## **OPERATING LIMITATIONS**

## **TABLE OF CONTENTS**

|   | <b>,</b>   | Page   |
|---|--|--------|
|   | Introduction   | . 2-3  |
|   | Airspeed Limitations   | 2-4    |
|   | Airspeed Indicator Markings  | 2-5    |
|   | Powerplant Limitations   | 2-6    |
|   | Powerplant Instrument Markings   | 2-7    |
|   | Weight Limits  | 2-8    |
|   | Normal Category  | 2-8    |
| 1 | and the same of th | .2-8   |
| • | Utility Category   | 2-8    |
| ı | Maximum Weight in Baggage Compartment - Utility Category.  | 2-8    |
| 1 | Center Of Gravity Limits   | 2-9    |
| ı | Normal Category  | 2-9    |
|   | Utility Category   | 2-9    |
| 1 | Maneuver Limits  | .2-10  |
| ı | Normal Category  | .2-10  |
|   | Utility Category   | .2-10  |
|   | Flight Load Factor Limits  | 2-11   |
|   | Normal Category  | . 2-11 |
|   | Utility Category   | . 2-11 |
| ı | Kinds Of Operations Limits   | .2-12  |
| ı | Kinds Of Operations Equipment List   | .2-13  |
| ı | Fuel Limitations   | .2-18  |
| 1 | Flap Limitations   | .2-18  |
|   | System Limitations   | .2-19  |
|   | Aux Audio System   | .2-19  |
| 1 | 12V Power System   | 2-19   |
| ı | G1000 Limitations  | .2-20  |
|   | GPS - WAAS   | .2-21  |
| Ì | Bendix/King KAP 140 2 Axis Autopilot (if installed)  |        |
| ı | Terrain Awareness and Warning System   |        |
|   | (TAWS-B) (if installed)  | .2-22  |
| 1 | Placards   | .2-23  |
|   |  |        |

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# SECTION 2 OPERATING LIMITATIONS

### INTRODUCTION

Section 2 includes operating limitations, instrument markings, and basic placards necessary for the safe operation of the airplane, its engine, standard systems and standard equipment. The limitations included in this section and in Section 9 have been approved by the Federal Aviation Administration. Observance of these operating limitations is required by Federal Aviation Regulations.

#### NOTE

- Refer to Supplements, Section 9 of this Pilot's Operating Handbook for amended operating limitations, operating procedures, performance data and other necessary information for airplanes equipped with specific options.
- The airspeeds listed in Figure 2-1, Airspeed Limitations, and Figure 2-2, Airspeed Indicator Markings, are based on Airspeed Calibration data shown in Section 5 with the normal static source. If the alternate static source is being used, ample margins should be observed to allow for the airspeed calibration variations between the normal and alternate static sources as shown in Section

The Cessna Model No. 172S is certificated under FAA Type Certificate No. 3A12.

## **AIRSPEED LIMITATIONS**

Airspeed limitations and their operational significance are shown in Figure 2-1. Maneuvering speeds shown apply to normal category operations. The utility category maneuvering speed is 98 KIAS at 2200 pounds.

## **AIRSPEED LIMITATIONS**

| SYMBOL          | SPEED                                | KCAS | KIAS | REMARKS  |
|-----------------|--------------------------------------|------|------|--|
| V <sub>NE</sub> | Never Exceed Speed                   | 160  | 163  | Do not exceed this speed in any operation.                                 |
| V <sub>NO</sub> | Maximum Structural<br>Cruising Speed | 126  | 129  | Do not exceed this speed except in smooth air, and then only with caution. |
| V <sub>A</sub>  | Maneuvering Speed:                   |      |      | Do not make full or abrupt   |
|                 | 2550 Pounds                          | 102  | 105  | control movements above  |
|                 | 2200 Pounds                          | 95   | 98   | this speed.  |
|                 | 1900 Pounds                          | 88   | 90   |  |
| V <sub>FE</sub> | Maximum Flap<br>Extended Speed:      |      |      | Do not exceed this speed with flaps down.                                  |
|                 | FLAPS 10°                            | 107  | 110  |  |
|                 | FLAPS 10° to FULL                    | 85   | 85   |  |
|                 | Maximum Window<br>Open Speed         | 160  | 163  | Do not exceed this speed with windows open.                                |

Figure 2-1

## AIRSPEED INDICATOR MARKINGS

Airspeed indicator markings and their color code significance are shown in Figure 2-2.

## **AIRSPEED INDICATOR MARKINGS**

| MARKING    | KIAS VALUE OR<br>RANGE | SIGNIFICANCE   |  |  |
|------------|------------------------|--|--|--|
| Red Arc*   | 20 - 40                | Low airspeed warning.  |  |  |
| White Arc  | 40 - 85                | Full Flap Operating Range. Lower limit is maximum weight V <sub>SO</sub> in landing configuration. Upper limit is maximum speed permissible with flaps extended.   |  |  |
| Green Arc  | 48 - 129               | Normal Operating Range. Lower limit is maximum weight V <sub>S1</sub> at most forward C.G. with flaps retracted. Upper limit is maximum structural cruising speed. |  |  |
| Yellow Arc | 129 - 163              | Operations must be conducted with caution and only in smooth air.  |  |  |
| Red Line   | 163                    | Maximum speed for all operations.  |  |  |

<sup>\*</sup>G1000 airspeed indicator only.

Figure 2-2

CESSNA MODEL 172S NAV III KAP 140 AUTOPILOT

## POWERPLANT LIMITATIONS

Engine Manufacturer: Textron Lycoming

Engine Model Number: IO-360-L2A

Maximum Power: 180 BHP Rating

Engine Operating Limits for Takeoff and Continuous Operations:

#### NOTE

The static RPM range at full throttle is 2300 - 2400 RPM.

### CAUTION

ENGINE OPERATION WITH INDICATED OIL PRESSURE BELOW THE GREEN BAND RANGE WHILE IN CRUISE OR CLIMB CONFIGURATION IS CONSIDERED ABNORMAL. REFER TO SECTION 3, AMPLIFIED EMERGENCY PROCEDURES, "LOW OIL PRESSURE".

Fuel Grade: Refer to Fuel Limitations

Oil Grade (Specification):

MIL-L-6082 or SAE J1966 Aviation Grade Straight Mineral Oil or MIL-L-22851 or SAE J1899 Ashless Dispersant Oil. Oil must comply with the latest revision and/or supplement for Textron Lycoming Service Instruction No. 1014, must be used.

Propeller Manufacturer: McCauley Propeller Systems

Propeller Model Number: 1A170E/JHA7660

Propeller Diameter:

 Maximum
 .76 INCHES

 Minimum
 .75 INCHES

# **POWERPLANT INSTRUMENT MARKINGS**

Powerplant instrument markings and their color code significance are shown in Figure 2-3. Operation with indications in the red range is prohibited. Avoid operating with indicators in the yellow range.

## POWERPLANT INSTRUMENT MARKINGS

| INSTRUMENT                   | RED LINE<br>(MIN)                              | RED ARC<br>(LWR) | YELLOW<br>ARC     | GREEN ARC<br>(NORMAL<br>OPERATING<br>RANGE) | RED ARC<br>(UPR)   |
|------------------------------|--|------------------|-------------------|---|--------------------|
| Tachometer                   |  |                  |                   |   |                    |
| Sea Level                    |  |                  |                   | 2100 to 2500                                |                    |
| 5000 Feet                    |  |                  |                   |   | 2700* to 3000      |
| 10,000 Feet                  |  |                  |                   | 2100 to 2700<br>RPM                         | RPM                |
| Cylinder Head<br>Temperature |  |                  |                   | 200 to 500°F                                |                    |
| Oil<br>Temperature           |  |                  |                   | 100 to 245°F                                | 245* to 250°F      |
| Oil Pressure                 |  | 0 to 20 PSI      |                   | 50 to 90 PSI                                | 115* to 120<br>PSI |
| Fuel Quantity                | 0 (1.5<br>Gallons<br>Unusable<br>Each<br>Tank) |                  | 0 to 5<br>Gallons | 5 to 24<br>Gallons                          |                    |
| Fuel Flow                    |  |                  | _                 | 0 to 12 GPH                                 |                    |
| Vacuum<br>Indicator          |  |                  |                   | 4.5 to 5.5<br>in.hg.                        |                    |

<sup>\*</sup>Maximum operating limit is lower end of red arc.

Figure 2-3

## **WEIGHT LIMITS**

### **NORMAL CATEGORY**

| Maximum Ramp Weight:    | 2558 POUNDS |
|-------------------------|-------------|
| Maximum Takeoff Weight: | 2550 POUNDS |
| Maximum Landing Weight: | 2550 POUNDS |

# MAXIMUM WEIGHT IN BAGGAGE COMPARTMENT - NORMAL CATEGORY:

| Baggage Area A - Station 82 to 108:  | 120 POUNDS             |
|--------------------------------------|------------------------|
|                                      | . Refer to note below. |
| Baggage Area B - Station 108 to 142: | 50 POUNDS              |
|                                      | . Refer to note below. |

#### NOTE

The maximum allowable combined weight capacity for baggage in areas A and B is 120 pounds.

### **UTILITY CATEGORY**

| Maximum Ramp Weight:    | 2208 POUNDS |
|-------------------------|-------------|
| Maximum Takeoff Weight: |             |
| Maximum Landing Weight  |             |

# MAXIMUM WEIGHT IN BAGGAGE COMPARTMENT - UTILITY CATEGORY:

The baggage compartment must be empty and rear seat must not be occupied.

## CENTER OF GRAVITY LIMITS

#### NORMAL CATEGORY

Center Of Gravity Range:

Forward: 35.0 inches aft of datum at 1950 pounds or less, with straight line variation to 41.0 inches aft of datum at 2550

pounds.

Aft: 47.3 inches aft of datum at all weights.

Reference Datum: Lower portion of front face of firewall.

#### **UTILITY CATEGORY**

Center of Gravity Range:

Forward: 35.0 inches aft of datum at 1950 pounds or less, with straight line variation to 37.5 inches aft of datum at 2200

pounds.

Aft: 40.5 inches aft of datum at all weights.

Reference Datum: Lower portion of front face of firewall.

#### MANEUVER LIMITS

#### NORMAL CATEGORY

This airplane is certificated in both the normal and utility category. The normal category is applicable to aircraft intended for non aerobatic operations. These include any maneuvers incidental to normal flying, stalls (except whip stalls), lazy eights, chandelles, and turns in which the angle of bank is not more than 60°.

# NORMAL CATEGORY MANEUVERS AND RECOMMENDED ENTRY SPEED\*

| Chandelles                      | 105 KNOTS    |
|---------------------------------|--------------|
| Lazy Eights                     | 105 KNOTS    |
| Steep Turns                     | . 95 KNOTS   |
| Stalls (Except Whip Stalls)Slow | Deceleration |

<sup>\*</sup>Abrupt use of the controls is prohibited above 105 KNOTS.

#### UTILITY CATEGORY

This airplane is not designed for purely aerobatic flight. However, in the acquisition of various certificates such as commercial pilot and flight instructor, certain maneuvers are required by the FAA. All of these maneuvers are permitted in this airplane when operated in the utility category.

In the utility category, the rear seat must not be occupied and the baggage compartment must be empty.

# UTILITY CATEGORY MANEUVERS AND RECOMMENDED ENTRY SPEED\*

| Chandelles. | <br>105 KNOTS         |
|-------------|-----------------------|
| Lazy Eights | <br>105 KNOTS         |
|             | 95 KNOTS              |
| Spins       | <br>Slow Deceleration |
|             | Slow Deceleration     |

<sup>\*</sup> Abrupt use of the controls is prohibited above 98 KNOTS.

CESSNA MODEL 172S NAV III KAP 140 AUTOPILOT

# SECTION 2 OPERATING LIMITATIONS

## | MANEUVER LIMITS (Continued)

## **UTILITY CATEGORY** (Continued)

Aerobatics that may impose high loads should not be attempted. The important thing to bear in mind in flight maneuvers is that the airplane is clean in aerodynamic design and will build up speed quickly with the nose down. Proper speed control is an essential requirement for execution of any maneuver, and care should always be exercised to avoid excessive speed which in turn can impose excessive loads. In the execution of all maneuvers, avoid abrupt use of controls.

### FLIGHT LOAD FACTOR LIMITS

### **NORMAL CATEGORY**

| Flight Load F | actors (Maximum Tak | eoff Weight - 2550 | POUNDS):      |
|---------------|---------------------|--------------------|---------------|
| *Flaps UP     | ) <del>.</del>      |                    | +3.8g, -1.52g |
| *Flaps FU     | LL:                 |                    | +3.0g         |

#### **UTILITY CATEGORY**

| Flight Load Factors (Maximum Takeoff Weight - 2200 POL | JNDS):        |
|--|---------------|
| *Flaps UP:   | +4.4g, -1.76g |
| *Flaps FULL:   | +3.0g         |

## KINDS OF OPERATIONS LIMITS

The Cessna 172S Nav III airplane is approved for day and night, VFR and IFR operations. Flight into known icing conditions is prohibited.

The minimum equipment for approved operations required under the ■Operating Rules are defined by 14 CFR 91 and 14 CFR 135, as applicable.

The following Kinds of Operations Equipment List (KOEL) identifies the equipment required to be operational for airplane airworthiness in the listed kind of operations.

## KINDS OF OPERATIONS EQUIPMENT LIST

| KINDS OF OPERATION   |         |           |         |           |   |
|--|---------|-----------|---------|-----------|---|
|  | KIND    | OF O      | PERAT   |           |   |
| System, Instrument, Equipment and/or Function                | VER DAY | >FR N-GH- | IFR DAY | -FR Z-GIF | COMMENTS  |
| PLACARDS AND MARKINGS  |         |           |         |           |   |
| 1 - 172S Nav III - KAP 140<br>Autopilot POH/AFM              | 1       | 1         | 1       | 1         | Accessible to pilot in flight.                            |
| 2 - Bendix/King KAP 140 2 Axis<br>Autopilot POH Supplement 3 | 0       | 0         | A/R     | A/R       | Accessible to pilot<br>in flight when using<br>autopilot. |
| 3 - Garmin G1000 Cockpit<br>Reference Guide                  | 1       | 1         | 1       | 1         | Accessible to pilot in flight.                            |
| AIR CONDITIONING   |         |           |         |           |   |
| 1 - Forward Avionics Fan                                     | 1       | 1         | 1       | 1         |   |
| 2 - PFD Fan  | 0       | 0         | 0       | 0         |   |
| 3 - MFD Fan  | 0       | 0         | 0       | 0         |   |
| 4 - Aft Avionics Fan   | 1       | 1         | 1       | 1         |   |
| COMMUNICATIONS   |         |           |         |           |   |
| 1 - VHF COM  | 0       | 0         | 1       | 1         |   |
| ELECTRICAL POWER   |         |           |         |           |   |
| 1 - 24V Main Battery   | 1       | 1         | 1       | 1         |   |
| 2 - 28V Alternator   | 1       | 1         | 1       | 1         |   |
| 3 - 24V Standby Battery                                      | 0       | *         | *       | *         | * Refer to Note 1.  |
| 4 - Main Ammeter   | 1       | 1         | 1       | 1         |   |
| 5 - Standby Ammeter  | 0       | *         | *       | *         | * Refer to Note 1.  |

#### NOTE

 The European Aviation Safety Agency (EASA) requires the 24V Standby Battery and Standby Ammeter to successfully complete the pre-flight check before operating the airplane in VFR night, IFR day, or IFR night conditions in Europe. Correct operation of the 24V Standby Battery and Standby Ammeter is recommended for all other operations.

## KINDS OF OPERATIONS EQUIPMENT LIST (Continued)

|  | IZINIE   | \ <u>\\</u> | PERA     | CION   |   |
|--|----------|-------------|----------|--------|---|
|  | KINL     |             |          |        |   |
|  |          | V           |          | I      |   |
|  | <u>V</u> | F<br>R      | <u> </u> | F      |   |
| :  | F        | K           | F        | R      |   |
|  | Γ.       | N           | "        | N      |   |
|  | D        | ï           | D        | ï      |   |
|  | A        | G           | A        | G      |   |
| System, Instrument, Equipment and/or Function  | Y        | H<br>T      | Y        | H<br>T | COMMENTS  |
| EQUIPMENT AND FURNISHINGS                      |          |             |          |        |   |
| 1 - Seat Belt Assembly                         | 1        | 1           | 1        | 1      | Each Seat<br>Occupant   |
| 2 - Shoulder Harness                           | 1        | 1           | 1        | 1      | Front Seat<br>Occupants   |
| FLIGHT CONTROLS                                |          |             |          |        |   |
| 1 - Flap Position Indicator                    | 1        | 1           | 1        | 1      |   |
| 2 - Flap Motor                                 | 1        | 1           | 1        | 1      |   |
| 3 - Elevator Trim System                       | 1        | 1           | 1        | 1      |   |
| 4 - Elevator Trim Indicator                    | 1        | 1           | 1        | 1      |   |
| FUEL SYSTEM                                    |          | 191         |          |        |   |
| 1 - Electric Fuel Pump                         | 1        | 1           | 1        | 1      |   |
| 2 - Fuel Quantity Indicator - L Tank           | 1        | 1           | 1        | 1      |   |
| 3 - Fuel Quantity Indicator - R Tank           | 1        | 1           | 1        | 1      |   |
| ICE AND RAIN PROTECTION                        |          |             |          |        |   |
| 1 - Alternate Static Air Source                | 0        | 0           | 1        | 1      |   |
| 2 - Alternate Induction Air System             | 0        | 0           | 1        | 1      |   |
| INDICATING/RECORDING<br>SYSTEM                 |          |             |          |        |   |
| 1 - Stall Warning System                       | 1        | 1           | 1        | 1      | Marie Colored No. 2004 School |
| 2 - System Annunciator and<br>Warning Displays | 1        | 1           | 1        | 1      |   |
| LANDING GEAR                                   |          |             |          |        |   |
| 1 - Wheel Fairings                             | 0        | 0           | 0        | 0      | Removable   |

## KINDS OF OPERATIONS EQUIPMENT LIST (Continued)

|  | KIND OF OPERATION |    |   |    |                           |  |  |  |  |
|--|-------------------|----|---|----|---------------------------|--|--|--|--|
| · · · · · · · · · · · · · · · · · · ·                    |                   | V  |   | ı  |                           |  |  |  |  |
|  | ٧                 | F  | 1 | F  |                           |  |  |  |  |
|  | F                 | R  | F | R  |                           |  |  |  |  |
|  | R                 | ., | R | N1 |                           |  |  |  |  |
|  | D                 | N  | D | N  |                           |  |  |  |  |
|  | Ā                 | Ġ  | Ā | Ġ  |                           |  |  |  |  |
| System Instrument Equipment                              | Υ                 | Н  | Υ | Н  |                           |  |  |  |  |
| System, Instrument, Equipment and/or Function            |                   | Т  |   | T  | COMMENTS                  |  |  |  |  |
| LIGHTING   |                   |    |   |    | 1000                      |  |  |  |  |
| 1 - PFD Bezel Lighting                                   | 0                 | 0  | 0 | 1  |                           |  |  |  |  |
| 2 - PFD Backlighting                                     | *                 | 1  | 1 | 1  | *Refer to Note 2.         |  |  |  |  |
| 3 - MFD Bezel Lighting                                   | 0                 | 0  | 0 | 1  |                           |  |  |  |  |
| 4 - MFD Backlighting                                     | *                 | 1  | 1 | 1  | *Refer to Note 3.         |  |  |  |  |
| 5 - Switch and Circuit Breaker<br>Panel Lighting         | 0                 | 1  | 0 | 1  |                           |  |  |  |  |
| 6 - Standby Airspeed Indicator<br>Internal Lighting      | 0                 | 1  | 0 | 1  |                           |  |  |  |  |
| 7 - Standby Altimeter Internal<br>Lighting               | 0                 | 1  | 0 | 1  |                           |  |  |  |  |
| 8 - Non-stabilized Magnetic<br>Compass Internal Lighting | 0                 | 1  | 0 | 1  |                           |  |  |  |  |
| 9 - Standby Attitude Indicator<br>Internal Lighting      | 0                 | 1  | 0 | 1  |                           |  |  |  |  |
| 10 - Cockpit Flood Light                                 | 0                 | 1  | 0 | 1  |                           |  |  |  |  |
| 11 - Aircraft Position (NAV) Lights                      | 0                 | 1  | 1 | 1  |                           |  |  |  |  |
| 12 - STROBE Light System                                 | 1                 | 1  | 1 | 1  |                           |  |  |  |  |
| 13 - BEACON Light  | 0                 | 0  | 0 | 0  |                           |  |  |  |  |
| 14 - TAXI Light  | 0                 | 0  | 0 | 0  |                           |  |  |  |  |
| 15 - LAND (Landing) Light                                | 0                 | 1  | 0 | 1  | Operations for hire only. |  |  |  |  |

### NOTE

- 2. PFD backlighting is required for day VFR flight if MFD backlighting has failed. Display backup mode must be active so engine indicators are shown.
- 3. MFD backlighting is required for day VFR flight if PFD backlighting has failed. Display backup mode must be active so flight instruments are shown.

# KINDS OF OPERATIONS EQUIPMENT LIST (Continued)

|   | KINI             | OF O                       | PERA             |             |                               |
|---|------------------|----------------------------|------------------|-------------|-------------------------------|
|   | V<br>F<br>R<br>D | V<br>F<br>R<br>N<br>I<br>G | I<br>F<br>R<br>D | I F R N I G |                               |
| System, Instrument, Equipment and/or Function | Ŷ                | H                          | Ŷ                | H           | COMMENTS                      |
| NAVIGATION AND PITOT-<br>STATIC SYSTEM        |                  |                            |                  |             |                               |
| 1 - G1000 Airspeed Indicator                  | 1                | 1                          | 1                | 1           |                               |
| 2 - Standby Airspeed Indicator                | 0                | 0                          | 1                | 1           |                               |
| 3 - G1000 Altimeter                           | 1                | 1                          | 1                | 1           |                               |
| 4 - Standby Altimeter                         | 0                | 0                          | 1                | 1           |                               |
| 5 - G1000 Vertical Speed<br>Indicator         | 0                | 0                          | 0                | 0           |                               |
| 6 - G1000 Attitude Indicator                  | 0                | 0                          | 1                | 1           |                               |
| 7 - Standby Attitude Indicator                | 0                | 0                          | 1                | 1           |                               |
| 8 - G1000 Directional Indicator<br>(HSI)      | 0                | 0                          | 1                | 1           |                               |
| 9 - G1000 Turn Coordinator                    | 0                | 0                          | 1                | 1           |                               |
| 10 - Non-stabilized Magnetic<br>Compass       | 1                | 1                          | 1                | 1           |                               |
| 11 - VHF Navigation Radio<br>(VOR/LOC/GS)     | 0                | 0                          | A/R              | A/R         | As Required Per<br>Procedure. |
| 12 - GPS Receiver/Navigator                   | 0                | 0                          | A/R              | A/R         | As Required Per<br>Procedure. |
| 13 - Marker Beacon Receiver                   | 0                | 0                          | A/R              | A/R         | As Required Per<br>Procedure. |
| 14 - Blind Altitude Encoder                   | A/R              | A/R                        | 1                | 1           | As Required Per<br>Procedure. |
| 15 - Clock                                    | 0                | 0                          | 1                | 1           |                               |
| 16 - KAP 140 Autopilot<br>(if installed)      | 0                | 0                          | 0                | 0           |                               |

# SECTION 2 OPERATING LIMITATIONS

# KINDS OF OPERATIONS EQUIPMENT LIST (Continued)

|  | KINE        | OF O             | PERAT          |         |          |
|--|-------------|------------------|----------------|---------|----------|
|  | V<br>F<br>R | V<br>F<br>R      | I<br>F<br>R    | F R     |          |
|  | D<br>A<br>Y | N<br>I<br>G<br>H | D<br>A<br>Y    | N I G I |          |
| System, Instrument, Equipment and/or Function    | 1           | Ť                | 1              | T       | COMMENTS |
| VACUUM   |             |                  |                |         |          |
| 1 - Engine Driven Vacuum<br>Pump                 | 0           | 0                | 1              | 1       |          |
| 2 - Vacuum Indicator                             | 0           | 0                | 1              | 1       |          |
| ENGINE FUEL AND CONTROL                          |             |                  |                |         | 100      |
| 1 - Fuel Flow Indicator                          | 1           | 1                | 1              | 1       |          |
| ENGINE INDICATING                                |             |                  |                |         |          |
| 1 - Tachometer (RPM)                             | 1           | 1                | 1              | 1       |          |
| 2 - Cylinder Head Temperature<br>(CHT) Indicator | 0           | 0                | O <sub>.</sub> | 0       |          |
| 3 - Oil Pressure Indicator                       | 1           | 1                | 1              | 1       |          |
| 4 - Oil Temperature Indicator                    | 1           | 1                | 1              | 1       |          |
| ENGINE OIL                                       |             | 100000           |                |         | F 250    |
| 1 - Engine Crankcase Dipstick                    | 1           | 1                | 1              | 1       |          |

# SECTION 2 OPERATING LIMITATIONS

CESSNA MODEL 172S NAV III KAP 140 AUTOPILOT

## **FUEL LIMITATIONS**

| Total Fuel:                          | 56.0 U.S. GALLONS       |
|--------------------------------------|-------------------------|
| Ī                                    | (28.0 GALLONS per tank) |
| Usable Fuel (all flight conditions): | 53.0 U.S. GALLONS       |
| 1                                    | (26.5 GALLONS per tank) |
| Unusable Fuel:                       | 3.0 U.S. GALLONS        |
| 1                                    | (1.5 GALLONS per tank)  |

#### NOTE

To ensure maximum fuel capacity and minimize crossfeeding when refueling, always park the airplane in a wings level, normal ground attitude and place the fuel selector in the LEFT or RIGHT position. Refer to Figure 1-1 for normal ground attitude definition.

Takeoff and land with the fuel selector valve handle in the BOTH position.

Maximum slip or skid duration with one tank dry: 30 seconds

Operation on either LEFT or RIGHT tank limited to level flight only.

With 1/4 tank or less, prolonged uncoordinated flight is prohibited when operating on either left or right tank.

Fuel remaining in the tank after the fuel quantity indicator reads 0 (red line) cannot be safely used in flight.

Approved Fuel Grades (And Colors):

100LL Grade Aviation Fuel (Blue)100 Grade Aviation Fuel (Green)

## **FLAP LIMITATIONS**

| Approved Takeoff Range:. | <br> | <br> | <br> | <br> | <br> | <br> | UP to 10°  |
|--------------------------|------|------|------|------|------|------|------------|
| Approved Landing Range:  | <br> | <br> | <br> | <br> | <br> | <br> | UP to FULL |

# SECTION 2 OPERATING LIMITATIONS

### SYSTEM LIMITATIONS

#### **AUX AUDIO SYSTEM**

Use of the AUX AUDIO IN entertainment input is prohibited during takeoff and landing.

Use of the AUX AUDIO IN entertainment audio input and portable electronic devices (PED), such as cellular telephones, games, cassette, CD or MP3 players, is prohibited under IFR unless the operator of the airplane has determined that the use of the Aux Audio System and the connected portable electronic device(s) will not cause interference with the navigation or communication system of the airplane.

#### 12V POWER SYSTEM

The 12 Volt Power System (POWER OUTLET 12V - 10A) is not certified for supplying power to flight-critical communications or navigation devices.

Use of the 12 Volt Power System is prohibited during takeoff and landing.

Use of the 12 Volt Power System is prohibited under IFR unless the operator of the airplane has determined that the use of the 12 VDC power supply and connected portable electronic device(s) will not cause interference with the navigation or communication systems of the airplane.

## **G1000 LIMITATIONS**

The current Garmin G1000 Cockpit Reference Guide (CRG) Part Number and System Software Version that must be available to the pilot during flight are displayed on the MFD AUX group, SYSTEM STATUS page.

GPS based IFR enroute, oceanic and terminal navigation is prohibited unless the pilot verifies the currency of the database or verifies each selected waypoint for accuracy by reference to current approved data.

RNAV/GPS instrument approaches must be accomplished in accordance with approved instrument approach procedures that are retrieved from the G1000 navigation database. The G1000 database must incorporate the current update cycle.

Use of the TRAFFIC MAP to maneuver the airplane to avoid traffic is prohibited. The Traffic Information System (TIS) is intended for advisory use only. TIS is intended only to help the pilot to visually locate traffic. It is the responsibility of the pilot to see and maneuver to avoid traffic.

Use of the TERRAIN PROXIMITY information for primary terrain avoidance is prohibited. The Terrain Proximity map is intended only to enhance situational awareness. It is the pilot's responsibility to provide terrain clearance at all times.

Use of the NAVIGATION MAP page for pilotage navigation is prohibited. The Navigation Map is intended only to enhance situational awareness. Navigation is to be conducted using only current charts, data and authorized navigation facilities.

■ Navigation using the G1000 is not authorized North of 72° North latitude or South of 70° South latitude due to unsuitability of the magnetic fields near the Earth's poles. In addition, operations are not authorized in the following regions:

- North of 65° North latitude between longitude 75° W and 120° W (Northern Canada).
- North of 70° North latitude between longitude 70° W and 128° W (Northern Canada).
- North of 70° North latitude between longitude 85° E and 114° E (Northern Russia).
- South of 55° South latitude between longitude 120° E and 165° E (region south of Australia and New Zealand).

### G1000 LIMITATIONS (Continued)

The COM 1/2 (split COM) function of the Audio Panel is not approved for use. During COM 1/2 operation, transmission by one crew member inhibits reception by the other crew member.

The fuel quantity, fuel used and fuel remaining functions of the G1000 are supplemental information only and must be verified by the pilot.

GPS - WAAS (Airplanes 172S9810 thru 172S10431 incorporating MK206-34-08 and not incorporating SB09-34-06 and Airplanes 172S10432 thru 172S10467 and 172S10506 172S10508 thru 172S10469 thru and 172S10639 172S10641 thru 172S10655 not and incorporating SB09-34-06)

Use of the Garmin G1000 system for GPS or WAAS navigation under Instrument Flight Rules (IFR) requires that:

- The airplane must be equipped with an approved and operational alternate means of navigation appropriate to the route being flown (NAV receiver, DME or ADF).
- For flight planning purposes, if an alternate airport is required, it must have an approved instrument approach procedure, other than GPS or RNAV, that is anticipated to be operational and available at the estimated time of arrival. All equipment required for this procedure must be installed and operational.
- 3. For procedures requiring a prediction of GPS Receiver Autonomous Integrity Monitoring (RAIM) capability for TSO-C129a (non-WAAS) equipment (e.g. oceanic operations, U.S. RNAV routes, European BRNAV and PRNAV, etc.), the Garmin WAAS Fault Detection/Exclusion Prediction program (006-A0154-01 or later approved version) should be used to confirm the availability of RAIM for the intended route and time of flight. Generic prediction tools do not provide an accurate indication of RAIM availability for the Garmin G1000 system.
- 4. When flight planning an LNAV/VNAV or LPV approach, the Garmin WAAS Fault Detection/Exclusion Prediction program (006-A0154-01 or later approved version) should be used in addition to any NOTAMs issued from the approach.

## BENDIX/KING KAP 140 2 AXIS AUTOPILOT (if installed)

Use of the Bendix/King KAP 140 Autopilot is prohibited when the Audio Panel is inoperative (since the aural warning will not be provided when Autopilot is disengaged).

(Continued Next Page)

I

## **G1000 LIMITATIONS** (Continued)

# TERRAIN AWARENESS AND WARNING SYSTEM (TAWS-B) (if installed)

Use of the Terrain Awareness and Warning System (TAWS-B) to navigate to avoid terrain or obstacles is prohibited. TAWS-B is only approved as an aid to help the pilot to see-and-avoid terrain or obstacles.

TAWS-B must be inhibited when landing at a location not included in the airport database.

Use of TAWS-B is prohibited when operating using the QFE altimeter setting (altimeter indicates 0 feet altitude when the airplane is on the runway).

The pilot is authorized to deviate from the current ATC clearance only to the extent necessary to comply with TAWS-B warnings.

The geographic area of the TAWS-B database must match the geographic area in which the airplane is being operated.

Serials 172S9810 thru 172S10467 and 172S10469 thru 172S10506 and 172S10508 thru 172S10639 and 172S10641 thru 172S10655 not incorporating SB08-34-03

Flight operations are prohibited over large bodies of sea level water if that flight is conducted under operating regulations that require a functioning TAWS.

#### CAUTION

TAWS-B FORWARD LOOKING TERRAIN AVOIDANCE (FLTA) IS NOT AVAILABLE WHEN FLYING OVER THE OPEN OCEAN/SEA (SPECIFICALLY ANY BODY OF WATER AT SEA LEVEL, MORE THAN 6NM FROM ANY TERRAIN FEATURES) UNTIL TERRAIN DATABASE 08T2 OR LATER IS INSTALLED. DO NOT USE TAWS-B INFORMATION FOR PRIMARY TERRAIN AVOIDANCE. TAWS-B IS INTENDED ONLY TO ENHANCE SITUATIONAL AWARENESS.

### **PLACARDS**

The following information must be displayed in the form of composite or individual placards.

 In full view of the pilot: (The "DAY-NIGHT-VFR-IFR" entry, shown on the example below, will vary with installed equipment).

B7641

The markings and 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 or in the Utility Category are contained in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

Normal Category - No acrobatic maneuvers, including spins, approved.

Utility Category - No acrobatic maneuvers approved, except those listed in the Pilot's Operating Handbook.

Baggage compartment and rear seat must not be occupied.

Spin Recovery - Opposite rudder - forward elevator - neutralize controls.

Flight into known icing conditions prohibited.

This airplane is certified for the following flight operations as of date of original airworthiness certificate:

DAY - NIGHT - VFR - IFR

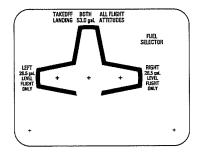
On control lock:

B6143



On the fuel selector valve:

B7652



Near both fuel tank filler caps:

B7644

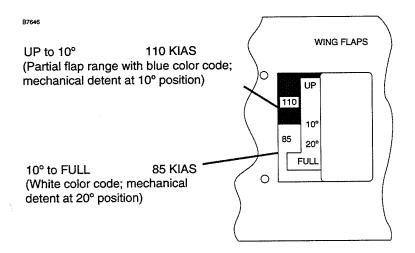
FUEL
100LL / 100 MIN. GRADE AVIATION GASOLINE
CAP. 26.5 U.S. GAL. USABLE
CAP. 17.5 U.S. GAL. USABLE TO BOTTOM
OF FILLER INDICATOR TAB.

or

B7645

FUEL
100LL / 100 MIN. GRADE AVIATION GASOLINE
CAP. 26.5 U.S. GAL. (100 LITRES) USABLE
CAP. 17.5 U.S. GAL. (66 LITRES) USABLE
TO BOTTOM OF FILLER INDICATOR TAB.

## 5. On flap control indicator:

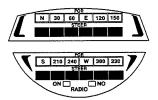


## 6. In baggage compartment:

120 POUNDS MAXIMUM
BAGGAGE FORWARD OF BAGGAGE DOOR LATCH
50 POUNDS MAXIMUM
BAGGAGE AFT OF BAGGAGE DOOR LATCH
MAXIMUM 120 POUNDS COMBINED
FOR ADDITIONAL LOADING INSTRUCTIONS
SEE WEIGHT AND BALANCE DATA

7. A calibration card must be provided to indicate the accuracy of the magnetic compass in 30° increments.

B6148



8. Molded on the oil filler cap/dipstick:

B7648



9. Silk-screened on the instrument panel directly above the PFD:

B7938

MANEUVERING SPEED: 105 KIAS

# SECTION 2 OPERATING LIMITATIONS

## PLACARDS (Continued)

10. Silk-screened on the upper right instrument panel:

B6151

SMOKING PROHIBITED

11. On auxiliary power plug door and second placard on battery box:

B6152

CAUTION 24 VOLTS D.C.
THIS AIRCRAFT IS EQUIPPED WITH
ALTERNATOR AND A NEGATIVE
GROUND SYSTEM.
OBSERVE PROPER POLARITY
REVERSE POLARITY WILL DAMAGE
ELECTRICAL COMPONENTS.

12. On the upper right side of the aft cabin partition:

B6153

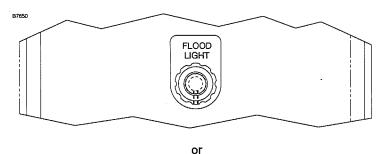
EMERGENCY LOCATOR TRANSMITTER INSTALLED AFT OF THIS PARTITION. MUST BE SERVICED IN ACCORDANCE WITH FAR PART 91.207

οг

B7651

EMERGENCY LOCATOR TRANSMITTER INSTALLED AFT OF THIS PARTITION. MUST BE SERVICED IN ACCORDANCE WITH 14 CFR 91.207

■ 13. On the center overhead flood light control switch:



FLOOD LIGHT