getting to grips with cabin safety

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getting to grips with

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1. INTRODUCTION

Welcome to ‘Getting to Grips with Cabin Safety’!

This brochure is a comprehensive review of Cabin Crew Emergency Procedures.

The aim of “Getting to Grips with Cabin Safety” is to provide Operators with guidance to develop procedures to implement their own cabin safety program, which is customized to the Operator’s specific requirements.

The compilation of this "Getting to Grips with Cabin Safety" brochure involved a global understanding of how safety procedures are used onboard aircraft worldwide. This was achieved through extensive research of, studies and articles, accident analysis of aviation authorities worldwide, Airbus in-service experience, and an overview of existing standards and procedures.

No single aviation authority standard is represented by this brochure, as there are many different practices exercised by Operators worldwide.

Should any deviation appear between the information provided in this brochure, and that published in the applicable CCOM, AFM, MMEL, FCOM, AMM, the latter shall prevail at all time.

2. CABIN SMOKE AWARENESS

2.1. INTRODUCTION

It has been said that. “There is no smoke, without fire”. This may not always be true, however, it would certainly be a good indication of an abnormal situation.

Many smoke occurrences are resolved, and do not affect the operation of a flight.

All reports of smoke in the cabin must be regarded as potentially serious.

It is important that crewmembers respond, report, and be aware of the indications of smoke immediately. Identifying the source of smoke, and taking immediate action, will significantly minimize the risk of fire onboard the aircraft.

The existence of smoke may impact flight operations, cause flight diversions, and may result in delays, cancellations, declared emergencies, evacuations. In addition, the presence of smoke may physically affect passengers and crewmembers, if it is not dealt with rapidly and efficiently.

This chapter addresses the various potential sources of smoke onboard an aircraft.

2.2. IDENTIFYING THE SOURCES OF SMOKE

In the aircraft cabin, only some areas are equipped with smoke detectors, such as the lavatories, the crew rest areas and the Video Control Center (A340-500/600) Smoke detection and fire suppression rely on the intervention of the cabin crew.

It is wise to treat a smoke occurrence as a fire, until it has been proven otherwise. Keep in mind that the development of an odor, or smoke, takes some time to reach a level that is easily noticeable.

Smoke occurrences in the cabin usually involve equipment that is easily accessible to cabin crew. It can be observed directly if it is coming from a coffeemaker, oven, a seat video screen, or a passenger seat control box. Sometimes the cabin crew may not see it, but may be alerted by an odor. In this case, the odor should be traced to its strongest location, in order to pinpoint the source of the smoke. Another indication may be a surface that is abnormally warm.

If the source can be identified, and is connected to an electrical source (for example, a coffeemaker), the circuit breaker relating to that coffeemaker should be pulled. If the source of the smoke cannot be identified, and is coming from the galley area, isolate the area by using the “galley shutoff”, or by pulling all of the galley circuit breakers to cut off the power source.

In case of smoke emissions from any electrical source, first of all, remove the power source.

Keep firefighting equipment readily available, in the event that the situation deteriorates.

2.3. DIFFICULT TO IDENTIFY SOURCES OF SMOKE

In January of 2004, the FAA issued an Advisory Circular entitled 'In-Flight Fires'. The Advisory Circular was issued with emphasis on hidden fires, and the importance for crewmembers to:

- Recognize the sources of smoke
- Rapidly assess conditions
- Take immediate action to gain access to fires that are behind interior panels.

One of the first indications of a hidden fire may be smoke emitting from areas that cannot be accessed easily by the cabin crew, such as sidewalls, overhead panels, air ducts, ceiling panels, or cargo compartments. These "hidden areas" may have little, or virtually no access, and have very restricted or no visible way of being monitored.

Smoke emissions from these areas is a definite sign of a problem.

Many of these "hidden areas" involve wiring, air conditioning, and insulation, and may, in fact, hide a potential fire within the aircraft.

Smoke emitting from the seams of a wall panel may possibly indicate electrical arcing that has ignited another piece of material.

Smoke and fumes, due to contamination of the cabin air supply, may also infiltrate the cabin. Items that are in the cargo compartments are another source to consider.

Immediate investigation of odors, fumes, unusual noises, and passenger observations that may relate to a smoke occurrence, may save valuable time.

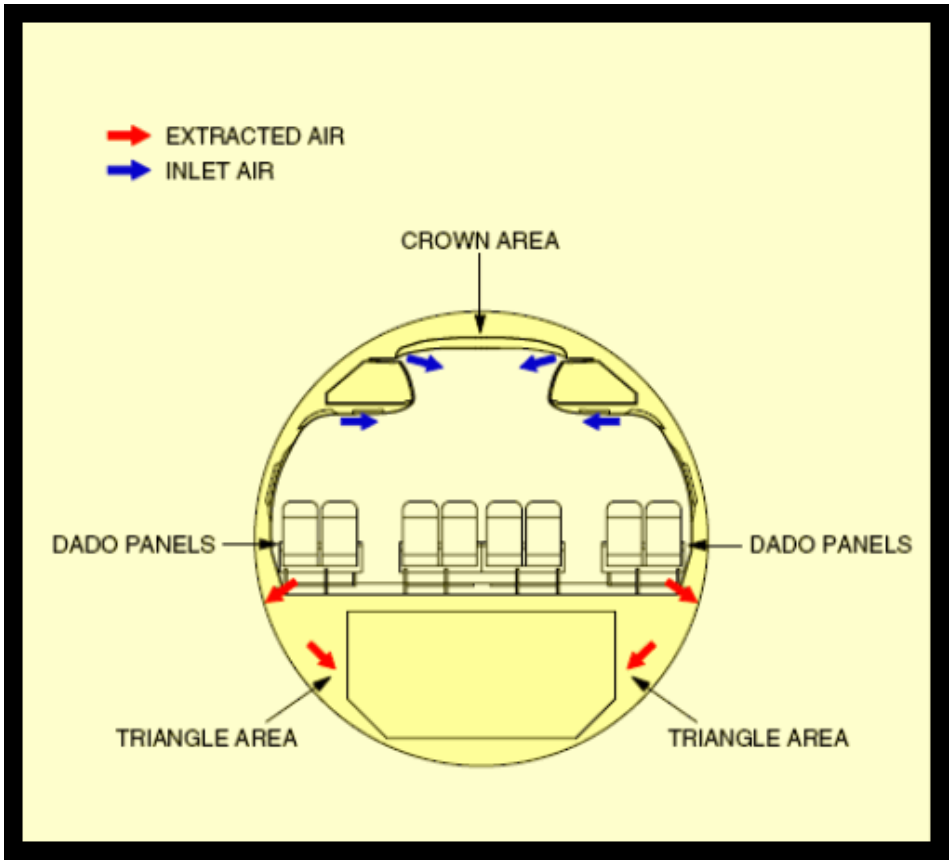
The diagram below is a typical cross-section of an aircraft. It is important for cabin crew to be aware of the potential sources of smoke onboard the aircraft, and to familiarize themselves with these areas. This enables crewmembers to determine the source of the smoke, and take immediate action.

- **Crown Area**. This area is above the ceiling panels. This overhead area includes wiring bundles, control surface cables, passenger emergency oxygen system, parts of the air conditioning system, and components of the aircrafts In-Flight Entertainment System (IFE).

- **Dado Panels**. These are the vents that are at the foot of the sidewall panels, on each side of the passenger cabin. Most aircraft air conditioning systems supply conditioned air from the cabin ceiling. This conditioned air then flows from the top of the cabin to the bottom, exits via the return grills, and finally leaves the aircraft via the outflow valves.

- **Triangle Area**. This area is below the floor outboard of the cargo area. This area hosts hydraulic lines, electrical components and wiring bundles.

Figure 2-1
(Source. Airbus Cabin Crew Operating Manual)



2.4. CIRCUIT BREAKER PHILOSOPHY

Circuit breakers perform a dual function in aircraft electrical systems. Their primary function is to provide protection from overheating, due to an abnormal electrical load on a piece of equipment, which may result in the total or partial deactivation of the electrical installation owing to a short circuit.

The secondary function is to facilitate the isolation of specific circuits that do not have any other switching mechanism.

The likely reason for a circuit breaker to trip is an abnormality in the electrical load, or in the associated wiring. A circuit breaker will open, when a predetermined current is detected. A thermal sensing element (e.g. bi-metal), whose characteristics are dependent on the current, opens the circuit.

"Pulling" a circuit breaker will cut off the power source to an electrical item. A circuit breaker that has been "pulled" or "tripped" automatically, should **never** be re-engaged by cabin crew. However, it must be reported and recorded in the maintenance log, according to the Operators policy.

Circuit breakers that relate to cabin items, such as lights, and entertainment systems may be used to isolate equipment in the event of smoke and fire, in accordance with the operator's policy.

Cabin crewmembers should report all electrical failures and malfunctions to the flight crew.

Tripped circuit breaker(s), particularly multiple circuit breakers, in galleys or in the In-Flight Entertainment System, may indicate a problem in a "hidden area" of the aircraft, where wiring and other components are located.

Re-engaging a tripped circuit breaker may aggravate any electrical damage, and risks affecting other equipment. This may result in a temperature increase, and smoke emissions in the area concerned.

Circuit breaker "re-engagement" has been the causes of some smoke and fire occurrences.

Do not use circuit breakers as "ON / OFF" switches for equipment.

Figure 2-2

Example of Galley Circuit Breaker Panel

2.5. CABIN TO COCKPIT COMMUNICATION

The importance of effective crew communication cannot be stressed enough, particularly in an abnormal/emergency situation. During the study of many accident and incident reports, crew communication has played an extremely important role, and has significantly contributed to the outcome.

In the past, ineffective (or lack of) communication amongst the cabin crew and the flight crew has contributed to the severity of an accident. Equally, effective communication between the flight crew and the cabin crew has made the difference between an accident and an incident.

Effective communication :

- Reduces confusion
- Increases confidence in decision making
- Improves the chances of a successful outcome

The information that the flight crew receives from the cabin crew determines the course of action that the flight crew will take. Therefore, it is vitally important that the flight crew receives a realistic account of the events in the cabin, as they occur.

If smoke or fumes are detected in the cabin, the flight crew should be informed immediately.

One cabin crewmember should act as a liaison between the cabin and the flight crew, via the interphone. This is to avoid conflicting information.

The information should be clear and concise, and reflect the conditions in the cabin. **Remember to “Keep it Simple”!**

- Location
- Source (if possible)
- Severity (density, color, odor, how it is affecting people)
- Action taken.

Never underestimate the severity of smoke and fire, when reporting to the flight crew.

Do not mention fire, unless flames are actually visible.

2.6. COMPONENTS OF SMOKE AND PHYSIOLOGIAL EFFECTS

The nature of smoke, its ability to spread quickly, and its chemical components and fumes may cause damage rapidly, and lead to death within a relatively short period of time.

Smoke has the ability to impair judgment and affect performance. The effects of smoke inhalation depend on the individual level of tolerance. Materials that the used in the cabin, such as curtains, plastic, paper, or carpets, release toxic fumes when smoldering.

- **Carbon monoxide (CO):** This is produced when carbon-based items burn. Many items onboard the aircraft are carbon-based.

  Effects: Dizziness, headaches, vomiting, impaired alertness, problems of vision and lack of judgment.

- **Hydrogen cyanide:** This is produced when nitrogen based items burn. These include items such as, wool, silk and nitrogen-based synthetics.

  Effects: The effects are the same as the above-listed for carbon monoxide. However, because hydrogen cyanide interferes with the way oxygen is carried in the body, and its effects on the respiratory system, death from cyanide poisoning is relatively quick.

- **Hydrogen chloride & Acrolein :** Both of these chemicals are found in smoke that is produced, when electrical wires burn.

  Effects: These act as a severe irritant to the eyes and the respiratory tract, causing pain, tears and disorientation.

In some cases, when smoke and toxic gases have been present in the cabin, some crews have had difficulty in verbal communicating, due to the effects of smoke inhalation on their voices.

2.7. PROTECTION FROM SMOKE INHALATION

Smoke fumes, even when inhaled in small quantities, may be fatal depending on the individual's level of tolerance. If the concentration of smoke and fumes becomes excessive, crewmembers must take action in order to protect passengers, and themselves, from the effects of smoke inhalation.

- Cabin crew should put on a PBE to protect themselves from the effects of smoke inhalation
- Do not open the cockpit door. Every effort should be made to prevent smoke and fumes from contaminating the cockpit
- Move passengers away from the area if possible
- If it is not possible to relocate passengers, encourage them to keep their heads as low as possible to the floor level. (As smoke rises, there is more breathable air at floor level)
- Distribute wet towels, or wet cloths to passengers. Instruct passengers to breathe, placing the wet towels/cloths over their nose and mouth. This will help filter out acidic gases such as hydrogen chloride, hydrogen fluoride and hydrogen cyanide, as well as smoke particles.

In the past, smoke occurrences have resulted in aircraft evacuations. Incapacitation, due to smoke inhalation, may diminish the ability to evacuate the aircraft, and may reduce the chances of survival.

2.8. SUMMARY

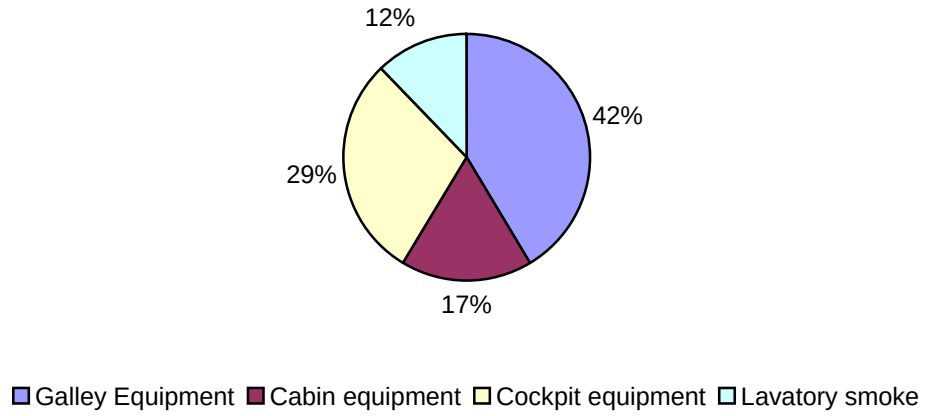
It is important to remember that a smoke occurrence can be a potential fire that, if left undetected, can deteriorate within a short space of time.

- Smoke occurrences require cabin crewmembers to respond quickly, to locate the source and notify the flight crew without delay
- When the source of the smoke can be identified, immediate intervention by the cabin crew can minimize the risk to flight safety
- Cabin crew should be aware of the indications of smoke from “Hidden Areas”.

2.9. ANALYSIS OF IN- SERVICE OCCURRENCE REPORTS

In-Service Occurrence reports (ISO's) relate to incidents that happen during aircraft operations and are reported back to Airbus by Operators. The following chart represents the in-flight smoke occurrences reported during 2003.

Easy to locate sources of smoke



This chart represents the type of smoke occurrences that are easy to identify, that involve equipment that is easily accessible to crew, as described in the previous chapter.

- Galley equipment represents the largest percentage 42%. Coffeemakers and ovens contributed to the majority of smoke occurrences. It is interesting to note that in some of the smoke occurrences involving ovens, an element of human error was involved. One example was paper towels left in the oven being the cause of smoke. Food and grease deposits in the ovens were also a contributing factor in some cases.

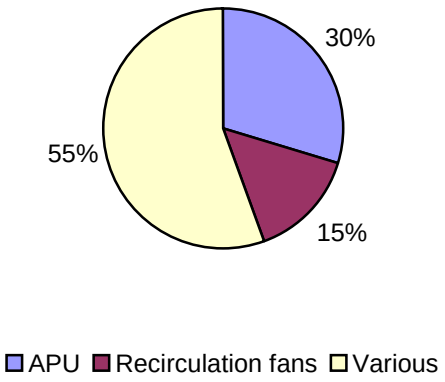
- Cockpit equipment included. A closet light unit, CDSS monitor, MCDU, and map reading light.

- Cabin equipment included. IFE screens and lights (ballast, reading and ceiling).

- It is interesting to note that all lavatory smoke occurrences were the result of passengers smoking! In one instance the crewmember smelt the odor, but the lavatory smoke detector was not activated, because the passenger was holding a cup over it to prevent activation!!

The following chart represents the type of smoke occurrences that are difficult for the cabin crew to identify the source of. These types of smoke occurrences contaminate the cabin through the ventilation system and air ducts, or produce smoke from panels that would be difficult for crewmembers to access.

Sources of Smoke that are Difficult to Identify



- The largest portion of the chart is “various”, as there were many different sources of smoke in the cabin that occurred in many different ways. These include bird ingestion, lightening strike, smoke from an oxygen outlet panel, external power receptacle, contamination of an oil filter, damaged wire bundles behind panels, and circuit breakers that did not “trip” for in-operative items.

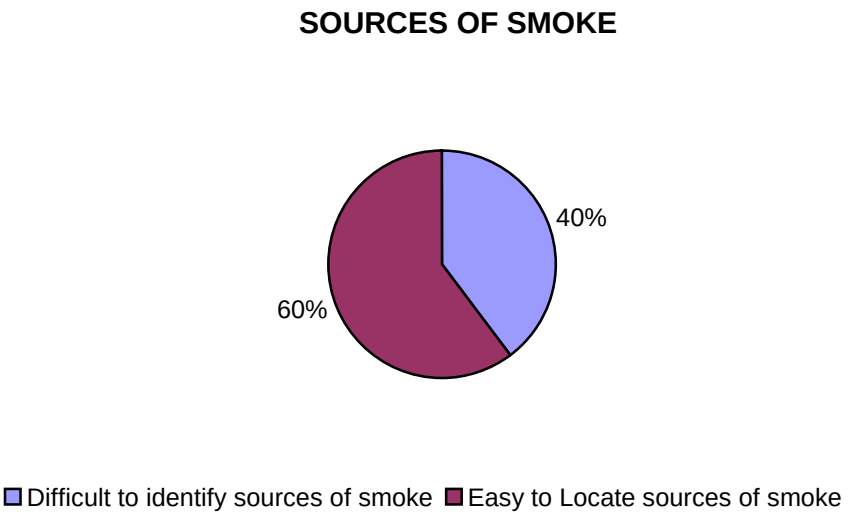
- The APU was identified as, not only contributing to smoke occurrences, but also as the origin of fumes and odors. The ingestion of anti/de-icing fluids by the APU may cause smoke in the cabin, and can trigger smoke warnings in the cockpit. This kind of contamination goes through the bleed air system, and then through the air conditioning, leading to smoke in the pressurized areas of the aircraft.

- Cabin recirculation fans have also contributed to smoke occurrences, and can be the cause of a significant amount of smoke in the cabin.

2.10. ANALYSIS SUMMARY 2003

From the analysis, we can see that the cabin crew easily identified 60% of the smoke occurrences reported. However, 40% of smoke occurrences were not easily identifiable, therefore re-enforcing the need for cabin crew to be aware of other possible sources of smoke in the cabin, particularly in hidden areas.

- In the final analysis only one of the smoke occurrences resulted in fire. This was an oven fire that was caused by saran/plastic wrap, left on during the cooking cycle.
- Smoke occurrences have resulted in cabin crewmembers and passengers being hospitalized, due to smoke inhalation.
- The effects of fumes reported by crewmembers were eye irritation and sore throats.
- The percentage of flights that diverted due to smoke occurrences was 20.60% for the year 2003.
- Smoke occurrences have resulted in some full emergency evacuations.



2.11. LIST OF ODORS MOST REPORTED

The following table lists the types of odors that are the most often reported from Airbus operators. The words used to describe the odors reflect the language used in the reports. However, the purpose is to link the odor to its possible source.

DESCRIPTION OF ODORS	PRIMARY CAUSE (MOST REPORTED LISTED FIRST)
Acrid	Electrical Equipment/IFE Engine Oil Leak
Burning	Electrical Equipment Galley Equipment Bird Ingestion
Chemical	Contaminated Bleed Cuts APU Ingestion
Chlorine	Smoke hood Blocked Door Area Drain
Electrical	Electrical Equipment
Dirty Socks	APU or Engine Oil Leaks
Foul	Toilets
Fuel	APU FCU/Fuel Line
Oil	Engine or APU Oil Leak
Skydrol	Engine Hydraulic
Sulphur	Wiring Avionics Filter Water Contamination Light Bulb

2.12. DRY ICE

Dry ice is a familiar item in the aircraft galleys; caterers to preserve food items that need to be kept chilled usually use it.

Dry ice, is, solidified carbon. It is subject to the process of sublimation, i.e. the conversion of a solid substance directly in to gas (carbon dioxide vapor).
Dry ice gradually releases carbon dioxide, which is not poisonous, but may well present a problem, in confined or poorly ventilated areas. Crewmembers should be aware of the physiological symptoms that are associated with a higher than normal level of carbon dioxide in the air. Symptoms include:

- Headache
- Dizziness
- Shortness of breath
- Muscular weakness
- Drowsiness
- Ringing in the ears

The recovery time is rapid after leaving the affected area. If, crewmembers experience these symptoms in-flight, they must:

- Leave the affected area
- Notify the Purser and the Flight crew
- Complete a flight report (Air Contamination)
  - Give details of the number of crewmembers affected,
  - The type of symptoms experienced by crewmembers
- Report to the medical department upon arrival

The hazards associated with dry ice onboard the aircraft are considered minimal under normal cabin ventilation conditions.

The following precautions should be taken when handling dry ice:

- Use gloves to handle dry ice – do not let dry ice contact the skin
- Do not let dry ice contact water– As it produces smoke

The transport of dry is the sole responsibility of the operator.

3. MANAGING ONBOARD FIRES

3.1. INTRODUCTION

Fire is considered to be the most serious in-flight emergency. A recent study of in-flight fires carried out by the Transportation Safety Board of Canada, in which 15 in-flight fires between the years 1967 and 1998 were studied, revealed that the average length of time between the discovery of an in-flight fire and Controlled Flight into Terrain (CFIT) 17 minutes.

A fire must be brought under control as soon as possible. Considering how time critical this type of emergency is, it is imperative that not a second is lost in trying to suppress the fire and minimize the risk to the flight.

Due to the nature of a fire, and its devastating effects on an aircraft, particularly within a confined space, it is important to know what steps should be taken to prevent the fire, and to stop it from spreading.

Emphasis has been placed on flight crews taking “Immediate and aggressive action” to locate the source of the fire and to immediately put it out. Any fire, no matter how small, may rapidly become out of control, if not dealt with immediately.

Therefore, at the first sign of any fire, the first priority will always be **to put it out.**

In-flight firefighting skills require knowledge, technique and realistic “hands on” training for crewmembers.

3.2. EASA/JAA FIRE AND SMOKE TRAINING STANDARDS

Every aviation authority has its own cabin crew training standards and requirements. In Eu-Ops/Jar-Ops 1, subpart O, 1.1005, the fire and smoke training standards for cabin crew operating within the EASA/JAA region (Europe), and is as follows:

"Fire and Smoke Training. An operator shall ensure that fire and smoke training includes.

1. Emphasis on the responsibility of cabin crew to deal promptly with emergencies involving fire and smoke and, in particular, emphasis on the importance of identifying the actual source of the fire;

2. The importance of informing the flight crew immediately, as well as the specific actions necessary for co-ordination and assistance, when fire and smoke are discovered.

3. The necessity for frequent checking of potential fire-risk areas including toilets, and the associated smoke detectors;

4. The classification of fires and the appropriate type of extinguishing agents and procedures for particular fire situations, the techniques of application of extinguishing agents, the consequences of misapplication, and of use in a confined space; and

5. The general procedures of ground based emergency services at aerodromes".

In any abnormal/emergency situation onboard the aircraft, the training received by the crewmembers will have a direct impact on crew performance. Training is the most effective way of improving crew awareness and co-ordination, and should include flight crew and cabin crew being instructed in each other's basic emergency procedures, with particular emphasis on smoke and in-flight fires.

Training should give crewmembers the confidence to feel that they have the necessary information and techniques to deal successfully with any type of onboard fire.

3.3. FIRE DETECTION

Fire protection is an integral part of the design of the modern aircraft. In the passenger cabin all cabin crew and passenger seats are fire blocked, lavatories are equipped with smoke detectors, and automatic fire extinguishers beneath each sink. Crew rest areas are equipped with smoke detectors and extinguishers. Even galley and toilet waste bins are designed to contain fire. Yet, cabin fires may still occur.

Sometimes a fire may not always be obvious, and smoke and flames may not always be visible, but there may be other indications that a potential fire is in progress. Signs to be aware of include.

- Fumes or unusual odors
- Electrical malfunctions, for example, circuit breakers “tripping”
- Noises, such as, popping, snapping or crackling, which may indicate electrical arcing
- Hot spots on sidewalls, floors, and panels should be investigated.

If passengers or crewmembers suddenly develop eye irritation, sore throats, and/or headaches, may indicate that gas fumes are present, but may have not reached a level where they are visible.

Cabin crewmembers must immediately investigate any reports from passengers that may indicate a fire.

The aim is to locate and extinguish a fire in the early stages.

Fires can be complex, in order to fight a fire successfully crewmembers need to know what they may have to deal with, therefore it is important to know a little about fire chemistry and combustion and the different “classes” of fire.

3.4. FIRE CHEMISTRY

The principle of fire safety is keeping fuel sources and ignition sources separate.

Combustion consists of four elements:

- **Oxygen:** Needed to keep the fire going
- **Heat:** Needed to ignite material
- **Fuel:** In the form of a combustible material
- A chemical chain reaction, and the result = **FIRE**.

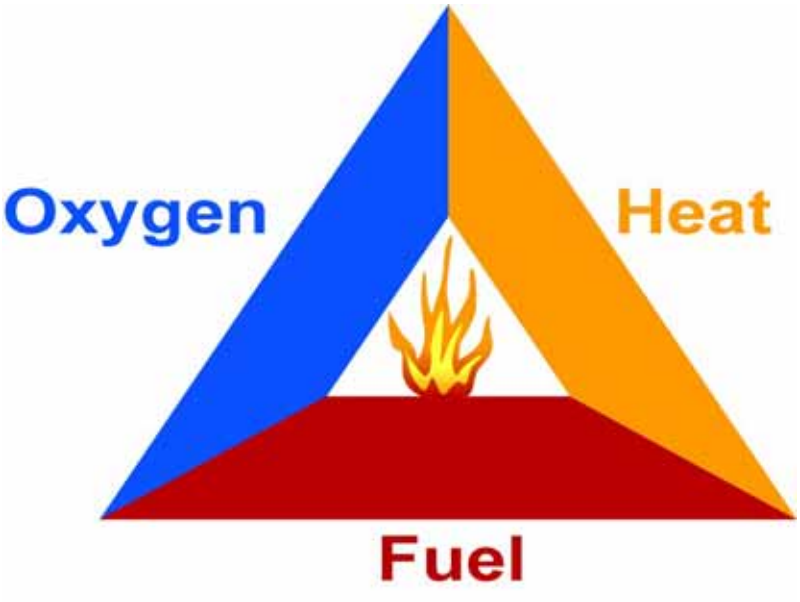


Figure 3-1
The fire triangle

The principle of firefighting is to remove at least one element from the fire, in order to put it out.

Fire has three recognized stages:

1. The Incipient Stage. The preheating stage, when the fire is in slow progress.

2. The Smoldering Stage. When the initial combustion begins. This is the stage were a light haze will appear, or smoke particles may be visible. The smoke particles can be transported away from the source by convection and background air movement.

3. The Flame Stage. When the fire has fully developed, and is spreading rapidly.

A fire will continue until:

- All the fuel has been consumed
- One, or more, element has been removed
- The temperature has been reduced
- The chain reaction has been broken.

3.5. CLASSES OF FIRE

Fires are classed as A, B, C, and D type fires. Onboard an aircraft, classes A, and C are the most commonly encountered. It is important for cabin crew to select the appropriate fire extinguisher, according to the type of fire.

Class A Fires: Wood, paper, cloth and plastic are the fuel source.
This type of fire needs to be cooled and quenched by using water. A water/glycol extinguisher should be used or a non-alcoholic liquid. For example, juice, tea or coffee will extinguish this class of fire. Class “A” fires need to be quenched and cooled by water, or solutions containing a large percentage of water. Halon can be used if it is the closest extinguisher available, but the area needs to be soaked, with non-alcoholic liquids afterwards.

Smoke: Usually grayish/brown in color. The smoke can be quite dense , depending on the quantity of fuel.

Class B Fires: Contain flammable liquid, hydraulic fluid, oil, tar or aircraft fuel. Extinguishing agents need to have a blanketing effect. A Halon extinguisher would be required.

Smoke: Usually black in color, very thick, very distinct oil/petrol-like odor.

Class C Fires: Involve live electrical equipment. The emphasis is placed on extinguishing the fire with an element that is non-conductive, and avoiding damage to nearby electrical circuitry. Halon extinguisher should be used.

Smoke: Usually light grey, nearly white with a bluish tinge. Very fine smoke can disperse rapidly. Has a distinct acrid odor.

Class D Fires: Involve combustible metals, for example, sodium, magnesium, lithium and potassium. Special powder extinguishers are used on these types of fire, because of the possible chemical reaction between the burning and extinguishing agent.

3.6. HALON EXTINGUISHERS

The use of Halon has generated some controversy and misunderstanding during recent years, however the FAA advisory circular AC120-80 'in-flight fires' issued in January, 2004, addresses the subject of Halon use, by stressing the effectiveness of Halon, when fighting in-flight fires.

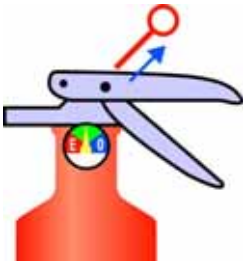
"NTSB investigations of in-flight fires indicate that crewmembers have been hesitant to use Halon extinguishers during flight because of mistaken ideas about the adverse effects of Halon. In one instance, a flight attendant went to the cockpit to inform the flight crew of a fire and asked the captain whether to spray Halon in to a vent where she suspected a fire. The captain instructed her not to use the Halon extinguisher, indicating he was concerned about spraying Halon in the cabin. In another instance, an off-duty company pilot considered using a Halon fire extinguisher, but decided against doing so because he was concerned that the Halon "would take away more oxygen". In each instance, the crewmembers lost critical time and delayed the aggressive pursuit of the fire" (Source FAA Advisory Circular 120-80, January 2004).

Halon or BCF (chemical name bromochlorodiflouromethane, are member of the chemical family of Halogenated Hydrocarbons) is a liquefied gas that extinguishes fires by chemically interrupting a fire's combustion chain, as opposed to physically smothering the fire. This is one of the main reasons why Halon is effective when the exact source of the fire cannot be positively determined. A small concentration of Halon in the air as a vapor will prevent a fire from continuing to burn.

Halon is toxic, and crewmembers should take precautions when using a Halon extinguisher in a confined/unventilated area. A PBE (Portable breathing equipment) should be used.

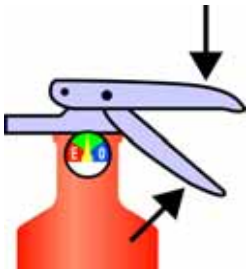
"The NTSB has expressed concern that the risks of exceeding the maximum recommended levels of Halon gas outlined in AC 20-42C have been over emphasized in crewmember training programs, especially when compared to the risks of an in-flight fire. The NTSB emphasizes, "that the potential harmful effects on passengers and crew [of Halon] are negligible compared to the safety benefits achieved by fighting in-flight fires aggressively". The toxic effects of a typical aircraft seat fire, for example, far outweigh the potential toxic effects of discharging a Halon fire extinguisher" (AC-120-80, January 2004).

3.7. HOW TO USE A FIRE EXTINGUISHER

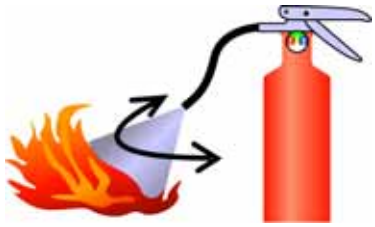


Pull the pin or turn the handle.
Until the pin is released the extinguisher is locked. The pin needs to be removed to release the handle or lever.

Aim at the base of the fire.
The extinguisher must be aimed at the base of the fire, in order to remove the source of fuel.



Squeeze the top handle or lever.
This will release the extinguishing agent. Releasing the lever will stop the flow. Hand held extinguishers should always be held upright.



Sweep from side to side.
Use the extinguisher in a sweeping motion. Initially, stand 8/10 ft away (2.5m). As the fire reduces, move closer with the extinguisher. Always direct the nozzle at the base of the fire.

The right technique in fighting a fire is an important part of the process. There are only a limited amount of fire extinguishers onboard the aircraft, therefore it is important to maximize their use.

- For the best results, attack the base of the fire at the near edge, progressively working to the back of the fire, by moving the fire extinguisher nozzle in a sweeping motion from side-to-side.

- The fire extinguisher should not be discharged on a burning surface at close range. A distance of 5 to 8 feet (1.5m to 2.5m) should be respected, because the speed of the extinguishing agent being discharged may cause splashing or may scatter burning material.

- The duration of use of a fire extinguisher may be between 8 to 25 seconds depending on the make and model of the extinguisher. The correct selection and use of the extinguisher must be made without delay.

- Have backup extinguishers available to use immediately after depletion, in order to maintain the firefighting effort.

3.8. CREW COMMUNICATION AND COORDINATION

In the event of a fire onboard the aircraft, communication and coordination between the cabin crew and flight crew are essential. If a fire is discovered in the cabin, the flight crew should be informed immediately. One person should maintain contact with the flight crew via the interphone, near to the fire scene.

The method of reporting should be clear and concise, in order that the message is understood. Keep it simple and keep to the facts. Tell the flight crew exactly what is happening in the cabin.

- Location of the fire
- Source
- Severity/density of the fire, including odors and the color of smoke
- Firefighting progress
- Number of fire extinguishers used
- Time firefighting action started.

The flight crew relies on the reports provided by the cabin crewmembers, to determine the course of action to take. The cabin crew must continue to advise the flight crew about of the conditions existing in the cabin, and kept up to date on the firefighting progress.

The following is an extract from an NTSB final report after an onboard fire.

"The board determined that the probable cause of the accident was a fire of undetermined origin, an underestimate of fire severity, and conflicting fire progress information provided to the captain. Contributing to the severity of the accident was the flight crew's delayed decision to institute an emergency descent" (NTSB/AAR-84/09)

3.9. WORKING AS A TEAM

The firefighting procedures require a team of at least three cabin crewmembers. A team effort is the most effective way to combat an onboard fire. The roles are defined as follows:

- **The Firefighter**
- **The communicator**
- **The Assistant Firefighter**

Crew communication and coordination is important, and the roles of these three cabin crewmembers complement each other, because their tasks are performed simultaneously, in order to optimize the firefighting effort.

- **The Firefighter:** The first crewmember that finds the fire will take the role of the Firefighter. This cabin crewmember:

– Alerts other cabin crewmembers
– Obtains the nearest fire extinguisher
– Immediately locates the source of the fire
– Fights the fire.

- **The Communicator:** The second cabin crewmember on the scene. The communicator. Informs the flight crew of the fire/smoke.

– Location
– Source
– Severity/Density (Color of smoke/odor)
– Firefighting progress
– Number of extinguishers used
– Time firefighting action started.

The communicator maintains the communication link between the cabin and the flight crew, via an interphone that is near the firefighting scene.

The communicator must provide the flight crew with an accurate description of the firefighting effort, and of the situation in the cabin.

- **The Assistant Firefighter:** The third cabin crewmember on the scene. The Assistant Firefighter:

- Supplies extra firefighting equipment
- Supports the firefighting effort
- Removes flammable material from the area

The Assistant Firefighter must be prepared to replace the Firefighter, and exchange roles with the Firefighter, as required.

- **Support crewmembers:** These crewmembers are not directly involved in the firefighting effort, but will be required provide assistance (e.g. to relocate passengers, administer first-aid, calm and reassure passengers).

After any fire or smoke occurrence, one crewmember should be responsible for monitoring the affected area for the remainder of the flight, and should regularly report to the Purser.

3.10. PASSENGER MANAGEMENT

If there are passengers within close proximity to the fire, move them away from the immediate area. If the amount of smoke or fumes is affecting the passengers, encourage them to cover their nose and mouth with a cloth, to protect from smoke particles. Alternatively, and better still, distribute wet towels to the passengers, if available. Instruct passengers to protect themselves from smoke inhalation.

If a passenger needs to be treated for smoke inhalation, and requires oxygen, the passenger must be moved away from the affected area, before administering the oxygen.

It is important to take into account the reaction of the passengers during an onboard fire. Most passengers will express concern, or may even panic. Therefore, there is definite need for crewmembers to be present in the cabin to calm and reassure passengers. Crewmembers who are not actively involved in the firefighting effort should remain in the cabin to give assistance where required.

Keep the passengers informed, in a calm and reassuring manner, by telling them what is happening. This may help them to prepare psychologically for what may come, particularly in the event of an emergency descent or an evacuation.

3.11. OVEN FIRES

Oven fires deserve a special mention because of the frequency of their occurrence. Many oven fires are preventable.

The Civil Aviation Authority, in the United Kingdom, issued a Flight Operation Department Communication in October 2003, which addresses the increased amount of reports of oven fires. The CAA made the following recommendations to operators.

a. "Operators should review their current procedures, amending their Operations Manuals where necessary, to ensure that the following items are covered.

b. Cabin crew pre-flight checks should include a requirement for all ovens to be inspected not only for cleanliness but also to ensure that no foreign objects are present;

c. Cabin crew procedures should include a requirement to inspect ovens prior to switching the oven on to ensure that no foreign objects are present;

d. Cabin crew procedures should include guidance as to the steps to be taken following the spillage of food or grease within the oven during a flight, and the entry to made in the Cabin Defect Log and/or Technical Log as appropriate.

Operators should remind their catering contractors of the importance of checking oven racks prior to loading ovens to ensure that no foreign objects such as labels, cardboard packaging etc, are attached to the racks"

Any in-flight fire including oven fires, the principle of firefighter, communicator and assistant will always apply. The emphasis is placed on crew co-ordination and communication to achieve a successful outcome.

When an oven fire occurs, the oven door should be kept closed. Opening an oven door when fire is present is hazardous. Opening the oven door will introduce oxygen from outside that may cause a flash fire.

ALWAYS NOTIFY THE FLIGHT CREW IMMEDIATELY.

The communicator must remain on the interphone and maintain the communication link between the cabin and the flight crew for the duration of the event. An accurate report of the situation existing in the cabin must be relayed without delay.

When an oven fire occurs the following actions should be taken by the firefighter:

- Keep the oven door closed, to deprive the fire of oxygen, in most incidents the fire will extinguish itself
- Switch off the oven power using the ON/OFF push button
- Isolate the electrical power from the oven by pulling the corresponding circuit breaker
- Monitor the situation
- Have a fire extinguisher, protective breathing equipment (PBE), fire gloves ready to use if the situation deteriorates.

If the situation worsens, or the fire is still present:

- Don PBE and fire gloves to protect yourself
- Open the oven door very slightly, just enough to insert the nozzle of the fire extinguisher
- Insert the nozzle of the fire extinguisher and discharge a small amount of the extinguishing agent
- Close the oven door
- Repeat the procedure, if necessary.

3.12. FIRES IN HIDDEN AREAS

"Hidden Areas" are defined as "*any area inside the pressure shell, which is not readily accessible to the crew, other than a dedicated cargo area*."

It is important that there is awareness of the possibility of fires in "hidden areas" that would not be accessible to crew. These are areas where fires may propagate undetected, such as, sidewall panels, floors, bulkheads, ventilation grills and ceiling panels. Indications of "hidden fires" may be unusually hot surfaces, or smoke being emitted from wall or ceiling seams. Fumes and unusual odors may be another indication. Due to the lack of access to these areas, it is difficult to locate the source, but the threat to the flight safety remains the same.

If fire is suspected behind a panel, try to locate a "hot spot" an unusually warm area. This is generally a good indicator as to where the source of the fire is.

Move the back of the hand along the panel to find the hottest area. Using the back of the hand is more sensitive to temperature changes than the palm.

It may be necessary to remove panels to access the area. A crash axe may be used as a lever to lift the panel, or an incision may be made in the panel large enough to place the nozzle of the extinguisher, in order to discharge the agent into the affected area.

"**Should I consider cutting or punching a hole in an aircraft cabin wall, ceiling, or floor panel in order to gain access to a fire?** *If this is the only way to gain access to the fire, yes. In this situation, the risk of damaging equipment behind the paneling and the possibility of creating a bigger problem must be weighed against the catastrophic potential of in-flight fires left unattended".*
(FAA Advisory Circular 120-80)

Indiscriminate use of a crash axe or other instruments to access panels may damage some essential wiring, and damage aircraft systems. It is necessary that crewmembers are familiar with the different components located behind panels according to the aircraft type and configuration.

Crewmembers must count on their own determination and use all the resources available to fight a fire

3.13. SUPPRESSED FIRE

A suppressed fire is a fire that has only been partially extinguished. It may not have visible flames. A suppressed fire, if not extinguished, may re-ignite and develop into a larger, uncontrollable fire in a short space of time.

When a fire has been extinguished, crewmembers must prevent any possibility re-ignition. On all non-electrical fire debris the use of wet pillows, blankets and non-alcoholic beverages should be used to soak the area, and suffocate the potential of re-ignition.

However, liquids should not be used on electrical items or wiring.

3.14. FIRE PREVENTION

Although every effort is made by the aviation industry to reduce the risk of onboard fires, fires can still occur for different reasons. Effective fire prevention requires that the cabin crew be alert to possible fire hazards and vigilant in the cabin.

Frequent monitoring of the cabin is important to ensure that no smoke or fire is present. There are still many reports of passengers smoking in the lavatories. Frequently monitoring of the lavatories, particularly the waste bins and stowage areas, will help detect a carelessly discarded cigarette, before it creates a hazard.

Galley areas should be monitored frequently to ensure that paper, plastic and other combustible items are not left near warming plates, ovens, bun warmers, and other hot galley surfaces.

Any indication of smoke or fire must be dealt with **immediately.**

3.15. SUMMARY

In-flight firefighting requires knowledge, skill, resourcefulness and determination on behalf of the crewmembers, to deal effectively with the challenge of an in-flight fire.

- Cabin crew should be aware of the various indications of fire, smoke alarms, visible smoke, unusual odors, fumes, circuit breaker(s) tripping, and hot spots.
- If an in-flight fire is suspected or is known cabin crew should take immediate action to locate the source of the fire and aggressively fight the fire.
- Emphasis must be placed on the importance of notifying the flight crew immediately, upon discovery of a fire. Maintaining an open line of communication and giving the flight crew a realistic account of events in the cabin.
- Cabin crew should be knowledgeable of the type of fire extinguishers carried onboard the aircraft and their correct use.
- Emphasis should be placed on dealing with fires within hidden areas of the aircraft. Crewmembers should understand the correct methods/techniques to gain access to these areas.
- The importance of communication, crew co-ordination and teamwork during any type of in-flight emergency.

3.16. CABIN CREW FIRE AND SMOKE PROCEDURES

These procedures apply to the following aircraft.

A300/A300-600/A310/A318/A319/A320/A321/A330/A340

3.16.1. BASIC FIREFIGHTING PROCEDURE

The Firefighter, the Communicator and the Assistant Firefighter perform their roles and actions **SIMULTANEOUSLY**.

FIREFIGHTER

-OTHER CREWMEMBERS . . . . . **ALERT**

-FIREFIGHTING EQUIPMENT . . . . **EQUIP**
Take the nearest appropriate fire extinguisher. Consider the use of a PBE.

-SOURCE OF THE FIRE . . . . **LOCATE**

-FIRE EXTINGUISHER . . . . **DISCHARGE AT BASE OF FIRE**

-FIREFIGHTING EFFORT . . . . **MAINTAIN UNTIL THE FIRE IS OUT**

• **When the fire is out:**

AFFECTED AREA . . . . . **DAMPEN**
The affected area should be dampened to prevent the fire from re-ignition

WARNING

Do not dampen electrical equipment.

COMMUNICATOR

FLIGHT CREW . . . . . **NOTIFY IMMEDIATELY VIA INTERPHONE**
Use the interphone, to prevent smoke from contaminating the cockpit. Give the following information:

- Location
- Source
- Severity/Density (color of smoke/odor)
- Firefighting progress
- Number of fire extinguishers used
- Time firefighting action started.

BASIC FIRE FIGHTING PROCEDURE CONT'D.

-COMMUNICATION WITH FLIGHT CREW . . . . . MAINTAIN

-INSTRUCTIONS FROM FLIGHT CREW . . . . . COMMUNICATE TO CREWMEMBERS

ASSISTANT FIREFIGHTER

FIREFIGHTING EQUIPMENT . . . . . SUPPLY

• If necessary:

-REPLACE FIREFIGHTER . . . . . PREPARE
-PBE . . . . . .DON

SUPPORT CREWMEMBERS

-PASSENGERS AND PORTABLE OXYGEN. MOVE FROM IMMEDIATE AREA

-FIREFIGHTING EFFORT . . . . ASSIST AND SUPPORT

-PASSENGERS . . . . CALM AND REASSURE

• When the fire is out:

-DEDICATED CREWMEMBER . . . MONITOR FOR THE REMAINDER OF THE FLIGHT
The affected area must be monitored for the remainder of the flight. Regular reports must be made to the Purser.

3.16.2. OVEN SMOKE/FIRE PROCEDURE

These procedures apply to the following aircraft.

A300/A300 -600/A310/A318/A319/A320/A321/A330/A340

Oven smoke/fires may be caused by the oven contents, such as, food or grease deposits. Electrical malfunctions may also be another source.

-OVEN DOOR……..CLOSE

-OVEN POWER……OFF

Note.

By keeping the oven door closed the fire will usually extinguish itself.

-CIRCUIT BREAKER……..PULL
The applicable circuit breaker is located on the galley's centralized electrical panel.

- **IF SMOKE OR FIRE IS STILL PRESENT:**

-PBE AND FIRE GLOVES……DON

(*)-OVEN DOOR……..OPEN SLIGHTLY

Note.

Open the oven door slightly, enough to insert the nozzle of the fire extinguisher into the oven

(*) -FIRE EXTINGUISHER……DISCHARGE

(*) -OVEN DOOR……..CLOSE

-FIREFIGHTING EFFORT……REPEAT AS NECESSARY
(*)Repeat last three steps of the procedure, as necessary.

3.16.3. LAVATORY SMOKE/FIRE PROCEDURE

These procedures apply to the following aircraft.

A300/A300-600/A310/A318/A319/A320/A321/A330/A340

Lavatory smoke/fires can be caused by electrical system malfunctions for example, the water heater, toilet vacuum, or may be caused by burning materials usually caused by a carelessly discarded cigarette in the lavatory waste bin.

ALERT PHASE

Each type of aircraft has visual and aural warnings that trigger, when smoke is detected in one of the aircraft lavatories.

The Firefighter, the Communicator, and the Assistant Firefighter perform their roles and actions **Simultaneously.**

FLIGHT CREW

- **SMOKE LAVATORY SMOKE** . . . . . **CREW AWARENESS**
Maintain contact with the cabin crew to follow up on the status of the fire.

CABIN CREW PROCEDURE

On the FAP, and/or related AAP, the SMOKE warning indication comes on, with an associated triple chime, repeated every 30 seconds (optionally 10 seconds).

- **AFFECTED LAVATORY** . . . . . **LOCATE**
On all AIPs, the affected lavatory is clearly indicated and a red indicator flashes.The amber light, on the respective ACPs, and the outside Smoke/Pax call indicator of the affected lavatory flashes.
Affected lavatory is also shown on the FAP.

- **SMOKE PUSHBUTTON (ON THE FAP or AAP IN YOUR ZONE)** . . **RESET**

To silence the chime, and reset all visual warnings on the ACPs, the AIPs.

Note.

The amber Smoke indicator of the affected lavatory, the SMOKE RESET pushbutton on the FAP and respective AAP and the indication on the FAP Smoke page remain ON until all smoke has dissipate.

LAVATORY SMOKE/FIRE PROCEDURE CONT'D...

WARNING

Do not open the lavatory door. First, check the door for heat. Using the back of the hand, feel the panel of the lavatory door, to determine temperature and presence of fire.

- **LAVATORY DOOR** . . . . . **CHECK FOR HEAT**

• **If the door lavatory panel is cool.**

- **LAVATORY DOOR** . . . . **OPEN SLOWLY WITH CAUTION**

- **SOURCE OF SMOKE/FIRE** . . . . . **LOCATE**

• **If fire is present:**

- **BASIC FIREFIGHTING PROCEDURE** . . .. **APPLY**

- **FIRE EXTINGUISHER** . . . . **DISCHARGE AT BASE OF FIRE**

• **If door panel is hot:**

Note.

If the door is hot, the fire is at a critical stage. Have extra fire fighting equipment available and ready to use.

- **PBE** . . . .**DON**

- **FIREFIGHTER** . . . . **PROTECT SELF**
Stay low and crouch down, using the door panel as protection against smoke and heat.

- **(*) LAVATORY DOOR** . . . . . **OPEN SLIGHTLY**
To pass the nozzle of the extinguisher.

- **(*) FIRE EXTINGUISHER** . . . . . **DISCHARGE**

- **(*) LAVATORY DOOR** . . . . . **CLOSE**

- **FIREFIGHTING** . . . . **REPEAT AS NECESSARY**
(*) Repeat last four steps of the procedure, as necessary.

• **If situation is cleared:**

- **AFFECTED LAVATORY** . . **MONITOR FOR THE REMAINDER OF THE FLIGHT**

3.16.4. OVERHEAD BIN SMOKE/FIRE PROCEDURE

These procedures apply to the following aircraft.

A300/A300 -600/A310/A318/A319/A320/A321/A330/A340

Smoke/fire in overhead bins may be caused by the contents or a possible electrical malfunction in the Passenger Service Unit (PSU).

• **If smoke is visibly emitting from an overhead bin:**

- **BASIC FIRE FIGHTING PROCEDURE** . . . . . **APPLY**

- **OVERHEAD BIN** . . . . **CHECK FOR HEAT**
Check for heat. Using the back of the hand, feel the overhead bin to determine the temperature and presence of fire.

- **(*) OVERHEAD BIN** . . . . . **OPEN SLIGHTLY**
Enough to pass the nozzle of the fire extinguisher.

CAUTION

Opening the overhead bin more than is necessary risks contaminating the cabin with smoke, and puts occupants at risk of smoke inhalation.

- **(*)FIRE EXTINGUISHER** . . . . . **DISCHARGE**

Note.

The fire extinguisher must be discharged into the overhead bin, away from the seat, to prevent debris from contaminating the cabin.

- **(*) OVERHEAD BIN** . . . . . **CLOSE AND LATCH**

- **FIREFIGHTING** . . . . . **REPEAT AS NECESSARY**
(*) Repeat last 3 steps of the procedure, as necessary.

3.16.5. PAX SEAT SMOKE PROCEDURE

These procedures apply to the following aircraft.

A318/A319/A320/A321/A330/A340

The class of fire will determine how a passenger seat smoke/fire event is dealt with. The source of smoke/fire may come from the IFE screen, ISPSS outlet, or from the seat boxes located under the passenger seats.

• **If the source of the smoke/fire is from an electrical origin:**

- **PAX SYS SWITCH** . . . . . **OFF**
The PAX SYS switch is located in the cockpit, on the VCC and optionally on the FAP.

- BASIC FIRE FIGHTING PROCEDURE . . . . . **APPLY IF NECESSARY**

3.16.6. CABIN SMOKE/FIRE PROCEDURE HIDDEN AREA OR UNKNOWN SOURCE

These procedures apply to the following aircraft.

A300/A300 -600/A310/A318/A319/A320/A321/A330/A340

Smoke emissions from sidewall panels, ceiling panels and vents may indicate a hidden fire. In some cases, smoke may appear some distance away from it's actual source.

- **BASIC FIRE FIGHTING PROCEDURE . . . . . APPLY**

FIREFIGHTER
- **SOURCE OF SMOKE . . . . . LOCATE**

- **REASON FOR SMOKE . . . . . INVESTIGATE AND DETERMINE**

Note.

To determine the source of a potential fire, crewmembers should check for" hot spots" on panels. Use the back of the hand along the panels to feel for the presence of unusually hot areas.

• WHEN "HOT SPOT" IS LOCATED:

- **AREA . . . . . ACCESS WITH CARE**

CAUTION

When gaining access behind panels, be aware of the presence of wiring bundles. Make a careful incision in the panel to pass extinguisher nozzle, or lever the panel to gain access.

-FIRE EXTINGUISHER . . . . . DISCHARGE

-DEDICATED CREWMEMBER... ...MONITOR FOR THE REMAINDER OF THE FLIGHT
The affected area must be monitored for the remainder of the flight. Regular reports must be made to the Chief Purser.

3.16.7. GALLEY SMOKE/FIRE PROCEDURE

These procedures apply to the following aircraft.

A300/A300 -600/A310/A318/A319/A320/A321/A330/A340

Galley smoke/fire occurrences can be caused by electrical equipment malfunction for example, coffee makers, ovens, water boilers etc.

• If the source of the smoke/fire is identified from a piece of electrical equipment:

- **ELECTRICAL POWER** . . . . **OFF**

- **APPLICABLE CIRCUIT BREAKER** . . . . . **PULL**
Circuit breakers are located on the galley's centralized electrical panel.
Pulling the applicable circuit breaker should stop the smoke/fire.

• If the source of the smoke cannot be identified:

GALLEY SHUTOFF

- **MAIN GALLEY POWER** . . . . . **OFF**

- **ALL CIRCUIT BREAKERS** . . . . . **PULL**

• If the smoke/fire continues:

- **BASIC FIRE FIGHTING PROCEDURE** . . . . . **APPLY**

3.17. FIRE PROTECTION WIDEBODY AIRCRAFT – A300/A300-600/A310

3.17.1. LAVATORY FIRE EXTINGUISHER

Each lavatory has a small extinguisher bottle, installed above each waste container.

3.17.2. DESCRIPTION

The extinguisher is composed of a bottle, an extinguisher nozzle and a local overheat detector.

The bottle contains 120 grams of the chemical products Halon and Freon.

3.17.3. OPERATION

A thermo sensitive sprinkler head comes on automatically, when the temperature exceeds 77°C (70°F).

Note.

A temperature plate is located on the internal face of the waste compartment door, which enables the cabin crew to check if the fire extinguishers operated after an unusual increase in temperature.

The cabin crew must check the temperature plate as part of the preflight check.

If the temperature plate is WHITE, the extinguisher is ready for use

If the temperature plate is BLACK, call maintenance personnel to check, (The extinguisher is probably empty).

A300/A300-600/310 Lavatory Fire Extinguisher
Figure-3-2

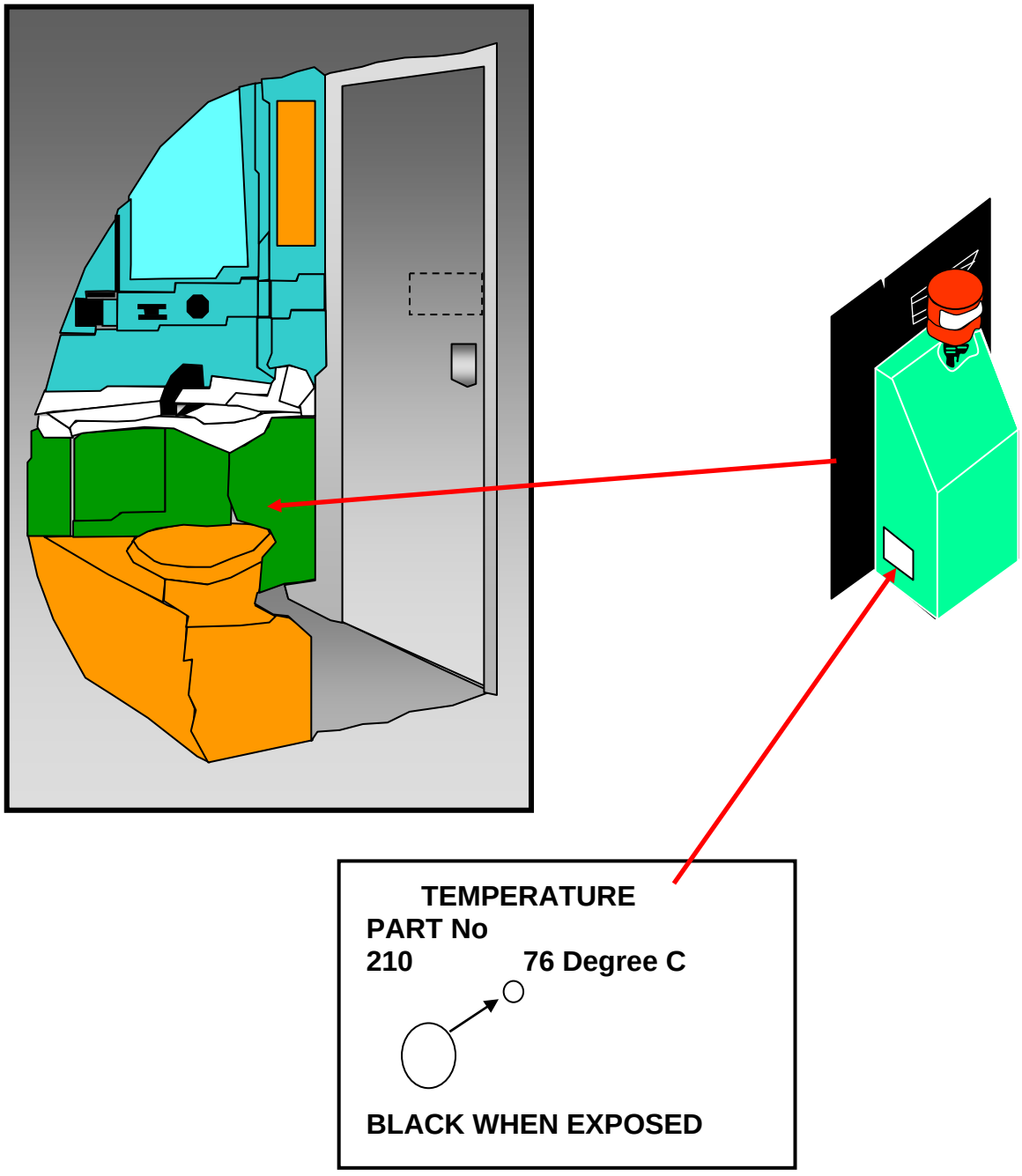
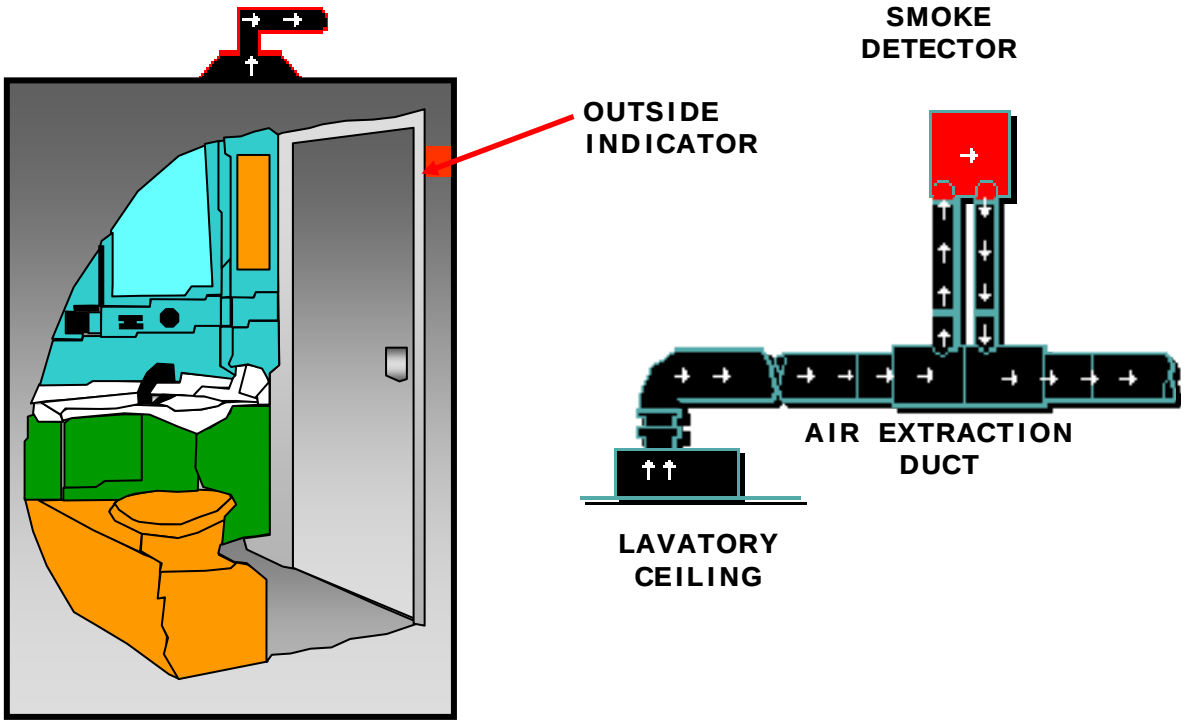


Figure 3-3

Lavatory Smoke Detector A300/A310



Warning light pushbuttons are located at the Purser's and the aft cabin crew station. When the smoke warning light is on, the cabin attendant priority call system is activated.

In addition, a test pushbutton is located at the Purser's station.

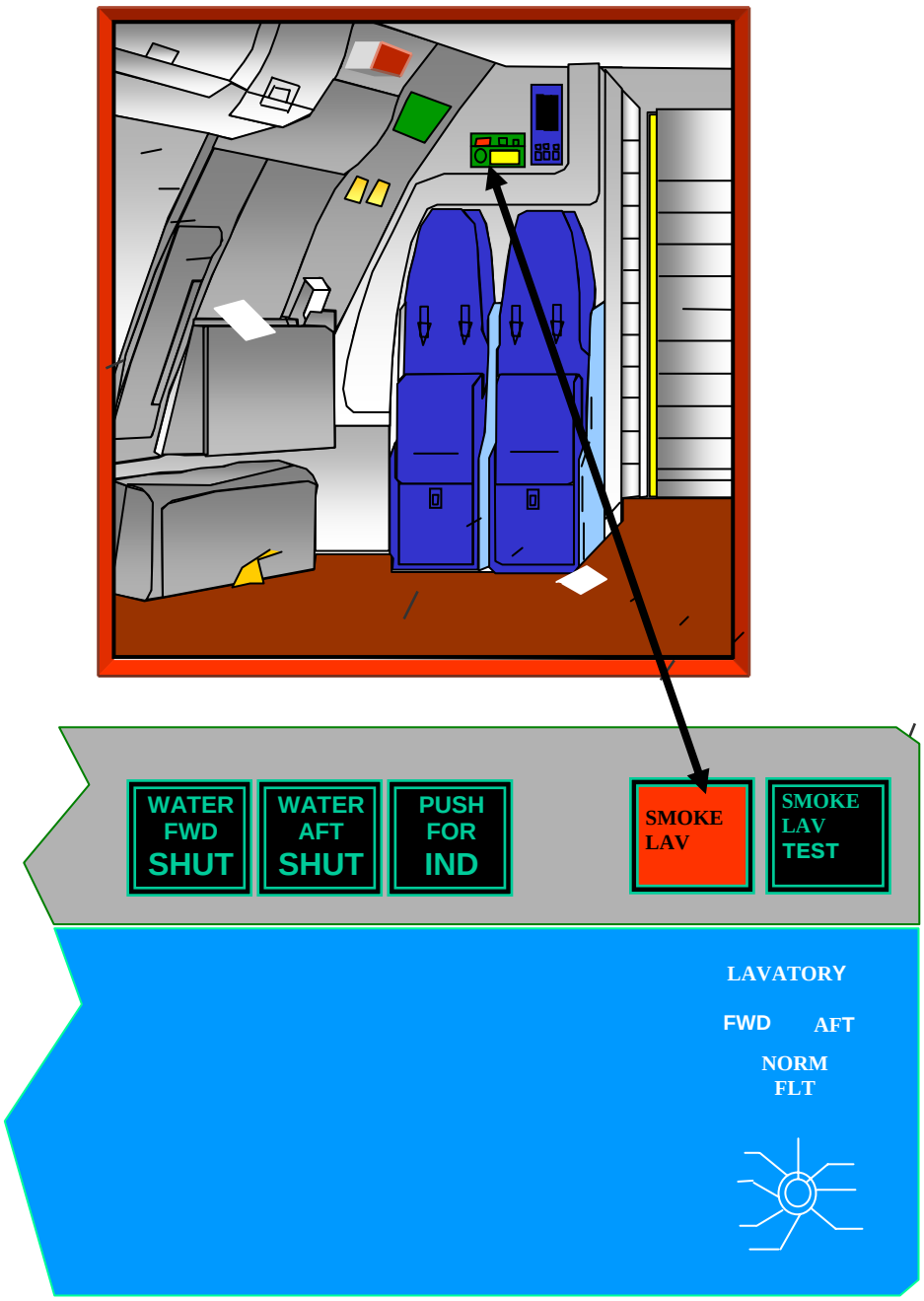
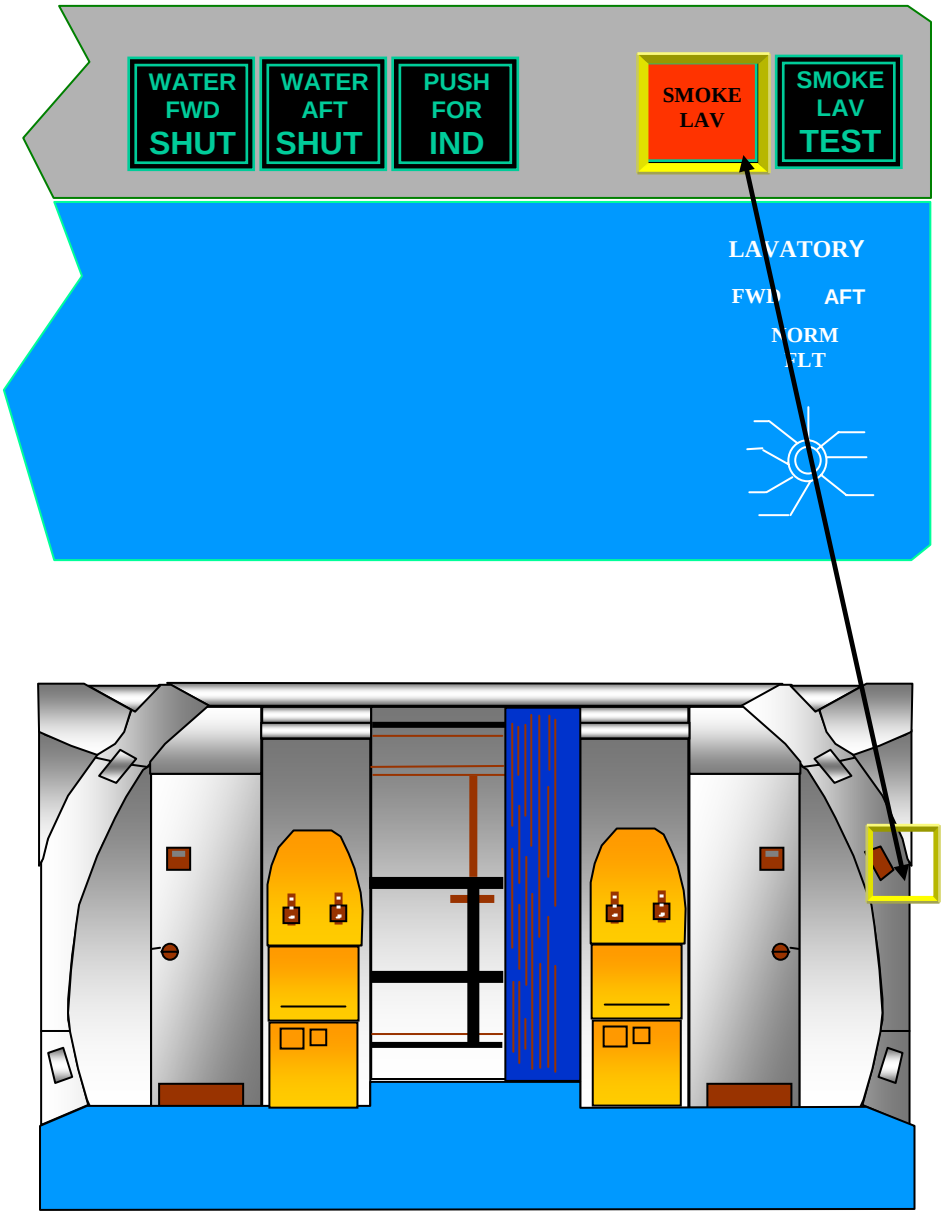


Figure 3-4

Smoke Warning Indication Aft Cabin Crew Station



3.18. LAVATORY SMOKE DETECTION SYSTEMS AND DESCRIPTIONS

No.	Configuration		System reaction
I	Standard		- Corresponding red warning light on lavatory blinks - SMOKE LAV at FWD Purser and AFT ATT station blinks - (Repetitive) Hi/Lo chime is broadcast - White CAPT CALL lights at ATT stations come on (not 2LH/RH) - Green LED's of keyboard at ATT stations come on - Red light at all ACPs come on
II	Standard with an additional interface to the cockpit		- Corresponding red warning light on lavatory wall blinks - SMOKE LAV light at FWD Purser and AFT ATT station blinks - (Repetitive) Hi/Lo chime is broadcast - White CAPT CALL lights at ATT stations come on (not 2LH/RH) - Green LED's of keyboard at ATT stations come on - Red light at all ACP's come on - Warning light and/or message activated in cockpit
III	Standard with direct operation of the respective amber area call light by system		- Corresponding red warning light on lavatory wall blinks - SMOKE LAV light at FWD Purser and AFT ATT station blinks - (Repetitive) Hi/Lo chime is broadcast - White CAPT CALL lights at ATT stations come on (not 2LH/RH) - Green LED's of keyboard at ATT stations come on - Red light at all ACPs come on - Amber light at respective ACP blinks - A repetitive tone is emitted from the detector (only Jamco) - The red LED on the smoke detector lights (only Jamco)
IV	Standard with Pulse Generator and Signal Counter, additional relays in system LN and chime activation		- Corresponding red warning light on lavatory wall flashes - SMOKE LAV light at FWD Purser and AFT ATT station flashes - 3x Hi chime sounds - Amber light at respective ACP (zone) flashes for 60 seconds - Warning light and ECAM message activated in cockpit.

3.19. WIDEBODY FLEET CABIN CIRCUIT BREAKER PANELS

3.19.1. A300/A300-600/A310

There is one circuit breaker panel in the forward of the cabin, and one circuit breaker panel in the aft of the cabin. Circuit breakers that relate to cabin items, such as lights, and entertainment systems are on these panels, and may be used to isolate equipment in the event of smoke and fire, in accordance with the operator's policy.

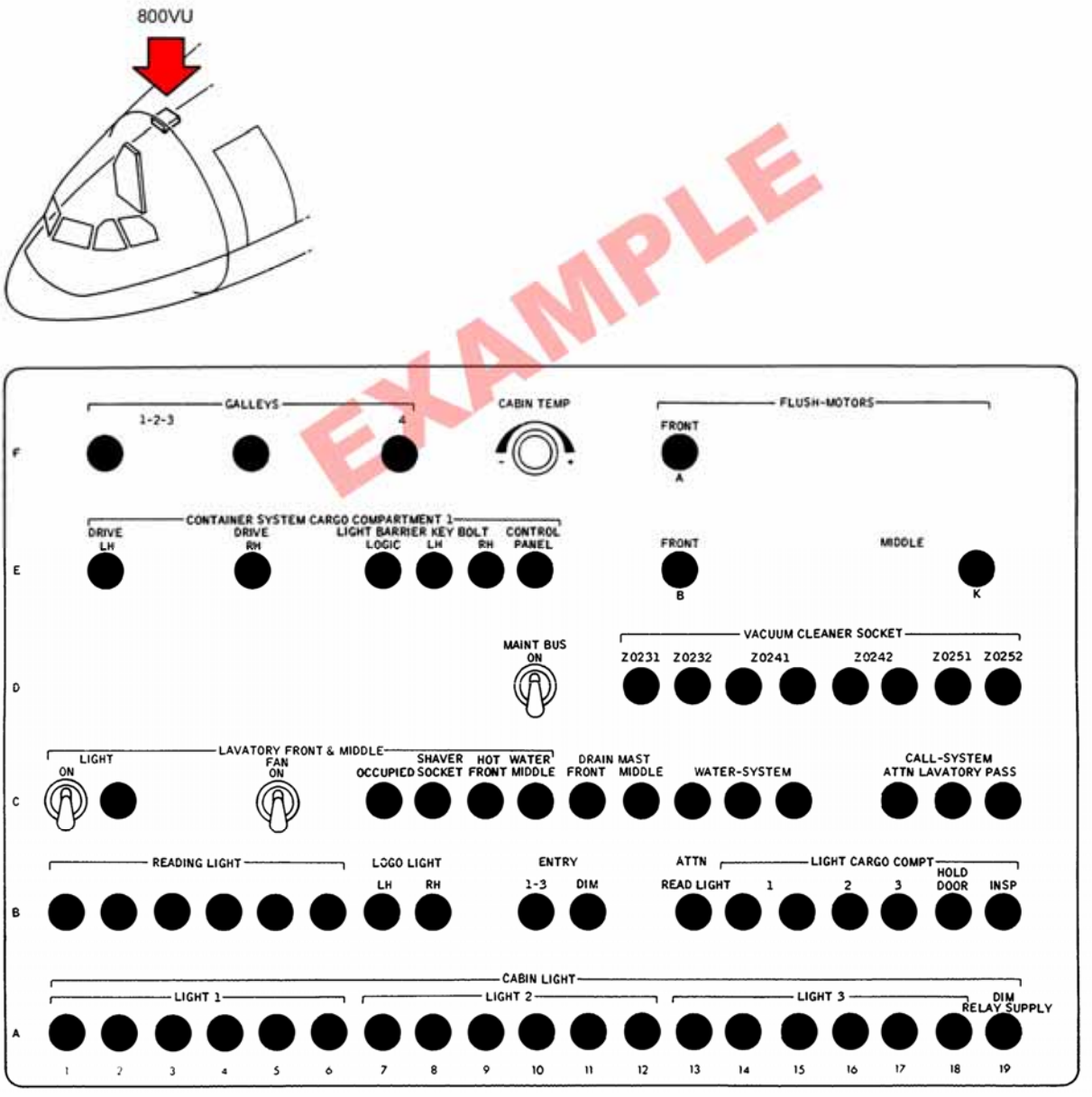
As Airbus aircraft are customized to our operator's requirements, the circuit breaker panels illustrated on the following pages are only to provide an overview of the panels.

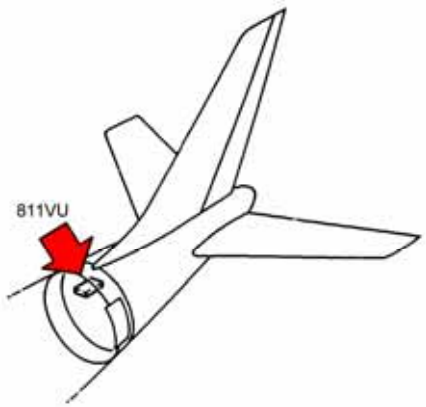
Please contact your engineering department if you wish to have your operators customized circuit breaker panel configuration

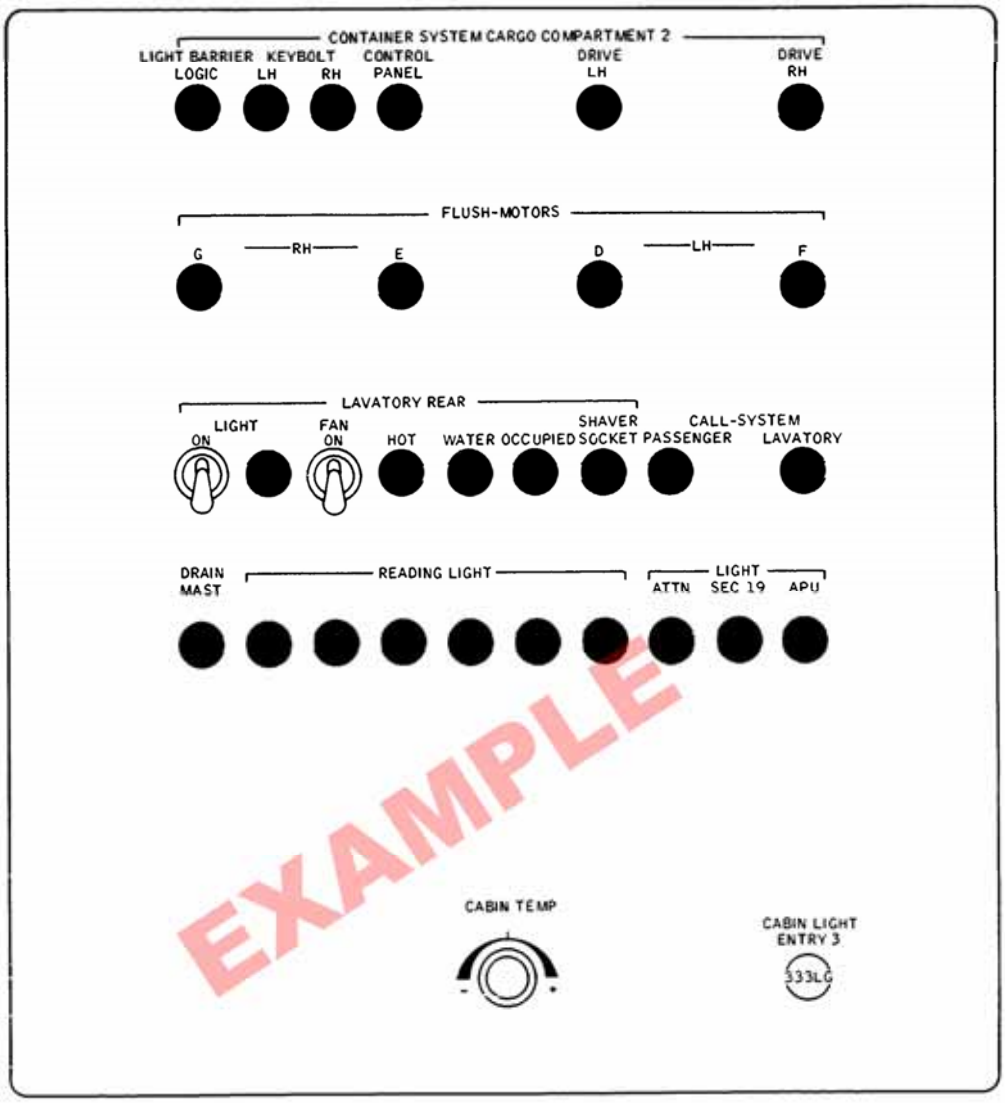
CAUTION

It is not permitted to reset a tripped C/B. If you reset it, you can cause an overload to another system.

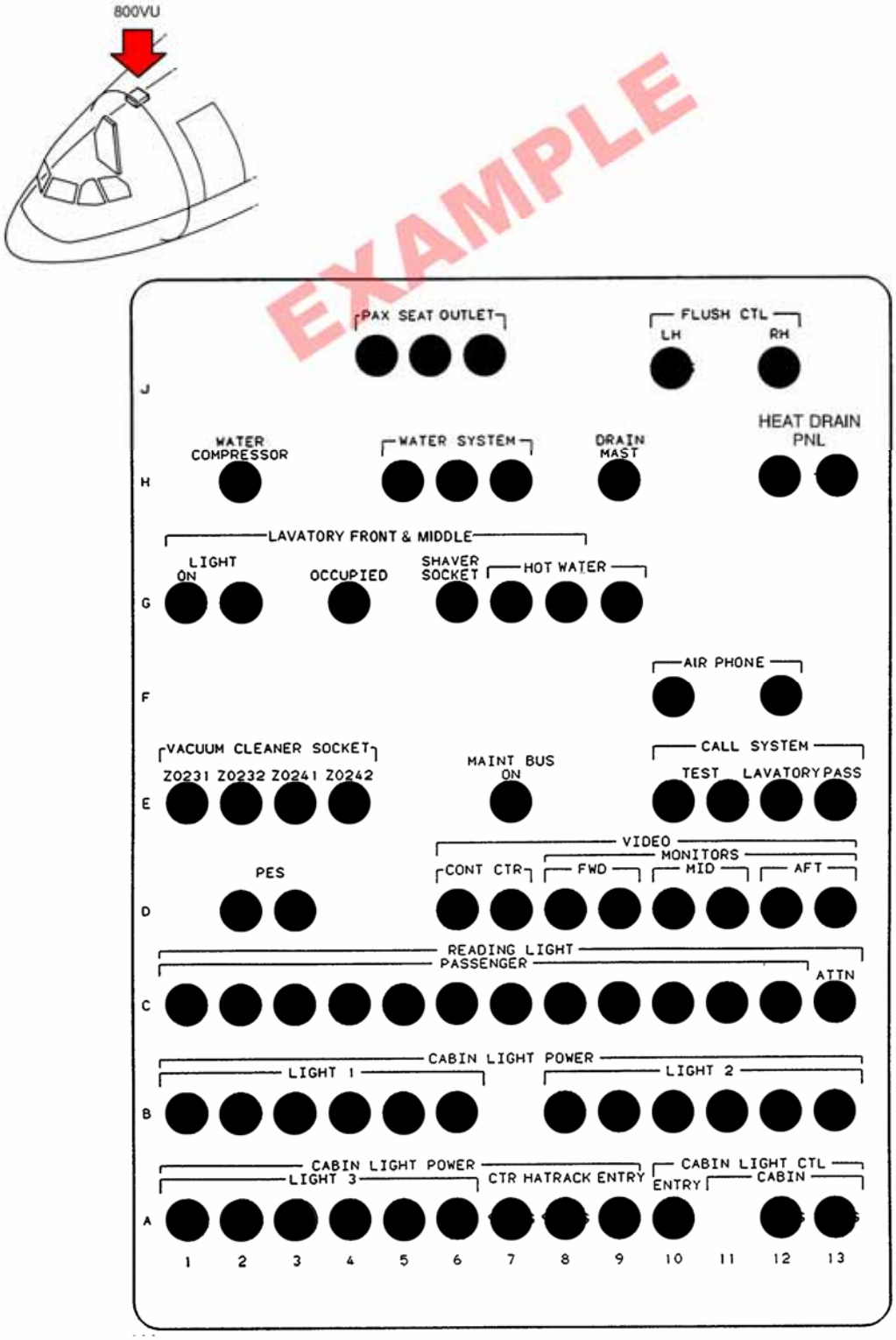
3.19.2. A300 CABIN CIRCUIT BREAKER PANELS

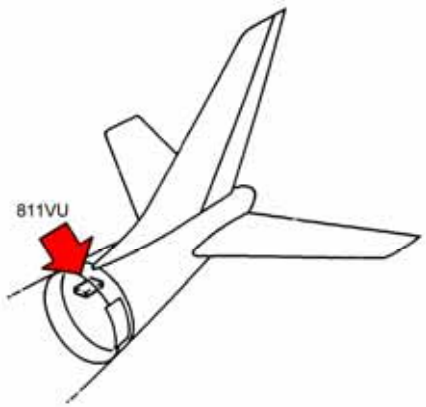


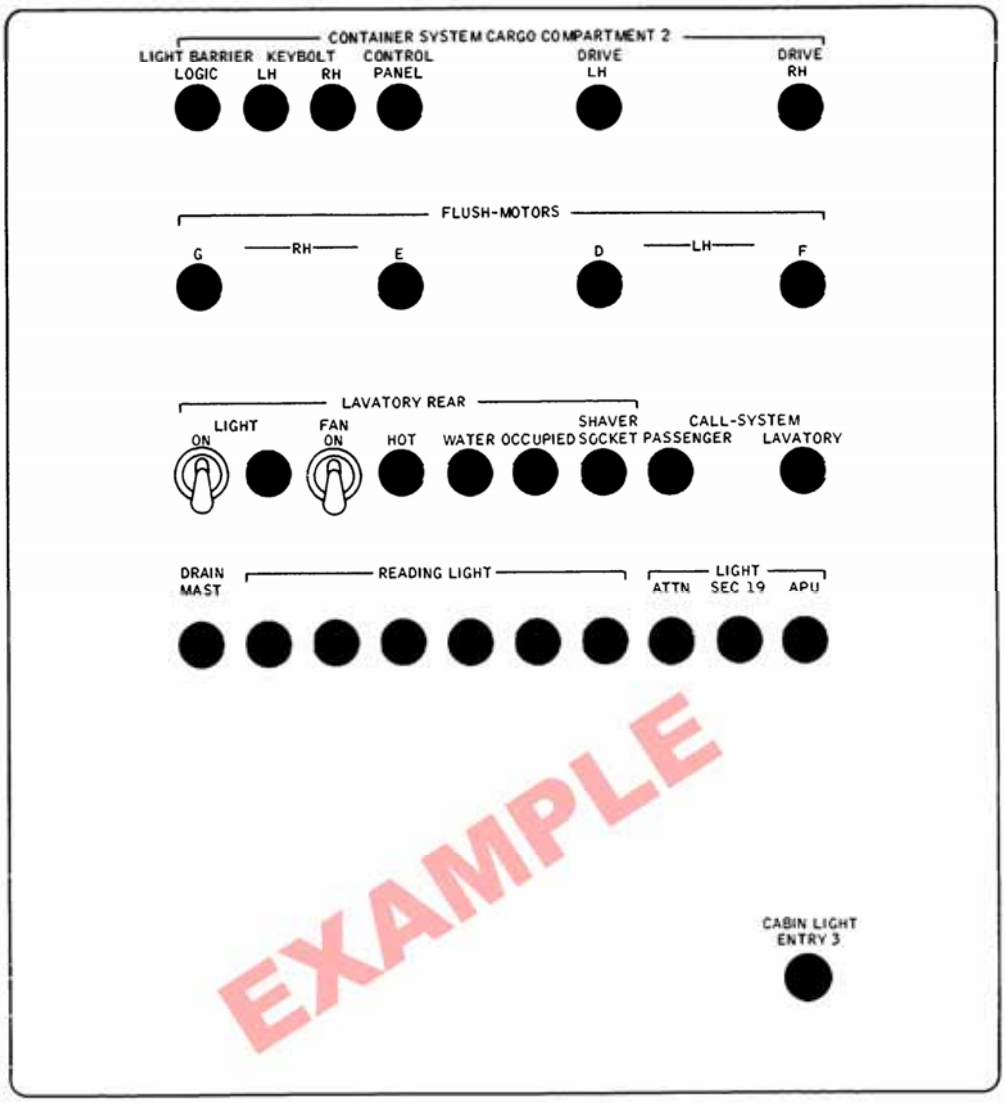

811VU


CONTAINER SYSTEM CARGO COMPARTMENT 2
LIGHT BARRIER LOGIC
KEYBOLT LH
KEYBOLT RH
CONTROL PANEL
DRIVE LH
DRIVE RH
FLUSH-MOTORS
G
RH
E
D
LH
F
LAVATORY REAR
LIGHT ON
FAN ON
HOT
WATER
OCCUPIED
SHAVER SOCKET
CALL-SYSTEM PASSENGER
LAVATORY
DRAIN MAST
READING LIGHT
LIGHT ATTN
SEC 19
APU
EXAMPLE
CABIN TEMP
CABIN LIGHT ENTRY 3
333LG

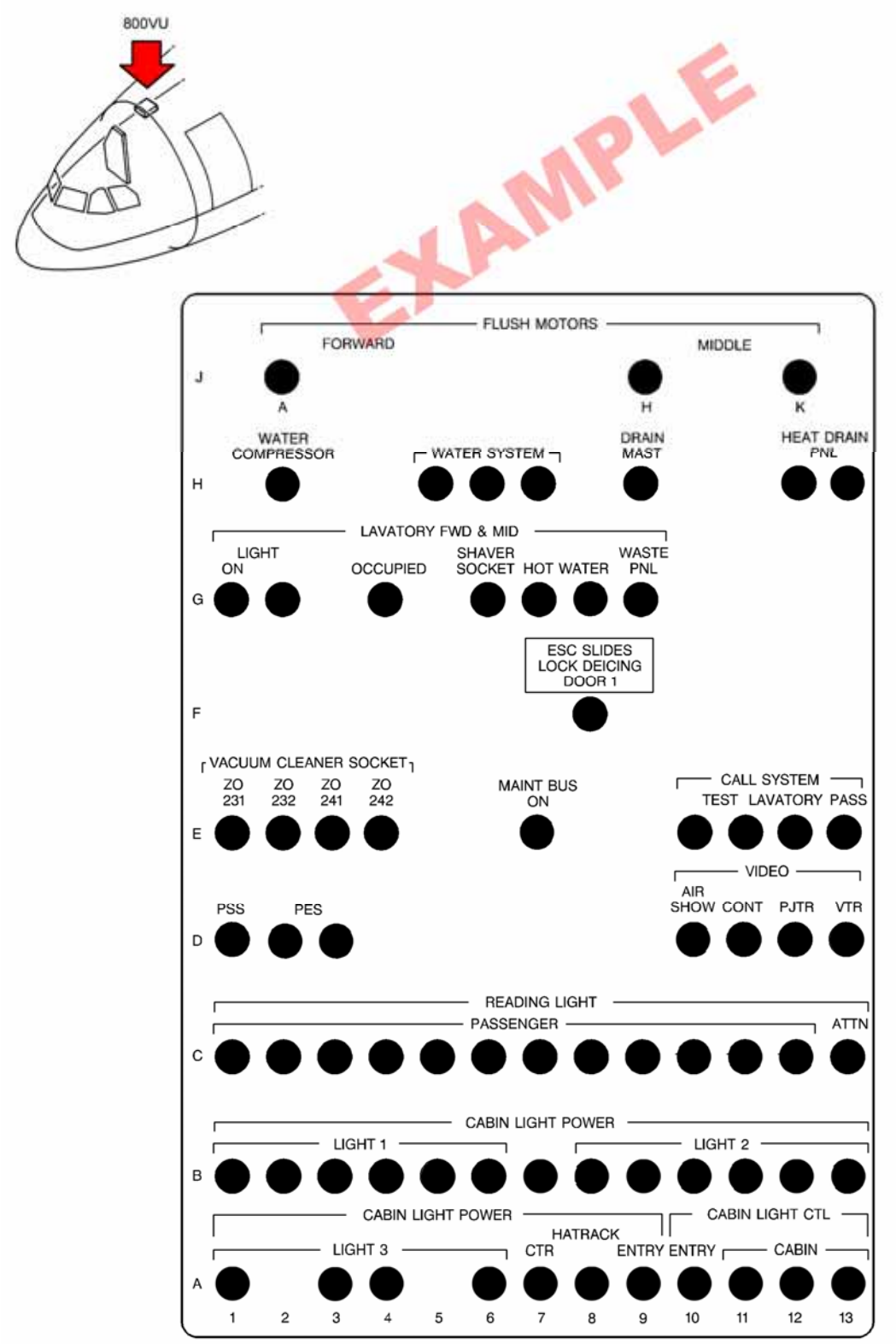
3.19.3. A300-600 CABIN CIRCUIT BREAKER PANELS

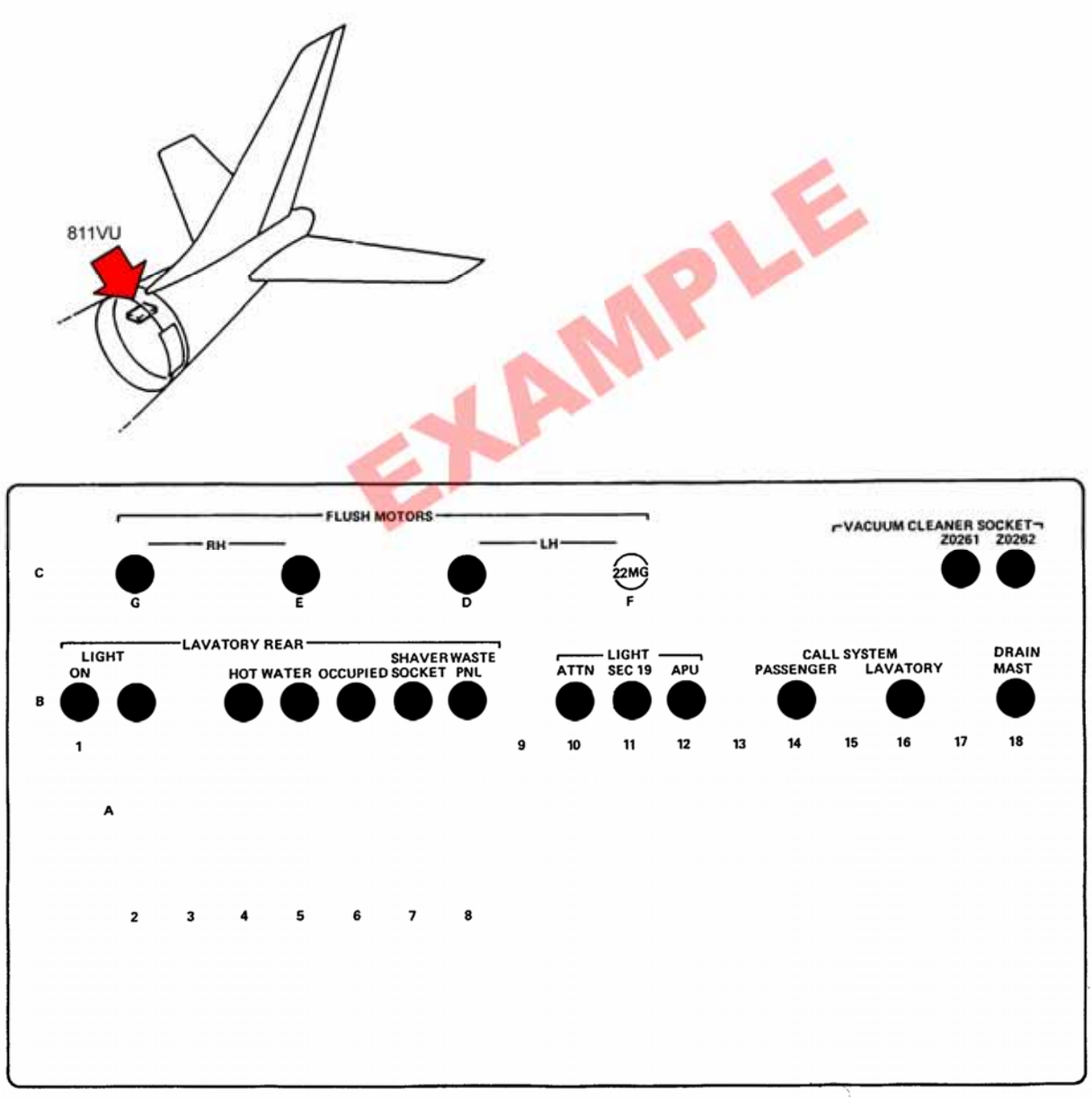



811VU


CONTAINER SYSTEM CARGO COMPARTMENT 2
LIGHT BARRIER LOGIC
KEYBOLT LH
KEYBOLT RH
CONTROL PANEL
DRIVE LH
DRIVE RH
FLUSH-MOTORS
RH
LH
G
E
D
F
LAVATORY REAR
LIGHT ON
FAN ON
HOT
WATER
OCCUPIED
SHAVER SOCKET
CALL-SYSTEM PASSENGER
LAVATORY
DRAIN MAST
READING LIGHT
LIGHT
ATTN
SEC 19
APU
CABIN LIGHT ENTRY 3
EXAMPLE

3.19.4. A310 CABIN CIRCUIT BREAKER PANELS




811VU
EXAMPLE
FLUSH MOTORS
RH
LH
VACUUM CLEANER SOCKET
Z0261
Z0262
C
G
E
D
22MG
F
LAVATORY REAR
LIGHT ON
HOT WATER
OCCUPIED
SHAVER SOCKET
WASTE PNL
LIGHT
ATTN
SEC 19
APU
CALL SYSTEM
PASSENGER
LAVATORY
DRAIN MAST
B
1
9
10
11
12
13
14
15
16
17
18
A
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3
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6
7
8

3.20. SINGLE AISLE AIRCRAFT FIRE PROTECTION

(A318/A319/A320/A321)

3.20.1. LAVATORY SMOKE DETECTION

A smoke detector is located in each lavatory. The smoke detectors are connected to the CIDS (Cabin Intercommunication Data System) by the CIDS-SDF (CIDS Smoke Detection Function), and the Flight Warning Computer (FWC).

If smoke is detected, the system gives a visual and aural warning to the flight crew and the cabin crew.

The warnings in the cockpit are:

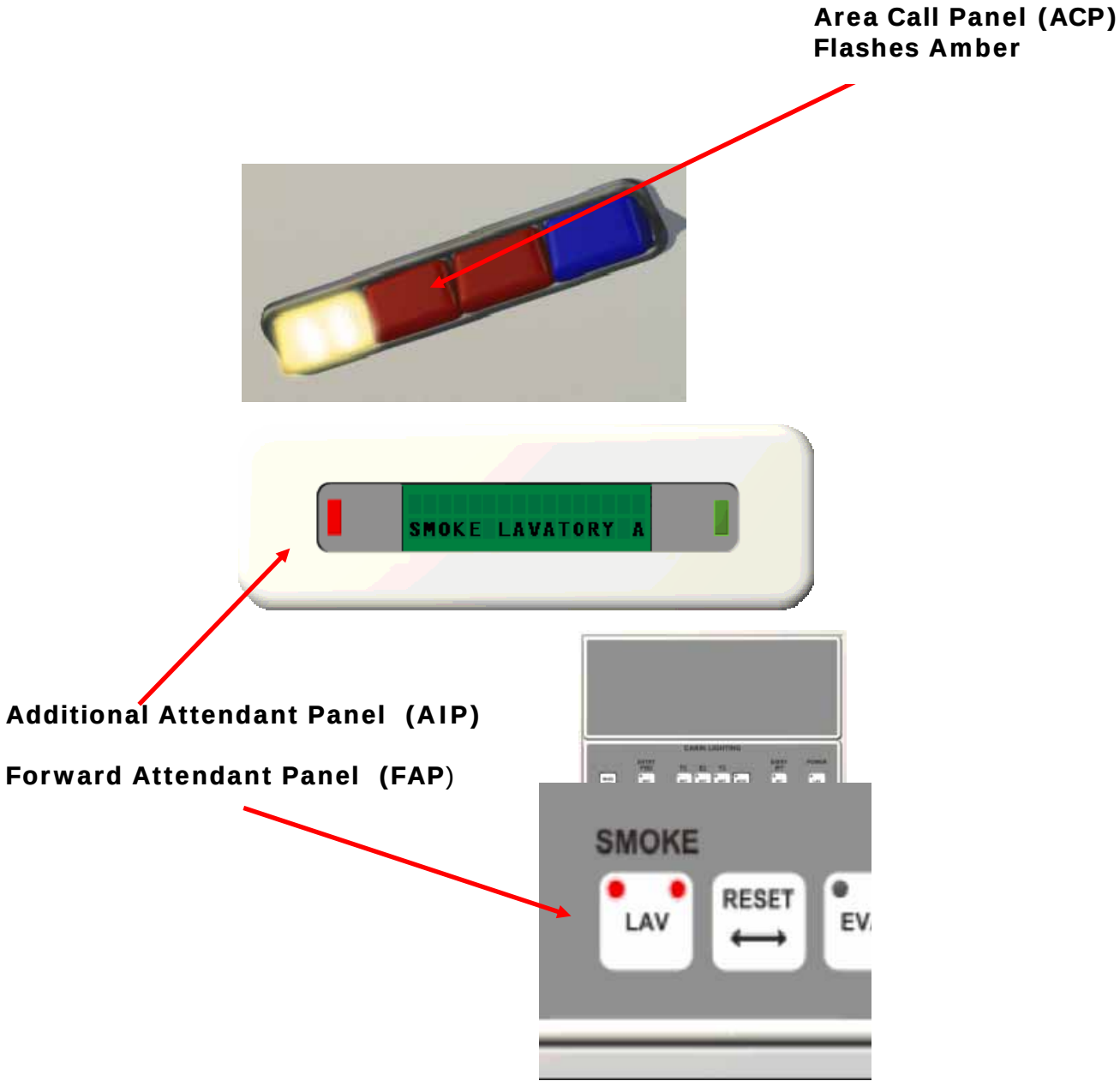
- A repetitive chime
- A red master warning light
- A smoke warning indication on the ECAM upper display unit.

The cabin warnings are:

- A repetitive chime from all the cabin loudspeakers, and all attendant station loud speakers
- A red flashing indicator light and a steady text (SMOKE LAV X) on all Attendant Indication Panels (AIP)
- An amber light flashes on the related Area Call Panel (ACP)
- An amber light flashes on the related lavatory wall
- A red indication SMOKE LAV on the Forward Attendant Panel (FAP) or the related Aft Attendant Panel (AAP).

Figure 3-5

Smoke Warning Cabin Indications



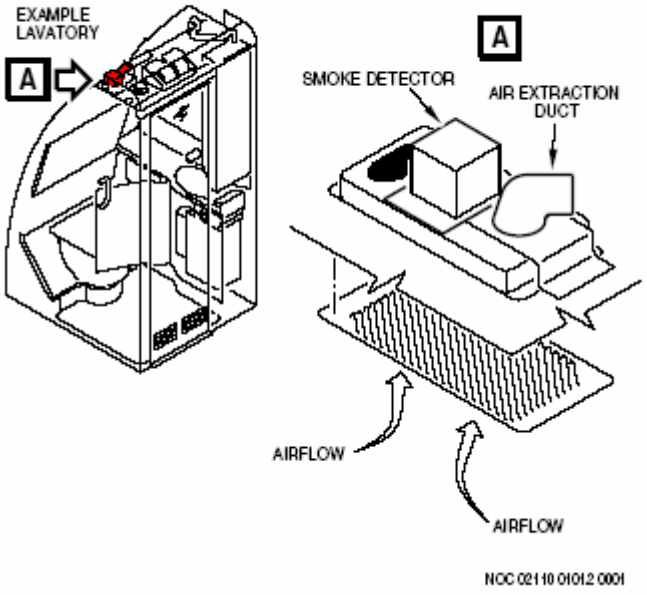
When smoke enters into the measuring chamber of the detector, a warning signal is transmitted to the CIDS (Cabin Intercommunication Data System) with the CIDS-SDF (CIDS Smoke Detection Function) and the FWC (Flight Warning Computer)

The CIDS activates the related indications on the FAP, AIP and the ACP.
The FWC activates the related indications in the cockpit.

By pressing the LAV SMOKE/RESET push-button on the FAP or on the related AAP, here the aural and visual warning as well as the warning indications on the ACP and AIP are turned off. The indication on the FAP disappears, as soon as the density of smoke drops below the threshold of the respective smoke detector.

Figure 3-6

Lavatory Smoke Detection System



3.21. SINGLE AISLE WASTE-BIN FIRE EXTINGUISHER

3.21.1. GENERAL

Each lavatory has a waste bin fire extinguisher.

3.21.2. LOCATION

There is a fire extinguisher above the waste bin in each lavatory.

Note:

The indicator on the gauge must be in the green area to ensure full operation, in case of a fire.

3.21.3. DESCRIPTION

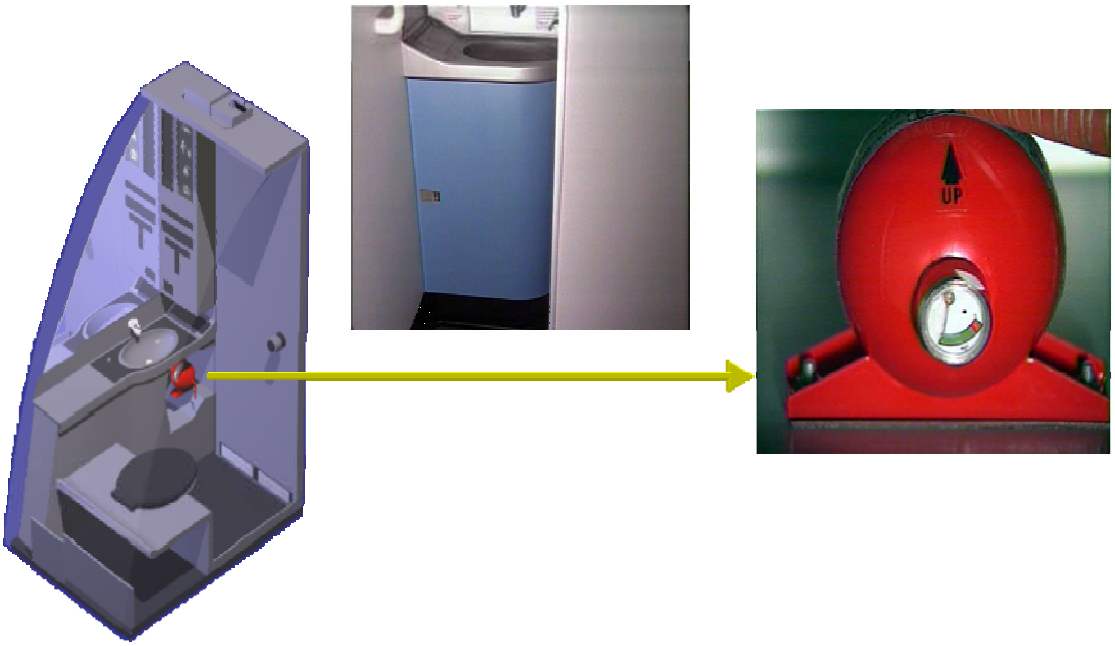
Each fire extinguisher has these main components.

- A spherical container with a mounting bracket
- A discharge tube with a fusible plug
- A pressure gauge that indicates extinguisher status
- An identification label.

3.21.4. OPERATION

If a fire is detected in the waste bin, the fire extinguisher operates automatically. When the temperature in the waste bin increases to approximately 79 °C (174.2 °F.), the fusible plug that is in the end of the discharge tube melts, and lets the agent flow into the waste bin.

Figure - 3-7
Lavatory Fire Extinguisher



3.22. LAVATORY SMOKE DETECTION-A318/A319/A320 ENHANCED CIDS

In case smoke detected in the lavatory, the cabin crew is alerted via aural and visual warnings.

3.22.1. DESCRIPTION

The Smoke Detection Function (SDF) is integrated in the CIDS Director.
The lavatory smoke detection alert comprises aural and visual warnings.

The aural warning is a repetitive triple LOW chime at a repetitive time of 30 seconds, broadcast via all passenger and attendant station loudspeakers.

• The visual warning comprises of:

- The amber lavatory indicator flashes at the affected location;

- The flashing of the amber segment on the respective ACP;

- The display of the affected lavatory compartment (max. 16 digits) in clear wording, for instance “SMOKE LAV A”, and AIP red indicator flashing on all Attendant Indication Panels.

- The steady illumination of a common red lavatory smoke indicator on the attendant panel in the respective lavatory area (FAP or AAP)

- The affected lavatory is graphically shown on FAP SMOKE DETECTION page.

• The aural warning can by reset manually by pressing the RESET switch on FAP or AAP.

• The visual warnings on ACP, AIPs and affected lavatory (indicator light) are reset manually for the respective area by pressing the RESET switch on FAP or AAP.

• SMOKE RESET button on FAP hard key sub panel and on FAP SMOKE DETECTION page when smoke is detected

• SMOKE RESET on AAP

• The red lavatory smoke indicator on FAP and on AAP cannot be reset manually. The indication extinguishes when the smoke alert is reset by the SDF.

• Lavatory smoke detector failures are reported on the FAP SMOKE DETECTION page with associated CIDS Caution Light on the FAP).

Figure 3-8

Example FAP (Flight Attendant Panel) Enhanced CIDS Smoke Page

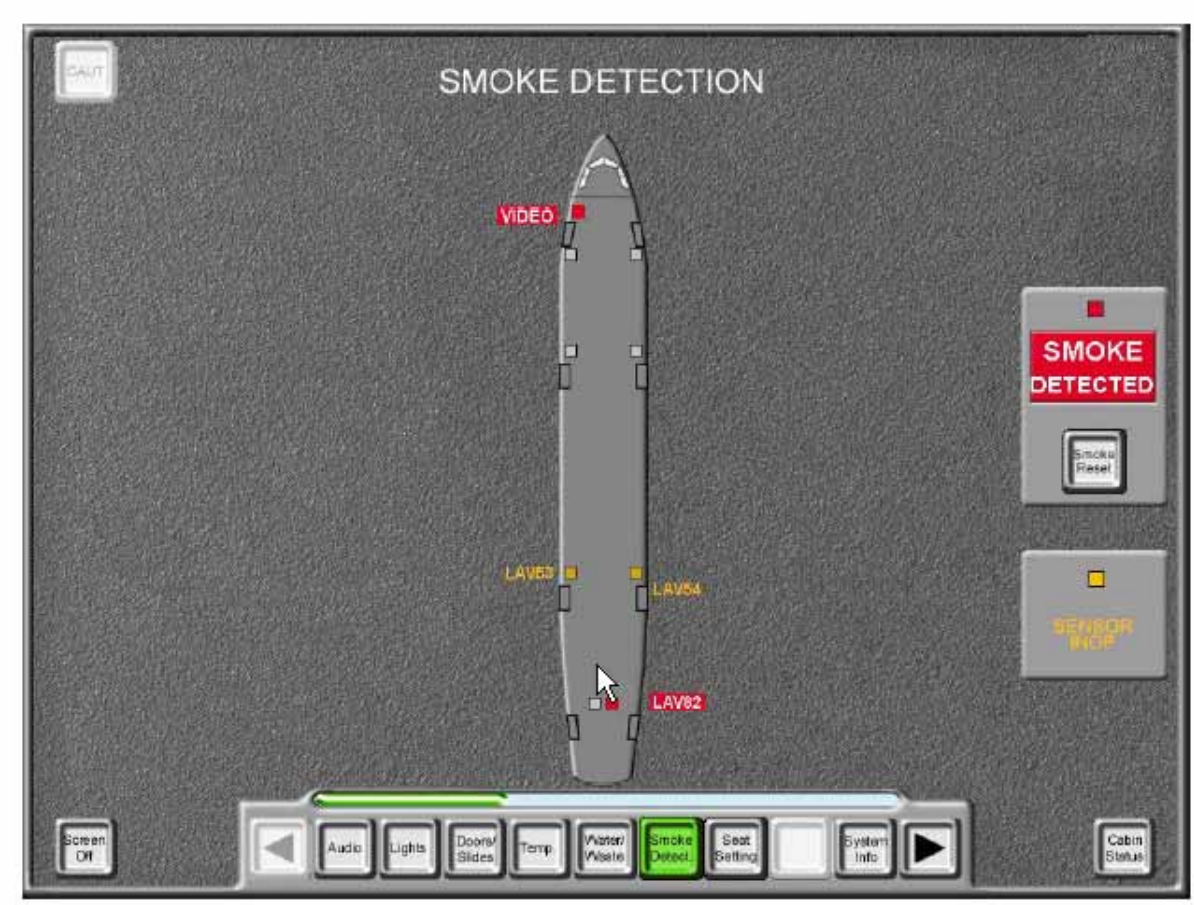
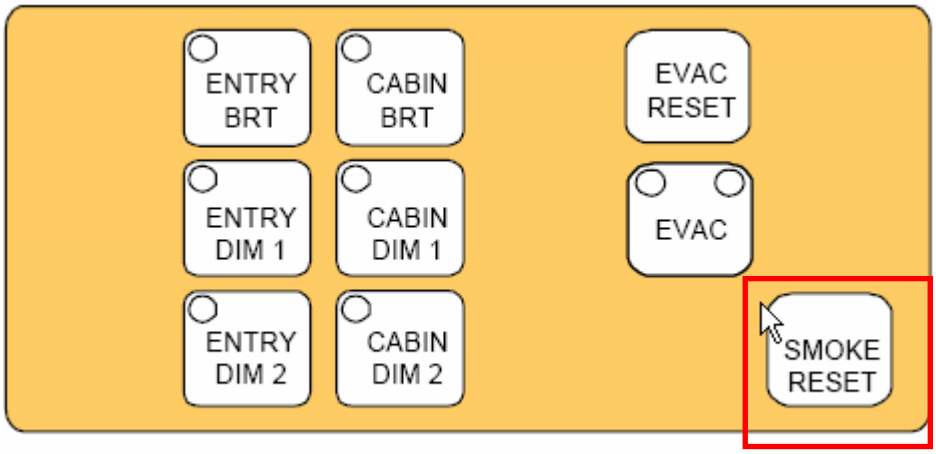


Figure 3-9

Example of AAP (Aft Attendant Panel)



3.23. A318/A319/A320/A321 CABIN CIRCUIT BREAKER PANELS

Circuit breakers are installed to protect the electrical circuits and their related components.

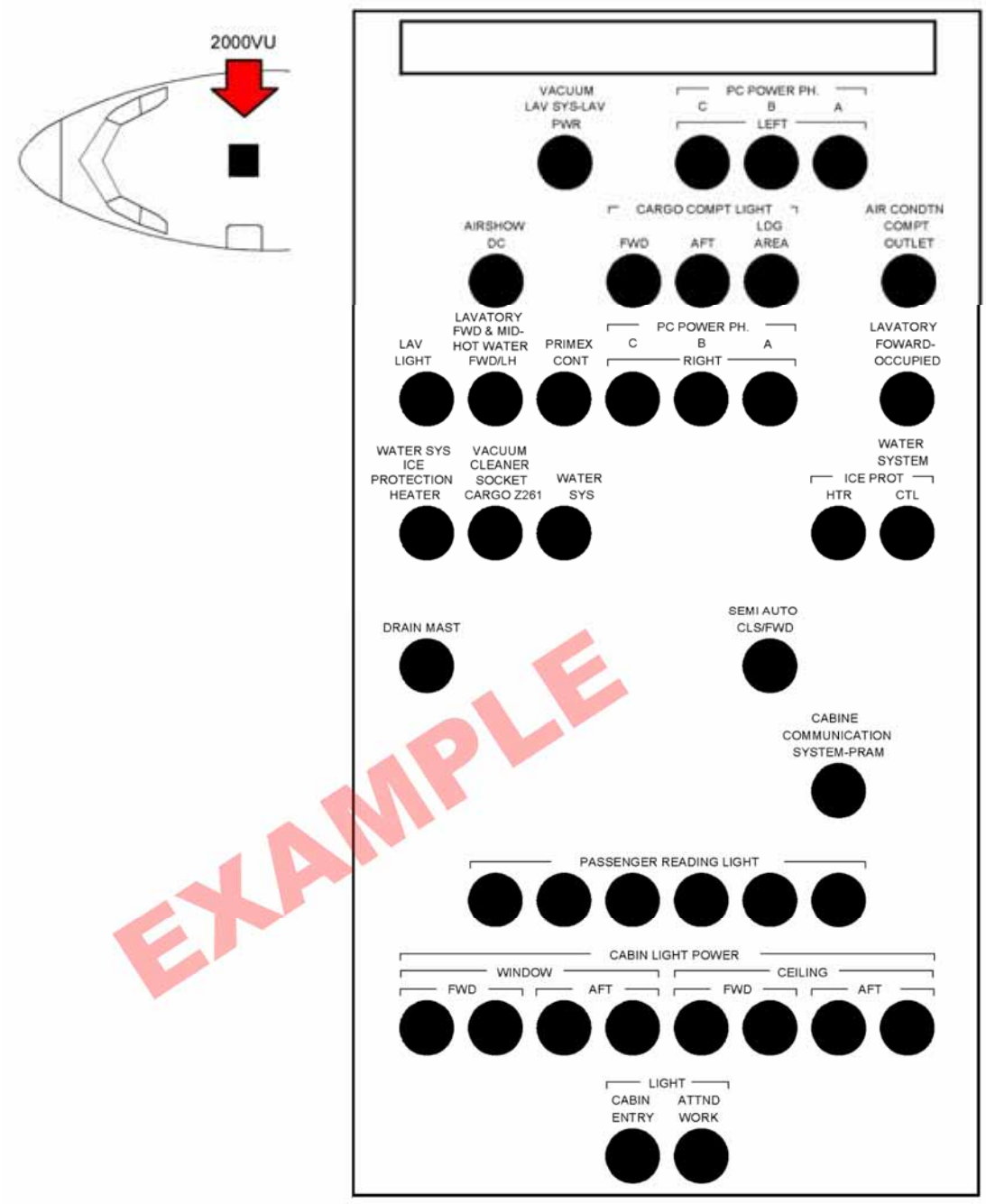
There is one circuit breaker panel in the forward of the cabin, and one circuit breaker panel in the aft of the cabin. Circuit breakers that relate to cabin items, such as lights, and entertainment systems are on these panels, and may be used to isolate equipment in the event of smoke and fire, in accordance with the operator's policy.

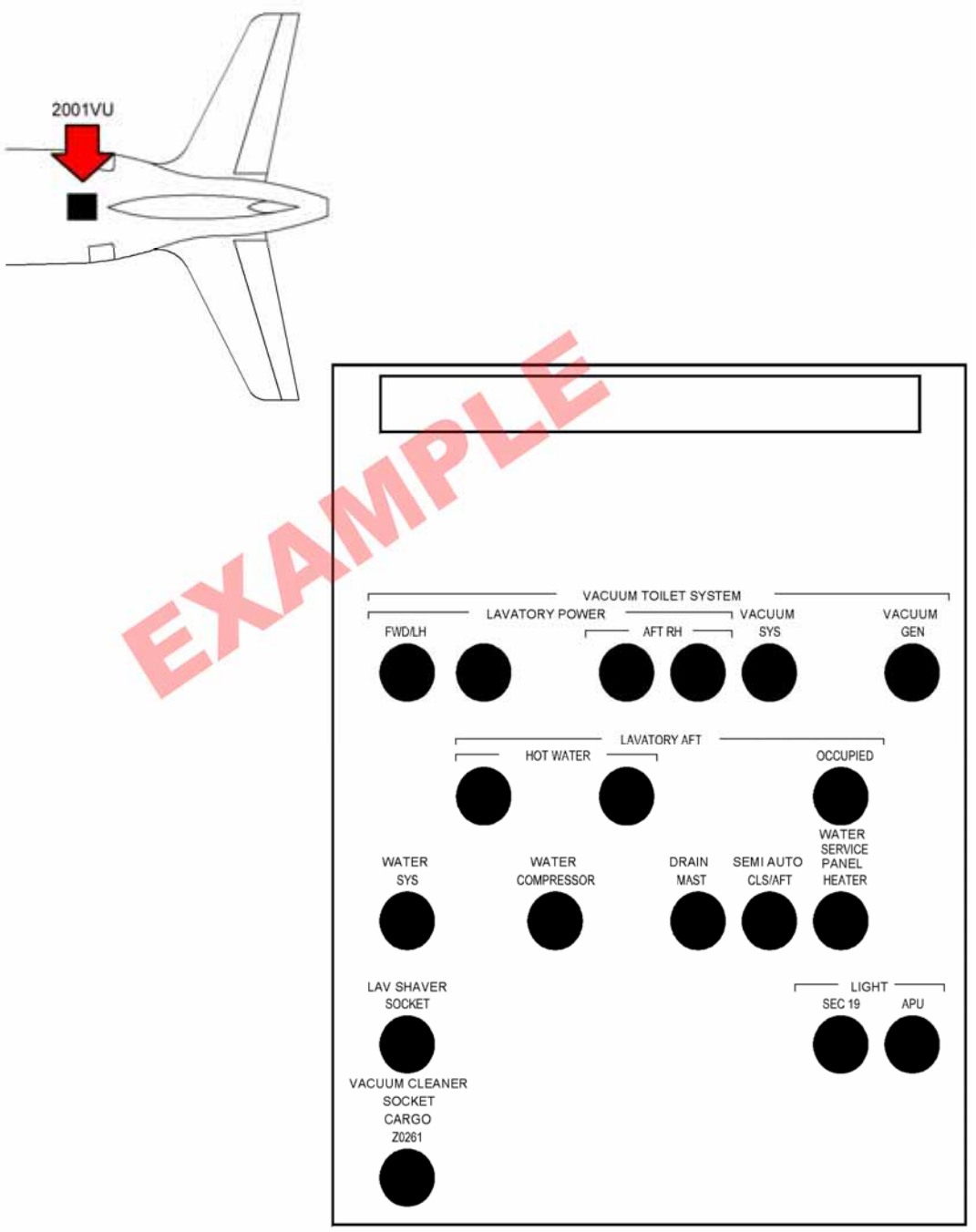
As Airbus aircraft are customized to our operator's requirements, the circuit breaker panels illustrated on the following pages are only to provide an overview of the panels.

Please contact your engineering department if you wish to have your operators customized circuit breaker panel configuration

CAUTION

It is not permitted to reset a tripped C/B. If you reset it, you can cause an overload to another system.


2000VU
VACUUM LAV SYS-LAV PWR
PC POWER PH.
C
B
A
LEFT
AIRSHOW DC
CARGO COMPT LIGHT
FWD
AFT
LDG AREA
AIR CONDTN COMPT OUTLET
LAV LIGHT
LAVATORY FWD & MID-HOT WATER FWD/LH
PRIMEX CONT
PC POWER PH.
C
B
A
RIGHT
LAVATORY FOWARD-OCCUPIED
WATER SYS ICE PROTECTION HEATER
VACUUM CLEANER SOCKET CARGO Z261
WATER SYS
WATER SYSTEM
ICE PROT
HTR
CTL
DRAIN MAST
SEMI AUTO CLS/FWD
CABINE COMMUNICATION SYSTEM-PRAM
PASSENGER READING LIGHT
CABIN LIGHT POWER
WINDOW
CEILING
FWD
AFT
FWD
AFT
LIGHT
CABIN ENTRY
ATTND WORK
EXAMPLE


2001VU
EXAMPLE
VACUUM TOILET SYSTEM
LAVATORY POWER
FWD/LH
AFT RH
VACUUM SYS
VACUUM GEN
LAVATORY AFT
HOT WATER
OCCUPIED
WATER SYS
WATER COMPRESSOR
DRAIN MAST
SEMI AUTO CLS/AFT
WATER SERVICE PANEL HEATER
LAV SHAVER SOCKET
LIGHT
SEC 19
APU
VACUUM CLEANER SOCKET CARGO Z0261

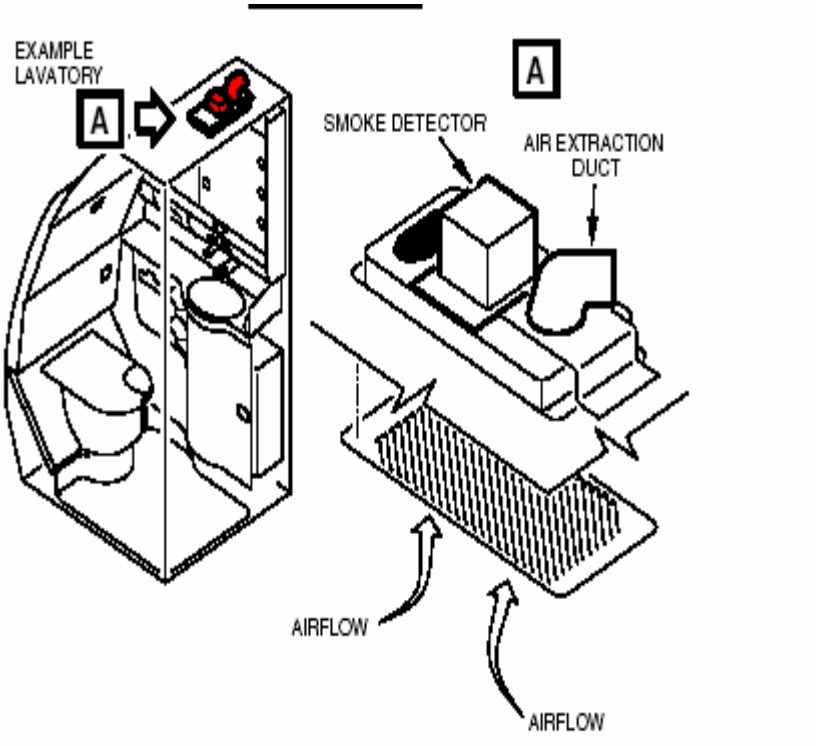
3.24. LONG RANGE AIRCRAFT FIRE PROTECTION

3.24.1. A330/A340 LAVATORY SMOKE DETECTION

One smoke detector is installed in each lavatory extraction duct. If smoke enters into the measuring chamber of the detector, a warning signal is transmitted to the CIDS.

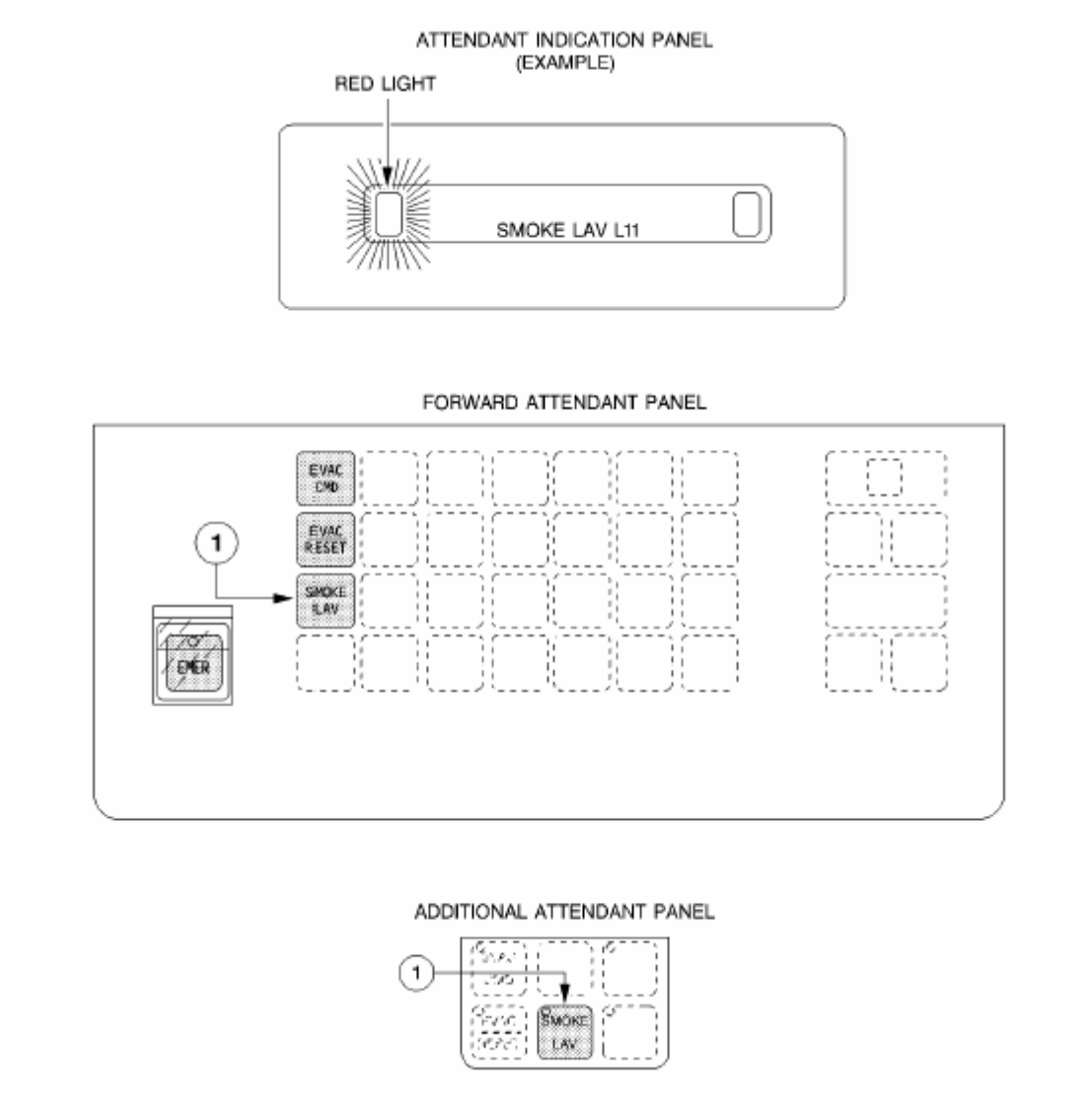
Figure 3-10

Lavatory Smoke Detection System



On all the AIPs the affected lavatory is shown in clear wording and the red indicator light flashes. The amber light on the respective ACP, and the outside smoke indicator of the affected lavatory are flashing. The corresponding LAV SMOKE button on the FAP or the AAP comes on.

Figure 3-11
Lavatory Smoke Indications



3.24.2. VCC SMOKE PROCEDURE FOR A330/A340 AIRCRAFT

- **<u>If the VCC is not equipped with smoke detection.</u>**

- **CABIN CREW…INFORM AND COORDINATE WITH THE FLIGHT CREW**

***-IFE Switch……OFF**
The IFE switch is located on the VCC switch panel. This enables *the isolation of the IFE/VCC electrical supply.*

- **BASIC FIRE FIGHTING PROCEDURE……APPLY**

-CABIN CREW…….MAINTAIN CONTACT WITH FLIGHT CREW
The cabin crew should maintain contact with the FLIGHT CREW to monitor the status of the smoke.

- **If situation is cleared:**

-(AFFECTED) VCC……..CHECK PERIODICALLY
To ensure that the VCC remains clear of smoke.

- **<u>If the VCC is equipped with smoke detection.</u>**

On the VCC smoke control panel, the smoke warning indication comes on, with a red indicator warning and an alarm horn.

-CABIN CREW……INFORM AND COORDINATE WITH FLIGHT CREW

-*IFE SWITCH……..OFF
The IFE switch is located on the VCC switch panel. This enables the isolation of the IFE/ VCC electrical supply.

FIRE FIGHTING PROCEDURE……APPLY

“HORN INTERRUPT” PUSHBUTTON……PUSH
To silence the horn in the cabin.

-CABIN CREW…MAINTAIN CONTACT WITH FLIGHT CREW
The cabin crew should maintain contact with the FLIGHT CREW to monitor the status of the smoke.

- **If situation is cleared:**

- (AFFECTED) VCC……..CHECK PERIODICALLY
To ensure that the VCC remains clear of smoke.

NOTE *. The denomination of the IFE switch(es) depends on the cabin configuration.

The IFE switch(es) are the following:

- **PES/COM Main switch**
- **VCC Main Power switch**
- **PES Main switch**
- **PAX/SYS switch (only for SWR A330/A340 aircraft).**

3.25. A330 CABIN CIRCUIT BREAKER PANELS

Circuit breakers are installed to protect the electrical circuits of their related components.

There is one circuit breaker panel in the forward of the cabin, and one circuit breaker panel in the aft of the cabin. Circuit breakers that relate to cabin items, such as lights, and entertainment systems are on these panels, and may be used to isolate equipment in the event of smoke and fire, in accordance with the operator's policy.

A cover protects each circuit breaker panel to prevent unauthorized access.

The VE panels have rows of circuit breakers. The function of each circuit breaker is shown below the related circuit breaker. The location of the circuit breaker is defined through a matrix (Letter x Number).

-A letter (A, B, C…) for the circuit breaker row,

-A number (1,2,3…) for the circuit breaker column.

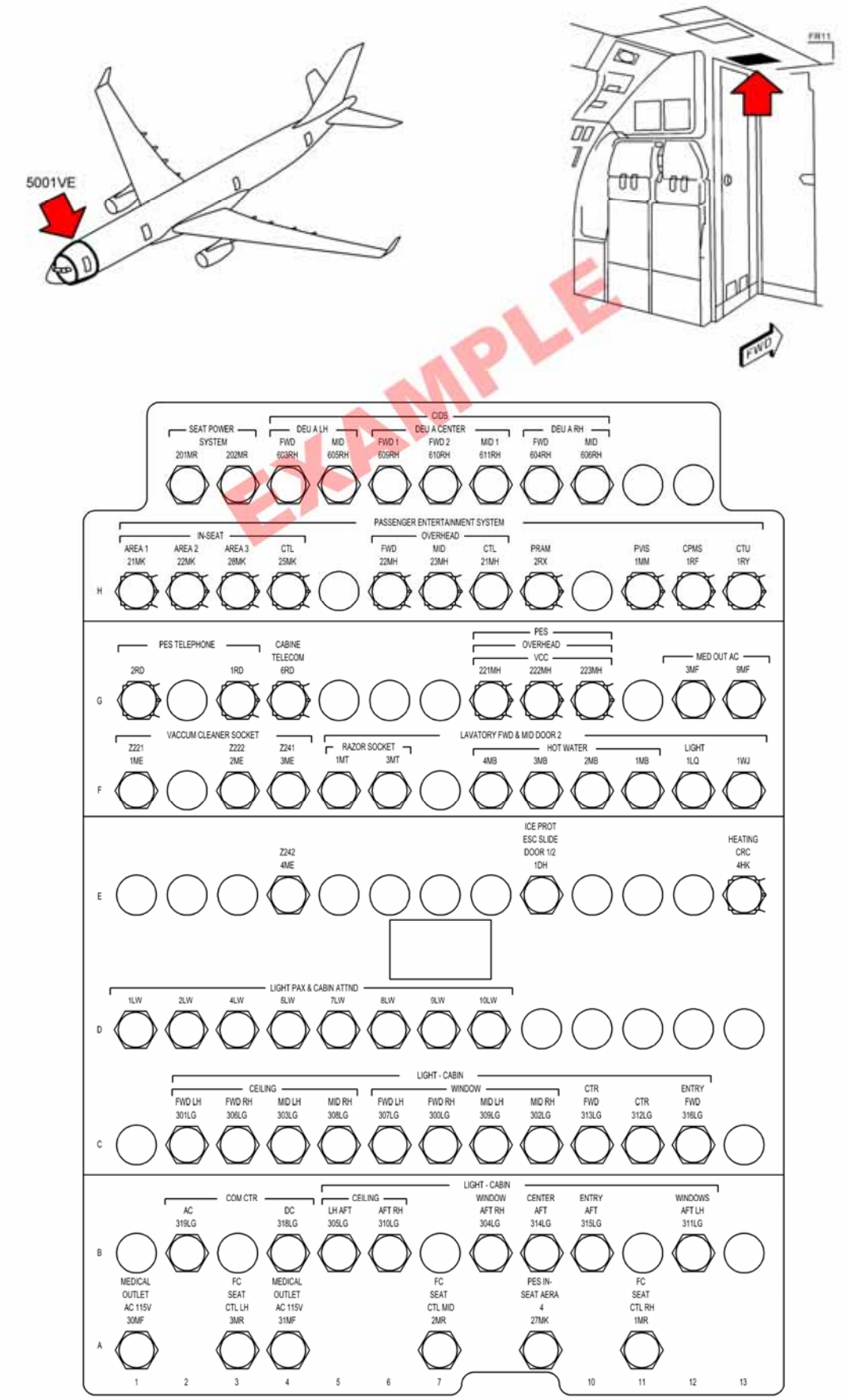
Example:
If a circuit breaker is installed in row C on position 8 (column 8) the related location is called C8.
In this case the circuit breaker C8 protects the electrical circuit, which is responsible for the cabin lighting on the right hand window side in the middle of the cabin area.

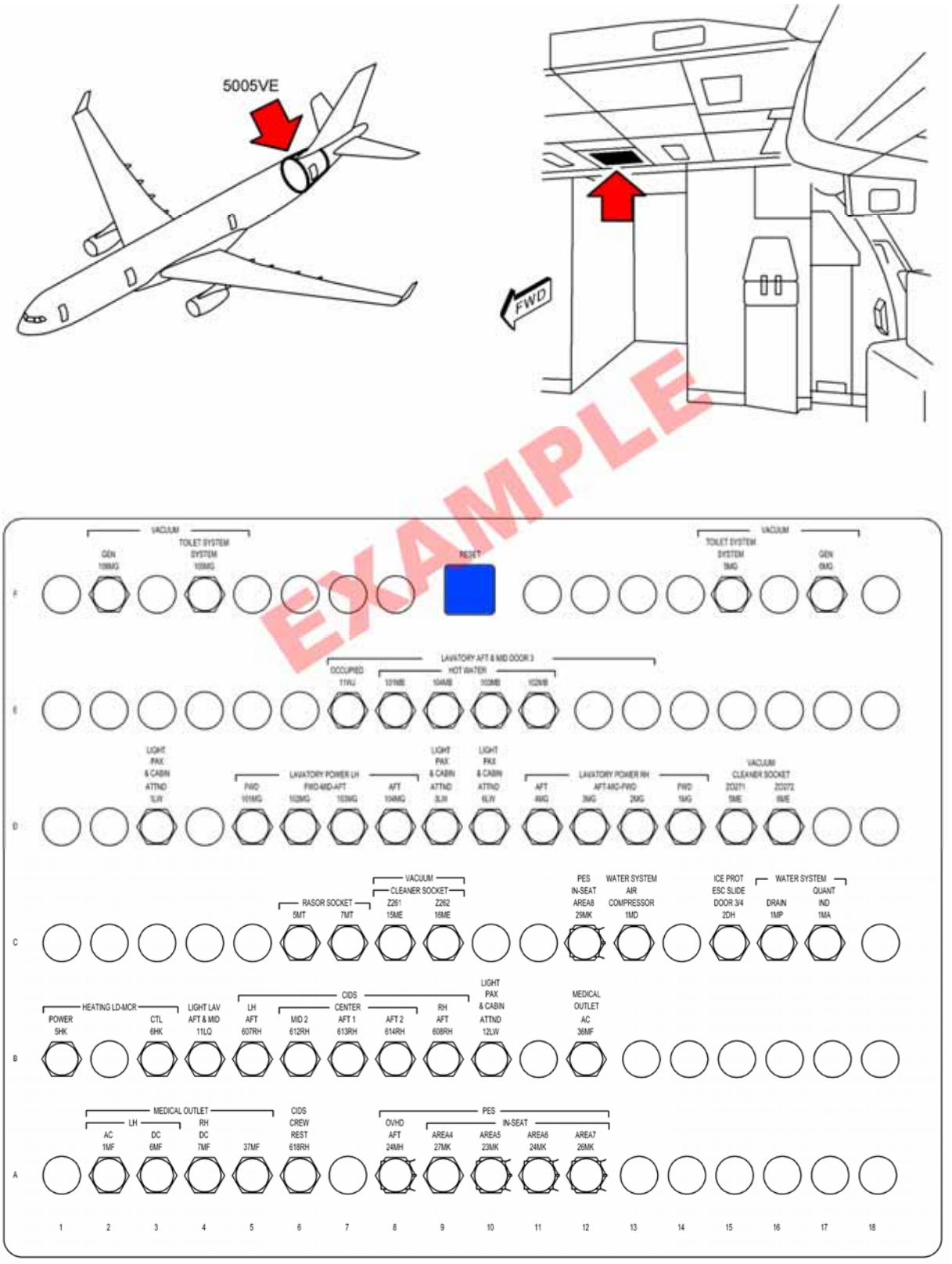
CAUTION

It is not permitted to reset a tripped C/B. If you reset it, you can cause an overload to another system.

As Airbus aircraft are customized to our operator's requirements, the circuit breaker panels illustrated on the following pages are only to provide an overview of the panels.

Please contact your engineering department if you wish to have your operators customized circuit breaker panel configuration.


5001VE
FWD
EXAMPLE
CIDS
SEAT POWER SYSTEM
DEU A LH
DEU A CENTER
DEU A RH
PASSENGER ENTERTAINMENT SYSTEM
IN-SEAT
OVERHEAD
PES TELEPHONE
CABINE TELECOM
PES
OVERHEAD
VCC
MED OUT AC
VACCUM CLEANER SOCKET
RAZOR SOCKET
LAVATORY FWD & MID DOOR 2
HOT WATER
LIGHT
ICE PROT ESC SLIDE DOOR 1/2
HEATING CRC
LIGHT PAX & CABIN ATTND
LIGHT - CABIN
CEILING
WINDOW
COM CTR
MEDICAL OUTLET AC 115V 30MF
FC SEAT CTL LH 3MR
MEDICAL OUTLET AC 115V 31MF
FC SEAT CTL MID 2MR
PES IN-SEAT AERA 4 27MK
FC SEAT CTL RH 1MR


5005VE
FWD
EXAMPLE
VACUUM
TOILET SYSTEM
GEN
RESET
LAVATORY AFT & MID DOOR 3
OCCUPIED
HOT WATER
LIGHT PAX & CABIN ATTND
LAVATORY POWER LH
FWD
FWD-MID-AFT
AFT
LAVATORY POWER RH
AFT-MID-FWD
VACUUM CLEANER SOCKET
RASOR SOCKET
CLEANER SOCKET
PES IN-SEAT AREA8 29MK
WATER SYSTEM AIR COMPRESSOR 1MD
ICE PROT ESC SLIDE DOOR 3/4 2DH
WATER SYSTEM DRAIN 1MP
QUANT IND 1MA
HEATING LD-MCR
POWER 5HK
CTL 6HK
LIGHT LAV AFT & MID 11LQ
CIDS
LH AFT 607RH
MID 2 612RH
CENTER AFT 1 613RH
AFT 2 614RH
RH AFT 608RH
LIGHT PAX & CABIN ATTND 12LW
MEDICAL OUTLET AC 36MF
MEDICAL OUTLET
LH
AC 1MF
DC 6MF
RH
DC 7MF
37MF
CIDS CREW REST 618RH
PES
OVHD AFT 24MH
IN-SEAT
AREA4 27MK
AREA5 23MK
AREA6 24MK
AREA7 26MK
F
E
D
C
B
A
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

3.26. A340 CIRCUIT BREAKER PANELS

Circuit breakers are installed to protect the electrical circuits of their related components.

There is one circuit breaker panel in the forward of the cabin, and one circuit breaker panel in the aft of the cabin. Circuit breakers that relate to cabin items, such as lights, and entertainment systems are on these panels, and may be used to isolate equipment in the event of smoke and fire, in accordance with the operator's policy.

A cover protects each circuit breaker panel to prevent unauthorized access.

The VE panels have rows of circuit breakers. The function of each circuit breaker is shown below the related circuit breaker. The location of the circuit breaker is defined through a matrix (Letter x Number).

-A letter (A, B, C…) for the circuit breaker row,

-A number (1,2,3…) for the circuit breaker column.

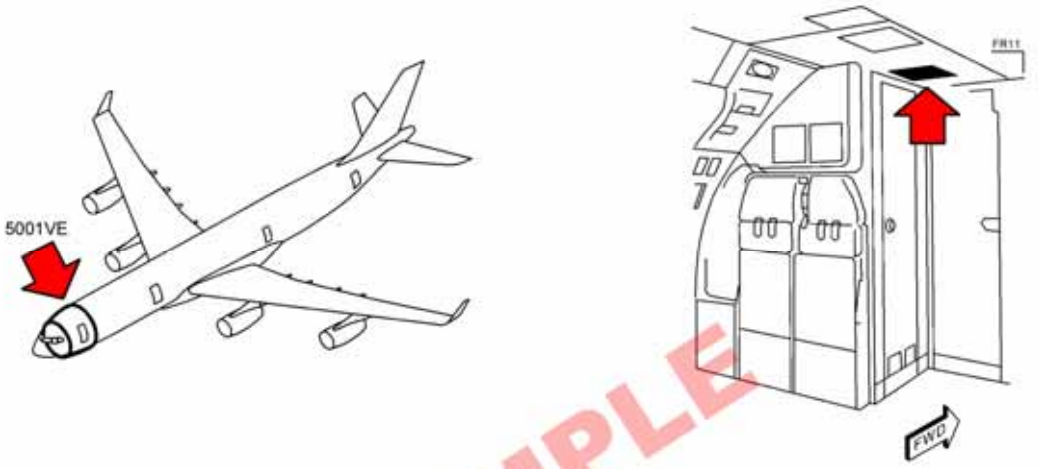
Example:
If a circuit breaker is installed in row C on position 8 (column 8) the related location is called C8.
In this case the circuit breaker C8 protects the electrical circuit, which is responsible for the cabin lighting on the right hand window side in the middle of the cabin area.

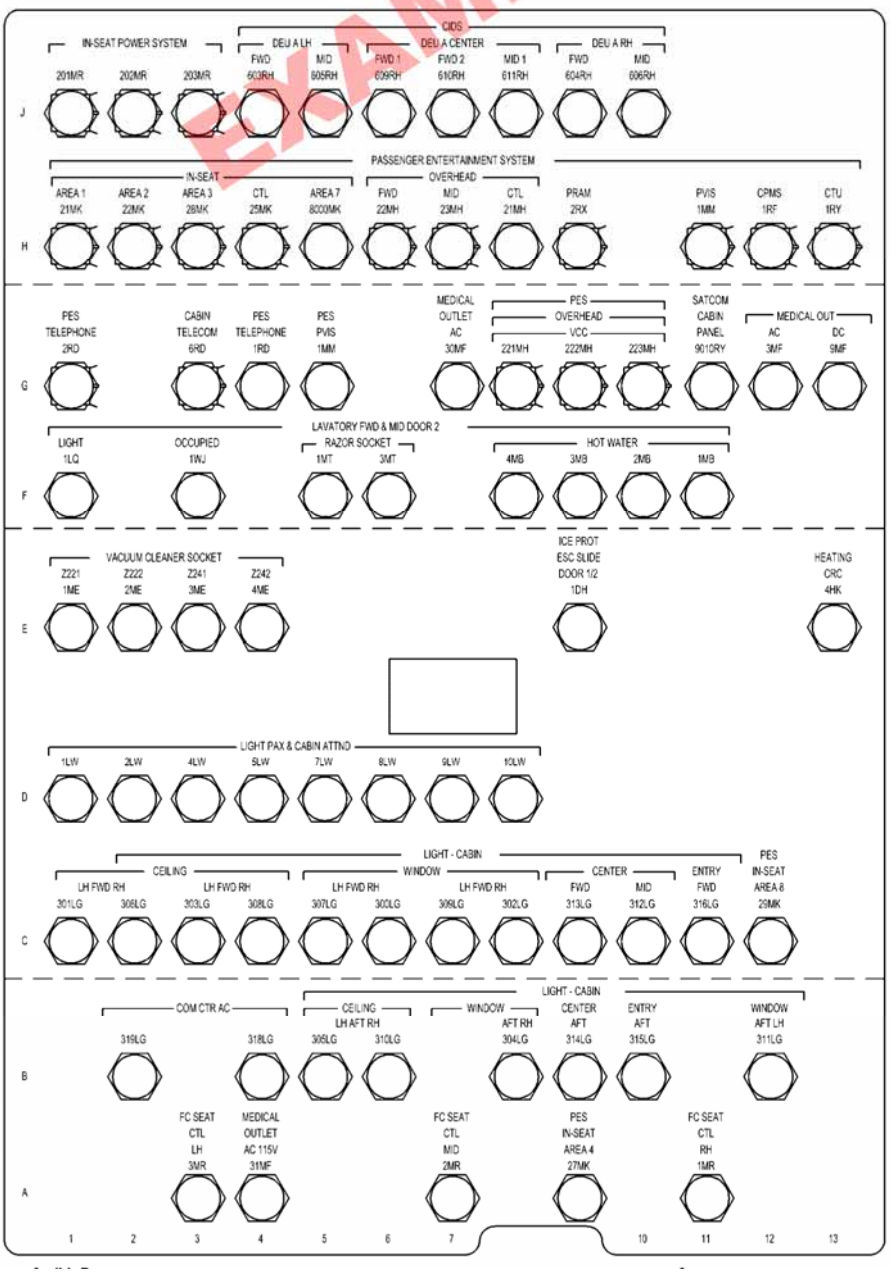
CAUTION

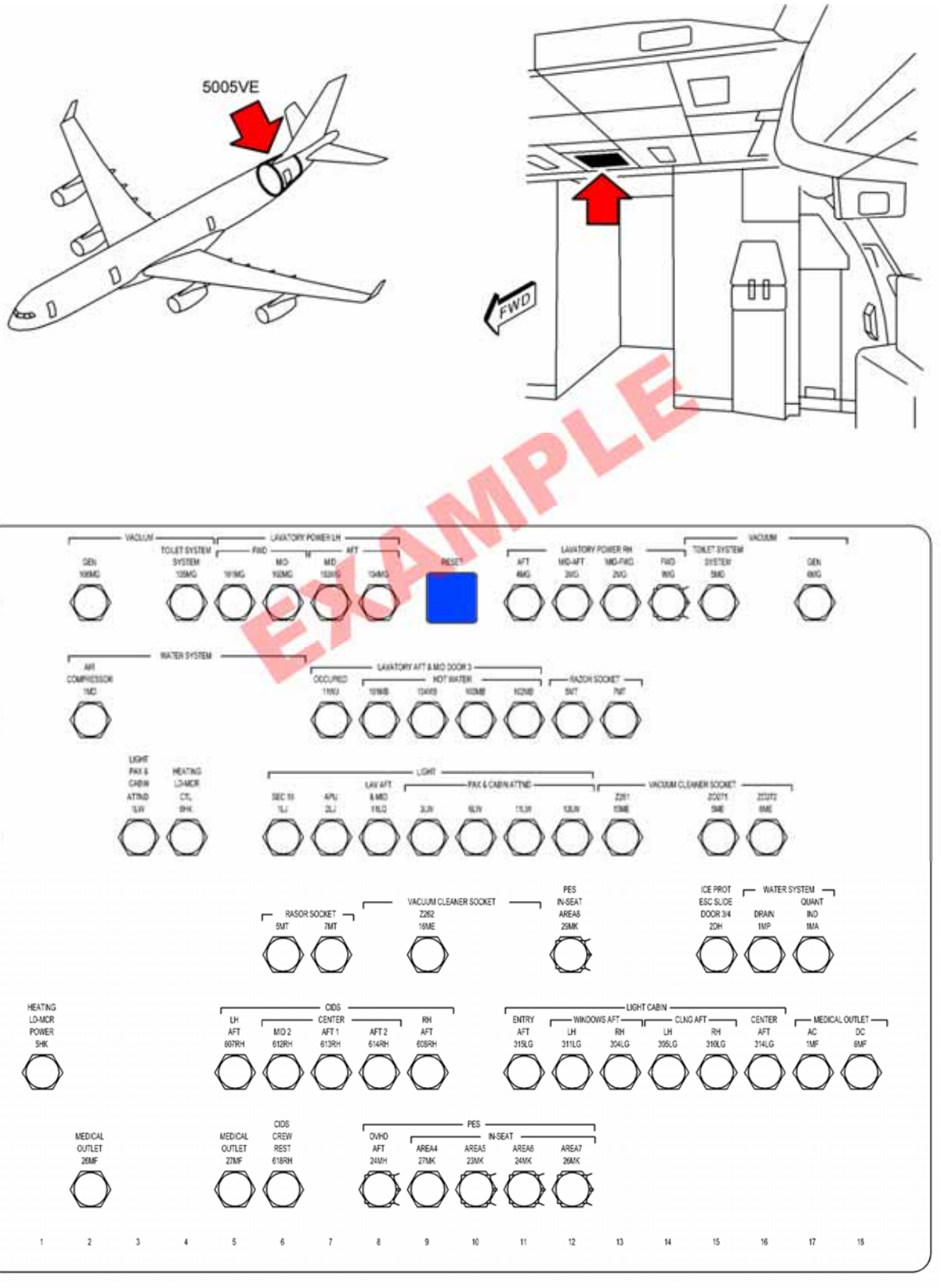
It is not permitted to reset a tripped C/B. If you reset it, you can cause an overload to another system.

As Airbus aircraft are customized to our operator's requirements, the circuit breaker panels illustrated on the following pages are only to provide an overview of the panels.

Please contact your engineering department if you wish to have your operators customized circuit breaker panel configuration.


5001VE
FWD


CIDS
IN-SEAT POWER SYSTEM
DEU A LH
DEU A CENTER
DEU A RH
PASSENGER ENTERTAINMENT SYSTEM
IN-SEAT
OVERHEAD
LAVATORY FWD & MID DOOR 2
RAZOR SOCKET
HOT WATER
VACUUM CLEANER SOCKET
ICE PROT ESC SLIDE DOOR 1/2
HEATING CRC 4HK
LIGHT PAX & CABIN ATTND
LIGHT - CABIN
CEILING
WINDOW
CENTER
ENTRY
COM CTR AC
FC SEAT CTL LH 3MR
MEDICAL OUTLET AC 115V 31MF
FC SEAT CTL MID 2MR
PES IN-SEAT AREA 4 27MK
FC SEAT CTL RH 1MR


5005VE
FWD
VACUUM
LAVATORY POWER LH
TOILET SYSTEM
FWD
MID
AFT
RESET
LAVATORY POWER RH
TOILET SYSTEM
VACUUM
WATER SYSTEM
AIR COMPRESSOR
LAVATORY AFT & MID DOOR 3
OCCUPIED
HOT WATER
RAZOR SOCKET
LIGHT
PAX & CABIN ATTND
HEATING LD-MCR CTL
LAV AFT & MID
VACUUM CLEANER SOCKET
RASOR SOCKET
VACUUM CLEANER SOCKET
PES IN-SEAT AREA8
ICE PROT ESC SLIDE DOOR 3/4
WATER SYSTEM
DRAIN
QUANT IND
HEATING LD-MCR POWER
CIDS
LH AFT
MID 2
CENTER AFT 1
AFT 2
RH AFT
LIGHT CABIN
ENTRY AFT
WINDOWS AFT
LH
RH
CLNG AFT
CENTER AFT
MEDICAL OUTLET
AC
DC
MEDICAL OUTLET
MEDICAL OUTLET
CIDS CREW REST
PES
OVHD AFT
IN-SEAT
AREA4
AREA5
AREA6
AREA7
F
E
D
C
B
A
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

3.27. FIRE PROTECTION-A330/A340 ENHANCED CABIN

The cabin crew is alerted via aural and visual warnings, if smoke is detected in the cabin.

The lavatory smoke detection alert is transmitted via the CIDS, when the CIDS DIRECTOR receives the necessary information from the Smoke Detection Control Unit (SDCU), via one of two ARINC 429 data buses.

The CIDS indicates smoke alerts that are detected in the lavatories, the VCC and the crew rest compartments (if installed).

The smoke detection alert comprises of aural and visual warnings.

The aural warning is a repetitive triple chime at a repetitive time of 30 seconds, broadcast via all passenger and cabin crew station loudspeakers.

The aural warning can be reset manually, by pressing the RESET pushbutton on FAP or any AAP (if there is a LAV SMOKE pushbutton)

The visual warnings in the cabin are:

- The amber lavatory indicator flashing at affected location
- The flashing of the amber segment on the respective ACP (and possibly the ACP's on the respective side of the aircraft, according to the Cabin Assignment Module CAM definition)
- The display of the affected lavatory compartment (max. 16 digits) in clear wording, for instance "SMOKE LAV 11", and red indicator flashing on all AIPs
- The steady illumination of a common red lavatory smoke indicator on the attendant panel in the respective lavatory area (FAP or AAP)
- The affected location (LAV, VCC, FCRC…) is graphically shown on the SMOKE DETECTION page on the FAP.

The visual warnings on ACPs and AIPs can be reset manually for the respective area, by pressing the RESET switch on the FAP or the respective AAP (if there is a LAV SMOKE pushbutton).

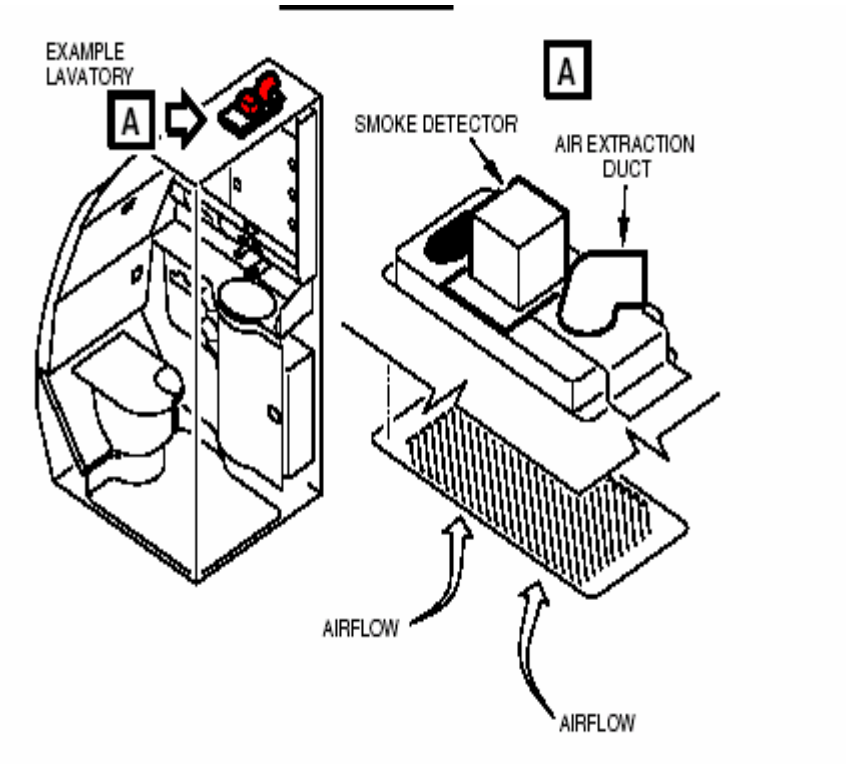
The red lavatory smoke indicators on the FAP, and on the respective AAP and the indicator light of the affected lavatory cannot be reset manually. The indication extinguishes when the smoke alert is reset by the SDCU.

3.28. LAVATORY SMOKE DETECTION – ENHANCED CABIN

A330/A340 (ENHANCED CABIN) A340-500/A340-600

In case of fire, each lavatory has a smoke detector, and a waste bin fire extinguisher.

If smoke enters in the measuring chamber of the detector, the Smoke Detection Control Unit (SDCU) transmits a smoke warning signal to the Cabin Intercommunication Data System (CIDS).



• The visual warnings include:

- The amber lavatory indicator that flashes at the affected location

- The amber segment flashes on the respective ACP

- The display of the affected lavatory compartment, in clear wording, and the red indicator on all AIPs flashes

- The steady red lavatory smoke indicator light on the attendant panel, in the respective lavatory area (FAP or AAP)

- The affected location lavatory appears on the SMOKE DETECTION page on the FAP

• The aural warning can be reset manually, by pressing the RESET pushbutton on the FAP or any AAP (if there is a LAV SMOKE pushbutton).

• The visual warnings on ACP and AIPs can be reset manually for the respective area, by pressing the RESET switch on the FAP or the respective AAP (if there is a LAV SMOKE pushbutton).

• The red lavatory smoke indicators on the FAP and on the respective AAP, and the indicator light of the affected lavatory cannot be reset manually. The indication goes out when the smoke alert is reset by the SDCU.

Figure 3-12

Smoke Indications on the Flight Attendant Panel (FAP)

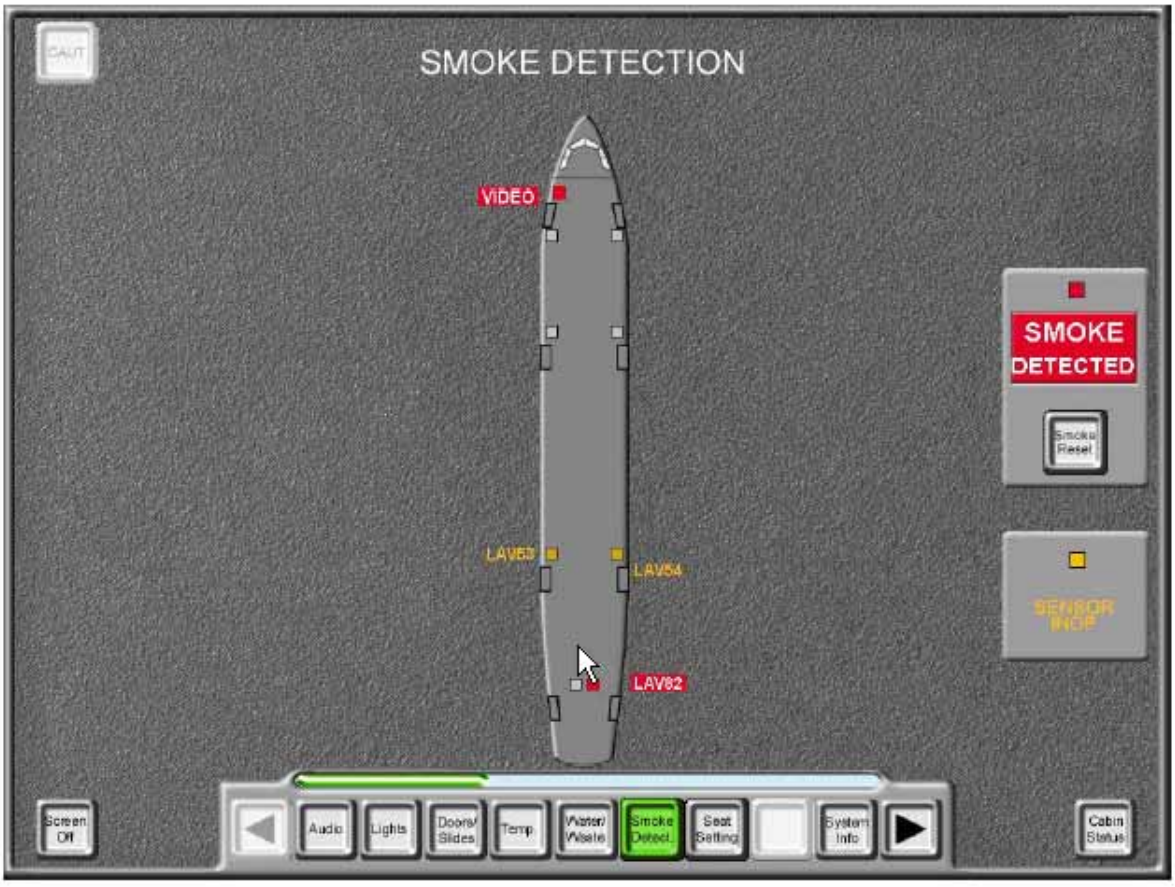
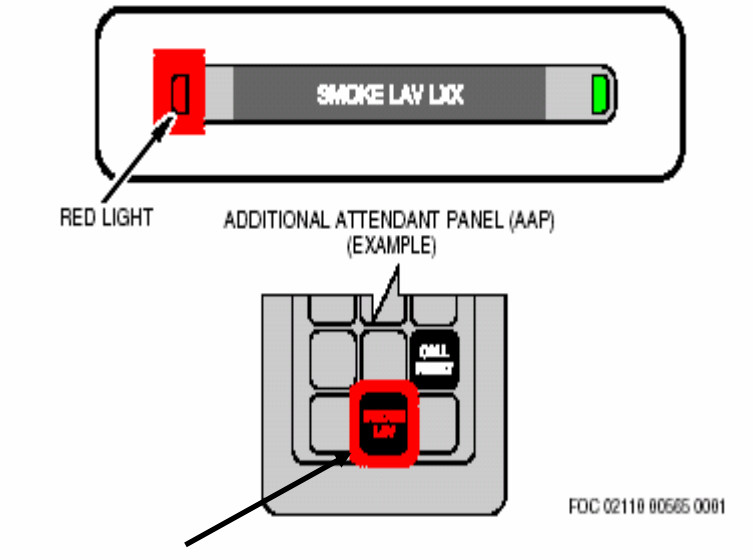


Figure 3-13

Smoke Warning Indications

Attendant Indication Panel (AIP)



Note:
XX displays the location of the related lavatory smoke detector in the Attendant Indication Panel (AIP)

3.29. VCC SMOKE PROCEDURE – ENHANCED CABIN

A330/A340 (ENCHANCED CABIN)/ A340-500/A340-600

FLIGHT CREW
-SMOKE CAB VIDEO 1(2)(3)(4) SMOKE…… CREW AWARENESS
Maintain contact with the cabin crew.

CABIN CREW PROCEDURE
On the FAP, or related AAP, the SMOKE warning indication comes on, with an associated triple chime, repeated every 30 seconds (optionally 10 seconds)

-CABIN CREW… INFORM AND COORDINATE WITH FLIGHT CREW

-PAX SYS SWITCH……OFF
The PAX SYS switch is located in the cockpit, on the VCC and optionally on the FAP.

-BASIC FIRE FIGHTING PROCEDURE…… APPLY

-SMOKE PUSHBUTTON (ON THE FAP or AAP IN YOUR ZONE)… RESET
To silence the chime in all cabin, and reset all visual warnings on the ACPs, the AIPs of the respective zones.

Note.

Only the FAP Smoke page, and the Smoke light on the respective FAP/AAP panel remain on until all smoke has dissipated.

-CABIN CREW……MAINTAIN CONTACT WITH FLIGHT CREW
The cabin crew should maintain contact with the flight crew to monitor the status of the smoke.

- **If confirmed that the smoke comes from the VCC:**

-C/Bs VIDEO CONTROL CENTER. AC1, AC2, AC3, DC……..PULL
This enables the isolation of the VCC electrical supply. These circuit breakers are on the 5001VE circuit breaker panel, located in the overhead panel, near the cockpit door.

- **When all the C/Bs for the video control center have been confirmed as pulled:**

-PAX SYS……NORM
This enables the restoration of the IPSS power supply for the remainder of the flight

3.30. A330 CIRCUIT BREAKER PANELS - ENHANCED CABIN

Circuit breakers are installed to protect the electrical circuits of their related components.

There is one circuit breaker panel in the forward of the cabin, and one circuit breaker panel in the aft of the cabin. Circuit breakers that relate to cabin items, such as lights, and entertainment systems are on these panels, and may be used to isolate equipment in the event of smoke and fire, in accordance with the operator's policy.

A cover protects each circuit breaker panel to prevent unauthorized access.

The VE panels have rows of circuit breakers. The function of each circuit breaker is shown below the related circuit breaker. The location of the circuit breaker is defined through a matrix (Letter x Number).

-A letter (A, B, C…) for the circuit breaker row

-A number (1,2,3…) for the circuit breaker column.

Example.
If a circuit breaker is installed in row C on position 8 (column 8) the related location is called C8.
In this case the circuit breaker C8 protects the electrical circuit, which is responsible for the cabin lighting on the right hand window side in the middle of the cabin area.

CAUTION

It is not permitted to reset a tripped C/B. If you reset it, you can cause an overload to another system.

As Airbus aircraft are customized to our operator's requirements, the circuit breaker panels illustrated on the following pages are only to provide an overview of the panels.

Please contact your engineering department if you wish to have your operators customized circuit breaker panel configuration.

3.30.1. CIRCUIT BREAKER PANEL LOCATION

On the circuit breaker (C/B) panel's 5001VE and 5005VE the circuit breakers for the different electrical systems are located. These VE panels have different locations, 5001VE in the FWD and 5005VE in the AFT cabin area.

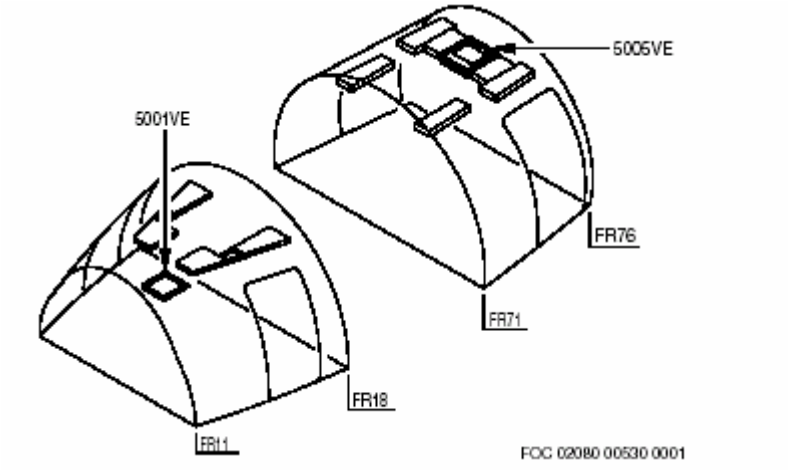


Figure 3-14

5001VE Circuit Breaker Panel

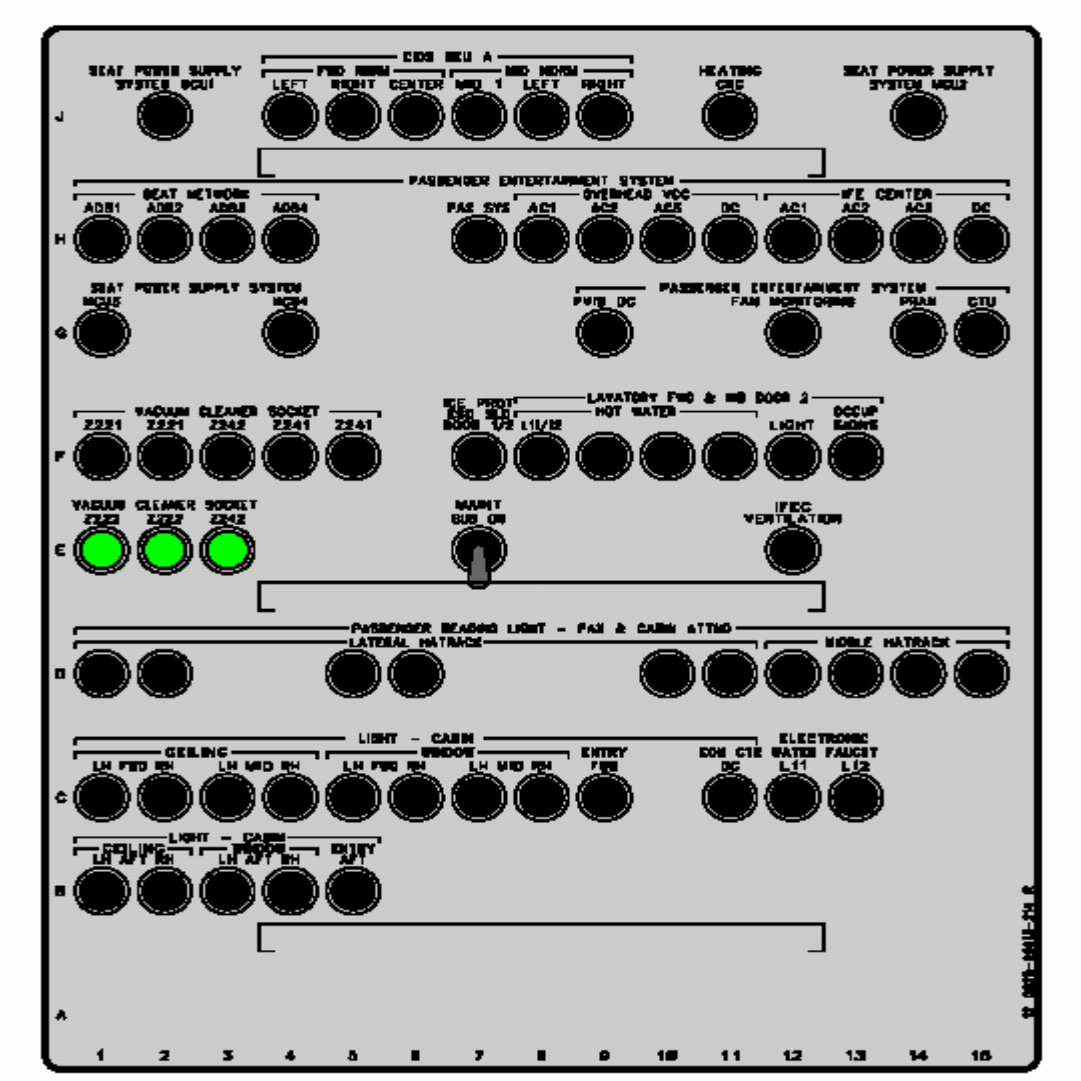
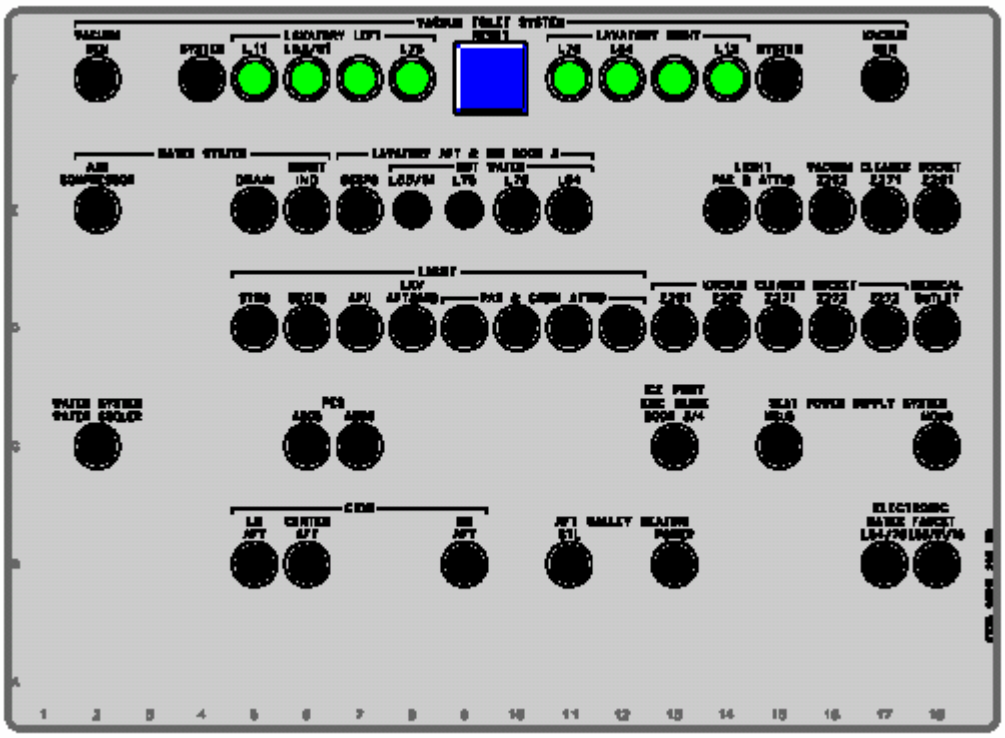


Figure 3-15

5005VE Circuit Breaker Panel



3.31. A340 CIRCUIT BREAKER PANELS - ENHANCED CABIN

Circuit breakers are installed to protect the electrical circuits of their related components.

There is one circuit breaker panel in the forward of the cabin, and one circuit breaker panel in the aft of the cabin. Circuit breakers that relate to cabin items, such as lights, and entertainment systems are on these panels, and may be used to isolate equipment in the event of smoke and fire, in accordance with the operator's policy.

A cover protects each circuit breaker panel to prevent unauthorized access.

The VE panels have rows of circuit breakers. The function of each circuit breaker is shown below the related circuit breaker. The location of the circuit breaker is defined through a matrix (Letter x Number).

-A letter (A, B, C…) for the circuit breaker row,

-A number (1,2,3…) for the circuit breaker column.

Example.
If a circuit breaker is installed in row C on position 8 (column 8) the related location is called C8.
In this case the circuit breaker C8 protects the electrical circuit, which is responsible for the cabin lighting on the right hand window side in the middle of the cabin area.

CAUTION

It is not permitted to reset a tripped C/B. If you reset it, you can cause an overload to another system.

As Airbus aircraft are customized to our operator's requirements, the circuit breaker panels illustrated on the following pages are only to provide an overview of the panels.

Please contact your engineering department if you wish to have your operators customized circuit breaker panel configuration.

3.31.1. CIRCUIT BREAKER PANEL LOCATION

On the circuit breaker (C/B) panel's 5001VE and 5005VE the circuit breakers for the different electrical systems are located. These VE panels have different locations, 5001VE in the FWD and 5005VE in the AFT cabin area.

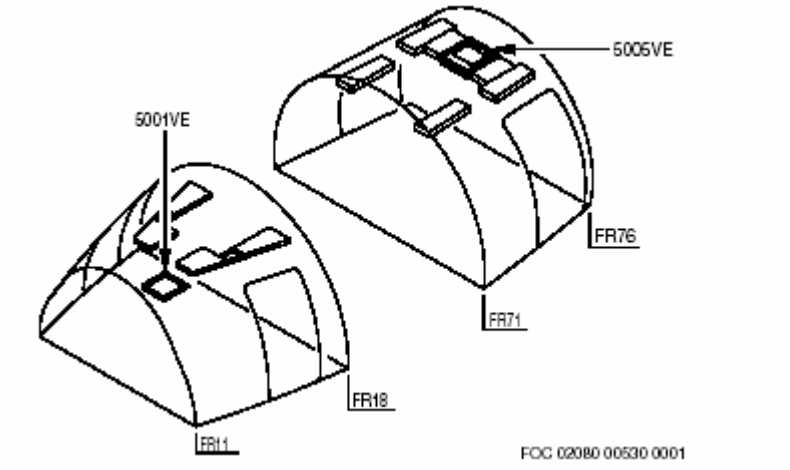


Figure 3-15

5001VE Circuit Breaker Panel

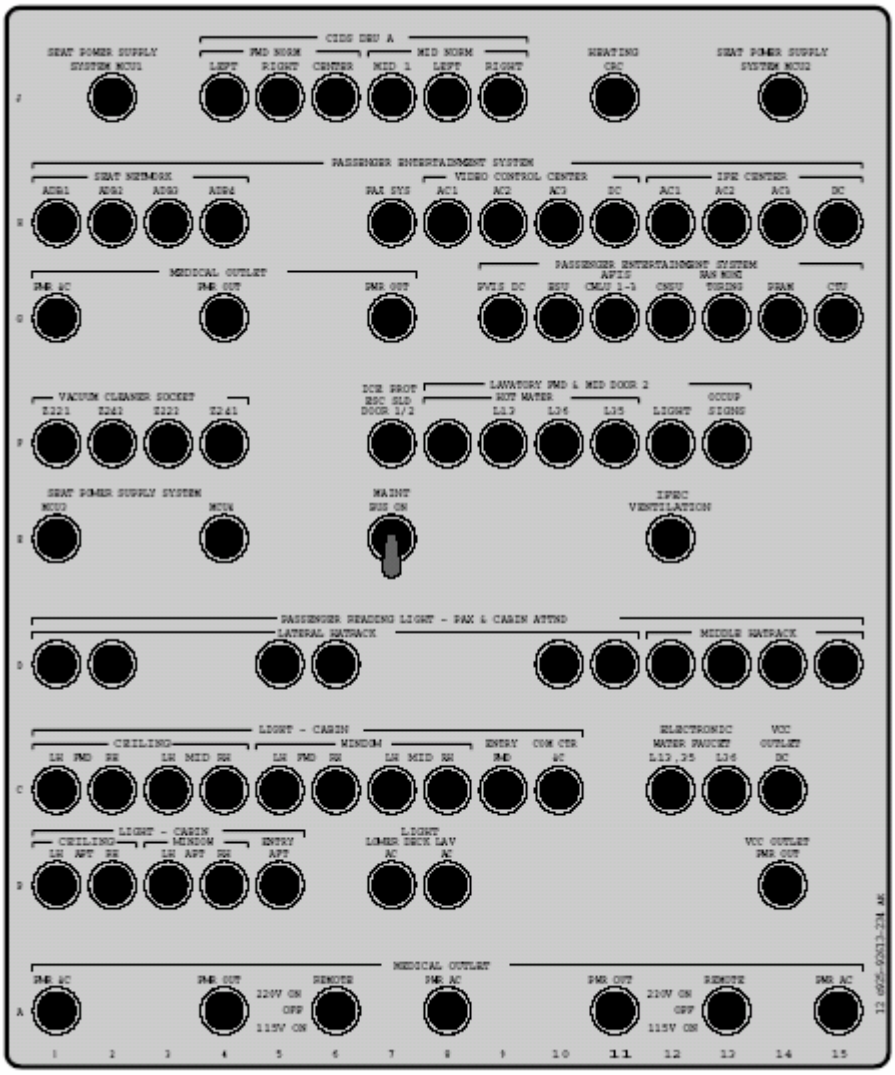
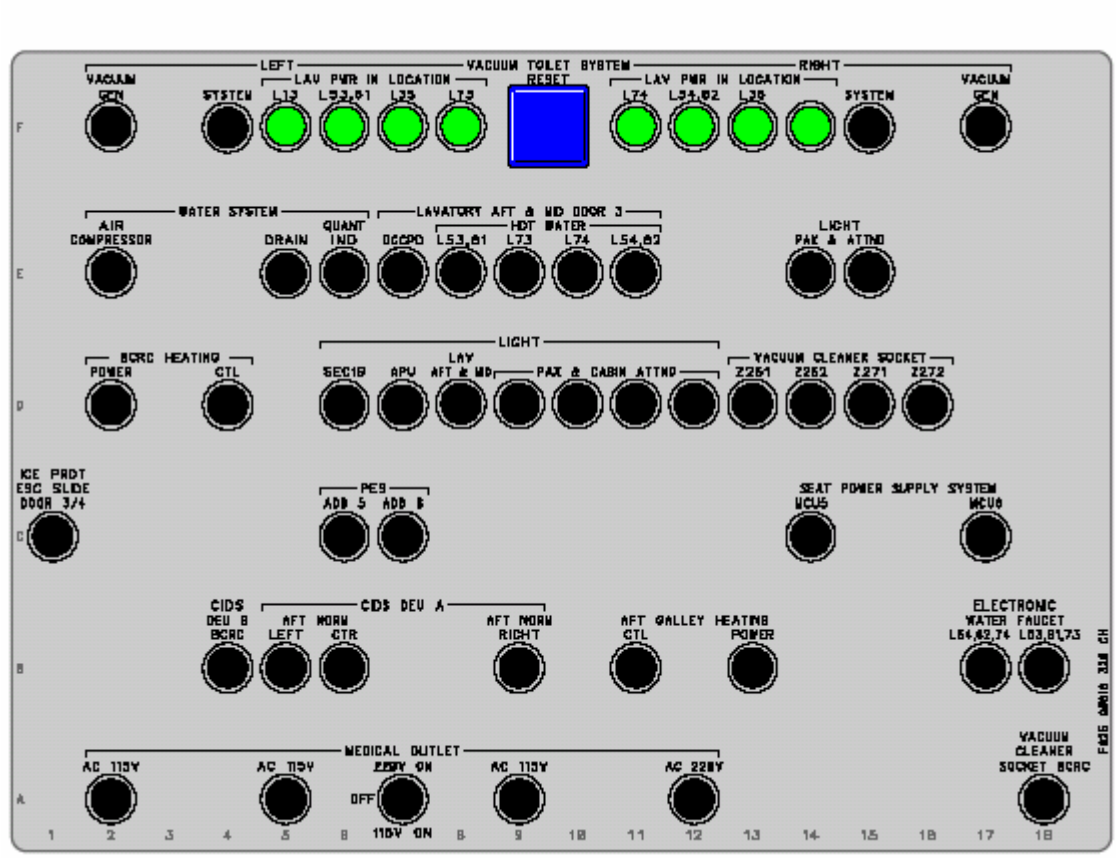


Figure 3-16

5005VE Circuit Breaker Panel



3.32. A340-500/600 CABIN CIRCUIT BREAKER PANELS

Circuit breakers are installed to protect the electrical circuits of their related components.

A cover protects each circuit breaker panel to prevent unauthorized access.

The VE panels have rows of circuit breakers. The function of each circuit breaker is shown below the related circuit breaker. The location of the circuit breaker is defined through a matrix (Letter x Number).

-A letter (A, B, C…) for the circuit breaker row,

-A number (1,2,3…) for the circuit breaker column.

Example.
If a circuit breaker is installed in row C on position 8 (column 8) the related location is called C8.
In this case the circuit breaker C8 protects the electrical circuit, which is responsible for the cabin lighting on the right hand window side in the middle of the cabin area.

CAUTION

It is not permitted to reset a tripped C/B. If you reset it, you can cause an overload to another system.

As Airbus aircraft are customized to our operator's requirements, the circuit breaker panels illustrated on the following pages are only to provide an overview of the panels.

Please contact your engineering department if you wish to have your operators customized circuit breaker panel configuration.

3.32.1. CIRCUIT BREAKER PANEL LOCATION

On the circuit breaker (C/B) panel's 5001VE and 5005VE the circuit breakers for the different electrical systems are located. These VE panels have different locations, 5001VE in the FWD and 5005VE in the AFT cabin area.

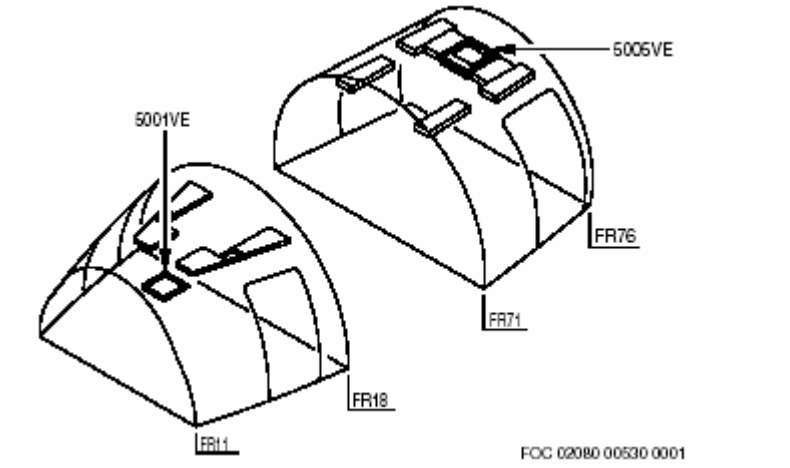


Figure 3-17

5001VE Circuit Breaker Panel

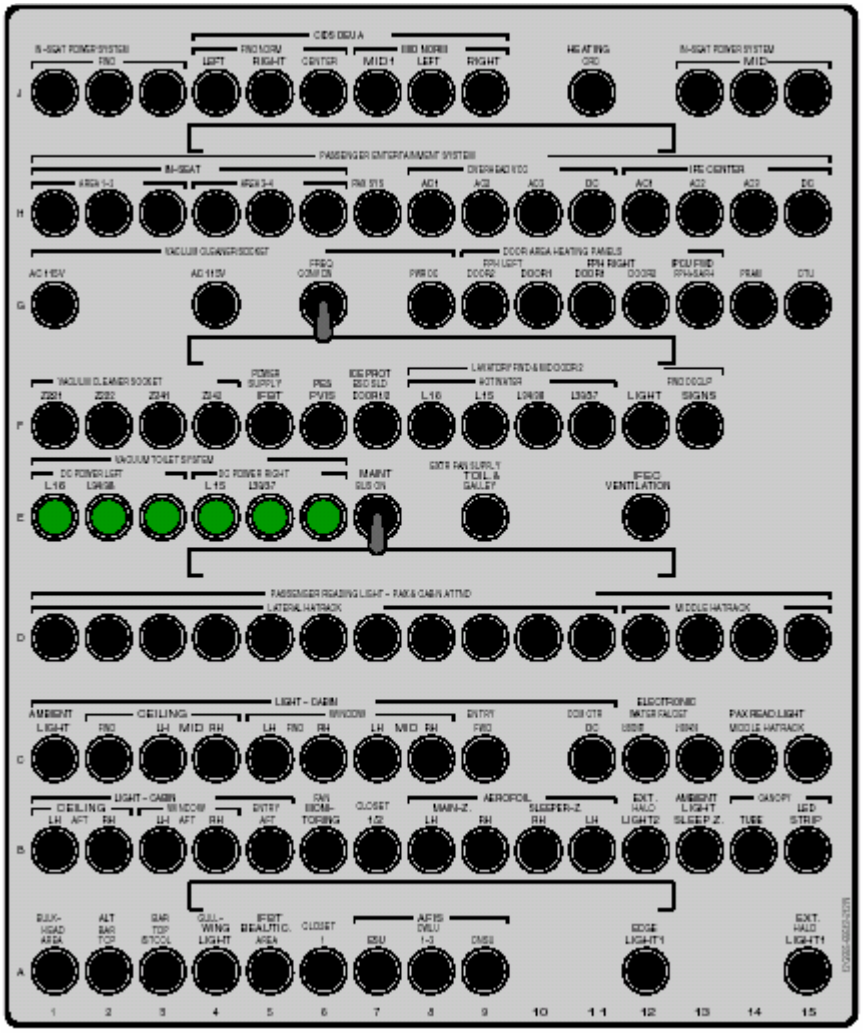
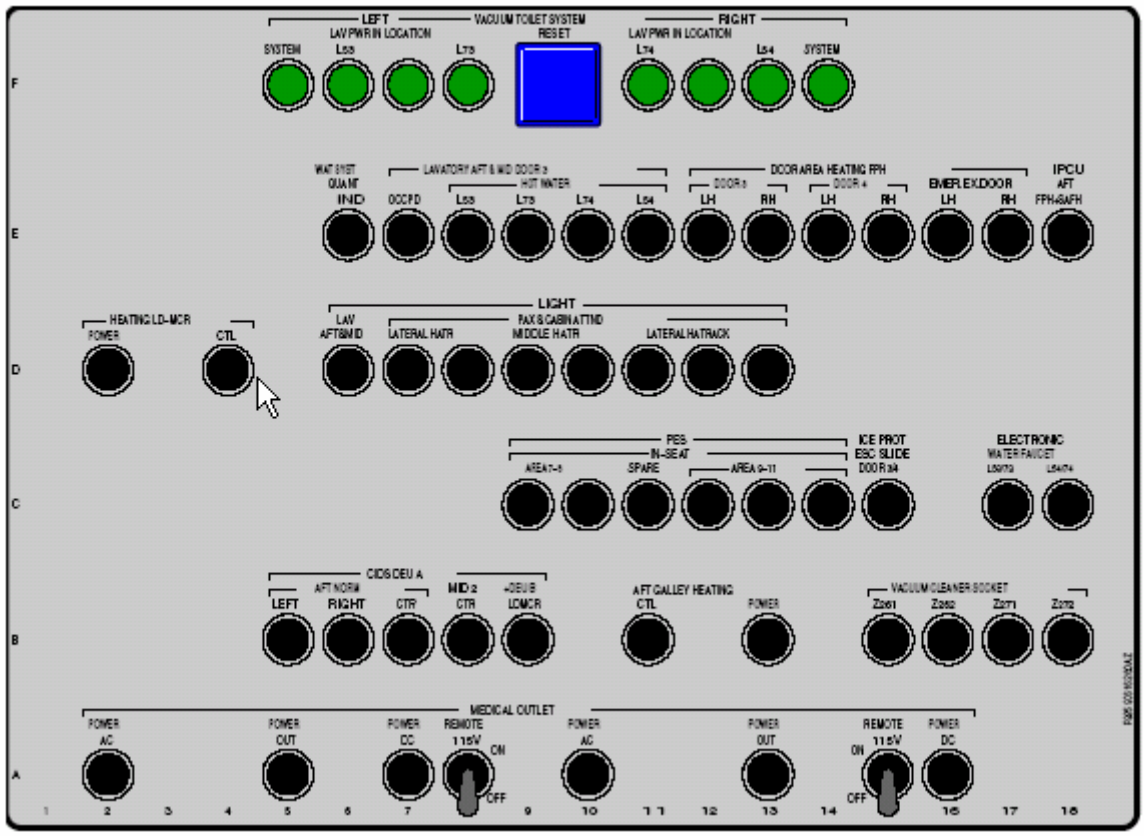


Figure 3-18

5005VE Circuit Breaker Panel



3.33. LONG RANGE AIRCRAFT CREW REST COMPARTMENTS

A330/A340 (Enhanced Cabin)/A340-500/A340-600

On long-distance or overnight flights, the cabin crew must have the possibility to relax or to sleep. Thus, the aircraft has special crew rest rooms. Depending on their location there are different types of crew rest rooms.

Flight Crew Rest Compartment (FCRC) Because of its location, which is always nearby the cockpit, it is intended to be used from the flight crew (the pilots).

Lower Deck - Mobile Crew Rest (LDMCR)

- An under floor crew rest room intended for cabin crew use. Integrated in a container similar to the freight containers. Allows flexible use and quick.
- Installation or removal. Alternatively installed to a bulk crew rest compartment. Accessible via an own staircase.

Bulk Crew Rest Compartment (BCRC)
A stationary under floor crew rest room installed in the bulk cargo compartment. Installed alternatively to a LDMCR. Intended for cabin crew use only. Additional zone(s) is possible. This type of crew rest room is called Full Bulk Crew Rest Compartment (FBCRC).

Dock-on Crew Rest (DCR)
An under floor crew rest room integrated in a container similar to the freight containers. Accessible via other lower deck facilities only, means that there is no own staircase.

3.34. CREW REST COMPARTMENTS - NORMAL OPERATION

A preflight inspection of the crew rest compartment emergency equipment must be completed.

A security check of the of the crew rest compartments should be completed before each flight departure.

WARNING

1. During the flight, the occupancy of the crew rest compartments is limited to the total number of bunks and/or seats that are installed in the compartment

2. The crew rest compartments may only be used by operating crewmembers that are trained in the use of emergency equipment, emergency procedures and the systems of the crew rest compartments

3. Smoking is prohibited in the crew rest compartments

4. The crew rest compartment is limited to the stowage of the crewmembers personal baggage only. The stowage of cargo or passenger baggage is prohibited.

During taxi, takeoff, final approach landing, the crew rest compartments must be.

- Unoccupied
- Doors closed and locked.

During the flight, when the crew rest compartments are occupied, the occupants must ensure that their seat belts are fastened while seated or lying down.

3.35. LOWER DECK CREW REST COMPARTMENTS

The stairwell hatch must remain open, and secured with the hatch retainers, at all times when the lower deck crew rest compartment is occupied.

To isolate the lower deck crew rest compartment from cabin noise, the stairwell door should be closed, but the stairwell hatch must remain open and secured.

In case of smoke or fire in the lower deck crew rest compartment or in the cargo compartments, the stairwell hatch must be closed, in order to isolate these compartments.

CAUTION

The LDCRC stairwell hatch may only be closed when the LDCRC is unoccupied / evacuated.

A post-flight security inspection of the crew rest compartments must be performed before the cabin crew disembarks from the aircraft.

3.36. CREW REST SMOKE DETECTION –LDMCR

The connected smoke detectors permanently analyze the ambient air in the crew rest compartment. The Smoke Detection Control Unit (SDCU) triggers and stores the following alarm signals:

- The optical alarm indicator corresponding to the smoke detector flashes, when smoke is detected
- The warning horn triggers intermittently
- The lighted signs RETURN TO CABIN and DO NOT OPEN HATCH and the smoke indicator in the cockpit are activated.

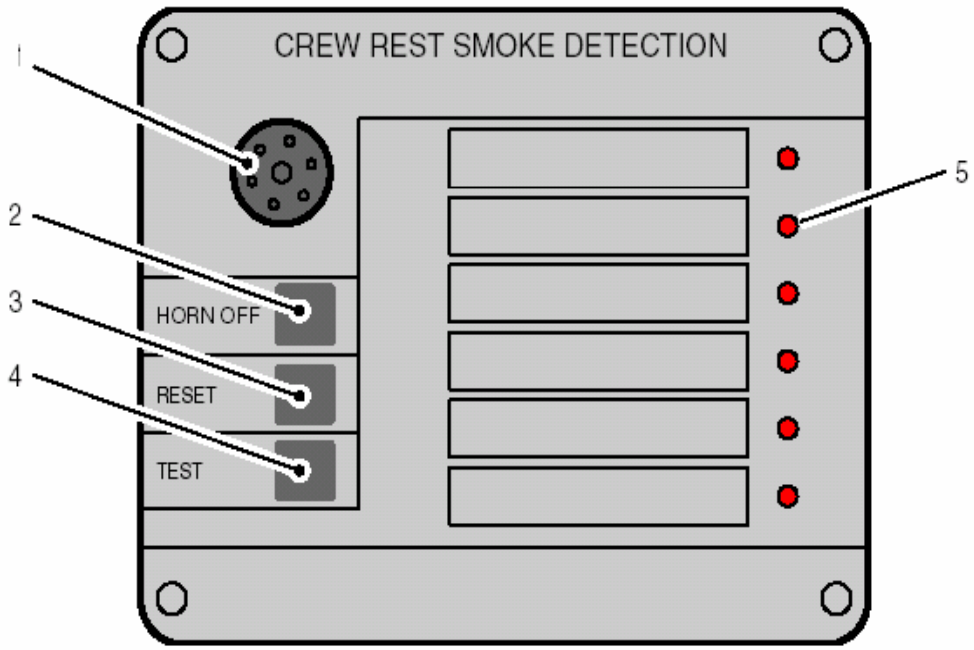


Figure 3-16

Crew Rest Smoke Detection (CRSD) Control Unit

1. Warning horn
2. HORN OFF pushbutton
3. RESET pushbutton
4. TEST pushbutton

5. Smoke detector channels with optical alarm indicators (LEDs).

Pushbutton Operation

-HORN OFF pushbutton
Pressing this pushbutton stops the warning horn chime

Note:

The HORN OFF pushbutton is not activated until the first triple chime is completed. Wait until the first triple chime is over, before pressing the pushbutton.

-RESET pushbutton

Pressing this pushbutton deactivates:

- The optical alarm indicator
- The lighted LEAVE LDMCR and DO NOT OPEN HATCH and the smoke indicator in the cockpit

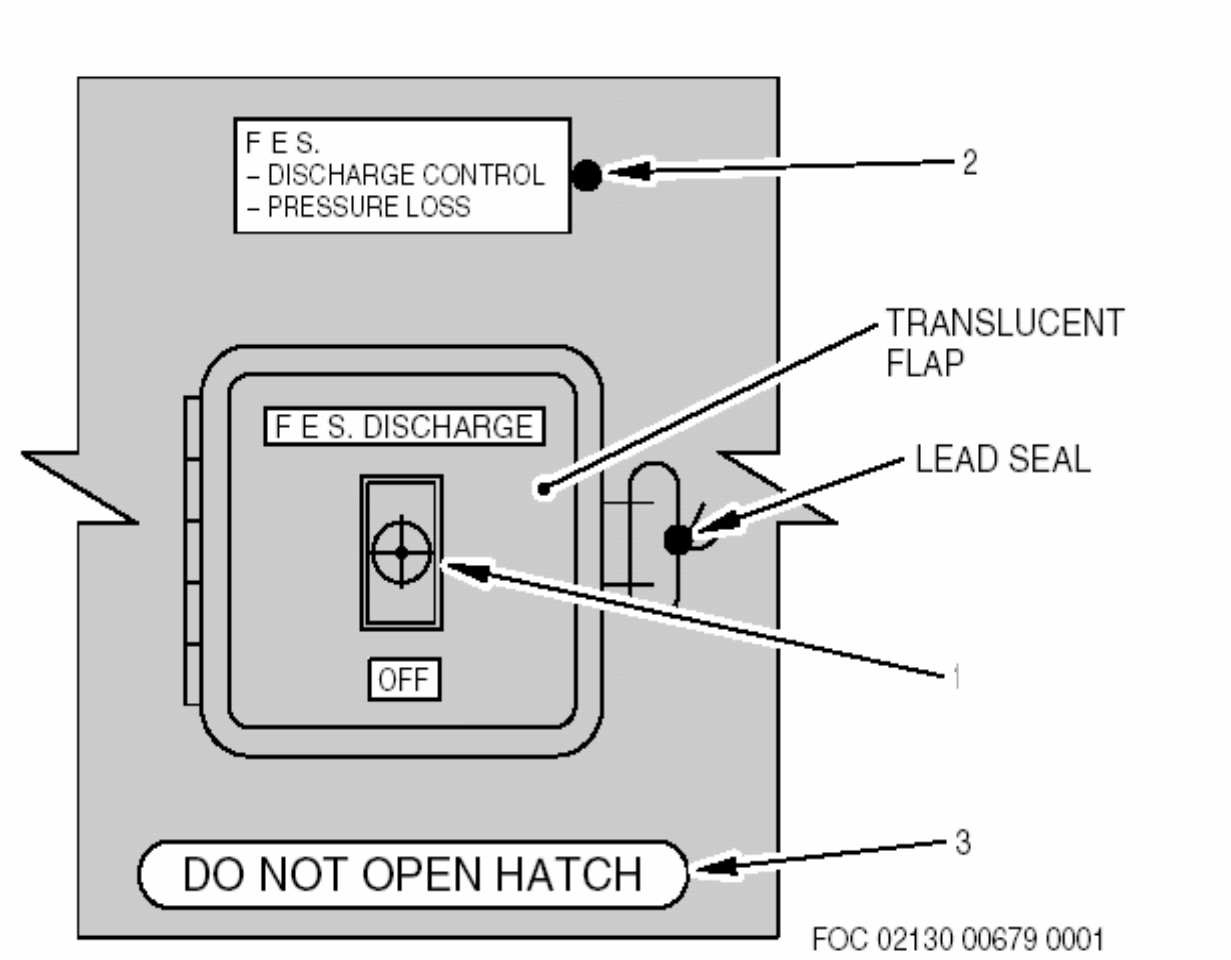
-TEST Pushbutton

Pressing this pushbutton results in testing the smoke detection control unit and all the connected smoke detectors.

3.37. CREW REST FIRE EXTINGUISHING SYSTEM (F.E.S)- LDMCR

Figure 3-17

F.E.S Discharge Panel



1. F.E.S discharge switch
2. F.E.S control indicator (red LED)
3. Lighted sign DO NOT OPEN HATCH

The F.E.S discharge panel is in the staircase housing.

3.37.1. HOW TO OPERATE THE FIRE EXTINGUISHING SYSTEM

WARNING

Before starting the F.E.S discharge ensure that:
-All crewmembers have evacuated the LDMCR
-The exit hatch and the emergency exit hatch must be closed and locked

To start the F.E.S discharge:

1. Remove the lead seal
2. Turn the cover flap to the open position
3. Press the F.E.S discharge switch to the DISCHARGE position.

The DO NOT OPEN HATCH sign comes on.

The F.E.S control indicator lights up to indicate the extinguisher discharge.

3.37.2. LDMCR SMOKE/FIRE PROCEDURE

A330/A340/340-500/A340-600

SMOKE WARNING PRINCIPAL

• **When smoke is detected in the LDMCR.**

• **In the LDMCR:**

- Loudspeaker. A single low chime will sound repeatedly for 30 s. Following the single low chime, a repetitive triple chime (smoke alarm) will sound every 30 s

- Low Flow Buzzer / when the air conditioning isolation valve closes, the low airflow buzzer will sound for 30 s.

- Attendant Indication Panel (AIP). The smoke location message comes on and the red indicator light flashes.

- LEAVE LDMCR. Signs will come on

- LDMCR lighting. Will come on to 100 %intensity

On the CRSD control unit, the red indicator of the applicable smoke detector flashes.

• **In the staircase housing:**

The visual "DO NOT OPEN HATCH" warning appears in the staircase housing (when both the emergency exit and exit hatches are closed).

• **In the cabin:**

- Flight Attendant Panel (FAP) and Mini-FAP (MFAP) the SMOKE RESET button comes on. The FAP smoke page will show the affected area.

- A triple chime will be repeated every 30 s.

- On the respective Area Call Panel (ACP) the amber lights will flash.

- On the AIPS the smoke location message comes on, and red indicator light flashes.

FLIGHT CREW
-SMOKE CAB REST SMOKE……CREW AWARENESS
Maintain contact with the cabin crew to follow up on the status of the fire.

LDMCR SMOKE CONT'D..

CABIN CREW PROCEDURE

-STAIRCASE HOUSING DOOR...FEEL FOR HEAT AND OPEN THE DOOR VERY SLOWLY

-LDMCR. ……..CHECK FOR THE PRESENCE OF SMOKE AND FIRE
Search all the bunks, closets and stowage compartments.

• If smoke / fire is not visible in LDMCR, the smoke warning is unjustified.

-CRSD control unit HORN OFF pushbutton…….. PRESS
To silence the CRSD horn.

-**SMOKE DETECTOR RED INDICATOR...NOTE, WHICH ONE IS FLASHING**
To inform the ground maintenance personnel which smoke detector triggered the spurious smoke warning.

-CRSD CONTROL UNIT…….. PRESS the RESET pushbutton
To reset the concerned red indicator and the lighted signs. "LEAVE LDMCR/BCRC" and "DO NOT OPEN HATCH".

• If smoke / fire is visible.

-LDMCR EMPTY…….. CHECK

-BASIC FIRE FIGHTING PROCEDURE…….. APPLY
With portable fire extinguisher.

• If unable to extinguish the fire using the portable fire extinguisher.

-**CABIN CREW .... EVACUATE THE LDMCR**

-EXIT HATCH AND EMERGENCY EXIT HATCH..... CLOSE AND LOCK

-FES SWITCH .... SET TO DISCHARGE POSITION

WARNING

The main exit hatch and the emergency exit hatch must remain closed until arrival.

-LCMCR……..MONITOR FOR THE REMAINDER OF THE FLIGHT

3.37.3. LDMCR AIR CONDITIONING LOW FLOW

• If the air flow into LDMCR is incorrect, a buzzer sounds through the LDMCR loudspeakers for approximately 30 seconds and the "LOW AIR FLOW" sign comes on heating control panel.

The "LEAVE LDMCR" signs come on at each bunk. The crew rest compartment occupants must proceed as follows.

-OCCUPANTS. ……LEAVE THE CREW REST COMPARTMENT

-CREW REST COMPARTMENT EMPTY…… CHECK

-EXIT AND EMERGENCY EXIT HATCHES…….. CLOSED

-CABIN CREW…….. INFORM THE FLIGHT CREW

3.37.4. LDMCR HEATING SYSTEM FAULT

• If the heating system fails, the LDMCR heating control panel's fault light comes on.

Crew rest occupants should proceed as follows.

-**HEATING CONTROL PANEL……RESET**
The reset button is located on the heating control panel.

• If the fault light remains on, the heating system is faulty

-CABIN CREW……INFORM THE FLIGHT CREW
The cabin crew should report the heating system failure to the flight crew, and apply airline procedure.

3.37.5. FLIGHT CREW REST COMPARTMENT SMOKE/FIRE PROCEDURE

A330/A340/A340-500/600

SMOKE WARNING PRINCIPLE
• When smoke is detected in the FCRC.

In the FCRC:

- Loudspeaker. A single low chime will sound repeatedly for 30 s. Following the single low chime, a repetitive triple chime will sound every 30 s.
- Attendant Indication Panel (AIP). The smoke location message comes on and the red indicator light flashes.
- FCRC lighting. Will come on to 100 % intensity

In the cabin:

- On the Flight Attendant Panel (FAP) and Additional Attendant Panel (AAP).

  The SMOKE RESET button comes on.

  The FAP smoke page will show the affected area.
- A triple chime will be repeated every 30 s (optionally every 10 s).
- On the respective Area Call Panel (ACP) the amber lights will flash.
- On the AIPS the smoke location message comes on, and red indicator light flashes.

-

FLIGHT CREW

ECAM ALERT SMOKE FLT REST SMOKE ..... CREW AWARENESS
Maintain contact with the cabin crew and follow up on the status in the FCRC

CABIN CREW

SMOKE RESET PUSH BUTTON ON THE FAP OR THE RESPECTIVE AAP..... PRESS TO RESET

This will:
- Silence the chimes in the cabin
- Reset the visual warnings on the respective ACPS and AIPS

Note:

The amber smoke indicator, the smoke reset pushbutton the FAP smoke page remain ON until the smoke has dissipated.

FCRC ..... SEARCH FOR PRESENCE OF SMOKE AND OF FIRE
Search all bunks, closets, and stowage compartments.

FLIGHT CREW REST COMPARTMENT SMOKE / FIRE PROCEDURE CONT'D..

- **If smoke or fire is visible:**

BASIC FIREFIGHTING PROCEDURE.....APPLY
Use a portable fire extinguisher. Consider the use of a PBE.

FCRC .... MONITOR FOR THE REMAINDER OF THE FLIGHT

3.37.6. BULK CREW REST COMPARTMENT (BCRC) FIRE PROTECTION

A330 / A340 / A340-500 / A340-600

A stationary under floor crew rest room installed in the bulk cargo compartment. Installed alternatively to a LDMCR intended for cabin crew use only. Additional zone(s) is possible. This type of crew rest room is called Full Bulk Crew Rest Compartment (FBCRC).

SMOKE DETECTOR

The smoke detector is installed on the ceiling. It detects smoke in the zone, where it is installed and indicates this to the flight and cabin crew

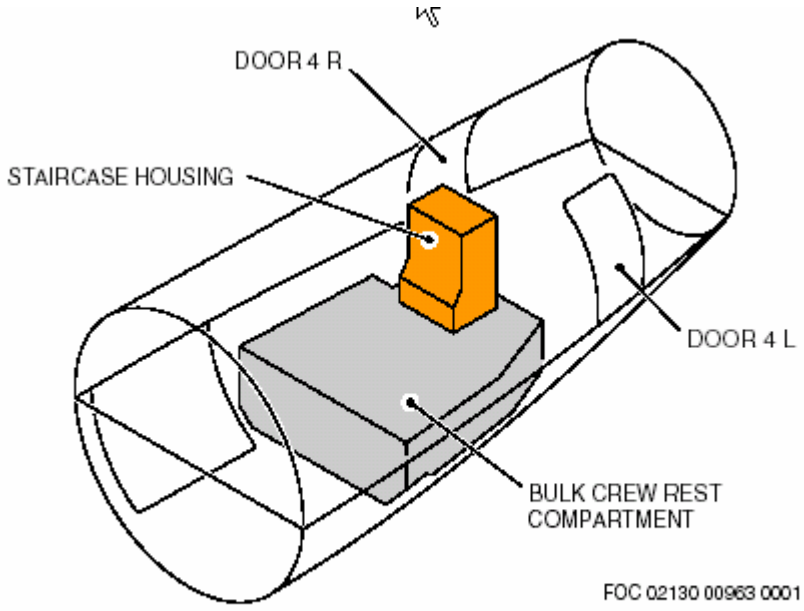
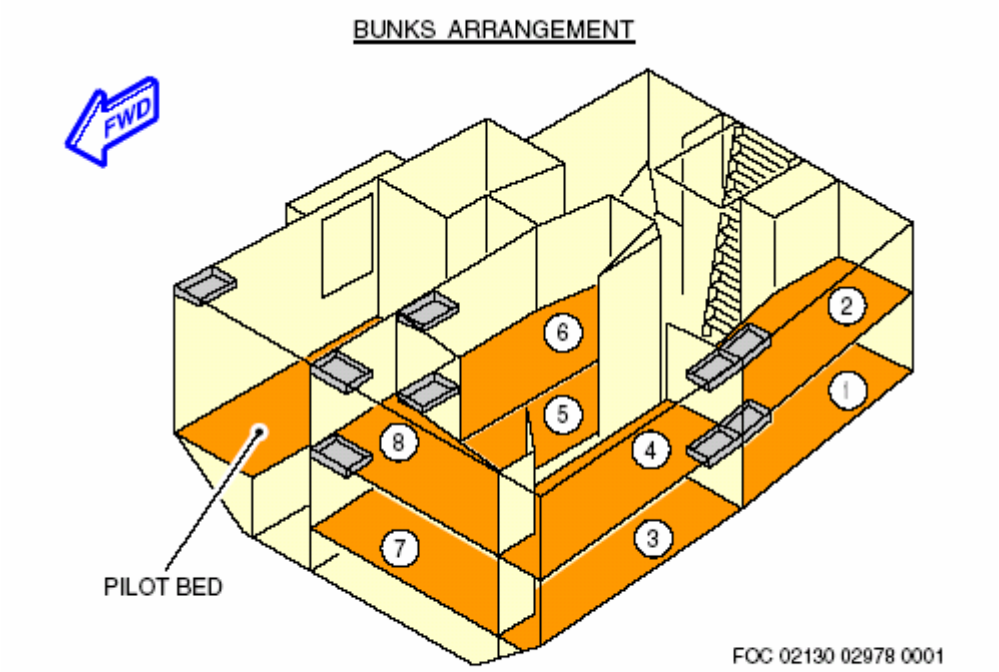


Figure 3-18

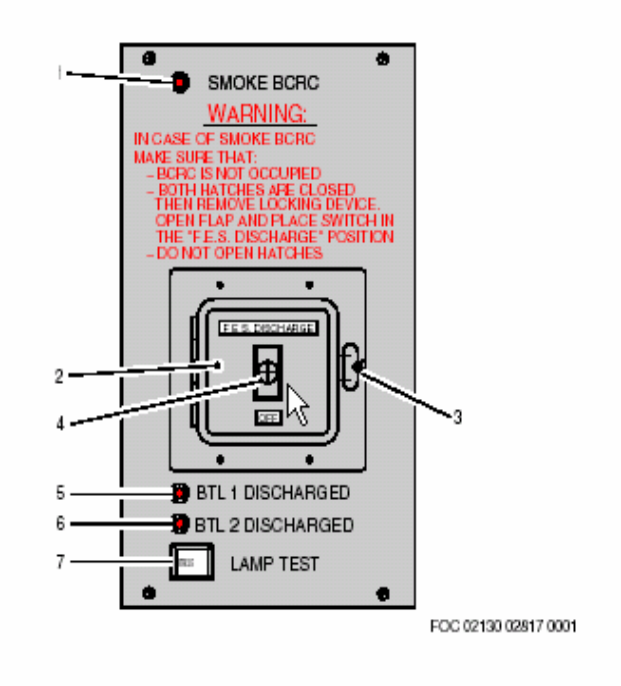
Full Bulk Crew Rest Compartment (FBCRC)



Note: The service units are shown in grey color.

All bunks are equipped with lap belts to protect the crew members from injury.

3.37.7. BCRC FIRE EXTINGUISHING SYSTEM (F.E.S)



1. Indicator light SMOKE BCRC
This comes on if any smoke detector detects smoke in BCRC

2. Translucent flap
Cover the toggle switch FES DISCHARGE to avoid inadvertent activation

3. Lead seal

4. Toggle switch FES DISCHARGE
Starts the discharge of the fire extinguishing bottle 1. When bottle 1 is empty, the FES automatically switches over and discharges bottle 2.

5. Indicator light BTL 1 DISCHARGED

6. Indicator light BTL 2 DISCHARGED

7. Pushbutton LAMP TEST
Starts a functional test of the indicator lights SMOKE BCRC, BTL 1 DISCHARGED and BTL 2 DISCHARGED.

STARTING THE FES DISCHARGE

WARNING

Before starting the FES discharge ensure that:

-All crewmembers have left the BCRC
-The emergency exit hatch and the entrance hatch are closed and locked

1. Remove the lead seal on the cover flap of the toggle switch FES DISCHARGE.
2. Open the cover flap.
3. Move the toggle switch FES DISCHARGE to the DISCHARGE position.

3.37.8. BCRC/FBCRC SMOKE/FIRE PROCEDURE

A330/A340/A340-500/A340-600

SMOKE WARNING PRINCIPAL

- **When smoke is detected in the BCRC/FBCRC.**

- **In the BCRC/FBCRC:**

  - Loudspeaker. A single low chime will sound repeatedly for 30s. Following the single low chime, a repetitive triple chime will sound every 30s.
  - Attendant Indication Panel (AIP). The smoke location message comes on and the red indicator light flashes.
  - BCRC/FBCRC lighting. Will come on to 100 % intensity

In the cabin:

  - On the Flight Attendant Panel (FAP) and Additional Attendant Panel (AAP).

    The SMOKE RESET button comes on.

    The FAP smoke page will show the affected area.
  - A triple chime will be repeated every 30 s (optionally every 10 s).
  - On the respective Area Call Panel (ACP) the amber lights will flash.
  - On the AIPS the smoke location message comes on, and red indicator light flashes.

- **In the staircase housing:**

The visual "DO NOT OPEN HATCH" warning appears in the staircase housing (when both the emergency exit and exit hatches are closed).

FLIGHT CREW

- **SMOKE BULK REST SMOKE** . . . . . **CREW AWARENESS**
Maintain contact with the cabin crew to follow up on the status of the fire.

CABIN CREW PROCEDURE

- **SMOKE RESET PUSHBUTTON (on FAP, or respective AAP)** . . **RESET**
This will.
- Silence the chimes in the cabin
- Reset the visual warnings on the respective ACPS and AIPS

Note.

The amber Smoke indicator, the Smoke reset pushbutton on the FAP and respective AAP and the indication on the FAP Smoke page remain ON until all smoke has dissipated.

BCRC/FBCRC SMOKE CONT'D..

- **STAIRCASE HOUSING DOOR. ....** **FEEL FOR HEAT AND OPEN THE DOOR VERY SLOWLY**

-BCRC/FBCRC . . . . . **SEARCH FOR PRESENCE OF SMOKE AND OF FIRE**
Search all bunks, closets, and stowage compartments

• If smoke or fire is not visible in BCRC/FBCRC, the smoke warning is unjustified.

• If smoke or fire is visible:

-BCRC/FBCRC EMPTY . . . . **CHECK**

-BASIC FIREFIGHTING PROCEDURE . . . . . **APPLY**
Use a portable fire extinguisher. Consider the use of a PBE.

• If unable to extinguish the fire using the portable fire extinguisher.

-CABIN CREW .... EVACUATE THE LDMCR

-EXIT HATCH AND EMERGENCY EXIT HATCH..... CLOSE AND LOCK

-FES SWITCH .... SET TO DISCHARGE POSITION

WARNING

The main exit hatch and the emergency exit hatch must remain closed until arrival.

- **BCRC/FBCRC** . . . **MONITOR FOR THE REMAINDER OF THE FLIGHT**

3.37.9. FBCRC EVACUATION PROCEDURE

A330/A340/A340-500/A340-600

• If the main exit hatch, or the staircase door is blocked, the cabin crew must evacuate through the emergency exit hatch.

• Opening the emergency exit hatch from inside the FBCRC.

-DECORATIVE HATCH COVERING……REMOVE
Place a finger in the hole of the hatch cover, and firmly pull down on the hatch cover to remove it.

-EMERGENCY EXIT HATCH HANDLE……. PULL DOWN VERTICALLY
This releases the hatch handle.

-EMERGENCY EXIT HATCH…….. PUSH UPWARD AND OUTWARD
To exit the FBCRC, step up onto the support, and pull yourself up into the cabin.

• Opening the emergency exit hatch from inside the cabin.

-CARPET COVERING……REMOVE

-EMERGENCY EXIT HATCH HANDLE……. LIFT AND TURN COUNTERCLOCKWISE
This unlocks the hatch handle.

-EMERGENCY EXIT HATCH. ……LIFT AND PULL TOWARDS CABIN

-CABIN CREW IN CABIN……. INFORM FBCRC OCCUPANTS
FBCRC occupants should be informed to move away from the hatch opening, because the hatch will drop down when it is opened.

-DECORATIVE HATCH COVER . . . PUSH DOWN FIRMLY TO REMOVE

• If the main exit hatch, or the staircase door, AND the separation door are blocked, the cabin crew must evacuate through the Kick-Out-Panel. This panel is on the wall of the lower bed of Bed Unit 3 and permits evacuation into the flight crew portion of the FBCRC. Then the cabin/flight crew evacuate via the emergency exit hatch

• Opening the Kick-Out-Panel from inside the flight crew portion of the FBCRC cabin crew side.

-EMERGENCY HATCH PANEL…… PUSH TO OPEN
Opens the Kick-Out-Panel.

FBCRC EVACUATION PROCEDURE CONT'D..

• If the emergency exit hatch, and the separation door are blocked, the flight crew must evacuate through the Kick-Out-Panel. This panel is on the wall and permits evacuation into the cabin crew portion of the FBCRC. Then the cabin/flight crew evacuate via the main exit hatch

• Opening the Kick-Out-Panel from inside the flight crew portion of the FBCRC.

-EMERGENCY HATCH PANEL…… PULL TO OPEN
Opens the Kick-Out-Panel.

3.37.10. LDMCR/BCRC EVACUATION THROUGH THE EMERGENCY HATCH

A330/A340/A340-500/A340-600

• If the main exit hatch or the staircase door is blocked, the cabin crew must evacuate through the emergency exit hatch.

Emergency exit hatch opening from inside.

- **EMERGENCY EXIT HATCH HANDLE… PULL DOWN TO VERTICAL POSITION**
To unlock the hatch.

- **EMERGENCY EXIT HATCH. ……PUSH UPWARD AND OUTWARDS**
To exit, step up on the support and pull yourself up into the cabin.

Emergency exit hatch opening from the cabin.

Remove the piece of carpet

-EMERGENCY EXIT HATCH HANDLE……LIFT AND TURN COUNTERCLOCKWISE
To unlock the hatch.

-EMERGENCY EXIT HATCH ……LIFT AND PULL TOWARDS CABIN

3.37.11. FBCRC/LDMCR/BCRC EVACUATION OF AN INCAPACITATED PERSON

A330/A340/A340-500/A340-600

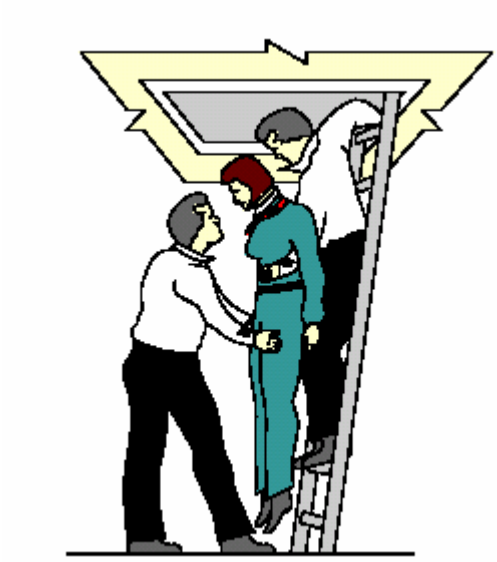
If a person becomes incapacitated in the FBCRC/LDMCR/BCRC, and if their condition permits, they should be taken to the main deck before landing. This is due to the fact that the FBCRC/LDMCR/BCRC should not be occupied during takeoff and landing. However, the Captain may adopt a different procedure, if such a non-critical landing situation is encountered.

An incapacitated person can be evacuated to the main deck area via the ladder.
In such cases, crewmembers should be requested to help clear access to the main deck (i.e. by opening doors, removing obstacles from the evacuation path, etc.), or to provide general support (i.e. by ensuring adequate lighting conditions, etc.).

The number of people required to safely transport an incapacitated person depends on a number of variables (e.g. the occupant's size, weight, general medical condition, physical strength of the assistants, etc.) However, two to three persons within the FBCRC/LDMCR/BCRC should be enough to safely lift an incapacitated person. Two other persons should be at the upper end of the ladder to take over.

EVACUATION THROUGH THE MAIN EXIT HATCH

EVACUATION THROUGH THE MAIN EXIT HATCH - INITIAL PHASE



EVACUATION OF AN INCAPACITATED PERSONOUT OF THE FBCRC/LDMCR/BCRC CONT'D..

-CREWMEMBER…….. CARRY INCAPACITATED PERSON
One crewmember should place his/her back to the ladder, and then use his/her left hand to hold up the incapacitated person under their arms. The crewmember should then use his/her right hand to slide up the ladder, while holding on to the incapacitated person and pulling them up the ladder.

-OTHER CREWMEMBER(S)…… ASSIST
The other crewmember helps by holding up the incapacitated person's legs and feet.

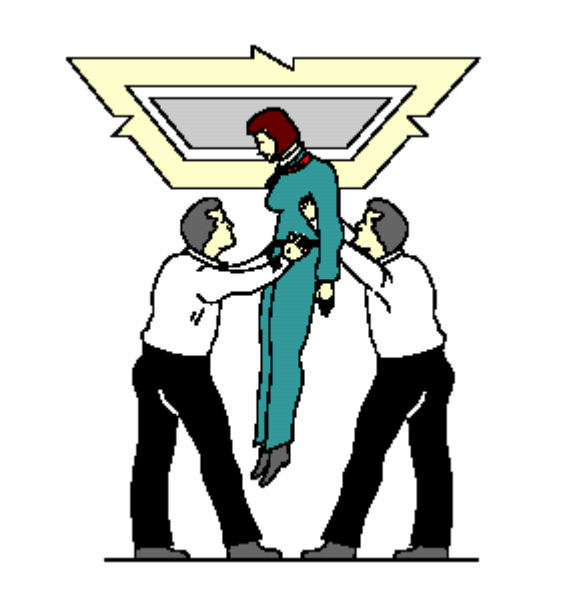
-TWO CREWMEMBERS AT THE TOP OF THE LADDER . . . . . GUIDE
Two crewmembers wait at the top of the ladder, grab hold of the incapacitated person, and help guide the evacuation by supporting the incapacitated person's head and neck through the hatch.

EVACUATION THROUGH THE MAIN EXIT HATCH - FINAL PHASE

EVACUATION OF AN INCAPACITATED PERSONOUT OF THE FBCRC/LDMCR/BCRC CONT'D..

EVACUATION THROUGH THE EMERGENCY EXIT HATCH

EVACUATION THROUGH THE EMERGENCY EXIT HATCH - INITIAL PHASE



-CREWMEMBER.CARRY INCAPACITATED PERSON

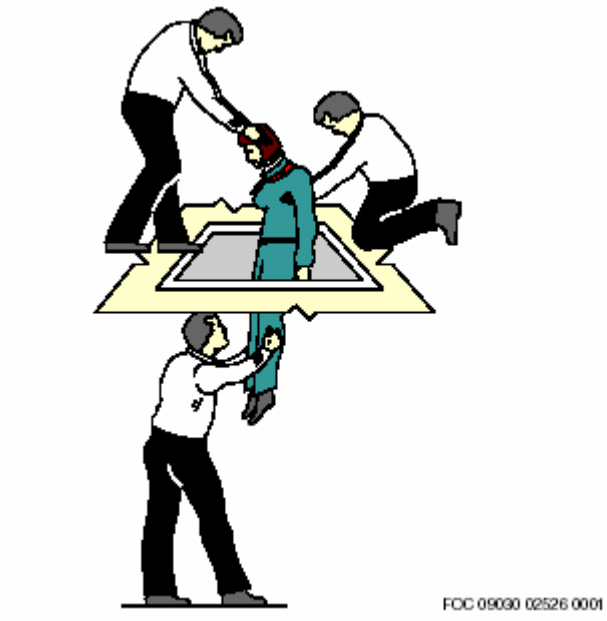
One crewmember should grasp the incapacitated person by holding them up under their arms, and keep them upright.

-OTHER CREWMEMBER(S)……..ASSIST

The other crewmember holds the incapacitated person by the waist, guides the incapacitated person through the hatch.

EVACUATION OF AN INCAPACITATED PERSON OUT OF THE FBCRC / LDMCR / BCRC CONT'D..

EVACUATION THROUGH THE EMERGENCY EXIT HATCH - FINAL PHASE



-ONE CREWMEMBER OUTSIDE THE HATCH. ……GUIDE
One crewmember waits outside the hatch to help support the incapacitated person's head through the hatch. When the incapacitated person's shoulders reach the opening, the crewmember should then pull the person up through the hatch by holding them up under their arms.

-OTHER CREWMEMBER OUTSIDE THE HATCH ……..ASSIST
The other crewmember helps by holding up the incapacitated person's legs.

3.37.12. BCRC/FBCRC AIR CONDITIONING LOW FLOW PROCEDURE

A330/A340/A340-500/A340-600

• If the airflow into BCRC/FBCRC is incorrect, a buzzer sounds through the BCRC/FBCRC loudspeakers for approximately 30 seconds and the RTC (Return To Cabin) sign comes on at each bun.

Crew rest compartment occupants must proceed as follows:

-OCCUPANTS…….. EXIT CREW REST COMPARTMENT

-CREW REST COMPARTMENT EMPTY……CHECK

-EXIT AND EMERGENCY EXIT HATCHES ……CLOSED

-CABIN CREW. ……INFORM FLIGHT CREW

3.37.13. FBCRC HEATING SYSTEM FAULT PROCEDURE

A330/A340/A340-500/A340-600

• If the heating system fails, the FBCRC heating control panel's fault light comes on the crew rest compartment occupants should proceed as follows:

-HEATING CONTROL PANEL…… RESET
The ON/OFF button (located on the heating control panel) should be cycled OFF then back to ON.

• If the fault light remains on, the heating system is faulty

-CABIN CREW……..REPORT TO FLIGHT CREW
The cabin crew should report the heating system failure to the flight crew , and apply airline procedure.

4. EMERGENCY EVACUATION

4.1. INTRODUCTION

There are many factors that contribute to the successful evacuation of an aircraft.

- The procedural knowledge of the cabin crew. This includes training, experience and behavior
- The aircraft configuration, the layout of the cabin
- The environment inside and outside the aircraft (e.g., the presence of smoke, fire, the cabin lighting, and outside conditions)
- The behavior of the passengers, their age, level of fitness and motivation

During an emergency evacuation, it is essential for the cabin crew to be able to apply their knowledge of procedures, and rapidly adapt to the situation.

In the case of a life threatening situation onboard the aircraft, it is essential that the aircraft is evacuated quickly and efficiently to increase the occupants chances of survival.

The role of the cabin crewmember will change from being customer service-oriented, to being.

- A cabin safety specialist
- An assertive leader
- Ready to act
- In control of any given emergency situation.

“Cabin crew must switch from the commercial role to the safety role. he/she must become assertive and firm. The attributes of this role are. training, airline culture, experience, uniform. The level of valorization of the safety role by the airline is an

important factor because it is directly related to the amount and quality of the cabin crew training regarding safety features and, on the image passengers and flight crew have about the role of cabin crew. Cabin crew safety training and recognition of their safety role by the aircraft occupants, will directly impact the decision making process, the cabin preparation and the guidance of passengers" (VERRES Consortium, July 2002).

Passengers very rarely see this aspect of the cabin crew's role. During an emergency situation the passengers will look to the cabin crew for guidance and assistance.

The majority of emergencies that result in evacuation occur during the takeoff, and landing phases of flight. They are frequently sudden and unexpected, or occur with very little warning.

These types of emergencies leave crewmembers with little time to react.

4.2. USING SILENT REVIEW

The use of the Silent Review, or the 30 second review", is an excellent tool to prepare for the unexpected. The "Silent Review" helps the cabin crew to focus their attention on safety. Crewmembers will also be ready to act, in the event of an unexpected emergency.

The constant use of the "Silent Review" is a key element in identifying emergency duties and responsibilities, and increases environmental awareness during the takeoff and landing phases of flight. It enables cabin crew to respond, adapt and react quickly in the event of an emergency.

"Silent Review" can take any form, and there are no hard and fast rules. It should contain all the elements needed to "Review" evacuation duties and responsibilities. It may include, but is not limited to, the following subjects:

- How to brace for impact
- Commands
- Cabin environment (identify under what circumstances cabin crew would initiate evacuation, fire, smoke, life-threatening situation, ditching, no response from flight crew)
- How to initiate evacuation, if necessary
- Operation of exits
- Alternate exits
- How to assess outside conditions
- Self-protection

- Location of manual inflation handle
- Evacuation commands
- Location of able bodied passengers
- Location of passengers that require assistance, for example, disabled passengers, or unaccompanied minors.

Below, is an example of a silent review used by some operators, it is easy to memorize. At the same time, this puts the order of the evacuation duties and responsibilities into prospective. This example is known as "**OLDABC**".

- **O**PERATION OF EXITS
- **L**OCATION OF EMERGENCY EQUIPMENT
- **D**RILLS (Brace for impact)
- **A**BLE-BODIED PASSANGERS AND DISABLED PASSENGERS
- **B**RACE POSITION
- **C**OMMANDS

Something that can easily be committed to memory can easily be recalled during a stressful situation.

It is easy to get caught up in the everyday onboard tasks, and all the different duties required of cabin crew, such as boarding, catering issues, passengers queries, delays, and it is easy to get distracted. When crewmembers take their positions for takeoff or landing, the use of the "Silent Review" will help to focus on the emergency responsibilities, in the event of an unplanned emergency. The ability to anticipate a situation before it happens will enable crewmembers to respond rapidly.

The cabin crew should be alert to any indication that a possible emergency situation exists, when preparing for takeoff and landing. Such indications may be fire, smoke, scraping metal, unusual noises, the force of impact, or an unusual aircraft attitude.

4.3. FACTORS AFFECTING CABIN EVACUATION

4.3.1. CABIN CONFIRGUATION

The cabin configuration can have an impact on the efficiency of the evacuation. To enhance the situational awareness skills of the cabin crew, they should be familiar with the cabin layout, and the areas where congestion may occur due to:

- The passenger seating density
- The location of galleys, lavatories, bars etc.
- Restricted visibility
- Passengers arriving from different directions to the exits.

Some exits, for example the forward and aft exits, may be under utilized because the majority of passengers are seated in the mid section of the aircraft and will be drawn towards their nearest exits.

It may be necessary for the cabin crew to redirect passengers to other usable exits to avoid congestion, and to maximize the use of all the usable exits, in order to evacuate the aircraft as rapidly as possible.

To achieve this the cabin crew must be aware of what is happening in the cabin.

4.3.2. CROWD CONTROL

One of the key elements to an efficient evacuation is effective crowd control and cabin management by the cabin crew. The actions and commands of the cabin crew will influence the performance of the passengers during the evacuation. The objectives for the cabin crewmembers are:

- To quickly establish the passenger flow at each usable exit
- To evacuate the aircraft as quickly as possible.

Crewmembers must have control of the situation, and be assertive in the way commands and instructions are given to passengers. Not all passengers react in the same manner. Some evacuations have been quite efficient because passengers have co-operated with the crewmember instructions. Other evacuations, especially where a life-threatening situation has been perceived, have created a varying range of reactions.

- Panic (screaming, crying, hysteria)
- Negative panic (does not react, frozen)
- No perception that danger exists
- Will insist on leaving by the door they entered
- Exiting with carry-on baggage
- Returning to seat to re-stow baggage
- Want to take control of evacuation
- Pushing
- Jumping over seatbacks to get ahead, disregarding others.

People who have been involved in evacuations documented the above types of behavior. There is an absolute need for crewmembers to assert their authority, in order to avoid delays in getting passengers down the slide and away from danger. Be prepared to use a certain amount of physical force, in order to get some passengers to leave the aircraft.

4.3.3. EVACUATION COMMANDS TO PASSENGERS

The cabin crew must use positive verbal commands and physical gestures, in order to efficiently direct passengers towards the exits and assist them down the slides.

Note:

Cabin crew must also be prepared to use some physical force, if necessary, to evacuate some passengers from the aircraft.

The commands used by the cabin crew should be.

- Assertive
- Positive
- Short
- Loud
- Clear
- Well paced

4.4. CABIN CREW INITIATED EVACUATION

Many evacuations are not planned, and occur with no warning. In most cases the decision to evacuate is made by the flight crew. In a study conducted by the VERRES (VLTA Emergency Requirements Research Evacuation Study, Task 1.2), 77 accidents were analyzed. The results of the analysis show that in 11 of the 77 cases (14%) *"cabin crew had a significant role in the evacuation decision since they often ask the pilot to decide an evacuation".*

There may be occasions when the cabin crew has to initiate the evacuation, if a there is a life-threatening situation in the cabin, such as.

- Uncontrollable fire
- Dense smoke
- Severe structural damage
- Ditching
- No communication from the flight crew.

When making the decision to initiate an evacuation, the cabin crew must evaluate the level of danger, and the consequences that a delay in decision-making may have. Smoke or fire, that is out of control would definitely require a rapid decision because of the danger it presents to the occupants of the aircraft, its ability to incapacitate rapidly, impair judgment and restrict vision, therefore rendering the evacuation process difficult.

If the cabin crew considers that an evacuation may be required, they must attempt to contact the flight crew in order to inform them of the situation, and then await instructions. If contact with the flight crew is not possible, cabin crew should initiate the evacuation.

However, any evacuation requires crew co-ordination, because not all crewmembers may be aware that a life-threatening situation exists. Therefore, all crewmembers need to be informed. There are many possible methods, depending on their availability.

- Public Address
- Interphone
- Megaphone
- Evacuation alarm.

4.5. UNPLANNED GROUND EVACUATION

In the event of an “Unprepared Emergency”, cabin crewmembers may only have enough time to give very short commands to prepare passengers for an imminent crash. In an unprepared emergency, the “Brace” command may come from the flight crew, or be initiated by the cabin crew.

The command to instruct passengers to assume the brace position, in any unplanned emergency will be. **”Heads down”, “Hold your ankles”,** and **“Stay down”**. The commands should be given until the aircraft has come to a complete stop.

The instructions to take the brace position will be the most important piece of information that crew will give to passengers in an unplanned emergency.

These commands must be repeated continuously, until the aircraft has come to a complete stop. This is to ensure that the passengers remain in the “Brace” position, to maximize protection from injury.

Shout as loud as possible to be heard in the cabin. If possible try to synchronize calling commands, so that they come across loud and clear. Repeating the commands, even over a short period of time, is tiring for the voice. For this reason, it is important to try to alternate with another crewmember seated in the same area.

4.6. THE EVACUATION PROCESS

When the aircraft has come to a complete stop.

"Release seatbelts", **"Come this way"** to bring the passenger to the exits. Using strong voice commands will act as a beacon for passengers, especially if visibility is limited, due to smoke being present in the cabin.

"Leave belongings" is important, as baggage carried to the door of the aircraft has delayed evacuations, and has caused pile-ups at the bottom of the slide in previous evacuations!

Cabin crew assesses outside conditions. Is it safe to open the door, is the area below free of smoke, fire, obstacles and debris?

Cabin crewmembers should protect themselves by holding on to the "frame assist handle", staying in the assist space located on either side of the door. This prevents them from being pushed overboard in the event of a rush of passengers, and will not interfere with passengers exiting from the aircraft.

If it is safe to do so, open the aircraft door in the "Armed" mode.

Ask 1 or 2 passengers to hold other passengers back until the slide is fully inflated. Alternatively use the command **" Stand back".**

If the slide does not inflate, and the crewmember needs to pull the "Manual Inflation Handle", extra time may be required. Time in an emergency may seem like an eternity, even though it might only be a few extra seconds. The passengers' urgency to get out will increase with every passing second. The passengers must be held back until, the slide is fully inflated and ready for use.

Check that the slide is correctly inflated, before sending passengers down the slide.

- If two cabin crewmembers are assigned to one exit, one should manage the passengers while the other checks the conditions (i.e. correct slide inflation, and the outside conditions).

Figure 4-1

Evacuation Exercise of A330 using Overwing Canted Slide

4.7. THE EFFECT OF SMOKE AND FIRE DURING EVACUATION

It has been well documented in accident reports, that smoke and fire in the cabin has presented frequent obstacles during evacuation. Smoke or fire in the cabin can also cause a tremendous amount of anxiety and panic amongst the passengers.

Inhalation of smoke and toxic fumes has incapacitated people, and limited their physical and mental ability to the extent that they have not been able to reach, or operate the exits.

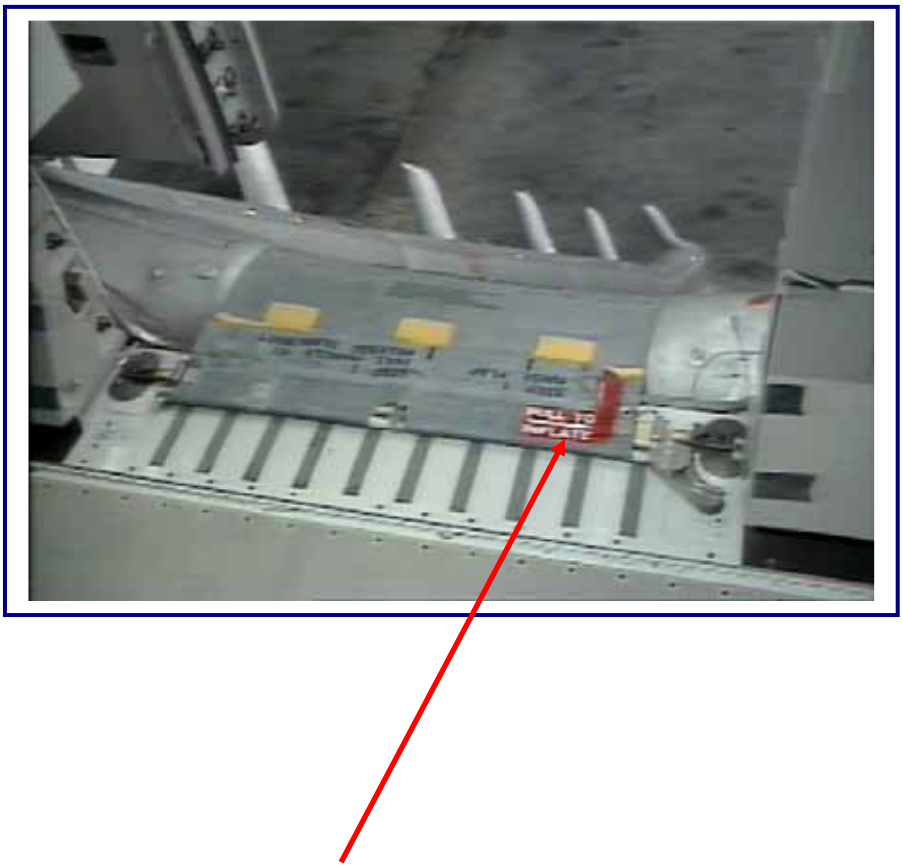
Smoke has the ability to obscure light, and make visibility difficult. A study by CAMI (Civil Aero Medical Institute) found that smoke inhalation and burns were the primary cause of death in 95% of fatalities during evacuation.

In the presence of smoke and/or fire, an evacuation must be done as quickly as possible to increase the chances of survival.

Advise passengers to cover their nose and mouth, stay close to the floor (there is more breathable air at floor level, as smoke rises), and crawl on hands and knees if necessary, in order to exit the aircraft before being hindered by the effects of smoke inhalation.

Figure 4-2

Location of the Manual Inflation Handle



4.8. EXIT MANAGEMENT

Monitor the progress of the evacuation, and ensure that the slide is clear at the bottom, and that there are no pile-ups.

It is useful to ask two or three passengers to assist at the bottom of the slide. The crewmembers should use commands such as:

- **“Stay at the bottom”**
- **“Help people off”**
- **“Send them away”.**

Passenger help at the bottom of the slide significantly reduces the risk of congestion and injury.

Maintain the flow of the evacuation using commands, such as:

- **“Jump and slide”**
- **“Form double lines (Dual lane slide)**
- **“Form one line (Single lane slide)**
- **“Keep moving”**
- **“Hurry”.**

Crewmembers also need to be aware of any developments during the evacuation. For example, if the slide becomes damaged, or there is fire in the area, or anything that renders the exit unusable. The crewmember must “Stop” the evacuation at that door, “Block” the exit, and “Re-direct” passengers to the “Nearest usable exit”.

When redirecting passengers, crewmembers need to be aware of which exit to direct passengers to. **Listen for another crewmember giving the command to “come this way” or “Jump”, indicating that the exit is usable.**

Redirect passengers to the usable exit. Use positive commands:

- **“Blocked exit”**
- **“Go across”**
- **“Go forward”**

- **“Go to the back”.**

4.9. PRE-CABIN CREW EVACUATION

When the flow of passengers to the exit begins to slow down, the cabin crew should check the cabin and call remaining all remaining passengers to the exits. When the flow of passengers has stopped, the cabin crew should check their assigned area for any remaining passengers.

If the cabin is in darkness, use a flashlight to check the cabin. Check the following areas:

- Aisles
- Seats (including the floors area between the seats)
- Galleys
- Lavatories
- Crew rest areas
- Cockpit.

When the cabin crewmember’s assigned area is empty, or it is no longer safe to remain onboard the aircraft, the cabin crewmember should evacuate through the first usable exit.

If an evacuation occurs away from an airfield, the cabin crew should take their assigned emergency equipment from the aircraft, if the situation permits.

4.10. POST EVACUATION

The cabin crew will be responsible for a large number of passengers until the rescue and emergency services personnel assist them.

When the cabin crew has evacuated the aircraft they must manage the passengers on the ground, by:

- Assisting passengers away from the slides
- Directing passengers upwind and away from the aircraft
- Keeping passengers away from, fuel, fire and vehicles
- Assembling the passengers and keeping them together
- Enforcing no smoking and prohibiting the use of mobile phones
- Assisting passengers and giving first aid, when necessary
- Making a passenger headcount, if possible.

-

Note.

Cabin crewmembers seated near a megaphone should consider taking it from the aircraft to assist with crowd management post evacuation

Figure 4-3

A340 Escape Slide

5. PLANNED GROUND EVACUATION

5.1. INTRODUCTION

A planned ground evacuation can be defined as an evacuation that enables the cabin crew to review procedures, and to inform and prepare passengers for an emergency landing. Crewmembers provide passengers with brace instructions, guidance on exit usage, and information on how and when exits should be operated. Effective communication between the crewmembers and the passengers is necessary for a timely, effective, and orderly response.

A safety study by the NTSB (National Transportation Safety Board) in 2000, entitled “Emergency Evacuation of Commercial Airplanes”, cites examples of planned evacuations where the crewmembers were able to provide passengers with a detailed briefing. The cabin preparation and briefing resulted in an orderly, timely evacuation with few to no injuries.

5.2. CABIN CREW ALERT PHASE

It is important for Operators to establish procedures in order to ensure that adequate guidance is provided to both flight crews and cabin crews on how to conduct abnormal and emergency briefings.

For example, if the flight crew needs to inform the cabin crew of an emergency, there may be a specific signal to alert the cabin, such as:

- A series of chimes
- A specific phrase, i.e. “Purser to cockpit”.

These specific actions alert the other crewmembers that there is an emergency situation. When crewmembers hear the signal, this indicates that an emergency situation exists, and that they must secure all equipment. Crewmembers should be ready, at their stations, to be briefed by the Purser via the interphone.

5.3. EMERGENCY CHECKLISTS

Emergency checklists are useful tools that enable crewmembers to prepare the cabin for a planned emergency. It contains all the steps required to prepare the cabin for an emergency, and lists the steps to be completed in order of priority.

Many Operators have developed checklists in the form of laminated cards that are distributed to each crewmember, or are stowed near the crewmembers' seats in the cabin. These types of checklists should be readily accessible to crewmembers. Emergency checklists are designed to provide support to crewmembers in a planned emergency, and to help them complete all the necessary steps without forgetting any of the steps. Emergency checklists should be short and consistent.

5.4. THE FLIGHT CREW TO PURSER BRIEFING

The flight crew should brief the Purser in a clear, and concise manner. The briefing should provide the Purser with the following information:

- Nature of emergency, and intentions of the flight crew, for example landing away from an airfield or at an airfield
- Time available to prepare the cabin (the cabin and flight crew should synchronize watches to assist with time management)
- What the brace signal will be
- Signal to remain seated (if no evacuation is required)
- Special instructions/other information

Who will inform the passengers and when (flight crew or Purser).

5.5. TIME MANAGEMENT

Time permitting, a full passenger briefing may be possible, however, a certain amount of time should be allocated to each task on the checklist. The Purser will need to closely monitor the time in order to accomplish as many tasks on the checklists, as time permits.

The extent of the cabin preparation will depend on the time available. The steps of the cabin preparation should be completed in the order of their importance.

Time management is an essential element of a good cabin preparation!

5.6. THE PURSER TO CABIN CREW BRIEFING

The Purser will relay the information provided by the flight crew to all of the crewmembers. The Purser will then will instruct the crewmembers to:

- Take their emergency checklists
- Take their emergency briefing position
- Be prepared for the emergency announcement and demonstration.

5.7. THE CABIN CREW TO PASSENGER BRIEFING

For psychological reasons, it is better for the flight crew to inform the passengers of an emergency. However, this may not always be possible, due to the workload of the flight crew during an emergency. Therefore, the Purser may be required to make the initial announcement. The Purser must explain:

- The nature of the emergency
- Necessity to prepare the cabin
- Passengers must follow the instructions of the cabin crew.

Before the emergency demonstration begins ensure that:

- The cabin dividers are open
- The cabin lighting is turned up to 100% bright lighting
- The entertainment system is switched off.
- The cabin crew should are ready to demonstrate the emergency briefing in their assigned areas

5.8. GOLDEN RULES OF PASSENGER BRIEFING

The aim of the briefing is to give passengers as much information as possible. The amount of time available will determine the extent of the briefing. Both passengers and crewmembers will need to give their undivided attention to the announcements. Therefore, there should be no elements of unnecessary distraction. This is the only opportunity that crewmembers will get to relate this information. To avoid distraction crewmembers should:

- Stay in the assigned brief/secure position
- Do not walk up and down the aisle during the announcement
- Do not talk during the announcements
- Coordinate the demonstration with the announcement.

When reading the safety briefing announcement, it is important to pause at key points, in order to give the cabin crewmembers time to demonstrate, and, check passenger compliance.

5.9. THE CONTENTS OF THE PASSENGER BRIEFING

5.9.1. THE BRACE POSITION

The brace position is essential when preparing passengers in an emergency landing. Reviewing the brace position during a passenger briefing will help to ensure that passengers are in the correct brace position for landing.

The brace position has a dual function. First of all, it reduces body flailing, as passengers must lean or bend over their legs. Secondly, it protects passengers from hitting their head on a hard surface.

This position must be adapted if the seat is:

- Facing a seat back or a bulkhead
- Forward facing or aft-facing with a safety belt and a shoulder harness (crewmember seats only).

It must also be adapted if passengers are:

- Expectant mothers
- Traveling with infants
- Obese

It must be emphasized to passengers that they should expect more than one impact, and they must remain in the brace position until the aircraft comes until a complete stop.

- Point out the “Brace” position on the safety information card
- Demonstrate holding/grabbing ankles/crossing arms
- Check “Brace” position and alternative “Brace” positions.

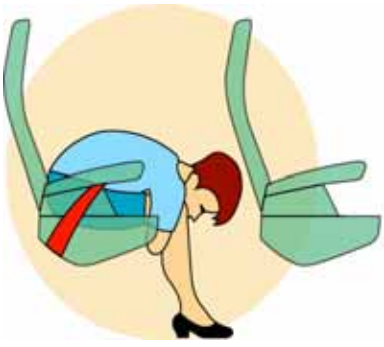
It is important to ensure that the passengers understand how to “brace” for impact correctly, to reduce injury.

- Passengers should press their backs into the seat
- Seat belts should be worn as low and as tight on the torso as possible. The tighter the safety belt, the better the restraint
- Upper body should be bent forward as far as possible, with the chest close to the thighs and knees
- Head should be down a low as possible. The head should be face down in the lap. The head should not be turned to the side.
- Arms should be around or behind legs, tucked in against the body
- Lower legs should be angled slightly behind the knee joints
- Feet should be placed flat on the floor.

5.9.2. ILLUSTRATED BRACE POSITIONS

- Forward facing seat
- Safety belt only
- High density seating
- Against seat and against seat with break over feature

- Forward facing seat
- Safety belt only
- High density seating
- Against bulkhead



- Forward facing seat
- Safety belt only
- Low density seating
- Arms wrapped under legs

- Forward facing seat
- Safety belt and shoulder harness

- Aft facing seat
- Safety belt and shoulder harness

- Forward facing seat
- Safety belt only
- High density seating
- Adult holding infant

- Forward facing seat
- Safety belt only
- High density seating
- Against seat and against seat with break over feature

- Forward facing seat
- Safety belt only
- Low density seating
- Grabbing ankles

- Forward facing seat
- Safety belt only
- High density seating
- Against seat and against seat with break over feature
- Pregnant

- Forward facing seat
- Safety belt only
- Low density seating
- Arms wrapped behind legs

- Aft facing seat
- Safety belt only

- Aft facing seat
- Safety belt only
- Pregnant

(Source: Transportation Safety Board of Canada, Commercial and Business Aviation Advisory Circular, AC0155)

Once the brace position has been explained, the next step is to inform the passengers when to assume the brace position, for example:

"When you hear the crew shouting "Brace, Brace, Brace", this will be your signal to take the "brace position", you must remain in this position until the aircraft has come to complete stop".

5.9.3. EMERGENCY EXIT LOCATION

The cabin crew must indicate the location of the nearest emergency exits and the floor proximity exit path lighting to the passengers.

5.9.4. SECURING LOOSE ITEMS

Passengers should remove and stow all loose sharp items from their person, and secure them in an overhead bin, closet or under a seat. These objects include.

- Carry on baggage
- High heeled shoes
- Handbags
- Laptops
- Briefcases

All of these items must be placed in an overhead bin, closet or under a seat.

High-heeled shoes and sharp objects must also be removed, because these objects can cause damage to the slide during an evacuation. In addition, these objects must not be stowed in seat pockets, since they may injure passengers when they take the brace position.

Seat pockets should only be used to stow small objects, such as pens and eyeglasses. Cabin crews should also remove items such as pens, badges and wing pins from their uniforms.

5.9.5. ABLE BODIED PASSENGERS

The International Civil Aviation Organization (ICAO) defines able-bodied passengers (ABPs) as “passengers selected by crewmembers to assist in managing emergency situations if and as required”.

The selection of ABPs is based on their ability to understand instructions, their physical ability, and their ability to stay calm. The ideal candidates are people such as:

- Deadheading crewmembers
- Military personnel
- Police
- Fire personnel
- People who respond to instruction.

Crewmembers should avoid selecting family members traveling together to be ABPs, because they will naturally prefer to assist their family members before the other passengers. Instead, crewmembers should select passengers who are traveling alone to be ABPs.

Deadheading crew, military, police, and/or fire service are good choices, because they are used to following instructions, and have the required manual dexterity.

Ideally, crewmembers should select 3 ABPs at each exit. One of the ABPs should be briefed on the following.

- How to replace crewmembers in case they become incapacitated. However, crewmembers must emphasize that ABPs will replace crewmembers **only** if they are not able perform their function due to incapacitation
- How to assess conditions outside the aircraft, for example, how to identify that an exit is usable/no longer usable
- How to open the exit
- How to protect oneself from going overboard, to remain in the assist space and to hold on to the frame assist handle
- Commands to be used during evacuation. i.e. “Jump and slide”
- How to open the crewmembers’ seatbelt. The crew harness buckle is different from passengers’ seat buckles, and a crewmember that is incapacitated in a crew seat may block a usable exit.

The two other ABPs should be briefed on how to assist the cabin crew during the evacuation, for example:

- Holding passengers back during door opening and slide inflation
- Remaining at the bottom of the slide during the evacuation to assist other passengers.

The cabin crew should brief the ABPs seated at overwing exits on the following:

- How to assess the outside conditions
- When to open the exit
- How to open the exit
- Commands to be used. i.e. “Come this way”, “Step out”, “Follow the arrows”, “Run and slide”
- How to redirect passengers if an exit is no longer usable or blocked.

ABPs should is also be assigned to assist special needs passengers, such as:

- Passengers with reduced mobility
- The elderly
- Unaccompanied minors
- People traveling alone with more than one child

5.10. SECURING THE CABIN

When the passenger briefing has been completed, the final cabin secure is required, as follows:

- Seat belts fastened
- Seat backs in the up-right position
- Tray tables closed and latched
- Armrests down
- Carry on baggage stowed and secure
- Overhead bins closed and latched
- Aisles clear of all obstructions
- Service items cleared
- Cabin dividers open.

When the passengers and the cabin have been secured, areas such as lavatories and galleys need to be correctly secured.

All lavatories should be vacated and locked.

All galley equipment should be stowed and secured.

- Close and lock all containers
- Ensure that carts are correctly stowed and secured
- Switch off all galley power and pull all galley circuit breakers.

When the cabin has been secured, and the cabin preparation is complete, the Purser will notify the flight crew.

The Purser should also ask the flight crew for an update of the situation, and the amount of time remaining.

The cabin lighting should be adjusted according to the expected outside conditions.

Cabin crewmembers should take their seats, adjust the harness, begin a “silent review”, and be prepared to “brace”, when the command comes from the flight crew.

5.11. SUMMARY

- There may be more than one impact. Therefore, remain in the “Brace” position until the aircraft stops.
- The aircraft must be at a complete stop before initiating an evacuation.
- Before opening a door forward, or aft of an engine, ensure the engines are not running.
- Evacuation should begin immediately upon receiving the “Evacuation Signal”.
- “Positive Assertive” action from the cabin crewmembers will directly impact the rate of flow, and accelerate passenger movement to the exits and down the slides.
- Monitor the flow of the evacuation, and be aware of congestion in the aisles, and at the bottom of the escape slide.
- Be alert to evolving situations, for example, fire, or slide damage.
- Be ready to redirect passengers to another exit.

5.11.1. EMERGENCY PASSENGER DOOR OPERATION

This procedure applies to the following aircraft:
A318/A319/A320/A321/A330/A340

-FRAME ASSIST HANDLE . . . . **GRASP**

-SLIDE ARMED . . . . **CHECK**

-OUTSIDE CONDITIONS . . . . **CHECK SAFE**
Use the door window to ensure that slide deployment area is clear of.

- Fire
- Smoke
- Obstacles

• If outside conditions are safe:

-DOOR CONTROL HANDLE . . **RAPIDLY LIFT FULLY UP AND RELEASE**

WARNING

When the door is in the "ARMED" mode, the "Cabin Pressure Warning Light" does not illuminate to indicate cabin differential pressure.
Indications of cabin differential pressure may be.

- **Resistance in the Door Control Handle when it is being lifted to the open position, using normal force, and/or**
- **A Hissing noise around the immediate door area,**

If circumstances permit, fully lower the door control handle to the closed position. Notify the flight crew immediately.

• If the door power assist fails the door will not open automatically:

DOOR . . . . . **PUSH TO OPEN**

GUST LOCK . . . . **CHECK ENGAGED**

SLIDE DEPLOYED AND INFLATED . . . . . **VISUAL CHECK**

• If the slide does not inflate;

RED, MANUAL INFLATION HANDLE . . . . . **PULL**
This red, manual inflation handle is located on the right-hand side of the slide's girt extension.

5.11.2. GROUND EVACUATION PROCEDURE

The order to evacuate is usually given by the flight crew, however, in clearly catastrophic circumstances any cabin crewmember may initiate an evacuation.

- **EVACUATION ORDER . . . . . .RECEIVED**
- **"EVACUATE, EVACUATE, SEAT BELTS OFF" . . . . . SHOUT**
- **"LEAVE EVERYTHING, HIGH HEELS OFF" . . . . . SHOUT**
- **FRAME ASSIST HANDLE . . . . . GRASP**
- **SLIDE ARMED . . . . . .CHECK**
- **OUTSIDE CONDITIONS . . . . . .CHECK SAFE**

  Check through the observation window to ensure that the slide deployment area is clear of.
  - Fire
  - Smoke
  - Obstacles

• **If outside conditions are unsafe:**

- **PASSENGERS TO NEAREST USABLE EXIT . . . . . REDIRECT**
- **EXIT . . . . . GUARD**

• **If outside conditions are safe:**

- **FRAME ASSIST HANDLE . . . . . GRASP**
- **DOOR . . . . . OPEN**

• **If the door power assist fails the door will not open automatically:**

- **DOOR . . . . . PUSH TO OPEN MANUALLY**
- **GUST LOCK . . . . . CHECK ENGAGED**
- **SLIDE DEPLOYED AND INFLATED . . . . . VISUAL CHECK**

  Ensure that the slide deployment area is clear of all obstructions.

• **If the slide does not inflate automatically:**

- **RED, MANUAL INFLATION HANDLE . . . . . PULL**

  The red, manual inflation handle is located on the right-hand side of the slide girt extension.

- ASSIST SPACE . . . . . .OCCUPY

- PASSENGER EVACUATION . . . . . EXPEDITE

ON GROUND EVACUATION CONT'D..

- **If the slide becomes unserviceable:**

– **PASSENGER EVACUATION . . . . . .STOP**
– **PASSENGERS TO ANOTHER USABLE EXIT . . . . . REDIRECT**

- ASSIGNED AREA . . . . CHECK FULLY EVACUATED

- EMERGENCY EQUIPMENT . . . . TAKE

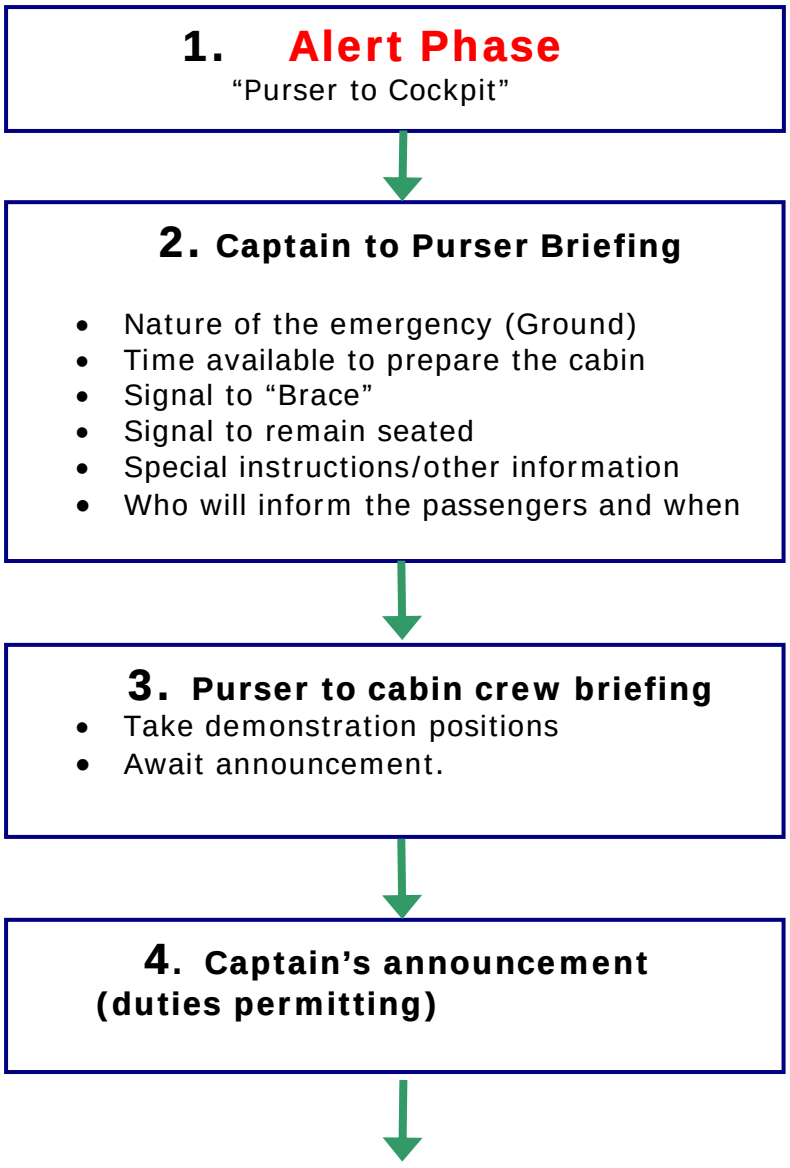
Time permitting, each cabin crewmember takes their designated safety and survival equipment before leaving the aircraft.

-CABIN CREW . . . . EVACUATE

-PASSENGERS AWAY FROM THE AIRCRAFT . . . . . .DIRECT

-ON GROUND . . . . CONDUCT POST EVACUATION DUTIES

5.11.3. CABIN PREPARATION - PLANNED GROUND EVACUATION



5. Purser's Announcement

If an announcement from the Captain is not possible.

- The Nature of the Emergency
- Necessity to prepare the cabin
- Follow the instructions of the crew

The emergency demonstration announcement should include.

- Brace positions
- Location of exits
- Loose items
- Passenger assistance (ABP's)
- Safety Card Review (Including Seat belts, tray tables, seat backs, armrests)

6. Final cabin secure check

- Seat belts fastened
- Seatbacks upright
- Tray tables stowed and latched
- Carry on baggage stowed and secure
- Overhead bins closed and latched
- Aisles clear of all obstructions
- Service items cleared
- Cabin dividers open

7. Secure Galleys

- Close and secure all containers
- Carts stowed and secured
- Switch off all galley power
- Pull all circuit breakers

8. Check all doors

"ARMED"

9. Cabin crew to Purser

- Cabin preparation complete

10. Purser to Captain

- "Cabin Ready" cabin preparation complete
- Obtain updated information

11. Commands from Captain to Cabin Crew via PA
"Attention Crew! At Stations!"

12. All Cabin crew at stations

- Secure seat harness
- Silent Review

13. Command from captain to cabin crew via PA (Approximately 1 minute before landing)
"Brace for impact"

6. DITCHING

6.1. INTRODUCTION

The definition of ditching is *"A deliberate emergency landing on water, were the aircraft touches down under control*". However, in commercial aviation this is a rare occurrence.

A ditching, when executed correctly, is survivable. During a planned ditching the cabin crew have notice, and therefore, sufficient time to prepare the cabin, or to advise passengers to put on their life vests.

During cabin crew training, the emphasis is placed mainly on "ditching" in a large body of water as many skills are required, particularly the principles of survival, until rescue arrives.

However, an NTSB study of Air Carrier water contact accidents indicates that these accidents are usually inadvertent, with no time to prepare. Most accidents occur during the takeoff and landing phases of flight, and usually within proximity of the airport. Many water contact accidents occur during the hours of darkness.

There is usually a lot of damage to the aircraft. In some cases, the cabin has flooded quickly, and the aircraft has sunk within minutes.

The actions and response of the cabin crew, during a "ditching" or inadvertent water landing, will have a direct effect on the chances of survival. Wet drills and ditching exercises, that form part of the cabin crew's initial training and further emergency training, provide the cabin crew with invaluable information, that helps them to react effectively, and improves their situational awareness skills in emergencies.

6.2. UNPLANNED DITCHING

Many “inadvertent water landings” (referred to as “Unplanned Ditching”) have been documented. Unlike a planned emergency, during unplanned ditching there has been no time for the cabin crew to prepare the passengers, for example advising “Brace” positions, or donning life vests.

An unplanned ditching occurred in 1989, on a night flight during the take-off roll. The aircraft drifted to the left, the take-off was aborted, and the aircraft overran the runway, and then dropped onto the wooden approach light pier. The aircraft broke into three pieces and came to rest in the water.

During take-off, the cabin crew knew that something was abnormal, and that the take-off was deteriorating. They immediately reacted by shouting the “Brace” commands to the passengers.

When the aircraft came to a complete stop, the crew assessed the outside conditions. They opened the exits, according to the outside conditions, and immediately gave the commands for the passengers to evacuate.

The flotation devices onboard this aircraft were seat cushions. The water depth was between 7-12 meters deep with a 1-knot current.
Due to the strong current it was difficult for some people to stay afloat. The crewmembers threw seat cushions to passengers who were in the water. Two of the passengers could not swim, two of the crewmembers linked their arms together to support these passengers, and prevent them from going under the water.

The crewmembers remained in control of the situation, and they instructed the passengers in the water to stay in groups and to help each other.

Approximately 20 passengers exited by the left wing, which was not in the water, and the ditching line was attached. These passengers held on to the ditching line, until they were rescued. Amongst the passengers on the wing was a woman with an 8-month old infant, and a 5-year-old child.

The NTSB commended the actions of the four cabin crewmembers, as they performed “in an outstanding manner”.

Amongst the total of 63 people onboard, there were two fatalities.

This just a brief synopsis of the accident, however, the actions of the cabin crewmembers resulted in making the accident survivable (NTSB/AAR-90/03).

6.3. SITUATIONAL AWARENESS

In any unprepared emergency the reaction of the cabin crewmembers will depend largely on their situational awareness skills.

When preparing for take-off and landing, the use of the “Silent Review” will heighten crewmembers’ situational awareness skills, and prepare them for the unexpected. When departing or arriving to a destination that involves flying over water, some ditching information in to the “Silent Review” should be included. Think about the extra information that will need to be given to passengers, for example, the use of equipment:

- What commands should be used?
- What should be looked for, when assessing conditions?
- What would determine the exits, usable/unusable?
- What equipment should be used?
- How to use the slide raft?
- What equipment to take?
- How to manage passengers in the water?
- How to manage passengers in the raft?

During “Unplanned” ditching, like any unplanned emergency, anything can happen and anything is possible. Crewmembers may also have to contend with rising water, damaged equipment, communication problems, as well as evacuating children, elderly and handicapped.

No two incidents/accidents are the same. ”Unplanned” ditching poses a formidable challenge to crewmembers.

The outcome will depend on many factors:

- Immediate actions of the cabin crewmembers
- The condition of the aircraft
- Ability to evacuate into slide/sliderafts.

The leadership of the cabin crew plays a very important role in any emergency, even more so, in the event of a ditching. Crewmembers will have to use their knowledge of equipment, survival procedures, and rescue techniques. Crewmembers need to be efficient and maintain control of the situation.

Time is of the essence in an emergency, in order to evacuate the aircraft and get people to safety as quickly as possible, without endangering lives. The level of danger to both passengers and cabin crew increases as time passes, and therefore stresses the urgency to evacuate the aircraft rapidly.

Landing on water can be divided into in three phases:

- The impact phase
- The egress phase
- The survival phase.

6.4. THE IMPACT PHASE

As stated in the accident synopsis, the crewmembers realized that the takeoff was deteriorating. They were aware that there was a problem, and commanded their passengers to “Brace”.

As with any unplanned impact, one of the first actions crewmembers will need to take, is to shout the commands for the “Brace” position. This will reduce the amount of injury to the passengers, and give them a better chance of being able to evacuate the aircraft and survive. Remember, there maybe be more than one impact, everyone will need to remain in the “Brace” position until the aircraft finally comes to a complete stop.

If the cabin is flooding, or water is visible, start evacuating the aircraft immediately. Crewmembers should immediately don their life vests, and simultaneously shout commands to passengers to **”Release seatbelts”, “ Get Life vests”, or “Seat cushions”, “Come this way”.**

The flight crew may give the command to evacuate with instructions of which exits may be usable or unusable**. Listen for specific instructions from the flight crew.**

Not all crewmembers, in inadvertent water landings, were aware that they were in water until they assessed the outside conditions. It may be possible that only one part of the aircraft is in the water.

The cabin crew must communicate to establish the status of all the exits. Crewmembers must use whatever means available to communicate.

6.5. THE EGRESS PHASE

When assessing the conditions before exiting the aircraft, it will be necessary to determine if the aircraft is floating, sinking, or if the water level is present at exits. This information will determine the actions that the cabin crew will take.

6.6. PASSENGER REACTION

As with any type of unplanned emergency, particularly when there is a need to evacuate the aircraft rapidly, the expertise, instructions and the assertiveness of the crewmembers will have a direct impact on the outcome.

Passenger reaction may be somewhat different than in a ground evacuation, because other elements, such as water are involved, and the use of equipment, such as lifejackets, will be unfamiliar.

- It is possible that passengers may be injured, particularly if the aircraft has been subjected to severe structural damage
- The level of panic may be higher, particularly if water is present, or rising in the cabin
- Passengers may find it difficult to find life vests
- Passengers may have difficulty donning life vests.

6.7. AIRCRAFT SINKING RAPIDLY

- Direct passengers out the nearest opening
- Instruct passengers to support themselves, by holding anything that will keep them afloat
- Find as much flotation equipment as time permits, distribute to passengers
- Leave the aircraft.

6.8. AIRCRAFT FLOATING

The level of the water will determine whether the exit is usable or not. Exits that are below water, or seeping water at the sides, are not considered usable.

Use all exits above the water line. If the level of water is at the doorsill, evacuate passengers directly on the slide/sliderafts, and leave the slide/slideraft attached to the floor of the aircraft.

If possible, avoid evacuating passengers directly into the water, although sometimes there may be no other option.

It is possible that aircraft fuel, hydraulic fluid and oil have contaminated the water, swallowing or being in contact with these fluids can cause temporary loss of hearing, vision and produce nausea. Boarding a raft from the water can be a difficult task, someone who is covered in fuel and oil will be slippery and difficult to grasp from the water.

Low water temperatures may also pose a threat of hypothermia. The symptoms of hypothermia may start within 10 minutes.

If the water is cold it may cause panic and shock. Shock can place severe strain on the body and lead to cardiac arrest.

Those who are non-swimmers are very susceptible to incapacitation and drowning.

Be prepared to shout instructions regarding how to board the slideraft. **“Shoes off”**, **“Board on hands and knees**,**” “Go to the end”**, **and “Sit down”**.

6.9. OVERWING EXITS

Overwing exits are secondary exits during a ditching, because they are not equipped with slide/sliderafts.

If the overwing exits are usable, attach the lifeline, when installed, to the hook on the wing.

Instruct passengers to step on to the wing, inflate their lifejackets, and hold on to the lifeline. If circumstances permit, keep the passengers together on the wing until rescue arrives.

6.10. LIFEVESTS

Donning a life vest takes time, thought, and dexterity. Imagine what it would be like to have to use a life vest for the first time under these circumstances. The passenger must use the life vest, as follows:

- Locate it
- Retrieve it from storage
- Unpack it from the plastic pouch
- Don it
- Fasten or tie it
- Inflate it.

Several accident reports have reflected the difficulties that passengers have experienced in locating, and retrieving their life vests. One report states that *"passengers had been told 5 to 7 minutes before impact of a possible ditching, some passengers had to get on their hands and knees to retrieve the life vests from the stowage and put them on."*

Another report states "rising water in the cabin compounded the problems of locating and removing the vests from the under seat compartments". Crewmembers and able-bodied passengers had to swim under water to retrieve as many life vests as possible and distribute them to passengers that are already outside the aircraft. Life vests may also be dislodged from stowage during impact.

Crewmembers may find themselves having to the shout instructions to passengers regarding the use of the flotation devices.

Research carried out by Civil Aero Medical Institute (CAMI) in the United States has confirmed that people have difficulty in donning life vests. Adjustable waist straps appear to pose the biggest problems. Either they are not tightened, or the passengers cannot fasten them correctly, or do not fasten them at all, or the straps become twisted and caught in the strap length adjuster. The numerous straps, and the various attachment mechanisms confused many of the research participants. The research was conducted in a test environment. It is important to remember that the level of stress will be greater in reality, and is an important element.

The cabin crew should know how to give instructions for the use of equipment carried onboard the aircraft. Expect to shout instructions in order to help passengers don their life vests correctly.

- **"Life vests under your seats"**
- **"Tear open the pouch"**
- **"Place over your heads"**
- **"Fasten straps tight around waist"**
- **"Inflate when leaving the aircraft".**

The cabin crew should think about the commands that may be used in order to assist passengers in donning their life vests correctly. The voice of the crewmember giving instructions is a very effective tool, and can make a difference.

Life vests should be inflated as the passengers are exiting the aircraft. Life vests should not be inflated in the cabin to avoid damage.

When all passengers have boarded the slide/slideraft, the crewmember will be the last person to board. If the slide/slideraft is still attached to the floor;

- Lift the Flap
- Pull "Disconnect Handle".

The slide/slideraft will still be attached to the aircraft by the mooring line. To separate the slide/slideraft from the aircraft:

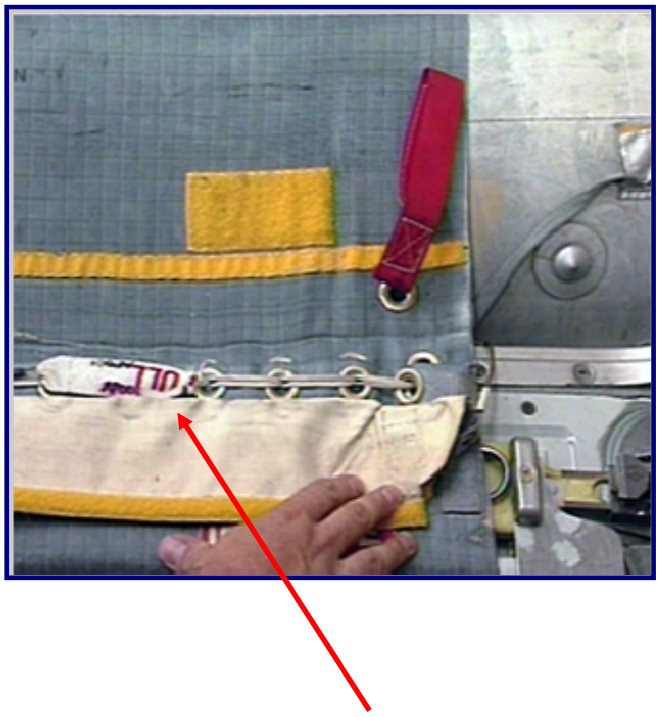
- Cut the mooring line.

Figure 6-1

Slide Raft Disconnection

Step 1. Lift Flap

Step 2. Pull the Disconnect Handle



Disconnect Handle

6.11. SURVIVAL PHASE

If the aircraft is near an airport, assistance and rescue will not be far away. However, crewmembers must remain in control of the situation, and keep passengers together.

If passengers are in the water waiting for rescue, the cabin crew should instruct them to stay “huddled” in groups, by forming a circle and facing towards the center. The crew should encourage passengers to help each other, until assistance arrives. For example, an injured person may be placed in the center of the circle, this will help them to stay afloat and maintain body heat.

Staying together in groups has a dual purpose. Firstly, it is easier to locate survivors if they are all together or in groups. Secondly, staying ”Huddled” together in a circle provides body heat, and slows down the effects of hypothermia.

If slide/sliderafts have been used, get as many people as possible out of the water.

The most important factor in surviving an “unplanned ditching” is the quick response from the crew to take immediate action, knowledge of ditching procedures, and above all, the ability to remain in control of the situation.

The most appropriate way to prepare cabin crew for the unexpected is to provide training, that encourages cabin crew to “think on their feet”, and to use and adapt their skills to the situation.

6.12. PLANNED DITCHING

Planned ditching in commercial aviation is a rare occurrence, however, in other sectors of aviation ditching does occur and is survivable.

In commercial aviation, probably the most successful ditching of a commercial transport aircraft was in Sitka Sound, near Biorka Island, Alaska, in October 1962. Due to an engine failure, during cruise at 20 000 feet, the engine seized and began to lose parts. The Captain decided to ditch the aircraft.

There are many factors that contributed to the successful outcome of the Sitka Sound ditching.

The communication between the flight crew, and the cabin crewmembers, was an open two-way communication. This enabled the cabin crewmembers to carry out detailed cabin preparations. The cabin crewmembers had approximately 45 minutes to prepare the cabin.

The crewmembers rehearsed the “Brace” position with the passengers, gave instructions for donning life vests, and distributed life vests for children.

The cabin crew explained to the passengers seated at exits, how to open the exits, and launch the life rafts. The rafts were moved to the corresponding exits, and the static lines secured. These passengers were advised by the crewmembers not to take any action, until advised.

When the cabin was prepared, the cabin crew informed the flight crew that the cabin was ready.

The cabin crewmember used the public address system to tell passengers to take the “Brace” position, and remain in that position until the aircraft came to a complete stop.

When the aircraft stopped, the cabin crew immediately began to deploy the life rafts, and assist the passengers to board. The water level in the cabin rose to approximately 2 feet (75cm), however the aircraft took 24 minutes to sink.

Within 5 minutes of ditching, all the passengers and crew were in the rafts. Only one raft did not have a crewmember onboard. Within 20 minutes all passengers and crew had been transferred to a launch, and boarded the coast guard vessel.

This was a civilian aircraft operating as a military passenger charter.
All the occupants survived, and none of the passengers or crew was seriously injured.

The report of the "Civil Aeronautics Board" (now called the NTSB) described this ditching as *"an outstanding feat".* The successful outcome was attributed to the following factors:

- Ideal conditions of wind and sea
- Crew familiarity with ditching procedures
- Sufficient time to prepare the cabin
- The military passengers' receptiveness and responsiveness to orders.

This example highlights the fact that ditching can happen, but it can also be survived.

6.13. CABIN PREPARATION – DITCHING DIFFERENCES

Preparing the cabin for a ditching is similar to preparing the cabin for a land evacuation, however, there are a few differences.

1. Alert Phase

Unlike a planned ground evacuation, there will be no instruction to "remain seated" in the flight crew to purser briefing. In this case it will be necessary for everyone to evacuate the aircraft.

- **N**ature of the emergency
- **T**ime available (check watch)
- **S**pecial Instructions
- **B**race signal.

2. Passenger Briefing

The passenger briefing will take the same form as the "planned ground evacuation" briefing, however, the passengers will need more information due to the nature of the emergency, and the equipment required to survive.

- Donning and the use of the life vest
- ABP Assistance briefing will be more detailed

The amount of time available will determine the level of preparation. The most important survival information should take priority, and other tasks should be accomplished as time permits:

- Life vests
- Brace position
- Exits
- ABP Briefings
- Safety Checks
- Final Cabin preparation.

Cabin crewmembers must have their own life vest before commencing the briefing.

The cabin crewmembers should be in their designated brief and secure area, equipped and ready to commence the passenger briefing.

Cabin crewmembers should listen carefully to the announcement, and coordinate the demonstration with the instructions.

When reading the safety briefing announcement, it will be important to pause at key points, in order to give the cabin crewmembers time to don their lifevests, demonstrate, and, check passenger compliance.

6.14. LIFEVESTS

Crewmembers should simultaneously don their life vest and demonstrate to the passengers, as follows:

- Remove the crew life vest from the pouch
- Unfold the life vest and hold it up in front [crewmember]
- Don the life vest
- Secure straps
- Identify light (if applicable)
- Identify Whistle (if applicable).

Crewmembers should then check the passenger life vests in his/her assigned area.

Assist passengers in putting on, and securing their children's life vests. Assist other passengers that may need help. If an adult life vest is to be used for a child, adapt it accordingly. If available, distribute and explain to passengers how to use other flotation equipment, such as baby survival rafts.

6.15. EXITS

Indicate the exits that have slide rafts to passengers. The location of slide/slide rafts may vary according to the aircraft type.

Overwing exits do not have slide rafts. The cabin crew should indicate the nearest slide/life rafts to passengers that are seated at overwing exits.

6.16. ABLE BODIED PASSENGER BRIEFINGS

The criteria used for selecting Able Bodies Passengers (ABPs) for a ground evacuation applies to ditching. Ideally, select three APBs per exit, and seat them at the exit.

One ABP should be briefed to replace the cabin crewmember in case the crewmember becomes incapacitated. The crewmember should brief the passengers on.

- How to assess conditions outside the aircraft, and identify if the exit is usable/unusable (determined by water level)
- How to open the exit
- How to locate the manual inflation handle
- How to protect him/herself from going overboard, and remain in the assist space.
- The commands to be used during evacuation
- How to board the slide/raft
- How to disconnect the slide/raft
- How to cut the mooring line to release the raft from the aircraft.

ABPs Two and Three. Slide raft assistance.

ABPs two and three should be instructed to board the raft to assist passengers. One ABP should be instructed to go to the end of the raft. The other ABP should be instructed to stay in the middle of the raft to assist passengers to the far end.

On some aircraft types, were the rated capacity of the slide/ rafts is lower than the number of people onboard (such as the A320/A321), a round raft is located in the cabin. ABPs two and three are responsible for the round raft. These ABPs will be briefed how to:

- Take the raft to the exit
- Use the mooring line to attach the raft to a fixed part of the aircraft, for example, a passenger seat
- Launch the raft (the raft must be thrown outside the aircraft)
- Manually-inflate the raft, in case it does not inflate. “Pull the mooring line”
- Board the raft and distribute passengers evenly.

When the ABP briefing has been completed, the cabin crew should perform final safety check to ensure that all loose or sharp objects have been removed, and that the cabin is secure.

For the A320, during the final cabin preparation, the survival kit should be attached to the slide raft by attaching the lanyard, that is located forward of the door, to the hook on the survival kit.

When the cabin is secure, the Purser should inform the flight crew that the cabin is ready. The Purser should ask the flight crew for updated information, and communicate any new information with the rest of the cabin crew. The flight crew may be able to inform the Purser about:

- The nearest landfall
- Shipping in the area.

When the cabin preparation is complete, the cabin crewmembers should then prepare themselves. Ensure that the doors are in the armed position, and concentrate on the “Silent Review”, including the removal of emergency equipment or the three “W’s”.

- Who collects
- What to collect
- Where to collect.

The flight crew will give the “Brace” command at the appropriate time.

Cabin crewmembers should repeat the brace command until the aircraft has come to a complete stop.

6.17. POST DITCHING

When the aircraft has come to a complete stop, cabin crewmembers will release their seat belts, and begin to shout their commands. If the noise level is high, use a megaphone, or the PA, if operative.

The ability to evacuate passengers from the aircraft to the rafts will depend on the state of the sea, and the condition of the aircraft. When an aircraft is intact it should be able to float on calm seas for several minutes.

Being aware of the situation in the cabin, and the condition of the aircraft, will determine how passengers will leave the aircraft and where.

In the worst possible case, if the aircraft is sinking, passengers and crew should leave the aircraft through any possible opening. Instruct passengers to inflate their life vests, and hold on to anything that is floating.

Structures, such as engine pylons, flaps may detach from the aircraft and possibly damage the rafts, as the aircraft starts to sink. Therefore, stressing the urgency to evacuate the aircraft, and get away from immediate danger.

Assess outside conditions.

The level of water at the exit will determine if the exit is usable, or not. Exits that are below water, partially submerged, or seeping water around the edges, must be considered unusable. Priority should be given to exits that are above the water level.

When the exits have been opened, crewmembers will be able to determine how to evacuate passengers to the rafts. **If the water is at doorsill** level, the passengers may board the slide/slideraft directly from the aircraft. The slide/slideraft should be left attached to the floor of the aircraft.

Passengers must inflate their life vests, when exiting the aircraft.

Distribute passengers evenly on slide /sliderafts, to prevent capsizing.

If the water level is too far away from the doorsill, detach the raft from the doorsill using the “disconnect handle”. The raft will still be attached to the aircraft

by the mooring line. Crewmembers should pull the mooring line in, to keep the slide/slideraft close to the door to evacuate passengers.

Cabin crewmembers will need to continue shouting commands, to speed up the evacuation.

When boarding passengers into the rafts, ensure that the passenger count does not exceed the raft capacity.

Monitor the flow at each exit, and be prepared to re-direct passengers to other rafts, in case there is congestion, or if the cabin conditions change (For example, unusable exits, rising water, aircraft sinking).

Before the cabin crewmembers leave the aircraft, check the cabin to ensure that all passengers and crew have evacuated. Remove assigned emergency equipment from the aircraft.

- Inflate life vest and evacuate the aircraft into the assigned slide/slideraft
- If, the slide/slideraft is still connected to the aircraft pull the “disconnect handle. The slide/slideraft is still connected to the aircraft by the mooring line.
- Using the knife, cut the mooring line to separate the slide/slideraft from the aircraft
- Retrieve the survival kit attached to the lanyard.

Once separated from the aircraft:

- Get clear and upwind of the aircraft, but stay in the vicinity of the aircraft
- Stay clear of fuel contaminated water, in case the fuel ignites
- Stay clear of any debris, which may damage the rafts
- Locate other survivors.

If possible, there should be at least one crewmember per slide/slideraft. The crewmember should take the leadership role. The survival of the passengers depends on the crewmembers knowledge, and ability to use the available survival equipment, and the ability to cope with the hazards and hardship.

As soon as the raft is clear of the wreckage, the cabin crew should deploy the sea anchor. The sea anchor must be deployed in order to prevent the raft from drifting with the current. It is possible to drift over 160 Kilometers in one day, therefore making it difficult to locate survivors.

When survivors have been found in the water, immediate action should be taken to get them onboard the slideraft. Throw the heaving ring located on the raft, to the survivor and pull them towards the raft.

When bringing survivors into the raft, it is important to ensure that the weight is evenly distributed to avoid the raft from capsizing. Boarding handles, or boarding steps, are usually located on the slideraft to assist survivors. Passengers should be boarded from the toe end of the slide/raft.

Some survivors may be injured, or too weak to board the raft, and may require assistance. This can be quite difficult, however, there are techniques that may make it easier. Below is an example of one such technique.

- Two people should hold the person under the armpits (not the arms)
- Push the person down into the water, and then pull as the buoyancy from the life vest pushes the person up again.

However, keep the person informed every step of the rescue, so that he/she can cooperate!

Once onboard the raft, all persons should keep their life vests until rescued.

Remember that keeping the raft close to the ditching site will make location easier.

6.18. SURVIVAL

The four basic principles to survival are:

- Protection
- Location
- Water
- Food.

6.18.1. PROTECTION

Erect the canopy to prevent wind-chill hypothermia from affecting wet bodies. When the canopy is erected, all occupants will be protected from the elements.

Check the physical condition of all passengers and other crewmembers onboard, and administer first aid as necessary.

Seasickness can be expected. The smell inside the life raft, and loss of visual reference increases the risk of seasickness. Vomiting causes a serious loss of fluid.

If available, seasickness pills should be distributed. However, if they are not available, occupants should be instructed to look at the horizon to have a visual reference.

Using the bailing bucket and the sponges from the survival kit, remove water from the raft. The floor of the raft should be kept as dry as possible.

Try to keep the raft clean and dry to prevent illness and infection.

The condition of the raft should be frequently monitored. If necessary, inflate the buoyancy chambers using the hand pump that is in the survival kit. The buoyancy chambers should be firm, but not too hard. Inflation should be checked regularly.

6.18.2. LOCATION

The second element of survival is “Location”. Any radio beacons should be activated, to send out a signal to identify your location.

Other signaling equipment in the survival kit includes:

- Signaling mirror
- Day/night flares
- Dye marker.

If there is more than one slideraft, they should be tied together. A distance of approximately 8 meters (25 feet) should be respected, to allow for wave action. Keeping the rafts together makes location and rescue easier.

If transceivers are available, they should be used to check the beacon signal, on 121.5 MHZ. The “beeping” noise will confirm that the beacon is correctly deployed.

Transceivers may also be used to communicate with other rafts.

Rescue at sea requires a cooperative effort. Therefore, raft occupants should actively participate in the rescue effort, and assist with raft maintenance. Not only will this help to use time constructively, but also to mentally occupy passengers and crewmembers, and to keep the morale up, during a very difficult situation. The crewmembers should assign tasks to occupants, for example:

- Looking out, to spot passing aircraft or ships
- Using signaling mirror, as mirror flashes can be seen for many kilometers, even in hazy weather
- Keeping the floor of the raft dry

- Recovering moisture, or rainwater to drink.

These duties should be rotated every few hours. It will give people a sense of responsibility. Passengers should be reminded that cooperation is necessary to survive.

Conditions in the raft will be far from ideal. Even during a short space of time, occupants may feel cramped, tired and anxious.

Mental attitude is a very important aspect of survival. In emergency situation, try to keep the morale up to prevent people from falling in to hopelessness and despair. Do not give up hope, because the will to live is a key element of survival.

6.18.3. WATER

Crewmembers will need to assess how much food and water is available, and ration them accordingly.

Water is the most important element. It is possible to live on just water for 10 days, or more. When the water supply is limited and cannot be replaced, it should be used efficiently.

Freshwater supplies should be protected from being contaminated from seawater.

At night, if water is in short supply, the canopy can be rolled up at the side to collect dew, by using a sponge or cloth.

The amount of water available, and the amount of people and their physical condition, should be considered when rationing water.

6.18.4. FOOD

The general rule is, “if you don’t have water, don’t eat”. Only eat if water is available, as it is necessary to aid digestion.

6.19. RESCUE

When an aircraft or a ship has been sighted, all the signaling equipment available should be used to attract attention. Occupants must stop signaling as the craft approaches.

The raft will need to be prepared. Take the canopy down; secure all loose items in the raft. The crewmember should instruct the passengers to ensure their life vests are fully inflated, by blowing into the tubes, to restore the buoyancy chambers.

Never take a life vest off during rescue.

Passengers and crewmembers will have to be patient during the rescue operation, and understand that the procedure takes time, depending on the type of rescue craft. It may not be possible to rescue all raft occupants at once.

The crewmember may have to decide who should be rescued first, such as injured passengers and crewmembers, or women with children. The crewmember will need to manage the passengers calmly, and maintain order until the last person has been rescued.

The crewmembers and passengers must follow the instructions of the rescue personnel, and remain in the raft until instructed.

Helicopter rescue requires particular attention, and it is imperative that the instructions given by the rescue crew are obeyed.

- Do not attempt to stand up - all raft occupants should remain seated with arms and legs inside the raft
- Rotor wash from the helicopter may be quite severe. Keep people low in the raft, and ensure that the weight is evenly distributed.
- Do not do anything using your own initiative
- Do not reach out to grab the cable (to avoid the possibility of an electric shock), wait until it reaches the raft or makes contact with the water
- Wait for instruction from the winch man
- On reaching the door sill of the helicopter, don’t try to help yourself in, let the helicopter crew bring you onboard
- A rescue swimmer may not always drop from the helicopter to aid with rescue. The cabin crewmember may have to help with instruction
- The crewmember must stay in the raft until all passengers have been rescued.

With modern satellite technology, location and rescue may not be far away.

However, it is always best to prepare for the most extreme circumstances.

Crewmembers should feel confident that their knowledge of ditching procedures, and survival techniques would get them through the worst possible circumstances.

During this chapter, examples of “unplanned” and “planned” ditching were used to highlight the positive effects that crewmembers can have during emergencies.

Crewmembers are always the leaders in any emergency situation. An effective leader has knowledge and skills, plus the ability to apply those skills as necessary.

6.19.1. EVACUATION ON WATER PROCEDURE- SLIDERAFT

- STAND UP AND SHOUT . . . . . "UNFASTEN SEATBELTS, LIFEVESTS ON"

Inflate the lifevest, only once outside the aircraft.

- ORDER . . . . . "REMOVE SHOES"

- **• If the is usable.**
- **DOOR IN ARMED POSITION . . . . . OPEN**
- **RED, MANUAL INFLATION HANDLE . . . . . PULL**

  Do not wait for automatic inflation of the slideraft.

• If the water level is close to the door sill:
The slideraft inflates on the water.

- **SLIDERAFT . . . . . LEAVE ATTACHED TO CABIN FLOOR**
- **ASSIST SPACE . . . . . OCCUPY**

• If the water level is too far away from the door sill:

- SLIDERAFT . . . . . DISCONNECT FROM DOOR SILL
The slideraft remains tied to the aircraft by a 6-meters (20 feet) mooring line.

-MOORING LINE . . . . . HOLD
To keep the slideraft close to the exit, hold the mooring line.

-PASSENGERS EVACUATION . . . . . EXPEDITE

-“COME THIS WAY”, “HURRY” . . . . . SHOUT

-PASSENGER LIFEVESTS... INSTRUCT PASSENGERS TO INFLATE LIFE VESTS WHEN EVACUATING THE AIRCRAFT

-NUMBER OF PASSENGERS BOARDING THE SLIDERAFT . . . MONITOR

-ASSIGNED AREA . . . . . CHECK FULLY EVACUATED

-LAST CREWMEMBER . . . . . BOARD SLIDERAFT

-MOORING LINE . . . . . CUT

-SURVIVAL KIT . . . . . RETRIEVE
The survival kit is attached to the slideraft via a lanyard.

6.19.2. EVACUATION ON WATER PROCEDURE – ESCAPE SLIDE

The escape slide is used as a passenger flotation device only. It is not equipped with a canopy or a survival kit.

-STAND UP AND SHOUT . . . . . "UNFASTEN SEATBELTS, LIFEVESTS ON"

Inflate the lifevest, only once outside the aircraft.

-ORDER . . . . . "REMOVE SHOES"

- **If the exit is exit usable:**
  - **DOOR IN ARMED POSITION . . . . . OPEN**
  - **RED, MANUAL INFLATION HANDLE . . . . . PULL**

    Do not wait for automatic inflation of the slide.

- **If the water level is close to the doorsill:**

The slide inflates on the water.

  - **SLIDE . . . . . LEAVE ATTACHED TO CABIN FLOOR**
  - **ASSIST SPACE . . . . . OCCUPY**

- **If the water level is too far away from the doorsill.**

- SLIDE . . . . . DISCONNECT FROM DOOR SILL
The slide remains tied to the aircraft by a 6-meters (20 feet) mooring line.

-MOORING LINE . . . . . HOLD
To keep the slide close to the exit, hold the mooring line.

-PASSENGERS EVACUATION . . . . . EXPEDITE

-“COME THIS WAY”, “HURRY” . . . . . SHOUT

-PASSENGER LIFEVESTS... INSTRUCT PASSENGERS TO INFLATE LIFE VESTS WHEN EVACUATING THE AIRCRAFT

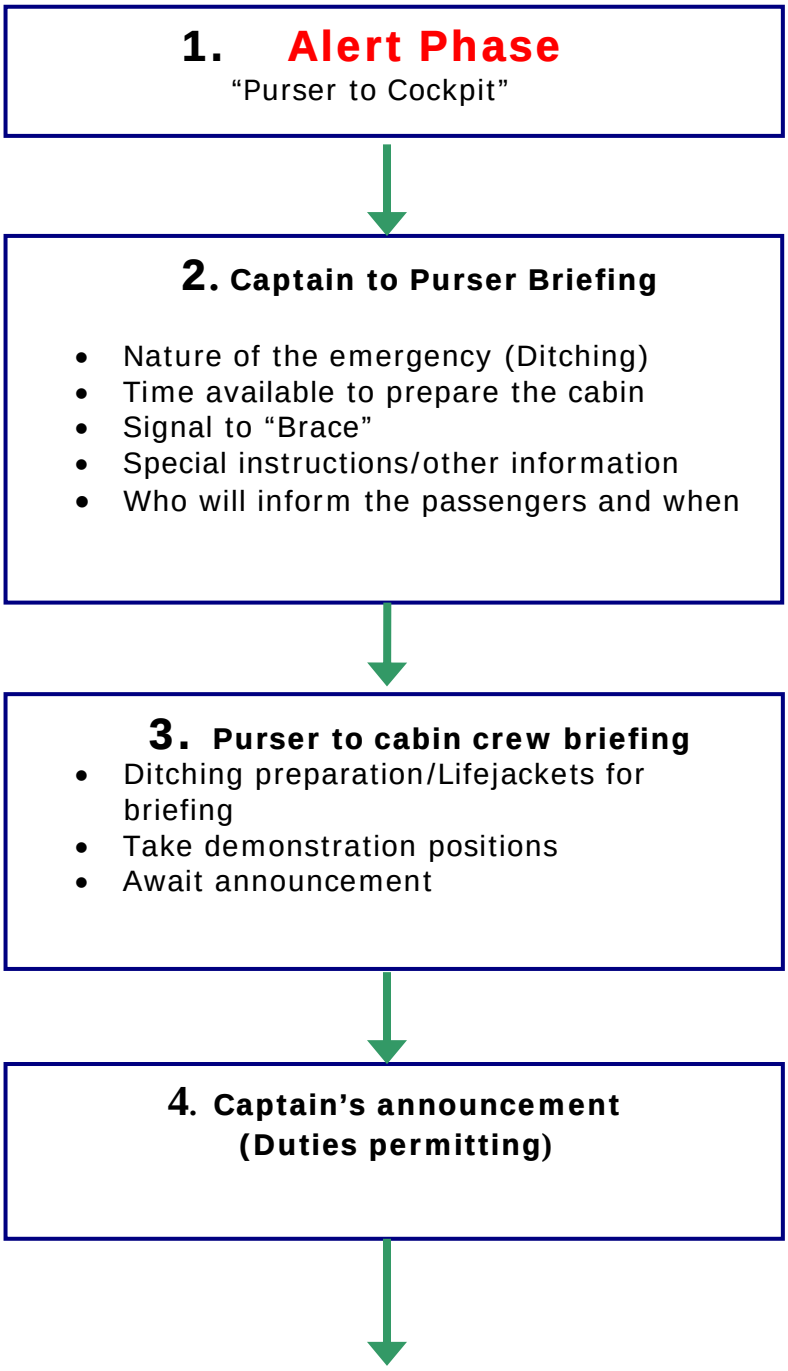
-NUMBER OF PASSENGERS BOARDING THE SLIDE . . ... MONITOR

-ASSIGNED AREA . . . . . CHECK FULLY EVACUATED

-LAST CREWMEMBER . . . . . BOARD SLIDERAFT

-MOORING LINE . . . . . CUT

6.19.3. PLANNED DITCHING CABIN PREPARATION



5. Purser's Announcement

- If the captain's announcement is not possible
- The Nature of the emergency
- Necessity to prepare the cabin
- Follow the instructions of the crew

The emergency demonstration announcement should include.

- Lifejackets (Stress only to be inflated when exiting the aircraft)
- Brace positions
- Location of exits. Slide/life rafts
- Loose items
- Passenger assistance (ABP's)
- Assistance with lifejackets, children and infants
- Safety Card Review (Including Seat belts, tray tables, seat backs, armrests)

6. Final cabin secure check

- Seat belts fastened
- Seatbacks upright
- Tray tables stowed and latched
- Carry on baggage stowed and secure
- Overhead bins closed and latched
- Aisles clear of all obstructions
- Service items cleared
- Cabin dividers open

7. Secure Galleys

- Close and secure all containers
- Carts stowed and secured
- Switch off all galley power
- Pull all circuit breakers

8. Check all doors

"ARMED"

↓

9. Cabin crew to Purser

- cabin preparation complete

↓

10. Purser to Captain

- " Cabin Ready " cabin preparation complete
- Obtain updated information

↓

11. Command from Captain to Cabin Crew via PA

"Attention Crew! At Stations!"

↓

12. All Cabin crew at stations

- Secure seat harness
- Silent Review (Including the three W's)

↓

13. Command from captain to cabin crew via PA (Approximately 1 minute before Landing)

7. CABIN DEPRESSURIZATION

7.1. INTRODUCTION

Aircraft have cabin air systems that control pressurization, airflow, air filtration, and temperature. The purpose of these systems is to provide a safe and comfortable cabin environment, and to protect all cabin occupants from the physiological risks of high altitudes. Modern aircraft are now operating at increasingly high altitudes. This increases the physiological risks that are associated with depressurization.

In the case of depressurization, there is a risk that not enough oxygen will be supplied to the body. This condition, hypoxia, is the greatest threat to both crewmembers and passengers.

7.2. CABIN PRESSURIZATION

Pressurization of the aircraft cabin begins before, or shortly after, takeoff. The air from outside the aircraft is compressed through the engines, cooled and humidified by the air conditioning unit, and then distributed into the cabin. The pressurization system is maintained by a series of valves that control the flow of the air into, and out of the cabin. The aim is to pump more air into the cabin than is allowed to escape. As the aircraft climbs, the “outflow” valves close and the pressure builds up inside the cabin to an altitude of between 6 000ft and 8 000ft. The pressurized cabin protects the occupants from the physiological risks of high altitude.

The external altitude may be 41 000 feet, therefore the difference between the cabin altitude and the external altitude, creates a “pressure differential”.

During depressurization, the cabin pressure decreases, and the cabin altitude increases to equalize with the flight altitude.

The risk of a pressurized cabin is the potential for cabin depressurization. This can occur due to a pressurization system malfunction, or damage to the aircraft that causes a breach in the aircraft structure, enabling cabin air to escape outside the aircraft, for example loss of a window, or a breach in the aircraft fuselage due to an explosion.

The loss of pressurization can be slow - in case of a small air leak - while a rapid or explosive depressurization occurs suddenly, usually within a few seconds.

Other factors influence the rate and duration of depressurization:

- The larger the cabin, the longer the depressurization time
- The larger the opening, the faster the depressurization
- The greater the “pressure differential” between the cabin pressure and the external environmental pressure, the more forceful the depressurization.

When cabin pressure decreases, the occupants are no longer protected from the dangers of high altitude, therefore increasing the risk of hypoxia, depressurization illness and hypothermia. It is, therefore, important that crewmembers recognize the different types of depressurization, react effectively to overcome the difficulties associated with a loss in cabin pressure.

7.3. TYPES OF DEPRESSURIZATION

Depressurization can be separated into two categories:

- Rapid/Explosive
- Slow/insidious.

7.3.1. RAPID/EXPLOSIVE DEPRESSURIZATION

Structural damage or malfunction in the pressurization system may cause rapid depressurization. Rapid depressurization may be explosive, especially where there is be a breach in the fuselage. Listed below are some of the signs of a rapid depressurization:

- Loud bang, thump or clap. When the two masses of air make contact
- Cloud of fog or misting in the cabin. Due to the drop in temperature, and the change of humidity
- Rush of air, as the air exits the cabin
- Drop in temperature as the cabin temperature equalizes with the outside temperature
- Release of cabin oxygen masks, when the cabin altitude reaches 14,000ft.

If a breach in the structure is the cause of the depressurization, the rush of air that leaves the aircraft through the breach. Anything that is in the immediate area that is not secured will be ejected from the aircraft.

Debris may fly around the cabin, and loose items may become projectiles. Dust particles may also restrict vision.

Occupants will also feel some of the physiological effects such as:

- Hypoxia
- Hypothermia
- Gas expansion
- Exposure to windblast.

7.3.2. SLOW DEPRESSURIZATION

Slow depressurization is a very gradual decrease in cabin pressure. Slow depressurization may be the result of a faulty door seal, a malfunction in the pressurization system, or a cracked window.

Slow depressurization may occur, however, it may not be obvious. There will be no fog or sound of air rushing through the cabin, or any visible indication of depressurization. Therefore, cabin crewmembers must be alert to any clues that may indicate slow depressurization.

One of the first physiological indications may be ear discomfort, or ‘popping’, joint pain, or stomach pain as the gas expands.

Cabin crewmembers should be aware of the signs and symptoms of hypoxia, not only for passengers, but also for other crewmembers. Due to the insidious nature of hypoxia, the symptoms may not be identified until it is too late.

Anyone that has symptoms of hypoxia should be given oxygen, and the flight crew should be immediately notified.

If the origin of the slow depressurization is a faulty door or window seal, there may be a slight “hissing” sound in the immediate area. In this case, notify the flight crew. Any passengers that are seated in the area should be moved, and reseated if possible. All other cabin crewmembers should be informed. As a precautionary measure all seatbelts should be fastened, and equipment stowed and secured, in the event of a rapid depressurization.

7.4. HYPOXIA

The greatest danger during depressurization is hypoxia. The most common type of hypoxia in aviation is "hypoxic hypoxia", which occurs due to low partial pressure of oxygen in the arterial blood. If oxygen is not used immediately in hypoxia cases, it is possible that occupants become incapacitated and lose consciousness in a very short time.

The effects of hypoxia (lack of oxygen) cannot be over emphasized. It is important for cabin crew to realize that even mild hypoxia, though not fatal, can have fatal results. This is because hypoxia can significantly reduce the crewmembers ability to perform, and consequently lead to errors that may be fatal.

The insidious nature of hypoxia causes a subtle decrease in individual performance, followed by incapacitation, the symptoms may not be identified until it is too late.

It is necessary to remember that each person may not react in the same way, and that the symptoms of hypoxia may manifest themselves differently in each individual.

Hypoxia can cause a false sense of well being. It is possible for a person to be hypoxic and not be aware of their condition. Therefore, it is important that the cabin crew recognizes the signs of hypoxia, and provides oxygen as soon as possible, in order to prevent a loss of consciousness. The affected passenger or crewmember usually recovers a few minutes after receiving oxygen. However, they may not be aware of having lost consciousness.

7.5. THE TIME OF USEFUL CONSIOUSNESS

The time of useful consciousness refers to the time available to individuals to perform their tasks, after they have been deprived of oxygen, but are still aware of their environment and capable of controlling their actions.

It is important for the cabin crew to realize that the time of useful consciousness is different for each individual, and depends on the:

- Altitude
- Individual's state of health
- Amount of activity.

The 'Time of Useful Consciousness' table is used as a guideline for the expected performance time at different altitudes. The 'Time of Useful Consciousness' is a relative term, and will vary according to each individual's state of health and level of activity.

The primary factor that will effect cabin crewmembers, and reduce their 'time of useful consciousness' is the level of activity. Activity increases the need for oxygen. The more cabin crewmembers move around the cabin the higher their oxygen requirement. During depressurization, and particularly post depressurization, cabin crewmembers should consider their own oxygen requirements. The 'Time of Useful Consciousness' does not imply that a person will be able to perform their duties to their full capacity. As the time increases the ability to perform duties will diminish, and even the simplest of tasks may become difficult, as hypoxia sets in.

The cabin crew must remember that, in cases of continued physical activity, the time of useful consciousness is significantly reduced.

Table 1

Carlyle, 1963

Time of Useful Consciousness Table at Various Altitudes

TIME OF USEFUL CONSCIOUSNESS		
Altitude	**Moderate Activity**	**Sitting Quietly**
22 000 feet	5 minutes	10 minutes
25 000 feet	2 minutes	3 minutes
28 000 feet	1 minute	1.5 minutes
30 000 feet	45 seconds	1.25 minutes
35 000 feet	30 seconds	45 seconds
40 000 feet	18 seconds	30 seconds

Note:

It is important to emphasize that this table is only a guideline, and provides average values that can increase or decrease, depending on the skills needed to accomplish a task, on the individual's health, and on the amount of activity. For example, the time of useful consciousness for a cabin crewmember involved in moderate activity is significantly less, compared to a passenger that is sitting quietly

The following are some other factors that can contribute to reducing the time of useful consciousness.

- Fatigue: A person who is physically or mentally fatigued will have an increased risk of hypoxia
- Physical effort: During physical activity, there is an increased need for oxygen, an increased risk of hypoxia and, as a result, a decrease in the amount of useful consciousness time
- Alcohol: Alcohol can significantly affect behavior, and can increase the risk of hypoxia, in addition to aggravating some of the behavioral changes resulting from hypoxia.

7.6. THE PHYSIOLOGICAL AND PSYCHOLOGICAL EFFECTS OF HYPOXIA

Physical activity, during the initial descent and post depressurization, when the aircraft has leveled out, will increase the need for oxygen. If supplemental oxygen is not used, cabin crewmembers may become hypoxic and incapacitated. Cabin crewmembers performance is vital during in-flight emergencies. The symptoms of hypoxia are various, and may manifest themselves differently in each individual. Initial signs of hypoxia include:

- Increased rate of breathing
- Headache
- Nausea
- Light-headedness
- Dizziness
- Tingling sensation in hands and feet
- Sweating
- Irritability
- Euphoria
- Cyanosis (bluing of the lips and the fingernails)
- Ear discomfort
- Stomach pain due to gas expansion.

As the lack of oxygen increases, the symptoms become more pronounced with the lack of oxygen, and include:

- Impaired vision
- Impaired judgment
- Motor control (unable to coordinate)
- Drowsiness
- Slurred Speech

- Memory loss
- Difficulty to concentrate.

Hypoxia can cause a false sense of well-being. It is possible for a person to be hypoxic and not be aware of their condition. It is important that cabin crewmembers recognize the signs of hypoxia, and administer supplemental oxygen as soon as possible in order to prevent unconsciousness.

When oxygen has been administered recovery will usually be within minutes. However, the person may not be aware of having a period of reduced consciousness.

7.7. CABIN DEPRESSURIZATION PROCEDURE

In 1995, a study conducted by the Civil Aero Medical Institute (CAMI) in the United States, entitled “Flight Attendant Procedures in a Depressurization”, revealed that accident investigators, and safety inspectors reported that cabin crew did not follow the recommended procedures during depressurization. This study resulted in a Flight Standards Information Bulletin (FSIB released by the FAA) that provides the recommended procedures in a cabin depressurization event.

In the case of depressurization the immediate use of oxygen is critical. Therefore, the first actions to be performed by the cabin crew are.

- **Immediately don the nearest oxygen mask**
- **Sit down fasten your seat belt, or grasp a fixed object**
- **Hold on.**

If the cabin crew is not able to sit down or grasp a fixed object, they should wedge themselves between passengers and ask passengers for assistance. For example, in one cabin depressurization event, a cabin crewmember was saved from ejection out of the aircraft, because a passenger was holding on to the cabin crewmember's ankle.

The priority of the cabin crew is to consider their personal safety.

Incapacitated or injured cabin crewmembers will not be able to assist other cabin crewmembers and passenger during the post-depressurization phase.

7.8. CREW COMMUNICATION AND COORDINATION

During any emergency, effective crew communication is critical to a successful outcome. Effective Crew Resource Management (CRM) involves cooperation and communication between the flight and cabin crew. In many abnormal and emergency situations, the cabin crew plays an important role in helping the flight crew to identify and resolve developing problems.

Many incident and accident reports have revealed that effective crew communication, between flight and cabin crew, can make the difference between an accident and an incident. It has also been revealed that ineffective communication between the flight and cabin crew has contributed to the severity of an accident.

7.9. COMMUNICATING IN A NOISY ENVIRONMENT

Communication between the flight crew and the cabin crew may be difficult. Equally communication between the cabin crewmembers and the passengers may cause problems, depending on the type of depressurization, particularly if it is rapid/explosive and the noise level may be quite high.

Some rapid/explosive depressurizations have been severe, and presented the crewmembers with diverse challenges to overcome. One such depressurization happened over the pacific, not only were the cabin crewmembers faced with an explosive depressurization, but they also had to try and prepare the cabin for a ditching, and then a land evacuation with 337 passengers onboard.

“Communication between the flight attendants and passengers was very difficult because of the high ambient noise level in the cabin after the depressurization, even though the public address (PA) system was operational. Flight attendants were located at each of the 10 doors, yet there were only two megaphones required to be on the airplane; one located at door 1- left and the other at 4-left.

The flight attendants, who were responsible for each of these two doors, used the megaphones to broadcast commands to passengers in their immediate areas and to other flight attendants in preparation for the landing and subsequent evacuation. The other 13 flight attendants (including one deadheading flight attendant) had to shout, use hand signals, and show passengers how to prepare for the evacuation by holding up passenger safety cards.”

“Because of the intense cabin noise she [the flight attendant] had to communicate with passengers by holding up a safety card and a life preserver. Passengers sitting in the front rows, in turn, showed safety cards and life preservers to other passengers seated behind”. (Source Accident Report NTSB/AAR-90/01)

During any emergency, effective communication is critical to the outcome. Cabin crewmembers should use any possible means to communicate with other crewmembers and passengers.

7.10. POST DEPRESSURIZATION

After a depressurization, when the aircraft reaches a safe altitude, the cabin crew can move around the cabin, and should use the portable oxygen cylinders until they are confident that they can breathe without support.

When the emergency descent is completed, and a safe altitude is reached, the cabin crew should consider their oxygen requirements. Due to the physical activity at an increased altitude, the cabin crew may still be exposed to hypoxia. Oxygen deprivation can be insidious and the cabin crew may not be the best judges of their own oxygen intake after depressurization.

After cabin depressurization, the cabin crew should.

- Check on the flight crew, and be prepared to assist in the case of pilot incapacitation.
- Check passengers for any injuries
- Check the cabin for any damage
- Provide first-aid and oxygen, as necessary
- Report the cabin status to the flight crew.

7.11. OXYGEN SYSTEMS

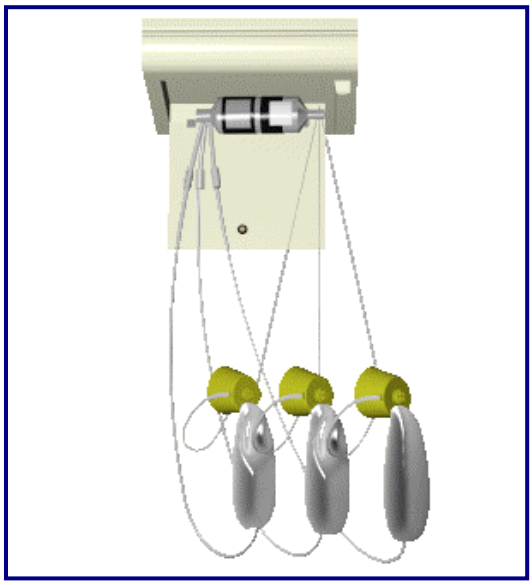
When the cabin altitude increases above 14 000 feet, the oxygen masks that are housed above the passenger seats, in the lavatories, galleys, and crew stations will deploy automatically. The flight crew may also manually deploy the oxygen mask system.

When the compartments are open, the masks drop down, and are suspended by a lanyard. The oxygen masks are normally in groups, depending on the seat row configuration of the aircraft. Each group of masks has a release pin that is connected to a lanyard. It is sufficient to pull one mask, to activate the oxygen for that entire row of seats.

There are two different passenger oxygen systems that are currently used on aircraft, chemical and gaseous. However, there are some differences between the two systems.

Figure 7-1

Cabin Fixed Oxygen System



7.11.1. CHEMICAL OXYGEN

The chemical system generates a chemical reaction, when the mask has been pulled down and the release pin has been removed. When the oxygen begins to flow to the mask, it will continue for either **15 or 22** minutes.

It is not possible to stop the flow of oxygen when it has started. The chemical generator creates heat and becomes hot, therefore a smell of burning, where dust has gathered, is not unusual. Passengers may become concerned with the smell of burning associated with the oxygen generators.

In a Notice to AOC holders (NTAOCH) No. 5/96, the CAA recommended that.

"As soon as practicable after emergency oxygen masks have been deployed, passengers should be advised that there is a possibility of a smell of burning associated with the normal operation of chemical oxygen generator systems"

A passenger announcement should be made, when it is considered safe to do so.

7.11.2. GASEOUS OXYGEN

A number of high-pressure oxygen bottles, contained within the aircraft, supply gaseous oxygen to the cabin. Unlike the chemically generated oxygen that works independently from the aircraft altitude, the gaseous system is activated depending on the cabin altitude.

The mask receives pure oxygen under positive pressure, at a rate governed by the cabin altitude pressure.

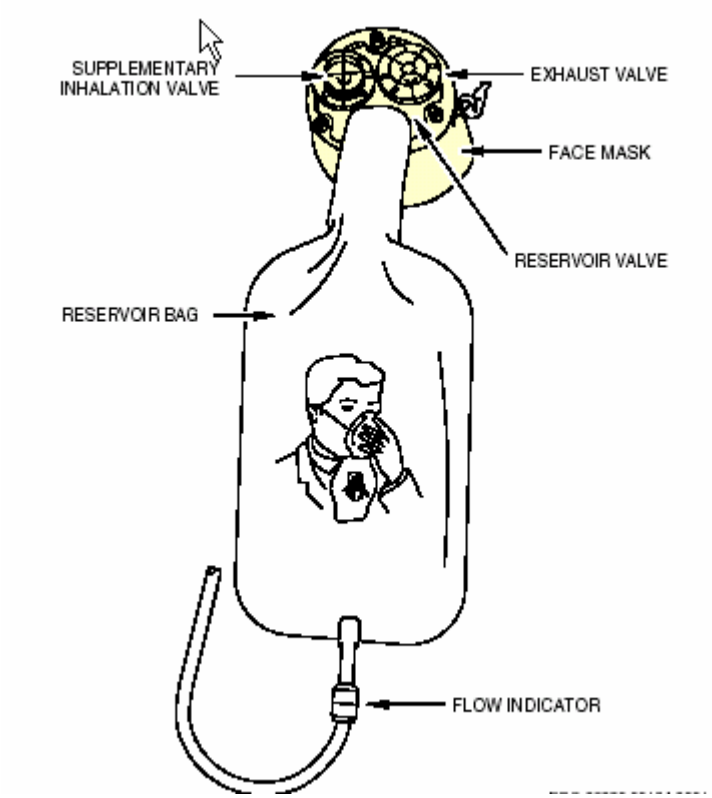
The lower the altitude, the less oxygen will flow to the masks. When the cabin altitude reaches 10 000 feet, the oxygen supply will stop.

Unlike the chemically generated oxygen, there is no burning odor, because there no heat is generated.

Figure 7-2

Oxygen Mask 1

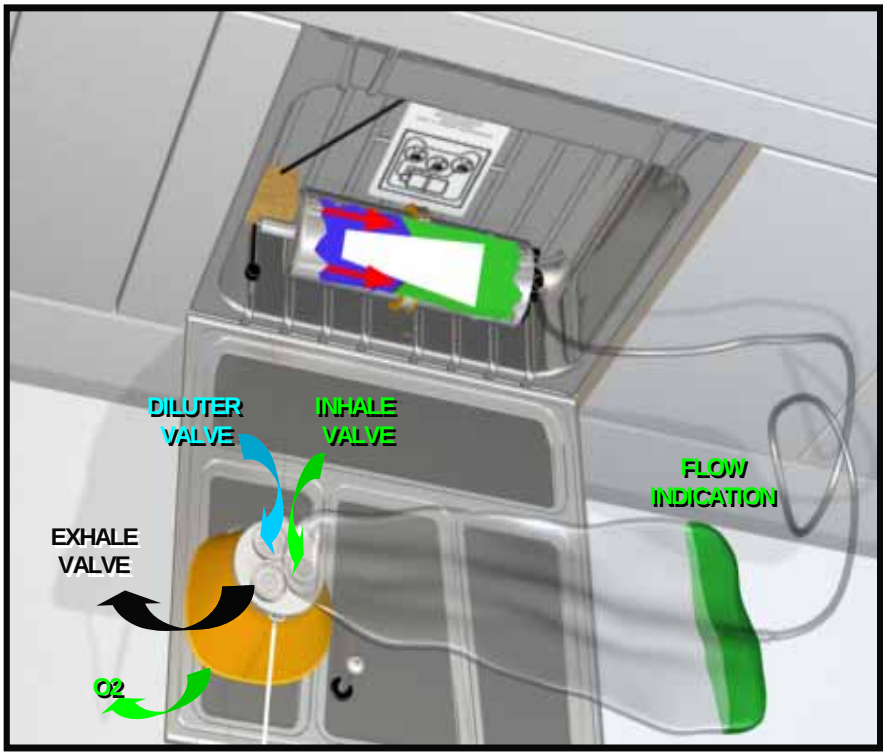
The flow indicator is visible through the transparent tubing.



The flow indicator, a green bead, is visible through the transparent tubing, when oxygen is flowing to the mask.

Figure 7-3

Oxygen Mask 2



The oxygen flow indication on this oxygen mask is the green strip on the reservoir bag.

7.11.3. COCKPIT OXYGEN

In the event of depressurization, or emissions of smoke or noxious gases, a fixed oxygen system in the cockpit supplies adequate oxygen to the flight crew.

Four full-face quick donning facemasks are stowed in boxes that are easy to access, adjacent to the crewmembers' seats (one per seat).

A mask-mounted regulator supplies a mixture of air and oxygen, or pure oxygen, and performs emergency pressure control. With the regulator set to "NORMAL", the user breathes a mixture of cabin air and oxygen up to the cabin altitude at which point the regulator supplies 100% oxygen. The user can select the regulator to 100%, in this case the regulator supplies pure oxygen at all cabin altitudes.

How to use the cockpit oxygen:

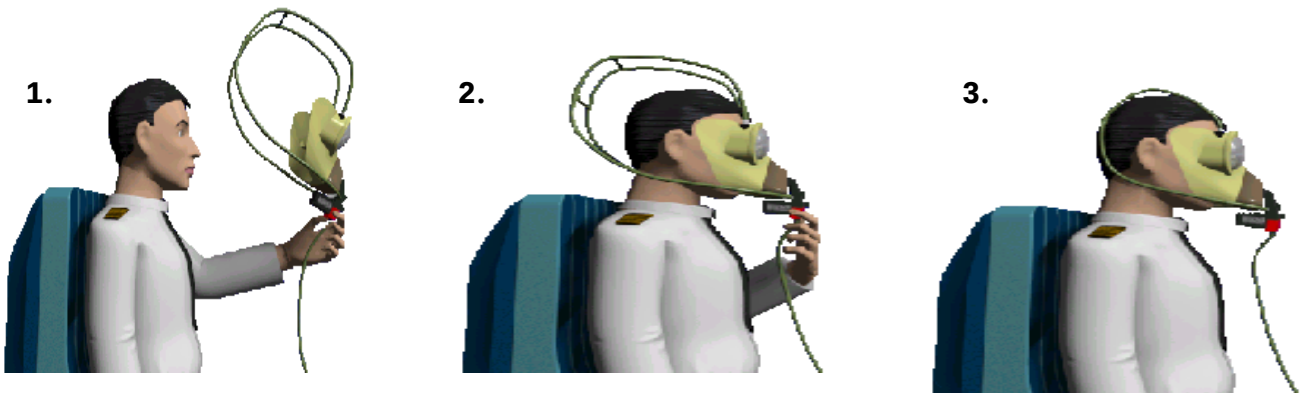
1. Remove the mask from the storage box, and then squeeze and pull the two red grips upwards. Continue to squeeze the red grips, as this causes the oxygen flow to inflate the head harness.

2. When the mask is in place, release the grips (so that the oxygen flows out of the harness), and then tie the mask to the face.

3. The mask can be donned with one hand. The microphone is automatically transferred to the mask.

Figure 7-4

Donning the cockpit oxygen mask



Cockpit Oxygen System

Figure 7-5

7.11.4. PORTABLE OXYGEN CYLINDERS

Oxygen cylinders are located throughout the cabin. The number and location of the oxygen cylinders varies, depending on the aircraft cabin configuration.

Zodiac AVOX Systems

Portable Oxygen Cylinder Assembly

7.11.5. CABIN DEPRESSURIZATION PROCEDURE

NEAREST OXYGEN MASK . . . . DON

WARNING

Do not remove your oxygen mask until it is safe to do so. Removing your oxygen during a depressurization may lead to total incapacitation caused by hypoxia.

NEAREST SEAT . . . . . SIT DOWN

SEATBELT . . . . . FASTEN
In case of cabin depressurization, the lavatory return to seat" signs do not come on. For passengers located in the lavatories, 2 masks will immediately drop down from the lavatory ceiling. Passengers should apply the mask over their nose and mouth.

- **If no seat is available:**

FIXED OBJECT . . . . . GRASP AND HOLD ON
When no seat is available, the cabin crew should wedge themselves between passengers and hold on.

DON OXYGEN MASKS - FASTEN SEATBELTS . . . . INSTRUCT PASSENGERS
From your location, speak through your mask, or use gestures to demonstrate the donning of masks.

ANNOUNCEMENT . . . . MAKE, IF POSSIBLE
Although the bag does not inflate, oxygen is flowing to the mask.

- **When notified by the flight crew (PA) that a safe flight level has been reached.**

CABIN CREW . . . . TRANSFER TO PORTABLE OXYGEN

Note.

To prevent crew incapacitation due to hypoxia, the cabin crew must transfer to portable oxygen, and consider their post decompression oxygen needs. When deciding to remove oxygen masks, the cabin crew must use good judgment, and must be alert to any signs of hypoxia.

CABIN DEPRESSURIZATION CONT'D..

FLIGHT CREW . . . . . **CHECK**
The cabin crewmember nearest to the cockpit should check on the flight crew in case assistance is needed.

PASSENGERS AND CABIN . . . . . **CHECK**
The cabin crew should check for passenger injuries and, damage to the cabin.

FIRST AID AND OXYGEN . . . . . **GIVE AS REQUIRED**

CABIN STATUS . . . . . **REPORT TO FLIGHT CREW**
Report the nature of injuries, and the cabin damage to the flight crew.

7.11.6. LDMCR/BCRC/FBCRC DEPRESSURIZATION PROCEDURE

A330/A340/A340-500/A340-600

When a rapid depressurization occurs, a low chime sounds in the crew rest compartment for approximately 30 seconds and, at 14000 feet, the oxygen masks automatically drop from the oxygen container.

The crew rest occupants must proceed as follows:

-OXYGEN MASKS…….. DON IMMEDIATELY

-SEATBELT…….. FASTEN

-CREW REST OCCUPANTS…….. STAY INSIDE

- **When the flight crew notifies (via PA) that a safe flight level has been reached.**

-CABIN CREW ……RETURN TO MAIN DECK

7.12. SUMMARY

During any in-flight emergency, including depressurization, the first action of the cabin crewmembers will always address the greatest threat to safety.

The greatest danger is the risk of hypoxia, and the possibility of being ejected from the aircraft. Therefore, the immediate action for cabin crewmembers will always be.

- **Immediately, don the nearest oxygen mask, sit down or grasp a fixed object, and hold on, until given clearance by the flight crew to move around the cabin.**

- To consider their own oxygen requirements post depressurization. The cabin crew should transfer to portable oxygen during the post depressurization walk about, to prevent the symptoms of hypoxia. Remember, physical activity requires more oxygen than sitting down. An incapacitated crewmember is no longer able to perform safety duties, and aid passengers.

Communication is a lifeline during any emergency. The information that cabin crewmembers can give passengers will save lives. The sharing of information is vital during any emergency, whether it is between crewmembers or passengers. Aircraft safety and survival is a team effort.

8. TURBULENCE MANAGEMENT

8.1. INTRODUCTION

During a flight it is common for aircraft to encounter turbulence. Turbulence is the leading cause of injury to passengers and cabin crew in non-fatal accidents. Initiatives can be taken to reduce turbulence-related injuries, with little or no financial cost to the operator.

The aim of this Chapter is to:

- Increase cabin crew awareness of the hazards of turbulence
- Provide strategies to enable the cabin crew to effectively manage the cabin during turbulence
- Help cabin crewmembers to ensure safety in the cabin and prevent turbulence-related injuries.

8.2. STATISTICAL DATA

Turbulence-related injuries to cabin crewmembers occur much more frequently than turbulence-related injuries to passengers, because cabin crewmembers are constantly working in the cabin.

IATA, Safety Trend Evaluation, Analysis and Data Exchange System (STEADES) performed a study of turbulence-related injuries to cabin crewmembers.

Analysis revealed that from January 1st 2004 to December 31st 2004 there were 232 reported cases of turbulence-related injuries to cabin crewmembers, and that.

- **64%** of the injuries were due to cabin crewmembers not being secured during turbulence
- **44%** of the injuries occurred in the galley
- **9%** of these incidents resulted in serious injury to cabin crewmembers.

In the majority of these cases, cabin crewmembers were lifted off the floor, or lost their balance, resulting in foot, ankle and back/spinal injuries.

Other cabin crew injuries were due to loose items in the cabin, such as trolleys.

Figure 1

Damage to cabin ceiling panel during turbulence

8.3. TURBULENCE DEFINITIONS

The levels of turbulence are defined and described as follows.

- **Light Turbulence.**

  Light turbulence momentarily causes slight, erratic changes in the aircraft altitude or attitude.

  – Passengers may feel a slight strain against seat belts
  – Liquids are shaking but are not splashing out of cups
  – Trolleys can be maneuvered with little difficulty.

- **Moderate Turbulence.**

  Moderate turbulence, causes rapid bumps or jolts.

  – Passengers feel definite strain against seat belts
  – Liquids are splashing out of cups
  – Trolleys are difficult to maneuver
  – It is difficult to walk or stand in the cabin.

- **Severe Turbulence.**

  Severe turbulence causes large abrupt changes in the aircraft altitude and attitude.

  – Passengers are forced violently against their seatbelts
  – Items fall or lift off the floor
  – Loose items are tossed about the cabin
  – It is impossible to walk.

8.4. TURBULENCE MANAGEMENT

8.4.1. CREW COMMUNICATION AND COORDINATION

Two-way communication between the cabin crew and the flight crew is necessary in order to manage turbulence and prevent turbulence-related injuries. There are Standard Operating Procedures (SOP's) that can be implemented to enable the flight crew and the cabin crew to improve communication and effectively manage the aircraft and the cabin during turbulence.

For example, use common terminology when communicating the severity of turbulence.

- Light turbulence
- Moderate turbulence
- Severe turbulence.

Using common terminology ensures that the flight crew and the cabin crew share a common understanding of the level of turbulence expected. This enables the cabin crew to perform the appropriate actions and duties, to effectively manage the cabin during turbulence.

Note.

On large aircraft, it is possible that the forward section of the aircraft will experience less turbulence than the aft section of the aircraft. Therefore, the flight crew may not be aware of the level of turbulence experienced in the aft section of the cabin.

It is important that the cabin crew inform the flight crew of turbulent conditions in the cabin during the flight.

8.4.2. ANTICIPATED TURBULENCE

The flight crew should be briefed on the en-route weather as part of the preparation for
the flight. Therefore, the flight crew can be aware of possible areas of turbulence that are forecast for the flight.

The preflight briefing between the flight crew and the cabin crew should include information about the areas of turbulence expected during the flight, and
the procedures to be applied in the case of turbulence, for example.

- If areas of turbulence are forecast during the flight
- Estimated time until reaching the area of turbulence
- The severity of the expected turbulence (i.e. light, moderate or severe turbulence)
- The actions that the Captain wants the cabin crew to perform when turbulence is expected
- The signal that flight crew will give to the cabin crew to indicate that the aircraft is no longer going through turbulence (for example, by calling the cabin crew via the cabin interphone, or Passenger Address (PA).

8.4.3. UNANTICIPATED TURBULENCE

During the flight, the aircraft may encounter areas of turbulence that were not forecast.

For example, Clear Air Turbulence (CAT), which usually occurs at high altitudes, during cruise the aircraft, may suddenly enter an area of turbulence. Clear Air Turbulence can be forecast but cannot be detected by the aircraft radar, so there is often no warning.

When an aircraft encounters, or is about to encounter, moderate or severe turbulence there may be little or no time for preparation.

If the flight crew turns on the FASTEN SEAT BELT signs and makes an announcement for “all passengers and crew to fasten seat belts immediately”, the cabin crew should.

- Immediately sit down and secure themselves (if a crew seat is not near or is not available, the cabin crewmember should use a passenger seat)
- Instruct passengers via the PA to fasten their seat belts
- Stay seated until advised by the flight crew or until the FASTEN SEAT BELT sign is switched off.

If time permits before the turbulence encounter, the flight crew should advise the cabin crew.

- How much time is available to secure the cabin
- The level and expected duration of the turbulence encounter
- How the flight crew will inform the cabin crew that the aircraft is no longer going through turbulence (for example, by calling the cabin crew via the cabin interphone, or Passenger Address.

8.4.4. CABIN CREW PERSONAL SAFETY

Turbulence-related injuries to cabin crewmembers are more frequent than turbulence-related injuries to passengers. Cabin crew should be aware of the types of hazards in the cabin that can cause harm during a turbulence encounter. When a cabin crewmember loses balance during a jolt, they may injure themselves by striking armrests, ceiling video screens or in-flight entertainment equipment connected to passenger seats.

Federal Aviation Authority (FAA) Advisory Circular 120-88A recommends that training courseware should be used to increase cabin crew awareness of their vulnerability during moderate and severe turbulence encounters. During cabin crew initial and recurrent training, it is recommended to use real scenarios and interviews with cabin crewmembers that have experienced moderate to severe turbulence, in order to demonstrate that “turbulence can be stronger than you are”.

8.4.5. BALANCING SAFETY AND SERVICE

The role of cabin crew requires that both safety and service duties be performed during the flight.

It is important that Operators develop strategies that can enable the cabin crew to effectively manage both safety and service duties.

For example, if turbulence is anticipated to occur after takeoff or during approach, the cabin service can be adapted according to the flight conditions. If turbulence is expected near the destination, starting the cabin service earlier will give the cabin crew sufficient time to correctly secure the cabin before approach.

Cabin crew should not risk injury by continuing cabin service during moderate or severe turbulence. If the turbulence is too intense, the cabin crew should.

- Inform the Purser and the flight crew
- Stop the cabin service
- The cabin crew should be seated without delay, whether or not they have been instructed to do so by the flight crew.

8.4.6. CABIN MANAGEMENT

It is possible that loose objects, such as passenger baggage, or service equipment, such as trays, trolleys, etc. become projectiles, and cause injury to cabin crewmembers and passengers during turbulence.

Operators should develop and implement strategies to enable the cabin crew to efficiently manage the cabin, in order to ensure safety and prevent turbulence-related injuries. Some practices can be applied to assist the cabin crew, for example.

- Ensuring that trolleys do not remain unattended in front of exits, outside the galleys, or in the aisles during cabin service
- Frequently checking the cabin during the flight to ensure that.
  - The cabin is kept tidy, in order to limit the amount of loose objects, such as glasses and trays
  - Passenger baggage is not left in the aisles
  - All the overhead stowage compartments are closed during the flight.

If the cabin crew implements the above-mentioned strategies, they will need less time to secure the cabin in the case of turbulence.

8.4.7. GALLEY MANAGEMENT

Many cabin crew injuries occur in the galley areas. These injuries are mostly due to galley equipment or objects that are not secured, for example.

- Trolleys that remain in the galleys without the brakes being applied
- Galley compartments that are not correctly latched and closed, falling from their stowage, and, spilling their contents
- Bottles, coffee pots, and service items falling of the galley countertops.

After each service, the cabin crew should.

- Stow trolleys in their correct stowage
- Set the trolley brake to on, when the trolley is not being moved
- Close and lock the doors of trolleys and stowage compartments immediately after each use
- Stow service equipment that is not in use
- Stow service equipment that is in use in a drawer so that it can be easily stowed in the event of turbulence
- Use the latches provided on coffee/beverage makers to keep coffee pots secured, in order to prevent hot contents from spilling.

Cabin crew should never use the galley standard units as a seat or a ladder. The galley standard units should be in their correct location, closed and latched when not in use.

Securing the galley after each service and restraining all equipment after each use, means that less time is needed to secure the galley in the event of turbulence. Therefore, this enables the cabin crew to secure themselves rapidly and prevent injuries.

8.4.8. PASSENGER MANAGEMENT

The most effective way to prevent passenger and cabin crew injuries during turbulence is to sit down and keep your seatbelt fastened.

The best way to help prevent turbulence-related injury is to use seat belts. The flight crew and cabin crew should encourage the use of seat belts and the importance of passenger compliance with the FASTEN SEAT BELT signs.

Flight safety organizations recommend that, during the after takeoff announcement, the flight crew and cabin crew should advise passengers to always keep their seat belts fastened while seated.

When the FASTEN SEAT BELT sign comes on during the flight due to turbulence, a Passenger Address (PA) must be made to advise passengers to return to their seats and fasten belt, until the seat belt sign has been switched off.

When the FASTEN SEAT BELT sign comes on in-flight due to turbulence, the cabin crew must.

- Make an announcement to advise passengers to return to their seats and fasten their seat belts until the Captain has turned the seat belt sign off
- Walk through the cabin and check that all passengers are seated with their seat belts fastened
- Make periodic announcements when the FASTEN SEAT BELT signs are on for a long time, or when passengers do not comply with the FASTEN SEAT BELT signs.

Note.

When the FASTEN SEAT BELT signs remain on for reasons other than turbulence, the effectiveness of the FASTEN SEAT BELT sign is reduced for passengers and cabin crew.

8.5. POST TURBULENCE

When the turbulence is over, the flight crew will advise the cabin crew that they can resume their cabin duties.

After moderate to severe turbulence, the cabin crew must check the cabin for damage and passenger injuries. The cabin crew should provide first aid treatment to injured passengers or crewmembers, and reassure passengers if necessary. In addition, the Purser must report the cabin status to the flight crew.

8.6. SUMMARY

- Cabin crew must be aware of their own safety during turbulence
- The flight crew and cabin crew preflight briefing, should include the following subjects:

– Anticipated areas of turbulence during the flight

– The importance of keeping the flight crew informed of the conditions in the cabin.

- Use standard terminology when referring to the severity of a turbulence encounter, to ensure that all cabin crewmembers and flight crewmembers understand the meaning and the required actions
- Encourage the use of seat belts. During the after takeoff passenger announcement, the cabin crew should advise passengers to use their set belts during the flight, and request that passengers keep their seat belts fastened at all times when seated
- Effectively use the Passenger Address (PA) system and other types of communication with passengers during turbulence to ensure safety.

8.6.1. TURBULENCE MANAGEMENT PROCEDURES

The following levels of turbulence can be encountered during a flight.

- Light turbulence
- Moderate turbulence
- Severe turbulence.

The cabin crew should always use these terms when communicating turbulent conditions to the flight crew or other cabin crewmembers.

The table below describes the turbulence procedures for cabin crew.

LIGHT TURBULENCE	MODERATE TURBULENCE	SEVERE TURBULENCE
- Visually check that all passengers are seated with their seat belts fastened and hand baggage is stowed - Infants must be removed from bassinets and secured with an infant seat belt (if applicable) on the guardians lap, or secured in an approved car seat. - Give the "cabin secure" to the Chief Purser - Chief Purser informs the flight crew that the cabin is secure.	-When the cabin crew are returning to their crew seats, check that all passengers are seated with their seat belts securely fastened and hand baggage is stowed - Infants must be removed from bassinets and secured with an infant seat belt (if applicable) on the guardians lap, or secured in an approved car seat. - Give the "cabin secure" to the Chief Purser - Chief Purser informs the flight crew that the cabin is secure.	- The cabin crew must not attempt to visually check passenger compliance - If trolleys are in the cabin,set the brakes on all trolleys that are in use in the current location - Place jugs/pots of hot beverages on the floor - The cabin crew must immediately sit down. Take the nearest seat (including passenger seat) and fasten seatbelt/harness. **WARNING** Cabin crew must not risk personal injury by continuing service during turbulent conditions. The personal safety of the cabin crew is the priority

9. DANGEROUS GOODS AWARENESS

9.1. INTRODUCTION

Many everyday items and substances can be dangerous when transported by air. Due to the variations in temperature and pressure during a flight, some of these items may leak or break, generating toxic fumes or possibly starting a fire.
Employee's who may come into contact with dangerous goods need to be aware of the nature of such goods, their potential for causing incidents and accidents and how they should be dealt with.

9.2. DEFINITION OF DANGEROUS GOODS

The International Civil Aviation Organization (ICAO) defines dangerous goods as; "Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Instructions."

(ICAO *Technical Instructions for the Safe Transport of Dangerous Goods by Air*)
The International Civil Aviation Organization (ICAO) "*Technical Instructions for the Safe Transport of Dangerous Goods by Air",* provides Operators with the basic legal requirements for transporting dangerous goods by air.

The International Civil Aviation Organization (ICAO) and the International Air Travel Association (IATA) provide guidance material for Operators who wish to develop their dangerous goods training programs. The ICAO and IATA guidance material is updated annually and provides Operators with an excellent source of information on dangerous goods.
Many aviation authorities require that Operators provide dangerous goods training for cabin crew during initial and recurrent training.

Operators should include dangerous goods as part of the cabin crew training program to increase cabin crew awareness to:

- The risks involved in carrying dangerous goods by air
- How to deal with a dangerous goods incident onboard the aircraft.

9.3. REPORTED DANGEROUS GOODS INCIDENTS

Prohibited dangerous goods may inadvertently be carried onboard an aircraft by passengers who are not aware of, or who deliberately ignore, the regulations. Items that passengers are entitled to carry onboard an aircraft may also cause an incident.

The following are some examples of cases where baggage contained dangerous goods onboard the aircraft.

- "Upon arrival, customs officers found a passenger's baggage contained 48 long fireworks (roman candle type), 32 packets of friction ignition (match style) fireworks and 2 cigarette lighters, all packed in the same bag. The passenger had started his journey with another operator and had made two transit stops prior to connecting with the flight in question." *(Source. Civil Aviation Authority, United Kingdom Safety Regulation Group, Dangerous Goods Monthly Report, April 2007).*
- The picture below shows damage to passenger baggage due to damaged bottles of 35-percent hydrogen peroxide solution in water, an oxidizer with corrosive properties that leaked in a cargo compartment.

  The bottles were in an ice chest that was checked in by a passenger on the flight.

  The suitcase was found smoldering in the cargo compartment by the baggage handlers.

Photo Credit. National Transportation Safety Board, (NTSB) DCA-99-MZ-001

Damage to Passenger Baggage

9.4. DANGEROUS GOODS CLASSIFICATIONS

The main document of reference used by operators is the International Air Transport Association (IATA) Dangerous Goods Regulations (DGR) guide. The IATA DGR provides operators with information regarding the marking, packaging, labeling and, the documents required for dangerous shipments, based on international and national air regulations.
The IATA Dangerous Goods Regulations are developed in accordance with the ICAO Technical Instructions.
Dangerous goods are classified into hazard classes. Each hazard class is divided into several sections and specific labels are applied to each one of these classes and/or sections.
A system of diamond-shaped placards and labels are used to identify dangerous goods. Different colors and symbols, such as a flame for flammables or skull and crossbones for poisons, identify the dangers associated with the product.

Note.

These symbols are subject to revision. Operators should refer to the IATA Dangerous Goods Regulations.

Class 1. Explosives – Explosive substances, explosive articles, and pyrotechnic devices, for example, ammunition, and fireworks.

Class 2. Gases

- **Class 2.1 Flammable Gases**. Gases, which ignite on contact with an ignition source, such as acetylene and hydrogen
- **Class 2.2 Non-Flammable Gases**. Gases, which are neither flammable nor poisonous.
- **Class 2.3 Poisonous Gases**. Gases liable to cause death or serious injury to humans if inhaled for example hydrogen cyanide

Class 3. Flammable liquids – Examples are petrol, alcohol, and perfume.

Class 4. Flammable solids – Examples are matches, flammable metal powder

- **Class 4.1. Spontaneous Combustibles**
- **Class 4.2. Dangerous When Wet -** Solid substances that emit a flammable gas when wet or react with water when wet, such as sodium and potassium.

Class 5. Oxidizing Agents and Organic peroxides

- **5.1 Oxidizing Agent -** oxidizing agents, which are not organic such as ammonium nitrate and chemical oxygen generators.
- **5.2 Organic Peroxides –** are thermally unstable substances that may undergo heat generating, self-accelerating decomposition. These substances are sensitive to impact or friction, or may create a dangerous reaction when in contact with other substances. These substances may be explosive and burn rapidly. Some examples are, fertilizers, and pool chemicals.

Class 6. Toxic (poisonous) and infectious substances

- **Class 6.1 Toxic substances** - those substances that are liable to cause death or injury if swallowed, inhaled or absorbed through the skin. Examples are pesticides and poisons, mercury.

- **Class 6.2 Infectious substances** - those known to contain, or reasonably expected to contain, pathogens, such as Bacteria, Viruses, medical waste (used needles).

Class 7. Radioactive materials

Class 8 Corrosives –Corrosive substances can dissolve organic tissue or severely corrode certain metals for example, hydrochloric acid or sulfuric acid contained in batteries.

Class 9 Miscellaneous - Hazardous substances such as dry ice and magnets.

9.5. DANGEROUS GOODS ACCEPTED IN THE CABIN

Passengers and cabin crewmembers are permitted to carry a limited amount of classified dangerous goods for personal use in their carry-on baggage, such as:

- Toiletry articles. e.g. perfume, nail polish, nail polish remover
- Small lithium and lithium-ion batteries, such as those found in portable electronic devices
- Alcoholic beverages, with an alcohol content of less than 70%
- Dry ice.

Note.

The types of items that are authorized onboard the aircraft may vary in each country, depending on the local aviation authority and security regulations.

Other classified dangerous goods that are permitted in the cabin include required emergency equipment, in accordance with airworthiness regulations, such as:

- Oxygen
- Fire extinguishers
- CO2 gas cylinders to inflate the life vests.
-

9.6. PROHIBITED DANGEROUS GOODS

The discovery of the following items in the cabin must be considered as a dangerous goods incident as the items below are strictly prohibited for transport in the cabin.

- Explosives - fireworks, flares, toy gun caps
- Compressed gases - filled or partly filled aqualung cylinders (including camping gas cylinders)
- Flammable liquids and solid - lighter fuel, non-safety matches, paints, thinner, fire lighters
- Oxidizers - some bleaching powders
- Organic peroxides - some types of solid hydrogen peroxide
- Poisons - arsenic, cyanide, and weed-killer
- Irritating materials - Tear gas devices
- Infectious substances - live virus materials

- Radioactive materials - medical or research samples which contain radioactive sources
- Corrosives - acids, alkalis, wet cell type car batteries, caustic soda
- Magnetized materials - instruments containing magnets.

9.7. DANGEROUS GOODS HANDLING

Operators should provide dangerous goods response kits onboard the aircraft to enable the cabin crew to deal with a dangerous goods incident. A dangerous goods response kit usually contains the following minimum equipment.

- Large, heavy quality polyethylene bags
- Bag ties to seal the bags correctly after use
- Long rubber gloves.

If a dangerous goods response kit is not provided onboard the aircraft, the cabin crew must improvise using the equipment that is available. There are many pieces of equipment in the cabin that the cabin crew may use in this case, such as.

- Oven gloves/fire gloves that can be covered with plastic bags to protect the hands
- Large and small polyethylene bags, e.g. waste bin bags, duty free bags or airsickness bags
- Absorbent materials, e.g. paper towels, newspapers, headrest covers, etc.
- Catering boxes
- Towels
- Blankets.

9.8. DISCOVERY OF DANGEROUS GOODS IN THE CABIN

The first alert to a dangerous goods spillage or leak may be from a passenger who notices an unusual odor or fumes, or who simply identifies an item that is leaking from cabin baggage.
When a dangerous good is discovered in the cabin, the cabin crew must **notify the flight crew immediately.**

The cabin crew should ask the passenger concerned to **identify the item**. The passenger may be able to provide the cabin crew with some guidance on the hazard involved.

The cabin crew should try to collect as much information as possible, e.g. check for.

- A dangerous goods label
- Numbers on the packaging
- Written information on the packaging
- Odors
- Fumes
- Smoke
- An effect on passengers.

- *In the case of a spill of known or suspected dangerous goods in powder form.*
- *Leave everything undisturbed*
- *Do not use a fire extinguisher or water*
- *Cover the area with polyethylene, plastic bags and blankets*
- *Isolate the area until after landing.*

9.9. CREW COMMUNICATION AND COORDINATION

The cabin crew should provide the flight crew with an accurate description of the item, and the effects in the cabin, in order to help the flight crew to apply the appropriate procedure. It is essential that the cabin and flight crews coordinate their actions and that they keep each other fully informed of their actions and intentions.

9.10. PROTECTION

The cabin crew should put on gloves before they touch leaking, suspicious packages or items in order to protect their hands. If rubber gloves are not provided, fire-resistant gloves or oven gloves covered by polyethylene bags are a suitable alternative.

The cabin crew should also use Portable Breathing Equipment (PBE) to protect themselves from fumes or smoke.

If there are fumes or smoke, the cabin crew should take prompt action and move passengers away from the affected area, provide wet towels or cloths to passengers, and instruct passengers to breathe through them.

If the item or substance is emitting fumes or smoke, or if there is a fire, the cabin crew must apply the procedures for smoke and fire.

Water should not be used on a spillage or when fumes are present as it may spread the spillage or increase the fumes. Consideration should also be given to the possible presence of electrical components when using water extinguishers.

9.11. DANGEROUS GOODS REMOVAL

The dangerous good and the associated contaminated materials should be removed from the cabin.

The dangerous good should be placed in a dangerous goods bag or a polyethylene bag, with the broken part or opening facing upwards. Put all materials that become contaminated when removing the dangerous good in the same bag.

Close the bag and expel excess air, twist the open end of the bag, and seal it by tying a knot or using a bag tie.

Note.

The cabin crew must not make the bag airtight. It must be tight enough to be secure, but not so tight that pressure equalization cannot take place.

Take off the gloves, and avoid skin contact with any contaminants. Put the gloves in the second bag. Place the first bag into the second dangerous goods bag using the same procedure.

All contaminated materials, such as seat covers and sections of carpet should be treated in the same manner as a dangerous good.

9.12. STOWING DANGEROUS GOODS ITEMS

After the cabin crew cleans up the dangerous goods spill, they must ensure that the polyethylene bags containing the dangerous goods are safely stowed and secured.

If a catering box is available, the cabin crew can use it to store the bags containing the dangerous goods.

Dangerous goods should be stored in a location that is as far away from the cockpit and passengers as possible. The cabin crew may use an aft galley or aft lavatory, if possible. However, boxes or plastic bag(s) must not be stored against the pressure bulkhead or fuselage wall.

If the cabin crew uses a lavatory to store dangerous goods, boxes should be put on the floor, bag(s) should be stowed in an empty waste container, and the

lavatory door should be locked from the outside. Using the lavatory to store the dangerous goods will prevent fumes from entering the cabin.

Note.
In a pressurized aircraft, if a lavatory is used, any fumes will be vented away from passengers.

When moving a box that contains dangerous goods, the cabin crew must ensure that the opening remains upward. When moving a bag, the cabin crew must ensure that
the receptacle containing the dangerous goods remains upright.
Regardless of the location of the catering box or bag, the cabin crew must secure them firmly to prevent them from moving.

9.13. REPORTING A DANGEROUS GOODS INCIDENT

The cabin and flight crew should coordinate to complete an Air Safety Report following a dangerous goods incident, in many countries this report is mandatory. This report should include:

- The date of the incident or accident, or the discovery of undeclared or incorrectly declared dangerous goods
- The flight number and flight date
- A description of the goods and the location found in the cabin
- The type of packaging, and the packaging specification marking on it
- Passenger details, e.g. seat number, name, address
- Crew actions
- Any other relevant information.

The cabin crew must enter the details of the incident in the aircraft maintenance logbook, so that the maintenance personnel can replace the dangerous goods kit (if installed) and repair any damage to the cabin caused by the incident.

After landing, notify the ground personnel all the known facts about the Dangerous Goods item and where it is stowed.

9.14. DANGEROUS INCIDENT GOODS CHECKLIST

INITIAL ACTION

The cabin crew must notify the flight crew of:

- The nature and location of the dangerous good
- The type of dangerous goods, if possible (passenger may be able to assist)
- Whether or not passengers are affected, e.g. if there is smoke or fumes in the cabin.

IN THE CASE OF FIRE

The cabin crew must apply the basic firefighting procedure.

Note.

The cabin crew must use the firefighting procedure to control any fire. In general, the cabin crew must not use water on a spillage or when there are fumes. This is because water may cause the spillage to spread or may increase the fumes. The cabin crew should also consider whether or not there are electrical components in the area when using water extinguishers.

IN THE CASE OF SPILLAGE OR A LEAK

The cabin crew must:

- Collect the emergency response kit (if equipped) or other useful items
- Put on rubber gloves and Portable Breathing Equipment (PBE)
- Move passengers away from the area, distribute wet towels or cloths, and instruct passengers to place the wet cloths over their nose and mouth and breathe through them.

REMOVAL OF DANGEROUS GOODS

The cabin crew must remove a dangerous good as follows:

1. Put the dangerous good in a dangerous goods bag or a polyethylene bag, with the broken part or opening facing upwards.
2. Put all materials that become contaminated when removing the dangerous good in the same bag.
3. Close the first bag and expel excess air, twist the open end of the bag, and seal it using one bag tie.

   Note.

   The cabin crew must not make the bag airtight. It must be tight enough to be secure, but not so tight that pressure equalization cannot take place.
4. Take off the gloves, and avoid skin contact with any contaminants. Put the gloves in the second bag.
5. Place the first bag into the second dangerous goods bag using the same procedure.
6. Tag and stow the bag in the lavatory. Tag and lock the lavatory door with a dangerous goods tag.
7. Treat all contaminated materials, such as seat covers and sections of carpet in the same manner as a dangerous good.
8. Cover the carpet/floor area where the dangerous good has leaked/spilled.
9. Regularly inspect the lavatory used for dangerous goods stowage and the contaminated areas in the cabin.
10. Make an entry in the cabin/aircraft maintenance logbook.
11. Complete An Air Safety Report of the incident.

AFTER LANDING

The cabin crew must provide the ground/maintenance personnel with all necessary information regarding the dangerous good and where it is located.

10. BOMB ON BOARD

10.1. INTRODUCTION

There are many different forms of bomb threats, the majority of which are hoaxes. However, a bomb threat, no matter which form it takes, should be regarded as a legitimate threat to flight safety.

Types of bomb threats.

- **Specific.** The operator, flight number, aircraft type, departure time, and destination are positively identified. The location of the bomb on board the aircraft may also be given

- **Non-specific**. May identify a flight by destination, origin or departure time.

These types of threats usually take the form of a telephone call. The bomb threat will be treated according to the operator's policy and security procedures.

However, there are other threats that may occur onboard the aircraft:

- Passenger made bomb threat

- An anonymous written message found onboard the aircraft, such as a message on the mirror in the lavatory, on an airsickness bag, or on a piece of paper left visible to passengers or crew

In the event of a threat made in-flight, **notify the flight crew immediately.**

The captain will decide the course of action to take. The cabin crew should wait for further instructions.

10.2. SUSPECT ITEM

How would cabin crewmembers determine a suspect item onboard?

The three following questions may help to determine a suspect object:

- **Is the item characteristic "normal" to the location?**
- **Has the item been hidden?**
- **Does the object look obviously suspicious?**

The cabin crew should report any doubts regarding any unusual item. The crewmember that finds the item should:

- Notify the flight crew immediately
- Notify all other crewmembers.

DO NOT

- **Leave the suspect object unattended, ask another crewmember to stay and guard over the area, to prevent any inadvertent movement or handling**
- **Touch or disturb the object**
- **Move it until the Captain has made the decision to move the item to the Least Risk Bomb Location (LRBL)**
- **Cut or disconnect, any wires or strings**
- **Use electronic devices in the vicinity of the suspect object.**

Provide the flight crew with as much information as possible.

- **Exact location**
- **Description of the object - give as much detail as possible**
- **Size**
- **Color**
- **Any particular odor.**

The cabin crew should wait for further instructions from the flight crew. The Captain will decide whether to implement the ‘Bomb on Board’ procedure.

10.3. BOMB ON BOARD CABIN CREW PROCEDURE

When a suspect device is found in the cabin.

WARNING

Do not cut or disconnect any wires Do not attempt to gain entry to internal components of a closed or sealed suspect device. Any attempt may result in an explosion. Booby-trapped closed devices have been used on aircraft in the past.

WARNING

Alternative Least Risk Bomb Locations LRBL must not be used without consulting with an aviation explosives security specialist. Never take a suspect device to the cockpit.

The LRBL location for each aircraft is documented in the Aircraft Flight Manual.

EOD PERSONNEL ON BOARD..... CHECK
Announce. "Is there any EOD personnel on board?" By using the initials, only persons familiar with EOD (Explosive Ordnance Disposal) will be made aware of the problem.

BOMB..... .... DO NOT OPEN, DO NOT CUT WIRES, SECURE AGAINST SLIPPING, AVOID SHOCKS
Secure in the attitude found and do not lift before having checked for an anti-lift ignition device.

PASSENGERS..... ..... LEAD AWAY FROM BOMB
Move passengers at least 4 seat rows away the bomb location. On full flights, it may be necessary to double up passengers to achieve standoff from the suspect device.
Passengers near the bomb should protect their heads with pillows, blankets.
All passengers must remain seated with seat belts on and, if possible, head below the top of the head rest. Seat backs and tray tables must be in their full upright position.
Service items may need to be collected in order to secure tray tables.
Distance from an explosion is one of the best protective measures for passenger safety.
Placing seat backs and tray tables in their full, upright positions will provide additional protection

CREW REST AREAS..... EVACUATE
For aircraft equipped with crew rest areas (Main Deck and Lower Deck).

PORTABLE ELECTRONIC DEVICES ..... SWITCH OFF

BOMB ON BOARD CONT'D..

Move it in the position found to the prepared LRBL base with the card in place beneath it. Stabilize it on top of the plastic sheet above the 10 inches (25 cm) of wetted materials and center it against the inside surface of the door.
Position the bomb in the attitude found, as close to the center of the LRBL door.

CAUTION

Ensure that when the suspect device, when placed in the stack against the door, is above the slide pack but NOT against the door handle, and if possible, avoid placement in the view port.

LEAST RISK BOMB LOCATION .....COMPLETE
Place an additional sheet of thin plastic over the bomb.

CAUTION

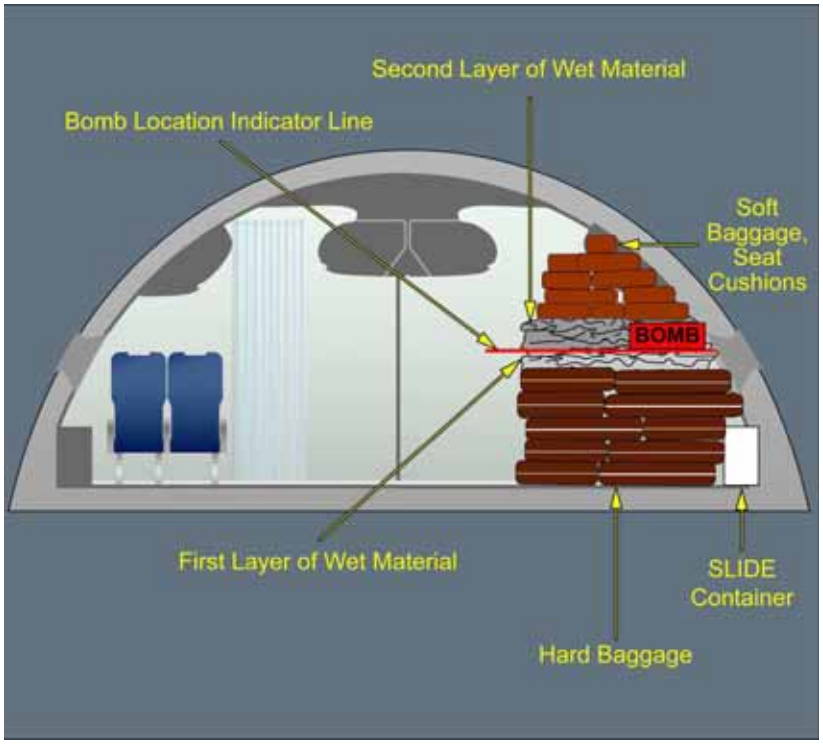
Do not omit the plastic sheets, as the suspect device could get wet and possibly short circuit electronic components causing inadvertent device activation.

Saturate soft blast -attenuating materials for example, blankets or clothes, with water or any other nonflammable liquid and carefully pack at least 10 inches (25 cm) of wetted material around and on top of the bomb.
Arrange luggage and blast attenuating materials in a manner that prevents excessive weight from being applied directly in the bomb, and fill the entire the entire remaining area above the bomb with soft blast-attenuating materials, for example, seat cushions up to the cabin ceiling and out to the aisle.

LRBL ..... SECURE
Secure the LRBL stack in place using seat belts, headset cords, ties, or other appropriate materials.

BOMB ON BOARD CONT'D..

LRBL Stack



PASSENGERS..... MOVE / ADVISE

Move passengers at least 4 seat rows away from the least risk bomb location (RH aft cabin door). On full flights, it may be necessary to double up passengers to achieve standoff from the suspect device.

Passengers near the bomb should protect their heads with pillows, blankets.

All passengers must remain seated with sea belts on and, if possible, head below the top of the headrest. Seat backs and tray tables must be in their full upright position.

BOMB ON BOARD CONT'D..

CABIN CREW..... NOTIFY FLIGHT CREW LRBL SECURED

Note.
Consider disarming the door directly across from the LRBLto enable the response team to open this door from the outside, if needed during their procedures.

EVACUATION / DISEMBARKATION.....EXECUTE

11. CREW RESOURCE MANAGEMENT

11.1. INTRODUCTION

"Crew Resource Management is the effective use of available resources (e.g. crewmembers, aircraft systems and supporting facilities), to achieve safe and efficient operations" (JAR-OPS and ICAO).

Aviation has reached a very high level of safety with very low accident rates in recent years. This can be attributed to the efforts of the many people involved in the design, manufacture, and training, and the aviation authorities who take time and effort to ensure the highest possible levels of flight safety. The ultimate goal is to obtain zero accidents. However, accidents do still happen!

Accident analysis indicates that there are many factors that contribute to an accident. Accidents rarely occur due to one particular cause, but are in fact attributed to a chain of events. Some accidents have been attributed to the failings of both flight crew and cabin crewmembers, to communicate. Therefore, to improve performances and help crewmembers realize the factors that influence the way crewmembers communicate, make decisions, manage stress and increase situational awareness skills; "Crew Resource Management" (CRM) was born.

The every day operation of an aircraft requires very complex planning and coordination. Think for a moment of how many teams of people are involved in just getting one aircraft off the ground, a lot, isn't it. Now, think of when cabin crewmembers board the aircraft and the number of tasks to be accomplished before takeoff. The flight crew is also bombarded with tasks. Sometimes it can be overwhelming, every day does not always run smoothly, and just to complicate matters further, we are all **HUMAN**!! The "Human Factor" is a big part of the equation!

Since 1940, three out of four accidents have had at least one contributory factor relating to human performance.

CRM addresses the human factors elements of flying, such as interpersonal relationships, stress, fatigue and how they can affect performance. The correct application of CRM skills helps to create an effective crew, and is a valuable tool that helps crewmembers to assess situations, and react accordingly. CRM promotes vigilance in order to prevent errors that may occur due to human error.

Initially, CRM was for pilots only. Today, it is a mandatory part of initial and recurrent cabin crew training in JAA, CAA, and FAA operating regions, and many countries throughout the world.

CRM should not been seen a “just another training course”, but as a means to help crewmembers to be objective, effective and cope with what can sometimes be a very hectic working environment. CRM helps crewmembers to develop knowledge, skills and attitudes that will reduce the risk of error.

11.2. COMMUNICATION AND COOPERATION

JAR-OPS 1.989 Terminology –Definition of Cabin Crew

“Cabin Crew Member; A crew member, other that a Flight Crew Member, who performs, in the interests of safety of passengers, duties assigned by the operator or the commander of the aircraft”.

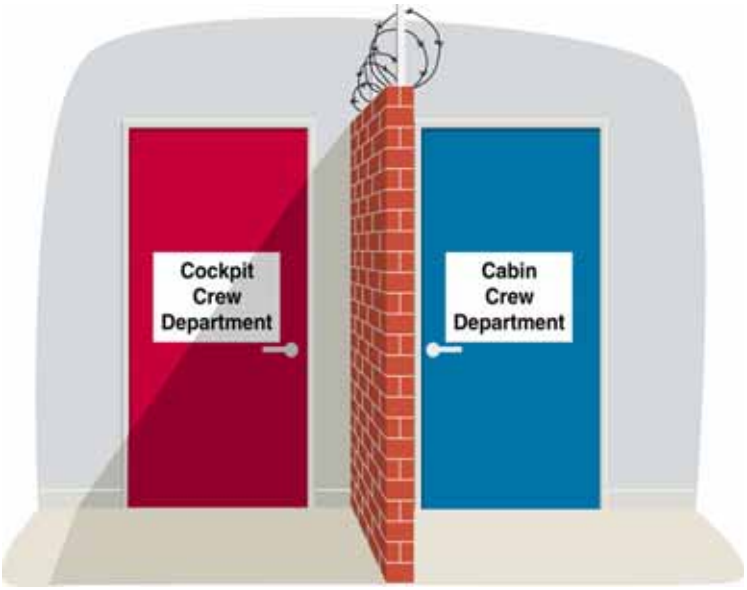
The cabin crewmember should function as an extension of the flight crew, to ensure safety in the cabin. Flight crew and cabin crew should function as one team with a common goal - flight safety.

Any situation, feeling, word, behavior, observation that alerts cabin crewmembers to a possible threat to flight safety, must immediately be reported to the Purser and the flight crew.

In order to better understand why there is sometimes a lack of communication between the flight crew and the cabin crewmembers, it is necessary to go back in time to see how the two different cultures began.

"In the 70 -year history of the commercial airlines, traditions and roles have evolved which influence the crew of today. The original aviators were intrepid pilots who risked life and limb to deliver the mail for the U.S post office. Despite the primitive aircraft and the lack of radio guidance, those independent, self-reliant fliers persevered. In contrast, the original flight attendants were nurses and were selected to be compliant and subservient. Therefore, two very different types of people were called upon to work together is close proximity to one another. A rigid chain of command was adopted from the military and maritime traditions and the pilots and stewardesses were relegated in to separate departments. Moreover, the early flight manuals instructed crews not to converse. Remnants of those guidelines are still in evidence today"

(Source, Mahler, 1991; Chute and Weiner, 1994; 1995.)



There are many factors that can affect crew communication, such as:

- The flight crew report to operation/cabin crew to onboard service
- Separate scheduling, different duty time regulations
- Flight crew is mostly male/cabin crew is mostly female
- Technical versus social orientation
- Bad or poor perception of each others duties
- Two very different areas of the aircraft separated by a reinforced door
- Sterile cockpit rule
- Crew pairings.

Communication is essential for the safe operation of an aircraft. However, poor communication continues to contribute to many safety issues within the industry. The incident and accident reports highlight the fact that there is need for improvement in this area, particularly concerning flight and cabin crew communication.

Flight and cabin crewmembers have the same goals - the safety of the flight being the highest priority. Most crew's work well together, and communication is open between the flight crew and the cabin crew. However, it is important to realize how flight safety can be compromised, when a barrier to communication exists or there is no communication at all.

Many accident analyses have indicated that communicating information between the cabin and the cockpit, and vice versa, is vital to flight safety. The following is an extract from the accident report of an accident that took place in the United Kingdom. This is one of a few major accidents that could have had a different outcome, if there had been sufficient communication.

"The three flight attendants in the rear of the cabin saw evidence of fire from the No 1 engine, and two of them briefly saw light colored smoke in the cabin."

"The commander then broadcast to the passengers on the cabin address system that there was trouble in the right engine which had produced some smoke in the cabin, that the engine was now shutdown and they could expect to land at east Midlands Airport in about 10 minutes. The flight attendants who saw signs of fire in the left engine later stated that they had not heard the commander's reference to the right engine. However, many of the passengers who saw the fire were

puzzled by the commanders reference to the right engine, but none brought the discrepancy to the attention of the cabin crew"
Following the accident, the AAIB (in Section 2.1.2.2 "Coordination between the flight deck and the cabin") made the following analysis.

"It was extremely unfortunate that the information evident to many of the passengers of the fire associated with the left engine did not find its way to the flight deck even though, when the commander made his cabin address broadcast, he stated that he had shut down the "right" engine. The factor of the role commonly adopted by passengers probably influenced this lack of communication. Lay passengers generally accept that the pilot is provided with full information on the state of the aircraft and they will regard it as unlikely that they have much to contribute to his knowledge. Even those passengers who noticed the commander's reference to the right engine might well have assumed that the commander had made a slip of the tongue, or that the commander had dealt with it. It cannot be regarded as surprising that information from the passengers was not made available to the pilots.

The same information was available to the 3-cabin crew in the rear of the aircraft but they, like the passengers, would have had no reason to suppose that the evidence of the malfunction they saw on the left engine was not equally apparent to the flight crew from the engine instruments. In addition, it would appear that there was not the same awareness of the possible error, since these cabin crewmembers heard the commander's reference to the right engine. This may have because the cabin crews, engaged in their own duties, were not aware of any more than the general sense of the broadcast. In addition, cabin crew are generally aware that any intrusion into the flight deck during busy phases of flight may be distracting, and this is particularly true if the flight crew are known to be dealing with an emergency. There can thus be at these times a firm division between flight deck and cabin, and it is notable in this context that in this accident the flight service manager made not initial attempt to approach the flight deck until he was called.

However, it must be stated that had some initiative been taken by one or more of the cabin crew who had seen the distress of the left engine, this accident could have been prevented. It must be emphasized, nonetheless, that present patterns of airline training do not provide specifically for the exercise of coordination between cabin and flight crew in such circumstances" (Source AAIB UK Aircraft Accident Report No. 4/90 (EW/C1095).

This is an example of what can happen when people do not communicate, when we "Don't tell the pilot", and assume that "the pilots know". Pilots may not always be aware of a fault. Therefore, cabin crewmembers can play a crucial role by giving critical information to the flight crew in a timely and accurate manner.

11.3. BRIEFING AND CABIN CREW COMMUNICATION

Effective communication between the cabin crew is vital to the every operation of the aircraft, and is conducive to:

- Establishing common objectives
- Exchanging information
- Monitoring activity
- Reporting situations.
- Setting a friendly and professional atmosphere.

At the beginning of each duty, a briefing is held for the cabin crew to meet and review together the details and requirements for the following duty period.

Briefing is probably the most important part of any flight preparation. Unlike many other types of work were co-workers know each other and have had time to build up a rapport, flight crew do not always know each other, and yet have to work together in close proximity, and sometimes, for very long periods of time. Briefing is where the rapport building should start by encouraging openness, friendliness, mutual respect and professionalism. Briefing is the starting block for a high performance crew.

Briefing, as the word suggests, should be ‘brief’! What are the ingredients of a good briefing? Well, it can be as simple as A-B-C.

- **A= Appropriate**
- **B= Brief**
- **C=Clear and Concise.**

The briefing should be relevant, and appropriate to the flight.

The briefing should be brief, and should cover the main points!! A briefing should be prepared for each individual flight otherwise, it becomes routine and repetitive, and the crew’s attention will be lost!! Focus on details that are specific to the flight.

The aim of the briefing is to organize the crew activities. It is important that every crewmember knows their allocated work position, and their safety responsibilities. The briefing must be understood by all crewmembers. Always give crewmembers the opportunity to ask questions, and remember.

"A simple but well understood plan of action, supported by all is preferable to a possibly brilliant but manifestly misunderstood plan" (Dèdale, Briefings, Europe).

Briefings are the ideal moment for cabin and flight crew to set the tone, and the expectations for a flight. It is also the opportunity to advocate open two-way communication between the cabin and the flight crew. Joint crew briefings assist in creating a working environment that is more conducive to a safe operation.

- Crewmembers should introduce themselves
- Use professional and friendly language
- Be respectful of each other
- Be safety conscious
- Cabin crewmembers should be encouraged to report to the purser, or the flight crew, anything that they feel may pose a threat to the safety of the flight
- Discuss the "Sterile Cockpit" rule with the pilots, and the circumstances that are acceptable for contacting the flight crew during this time
- Understand each other's workload.

Joint cabin crew/flight crew briefings are important. If is not possible to meet before boarding the aircraft, every effort should be made for the crew to meet together before departure. The flight crew and the Purser should encourage open communication from all crewmembers. All crewmembers should feel that they will be listened to, and that information and feedback are welcome and appreciated.

Maintaining a common picture of a situation is achieved through direct communication, briefings and the use of documented procedures. Communication is a two–way transfer. Communication also means listening. Listening is an important 'skill'. Active listening demands attention to be directed towards the speaker and the message. If, you listen to the other person, you will gain more information. There is also a chance that they will listen to what you say.

11.4. BARRIERS TO COMMUNICATION

Barriers to communication are highly undesirable onboard the aircraft. However it is important to be aware of these barriers, and manage them before they become a source of conflict that will result in a breakdown of communication.

- **Uncommunicative attitudes.** It is not easy to communicate with someone who does not want to communicate.

- **Hierarchy**. It is more difficult to be assertive with a senior colleague, than with a colleague of the same job level.

- **Non-verbal components can 'betray' you**. For example, during a PA announcement, additional signs such as breathing, voice, hesitations, and accent contribute to the message.

- **Workload can impair, or even prevent communication.** When there is a high workload, there is less time to communicate. If communication is forced during a high workload, it is possible that crewmembers will forget about the task in hand, and return to their original activity to early or too late in the sequence, consequently committing errors of commission (i.e. repeating actions already done), or errors of omission (i.e. forgetting steps in the sequence).

- **Cultural differences**. Cultural differences and language can seriously confuse communication. Cultural differences are not just limited to different countries of origin, but education, upbringing, and values. For example, English is spoken in England and in the United States, however, the meaning of a word in England may not have the same meaning in the United States. The same word may have two totally different meanings, depending on what side of the Atlantic you are on.

- **Difficulties due to the medium of transmission.** Distortion of the information due to background noise, excessive feedback (and volume level) on the PA system, or poor volume of interphone.

- **Assumptions.** When Assumptions can be based on expectation and context. Problems associated with assumptions can be minimized, if the message is not ambiguous, and accurate feedback is given. Assumptions occur, when.
  - One of the parties 'assumes' that the other party knows or is aware of a situation, and there is no communication at all
  - The sender of a message may assume that the person receiving the message understands the content and context.
- **Lack of confidence.** A lack of confidence in the abilities of other members of the crew.

The following is an extract from a National Transportation Safety Board incident report that addresses the importance of effective communication between crewmembers.

"*Given the acknowledged seriousness of the in-flight fire and the obvious association of a report of smoke in the cabin with a strong possibility of a fire, the safety board is deeply concerned by the captain's apparent reluctance to accept either the flight attendant's or deadheading crewmembers report as valid or to seek additional information to resolve his uncertainty".*

"The captain's skepticism about the report of smoke was also reflected in the first officer's dialogue with the cabin crew".

"In conclusion, the safety board believes that while it is unlikely that the captain could have taken any action to land the plane more quickly, the flight crew failed to use the cabin crew effectively to obtain an accurate understanding of the developing problem. Had communications between the flight crew and the cabin crew been more effective, the safety board believes that the captain would have called for the fire/rescue equipment to meet the airplane and ordered an emergency evacuation on the runway. The safety board believes that airlines should use this example in cockpit and cabin crew coordination training to illustrate the need for flight crews to more effectively use cabin crews in describing suspected in-flight safety problems and to emphasize the need for cabin crews to be assertive when communicating information about safety problems to the flight crew.

The lack of close coordination and timely exchange of accurate information among crewmembers were clearly problems during preparations for a possible emergency landing of a DC-8 at Portland, Oregon, in 1978. during an in-flight fire aboard an L-1011 at Riyadh, Saudi Arabia, in 1980. during preparations of a possible ditching of an L-1011 near Miami, Florida, in 1985; and during an in-flight fire onboard a DC-9 at Cincinnati, Ohio, in 1985. These instances, vividly support improved coordination and communications and joint cockpit and cabin crew training with respect to conducting emergency procedures and periodic

emergency drills in which cockpit/cabin crew coordination and communication are practiced" NTSB/HZM-88/0.

11.5. INFORMATION SHARING

Effective communication is complex. The tone, expression, and gestures all contribute to the way the message is received by others. The meaning of the message is driven by the receiver's context.

Since the introduction of the "locked cockpit door" the majority of communication between the flight crew and the cabin takes place via the interphone. This form of communication does not provide visual feedback. It is important to understand and to be understood using speech and tone only.

Shared information should be factual, and only important points should be included. The crewmember giving the information should speak clearly in order t be heard and understood. **Keep the message short and simple.** The person receiving the message should always have the opportunity to ask questions, to clarify the information. Answers should be clear, concise and factual. Don't guess!

When receiving information it is important to clarify the important points with the person that is giving the information, by paraphrasing the information to ensure that the message has been correctly understood. Feedback should always be encouraged.

11.6. SOURCES OF INFORMATION

One aspect of CRM is to consider all of the resources that are available. There are many sources of information available on the aircraft, which enable crewmembers to detect, assess and act effectively in various situations.

11.6.1. PASSENGERS

Passengers can be a great source of information, and may sometimes be the first to bring information regarding an unusual odor, for example, to the crewmembers attention.

Always take into account passengers' remarks regarding:

- The cabin (noise, fumes, smoke, fire, loose objects etc.)
- Other passengers behavior
- Aircraft exterior (wings, fuselage etc.)

- Outside environment (runway, weather etc.).

Cabin crewmembers should follow up any reports from passengers regarding anything unusual, and ensure that the purser and flight crew are informed.

Operators should encourage passengers to communicate with the cabin crew, one airline has included the following phrase in its passenger briefing.
"*If you have any safety concern during the flight, please do not hesitate to bring it to the attention of a crewmember".*

Something as simple as this will encourage passengers to address the crew and voice their concerns.

11.6.2. STANDARD OPERATING PROCEDURES

Standard operating procedures are a form of communication that is provided by the operators to crewmembers, and details the procedures to be followed. When the procedures are understood and adhered to, they provide a common ground and understanding amongst the entire crew.

Many operators have crewmembers of different cultures and nationalities that are sometimes based in various parts of the world. The common language of the Standard Operating Procedures enables these crewmembers to work together and communicate. **When consistently applied, Standard Operating Procedures provide a guaranteed form of communication.**

11.6.3. CABIN INTERCOMMUNICATION DATA SYSTEM (CIDS)

CIDS is an automated information system for flight crew, cabin crew and ground personnel. CIDS operates, controls and monitors the main cabin systems such as, air conditioning, communications, fire protection, ice protection, lights, waste and water.

The CIDS system is also able to detect faults in its components, and the connected equipment automatically.

If faults are detected, indications will appear on the Flight Attendant Panels (FAPs), to alert crewmembers.

11.6.4. COMMUNICATION WITH MAINTENANCE

Maintenance personnel are a vital part of the daily operation of the aircraft. Like everyone involved in the operation of a departing or arriving aircraft, they also have a heavy workload with time constraints, particularly during short turn around times.

It is important that the purser communicates with the maintenance personnel in order to understand the impact of any technical malfunction. For example, deferred items, inoperative items, tripped circuit breakers, or any items that may have effect on the flight.

When reporting items to maintenance, particularly when entering items in the cabin maintenance logbook, the following points should be considered:

- Use clear terminology to report problems and actions taken
- Clearly identify the location, and the description of the problem

Ensure that the cabin maintenance logbook is prepared well in advance of arrival, and that all maintenance items have been listed.

Maintenance personnel should be extended the same courtesy and respect as any other member of the crew. They are part of the same team and play a vital role in daily operations.

- Verbal communication between the Purser and the maintenance personnel is important
- Ensure that cabin crewmembers understand the impact of any technical malfunction, and it's possible effects on cabin service
- Use clear terminology to report problems and the actions taken
- Report the problem to the appropriate person, if possible.

11.6.5. COMMUNICATION AND COOPERATION WITH CATERING PERSONNEL

When catering personnel are onboard the aircraft, a cabin crewmember should be present in the galley areas to monitor catering operations. Catering personnel may not understand the impact of their actions on safety. When monitoring catering, cabin crewmembers should ensure that:

- Trolleys are operative and the brakes work
- Ovens are checked thoroughly for unusual objects, papers, towels
- Handles and latches on stowage bins are in working order.

11.6.6. COMMUNCIATION AND COORDINATION WITH BOARDING STAFF

The boarding of the aircraft is a very coordinated task between the flight crew, cabin crewmembers and ground personnel.

The priority of boarding staff is to board all the passengers to maintain an “on time departure”.

However, there are days when, due the late arrival of an inbound aircraft, ground personnel have the responsibility for all the passengers, and the possibilities of missed connections.

In order to avoid confusion and passengers boarding before the cabin preparation has been completed, cabin crewmembers should liaise with the boarding staff, for example:

- Inform the boarding staff of the cabin status
- Ensure that boarding does not commence before the flight crew; cabin crew and boarding teams have met.

Communication is the key element to the smooth and safe operation of a flight.

11.7. SUMMARY

To improve flight safety and promote efficient team work:

- Use briefings to encourage communication and teamwork, and to build a rapport with the crew. A good briefing will result in a high performing team!
- Following Standard Operating Procedures ensures that all crewmembers are familiar with the flight standards and expectations.
- Communicate and cooperate with, other crewmembers, maintenance personnel, catering staff, and boarding staff.
- Communicate with passengers, and make them feel comfortable and able to communicate with the crew.

11.8. FACTORS AFFECTING PERFORMANCE

11.8.1. PASSENGER CONFLICT

"Conflicts arise from the perception of incompatible needs or goals, and from the impossibility or failure to render them compatible (Source 'Briefings' Dèdale, Europe).

In recent years, reports of 'unruly passenger behavior' have become more frequent, with a wide variety of anti-social behavior that ranges from verbal abuse to physical assault.

Many of these incidents have had an impact on flight operations, flights being diverted, delayed arrival and the knock back effect on the rest of the operation, including missed passenger connections, inconvenience, and the financial cost involved in diverting a flight.

Many passengers and crewmembers have been extremely upset and frightened by the behavior of some unruly passengers.

Conflicts can take many forms. Some may be resolved through discussion and a satisfactory conclusion found, without further consequences. However, when a conflict becomes confrontational and hostile, it must be addressed immediately. If the conflict occurs on ground, it should be resolved before leaving.

When a conflict becomes confrontational, it can generate emotional responses, such as emotional tension and stress.

As a conflict escalates, communication deteriorates, and the conflict becomes destructive. At this stage the people involved may develop acute stress. In turn, acute stress affects performance.

Dealing with any type conflict requires tact, diplomacy, and most of all, the ability to remain calm.

Most importantly, does the behavior of the passenger pose a threat to the safety of the flight?

How can cabin crew resolve passenger conflict? Conflict management is related to attitude.

- Listen, to allow the passenger to express his/her concerns, this helps to reduce tension
- Be courteous, but firm
- Address the issue, **what is right, not who is right**
- Appeal to reason, before resorting to authority
- Ensure cabin safety
- Be assertive
- Involve the crew and the purser
- The purser should inform the flight crew, if necessary
- Don't take it personally.

The following is one example of passenger behavior that was a source of conflict between a passenger onboard an aircraft, and the crewmembers that were fulfilling the safety requirement.

"*Passenger would not get off her cell phone when advised by the crew. The Captain said, "Prepare for takeoff" and she wouldn't get off the phone. Other passengers yelled at her to get off the phone. She ignored them also. Then she started screaming profanity to all the flight attendants and passengers".* (Source ASRS report)

The conflict was due to non-compliance with an aviation safety regulation, and interfered with the performance of crewmembers duties. The conflict arose due to incompatible goals.

The goal of the passenger was to continue using the mobile phone, knowing that it was prohibited. The goal of the crew was to ensure the safety of the flight, by asking for the passenger to comply with an aviation regulation.

One of the most frequent sources of passenger conflict onboard the aircraft is non-compliance with the 'No Smoking' rule.

Many aviation authorities throughout the world have very strict regulations regarding passenger behavior, and clearly define the type of behavior that is "unacceptable". The regulations are also a resource for crewmembers that enables

them to define the type of behavior that poses a threat to flight safety. The following is an extract of the Air Navigation Order (ANO) 2000, from the United Kingdom.

“63. A person shall not recklessly or negligently act in a manner likely to endanger an aircraft, or any person therein.

64. A person shall not recklessly or negligently cause or permit an aircraft to endanger any person or property.

65. A person shall not enter any aircraft when drunk, or to be drunk in any aircraft.

66 (2). A Person shall not smoke in any compartment of an aircraft registered in the United Kingdom at a time when smoking is prohibited in that compartment by a notice to that effect exhibited by or on behalf of the commander of the aircraft.

67. Every person in an aircraft shall obey all lawful commands which the commander of that aircraft may give for the purpose of securing the safety of the aircraft and of the persons or property carried therein, or the safety, efficiency or regularity of air navigation.

68. No person shall while in an aircraft.

(a) Use any threatening, abusive or insulting words towards a member of the crew of the aircraft;

(b) Behave in a threatening, abusive, insulting or disorderly manner towards a member of the crew of the aircraft; or

(c) Intentionally interferes with the performance by a member of the crew of the aircraft of his duties”.

IATA resolution RRP 1724 provides operators with a useful guideline for dealing with “difficult” passengers, this includes Article 7. “Refusal and Limitation of Carriage”, and Article 11 ‘’Conduct aboard Aircraft”.

Signs of misconduct may sometimes be seen at the check-in area, security checkpoints or in the departure area. All employees that are involved with passenger contact, check-in staff, security personnel, departure lounge staff, have a responsibility to ensure that flight safety is not compromised due to passenger misconduct. Many operators have their own policy on passenger behavior, what is “acceptable” and “not acceptable”.

11.8.2. STRESS

- Stress is an automatic response to a perturbing situation
- Stress is a vital adaptation mechanism, as it mobilizes resources against any kind of aggression agent
- Stress is not only a physical reaction but also an emotional one
- A stressful situation can either be unexpected (for example, an emergency), or anticipated (for example, when you know in advance that you will have an overbooked flight, and therefore, difficult passengers).

Stress can be either good or bad. It is a question of intensity. Moderate stress improves performance, and enables people to adapt to situations. However, when the level of stress is beyond the individual's capacity, stress may then become a problem, and result in poor performance.

Have you ever felt like this?

The environment itself does not cause stress, but rather by the way individuals interpret their environment and their perception of a situation. The response to stress is automatic, however the way individuals react to stress is related to their perception of their ability to cope.

This section aims to advise crewmembers how to recognize, prevent, and cope with stress, and how to reduce the warning signs within one, and other crewmembers.

The following types of stress affect people:

- **Acute stress** comes from the pressure of managing a situation in the immediate past, present or near future. Acute stress can be exciting and thrilling in limited amounts, for a short period of time. However, too much acute stress can be exhausting. People are immediately aware of acute stress because it is new, a sudden surge.

- **Chronic stress** is an accumulation of pressure and demands that build up over a long period of time. The danger of chronic stress is that it is difficult to identify the symptoms, because it is old, familiar and easy to get used to. This may lead to a sense of hopelessness, and fatalistic helplessness. Over a period of time, chronic stress can deplete physical and mental resources, and can pose serious health risks (heart attack, stroke, cancer and suicide).

- **Anxiety or Anticipatory stress** is in anticipation of an event that may be viewed as dangerous or unpleasant, that the person has no control over. Anxiety may be real or imaginary. Reactions to anxiety may vary from mild discomfort, to intense anguish and the impression of immediate death. Intense anxiety can cause an intense stress reaction, with all the affects of stress.

The following are some of the symptoms and affects of stress.

- **Physiological symptoms**. Dryness of mouth, sweating
- **Cognitive effects**. Lack of concentration, forgetfulness, indecision
- **Health effects**. Insomnia, nausea, headaches diarrhea
- **Behavioral symptoms**. Restlessness, nervous laughter, change in appetite, excessive drinking
- **Subjective effects**. Depression, mood swings, irritability, anxiety.

Onboard the aircraft, the obvious source of stress would be dealing with any kind of emergency situation. However, there are many kinds of stressful situations or events, also called *stressors.*

- **Mental stressors**. Stress rises when you are under pressure, particularly time pressure. This type of stress can be increased when you feel you are lacking the knowledge, or the skills required to cope with the situation

- **Physical Stressors**. Noise, light, vibration, pain, illness, fatigue

- **Professional stressors**. Adverse working conditions, bad working environment, airline mergers, strikes, and salary problems are all professional stressors. Professional stressors may be intensified if the individual also has private life stressors

- **Social stressors**. Conflicts with passengers, colleagues, or even management

- **Private life stressors**. Divorce, death, illness, change of life conditions or environment. Even positive events such as a birth or marriage can be stressors.

When stress has been recognized, the tendency is to respond in one of two ways. defensive or coping.

- A defensive reaction to stress would be to take alcohol or medication, denying that there is a problem, “when someone is in denial”, or quite simply blaming someone else. A defensive reaction is only alleviating the symptoms of stress, not the actual cause.

- Coping with stress is dealing directly with the source of the stress, as opposed to the symptoms. Strategies for coping with stress could be, facing a problem directly, delegating workload, and prioritizing tasks. Coping with stress requires assessing a situation, adjusting to a situation, or changing a situation.

However, there are ways to help manage stress. Stress is a part of life that cannot be avoided. Whether work related, personal or outside the control of the individual, stress can affect how a person thinks and performs. Therefore, it is important to effectively manage stress. A good healthy lifestyle, a positive outlook, support from family, friends and peers are all valuable tools that help build confidence and resistance to stress.

Performing the following may help to relieve stress:

- Sufficient sleep and a well balanced diet, particularly on stopovers, must be organized around the need for rest
- Regular physical exercise promotes good health and good self esteem, and battles anxiety and depression
- Talk to someone - a friend, or colleague
- Relaxation exercises, breathing exercises
- Tai Chi, yoga or stretching is an excellent way to integrate physical and mental wellbeing
- Learn to say no, to avoid overloading yourself
- Do something that makes you feel good
- Laugh!

11.8.3. COPING WITH EVERY DAY STRESS

The cabin environment can be somewhat hectic at times, particularly when things do not go according to plan. For example, if an oven is broken, and the service starts ‘falling apart’ and things seem to be going from bad to worse. Well, the good news is when you work as part of a crew you are not alone!! However, you can do the following:

- Accept the situation
- Go back to basics, trust your skills and knowledge
- Stick to documented procedures
- Use all available resources, ask for help, and say that you are stressed
- You are not alone, trust and have confidence in your colleagues
- Keep your sense of humor.

Remain in control of yourself, and keep as cool as possible. This will help maintain a calm atmosphere, and good working conditions in the cabin. In the event of an

abnormal/emergency situation, staying calm will help to prevent passengers from panicking. Panic is contagious, particularly onboard an aircraft.

It is important to remember your primary task, and focus your attention on executing it 'step by step'.

If danger is present, do not attempt to conceal it. Face the problem using all available resources, and always ask for help.

Stress can also be managed at crew level. You are part of a crew, and as such you have fellow crewmembers, a Purser and a Captain that you can rely on. Cabin crewmembers should remember that they are also a resource for the others.

11.8.4. STRESS DURING EMERGENCIES

During an emergency situation, it is normal for cabin crewmembers to feel stressed. Reports have shown that crewmembers have not always remembered emergency procedures, or have not adhered to procedures due to stress. In some cases, the actions of the cabin crewmembers have contributed to an increase in the number of passenger injuries.

The following is an extract from an accident report that gives a very clear example of the kind of actions that can happen under stress.

"A DC-10 with 186 passengers and a crew of 15 overran the departure end of the runway at Los Angeles, California, on March 1, 1978. When the airplane departed the runway, the left main gear failed, causing the fuel tank to rupture. There was a significant fire and an evacuation was initiated. When the airplane stopped, two flight attendants who had 18 years and 4 years experience respectively, seated at the L-1 exit unsuccessfully attempted to open the exit. The door was eventually opened with the selector handle in the "disarmed" position, and the slide remained in the container on the door. The flight attendant at R-3, with 18 years experience, stated that she "automatically" disarmed the slide before opening the exit. She realized what she had done, rearmed the exit and opened the door. Another flight attendant with 21 years experience at L-4, stated that "My first reaction, I just zeroed in on the panel, and the thing I saw was the disarming handle. I disarmed the slide. I realized what I did. I jammed it back in." The door opened and the slide inflated".

As demonstrated in this extract, there is a risk that behavior reverts to automatic reactions, under conditions of stress. However, the cabin crewmembers in the above extract, realized their error and rectified it.

One of the best tools to prevent stress in any emergency is **TRAINING.**

When cabin crewmembers feel that they do not have the skills to handle an abnormal, or emergency situation, the rate of stress increases. This is also true

when cabin crewmembers feel that they do not have the required or insufficient knowledge.

Training develops the skills, and increases the knowledge to help cabin crewmembers be effective during emergencies.

The ability of the cabin crewmembers to perform their duties successfully, during an emergency, is directly linked to the quality of their emergency training. More efficient reactions to stress can be taught through training.

Good and frequent training produces:

- Good skills (that tend to be automatically activated)
- Control over the situation
- Efficient coping strategies
- Increases confidence.

Good training increases confidence, and gives cabin crew the ability to cope with stress in emergency situations. Cabin crewmembers should be confident in knowing what the task requires, and knowing what they have to do.

11.8.5. SLEEP

Having discussed the effects of conflicts and stress on performance, this section focuses on the effects of sleep deprivation on individual performances.

Sleep deprivation is lacking sleep, whilst fatigue is due to consuming our mental or physical resources. Both alter vigilance in a complex way.

The need for sleep varies amongst individuals. Some people need more sleep than others.

90% of people sleep between 6 and 9 hours

- Each individual has their own sleeping pattern
- Sleeping patterns may change, or vary, according to health and age
- Identifying and respecting your sleep pattern are conditions for good performance.

Individuals know their own sleep requirement, and how much sleep they will need in order to be refreshed. However, if the amount of sleep has not been sufficient, particularly over a few days, the individual will build up a ‘sleep deficit’, that will need to be recovered, otherwise it will affect the level of performance.

As crewmembers' sleeping patterns may change or be disrupted, due to the nature of flight patterns. Long haul or short haul.

Long haul flights cross many time zones, and can therefore disturb sleep patterns. Crewmembers are awake when they would normally be asleep and vice versa.

Short/Medium haul flights, with very early check-in times (sometimes 4.00am), when most people are still in their beds can also disrupt sleep patterns.

Rest and sleep is vital for crewmembers. One hour of good quality sleep is supposedly, good for two hours of activity. The amount of time for rest periods and stopovers should be allocated wisely, and crewmembers should rest sufficiently before going on a flight.

The nature of the work means that the crews do not always work everyday of the week, or the same hours each day, nor do they eat at the same hour each day, or sleep at the same hour each night. Just when a block of days off means that crewmembers can start to get back to a "normal routine", it is time for them to leave again with their suitcase, to possibly fly around the world and back.

- Sleep is a necessity
- Sleep deprivation may lead to a serious health disorder
- It is essential that crewmembers are well rested before taking a flight, particularly on stopover
- Ensure that the proper rest period requirements are respected.

Jar-Ops 1.085.

"Although the controls on flight and duty periods are intended to ensure that adequate opportunities are provided for crewmembers to obtain rest and sleep, individuals should ensure that proper advantage it taken of such opportunities".

11.8.6. FATIGUE

Consuming too much physical or mental energy causes fatigue. It is the bodies' way of saying that there is a need for the individual to restore, and replenish their energy. Fatigue can be attributed to many of the following factors.

- Physical activity
- Mental activity
- Delayed sleep

- Sleep deprivation
- State of health
- Long hours
- Working during normal sleep hours
- Working on rotating shifts and schedules
- Monotonous/repetitive tasks.

Whether cabin crew or flight crew, many of these factors apply to cabin crews professional lives, and can affect performance. Crewmembers should be aware of the symptoms of fatigue. The following is a list of some of the symptoms and effects of fatigue.

- Diminished perception (vision, hearing…) and lack of awareness
- Reduction in motor skills, causing slow reaction, reduced coordination
- Reduction in short term memory
- Mood changes - depressed, elated, energetic
- Channeled concentration - fixating on a single issue, and inability to maintain an overview
- Easily distracted
- Poor judgment and decision making, leading to increased mistakes
- Diminished standards.

Sleep and rest is essential to combat fatigue. There are also other factors that can reduce the effects of fatigue.

- Fatigue and physical activity - Regular physical activity of moderate intensity increases resistance to both stress and fatigue. However, too much physical activity before departure is tiring
- Balanced meals - Try to avoid meals that are high in sugar or fat, either before a flight or onboard the aircraft
- A healthy lifestyle - Do not drink alcohol or drugs. Refrain from smoking.

During a flight, particularly on a long haul night flight, serving the breakfast before landing can require some extra effort.

This is the time when the cabin is noisy, the window shades go up (when the sunlight is blinding!), passengers start to walk in the aisles as soon as the carts are moved into the aisles, or there are many passengers waiting near the toilets, this can be particularly annoying when the toilets are near the galley!!

It is easy to become irritated. If crewmembers are irritated, their attitudes towards passengers and colleagues may change. It is important to recognize fatigue, and accept it. Crewmembers should also remain professional, calm, collected and efficient.

11.9. SUMMARY

Each individual can manage the factors that affect performance. To summarize factors that affect performance.

- Manage conflict. Listen and propose a safe solution. Involve the crew and refer to the captain
- Under stressful situations. Go back to basics, and use all available resources. Refer to documented procedures.
- Adapt your lifestyle. Eat a well-balanced healthy diet, exercise regularly, and sleep!

11.10. ERROR MANAGEMENT

"It is the nature of man to err", according to the roman philosopher Cicero some two thousand years ago!!

Error has been defined as follows.

"Error will be taken as a generic term to encompass all those occasions in which a planned sequence of mental or physical activities fails to achieve its intended outcome, and when these failures cannot be attributed to the intervention of some chance agency",

(Source "Human error" by Professor James Reason.)

CRM addresses errors in two ways.

- Detecting an error in the early stages, and correcting or controlling it
- Reducing the possibility of error.

Part of the human condition is to make errors, no matter who the person is. Everyone has made an error at one time or another. Errors are made when the individual's actions deviate from their intentions, or if the intention is not appropriate. Therefore, an error by nature is never intentional.

The most common errors are slips, lapses and mistakes.

- Slips. When the intended action does not go as planned (for example, taking the wrong train or bus)
- Lapses. Occur due to forgetfulness, or a lack of attention (for example, forgetting to arm/disarm the aircraft doors)
- Mistakes. Occur when there is fault in the plan or the intention, and the individual believes that their action is correct, when in fact it is wrong (for example, seeing smoke coming from a coffeemaker, and turning the wrong coffeemaker off).

Part of cabin crewmember training is to learn from errors. Using the mockups, to create realistic exercises for cabin crewmembers, provides the crewmembers with the opportunity to learn from their errors, without suffering from the consequences of committing the same error onboard the aircraft.

Making an error during an evacuation exercise in a mock-up, is not as serious as making the same mistake in reality. For example, during an evacuation exercise the crewmember may not assess conditions properly and may open the aircraft

door, only to realize that there is “fire” outside the exit. The same gesture in a real emergency situation could have disastrous results.

Cabin crew instructors should be aware that errors made during training exercises should be treated as a learning experience, as opposed to a criticism of individual performance.

The use of scenarios or accident analysis, where errors have occurred, is probably the most effective method to learn how to detect and prevent future errors.

Experienced personnel can occasionally make errors. The errors they make are different from the errors made by novices. Some errors made by experienced personnel stem from complacency. Experience is not a “cure all”. Experienced cabin crewmembers still make mistakes, and even benefit from them!! Life is a learning process, each person can learn a lot from their own mistakes, and the mistakes of others. The aim is to learn from errors, and adapt behavior to avoid repeating the same error.

The downside of making errors is that every action has a reaction!

Error and Consequence

The effects of an error depend on the situation, and the context in which it occurs.

For example, a cabin crewmember forgets to disarm the door for arrival that could provoke inadvertent slide deployment, which in turn (depending on the context), could cause:

- **Flight delay / cancellation**
- **Offloading of passengers**
- **Serious injury to someone on the ground.**

11.11. VIOLATION

Sometimes errors are intentional. Another source of error is **Violation.** Contrary to slips, lapses and mistakes, violations are intentional.

Violation is defined as “an intentional deviation from a regulation, procedure or rule”. For example, if crewmembers do not perform preflight checks in accordance with company policy, or if they cut corners on the in-flight service, “to save time”.

In the beginning, violations are intentional, but they can become routine. When a violation becomes routine, it becomes the “Norm”, and the individual no longer realizes that it is a violation and becomes complacent.

When violations become the “Norm”, they have a tendency to substitute the official rules. Standard Operating Procedures (SOPs) provide a common language, and provide the basis for communicating as a crew. If crewmembers regularly violate the SOPs, the basis of communication is lost, and can cause confusion and misunderstanding.

Group pressure and group conformity can produce a violation. For example, when cabin crewmembers work for the same company, but are not based in the same city/country. The majority of the cabin crewmembers are based in “A”, and a few joining cabin crewmembers are based in “B”. Group pressure causes group “B” to conform to group A’s behavior, because “That’s the way we do it here”. The violation becomes the “norm”, and replaces the official regulation. The common ground for communication is then compromised, and result in confusion.

Standard Operating Procedures are particularly important for Operators that have personnel in various parts of the world, because they provide a common language, and a tool that enables crews to work together effectively.

W A R N I N G

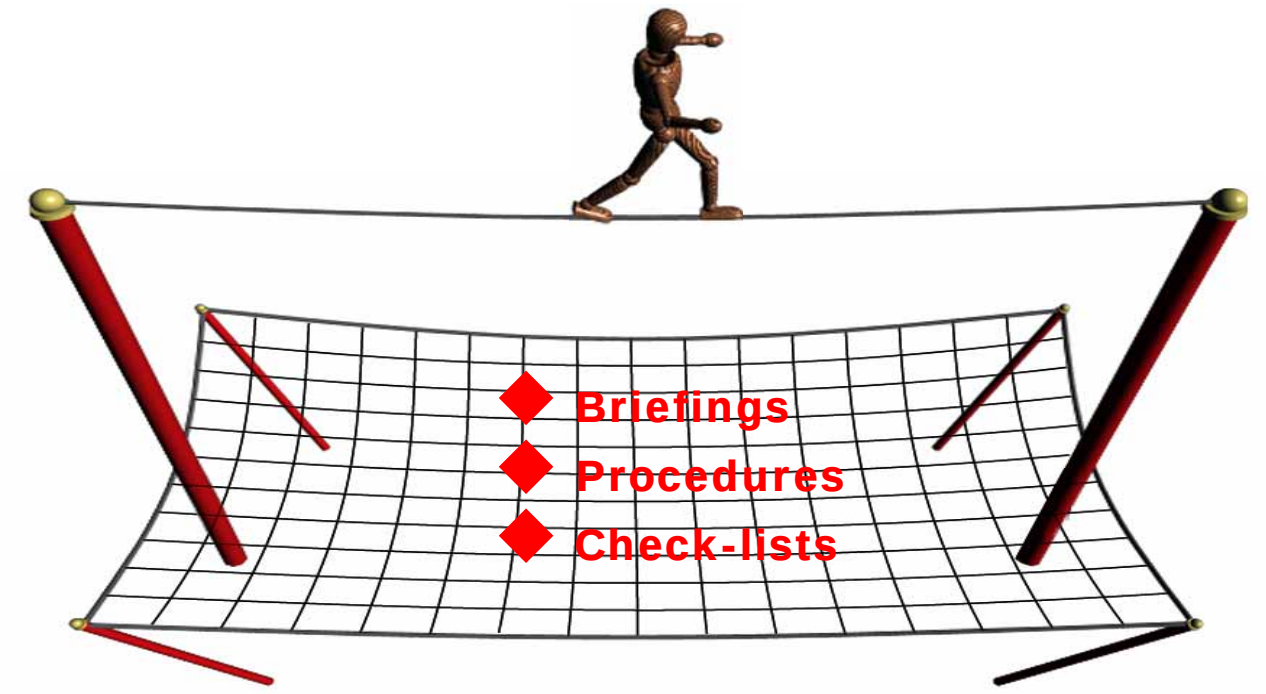
Most violations are a threat to safety

Violations are a threat to safety. By violation cabin crewmembers remove a layer of defense against error, and weaken their safety net.

Management of violations has to be performed both at the individual and the team level. Pursers and experienced cabin crewmembers should encourage colleagues to respect rules and regulations, and understand operating procedures.

The best way to avoid violation is to decide not to violate!

Standard Aviation Tools for Error Management



These provide the tools to work, but they also provide a safety net against error!

11.12. TEAM PERFORMANCE

A team is made up of players. Each crewmember is a team player with a specific role, and task just like a soccer team.

The teamwork between the players in a soccer match is quite amazing - the players know intuitively who to pass the ball to, and how to pass it. The next player controls the ball, and passes it to someone in a position to score a goal. Over the years there have been many great soccer players, Pele, Zidane, and Beckham, who have been singled out for their performances that contributed to the success of their respective teams.

A good team does depend on individual performances; however, team performance takes precedence over individual performance.

Great team performance depends on **'synergy'**. 'Synergy' is a technical term from the world of medicine that means, "working together".

When in synergy, the performance of a team working together, is higher than the sum of the individual performances. **1+1>2!**

Conditions for synergy are:

- A shared goal
- A clear crew structure
- Clear task allocation
- Team spirit
- Good leadership.

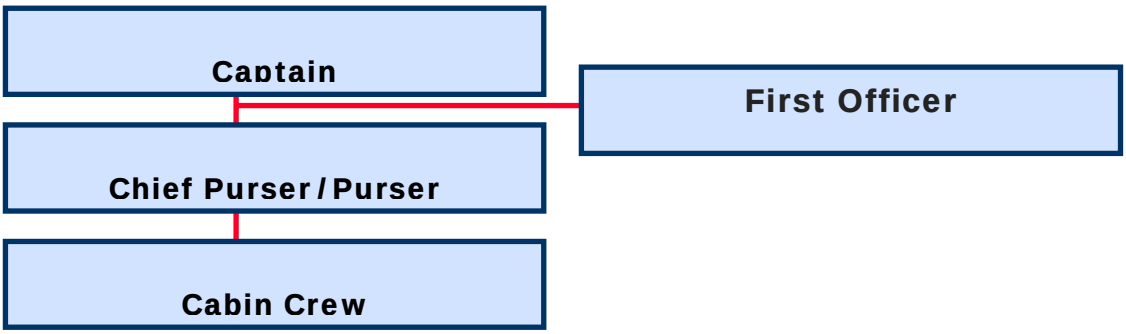
The role of cabin crewmembers onboard the aircraft is complex, as there are two clearly defined aspects the safety role, and the service role. Sometimes, there is conflict between the two, which can have implications on performance.

The duality of the roles is somewhat Jekyll and Hyde, requiring cabin crewmembers to be two different people, depending on the circumstances, one minute smiling and pleasant, the next minute assertive and demanding when dealing with a safety threat.

The structure of the cabin crew ensures that crewmembers have specific roles, and very specific duties. The application of good CRM within a crew creates the right balance for the crew to work as an effective team.

In order for a team to be effective, they must be able to talk to each other, share information, listen to each other and be assertive, when necessary.

In every effective team, there are leaders and followers. Followers should not be thought of as 'sheep following blindly'. Followers play a complimentary role to leadership. A follower is the supporting role. Every effective leader needs support.



The Captain

The Captain is the leader onboard the aircraft. The Captain is ultimately responsible for the safety of the aircraft.

"The commander shall have authority to give all commands he deems necessary for the purpose of securing the safety of the airplane and of the persons or property carried therein, and all persons carried in the airplane shall obey such commands" Jar-Ops 1.085(e)(2).

The Captain's decision is final.

The Captain is the leader of the crew, and has a responsibility to ensure that the entire crew functions as a team.

The first Officer

If something happens to the captain, such as incapacitation, the first officer will assume command of the aircraft.

The Chief Purser / Purser

The Purser is responsible for all the cabin crewmembers, and is identified as the leader of the cabin crew. The Purser allocates the workload and tasks, to the cabin crewmembers.

The Purser is the communication link between the cabin and the Flight crew. The captain informs the purser of any technical, or operational problems. The Purser, shares the information with the other cabin crewmembers.

Cabin Crewmembers

The cabin crewmembers play a supporting role to the Captain, First Officer, and Purser. The cabin crewmembers are the eyes and ears in the cabin for the flight crew. They provide the flight crew with any pertinent information regarding safety, unusual situations via the purser.

Trainees

Although trainees have no specific safety responsibilities onboard the aircraft, every crewmember has a responsibility to help them and train them. Cabin crewmembers should answer any questions that they may have on technical, safety or service issues. Try and remember what it was like when you first started. Experienced crewmembers are role models for trainees, and must show a good example!

11.13. LEADERSHIP

The leadership onboard is established by the airline. Naturally, there will always be the Captain, First Officer and sometimes a relief pilot in the cockpit. In the cabin there is sometimes a Chief Purser, and pursers in different cabins, or just one Purser for the entire aircraft.
The Purser is responsible for all the cabin crewmembers and their activities.

A leader is someone who through word, action and example can influence the behavior and actions of others. A leader has the capacity to share the goals of the team, understand the needs of the team, and motivate the team to achieve their goals. Good leadership requires teamwork. The quality of the leader depends largely on the relationship with the other members of the team.

There is a difference between authority and leadership. Leadership is an acquired skill, whereas authority is assigned. A good leader has the correct balance of both.

The role of a leader is to:

- Build the team
- Manage the workload
- Manage time
- Coordinate and monitor activity
- Prevent and solve conflicts
- Listen to input from other members of the team
- Make decisions
- Provide and maintain standards
- Supervise and intervene in case of a deviation from standards.

A good leader has the acquired knowledge, skills, expertise and professionalism to motivate the rest of the team and inspire confidence. A good leader also:

- Establishes an atmosphere that encourages communication and team participation
- Listens to feedback and input from others.
- Motivates the team by appreciation, and the ability to praise when appropriate
- Takes the initiative and assists team members in completing tasks during difficult situations
- Remains calm in conflicts, and is able to be objective and propose solutions
- Has the ability to differentiate between “what is right, not who is right”
- Has good problem solving skills that involve gathering information, identifying the problem, finding a solution, or another course of action
- Informs other team members when there is a change of plan
- Has a sense of humor - it always helps!!

A good leader is always a pleasure to work with, and can make a difference to the work environment onboard the aircraft.

11.14. SUMMARY

Good team performance and synergy require.

- Crew structure
- Clear and balanced allocation of roles and tasks
- Good leadership
- Good follower ship, and lots of team spirit
- Compliance with procedures
- Adherence to allocated tasks
- Effective communication
- Confidence to report any safety related items- even if in doubt!

As part of a crew, each person brings their knowledge, skill, experience, individualism and personality to the team. Every crewmember has worth, and contributes toward the team effort.

Exercising good CRM as part of work practice enhances team performance, and more importantly reduces the risk of errors.

12. ABBREVIATIONS

ABBREVIATIONS	
A	Amber
AA	Airworthiness Authorities
AAP	Additional Attendant Panel
AAT	Aircraft Allocation Table
ABN	Abnormal
ABV	Above
AC	Alternating Current
A/C, AC	Aircraft
ACARS	Aircraft Communication Addressing and Reporting System
ACP	Area Call Panel
ACU	Air show Control Unit
ADB	Area Distribution Box
ADIRS	Air Data and Inertial Reference System
ADS	Automatic Dependent Surveillance
ADV	Advisory
AEVC	Avionic Equipment ventilation Computer
AFT	After
AIDS	Aircraft Integrated Data System
AIP	Attendant Indication Panel
ALT	Altitude
ALTN	Alternate
AMU	Audio Management Unit
ANT	Antenna
AOLS	Airbus On Line Services
APU	Auxiliary Power Unit
ARINC	Aeronautical Radio Incorporated
ARN	Aircraft Registration Number
ARPT	Airport

A/S	Airspeed
ASAP	As Soon As Possible
ASP	Audio Selector Panel
ATC	Air Traffic Control
ATR	Audio Tape Reproducer
ATSU	Air Traffic Service Unit
ATT	Attitude
AVNCS	Avionics
AWY	Airway
B	Blue
BARO	Barometric
BAT	Battery
B/C, BC	Business Class
BCL	Battery Charge Limiter
BCRC	Bulk Crew Rest Compartment
BFE	Buyer Furnished Equipment
BGM	Boarding Music
BIT	E Built-In Test Equipment
BMC	Bleed Monitoring Computer
BRK	Brake
BRT	Bright
BTL	Bottle
C	Centigrade
C1	Coat-stowage 1
CAB	Cabin
CAPT	Captain
CAM	Cabin Assignment Module
CAT	Category
CAUT	Caution
C/B	Circuit Breaker
CBMU	Circuit Breaker Monitoring Unit
CC	Cabin Crew
CC1	Cabin Crew 1
CCB	Cabin Crew Bulletin
CCL CIDS	Caution Light
CCOM	Cabin Crew Operating Manual
CCS	Cabin Communication System
CECAM	Centralized Cabin Monitoring
CDU	Control and Display Unit
CFDS	Centralized Fault Display System
CG	Center of Gravity
CHA	Channel
CHG	Change

CHK	Check
CIDS	Cabin intercommunication Data System
CIN	Change Identification Number
CIP	Cabin Interface Plug
CKPT	Cockpit
C/L	Check List
CLB	Climb
CLG	Ceiling
CLR	Clear
CLSD	Closed
CM	Crewmember
CMC	Central Maintenance Computer
CMD	Command
CMS	Central Maintenance System
CMT	Cabin Management Terminal
CNTOR	Contactor
COC	Customer Originated Changes
COMP	Compartment
CPTR	Computer
CO	Company
COM	Communication
CONF	Configuration
CONT	Continuous
CPCU	Cabin Pressure Control Unit
CR2	Crew Rest Compartment
CRC	Continuous Repetitive Chime
CRG	Cargo
CRS	Course
CRSD	Crew Rest Smoke Detection
CRZ	Cruise
CSTR	Constraint
CSU	Cassette Stowage Unit
CTL	Control
CTL PNL	Control Panel
CTLR	Controller
CTR	Center
CTU	Cabin Telecommunication Unit
CVR	Cockpit Voice Recorder
Db	Decibel
DCC	Digital Cockpit Controller
DCR	Dock-on Crew Rest
DEG	Degree
DES	Descent
DEST	Destination

DET	Detection
DEU	Decoder/Encoder unit
DFDR	Digital Flight Data Recorder
DIM	Dimming
DIR	Direction
DISC	Disconnect
DISCH	Discharge
DISPL	Display
DIST	Distance
DN	Down
DSCS	Door Slide Control System
DSU	Data Server Unit
DU	Display Unit
DU	Documentary Unit
E	East
ECAM	Electronic Centralized Aircraft Monitoring
ECS	Environmental Control System
EIS	Electronic Instruments System
ELEC	Electricity
ELEV	Elevator, Elevation
ELMU	Electrical Load Management Unit
EMER	Emergency
EMER	EXIT R Emergency Exit Right (overwing)
ENG	Engine
EOD	Explosive Ordnance Disposal
EPSU	Emergency Power Supply Unit
EVAC	Evacuation
F/A	First Aid
FAIL	Failure
FAP	Flight Attendant Panel
FAR	Federal Aviation Regulations
FBCRC	Full Bulk Crew Rest Compartment
F/C, FC	First Class
FCOM	Flight Crew Operating Manual
FCRC	Forward Crew Rest Compartment
FCU	Flush Control Unit
FDAU	Flight Data Acquisition Unit
FDB	Floor Disconnect Box
FDIU	Flight Data Interface Unit
FES	Fire Extinguishing System
F/F	Full Face (smoke mask)
FF	Fast Forward
FL	Flight Level

FLT	Flight
F/O	First Officer
FPEEPMS	Floor-Proximity Emergency Escape Path-Marking System
FREQ	Frequency
FSB	Fasten Seat Belt
FSM	Fault System Management
FSN	Fleet Serial Number
FT	Foot, Feet
FT/MN	Feet per Minute
FWC	Flight Warning Computer
FWD	Forward
FWS	Flight Warning System
G	Green
G5	Galley 5
GEN	Generator
GND	Ground
GRVTY	Gravity
GS	Ground Speed
GWDU	Galley Waste Disposal Unit
H	Hour, Hot
HI	High
HP	High Pressure
HPV	High Pressure Valve
HZ	Hertz
HS	Handset
ICAO	International Civil Aviation organization
IDENT	Identification
IFE	In Flight Entertainment
IFEC	In Flight Entertainment Center
IGN	Ignition
IMM	Immediate
IND	Indication
INOP	Inoperative
INT	Interphone
INTENS	Intensity
IPCU	Ice Protection Control Unit
IR	Inertial Reference
IRS	Inertial Reference System
KG	kilogram
KT	Knot
L	Left
LAV	Lavatory
LAV34	Lavatory 34

LCD	Liquid Crystal Display
LD	Lower Deck
LDF	Lower Deck Facilities
LDG	Landing
LD LAV	Lower Deck Lavatory
LDMCR	Lower Deck Mobile Crew Rest
LED	Light Emitting Diode
L/G	Landing Gear
LGCIU	Landing Gear Control Interface unit
LIM	Limitation
LH	Left Hand
LO	Low
LOM	List Of Modifications
LONG	Longitude
LOS	List Of Sections
LP	Low Pressure
LRBL	Least Risk Bomb Location
LRU	Line Replaceable Unit
LS	Loudspeaker
LSU	Lavatory Service Unit
LT	Light
LVL	Level
M	Magenta, Mach, Meter
MAIN	T Maintenance
MAN	Manual
MB	Milibar
MCDU	Multipurpose Control and Display Unit
MD	Main Deck
MECH	Mechanic
MED	Medium
MEL	Minimum Equipment List
MIC	Microphone
MIN	Minimum
MKR	Marker (radio) Beacon
MLW	Maximum Design Landing Weight
MM	Main Multiplexer
MMEL	Master Minimum Equipment List
MMO	Mach Max Operating Speed
MN	Minute
MRT	Manual Release Tool
MSA	Minimum Safe Altitude
MSG	Message
MSU	Minimum Safe Altitude
MSU	Media Server Unit

MSL	Mean Sea Level
MTOW	Maximum design TakeOff Weight
MWP	Manual Warning Panel
MZFW	Maximum design Zero Fuel Weight
N	North
N/A	Not Applicable
NATS	North American Telephone System
NAV	Navigation
ND	Navigation Display
NM	Nautical Mile
NORM	Normal
NS	No Smoking
NTPD	Normal Temperature Pressure Dry
O2	oxygen
OAT	Outside Air Temperature
OBRM	On Board Replaceable Module
OCCPD	Occupied
OFF/R	Off Reset
OFST	Offset
OL	Outboard Left
O/P	Output
OPP	Opposite
OPS	Operations
OPT	Optional
OR	Outboard Right
OVBD	Overboard
OVHD	Overhead
OVHT	Overheat
OVRD	Override
OVSPD	Overspeed
OXY	Oxygen
P	Purser
PA	Passenger Address
PAT	Primary Access Terminal
PAX	Passenger
pb,PB	Pushbutton
pb sw	Pushbutton Switch
PBE	Portable Breathing Equipment
PCB	Passenger Call Button
PCU	Passenger Control Unit
PDF	Portable Document Format
PED	Portable Electronic Devices
PERF	Performance
PES	Passenger Entertainment System

PIM	Programming and Indication Modul
PISA	Passenger Interface and Supply Adapter
P/N	Part Number
PNL	Panel
POS	Position
PSIU	Passenger Service Information Unit
PSP	Pre-selected Passenger
PSU	Passenger Service Unit
PT	Point
PTP	Programming and Test Panel
PTT	Push To Talk
PVIS	Passenger Visual Information System
PWCU	Potable Water Control Unit
PWR	Power
QCCU	Quantity Calculation and Control Unit
QT	Quart (US)
QTY	Quantity
R	Right, Red
RA	Radio Altitude
RAD	Radio
RADVR	Random Access Digital Video Reproducer
RC	Repetitive Chime
RCDR	Recorder
RCL	Recall
RCVR	Receiver
REG	Regulation
REL	Release
REV	Reverse
REW	Rewind
RH	Right Hand
RQRD	Required
RS	Reset Restore
RSVR	Reservoir
RTE	Route
RTS	Return To Seat
RVC	Remote Volume Control
RWY	Runway
S	South
SAT	Static Air Temperature
SB	Service Bulletin
SC	Single Chime
SCU	System Control Unit
SDP	Smoke Detection Panel
SDCP	Smoke Detection Control Panel

SDCU	Smoke Detection Control Unit
SEB	Seat Electronic Box
SEL	Selector, Select
SELCAL	Selective Calling System
SEU	Seat Electronit Unit
SERV INT	Service Interphone
SFE	Seller Finished Equipment
S/N	Serial Number
SPD	Speed
s/r12,	SR12 Seat Row 12
SSC	Single Stroke Chime
STAT	Static
STBY	Standby
STD	Standard
STS	Status
SW	Switch
SYS	System
T True,	Turn, Total
TBC	To Be Confirmed
TBD	To Be Determined
T/C,TC	Tourist Class
TCAS	Traffic-Collision Alert System Avoidance System
TEMP	Temperature
TK	Tank
TMR	Timer
T.O.	Take Off
TU	Tapping Unit
UP	Upper
UTC	Universal Coordinated Time
V	Volt
VC	Ventilation controller
VCC	Video Control Center
VCR	Video Cassette recorder
VCU	Video Control Unit
VENT	Ventilation
VHF	Very High Frequency
VIB	Vibration
VOL	Volume
VLV	Valve
VOD	Video On Demand
VTR	Video Tape Reproducer
W White,	West
WARN	Warning

WDO	Window
WIPDU	Water Ice Protection Data Unit
WMS	Warning and Maintenance System
WSHLD	Windshield
WT	Weight
WWP	Water Waste Page
XML	Extensible Markup Language
XMTR	Transmitter
X-TALK	Cross Table
Y	Yellow
YC	Economy Class, Tourist Class
YC	Y/C Economy Class Front