft (12,500 m)	41,000 ft (12,500 m)
Fuselage Length	153 ft 1 in (46.66 m)	153 ft 1 in (46.66 m)
Wingspan	144 ft (43.9 m)	144 ft (43.9 m)
Tail height	51 ft 10 in (15.8 m)	51 ft 10 in (15.8 m)
Powerplants (Engines)	2 × PWJT9D or 2 × CF6-80A3	2 × PW4156 or 2 × CF6-80C2
Cabin Length	33.25 m	33.25 m
Cabin Diameter	5.28 m	5.28 m
Cargo Volume	Main deck 61.8 m^3 Under floor 17.3 m^3 Total load 79.9 m^3	Main deck 61.8 m^3 Under floor 17.3 m^3. Total load 79.9 m^3.
LD3 Containers in belly	14	14.
Standard 2.24 m × 3.17 m pallets	In belly, with 6 LD3 containers	In belly 3, with 6 LD3 containers
Wing Area	219 m^2	219 m^2
Wing Sweep	28 degrees	28 degrees
Maximum Landing Weight	117,934 Kg	123,000 Kg.
Cruise Speed	850 km/h	850 km/h
Maximum Range	7,519 km	7,982 km

AA.3.6 Renowned Operators of Airbus A 310

48 - Federal Express
18 - Air India
12 - PIA - Pakistan International Airlines
9 - Air Transat
7 - Iran Air
6 - TAP Air Portugal
6 - THY
6 - Hapag-Lloyd
5 - Aeroflot

Figure AA.38 *A310 Banking*

AA.3.7 Incidents

- **Hull-loss Accidents** six with a total of 518 fatalities.
- **Hijackings** 10 with a total of five fatalities.
- **S7 Airlines Flight 778,** an **Airbus A310-324** jet from **Moscow** carrying **196 passengers and eight crew,** overshot the runway at **Irkutsk in Siberia** on 10th July, 2006 at 02:15 UST, plowed through a concrete barrier and caught fire as it crashed into buildings. Latest reports say **70 of the 204 on board survived, with 12 still missing**. Since the accident, casualty figures have fluctuated, in part due to three people who were not on the passenger manifest boarding the aircraft, and some survivors having walked home and assumed to be trapped in the wreckage.
- **Aeroflot Flight 593** crashed in **Siberia** after the pilot let his son sit at the controls.
- **Kenya Airways Flight 431** crashed in the **Atlantic Ocean** shortly after takeoff from **Abidjan on January 31, 2000.**
- **Other Incidents:** Rudder partially fell off an **Air Transat flight.**

AA.3.8 6 Airbus A310 – written off by accidents

July 31, 1992. HS-TID Airbus A310-304 Thai Airways International crashed 40 km **North of Katmandu, Nepal.** A flap fault occurred while the flight was on to the approach, the Airbus flew into a mountain. **113 fatalities/113 on board.**

March 23, 1994. F-OGQS Airbus A310-304. Aeroflot Russian International Airlines, after a demonstration for and with the children of the Captain, the Airbus A310 stalled and entered a spin. Two minutes and six seconds later the aircraft struck the ground near **Mezhduretshensk Russia. 75 fatalities / 75 on board.**

March 31, 1995. YR-LCC Airbus A310-324 Tarom. After take-off from **Bucharest-Otopeni, Romania** the A310 began a descent, and finally a steep dive and crashed in a field. **60 fatalities/ 60 on board.**

December 11, 1998. HS-TIA Airbus A310-204 Thai Airways International. Weather in the **Surat Thani area, Thailand** was poor with limited visibility and heavy rainfall. The Airbus was on its third landing attempt when it stalled and crashed about three to five km southwest of the airport in a rubber plantation. **101 fatalities/146 on board.**

January 30, 2000. 5Y-BEN Airbus A310-304 Kenya Airways. 2 km south of **Abidjan, Cote d' Ivoire,** the A310 transitioned from climb to descent and crashed about 1km offshore. **169 fatalities/ 179 on board.**

July 12, 2000. D-AHLD Airbus A310-304 Hapag-Lloyd. Because of gear problems, the crew decided to fly with the gear down. Approaching **Vienna (Austria),** it appeared that there was not enough fuel on board. At about 12 nm short of the runway, at about 4000 feet altitude both engines quit. The aircraft landed in the grass some 500 m from the runway 34 threshold. The left main gear broke off and the No. 1 engine and wing sustained substantial damage as the aircraft slid for 600 m before coming to rest. **0 fatality/179 on board.**

Airbus A-340

AA.4.1 Specifics

Figure AA.39 *Lufthansa A340-600*

Developing Nation	Europe
Manufacturer/ Designer	EADS–Airbus
Production Line	Toulouse–Blagnac, France
Maiden flight	1991-10-25
Introduced	March 1993 with Lufthansa and Air France
Primary users	Lufthansa (39) Iberia Airlines (31) Air France (21) Virgin Atlantic Airways (19)
Number built	319
Unit cost	A340-200 $87,000,000 (1989) A340-300 $171,000,000 (2006) A340-500 $198,000,000 (2006) A340-600 $218,000,000 (2006)
Developed from	Airbus A300
Variants	Airbus A330

AA.4.2 About the Aircraft

The Airbus A340 is a long-range four-engine wide body commercial passenger airplane manufactured by EADS (Airbus). It is similar in design to the two-engine A330.

AA.4.3 History

The first published studies for the A340 were as the TA11 in 1981, in the November issue of Air International (coinciding with the display of the A300 at that year's Farnborough Air Show). Concept drawings of the A320 (SA 9) and A330 (TA10) were also published along with expected performance figures by Airbus Industry.

Airbus's new aircraft was launched in June 1987; a long-range complement to the short-range A320 and the medium-range A300. At the time, Airbus's twin jets were at a disadvantage against aircraft such as the Boeing B747 because of the ETOPS problem, which enunciates that twin engine aircraft had to stay within close range of emergency airfields in case one of their engines malfunctioned. Airbus' engineers designed the A340 parallely with the twin-engined A330; both

aircraft share the same wing and similar fuselage structure, and borrow heavily from the advanced avionics developed for the A320. The four-engine A340 is able to fly long over-water routes.

The original intention was to use the new superfan engines of IAE (International Aero Engines) in the A340, but IAE decided to stop their development and the CFMI CFM56-5C4s were used instead. When the A340 first flew in 1991, engineers noticed a potentially major design flaw in the first model, viz. the wings were not strong enough to carry the outboard engines at cruising speed without warping and fluttering. To alleviate this, an underwing bulge called the plastron (Refer to Figure AA.40 'A340 on Landing Approach' and Figure AA.41 'A340 Preparing for Landing', named after the undershell of a tortoise, was developed to correct airflow problems around the engine pylons. The modified A340 began commercial service in 1993 with Lufthansa and Air France.

The A340 incorporates high-technology features such as fully digital fly-by-wire flight control system. It also uses a sidestick controller instead of normal control columns. There is one joystick to the left of the pilot and one to the right of the co-pilot. The cockpit also features CRT-based glass cockpit displays on the A340-200 and A340-300 and LCD-based displays on -500 and -600. Some composite primary structures are also used.

As the years went by, orders for the A340 began diminishing. It can be argued that, with modern engines having extremely low failure rates (as seen in the ETOPS certification of most twin jets) and increased power output, four engines are no longer necessary except for very large aircraft such as the Airbus A380 or Boeing B747.

In January 2006, Airbus announced plans to develop an enhanced version of the A340. Airbus claims that the enhanced A340 will be more fuel-efficient than earlier A340s and will compete more effectively with the Boeing B777.

Figure AA.40 *A340 on Landing Approach*

Figure AA.41 *A340 Preparing for Landing*

Figure AA.42 *A340 Cabin*

Figure AA.43 *A340 Comfort*

Figure AA.44 *A340 Cockpit*

AA.4.4 Specifications

	A340-200	*A340-300*	*A340-500*	*A340-600*
Wing span	60.30 m 197 ft 1 in	60.31 m 197 ft 10 in	63.45 m 208 ft 2 in	
Wing sweep	30°		31.1°	
Length	59.39 m 194 ft 10 in	63.60 m 208 ft 10 in	67.90 m 222 ft 8 in	75.30 m 246 ft 11 in
Height	16.70 m 54 ft 9 in	16.85 m 55 ft 3 in	17.10 m 56 ft in	17.30 m 56 ft 9 in
Typical cruise speed	Mach 0.82 (875 km/h, 544 mph)		Mach 0.83 (885 km/ h, 550 mph)	
Maximum cruise speed	Mach 0.86 (917 km/h, 570 mph)		Mach 0.86 (917 km/h, 570 mph)	
Operating range	14,800 km 9,196 miles	13,700 km 8,513 miles	16,700 km 10,377 miles	14,600 km 9,072 miles
Empty Weight	129,000 kg 284,396 lb	129,275 kg 295,503 lb	170,400 kg 375,668 lb	177,000 kg 390,218 lb
Service Ceiling	11,887 m 38,999 ft			
Fuel Capacity	155,040 Litres 40,957 Gal	140,640 Litres 37,153 Gal	222,000 Litres 58,646 Gal	204,500 Litres 54,023 Gal
Engine Options	4 × CFM56-5C2 (138.78kN) 4 × CFM56-5C3 (144.57kN) 4 × CFM56-5C4 (151.25kN)	4 × CFM56-5C2 (138.78kN) 4 × CFM 56-5C3 (144.57kN) 4x CFM56-5C4 (151.25kN) 4 × CFM56-5C3P (149.9kN)	4 × Trent 553 (236kN)	4 × Trent 556 (249kN)
Passengers (3 classes)	239	295	313	380
ULD Capacity	18 LD3s/6 pallets	32 LD3s/11 pallets	30 LD3s/10 pallets	42 LD3s/14 pallets

AA.4.5 Variants

There are four variants of the A340 that were launched on two separate occasions. The A340-200 and A340-300 were launched in 1987 with introduction into service in March 1993. The A340-500 and A340-600 were launched in 1997 with introduction into service in 2002.

Figure AA.45 *A340 Taking Off*

AA.4.5A A340-200

Figure AA.46 *Olympic Airlines A340-300*

Figure AA.47 *Aerolíneas Argentinas A340-200*

One of two initial versions of the A340, the A340-200, with 261 passengers in a three-class cabin layout has a range of 7,450 nautical miles (13,000 km). This is the shortest version of the type and ***the only version with wing span measuring greater than the length of the plane***. It is powered by four CFMI CFM56-5C engines. The plane's range was one of the longest at the time and it was intended to open long and thin passenger-density routes, specially over water.

One version of this type was ordered by the ***Sultan of Brunei*** requesting for a non-stop range of 8,000 nautical miles. This A340-800 had an increase in fuel capacity, a MTOW of 275 tonnes similar to the A340-300, and minor reinforcements to the undercarriage. Upon completion, its final range was specified at 8,100 nautical miles (15,000 km). It is powered by the 34,000 lb_f (151 kN) thrust CFMI CFM56-5C4s similar to the -300E. However, this plane was never delivered.

Other A340-200s were later given performance improvement packages (PIPs) that helped them achieve similar gains in capability as the A340-800. These aircraft are labeled A340-213X.

Due to its large wing span, four engines, low capacity, and improvements to the A340-300, the 200 proved heavy and unpopular with mainstream airlines. Only 28 A340-200s were produced with several now in VIP service. South African Airways is the largest operator with 6 flying mostly on Cape Town routes. This version is out of production at present.

AA.4.5B A340-300

The A340-300 flies 295 passengers in a typical three-class cabin layout over 6,700 nautical miles (12,400 km). This is the initial version, having flown on October 25, 1991, and entered service with Lufthansa and Air France in March 1993. It is powered by four CFMI CFM56-5C engines, similar to the -200.

Figure AA.48 *Qatar Airways A340-500 in Munich*

Figure AA.49 *Qatar Airways A340-600HGW landing in Toulouse*

The A340-313X is a heavyweight version of the A340 and was first delivered to Singapore Airlines in April 1996, though Singapore Airlines no longer operates this model.

The A340-313E is the latest version of this type and was first delivered to Swiss International in 2003. It has a MTOW of 276.5 tonnes with typical range of between 7,200 and 7,400 nautical miles (13,100 km and 13,500 km) with 295 passengers. It is powered by the more powerful 34,000 lb_f (151 kN) thrust CFMI CFM56-5C4 engines.

This model is still in production with 219 orders to date of which 211 have been delivered. The largest operator of this type is Lufthansa with 30 aircraft.

The direct Boeing equivalent is the B777-200ER.

AA.4.5C A340-500

The A340-500 was introduced as the world's longest-range commercial airliner. It made its first flight on February 11, 2002 and was certified on December 3, 2002 with early deliveries to Emirates. While the KC-10 Extender is the longest-ranged production aircraft, the A340-500 was the world's

longest-range commercial airliner until the introduction of the Boeing B777-200LR "Worldliner" in early 2006. The A340-500 can fly 313 passengers in a three-class cabin layout over 8,650 nautical miles (16,000 km). Singapore Airlines, for example, uses this model for its Newark-Singapore nonstop route, an 18-hour, 15,345 km journey that is the longest non-stop commercial flight in the world; the airline does this with 181 passengers in a 2 class layout. The A340-500 is capable of travelling non-stop from London to Perth, Australia. Also, Thai Airways International flies this model for its non-stop flights from Bangkok to Los Angeles and Bangkok to New York, while Air Canada flies this model for its non-stop flights from Toronto to Hong Kong.

Compared with the A340-300, the -500 features a 3.3 m fuselage stretch, an enlarged wing area, massive increase in fuel capacity (around 50% over -300), slightly higher cruising speed, larger horizontal stabilizer and smaller vertical tailplane. The A340-500/-600 has taxi cameras to help the pilots during ground manoeuvers. The A340-500 is powered by four 53,000 lb_f (236 kN) thrust Rolls-Royce Trent 553 turbofans.

The A340-500HGW (High Gross Weight) version with a range of 9,000 nm equivalent to 16,700 km and an MTOW of 380 tonnes had entered service in 2007 with Thai Airways International. It uses the strengthened structure and enlarged fuel capacity of the A340-600HGW. The A340-500HGW is powered by four 56,000 lb_f (249 kN) thrust Rolls-Royce Trent 556 turbofans.

The direct Boeing equivalent is the B777-200LR, which entered service in February 2006.

AA.4.5D A340-600

Designed as an early-generation Boeing B747 replacement, the A340-600 flies 380 passengers in a three-class cabin layout (419 in 2 class) over 7,500 nautical miles (13,900 km). First flight of the A340-600 was made on April 23, 2001. Virgin Atlantic began commercial services in August 2002. Cathay Pacific uses the plane on its nonstop service between Hong Kong and New York City (JFK).

The A340-600 is more than 10 m longer than a basic -300, making it the longest airliner in the world; more than four metres longer than Boeing's B747-400 (but 1.1 metres shorter than the upcoming B747-8). The wing is based on the A330/A340's, but is 1.6 m longer and has a tapered wingbow insert, increasing wing area and fuel capacity. It is powered by four 56,000 lb_f (249 kN) thrust Rolls-Royce Trent 556 turbofans. It also has an additional four-wheel undercarriage on the fuselage centre-line to cope with the increased MTOW.

The initial seven A340-600 aircraft were delivered with overweight wings. After the A340-600 launch customer, Virgin Atlantic, elected to receive replacement aircraft, these airframes were delivered at a reduced price to Iberia Airlines and Cathay Pacific.

Latest deliveries of the A340-600 have introduced new features such as 'lower-deck facilities', which include galleys with a trolley lift to main deck, creating more seating capacity on the main deck. In addition, airlines have chosen to install mini suites in first class cabins and AFIS (Airbus In-Flight Information System).

The A340-600HGW (High Gross Weight) version first flew on 18th November, 2005 and was certified on April 14, 2006. It has an MTOW of 380 tonnes and a range of up to 7,900 nm (14,600 km), made possible by strengthened structure, increased fuel, more powerful engines and new manufacturing techniques like laser beam welding. The A340-600HGW is powered by four 60,000 lb_f (267 kN) thrust Rolls-Royce Trent 560 turbofans.

Emirates became the launch customer for the -600HGW when it ordered 18 at the 2003 Paris Air Show; but postponed their order indefinitely in order to wait for Airbus' future plans for the A340 range to be made clear. This order was ultimately cancelled. Rival Qatar Airways, which placed its order at the same air show, took delivery of the first aircraft on 11th September, 2006.

The direct Boeing equivalent is the B777-300ER.

Figure AA.50 *A340 Setting Course*

Figure AA.51 *A340 Taxiing*

Airbus A340-600 Specifications

Cockpit crew:	Two pilots
Passengers two class: 419	36 Business Class
	383 Economy Class
Passengers three class: 380	12 First Class
	54 Business Class
	314 Economy Class
Cabin length:	60.98 m
Cabin diameter:	5.28 m
Cabin height:	2.54 m
Cargo volume:	Total load 207.6 m^3
Wing area:	439.4 m^2
Fuselage length:	75.30 m
Fuselage diameter:	5.64 m
Max. zero-fuel weight:	251,000 kg
Max. payload:	55,600 kg
Max. take off weight:	380,000 kg
Max. landing weight:	265,000 k
Service ceiling:	11,887 m

Renowned Airbus A340-600 airline operators

10 - Lufthansa	5 – China Eastern Airlines
7 - South African Airways	3 – Cathay Pacific Airlines
7 - Virgin Atlantic Airways	1 - Airbus Industries
5 - Iberia	

Airbus A340-600, 38 built, 38 active, 22 on order as in November 2004.

AA.4.6 Incidents

Until December 11, 2005:

Hull loss accidents

The A340 has not had a fatal incident to date, but it has suffered two hull-loss accidents:

- Air France A340-211 (F-GNIA): On January 20, 1994, an Air France A340-211 (F-GNIA) was lost to fire during servicing at CDG.
- Air France Flight 358: On August 2, 2005, all 297 passengers and 12 crew survived a crash and fire after their A340-300 (F-GLZQ) overshot runway 24L at Toronto Pearson International Airport in a thunderstorm. The aircraft slid into Etobicoke Creek and broke up. Forty-three were injured, some seriously because some of the emergency slides did not operate properly. This forced some passengers to jump nearly 20 ft (6 m) to the ground.

Other incidents

- An A340-311 of Virgin Atlantic Airways was forced to land with the right main gear retracted on November 5, 1997 at London Heathrow Airport. While landing, the left main gear collapsed. All 100 passengers were unharmed. The Aircraft was repaired within 28 days.
- The landing gear of an A340-211 of Sabena collapsed during landing at Brussels Airport on August 29, 1998. The right horizontal stabilizer was destroyed.
- An A340-312 of Sri Lankan Airlines was destroyed on the ground by Tamil Tiger guerillas on July 24, 2001 at Colombo-Bandaranayake IAP, Sri Lanka, along with 2 A330s and a squadron of military aircraft.
- An A340-313X of Emirates ran off the runway when taking off from Johannesburg International Airport on April 9, 2004. Both pilots were unfamiliar with this heavier variant of the Airbus. At the call to rotate, the pilot flying pulled back on the stick. However, according to a report by the airline, "for approximately six or seven seconds, the aircraft nose did not move upward". The nose finally came up, but the aircraft still did not become airborne. The crew felt a rumbling, selected full power, and about two seconds later the aircraft lifted off the ground. The airport says 25 runway threshold and approach lights, and part of the runway surface, were damaged as the aircraft went over the end of 21R. The pilot had received ambiguous instructions regarding rotation technique during his transition training. Emirates Training establishment was censured by Airbus after an investigation.

AA.4.7 Trivia

- The A340-200 and A340-500 were the longest-ranged airliners in the world when they were first released.
- A340-600 is the longest passenger airliner in the world at 75.30 m (246 ft 11 in). It will be surpassed by the 76.4 m long Boeing B747-8 Intercontinental once it enters service.
- The longest regular schedule non-stop flight, Singapore Flight 21 from Newark, New Jersey, USA to Singapore uses an Airbus A340-500 aircraft. The flight is scheduled to be airborne for 18 hours, 40 minutes.

Airbus A320

AA.5.1 The Aircraft

The A320 was the first narrow body airliner from Airbus. It was designed with ultimate new technology. The features include:

- Fly-by wire control system.
- Extensive use of composite materials.
- Two-crew cockpit with side stick controllers.

The Airbus A320 is a short-to-medium range commercial passenger aircraft manufactured by Airbus and is the basis for a whole family of airliners comprising A318, A319 and A321.

Figure AA.52 *A320 in Flight*

AA.5.2 The History

The Airbus A320 programme was launched on March 23, 1984. The maiden flight was made on February 22, 1987 from Toulouse. Certification of the Airbus A320-100 was achieved on February 26, 1988. It was delivered to Air France on March 26, 1988. British Airways followed on March 31.

The A320-200 is now the standard version. The V2500 power plant option was first flight-tested on July 28, 1988, and this engine was approved on the A320 on April 20, 1989. The aircraft was delivered to Adria Airways in May 1989. The stretched version of A320 is A321 and the shortened ones are A319 and A318.

First delivered in 1988, the A320 pioneered the use of digital fly-by-wire flight control systems in commercial aircraft. With more than 2800 built, it is the second best selling jet airliner family of all time, after the Boeing B737, its closest rival.

Figure AA.53 *Airbus A320*

Figure AA.54 *Passengers Deplaning from A320*

AA.5.3 Development

After the initial success of the Airbus A300, Airbus began developing a new model aimed at replacing the Boeing B727, world's most popular aircraft at the time. The new Airbus A320 would be of the same size as B727 and yet offer improved operating economics and various passenger capacities. The digital technology introduced in the A320 was aimed to herald a two-generation technological leap over the all-analog Boeing B727 and be a generation ahead of the Boeing B737-300/400/500 series. The A320 was targeted at the global fleet replacement requirements for the B727 and early variants of the B737.

After the oil price rises of the 1970s, Airbus needed to minimise the trip fuel costs of the A320. To that end, Airbus incorporated advanced features including

- Fly-by-wire flight control
- Composite primary structures
- Centre-of-gravity control (using fuel)
- Glass cockpit (EFIS) and
- A 2-person flight deck.

The final result: The A320 consumes 50 percent less fuel than the B727.

AA.5.4 Production

Airbus A320: built 1326, active 1295, on order 73, stored 20 and written off 11 as in October 2004.

AA.5.5 Features

Figure AA.55 *An Air Asia A320 Economy Class Cabin*

Figure AA.56 *Airbus A320 Taxiing*

Compared to other airliners of the same class, the A320 features a wider cabin and larger overhead bins along with fly-by-wire technology. In addition, the aircraft has a spacious cargo hold equipped with large doors to assist expedient loading and unloading of goods. These features have resulted in orders from airlines including Northwest Airlines, United Airlines, Philippine Airlines and British Airways. The A320's low maintenance and operating costs have appealed to low-cost carriers like JetBlue which has orders and options for up to 233 jets of the A320 family.

Other low-cost carriers with significant orders include EasyJet, Frontier Airlines, Tiger Airways and Air Asia.

The A320 features a computerised on-board maintenance system. The avionics system is designed for easy upgrade without major rework. With the exception of the very earliest A320s, most can be upgraded to the latest avionics standards, keeping the aircraft advanced even after almost two decades in service.

The flight deck is equipped with Electronic Flight Information Systems (EFIS) with sidestick controllers (Refer to Figure AA.57–– 'A320 Cockpit'). At the time of the Aircraft's introduction, the behaviour of the fly-by-wire system (equipped with full flight envelope protection) was a new experience for many pilots. Rigorous pilot training and modification of the fly-by-wire system has greatly reduced incidents related to the

Figure AA.57 *A320 Cockpit*

EFIS system.

Two suppliers provide turbofan engines for the A320 series: CFM International with their CFM56 and International Aero Engines, offering the V2500.

AA.5.6 Competition

The A320 family has faced competitive challenges from the Boeing B737 Classics (-300/-400/-500) and the Boeing B737 Next-Generation (-600/-700/-800/-900). As of February 2006, the A320 family's only remaining competitor is the Boeing B737 Next-Generation series, as the other models have ceased production.

Airbus is working on a replacement for the A320 series, tentatively dubbed NSR, for "New Short-Range aircraft".

AA.5.7 Airbus A320-200 Specifics

Developing nation:	Europe
Manufacturer/designer:	EADS - Airbus Industries
Production line:	Toulouse-Blagnac, France
Type Aircraft:	Short to medium range airliner
Cockpit crew:	Two pilots and a flight engineer
Passengers single class:	164 (variable for different airlines)
Passengers two class:	- 12 business class. (- do -)
	- 138 economy class. (- do -)
Cabin length:	27.50 m
Cabin diameter:	3.70 m
Cabin height:	2.22 m
LD3 belly Containers:	7
Wing span:	34.09 m
Wing area:	122.6 m^2
Wing sweep:	25 degrees
Fuselage length:	37.57 m
Fuselage diameter:	3.96 m
Height:	11.76 m
Track:	7.59 m
Engines:	- Two CFM International CFM56-5A1 rated 111.2 kN.
	- Two CFM International CFM56-5A3 rated 117.88 kN.
	- Two CFM International CFM56-5B4 rated 117.9 kN.
	- Two International Aero Engines V2500-A1 rated 111.2 kN.
	- Two International Aero Engines V2527-A5 rated 117.9 kN.
Weight:	- Empty: 42,200 kg
	- Max. zero-fuel weight: 62,605 kg
	- Fuel: 18,806 kg
	- Max. payload: 19,093 kg
Max. take-off weight:	77,020 kg.
Max. landing weight:	65,999 kg.
Cruise speed:	833 km/h.
Max. speed:	926 km/h.
Max. ceiling:	11,887 m.
Max. range:	6,797 km.

Figure AA.58 *A320 Getting Prepared for Flight*

AA.5.8 Technology

Technological advancements in the A320 include:

- The first fully digital fly-by-wire flight control system in a civil airliner, hence the first with relaxed stability.
- Fully glass cockpit rather than the hybrid versions found in A310, Boeing B757 and Boeing B767.
- The first narrow body airliner with a significant amount of the structure made from composites.
- Centralised maintenance diagnostics systems allowing diagnosis of problems from the flight deck.
- Airbus recently has started installing LCD (liquid crystal display) units in the flight deck of its new A320 flight decks instead of the original CRT (cathode ray tube) displays. LCDs weigh less and produce much less heat than CRT displays.

AA.5.9 New Winglets

There are currently two new styles of winglets in the testing stage at Airbus. Their primary purpose is to counteract the wingtip vortices more effectively than the previous winglets. Wingtip vortices induce drag decreases fuel efficiency. Adopting the new winglets would drastically reduce fuel costs.

Figure AA.59 *Air France was the launch customer of the Airbus A320*

AA.5.10 Variants

The A320 has given rise to a family of aircraft which share a common design, but are slightly smaller (the A319), significantly smaller (the A318) or slightly larger (the A321).

Figure AA.60 *A320 Lining for Take Off*

Figure AA.61 *Crash of A320*

Passenger capacity of A320 ranges from 100 to 220. They compete with the Boeing B737, B757-200, and B717. All have the same pilot type-rating.

Technically, the name "A320" only refers to the original mid-sized aircraft, but it is often informally used to indicate any of the A318/A319/A320/A321 family. All variants are able to be Extended-range Twin-engine Operational Performance Standards (ETOPS) certified.

The A320 series has two variants, the A320-100 and A320-200.

The A320-200 is the definitive version as only 21 A320-100s were ever produced. These aircraft, the first to be manufactured, were delivered to Air France and British Airways only.

Typical range with 150 passengers for the A320-200 is about 2900 nautical miles (5,400 km). It is powered by two CFMI CFM56-5 or IAE V2500 with thrust ratings between 25,500 to 27,000 pounds force (113 kN to 120 kN).

The direct Boeing competitor of A320 is the B737-800.

Figure AA.62 *A320 Banking*

Figure AA.63 *A320 Evacuated After Crash*

Figure AA.64 *A320 Landing Approach*

AA.5.11 The 11 Aircraft written-off by accidents

June 26, 1988. **F-GFKC** Airbus A320-111 **Air France.** At an air show at **Mulhouse-Habsheim, France** the A320 flew at low speed, gear down at 100 feet and reducing to reach maximum possible angle of attack. The plane sank slowly into the forest and a fire broke out. **3 fatalities / 136 on board**.

February 19, 1990. **VT-EPN Airbus A320-230 Indian Airlines.** On final approach at **Bangalore, India** the aircraft descended well below the normal approach profile and kept descending until it struck the boundaries of the Karnataka Golf Club, 800 metres short of the runway. **92 fatalities / 146 on board**.

January 20, 1992. **F-GGED Airbus A320-111 Air Inter. The Vosges mountains near Strasbourg, France** were in clouds above 600 m, with tops of the layer reaching about 1,950 m. The aircraft struck trees and impacted a 825 m high ridge at the 800 m level near Mt. Saint-Odile. **87 fatalities / 96 on board**.

September 14, 1993. **D-AIPN. Airbus A320-211 Lufthansa** crashed at runway 11 of **Warsaw-Okecie, Poland**, by wind shear on the approach. The Airbus' right gear touched down 770 m from the runway 11 threshold. The left gear touched down 9 seconds later, 1525 m from the threshold. A wheel broke and a fire started in the left wing area and penetrated into the passenger cabin. **2 fatalities / 70 on board.**

March 10, 1997. **A40-EM. Airbus A320-212 Gulf Air.** At take-off from **Abu Dhabi International Airport, United Arab Emirates**, control difficulties at V1 forced the crew to abort the take-off. The Airbus overran the runway. The nose gear collapsed. **0 fatalities / 115 on board**.

March 22, 1998. **RP-C3224 Airbus A320-214 Philippine Airlines.** During landing at **Bacolod Airport, Philippines** this A320 went through a low concrete perimeter fence, crossed a small river and hit a row of houses before stopping near a highway (Refer to Figure AA.63 'A320 Evacuated After Crash'). **0 fatalities / 127 on board**.

April 11, 2000. **F-OHMD Airbus A320-231 Mexicana.** At **Minatitlan Airport, Mexico**, the plane suffered extreme fire damage while being refueled. It appears the refueling truck drove off still connected to the aircraft. **0 fatalities / 0 on board**.

August 23, 2000. **A40-EK Airbus A320-212 Gulf Air.** After a go-around at the approach of **Bahrain International Airport, Bahrain**, the Airbus impacted the sea at a 6.5 degree nose down angle, about 1nm north of the airport. **143 fatalities / 143 on board.**

February 7, 2001. **EC-HKJ Airbus A320-214 Iberia.** After landing the nose gear collapsed and the aircraft skidded about 1000 m down the runway before coming to a stop at **Bilbao Airport, Spain**. **0 fatalities / 143 on board**.

July 24, 2001. **4R-ABA Airbus A320-231 Sri Lankan Airlines.** Tamil Tiger rebels launched a major pre-dawn suicide attack on **Colombo-Bandaranayake International Airport, Sri Lanka**. This A320 was written-off. **0 fatalities / 0 on board.**

August 28, 2002. **N635AW Airbus A320-231 America West.** During landing at **Phoenix-Sky Harbor International Airport, AZ, USA**, the A320 crossed the apron east of intersection B8, and experienced the collapse and partial separation of its nose gear strut assembly upon traversing the dirt infield area south of the runway. **0 fatalities / 159 on board.**

Appendix

B

Aircraft Boeing

Boeing B747

AB.1.1 Specifics

Figure AB.1 *Singapore Airlines Boeing B747-400*

Type	Airliner
Manufacturer	Boeing Commercial Airplanes
Maiden flight	1969-02-09[1]
Introduced	1970-01-22 with Pan American World Airways and Trans World Airlines[1]
Primary user	Japan Airlines (60) British Airways (57) Korean Air (42) Cathay Pacific (37) Qantas (35) China Airlines (34) Air France (32)
Number built	1469 built and 89 more on order as of Nov. 2006
Unit cost	B747-100 $24,000,000 (1967) B747-200 $39,000,000 (1976) B747-300 $82,000,000 (1982) B747-400 $230,000,000 (2006)

Boeing B747, commonly called a **Jumbo Jet**, is among the most recognisable jet airliners and was the largest passenger airliner in service till recently. First flown commercially in 1970, it held the size record for more than 35 years until surpassed by the Airbus A380 that entered service in 2007. The Soviet-built Antonov An-225 cargo transport remains the world's largest aircraft in service.

The four-engine B747, produced by Boeing's commercial airplane division, uses a two-deck configuration. A typical three-class layout accommodates 416 passengers, while a two-class layout accommodates a maximum of 524 passengers. The hump created by the upper deck has made the B747 a highly recognisable icon of air travel.

The B747-400, the only series currently in production, flies at high-subsonic speeds of mach 0.85 (567 mph or 913 km/h), and features intercontinental range of 7260 nm (13,446 km)). This is sufficient to fly non-stop from New York to Hong Kong,—a third of the way around the globe. In 1989, a Qantas B747-400 flew non-stop from London to Sydney, a distance of 11,185 miles (18,001 kilometres) in 20 hours and 9 minutes, although this was a delivery flight with no passengers or freight aboard.

Figure AB.2 *The prototype B747, City of Everett, at the Museum of Flight in Seattle, Washington*

Figure AB.3 *B747 Climbing*

Figure AB.4 *B747 Taxiing*

AB.1.2 History & Development

The B747 was a monumental engineering and management challenge and was born from the explosion of air travel in the 1960s. The era of commercial jet transportation, led by the enormous popularity of the Boeing B707, had revolutionised long distance travel and made possible the concept of the "global village." Boeing had already developed a study for a very large fixed-wing

aircraft while bidding on a US military contract for a huge cargo plane. They lost the contract to Lockheed's C-5 Galaxy, but came under pressure from its most loyal airline customer, Pan Am, to develop a giant passenger plane that would be over twice the size of the B707. In 1966, Boeing proposed a preliminary configuration for the airliner to be called the B747. Pan Am ordered 25 of the initial 100 series for US $550 million.

Figure AB.5 *Cargolux B747-400F with the Nose Cone Loading Door open*

At the time, it was widely thought that the B747 would be replaced in the future with an SST (supersonic transport) design. In a shrewd move, Boeing designed the B747 so that it could easily be adapted to carry freight. Boeing knew that if and when sales of the passenger version reduced, the plane could remain in production as a cargo transport. The cockpit was moved to a shortened upper deck so that a 'nose cone loading door' could be included, thus creating the B747's distinctive "bulge".

The B747 was expected to become obsolete after sale of 400 units, but the production passed the 1,000 mark in 1993. The expected slow down in sales of the passenger version in favour of the freighter model has only been realised in the early 2000s.

The development of the B747 was a huge undertaking. Boeing did not have a facility large enough to assemble the giant aircraft, so the company built an all-new assembly building, the world's biggest factory of the time The Everett plant is the size of 40 football fields and is situated near Everett, Washington. The factory is the largest building by volume ever built, on over 780 acres of land.

Figure AB.6 *B747 Lining up for Take-Off*

Figure AB.7 *B747 Final Landing Approach*

Figure AB.8 *B747 Banking*

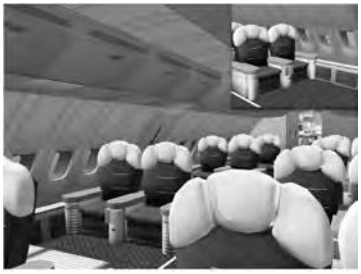


Figure AB.9 *B747 Executive Class Cabin*

Figure AB.10 *Hugeness of Boeing B747*

Figure AB.11 *B747 Economy Class Cabin*

Figure AB.12 *B747 Touch Down*

Figure AB.13 *Comfort of B747*

Figure AB.14 *Boeing B747*

Figure AB.15 *B747 Landing*

Figure AB.16 *B747 in Flight*

Figure AB.17 *B747 Cockpit*

Figure AB.18 *B747 Comfort*

Pratt and Whitney developed a massive high-bypass turbofan engine, the JT9D, which was initially used exclusively with the B747. Four of these engines mounted in pods below the wings, power the B747. To appease concerns about the safety, airworthiness and fly-ability of such a massive aircraft, the B747 was designed with four backup hydraulic systems, split control surfaces, redundant main landing gear, multiple structural redundancy, and sophisticated flaps that allowed it to use standard-length runways. The wing was swept back at an unusually high angle of 37.5 degrees, and it was chosen in order to minimise the wing span, thus allowing the B747 to use existing hangars.

Boeing built an unusual training device known as "Waddell's Wagon" (named after the B747 test pilot, Capt. Jack Waddell), which consisted of a mock-up cockpit mounted on the roof of a truck. It was intended to train pilots on how to taxi the plane from the high upper deck position.

Figure AB.19 *Uniformed flight attendants representing each of the B747's initial 26 airlines*

Boeing had promised to deliver the B747 to Pan Am by 1970, meaning that it then had less than four years to develop, build and test the aircraft. Work progressed at such a breakneck pace that all those who worked on the development of the B747 were given the nickname "*The Incredibles*". Initial problems with the JT9D's development forced Boeing to delay deliveries up to a year and as a result, about 30 aircraft were left stranded at the Everett plant, at one time.

Boeing enjoyed a monopoly in the very large passenger aircraft industry for more than 35 years. In fact, the record and benchmark set by the Boeing B747 was only surpassed, after its first delivery, by the A380, built by its rival, Airbus.

AB.1.3 In service

On January 15, 1970, First Lady Pat Nixon officially christened a Pan Am Boeing B747 at Washington Dulles International Airport in the presence of Pan Am chairman Najeeb Halaby. Red, white, and blue water was sprayed on the aircraft, rather than customary uncorking of a bottle of champagne. The first commercial flight involving the Boeing B747 took place on January 21, 1970 operated by Pan Am between New York's John F. Kennedy International Airport and London's Heathrow Airport. Pan Am added B747 service to London from Boston, Washington, and other cities during the spring and summer of 1970. Overnight, a new horizon of air travel had been created and other airlines rushed to bring their own B747 jets into service. TWA, Japan Airlines, Lufthansa, BOAC, and Northwest Orient were among the first carriers to offer B747 service on long-haul flights. American Airlines initiated B747 service between New York and Los Angeles by the summer of 1970.

Another issue raised by the airlines was fuel efficiency that briefly returned to haunt Boeing in the1970s. McDonnell Douglas and Lockheed were working on widebody three-engine "tri-jets". A three-engine airliner generally burns less fuel per flight than a four-engine, and airlines were trying to lower costs and increase fuel efficiency.

The Arab oil crisis and economic stagnation in the United States lowered the number of airline passengers and made it difficult for airlines to fill their new B747, so American Airlines replaced coach seats on its B747s with piano bars in an attempt to attract more customers. Eventually, it relegated its B747s to cargo service and then sold them. Continental Airlines also removed its B747s from service. The advent of smaller, more efficient wide-bodies, starting with the trijet DC-10 and L-1011, and followed by the twinjet B767 and A300, took away much of the B747's original market. Other airlines that have removed B747s from their fleet include Air Canada, Aer Lingus, Avianca, SAS, TAP, America West, and Olympic Airways.

However, many international airlines continued to use the B747 on their busiest routes. The type remained popular among Asian airlines for short and medium-range flights between major cities. In Japan, domestic airlines continue to pack B747s to their maximum passenger capacity. Elsewhere, B747s remain popular on long-range trunk routes, trans-oceanic flights and the Kangaroo routes between Europe and Oceania. The largest fleet of B747s today belongs to Japan Airlines, at approximately 78 (series -200s, -300s and 44 -400s). British Airways has the next largest fleet of B747s, comprising 56 B747-400s.

AB.1.4 Future of the B747

Many different stretching schemes for the B747 have been proposed, but the only design to be adopted is 2005's B747-8. The B747-X program was launched in 1996 as Boeing's response to the Airbus A3XX proposal. The B747-X would have consisted of the B747-500X and B747-600X, seating up to 800 passengers. General Electric and P&W formed the engine alliance and designed

the GP7200 turbofan to power the Airbus A380. This engine was supposed to have been planned to power the B747-X.

When development of the Airbus A380 formally began in 2000, Boeing re-examined its B747-X planning and programme and instead of devoting its energies to the sonic cruiser immediately, and B787 thereafter, decided to put the sonic cruiser programme on hold for an undefined period. Some of the ideas developed for the B747-X were, however, used in the production of the B747-400ER.

In early 2004, Boeing rolled out tentative plans for what it called the B747 Advanced. Similar in nature to the B747-X plans, the stretched B747 Advanced uses advanced technology from the B787 to modernise the design and its systems. On November 14, 2005, Boeing announced it was launching the B747 Advanced as the B747-8.

AB.1.5 Variants

There are five variants of the B747 launched on five separate occasions. The B747-100 was the original and was launched in 1966. The B747-200 was the second model and was followed soon after with an order in 1968. The B747-300 was launched in 1980. The B747-400 was launched in 1985, and the last, the B747-8 was launched in 2005. However, only the B747-400 has been in production since.

Figure AB.20 *Boeing B747-100 in livery of launch customer Pan Am*

AB.1.5A B747-100

The first model of the jet, the B747-100, rolled out of the new Everett facility on September 2, 1968. The prototype, named City of Everett, first flew on February 9, 1969. On January 22, 1970, the B747-100 entered service with launch customer Pan American World Airways on the New York-London route. The flight was supposed to occur on January 21, but engine overheating made the original plane unusable and it had to be substituted, creating a more than 6-hour delay to the next day.

The US military designation for B747-100 is C-19.

The very first B747-100s off the line were built with six (3 per side) upper-deck windows to accommodate upstairs lounge areas. A little later, as airlines began to use the upper-deck for premium passenger seating instead of lounge space, Boeing offered a ten window upper deck as an option, and it quickly became the standard. Some 100s were even retrofitted with the new configuration.

Upon airline retirement, many B747-100s have been converted to freighters over the years. Their cheap acquisition costs more than compensate for lack of carrying capacity. They are also ideal for parcels since volume is paramount as compared to weight.

One ex-JAL B747-100SR, registered N905NA, is operated by NASA as a shuttle carrier aircraft.

A B747-100 is owned by General Electric and used as a testbed for their engines.

Total production was 250. Of these, 167 were B747-100, 45 were SP, 29 were SR, and 9 were 100B.

AB.1.5B B747-100B

The B747-100 was later superseded by the B747-100B, which has a stronger airframe and undercarriage design. This increased maximum take-off weight to 750,000 lb av (340,194 kg). The B747-100B was only delivered to Iran Air and Saudia (now Saudi Arabian Airlines).

AB.1.5C B747-100SR

With requests from Japanese airlines, Boeing developed the B747SR as a 'Short Range' variant of the B747-100. The SR has a lower fuel capacity, but can carry more passengers; up to 498 passengers in early versions and more than 550 passengers in later models.

Two B747-100B/SRs were delivered to Japan Airlines (JAL) with a stretched upper deck to accommodate more passengers. This is known as the "SUD" (Stretched Upper Deck) modification.

All Nippon Airways (ANA) operated B747SR on domestic Japanese routes with 455-456 seats, but retired the aircraft on 10th March, 2006. JAL operates its B747-100B/SR/SUD aircraft with 563 seats on domestic routes.

With the arrival of the much more economical Boeing B777-300, the SRs are now being replaced.

AB.1.5D B747SP

The B747SP was a shortened version of the B747-100. It was introduced into service in 1976 with Pan Am. Apart from the upcoming B747-8 the SP is the only B747 with a modified length fuselage. It was designed to fly higher, faster, and longer than the B747-100. Boeing expected it to compete with Douglas DC-10 and create a niche market. However, in the end only a total of 45 were built.

As of August 2006, a total of 13 Boeing B747SP aircraft were in airline service.

The sole remaining South African Airways B747SP, the "*Maluti*", remain on show at Rand Airport as a static display/museum aircraft.

AB.1.5E B747-200

Entering service in 1971, and further improved over successive years, the B747-200 had more powerful engines and higher takeoff weights than the -100. Total production was 393. As on the -100, a stretched upper deck (SUD) modification was offered much later. KLM remains the only airline to retrofit their -200s with the SUD option.

AB.1.5F B747-200B

The B747-200B is an improved version of the B747-200, with increased fuel capacity and more powerful engines. Qantas took delivery of these in 1971. It comes in a combi version as well. The 200B aircraft have a full load range of about 6700 mi (10,783 km). The US military designation for B747-200B is C-25. The USAF only operates two C-25 in VIP configuration (VC-25A). These two aircraft, tail numbers 28000 and 29000 are known by the call sign ***Air Force One*** when the US President is onboard.

AB.1.5G B747-200C

The B747-200C Convertible, essentially a passenger aircraft that can be converted to a freighter and back when needed. The seats are removable and the fuselage has a much bigger door on the maindeck for cargo entry. The 200C could be fitted with a nose door.

AB.1.5H B747-200H

This type can carry both freight and passengers, but unlike the 200C, it can do so at the same time. A wall half way through the main deck, separates the cargo in the back from passengers in the

front. This type carries cargo throughout the lower deck, and on half the maindeck, along with roughly 200 passengers. Also known as the B747-200 Combi.

AB.1.5I B747-200F

This is a freighter version of the -200 model. It could be fitted with or without the nose door. It has a 105 ton capacity and a MTOW of 833,000 lb. It entered service in 1972 with Lufthansa.

AB.1.5J B747-300

With the poor reception of the B747SP due to higher trip costs compared with the DC-10 and Lockheed L-1011, Boeing decided on offering a trijet version of the SP. The plane would have been bigger than either of the two, seating around 600. However, this idea was dropped.

The B747-300 was introduced in 1980. This was the first B747 model to feature a "Stretched Upper Deck", which was 23 ft 4 in longer than earlier variants. The 300 also had a straight staircase for the upper deck rather than the spiral, and this created more room, both below and above for more seats. With minor aerodynamic changes, Boeing increased the cruise speed of the 300 to Mach 0.85 from Mach 0.84 on the 100/200. Also, with improved fuelburn, range improved to 7700 mi (12,392 km).

Swissair was the launch customer for the B747-300. The first plane was delivered to French airline UTA on March 1, 1983.

Despite the improvements of the -300, only 81 aircraft were ordered, 56 for full passenger use, 21 M and 4 SR. One factor for the low sales was the launching of the B747-400 in 1985.

AB.1.5K B747-300M

The 300M had similar cargo capacity as the 200M. However, with the stretched upperdeck it could carry more passengers. This proved popular in the fleet of KLM on their Africa routes that had few passengers, yet considerable air freight.

AB.1.5L B747-300SR

The Japanese airlines again asked for a high capacity domestic model and Boeing offered the SR. JAL operated such aircraft with over 500 seats on Okinawa-Tokyo route as well as others.

Airlines, as in August 2006, operating the Boeing B747-300 include JAL/JALways (12), and Saudi Arabian Airlines (9). Some 16 other airlines operate smaller numbers of the type and a total of 72 Boeing B747-300 aircraft (all versions) were in airline service.

AB.1.5M B747-400

The B747-400 is a long range high capacity wide airliner. The B747-400 is the latest model of the B747 and the only series still in production. It added 6 ft (1.8 m) wing tip extensions and 6 ft (1.8 m) winglets, tail fuel tanks, revised engines, an all-new interior, and an all-new glass cockpit that dispensed with the need for a flight engineer.

The passenger version first entered service in February 1989 with Northwest Airlines on the Minneapolis to Phoenix route. The combi version entered service in September 1989 with KLM. The freighter version entered service in November 1993 with Cargolux.

In August 2006 a total of 627 Boeing B747-400 aircraft (all versions) were in airline service, with 46 further firm orders. Major operators include: Air India (12), All Nippon Airways (23), Cathay Pacific (30, plus 6 on order), China Airlines (34, plus 2 on order), Japan Airlines (44), Korean Air (43), Qantas (30), Singapore Airlines (27), Singapore Airlines Cargo (15), Air France (21), British Airways (57), KLM Royal Dutch Airlines (25, plus 1 on order), Lufthansa (30), and United Airlines (31). Some 24 airlines also operate the type, but in smaller numbers.

Variants of B747-400:

Boeing B747-400: Passenger aircraft

Boeing B747-400D: Domestic passenger aircraft for high capacity transport on short routes; no winglets

Boeing B747-400M: Combi passenger, cargo with left-side main-deck cargo door aft of the wing

Boeing B747-400F: Freighter airplane. It has a nose cargo door and an optional main-deck side cargo door.

Boeing B747-400ER: Passenger aircraft. The B747-400ER can be equipped with upto two fuel tanks in the forward lower cargo compartment.

Boeing B747-400FER: This is similar to the B747-400F, except for the increased gross weight capability, which allows it to carry more cargo. This airplane is not fitted with the cargo compartment fuel tanks.

Boeing YAL-1A: Airborne laser for the USAF.

Boeing B747-400LCF: The large cargo freighter features an entire aft fuselage that swings open for loading. With modifications to enlarge the upper fuselage which increases the volume of the main cargo deck to1.845 m^3, it has 300 per cent more capacity than the B747-400 freighter. In 2007 the airplane is returning to support final assembly of the first 787 Dreamliner**.**

Details and Specifications of Boeing B747-400:

Developing Nation: United States of America

Manufacturer/Designer: Boeing Commercial Airplane Company

Details of Items	*B747-400*	*B747-400F*	*B747-400D*	*B747-400ER*	*B747-400EFR*
First Flight	Apr. 29, 1998 N40 1 PW	May 4, 1993 N6005C	Mar. 18, 1991 N60668	Jul. 31, 2002 N6018N	Sep. 30, 2002 N5017Q
First Delivery	Jan. 26, 1989 Norwest Airlines	Oct. 22, 1993 Cargolux	Oct. 10, 1991 Japan Airlines	Oct. 31, 2002 Quantas	Oct. 17, 2002 Air France
Passengers Two Class	42 First class 458 Economy		628 All Economy	42 First Class 458 Economy	
Passengers Three Class	24 First class 32 Business 302 Economy			24 First Class 32 Business 302 Economy	
Upper Deck	42 Business				
Cabin Length	57.00 m				
Cabin Diameter	6.13 m				
Cabin Height	2.54 m				
Baggage Compartment	28.3 cu. M				
Wing Area	524.90 m^2		510.97 m^2		
Wing Span	64.44 m		59.64 m		
Wing Sweep	37.5 degrees				

AB.1.5N B747 Large Cargo Freighter

Three used Boeing B747-400 passenger aircraft are to be converted into an outsize configuration, in order to ferry Boeing 787 sub-assemblies to Everett, Washington for final assembly. The first B747 LCF flew for the first time, unpainted, on September 9, 2006. The LCF is not a Boeing model and will not be sold to any customers or see any airliner operation.

AB.1.5O B747-8

Compared to previous B747s, the B747-8 Intercontinental is "stretched" in two bands for a total extension of 11.7 ft (3.6 m).

Boeing announced a new B747 model, the B747-8 (referred to as the B747 Advanced prior to launch) on November 14, 2005, which uses the same engine and cockpit technology as the 787. (It was decided to call it the B747-8 because of the technology it will share with the 787 *Dreamliner*). Boeing claims that the new design would be quieter, more economical and more environmentally friendly. The passenger version (dubbed B747-8 Intercontinental) would be capable of carrying up to 467 passengers in a 3-class configuration and fly over 8000 nm (14,816 km) at mach 0.86 (1054 km/h). As a derivative of the already common B747-400, the B747-8 has the economic benefit of similar training and interchangeable parts.

The B747-8I is also streched to add more capacity/payload. It's stretched from 70.8 to 76.4 metres.

In October 2006 there was a total of 3 firm orders for the Boeing B747-8I aircraft from VIP customers.

In November 2006 there was an additional firm order for the Boeing B747-8I aircraft for a VIP transport.

Figure AB.21 *Stretched B747*

Variants of 747-8: B747-8F Boeing also announced a new freighter model, to be a derivate to the B747-400ERF. It is also a competitor to the A380-800F, which has 20 orders to date. The B747-8F is a 76.4 metres long plane, which provides capacity of 132 tons of cargo. One of the great features is the forward (overhead) nose-door. It also has the same engines as the B747-8I and B787. There are wing changes and a new cockpit.

In October 2006 there were a total of 44 firm orders for the Boeing B747-8F aircraft from Nippon Cargo Airlines (8), Cargolux (10), Emirates air cargo (10) and two undisclosed buyers.

AB.1.6 Government and Military

The US military designation for B747-400 is C-33.

The current US presidential aircraft, two B747's, tail numbered 28000 and 29000, with *Air Force designation* VC-25A, are among the most famous B747 models. They are popularly known as ***Air Force One***, although that name is technically the call sign for any United States Air Force Aircraft while carrying the President. Both VC-25As are based on the civilian B747-200B, though they contain many of the innovations introduced on the B747-400. Other special B747s include the E-4B formerly known as National Emergency Airborne Command Post (referred to colloquially as "***Kneecap***"), now referred to as National Airborne Operational Command (NAOC); modified B747s to transport the space shuttle (shuttle carrier aircraft); and aerial refueling tankers. A recent addition to the military's B747 arsenal is the experimental Airborne Laser, a component of the national missile defense plan. T/Space is also planning to use a B747 for its CXV space capsule proposal.

Figure AB.22 *VC-25A 29000**

Figure AB.23 *20-1101***

A number of other governments also use the B747 as a VIP transport, including Bahrain, Brunei, India, Iran, Japan, Oman, Qatar, Saudi Arabia, and United Arab Emirates. Recently, several new Boeing B747-8 have been ordered by Boeing Business Jet for conversion to VIP transport for several unidentified customers.

AB.1.7 Specifications

Measurement	*B747-100*	*B747-200B*	*B747-300*	*B747-400*	*B747-400ERF*	*B747-8I*
Cockpit Crew	Three	Three	Three	Two	Two	Two
Fuselage Length	70.6 m (231 ft 10 in)	70.6 m (231 ft 10 in)	70.6 m (231 ft 10 in)	70.6 m (231 ft 10 in)	70.6 m (231 ft 10 in)	76.4 m (250 ft 8 in)
Wingspan	59.6 m (195 ft 8 in)	59.6 m (195 ft 8 in)	59.6 m (195 ft 8 in)	64.4 m (211 ft 5 in)	64.4 m (211 ft 5 in)	68.5 m (224 ft 9 in)
Height	19.3 m (63 ft 5 in)	19.3 m (63 ft 5 in)	19.3 m (63 ft 5 in)	19.3 m (63 ft 5 in)	19.3 m (63 ft 5 in)	19.4 m (63 ft 6 in)
Weight empty	162,400kg (358,000 lb.)	174,000 kg (383,000 lb.)	178,100 kg (392,800 lb.)	178,756 kg (393,263 lb.)	164,382 kg (361,640 lb.)	276,691 kg (610,000 lb)

(*Contd.*)

*VC-25A *29000* one of the two highly customised Boeing B747-200Bs that have been part of the *United States Presidental Fleet* since 1990

**20-1101 *Japanese Airforce One*, one of the two customised Boeing B747-400s that have been part of the *Japanese Air Force* since 1993

(*Contd.*)

Maximum take-off weight	333.4 t (735,000 lb.)	374.8 t (833,000 lb.)	374,800 kg (833,000 lb.)	396,890 kg (875,000 lb.)	413,636 kg (910,000 lb.)	439,985 kg (970,000 lb)
Cruising speed	mach 0.84 (895 km/h)	mach 0.84 (895 km/h)	mach 0.85 (910 km/h)	mach 0.855 (913 km/h)	mach 0.855 (913 km/h)	mach 0.85 (910 km/h)
Maximum speed	mach 0.89 (1023 km/h)	mach 0.89 (1023 km/h)	mach 0.89 (1023 km/h)	mach 0.92 (1093 km/h)	mach 0.92 (1093 km/h)	
Range fully loaded	9,800 km (5,300 nm)	12,700 km (6,850 nm)	12,400 km (6,700 nm)	13,450 km (7,260 nm)	9,200 km (4,970 nm)	14,815 km (8,000 nm)
Max. fuel capacity	183,380 litres (48,445 USG)	199,158 litres (52,410 USG	199,158 litres (52,410 USG)	216,840 litres (57,285 USG)	216,840 litres (57,285 USG)	
Engine thrust each	46,500 lbf PW 46,500 lbf GE 50,100 lbf RR	54,750 lbf PW 52,500 lbf GE 53,000 lbf RR	54,750 lbf PW 55,640 lbf GE 53,000 lbf RR	63,300 lbf PW 62,100 lbf GE 59,500 lbf RR	63,300 lbf PW 62,100 lbf GE	
Engine models each	PW JT9D-7A GE CF6-45 A2 RR RB 211-524B2	PW JT9D-7R4G2 GE CF6-50E2 RR RB211-	PW JT9D-7R4G2 GE CF6-80C2B1 RB211-524D4	PW 4062 GE CF6-80C2B5F RR RB211-524H	PW 4062 GE CF6-80C2B5F	GEnx-2B67

AB.1.8 Preserved B747s:

An increasing numbers of 'classic' B747-100 and B747-200 series have been retired, some finding their way into aircraft museums. They include:

- Boeing B747-100 NB7470, City of Everett, the first B747 and prototype at the Museum of Flight, Seattle, Washington, USA. (Refer to Figure AB.2—"The prototype B747, Citi of Everett").
- KLM B747-200(SUD) PH-BUK "Louis Blériot" at National Aviation Theme Park Aviodrome, Lelystad, Netherlands.
- Qantas B747-200 VH-EBQ "City of Bunbury" at Qantas Founders Outback Museum, Longreach Airport, Longreach, Queensland, Australia.
- South African Airways B747-200 ZS-SAN "Lebombo" and B747SP ZS-SPC "Maluti" at Rand Airport, Johannesburg, South Africa.
- Lufthansa B747-200 D-ABYM "Schleswig-Holstein" at Technik Museum Speyer, Speyer, Germany.
- Air France B747-100 F-BPVJ at Musée de l'Air et de l'Espace, Le Bourget airport, Paris, France.
- Iran Air B747SPs EP-IAA and EP-IAC and B747-200F EP-ICC at Tehran Aerospace Exhibition, Tehran, Iran.
- Korean Air B747-200 HL7463 at Jeongseok Aviation Center, Jeju, South Korea.

AB.1.9 Incidents

- The first crash of a B747 took place in November of 1974 when Lufthansa Flight 540 crashed in Nairobi killing 59 people.
- The Tenerife disaster on March 27, 1977 claimed a total of 583 lives when two B747s collided in heavy fog at Los Rodeos Airport, making it the **highest death toll of any accident in aviation history.**
- An Air India Flight 855 Boeing B747 crashed into the sea off the coast of Mumbai (Bombay) on New Year's Day**,** 1978. All passengers and crew were killed. Many residents of sea-front houses in Mumbai were witness to the incident.

- On August 12, 1985, the Japan Airlines Flight 123 (a B747SR) lost control and crashed, causing 520 fatalities and is currently the worst single-aircraft disaster in aviation history.
- The Lockerbie bombing was a Pan Am **B747-100.**
- Air India Flight 182 was a B747-237B that exploded on June 23, 1985. All 329 on board were killed. Up until September 11, 2001, the Air India bombing was the single deadliest terrorist attack involving aircraft.
- Korean Air Lines Flight 007 was a B747-230B which was shot down by the Soviet Air Force on September 1, 1983. All **269** passengers and crew aboard were killed.
- El Al Flight 1862 was a B747-200F which crashed shorly after take-off from **Amsterdam** Schiphol on October 4**,** 1992. Engines no. 3 and 4 detached shortly after take-off and as a result the flight crew lost control and the crippled B747 crashed into the Klein-Kluitberg apartments in Bijlmermeer at high speeds. All 3 crew were killed as well as 43 on the ground.
- 04th Nov, 1993 B-165 Boeing B747-409 China Airlines After touch-down at Hong Kong-Kai Tak International Airport, Hong Kong**,** The B747-400 skidded off the wet runway and ended up in shallow water of Hung Hom Bay. 0 fatalities/396 on board.
- 05th Aug, 1998 HL7496 Boeing B747-4B5 Korean Air. On landing at ,Seoul-Kimpo International Airport, South-Korea, bad weather, including heavy rainfall, the B747 in bounced and slid 100 meters off the runway before coming to a stop in a grassy area on the edge of a platform. 0 fatalities/395 on board.
- 31st Oct, 2000 9V-SPK Boeing B747-412 Singapore Airlines. Weather conditions were very poor because of typhoon 'Xiang Sane' at Taipei-Chiang Kai Shek Airport, Taiwan. The crew had been cleared for a runway 05L departure because runway 05R was closed because of construction work. The crew choose the wrong runway, and on takeoff, 3.5 seconds after V1, the aircraft hit concrete barriers, excavators and other equipment on the runway. The plane crashed back onto the runway, breaking up and bursting into flames while sliding down the runway and crashing into other objects related to work being done on runway 05R. 83 fatalities / 179 on board.
- China Airlines Flight 611, a B747-209B, broke-up mid flight on May 25, 2002, en route to Hong Kong International Airport**,** Hong Kong from Chiang Kai Shek International Airport in Taipei, Taiwan. All passengers and crew on board lost their lives.
- On 31st October, 2000, Singapore Airlines Flight 006, a Boeing B747-400 flying on a Singapore to Los Angeles via Taipei route rammed into construction equipment while attempting to take off from a closed runway at Chiang Kai Shek International Airport, caught fire and was destroyed, killing 79 passengers and 3 crew members. The accident prompted the airline to change the flight number of this route from 006 to 030 and to remove the "Tropical Megatop" livery on the accident aircraft's sister ship.

Despite all these, very few crashes have been attributed to design flaws of the B747. The Tenerife disaster was a result of pilot error, ATC error and communications failure, while Japan Airlines Flight 123 the consequence of improper aircraft repair. United Airlines Flight 811, which suffered an explosive decompression mid-flight on February 24, 1989, subsequently had NTSB issuing a recommendation to have all similar B747-200 cargo doors modified. TWA Flight 800, a B747-100 that exploded mid-air on July 17, 1996, led to the Federal Aviation Administration proposing a rule requiring the installation of an inerting system in the centre fuel tank for most large aircraft.

As of May 2006, there were a total of 44 hull-loss occurrences involving B747s, with 3707 fatalities.

AB.1.10 Trivia

- A B747-400 has six million parts (half of which are fasteners) made in 33 countries.
- Just one engine on a B747 produces more thrust than all four engines on an early model Boeing 707 combined.
- As with other airliners such as the DC-10, the engines on a B747 are not visible from the cockpit windows. This configuration has had significance during various accidents and incidents involving this aircraft.
- When pressurised, a B747 fuselage holds over a ton of air.
- Early model B747s have more than 700 lb (300 kg) of depleted uranium molded into the engine nacelles. Its purpose is as ballast to prevent the wing from fluttering.
- At the time of its launch, the term "jumbo jet" had already been coined by the media to describe a general class of new wide-bodied airliners then being developed, including the Lockheed L-1011 TriStar and McDonnell Douglas DC-10. Boeing was keen to discourage the media and the public from using the term "jumbo jet" for the B747, but their efforts were in vain and now the term is synonymous with the B747.
- Because of its length, there is a small flexure of the fuselage in flight. This effect was not anticipated in the design of the autopilot on early models, and so there is a very slow oscillation in yaw when flying on autopilot. This was first discovered on an overseas flight to the Paris Air Show, when some of the people in the rear became air sick. Upon return, the plane went through tests to solve the problem and adjust the yaw damper system. The effect is now too small to be noticeable by passengers.
- To enable easy transportation of spare engines between sites by airlines, early B747s include the ability to attach a non-functioning fifth-pod engine under the port wing of the aircraft, between the nearest functioning engine and the fuselage. Photographs of planes flying in this configuration are highly prized by aircraft enthusiasts.
- Although the upper deck might seem small compared to the size of the whole aircraft, it can seat a significant number of people: JAL has 86 seats on the upper deck of its B747-400D aircraft.
- The B747 is certified to fly on 3 of its 4 engines. A B747 can successfully take-off even if an engine fails after rotation, and in many cases the flight can continue to its destination.
- On 24th May, 1991 an El Al Boeing B747 airlifted a record-breaking 1,087 passengers; Ethiopian Jews flying from Addis Ababa to Israel as part of Operation Solomon. The passenger count became 1,088 when a baby was born in-flight.
- In December 2004, a special Boeing B747-400 (B-18210) was delivered to China Airlines. It is nicknamed "B747 Dreamliner". Its livery is a combination of Boeing's corporate livery on the fuselage and China Airlines's plum blossoom on the tail. It is one of two non-retrofitted non-B747-400ERs to feature Boeing's signature interior from the Boeing B777 (the other being B-18211, also delivered to China Airlines).
- There are other aircraft with prominent humps on the upper fuselage including the Carvair, which was built from 1961 to 1969. It appeared in the 1964 James Bond movie *Goldfinger.*
- The B747 has appeared as a setting for a number of films, including *Airport 1975, Snakes on a Plane*, *Air Force One, Turbulence* and *Executive Decision*.

Boeing B777

AB.2.1 Specifics

Figure AB.24 *Boeing B777 on Flight*

Type	Airliner
Manufacturer	Boeing Commercial Airplanes
Maiden Flight	1994-06-12
Introduced	1995-06-07 with United Airlines
Primary Users	Singapore Airlines (61) United Airlines (52) American Airlines (47) Emirates (44)
Number Built	600 as of 2006
Unit Cost	B777-200: US$178-195 million B777-200ER: US$190-212.5 million B777-200LR: US$219-243 million B777-300: US$210-234 million B777-300ER: US$237-264 million B777F: US$232.5-240 million

AB.2.2 About the Aircraft

The Boeing B777 is a family of long-range wide-body twin-engine airliners built by Boeing's commercial airplanes division. It can carry between 301 and 368 passengers in a three-class configuration and has a range from 5,210 to 9,420 nautical miles (9,649 to 17,445 km). Distinguishing features of the B777 include a set of six wheels on each main landing gear, its perfectly circular fuselage cross section, the pronounced "neck" aft of the cockpit, and the blade-like rear tailcone.

The B777 was the first commercial aircraft to be designed entirely on computer. No paper drawings were ever produced; everything was created on a 3D CAD software system known as CATIA. This allowed a virtual B777 to be assembled in simulation, allowing engineers to examine for interferences and to test whether the many thousands of parts would fit together properly before costly physical prototypes were manufactured.

Direct market competitors to the B777 are the Airbus A330-300, A340 and some models of the proposed A350 XWB.

Developing nation:	**United States of America**
Manufacturer/designer:	Boeing Commercial Airplane Company
Production line:	Everett, WA
Type Aircraft:	Long and ultra long range wide body airliner
First flight:	– B777-200 June 12, 1994, NB7771 – B777-200ER October 7, 1996, N5022E – B777-200LR March 8, 2005, N60659 – B777-300 October 16, 1997, N5014K – B777-300ER February 24, 2003, N5017V
First delivery:	– B777-200 May 15, 1995 to United Airlines – B777-200ER February 6, 1997 to British Airways – B777-200LR early 2006 to Pakistan International Airlines – B777-300 May 22, 1998 to Cathay Pacific Airways – B777-300ER April 29, 2004 to Air France

AB.2.3 History of B777

In the 1970s, Boeing unveiled new models: the twin-engine B757 to replace the venerable B727, the twin-engine B767 to challenge the Airbus A300, and a trijet B777 concept to compete with the DC-10 and the Lockheed L-1011 TriStar.

Based on a re-winged B767 design, the 275 seat B777 was to be offered in two variants: a 5,000 km (2,700 nm) transcontinental and an 8,000 km (4,320 nm) intercontinental.

Figure AB.25 *Boeing B777*

Figure AB.26 *B777 Touching Down*

Figure AB.27 *B777 in Flight*

Figure AB.28 *B777 Cockpit*

The twinjets were a big success, due in part to the 1980s ETOPS regulations. The launch of the B777 was cancelled (much like the trijet concept of the Boeing B757) in part because of the complexities of trijet design and the absence of a 40,000 lb_f (178 kN) engine. The cancellation left Boeing with a big size and range gap in its product line between the B767-300ER and the B747-400.

AB.2.4 Technological Features of B777

Boeing employed advanced technologies in the B777. These features included:

- Honeywell LCD glass cockpit flight displays
- Fully digital fly-by-wire flight controls with emergency manual reversion
- Fully software configurable avionics
- Electronic Flight Bag Computers
- Lighter design including use of composites (9% by weight)
- Fiber optic avionics network
- The largest and most powerful turbofan engines on a commercial airliner with a 128 inch (3.3 m) fan diameter on the GE-90-115B

The B777 first flew on June 14, 1994 piloted by B777 Chief Test Pilot John E. Cashman. The aircraft would later undergo a flight test programme more extensive than any other Boeing model. The development, testing, and delivery of the B777 was the subject of the documentary series, "21st Century Jet: The Building of the B777." The FAA awarded full 180 minute ETOPS clearance ("ETOPS-180") for PW4074 B777-200s on May 30, 1995. The B777 was the first aircraft to carry an ETOPS-180 rating at its entry into service.

A notable design feature is Boeing's decision to retain conventional control yokes rather than fit sidestick controllers as used in many fly-by-wire fighter aircraft and in current Airbus models. Boeing viewed "stick and rudder" controls as being more intuitive for pilots.

AB.2.5 Variants of B777

Boeing uses two characteristics to define their B777 models. The first is the ***airframe size***, which affects the number of passengers and amount of cargo that can be carried.

The initial proposal from Boeing was simply to enlarge the B767, resulting in the B767-X concept. It was similar to a B767, but with a longer fuselage and larger wings seating about 340 passengers and with a maximum range of 7,300 nautical miles (13,500 km).

The airlines were unimpressed with the B767-X. They wanted short to intercontinental range capability, cabin cross section similar to the B747, a fully flexible cabin configuration and an operating cost lower than any B767 stretch. The result was a new design: the B777 twinjet.

Figure AB.29 *B777 in Approach*

Figure AB.30 *B777 Engine*

The design phase of the B777 differed from previous Boeing jetliners. For the first time, eight major airlines and their passengers had a role in the development of the plane. The major airlines consulted were United Airlines, American Airlines, Delta Air Lines, ANA, British Airways, JAL, Qantas, and Cathay Pacific. The "working together" philosophy, as Boeing called it, meant that the B777 was their most customer oriented aircraft yet. As of December 2006, Qantas is the only carrier, of the major airlines consulted, who has yet to order the B777.

Singapore Airlines is the largest operator of the Boeing B777 family with 60 in service, of which 46 are of the B777-200ER variant, 12 are B777-300s and 2 are B777-300ER. Another 17 B777-300ERs are on firm order, with 13 more on option.

At the end of August 2006, 44 different customers had placed 851 orders for B777s.

Boeing B777 built 500, active 500, on order 147 as of January 2005.

The B777-200 and derivatives are the base size. A few years later, the aircraft was stretched into the B777-300.

The second characteristic is ***range***. Boeing defines three segments:

- A market - 3,900 to 5,200 nautical miles (7,220 to 9,630 km)
- B market - 5,800 to 7,700 nautical miles (10,740 to 14,260 km)
- C market - 8,000 nautical miles (14,815 km) and greater

These markets are also used to compare the B777 to its competitor, the Airbus A340.

AB.2.5A B777-200

The B777-200 (772A) was the initial A-market model. The first customer delivery was to United Airlines (FAA: NB777UA) in May 1995. It is available with a maximum take-off weight (MTOW) from 229 to 247 tonnes and range capability between 3780 and 5150 nautical miles (7000 to 9500 km).

The -200 is powered by two 74,000 lb_f (329 kN) Pratt & Whitney PW4074 turbofans, 75,000 lb_f (334 kN) General Electric GE90-75Bs, or 75,000 lb_f (334 kN) Rolls Royce Trent 875s.

The first B777-200 built was actually used by Boeing's Non-Destructive Testing (NDT) campaign in 1994-1995, and provided valuable data for the -200ER and -300 programmes (see below). This A-market aircraft was finally sold to Cathay Pacific Airways and delivered in December 2000.

The direct Airbus equivalent of B777 is the A330-300.

AB.2.5B B777-200ER

Originally known as the B777-200IGW (for "increased gross weight"), the longer range B market B777-200ER (772B) features additional fuel capacity, with increased MTOW range from 263 to 286 tonnes and range capability between 6000 and 7700 nautical miles (11,000 to 14,300 km). ER stands for Extended Range. British Airways received the first B777-200ER in February 1997.

The B777-200ER can be powered by any two of a number of engines: the 84,000 lb_f (374 kN) PW4084 or Trent 884, the 85,000 lb_f (378 kN) GE90-85B, the 90,000 lb_f (400 kN) PW4090, GE90-90B1, or Trent 890, or the 92,000 lb_f (409 kN) GE90-92B or Trent 892. In 1998, Air France took delivery of a B777-200ER powered by GE90-94B engines capable of 94,000 lb_f (418 kN) thrust. The Rolls Royce Trent 800 is the leading engine for the B777. The engine is used on the majority of B777-200s, ERs and 300s as the engine is not offered for the 200LR and 300ER.

On April 2, 1997 a Boeing B777-200ER, with registration 9M-MRA (dubbed the "Super Ranger") of Malaysia Airlines, broke the ***'Great Circle Distance without Landing'*** record for an airliner by flying east (the long way) from Boeing Field, Seattle, to Kuala Lumpur, Malaysia, covering the distance of 20,044 km in 21 hours, 23 minutes.

The direct Airbus equivalents of B777-200ER are the A340-300 and the proposed A350-900.

As of August 2006, a total of 462 Boeing B777-200 aircraft (both -200 and -200ER) remain in airline service, with 53 further firm orders. Major operators include: Air China (10), All Nippon Airways (23, plus 4 on order), Japan Airlines (25, plus 1 on order), Korean Air (11, plus 7 on order), Malaysia Airlines (17), Saudi Arabian Airlines (23), Singapore Airlines (46), Vietnam Airlines (10), Air France (25), Alitalia (10), British Airways (43), KLM Royal Dutch Airlines (13, plus 1 on order), American Airlines (46, plus 7 orders), Continental Airlines (18, plus 2 orders) and United Airlines (52). Some 19 other airlines also operate smaller numbers of the type.

AB.2.5C B777-200LR (Long Range)

The B777-200LR (772C) ("LR" for "Longer Range") became the world's longest ranging commercial airliner when it entered service in 2006. Boeing named this plane the ***Worldliner*** for its ability to ***almost connect any two airports in the world***. It is capable of flying 9,420 nautical miles (17,445 km) in 18 hours. Developed alongside the B777-300ER, the B777-200LR will achieve this with huge 110,000 lb_f (489 kN) thrust General Electric GE90-110B1 turbofans, a significantly increased MTOW and three optional auxiliary fuel tanks manufactured by Marshall Aerospace in the rear cargo hold. Other new features include raked wingtips, a new main landing gear and additional structural strengthening. Rolls Royce originally offered the Trent 8104 engine (104,000 to 114,000 lb_f)(463 to 507 kN), that has been tested up to 117,000 lb_f (520 kN), but Boeing and Rolls Royce couldn't agree on risk sharing on the project, and so the engine was never offered to customers. The aircraft rolled out on February 15, 2005 and first flew on March 8, 2005. The second prototype made its first flight on May 24, 2005. The only mass-produced aircraft with greater unrefueled range is the KC-10 Extender.

Figure AB.31 *The B777-200LR Worldliner, presented at the Paris Air Show 2005*

Figure AB.32 *PIA B777-200LR - The first airline to take delivery of the Worldliner*

The longer range B777-200LR was initially proposed as a B777-100X. It would have been a shortened version of the B777-200, analogous to the Boeing B747SP. The shorter fuselage would reduce the take-off weight. The reduced weight could be utilised to fuel tankage, increasing the range of the aircraft. In that case, the aircraft would have carried fewer passengers than the B777-200, while having similar operating costs that would have had a higher cost per seat. With the advent of more powerful engines, the B777-100X proposal was replaced by the B777X programme that evolved into B777-200LR.

On November 10, 2005 a B777-200LR set a record for the *longest non-stop flight by passenger airliner* by flying 11,664 nautical miles (13,422 statute miles, or 21,602 km) eastwards (the westerly

Great Circle Route is only 5,994 miles) from Hong Kong to London, UK. The journey took about 22 hours and 42 minutes. This was logged in the ***Guinness World Records*** and surpassed the average range of the Boeing B777-200LR, which is around 9,420 nm.

On February 2, 2006 Boeing announced that the B777-200LR has been certified by both FAA and EASA to enter into passenger service with airlines.

The first Boeing B777-200LR was delivered to Pakistan International Airlines on February 26, 2006, (refer Figure AB.32) and the second on March 23, 2006. There are at least 5 Boeing B777 in service right now with PIA and the company plans to replace all its older jets with the series. Under a deal Pakistan also produces components and other spare parts for Boeing B777 series. Last year Boeing itself bought components and spare parts from Pakistan worth $100 million. Other customers include Air India and EVA Air. On November 9, 2005, Air Canada confirmed an order for the aircraft, which had previously been cancelled due to labour issues. Emirates announced on November 20, 2005 that they bought 10 of these aircraft as part of a larger B777 order (42 in all). On September 12, Qatar Airways announced firm orders for the Boeing B777-200LR along with Boeing B777-300ER. On October 10, 2006, Delta Air Lines announced 2 firm orders of the aircraft to add to its long haul routes.

Its direct Airbus equivalent is the A340-500. When compared to the *Worldliner*, the A340-500 is capable of flying 9,017 nautical miles (16,700 km) non-stop. It is however free from ETOPS restrictions. A future model, the A350-900R, aims to have a range up to 9,500 nautical miles or 17,600 km.

After the announcement of the new Airbus A350XWB family, Boeing proposed lessening the weight of the Boeing B777-200LR with more composites to attract an order from Qantas. The weight reduction will be approximately seven tonnes.

Figure AB.33 *AB777 First Class Comfort*

Figure AB.34 *B777 Flying over Ice Clad Peaks*

Air New Zealand are also looking at the possibility of using the -200LR variant to add with their -200ER's to bring in a new Auckland to New York route, beginning an ultra-long range route. They have a possible 4 options.

In August 2006, Boeing received 40 firm orders from Air India (8), Emirates Airline (10), EVA Air (2), Qatar Airways (6), Delta Air Lines (2), and Air Canada (6).

AB.2.5D B777-300

The stretched A market B777-300 (773A) is designed as a replacement for B747-100s and -200s. Compared to the older B747s, the stretched B777 has comparable passenger capacity and range, but burns one third less fuel and accepts 40% lower maintenance costs. Boeing publicly announced

it was developing the B777-300 at the Paris Air Show in mid-June 1995. The B777-300 rolled out on September 8, 1997, followed by its first flight on October 16 the same year.

It features a 33 ft 3 in fuselage stretch over the baseline B777-200, allowing seating for up to 550 passengers in a single class high density configuration and is also 13 tonnes heavier. The B777-300 has tailskid and ground manoeuvring cameras mounted on the horizontal tail and underneath the forward fuselage to aid pilots during taxi due to the aircraft's enormous and wondrous length.

It was awarded type certification simultaneously from the US FAA and European JAA and was granted 180 min ETOPS approval on May 4, 1998 and entered service with Cathay Pacific later that month.

B777-300 Specifics:

Cockpit Crew:	Two Pilots
Passengers single class:	Up to 550
Passengers two class:	– 58 business class – 284 economy class
Passengers three class:	– 30 first class – 84 business class – 254 economy class
Cabin length:	59.24 m
Cabin diameter:	5.86 m
Baggage compartment:	17 m^3
Cargo volume:	213.9 m^3
LD3 Containers in belly:	20
Standard 2.24 m × 3.17 m pallets:	8
Wing span:	60.93 m
Wing area:	427.8 m^2
Wing sweep:	8.7 degrees.
Fuselage length:	73.86 m
Fuselage diameter:	6.19 m
Height:	18.51 m
Horizontal tail unit:	21.53 m
Wheelbase:	31.22 m
Track:	10.97 m
Engines:	– Two Pratt & Whitney 4098 rated 424.1 kN – Two Rolls Royce Trent 892 rated 411.48 kN – Two General Electric GE90-94B rated 432.8 kN
Weight:	– Empty: 139,025 kg/ Max. zero-fuel weight: 224,528 kg – Fuel: 171,160 litre/- Max. payload: 66,770 kg
Max. take off weight:	297,560 kg.
Max. landing weight:	237,682 kg.
Cruise speed:	895 km/h.
Max. speed:	941 km/h.
Take-off speed:	270 - 345 km/h.
Landing speed:	245 - 285 km/h.
Service ceiling:	13,135 m.
Range:	11,029 km.
Performance:	– Take-off run 3,231 m at max. take-off weight. – Landing run 1,829 m at max. landing weight.

The operating range of the aircraft with 386 passengers in three classes is 5720 nautical miles (10,600 km). It is typically powered by two of the following engines: 90,000 lb_f (400 kN) PW4090 turbofans, 92,000 lb_f (409 kN) Trent 892 or General Electric GE90-92Bs, or 98,000 lb_f (436 kN) PW-4098s.

This aircraft has no direct Airbus equivalent, but the A340-600 is offered as its competitor.

In August 2006, a total of 60 Boeing B777-300 aircraft remained in airline service with All Nippon Airways (7), Cathay Pacific (12), Emirates Airline (12), Japan Airlines (7), Korean Air (4), Singapore Airlines (12) and Thai Airways International (6).

AB.2.5E B777-300ER (Extended Range)

The B777-300ER is the first of two new longer range B777 models; the B777-300ER and the B777-200LR (Longer Range), at the request of airline customers seeking airplanes with additional flexibility to serve the non-stop routes that passengers demand. This is the extended range (ER) version of B777-300, and contains many modifications, including the GE90-115B engines, which are the world's most powerful jet engines with 115,300 lb_f (513 kN) thrust. Other features include longer wings with raked wingtips, a new main landing gear, extra fuel tanks (2,600 gallons), as well as strengthened fuselage, wings, empennage, nose gear, engine struts and nacelles. The range with a 365 passenger three-class configuration is 7,880 nautical miles (14,594 km) and it is capable of serving such routes as Paris-Los Angeles and Paris-Tokyo. Although the B777-300ER programme was launched by Air France, due to political reasons, Japan Airlines was advertised as the launch customer. The first flight of the B777-300ER was on February 24, 2003. Delivery of the first B777-300ER to Air France occurred on April 29, 2004.

During the B777-300ER's 1,500-hour flight test programme, the airplane exceeded its original design performance targets. As a result, the new jetliner provided increased payload and range capability over those promised to customers at the time of its sale.

The main reason for the B777-300ER's extra 3,500 km (1,900 nm) range over the B777-300 is not the extra 2,600 gallons of fuel (45,220 to 47,890), but the other host of improvements; specially the increase in the maximum take-off weight (MTOW). The MTOW for the B777-300ER is 775,000 lb vs. 660,000 lb for the B777-300. Both weigh approximately 360,000 lb empty. Both have the same passenger capacity and roughly the same payload capacity. As with aviation rules, the MTOW must be subtracted by the empty weight and payload weight to determine the zero-fuel weight as also the landing weight. Then, any remaining weight gives the capacity for carrying fuel. All manufacturers give range with maximum payload, not maximum fuel. Therefore, if both planes weigh 360,000 lb and have a 120,000 lb payload, then the B777-300 can only carry 180,000 lb of fuel (26,865 gallons) compared to the B777-300ER's 295,000 lb of fuel (44,029 gallons). This enables the ER to fly roughly 34% farther with only a 6% increase in fuel capacity. Since entering service, all orders for the stretched B777 have been for ERs.

The B777-300ER has updated avionic, electrical, flight and environmental control systems. The airplane's raked wingtips offer fuel efficiency improvements and its semi-levered landing gear permits takeoffs on shorter runways. It also features the award-winning Boeing Signature Interior, known for its ambient lighting and easily accessible drop-down luggage bins.

'General Electric Aircraft Engines' manufactures the engines for both longer range B777 models. The GE90-115B turbofan is the world's largest and most powerful commercial jet engine, producing 115,000 pounds of thrust, currently a Guinness World Record.

On Friday, 3rd December, 2004 was the rollout of the 500th Boeing B777 commercial airplane. The Boeing B777 the fastest-selling twin-aisle airplane ever, had reached 500 airplanes delivered faster than any other twin-aisle airplane in commercial history. The 500th B777 was scheduled for delivery to International Lease Finance Corp. and operator Air France. Thirty-eight customers have ordered 647 Boeing B777.

Specifics of B777-300ER

Passengers two class:	– 56 business class – 283 economy class
Passengers three class:	– 12 first class – 42 business class – 316 economy class
Wing span:	64.80 m
Height:	18.85 m
Cargo volume:	213.9 m^3
Engines:	– Two General Electric GE90-115B rated 512 kN
Weight:	– Empty: 167,829 kg – Max. zero-fuel weight: 237,682 kg – Fuel: 181,280 litre – Max. payload: 69,853 kg
Max. take off weight:	344,550 kg
Max. landing weight:	251,290 kg
Range:	14,270 km
Performance:	– Take-off run 3,353 m at max. take-off weight. – Landing run 1,585 m at max. landing weight.

The B777-300ER's direct Airbus equivalent is the A340-600HGW.

Renowned Boeing B777-300 Users: In August 2006, a total of 53 Boeing B777-300ER aircraft were in airline service with All Nippon Airways (5, plus 5 orders), Emirates Airline (17, plus 37 orders), EVA Air (3, plus 10 orders), Japan Airlines (6, plus 7 orders) and Air France (17, plus 9 orders). Firm orders total 155 and include Air India (15), Cathay Pacific (18), Jet Airways (10), Qatar Airways (14), Singapore Airlines (2, plus 17 orders) and Air Canada (11).

AB.2.5F B777 Freighter

The B777 Freighter (B777F) is an all-cargo version of the B777-200. It is an amalgamation of features from the B777-200LR and the B777-300ER. It uses the engines and structural upgrades of the B777-200LR combined with the fuel tanks and undercarriage of the B777-300ER. The B777F has entered service in late 2008.

The B777F promises excellent operating economics compared to existing freighters. The aircraft has a large interior volume and excellent range. The B777F will have a payload of 103 tons. This is very close to the capacity of the B747-400F, which has a payload of 112 tons. The two aircraft have a nearly identical payload density. The B777F is powered by the 110,000 lb_f (489 kN) GE90-110B1) engines identical to the B777-200LR.

With the same fuel capacity as the B777-300ER, the B777F have excellent range. However, as with all aircraft, freighters included, maximum range is measured based on maximum payload. This limits the B777F to a range of 9,065 km or (4,895 nm) at maximum payload. This means the aircraft takes off with its tanks half full. This is only in instances that the plane carries all 103 tons on board. For airlines that carry lighter cargo, the B777F can travel much longer distances non-stop. Air Canada has purchased two of these for their Vancouver–Shanghai and Vancouver–Hong Kong routes among others. Both these routes are farther than 9,000 km. These planes will take off a bit lighter and with more fuel on board. Boeing thinks parcel carriers, as well as others who are more concerned with volume rather than weight, can, for example, carry flights from mainland United States to China without making stops at cities like Anchorage, Alaska. This will bring new efficiencies and save time.

Airbus has no comparable aircraft in its fleet, but is developing two models with similar specifications to the B777F. The A330-200F will carry less payload, but is a smaller and a cheaper alternative. The proposed A350-900F is a more capable competitor. However, even this model is not designed to target the exact market of the B777F. It will carry around 90 tons. The MD-11F is another comparable aircraft, but with less range than the B777F. The B777F, which entered service in 2008, is expected to be the second-longest-range freighter in the world after the A380F. The B747-400ERF can carry more cargo and travel farther than the B777F, but the B747-8F replacing it will have less range than the B747-400ERF in the interest of more payload.

On November 7, 2006 FedEx cancelled its order of ten Airbus 380s, citing the delays in delivery. FedEx said it would buy 15 B777Fs instead, with an option to purchase 15 additional B777Fs. FedEx's CEO stated that the availability and delivery timing of this aircraft, coupled with its attractive payload range and economics, make this choice the best decision for FedEx."

Potential customers of B777F are Lufthansa Cargo, United Parcel Service, and EVA Cargo. Air Canada, along with Air France-KLM have signed on as the B777F launch customers. The order for seven aircraft, (5 for Air France and 2 for Air Canada) is worth US$1.5 billion at list prices (first delivery in 2008). Air Atlanta Icelandic has ordered eight B777F aircraft, while Emirates SkyCargo has also ordered eight. In December 2006 there were firm orders for a total of 49 B777 Freighters from FedEx (15), Emirates SkyCargo (8), Avion Group/Air Atlanta Icelandic (8), Air France (5), Guggenheim Aviation Partners (3), Air Canada (2), and Qatar Airways (2).

AB.2.6 B777 Specifications

Measurement	*B777-200*	*B777-200ER*	*B777-200LR*	*B777-200F*	*B777-300*	*B777-300ER*
Cockpit crew	Two					
Seating capacity	305 (3-class)	303 (3-class)	N/A	368 (3-class)	365 (3-class)	
Length	63.7 m (209 ft 1 in)	73.9 m (242 ft 4 in)				
Wingspan	60.9 m (199 ft 11 in)	64.8 m (212 ft 7 in)	60.9 m (199 ft 11 in)	64.8 m (212 ft 7 in)		

(*Contd.*)

(*Contd.*)

Measurement	*B777-200*	*B777-200ER*	*B777-200LR*	*B777-200F*	*B777-300*	*B777-300ER*
Wing Sweepback	31.64°					
Height	18.5 m (60 ft 9 in)					
Cabin Width	5.86 m (19 ft 3 in)					
Fuselage Width	6.19 m. (20 ft 4 in)					
Plane Weight	139,225 kg (307,000 lb)	142,900 kg (315,000 lb)	148,181 kg (326,000 lb)	N/A	160,120 kg (353,600 lb)	166,881 kg (366,940 lb)
Maximum take-off weight	247,210 kg (545,000 lb)	297,560 kg (656,000 lb)	347,450 kg (766,000 lb)	347,450 kg (766,000 lb)	299,370 kg (660,000 lb)	351,534 kg (775,000 lb)
Cruising Speed	0.84 Mach					
Cargo Capacity	150 m^3 (5,302 ft^3)	636 m^3 (22,455 ft^3)	200 m^3 (7,080 ft^3)	200 m^3 (7,080 ft^3)		
Range fully loaded	9,649 km (5,210 nm)	14,316 km (7,730 nm)	17,446 km (9,420 nm)	9,065 km (4,895 nm)	11,029 km (5,995 nm)	14,594 km (7,880 nm)
Max. Fuel Capacity	117,335 litres (31,000 USG)	171,160 litres (45,220 USG)	202,287 litres (53,440 USG)	181,280 litres (47,890 USG)	171,160 litres (45,220 USG)	181,280 litres (47,890 USG)
Service Ceiling	13,135 m (43,100 ft)					
Engines	2 X PW 4077 2 X RR 877 2 X GE 90-77B	2 X PW 4090 2 X RR 895 2 X GE	2 X GE 90-110B	2 X PW 4098 2 X RR 892 2 X GE 90-94B	2 X GE 90-115B	

AB.2.7 Incidents (Last Updated: December 3, 2006)

As of November 2006, the only fatality involving a Boeing B777 occurred in a refuelling fire at Denver International Airport in 2001. Although the aircraft's wings were badly scorched, it was eventually repaired and put back into service with British Airways. Of the other incidents which have occurred, none have resulted in the hull being written off.

AB.2.8 Trivia

- Every passenger airline involved in the design team of the B777 has ordered the aircraft, except Qantas, for which Boeing is developing a special type of the B777-200LR to fly its Sydney to London route.
- Most aircrew and aviation enthusiasts refer to the B777 as the "Triple Seven" rather than saying "seven" followed by a double-digit number or saying all numbers individually as is commonly done when referring to other Boeing airliners (such as "Seven Twenty Seven"/ "Seven Two Seven" or "Seven Forty Seven"/"Seven Four Seven").

- The B777's undercarriage is the largest ever used in a commercial jetliner, and its tyres are the largest ever fitted to a commercial aircraft. Each main landing gear tyre of a B777-300 carries a maximum rated load of 52,310 lb (23,730 kg) when the aircraft is fully loaded; the heaviest load per tyre of any production aircraft ever built.
- The B777-300ER has been tested flying with only one working engine for as long as six hours 29 minutes (389 minutes) over the Pacific Ocean as part of its Extended-range Twin-engine Operational Performance Standards (ETOPS) trials. (*Note: 3 hours successful and reliable operation of one-engine-out is sufficient for ETOPS 180 min certification.*)
- The GE90-110B and -115B engines (including nacelle) fitted on the B777-200LR and -300ER have a diameter larger than the fuselage of early versions of the Boeing B737. The Guinness Book of World Records recognised the -115B, powering the B777-300ER, as the "World's Most Powerful Commercial Jet Engine" with a tested thrust of 127,900 lb_f (569 kN).

Figure AB.35 *B777 Leaving Ground*

Figure AB.36 *B777 Racing*

- The longest ETOPS-related emergency flight diversion (192 min. under one engine power) was conducted over the southern Pacific ocean on a United Airlines' Boeing B777-200ER, carrying 255 passengers, on March 17, 2003.
- The B777 has substantial non-US designed or non-US manufactured content, to be exceeded only by the 787. At least the following companies have made contributions: Mitsubishi Heavy Industries (fuselage panels), Kawasaki Heavy Industries (fuselage panels), Fuji Heavy Industries, Ltd. (center wing section), Ilyushin (jointly designed overhead baggage compartment).
- The B777 has the same Section 41 as the 767. This refers to the part of the aircraft from the very tip of the nose, going to just behind the cockpit windows. From a head-on view, the end of the section is very evident. This is where the bulk of the aircraft's avionics are stored.
- Some B777s have crew rest areas in the crown area above the cabin. Separate ones exist for the flight and cabin crew.
- The interior of the Boeing B777, also known as the Boeing signature interior, has later been used on other aircraft, including the Boeing 767-400ER, Boeing B747-400ER, newer Boeing 767-200s and 767-300s. The interior on the Next Generation B737 and the Boeing B757-300 is loosely based on the B777's interior, but also blends in aspects from the B757-200 interior. The B777 also features larger, more rounded windows than most other aircraft. The B777-

style windows were later adopted on the Boeing 767-400ER and Boeing B747-8. The Boeing 787 will feature a new interior evolved from the B777-style interior, and even larger windows.

- The B777 will be eventually replaced by a new product family, the Y3, which would draw upon B787 technologies. The Y3 is also to replace the B747 series.

Boeing B737

AB.3.1 Specifics

Figure AB.37 *B737 in New Boeing Colours*

Type	Airliner
Manufacturer	Boeing Commercial Airplanes
Maiden flight	1967-04-09
Introduced	1968-02-10 with Lufthansa
Number built	5,000+
Variants	Boeing Business Jet T-43 Boeing B737 AEW&C C-40 Clipper P-8 Poseidon

AB.3.2 The Achievement

On February 13, 2006, Boeing reached a milestone by delivering the 5,000th B737

AB.3.3 The History of B737

The Boeing B737 is the world's most popular medium-range, narrow body commercial passenger jet aircraft. With 6,160 ordered and 5,009 delivered, it is the most ordered and produced commercial airliner of all time and has been continuously manufactured by Boeing since 1967. There are now over 1,250 B737 airborne worldwide.

The B737 was born out of Boeing's need to field a competitor in the short-range, small capacity jetliner of the BAC 1-11 and the Douglas DC-9. However, one of its wing sets failed when submitted to static test on a bench at 95 per cent of designed maximum load capacity which further delayed its coming out. The wing had to be redesigned. This superb wing provided the aircraft with a wonderful capablity of operating with both, short runways and high altitude efficiency. Even with the early shortcomings, B737 was cheaper and quicker to design, featuring six-abreast seating (three on each side of the aisle) compared to the 1-11 and DC-9's five-abreast layout.

Figure AB.38 *B737 Taxiing*

Figure AB.39 *B737 Coming for Landing*

Figure AB.40 *B737 Cockpit*

Figure AB.41 *B737 Descending*

Figure AB.42 *B737 Leaving Bay*

Figure AB.43 *B737 Economy Class*

The -100 and -200 series are identifiable by their tubular engine nacelles which are integrated into the wing and project both fore and aft of it. The engines used on the original B737 models are Pratt and Whitney JT8D low-bypass turbofans. The originals can also be identified by the smoothly curving upsweep of the tail fin.

The first B737 (a 100 series) took its maiden flight on April 9, 1967 and entered service in February 1968 with Lufthansa. The B737-200 made its maiden flight on August 8, 1967. Lufthansa was the only customer to purchase all 30 B737-100 aircraft ever produced. The lengthened B737-200 was widely preferred and was produced until 1988. The inaugural flight of Boeing B737-200 for United was flown on April 28, 1968 from Chicago O'Hare (ORD) to Grand Rapids, Michigan (GRR).

In the early 1980s, the B737 had its first major facelift. The biggest change was the usage of CFM International CFM56 engines in place of the JT8Ds. The CFM56 is a high-bypass turbofan, and thus, its diameter was larger than the previous P&W unit, so the engine was slung underneath the wing rather than built into it. This posed a problem as the B737's limited ground clearance (a trait of the 707-derived fuselage) meant that the gearbox and accessories normally fitted to the bottom of the engine had to be fitted to the side, giving the cowling the fattened hamster cheek appearance that is often confused with a flattening of the nacelle geometry (this actually increased efficiency, Boeing found). At the same time, the B737 gained a partial glass cockpit from the B757 and B767. The first B737-300 entered service in 1984.

The Next-Generation B737 encompasses the -600, -700, -800 and -900, and amounted to a complete redesign of the 30-year old airliner. The B737NG is an entirely new aircraft, sharing very little with previous B737s, other than fuselage frames. New wings, new avionics and revised engines were the biggest engineering changes. The B737 was given a glass cockpit with CRT screens (except the -900, which had newer and higher tech LCD screens) and digital systems. A new interior was designed for the Next-Generation B737, borrowing heavily from the B777. The parts count is down by about 33%, reducing weight and simplifying maintenance. Additional changes since its introduction include a new interior and performance enhancing winglets which reduce fuel consumption and improve take-off and climb performance.

In 2001, the B737 was stretched one more time to create the B737-900, which is in fact longer and carries more passengers than the B707, and steps into the capacity of the B757-200.

Starting in 2004, short-field performance changes were developed in response to the needs of a Brazilian customer, Gol Transportes Aéreos for the Santos Dumont Regional Airport in Rio de Janeiro with its longest runway being only 4,341 feet (1,323 meters) in length. That runway was short compared to other runways and could not accommodate larger airplanes at higher approach speeds with full payloads.

Figure AB.44 *Cargo Loading of Boeing B737 – through Combi Door*

Figure AB.45 *Tail Platter of Boeing B737*

The first B737-800 SFP was delivered to GOL in late August 2006. Meanwhile, 11 customers have queued up for deliveries of 250 SFP-packaged models as of 2006.

The modifications made available optionally as the Short Field Performance package on the B737-600, -700 and -800 models are standard equipment for the B737-900ER. These enhancements include a **two-position tail skid** that enables reduced approach speeds, **sealed leading-edge**

slats that provide increased lift during takeoff, and **increased flight spoiler deflection on the ground** that improves takeoff and landing performances. Also, payload capability for landing went up 8,000 pounds on the B737-800 and B737-900ER and up 4,000 pounds on the B737-600 and B737-700, while the payload capability for takeoff went up 2,000 pounds on the B737-800 and B737-900ER and up 400 pounds on the B737-600 and B737-700.

In July 2005, Boeing announced the B737-900ER (Extended Range), formerly known as the B737-900X. The B737-900ER is the same size as the B737-900, but with the addition of a pair of exit doors and a flat rear pressure bulkhead, will carry 26 additional passengers, raising the maximum capacity from 189 to 215 in a single-class layout. The first B737-900ER was scheduled for delivery in the first half of 2007. Lion Air was scheduled to be the launch customer with an order of 30.

Boeing has also recently announced the B737-700ER (Extended Range). The B737-700ER is the same size as the B737-700, but with the addition of extra fuel tanks and a higher MTOW (Maximum Take-Off Weight). All Nippon Airlines (ANA) will be the launch customer.

AB.3.4 Variants of B737

There are 9 variants of the B737. The B737s also fall into three different generations. The "original" models are the B737-100 and the B737-200. The "classic" models were the B737-300, the B737-400, and the B737-500. The "next generation" variants include the B737-600, the B737-700, the B737-800, and lastly the B737-900.

AB.3.4A B737-100

The initial model was the B737-100 and was the smallest model. It was launched by Lufthansa in 1964 (which, by extension, launched the B737 itself) and entered service in 1968.

AB.3.4B B737-200

The B737-200 was an extended version of the B737-100. It was launched in 1965 and entered service in 1968. The B737-200 was later updated as the B737-200 Advanced. The B737-200 Advanced was also available as Convertible and Quick Change variants. In addition, the B737-200 Advanced was also sold as the B737-200 Executive Jet and B737-200HGW (High Gross Weight) variants. These models are quickly heading for extinction owing to poorer fuel efficiency and high noise emissions. These B737s are powered by Pratt & Whitney JT8D low-bypass ratio turbofan engines.

AB.3.4C B737-200C

This model (C for "Convertible") could be converted between passenger and cargo use. Wien Air, Alaska was the launch carrier for this aircraft.

AB.3.4D B737-200QC

The QC (for "Quick Change") was a further variation of the B737-200C, allowing rapid switching between roles.

AB.3.4E B737-300

The B737-300 was the new base model, and was slightly longer than the B737-200. Southwest Airlines were the launch customers with Jat Airways being the launch customer in Europe.

AB.3.4F B737-400

The B737-400 was stretched beyond the B737-300, primarily to accommodate charter airlines. Piedmont and Pace Airlines were the launch customers. The 400 was launched in 1985 and entered

service in 1988 with Piedmont. Alaska Airlines is the largest operator with 40 Aircraft, followed by Malaysia Airlines with 39 aircraft.

AB.3.4G B737-500

The 500 was the last of the second generation of B737s to be developed. It was launched in 1987 and entered service in 1990. With the growth of the B737-300 and B737-400, Boeing introduced the shortened 500 for the airlines replacing the earlier B737-100 and B737-200. It incorporated greater range, better economics, and a more modern looking cabin. The CFM engines were also much less noisy than the lower bypass ratio JT8D engines. The 500 was offered on May 20, 1987 and received 20 orders by Braathens SAFE (currently known as SAS Braathens), 13 from Southwest Airlines, 3 from Maersk Air, and 3 from Euralair. It received FAA certification on February 12, 1990 and was introduced into service by Southwest Airlines on February 24, 1990; measuring only 0.5 m (1ft 8 in) longer than the B737-200.

In August 2006 a total of 367 Boeing B737-500 aircraft were in airline service.

AB.3.4H B737-600

Along with the B737-700 and B737-800, the B737-600 was one of the three initial B737NG variants. The B737-600 superseded the B737-500. It was launched in 1995 and entered service in 1998. Scandinavian Airlines System was the launch customer.

In August 2006, a total of 66 Boeing B737-600 aircraft remained in airline service.

AB.3.4I B737-700

This model was launched by Southwest Airlines in 1993 and entered service in 1998. It has the longest range of any B737 and is a direct competitor to the A319. It usually seats 132 passengers in a two class cabin or 149 in all-economy configuration. The B737-700 is currently operated by some airlines on premium flights between North America and Europe.

Till August 2006, a total of 760 Boeing B737-700 aircraft (all versions) were in airline service, with 422 further firm orders.

The B737's new wing has greater chord, span and wing area, while the tail surfaces are also larger. The 2.4-metre high winglets first developed for the Boeing Business Jet development are now offered as an option on the B737-700. Among the many changes, the Next Generation B737s feature, CFM56-7B turbofan engines that are more efficient. The CFM56-7 combines the core of the CFM56-5 with the CFM56-3's low pressure compressor and a 1.55 m fan, as well as the B777 style EFIS flight deck with six flat panel LCDs which can present information as on the B777 or as on the B737-300/400/500 series; the latter allowing a common pilot type rating for the two B737 families. An HUD is optional.

Variants of Boeing B737-700:

Boeing B737-700 Business Jet (Boeing BBJ) Boeing B737 BBJ: This B737-700 model airplane is equipped with a B737-800 landing gear configuration. This model is also equipped with auxiliary fuel tanks in the cargo compartment for additional range capability. A main cabin interior is designed as per customer preference. Typical configuration includes a crew rest area, forward lounge, private suite with double bed and private bathroom facilities including shower, 12 first class sleeper seats at four abreast and 152 cm pitch, and rear galley and bathroom facilities. Alternatively, rear cabin can seat 24 passengers at two abreast and feature a conference area or exercise gym, or up to 63 passengers at six abreast.

Boeing has built 71; active 63, on order 6 executive jet airliners BBJ.

Boeing BBJ Specifications:

Wing span:	35.79 m
Wing area:	125 m^2
Winglet height:	2.44 m
Engines:	- Two CFM International CFM56-7B each rated 117.4 kN thrust
Weight:	- max. zero-fuel weight: 57,152 kg
Max. take off weight:	77,564 kg
Max. landing weight:	60,781 kg
With 3 auxiliary fuel tanks:	- Empty: 41,887 kg
	- Max. payload: 15,300 kg
	- Cargo volume lower deck: 17.3 m^3
	- Fuel: 31,646 litres
With 5 auxiliary fuel tanks:	- Empty: 42,362 kg
	- Max. payload: 14,821 kg
	- Cargo volume lower deck: 11.7 m^3
	- Fuel: 35,579 litres
With 8 auxiliary fuel tanks:	- Empty: 42,797 kg
	- Max. payload: 14,385 kg
	- Cargo volume lower deck: 6.1 m^3
	- Fuel: 39,584 litres
With 9 auxiliary fuel tanks:	- Empty: 42,896 kg
	- Max. payload: 14,286 kg
	- Cargo volume lower deck: 4.6 m^3
	- Fuel: 40,485 litres
Range:	- 8 passengers: 11,480 km
	- 25 passengers: 11,075 km
	- 50 passengers: 10,205 km

Renowned Boeing B737 BBJ Operators:

Executive Jet Aviation	- 4 B737 BBJ
Boeing	- 3 B737 BBJ
Privatair	- 3 B737 BBJ
General Electric	- 2 B737 BBJ
Mid East Jet	- 2 B737 BBJ
Royal Jet	- 2 B737 BBJ
Air Sahara	- 1 B737 BBJ

Summary April 2005.

Figure AB.46 *Boeing B737 taxiing out*

Figure AB.47 *Boeing B737-700 in LOT colours*

Boeing B737-700 C-40A Clipper: The BBJ's airframe also forms the basis for the convertible passenger/freighter variant of the 700. US Navy has ordered the B737-700QC, C-40A Clipper (to replace the DC-9 based C-9B). The C-40 first flew on April 17, 2000. The naval aircraft can be converted to carry 121 passengers, or 3 pallets of cargo plus 70 passengers, or 8 pallets of cargo only. The B737-700C variant features a 3.35 x 2.13 m cargo door on the right side of the aircraft, cargo handling systems in the cabin and a strengthened floor. These aircraft are currently (2002) based at Naval Air Station Fort Worth, Texas (VR-59) and Naval Air Station Jacksonville, Florida (VR-58).

Project Wedge Tail: The AEW&C system combines the new high-performance Boeing B737-700 increased gross weight (IGW) aircraft with the Northrop Grumman Multi-role Electronically Scanned Array (MESA) radar. Included in the platform are an advanced identification friend or foe (IFF) system; an expanded, passive surveillance system; a flexible, open-system architecture and a highly effective self-defense capability.

MESA radar is able to track air and sea targets simultaneously and can help the operator track high-performance aircraft, while continuously scanning the operational area; using the latest sensor technology. Northrop Grumman's 360-degree steerable beam. More than 1500 hours of wind tunnel testing have demonstrated the compatibility of the aircraft and the radar.

Knowledge Details

Developing nation:	United States of America
Manufacturer/designer:	Boeing Commercial Airplane Company
Production line:	Renton Municipal Airport, WA
Type aircraft:	Short to medium range airliner
First flight:	- 737-100 April 9, 1967, N73700 - 737-200 August 8, 1967, N9001U - 737-200C September 18, 1968 - 737-200Adv April 15, 1971 - 737-300 February 24, 1984, N350AU - 737-400 February 19, 1988, N73700 - 737-500 June 30, 1989, N73700 - 737-600 January 22, 1998, N7376 - 737-700 February 9, 1997, N737X - 737-800 July 31, 1997, N737BX - 737-900 September 2000, N737X
First delivery:	- 737-100 December 28, 1967 to Lufthansa - 737-200 December 29, 1967 to United Airlines - 737-200C October 30, 1968 to Wien Consolidated - 737-200Adv May 20, 1971 to All Nippon Airways - 737-300 November 28, 1984 to USAir - 737-400 September 15, 1988 to Piedmont - 737-500 February 28, 1990 to Southwest - 737-600 August, 1998 to SAS - 737-700 December 17, 1997 to Southwest

(*Contd.*)

(*Contd.*)

	- 737-800 April 22, 1998 to Hapag Lloyd - 737-900 May 16, 2001 to Alaska Airlines
Last delivery:	- 737-100 July 26, 1973 to NASA - 737-200 April 5, 1971 to Indian Airlines - 737-200C July 5, 1985 to Markair - 737-200Adv August 8, 1988 to Xiamen Airlines - 737-300 December 17, 1999 to Air New Zealand - 737-400 February 25, 2000 to CSA Czech Airlines - 737-500 July 26, 1999 to Air Nippon

Specification Details of Boeing B737-700C / C-40A:

Passengers:	- 121 single class - 70 in combi configuration with 3 pallets
Cabin floor:	75.1 m^2
Cargo volume:	- Under floor 27.3 m^3 - Total cargo volume 107.6 m^3
Standard 2.24 m × 3.17 m pallets:	- Main cargo deck of freighter 8.
Weight:	- Empty: 38,000 kg. - Max. zero-fuel weight: 57,153 kg. - Fuel: 26,033 litres. - Max. payload: 18,655 kg.
Max. take off weight:	77,565 kg.
Max. landing weight:	60,782 kg.
Range:	- With 121 passengers 5,555 km. - With 9,072 kg cargo 5,324 km.

B737-700C: This is again a convertible version where the seats can be removed for the plane to carry cargo. There is a large door on the left side of the airplane. The US Navy launched the B737–700C.

B737-700ER: Boeing launched this version on January 31, 2006. All Nippon Airways was to be the launch customer, with an entry into service date in early 2007. The B737–700ER is essentially a mainline passenger version of the BBJ1 and B737-700IGW. It offers a range of 5,510 nautical miles, with seating for 126 passengers in a two-class configuration.

Boeing B737-700 with winglets:

Wing span:	35.79 m
Wing area:	125 m^2
Winglet height:	2.44 m
Weight:	- empty: 37,648 kg - max. zero-fuel weight: 55,202 kg - fuel: 46,063 litres - max. payload: 17,554 kg
Max. take off weight:	70,080 kg
Max. landing weight:	58,604 kg

Boeing B737-700 production: Built 704, active 703, approximately on order 274, stored 1 as in April 2005.

Renowned Boeing B737-700 Operators:

Southwest Airlines	- 202 B737-700
Westjet	- 38 B737-700
Continental Airlines	- 36 B737-700
Easyjet	- 32 B737-700
Alaska Airlines	- 22 B737-700
GOL Transportes Aeros	- 20 B737-700
Air Sahara	- 5 B737-700

Summary April 2005

Figure AB.48 *B737 Landing*

Figure AB.49 *B737 Banking*

Figure AB.50 *B737 Comfort*

Figure AB.51 *B737 in Flight*

Note that No Boeing B737-700 is written-off by accidents.

AB.3.4J B737-800

The B737-800 was a longer version of the B737-700, directly replacing the B737-400. The 800 was launched by Hapag-Lloyd Flug (now Hapagfly) in 1994 and entered service in 1998.

The B737-800 seats 162 passengers in a 2-class layout, or 189 in 1-class. It has a range of 5665 km (3060 nautical miles) and is powered by CFMI CFM 56-7 engines. The direct Airbus equivalent is the A320.

In August 2006 a total of 1,026 Boeing B737-800 aircraft were in airline service, with 669 further firm orders.

AB.3.4K B737-900

In order to better compete with offerings from Airbus, Boeing later introduced the B737-900, which was its longest variant. Alaska Airlines launched the B737-900 in 1997 and entered it into service in 2000. The 900 has only a slightly higher passenger capacity than the -800 due to exit door limitations. This is in contrast to the Airbus A321 which has 4 full doors on either side of the fuselage. Even in an all economy 189 seat maximum, seat pitch would be a generous 34 inches. Boeing's research showed that the B737-900 could make a substitute for most routes flying a B757. The direct Airbus equivalent is the A321, though the B737-900 is slightly smaller.

In August 2006, a total of 52 Boeing B737-900 aircraft (all versions) were in airline service, with 80 further firm orders. Jet Airways is served by two of these aircrafts.

AB.3.4L B737-900ER

This is the newest addition to the Boeing B737 family and was introduced to meet the range and passenger capacity of the discontinued B757-200, with new exit doors and fuel tanks. The rear pressure bulkhead was flattened and there were other aerodynamic changes over the -900 variant, including the incorporation of the Short Field Performance package mentioned above.

Its advanced wing aerofoil design provides an economic cruise speed of Mach 0.78 with sprint capability of Mach 0.82. Lion Air of Indonesia launched the B737-900ER. The B737-900ER typically seats 180 passengers in a 2-class configuration, but in a single-class layout seats up to 215 passengers. It is powered by the same CFMI CFM56-7 engines as the -700ER model, the 900ER and has a range of 5,900 km (3,200 nautical miles). Final assembly of the first Boeing B737-900ER began in June 2006.

The 900ER was rolled out of the Renton, WA factory on August 8, 2006 for its launch customer, Lion Air who has put in a firm order of 60 such aircraft.

Figure AB.52 *B737 Against B747*

Figure AB.53 *B737 with Downed Inbuilt Air Stair*

AB.3.5 Gist Specifications of Boeing B737

Measurement	*B737-100*	*B737-400*	*B737-500*	*B737-600*	*B737-800*
Cockpit Crew	Two	Two	Two	Two	Two
Seating capacity	118 (1-class)	168 (1-class)	132 (1-class)	132 (1-class)	189 (1-class)
Airplane Length	28.6 m or 94’	36.5 m or 119’ 6”	31.1 m or 101’ 8”	31.2 m or 102’ 6”	39.5 m or 129’ 6”
Wingspan	28.3 m or 93’	28.9 m or 94’ 8”	28.9 m or 94’ 8”	34.3m or 112’ 7”	34.3m or 112’ 7”
Wing Sweepback	25°	25°	25°	25.02°	25.02°
Airplane Height	11.3 m or 37’	11.1 m or 36’ 5”	11.1 m or 36’ 5”	12.6 m or 41’ 3”	12.5 m or 41’ 2”
Fuselage Width	3.76 m or 12’ 4”	3.76 m or 12’ 4”	3.76 m or 12’ 4”	3.76 m or 12’ 4”	3.76 m or 12’ 4”
Fuselage Height	4.11 m or 13’ 6”	4.11 m or 13’ 6”	4.11 m or 13’ 6”	4.11 m or 13’ 6”	4.11 m or 13’ 6”
Cabin Width	3.54 m or 11’ 7”	3.54 m or 11’ 7”	3.54 m or 11’ 7”	3.54 m or 11’ 7”	3.54 m or 11’ 7”
Cabin Height	2.20 m or 7’ 3”	2.20 m or 7’ 3”	2.20 m or 7’ 3”	2.20 m or 7’ 3”	2.20 m or 7’ 3”
Weight Empty	28,120 kg or 61,864 lbs.	33,200 kg or 73,040 lbs.	31,300 kg or 68,860 lbs.	36,378 kg or 80,031 lbs.	41,413 kg or 91,108 lbs.
Maximum take-off weight	49,190 kg or 108,218 lbs.	68,050 kg or 149,710 lbs.	60,550 kg or 133,210 lbs.	66,000 kg or 145,500 lbs.	79,010 kg or 174,200 lbs.
Service Ceiling	35,000 ft	37,000 ft	37,000 ft	41,000 ft	41,000 ft
Cruising speed	mach 0.79	mach 0.78	mach 0.78	mach 0.785	mach 0.785
Maximum speed	mach 0.81	mach 0.81	mach 0.81	mach 0.81	mach 0.81
Range fully loaded	3,440 km or 1,860 nm	4,005 km or 2,165 nm	4,444 km or 2,402 nm	5,648 km or 3,050 nm	5,665 km or 3,060 nm
Max. fuel capacity	17,860 litres 4,725 USG	23,170 litres 6,130 USG	23,800 litres 6,296 USG	26,020 litres 6,875 USG	26,020 litres 6,875 USG
Engines	PW JT8D-7	CFM56-3B-2	CFM56-3B-1	CFM56-7	CFM56-7
Thrust	19,000 lbs.	18,500 lbs	22,000 lbs.	22,700 lbs.	27,300 lbs.
Fan Tip Diameter	1.37 m or 54”	1.52 m or 60”	1.52 m or 60”	1.55 m or 61”	1.55 m or 61”

Figure AB.54 *B737 Take Off*

Figure AB.55 *B737 Crashed*

AB.3.6 Recent Accidents

January 3, 2004 - Flash Airlines**,** Flight 604, a **B737-300** crashed shortly after take-off from Sharm el-Sheikh**,** Egypt killing all **148 passengers and crew.**

February 3, 2005 - Kam Air**,** Flight 904, a **B737-200** crashed into a mountain 20 miles (30 km) east of Kabul**,** Afghanistan killing all **96 passengers and eight crew.**

August 14, 2005 - Helios Airways**,** Flight 522, a **B737-300** crashed after cabin decompression and crew's loss of consciousness**, north of** Athens, killing all **121 passengers and crew**.

August 23, 2005 - TANS Peru**,** Flight 204, a **B737-200** crashed during a storm in the Peruvian **jungl**e, killing **40 of the 92 passengers and six crew.**

September 5, 2005 - Mandala Airlines**,** Flight 091, a **B737-200** crashed in Medan**,** Indonesia, killing **102 of the 117 passengers and crew, plus 47 more on the ground.**

October 22, 2005 - Bellview Airlines**,** Flight 210, a **B737-200** crashed shortly after take-off from Lagos**,** Nigeria**,** killing **all 111 passengers and six crew.**

December 8, 2005 - Southwest Airlines**,** Flight 1248, a **B737-700** slid off the runway during a heavy snowstorm landing at **Chicago's Midway Airport** killing **one person on the ground.**

September 29, 2006 - Gol Transportes Aéreos**,** Flight 1907, a **B737-800** Brazilian **airliner** with **154** people on board went down following a **collision with an** Embraer Legacy 600. All on board the B737 were killed. **The Legacy managed to land safely at a Brazilian Air Force Base.**

October 29, 2006 - ADC Airlines**,** Flight 53, a **B737-200** crashed during a storm shortly after takeoff from Abuja**,** Nigeria**. All but seven of the 104 passengers and crew are reported to have perished.**

AB.3.7 B737 Trivia

- The popularity of the B737 can be traced in large part to its use by Southwest Airlines, which has been a launch customer on the -300, -500, and -700 variants. Southwest uses no other aircraft type and accounts for over 9% of the total number of delivered B737 aircraft.
- The Boeing B737s has several nicknames such as: "The Baby Boeing", "Fat Albert", "flying football", and "Guppy" given by United Airlines personnel.
- Engines on the B737 Classic series (300, 400, 500) and Next-Generation series (600, 700, 800, 900) do not have circular inlets, as most aircraft do. Engineers needed additional space to locate equipment on the more powerful engines, but because the B737 sits lower to the ground than most aircraft, the enlarged engine would sit too close to the ground. Instead, the engineers placed equipment on the engine's sides, giving the engine a pronounced triangular shape. Boeing and CFM International, the engine manufacturer, claim that the triangular shape actually yields slightly improved performance. The necessary nacelle redesign is known in the industry as "hamsterisation", because of the resemblance of the shape to the rodent.
- Blended winglets are currently a very popular retrofit on the B737. These winglets stand approximately 8 feet tall and are installed at the end of the main wings. They help aerodynmics (resulting in reduced fuel burn, less engine wear, and less noise on take-offs).
- The fuselage of the B737 actually has a smaller diameter than that of the engine nacelle of the GE90-115B turbo-fan jet engine. The GE90-115B is used to power the Boeing B777-200LR and B777-300ER.
- The B737 has no full doors covering the main landing gear. The main landing gear (under the wings at mid-cabin), rotate into wells in the plane's belly, the legs being covered by partial doors, and "brush-like" seals aerodynamically smooth (or "fair") the wheels in the wells. The sides of the tyres are exposed to the air in flight. "Hub caps" complete the

aerodynamic profile of the wheels, but it is forbidden to operate without them, because they are actually links to the ground speed sensor that interfaces with the anti-skid brake system. With the number of B737s in use, it is estimated that one B737 takes-off every 5 seconds somewhere in the world.

- B737s are ***not*** equipped with fuel dump systems. Depending upon the nature of the emergency, B737s either circle to burn-off fuel or land overweight.
- "B737" is the first lyric in the song Travelin' Band, recorded by rock band Creedence Clearwater Revival.
- The B737 has carried the equivalent of the world's population, about 7 billion passengers.

Boeing B757

AB.4.1 Specifics

Figure AB.56 *Air Greenland Boeing B757-200*

Type	Airliner
Manufacturer	Boeing Commercial Airplanes
Maiden flight	1982-02-19
Introduced	1983-01-01 with Eastern Air Lines
Primary users	American Airlines (143) Delta Air Lines (121) United Airlines (97) United Parcel Service (75) Northwest Airlines (67) Continental Airlines (58)
Produced	1982–2004
Number built	1,050
Unit cost	B757-200 $65,000,000 (2002) B757-300 $80,000,000 (2002)

AB.4.2 The History of B757

The Boeing B757 is a medium-range trans-continental commercial passenger aircraft manufactured by Boeing Commercial Airplanes. It was launched by Eastern Air Lines and British Airways to replace the Boeing B727 and entered service in 1983. Production of the B757 ended on November

28, 2005 after 1,050 had been built. In November 2006, a total of 1,004 Boeing B757 aircraft remained in airline service.

Three principal models of this aircraft were eventually produced viz. the B757-200, B757-300, and the B757-200 Freighter. In addition, Boeing produced one B757-200 Combi. On October 28, 2004, the 1,050th and final B757—a Shanghai Airlines B757-200—was delivered. The B757-300, which is 7.1 metres longer than a B757-200, carries 20 per cent more passengers and was launched in September 1996 by German charter airline Condor Flugdienst.

AB.4.3 About the Aircraft

While the programme was a resounding financial success, sales dwindled during the late 90s, eventually forcing Boeing to cease its production. The B757 (designated "7N7" during initial development) was designed by Boeing to replace the Boeing B727 and complement the Boeing B767 on thin routes. Boeing originally offered the airlines a stretched, re-engined B727-200, known as the B727-300, but this never received enough interest from the airlines to proceed. Early 7N7 and B757 concepts featured a "T-tail" with under-wing engines, but a conventional tail was ultimately adopted. The B757 retains the same upper-fuselage diameter as Boeing B707, B727, and B737.

The B757 is used on heavy domestic routes as well as long routes between North America and Europe. The B757 was designed for hot and high climates, such as Mexico City like the B727 that it replaced.

The B757 was the first Boeing airliner launched with foreign engines, with early customers selecting the Rolls-Royce RB211-535. Pratt & Whitney soon offered the PW2000, launched by Delta Airlines. General Electric offered an engine option early in the programme, the CF6-32, but eventually abandoned the engine due to insufficient demand. For purposes of air traffic control spacing, B757 variants are treated as "heavies", because of their tendency to produce strong wake turbulence.

The B757 is also used for holiday/charter airlines in the UK. Thomas Cook Airlines, First Choice Airways, Monarch Airlines, Titan Airways, Excel Airways, Astraeus and Thomsonfly operate over 70 aircraft. British Airways profitably runs the aircraft on their short routes like London to Manchester (150 miles) and London to Glasgow (350 miles), while other airlines have used the B757 for intercontinental routes.

Throughout the programme some viewed the B757 as "too much aircraft" for the role of a B727 replacement. B757 offers 20% more seats and nearly 50% more range than the B727-200. The B757-200 was clearly not a like-for-like replacement. However, the B757-200 that entered production was too heavy for a shrunk variant, leaving a significant gap between the B757-200 and the B737-300. This gap was successfully exploited by the A320, further propelling Airbus into serious competition with Boeing and McDonnell Douglas.

Figure AB.57 *B757 Economy Class Cabin*

Figure AB.58 *B757 Take Off*

The B757 maintains competitive economics with newer short haul aircraft like the Boeing B737 and Airbus A320 product lines, following the trend of larger aircraft having lower seat/mile cost. Should passenger loads fall, the smaller B737 and A320 expose the airline to less financial risk. For those airlines, in need of large passenger carrying capacity, the A321 and B737-900ER have lower trip cost, albeit with slightly less seats and range. These airplanes fulfill the requirements of 90% of the routes served by the B757, and provide an alternative for airlines already operating B737 and A320.

The 1,050th and last B757, rolled off the production line at Renton on October 28, 2004. In the short term the B757-200 has been succeeded by the B737-900ER. Boeing believes the B737-900ER will be a suitable B757-200 replacement for most passenger applications, as the B737-900ER does not have the "heavy lift" capacity of the B757 family. In the long term, the B757 is to be succeeded by the Y1. The B757-300 is being succeeded by the Boeing B787 wide body.

Although production has ceased, blended winglets are available from Aviation Partners Inc. as a retrofit to increase fuel efficiency and range. Winglets on the B757 have only been approved for the -200 series, and are pending approval for the -300 series. American Airlines, Continental Airlines, Northwest Airlines, Finnair, and Icelandair are fitting them to some of their fleets.

AB.4.4 Special Customers of B757

The United States Air Force has fitted B757s for VIP transport duties. Designated C-32, these aircraft are often used to transport the Vice President of the United States under the call sign "Air Force Two". The Royal New Zealand Air Force has two B757s for transporting troops and VIPs.

One B757 is also serving as the ***Presidential Aircraft in Argentina***, with the military serial ***Tango 01***, and another one is also serving in the VIP and Presidential transport role in Mexico. A Boeing B757 is also used by the ***Royal Family of Saudi Arabia*** as a ***Flying Hospital***.

At least three B757s are in use as private aircraft, one by supermarket magnate ***Ronald Burkle***, and two by Microsoft co-founder ***Paul Allen***. Allen has one for personal use, tail number NB757AF. The other, tail number N756AF, he purchased to serve as team aircraft for the Portland TrailBlazers and the Seattle Seahawks.

Figure AB.59 *B757 Taxiing*

Figure AB.60 *B757 Engine through cabin window*

Figure AB.61 *B757Engine*

Figure AB.62 *B757 Comfort*

AB.4.5 B757 Variants

– 877 Boeing B757-200	– 4 Boeing VC-32A
– 78 Boeing B757-200PF	– 1 Boeing B757-200C
– 35 Boeing B757-200SF	– 55 Boeing B757-300

There are two variants of the B757. The B757-200 was the original, launched in 1979 with introduction into service in 1983. The B757-300 was launched in 1996 with introduction into service in 1999.

AB.4.5A B757-200

The B757-200 is the definitive version and forms the majority of B757s sold. Boeing positioned the plane above the B737 and as an eventual replacement for the B727. At first, it was meant to be a little shorter in length. In the end it was positioned not only above the B737, but also the B727.

This variant can carry 228 passengers in a single class. However, with a seat pitch of 29" it can carry a maximum of 234 passengers. This configuration is also the FAA limit for the aircraft, due to application of emergency exit rules.

The -200 was available in two different door configurations. One version used three standard doors per side with an additional, smaller door aft of the wing on each side for emergency evacuations. All eight door locations are equipped with inflatable evacuation slides. The alternate version is equipped with three standard doors per side (two towards the front and one at the aft of the cabin) with two "plug-type" overwing exits per side replacing the smaller door aft of the wing.

AB.4.5B B757-200PF

This proved to be a popular model after it was launched in 1985 and delivered in 1987 to UPS. The basic maximum take-off weight of the B757PF is 250,000 pounds (113,400 kilograms), with an option for 255,000 pounds (115,600 kilograms). Other customers for the B757-200PF were Ethiopian Airlines and Challenge Air Cargo.

The B757PF has no passenger windows or doors and no interior amenities. A large main-deck cargo door is installed in the forward area of the fuselage on the left-hand side. The flight crew

boards the aircraft through a single entry door installed immediately aft of the flight deck on the left side of the aircraft.

The interior of the main-deck fuselage has a smooth fiberglass lining. A fixed rigid barrier installed in the front end of the main deck serves as a restraint wall between the cargo and the flight deck. A sliding door in the barrier permits access from the flight deck to the cargo area.

Up to 15 containers or pallets, each measuring 88 by 125 inches (223 by 317 centimetres) at the base, can be accommodated on the main deck of the B757PF. Total main-deck container volume is 6,600 cubic feet (187 cubic m) and the two lower holds of the airplane provide 1,830 cubic feet (51.8 cubic m) for bulk loading. These provide a combined maximum revenue payload capability of 87,700 pounds (39,780 kilograms) including container weight. When carrying the maximum load, the B757PF has a range of about 2,900 nautical miles (5,371 kilometres).

Many former passenger B757-200s have been converted into B757-200 SF (Special Freighters), mainly for DHL. This conversion involves adding a cargo door on the left forward fuselage (identical to the B757-200PF), and removing all passenger amenities. All but the two forward cabin doors are sealed shut, and cabin windows are deleted. In September 2006, FedEx Express launched a US $2.6 billion fleet renewal initiative based on retiring its Boeing B727 aircraft acquiring second-hand Boeing B757's. Converted B757's were expected to enter service between 2008 and 2016.

AB.4.5C B757-200M

This model was launched for Royal Nepal airlines. It is a convertible version where the seats can be removed in order to place cargo on the main deck. Nepal needed a plane that operates from high altitide airfields. Having low passenger traffic, they also were in need of a plane that could be converted to a freighter. Boeing saw this as an opportunity and extended this model to suit the purpose. The B737 and B747 convertibles had proved popular and saw a market potential for the B757-200M. However, in the end only one example was ever manufactured and delivered, (9N-ACB). Royal Nepal still operates it.

AB.4.5D B757-200ER

These were proposed, but never launched. However, improvements such as winglets are offered for those upgrading their fleets. In November 2006, a total of 945 Boeing B757-200 aircraft remained in airline service. The largest operators of the aircraft include: American Airlines (141), Delta Air Lines (121), United Airlines (96), United Parcel Service (75), Northwest Airlines (48), Continental Airlines (41), US Airways (38) China Southern Airlines (25), DHL Air (21), Thomsonfly (18), First Choice Airways (17), Thomas Cook Airlines (15) and Icelandair (14). Some 87 other airlines also operate smaller numbers of the type.

Figure AB.63 *B757 Touching Down*

Figure AB.64 *Passengers Boarding B757*

Figure AB.65 *Combi Door of B757*

Figure AB.66 *B757 Lounge*

AB.4.5E B757-300

The B757-300 is a 23.4 ft stretched version of the -200 that first flew in August 1998. The B757-300 has the capacity to seat 289 passengers in one class cabin, though the highest configuration in airline service is 280 seats, as operated by Thomas Cook Airlines. For maintaining the same fuel capacity, the range had to be reduced to 6,287 km or 3,395 nm. 55 such aircraft were delivered. This model has 8 standard doors, with 4 over-the-wing exit doors, 2 on either side. This model also features the interior of the Next Generation B737, which blends aspects of the B757-200 interior with the Boeing B777 style interior. It has proved popular with charter airlines for its efficiency and dense capacity. However, most airlines shied away from it. They cited its lack of range and very long yet thin fuselage as their main reason.

For Boeing to have increased the fuel capacity, it had to strengthen the undercarriage and other areas to increase the MTOW. The B757-300 series was available for purchase with two engine options: either 191.7 kN (43,100 lb) Rolls Royce RB-211-535E4-B turbofans, or 195.1 kN (43,850 lb) Pratt & Whitney PW-2043 turbofans. Only Northwest Airlines ordered the B757-300 with the Pratt & Whitney engines, making them unique among the series. Thereafter, Boeing decided to focus efforts on the B737 Next Generation series (specifically the B737-900ER which Boeing believes will be a suitable B757-200 replacement for most passenger applications) and the Boeing N787, which Boeing believes, in smaller versions, will substitute for larger versions of the B757 family.

In November 2006, a total of 55 Boeing B757-300 aircraft remained in airline service.

AB.4.6 Specifications of Boeing B757-300

Developing nation:	United States of America
Manufacturer/designer:	Boeing Commercial Airplane Company
Production line:	Closed October 28, 2004
Type Aircraft:	Medium range narrowbody airliner
First flight:	- B757-200 February 19, 1982, NB757A - B757-200F August 13, 1987, N401UP - B757-300 August 2, 1998, NB757X
First delivery:	- B757-200 December 22, 1982 to Eastern Airlines - B757-200F September 17, 1987 to UPS - B757-300 March 10, 1999 to Condor

(*Contd.*)

(*Contd.*)

Cockpit crew:	Two pilots
Passengers single class:	279
Passengers two class:	- 12 first class/ - 231 economy class
Cabin length:	43.21 m
Cabin diameter:	3.54 m
Cabin height:	2.13 m
Cargo volume:	- Under floor 67.5 m^3
Wing span:	38.05 m
Wing area:	185.24 m^2
Wing sweep:	25 degrees
Fuselage length:	54.43 m
Fuselage diameter:	3.76 m
Height:	13.60 m
Horizontal tail unit:	15.24 m
Engines:	2 Pratt & Whitney PW2040 each rated 178.4 kN
	2 Pratt & Whitney PW2043 each rated 189.4 kN
	2 Rolls Royce RB211-535E4 each rated 179 kN
	2 Rolls Royce RB211-535E4B each rated 193.5 kN
Weight:	- Empty: 64,580 kg
	- Max. zero-fuel weight: 95,260 kg
	- Fuel: 43,495 litres.- Max. payload: 30,940 kg
Max. take off weight:	122,470 kg
Max. landing weight:	101,610 kg
Cruise speed:	852 km/h
Max. speed:	935 km/h
Max. ceiling:	11,887 m
Range:	- Max. range 6,287 km
Performance:	- Take-off run 2,743 m at max. take-off weight

AB.4.7 Trivia of B757

- As of 2006, the B757 has carried 1.4 billion passengers, four times the population of the United States and Canada combined.
- The B757 fleet has flown the equivalent of nearly 29,000 roundtrips between the Earth and the Moon.
- The B757 Freighter can hold over 6 million golf balls.
- At 255,000 pounds (115,660 kilograms), the B757 weighs as much as a diesel train locomotive.
- The surface area of a pair of B757 wings is 1,951 square feet (181 square m), about the same as the floor space of a three-bedroom house in the U.S.

- There are about 626,000 parts in a B757. About 600,000 bolts and rivets fasten those parts together. The length of electrical wiring is about 60 miles (100 kilometers).
- Airlines fly the B757 on a variety of length routes. The twin jet is used to serve city pairs as far as 4,281 statute miles (6,890 kilometres) and as close as 65 statute miles (105 kilometres).
- The first Boeing B757 was delivered to Eastern Air Lines on December 22, 1982.
- The 1050th and final new-build B757 was delivered to Shanghai Airlines on April 27, 2005.

Figure AB.67 *B757 in Landing Approach*

Figure AB.68 *B757 Touch Down*

AB.4.8 Incidents

(As of November 2006)

- Hull-loss accidents: 8 with a total of 700 fatalities (includes 125 fatalities on ground due to terrorist hijacking and subsequent crash)
  1. **2nd Oct, 1990** - Registration: **B-2812**, Carrier: China Southern, Fatalities: **46,** Approximate Location: **Guangzhou-Baiyun Airport, China.**
  2. **20th Dec, 1995** - Registration: **N651AA**, Carrier: American Airlines**,** Fatalities: **160,** Approximate Location: **Buga, Colombia.**
  3. **6th Feb, 1996** - Registration: **TC-GEN**, Carrier: Birgenair, Fatalities: **189**, Approximate Location: **Puerto Plata, Dominican Republic.**
  4. **2nd Oct,1996** - Registration: **N52AW**, Carrier: AeroPeru**,** Fatalities: **70**, Approximate Location: **Lima, Peru.**
  5. **14th Sep, 1999** - Registration: **G-BYAG**, Carrier: Britannia Airways, Fatalities: **None**, Approximate Location: **Gerona-Costa Brava Airport, Spain.**
  6. **11th Sep, 2001 - Registration: N591UA**, Carrier: United Airlines, Fatalities: **44**, Approximate Location: **Shanksville, Pennsylvania, United States.**
  7. **11th Sep, 2001 - Registration: N644AA**, Carrier: American Airlines, Fatalities: **64** on board and **125** on ground, Approximate Location: **The Pentagon, Washington, D.C., United States.**
  8. **21st Jul, 2002** - Registration: **A9C-DHL**, Carrier: DHL Aviation, Fatalities: **02**, Approximate Location: **Überlingen, Baden-Württemberg, Germany.**

Boeing B767

AB.5.1 Specifics

Figure AB.69 *Air Canada Boeing B767-300ER*

Type	Airliner
Manufacturer	Boeing Commercial Airplanes
Maiden flight	1981-09-26
Introduced	1982-09-08 with United Airlines
Primary users	Delta Air Lines (102) All Nippon Airways (79) American Airlines (74) Air Canada (45) Japan Airlines (39) United Airlines (35)
Number built	942 as of Aug 2006
Unit cost	B767-200ER: US$118.0–128.0 million B767-300ER: US$133.0–149.0 million B767-300F: US$143.0–155.0 million B767-400ER: US$146.0–160.5 million

AB.5.2 About Boeing B767

The Boeing B767 is a commercial passenger aircraft manufactured by Boeing's Commercial Airplane division.

Developing nation:	United States of America
Manufacturer/designer:	Boeing Commercial Airplane Company
Production line:	Everett, WA
Type Aircraft:	Medium to long range wide body airliner
First flight:	- B767-200 September 26, 1981 NB767BA - B767-200ER March 6, 1984 - B767-300 January 30, 1986 NB767S - B767-300ER December 9, 1986 - B767-300F June 20, 1995 - B767-400ER October 9, 1999 NB76700
First delivery:	- B767-200 August 19, 1982 to United Airlines - B767-200ER March 26, 1984 to El Al - B767-300 September 25, 1986 to Japan Air Lines - B767-300ER February 19, 1988 to American Airlines - B767-300F October 12, 1995 to United Parcel Service - B767-400ER August 29, 2000 to Continental Airlines

AB.5.3 Description

The Boeing B767, a wide body jet, was introduced at around the same time as the B757, its narrow body sister. In economy class the B767 has a seat-to-aisle ratio of 3.5 seats per aisle, making for quicker food service and quicker exit from the plane than many other jetliners, which typically have between four and six seats per aisle in economy class. The flight decks of the Boeing B757 and B767 are very similar and as a result, after a short conversion course pilots rated in the B757 are also qualified to fly the B767 and vice versa.

Figure AB.70 *American Boeing B767 taken off*

With the B707 aging, Boeing decided to offer a midsize plane to fit in between the B727/B737/B757 and the B747. With the fuselage width of 15 ft 6 in, it cuts the difference between the aircraft in half. It is offered in a twin aisle configuration of 2+3+2 in economy with the most common business configuration of 2+2+2. It is possible in some charter configurations to squeeze an extra seat for a 2+4+2 configuration. However, the seats are very narrow and this is not common.

The B767 sold very well in the late 1980s and early 1990s. At the end of June 2006, the Boeing B767 has 969 orders placed and 940 of those had been delivered. New orders had production scheduled through 2007.

AB.5.4 Variants of B767

The three variants of the B767 were launched on three separate occasions. The -200 variant was launched in 1978 with introduction into service in 1981. The -300 was launched in 1983 and entered service in 1986. The last variant, the -400 was launched in 1998 and entered service in 2000. Although there are a total of three variants, several versions have been produced.

AB.5.4A B767-200

The first model of the B767, was launched in 1978 and entered service with United Airlines in 1982. This model is used mainly for continental routes such as New York to Los Angeles. The B767-200 typically is outfited with 181 seats in a 3-class layout or 224 in a 2-class layout. All 200 models, have a capacity limit of 255 due to exit-door limitations.

Figure AB.71 *B767 on Landing Approach*

Figure AB.72 *B767 Touching Down*

Figure AB.73 *B767 Lining for Take-off*

Figure AB.74 *B767 Tail Section*

AB.5.4B B767-200ER

An extended-range variant first delivered to El Al in 1984, it became the first B767 to complete a nonstop transatlantic journey, and broke the flying distance record for twin jet airliners several times. Although the B767-200ER has no direct replacement, it is expected to be replaced indirectly in Boeing's line-up by the B787-8.

As of September 2006, total orders stand at 249, of which 128 are for the 200 (all delivered), and 121 are for the 200ER (118 delivered).

AB.5.4C B767-300

The Boeing B767-300 is the standard stretched version of the B767-200. It features a 6.42 m stretch consisting of fuselage plugs forward (3.07 m) and behind (3.35 m) the wing centre section. The flightdeck and systems were copied over from the B767-200.

- Boeing B767-300: Standard stretched version of the B767-200.
- Boeing B767-300ER: Extended-Range version, features higher weights and an additional wing centre section fuel tank.
- Boeing B767-300F: Freighter, include strengthened undercarriage and wing structure, a cargo handling system, no cabin windows and a main deck freight door.

A lengthened (21'1") B767 was ordered by Japan Airlines in 1983. It first flew on January 14, 1986, and was delivered to JAL on September 25. The B767-300 is expected to be replaced by the B787-3 in Boeing's line-up.

Boeing B767-300 Specifications

Cockpit crew:	Two pilots
Passengers single class:	290
Passengers two class:	– 18 first class – 198 economy class
Passengers three class:	– 15 first class – 40 business class – 119 economy class
Cabin length:	40.36 m
Cabin diameter:	4.72 m
Cabin height:	2.87 m

(*Contd.*)

Cabin volume:	483.9 m^3
Baggage compartment:	12.2 m^3
Cargo volume:	147 m^3
LD2 Containers in belly:	30
Standard 2.24 m × 3.17 m pallets:	– In belly 4 with 14 LD2 Containers
Wing span:	47.57 m
Wing area:	283.35 m^2
Wing sweep:	31.5 degrees
Fuselage length:	54.94 m
Fuselage diameter:	5.03 m
Height:	15.85 m
Horizontal tail unit:	18.62 m
Wheelbase:	22.76 m
Track:	9.30 m
Engines:	– Two General Electric CF6-80A2 each rated 216.5 kN – Two Pratt & Whitney JT9D-7R4D each rated 213.5 kN – Two Rolls Royce RB211-524H each rated 264.4 kN
Weight:	– Empty: 85,637 kg – Max. zero-fuel weight: 112,099 kg – Fuel: 63.216 litre – Max. payload: 44,497 kg
Max. take-off weight:	159,755 kg
Max. landing weight:	136,078 kg
Cruise speed:	852 km/h
Max. speed:	898 km/h
Service ceiling:	11,887 m
Range:	9,667 km
Performance:	– Take-off run 2,408 m at max.take-off weight.

AB.5.4D B767-300ER

An extended-range variant of the –300, it flew for the first time in 1986, but received no commercial orders until American Airlines purchased several in 1987. The aircraft entered service with AA in 1988. In 1995, EVA Air used a B767-300ER to inaugurate the first transpacific B767 service. The B767-300ER is expected to be replaced by the B787-8 in Boeing's line-up.

Figure AB.75 *B767 Climbing*

Figure AB.76 *B767 Business Class*

(*Contd.*)

Figure AB.77 *B767 in Flight*

Figure AB.78 *B767 Economy Class*

Boeing B767-300ER Specifications

Engines:	– Two General Electric CF6-80C2 each rated 231.3 kN – Two General Electric CF6-80C2B4 each rated 254.34 kN – Two General Electric CF6-80C2B6F each rated 267.03 kN – Two Pratt & Whitney PW4056 each rated 252.4 kN – Two Pratt & Whitney PW4060 each rated 266.9 kN – Two Rolls Royce RB211-524H each rated 264.4 kN
Weight:	– Empty: 90,582 kg – Fuel: 94,625 litre – Max. payload: 44,500 kg
Max. take off weight:	186,880 kg
Max. landing weight:	145,149 kg
Max. speed:	954 km/h
Take-off speed:	206–330 km/h
Landing speed:	215–300 km/h
Service ceiling:	13,137 m
Max. range:	11,482 km
Performance:	– Take-off run 2,408 m at max. take-off weight

AB.5.4E B767-300F

A highly-automated air freight version of the B767-300ER, ordered by United Parcel Service in 1993 and delivered in 1995.

Due to its unique fuselage width of 15'6", it is unable to carry ordinary Unit Load Devices, and instead has to use specially designed air freight containers and pallets. This model has three doors on the maindeck, plus two on the lower deck. Of the three doors on top, two are at the front, and one is at the rear right side. The two lower doors comprise one in the front right and one at the rear left.

As of September 2006, total orders stand at 741, of which 121 are for the 200ER (118 delivered), 532 are for the 300ER (512 delivered), and 50 are for the 300F (45 delivered).

Figure AB.79 *B767 Taxiing*

Figure AB.80 *B767 Coming in for Landing*

Figure AB.81 *B767 Economy Class*

Figure AB.82 *Food Platter on B767 Seat Front Table*

Boeing B767-300F Specifications

Cargo volume:	– Main deck 339.5 m^3 – Under floor 114.1 m^3 – Total load 453.6 m^3
LD2 Containers in belly:	30
LD3 Containers in belly:	15
Standard 2.24 m × 2.74 m pallets:	– Main cargo deck of freighter 24 and two special contoured pallets
Standard 2.24 m × 3.17 m pallets:	– In belly 4 with 14 LD2 Containers – Main cargo deck of freighter 14 and two special contoured pallets
Engines:	– Two General Electric CF6-80C2F each rated 257.6 kN – Two Pratt & Whitney PW4084 each rated 369.6 kN – Two Rolls Royce RB211-524G each rated 253 kN
Weight:	– Empty: 86,183 kg – Max. zero-fuel weight: 140,160 kg – Fuel: 91,380 litre – Max. payload: 54,885 kg

(*Contd.*)

(*Contd.*)

Max. take off weight:	186,880 kg
Max. landing weight:	147,871 kg
Max. range:	5,926 km with max. payload: 54,885 kg
Performance:	– Take-off run 2,408 m at max. take-off weight

AB.5.4F B767-400ER

This final extended variant was launched in 1997 on an order for Delta Air Lines and Continental Airlines to replace their aging Lockheed L-1011 and McDonnell Douglas DC-10 fleets. It was again stretched by 21.1 ft for a total of 201.4 ft. It also saw a wingspan increase of 14.3 feet over the previous two models and is the only B767 model to also feature "raked" wingtips, which increase fuel efficiency. It was introduced into service in 2000. This model is only available as the B767-400ER. However, it has less range than the other two ER variants. The B767-400ER is expected to be replaced by the B787-9 in Boeing's line-up.

As of September 2006, orders for B767-400ER stand at 38, with 37 delivered (16 to Continental Airlines and 21 to Delta Air Lines).

Figure AB.83 *Midair Refueling of B767*

Figure AB.84 *B767 Cockpit*

Figure AB.85 *B767 Taking Off*

Figure AB.86 *Decorated B767*

Airborne Surveillance Testbed: The Airborne Surveillance Testbed (AST) was built from the prototype B767-200 and sported a large "cupola" or hump which ran along the top of the aircraft from above the cockpit to just behind the trailing edge of the wings. Inside the cupola was a suite

of infrared seekers that were used to track theater ballistic missle launches in a series of tests. The aircraft remains in storage at the Victorville Airport in California.

AB.5.4G KC-767

The KC-767 Tanker Transport - B767-200ER-based aerial refueling platform is used by the Italian Air Force and the Japan Self-Defense Forces. The KC-767 has lost out to the Airbus A330 in two recent contests, for the RAF and Royal Australian Air Force.

The United States Air Force expressed interest in the aircraft, placing an order to lease 100 planes. However, the Pentagon suspended the order during the investigation of an Air Force procurement official, who had approved the KC-767 order soon before taking a civilian position with Boeing, on charges of conflict of interest.

AB.5.4H B767 E-10

Another version is the E-10 MC2A - B767-400ER-based replacement for the Boeing B707-based E-3 Sentry AWACS, the E-8 Joint STARS aircraft, and EC-135 ELINT aircraft. This is an all-new system, with a powerful Active Electronically Scanned Array and not based upon the Japanese AWACS aircraft.

AB.5.5 Specifications of B767

Measurement	*B767-200*	*B767-200ER*	*B767-300*	*B767-300ER*	*B767-300F*	*B767-400ER*
Length	48.5 m (159 ft 2 in)		54.9 m (180 ft 3 in)			61.4 m (201 ft 4 in)
Wingspan	47.6 m (156 ft 1 in)					51.9 m (170 ft 4 in)
Passengers	181 to 255		218 to 351	218 to 351	-	245 to 375
Cargo	81.4 m^3 (2,875 ft^3) 22 **LD2s**		106.8 m^3 (3,770 ft^3) 30 LD2s		454 m^3 (16,034 ft^3) 30 LD2s + 24 pallets	129.6 m^3 (4,580 ft^3) 38 LD2s
MTOW	315,000 lb (142,882 kg)	395,000 lb (179,169 kg)	350,000 lb (158,758 kg)	412,000 lb (186,880 kg)	412,000 lb (186,880 kg)	450,000 lb (204,116 kg)
Range	9,400 km (5,200 nautical miles) trans conti-nental	12,200 km (6,600 nautical miles) trans pacific	9,700 km (5,230 nautical miles) trans conti-nental	11,305 km (6,105 nautical miles) transpacific	6,050 km (3,270 nautical miles) transconti-nental	10,450 km (5,650 nautical miles) transatlantic
Cruise speed	**Mach** 0.8 (870 km/h, 540 mph)					
Engines	Two high-bypass **turbofans**, usually either **General Electric CF6-80A**, (early B767-200 and B767-300 non-ER versions) or **General Electric CF6-80C2** (about 65,000 lb_f (289 kN) thrust each) or **Pratt & Whitney PW4062** (about 63,000 lb_f (280 kN) thrust each); a very limited number use the **Rolls-Royce RB211** (about 60,000 lb_f (267 kN) thrust each)					

AB.5.6 Incidents (as of 2005)

- Hull-loss Accidents: 6 with a total of 568 fatalities.
- Other occurrences: 2 with a total of 0 fatalities.
- Hijackings: 5 with a total of 282 fatalities.

- Two Boeing B767 aircraft were involved in the **September 11, 2001 attacks**, and both crashed into the two towers of the ***World Trade Center***. American Airlines Flight 11, a **B767-223ER**, crashed into the North Tower, with **92 fatalities** on board. United Airlines Flight 175, a **B767-222**, crashed into the South Tower, with the loss of **all 65** on board. ***In addition, 2602 people perished on the ground, mostly in the two towers.***
- On November 23**,** 1996, Ethiopian Airlines flight **961** was hijacked, ran out of fuel, and crashed in the Indian Ocean near Comoros**.** The pilots used the aircraft's ram air turbine as an emergency power source. Of the **175** aboard, **123 died**. Until today, the incident was one of the few of landing a plane on water –**ditching, with survivors**.
- Gimli Glider: On July 23**, 1983**, Air Canada flight **143** ran out of fuel in flight and had to glide to an emergency landing. The pilots used the aircraft's ram air turbine to power the aircraft's hydraulic systems for control. There were **zero fatalities**. As of 2006, the aircraft (**C-GAUN**) is still flying with Air Canada.
- In **2000**, the **Government of** China purchased a **B767-300ER** as the official executive aircraft of former President Jiang Zemin. The aircraft had originally been delivered to Delta Air Lines in **June 2000** but was immediately resold to China United Airlines**.** After its transfer to the Chinese Government, the plane was taken to San Antonio, Texas to be refitted with a custom interior. In the fall of 2001, the Chinese Government announced that it had discovered 27 covert listening devices embedded in the plane's interior. The Chinese Government blamed the CIA **for planting the bugs**. The 22 Chinese military and Government officials charged with overseeing the refit were arrested suspicion of negligence and corruption. The **CIA** and **American President** George W. Bush denied having any knowledge of the existence of the listening devices. Diplomatic experts worried that the incident would have deleterious effects on Sino-American relations and Boeing's reputation in the lucrative Chinese market. However, relations between the two countries remained cordial and Chinese Airlines continued to purchase Boeing aircraft. ***The aircraft involved, however, was never put into use by the State***. It was converted back to the standard layout and transferred to Air China for normal passenger service.

AB.5.7 Trivia of B767

- The air flowing through a B767-400ER engine at take-off power could inflate the Goodyear Blimp in 7 seconds.
- Delta Air Lines is the world's largest B767 operator, with approximately 102 planes, including the B767-300, B767-300ER, and B767-400ER.
- Out of all airports in the world, Hartsfield-Jackson Atlanta International Airport has the highest number of Boeing B767 operations. Hartsfield-Jackson is home of the largest operator of the Boeing B767, Delta Air Lines.
- Newer B767-200s and B767-300s, as well as all B767-400ERs, feature a B777-style cabin interior, also known as the Boeing signature interior. The B767-400ER also features larger windows exactly like those found on the B777. All B767s produced feature the signature interior, and is also available as a retrofit for older B767s. American Airlines is retrofitting their B767-300s with the signature interior on the Business Class.
- In addition to the Boeing signature interior retrofit option, a simpler mode known as the Boeing B767 Enhanced Interior is available. This retrofit borrows styling elements from the Boeing signature interior. However, the outer section overhead bins are traditional-style shelf bins rather than the B777-style pivot bins. The first customer for the B767 Enhanced Interior is First Choice Airways.
- The co-founders of Google, Larry Page and Sergey Brin, purchased a used Boeing B767-200 aircraft for their business and personal needs. The refurbished plane would hold 50 passengers.

Boeing 787

AB.6.1 Specifics

Figure AB.87 *Rendering of the Boeing 787-8 Dreamliner's final design, in Northwest Airlines livery*

Type	Wide-body jet airliner
Manufacturer	Boeing Commercial Airplanes
Status	Under development
Number built	0 as of 2006
Unit cost	787-3: US$138-143 million 787-8: US$148-158 million 787-9: US$179-188 million

AB.6.2 Brief Description

The Boeing 787 ***Dreamliner*** is the latest mid-sized wide body, twin engined passenger airliner with pleasing features, developed by Boeing's Commercial Airplanes unit. It carries between 210 and 330 passengers depending on the seating configuration, and is more fuel-efficient than comparable earlier airliners. It is also the first major airliner to use composite material for most of its construction.

It uses 20 percent less fuel than any other airplane of its size and has forty to sixty percent more cargo revenue capacity. In addition to improving airplane performance, it features—computational fluid dynamics and wind tunnel testing to contribute to safety, the ultimate design goal.

Figure AB.88 *Boeing B787 in Flight*

Figure AB.89 *B787 Upper Class*

Figure AB.90 *Boeing B787*

Figure AB.91 *B787 Cockpit*

Figure AB.92 *B787 Lounge*

Figure AB.93 *Hugeness of Boeing B787*

Prior to January 28, 2005, the B787 was known as the developmental designator 7E7. The early renderings released depicted a radical design with highly curved surfaces. On April 26, 2005, one year to the day after the launch of the program, the final look of the external B787 design was changed with a less rakish nose and a more conventional tail.

AB.6.3 Background

When B767 sales weakened in the face of competition from the Airbus A330-200 in the late 1990s, Boeing began to consider a replacement. As the Boeing B747-400 was also beginning to lose attraction, the company proposed two new aircraft—the Sonic Cruiser and the B747X. The Sonic Cruiser was intended to achieve higher speeds (approximately Mach 0.98) while burning fuel at the same rate as the existing B767. The B747X, which was intended to compete with the Airbus A380, would have stretched the B747-400 and had a composite supercritical wing to improve efficiency.

Market interest for the B747X was not so encouraging. However, the Sonic Cruiser had brighter prospects. Several major airlines voiced their optimism for the concept. By decreasing travel time (with increased speed), they expected to be able to increase customer satisfaction and aircraft utilisation.

Despite the aftermath of the September 11, 2001 attacks, the global airline market rose by the end of that year. Airlines were not able to justify large capital expenditures, and due to increased fuel prices, were more interested in efficiency than speed. The worst-affected airlines were considered the most likely customers of the Sonic Cruiser. Boeing, offered airlines the option of using the airframe for either higher speed or increased efficiency. Due to high projected airframe costs, demand continued to evaporate. Eventually, Boeing switched tracks and decided to offer an alternative project, and canceled the B747X, once Airbus launched production of the A380 aircraft.

The formal launch of the **7E7** *Dreamliner* passenger jet was fixed for April 26th, 2004 based on a firm order for 50 **7E7**s from ANA (All Nippon Airways). Production was to begin in 2006. The first flight was expected in 2007 with certification, delivery and entry into service by April, 2008.

Large **7E7** components were programmed to be transported to the final assembly site on board modified B747-400s. This transport plan was understood to have resulted in saving of 30 days over the traditional shipping modes.

ANA's order was for thirty B787-3, 290-330 seat, one-class domestic aircraft, and twenty 787-8, longer-haul, 210-250 seat, two-class aircraft for regional international routes such as Tokyo-Narita-Beijing. The aircraft will allow new routes to be opened to mid-sized cities not previously served, such as Denver and Montreal. As is common for launch customers in the aviation industry, ANA is rumored to have received a significant discount of 40–50% off the original price.

Customer-announced orders and commitments for the B787 reached 237 aircraft during the first year of sales, and numbered 433 at the end of November, 2006. Boeing is expected to receive 500 firm orders by entry into service (EIS). This will make the B787 the fastest-ever selling wide-bodied airliner upon EIS.

AB.6.4 Development

The replacement for the Sonic Cruiser project was dubbed the 7E7 (with a development code name of Y2.) The "E" was said to stand for various things, depending upon the audience. To some, it stood for "efficiency", to others it stood for "environmentally friendly", and so on. In the end, Boeing claimed it stood merely for "eight", after the aircraft was eventually rechristened "B787".

The B787 essentially uses the technology proposed for the Sonic Cruiser in a more conventional airframe configuration. Boeing claims that the B787 will be up to 20% more fuel-efficient than current comparable aircraft. Roughly one-third of this efficiency improvement will come from the engines, another third from aerodynamic improvements and the increased use of lighter weight composite materials and the other third from advanced systems. The most notable system advancement contributing to efficiency is a "More Electric Architecture" (MEA) which replaces bleed air and hydraulic power with electrically powered compressors and pumps. Technology from the Sonic Cruiser and B787 will be used for improvement of Boeing's entire airliner product line, called the Yellowstone Project (of which the B787 is the first stage).

Boeing selected two engine types, the General Electric (GE) GEnx and Rolls-Royce Trent 1000 Engines to power the B787, both placed in pods under the wing. Significantly, this leaves Pratt & Whitney, which normally is a participant in this market space, unable to offer one of its own engines to Boeing B787 customers. For the first time in commercial aviation, both engine types will have a standard interface with the aircraft, allowing any B787 to be fitted with either a GE or Rolls-Royce engine at any time. Engine interchangeability makes the B787 a more flexible asset to airlines in the light of any future engine developments suiting their operating profile. The engine market for the B787 is estimated at US $40 billion over the next 25 years. The launch engine for all 3 current B787 variants is the Rolls-Royce Trent 1000.

In order to compete with the Airbus A350-900, and especially to compete for the large order from Emirates and an order from British Airways, Boeing has announced that it might produce a B787-10, with seating capacity between 290–310. Production of this new model is projected for the year 2012. The formal launch had come in 2007.

The B787-10 will be a stretched version of the B787-9 and will sacrifice some range to add extra seat and cargo capacity. However, while Boeing is optimising the B787-9, many aerodynamic improvements may be found on the B787-10 if required.

Figure AB.94 *B787 Tail PlatterB787*

Figure AB.95 *Cabin Interior*

Figure AB.96 *Wing & Engines of B787*

Figure AB.97 *B787 Comfort*

This proposed stretched variant is intended to compete with the planned Airbus A350-900. The B787-10 would supersede the B777-200ER in Boeing's current lineup, and could also be targeted to replace the Airbus A330-300 and A340-300, and McDonnell Douglas MD-11. Emirates Airlines and Qantas have shown interest in such variant which would enter service in the year 2012. This variant has not yet been officially launched by Boeing.

AB.6.5 About the Aircraft

- 18.5 in (47 cm) seat-bottom width (depending on aisle armrest widths) in 2+4+2 or 3+2+3 arrangements. Seat widths would be approximately 17.2 in (43.7 cm) for 3+3+3 seating.
- Cabin interior width, 50 in (127 cm) from the floor, is 18 ft 7 in (566 cm) and was recently increased by 1 inch (2.5cm). The B787's interior cabin width, measured at seated eye level (where width is, according to Boeing studies, actually perceived) is a full 15 in (38 cm) greater than that of the Airbus A330 and A340, but 5 in (13 cm) smaller than the currently expected future competitor, the A350-800 XWB. It has a two-class configuration of 240 seats in two class domestic with 46 in (116.8 cm) first class pitch and 34 in (59.7 cm) coach class. 296 passengers can be seated in a high density 3+2+3 coach arrangement with 36 in (91.4 cm) Business and 32 in (81.3 cm) Coach pitch. Up to 234 passengers may be seated in a three-class setup that uses 61 in (154.9 cm) pitch in First Class (2+2+2 or 2+1+2), 39 in (99 cm) pitch for Business (2+3+2 or 2+2+2) and 32 in (81.3 cm) for Coach (2+4+2).
- Cruise speed: 0.85 Mach (903 km/h or 561 mph at cruising altitude)
- Range of 8,500 nautical miles (15,700 km), enough to cover the Los Angeles to Bangkok or New York to Taipei routes
- Construction materials (by weight): 50% composite, 20% aluminum, 15% titanium, 10% steel, 5% other. Composite materials are significantly lighter and stronger than traditional aircraft materials, making the B787 a very light aircraft for its capabilities. By volume, the B787 will be 80% composite. This will allow the potential to take off from, and land on, relatively short airstrips as the B767 can, yet still have the capability to fly long-haul distances.
- The B787 production line will be able to finish an aircraft in as little as three days, compared to 11 days for the B737.
- Larger windows than in any other civil air transport currently in use (27 cm by 47 cm), with a higher eye level, so passengers can see the horizon, with liquid crystal display (LCD)-based "auto-dimming" to reduce cabin glare and maintain transparency. These are to be supplied by PPG.
- Light-emitting diode (LED) cabin lighting (three color) will be used instead of fluorescent tubes, allowing the aircraft to be entirely 'bulbless' and have 128 color combinations.
- Boeing has specified wireless in-flight entertainment systems, reducing wiring costs and aircraft weight.
- LCD multi-function displays on the flight deck, all of which will use an industry standard GUI widget toolkit (*Cockpit Display System Interfaces to User Systems*/ARINC 661)
- Bleedless turbofans, allowing elimination of superheated air conduits normally used for de-icing, Aircraft power, and other functions. These systems are to be replaced with an all-electrical system.
- Cabin air provided by electrically driven compressors (no engine bleed air)
- Higher humidity in the passenger cabin because of the use of composites (which do not corrode)
- The internal pressure will be increased, to the equivalent of 6000 feet (1800 m) altitude versus 8000 (2400 m) on conventional aircraft. This significantly improves passenger comfort.

- Boeing is experimenting with several engine noise reducing technologies for the B787. Among these are a redesigned air inlet, containing sound-absorbing materials and redesigned exhaust duct covers whose rims are tipped in a toothed pattern to allow for quieter mixing of exhaust and outside air. Boeing expects these developments to make the B787 significantly quieter both inside and outside the passenger cabin.

Early concept images of the B787 included rakish cockpit windows, a dropped nose, and a distinctive "shark-fin" vertical stabilizer. The final styling of the aircraft was more conservative, with the fin less radical than on earlier images, but the nose and cockpit windows were retained. The nose is very similar to that of the Dornier 328Jet.

AB.6.6 Production

Components and its Manufacturers

For B787, Boeing has sought for assistance from various organisations. Individual companies will be required to build secific component(s) and supply them to Boeing for assembly. As planned:

Company	Manufacturing Product
Boeing	• The B787's Tail Fin at Frederickson, Washington • Ailerons and Flaps at Boeing Australia and • Fairings at Boeing Canada
Mitsubishi Heavy Industries, Japan	• Wings
Alenia Aeronautica, Italy	• The Horizontal Stabilizers
Vought Aircraft Industries and Alenia Aeronautica, Italy and Spirit Aero System, Wichita, Kansas (USA)	• Middle and Rear Section of the Fuselage and • Tailplane
Kawasaki Heavy Industries, Japan	• Mid Forward Section of the Fuselage • The Fixed Section of the Wings and • The Landing Gear Well
Latecoere, France	• The Passenger Doors
Saab, Sweden	• The Cargo Doors • Access Doors and • Crew Escape Door
Toray Industries, Japan and Boeing	• Carbon Fiber
Messier-Dowty, France	• Landing Gear
Thales	• Integrated Standby Flight Display • Electrical Power Conversion System and • In-flight Entertainment
Rockwell Collins	• Flight Control • Guidance and other Avionic System including Standard Duel Head Up Guidance System • Display System including Head Down and Head Up Displays • Communication System including Advanced VHF and Satellite Communication Radios • Situational Awareness Systems including Terrain Awareness Warning Systems, Weather Radar and Traffic Alert and Collision Avoidance Systems (TCAS)

Honeywell of Phoenix, Arizona	The Navigation Package including: ■ Flight Management Function ■ Inertial Reference System ■ Air Data System and ■ Multi-mode Receiver Global Positioning System ■ The Crew Information System/Maintenance System (CIS/MS) ■ Flight Control ■ Guidance and other Avionic system including Standard Duel Head up Guidance System
Fuji Heavy Industries, Japan	• Centre Wing Box and installation of the Wells
Flight Dynamics	• Future integration of Forward Looking Infrared, by allowing improved visibility, using Thermal Sensing as part of the HUD System, allowing pilots to "see" through the clouds
Hamilton Sundstrand, Windsor Lock, Connecticut	Primary Power Distribution and Management Systems to the Aircraft, including: ■ Manufacture and production of Generator Control Units (GCUs) ■ Environmental Control System ■ Primary and Remote Power Distribution System ■ Electrical Power Generating and Start System ■ The integration of Power Transfer Systems that can move power from the Auxiliary Power Unit (APU) and the Main Engines to the necessary parts and machinery of the Aircraft
Kaiser Electroprecision	• The Pilot Controls, which will be similar in function to those of the B777
Goodrich, Charlotte NC	• The Fuel-quantity Indicating System and • Fuel Management Software along with the Necells and Thrust Reverser

The final assembly will consist of attaching fully-completed sub-assemblies, instead of building the complete aircraft from the ground up. This is a technique which Boeing has previously used on the B737 program, which involves shipping fuselage barrel sections by rail from Spirit's Wichita, Kansas facility to Boeing's narrowbody final assembly plant at Renton, Washington. Airbus has also used this technique in the past. After stiff competition, Boeing announced on December 16, 2003 that assembly would take place in Everett, Washington, employing 800 to 1,200 people.

The B787 will undergo wind-tunnel testing at Boeing's Transonic Wind Tunnel, QinetiQ's five-meter wind tunnel based in Farnborough, UK, and NASA Ames Research Center's wind tunnel, as well as at the French aerodynamics research agency, ONERA.

The first composite section rolled out in January 2005, and the final external design was set in April 2005. On June 30, 2006 Boeing celebrated the start of major assembly of the first B787 at the new factory of Fuji Heavy Industries in Handa, near Nagoya, Japan.

Boeing intends to deliver 118 Aircraft during the first 18 months of production. Due to customer demand, Boeing is currently considering opening a second production line. Some of the difficulty in this case revolves around the production capacity of suppliers. For example, Alenia has said that perhaps it shall only be able to produce seven B787 fuselage sections per month.

AB.6.7 Boeing B787 - 7E7 Picture Gallery

Boeing has approved the formal launch of the new B787 - 7E7 Dreamliner passenger Aircraft. The launch order for 50 7E7 Aircraft placed by All Nippon Airways (ANA) was announced in April 2004.

The 7E7-SR short range version will be the same length and height but with a shorter wingspan. The range is reduced to 6,480km.

B787 - 7E7 assembly is scheduled to start in 2006. First flight of the Dreamliner will be in 2007 with entry into service in 2008.

The 7E7 family of Aircraft, in the 200 to 300-seat class, will carry passengers, non-stop, on routes between 6,500km and 16,000km at various speeds of up to Mach 0.85.

The B787 - 7E7 will be able to fly directly to smaller airports, avoiding the need for passengers to transfer flights to regional destinations.

The design incorporates some of the advanced design features developed for the Sonic Cruiser concept, including increased use of lightweight composites and advanced aluminium alloys, making the aircraft more fuel-efficient and environmentally friendly.

Boeing has explored radical new concepts for the interior cabin configuration including "sweeping arches" and "a calming, simulated sky" to enhance passenger perception of spaciousness.

Large B787 - 7E7 assemblies will be transported to the final assembly site onboard modified B747-400s rather than by traditional shipping methods, saving time and money.

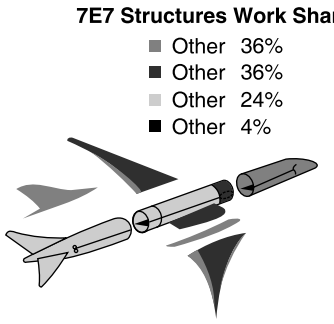


Diagram showing the construction workshare between Boeing and the B787 - 7E7 industrial partners

Boeing's prototype B787 flight deck

All the Pictures of Boeing B787 are Computer Oriented

AB.6.8 Technical Concerns

Boeing B787 - 7E7 Powerplants

The aircraft is powered by high-bypass 10:1 ratio and extremely quiet engines. The fuel efficiency of the engines will contribute up to 8% of the increased efficiency of the aircraft.

Boeing has selected two engine types, the General Electric GENX and the Rolls-Royce Trent 1000, each type developing 55,000lb to 70,000lb thrust. Each of the three planned 7E7 models will use the same engines. Both the types of engines compatible with the B787 will use a standard electrical interface, potentially allowing any aircraft to be fitted with Rolls-Royce or GE engines at any time. Both engines fit to a standard engine interface allowing interchangeability. The traditional bleed air heating and de-icing systems have been eliminated in favour of electrical systems. This flexibility will allow an airline to switch from one manufacturer to the other in the event of technological developments which conform more closely to their operating profile.

The General Electric GENX (General Electric Next Generation) engine is a derivative of the GE90 engine and uses Composite Fan Blades, a high-pressure ratio Compressor and a single annular Combustor where the compressed air and fuel are mixed, to give very low level of emissions. The GENX engine was scheduled to enter full engine testing in 2006.

The Rolls-Royce Trent 1000 is a new ultra high thrust variant of the Trent family and uses a three-shaft layout.

Boeing B787 – 7E7 Wing and Fuselage Design

It was suggested by many that the risks of having a composite fuselage have not been fully assessed and should not be attempted. It was also added that carbon fiber, unlike metal, does not visibly show cracks and fatigue and repairing any damage done to the aircraft would not be easy. Boeing has dismissed such notions insisting that the composites have been used on wings and other passenger aircraft parts for years and this is a non-issue. They have also stated that special defect-detection procedures will be put in place to negate any concern. In 2006, Boeing launched the B787 Gold Care program. This is a comprehensive life-cycle management service whereby all the aircraft that sign up for this program are routinely monitored and repaired if needed. This is the first program of its kind from Boeing. After sale protection programs are not new but have usually been offered by third party service centers. Boeing believes this brings them additional revenue and will also allow them to nullify any concern over maintaining this aircraft for over-anxious airlines.

The Boeing *Dreamliner* aircraft is of conventional design with low sweptback wings and two under-wing pylon-mounted engines. The design has replaced the Sonic Cruiser program and incorporates some of the advanced design features developed while examining the Sonic Cruiser concept. The design includes increased use of lightweight and high-durability composites and advanced aluminium alloys.

The low sweptback wings have raked wingtips. Carbon fibre and epoxy composites and titanium graphite laminate will be used in the construction of the wings.

Principal industrial partners in USA, Japan and Europe are sharing the major structural work. Boeing will be responsible for about 33% of the production with the flight deck and fuselage being manufactured at Wichita, the wings and the fuselage fairings at Winnipeg, Canada, the fin at Frederickson, and the moving leading and trailing edges of the wings at Tulsa and at Boeing, Australia.

Weight Issues

The B787 has been troubled by excess weight since assembly of the first unit began in 2006. This is typical in aviation for new aircraft during their development phase. The aircraft is first designed on computer and an empty weight is promised to customers to ensure fuel efficiency and payload obligations. However upon assembly, some parts may be manufactured with minor variances that multiply dramatically if the part is used frequently. Currently the first six B787 built have all been overweight but the seventh is expected to be on target. Boeing has redesigned some parts that were supposed to be made of steel to now be manufactured of titanium. The weight target that is pledged to customers is for a "green aircraft" with no interior fittings. Each airline chooses its own seats, lavatories and amenities. These all add weight in varying degrees between different customers but are irrelevant to Boeing's obligations.

AB.6.9 Variants

The *Dreamliner* aircraft is being designed in three versions, the baseline version, a short-range and a stretched version all launched at the same time in 2004. The B787-8 has entered service in 2008, while the B787-3 will enter service next in 2010. The last to enter service will be the B787-9 in 2010. The B787-3 and B787-8 variants will be available first, while the B787-9 will enter service in 2010, in spite of earlier suggestions that it would be delayed as orders for the B787-3 and

B787-8 sold out early production. As of June 16, 2006, five customers had placed orders for a total of 48 B787-9s.

AB.6.9A Boeing B787-3

This will be a 223 seat (three class) or 296 seat (two class) short-range version targeted at high-density flights, with a range of 3,500 nautical miles (6,500 km) when fully loaded. It is designed to compete with the Airbus A300 and replace Boeing B757-300, Boeing B767-200 and B767-300. The B787-3's intends to enter into service is in the year 2010. This model is limited in its range, not by fuel capacity but by a low maximum take-off weight of 360,000 lb (163,290 kg). It currently has the same fuel capacity as the B787-8. Range is given for any fuel capacity left after the aircraft weight and payload is subtracted from the Maximum Take-Off Weight (MTOW). With a full load of passengers and cargo, it will be limited in the amount of fuel it can take on board. This is an advantage on shorter, high-density routes especially those separated by water such as Tokyo to Shanghai, Osaka to Seoul or London to Berlin. Many airports charge landing fees depending on the weight of the aircraft, thus an airliner rated at a lower MTOW would pay lower fees.

The B787-3's wing will be different from that of the other versions, with the raked wingtips that improve long-range efficiency removed and winglets added. This decreases the wingspan and the aircraft weight. The wing will be the same except for the last 13 feet outboard of the ailerons. Winglets provide better efficiency over short distances while raked wingtips are superior over long distances.

Thirty years ago there were four to five flights from New York to Los Angeles per day, per one major airline. With deregulation, more and more airlines joined the route. Overcapacity led to airlines using smaller planes. Now there are around 47 direct flights per day between the two cities, with each flight usually carrying around 100-160 passengers (70% load factor). This has led to higher congestion and more pollution. This same phenomenon is occurring in Asia, Europe, and South America. With the proliferation of open sky agreements, numerous airlines have been started in countries like Brazil, India, China, and all over Europe and this has encouraged the usage of ever smaller single aisle planes between very large cities. On routes like São Paulo to Buenos Aires, Berlin to Paris, Mumbai to Kolkata the larger ones would be more logical. Boeing believes that in the future, aviation between very large (but close) cities of five million or more could ideally be by B787-3. It also believes legacy carriers that want to battle with low cost airlines can use this plane with twice the capacity of a single aisle craft but less than twice its operating cost (fuel, landing fees, maintenance, number of flight crew, airspace fees, parking fees, gate fees, etc...).

Regions such as India and East Asia which are within close proximity can make good use of this variant. Roughly 3.1 billion people live within the range of the B787-3 if used in India or China. A 3,500 nm (6,500 km) range is roughly a flight of seven hours. This range is more than enough to connect many major cities.

To date, however, only Japanese airlines have ordered this model for routes within East Asia.

AB.6.9B Boeing B787-8

This variant seats 223 passengers in three classes and has a range of 8,500 nautical miles (15,700 km). EIS is 2008. Boeing is targeting the B787-8 to replace the B767-200ER and B767-300ER. The B787-8 variant was initially priced at $US 120 million per aircraft, surprising the industry, which expected a higher price. There have been two price increases since launch and a B787-8 currently sells for $US 148-157.5 million.

AB.6.9C Boeing B787-9

This will be a stretched variant seating 263 in three classes with a range of 8,800 nautical miles (16,300 km). The targeted EIS is set at 2010. Boeing is targeting the B787-9 to compete with the Airbus A330-200 and A340-200, and replace Boeing B767-400ER, and McDonnell Douglas DC-10. This model is very similar to the B787-8 except for structural strengthening and the stretched fuselage. When first introduced, it had the same fuel capacity as the other two models. This gave it a slightly shorter range than the B787-8. Upon further consultation with airlines and design changes, it incorporated one extra forward tank to increase its fuel capacity. It will have the lowest seat-mile cost of any B787, and a longer range and a higher MTOW than the other two initial variants. It can fly non-stop from New York to Singapore or from Moscow to São Paulo.

The B787-3 is listed at $US 138-143 million, while the B787-9 is listed at $US 178.5-188 million.

Air New Zealand is the launch customer of this variant with 8 orders to date. Sales of this variant have been limited by its 2010 entry into service rather than any shortcomings. The smaller size, and the entry date of the B787-8 being two years earlier, it was a great enticement for most airlines and led to the -8 taking most orders. Now with the first two years of production completely sold out, airlines have been weighing the option of the B787-8 against the B787-9 since either one can be delivered after 2010. Qantas and Singapore Airlines have placed the largest orders for this variant.

AB.6.10 Specifications of B787

Model	**B787-3**	**B787-8**	**B787-9**
Cockpit crew	Two		
Passengers	223 (3-class) 296 (2-class)	223 (3-class)	263 (3-class)
Length	56.72 m (186 ft 1 in)	63 m (206 ft)	
Height	16.92 m (55 ft 6 in)		
Cruise Speed	Mach 0.85		
Wingspan	52 m (170 ft)	60.12 m (197 ft 3 in)	
Wing Sweepback	32.2°		
Cabin width	5.77 m (18 ft 9in)		
Max. take-off weight	163,636 kg (360,000 lb)	217,724 kg (480,000 lb)	244,940 kg (540,000 lb)
Range, loaded	6,500 km (3,500 nm)	15,700 km (8,500 nm)	16,300 km (8,800 nm)
Max. fuel	126,903 L (33,528 USG)	126,903 L (33,528 USG)	138,700 L (36,693 USG)
Service ceiling	13,100 m (43,000 ft)		
Engines (2×)	General Electric GEnx *or* Rolls-Royce Trent 1000		
Cargo Capacity	5 pallets + 5 LD3s.		

Appendix

C

ATR
Avions de Transport Régional/Aerei da Trasporto Regionale

Figure AC.1 *ATR 72 of Aer Arann at take off*

Figure AC.2 *ATR 42 taxiing*

AC.1.1 About the Consortium

The Italian-French collaborated Aircraft manufacturer Aerei da Trasporto Regionale or **Avions de Transport Régional** (**ATR**) was formed in 1981, from the consortium formed by **Aérospatiale** of France (now **EADS**) and **Aeritalia** (now **Alenia Aeronautica**), of Italy under French law to develop a family of regional airliners with its headquarters at Blagnac near Toulouse, France.

The consortium's first Aircraft ATR 42 was launched in October 1981. The ATR 42 and ATR 72 are the two models of aircraft built by ATR. American Eagle, the regional airline company of American Airlines under the AMR Corporation, refers to its ATR 72s as **Super ATRs**. Both these models are twin-turboprop engined, short-haul, regional airliners. The ATR 42 seats up to 60 passengers, while the ATR 72 seats 74 passengers. Both are operated by a two-person cockpit crew.

The proposed manufacture of 78-passenger **ATR 82**, which was to be powered by two Rolls-Royce/Allison AE 2100 turboprops, was suspended in early 1996.

Alenia Aeronautica's manufacturing facilities in Pomigliano near Naples, Italy, produce the aircraft fuselage and tail sections. Aircraft wings are assembled at EADS Sogerma Services in Bordeaux in western France for Airbus France. Final assembly, flight-testing, certification and deliveries are the responsibility of ATR in Toulouse, France.

Some of the main fuselage sections for the ATR are produced also in China at Shaanxi Aerospace Facility, Xian.

AC.1.2 ATR in India

ATR has captured a major share of the civil turboprop market in India. ATR aircraft are operating to smaller Indian towns, which did not have any regularly scheduled air service, mainly due to non-availibility of longer runways and adequate facilities. In view of the explosive growth in the Indian civil aviation market, Indian Airlines have announced several aggressive ATR aircraft acquisition programs (as of July 2006).

Air Deccan was India's first low cost carrier and the first private airline to focus on connecting smaller Indian towns and cities in southern India. It started scheduled services in 2003 with four leased ATR 42-320. On Jan 6, 2005 it announced plans to acquire 30 new ATR 72-500 aircraft and 6 second-hand aircraft (3 ATR 42-500 and 3 ATR 72-500). At this point the airline operated 12 ATR 42s on its network.

Kingfisher Airlines announced at the 2005 Dubai Air Show that it was placing a firm order for 20 ATR 72-500 aircraft with options for 15 more. The first aircraft was delivered on March 30, 2006. At the 2006 Farnborough Airshow, Kingfisher confirmed the 15 additional ATR 72-500 aircraft options and took options on 20 more. Kingfisher has also been a pioneer airline in introducing in-flight entertainment in its ATRs.

Jet Airways operates 8 ATR 72-500.

Indian Airlines (currently **Air India Domestic**) operates 4 ATR 42 aircraft.

First Air operates 8 ATR 42-300 and is the first in the world to land an ATR on an ice runway.

AC.1.3 Specifications

Measurement	ATR 42	ATR 72
Range	2,965 km	1,685 km
Wingspan	24.57 m	27.1 m
Length	22.67 m	27.2 m
Height	7.59 m	7.7 m
Max Take-Off Wt	16,700 kg	22,500 kg

AC.1.4 Facts and Trivia

- Passengers are boarded using the rear door (which is rare for a passenger plane and similar to that of Fokkar Friendship F27) as the front door is used to load cargo.

- A tail support must be installed when passengers are disembarking and boarding to prevent the nose from rising in the ATR 72 models.
- The consortium has 570 employees. The CEO is Filippo Bagnato.

AC.1.5 Accidents

- **American Eagle flight 4184** crashed due to icing **on October 31, 1994** in **Roselawn, Indiana**. The accident had a significant effect on deicing procedures in the United States, as well as American Airlines' utilisation of turboprop aircraft in specific geographical areas.
- **On 11 October 1999**, an **Air Botswana** captain boarded an ATR 42 aircraft and took off. Once in the air, he asked on radio to speak to the President, Air Botswana's General Manager and several others. In spite of all attempts to persuade him to land and discuss his grievances, he threatened that he was going to crash into some planes on the apron. After flying for about two hours, he did two loops and then crashed at 200 knots (230 mph) into Air Botswana's two other ATR 42 parked on the apron. The captain was killed but there were no other casualties. He had been grounded for medical reasons, refused reinstatement and regrounded until February 2000. This was his revenge.
- **On May 9, 2004,** an **American Eagle** Super ATR, flight 5401, crash-landed in **San Juan, Puerto Rico** when one of its tires blew. **17** people were injured, but there were **zero** fatalities.
- **On August 6, 2005,** an ATR 72 from **Bari, Italy,** on its way to **Djerba, Tunisia,** crashed into the **Mediterranean Sea** about 18 miles from the city of **Palermo,** during an emergency sea landing. **16** of the **39** on board died. The plane was operated by **Tuninter,** an affiliate of **Tunisair,** the national airline of Tunisia. The reason for the crash was engine fuel starvation, a contributing reason was the installation of wrong fuel quantity indicators. The maintenance staff had installed an ATR 42 indicator in this ATR 72.

ATR 42

AC.2.1 Aircraft Type

This is a 42 seat Turboprop regional aircraft.

AC.2.2 History of ATR 42

The first of two ATR 42 prototypes flew for the first time on August 16, 1984. Italian and French authorities granted certification in September 1985 and the first ATR-42 entered airline service on December 9, 1985.

The initial ATR 42-300 was the standard production version of the ATR 42 family until 1996. It features greater payload range and a higher takeoff weight than the prototypes. The similar ATR 42-320 (withdrawn in 1996) differed in having the more powerful PW-121 engines for better performance. The ATR 42 Cargo is a quick-change freight-passenger version of the ATR 42-300.

The ATR 42-500 is the first significantly improved version of the aircraft and features a developed interior. These are fitted with more powerful PW-127E engines for a substantially increased cruising speed (565km/h/305kt), driving six-blade propellers. It has a maximum range of 1850km (1000nm). The other considerable features are the EFIS cockpit, elevators and rudders of the stretched ATR 72 (described separately), plus new brakes and landing gear and strengthened wing and fuselage for greater weights. The first ATR 42-500 delivery was in October, 1995.

ATR was part of Aero International (Regional), the regional airliner consortium established in January 1996 to incorporate ATR, Avro and Jetstream. AI(R) handled sales, marketing and support for the ATRs, plus the Avro RJs and the Jetstream 41, until its disbandment in mid 1998 when ATR regained its independence.

AC.2.3 About the Aircraft

The ATR 42 is the initial version and was announced in 1981, making its maiden flight on 16 August, 1984. French and Italian approval (certification) followed in September, 1985 and the first revenue earning flight was in December, 1985.

Power plants

ATR 42-300 - Two flat rated 1340kW (1800shp) Pratt & Whitney Canada PW-120 turboprops driving four blade c/s Hamilton Standard propellers
ATR 42-320 - Two flat rated 1417kW (1900shp) PW-121s
ATR 42-500 - Two PW-127Es derated to 1610kW (2160shp) driving six-blade RatierFagiec/Hamilton Standard props

Figure AC.3 *ATR 42 Moving Out*

Figure AC.4 *ATR 42 Cabin Interior*

Figure AC.5 *ATR 42 in Flight*

Figure AC.6 *ATR 42 Taxiing*

Performance

ATR 42-300 – Max cruising speed 490km/h (265kt); economical cruising speed 450km/h (243kt). Range with max fuel and reserves at max cruising speed 4480km (2420nm), or 5040km (2720nm) at economical cruising speed
ATR 42-320 – Same as ATR 42-300 except max cruising speed 498km/h (269kt).
ATR 42-500 – Cruising speed 563km/h (304kt); max range 1850km (1000nm).

Weights

ATR 42-300 – Operating empty 10,285kg (22,674lb), max takeoff 16,700kg (36,817lb).
ATR 42-320 – Operating empty 10,290kg (22,685lb), max takeoff as per 42-300.
ATR 42-500 – Operating empty 11,250kg (24,802lb), max takeoff 18,600kg (41,005lb).

Dimensions & Capacity

Wing Span	24.57m (80ft 8in)
Length	22.67m (74ft 5in)
Height	7.59m (24ft 11in)
Wing Area	54.5m2 (586.6sq ft)
Flight crew	Two
Typical seating arrangement	42 at 81cm (32in) pitch
ATR-42 Cargo	Nine containers with a 4000kg payload

Production

By March 2003, 685 ATR 42 had been ordered.

AC.2.4 Variants

There are six variants of the ATR 42.

- ATR 42-200
- ATR 42-300
- ATR 42-320
- ATR 42 Cargo
- ATR 42-400
- ATR 42-500

Figure AC.7 *ATR 42 Banking*

Figure AC.8 *ATR 42 Taking Off*

Figure AC.9 *ATR 42 Cockpit*

Figure AC.10 *ATR 42 Coming for Landing*

AC.2.5 Renowned ATR 42 Users

In August 2006, a total of 312 ATR 42 aircraft remained in airline service, with another 12 firm orders. Major operators include:

- Total Linhas Aereas (19)
- Airlinair (17)
- Aeromar (16)
- Air Deccan (15)
- Air Contractors (11)
- Empire Airlines (11)
- Mountain Air Cargo (10)
- Czech Airlines (8)
- Trigana Air Service (7)
- Tarom (7)

ATR 72

AC.3.1 Aircraft Type

This is a 70 seat turboprop regional airliner.

AC.3.2 History of ATR 72

The ATR 72 is a stretched development of the popular ATR 42 and was launched in January 1986.

The first of three ATR 72 development aircraft flew for the first time in October 27, 1988, followed by the awarding of French and then US certification in late 1989. Entry into service was on October 27, 1989 with Kar Air of Finland. Some other early operators are Foshing Airlines, NFD (later Eurowings), CSA, American Eagle, TAT, Air Littoral, LOT, and Olympic Aviation.

Significant differences between the ATR 72 and the smaller and older ATR 42 include a 4.5m (14ft 9in) fuselage stretch and reworked wings. The ATR 72's wings are new outboard of the engine nacelles, with 30% of it made up of composite materials, comprising composite spars and skin panels and a carbon fibre wing box.

Aside from the baseline ATR 72-200, two developments have been offered, the ATR 72-210, and the ATR 72-500 (previously ATR 72-210A). The ATR 72-210 is optimised for operations in hot and high conditions. It has more powerful PW-127 engines for better takeoff performance.

The ATR 72-500 (renamed from ATR 72-210A on May 18, 1998), the further improved hot and high model was certified in early 1997. It features PW-127Fs driving six-blade composite Hamilton Sundstrand propellers.

The ATR 52C is an, as yet unlaunched, derivative with a redesigned tail to incorporate a rear loading ramp, intended for military and commercial operators. As with the ATR 42, a military maritime patrol version, known as the Petrel 72, has also been offered.

The ATR 72 would have formed the basis for the ATR 82, a 78 seat stretched development. The ATR 82 would have been powered by two Allison AE-2100 turboprops (ATR studied turbofans for a time) and would have a cruising speed as high as 610km/h (330kt). The ATR 82 was suspended when AI(R) was formed in early 1996.

Figure AC.11 *ATR 72 Taxiing*

Figure AC.12 *ATR 72 in Flight*

Figure AC.13 *View from ATR 72 Window*

Figure AC.14 *ATR 72 Moving Out with One Engine Power*

Figure AC.15 *ATR 72 Cabin Interior*

Figure AC.16 *ATR 72 Climbing*

Figure AC.17 *Kingfisher Airlines ATR 72 on flight*

Figure AC.18 *ATR 72 Crash*

AC.3.3 About the Aircraft

The ATR 72 is the basic ATR 42 stretched by 4.5 m (14 ft 9 in) with modified wings, more powerful engines, greater fuel capacity and other increased dimensions compared with the ATR 42. The ATR 72 was announced at the 1985 Paris Air Show and made its maiden flight on October 27, 1988. Exactly one year after that, on October 27, 1989, commuter airline Kar Air of Finland became the first company to put the plane into service.

In April 2000, ATR delivered its 600th ATR, an ATR 72-500 to Air Dolomiti. Customer airlines include Air Bosna, Air New Zealand, Alitalia, Arkia, Czech Airlines, Israir, Jet Airways, LOT Polish Airlines, Pakistan International Airlines (PIA), Olympic Airlines,TACV, TAROM, Thai Airways International and Vietnam Airlines. FedEx recently purchased several used ATR 42s and 72s from different airlines for conversion to cargo use.

Specifications

Power plants	**ATR 72-200** – Two 1610kW (2160shp) Pratt & Whitney Canada PW-124B turboprops driving four blade Hamilton Sundstrand propellers **ATR 72-210** – Two 1850kW (2480shp) P&WC PW-127 turboprops driving four blade Hamilton Sundstrand propellers **ATR 72-500** – Two 2051kW (2750shp) P&WC PW-127F turboprops driving six blade Hamilton Sundstrand propellers
Performance:	
ATR 72-200	Max cruising speed at 15,000ft 526km/h (284kt)
Economical Cruising Speed	460km/h (248kt)
Range with Reserves at Max Optional Weight	1195km (645nm)
Range with 66 Pax	2665km (1200nm)
Weights:	**ATR 72-200** – Operating empty 12,400kg (27,337lb), max takeoff 21,500kg (47,400lb), optional 22,000kg (48,501lb) **ATR 72-210** – Operating empty 12,450kg (27,447lb), max takeoff same as ATR-72-200 **ATR 72-500** – Operating empty 12,950kg (28,550lb), max takeoff 22,000kg (48,501lb), optional 22,500kg (49,604lb)
Dimensions:	
Wing span	27.05m (88ft 9in)
Length	27.17m (89ft 2in)
Height	7.65m (25ft 1in).
Wing Area	61.0 sq. mt. (656 sq. ft.)
Capacity	
Flight crew	Two
Max seating	74 passengers at four abreast and 76cm (30in) pitch
Typical seating	64 and 70 passengers, with seat pitch starting from 81cm (32in)
With larger forward freight door fitted	It can accommodate a payload of 7200kg (15,875lb) in 13 containers. ATR 52C - 7500kg (16,535lb) payload comprising pallets or five LD3 containers.

Production

By March 2003 - 306 ATR 72 had been ordered.

AC.3.4 Variants of ATR 72

There are four variants of the ATR 72

- ATR 72-200, the original production version
- ATR 72-210, with uprated engines
- ATR 72-500, originally named the ATR 72-210A, with higher weights and improved airfield performance
- ATR 52C, the first ATR 72 freighter with a large cargo door; unveiled at Farnborough 2002

Figure AC.19 *ATR 72 Banking & Climbing*

Figure AC.20 *ATR 72 Cockpit*

AC.3.5 Renowned ATR 72 Users

In August, 2006 a total of 297 ATR 72 aircraft (all variants) also remained in airline service, with 91 further firm orders. Major operators include:

- American Eagle Airlines (39)
- Binter Canarias (13)
- Atlantic Southeast Airlines (12)
- Mount Cook Airline (11)
- TransAsia Airways (10)
- Alitalia Express (10)
- Vietnam Airlines (9)
- Aer Arann (9)
- Bangkok Airways (8)
- Jet Airways (8)
- Air Dolomiti (8)
- Eurolot (8)
- Aero Airlines (7)

Some 47 other airlines also operate the type in smaller numbers.

Major firm orders include

- Kingfisher Airlines (31)
- Air Deccan (27)
- Aer Arann (10)
- Finncomm Airlines (7)

Appendix

D

Places of Tourist Interest, Things to See, Their Airports & Air Connections

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
1.	**Agra,** *Uttar Pradesh*	**Agra**/*Delhi/ Khajuraho/ Varanasi/Jaipur.*	Agra, on the west bank of river Yamuna, was originally established by Sikandar Lodhi of Afghanistan, in 1501 and developed by Emperor Akbar, in 1565. However, the city received its foremost fame with the construction of Taj Mahal by Emperor Shahjahan. **To see:** • **The Taj Mahal:** This is one of the Seven Wonders of the World. Its beauty changes with passage of time from dawn to dusk and with the fullness of the moon at night. The beauty of Taj Mahal is indescribable through words. The Mughal Emperor Shahjahan created this unique monument in the memory of his beloved wife Mumtaz Begum on the bank of river Yamuna. The construction started in 1631 and was completed in 1648 by employing 20,000 labourers and the expenditure in those days reached 40,00,000/- Pounds. The central dome of Taj Mahal is 80 ft. high with a circumference of 60 ft. 35 varieties of semi-precious stones were used in its construction. • **Agra Fort:** Emperor Akbar constructed this fort from 1565 to 1573. It is situated about 3 km. northeast of the Taj. Two, two-and-half km long and 20 ft. high walls that are separated by a 10 m ditch, surround the fort. • **Dewan-e-Aam:** Emperor Shahjahan built this red stone pavilion in 1627 to meet and listen to general public.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			• **Dewan-e-Khas:** This used to house the world famous Mayur Singhasan (The Peacock Throne) of Emperor Jahangir that was looted later by Nadir Shah of Persia. • **Dayal Bagh:** This is situated about 8 km north of Taj Mahal and houses the Swami (Sowami) Bagh Temple, which is known as The Garden of Supreme Lord. The white and pink marble stoned temple exemplifies the Pietradura sculpture. **Also to see:** Mothi Masjid, Itmat-Ud-Daula, Chini Ka Rauja, Rambagh, Jami Masjid, Sikandra, Fatepur Sikri, Jahangir Mahal, Sheesh Mahal, etc.
2.	**Ahmedabad,** Gujarat	**Ahmedabad/** Mumbai/ Delhi/ Bengaluru/ Bhuj	Ahmedabad is known as Manchester of the East because of its textile industry and fabric mills. In recent past, this was the capital of Gujarat, which at present is at Gandhinagar. The city was founded by the Muslim ruler Ahmed Shah in 1411 and derives its name from there. **To see:** Bhadra Fort, Calico Museum, Shaking Towers, ATIRA, ISRO, Teen Darwaja, Royal Square, Sidi Jali Masjid, etc.
3.	**Ajanta,** Maharashtra	**Aurangabad** Ajanta is 103 km from Aurangabad. Mumbai/ Udaipur/ Jaipur/Delhi	Ajanta is famous for its historic caves with unique sculptures. Best time to visit the place is between October and November as it rains during June to September. Ajanta is just next to the Taj Mahal in the tourist map of India. This Buddhist cave temple was developed from the year 200 BC to 650 AD. The horseshoe shaped, 275 m high place has 29 caves amongst which caves 8, 9, 10, 12 and 13 are from Heenjan and the rest are from Mahajan group. Down below the caves, flows river Bagoda, presenting unforgettable scenery. The caves display unique example of fresco paintings, with its ancient sculptures.
4.	**Ajmer,** Rajasthan	**Jaipur** 135 km from Ajmer Delhi/ Mumbai/ Jodhpur/ Udaipur/ Aurangabad	The city, on the bank of hillock-surrounded Ana Sagar Lake has combined religion and history in it. The city is famous for Darga Khwaja Sahib (Moinuddin Chisti's Darga). **To see:** • **Darga Khwaza Sahib:** The religious and spiritual teacher of Emperor Akbar, Khwaja Sahib Moinuddin Chisti, came to India in 1142 and settled in Ajmer until his death in 1256. His Mazhar (grave) is surrounded by two masjids, one convention hall and one silver covered 23 m high Buland Darwaza (Huge Gate). • **Adhai Din Ka Jhopra:** It is believed that this was built in 1153 as a sanskrit college and goddess Saraswati's mandir and transformed to masjid within two-and-half days, as per order of Muhammud Ghori. Five rows of pillars inscribed with statues

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			of Hindu gods and goddesses (collected by demolishing 30 Hindu Temples) supports this 200 × 175 ft rectangular platform. • **Star Fort:** Emperor Akbar built the fort situated at a height of 800 ft on Taragarh Hill in 1570. A grand view of the city is available from the fort. • **Ana Sagar Lake:** The man made lake was dug in 1135 by channeling water from Luni River. The beauty of the lake during sunrise and sunset is indeed breathtaking. **Also to see:** Jain Mandir, Daulat Bagh Garden, etc.
5.	**Allahabad** Uttar Pradesh	**Bamrauli** Delhi/ Lucknow	Allahabad is famous for Prayag, the meeting place of rivers Ganga, Yamuna and Saraswati. This is one of the most sacred places of Hindu religion. The place is well-known as Triveni also. **To see:** Akbar's Fort, Khushru Bagh, Anand Bhavan (the house of Nehru family), Bharadwaj Ashram, Alfred Park, Allahabad Museum, Kamyakup, Akshaybat, etc.
6.	**Almora** Uttaranchal	**Pithoragarh** 122 km from Almora	Almora is famous for its scenic beauty. The city faces the rugged Mt. Trishul, believed to be the weapon of Lord Shiva. Numerous snow-covered peaks are distinctly visible from here. One of the best locations to view the Himalayan peaks from Almora is the 'Bright End Corner'.
7.	**Amritsar** Punjab	**Amritsar** Delhi/ Srinagar	Amritsar is one of the border cities between India and Pakistan. Bus and train interlink the two countries from the city. It is famous for the Golden Temple, related with the Sikh religion. **To see:** • **The Golden Temple:** The fourth Sikh Guru, Ramdas, built the Temple in 1577 as per order of Emperor Akbar. For this purpose, a huge pond was dug in the middle of the city and the fifth Sikh Guru Arjandev built Har Mandir at the centre of this pond. The original Mandir, was demolished by Muslim King Ahmad Shah Durrani and thereafter rebuilt by Hindu Maharaja Ranjit Singh. The copper made main door of the temple is covered with 400 kg gold. The temple is indeed to be seen. • **Jalianwala Bagh:** On April 13, 1919, armed forces under the British General Dyer fired on and murdered thousands of unarmed Indians without any provocation. They were holding a meeting to protest the Rowland Act imposed by the British Government, dominating the Indian soil at that time. The whole world condemned the action. A red stoned platform was built later, in remembrance of the martyrs. • **Clock Tower Museum:** This museum displays precious stones and jewelry presented by the Nizam of Hyderbad to Maharaj

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			Ranjit Singh, Choury made with 1120 lb of Sandalwood, spectacularly carved peacock statues, etc. **Also to see:** Govindgarh Fort, Rambagh Park, Dugiana Temple, Ram Teerth, Taran Taaran, Dumduma Sahib, etc.
8.	**Arku Valley** Andhra Pradesh Hyderabad.	**Visakhapatnam** Bhubaneshwar/ Kolkata/	Arku Valley at a height of 1166 m is famous for Boraguhalu. • **Boraguhalu**: is estimated to be a million years old, is the longest cave of India and presents a unique example of natural sculpture, created by dripping water on limestone.
9.	**Bengaluru** Karnataka	**Bengaluru** Delhi/ Mumbai/ Kolkata/ Chennai/ Trivandrum/ Calicut/Pune/ Ahmedabad.	The capital of Karnataka, Bengaluru, at a height of 921 m above sea level is lovingly known as 'the Garden City' and is renowned as modern, well-planned and beautiful city with admirable weather. **To See:** • **Kubban Park/Jayachamarajendra Park:** The park was built in 1864 by the British on 300 acres of land. One of its main attractions is the toy train. The Government Museum with 18 wings was built in 1866 displaying 5000 years old exhibits from Vijaynagar, Mohenjodaro and Hallebid. The diamond shaped aquarium located here is the 2nd largest in India. Boating in Ulsur Lake towards the northeastern side of the park has its own charm. • **Lal Bagh**: This 240 acre botanical garden-cum-amusement park was built by Hyder Ali in 1760 and developed later by the British in the 19th century. This is situated on the southern part of the city. It houses trees brought from Persia, Kabul and France. The glass house in the garden, a replica of London's Crystal Palace, was built in 1890. Fountains, artificial lake, lotus pond, rose garden, deer park make this garden worth visiting. • **Lord Shiva Statue**: The 60 ft tall Lord Shiva's idol on the airport road is the tallest of the kind in the world. • **The Bull Temple:** This temple of Nandi, the carrier of Lord Shiva, displays his 6.2 m tall monolithic statue and is the oldest temple of the city. As per belief, the statue grows every year. **Also to See:** The Fort, Tipu Sultan's palace, Rashk-e-Jannat, Ulsoor lake, Visveswaraya technological and industrial museum, aquarium, etc.
10.	**Bhopal** Madhya Pradesh	**Bhopal** Gwalior/ Delhi/Indore/ Mumbai	Famous for its lakes, gardens and parks, Bhopal has derived its name from its builder King Bhuj. Bhuj+Pal have become Bhopal of recent days. **To See:** • **Bhojpur Lake:** King Bhuj constructed this lake on 500 sq.km area that started in the year 1010 and was completed in 1042. Situated about 37 km northwest of the city, this is the largest fabricated lake in whole Asia.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			• **The Great Lake & the Lower Lake:** The Lakes stretch for 6 km and are interconnected by a bridge. The view is indeed beautiful, when the city lights reflect on them at night. **Also to See:** Gopal temple, Mahakaleswar temple, Jantar Mantar (observatory), Kaliadaha palace, Safari park, Saukat mahal, Taj-ul-Masjid, Kamla park, Tribal museum, etc. Also to see nearby: Sanchi, Bhimbetka, Panchmadi, etc.
11.	**Bikaner** Rajasthan	**Bikaner** Delhi/Jaipur	Set within Thar desert the city is famous for ancient Indian art, culture and forts. **To See:** • **Junagarh Fort:** The fort, made with red and pink sand stone, surrounded by 30 ft ditch and 37 tombs, was built from 1587 to 1593 by Raja Rai Singh. The fort presents unique design works like glass and marble panels of Chandra Mahal and glasswork of Ful Mahal. Raja Surath Singh built Anup Mahal, inside the fort by using jewels acquired from Golkunda. There are numerous trophies and miniature paintings in the fort museum. • **Ganga Garden Museum:** It displays the collections of terracotta from Gupta, Kushan and pre-Harappa era. The white marble statue of goddess Saraswati here is a unique example of sculpture. • **Camel Breeding Firm:** This place is about 10 km from the city where breeding of nearly 300 camels take place. One should taste camel milk here. **Also to See:** Lalgarh palace, Jain Mandir, Devi Kund Sagar, Karnimata mandir, Gaznel palace, etc,
12.	**Bhubaneshwar** Orissa	**Bhubaneshwar** Kolkata/Delhi/ Nagpur/ Hyderabad/ Visakha-patnam/ Raipur Chennai/ Varanasi	Bhubaneshwar is the capital of Orissa and is famous for its sandstone temples. 'Swayambhu', means the master of the universe which can also be called 'Tribhubaneswar'. The place derives its name from this. **To See:** • **Lingaraj Swayambhu Temple:** This is the most famous amongst all the temples of Bhubaneshwar and features half Lord Shiva and half Lord Vishnu image in the single statue. There are 108 temples within the territory of this temple. • **Nandan Kanan:** This is a combination of botanical and zoologycal garden featuring white tigers, white crocodiles, lion safari park, ropeway, etc. along with numerous varieties of rare trees. • **Puri:** Puri, famous for Lord Jagannath Temple and its rough beaches - is about 100km. from Bhubaneswar.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			• **Konarak:** Konarak features the world-famous Sun Temple and is 64km from Bhubaneswar. • **Chilka Lake:** This 72km X 16km sweet water lake, is the largest of its kind in India and is 50km from Puri. **Also to See:** Vindu Sarovar, Siddhyaranya, Brahmeswar Temple, Khandagiri, Udaygiri etc.
13.	**Bolpur** (Shantiniketan) West Bengal	**Kolkata** Numerous Connections	Bolpur, situated on the bank of Ajoy Nad (River) is about 136km. from Kolkata. The place is famous for 'Shantiniketan', where the famous poet Gurudev Ravindranath Thakur had started an institution with five boys – which is the Vishwa Bharati University at present. 'Uttarayan', where the poet had passed his last days features a museum that displays the Nobel Prize Medal received by the poet in 1913 (recently pilfered). The poet rejected the Knighthood conferred on him, protesting the mass murder of Indians at Jalianwala Bagh, by the British. The museum displays, items like Cup, Gown, Slippers, Pen etc. used by the poet. 'Basantotsab', the festival of colours and 'Poushmela' are the two main functions along with many other functions throughout the year celebrated here. These celebrations and the tranquil scenic beauty of the place are the main attractions of Bolpur.
14.	**Chennai** Tamil Nadu	**Chennai** Numerous Domestic and International Connections	This is the Gateway of Southern India, the capital of Tamil Nadu and the 4th largest city of India. Marina Beach of Chennai is the 2nd largest beach (13km.) in the world. **To See:** • **Fort St. George:** The fort's construction started in 1639 and completed in 1653. A 20ft. high wall with three main entrances surrounds it. The palaces of Lord Clive and Lord Wellesley are within the fort. In British era, the northern part of the fort contained the George Town, the place for whites. The Fort was used by Royal Navy in those days, Helmets, Historic Deeds and Documents etc. are to be seen. • **The St. Mary's Church:** This is the first Protestant church constructed outside European Countries and is situated inside the fort. • **Light Houses:** On the northern side of the Fort, the old Light House is situated. The modern 150ft. high Light House is on the Marina Beach. The aerial view of Chennai from the Light House is very enjoyable. • **Marina Beach:** The 13km. long beach that starts from the southern part of the Fort and ends at San Thome, is covered by yellowish coloured sand and is a popular stretch for walking. • **Kapaleswar Mandir:** This temple of Lord Shiva is at Maylapur, towards the southern side of the city. Many Historical

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			happenings including that of 'Ramayana' are inscribed on the walls of the temple. In 1566, the Portuguese pirates destroyed the main temple. The King of Vijaynagar reconstructed it in the 16th century. • **Guindy National Park:** Built on 300acre land. The Park houses Black Buck, Spotted deer, civet cat, cheetah, antelope, fox, monkey, etc. **Also to See:** San Thome Cathedral created by St. Thomas, Parthasarathi temple, high court building, Anna square, Birla planetarium, Sittarangaram, Perambur Integral coach factory, Guindy deer park, Rajbhavan, Snake park, Anna zoological park, Theosophical society, Sreeperambudur, Red Hill lake (that supplies potable water to Chennai city), etc.
15.	**Coimbatore** Tamil Nadu	**Coimbatore** Chennai/ Calicut/ Madurai/ Mumbai/ Bengaluru/ Hyderebad/ Cochin	Coimbatore is known as the Manchester of South India. The place is world famous for its Forest College. **To See:** • **Perur:** 7 km from the railway station, this temple of Lord Shiva is famous for its admirable artwork. • **Maruthamalai Mandir:** Situated on a hillock about 12 km from the city, the temple features the idol of god Kartikeya. • **VOC Park:** This Park, near the stadium, is created in remembrance of martyrs of India's independence struggle. • **Annamalai Reserve Forest:** This is situated about 90 km east of Coimbatore. Various animals can be seen in their natural environment. **Also to See:** Agricultural University, Race Course, G.D. Naidu Art Exhibition Centre, etc.
16.	**Corbett National Park** Uttra Khand	**Pantnagar** 135 km from CNP. Lucknow/ Delhi Alternate A/P. Lucknow	This is the first national park of India. It was born in the name of Hailey National Park in 1935 and renamed as Corbett National Park in 1957, in memory of the famous environmentalist, nature lover, writer and hunter Jim Corbett. The park spreads between heights of 385 m to 1100 m covering an area of 1318 sq. km. The park features tiger, elephant, gharial, hyena, chital, wild boar, cheetah, blue bull, sambar, etc. along with 500 species of birds. The animals could be seen from 14 observation towers. Safari on elephant back is quite enjoyable and suitable to view the animals. Trout fishing is a popular sport here.
17.	**Dalhousie** Himachal Pradesh	**Amritsar** Delhi/ Jammu/ Srinagar	This 13 sq. km hilly terrain in Chamba valley in Himachal Pradesh, derives its name after Lord Dalhousie, the Viceroy of India in British regime. Five small hills Bhanjar, Patren, Bakrota, Tehra and Kale and three turbulent streams Chenab, Ravi and Bipasha

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			constitute Dalhousie. This flower, fruit, pine and deodar infested quiet place is famous for its scenic beauty, resembling and comparable with that of Scotland. **To See:** • **Panchapulla Falls:** These falls, in a quiet surrounding are dedicated to and visited in fond memory of martyr Ajit Singh. • **Bakrota View Point and Nehru Tibba:** This place offers one of the best breathtakingly beautiful view of snow covered peaks of Himalaya and that of four speedily flowing rivers. • **Daain Kund:** The place at a height of 2440 m, can be accessed by trekking 10 km for a beautiful view of the surroundings and the lake. Further ahead, at a height of 3335 m is Devi Point. **Also to See:** Kalatop, 'Snow Dawn' (The house, where the great poet Ravindranath Thakur lived for certain period), Saatdhara, etc.
18.	**Darjeeling** West Bengal	**Bagdogra** Kolkata/ Delhi/ Guwahati	Darjeeling is famous worldwide for the breathtaking view of the sunrise from Tiger Hill. The magnificent view of Mt Kanchenjunga is even better from Sandakfu, near Darjeeling. The ride on the heritage toy train, which passes through Ghoom, the highest railway station of the world, makes a permanent impression in everyone's heart. **To See:** • **Sinchal Lake:** Potable water for Darjeeling town comes from here. • **Batashia Loop:** During the journey of the toy train from the plains to Darjeeling, its track makes a full circle (a loop) at this place. • **Himalayan Mountaineering Institute:** Presently known as Tenzing Norge Mountaineering Institute, the institute trains adventure loving youths in mountaineering and rock climbing through its basic and advance courses. **Also to See:** Natural history museum, Darjeeling zoological garden, The Mall, Mahakal mandir, Pagla Jhora, Race course, Birch Hill, etc.
19.	**Ellora Caves** Maharashtra	**Aurangabad** (28 km from Ellora caves) Mumbai/ Delhi/ Udaipur/ Jaipur/Pune	Ellora is famous for its caves. • **The Caves:** There are 34 temple caves, formed by excavating basalt rock on mountain slopes and located in a semicircle facing westward. The first 12 caves are Buddhist caves, 13th to 29th are Hindu caves and 30th to 34th are Jain caves. Ellora caves should be seen along with Ajanta caves, which are about 28 km from there.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			Also to see: Grisaneshwar temple, a Hindu pilgrim centre, Ahmednagar fort, etc.
20.	**Gangtok** Sikkim	**Bagdogra** Kolkata/Delhi/ Guwahati	Situated at a height of 1850 m - Gangtok is the capital of Sikkim. The panoramic view of the snow-covered peaks of Mt. Kanchenjunga, Mt. Siniolchu, Mt. Pandim and Mt. Narsingh are visible from the western part of the city. The world famous Rhumtek monastery of Buddhist religion is about 24 km west of the city. **To See:** • **Rumtek Monastery:** The sixteenth Tibetian religious Guru, Gyalwa Karmapa of 'Kagyu-pa' stream built this Monastery, a replica of Tibet's Chhophhuk Gumpha, on the land given by Chogyal in 1968. Lama dance at this place is a 'must see' affair. • **Tsongo Lake:** This 1km. long, oval shaped lake with a depth of 50ft. is about 33km. from Gangtok at an altitude of 12,4000ft. People popularly pronounce it as Chhangu Lake. The surface freezes during winter and it is possible for the visitors to ski on its surface, at that time. • **Nathu-la Pass:** This is near the Indo-Chinese border, at an altitude of 14,400ft. and about 16km from Tsongo Lake. The view throughout the continually ascending road and at Nathu-la Pass is breathtaking indeed. **Also to See:** Tashi View Point, Tibet-logy Research Institute, Orchidorium etc.
21.	**Gaya** Bihar	**Gaya** Kolkata/Patna	Surrounded by three hills Brahmajoni, Ramshila and Prethshila, Gaya is one of the most famous and ancient Hindu pilgrim centre. Millions of Hindus offer rituals to the departed souls of their ancestors here, throughout the year. **To See:** • **Bodh Gaya:** This is one of the celebrated pilgrim centers of the Buddhist religion and is about 12km. from Gaya. **Also to See:** Sun Temple at Deo, Gandhi Mandap, Barabar Cave, Mahabodhi Temple, Bodhi Tree and the Monastery.
22.	**Gir Forest** Gujarat	**Keshod** Ahmedabad/ Mumbai	Gir Forest is the abode of Asiatic Lions and the only place that features Lions in Asia. Panther, Hyena, Wild Bore, Sambar, Blue Bull etc. are also found here.
23.	**Goa** Dabolim 45 km from	**Goa** Mumbai/ Delhi/	Goa is famous worldwide for its superb beaches and scenic beauty. • **To See in Panaji:** One must enjoy the magnificent view of the surroundings from Altino Hill and Patriarch Palace and the unique view of sunset from Dona Paola. The beautiful Miramar

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
	Panaji.	Bengaluru/ Chennai/ Cochin/ Trivandrum	Beach is nearest to the city. • **To See in Northern Goa:** Calangute and Kandolim twin beaches are world famous. The beach offers a magnificent view of sunset. A superb view of the bow shaped 7km.stretch of the Twin Beach and the Light House is available from Aguada Fort. Friday Market at Mapusa has its own attraction. Chhapora Beach is unique. Nearby Anjuna Beach is famous for Seafood. • **To See in Southern Goa:** Ships, from all over the world comes to Mormugao Harbour. • **To See in Old Goa:** The numerous religious establishments of various religions of Old Goa should be visited.
24.	**Guwahati** Assam	**Guwahati** (Gopinath Bardolai International Airport) Kolkata/ Delhi/Shillong/ Agartala/ Tezpur/Jorhat/ Dibrugarh etc.	Guwahati is the capital of Assam and can be accepted as the gateway of Northeastern India. It is famous for the 'Goddess Kamaksha Temple'. The view of the Brahmaputra River from here is breathtaking. **To See:** • **Hajo**: A Hindu, Muslim and Buddhist religion centre. **Also to see:** Nehru Park, Umananda Hill, Sukreshwar Janardan temple, Buddha temple, Assam state museum, etc.
25.	**Hardwar** Uttar Pradesh	**Lucknow** (595 km from Hardwar.) Lucknow/ Delhi/Patna/ Kolkata	The place is famous as one of the topmost Hindu pilgrimage centres. People believe, on bathing in Har-Ki-Pouri, 'Moksha' the eternal peace is bestowed on them. **To See:** Daksha Prajapati temple, Rajaji national park, Chilla wild life sanctuary featuring tiger, elephant, cheetah, panther, sambar, ghural (mountain goats), etc. along with numerous species of birds, Lukshman Jhula, etc.
26.	**Hyderabad** Andhra Pradesh	**Hyderabad** Bengaluru/ Mumbai/ Nagpur/ Bhubaneshwar/ Kolkata/ Delhi/Chennai and many National and international connections	Hyderabad is popularly known as Budapest of India. This twin city comprises Hyderabad and Secunderabad, separated by Hussain Sagar, it is on the bank of Mushi river. This was the capital of nizams in earlier days and now is the capital of Andhra Pradesh. The city is also famous for pearls. **To See:** • **Golconda Fort:** Situated about 11 km west of the city, it remained in possession of Bahamani sultans from 1346 to 1518 and thereafter under Kutubshahiraj from 1518 to 1687. An 18 ft high wall of 11 km circumference, with 8 granite stone gates and 70 watch towers, surrounds the fort. • **Tana Shahi Ka Gadi:** The first floor of this structure is reached by climbing 360 steps and the surrounding scenery from here is worth seeing. In the evenings, the light and sound programme based on the 'mighty sword of Tipu Sultan' is another attraction of this place.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			• **Salar Jung Museum:** This is the best single person collection museum in the world. The collection is of Mir Yusuf Ali Khan the 3rd Salar Jung. The museum has 35 rooms filled with more than 35,000 items. It is said that what could not be found in the world could be found in Salar Jung museum. • **Char Minar:** This structure is shaped like a 'Tazia' with four towers at its four corners that has given it its name. The decorative art on the structure is unique and looks graceful when the lights come on in the evening between 1900 and 2100 hrs. • **Buddha Purnima Complex:** On the Hussain Sagar dam, the monolithic 350 tons statue of Lord Buddha is the second tallest (22 m) Buddha statue in the world. **Also to See:** Osman Sagar, Falaknama place, Public garden, Lord Sri Venkateswara temple on Nabodat hill, Jami masjid, Nehru zoological park, Nizam Sagar dam, etc.
27.	**Imphal** Manipur	**Imphal** Kolkata/ Delhi/ Guwahati	The place is famous for its open market, where 3000 Manipuri ladies sell various handicrafts at a time. **To See:** • **Govindji Temple**: There are statues of Lord Krishna, Lord Balarama and Lord Jagannathdev in this temple. Various functions of Vaisnav religion viz. Rasleela, Gosthaleela etc. are held here throughout the year. • **Moirang Town:** The place is about 45 km from Imphal and on the bank of Loktak lake, where the National Army of Netaji Subhash Chandra Bose (the Azad Hind Fouj), first unfurled the Indian flag on 14th April, 1944.
28.	**Indore** Madhya Pradesh	**Indore** Delhi/ Gwalior/ Bhopal/ Mumbai	The place is famous as an industrial town, especially for its spinning mills. **To See:** • **Kaanch Mandir:** This is also known as Seth Hukumchand mandir and displays the statue of Digambar Jain along with statues of three tirthankars viz. Chandraprabhu, Shantinath and Adinath, on silver platform. The walls and the roof are constructed with glass and semi-precious stones. • **Rajwada:** This 350-year-old palace displays the history of the Holkar family through fresco paintings. The water clock of the palace must be seen. • **Ganapati Statue:** The 8 m tall Ganapati idol is the tallest of its kind in the world. **Also to See:** Geeta Bhavan at Kailash park, Kamla Nehru park, Annapurna temple, etc.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
29.	**Jaipur** Rajasthan	**Jaipur** Delhi/ Mumbai/ Jodhpur/ Udaipur/ Aurangabad/ Kolkata/ Ahmadabad	Jaipur is famously known worldwide as the 'Pink City' for the construction of its houses with pink coloured stone. **To See:** • **City Palace**: The palace occupies about a 7th part of the entire city and is a city by itself. • **Chandra Mahal**: This seven story white marble palace and museum displays numerous unique historical articles. • **Jantar Mantar:** This obsevatory is the biggest amongst five such built by Sawai Jai Singh. • **Hawa Mahal:** Built by Sawai Pratap Singh in 1799 with pink colour stone. This five story building looks somewhat like a pyramid. Air passing through its 360 windows cools it. • **Ambar Palace:** Construction of the palace was started by Raja Man Singh in 1590 and was finally completed by Sawai Jai Singh after more than 100 years. • **Jadughar:** The construction of this museum and the Albert Hall was started by Sawai Ram Singh and completed by Sawai Madho Singh to make the Jaipur visit of Prince Albert memorable. The total expenditure in those days was Rs 4,94,544/-. **Also to See:** Govindji temple, Indology museum, Nahar Garh fort, Queen Sisodia garden, Sanganer, etc.
30.	**Jhansi** Uttar Pradesh	**Gwalior** Delhi/Bhopal/ Indore/ Mumbai.	Jhansi is famous for Rani Lakshmi Bai, the queen of Jhansi, who gallantly fought the British troops in India's freedom fight in 1857. **To See:** Jhansi fort on Bangara hill, Rani Lakshmi Bai's statue, etc.
31.	**Kanha** National Forest Madhya Pradesh	**Nagpur** 330 km from Kanha. Mumbai/ Delhi/ Kolkata/ Hyderabad/ Bhubaneshwar/Raipur	Kanha, with an area of 250 sq. km which has extended to 447 sq. km at present, got its status as a national park in 1955. The forest is situated on Mekhal hill in between heights of 450 and 950 m. Although tiger, cheetah, chital and barasinga are the main attractions of this forest, but sambar, gaur, panther, chinkara, hyena, wild Boar are also visible. US National Park Service and Indian Centre of Environmental Education have jointly developed visitor's centre (exhibition centre) featuring 'Encounters in the Dark', a sound and light show on the forest and its inhabitants.
32.	**Kanyakumari** Tamil	**Trivandrum** 87 km from Kanyakumari.	This is the southern tip of the Indian soil and the meeting point of three oceans viz. Indian ocean in front, Bay of Bengal on left and Arabian Sea on right. The three can be identified distinctly through their colours from the 'Kanyakumari temple'.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
	Nadu	Delhi/ Cochin/ Mumbai/Goa/ Chennai/ Bengaluru	**To See:** • **Vivekananda Rock:** Swami Vivekananda visited Kanyakumari and meditated on a 55 ft rock surrounded by sea from 25th to 27th December, 1892. Later, a temple was constructed and the place derived its name as Vivekananda Rock. **Also to See:** Gandhi temple, Light house, Roman catholic church, Dutch fort, etc.
33.	**Khajuraho** Madhya Pradesh	**Khajuraho** Delhi/ Agra	Khajuraho is famous for its sculptures. At present, there are 22 locations with statues, segmented in 3 sectors viz. western, eastern and southern, which are situated on a 13 sq. km area. Tour of India becomes rather meaningless without viewing these sculptures of Khajuraho. **Also to See:** Archeological museum, etc.
34.	**Kolkata** West Bengal	**Netaji** Subhash Chandra Bose International Airport Numerous national and international connections	This more than 317 year-old city is famous worldwide as 'City of Joy'. Job Charnock could be recognised as the founder of this city. In 1698, East India Company took lease of three villages viz. Kolkata, Sutanuti and Gobindapur by paying Rs. 16,000/- and built Fort Williams in 1699. In 1772 Warren Hastings, the 1st Governer General of India made Calcutta (Kolkata of today) the capital of British dominated India. **To See:** • **Goddess Kali Temple:** This 90 ft high temple on the bank of 'Adi Ganga' river, houses the statue of goddess Kali and is accepted as one of the foremost Hindu pilgrim centres that attracts innumerable devotees from all over the world. The little finger of the right foot of Mother Sati is believed to have fallen here, elevating the place to a 'Pith' of Hindu religion. • **St. Paul's Cathedral:** This Catholic church of Indo-gothic sculpture was built by Bishop Wilson in 1847 by spending Rs. 5,00,000/-. The 247 ft long, 81 ft broad and 201 ft. high cathedral is a replica of Canterbury cathedral and presents a unique example of superb sculpture. • **Shahid Minar:** Octorlony Monument as it was previously known this 50 m tall monument (could be climbed by 218 steps), was built in 1814 to 1816 as a memento of victory in honour of Sir David Octorlony, the hero of the said victory. In the year 1969, it was renamed as 'Shahid Minar' in the remembrance of Indian freedom fighting martyrs. • **Indian Museum:** This is famous worldwide for its geological collections and is one of the museums in Asia that features items from pre-historic age including fossils, mummies,

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			meteorites weighing 56,287 g and many other such specimens. • **Victoria Memorial:** On January, 4 1921, King George the fifth (Prince of Wales, then) laid the foundation stone of this breathtaking specimen of sculpture that is only comparable to the Taj Mahal. The Memorial Hall occupies 26 hectare of land and was built at an expense of Rs. 10 crore in those days. • **Fort William:** This octagonal structure surrounded by a ditch accommodates 10,000 soldiers and is a city in itself. In 1773, its foundation stone was laid and the construction was completed in 1758, at an expenditure of two million British Pounds. **Also to See:** Parashnath Jain temple, Jawahar Sishu Bhavan, Zoo garden, Botanical garden, Floating maritime museum, National library, Ravindra sarovar lake, Raj Bhavan and the world famous Cricket field - Eden Garden.
35.	**Kutch** Gujarat	**Bhuj** Mumbai	Kutch is the largest district of Gujarat that features desert and sea together. Layers of salt cover 5000 sq km soil of northern Kutch. This is the only sanctuary famous for wild asses (gurkhar) in the world. Bhuj is the largest and the busiest base of Indian Air Force. It is also famous for its mirror set embroidered clothing and garments. **To See:** Kutch Museum on Hamirsar lake, Maharao palace, Ayna Mahal, Maharao Sinh Madansinghji museum, Mandavi port and Beach resort (60 km from Bhuj), etc.
36.	**Konarak** Orissa	**Bhubaneshwar** (64 km from Konarak.) Connections as under Bhubaneshwar	Konarak is famous worldwide because of the sculpture of its Sun Temple. Sambya, the son of Lord Krishna established this temple about 5000 years ago. It was rejuvenated, by removing sand and debris in 1904. Pipli, about 44 km from Konarak is famous for its colourful appliqué clothing.
37.	**Kulu Manali** Himachal Pradesh	**Kulu** Delhi/ Chandigarh	36 sq. km Kulu valley is situated between heights of 760 to 3915 m and houses numerous rivers like Satadru, Bias, Chandrabhaga, etc. The valley, known as 'Valley of Gods' is famous worldwide for its scenic beauty, snow covered peaks, turbulent rivers, fruits and flowers. A very popular festival/fair (Kulu Ka Dusshera) takes place on the Dusshera day in the month of October. **To See:** • **Raghunathji temple:** The faith is that Raghunathji came to this place from Ayodhya. The temple is about 1 km from the city at a picturesque location next to Sarbari water falls.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			• **Mahadevi Tirth:** This is situated on the Kulu-Manali road. The idol of goddess Vaishnodevi is inside the cave-temple. • **Bijaleswar Temple of Lord Shiva: '**Thunder destroys the 2 m tall idol of Lord Shiva and the priests mend the statue with pulse powder and butter' – this supernatural happening occurs every year. • **Manali:** It is opined to be more attractive than even Kulu. Manali is situated at a height of 1928 m and is 40 km from Kulu. **Also to See:** Devi Hirimba temple, Triloknath temple, Dhalpur maidan, etc.
38.	**Leh** Ladakh	**Leh** Srinagar/ Jammu/Delhi	Leh, famously known as Lama land, is the capital of Ladakh and is situated at a height of 3521 m in Karakoram range. The hill-surrounded city has houses on its slopes, which look like beehives. A magnificent view of the city and the surrounding hills are available from the roof of the palace of King Namgial. **To See:** • **Hemis Monastery:** Hemis, the biggest monastery in Ladakh, is 35 km from Leh. There are numerous wonderful statues, paintings and scrolls/thankas, in this monastery that are worth seeing. The Lama dance during Setchu (its festival) in June gives a unique experience and is most enjoyable. • **The King's Palace:** Singe Namgyal constructed the palace in sixteenth century as a replica of Petala palace of Lhasa (Tibet). It was damaged by Dogra invasion in the nineteenth century. A grand view of the city is available from the roof of the palace. • **Khardungla:** The Indo-Chinese border at Khardungla, situated at a height of 5300 m is about 46 km from Leh and is worth seeing for its scenic beauty. **Also to See:** Trak Tok Gumpa, Thikshe Gompa, Shankar Gompa, Spituk Gompa, Fiang Gompa, Tshye Palace Gompa, Ecological Development Center, etc.
39.	**Lucknow** Uttar Pradesh	**Amausi Airport, Lucknow** Delhi/Jaipur/ Patna/Kolkata	Previously known as Lakshmanbati, the capital of Lord Lakshman, Lucknow is the present capital of Uttar Pradesh. The river Gomati flows through the city to meet river Sarayu. **To See:** • **Lucknow Museum:** This possesses an incomparable collection of coins of Gupta and Mughal era, manuscripts, paintings and Hindu, Buddhist and Jain sculptures. • **Bara Imambara:** This was constructed in 1784 by Nawab Ashaf-ud-Daula and is the second biggest arch structured hall, in the world. The structure houses Bhulbhulaiya, which consists of exactly similar looking paths. After entering the place, it

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			becomes quite impossible to find your way out through the confusing paths, without the help of trained guides. The main entrance of this structure, known as 'Rumi Darwaza' or 'Turkish Gate' is indeed huge in size. • **Clock Tower:** Nawab Nasir-ud-din Hyder has built this, 67.3 m tower. The construction began in 1880 and was completed in 1887 with an expenditure of Rs. 1,17,000/- in those days. • **Chhota Imambara:** One of the tombs of this structure is made of gold and verses from the Holy Quran are inscribed on it. • **Juma Masjid:** It has three tombs in the shape of onion and two Aazan towers. It is worth seeing. • **The Residency:** Md. Adil Shah had built this place beginning in 1780 and ending in 1800 to provide accommodation for the British ambassador in Ayodhya. • **Open Air Zoo:** This was the first open air zoo in India that provides natural atmosphere to its inhabitants. **Also to See:** Lakshmanawati, Shahnafaz Imambara, Children's museum, Chhattar manzil, Botanical garden, National History museum, etc.
40.	**Madurai** Tamil Nadu	**Madurai** Chennai/ Calicut/ Mumbai/ Coimbatore/ Bengaluru/ Pune	Madurai, meaning the sweet place is situated between Hasti hill and Nag hill. The second city of the state is famous for the sculpture on its temples and for handlooms and handicrafts. **To See:** • **Meenakshi Amman Temple:** The temple was built by Nayak King Tirumalai, and planned by Vishwanath Nayak, in 1560. Built on 15 acres of land this is the second biggest temple of South India. The temple houses the statue of Lord Shiva and goddess Parvati as Meenakshi. **Also to See:** Golden Lotus tank, Temple of Pillars, Musical pillars, Thousand Pillar hall, Mariamman Teppakulam, Thiruparankudram temple, etc.
41.	**Mahabali-puram/ Mamalla-Puram** Tamil Nadu	**Chennai** 58 km from Mahabali-puram. Connections as under Chennai	The city is known as 'City of seven Pagodas', although except one, the rest had drowned in the sea. **To See:** • **Pancha Pandava Rath:** King Narasingha Burman I and Narasingha Burman II built this monolithic cave sculpture on the hill slope, facing Bay of Bengal, in the shape of a chariot, between the years 700 and 728. • **The Arjuna Tapasya:** This sculpture, in the shape of a whale, the largest bas relief of the world, is created by excavating a hillock of 27 X 09 m between the years 630 and 670. • **Shore Temple:** The sixteen-faced temple in granite stone built by the 'Pallavrajas' displays a statue of Lord Shiva and 2.5 m

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			statue of Lord Vishnu on snake bed. This is one of the world heritage temples. The splashing of rough sea waves on the wall of this temple presents a magnificent, but scary view. • **Nao Mandapams:** These nine cave temples, amongst which two remains incomplete, display unique sculptures of ancient days. • **Ganesh Temple:** Built by excavating one single rock, this temple presents a unique example of the ability of ancient sculptors. **Also to See:** Lord Krishna temple, Balancing Rock, School of Sculpture, Light house, etc.
42.	**Mussourie** Uttara Khand	**Dehradun** 34 km from Mussourie. Delhi/ Lucknow.	Mussourie, popularly known as the 'Queen of Hill Stations', is situated at an altitude of 2005 m and is famous for its breathtaking scenic beauty. **To See:** • **Camel's Back Road:** From the Durga Temple on this road the hill in front looks exactly like a camel and thus its name. • **The Ropeway:** This 400 m ropeway from Jhauaghar to Gun Hill presents a magnificent view of Badrinath, Bandarpuchchha and numerous other snow-covered peaks. • **Kemti Falls:** This waterfall, at a height of 1372 m is about 14 km off the city. It falls a few thousand feet and presents a view that is simultaneously scary and beautiful. • **Lal Tibba:** The place is about 4.8 km from the city, is the highest point of Mussourie and offers a magnificent view of the surroundings. • **Kathgodam Tibba:** This view-point is near Lal Tibba and presents a magnificent view of the snow covered peaks. • **Mosi and Bhatta Water Falls:** These are two ideal spots for a day's outing and picnic.
43.	**Mt. Abu** Rajasthan	**Udaipur** 150 km from Mt. Abu. As under Udaipur	Mt. Abu, the only hill station of Rajasthan is strewn with a peculiar kind of granite stone and infested with trees that span an area of 22 X 5 km at an altitude of 1219 m. **To See:** • **Dilwara Temple:** This mango tree infested temple is about 4 km from the city. The temple comprises five small temples; one each of Adinath, Neminath, Mahabir, Rishavdeo and Parswanath and furnishes an example of extreme perfection of sculptural excellence on marble stone. Leather items are banned within the temple area. • **Gurushikhar:** This temple is at the highest point (1722 m) of Rajasthan, about 15 km from the city and offers a clear view of the distant surroundings.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			• **Sunset Point:** Viewing sunset from this point is a unique experience. At one moment, you can see the sun and on the next, it disappears from sight. • **Nakki Lake:** The lake with many small islands is towered by the Tode hill. Boating is a popular pastime here. **Also to See:** Adhardevi temple, Gomukh, Honeymoon point, Gandhi park, Raghunathji temple, Madhavan, etc.
44.	**Mysore** Karnataka	**Bengaluru** 139 km from Mysore. As under Bengaluru	Mysore, a city of art, garden, parks and sandalwood was the capital of the King of Mysore. It is famous for all the aforesaid and its cottage industry. **To See:** • **Vrindavan Garden:** To provide water to Shivasamudram Simasa hydroelectric project a 3 km long and 40 m high dam with a 130 sq. km reservoir was built on river Kavery. Situated under the dam is this eye pleasing garden that is heavenly with its trees, flowers, lawns and fountains in general and dancing fountains in particular. This looks more attractive when the lights come on in the evening. • **King of Mysore's Palace:** A fire destroyed the old palace in 1897. The present palace was built over a span of 15 years spending Rs. 4.2 million, in 1912. The saffron colour palace structure covers an area of 80 X 50 m and is 48 m tall. Paintings of renowned artists like Raja Ravi Verma and many others and numerous historical and must-see items grace the palace. **Also to See:** Jagmohan Palace (Jaya Chamrajendra Art Gallery), Chamrajendra Zoological garden, Lalita Mahal, Chaminda hill, etc.
45.	**Mumbai** Maharashtra	**Mumbai** Kolkata/ Delhi/ Chennai/ Bengaluru/ Hyderabad and numerous national and international connections.	Seven islands viz. Colaba, Fort, Byculla, Parel, Worli, Matunga and Mahim constitute Mumbai metropolis. 46 per cent of total import-export business of India originates from Mumbai. **To See:** • **Victoria Terminus:** The railway station, popularly known as 'VT' was constructed in Italian gothic pattern as a replica of Pancrash station of London. In 1853 the first train started from VT to reach Thane, a journey of 35 km. A statue of Queen Victoria in front of the main entrance is worth seeing for its sculpture. • **Gateway of India:** This 26 m high replica of Arc-de-Triomphe of Paris represents Moorish sculpture was built in the year 1924, in honour of King George the Fifth and Queen Mary. Incidentally, the last British troop had to vacate Indian soil through this place, leaving free India behind. • **Marine Drive:** The lights of the road, which has changed its

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			name recently to Netaji Subhash Road, curves in a semicircle along with the beach to derive its name as Queen's Necklace and indeed appears as a necklace of pearl, when viewed from Kamla Nehru park at night. • **Hanging Garden:** Although the name suggests a hanging garden, it is actually built atop three reservoirs on Malabar hills. The spot presents a magnificent sunset view. • **Elephanta Caves:** These caves on Elephanta Island, a green island dominated earlier by the Portuguese, can be reached by climbing 120 steps and displays sculptures resembling that of Ajanta and Ellora caves. **Also to See:** Flora Fountain, Museum, Jahangir Art Gallery, Taraporewala aquarium, Funeral Tower of Silence, Choupati beach, Juhu beach, Kanheri national park, etc.
46.	**Nainital** Uttara Khand	**Pantnagar** Phool bagh (72 km from Nainital) Delhi/ Lucknow	The city, at a height of 1938 m surrounds the Naini lake which derives its name from goddess Nainidevi and is in turn surrounded by seven peaks viz. Naina Peak (2640 m), Alma (2432 m), Sher-ka-Danda (2405 m), Laria Kanta (2485 m), Ayyarpatta (2320 m), Handi Bundi (2179 m) and Deopatta (2422 m). **To See:** • **Naina Peak:** Previously known as China Peak, this is situated about 6.64 km from the city and presents a breathtaking view of the sunrise, several snow-covered peaks like Nandaghunti, Nandadevi, Nandakot etc. and the city itself. • **Snow View Point:** The place is 2.42 km from the city and at a height of 2287 m. It can be walked down to or can be accessed by a 700 m. long cable way from Malital's Oriel Express. The beautiful snow-covered peaks, as viewed from this place, can also be viewed from Laria Kanta and Tiffin Top. • **Hanuman Garh:** The place is about 3.22 km from the city. The sunset and the panoramic view from this temple of Lord Hanuman are truly unforgettable. • **Land's End:** This point is about 4.08 km from the city at a height of 2352 m and presents a view of Khurpatal lake which appears to be only a small pond from here. The near vertical slope descends from this point to the plains and hence its name. **Also to See:** Dorothy Seat, Bheemtal, Sattal, Bhowali sanatorium, Ramgarh, Mukteshwar, etc.
47.	**Ooty** Tamil Nadu	**Coimbatore** 97 km from Ooty. Calicut/	This 2285 m high hill station on Nilgiris has no snowfall, but has a healthy atmosphere. It is quite different in nature from other hill stations and is infested with flowers, fruit trees and eucalyptus.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
		Cochin/ Chennai/ Madurai/ Mumbai/ Bengaluru/ Hyderabad	There are numerous tea gardens and coffee plantations at this place. The city practically surrounds the race course. **To See:** Botanical garden, Race course, Ooty lake, Children park, St. Stephen church, etc.
48.	**Port Blair** Andaman & Nicobar	**Port Blair** Kolkata/ Chennai	Numerous small islands comprise the territory of Andaman and Nicobar. Amongst these islands, only few are inhibited. Port Blair is the foremost city of Andaman as far as administration of the territory is concerned and is at the southern part of the territory. The beauty of Andaman and Nicobar are the numerous colours of the surrounding sea water, which has hardly any comparison in the world. **To See:** • **Cellular Jail:** The British Government used to send the prisoners with high degree charges, especially with presumed adverse political record, to this jail. Andaman, at that time was known as 'Kala-Pani' and there was a strong belief that any person sent there would never return. • **Gymkhana Ground:** The chief of Indian National Army (Azad Hind Fauj), Netaji Subhash Chandra Bose had unfurled the flag of free India for the first time at this place on 30th December, 1943. • **Carbinescope Beach:** This pleasant palm and coconut tree covered beach is about 10 km from the city and a haven for sea bathers. • **Chatham Island:** This small island is towards the northern side of the city and can only be reached by crossing the small wooden bridge built over the sea. Numerous fishes could be seen from the bridge in the crystal clear water of the sea. **Also to See:** Fisheries museum, Zoological museum, Dilthaman water sports complex, Naval marine museum, Mt. Harriette, Ross island, Viper island, Havlock island, Neel island, etc. Car Nicobar island in Andaman and Nicobar territory is about 150 km. from Port Blair. Indian Air Force base here has a runway longer than that of Port Blair.
49.	**Pune** Maharashtra	**Pune** Delhi/ Chennai/ Bengaluru/ Mumbai	This picturesque, industry based city is 559 m above the sea level on the banks of Mutha and Mula river and is lovingly called the 'Queen of Deccan'. In British era, this dream city of Chhatrapati Shivaji was the monsoon capital of Bombay province. **To See:** • **Parvati Mandir:** The temple is situated on a 261 ft. high hillock and about 3.5 km Southwest of Pune city. The temple was built in the year 1753, spending Rs. 6,00,000/- and displays a gold

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			statue of goddess Parvati along with Lord ganapati, Lord Vishnu and goddess Durga. The panoramic view of the surroundings from here is wonderful. • **Peshwa Garden:** At the base of the hillock of Parvati temple, this beautiful garden spreads on 300 acres of land. The Saibaba temple is a little west of this garden. • **Raja Kelkar Museum:** The museum is segregated in 36 sections and displays about 2000 years old articles like terracotta works, musical instruments, weapons, pictures etc. **Also to See:** Gandhi National museum, Race course, Pataleshwar temple, Rajneesh Dham ashram, Singha Garh, etc.
50.	**Puri** Orissa	**Bhubaneshwar** 56 km from Puri	The Mahaprabhu Jagannathdev temple at Puri is indispensable for any devotee of Lord Vishnu. National and international tourists flock to the place throughout the year. The sea beach of Puri, lovingly known as Briton of India, attracts people equally. The rough sea with mountainous waves here is indeed spectacular. The lifesavers, known as 'Nulliahs' are quite essential for sea bathing at Puri. Viewing the sunrise and sunset, and collecting seashells are the most popular pastimes on the beach. **To See:** • **Jagannathji Temple:** King Anangabhimdev had built the present temple in the year 1198 by spending 5,00,000 tolas of gold. The 24 ft. wall with four gates viz. Singhadwar, Hastidwar, Ashwadwar and Khanjadwar on its four sides surrounds the 670 X 640 ft. temple. A 34 ft. high chlorite pillar in front of the Singhadwar supports a statue of Garuda, the king of birds and the carrier of Lord Vishnu. The statues of Lord Jagannathdev, Lord Balaram and goddess Subhadra get a chariot ride to Gundichabari on the rathayatra day and come back to the temple after a week on Ultorath day. The three chariots of 10 X 10 m floor area and 14 m height have 16 wheels, each of 2.1 m diameter. **Also to See:** Kanpata Hanuman, Sudamapuri, Bidurpuri, Ananda bazar, Indradumna sarovar, Raghurajpur, etc. Chilka lake, one of the largest and most beautiful lakes of India is 160 km from Puri.
51.	**Shillong** Meghalaya	**Barapani** Guwahati/ Aizawl	Shillong is the capital of Meghalaya and touches the boundaries of Goalpara, Kamrup and Kachhar districts of Assam and Maimansingh and Sylhet districts of Bangladesh. This beautiful hill station at 1496 m height, known as Scotland of the East, is covered with Pine and Fir trees, fruits and flowers with a pleasant weather and magnificent scenic beauty.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			To See: • **Ward Lake:** A beautiful wooden bridge connects a island in the middle of the lake with the boulevard. Swarm of colourful fishes could be viewed from the bridge. Boating in the lake is quite an attractive pastime for visitors. • **Golf Club:** On the periphery of the city is the golf club, the second largest in Asia popularly known as the 'Gleneagle of East'. This pine-surrounded nine holes golf course was built in the year 1889 and transformed to 18 holes in 1924. • **Butterfly Collection:** The Delimore Wangkha's butterfly collection contains thousands of butterflies in numerous colours and designs. Butterflies are exported to various countries from here. • **Bada Bazar:** Scores of Khasi ladies sell numerous handicraft products in this market. • **Shillong Peak:** This 1965 m high peak is 10 km from the city and offers a grand view of the city itself along with many peaks of Himalayan range. This is also a very popular picnic spot. • **Elephanta Falls:** It is about 12 km from the city. The vantage point to enjoy the waterfall is from a bridge between two hillocks that is reached by descending down 177 steps of a stairway, surrounded by forest. Along with visual pleasure, the waterfall offers listening pleasure originating from its flow and from numerous chirping birds. **Also to See:** Lady Hydery park and zoo, State museum, Umium lake, Goddess Kali temple, etc.
52.	**Shimla** Himachal Pradesh	**Jubbarhatti** (17 km from Simla) Delhi	Situated at 2213 m Shimla is the capital of Himachal Pradesh and lovingly known as the 'Queen of Hill Stations'. The place is infested with Fur, Oak, Deodar and Pine trees. Flowers, like Lily, Rhododendron and other uncountable coloured wildflowers of unknown variety, magnifies its attraction. **To See:** • **The Mall:** This is the central attraction of the city for a leisurely walk and enjoying the magnificent panoramic view of innumerable snow covered peaks. Shopping Arcades, Hotels, Restaurants, Tourist Information Centre, Railway Booking Office are all available at this place. • **Simla Museum:** The museum displays several sculptures in stone and wood, collected from the temples of Himachal Pradesh along with clothing and traditional paintings from Basoli and Kangra. • **Summer Hill:** This picturesque place is about 5km. west of the city, at a height of 1983m and is reachable by Simla – Kalka

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			narrow gauge train service. The 67m high The Chandwick waterfalls, 2km from this place, is an additional attraction. • **Jaku Hills:** Situated at 2455m and 2km East is of the city, this is the highest point of Shimla and is famous for all round panoramic view of the peaks, the city and the sunrise. • **Retreat:** This six-storied stone palace with wooden staircase was the garden house of British Viceroys in India. India and Pakistan was separated and their Peace Treaty (the Simla Pact) was signed later, in this house. **Also to See:** Simla Kali Temple, Anglician Christ Church, The Glain, Anandel Racecourse, Prospect Hill, Taradevi Temple, Sankatmochan Temple, Amusement Park etc.
53.	**Srinagar** Jammu and Kashmir	**Srinagar** Delhi/Leh/ Jammu/ Amritsar	The Kashmir valley, surrounded by Peer Punjal Hill range, is famously known as the 'Paradise of the World', which indeed it is. The city is situated at a height of 1768m, has an area of 37.8sq. km and is the capital of Jammu and Kashmir. Poplar tree infested Srinagar is analogously famous for its handicrafts like embroidered Shawl, Pashmina, Silk, Carpet and Oak furnitures as its heavenly scenic beauty, magnificent gardens, beautiful lakes and torrential streams. Lodging in well-decorated House Boats is a lifetime experience. **To See:** • **Dal Lake:** This great lake is formed by combination of Gagribal, Lakuti Dal and Bada Dal. The lake with boulevard road on its bank, is towered by Sankaracharya Hill on South. Nagin Lake is also a part of 6X3km Dal Lake. The House Boats are lined up at the middle of the lake and is approachable by small boats known as Shikaras. Touring the lake on Shikaras is a unique experience. The lake water remains almost invisible when it is covered by Water Lilies and Lotus in June and July. • **Char Chinar:** The Island derives its name from four huge Chinar trees at its four corners. It has a spectacular garden and a restaurant. • **Hari Parvat:** The fort on Hari Parvat, situated about 5km north of the city and west of Dal Lake, at a height of 122m over the city level, was constructed by Emperor Akbar in 1586 and derives its name from Maharaj Hari Singh. • **Chashmashahi:** This water outlet is at a distance of 9km from the city, on the bank of Dal Lake and surrounded by three-tire Jawahar Botanical Garden. The out rushing water is believed to cure many diseases. • **Nishat Bagh, Shalimar Bagh and Nashim Bagh:** These three must-see beautiful gardens are infested with trees blooming

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			with varieties of fruits and flowers. Fountains are activated on sundays. Indian tourist development corporation organises Light and sound shows (son-et-lumiere) in the evenings. **Also to See:** Nehru park, Kabutarkhana, Harone, Gagribal park, Pari Mahal, Hazratbal masjid, Sankaracharya mandir, etc.
54.	**Trivandrum,** Kerala	**Trivandrum** Goa/Cochin/ Delhi/ Mumbai/ Chennai	Trivandrum, the capital of Kerala changed its name to Tiruvanthapuram like many other cities of India. **To See:** • **Padnavswami Temple:** This seven storied granite stone temple, based on 368 pillars was established by Raja Martandya Varma in 1729 and is unique in its sculpture. Another attraction of this temple is a 28-pillar based Kulasekhar mandap. If one of the several small pillars is sounded, the sound of mridanga (drum) can be heard by placing one's ear on another pillar. • **Kovalam Beach:** This beautiful beach is only second to Miami in the world. This peaceful, bow shaped beach, with silvery sand has a calm sea in front and presents a spectacular scenery when the fishing boats return in the evening towards the light house. **Also to See:** Park view, Sangumugham beach, Vely tourist village, Napier museum, Chitralayam (art gallery), Priyadarshini planetarium, Science and technological museum, etc.
55.	**Udaipur** Rajasthan	**Udaipur** Jaipur/Delhi/ Agra	This place is famously known as 'Venice of the East' for its lovely lake, marvel palaces, well-decorated gardens and ancient temples. Maharana Udai Singh built the city in 1569 on the slope of the Aravali hills at a height of 577 m. **To See:** • **City Palace:** The granite stone palace originally built in 16th century on the bank of Pichhola lake, has resemblance with the Windsor castle. The mosaic work, miniature porcelain statues, fresco paintings, glasswork in various mahals of the palace are unique. • **Jagdeesh Mandir:** Maharana Jagat Singh built this three-storied temple of Lord Vishnu in 1651, spending Rs. 1,50, 000/ -. At four corners of the temple are four small temples of Lord Shiva, goddess Shakti, Sun God and Lord Ganesha. • **Pichhola Lake:** The lake was built in the later part of the fourteenth. century, occupying an area of 10 sq. km With the construction of Bari Pole Dam, the area has enlarged to 12. sq. km The lake is surrounded by hillocks and infested with small islands.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			Also to See: Sajjan nivas, Gulab bagh, Museum, Jagnivas palace, Fateh sagar, Lakshmi vilas palace, Monsoon palace, Pratap memorial, Sahelion ki baari, etc.
56.	**Varanasi** Uttar Pradesh	**Varanasi** Delhi/Agra/ Khajuraho/ Mumbai/ Kathmandu/ Lucknow/ Bhubaneshwar	Varanasi derives its name from rivers Varuna and Ashi that enclose it. Varanasi, is situated on the bank of river Ganges that turns a semi circle here making its flow appear northwards. Varanasi is known as one of the oldest city of the world and is famous for its 'ghats' on river Ganges and Lord Viswanath temple. **To See:** • **Kashi Vishwanath Temple:** Muslim attackers in eleventh and seventeenth. century repeatedly defaced the temple. The present temple containing the Lord Vishweshwar's linga murti in black stone, was established by Maharani Ahalyabai of Indore in 1776. Punjab Keshari Ranjit Singh covered the tombs of the temple with copper in 1835. 900 kg gold covers the main tomb of this 51 ft. high temple. The temple is one of the foremost Hindu religious spots. The narrow lane connecting the temple with the main road is known as 'Vishwanath Gally'. On both sides of the lane there are various small shops selling numerous articles which makes it famous and unique in the world. • **Durga Mandir:** This is situated towards the Ashi side of the city. Rani Bhavani of Bengal established this saffron coloured temple in the eighteenth. century. The place is popularly known as Monkey temple as it is infested with monkeys. • **'Ghats' on the Ganges of Varanasi:** Owing to its semicircular curvature the Ganges at Varanasi appears to flow Northwards and is known as 'uttarbahini Ganga'. There are about 365 'ghats' constructed by different kings and queens of the past. Amongst these, the Dasaswamedh ghat, Manikarnika ghat and Manmandir ghat, and Ahalyabai ghat are very famous. The boat rides on the river Ganges at different part of day and night to view the scene of the 'ghats' is unequalled in the world. • **Man Mandir:** Maharaja Jai Singh of Jaipur established this observatory in 1710 on Man mandir ghat. The ghat was built by Raja Man Singh of Ambar in the year 1600. • **Benaras Hindu University (BHU):** Pandit Madan Mohan Malviya established this university that teaches 112 of subjects at present on 5sq. km land. Birlas have constructed a replica of 'Vishwanath temple' within the campus of the university. • **Sarnath:** This is one of the ancient and foremost religious spots of Buddhist religion situated about 8 km northeast of the city. It is said that Lord Buddha initiated his preaching on Buddhism from this place.

(*Contd.*)

S. No.	*Place and State*	*Nearest Airport/ Connections*	*Importance and Important places to see*
			Also to See: Gyanbapi, Annapurna mandir, Tulsi Manas mandir, Kedarnath mandir, Alamgir masjid, Sanskrit University, Kashi Naresh's palace at Ramnagar, Vyas Kashi, etc.
57.	**Vishakha-patnam** Andhra Pradesh	**Vishakha-patnam** Chennai/ Kolkata/ Hyderabad/ Vijaywada	This twin city comprises Walteire and Vishakhapatnam and is famously known as Vizag. This is the second biggest port in south India and offers one of the finest beaches on Bay of Bengal. **To See:** Hindustan shipyard, Three Hillocks, Ramkrishna beach, Buddha park, Rishikonda beach, etc.

Answer Sheet

Question	CHAPTERS														
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**
01	d	d		d	d	d	b	d	c	a	d	d		d	
02	b	a		d	d	d	d	c	d	b	c	d		c	
03	a	d		b	c	d	b	b	c	b	a	b		b	
04	c	b		d	a	a	d	b	b	a	d	c		d	
05	b	c		a	c	c	c	c	a	b	b	b		c	
06	c	c		a	c	b	a	c	d	d		a		d	
07	c	c		c	a	c	d	b	a	d		d		a	
08	c	d		c	b	a	a	d	b	d		d		d	
09	b	d		c	d		c		d	b		d		d	
10	d	b		d			c		d	b		b		a	
11	c	d		d			d		d	c		d			
12	d	d		d			c		b			b			
13	**c**	a		**c**			d					**c**			
14	d	b		b			a					a			
15	a	c		b			d					d			
16	b	b					d					d			
17	a						b								
18	b														
19															
20															