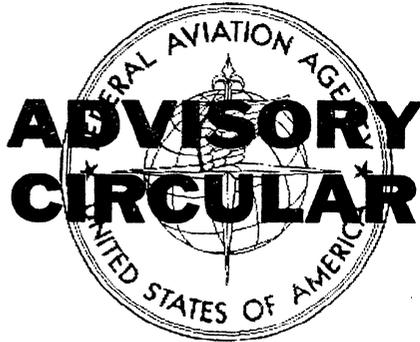


Federal Aviation Agency



AC NO: AC 90-34

AIR TRAFFIC AND
GENERAL OPERATIONS

EFFECTIVE :

2/27/68

SUBJECT : ACCIDENTS RESULTING FROM "WHEELBARROWING" IN
TRICYCLE GEAR EQUIPPED AIRCRAFT

-
1. PURPOSE. This advisory circular has been prepared to explain this phenomenon, the circumstances under which it is likely to occur, and recommended corrective action.
 2. BACKGROUND.
 - a. "Wheelbarrowing" may be described as an attitude or condition in a tricycle gear equipped aircraft that is encountered after initial ground contact during landing rollout, wherein the main wheels are lightly loaded or clear of the runway. However, the nose wheel is firmly in contact with the runway thus causing the nose gear to support a greater than normal percentage of aircraft weight while providing the only means of steering. In a crosswind, the airplane in this situation tends to pivot rapidly about the nosewheel, in a maneuver very similar to a ground loop in a tailwheel type airplane. Other indications of "wheelbarrowing" are wheel skipping and/or extreme loss of braking effect when the brakes are applied.
 - b. Normally, "wheelbarrowing" may be encountered if the pilot is utilizing excess approach speed in a full flap configuration that results in the aircraft touching down with little or no rotation. After this touchdown, the pilot may then try to hold the aircraft on the ground with forward pressure on the control wheel. Under these conditions, braking and steering capability is severely diminished and "wheelbarrowing" is likely to result.
 - c. Information received reveals that a number of "wheelbarrowing" accidents have occurred during crosswind landings made by pilots flying aircraft equipped with stabilator type elevators and nose wheel/rudder steering, and utilizing the "slip" technique for crosswind correction. On most general aviation aircraft, the nose wheel steers when rudder is applied and, for this reason, such landings require careful rudder operation just prior to and during touchdown. The "slip" method of drift correction is favored by
-

the majority of pilots as it accomplishes the desired results without presenting the need for a last minute directional correction prior to touchdown.

3. INFORMATION. While this information pertains to low wing aircraft with steerable nose gear, this "wheelbarrowing" effect may also prevail with other tricycle gear aircraft.
- a. It is recommended that pilots heed, and instructors emphasize, the need for proper attitude and airspeed control during approach and landing, particularly in crosswind conditions. These techniques are explained in detail in Advisory Circular 61-21, Flight Training Handbook. This publication is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
 - b. Corrective action must be based on a number of factors, i.e., degree of development of the wheelbarrowing, pilot proficiency, remaining runway length and aircraft performance versus aircraft configuration. Only after considering at least these factors, the pilot should initiate one of the following corrective measures:
 - (1) Close the throttle, relax forward elevator pressure to aft of the neutral position to lighten the load on the nosegear and return steering and braking to normal. If the flaps can be retracted safely during rollout, additional braking will be obtained on dry runways.
 - (2) If the aircraft is not pivoting, adequate aircraft performance is available, adequate runway is available and obstructions are not a factor execute a "go around."
 - c. During takeoff, the "wheelbarrowing" effect can occur at lower speeds than during landing due to the propwash increasing the lifting power of the horizontal stabilator. The use of excessive forward stick pressure during takeoff to hold the airplane on the ground to speeds above normal takeoff speed is not recommended.


acting Director
Flight Standards Service