

PILOT'S OPERATING HANDBOOK

1999 Kg. SENECA II



FAA APPROVED IN NORMAL CATEGORY BASED ON FAR 23 AND FAR PART 21, SUBPART J. THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY FAR 23 AND FAR PART 21, SUBPART J AND CONSTITUTES THE APPROVED AIRPLANE FLIGHT MANUAL AND MUST BE CARRIED IN THE AIRPLANE AT ALL TIMES.

AIRPLANE SERIAL NO. 34-7870066

AIRPLANE REGISTRATION NO. 9H-AEB

PA-34-200T
REPORT: VB-1140

FAA APPROVED BY: Ward Evans
WARD EVANS
D.O.A. NO. SO-1
PIPER AIRCRAFT CORPORATION
VERO BEACH, FLORIDA

DATE OF APPROVAL: SEPTEMBER 12, 1980



WARNING

EXTREME CARE MUST BE EXERCISED TO LIMIT THE USE OF THIS HANDBOOK TO APPLICABLE AIRCRAFT. THIS HANDBOOK IS VALID FOR USE WITH THE AIRPLANE IDENTIFIED ON THE FACE OF THE TITLE PAGE. SUBSEQUENT REVISIONS SUPPLIED BY PIPER AIRCRAFT CORPORATION MUST BE PROPERLY INSERTED.

Published by
PUBLICATIONS DEPARTMENT
Piper Aircraft Corporation
Issued: September 12, 1980

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APPLICABILITY

Application of this handbook is limited to the Piper PA-34-200T model airplane having a gross weight of 4407 pounds (1999 Kg.) and with serial numbers 34-7770001 and up.

This handbook cannot be used for operational purposes unless kept in a current status.

REVISIONS

The information compiled in the Pilot's Operating Handbook will be kept current by revisions distributed to the airplane owners.

Revision material will consist of information necessary to update the text of the present handbook and/or to add information to cover added airplane equipment.

I. Revisions

Revisions will be distributed whenever necessary as complete page replacements or additions and shall be inserted into the handbook in accordance with the instructions given below:

1. Revision pages will replace only pages with the same page number.
2. Insert all additional pages in proper numerical order within each section.
3. Page numbers followed by a small letter shall be inserted in direct sequence with the same common numbered page.

II. Identification of Revised Material

Revised text and illustrations shall be indicated by a black vertical line along the outside margin of the page, opposite revised, added or deleted material. A line along the outside margin of the page opposite the page number will indicate that an entire page was added.

Black lines will indicate only current revisions with changes and additions to or deletions of existing text and illustrations. Changes in capitalization, spelling, punctuation or the physical location of material on a page will not be identified by symbols.

ORIGINAL PAGES ISSUED

The original pages issued for this handbook prior to revision are given below:

Title, ii through v, 1-1 through 1-14, 2-1 through 2-10, 3-1 through 3-17, 4-1 through 4-26, 5-1 through 5-33, 6-1 through 6-66, 7-1 through 7-42, 8-1 through 8-16, 9-1 through 9-64, 10-1 through 10-2.

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS

Current Revisions to the PA-34-200T Seneca II Pilot's Operating Handbook, REPORT: VB-1140 issued September 12, 1980.


Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
	4-23	Revision IAW AD 9974-01 Docket No 98-CE-77AD Pages 1 to 4 of 4	 CAPT. R. ZARR 05 05 2002

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1.3 ENGINES

(a) Number of Engines	2
(b) Engine Manufacturer	Continental
(c) Engine Model Number	
(1) Left	TSIO-360E or TSIO-360EB
(2) Right	LTSIO-360E or LTSIO-360EB
(d) Rated Horsepower	
(1) Sea level	200
(2) 12,000 ft.	215
(e) Rated Speed (rpm)	2575
(f) Bore (inches)	4.438
(g) Stroke (inches)	3.875
(h) Displacement (cubic inches)	360
(i) Compression Ratio	7.5:1
(j) Engine Type	Six Cylinder, Direct Drive, Horizontally Opposed, Air Cooled

1.5 PROPELLERS

(a) Number of Propellers	2
(b) Propeller Manufacturer	Hartzell
(1) Propeller Hub and Blade Models	
a. Left	BHC-C2YF-2CKF/FC8459-8R
Right	BHC-C2YF-2CLKF/FJC8459-8R
b. Left	BHC-C2YF-2CKUF/FC8459-8R
Right	BHC-C2YF-2CLKUF/FJC8459-8R
When propeller deicing boots are installed:	
c. Left	BHC-C2YF-2CKF/FC8459B-8R
Right	BHC-C2YF-2CLKF/FJC8459B-8R
d. Left	BHC-C2YF-2CKUF/FC8459B-8R
Right	BHC-C2YF-2CLKUF/FJC8459B-8R
(2) Number of Blades	2
McCauley	
(1) Propeller Hub and Blade Models	
a. Left	3AF34C502/80HA-4
b. Right	3AF34C503/L80HA-4
When propeller deicing boots are installed: Same as above.	
(2) Number of Blades	3
(c) Propeller Diameter	
(1) Maximum	76
(2) Minimum	75
(d) Propeller Type	Constant Speed, Hydraulically Actuated, Full Feathering

1.7 FUEL

- | | | |
|--------------------------------------|--|-----|
| (a) Fuel Capacity (U.S. gal) (total) | | |
| (1) Without optional tanks | | 98 |
| (2) With optional tanks | | 128 |
| (b) Usable Fuel (U.S. gal) (total) | | |
| (1) Without optional tanks | | 93 |
| (2) With optional tanks | | 123 |
| (c) Fuel | | |
| (1) Minimum Grade | 100 Green or 100LL Blue | |
| | Aviation Grade | |
| (2) Alternate Fuels | Refer to latest revision of Continental Service Bulletin "Fuel and Oil Grades" | |

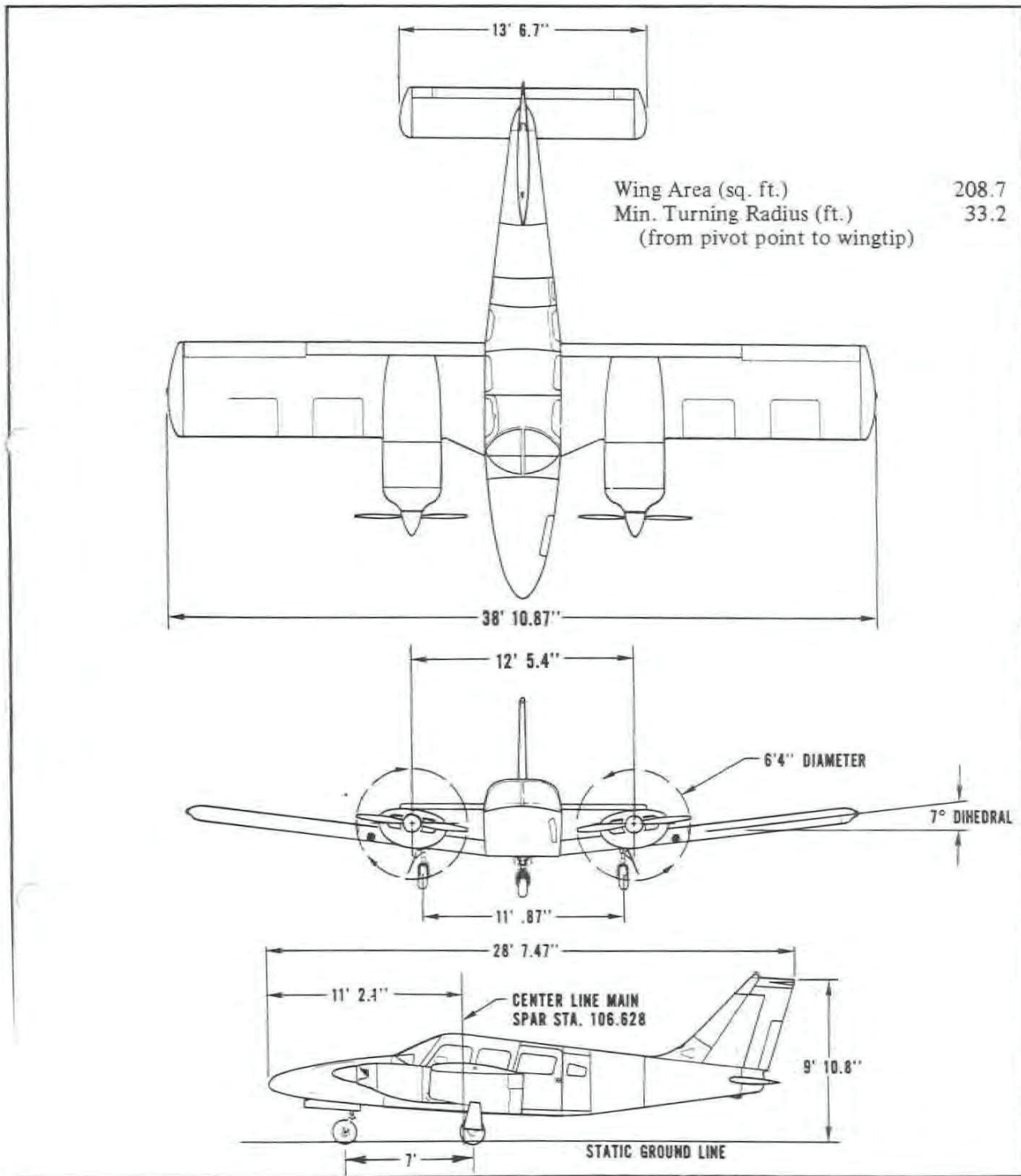
1.9 OIL

- | | | |
|---|---|------------|
| (a) Oil Capacity (U.S. quarts) (per engine) | | 8 |
| (b) Oil Specification | Refer to latest issue of Continental Service Bulletin "Fuel and Oil Grades" | |
| (c) Oil Viscosity per Average Ambient Temp. | | |
| | Aviation Grade | S.A.E. No. |
| (1) Below 40°F | 1065 | 30 |
| (2) Above 40°F | 1100 | 50 |

When operating temperatures overlap indicated ranges, use the lighter grade of oil. Multi-viscosity oils meeting Teledyne Continental Motors' Specification MHS-24A are approved.

1.11 MAXIMUM WEIGHTS

- | | | |
|---|---------|-----------|
| (a) Maximum Takeoff Weight (lbs)/(Kg.) | | 4407/1999 |
| (b) Maximum Landing Weight (lbs)/(Kg.) | | 4342/1970 |
| (c) Maximum Zero Fuel Weight (lbs)/(Kg.) - Standard | | 4000/1814 |
| (d) Maximum Weights in Baggage Compartments (lbs)/(Kg.) | FORWARD | AFT |
| | 100/45 | 100/45 |



THREE VIEW

Figure 1-1

SECTION I

GENERAL

1.1 INTRODUCTION

This Pilot's Operating Handbook is designed for maximum utilization as an operating guide for the pilot. It includes the material required to be furnished to the pilot by FAR 23 and FAR Part 21 Subpart J. It also contains supplemental data supplied by the airplane manufacturer.

This handbook is not designed as a substitute for adequate and competent flight instruction, knowledge of current airworthiness directives, applicable federal air regulations or advisory circulars. It is not intended to be a guide for basic flight instruction or a training manual and should not be used for operational purposes unless kept in a current status.

Assurance that the airplane is in an airworthy condition is the responsibility of the owner. The pilot in command is responsible for determining that the airplane is safe for flight. The pilot is also responsible for remaining within the operating limitations as outlined by instrument markings, placards, and this handbook.

Although the arrangement of this handbook is intended to increase its in-flight capabilities, it should not be used solely as an occasional operating reference. The pilot should study the entire handbook to familiarize himself with the limitations, performance, procedures and operational handling characteristics of the airplane before flight.

The handbook has been divided into numbered (arabic) sections each provided with a "finger-tip" tab divider for quick reference. The limitations and emergency procedures have been placed ahead of the normal procedures, performance and other sections to provide easier access to information that may be required in flight. The "Emergency Procedures" Section has been furnished with a red tab divider to present an instant reference to the section. Provisions for expansion of the handbook have been made by the deliberate omission of certain paragraph numbers, figure numbers, item numbers and pages noted as being intentionally left blank.

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1.13 BAGGAGE SPACE

	FORWARD	AFT
(a) Compartment Volume (cubic feet)	15.3	17.3
(b) Entry Width (inches)	24	
(c) Entry Height (inches)	21	

1.15 SPECIFIC LOADINGS

(a) Wing Loading (lbs per sq ft)		21.1
(b) Power Loading (lbs per hp)		
(1) Sea level		11.0
(2) 12,000 ft.		10.2

V_S	Stalling Speed or the minimum steady flight speed at which the airplane is controllable.
V_{SO}	Stalling Speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration.
V_{SSE}	Intentional One Engine Inoperative Speed is a minimum speed selected by the manufacturer for intentionally rendering one engine inoperative in flight.
V_X	Best Angle-of-Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
V_Y	Best Rate-of-Climb Speed is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

(b) Meteorological Terminology

ISA	International Standard Atmosphere in which: The air is a dry perfect gas; The temperature at sea level is 15° Celsius (59° Fahrenheit); The pressure at sea level is 29.92 inches hg. (1013 mb); The temperature gradient from sea level to the altitude at which the temperature is -56.5° C (-69.7°F) is -0.00198° C (-0.003566° F) per foot and zero above that altitude.
OAT	Outside Air Temperature is the free air static temperature, obtained either from inflight temperature indications or ground meteorological sources, adjusted for instrument error and compressibility effects.
Indicated Pressure Altitude	The number actually read from an altimeter when the barometric subscale has been set to 29.92 inches of mercury (1013 millibars).
Pressure Altitude	Altitude measured from standard sea-level pressure (29.92 in. Hg) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this handbook, altimeter instrument errors are assumed to be zero.
Station Pressure	Actual atmospheric pressure at field elevation.
Wind	The wind velocities recorded as variables on the charts of this handbook are to be understood as the headwind or tailwind components of the reported winds.

(c) Power Terminology

Takeoff Power	Maximum power permissible for takeoff.
Maximum Continuous Power	Maximum power permissible continuously during flight.

1.17 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

The following definitions are of symbols, abbreviations and terminology used throughout the handbook and those which may be of added operational significance to the pilot.

(a) General Airspeed Terminology and Symbols

CAS	Calibrated Airspeed means the indicated speed of an aircraft, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
KCAS	Calibrated Airspeed expressed in "Knots."
GS	Ground Speed is the speed of an airplane relative to the ground.
IAS	Indicated Airspeed is the speed of an aircraft as shown on the airspeed indicator when corrected for instrument error. IAS values published in this handbook assume zero instrument error.
KIAS	Indicated Airspeed expressed in "Knots."
M	Mach Number is the ratio of true airspeed to the speed of sound.
TAS	True Airspeed is the airspeed of an airplane relative to undisturbed air which is the CAS corrected for altitude, temperature and compressibility.
V_A	Maneuvering Speed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.
V_{FE}	Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.
V_{LE}	Maximum Landing Gear Extended Speed is the maximum speed at which an aircraft can be safely flown with the landing gear extended.
V_{LO}	Maximum Landing Gear Operating Speed is the maximum speed at which the landing gear can be safely extended or retracted.
V_{MC}	Air minimum control speed is the minimum flight speed at which the airplane is controllable with a bank of not more than 5 degrees when one engine suddenly becomes inoperative and the remaining engine is operating at takeoff power.
V_{NE}/M_{NE}	Never Exceed Speed or Mach Number is the speed limit that may not be exceeded at any time.
V_{NO}	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.

Center of Gravity (C.G.)	The point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
C.G. Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C.G. Limits	The extreme center of gravity locations within which the airplane must be operated at a given weight.
Usable Fuel	Fuel available for flight planning.
Unusable Fuel	Fuel remaining after a runout test has been completed in accordance with governmental regulations.
Standard Empty Weight	Weight of a standard airplane including unusable fuel, full operating fluids and full oil.
Basic Empty Weight	Standard empty weight plus optional equipment.
Payload	Weight of occupants, cargo and baggage.
Useful Load	Difference between takeoff weight, or ramp weight if applicable, and basic empty weight.
Maximum Ramp Weight	Maximum weight approved for ground maneuver. (It includes weight of start, taxi and run up fuel.)
Maximum Takeoff Weight	Maximum weight approved for the start of the takeoff run.
Maximum Landing Weight	Maximum weight approved for the landing touchdown.
Maximum Zero Fuel Weight	Maximum weight exclusive of usable fuel.

Maximum Climb Power	Maximum power permissible during climb.
Maximum Cruise Power	Maximum power permissible during cruise.

(d) Engine Instruments

EGT Gauge	Exhaust Gas Temperature Gauge
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(e) Airplane Performance and Flight Planning Terminology

Climb Gradient	The demonstrated ratio of the change in height during a portion of a climb, to the horizontal distance traversed in the same time interval.
Demonstrated Crosswind Velocity (DEMO. X-WIND)	The demonstrated crosswind velocity is the velocity of the crosswind component for which adequate control of the airplane during takeoff and landing was actually demonstrated during certification tests.
Accelerate-Stop Distance	The distance required to accelerate an airplane to a specified speed and, assuming failure of an engine at the instant that speed is attained, to bring the airplane to a stop.
MEA	Minimum en route IFR altitude.
Route Segment	A part of a route. Each end of that part is identified by: (1) a geographical location; or (2) a point at which a definite radio fix can be established.

(f) Weight and Balance Terminology

Reference Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Station	A location along the airplane fuselage usually given in terms of distance from the reference datum.
Arm	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
Moment	The product of the weight of an item multiplied by its arm. (Moment divided by a constant is used to simplify balance calculations by reducing the number of digits.)

1.19 CONVERSION FACTORS

<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>	<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>	
acres	0.4047	ha	cubic inches (cu. in.)	16.39	cm ³	
	43560	sq. ft.		1.639×10^{-5}	m ³	
	0.0015625	sq. mi.		5.787×10^{-4}	cu. ft.	
atmospheres (atm)	76	cm Hg	cubic meters (m ³)	0.5541	fl. oz.	
	29.92	in. Hg		0.01639	l	
	1.0133	bar		4.329×10^{-3}	U.S. gal.	
	1.033	kg/cm ²		0.01732	U.S. qt.	
	14.70	lb./sq. in.		61024	cu. in.	
	2116	lb./sq. ft.				1.308
bars (bar)	0.98692	atm.	35.3147	cu. ft.		
	14.503768	lb./sq. in.	264.2	U.S. gal.		
British Thermal Unit (BTU)	0.2519958	kg-cal	cubic meters per minute (m ³ /min.)	35.3147	cu. ft./min.	
centimeters (cm)	0.3937	in.	cubic yards (cu. yd.)	27	cu. ft.	
	0.032808	ft.		0.7646	m ³	
centimeters of mercury at 0°C (cm Hg)	0.01316	atm	degrees (arc)	0.01745	radians	
	0.3937	in. Hg		degrees per second (deg./sec.)	0.01745	radians/sec.
	0.1934	lb./sq. in.			0.125	fl. oz.
	27.85	lb./sq. ft.				
	135.95	kg/m ²				
centimeters per second (cm/sec.)	0.032808	ft./sec.	drams, fluid (dr. fl.)		0.0625	oz. avdp.
	1.9685	ft./min.	drams, avdp. (dr. avdp.)	0.3048	m	
	0.02237	mph				12
cubic centimeters (cm ³)	0.03381	fl. oz.				feet (ft.)
	0.06102	cu. in.	0.0606061	rod		
	3.531×10^{-5}	cu. ft.	1.894×10^{-4}	mi.		
	0.001	l	1.645×10^{-4}	NM		
	2.642×10^{-4}	U.S. gal.	feet per minute (ft./min.)	0.01136	mph	
cubic feet (cu.ft.)	28317	cm ³		0.01829	km/hr.	
	0.028317	m ³		0.508	cm/sec.	
	1728	cu. in.		0.00508	m/sec.	
	0.037037	cu. yd.				
	7.481	U.S. gal.				
28.32	l					
cubic feet per minute (cu. ft./min.)	0.472	l/sec.				
	0.028317	m ³ /min.				

<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>	<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>
feet per second (ft./sec.)	0.6818 1.097 30.48 0.5921	mph km/hr. cm/sec. kts.	hectares (ha)	2.471 107639 10000	acres sq. ft. m ²
foot-pounds (ft.-lb.)	0.138255 3.24 x 10 ⁻⁴	m-kg kg-cal	horsepower (hp)	33000 550 76.04 1.014	ft.-lb./min. ft.-lb./sec. m-kg/sec. metric hp
foot-pounds per minute (ft.-lb./min.)	3.030 x 10 ⁻⁵	hp	horsepower, metric	75 0.9863	m-kg/sec. hp
foot-pounds per second (ft.-lb./sec.)	1.818 x 10 ⁻⁵	hp	inches (in.)	25.40 2.540 0.0254 0.08333 0.027777	mm cm m ft. yd.
gallons, Imperial (Imperial gal.)	277.4 1.201 4.546	cu. in. U.S. gal. l	inches of mercury at 0°C (in. Hg)	0.033421 0.4912 70.73 345.3 2.540 25.40	atm lb./sq. in. lb./sq. ft. kg/m ² cm Hg mm Hg
gallons, U.S. dry (U.S. gal. dry)	268.8 1.556 x 10 ⁻¹ 1.164 4.405	cu. in. cu. ft. U.S. gal. l	inch-pounds (in.-lb.)	0.011521	m-kg
gallons, U.S. liquid (U.S. gal.)	231 0.1337 4.951 x 10 ⁻³ 3785.4 3.785 x 10 ⁻³ 3.785 0.83268 128	cu. in. cu. ft. cu. yd. cm ³ m ³ l Imperial gal. fl. oz.	kilograms (kg)	2.204622 35.27 1000	lb. oz. avdp. g
gallons per acre (gal./acre)	9.353	l/ha	kilogram-calories (kg-cal)	3.9683 3087 426.9	BTU ft.-lb. m-kg
grams (g)	0.001 0.3527 2.205 x 10 ⁻³	kg oz. avdp. lb.	kilograms per cubic meter (kg/m ³)	0.06243 0.001	lb./cu. ft. g/cm ³
grams per centimeter (g/cm)	0.1 6.721 x 10 ⁻² 5.601 x 10 ⁻³	kg/m lb./ft. lb./in.	kilograms per hectare (kg/ha)	0.892	lb./acre
grams per cubic centimeter (g/cm ³)	1000 0.03613 62.43	kg/m ³ lb./cu. in. lb./cu. ft.	kilograms per square centimeter (kg/cm ²)	0.9678 28.96 14.22 2048	atm in. Hg lb./sq. in. lb./sq. ft.

<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>	<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>
kilograms per square meter (kg/m ²)	2.896 x 10 ⁻³ 1.422 x 10 ⁻³ 0.2048	in. Hg lb./sq. in. lb./sq. ft.	meters per minute (m/min.)	0.06	km/hr.
kilometers (km)	1 x 10 ⁻⁵ 3280.8 0.6214 0.53996	cm ft. mi. NM	meters per second (m/sec.)	3.280840 196.8504 2.237 3.6	ft./sec. ft./min. mph km/hr.
kilometers per hour (km/hr.)	0.9113 58.68 0.53996 0.6214 0.27778 16.67	ft./sec. ft./min. kt mph m/sec. m/min.	microns	3.937 x 10 ⁻⁵	in.
knots (kt)	1 1.689 1.1516 1.852 51.48	nautical mph ft./sec. statute mph km/hr. m/sec.	miles, statute (mi.)	5280 1.6093 1609.3 0.8684	ft. km m NM
liters (l)	1000 61.02 0.03531 33.814 0.264172 0.2200 1.05669	cm ³ cu. in. cu. ft. fl. oz. U.S. gal. Imperial gal. qt.	miles per hour (mph)	44.7041 4.470 x 10 ⁻¹ 1.467 88 1.6093 0.8684	cm/sec. m/sec. ft./sec. ft./min. km/hr. kt
liters per hectare (l/ha)	13.69 0.107	fl. oz./acre gal./acre	miles per hour square (m/hr. sq.)	2.151	ft./sec. sq.
liters per second (l/sec.)	2.12	cu. ft./min.	millibars	2.953 x 10 ⁻²	in. Hg
meters (m)	39.37 3.280840 1.0936 0.198838 6.214 x 10 ⁻⁴ 5.3996 x 10 ⁻⁴	in. ft. yd. rod mi. NM	millimeters (mm)	0.03937	in.
meter-kilogram (m-kg)	7.23301 86.798	ft.-lb. in.-lb.	millimeters of mercury at 0°C (mm Hg)	0.03937	in. Hg
			nautical miles (NM)	6080 1.1516 1852 1.852	ft. statute mi. m km
			ounces, avdp. (oz. avdp.)	28.35 16	g dr. avdp.
			ounces, fluid (fl. oz.)	8 29.57 1.805 0.0296 0.0078	dr. fl. cm ³ cu. in. l U.S. gal.

SECTION 1
GENERAL

PIPER AIRCRAFT CORPORATION
PA-34-200T, SENECA II

<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>	<u>MULTIPLY</u>	<u>BY</u>	<u>TO OBTAIN</u>
ounces, fluid per acre (fl. oz./acre)	0.073	l/ha	rod	16.5 5.5 5.029	ft. yd. m
pounds (lb.)	0.453592 453.6 3.108×10^{-2}	kg g slug	slug	32.174	lb.
pounds per acre (lb./acre)	1.121	kg/ha	square centimeters (cm ²)	0.1550 0.001076	sq. in. sq. ft.
pounds per cubic foot (lb./cu. ft.)	16.02	kg/m ³	square feet (sq. ft.)	929 0.092903 144 0.1111 2.296×10^{-5}	cm ² m ² sq. in. sq. yd. acres
pounds per cubic inch (lb./cu. in.)	1728 27.68	lb./cu. ft. g/cm ³	square inches (sq. in.)	6.4516 6.944×10^{-3}	cm ² sq. ft.
pounds per square foot (lb./sq. ft.)	0.1414 4.88243 4.725×10^{-4}	in. Hg kg/m ² atm	square kilometers (km ²)	0.3861	sq. mi.
pounds per square inch (psi or lb./sq. in.)	5.1715 2.036 0.06804 0.0689476 703.1	cm Hg in. Hg atm bar kg/m ²	square meters (m ²)	10.76391 1.196 0.0001	sq. ft. sq. yd. ha
quart, U.S. (qt.)	0.94635 57.749	l cu. in.	square miles (sq. mi.)	2.590 640	km ² acres
radians	57.30 0.1592	deg. (arc) rev.	square rods (sq. rods)	30.25	sq. yd.
radians per second (radians/sec.)	57.30 0.1592 9.549	deg./sec. rev./sec. rpm	square yards (sq. yd.)	0.8361 9 0.0330579	m ² sq. ft. sq. rods
revolutions (rev.)	6.283	radians	yards (yd.)	0.9144 3 36 0.181818	m ft. in. rod
revolutions per minute (rpm or rev./min.)	0.1047	radians/sec.			
revolutions per second (rev./sec.)	6.283	radians/sec.			

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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-34-200T Seneca II 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	KIAS	KCAS
Never Exceed Speed (V_{NE}) - Do not exceed this speed in any operation.	195	195
Maximum Structural Cruising Speed (V_{NO}) - Do not exceed this speed except in smooth air and then only with caution.	163	165
Design Maneuvering Speed (V_A) - Do not make full or abrupt control movements above this speed.		
At 4407 LBS. (1999 Kg.) G.W.	135	137
At 3068 LBS. (1392 Kg.) G.W.	121	122

CAUTION

Maneuvering speed decreases at lighter weight as the effects of aerodynamic forces become more pronounced. Linear interpolation may be used for intermediate gross weights. Maneuvering speed should not be exceeded while operating in rough air.

Maximum Flaps Extended Speed (V_{FE}) - Do not exceed this speed with flaps extended.	107	109
Maximum Gear Extended Speed (V_{LE}) - Do not exceed this speed with landing gear extended.	129	130
Maximum Landing Gear Extending Speed (V_{LO}) - Do not extend landing gear above this speed.	129	130

	KIAS	KCAS
Maximum Landing Gear Retracting Speed (V_{LO}) - Do not retract landing gear above this speed.	107	109
Air Minimum Control Speed (V_{MC}) - Lowest airspeed at which airplane is controllable with one engine operating and no flaps.	66	69
Best Single Engine Rate of Climb Speed	89	90

2.5 AIRSPEED INDICATOR MARKINGS

MARKING	KIAS
Green Arc (Normal Operating Range)	63 to 163
Yellow Arc (Caution Range - Smooth Air)	163 to 195
White Arc (Flaps Extended Range)	61 to 107
Radial Red Line (Never Exceed - Smooth Air)	195
Radial Red Line (Minimum Control Speed - Single Engine)	66
Radial Blue Line (Best Rate of Climb Speed - Single Engine)	89

2.7 POWER PLANT LIMITATIONS

(a) Number of Engines	2
(b) Engine Manufacturer	Continental
(c) Engine Model Number	TSIO-360E or TSIO-360EB LTSIO-360E or LTSIO-360EB
(d) Engine Operating Limits	
(1) Rated Horsepower	
Sea level	200
12,000 ft.	215
(2) Maximum Rotational Speed (RPM)	2575
(3) Maximum Manifold Pressure (Inches of Mercury)	40
(4) Maximum Cylinder Head Temperature	460°F
(5) Maximum Oil Temperature	240°F
(e) Oil Pressure	
Minimum (red line)	10 PSI
Maximum (red line)	100 PSI
(f) Fuel Flow	
Normal Operating Range (green arc)	3.5 PSI to 20 PSI
Maximum at Sea Level (red line)	25 GPH (20 PSI)
(g) Fuel (minimum grade)	100 or 100LL Aviation Grade
(h) Number of Propellers	2

	KIAS	KCAS
Maximum Landing Gear Retracting Speed (V_{LO}) - Do not retract landing gear above this speed.	107	109
Air Minimum Control Speed (V_{MC}) - Lowest airspeed at which airplane is controllable with one engine operating and no flaps.	66	69
Best Single Engine Rate of Climb Speed	89	90

2.5 AIRSPEED INDICATOR MARKINGS

MARKING	KIAS
Green Arc (Normal Operating Range)	63 to 163
Yellow Arc (Caution Range - Smooth Air)	163 to 195
White Arc (Flaps Extended Range)	61 to 107
Radial Red Line (Never Exceed - Smooth Air)	195
Radial Red Line (Minimum Control Speed - Single Engine)	66
Radial Blue Line (Best Rate of Climb Speed - Single Engine)	89

2.7 POWER PLANT LIMITATIONS

(a) Number of Engines	2
(b) Engine Manufacturer	Continental
(c) Engine Model Number	TSIO-360E or TSIO-360EB LTSIO-360E or LTSIO-360EB
(d) Engine Operating Limits	
(1) Rated Horsepower	
Sea level	200
12,000 ft.	215
(2) Maximum Rotational Speed (RPM)	2575
(3) Maximum Manifold Pressure (Inches of Mercury)	40
(4) Maximum Cylinder Head Temperature	460°F
(5) Maximum Oil Temperature	240°F
(e) Oil Pressure	
Minimum (red line)	10 PSI
Maximum (red line)	100 PSI
(f) Fuel Flow	
Normal Operating Range (green arc)	3.5 PSI to 20 PSI
Maximum at Sea Level (red line)	25 GPH (20 PSI)
(g) Fuel (minimum grade)	100 or 100LL Aviation Grade
(h) Number of Propellers	2

- (i) Propeller Manufacturer:
Hartzell
- Propeller Hub and Blade Models
- | | |
|---------|----------------------------|
| a. Left | BHC-C2YF-2CKF/FC8459-8R |
| Right | BHC-C2YF-2CLKF/FJC8459-8R |
| b. Left | BHC-C2YF-2CKUF/FC8459-8R |
| Right | BHC-C2YF-2CLKUF/FJC8459-8R |
- When propeller deicing boots are installed:
- | | |
|---------|-----------------------------|
| c. Left | BHC-C2YF-2CKF/FC8459B-8R |
| Right | BHC-C2YF-2CLKF/FJC8459B-8R |
| d. Left | BHC-C2YF-2CKUF/FC8459B-8R |
| Right | BHC-C2YF-2CLKUF/FJC8459B-8R |

NOTES

Avoid continuous operation between 2000 and 2200 RPM above 32 IN. HG. manifold pressure.

Avoid continuous ground operation between 1700 and 2100 RPM in cross and tail winds over 10 knots.

McCauley

Propeller Hub and Blade Models

- | | |
|----------|-------------------|
| a. Left | 3AF34C502/80HA-4 |
| b. Right | 3AF34C503/L80HA-4 |

When propeller deicing boots are installed: Same as above.

- (j) Propeller Diameter (inches)
- | | |
|---------|----|
| Maximum | 76 |
| Minimum | 75 |

2.9 POWER PLANT INSTRUMENT MARKINGS

- (a) Tachometer
- | | |
|------------------------------------|---------------------|
| Green Arc (Normal Operating Range) | 500 RPM to 2575 RPM |
| Red Line (Maximum) | 2575 RPM |

(b) Fuel Flow and Pressure	
Green Arc (Normal Operating Range)	3.5 PSI to 20 PSI
Red Line (Maximum at Sea Level)	25 GPH (20 PSI)
Red Line (Minimum)	3.5 PSI
(c) Cylinder Head Temperature	
Green Arc (Normal Range)	either 360° F to 460° F or 240° F to 440° F
Red Line (Maximum)	460° F
(d) Oil Temperature	
Green Arc (Normal Operating Range)	either 75° F to 240° F or 100° F to 240° F
Red Line (Maximum)	240° F
(e) Oil Pressure	
Green Arc (Normal Operating Range)	either 30 PSI to 80 PSI or 30 PSI to 60 PSI
Yellow Arc (Caution)	10 PSI to 30 PSI and, either 80 PSI to 100 PSI or 60 PSI to 100 PSI
Red Line (Minimum)	10 PSI
Red Line (Maximum)	100 PSI
(f) Manifold Pressure	
Green Arc (Normal Operating Range)	10 IN. to 40 IN. HG.
Red Line (Maximum)	40 IN. HG.
(g) Exhaust Gas Temperature	
Red Line	1650° F

2.11 WEIGHT LIMITS

(a) Maximum Takeoff Weight	4407 LBS (1999 Kg.)
(b) Maximum Landing Weight	4342 LBS (1970 Kg.)
(c) Maximum Weights in Baggage Compartments	
Forward	100 LBS (45 Kg.)
Aft	100 LBS (45 Kg.)
(d) Maximum Zero Fuel Weight - Standard (See page 6.61 and 6-62.)	4000 LBS (1814 Kg.)

2.13 CENTER OF GRAVITY LIMITS

Weight Pounds	Forward Limit Inches Aft of Datum	Aft Limit Inches Aft of Datum
3400	82.0	94.6
4407	89.4	94.6

NOTES

Straight line variation between the points given.

Datum is 78.4 inches forward of wing leading edge from the inboard edge of the inboard fuel tank.

It is the responsibility of the airplane owner and the pilot to assure that the airplane is properly loaded. Maximum allowable gross weight is 4407 (1999 Kg.) pounds. See "Weight and Balance Section" for proper loading instructions.

2.15 MANEUVER LIMITS

All intentional acrobatic maneuvers (including spins) are prohibited. Avoid abrupt maneuvers.

2.17 FLIGHT LOAD FACTOR LIMITS (Flaps Up)

- (a) Positive Load Factor (Maximum) 3.8 G
- (b) Negative Load Factor (Maximum) No inverted maneuvers approved

2.19 TYPES OF OPERATIONS

The airplane is approved for the following operations when equipped in accordance with FAR 91 or FAR 135.

- (a) Day V.F.R.
- (b) Night V.F.R.
- (c) Day I.F.R.
- (d) Night I.F.R.
- (e) Icing conditions when equipped per Section 2.25.

2.21 FUEL LIMITATIONS

(a) Unusable Fuel

The unusable fuel in this aircraft has been determined as 2.5 gallons in each wing in critical flight attitudes (2.5 gallons is the total per side, each side having interconnected tanks).

(b) Usable Fuel

The usable fuel in this aircraft has been determined as 46.5 gallons in each wing or a total of 93 gallons with standard fuel tanks and 61.5 gallons in each wing or a total of 123 gallons with optional fuel tanks installed.

2.23 GYRO PRESSURE LIMITS

The operating limits for the pressure system are 4.5 to 5.2 inches of mercury for all operations as indicated by the gyro pressure gauge.

2.24 FLIGHT INTO KNOWN ICING CONDITIONS

For flight in icing conditions the following equipment must be installed in accordance with Piper drawings or in an FAA approved manner:

- (a) Pneumatic wing and empennage boots
- (b) Electrothermal propeller boots
- (c) Electric windshield panel
- (d) Heated pitot head
- (e) Wing ice light
- (f) Heated lift detectors
- (g) Propeller spinners must be installed.

2.27 HEATER LIMITATIONS

Operation of the combustion heater above 25,000 feet is not approved.

2.29 OPERATING ALTITUDE LIMITATIONS

Flight above 25,000 feet is not approved. Flight up to and including 25,000 feet is approved if equipped with oxygen in accordance with FAR 23.1441 and avionics in accordance with FAR 91 or FAR 35.

2.31 NOISE LEVEL

The noise level of this aircraft is 73.1 dB(A) when equipped with two bladed propellers and 76.0 dB(A) when equipped with three bladed propellers.

No determination has been made by the Federal Aviation Administration that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

WARNING

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.

* During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following visual cues. If one or more of these visual cues exists, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions.

- Unusually extensive ice accumulation on the airframe and windshield in areas not normally observed to collect ice.

- Accumulation of ice on the upper surface of the wing, aft of the protected area.

- Accumulation of ice on the engine nacelles or propeller spinners farther aft than normally observed.

* Since the autopilot, when installed and operating, may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when any of the visual cues specified above exist, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in severe icing conditions.

* All wing icing inspection lights must be operative prior to flight into known or forecast icing conditions at night. (NOTE: This supersedes any relief provided by the Master Minimum Equipment List (M MEL).)

Near emergency gear release:

EMERGENCY GEAR EXTENSION
PULL TO RELEASE. SEE P.O.H.
BEFORE RE-ENGAGEMENT

Near gear selector switch:

GEAR UP	107 KIAS MAX.
DOWN	129 KIAS MAX.

Adjacent to upper door latch (Front and rear doors):

ENGAGE LATCH BEFORE FLIGHT

In full view of pilot:

WARNING - TURN OFF STROBE LIGHTS WHEN TAXIING
IN VICINITY OF OTHER AIRCRAFT, OR DURING FLIGHT
THROUGH CLOUD, FOG OR HAZE.

On the inside of forward baggage compartment door:

MAXIMUM BAGGAGE THIS COMPARTMENT 100 LBS. SEE
THE LIMITATIONS SECTION OF THE PILOT'S OPERATING
HANDBOOK.

On aft baggage closeout:

MAXIMUM BAGGAGE THIS COMPARTMENT 100 LBS. NO
HEAVY OBJECTS ON HAT SHELF.

On instrument panel:

SINGLE ENGINE STALLS NOT RECOMMENDED. CAN
CAUSE 500 FT. LOSS OF ALTITUDE AND 15° PITCH
ANGLE.

The above statement notwithstanding, the noise level stated above has been verified by and approved by the Federal Aviation Administration in noise level test flights conducted in accordance with FAR 36, Noise Standards - Aircraft Type and Airworthiness Certificaton. This aircraft model is in compliance with all FAR 36 noise standards applicable to this type.

2.33 PLACARDS

In full view of the pilot:

THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS, AND MANUALS. NO ACROBATIC MANEUVERS (INCLUDING SPINS) APPROVED.

THIS AIRCRAFT APPROVED FOR V.F.R., I.F.R., DAY, NIGHT AND ICING FLIGHT WHEN EQUIPPED IN ACCORDANCE WITH FAR 91 OR FAR 135.

In full view of the pilot:

MAXIMUM TAKEOFF WEIGHT 4407 POUNDS
MAXIMUM LANDING WEIGHT 4342 POUNDS
ALL WEIGHT IN EXCESS OF 4000 POUNDS
MUST CONSIST OF FUEL, (EXCEPT IN CASES
SPECIFIED BY SECTION 6 OF P.O.H.).

MINIMUM SINGLE ENGINE CONTROL SPEED 66 KIAS

On instrument panel in full view of the pilot:

VA 135 AT 4407 LBS.
(See P.O.H.)

GEAR DOWN 129 KIAS (MAX.) OR V_{LO} 129 DN, 107 UP
GEAR UP 107 KIAS (MAX.) V_{LE} 129 MAX.
EXTENDED 129 KIAS (MAX.)

DEMONSTRATED CROSSWIND COMPONENT 17 KTS
OR
DEMO X-WIND 17 KTS

On instrument panel or sun visor:

TAKEOFF CHECK LIST	LANDING CHECK LIST	"LANDING CHECK LIST
Fuel Selectors On	Seat Backs Erect	Seat Backs Erect
Aux. Fuel Pump Off	Fasten Belts/Harness	Fasten Belts/Harness
Alternators On	Fuel Selectors On	Fuel Selectors On
Engine Gages Checked	Cowl Flaps Set	Cowl Flaps Set
Mixtures Set	Mixtures Rich	Mixtures Rich
Propellers Set	Aux. Fuel Pump Off	Aux. Fuel Pump Off
Alt. Air Off	Propellers Set	Propellers Set
Cowl Flaps Open	Gear Down	Gear Down
Seat Backs Erect	Flap Set - 107 KIAS Max.	Flap Set - (White Arc)
Flaps Set	Air Conditioner Off	Air Conditioner Off
Trim Set (Stab. & Rudder)	OR	
Fasten Belts/Harness		
Controls Free - Full Travel		
Doors Latched/Air Cond. Off		

The "Air Conditioner Off" item in the above takeoff and landing check lists is mandatory for air conditioned aircraft only.

On storm window:

DO NOT OPEN ABOVE 129 KIAS

Near windshield panel heat switch with windshield heating installation:

WINDSHIELD PANEL HEAT - SEE PILOT'S OPERATING HANDBOOK.

On engine instrument panel cover to left of engine controls with windshield heating installation without the entire Ice Protection System installed:

WARNING - THIS AIRCRAFT IS NOT APPROVED FOR FLIGHT IN ICING CONDITIONS.

In full view of the pilot for flight with the aft fuselage doors removed:

FOR FLIGHT WITH AFT DOORS REMOVED, CONSULT THE LIMITATIONS AND PROCEDURES SECTIONS OF THE PILOT'S OPERATING HANDBOOK.

Beneath the pitot heat switch:

GND. OPP.
3 MIN. MAX.

On the inside of both oil filler access doors:

OIL COOLER WINTERIZATION PLATE TO BE REMOVED WHEN AMBIENT TEMPERATURE EXCEEDS 50°F.

On the throttle quadrant below engine and propeller controls:

USE PROP SYNC MANUAL FOR TAKE-OFF LANDING AND
SINGLE ENGINE OPERATIONS.

On the executive writing table:

CAUTION - THIS TABLE MUST BE STOWED DURING
TAKEOFF AND LANDING.

On the instrument panel in full view of the pilot:

AVOID CONTINUOUS GROUND OPERATION 1700 - 2100
RPM IN CROSS/TAIL WIND OVER 10 KT

AVOID CONTINUOUS OPERATIONS 2000 - 2200 RPM
ABOVE 32" MANIFOLD PRESSURE

Adjacent to fuel tank fill caps with standard fuel tanks installed:

FUEL - 100/130 AVIATION GRADE - USABLE CAPACITY
46.5 GAL.

OR

FUEL - 100 OR 100LL AVIATION GRADE

Adjacent to fuel tank filler caps with optional fuel tank installed:

FUEL - 100/130 AVIATION GRADE - USABLE CAPACITY
61.5 GAL.

OR

FUEL - 100 OR 100LL AVIATION GRADE

On instrument panel or sun visor:

TAKEOFF CHECK LIST	LANDING CHECK LIST	"LANDING CHECK LIST
Fuel Selectors On	Seat Backs Erect	Seat Backs Erect
Aux. Fuel Pump Off	Fasten Belts/Harness	Fasten Belts/Harness
Alternators On	Fuel Selectors On	Fuel Selectors On
Engine Gages Checked	Cowl Flaps Set	Cowl Flaps Set
Mixtures Set	Mixtures Rich	Mixtures Rich
Propellers Set	Aux. Fuel Pump Off	Aux. Fuel Pump Off
Alt. Air Off	Propellers Set	Propellers Set
Cowl Flaps Open	Gear Down	Gear Down
Seat Backs Erect	Flap Set - 107 KIAS Max.	Flap Set - (White Arc)
Flaps Set	Air Conditioner Off	Air Conditioner Off"
Trim Set (Stab. & Rudder)	OR	
Fasten Belts/Harness		
Controls Free - Full Travel		
Doors Latched/Air Cond. Off		

The "Air Conditioner Off" item in the above takeoff and landing check lists is mandatory for air conditioned aircraft only.

On storm window:

DO NOT OPEN ABOVE 129 KIAS

Near windshield panel heat switch with windshield heating installation:

WINDSHIELD PANEL HEAT - SEE PILOT'S OPERATING HANDBOOK.

On engine instrument panel cover to left of engine controls with windshield heating installation without the entire Ice Protection System installed:

WARNING - THIS AIRCRAFT IS NOT APPROVED FOR FLIGHT IN ICING CONDITIONS.

In full view of the pilot for flight with the aft fuselage doors removed:

FOR FLIGHT WITH AFT DOORS REMOVED, CONSULT THE LIMITATIONS AND PROCEDURES SECTIONS OF THE PILOT'S OPERATING HANDBOOK.

Beneath the pitot heat switch:

GND. OPP.
3 MIN. MAX.

On the inside of both oil filler access doors:

OIL COOLER WINTERIZATION PLATE TO BE REMOVED WHEN AMBIENT TEMPERATURE EXCEEDS 50°F.