Chapter 1

Aircraft Information Summary

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General

This section presents a partial summary of the operating limitations and aircraft information necessary for the safe operation of the PA-34-200 Seneca. This section is provided for quick reference only, and is not intended to substitute the approved Aircraft Flight Manual and other official materials.

All BSU Aircraft are operated in accordance with the FAA regulations and BSU Aviation policies and procedures. In some cases, BSU policies and procedures will be more restrictive. Pilots shall refer to the BSU AOM and be familiar with all general BSU aircraft operating procedures.

In all cases, pilots operating BSU Piper PA-34-200 Seneca shall be thoroughly familiar with the information contained in the approved Aircraft Flight Manual, FAA regulations and applicable BSU Aviation policies and procedures.

CAUTION

Observance of these limitations is mandatory. This chapter provides only a partial summary of limitations in accordance with the Aircraft Flight Manual. Pilots must refer to the Aircraft Flight Manual and BSU Aviation Operations manual to become familiarize with all aircraft information.

NOTE

For aircraft equipped with specific options, refer to the Pilot's Information Manual (PIM) and FAA Approved Airplane Flight Manual (AFM) for amended operating limitations, procedures, performance data and/or other necessary information.

Kinds of Operations

The airplane is approved for the following operations when equipped in accordance with 14 CFR Part 91:

- **Day V.F.R.**
- **Night V.F.R.**
- **Day I.F.R.**
- **Night I.F.R.**
- **Non-icing**

CAUTION

The BSU PA-34-200 Seneca is <u>not</u> equipped for flight into icing conditions.

Flight into known icing conditions is PROHIBITED.

Structural and Weight Limitations

Maximum Ramp Weight.....4.200 lbs
Maximum Takeoff Weight .....4,200 lbs
Maximum Landing Weight.....4,000 lbs
Minimum Fuel Weight ..... 200 lbs

Forward Baggage Compartment Maximum Weight ..... 100 lbs
Aft Baggage Compartment Maximum Weight ..... 100 lbs
Aft Baggage Compartment Hat Shelf……No heavy objects

WARNING

All weight in excess of **4,000 lbs** must consist of fuel.

Maneuvering Limitations – Normal Category

The PA-34-200 Seneca is rated in the Normal category. The only authorized maneuvers in the Seneca are those maneuvers incidental to normal flying, stalls (except whip stalls), lazy eights, chandelles, and steep turns (with not more than 60^0 of bank).

Flight Load Factor Limitations - Normal Category

Positive Load Limit	**Negative Load Limit**
+3.8 g	No Inverted Maneuvers Approved

Power Plant Limitations

Manufacturer..... Lycoming
Model Numbers ..... IO-360-C1E6 (Left Side), LIO-360-C1E6 (Right Side)
Maximum Horsepower (each engine).....200
Maximum Engine Rotation Speed (RPM).....2700
Fuel Minimum Grade..... 100/100 LL (Blue)

Engine Starter Limitations

Minimum voltage to attempt engine start .....11 Volts
Maximum continuous cranking time (single start attempt) .....30 seconds
Minimum cool-down time between attempts .....3 minutes

Engine Operating Limitations (all operations)

Takeoff Power.....200 hp @ 2700 RPM
Maximum Continuous Power .....200 hp @ 2700 RPM
Maximum oil temperature (red line).....245º
Maximum Cylinder Head Temperature (CHT, red line) 475º

Cylinder Head Temperature (CHT) Management Normal Operating Limits

Takeoff Power and Maximum Continuous Power (max CHT)..... 435º
Economy power and cruise (max CHT) 400º

NOTE

Proper Cylinder Head Temperature management is critical to engine reliability and maximum service life. Flight crews will monitor CHT and oil temperature gauges, and adjust cowl flaps in accordance with the above limitations for all operations.

Oil Limitations

Maximum Oil Capacity (per engine) ..... 8 qts
Minimum Oil Quantity (per engine) / Flight of under 2 hours (BSU Policy) ..... 6 qts
Minimum Oil Quantity (per engine) / Flight of 2 hours or more (BSU Policy) ..... 7 qts

CAUTION

*Do not operate either engine with less than **six (6) quarts** of oil.*

Propeller Specifications and Limitations

Manufacturer ..... Hartzell / Model HC-C2YK-1/7666A-2
Type ..... Constant Speed, Controllable pitch
Max. Diameter ..... 76”
Min. Diameter ..... 74”
Minimum RPM for feathering ..... 800 RPM

WARNING

In an actual engine failure where propeller feathering may be required, care must exercised to feather the propeller **before** engine speed drops below **800 RPM.**

Engine feathering below **800 RPM** will be impossible.

CAUTION

*Avoid continuous static operations (over 5 minutes) between **2200 - 2400 RPM**.*

Fuel Limitations

Approved Fuel ..... Aviation Grade 100LL (Blue) or 100 (Green)
Total Capacity (all tanks) ..... 98 Gallons
Total Usable Fuel (all tanks) ..... 93 Gallons
Total Unusable Fuel (all tanks) ..... 5 Gallons
Usable Fuel (each wing) ..... 46.5 gallons
Unusable Fuel (each wing) ..... 2.5 Gallons

WARNING

Do not attempt takeoff with a fuel selector on “CROSSFEED”
Do not operate with both fuel selectors on “CROSSFEED”

CAUTION

Flight crews shall avoid maneuvers that could uncover or “un-port” the wing outlet in the fuel tanks. Un-porting can result in fuel flow interruption and power loss. Avoid extreme running takeoffs, slips/skids resulting in altitude loss in excess of 2000’, or other radical or extreme maneuvers.

Electrical System Limitations

Alternator Output ..... 14 Volts
Amps Load ..... Maximum 60 Amps
Battery Output ..... 12 Volts
Minimum voltage to attempt engine start ..... 11 Volts

WARNING

Both alternators must be functional to initiate a flight.
Departing with only a single functional alternator is prohibited.

Total electrical load must be reduced to **50 amps** or below
following single alternator failure in flight

Airspeed Limitations

CAUTION

The Airspeed Indicator for this aircraft is marked as KIAS (outer ring) and in MPH (inner ring). Flight crews must take care to adhere to published airspeed limitations regardless of the type of marking used.

NOTE

The primary airspeed reference in all BSU Flight operations will be in **KNOTS (KIAS).**

Airspeed Indicator Markings

Instrument Marking	Explanation	MPH	KIAS
White Arc	Full Flap Operating Range: Lower limit is max. weight V_{SO} in the landing configuration. Upper limit is maximum speed permissible with flaps fully extended.	69 -125	**60 - 108**
Green Arc	Normal Operating Range: Lower limit is max. weight V_{S1} with flaps retracted. The upper limit is V_{NO}.	76 -190	**66 - 165**
Yellow Arc	Caution Range: Flight in this range is limited to smooth air only, and then with caution.	190 – 217	**165 - 188**
Red Line (upper)	Never Exceed Speed: Maximum speed for all operations.	217	**188**
Red Line (lower)	Minimum Control Airspeed when Single Engine: Maintain above this airspeed in all Single Engine operations	80	**70**
Blue Radial Line	Best Single Engine Rate of Climb: Maintain this speed to achieve best climb performance with one engine inoperative; Should single engine climb be impossible, maintain this airspeed to minimize altitude loss.	105	**92**

NOTE

The maximum crosswind component for this aircraft is **13 KNOTS** (15 MPH)

NORMAL OPERATIONS AIRSPEEDS

Symbol	Reference	Definition	MPH	KIAS
V_{FE}	Max Flap Extend Speed	Do not exceed this speed with wing flaps extended.	125	**108**
V_{LO}	Max Landing Gear Operating Speed	Do not cycle the landing gear above these speeds.	(up) 125 (down)150	**(up) 108** **(down)130**
V_{LE}	Max. Landing Gear Extended Speed	Do not exceed this speed with the landing gear extended	150	**130**
Manual gear extend	Manual extension of landing gear (refer to emergency procedures)	Do not manually extend the gear above this speed	100	**87**
V_A	Maneuvering Speed	Do not make full or abrupt control movements above this speed. 4200 lbs. 2743 lbs.	 146 133	 **126** **115**
V_{NO}	Max Structural Cruising Speed	Do not exceed this speed except in smooth air, and then only with extreme caution	190	**165**
V_{NE}	Never Exceed Speed	Maximum speed for all operations.	217	**188**
V_{S1}	Stall Speed, Specified Configuration	Stall speed in a specified configuration, typically gear up, flaps up	76	**66**
V_{SO}	Stall Speed, Landing Configuration	Stall speed in the landing configuration, typically gear down, flaps down	69	**60**
Vr	Rotation speed	Rotate at this speed on take-off	85	**74**
V_X	Best Angle of Climb (max climb over distance)	Maintain this speed until clear of obstacles, to gain maximum altitude in minimum forward distance	90	**78**
V_Y	Best Rate of Climb (max vertical speed in climb)	Maintain this speed to gain greatest altitude in minimum time	105	**92**
V_{climb}	Enroute or cruise climb speed	Maintain this speed for the best combination of visibility, engine cooling and climb performance	120	**104**
Traffic Pattern	Typical speed to be maintained at TPA, if appropriate	Maintain this airspeed in the downwind leg of a traffic pattern	110	**100**
$V_{ref(normal)}$	Final approach speed / NORMAL landing	Maintain this airspeed on final approach (with no gusts)	95	**82**
$V_{ref(short)}$	Final approach speed / SHORT-FIELD landing	Maintain this airspeed on final approach (with no gusts)	87	**76**
$V_{ref(no\ flap)}$	Final approach speed / NO FLAP landing	Maintain this airspeed on final approach (with no gusts)	105	**92**
X/W component	Maximum crosswind component on takeoff and landing	Do not intentionally exceed this crosswind component on takeoff and landing	15	**13**

EMERGENCY OPERATIONS AIRSPEEDS

Symbol	Reference	Definition	MPH	KIAS
$V_{ref(no\ flap)}$	Final approach speed / NO FLAP landing	Maintain this airspeed on final approach during no-flap landings (with no gusts)	105	**92**
$V_{ref\ (SE)}$	Single engine final approach speed	Maintain this speed on final approach with one engine inoperative	105	**92**
V_G	Best Glide Speed (two engines inoperative)	Maintain this speed with both engines inoperative	117	**102**
V_{MC}	Single Engine Minimum Control Airspeed	Maintain above this airspeed at all times when one engine is inoperative to avoid losing directional control	80	**70**
Vyse	Single Engine Best Rate of Climb Speed (or minimum sink speed)	Maintain this speed to climb or minimize altitude loss in single engine situations	105	**92**
Vxse	Single Engine Best Angle of Climb Speed	Maintain this speed to climb over obstacles in single engine situations	98	**86**
Vsse	Single Engine Intentional Shutdown	Do not simulate shutting down one engine below this speed	105	**92**
Window Open	Max window open speed	Do not open the window above this speed	150	**130**
Manual Gear Extend	Manual extension of landing gear (refer to emergency procedures)	Do not manually extend the gear above this speed	100	**87**

Autopilot limitations

WARNING

AUTOPILOT USE IS PROHIBITED as follows:

☒ At AIRSPEEDS **above 169 KIAS** (195 MPH)

☒ With MORE than **25° of FLAPS**

☒ During **TAKEOFF, LANDING** and **INSTRUMENT PROCEDURES**

☒ Below **1000' AGL**

Runway limitations

WARNING

Minimum **usable** runway length for **any** BSU Seneca operations is **3,000 feet**

Runway must be **paved** and in good condition.

Training maneuvers limitations

WARNING

All intentional aerobatic maneuvers, including spins, are prohibited

No practice area maneuvers of **any** kind below **1,500' AGL**

Minimum altitude for any portion of stalls and slow flight, including recovery, is **3000' AGL**

Intentional banks in excess of **50°** are prohibited

Single engine operations limitations

WARNING

- **25º flaps** maximum during any **single engine** approach and landing
- Simulated engine failures below **3,000' AGL** will be accomplished with **throttle only**
- No practice area **single engine** maneuvers below **3,000' AGL**
- Single engine stalls and slow flight are prohibited
- Fuel selector on cross-feed during level single engine flight only
- Operating engine fuel selector must be on during single engine approach and landing
- During actual single engine shutdown limit electrical load to **50 amps** on the remaining alternator