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Airplane Flying Handbook

U.S. Department
of Transportation

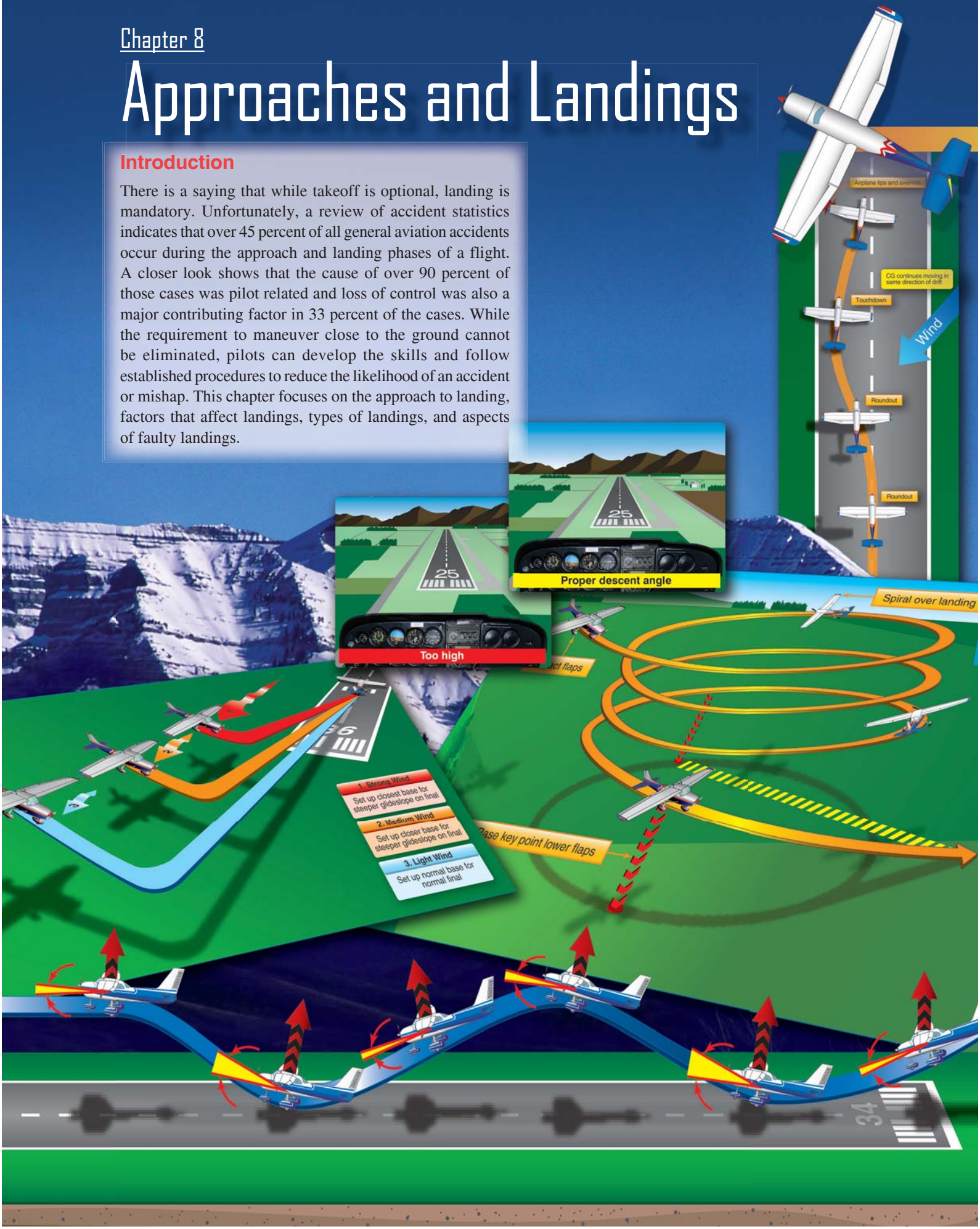
Federal Aviation
Administration

Chapter 8

Approaches and Landings

Introduction

There is a saying that while takeoff is optional, landing is mandatory. Unfortunately, a review of accident statistics indicates that over 45 percent of all general aviation accidents occur during the approach and landing phases of a flight. A closer look shows that the cause of over 90 percent of those cases was pilot related and loss of control was also a major contributing factor in 33 percent of the cases. While the requirement to maneuver close to the ground cannot be eliminated, pilots can develop the skills and follow established procedures to reduce the likelihood of an accident or mishap. This chapter focuses on the approach to landing, factors that affect landings, types of landings, and aspects of faulty landings.



does not bounce like a rubber ball. Instead, it rebounds into the air because the wing's AOA was abruptly increased, producing a sudden addition of lift. *[Figure 8-36]*

The abrupt change in AOA is the result of inertia instantly forcing the airplane's tail downward when the main wheels contact the ground sharply. The severity of the bounce depends on the airspeed at the moment of contact and the degree to which the AOA or pitch attitude was increased.

Since a bounce occurs when the airplane makes contact with the ground before the proper touchdown attitude is attained, it is almost invariably accompanied by the application of excessive back-elevator pressure. This is usually the result of the pilot realizing too late that the airplane is not in the proper attitude and attempting to establish it just as the second touchdown occurs.

The corrective action for a bounce is the same as for ballooning and similarly depends on its severity. When it is very slight and there is no extreme change in the airplane's pitch attitude, a follow-up landing may be executed by applying sufficient power to cushion the subsequent touchdown and smoothly adjusting the pitch to the proper touchdown attitude.

In the event a very slight bounce is encountered while landing with a crosswind, crosswind correction must be maintained while the next touchdown is made. Remember that since the subsequent touchdown is made at a slower airspeed, the upwind wing has to be lowered even further to compensate for drift.

Extreme caution and alertness must be exercised any time a bounce occurs, but particularly when there is a crosswind. Inexperienced pilots almost invariably release the crosswind correction. When one main wheel of the airplane strikes the runway, the other wheel touches down immediately afterwards, and the wings becomes level. Then, with no crosswind correction as the airplane bounces, the wind causes the airplane to roll with the wind, thus exposing even more surface to the crosswind and drifting the airplane more rapidly.

When a bounce is severe, the safest procedure is to execute a go-around immediately. Do not attempt to salvage the landing. Apply full power while simultaneously maintaining directional control and lowering the nose to a safe climb attitude. The go-around procedure should be continued even though the airplane may descend and another bounce may be encountered. It is extremely foolish to attempt a landing from a bad bounce since airspeed diminishes very rapidly in the nose-high attitude, and a stall may occur before a subsequent touchdown could be made.

Porpoising

In a bounced landing that is improperly recovered, the airplane comes in nose first initiating a series of motions that imitate the jumps and dives of a porpoise. *[Figure 8-37]* The problem is improper airplane attitude at touchdown, sometimes caused by inattention, not knowing where the ground is, miss-trimming or forcing the airplane onto the runway.

Ground effect decreases elevator control effectiveness and increases the effort required to raise the nose. Not enough elevator or stabilator trim can result in a nose low contact with the runway and a porpoise develops.

Porpoising can also be caused by improper airspeed control. Usually, if an approach is too fast, the airplane floats and the pilot tries to force it on the runway when the airplane still wants to fly. A gust of wind, a bump in the runway, or even a slight tug on the control wheel sends the airplane aloft again.

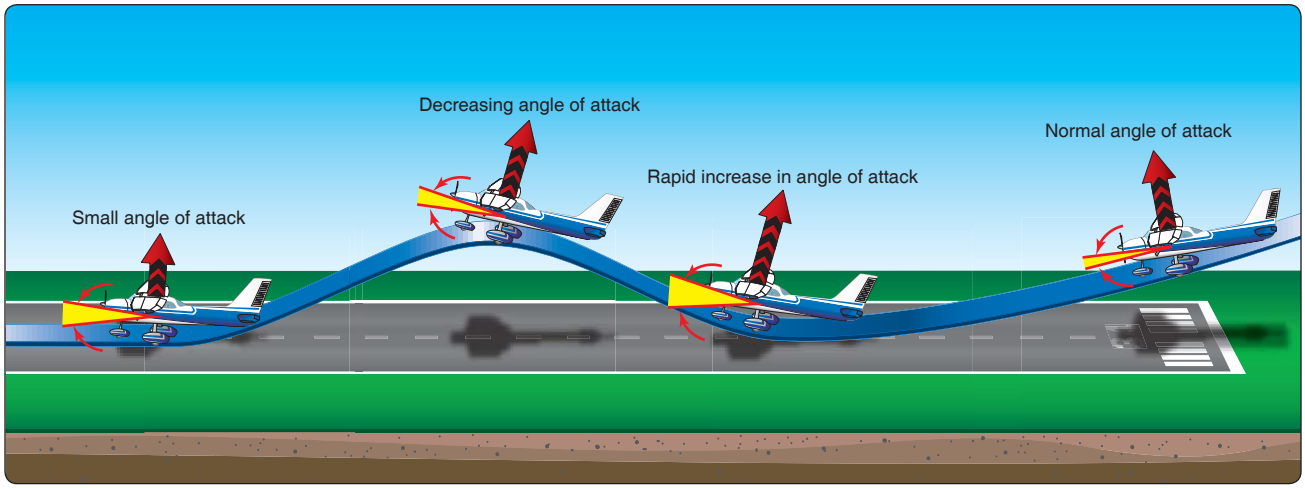


Figure 8-36. *Bouncing during touchdown.*