

SECTION 2

LIMITATIONS

2.1 GENERAL

This section provides the "FAA Approved" operating limitations, instrument markings, color coding and basic placards necessary for the safe operation of the PA-31-350 Navajo Chieftain and its systems.

Limitations associated with those optional systems and equipment which require handbook supplements can be found in Section 9 (Supplements).

2.3 AIRSPEED LIMITATIONS

SPEED	KCAS	KIAS
Never Exceed Speed (V_{NE}) - Do not exceed this speed in any operation.	236	236
Maximum Structural Cruising Speed (V_{NO}) - Do not exceed this speed except in smooth air and then only with caution.	187	185
Design Maneuvering Speed (V_A) - Do not make full or abrupt control movements above this speed.	162	160
Maximum Flaps Extended Speed (V_{FE}) - Do not exceed this speed with a given flap setting.		
Flaps extended speeds		
15° flap (serial numbers 31-7752001 through 7752201)	152	154
15° flap (serial numbers 31-7852001 and up)	160	162
25° flap (full flaps) (serial numbers 31-7752001 through 7852171)	130	132
25° flap (serial numbers 31-7952001 and up)	160	162
40° flap (full flaps) (serial numbers 31-7952001 and up)	130	132
Maximum Gear Extended Speed (V_{LE}) - Do not exceed this speed with landing gear extended.		
Serial numbers 31-7752001 through 7752201	130	128
Serial numbers 31-7852001 and up	156	153
Maximum Landing Gear Operating Speed (V_{LO}) - Do not extend or retract landing gear above this speed.		
Extend		
Serial numbers 31-7752001 through 7752201	130	128
Serial numbers 31-7852001 and up	156	153
Retract	130	128

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**PIPER AIRCRAFT CORPORATION
PA-31-350, NAVAJO CHIEFTAIN**

	KCAS	KIAS
Air Minimum Control Speed (V_{MCA}) - Lowest airspeed at which airplane is controllable with one engine operating and takeoff flaps.	78	76
Stall Speed (full flaps, gear down, power off, 7000 lbs.) (See Section 5, Performance, for stall speeds at reduced weights.)	74	74

NOTE

The maximum altitude loss during a single-engine stall, gear and flaps retracted is 600 feet. For a symmetrical power-off stall, gear and flaps retracted, maximum altitude loss is 500 feet. Altitude loss is less for other aircraft configurations.

Demonstrated Crosswind Velocity	20 KTS
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2.5 AIRSPEED INDICATOR MARKINGS

MARKING	KIAS
Green Arc (Normal Operating Range)	77 to 185
Yellow Arc (Caution Range - Smooth Air)	185 to 236
White Arc (Flaps Extended Range)	74 to 132
Radial Red Line (Never Exceed - Smooth Air)	236
Radial Red Line (Minimum Control Speed)	76
Radial Blue Line (Best Rate of Climb Speed - Single Engine)	106

2.7 POWER PLANT LIMITATIONS

(a) Number of Engines	2
(b) Engine Manufacturer	Lycoming
(c) Engine Model Number	
(1) Left	TIO-540-J2BD
(2) Right	LTIO-540-J2BD
(d) Engine Operating Limits	
(1) Maximum Horsepower	350
(2) Maximum Rotational Speed (RPM)	2575
(3) Maximum Manifold Pressure (Inches of Mercury)	
To 15,000 feet	49.0
15,000 to 22,000 feet	49.0 minus .61 per 1000 feet increase
22,000 to 24,000 feet	49.0 minus 2.2 per 1000 feet increase
(4) Maximum Cylinder Head Temperature	500° F
(5) Maximum Oil Temperature	245° F
(6) Maximum Exhaust Gas Temperature	1650° F
(e) Oil Pressure	
Minimum (red line)	25 PSI
Maximum (red line)	100 PSI

ENGINE FAILURE DURING FLIGHT (Below 76 KIAS)

Should an engine fail during flight at an airspeed below 76 KIAS, apply rudder towards the operative engine to maintain directional control. The throttles should be retarded to stop the yaw force produced by the inoperative engine. Lower the nose of the aircraft to accelerate above 76 KIAS and increase the power on the operative engine as the airspeed exceeds 76 KIAS.

After an airspeed above 76 KIAS has been established, an engine restart attempt may be made if altitude permits. If the restart has failed, or altitude does not permit, the engine should be secured. Move the propeller control of the inoperative engine to FEATHER and complete the "Engine Securing Procedure." Adjust the trim to a 5° bank into the operating engine. The cowl flap on the operative engine should be adjusted as required to maintain engine temperature within allowable limits.

ENGINE FAILURE DURING FLIGHT (Above 76 KIAS)

If an engine fails at an airspeed above 76 KIAS during flight, begin corrective response by identifying the inoperative engine. The operative engine should be adjusted as required after the loss of power has been verified. Attain and maintain an airspeed of 106 KIAS. Once the inoperative engine has been identified and the operating engine adjusted properly, an engine restart may be attempted if altitude permits.

Prior to securing the inoperative engine, check to make sure the fuel flow to the engine is sufficient. If the fuel flow is deficient, turn ON the emergency fuel pump. Check the fuel quantity on the inoperative engine side and switch the fuel selector to the other tank if a sufficient supply is indicated. Check the oil pressure and oil temperature and insure that the magneto switches are ON.

If the engine fails to start it should be secured using the "Engine Securing Procedure."

After the inoperative engine has been secured, the operative engine can be adjusted. Power should be maintained as required and the mixture control should be adjusted for power. Check the fuel supply and turn ON the emergency fuel pump if necessary. The cowl flaps on the operative engine should be adjusted as required to maintain engine temperatures within allowable limits. Adjust the trim to a 5° bank into the operating engine. The electrical load should be decreased to a required minimum. Land as soon as practical at the nearest suitable airport.

SINGLE ENGINE LANDING

If a single-engine landing is necessary, a check should be performed to determine whether or not the hydraulic pump is functioning for normal gear extension. This check is accomplished by placing the landing gear control in the "UP" position with the gear retracted. If the hydraulic pump is functioning, pressure will return the control to the neutral position. This check should be performed before entering the traffic pattern so that there will be time to pump the gear down with the hand pump if necessary.

The "Engine Securing Procedure" should be complete on the inoperative engine. Fasten the seat belts and shoulder harnesses and select the "FAN" position of the heater switch. The operative engine electric fuel pump should be ON and the mixture RICH. Advance the propeller control (operative engine) full forward. Check to ensure that the fuel selector is ON the main (inboard) tank on the same side as the operating engine. The fuel crossfeed valve should be OFF. The cowl flaps on the operative engine should be adjusted as required.

Maintain an airspeed of 116 KIAS or above and an altitude higher than normal until a landing is assured. When a landing is assured, extend the gear and flaps. Slowly retard the power on the operative engine and flare out the airplane for a normal landing. Trim as necessary as power is reduced. The airplane will tend to yaw toward the operative engine.

SINGLE ENGINE GO-AROUND

A single engine go-around should be avoided if at all possible. A go-around from a full flap position is not possible unless sufficient altitude is available to raise flaps in a descent. A final approach speed above 106 KIAS will place the airplane in the best configuration should a go-around be necessary.

To execute a single engine go-around, advance mixture, throttle, and propeller controls fully forward for maximum power on the operating engine. Retract flaps and landing gear. Maintain the airspeed at or above 106 KIAS. Set the trim and cowl flaps as required.

WARNING

A go-around should not be attempted after the airspeed is decreased below the best single engine angle of climb speed (104 KIAS).

During climbs, the best single engine rate of climb speed of 106 KIAS is recommended; however, in high ambient temperatures, airspeed must be increased to 110 KIAS as required for improved cooling. Normally, cylinder head temperatures can be maintained within limits through cowl flap adjustments. Climb rate will be reduced by approximately 50 FPM.

AIR START (UNFEATHERING PROCEDURE)

Turn ON the fuel selector of the inoperative engine side and push in the fuel boost pump circuit breaker. Open the throttle 1/2 inch. Move the propeller control full forward and the mixture control slowly forward. Turn ON the magnetos. Engage the starter until the propeller is unfeathered. As the RPM passes 1000 coming out of feather, pull the propeller control back to the low RPM position to prevent excessive engine speed. Maintain the engine speed between 1800 and 2000 RPM, not exceeding 2000 RPM. This low power setting must be held until the engine is warmed up and oil pressure and temperature are stabilized within limits. Turn the alternator ON and check the engine instruments. The air conditioner and propeller synchrophaser (if installed) can then be turned ON.

3.9 ENGINE ROUGHNESS

If an engine falters or runs erratically, the cause may be fuel flow interruption, fuel contamination, icing or air starvation, or ignition problems. If roughness occurs, turn the emergency fuel pumps ON. Scan the engine instruments to see if the cause can be determined. Adjust the mixture controls for maximum smoothness; if the mixture is too rich or too lean, engine roughness may result. Open the alternate air control; a blocked induction system can cause roughness. If cylinder head temperatures are too high or too low, adjust the cowl flaps as required.

If the problem is in the fuel system, selecting another tank containing fuel may remedy the situation. A check of the magnetos will determine if they are operating properly.

WARNING

If either the right or left fuel flow warning light illuminates and the fuel gauge indicates fuel remaining in the corresponding inboard tank, this will indicate a malfunction of the flapper door in the inboard tank. Immediately select the outboard tank or select crossfeed to avoid fuel flow interruption.