FLIGHT SAFETY FOUNDATION

ALAR

APPROACH-AND-LANDING ACCIDENT REDUCTION

TOOL KIT

FSF ALAR BRIEFING NOTE 1.6

Approach Briefing

To ensure mutual understanding and effective cooperation among flight crewmembers and air traffic control (ATC), a thorough approach briefing should be conducted on each flight.

Care should be taken to conduct a thorough briefing regardless of:

- How familiar the destination airport and the approach may be; or,
- How often the crewmembers have flown together.

Statistical Data

The Flight Safety Foundation Approach-and-landing Accident Reduction (ALAR) Task Force found that omission of an approach briefing or the conduct of an inadequate approach briefing were factors in the particular approach-and-landing accidents and serious incidents worldwide in 1984 through 1997 that were attributed, in part, to omission of action/inappropriate action. Seventy-two percent of the 76 accidents and serious incidents during the period involved omission of action/inappropriate action.[1]

Briefing Techniques

The importance of briefing techniques often is underestimated, although effective briefings enhance crew standardization and crew communication.

An interactive briefing style — that is, confirming the agreement and understanding of the pilot not flying/pilot monitoring (PNF/PM) after each phase of the briefing — will provide a more effective briefing than an uninterrupted recitation terminated by the final query, "Any questions?"

An interactive briefing fulfills two important purposes:

- To provide the pilot flying (PF) and the PNF/PM with an opportunity to correct each other (e.g., confirm the correct approach chart and confirm the correct setup of navaids for the assigned landing runway); and,
- To share a common mental image of the approach.

The briefing should be structured (i.e., follow the logical sequence of the approach and landing) and concise.

Routine and formal repetition of the same information on each flight may become counterproductive; adapting and expanding the briefing by highlighting the special aspects of the approach or the actual weather conditions will result in more effective briefings.

In short, the briefing should attract the attention of the PNF/PM.

Thus, the briefing should be conducted when the workload and availability of the PNF/PM permit an effective briefing.

Anything that may affect normal operation (e.g., system failures, weather conditions or other particular conditions) should be carefully evaluated and discussed.

The briefing should help the PF (giving the briefing) and the PNF/PM (acknowledging the briefing) to know the sequence of events and actions, as well as the special hazards and circumstances of the approach.

Whether anticipated or not, changes in ATC clearance, weather conditions or landing runway require a partial review of the initial briefing.

Timeliness of Briefings

To prevent any rush (and increased workload) in initiating and conducting the descent and the approach, descent preparation and the approach briefing typically should be

conducted 10 minutes before reaching the beginning-of-descent point.

Scope of Briefing

The approach briefing should include the following aspects of the approach and landing, including a possible missed approach and a second approach or diversion:

- Minimum safe altitude (MSA);
- Terrain, man-made obstructions and other hazards;
- Approach conditions (weather conditions, runway conditions);
- Instrument approach procedure details, including the initial steps of the missed approach procedure;
- Stabilization height (see stabilized approach recommendations);
- Final approach descent gradient (and vertical speed);
- Use of automation (e.g., lateral navigation [LNAV] and vertical navigation [VNAV]);
- Communications;
- Abnormal procedures, as applicable; and,
- Flight Safety Foundation (FSF) *Approach-and-Landing Risk Awareness Tool* (review and discuss).

Approach Briefing

The flight management system (FMS) pages and the navigation display (ND) should be used to guide and illustrate the briefing, and to confirm the various data entries.

An expanded review of the items to be covered in the approach briefing — *as practical and appropriate for the conditions of the flight* — is provided below.

Aircraft Status

Review the status of the aircraft (i.e., any failure or malfunction experienced during the flight) and discuss the possible consequences in terms of operation and performance (i.e., final approach speed and landing distance).

Fuel Status

Review the following items:

- Fuel on board;
- Minimum diversion fuel; and,
- Available holding fuel and time.

Automatic Terminal Information Service (ATIS)

Review and discuss the following items:

- Runway in use (type of approach);
- Expected arrival route (standard terminal arrival [STAR] or radar vectors);
- Altimeter setting (QNH [altimeter setting that causes the altimeter to indicate height above sea level (i.e., field elevation after landing)] or QFE [altimeter setting that causes the altimeter to indicate height above the QFE datum (i.e., zero feet after landing)], as required);
  - For international operations, be aware of the applicable altimeter-setting unit (hectopascals or inches of mercury);
- Transition altitude/flight level (unless standard for the country or for the airport);

Recommended Elements of a Stabilized Approach

All flights must be stabilized by 1,000 ft above airport elevation in instrument meteorological conditions (IMC) and by 500 ft above airport elevation in visual meteorological conditions (VMC). An approach is stabilized when all of the following criteria are met:

1. The aircraft is on the correct flight path;
2. Only small changes in heading/pitch are required to maintain the correct flight path;
3. The aircraft speed is not more than V_{REF} + 20 kt indicated airspeed and not less than V_{REF};
4. The aircraft is in the correct landing configuration;
5. Sink rate is no greater than 1,000 fpm; if an approach requires a sink rate greater than 1,000 fpm, a special briefing should be conducted;
6. Power setting is appropriate for the aircraft configuration and is not below the minimum power for approach as defined by the aircraft operating manual;
7. All briefings and checklists have been conducted;
8. Specific types of approaches are stabilized if they also fulfill the following: instrument landing system (ILS) approaches must be flown within one dot of the glideslope and localizer; a Category II or Category III ILS approach must be flown within the expanded localizer band; during a circling approach, wings should be level on final when the aircraft reaches 300 ft above airport elevation; and,
9. Unique approach procedures or abnormal conditions requiring a deviation from the above elements of a stabilized approach require a special briefing.

An approach that becomes unstabilized below 1,000 ft above airport elevation in IMC or below 500 ft above airport elevation in VMC requires an immediate go-around.

Source: FSF ALAR Task Force

- Terminal weather (e.g., runway condition, likely turbulence, icing or wind shear conditions); and,
- Advisory messages (as applicable).

Notices to Airmen (NOTAMs)

Review and discuss en route and terminal NOTAMs (as applicable).

Beginning-of-Descent Point

Confirm or adjust the beginning-of-descent point, computed by the FMS, as a function of the expected arrival (i.e., following the published STAR or radar vectors).

Approach Charts

Review and discuss the following items using the approach chart and the FMS/ND (as applicable):

- Designated runway and approach type;
- Chart index number and date;
- MSA — reference point, sectors and altitudes;
- Let-down navaids — frequencies and identifications (confirm the correct navaids setup);
- Airport elevation;
- Approach transitions (fixes, holding pattern, altitude and airspeed restrictions, required navaids setup);
- Final approach course (and lead-in radial);
- Terrain features (location and elevation of hazardous terrain or man-made obstacles);
- Approach profile view:
  - Final approach fix (FAF);
  - Final descent point (if different from FAF);
  - Visual descent point (VDP);
  - Missed approach point (MAP);
  - Typical vertical speed at expected final approach groundspeed; and,
  - Touchdown zone elevation (TDZE);
- Missed approach:
  - Lateral navigation and vertical navigation;
  - Airspeed restrictions;
  - Minimum diversion fuel; and,
  - Second approach (discuss the type of approach if a different runway and/or type of approach is expected) or diversion to the alternate airport;
- Ceiling and visibility minimums:
  - Decision altitude/height (DA[H]) setting (Category [CAT] I with or without radio altitude, CAT II and CAT III with radio altitude); or,
  - Minimum descent altitude/height (MDA[H]) setting and radio altimeter setting in DH window (nonprecision approaches); and,
- Local airport requirements (e.g., noise restrictions on the use of thrust reversers, etc.).

CAT II/CAT III Instrument Landing System (ILS)

Review and discuss as applicable, depending on the type of approach.

Airport Charts

Review and discuss the following items using the airport charts:

- Runway length, width and slope;
- Approach lighting and runway lighting, and other expected visual references;
- Specific hazards (as applicable); and,
- Intended exit taxiway.

If another airport is located in the close vicinity of the destination airport, relevant details or procedures should be discussed for awareness purposes.

Use of Automation

Discuss the use of automation for vertical navigation and lateral navigation:

- Use of FMS or selected modes; and,
- Step-down approach (if a constant-angle nonprecision approach [CANPA] is not available).

Landing and Stopping

Discuss the intended landing flaps configuration (if different from full flaps).

Review and discuss the following features of the intended landing runway:

- Surface condition;
- Intended use of autobrakes and thrust reversers; and,
- Expected runway turn-off.

Taxi to Gate

Review and discuss the taxiways expected to be used to reach the assigned gate (with special emphasis on the possible

crossing of active runways). As required, this review and discussion can be delayed until after landing.

Deviations from Standard Operating Procedures (SOPs)

Any intended deviation from SOPs or from standard calls should be discussed during the briefing.

Go-Around

To enhance preparation for a go-around, primary elements of the missed approach procedure and task sharing under normal conditions or abnormal conditions should be discussed during the approach briefing.

The briefing should include the following:

- Go-around call (a loud and clear "go-around/flaps");
- PF-PNF/PM task sharing (flow of respective actions, including desired guidance — mode selection — airspeed target, go-around altitude, excessive-parameter-deviation calls);
- Intended use of automation (automatic or manual go-around, use of FMS LNAV or use of selected modes for the missed approach);
- Missed-approach lateral navigation and vertical navigation (highlight obstacles and terrain features, as applicable); and,
- Intentions (second approach or diversion).

Crews should briefly recall the main points of the go-around and missed approach when established on the final approach course or after completing the landing checklist.

Summary

The approach briefing should be adapted to the conditions of the flight and focus on the items that are relevant for the approach and landing (such as specific approach hazards).

The approach briefing should include the following items:

- MSA;
- Terrain and man-made obstacles;
- Weather conditions and runway conditions;
- Other approach hazards, as applicable;
- Minimums (ceiling and visibility or runway visual range);
- Stabilization height;
- Final approach descent gradient (and vertical speed); and,
- Go-around altitude and missed-approach initial steps.

The following FSF ALAR Briefing Notes provide information to supplement this discussion:

- 1.1 — Operating Philosophy;
- 2.1 — Human Factors;
- 2.3 — Pilot-Controller Communication;
- 5.1 — Approach Hazards Overview;
- 6.1 — Being Prepared to Go Around; and,
- 7.1 — Stabilized Approach.

Note

1. Flight Safety Foundation. "Killers in Aviation: FSF Task Force Presents Facts About Approach-and-landing and Controlled-flight-into-terrain Accidents." *Flight Safety Digest* Volume 17 (November–December 1998) and Volume 18 (January–February 1999): 1–121. The facts presented by the FSF ALAR Task Force were based on analyses of 287 fatal approach-and-landing accidents (ALAs) that occurred in 1980 through 1996 involving turbine aircraft weighing more than 12,500 pounds/5,700 kilograms, detailed studies of 76 ALAs and serious incidents in 1984 through 1997 and audits of about 3,300 flights.

Related Reading From FSF Publications

Loukopoulos, Loukia D.; Dismukes, R. Key; Barshi, Immanuel. "The Perils of Multitasking." *AeroSafety World* Volume 4 (August 2009).

Dean, Alan; Pruchnicki, Shawn. "Deadly Omissions." *AeroSafety World* Volume 3 (December 2008).

Lacagnina, Mark. "Missed Assessment." *AeroSafety World* Volume 3 (October 2008).

Gurney, Dan. "Last Line of Defense." *AeroSafety World* Volume 2 (January 2007).

Gurney, Dan. "Change of Plan." *AviationSafety World* Volume 1 (December 2006).

Gurney, Dan. "Delayed Pull-Up." *AviationSafety World* Volume 1 (September 2006).

Flight Safety Foundation (FSF) Editorial Staff. "Nonadherence to Approach Procedure Cited in Falcon 20 CFIT in Greenland." *Accident Prevention* Volume 61 (November 2004).

FSF Editorial Staff. "Failure to Maintain Situational Awareness Cited in Learjet Approach Accident." *Accident Prevention* Volume 60 (June 2003).

FSF Editorial Staff. "Sabreliner Strikes Mountain Ridge During Night Visual Approach." *Accident Prevention* Volume 60 (April 2003).

FSF Editorial Staff. "Inadequate Weather Communication Cited in B-737 Microburst-downdraft Incident." *Airport Operations* Volume 29 (January–February 2003).

Flight Safety Foundation. "Controlled Flight Into Terrain: Korean Air Flight 801, Boeing 747-300, HL 7468 Nimitz Hill, Guam, August 6, 1997." *Flight Safety Digest* Volume 19 (May–July 2000).

FSF Editorial Staff. "Preparing for Last-minute Runway Change, Boeing 757 Flight Crew Loses Situational Awareness, Resulting in Collision with Terrain." *Accident Prevention* Volume 54 (July–August 1997).

Sumwalt, Robert L. III. "Accident and Incident Reports Show Importance of 'Sterile Cockpit' Compliance." *Flight Safety Digest* Volume 13 (July 1994).

Edwards, Mary. "Crew Coordination Problems Persist, Demand New Training Challenges." *Cabin Crew Safety* Volume 27 (November–December 1992).

Notice

The Flight Safety Foundation (FSF) Approach-and-Landing Accident Reduction (ALAR) Task Force produced this briefing note to help prevent approach-and-landing accidents, including those involving controlled flight into terrain. The briefing note is based on the task force's data-driven conclusions and recommendations, as well as data from the U.S. Commercial Aviation Safety Team's Joint Safety Analysis Team and the European Joint Aviation Authorities Safety Strategy Initiative.

This briefing note is one of 33 briefing notes that comprise a fundamental part of the FSF *ALAR Tool Kit,* which includes a variety of other safety products that also have been developed to help prevent approach-and-landing accidents.

The briefing notes have been prepared primarily for operators and pilots of turbine-powered airplanes with underwing-mounted engines, but they can be adapted for those who operate airplanes with fuselage-mounted turbine engines, turboprop power plants or piston engines. The briefing notes also address operations with the following: electronic flight instrument systems; integrated autopilots, flight directors and autothrottle systems; flight management systems; automatic ground spoilers; autobrakes; thrust reversers; manufacturers'/operators' standard operating procedures; and, two-person flight crews.

This information is not intended to supersede operators' or manufacturers' policies, practices or requirements, and is not intended to supersede government regulations.

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