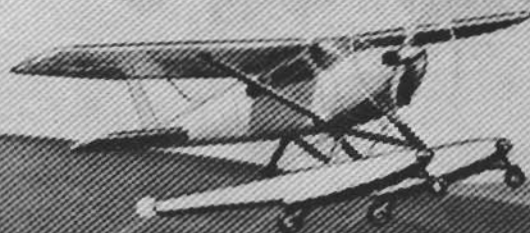


AC 61-21A

# Flight Training Handbook



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**U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION**

**FLIGHT STANDARDS SERVICE**



cleared periodically by briefly advancing the throttle to normal cruise power, while adjusting the pitch attitude to maintain a constant airspeed. Preferably, this should be done while headed into the wind to minimize any variation in groundspeed and radius of turn.

After the throttle is closed and gliding speed is established, a gliding spiral should be started and a turn of constant radius maintained around the selected spot on the ground. This will require correction for wind drift by steepening the bank on downwind headings and shallowing the bank on upwind headings, just as in the maneuver "turns around a point." During the descending spiral the pilot must judge the direction and speed of the wind at different altitudes and make appropriate changes in the angle of bank to maintain a uniform radius.

A constant airspeed should also be maintained throughout the maneuver. Failure to hold the airspeed constant will cause the radius of turn and necessary angle of bank to vary excessively. On the downwind side of the maneuver, the steeper the bank angle the lower the pitch attitude must be to maintain a given airspeed. Conversely, on the upwind side, as the bank angle becomes shallower, the pitch attitude must be raised to maintain the proper airspeed. This is necessary because the airspeed tends to change as the bank is changed from shallow to steep to shallow.

During practice of the maneuver the pilot should execute a specific number of turns and roll out toward a definite object or on a specific heading. During the rollout, smoothness, is essential, and the use of controls must be so coordinated that no increase or decrease of speed results when the straight glide is resumed.

#### **Descents (Maximum Distance Glides)**

The best angle of glide is one that allows the airplane to travel the greatest distance over the ground with the least loss of altitude. This is the airplane's maximum L/D (lift over drag) and is usually expressed as a ratio. For example, an airplane having an L/D or glide ratio of 10:1 will travel 10 feet forward for every foot it descends.

For a particular airplane the manufacturer recommends an airspeed and configuration that will provide the maximum glide distance. This speed (best glide speed) usually found in the Airplane Flight Manual or Pilot's Operating Manual, is of primary importance because if the engine should fail in flight the pilot's chief concern may be whether or not the airplane can glide far enough to reach a suitable landing area.

The objective of this maneuver, then, is to establish a glide that will allow the airplane to travel forward the greatest possible distance from a given altitude.

To establish the glide, the landing gear and flaps should first be retracted to eliminate unwanted drag. The throttle should be reduced to idle, the propeller placed in full high pitch (low RPM) position, and the airplane then eased into a glide until the proper airspeed is established. If the airplane's nose is lowered excessively, the airplane will go into too steep a glide, and naturally will cover very little horizontal distance. On the other hand if the nose is raised too high and too much airspeed is lost, the airplane will settle and descend at a steeper angle than if the nose were somewhat lower.

When practicing the power-off descents, the engine should be cleared periodically, as is done in the steep spiral maneuver, to prevent excessive cooling and fouling, and of course the descent should be terminated at a safe altitude. Care must be exercised when advancing the throttle to avoid overstressing the engine.

#### **Descents (Emergency)**

This maneuver is a procedure for establishing the fastest practical rate of descent during emergency conditions which may arise as the result of an uncontrollable fire, a sudden loss of cabin pressurization, or any other situation demanding an immediate and rapid descent. The objective, then, is to descend the airplane as soon and as rapidly as possible, within the limitations of the airplane, to an altitude from which a safe landing can be made, or an altitude where pressurization or supplemental oxygen is not needed.

The simulated emergency descent must be started high enough to permit recovery at a safe altitude. Before entering the maneuver, the area below must be free of other air traffic, since the loss of altitude is quite rapid. *In no case should the airplane's never-exceed speed ( $V_{ne}$ ), maximum gear-extended speed ( $V_{ge}$ ), or maximum flap-extended speed ( $V_{fe}$ ) be exceeded.*

Generally, the maneuver should be performed with the airplane configured as recommended by the manufacturer. Except when prohibited by the manufacturer, the **power should be reduced to idle**, and the **propeller control (if so equipped), should be placed in the low pitch (or high RPM) position.** This will allow the propeller to act as an aerodynamic brake to help prevent excessive airspeed during the descent. As quickly as practical, **the landing gear and full flaps should be extended** to provide maximum drag so that a descent as rapidly as possible can be made without excessive airspeed. This, of course, should be done only in accordance with the airplane manufacturer's recommendations.

To maintain *positive* load factors (G forces) and for the purpose of clearing the area below,

a **30° to 45° bank should be established** for at least a 90° heading change while initiating the descent.

Normally during student training, as soon as all prescribed procedures are completed and the descent is established and stabilized, the maneuver should be terminated. In airplanes with piston engines, a prolonged practice emergency descent should be avoided to prevent excessive cooling of the cylinders.

## Chandelles

A "chandelle" is a climbing turn beginning from approximately straight-and-level flight, and ending at the completion of 180° of turn in a wings-level, nose-high attitude at the minimum controllable airspeed (Fig. 11-31). The maneuver demands that the maximum flight performance of the airplane be obtained; that is, the airplane should gain the most altitude possible for a given degree of bank and power setting without stalling. However, since numerous atmospheric variables beyond control of the pilot will affect the specific amount of altitude gained, the altitude gain is not a criterion of the quality of the maneuver.

## CHANDELLE

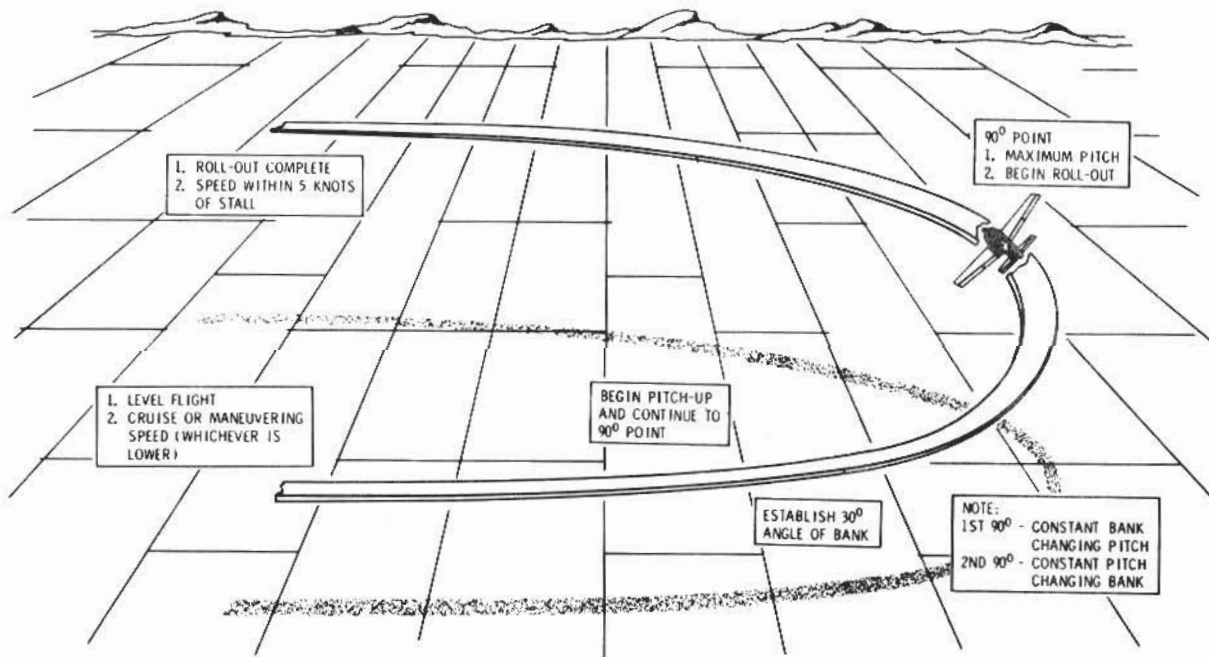


Figure 11-31 Chandelle