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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 operation of the airplane and its systems.

This airplane must be operated as a normal or utility category airplane in compliance with the operating limitations stated in the form of placards and markings and those given in this section and this complete 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 ( $V_{NE}$ ) - Do not exceed this speed in any operation.	154	148
Maximum Structural Cruising Speed ( $V_{NO}$ ) - Do not exceed this speed except in smooth air and then only with caution.	125	121
Design Maneuvering Speed ( $V_A$ ) - Do not make full or abrupt control movements above this speed.		
At 2550 LBS. G.W.	113	111
At 1634 LBS. G.W.	89	89

#### 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 the flaps extended.	102	100
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## 2.5 AIRSPEED INDICATOR MARKINGS

MARKING	IAS
Red Radial Line (Never Exceed)	(154 KTS)
Yellow Arc (Caution Range - Smooth Air Only)	(125 KTS to 154 KTS)
Green Arc (Normal Operating Range)	(55 KTS to 125 KTS)
White Arc (Flap Down)	(49 KTS to 102 KTS)

## 2.7 POWER PLANT LIMITATIONS

(a) Number of Engines	1
(b) Engine Manufacturer	Lycoming
(c) Engine Model No.	0360-A4A or 0-360-A4M with carburetor setting 10-3878
(d) Engine Operating Limits	
(1) Maximum Horsepower	180
(2) Maximum Rotation Speed (RPM)	2700
(3) Maximum Oil Temperature	245°F
(e) Oil Pressure	
Minimum (red line)	25 PSI
Maximum (red line)	90 PSI
(f) Fuel Pressure	
Minimum (red line)	.5 PSI
Maximum (red line)	8 PSI
(g) Fuel Grade (AVGAS ONLY) (minimum octane)	100/130 - Green
(h) Number of Propellers	1
(i) Propeller Manufacturer	Sensenich
(j) Propeller Model	76EM8S5-0-60 * or 76EM8S5-0-62 **
(k) Propeller Diameter	
Minimum	76 IN.
Maximum	76 IN.
(l) Propeller Tolerance (static RPM at maximum permissible throttle setting)	Not above 2425 RPM* Not below 2325 RPM* Not above 2375 RPM** Not below 2275 RPM**

No additional tolerance permitted.

\*Serial nos. 28-7790001 through 28-7790607.

\*\*Serial nos. 28-7890001 and up.

## 2.9 POWER PLANT INSTRUMENT MARKINGS

- |                                     |                  |
|-------------------------------------|------------------|
| (a) Tachometer                      |                  |
| Green Arc (Normal Operating Range)  | 500 to 2700 RPM  |
| Red Line (Maximum Continuous Power) | 2700 RPM         |
| (b) Oil Temperature                 |                  |
| Green Arc (Normal Operating Range)  | 75° to 245°F     |
| Red Line (Maximum)                  | 245°F            |
| (c) Oil Pressure                    |                  |
| Green Arc (Normal Operating Range)  | 60 PSI to 90 PSI |
| Yellow Arc (Caution Range) (Idle)   | 25 PSI to 60 PSI |
| Red Line (Minimum)                  | 25 PSI           |
| Red Line (Maximum)                  | 90 PSI           |
| (d) Fuel Pressure                   |                  |
| Green Arc (Normal Operating Range)  | .5 PSI to 8 PSI  |
| Red Line (Minimum)                  | .5 PSI           |
| Red Line (Maximum)                  | 8 PSI            |

## 2.11 WEIGHT LIMITS

- |                     | NORMAL   | UTILITY  |
|---------------------|----------|----------|
| (a) Maximum Weight  | 2550 LBS | 1950 LBS |
| (b) Maximum Baggage | 200 LBS  | 0 LBS    |

### NOTE

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

### 2.13 CENTER OF GRAVITY LIMITS

(a) Normal Category

Weight Pounds	Forward Limit Inches Aft of Datum	Rearward Limit Inches Aft of Datum
2550	88.6	93.0
2050 (and less)	82.0	93.0

(b) Utility Category

Weight Pounds	Forward Limit Inches Aft of Datum	Rearward Limit Inches Aft of Datum
1950 (and less)	82.0	86.5

#### NOTES

Straight line variation between points given.

The datum used is 78.4 inches ahead of the wing leading edge at the inboard intersection of the straight and tapered section.

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

### 2.15 MANEUVER LIMITS

- (a) Normal Category - All acrobatic maneuvers including spins prohibited.
- (b) Utility Category - Approved maneuvers for bank angles exceeding 60°.

	Entry Speed
Steep Turns	113 KIAS
Lazy Eights	113 KIAS
Chandelles	113 KIAS

### 2.17 FLIGHT LOAD FACTORS

	<b>NORMAL</b>	<b>UTILITY</b>
(a) Positive Load Factor (Maximum)	3.8 G	4.4 G
(b) Negative Load Factor (Maximum)	No inverted maneuvers approved	

## 2.19 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

## 2.21 FUEL LIMITATIONS

- (a) Total Capacity 50 U.S. GAL
- (b) Unusable Fuel 2 U.S. GAL  
The unusable fuel for this airplane has been determined as 1.0 gallon in each wing in critical flight attitudes.
- (c) Usable Fuel 48 U.S. GAL  
The usable fuel in this airplane has been determined as 24.0 gallons in each wing.

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## 2.23 PLACARDS

In full view of the pilot:

"THIS AIRPLANE MUST BE OPERATED AS A NORMAL OR UTILITY CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS AND MANUALS.

ALL MARKINGS AND PLACARDS ON THIS AIRPLANE APPLY TO ITS OPERATION AS A UTILITY CATEGORY AIRPLANE. FOR NORMAL AND UTILITY CATEGORY OPERATION, REFER TO THE PILOT'S OPERATING HANDBOOK.

NO ACROBATIC MANEUVERS ARE APPROVED FOR NORMAL CATEGORY OPERATIONS. SPINS ARE PROHIBITED FOR NORMAL AND UTILITY CATEGORY."

In full view of the pilot, the following takeoff and landing check lists will be installed:

### TAKEOFF CHECK LIST

Fuel on proper tank  
Electric fuel pump on  
Engine gauges checked  
Flaps - set  
Carb heat off

Mixture set  
Seat backs erect

Fasten belts/harness  
Trim tab - set  
Controls - free  
Door - latched  
Air Conditioner - off

### LANDING CHECK LIST

Fuel on proper tank  
Mixture rich  
Electric fuel pump on

Seat back erect

Flaps - set (102 KIAS max.)  
Fasten belts/harness  
Air Conditioner - off

The "AIR COND OFF" item in the above takeoff and landing check lists is mandatory for air conditioned aircraft only.

In full view of the pilot, in the area of the air conditioner control panel when the air conditioner is installed:

“WARNING – AIR CONDITIONER MUST BE OFF TO INSURE  
NORMAL TAKEOFF CLIMB PERFORMANCE.”

Adjacent to upper door latch:

“ENGAGE LATCH BEFORE FLIGHT.”

On inside of the baggage compartment door:

“BAGGAGE MAXIMUM 200 LBS”

“UTILITY CATEGORY OPERATION - NO BAGGAGE OR AFT  
PASSENGERS ALLOWED. NORMAL CATEGORY OPERATION  
- SEE PILOT'S OPERATING HANDBOOK WEIGHT AND  
BALANCE SECTION FOR BAGGAGE AND AFT PASSENGER  
LIMITATIONS.”

In full view of the pilot:

“MANEUVERING SPEED 113 KIAS AT 2550 LBS. (SEE  
P.O.H.)”

“UTILITY CATEGORY OPERATION - NO AFT PASSENGERS  
ALLOWED.”

“DEMONSTRATED CROSS WIND COMPONENT - 17 KTS.”

On the instrument panel in full view of the pilot when the oil cooler winterization kit is installed:

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

In full view of the pilot:

“UTILITY CATEGORY OPERATION ONLY.”

- (1) NO AFT PASSENGERS ALLOWED.
- (2) ACROBATIC MANEUVERS ARE LIMITED TO THE FOLLOWING:

	ENTRY SPEED
SPINS PROHIBITED	
STEEP TURNS	113 KIAS
LAZY EIGHTS	113 KIAS
CHANDELLES	113 KIAS

On the instrument panel in full view of the pilot:

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