



Memorandum for Record

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National Transportation Safety Board
Office of Aviation Safety – Western Pacific Region

NTSB Accident Number: WPR20LA024
Aircraft Registration & Make/Model: N3206R / Piper PA28
Accident Location: Ogden, Utah
Accident Date: November 17, 2019

The following pages are excerpts from the Piper Aircraft PA28R-180 1968 Owner's Handbook.

LANDING GEAR

The Cherokee Arrow is equipped with a retractable tricycle landing gear which is hydraulically actuated by an electrically power reversible pump. The pump is controlled by a selector switch on the instrument panel to the left of the control quadrant. The landing gear is retracted or extended in about seven seconds.

Some aircraft also incorporate a pressure sensing device in the system which lowers the gear regardless of gear selector position, depending upon airspeed and engine power (propeller slipstream). Gear extension is designed to occur, even if the selector is in the up position, at airspeeds below approximately 105 mph with power off. The device also prevents the gear from retracting at airspeeds below approximately 85 mph with full power, though the selector switch may be in the up position. This speed increases with reduced power and/or increased altitude. The gear will not retract above a speed of approximately 125 to 130 mph. The sensing device operation is controlled by differential air pressure across a flexible diaphragm which is mechanically linked to a hydraulic valve and an electrical switch which actuates the pump motor. A high pressure and static air source for actuating the diaphragm is provided in a mast mounted on the left side of the fuselage above the wing. Manual override of the device is provided by an emergency gear lever located between the front seats to the left of the flap handle.

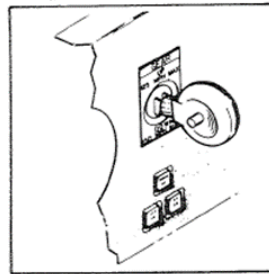
The emergency gear lever, when held in the raised position, can be used to override the system, and gear position is controlled by the selector switch regardless of airspeed-power combinations. The lever must also be held in the raised position when gear up stalls are practiced.

The emergency gear lever, when used for emergency extension of the gear, manually releases hydraulic pressure to permit the gear to free fall with spring assistance on the nose gear. The lever must be held in the downward position for emergency extension.

Gear down and locked positions are indicated by three green lights located below the selector, and a yellow light for in transit positions is located at the top of the panel. All lights out indicate the gear is up.

Two micro-switches in the throttle quadrant activate a warning horn and a red Warning Gear Up light under the following conditions:

- (1) Gear up and power reduced below approximately 14 inches of manifold pressure.

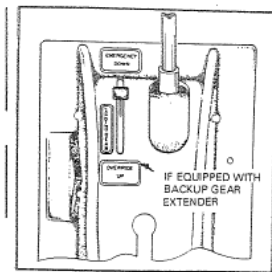


Landing Gear Selector

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Figure 1. Landing gear, and back up landing gear extender system description.



Emergency Gear Lever

(2) On aircraft equipped with the backup gear extender, if the system has extended the landing gear and the landing gear selector is UP, except with full throttle.

(3) Gear selector switch is UP while on the ground.

On aircraft which are NOT equipped with the backup gear extender, an additional switch is installed which activates the warning horn and light whenever the flaps are extended beyond the approach position (10°) and the landing gear are not down and locked.

The nose gear is steerable through a 60 degree arc through use of the rudder pedals. As the nose gear retracts, the steering linkage disengages to reduce rudder pedal loads in flight. The nose wheel is equipped with a hydraulic shimmy dampener.

The oleo struts are of the air-oil type, with normal extension being 2.75 inches for the nose gear and 2.0 inches for the main gear under normal static load (empty weight of airplane plus full fuel and oil).

The standard brake system includes toe brakes on the left set of rudder pedals and a hand brake located below and near the center of the instrument panel. The toe brakes and the lever have their own brake cylinders, but they both use a common reservoir. The parking brake is incorporated in the lever brake and is

Figure 2. Emergency gear lever description.

engine is warm enough for takeoff when the throttle can be opened without the engine faltering. Do not take off with a dead battery as some voltage is needed to excite the alternator.

TAKEOFF

Just before takeoff the following items should be checked:

- | | |
|----------------------------|---------------------------------|
| 1. Fuel - on proper tank | 6. Quadrant friction knob - set |
| 2. Electric fuel pump - ON | 7. Flaps - set |
| 3. Engine gauges - checked | 8. Trim tab - set |
| 4. Prop - set | 9. Controls - free |
| 5. Mixture - set | 10. Door - latched |

The takeoff technique is conventional for the Cherokee Arrow. The tab should be set slightly aft of neutral, with the exact setting determined by the loading of the aircraft. Allow the airplane to accelerate to 60 to 70 mph, then ease back on the wheel enough to let the airplane fly itself off the ground. Premature raising of the nose, or raising it to an excessive angle will result in a delayed takeoff. After takeoff, let the aircraft accelerate to the desired climb speed by lowering the nose slightly.

Takeoffs are normally made with flaps up. However, for short field takeoffs, and for takeoffs under difficult conditions such as deep grass or on a soft surface, distances can be reduced appreciably by lowering flaps to 25° (second notch).

After takeoff, the pilot should retract the landing gear with the gear selector switch located on the instrument panel. If the aircraft is equipped with the backup gear extender and the gear selector switch is placed in the gear up position before reaching the airspeed* at which the system no longer commands gear down, the gear will not retract. This simply indicates that the system is functioning. Normally, the airplane should be allowed to accelerate to this airspeed* before placing the selector switch in the gear up position.

For obstacle clearance on takeoff and for takeoff from high altitude

Figure 3. Takeoff procedures.

SECTION III

CHEROKEE "ARROW"

airports, on aircraft equipped with the backup gear extender, the landing gear can be retracted at the pilot's discretion by placing the gear selector switch in the up position and then holding the emergency gear lever in the override up position. It is necessary to hold the lever in the override up position until the airspeed* required for retraction by the system has been attained.

After takeoff has proceeded to a safe altitude, recommended climb power is 25 inches of manifold pressure and 2500 rpm.

*Approximate airspeed of 85 mph IAS at sea level to 100 mph IAS at 10,000 ft, with a straight line variation between.

CLIMB

The best rate of climb at gross weight will be obtained at 100 mph. The best angle of climb may be obtained at 90 mph. At light gross weights these speeds are reduced somewhat. For climbing en route a speed of 110 mph is recommended. This will produce better forward speed and increased visibility over the nose during the climb.

STALLS

All controls are effective at speeds down through the stalling speed, and stalls are gentle and easily controlled.

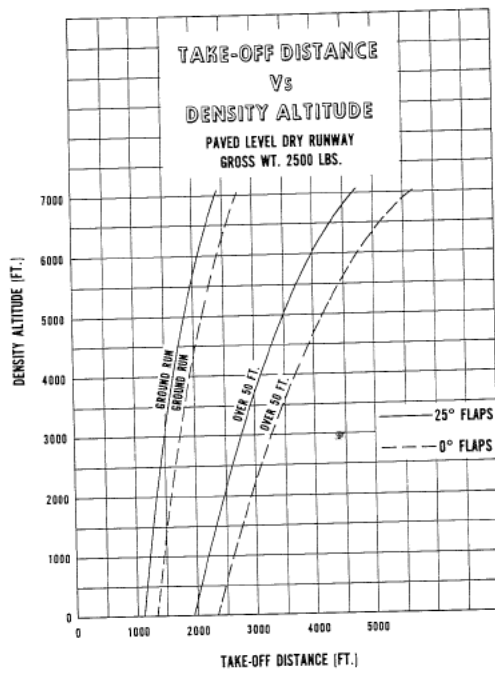
STALL SPEED TABLE

Angle Of Bank	Flaps 40°	Flaps Retracted
0°	63 MPH	69 MPH
20°	65 MPH	71 MPH
40°	72 MPH	79 MPH
60°	89 MPH	98 MPH

Power Off — Gear Down — Gross Weight 2500 lbs.

Figure 4. Take off procedures continued.

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PIPER CHEROKEE**

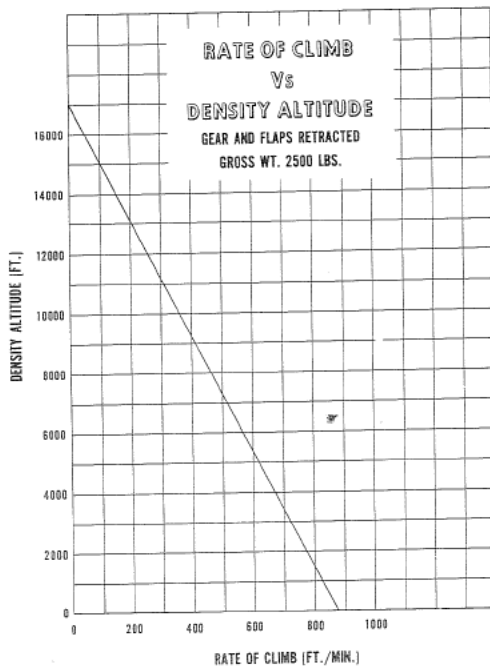


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Figure 5. Takeoff distance vs. density altitude.

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Figure 6. Rate of climb vs. density altitude.