



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

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Attachment 7 – PSA Airlines Flight Operations Manual [Excerpts]

OPERATIONAL FACTORS

DCA20CA071



Flight Operations Manual
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Just as we follow a standard for operations, we must follow a standard for good communication. If effective communication skills are established during normal operation, each crewmember will be better equipped to handle an emergency situation. Before a critical situation is encountered, the team must be built by discussing your mission, what could go wrong and a plan to handle possible unusual or emergency situations. Each crewmember must strive to maintain a balance between their social and their operational focus.

4.3.2 Normal Operation.

Each crewmember must strive to maintain good communication throughout flight operations. During the flight, the flight crew communicates with the flight attendant(s) by utilizing a variety of cabin announcements and bell chimes, along with two-way communication through the interphone. Each crewmember should be familiar with the “normal” flight routine of other crewmembers so that he/she is able to detect when something is wrong or out of the ordinary. The flight crew has a heavy task load such as during critical phases of flight (critical phases of flight are defined as taxi, takeoff, landing, all operation below 10,000 ft. except cruise and severe turbulence). Communication during these times should be limited to issues related to the safe operation of the flight, including:

- Responding to any call from the flight crew
- A serious disturbance created by a passenger
- An emergency situation of which the flight crew must be made aware
- A problem with the aircraft doors, structure, or systems

It is the responsibility of all flight attendants to keep the flight crew informed as to the condition of the cabin and passengers. If discrepancies are present, the flight crew should be notified. Accurately express all concerns clearly and concisely.

CRJ-701 and CRJ-900 – The FWD FA is responsible for direct communication with the flight crew and for maintaining communication with the AFT FA.

4.3.3 Emergency Situation.

During a critical situation communication must become as direct as possible. Clearly state the problem along with a recommended course of action.

Decision Making.

- Strive to accurately define the problem.
- Gather information; use all of your resources (ATC, OCC, flight plan, passengers, etc.).
- Generate all possible solutions (brainstorm).
- Evaluate the solution.
- Work together to make a decision.

4.3.4 Situational Awareness.

During any situation there are certain “Red Flags” that crewmembers should be aware of:

- Ambiguity – two (2) or more sources of information that do not agree or are unclear
- Distraction – to turn away from the original focus of attention
- Fixation – the focus of attention on a single item, to the exclusion of all others
- Overload – too busy to stay on top of everything
- Complacency – lack of awareness of actual dangers or deficiencies
- Improper procedures – departing from standard procedures
- Unresolved discrepancy – failure to resolve conflicts

Regaining Awareness.

- Recognize the problem.
- Acknowledge personal limits.
- Prioritize and delegate tasks.
- Communicate information.
- Actively monitor the situation.

4.8.10 Announcements.

Source: ISARP FLT 3.13.3, 3.13.5, 3.13.8

Miscommunication can arise when one pilot is off ATC frequency. To increase the likelihood that both pilots monitor ATC clearance, it may be necessary to tailor timing and/or length of the announcements relative to anticipated ATC clearances.

Taxi Delay.

When a taxi delay is encountered, the flight crew will provide customers with updated delay status approximately every 15 minutes (parking brake set). This announcement allows the Flight Attendant(s) to move about the cabin providing customer-related services.

• Note •

Subsequent movement of the aircraft must be coordinated with the Flight Attendant(s) to ensure passenger service items are collected prior to continuing taxi.

In-Flight Turbulence.

When moderate or greater turbulence is anticipated, alert the Flight Attendant(s) and passengers and illuminate the fasten seatbelt sign.

In-flight Fasten Seatbelt Sign.

On.

When the fasten seatbelt sign is illuminated in flight, a flight deck crewmember will make an announcement instructing passengers to return to their seats and remain seated with their seat belts fastened. The Flight Attendant(s) may call the flight deck via the interphone for additional information.

Off.

When the seatbelt sign is turned off, a flight deck crewmember will make an announcement advising passengers to keep their seatbelts fastened at all times when seated.

Takeoff.

When approaching the departure end of the runway (ex. #1 or #2 for takeoff), notify the Flight Attendant(s) to be seated. If the Flight Attendant(s) is/are not ready, they will notify the flight deck crew immediately by interphone.

Example Takeoff Announcement.

“Ladies and gentlemen, we have been cleared onto the runway. Flight Attendant(s), please prepare for departure.”

- OR -

“Ladies and gentlemen, we are number one (or two) for the runway. Flight Attendant(s), please prepare for departure.”

• Note •

FAA regulations prohibit providing additional information to the passengers when the aircraft is moving (critical phase). Save information regarding weather and arrival times for when the aircraft is parked.

Cruise.

Upon level-off at cruise altitude and as necessary thereafter, notify the Flight Attendant(s) and passengers of appropriate flight information (e.g., turbulence, seatbelt sign, weather, ETA, etc.)

Pre-Arrival.

Leaving cruise altitude (approximately 20 minutes prior to landing) notify the Flight Attendant(s) and passengers of ETA and other appropriate information (e.g., turbulence, seatbelt sign, weather, etc.)

4.14 Preventing Injuries Caused By Turbulence

Source: ISARP FLT 3.13.6

The Captain must emphasize the importance of the Flight Attendants' personal safety. Flight Attendant injuries occur at a disproportionately high rate compared to other crewmembers and other cabin occupants because Flight Attendants spend more time in the passenger cabin unseated and, therefore, unbelted. Flight Attendants can also increase risk and compromise their personal safety by trying to adhere to routine procedures normally accomplished on every flight, such as completing seatbelt compliance checks, rather than by responding to the nonroutine situation that a turbulence encounter presents. It is imperative that the Captain instruct the Flight Attendant(s) to be seated in such conditions.

An effective preflight briefing should include:

- Potential of turbulence encounters during each flight leg
- Emphasis on the importance of keeping the flight deck informed of the conditions in the cabin
- Commitment to using standard air carrier procedures and phraseology during a turbulence encounter
- The importance of maintaining communication during the flight, including communication with the aircraft Dispatcher, as appropriate
- The results of communication errors; such as the use of vague, inaccurate descriptions and nonstandard phraseology regarding turbulence

In Flight:

- Flight crew must promptly and clearly communicate turbulence advisories including specific directions to Flight Attendants and to passengers. Those advisories can include directions to be seated with seatbelts fastened, and to secure cabin service equipment, as conditions may require
- Flight Attendants must effectively communicate directions to passengers to be seated with seatbelts fastened
- Flight Attendants can verify that any CRS is secured properly in a forward facing seat and that the child appears to be properly secured in the CRS
- Before descent, or early in the descent, depending on conditions, flight crews may give passengers notice via an announcement that the Fasten Seatbelt sign will be illuminated in 10-15 minutes, and that any personal needs requiring movement in the cabin should be met before that time. This practice emphasizes the requirement to comply with the Fasten Seatbelt sign
- The Captain should promote reasonable communication between Flight Attendants and the flight crew regarding the use of the Fasten Seatbelt sign
- The environment in the cabin may be very different from the environment in the flight deck during turbulence. Flight Attendants should feel free to request that the flight crew illuminate the Fasten Seatbelt sign whenever they judge it is appropriate to do so
- When the Fasten Seatbelt sign remains illuminated for prolonged periods of time for reasons other than protection from a turbulence encounter, its effectiveness can diminish for passengers and Flight Attendants. Flight Crewmembers should turn off the seatbelt sign as soon as conditions cease to exist. If forecast conditions exist that warrant leaving the seatbelt sign illuminated, an announcement should be made describing the conditions and the need to remain seated.

Dispatchers and flight crews should be encouraged to maintain 2-way communication before, during, and after a flight. In the preflight planning phase, the Dispatcher may use the "Remarks" section of the dispatch (flight) release to advise flight crews of known or forecast turbulence. A "call Dispatch" notation on the dispatch release may be included to indicate that the Dispatcher believes a telephone conversation with the pilot is necessary. Communication may resume at any time during or after flight using an Aircraft Communication Addressing and Recording System (ACARS), company radio, or telephone and is encouraged to improve the flow of real-time information regarding turbulence. During a flight, the pilot(s) and Dispatcher must communicate any changes in the forecast or actual turbulence conditions via voice or digital communication methods in order to pass real-time turbulence information along to other flights.

10.6.4 Thunderstorms.

Source: ISARP FLT 3.11.38

Thunderstorms present significant hazards; avoid thunderstorm activity.

Radar Use.

Use large scales on weather radar to keep “big picture.” Use smaller scales as necessary to assist in avoidance.

Radar and Turbulence in Thunderstorms.

Consider the turbulence level of the entire cell to be that of the most intense portion of the radar return (e.g., when an echo contains green, yellow, and red intensity levels, the turbulence level of the entire cell is red).

Enroute Lateral Separation.

Lateral separation is preferred for avoiding thunderstorm activity. Contact ATC as early as possible for deviations. Use distances in the following table for minimum lateral separation:

Minimum Lateral Thunderstorm Avoidance Criteria

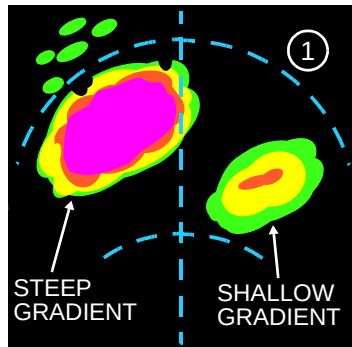
Echo Type	Description	Avoidance Minima
Convective Shower	• Lightning possible • Round/oval shape • Symmetrical gradient • Radar tops $\geq 30,000$ ft • Isolated cell • NWS VIP ≥ 4 • Echo containing magenta turbulence echo or yellow and/or red precipitation echo	— Avoid visible clouds — Avoid displayed precipitation echo (including green echo)
Intense	Contains red echo <u>and</u> any of the following: • Irregular shape (notches, hooks, pendant shape, etc.) • Asymmetrical gradient • Radar tops $>30,000$ ft • Southern-most cell in a line • NWS VIP level 5/6 • Prominent shadow • Magenta precipitation echo	SAT $>0^{\circ}\text{C}$ (32°F) — Avoid flight into and below visible clouds. — Avoid all displayed. precipitation by 10 nm in upwind quadrants/20 nm in downwind quadrants SAT $\leq 0^{\circ}\text{C}$ (32°F) — Avoid flight into and below all visible clouds by 5 nm. — Avoid displayed precipitation from echo (including green echo) by 20 nm.

VIP - An acronym for Video Integrator and Processor. This processor was used on the WSR-57 and WSR-74C radars to indicate rainfall rates. It is still used occasionally on WSR-88D radar products. This processor contours radar reflectivity (in dBZ) into six VIP levels.

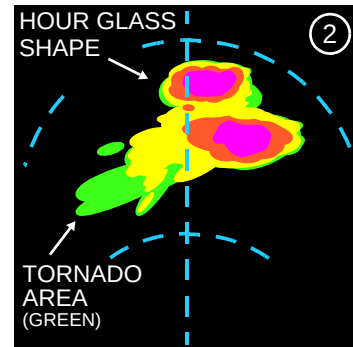
VIP Levels - Categorized intervals of reflectivity which are computer processed by a Digital Video Integrator Processor (D/VIP). These intervals were very important before the installation of the 88-D Radar network. Some of the 88-D Radar products still have these intervals on them. The following table illustrates the various rainfall rates associated with VIPs:

VIP Level	Precipitation Description	Rainfall Rate (inches/hour)	
		Stratiform	Convective
VIP 6 (>57 dBZ)	Very heavy rain and hail; large hail possible		7.10" or more
VIP 5 (50-57 dBZ)	Very heavy rain; hail possible		4.50" - 7.10"
VIP 4 (44-50 dBZ)	Heavy rain		2.20" - 4.50"
VIP 3 (38-44 dBZ)	Moderate to heavy rain	0.50" - 1.00"	1.10" - 2.20"
VIP 2 (30-38 dBZ)	Light to moderate rain	0.10" - 0.50"	0.20" - 1.10"
VIP 1 (18-30 dBZ)	Light precipitation	0 - 0.10"	0.05" - 0.20"

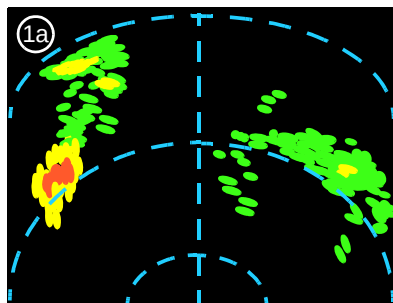
Storm Shapes



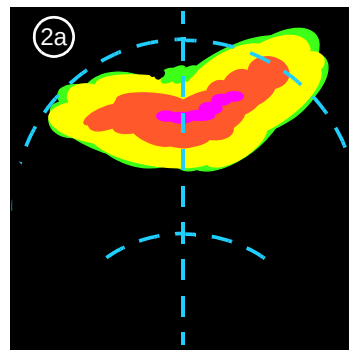
Round Or Oval



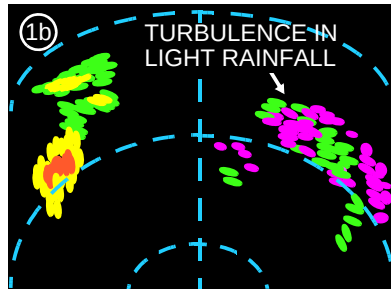
Asymmetrical Gradient



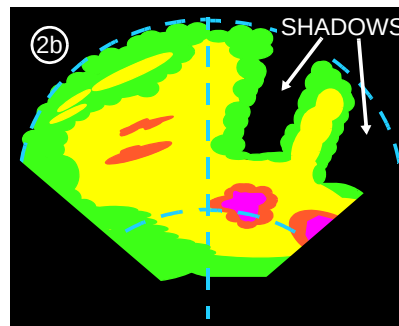
In this WX mode avoid the cell to the left.



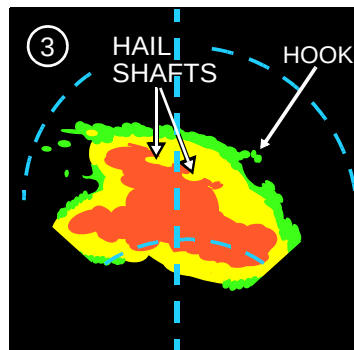
Crescent Shape
(Intense, shadow- producing storm)



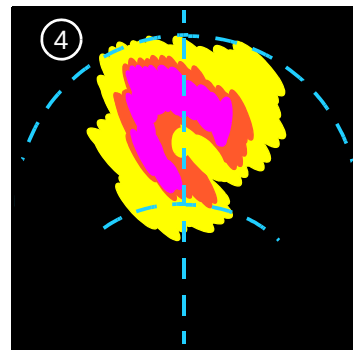
In the WX+ Doppler mode the turbulence occurring in the light rain to the right can be seen. Avoid this area. (If the Doppler echoes were not present, the green stratus area on the right could be penetrated.)



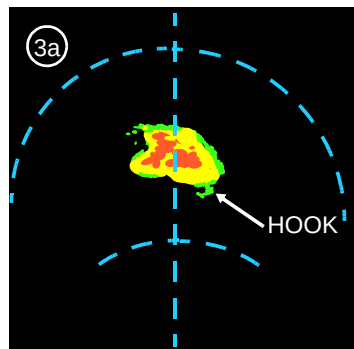
Shadows



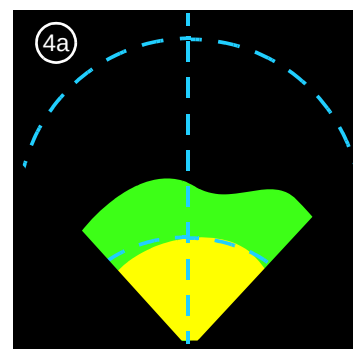
Pendant shape with scallops (hail shafts) along far edge of red on 3-color radar.



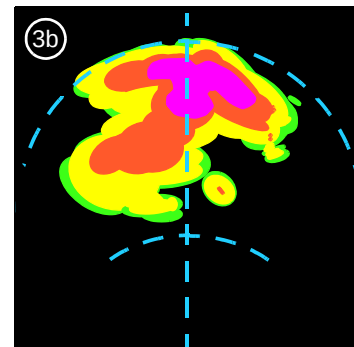
Classic U - Shaped Notch



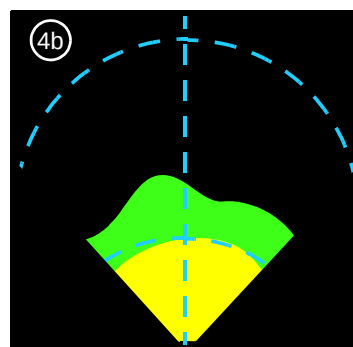
Same pendant cell with gain reduced. Red still remains, it's a level 5 or 6 storm. (Note hook)



Dip



Note finger on far side (hail); and classic hook on left.



Bulge

Factors Increasing Thunderstorm Hazards.

The following factors increase hazards associated with thunderstorms. Consider these factors when choosing a course of action; multiple factors may increase hazards exponentially.

- significantly unstable atmosphere,
- dewpoint >10°C,
- temp/dewpoint spread >16°C,
- storm movement >10 kts,
- southern-most cell in a line.

Overflight Avoidance.

Avoid hazardous weather laterally if possible. In IMC, clear cell tops by at least 20 percent of radar cell height; in VMC, visually clear cell tops by at least 5,000 ft.

Anvil Circumnavigation.

The downwind side of a thunderstorm may contain hail and severe turbulence above or below the anvil. A good rule of thumb is to avoid the downwind (anvil) side of the main body of the cells by at least one mile for every knot of wind at that altitude (e.g., If the winds aloft at the altitude of the anvil are 270° at 60 kts, avoid the downwind side of the main body by 60 nm).

Caution

Be alert for hail. Severe hail has been encountered as much as 20 mi downwind of large thunderstorms.

Thunderstorm Penetration.

If all attempts to avoid hazardous weather fail and thunderstorm penetration is unavoidable:

- Tighten safety belt and fasten shoulder harness; advise the Flight Attendant(s) as soon as possible.
- Use all available resources including ATC, weather radar, and visual observations to select a straight course that passes through the least intense area of the storm.

WARNING

Do not penetrate radar shadows. Fly away from crescent shapes or dips in display; fly towards bulges. Radar beam attenuation can cause areas of heavy precipitation to appear as clear areas or radar shadows.

- Avoid altitudes near the freezing level. Greatest probability of severe turbulence and lightning strikes exists near the freezing level.
- Once inside a cell, continue on a straight course. Expect very large fluctuations in pitot static instruments; use gyro-stabilized instruments for flight indications.
- Refer to Chapter 8: Adverse Weather in the applicable Pilot Operating Handbook for specific instructions.

10.6.5 Turbulence.

Source: ISARP FLT 3.11.38, 3.13.3, 3.13.5, 3.15.2

Limitations.

The following limitations apply to operations in turbulence:

- Operations are not authorized in KNOWN severe turbulence (PIREPS or ride reports with size of reporting aircraft given consideration).
- Operations are not authorized in flight plan guidance intensities of extreme, KNOWN or FORECAST during any phase of flight.
- Dispatch or operations are not authorized in an area of mountain wave activity designated as extreme.
- Dispatch and operations are authorized through SIGMET areas containing a FORECAST for severe turbulence.
- Dispatch is authorized through an area of KNOWN severe turbulence, if the forecast indicates that the turbulence will decrease to a level less than severe before the flight reaches that area. In this case, the dispatcher will provide a contingency plan.

• Note •

While enroute, crews may not request or accept a direct routing from ATC through any area, including mountain wave areas, which the dispatcher has specifically routed around based upon flight plan guidance.

Preflight Planning.

Include knowledge of reported or potential turbulence along the route of flight in the crew leg briefing using Turbulence Procedures.

Reported Turbulence Ahead (Light, Moderate, Severe).

If advised of turbulence ahead (e.g., ATC or PIREPs), the captain will notify the Flight Attendant(s) of the turbulence and its reported severity level using Turbulence Procedures.

Suspected Turbulence Ahead – Severity Unknown (i.e., potential or anticipated turbulence).

If turbulence is suspected ahead but the severity of it is not known due to lack of information (e.g., no ATC/pilot reports, forecasts, etc.), use information available (e.g., radar return, suspect cloud formations, etc.) to notify Flight Attendant(s). Based upon the visual cues, radar returns, personal experience, etc., and the turbulence tables, the captain will decide what actions the Flight Attendant(s) will take using Turbulence Procedures.

If the captain thinks the Flight Attendant(s) should take their seats immediately, he will advise the Flight Attendant(s) that Severe Turbulence Procedures are in effect. However, if the captain thinks the Flight Attendant(s) could still perform duties out of their seats, notification of Light Turbulence Procedures would be appropriate. All crewmembers will then perform their duties as outlined in the Turbulence Procedures tables.

Turbulence Encounter Without Warning.

When unexpected turbulence is encountered, notify the Flight Attendant(s) as soon as possible using Turbulence Procedures. It is understood that in severe turbulence encounters, it may not be possible to communicate with anyone until the level has decreased. If the Flight Attendant(s) have not heard from the flightdeck regarding the turbulent conditions in a reasonable amount of time, the Flight Attendant(s) will call the flightdeck for guidance. If the condition is such that communications cannot be established, the Flight Attendant(s) will set cart brakes and be seated immediately. They will not resume any duties until advised by the flightdeck.

• Note •

Continued flight into known severe turbulence is prohibited.

References to severe turbulence in this section are for unexpected, severe turbulence encounters.

In all cases, the flightdeck and Flight Attendant(s) must comply with the communication and actions outlined in the following Turbulence Procedures tables. Flight Attendant(s) will implement specific cabin procedures associated with the level of turbulence communicated by the flight crew and the amount of time available.

Provide the following information very clearly to the Flight Attendant(s):

• Note •

**Turbulence severity can vary with aircraft location.
Typically turbulence intensities are greater in the rear of the aircraft.**

1. Turbulence severity level that will achieve the desired action by the Flight Attendant(s). When communicating to the Flight Attendant(s) use only the following terms:

- Light Turbulence Procedures
- Moderate Turbulence Procedures
- Severe Turbulence Procedures

Do not use any other terms which can cause confusion.

2. Time available until the encounter is expected (if known). Provide the Flight Attendant(s) as much notification time as possible, keeping in mind that normal flight attendant procedures for galley and cabin cleanup may take up to 20 minutes to complete.

3. Length of time expected to be in turbulent environment (if known).

Emphasize that after the expected time has elapsed, the Flight Attendant(s) are to remain in their seats until advised by the flightdeck.

• Note •

Procedures dictate Flight Attendant(s) remain seated until the flightdeck has provided clear communication that it is safe to get out of their seats.

See the following table for turbulence definitions, and crew actions during turbulence encounters.

Turbulence Encounters				
Intensity	Definition	Inside Cabin Reaction	Flightdeck Actions	Flight Attendant Actions
Light Turbulence	Turbulence that momentarily causes slight, erratic changes in altitude or attitude (pitch, roll, yaw) (PIREP to ATC as light turbulence) - OR - Turbulence that causes slight, rapid and somewhat rhythmic bumpiness without appreciable changes in altitude or attitude (PIREP to ATC as light chop).	• Occupants may feel a slight strain against seat belts. • Liquids shaking but not splashing out of cups • Little or no difficulty in walking.	• Seat belt sign on at Captain's discretion. If sign activated, make PA announcement instructing passengers to return to their seats • Notify Flight Attendant(s) that Light Turbulence Procedures are in effect and the expected duration • Notify ATC (light turbulence or light chop, as applicable)	• Make seat belt sign on announcement, if necessary • Continue service with caution • Discontinue service of hot liquids and remove hot liquids from carts • If seat belt sign on, Verify passenger seat belts are fastened and infants/ children are secured in seat • If seat belt sign on, verify lavatory is unoccupied

Turbulence Encounters (cont)				
Intensity	Definition	Inside Cabin Reaction	Flightdeck Actions	Flight Attendant Actions
Moderate Turbulence	Turbulence that is similar to Light Turbulence but of greater intensity. Changes in altitude or attitude occur but the aircraft remains in positive control at all times. It usually causes variations in indicated airspeed (PIREP to ATC as moderate turbulence) - OR - Turbulence that is similar to Light Chop but of greater intensity. It causes rapid bumps or jolts without appreciable changes in aircraft altitude or attitude (PIREP to ATC as moderate chop).	• Occupants feel a definite strain against seat belts. • Liquids splashing out of cups • Difficulty in walking.	• Seat belt sign must be on • Make P.A. instructing passengers and FAs to be seated • Notify Flight Attendant(s) that Moderate Turbulence Procedures are in effect and expected duration • When moderate turbulence is no longer in effect, notify Flight Attendant(s) when service may be resumed. Extinguish seat belt sign at captain's discretion • Notify ATC (moderate turbulence or moderate chop, as applicable) • Company PIREP (moderate turbulence or moderate chop, as applicable)	• Make seat belt sign on or turbulence announcement, if necessary • Discontinue service • Stow and secure galley equipment and carts • Sit down and secure seat belt • Remain seated until notified by the flightdeck or the seat belt sign has been turned off • Check for passengers/crew needing attention or assistance. Inform captain of any injuries or interior cabin damage
Severe Turbulence	Turbulence that causes large, abrupt changes in altitude or attitude. It usually causes large variations in indicated airspeed. Aircraft may be momentarily out of control (PIREP to ATC as severe turbulence) - OR - Turbulence in which the aircraft is violently tossed about and is practically impossible to control. It may cause structural damage (PIREP to ATC as extreme turbulence)	• Occupants forced violently against seat belt • Items falling or lifting off surface • Walking is impossible	• Seat belt sign must be on • Make P.A. instructing passengers and FAs to be seated immediately • Notify FLIGHT ATTENDANT(S) that Severe Turbulence Procedures are in effect and expected duration • When severe turbulence is no longer in effect, notify Flight Attendant(s) when service maybe resumed. Extinguish seat belt sign at captain's discretion • Notify ATC (severe or extreme turbulence, as applicable) • Company PIREP (severe or extreme turbulence, as applicable)	• Make seat belt sign on or turbulence announcement, if possible • Discontinue service • Set brakes on all carts in present location • Sit down immediately and secure nearest seat belt • Remain seated until notified by the flightdeck or the seat belt sign is turned off • Check for passengers/crew needing attention or assistance. Inform captain of any injuries or interior cabin damage