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SECTION 2

LIMITATIONS

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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 operation of the airplane and its systems.

This airplane must be operated as a normal category airplane in compliance with the operating limitations stated in this section and the handbook.

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 (VNE) - Do not exceed this speed in any operation.	202	194
Maximum Structural Cruising Speed (VNO) - Do not exceed this speed except in smooth air and then only with caution.	169	165
Maximum Operating Maneuvering Speed (VO) - Do not make full or abrupt control inputs above this speed.		
At 3800 lb Gross Weight	135	133
At 2870 lb Gross Weight	115	115

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 turbulant air.

2.3 AIRSPEED LIMITATIONS (continued)

SPEED	KIAS	KCAS
Maximum Landing Gear Extended Speed (VLE) -Do not exceed this speed with landing gear extended.	140	138
Maximum Landing Gear Extension Speed (VLO) - Do not exceed this speed when extending the landing gear.	140	138
Maximum Landing Gear Retraction Speed (VLO) - Do not exceed this speed when retracting the landing gear.	109	109
Maximum Flaps Extended Speed (VFE) - Do not exceed this speed with the flaps extended.	111	109
One Engine Inoperative Best Rate of Climb Speed.	88	90
Air Minimum Control Speed (VMCA) - Lowest airspeed at which airplane is controllable with one engine operating and no flaps.	56	63

NOTE

VMCA for this airplane is defined by aerodynamic stall.

2.5 AIRSPEED INDICATOR MARKINGS

MARKING	IAS
Red Line (Never Exceed)	202 KTS
Yellow Band (Caution Range - Smooth Air Only)	169 KTS to 202 KTS
Green Band (Normal Operating Range)	57 KTS to 169 KTS
White Band (Flap Down)	55 KTS to 111 KTS
Blue Line (One Engine Inoperative Best Rate of Climb Speed)	88 KTS
Red Line (One Engine Inoperative Air Minimum Control Speed)	56 KTS

2.7 POWER PLANT LIMITATIONS

(a) Number of Engines: 2

(b) Engine Manufacturer: Lycoming

(c) Engine Model No.
- Left: IO-360-B1G6
- Right: LIO-360-B1G6

(d) Engine Operating Limits
- (1) Maximum Horsepower: 180
- (2) Maximum Rotation Speed (RPM): 2700
- (3) Maximum Manifold Pressure: Full Throttle
- (4) Maximum Cylinder Head Temperature: 500°F
- (5) Maximum Oil Temperature: 245°F

(e) Oil Pressure
- Minimum: 25 PSI
- Maximum: 115 PSI

(f) Fuel (AVGAS ONLY)
(minimum grade): 100 or 100LL Aviation Grade

(g) The propellers in this table are approved for use, but a straight blade propeller and a scimitar blade propeller may not be installed on the same airplane.

Propeller Manufacturer	**Hartzell**	**Hartzell**
Blade Model and Description	HC-C2Y(K, R)-2CEUF/ FC7666A-2R (Left) HC-C2Y(K, R)-2CLEUF/ FC7666A-2R (Right) Straight Blade	HC-C2YR-2CEUFP/ FC7497 (Left) HC-C2YR-2CLEUFP/ FJC7497 (Right) Scimitar Blade
Number of Blades	2	2
Propeller Diameter (inches)	74 (Maximum) 72 (Minimum)	74 (Maximum) 72.5 (Minimum)

2.9 POWER PLANT INSTRUMENT MARKINGS

(a) Tachometer	
Green Arc (Normal Operating Range)	500 to 2700 RPM
Red Line (Maximum)	2700 RPM
(b) Oil Temperature	
Green Band (Normal Operating Range)	75°F to 245°F
Red Line (Maximum)	245°F
(c) Oil Pressure	
Green Band (Normal Operating Range)	55 PSI to 95 PSI
Yellow Band (Caution Range) (Idle)	25 PSI to 55 PSI
Yellow Band (Warm Up, Taxi & T.O.)	95 PSI to 115 PSI
Red Line (Minimum)	25 PSI
Red Line (Maximum)	115 PSI
(d) Cylinder Head Temperature	
Green Band (Normal Range)	200°F to 500°F
Red Line (Maximum)	500°F
(e) Fuel Flow	
Green Band (Normal Operating Range)	3.0 GPH to 25.0 GPH

2.11 SYSTEMS LIMITATIONS

a) Alternator	
1) Maximum Load Ground	60 AMPS
2) Maximum Load Flight	65 AMPS
b) Main Battery	
Minimum	25 VOLTS
Maximum	32 VOLTS
c) Emergency Battery	
Minimum	20 VOLTS
Minimum Required for Flight	23.3 VOLTS
Maximum	32 VOLTS

2.13 WEIGHT LIMITS

(a) Maximum Ramp Weight	3816 lb
(b) Maximum Takeoff Weight	3800 lb
(c) Maximum Landing Weight	3800 lb
(d) Maximum Weight in Baggage Compartment	200 lb

NOTE

Refer to Section 5 (Performance) for maximum weight as limited by performance.

2.15 CENTER OF GRAVITY LIMITS

Weight Pounds	Forward Limit Inches Aft of Datum	Rearward Limit Inches Aft of Datum
2800	84.0	93.0
3400	85.0	93.0
3800	89.0	93.0

NOTE

Straight line variation between points given.

The datum used is 78.4 inches ahead of the wing leading edge at wing station 106.

It is the responsibility of the airplane owner and the pilot to ensure that the airplane is properly loaded. See Section 6 (Weight and Balance) for proper loading instructions.

2.17 MANEUVER LIMITS

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

2.19 FLIGHT LOAD FACTORS

(a) Positive Load Factor (Maximum)	
(1) Flaps Up	3.8 G
(2) Flaps Down	2.0 G
(b) Negative Load Factor (Maximum)	-1.5 G

No inverted maneuvers approved.

2.21 TYPES OF OPERATION

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) Non Icing

2.23 FUEL LIMITATIONS

(a) Minimum Aviation Fuel Grade	100LL or 100
(b) Total Capacity	110 U.S. GAL.
(c) Unusable Fuel The unusable fuel for this airplane is 1.0 gallon in each nacelle in critical flight attitudes.	2 U.S. GAL.
(d) Usable Fuel The usable fuel in this airplane is 54 gallons in each nacelle for a total of 108 gallons.	108 U.S. GAL.

2.25 MAXIMUM SEATING CONFIGURATION

The maximum seating capacity is 4 persons.

2.27 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS

(a) Cockpit Reference & Pilot's Guide

The Garmin G1000 Cockpit Reference Guide for the PA-44-180 Seminole (Garmin P/N 190-02199-00 latest appropriate revision and -XX part number) must be immediately available to the pilot while operating the airplane.

(b) System Software Requirements.

The G1000 must utilize the following or later FAA approved software versions:

Component	Identification	Software Version	
		Note *	Note **
PFD	Primary Flight Display	20.10	20.86
MFD	Multifunction Flight Display	20.10	20.86
GMA	Audio Panel	4.04	5.20D
GRS	Attitude and Heading Reference System	2.02	2.06
GDC	Air Data Computer	2.02	2.05
GIA	Integrated Avionics Unit	8.05.2	2.04
GEA	Engine Airframe Interface Unit	2.07	2.11
GPS	Global Positioning System	5.1	7.0
GMU	Magnetometer Unit	2.05	2.00

The software versions can be verified on the AUX - SYSTEM STATUS page of the MFD.

* Applicable to SN 4496395, 4496397 thru 4496431, and 4496433 thru 4496446.

** Applicable to SN 4496432, 4496447 and up.

2.27 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(c) Databases

GPS/SBAS based IFR enroute, oceanic and terminal navigation predicated upon the Garmin G1000 GPS receiver is prohibited unless the pilot uses a valid, compatible, and current navigation database or verifies each selected waypoint for accuracy by reference to current data.

Instrument approach navigation predicated upon the Garmin G1000 GPS receiver must be accomplished in accordance with approved instrument approach procedures that are retrieved from the G1000 navigation database. The G1000 navigation database must incorporate the current update cycle or each waypoint must be verified for accuracy with current approach chart data. Manual entry of data points is prohibited.

(d) Flight Planning

In areas where GPS WAAS SBAS coverage is not available, the pilot must verify RAIM availability. See Section 1.21 for available FDE/RAIM prediction programs.

For operations within the U.S. Nation Airspace System on RNP and RNAV procedures when GPS WAAS SBAS signals are not available, the availability of GPS RAIM shall be confirmed for the intended route of flight. In the event of a predicted continuous loss of RAIM of more than five minutes for any part of the intended route of flight, the flight should be delayed, canceled, or re-routed on a track where RAIM requirements can be met.

For operations within European B-RNAV/RNAV 5 and P-RNAV airspace, if more than one satellite is scheduled to be out of service, then the availability of RAIM/FDE shall be confirmed for the intended flight (route and time). In the event of a predicted continuous loss of RAIM/FDE of more than five minutes for any part of the intended flight, the flight shall be delayed, canceled, or rerouted on a track where RAIM/FDE requirements can be met. For operations where the route requires oceanic/remote area (Class II) navigation, the aircraft's operator or flight crew must determine that RAIM/FDE will be available along the intended route of flight. If RAIM/FDE will be unavailable for more than 34 minutes for RNP-10 airspace or 25 minutes for RNP-4 airspace, then the operation must be rescheduled when RAIM/FDE is available.

2.27 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(d) Flight Planning

In areas where GPS SBAS coverage is not available, the pilot must verify RAIM availability. See Section 1.21 for available FDE/RAIM prediction programs.

For operations within the U.S. Nation Airspace System on RNP and RNAV procedures when GPS SBAS signals are not available, the availability of GPS RAIM shall be confirmed for the intended route of flight. In the event of a predicted continuous loss of RAIM of more than five minutes for any part of the intended route of flight, the flight should be delayed, canceled, or re-routed on a track where RAIM requirements can be met.

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When RAIM is required for GPS integrity (GPS SBAS not available) during instrument meteorological conditions (IMC), other non-GPS navigation equipment appropriate to the operation, must be available.

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2.27 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(e) Enroute

Whenever possible, RNP and RNAV routes including Standard Instrument Departures (SIDs) and Obstacle Departure Procedures (ODPs), Standard Terminal Arrival (STAR), and enroute RNAV "Q" and RNAV "T" routes should be loaded into the flight plan from the database in their entirety, rather than loading route waypoints from the database into the flight plan individually. Selecting and inserting individual named fixes from the database is permitted, provided all fixes along the published route to be flown are inserted. Manual entry of waypoints using latitude/longitude or place/ bearing is prohibited.

Navigation information is referenced to WGS-84 reference system, and should only be used where the Aeronautical Information Publication (including electronic data and aeronautical charts) conform to WGS-84 or equivalent.

(f) Approaches

(1) Vertical Guidance

Advisory vertical guidance deviation information is only an aid to help pilots comply with altitude restrictions. When using advisory vertical guidance, the pilot must use the primary barometric altimeter to ensure compliance with all altitude restrictions, particularly during instrument approach operations.

2.27 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(f) Approaches (continued)

(1) Vertical Guidance (continued)

When GPS SBAS corrections are unavailable or if operating outside of GPS SBAS coverage, instrument approaches utilizing the GPS receiver will be conducted in the approach mode and Fault Detection and Exclusion mode. Loss of Integrity annunciations must not be displayed at the final approach fix. Vertical guidance from GPS will not be available if GPS SBAS corrections are unavailable or if operating outside of GPS SBAS coverage. GPS SBAS corrections should be selected OFF when operating outside of GPS SBAS system coverage. Barometric vertical guidance (Baro-VNAV) may be used for LNAV/VNAV approaches in the absence of SBAS coverage.

NOTE

This aircraft is not authorized to perform barometric vertical guidance (baro-VNAV) approaches in the EASA airspace system.

IFR non-precision approach with vertical guidance approval using the GPS/SBAS sensor is limited to published approaches within the U.S. and EASA Airspace Systems. Approaches to airports in other airspace are not approved unless authorized by the appropriate governing authority.

(2) GPS Approaches

See Section 1, paragraph 1.21. for approved GPS operations/ approaches.

(3) Non GPS Approaches

The navigation equipment required to perform an instrument approach procedures is indicated by the title of the procedure and notes on the IAP chart. Use of the Garmin GPS/SBAS receivers to provide navigation guidance during the final approach segment of an ILS, LOC, LOC-BC, LDA, SDF, MLS or any other type of approach not approved for "or GPS" navigation is prohibited. When using the Garmin VOR/LOC/GS receivers to fly the final approach segment, VOR/LOC/GS navigation data must be selected and presented on the CDI of the pilot flying.

2.27 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(h) Terrain, TAWS-B, and Obstacle Display (continued)

Obstacles 200 feet and higher are included in the obstacle database. It is very important to note that not all obstacles are necessarily charted and therefore may not be contained in the obstacle database. The terrain and TAWS-B databases cover all latitude and longitudes and the obstacle database covers the United States, Canada, and Europe.

NOTE

The area of coverage may be modified as additional obstacle data sources become available.

(i) Datalink Weather Display

Optional XM weather information displayed on the MFD is limited to supplemental use only and may not be used in lieu of an official weather data source.

WARNING

Do not use data-linked weather as the sole means for negotiating a path through a thunderstorm area (tactical maneuvering). Avoid any thunderstorm identified as severe or giving an intense radar echo by at least 20 miles. This is especially true under the anvil of a large cumulonimbus.

(j) Traffic Display

Traffic shown on the display may or may not have traffic alerting available. The display of traffic is an aid to visual acquisition and may not be utilized for aircraft maneuvering.

(k) Synthetic Vision System (SVS)

Use of the Synthetic Vision system display elements alone for aircraft control without reference to the G1000 primary flight instruments or the aircraft standby instrument is prohibited.

Use of the Synthetic Vision system alone for navigation, or obstacle/terrain avoidance is prohibited.

2.27 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(l) Electronic Flight Bag (EFB)

The G1000 Integrated Avionics System as installed in this aircraft supports approval of AC 20-76C Hardware Class 3, Software Type B Electronic Flight Bag (EFB) electronic aeronautical chart applications when using current FliteChart or ChartView data.

For operations under 14 CFR Part 91, it is suggested that a secondary or backup source of aeronautical information necessary for the flight, is available to the pilot in the aircraft. The secondary or backup information may be either traditional paper-based material or displayed electronically. If the source of aeronautical information is in electronic format, operators must determine non-interference with the G1000 system and existing aircraft systems for all flight phases.

(m) ChartView, FliteCharts, and SafeTaxi®

Do not use SafeTaxi®, ChartView, or FliteCharts functions as the basis for ground maneuvering. SafeTaxi®, ChartView, and FliteCharts functions have not been qualified to be used as an Airport Moving Map Display (AMMD). They are intended to improve pilot situational awareness during ground operations and should only be used by the flight crew to orient themselves on the airport surface.

2.27 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(n) Minimum fully functional equipment required for flight operations:

Equipment	Number Installed	VFR	IFR
PFD	1	0 (1)	1
MFD	1	0 (2)	1
GEA	1	1	1
GIA	2	2	2
GPS	2	0	1
AHRS (GRS)	1	0	1
ADC (GDC)	1	0	1
Magnetometer (GMU)	1	0	1
Standby Instrument - Attitude	1	0	1
Standby Instrument - Airspeed	1	0 (3)	1
Standby Instrument - Altimeter	1	0 (3)	1
Standby Instrument - Heading	1	0 (3)	1

(1) If the PFD is inoperative during DAY or NIGHT VFR, the MFD must be operative.

(2) If the MFD is inoperative, the PFD must be operative for ALL flight operations.

(3) If this standby instrument indication is inoperative, the equivalent indication on the PFD must be operative.

NOTE

To be considered fully functional, there must be no active CAS Messages, System Annunciations or System Message Advisories related to the equipment required for flight operations. (see table above).

NOTE

Flight in IMC should not be conducted if system alerts are present for any equipment required for IFR operations (see table above).

2.29 GFC 700 AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)

1. The autopilot must be disengaged during takeoff and landing.
2. Autopilot minimum engagement heights:
   a. 400 feet AGL during takeoff and subsequent climb operations.
   b. 1000 feet AGL during cruise and descent operations.
   c. 200 feet AGL during approach operations.
3. Autopilot minimum approved operating speed:
   On Approach - 90 KIAS
   Other than Approach - 80 KIAS
4. Autopilot maximum approved operating speed - 190 KIAS
5. Maximum fuel imbalance during autopilot operations - 10 gal.
6. Autopilot coupled go-around prohibited with one engine inoperative.
7. Maximum autopilot engagement limits:
   a. Pitch axis: +/-50°
   b. Roll axis: +/-75°
8. If the stall warning system is inoperative, Underspeed Protection (USP) will not activate in altitude critical modes (ALT, GS, GP, TO and GA).
9. Autopilot approved for Category 1 precision approaches and non-precision approaches only.

2.27 GARMIN G1000 AVIONICS SYSTEM LIMITATIONS (continued)

(o) Minimum fully functional equipment required for flight operations:

Equipment	Number Installed	VFR	IFR
PFD	1	0 (1)	1
MFD	1	0 (2)	1
GEA	1	1	1
GIA	2	2	2
GPS	2	0	1
AHRS (GRS)	1	0	1
ADC (GDC)	1	0	1
Magnetometer (GMU)	1	0	1
Standby Instrument - Attitude	1	0	1
Standby Instrument - Airspeed	1	0 (3)	1
Standby Instrument - Altimeter	1	0 (3)	1
Standby Instrument - Heading	1	0 (3)	1

(1) If the PFD is inoperative during DAY or NIGHT VFR, the MFD must be operative.

(2) If the MFD is inoperative, the PFD must be operative for ALL flight operations.

(3) If this standby instrument indication is inoperative, the equivalent indication on the PFD must be operative.

NOTE

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3. Autopilot minimum approved operating speed:
   On Approach - 90 KIAS
   Other than Approach - 80 KIAS
4. Autopilot maximum approved operating speed - 190 KIAS
5. Maximum fuel imbalance during autopilot operations - 10 gal.
6. Autopilot coupled go-around prohibited with one engine inoperative.
7. Maximum autopilot engagement limits:
   a. Pitch axis: +/-50°
   b. Roll axis: +/-75°
8. If the stall warning system is inoperative, Underspeed Protection (USP) will not activate in altitude critical modes (ALT, GS, GP, TO and GA).
9. Autopilot approved for Category 1 precision approaches and non-precision approaches only.

2.31 STANDBY INSTRUMENT LIMITATIONS

NOTE

See Section 2.27 (o) for approved VFR and IFR operations when the standby instrument has an invalid or failed function.

1. Aspen Standby Instrument
   a. The Aspen Evolution Backup Display (EBD) Pilot's Guide P/N 091-00027-001, Revision A, or later appropriate revision) must be immediately available to the flight crew.
   b. Use of the EBD for IFR operations within 750 nautical miles of the magnetic north or south pole, is NOT AUTHORIZED.

2.31 STANDBY INSTRUMENT LIMITATIONS (continued)

2. Garmin G5 Standby Instrument
   The G5 must utilize the following or later FAA approved software versions:

Component	Software Version
G5 Standby Instrument	6.40

2.33 PLACARDS

LIMITATIONS

THE MARKINGS & PLACARDS INSTALLED IN THIS AIRPLANE CONTAIN OPERATING LIMITATIONS WHICH MUST BE COMPLIED WITH WHEN OPERATING THIS AIRPLANE IN THE NORMAL CATEGORY. OTHER OPERATING LIMITATIONS WHICH MUST BE COMPLIED WITH WHEN OPERATING THIS AIRPLANE IN THIS CATEGORY ARE CONTAINED IN THE AIRPLANE FLIGHT MANUAL. NO ACROBATIC MANEUVERS, INCLUDING SPINS, APPROVED. THIS AIRCRAFT APPROVED FOR V.F.R., I.F.R., DAY AND NIGHT NON-ICING FLIGHT WHEN EQUIPPED IN ACCORDANCE WITH FAR 91 OR FAR 135.

ONE ENGINE INOPERATIVE AIR MINIMUM CONTROL SPEED 56 KIAS.

ONE ENGINE INOPERATIVE STALLS NOT RECOMMENDED. CAN CAUSE 300 FT. LOSS OF ALTITUDE AND 30° PITCH ANGLE.

INFORMATION

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

WARNING

TURN OFF STROBE LIGHTS WHEN IN CLOSE PROXIMITY TO GROUND OR DURING FLIGHT THROUGH CLOUD, FOG OR HAZE.

2.33 PLACARDS (continued)

On storm window:

DO NOT OPEN ABOVE 129 KIAS

On lower left portion of instrument panel:

ALTERNATE STATIC SOURCE – PULL AFT TO OPEN
ALL CABIN VENTS AND STORM WINDOW MUST BE CLOSED. HEATER AND DEFROSTER MUST BE ON. OPEN FOR STATIC SYSTEM DRAIN

Near emergency gear release:

EMERGENCY GEAR EXTENSION
PULL TO RELEASE. SEE AFM
BEFORE RE-ENGAGEMENT

Adjacent to upper door latch:

ENGAGE LATCH BEFORE FLIGHT

Near the Emergency Exit release handle:

EMERGENCY EXIT
REMOVE COVER PANEL
PULL HANDLE FORWARD
PUSH WINDOW OUT