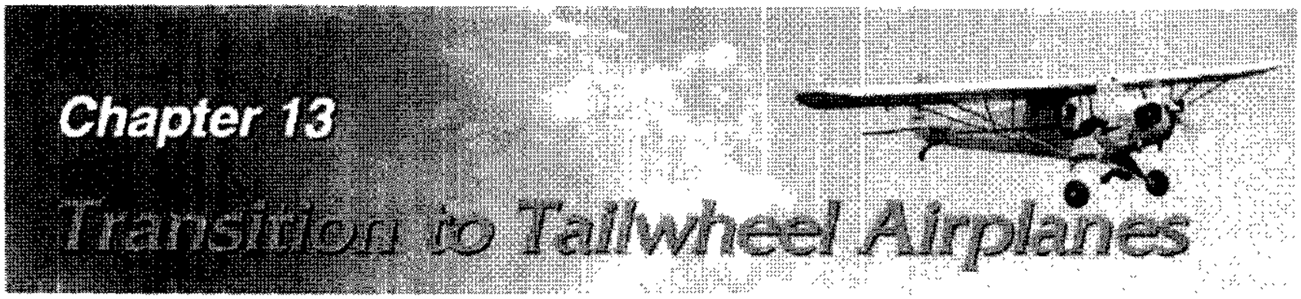

TAILWHEEL AIRPLANES

Tailwheel airplanes are often referred to as conventional gear airplanes. Due to their design and structure, tailwheel airplanes exhibit operational and handling characteristics that are different from those of tricycle gear airplanes. Tailwheel airplanes are not necessarily more difficult to takeoff, land, and/or taxi than tricycle gear airplanes; in fact under certain conditions, they may even handle with less difficulty. This chapter will focus on the operational differences that occur during ground operations, takeoffs, and landings.

LANDING GEAR

The main landing gear forms the principal support of the airplane on the ground. The tailwheel also supports the airplane, but steering and directional control are its primary functions. With the tailwheel-type airplane, the two main struts are attached to the airplane slightly ahead of the airplane's center of gravity (CG).

The rudder pedals are the primary directional controls while taxiing. Steering with the pedals may be accomplished through the forces of airflow or propeller slipstream acting on the rudder surface, or through a mechanical linkage to the steerable tailwheel. Initially, the pilot should taxi with the heels of the feet resting on the cockpit floor and the balls of the feet on the bottom of the rudder pedals The feet should be slid up onto the brake pedals only when it is necessary to depress the brakes. This permits the simultaneous application of rudder and brake whenever needed. Some models of tailwheel airplanes are equipped with heel brakes rather than toe brakes. In either configuration the brakes are used primarily to stop the airplane at a desired point, to slow the airplane, or as an aid in making a sharp controlled turn. Whenever used, they must be applied smoothly, evenly, and cautiously at all times.

TAXIING

When beginning to taxi, the brakes should be tested immediately for proper operation. This is done by first applying power to start the airplane moving slowly forward, then retarding the throttle and simultaneously applying pressure smoothly to both brakes. If braking action is unsatisfactory, the engine should be shut down immediately.

To turn the airplane on the ground, the pilot should apply rudder in the desired direction of turn and use whatever power or brake that is necessary to control the taxi speed. The rudder should be held in the direction of the turn until just short of the point where the turn is to be stopped, then the rudder pressure released or slight opposite pressure applied as needed. While taxiing, the pilot will have to anticipate the movements of the airplane and adjust rudder pressure accordingly. Since the airplane will continue to turn slightly even as the rudder pressure is being released, the stopping of the turn must be anticipated and the rudder pedals neutralized before the desired heading is reached. In some cases, it may be necessary to apply opposite rudder to stop the turn, depending on the taxi speed.

The presence of moderate to strong headwinds and/or a strong propeller slipstream makes the use of the elevator necessary to maintain control of the pitch attitude while taxiing. This becomes apparent when considering the lifting action that may be created on the horizontal tail surfaces by either of those two factors. The elevator control should be held in the aft position (stick or yoke back) to hold the tail down.

When taxiing in a quartering headwind, the wing on the upwind side will usually tend to be lifted by the wind unless the aileron control is held in that direction (upwind aileron UP). Moving the aileron into the UP position reduces the effect of wind striking that wing, thus reducing the lifting action. This control movement will also cause the opposite aileron to be placed in the DOWN position, thus creating drag and possibly some lift on the downwind wing, further reducing the tendency of the upwind wing to rise.

When taxiing with a quartering tailwind, the elevator should be held in the full DOWN position (stick or yoke full forward), and the upwind aileron down. Since the wind is striking the airplane from behind, these control positions reduce the tendency of the wind to get under the tail and the wing possibly causing the airplane to nose over. The application of these crosswind taxi corrections also helps to minimize the weathervaning tendency and ultimately results in increased controllability.

An airplane with a tailwheel has a tendency to weathervane or turn into the wind while it is being taxied. The tendency of the airplane to weathervane is greatest while taxiing directly crosswind; consequently, directional control is somewhat difficult. Without brakes, it is almost impossible to keep the airplane from turning into any wind of considerable velocity since the airplane's rudder control capability may be inadequate to counteract the crosswind. In taxiing downwind, the tendency to weathervane is increased, due to the tailwind decreasing the effectiveness of the flight controls. This requires a more positive use of the rudder and the brakes, particularly if the wind velocity is above that of a light breeze.

Unless the field is soft, or very rough, it is best when taxiing downwind to hold the elevator control in the forward position. Even on soft fields, the elevator should be raised only as much as is absolutely necessary to maintain a safe margin of control in case there is a tendency of the airplane to nose over.

On most tailwheel-type airplanes, directional control while taxiing is facilitated by the use of a steerable tailwheel, which operates along with the rudder. The tailwheel steering mechanism remains engaged when the tailwheel is operated through an arc of about 16 to 18° each side of neutral and then automatically becomes full swiveling when turned to a greater angle. On some models the tailwheel may also be locked in place. The airplane may be pivoted within its own length, if desired, yet is fully steerable for slight turns while taxiing forward. While taxiing, the steerable tailwheel should be used for making normal turns and the pilot's feet kept off the brake pedals to avoid unnecessary wear on the brakes.

Since a tailwheel-type airplane rests on the tailwheel as well as the main landing wheels, it assumes a nose-high attitude when on the ground. In most cases this places the engine cowling high enough to restrict the pilot's vision of the area directly ahead of the airplane. Consequently, objects directly ahead of the airplane are difficult, if not impossible, to see. To observe and avoid colliding with any objects or hazardous surface conditions, the pilot should alternately turn the nose from one side to the other—that is zigzag, or make a series of short S-turns while taxiing forward. This should be done slowly, smoothly, positively, and cautiously.

NORMAL TAKEOFF ROLL

After taxiing onto the runway, the airplane should be carefully aligned with the intended takeoff direction, and the tailwheel positioned straight, or centered. In airplanes equipped with a locking device, the tailwheel should be locked in the centered position. After releasing the brakes, the throttle should be smoothly and continuously advanced to takeoff power. As the airplane starts to roll forward, the pilot should slide both feet down on the rudder pedals so that the toes or balls of the feet are on the rudder portions, not on the brake portions.

An abrupt application of power may cause the airplane to yaw sharply to the left because of the torque effects of the engine and propeller. Also, precession will be particularly noticeable during takeoff in a tailwheeltype airplane if the tail is rapidly raised from a three point to a level flight attitude. The abrupt change of attitude tilts the horizontal axis of the propeller, and the resulting precession produces a forward force on the right side (90° ahead in the direction of rotation), yawing the airplane's nose to the left. The amount of force created by this precession is directly related to the rate the propeller axis is tilted when the tail is raised. With this in mind, the throttle should always be advanced smoothly and continuously to prevent any sudden swerving.

Smooth, gradual advancement of the throttle is very important in tailwheel-type airplanes, since peculiarities in their takeoff characteristics are accentuated in proportion to how rapidly the takeoff power is applied.

As speed is gained, the elevator control will tend to assume a neutral position if the airplane is correctly trimmed. At the same time, directional control should be maintained with smooth, prompt, positive rudder corrections throughout the takeoff roll. The effects of torque and P-factor at the initial speeds tend to pull the nose to the left. The pilot must use what rudder pressure is needed to correct for these effects or for existing wind conditions to keep the nose of