NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

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Attachment 19 – Premier Landing and Technique

OPERATIONAL FACTORS

ERA13MA139

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A. Premier Landing and Technique

INFO mode processes real time flight information from the Flight Management System. Information presented includes altitude, outside air temperature, groundspeed in miles per hour, and time to destination.

Information provided by Airshow is stored in CD-ROM for output to the airplane monitor.

AUTO mode is designed to continually cycle all of the desired information available. AUTO mode may be interrupted anytime during the cycle to select any of the available information screens.

CABIN BRIEFER

The airplane is provided with a dB Systems, Inc. Cabin Briefer. The briefer provides standard cabin briefings. In addition, the briefer can be supplied with custom briefings as desired by the operator. The system operates in the following modes; Welcome (defined by the dot on the control panel), Turbulence, Landing, and Exit. The audio from the briefer is supplied to the cabin through the airplane Standard Paging System.

LANDING PERFORMANCE AND TECHNIQUE

Procedures identified in the FAA approved Airplane Flight Manual (AFM) must be adhered to in order to obtain the scheduled performance. Along with the procedures presented in the normal procedures section, the operator should review the Flight Test Performance Conditions presented in Section 5 of the AFM to better understand the conditions under which the AFM performance was obtained.

LANDING DISTANCE DETERMINATION

Prior to initiating the approach, the pilot is to determine the required landing distance for the airplane considering the airplane configuration, weight, and field conditions. The Landing Distance graphs contained in the AFM relate required landing distance for combinations of airfield elevation, temperature, wind, runway gradient, and airplane weight. The pilot needs to account for all these variables in the assessment of the required landing distance. If the airplane is landing in an abnormal configuration due to a system failure, the normal landing distance should be determined from the appropriate landing distance graph accounting for all given variables, then increased by the factor identified in the abnormal or emergency procedure. Lastly, the Landing Distance graphs contained in Section 5 of the AFM present performance on paved dry runways. Runway conditions other than this will result in longer distances. Wet and contaminated runway performance is presented in supplements to the AFM.

LANDING APPROACH

A successful landing begins with the approach. The FAA has emphasized the stabilized approach concept for many years, although real life constraints as well as ATC requests and clearances often compromise the stabilized approach concept. This notwithstanding, it is incumbent on the pilot in command to establish a safe, stabilized approach prior to initiating a landing. There are as many definitions of a stabilized approach as there are pilots flying, each one with good points. At a minimum, it is recommended that the pilot evaluate the approach at approximately 1/2 nautical mile from the runway. At 1/2 nautical mile and at the appropriate published V_{ref} speed, the airplane will be approximately 15 seconds from the start of the landing procedure. At 1/2 nautical mile from the threshold, a standard three-degree glide path would place the airplane at 160 feet above the landing field elevation. At this point, the airplane should be in the final landing configuration, trimmed at V_{ref} with normal power setting for the approach. Deviations from this glide path, airspeed, thrust setting or configuration will probably carry into the landing maneuver and could adversely impact the results. If you are still working on establishing the stabilized approach at this point, a go-around should be considered to allow you the opportunity to better set up the landing approach.

LANDING DISTANCE

The landing distance in the AFM comprises two segments: landing air distance and landing ground roll. The landing distance presented in the AFM reflects a performance landing. The presented distances are based on the following procedure: As stated in Section 5 of the AFM, the landing distance begins at a point 50 feet above the landing runway threshold. The airplane is assumed to be stabilized on a three-degree glide path to that point. At 50 feet above the runway threshold, thrust levers are moved to idle with a minimum flare touchdown. No attempt is made to execute a smooth landing. Full brake application is assumed to be applied within one second after touchdown, followed by lift dump deployment within one second. Full brake application is maintained until the airplane reaches a full stop. As used here, "full brake application" means applying maximum brake pressure such that anti-skid is active and controlling the brakes throughout the landing roll. It is not expected that every landing will follow this technique, nor is this technique necessary for every landing. However, every operator needs to know how their individual technique may influence actual landing distance of the airplane. To assist in that effort, a full review of the landing process is presented below with information to assist you in determining how your individual technique will influence the landing distance of the airplane.

AIR DISTANCE

The first major segment of the landing distance lies between the point 50 feet above the landing runway threshold and the point the airplane touches down. At normal landing weights (9000 - 11,600 lbs.), V_{ref} would range between 107 and 121 knots. At V_{ref} speed on a three-degree glide path the stabilized sink rate would range from 567 ft/min up to 641 ft/min (9.5 to 10.7 ft/sec). If no flare were accomplished, the airplane would touch down 954 feet from the threshold at these sink rates. Although the airplane is designed for the loads resulting from these sink rates, it is not the style of landing most passengers would appreciate. To provide for a more reasonable touchdown, the landing distance in the AFM accounts for a flare of two to three seconds to reduce the sink rate. This flare increases the landing air distance from the 954 geometric distance to approximately 1500 feet. The distance in your AFM accounts for this technique. The touchdown sink rate resulting from this minimum flare will be a firm landing and may be more than you, or your passengers desire. If your technique involves a flare that exceeds three seconds, the additional flare will result in increased distance from the 50 foot threshold height to touchdown. The airplane deceleration rate will be negligible in this extended flare, requiring the same braking (ground roll) distance, so this additional distance would be above and beyond that presented in the AFM. Your landing distance will increase 5% for every second of flare beyond 3 seconds. In addition to a delayed touchdown, a threshold crossing height above 50 feet will increase your landing air distance. For every 10 feet above the standard 50 foot threshold height, your landing distance will increase 200 feet.

GROUND ROLL DISTANCE

The other major segment of the landing distance is the ground roll distance. Beginning at the touchdown point, the brakes are to be immediately applied. The brakes are the only deceleration device provided on the Model 390 and the sooner they are applied, the sooner you will stop. The lift dump system greatly increases the effectiveness of the brakes but does not provide significant deceleration itself. The AFM assumes full brake application is achieved one second after touchdown. Following brake application, the lift dump is assumed to be deployed one second later. The lift dump deployed maximum braking condition is assumed to be maintained until the airplane reaches a full stop. Every second delay in brake application, beyond one second, will add 5% to your landing distance.

Another important factor that affects your landing distance is your approach speed. The Model 390 operates at a relatively high wing loading. This results in the airplane being less influenced by turbulence than other aircraft of similar size. This feature allows Model 390 pilots to operate the airplane at scheduled landing approach speeds without adding additional speed for normal turbulence or wind gusts. The scheduled V_{ref} speed should be utilized as the target and response of the airplane monitored on the approach. Speed variations around V_{ref} (above and below) would be normal in gusty or turbulent conditions, but no speed increase would be necessary unless (1) the average of the airspeed excursions starts to drift below V_{ref} or (2) the low speed transients extend down to a speed halfway between V_{ref} and the low speed awareness cue (red line). If either of these cases is noted, the approach speed should be increased just enough to alleviate the condition. If the turbulence diminishes, the speed should be returned back to V_{ref}. If for any reason additional speed is carried into the landing maneuver, the impact of this speed must be accounted for in your landing distance determination. For every knot above V_{ref} the landing distance will increase 1.3%.