

# N6426F – C172N

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*Fact Book*



# 1. Limitations

SECTION 2  
LIMITATIONS

CESSNA  
MODEL 172N

## 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 97 KIAS at 2000 pounds.

	SPEED	KCAS	KIAS	REMARKS
V <sub>NE</sub>	Never Exceed Speed	158	158	Do not exceed this speed in any operation.
V <sub>NO</sub>	Maximum Structural Cruising Speed	126	127	Do not exceed this speed except in smooth air, and then only with caution.
V <sub>A</sub>	Maneuvering Speed: 2300 Pounds 1950 Pounds 1600 Pounds	96 88 80	97 89 80	Do not make full or abrupt control movements above this speed.
V <sub>FE</sub>	Maximum Flap Extended Speed: 10° Flaps 10° - 40° Flaps	110 87	110 85	Do not exceed this speed with flaps down.
	Maximum Window Open Speed	158	158	Do not exceed this speed with windows open.

Figure 2-1. Airspeed Limitations

## AIRSPEED INDICATOR MARKINGS

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

MARKING	KIAS VALUE OR RANGE	SIGNIFICANCE
White Arc	33 - 85	Full Flap Operating Range. Lower limit is maximum weight $V_{S_0}$ in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green Arc	44 - 127	Normal Operating Range. Lower limit is maximum weight $V_S$ at most forward C.G. with flaps retracted. Upper limit is maximum structural cruising speed.
Yellow Arc	127 - 158	Operations must be conducted with caution and only in smooth air.
Red Line	158	Maximum speed for all operations.

Figure 2-2. Airspeed Indicator Markings

## POWER PLANT LIMITATIONS

Engine Manufacturer: Avco Lycoming.  
Engine Model Number: O-320-H2AD.  
Engine Operating Limits for Takeoff and Continuous Operations:  
Maximum Power: 160 BHP rating.  
Maximum Engine Speed: 2700 RPM.

### NOTE

The static RPM range at full throttle (carburetor heat off and full rich mixture) is 2280 to 2400 RPM.

Maximum Oil Temperature: 245°F (118°C).  
Oil Pressure, Minimum: 25 psi.  
Maximum: 115 psi.  
Propeller Manufacturer: McCauley Accessory Division.  
Propeller Model Number: 1C160/DTM7557.  
Propeller Diameter, Maximum: 75 inches.  
Minimum: 74 inches.

## POWER PLANT INSTRUMENT MARKINGS

Power plant instrument markings and their color code significance are shown in figure 2-3.

INSTRUMENT	RED LINE	GREEN ARC	YELLOW ARC	RED LINE
	MINIMUM LIMIT	NORMAL OPERATING	CAUTION RANGE	MAXIMUM LIMIT
Tachometer: Sea Level 5000 Feet 10000 Feet	---	2100-2450 RPM 2100-2575 RPM 2100-2700 RPM	---	2700 RPM
Oil Temperature	---	100°-245°F	---	245°F
Oil Pressure	25 psi	60-90 psi	---	115 psi
Fuel Quantity (Standard Tanks)	E (1.5 Gal. Unusable Each Tank)	---	---	---
Fuel Quantity (Long Range Tanks)	E (2.0 Gal. Unusable Each Tank)	---	---	---
Suction	---	4.5-5.4 in. Hg	---	---

Figure 2-3. Power Plant Instrument Markings

## WEIGHT LIMITS

### NORMAL CATEGORY

Maximum Ramp Weight: 2307 lbs.

Maximum Takeoff Weight: 2300 lbs.

Maximum Landing Weight: 2300 lbs.

Maximum Weight in Baggage Compartment:

Baggage Area 1 (or passenger on child's seat) - Station 82 to 108: 120 lbs. See note below.

Baggage Area 2 - Station 108 to 142: 50 lbs. See note below.

#### NOTE

The maximum combined weight capacity for baggage areas 1 and 2 is 120 lbs.

## 2. Emergency Procedures

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SECTION 3  
EMERGENCY PROCEDURES

### INTRODUCTION

Section 3 provides checklist and amplified procedures for coping with emergencies that may occur. Emergencies caused by airplane or engine malfunctions are extremely rare if proper preflight inspections and maintenance are practiced. Enroute weather emergencies can be minimized or eliminated by careful flight planning and good judgment when unexpected weather is encountered. However, should an emergency arise, the basic guidelines described in this section should be considered and applied as necessary to correct the problem. Emergency procedures associated with ELT and other optional systems can be found in Section 9.

### AIRSPEEDS FOR EMERGENCY OPERATION

Engine Failure After Takeoff:	
Wing Flaps Up . . . . .	65 KIAS
Wing Flaps Down . . . . .	60 KIAS
Maneuvering Speed:	
2300 Lbs . . . . .	97 KIAS
1950 Lbs . . . . .	89 KIAS
1600 Lbs . . . . .	80 KIAS
Maximum Glide . . . . .	65 KIAS
Precautionary Landing With Engine Power . . . . .	60 KIAS
Landing Without Engine Power:	
Wing Flaps Up . . . . .	65 KIAS
Wing Flaps Down . . . . .	60 KIAS

### OPERATIONAL CHECKLISTS

#### ENGINE FAILURES

##### ENGINE FAILURE DURING TAKEOFF RUN

1. Throttle -- IDLE.
2. Brakes -- APPLY.
3. Wing Flaps -- RETRACT.
4. Mixture -- IDLE CUT-OFF.
5. Ignition Switch -- OFF.
6. Master Switch -- OFF.

### ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

1. Airspeed -- 65 KIAS (flaps UP).  
60 KIAS (flaps DOWN).
2. Mixture -- IDLE CUT-OFF.
3. Fuel Selector Valve -- OFF.
4. Ignition Switch -- OFF.
5. Wing Flaps -- AS REQUIRED.
6. Master Switch -- OFF.

### ENGINE FAILURE DURING FLIGHT

1. Airspeed -- 65 KIAS.
2. Carburetor Heat -- ON.
3. Fuel Selector Valve -- BOTH.
4. Mixture -- RICH.
5. Ignition Switch -- BOTH (or START if propeller is stopped).
6. Primer -- IN and LOCKED.

## FORCED LANDINGS

### EMERGENCY LANDING WITHOUT ENGINE POWER

1. Airspeed -- 65 KIAS (flaps UP).  
60 KIAS (flaps DOWN).
2. Mixture -- IDLE CUT-OFF.
3. Fuel Selector Valve -- OFF.
4. Ignition Switch -- OFF.
5. Wing Flaps -- AS REQUIRED (40° recommended).
6. Master Switch -- OFF.
7. Doors -- UNLATCH PRIOR TO TOUCHDOWN.
8. Touchdown -- SLIGHTLY TAIL LOW.
9. Brakes -- APPLY HEAVILY.

### PRECAUTIONARY LANDING WITH ENGINE POWER

1. Wing Flaps -- 20°.
2. Airspeed -- 60 KIAS.
3. Selected Field -- FLY OVER, noting terrain and obstructions, then retract flaps upon reaching a safe altitude and airspeed.
4. Avionics Power Switch and Electrical Switches -- OFF.
5. Wing Flaps -- 40° (on final approach).
6. Airspeed -- 60 KIAS.
7. Master Switch -- OFF.
8. Doors -- UNLATCH PRIOR TO TOUCHDOWN.

9. Touchdown -- SLIGHTLY TAIL LOW.
10. Ignition Switch -- OFF.
11. Brakes -- APPLY HEAVILY.

### DITCHING

1. Radio -- TRANSMIT MAYDAY on 121.5 MHz, giving location and intentions and SQUAWK 7700 if transponder is installed.
2. Heavy Objects (in baggage area) -- SECURE OR JETTISON.
3. Approach -- High Winds, Heavy Seas -- INTO THE WIND.  
Light Winds, Heavy Swells -- PARALLEL TO SWELLS.
4. Wing Flaps -- 20° - 40°.
5. Power -- ESTABLISH 300 FT/MIN DESCENT AT 55 KIAS.

#### NOTE

If no power is available, approach at 65 KIAS with flaps up or at 60 KIAS with 10° flaps.

6. Cabin Doors -- UNLATCH.
7. Touchdown -- LEVEL ATTITUDE AT ESTABLISHED RATE OF DESCENT.
8. Face -- CUSHION at touchdown with folded coat.
9. Airplane -- EVACUATE through cabin doors. If necessary, open window and flood cabin to equalize pressure so doors can be opened.
10. Life Vests and Raft -- INFLATE.

### FIRES

#### DURING START ON GROUND

1. Cranking -- CONTINUE, to get a start which would suck the flames and accumulated fuel through the carburetor and into the engine.

If engine starts:

2. Power -- 1700 RPM for a few minutes.
3. Engine -- SHUTDOWN and inspect for damage.

If engine fails to start:

4. Throttle -- FULL OPEN.
5. Mixture -- IDLE CUT-OFF.

6. Cranking -- CONTINUE.
7. Fire Extinguisher -- OBTAIN (have ground attendants obtain if not installed).
8. Engine -- SECURE.
  - a. Master Switch -- OFF.
  - b. Ignition Switch -- OFF.
  - c. Fuel Selector Valve -- OFF.
9. Fire -- EXTINGUISH using fire extinguisher, wool blanket, or dirt.
10. Fire Damage -- INSPECT, repair damage or replace damaged components or wiring before conducting another flight.

#### ENGINE FIRE IN FLIGHT

1. Mixture -- IDLE CUT-OFF.
2. Fuel Selector Valve -- OFF.
3. Master Switch -- OFF.
4. Cabin Heat and Air -- OFF (except overhead vents).
5. Airspeed -- 100 KIAS (If fire is not extinguished, increase glide speed to find an airspeed which will provide an incombustible mixture).
6. Forced Landing -- EXECUTE (as described in Emergency Landing Without Engine Power).

#### ELECTRICAL FIRE IN FLIGHT

1. Master Switch -- OFF.
2. Avionics Power Switch -- OFF.
3. All Other Switches (except ignition switch) -- OFF.
4. Vents/Cabin Air/Heat -- CLOSED.
5. Fire Extinguisher -- ACTIVATE (if available).

### WARNING

After discharging an extinguisher within a closed cabin, ventilate the cabin.

If fire appears out and electrical power is necessary for continuance of flight:

6. Master Switch -- ON.
7. Circuit Breakers -- CHECK for faulty circuit, do not reset.
8. Radio Switches -- OFF.
9. Avionics Power Switch -- ON.
10. Radio/Electrical Switches -- ON one at a time, with delay after each until short circuit is localized.



11. Vents/Cabin Air/Heat -- OPEN when it is ascertained that fire is completely extinguished.

### CABIN FIRE

1. Master Switch -- OFF.
2. Vents/Cabin Air/Heat -- CLOSED (to avoid drafts).
3. Fire Extinguisher -- ACTIVATE (if available).

### WARNING

After discharging an extinguisher within a closed cabin, ventilate the cabin.

4. Land the airplane as soon as possible to inspect for damage.

### WING FIRE

1. Navigation Light Switch -- OFF.
2. Pitot Heat Switch (if installed) -- OFF.
3. Strobe Light Switch (if installed) -- OFF.

### NOTE

Perform a sideslip to keep the flames away from the fuel tank and cabin, and land as soon as possible using flaps only as required for final approach and touchdown.

## ICING

### INADVERTENT ICING ENCOUNTER

1. Turn pitot heat switch ON (if installed).
2. Turn back or change altitude to obtain an outside air temperature that is less conducive to icing.
3. Pull cabin heat control full out and open defroster outlets to obtain maximum windshield defroster airflow. Adjust cabin air control to get maximum defroster heat and airflow.
4. Open the throttle to increase engine speed and minimize ice build-up on propeller blades.
5. Watch for signs of carburetor air filter ice and apply carburetor

heat as required. An unexplained loss in engine speed could be caused by carburetor ice or air intake filter ice. Lean the mixture for maximum RPM, if carburetor heat is used continuously.

6. Plan a landing at the nearest airport. With an extremely rapid ice build-up, select a suitable "off airport" landing site.
7. With an ice accumulation of 1/4 inch or more on the wing leading edges, be prepared for significantly higher stall speed.
8. Leave wing flaps retracted. With a severe ice build-up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
9. Open left window and, if practical, scrape ice from a portion of the windshield for visibility in the landing approach.
10. Perform a landing approach using a forward slip, if necessary, for improved visibility.
11. Approach at 65 to 75 KIAS depending upon the amount of the accumulation.
12. Perform a landing in level attitude.

#### **STATIC SOURCE BLOCKAGE (Erroneous Instrument Reading Suspected)**

1. Alternate Static Source Valve -- PULL ON.
2. Airspeed -- Consult appropriate calibration tables in Section 5.

#### **LANDING WITH A FLAT MAIN TIRE**

1. Approach -- NORMAL.
2. Touchdown -- GOOD TIRE FIRST, hold airplane off flat tire as long as possible.

#### **ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS**

##### **AMMETER SHOWS EXCESSIVE RATE OF CHARGE (Full Scale Deflection)**

1. Alternator -- OFF.
2. Alternator Circuit Breaker -- PULL.
3. Nonessential Electrical Equipment -- OFF.
4. Flight -- TERMINATE as soon as practical.

**LOW-VOLTAGE LIGHT ILLUMINATES DURING FLIGHT  
(Ammeter Indicates Discharge)**

NOTE

Illumination of the low-voltage light may occur during low RPM conditions with an electrical load on the system such as during a low RPM taxi. Under these conditions, the light will go out at higher RPM. The master switch need not be recycled since an over-voltage condition has not occurred to de-activate the alternator system.

1. Avionics Power Switch -- OFF.
2. Alternator Circuit Breaker -- CHECK IN.
3. Master Switch -- OFF (both sides).
4. Master Switch -- ON.
5. Low-Voltage Light -- CHECK OFF.
6. Avionics Power Switch -- ON.

If low-voltage light illuminates again:

7. Alternator -- OFF.
8. Nonessential Radio and Electrical Equipment -- OFF.
9. Flight -- TERMINATE as soon as practical.

## 4. Normal Procedures

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SECTION 4  
NORMAL PROCEDURES

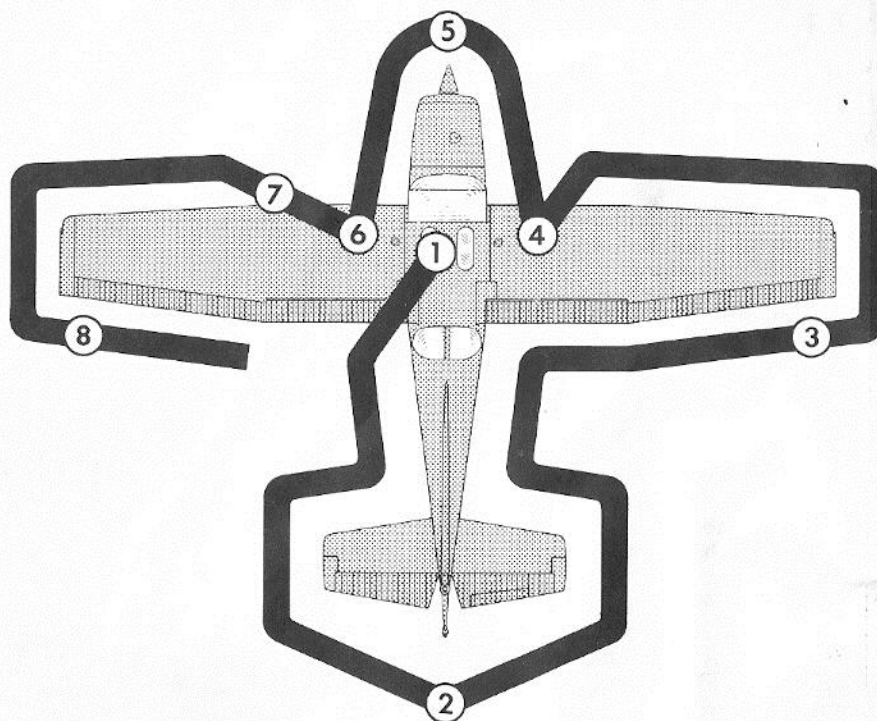
### INTRODUCTION

Section 4 provides checklist and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems can be found in Section 9.

### SPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum weight of 2300 pounds and may be used for any lesser weight. However, to achieve the performance specified in Section 5 for takeoff distance, the speed appropriate to the particular weight must be used.

Takeoff, Flaps Up:	
Normal Climb Out . . . . .	70-80 KIAS
Short Field Takeoff, Flaps 10°, Speed at 50 Feet . . . . .	53 KIAS
Enroute Climb, Flaps Up:	
Normal, Sea Level . . . . .	75-85 KIAS
Normal, 10,000 Feet . . . . .	70-80 KIAS
Best Rate of Climb, Sea Level . . . . .	→ 73 KIAS
Best Rate of Climb, 10,000 Feet . . . . .	68 KIAS
Best Angle of Climb, Sea Level . . . . .	→ 59 KIAS
Best Angle of Climb, 10,000 Feet . . . . .	61 KIAS
Landing Approach:	
Normal Approach, Flaps Up . . . . .	60-70 KIAS
Normal Approach, Flaps 40° . . . . .	55-65 KIAS
Short Field Approach, Flaps 40° . . . . .	59 KIAS
Balked Landing:	
Maximum Power, Flaps 20° . . . . .	55 KIAS
Maximum Recommended Turbulent Air Penetration Speed:	
2300 Lbs . . . . .	97 KIAS
1950 Lbs . . . . .	89 KIAS
1600 Lbs . . . . .	80 KIAS
Maximum Demonstrated Crosswind Velocity:	
Takeoff or Landing . . . . .	15 KNOTS



NOTE

Visually check airplane for general condition during walk-around inspection. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces. Also, make sure that control surfaces contain no internal accumulations of ice or debris. Prior to flight, check that pitot heater (if installed) is warm to touch within 30 seconds with battery and pitot heat switches on. If a night flight is planned, check operation of all lights, and make sure a flashlight is available.

Figure 4-1. Preflight Inspection

## CHECKLIST PROCEDURES

### PREFLIGHT INSPECTION

#### ① CABIN

1. Pilot's Operating Handbook -- AVAILABLE IN THE AIRPLANE.
2. Control Wheel Lock -- REMOVE.
3. Ignition Switch -- OFF.
4. Avionics Power Switch -- OFF.
5. Master Switch -- ON.

#### WARNING

When turning on the master switch, using an external power source, or pulling the propeller through by hand, treat the propeller as if the ignition switch were on. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

6. Fuel Quantity Indicators -- CHECK QUANTITY.
7. Master Switch -- OFF.
8. Static Pressure Alternate Source Valve (if installed) -- OFF.
9. Baggage Door -- CHECK, lock with key if child's seat is to be occupied.

#### ② EMPENNAGE

1. Rudder Gust Lock -- REMOVE.
2. Tail Tie-Down -- DISCONNECT.
3. Control Surfaces -- CHECK freedom of movement and security.

#### ③ RIGHT WING Trailing Edge

1. Aileron -- CHECK freedom of movement and security.

#### ④ RIGHT WING

1. Wing Tie-Down -- DISCONNECT.
2. Main Wheel Tire -- CHECK for proper inflation.
3. Before first flight of the day and after each refueling, use sampler cup and drain small quantity of fuel from fuel tank sump quick-drain valve to check for water, sediment, and proper fuel grade.
4. Fuel Quantity -- CHECK VISUALLY for desired level.
5. Fuel Filler Cap -- SECURE.

**⑤ NOSE**

1. Engine Oil Level -- CHECK, do not operate with less than four quarts. Fill to six quarts for extended flight.
2. Before first flight of the day and after each refueling, pull out strainer drain knob for about four seconds to clear fuel strainer of possible water and sediment. Check strainer drain closed. If water is observed, the fuel system may contain additional water, and further draining of the system at the strainer, fuel tank sumps, and fuel selector valve drain plug will be necessary.
3. Propeller and Spinner -- CHECK for nicks and security.
4. Landing Light(s) -- CHECK for condition and cleanliness.
5. Carburetor Air Filter -- CHECK for restrictions by dust or other foreign matter.
6. Nose Wheel Strut and Tire -- CHECK for proper inflation.
7. Nose Tie-Down -- DISCONNECT.
8. Static Source Opening (left side of fuselage) -- CHECK for stoppage.

**⑥ LEFT WING**

1. Main Wheel Tire -- CHECK for proper inflation.
2. Before first flight of the day and after each refueling, use sampler cup and drain small quantity of fuel from fuel tank sump quick-drain valve to check for water, sediment and proper fuel grade.
3. Fuel Quantity -- CHECK VISUALLY for desired level.
4. Fuel Filler Cap -- SECURE.

**⑦ LEFT WING Leading Edge**

1. Pitot Tube Cover -- REMOVE and check opening for stoppage.
2. Fuel Tank Vent Opening -- CHECK for stoppage.
3. Stall Warning Opening -- CHECK for stoppage. To check the system, place a clean handkerchief over the vent opening and apply suction; a sound from the warning horn will confirm system operation.
4. Wing Tie-Down -- DISCONNECT.

**⑧ LEFT WING Trailing Edge**

1. Aileron -- CHECK for freedom of movement and security.

**BEFORE STARTING ENGINE**

1. Preflight Inspection -- COMPLETE.

2. Seats, Belts, Shoulder Harnesses -- ADJUST and LOCK.
3. Fuel Selector Valve -- BOTH.
4. Avionics Power Switch, Autopilot (if installed), Electrical Equipment -- OFF.

#### CAUTION

The avionics power switch must be OFF during engine start to prevent possible damage to avionics.

5. Brakes -- TEST and SET.
6. Circuit Breakers -- CHECK IN.

### STARTING ENGINE

1. Mixture -- RICH.
2. Carburetor Heat -- COLD.
3. Master Switch -- ON.
4. Prime -- AS REQUIRED (2 to 6 strokes; none if engine is warm).
5. Throttle -- OPEN 1/8 INCH.
6. Propeller Area -- CLEAR.
7. Ignition Switch -- START (release when engine starts).
8. Oil Pressure -- CHECK.
9. Flashing Beacon and Navigation Lights -- ON as required.
10. Avionics Power Switch -- ON.
11. Radios -- ON.

### BEFORE TAKEOFF

1. Parking Brake -- SET.
2. Cabin Doors and Window(s) -- CLOSED and LOCKED.
3. Flight Controls -- FREE and CORRECT.
4. Flight Instruments -- SET.
5. Fuel Selector Valve -- BOTH.
6. Mixture -- RICH (below 3000 feet).
7. Elevator Trim and Rudder Trim (if installed) -- TAKEOFF.
8. Throttle -- 1700 RPM.
  - a. Magnetos -- CHECK (RPM drop should not exceed 125 RPM on either magneto or 50 RPM differential between magnetos).
  - b. Carburetor Heat -- CHECK (for RPM drop).
  - c. Engine Instruments and Ammeter -- CHECK.
  - d. Suction Gage -- CHECK.
  - e. Throttle -- 1000 RPM or LESS.



SECTION 4  
NORMAL PROCEDURES

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9. Radios -- SET.
10. Autopilot (if installed) -- OFF.
11. Air Conditioner (if installed) -- OFF.
12. Strobe Lights -- AS DESIRED.
13. Throttle Friction Lock -- ADJUST.
14. Brakes -- RELEASE.

## TAKEOFF

### NORMAL TAKEOFF

1. Wing Flaps -- 0° - 10°.
2. Carburetor Heat -- COLD.
3. Throttle -- FULL OPEN.
4. Elevator Control -- LIFT NOSE WHEEL (at 55 KIAS).
5. Climb Speed -- 70-80 KIAS.

### SHORT FIELD TAKEOFF

1. Wing Flaps -- 10°.
2. Carburetor Heat -- COLD.
3. Brakes -- APPLY.
4. Throttle -- FULL OPEN.
5. Mixture -- RICH (above 3000 feet, LEAN to obtain maximum RPM).
6. Brakes -- RELEASE.
7. Elevator Control -- SLIGHTLY TAIL LOW.
8. Climb Speed -- 53 KIAS (until all obstacles are cleared).

## ENROUTE CLIMB

1. Airspeed -- 70-85 KIAS.

### NOTE

If a maximum performance climb is necessary, use speeds shown in the Rate Of Climb chart in Section 5.

2. Throttle -- FULL OPEN.
3. Mixture -- RICH (above 3000 feet, LEAN to obtain maximum RPM).

## CRUISE

1. Power -- 2200-2700 RPM (no more than 75% is recommended).
2. Elevator and Rudder Trim (if installed) -- ADJUST.
3. Mixture -- LEAN.

## DESCENT

1. Fuel Selector Valve -- BOTH.
2. Mixture -- ADJUST for smooth operation (full rich for idle power).
3. Power -- AS DESIRED.
4. Carburetor Heat -- FULL HEAT AS REQUIRED (to prevent carburetor icing).

## BEFORE LANDING

1. Seats, Belts, Harnesses -- SECURE.
2. Fuel Selector Valve -- BOTH.
3. Mixture -- RICH.
4. Carburetor Heat -- ON (apply full heat before reducing power).
5. Autopilot (if installed) -- OFF.
6. Air Conditioner (if installed) -- OFF.

## LANDING

### NORMAL LANDING

1. Airspeed -- 60-70 KIAS (flaps UP).
2. Wing Flaps -- AS DESIRED (0°-10° below 110 KIAS, 10°-40° below 85 KIAS).
3. Airspeed -- 55-65 KIAS (flaps DOWN).
4. Touchdown -- MAIN WHEELS FIRST.
5. Landing Roll -- LOWER NOSE WHEEL GENTLY.
6. Braking -- MINIMUM REQUIRED.

### SHORT FIELD LANDING

1. Airspeed -- 60-70 KIAS (flaps UP).
2. Wing Flaps -- FULL DOWN (40°).
3. Airspeed -- 59 KIAS (until flare).
4. Power -- REDUCE to idle after clearing obstacle.
5. Touchdown -- MAIN WHEELS FIRST.
6. Brakes -- APPLY HEAVILY.
7. Wing Flaps -- RETRACT.

### BALKED LANDING

1. Throttle -- FULL OPEN.
2. Carburetor Heat -- COLD.
3. Wing Flaps -- 20° (immediately).
4. Climb Speed -- 55 KIAS.
5. Wing Flaps -- 10° (until obstacles are cleared).  
RETRACT (after reaching a safe altitude and 60 KIAS).

### AFTER LANDING

1. Wing Flaps -- UP.
2. Carburetor Heat -- COLD.

### SECURING AIRPLANE

1. Parking Brake -- SET.
2. Avionics Power Switch, Electrical Equipment, Autopilot (if installed) -- OFF.
3. Mixture -- IDLE CUT-OFF (pulled full out).
4. Ignition Switch -- OFF.
5. Master Switch -- OFF.
6. Control Lock -- INSTALL.

# 5. Performance

SECTION 5  
PERFORMANCE

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## AIRSPEED CALIBRATION NORMAL STATIC SOURCE

CONDITION:  
Power required for level flight or maximum rated RPM dive.

FLAPS UP														
KIAS	40	50	60	70	80	90	100	110	120	130	140	150	160	
KCAS	50	56	63	71	80	89	99	109	119	129	139	149	160	
FLAPS 10°														
KIAS	40	50	60	70	80	90	100	110	---	---	---	---	---	---
KCAS	49	55	62	71	80	90	99	108	---	---	---	---	---	---
FLAPS 40°														
KIAS	40	50	60	70	80	85	---	---	---	---	---	---	---	---
KCAS	48	55	63	72	82	87	---	---	---	---	---	---	---	---

Figure 5-1. Airspeed Calibration (Sheet 1 of 2)

### AIRSPEED CALIBRATION ALTERNATE STATIC SOURCE

#### HEATER/VENTS AND WINDOWS CLOSED

FLAPS UP												
NORMAL KIAS	40	50	60	70	80	90	100	110	120	130	140	
ALTERNATE KIAS	39	51	61	71	82	91	101	111	121	131	141	
FLAPS 10°												
NORMAL KIAS	40	50	60	70	80	90	100	110	---	---	---	
ALTERNATE KIAS	40	51	61	71	81	90	99	108	---	---	---	
FLAPS 40°												
NORMAL KIAS	40	50	60	70	80	85	---	---	---	---	---	
ALTERNATE KIAS	38	50	60	70	79	83	---	---	---	---	---	

#### HEATER/VENTS OPEN AND WINDOWS CLOSED

FLAPS UP												
NORMAL KIAS	40	50	60	70	80	90	100	110	120	130	140	
ALTERNATE KIAS	36	48	59	70	80	89	99	108	118	128	139	
FLAPS 10°												
NORMAL KIAS	40	50	60	70	80	90	100	110	---	---	---	
ALTERNATE KIAS	38	49	59	69	79	88	97	106	---	---	---	
FLAPS 40°												
NORMAL KIAS	40	50	60	70	80	85	---	---	---	---	---	
ALTERNATE KIAS	34	47	57	67	77	81	---	---	---	---	---	

#### WINDOWS OPEN

FLAPS UP												
NORMAL KIAS	40	50	60	70	80	90	100	110	120	130	140	
ALTERNATE KIAS	26	43	57	70	82	93	103	113	123	133	143	
FLAPS 10°												
NORMAL KIAS	40	50	60	70	80	90	100	110	---	---	---	
ALTERNATE KIAS	25	43	57	69	80	91	101	111	---	---	---	
FLAPS 40°												
NORMAL KIAS	40	50	60	70	80	85	---	---	---	---	---	
ALTERNATE KIAS	25	41	54	67	78	84	---	---	---	---	---	

Figure 5-1. Airspeed Calibration (Sheet 2 of 2)

## STALL SPEEDS

CONDITIONS:  
Power Off

NOTES:

1. Maximum altitude loss during a stall recovery may be as much as 180 feet.
2. KIAS values are approximate.

### MOST REARWARD CENTER OF GRAVITY

WEIGHT LBS	FLAP DEFLECTION	ANGLE OF BANK							
		0°		30°		45°		60°	
		KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
2300	UP	39	50	42	54	47	59	56	71
	10°	38	47	40	51	45	56	54	66
	40°	31	44	33	47	37	52	45	62

### MOST FORWARD CENTER OF GRAVITY

WEIGHT LBS	FLAP DEFLECTION	ANGLE OF BANK							
		0°		30°		45°		60°	
		KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
2300	UP	44	53	47	57	52	63	62	75
	10°	44	51	47	55	52	61	62	72
	40°	33	47	35	51	39	56	47	66

Figure 5-3. Stall Speeds

**TAKEOFF DISTANCE**  
**MAXIMUM WEIGHT 2300 LBS**

**SHORT FIELD**

CONDITIONS:  
Flaps 10°  
Full Throttle Prior to Brake Release  
Paved, Level, Dry Runway  
Zero Wind

NOTES:

1. Short field technique as specified in Section 4.
2. Prior to takeoff from fields above 3000 feet elevation, the mixture should be leaned to give maximum RPM in a full throttle, static runup.
3. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
4. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C			10°C			20°C			30°C			40°C		
	LIFT OFF	AT 50 FT		GRND ROLL 50 FT OBS	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL 50 FT OBS	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	
2300	48	53	S.L.	695	745	1340	805	1440	865	1545	925	1655	925	1545	925	1655		
			1000	760	820	880	1475	950	1585	950	1705	1020	1830	1020	1705	1020	1830	
			2000	835	900	1625	970	1750	1045	1885	1120	2030	1120	1885	1120	2030		
			3000	920	990	1800	1070	1940	1150	2095	1235	2260	1235	2260				
			4000	1010	1090	2000	1180	2165	1270	2340	1365	2535	1365	2340	1365	2535		
			5000	1115	1205	2235	1300	2425	1405	2635	1510	2860	1510	2860				
			6000	1235	1335	2515	1440	2740	1555	2985	1675	3265	1675	2985	1675	3265		
			7000	1370	1480	2850	1600	3125	1730	3430	1865	3775	1865	3430	1865	3775		
			8000	1520	1645	3270	1780	3610	1925	4000	2080	4465	2080	4000	2080	4465		

Figure 5-4. Takeoff Distance (Sheet 1 of 2)

**TAKEOFF PERFORMANCE**  
2100 LBS AND 1900 LBS

**SHORT FIELD**

REFER TO SHEET 1 FOR APPROPRIATE CONDITIONS AND NOTES.

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
2100	46	51	S.L.	560	1020	605	1095	650	1170	700	1250	750	1340
			1000	615	1115	665	1195	715	1285	765	1375	820	1470
			2000	675	1225	725	1315	785	1410	840	1515	905	1625
			3000	740	1345	800	1445	860	1555	925	1670	995	1795
			4000	815	1485	880	1600	950	1720	1020	1855	1095	1995
			5000	900	1645	970	1775	1045	1915	1125	2065	1210	2225
			6000	990	1825	1070	1975	1155	2135	1245	2310	1340	2505
			7000	1095	2040	1185	2210	1280	2400	1380	2605	1485	2835
1900	43	48	8000	1215	2295	1315	2495	1420	2720	1530	2965	1650	3245
			S.L.	450	820	480	880	520	940	555	1000	595	1070
			1000	490	895	525	960	565	1025	610	1095	655	1170
			2000	535	980	580	1050	620	1120	665	1200	715	1280
			3000	590	1070	635	1150	680	1230	735	1315	785	1410
			4000	645	1175	695	1260	750	1355	805	1450	865	1555
			5000	710	1295	765	1390	825	1495	890	1605	955	1725
			6000	785	1430	845	1540	910	1655	980	1785	1055	1920
7000	865	1585	935	1710	1005	1845	1085	1990	1165	2145			
8000	955	1765	1030	1905	1115	2060	1200	2230	1290	2410			

Figure 5-4. Takeoff Distance (Sheet 2 of 2)



## MAXIMUM RATE OF CLIMB

CONDITIONS:  
Flaps Up  
Full Throttle

NOTE:  
Mixture leaned above 3000 feet for maximum RPM.

WEIGHT LBS	PRESS ALT FT	CLIMB SPEED KIAS	RATE OF CLIMB - FPM			
			-20°C	0°C	20°C	40°C
2300	S.L.	73	875	815	755	695
	2000	72	765	705	650	590
	4000	71	655	600	545	485
	6000	70	545	495	440	385
	8000	69	440	390	335	280
	10,000	68	335	285	230	---
	12,000	67	230	180	---	---

Figure 5-5. Maximum Rate of Climb

## TIME, FUEL, AND DISTANCE TO CLIMB

### MAXIMUM RATE OF CLIMB

CONDITIONS:  
Flaps Up  
Full Throttle  
Standard Temperature

- NOTES:
1. Add 1.1 gallons of fuel for engine start, taxi and takeoff allowance.
  2. Mixture leaned above 3000 feet for maximum RPM.
  3. Increase time, fuel and distance by 10% for each 10°C above standard temperature.
  4. Distances shown are based on zero wind.

WEIGHT LBS	PRESSURE ALTITUDE FT	TEMP °C	CLIMB SPEED KIAS	RATE OF CLIMB FPM	FROM SEA LEVEL		
					TIME MIN	FUEL USED GALLONS	DISTANCE NM
2300	S.L.	15	73	770	0	0.0	0
	1000	13	73	725	1	0.3	2
	2000	11	72	675	3	0.6	3
	3000	9	72	630	4	0.9	5
	4000	7	71	580	6	1.2	8
	5000	5	71	535	8	1.6	10
	6000	3	70	485	10	1.9	12
	7000	1	69	440	12	2.3	15
	8000	-1	69	390	15	2.7	19
	9000	-3	68	345	17	3.2	22
	10,000	-5	68	295	21	3.7	27
	11,000	-7	67	250	24	4.2	32
	12,000	-9	67	200	29	4.9	38

Figure 5-6. Time, Fuel, and Distance to Climb

### CRUISE PERFORMANCE

CONDITIONS:  
2300 Pounds  
Recommended Lean Mixture

PRESSURE ALTITUDE FT	RPM	20°C BELOW STANDARD TEMP			STANDARD TEMPERATURE			20°C ABOVE STANDARD TEMP		
		% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2000	2500	---	---	---	75	116	8.4	71	115	7.9
	2400	72	111	8.0	67	111	7.5	63	110	7.1
	2300	64	106	7.1	60	105	6.7	56	105	6.3
	2200	56	101	6.3	53	100	6.1	50	99	5.8
	2100	50	95	5.8	47	94	5.6	45	93	5.4
4000	2550	---	---	---	75	118	8.4	71	118	7.9
	2500	76	116	8.5	71	115	8.0	67	115	7.5
	2400	68	111	7.6	64	110	7.1	60	109	6.7
	2300	60	105	6.8	57	105	6.4	54	104	6.1
	2200	54	100	6.1	51	99	5.9	48	98	5.7
2100	48	94	5.6	46	93	5.5	44	92	5.3	
6000	2600	---	---	---	75	120	8.4	71	120	7.9
	2500	72	116	8.1	67	115	7.6	64	114	7.1
	2400	64	110	7.2	60	109	6.8	57	109	6.4
	2300	57	105	6.5	54	104	6.2	52	103	5.9
	2200	51	99	5.9	49	98	5.7	47	97	5.5
2100	46	93	5.5	44	92	5.4	42	91	5.2	
8000	2650	---	---	---	75	122	8.4	71	122	7.9
	2600	76	120	8.6	71	120	8.0	67	119	7.5
	2500	68	115	7.7	64	114	7.2	60	113	6.8
	2400	61	110	6.9	58	109	6.5	55	108	6.2
	2300	55	104	6.2	52	103	6.0	50	102	5.8
2200	49	98	5.7	47	97	5.5	45	96	5.4	
10,000	2650	76	122	8.5	71	122	8.0	67	121	7.5
	2600	72	120	8.1	68	119	7.6	64	118	7.1
	2500	65	114	7.3	61	114	6.8	58	112	6.5
	2400	58	109	6.5	55	108	6.2	52	107	6.0
	2300	52	103	6.0	50	102	5.8	48	101	5.6
2200	47	97	5.6	45	96	5.4	44	95	5.3	
12,000	2600	68	119	7.7	64	118	7.2	61	117	6.8
	2500	62	114	6.9	58	113	6.5	55	111	6.2
	2400	56	108	6.3	53	107	6.0	51	106	5.8
	2300	50	102	5.8	48	101	5.6	46	100	5.5
	2200	46	96	5.5	44	95	5.4	43	94	5.3

Figure 5-7. Cruise Performance

# LANDING DISTANCE

## SHORT FIELD

CONDITIONS:  
Flaps 40°  
Power Off  
Maximum Braking  
Paved, Level, Dry Runway  
Zero Wind

NOTES:

1. Short field technique as specified in Section 4.
2. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots
3. For operation on a dry, grass runway, increase distances by 45% of the "ground roll" figure.

WEIGHT LBS	SPEED AT 50 FT KIAS	PRESS ALT FT	0°C			10°C			20°C			30°C			40°C			
			GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS		
2300	59	S.L.	495	1205	510	1235	530	1265	550	1300	570	1335	590	1370	610	1405	630	1440
		1000	510	1235	530	1265	550	1300	570	1335	590	1370	610	1405	630	1440	655	1480
		2000	530	1265	550	1300	570	1335	590	1370	615	1410	635	1445	655	1485	680	1525
		3000	550	1300	570	1335	590	1370	615	1410	635	1450	660	1485	685	1525	705	1570
		4000	570	1335	590	1370	615	1415	640	1455	660	1490	685	1535	710	1575	730	1615
		5000	590	1370	615	1415	640	1455	660	1495	685	1535	710	1575	735	1620	760	1665
		6000	615	1415	640	1455	660	1495	685	1535	710	1575	735	1620	760	1665		
		7000	640	1455	660	1495	685	1535	710	1575	735	1620	760	1665				
8000	665	1500	690	1540	710	1580	735	1620	760	1665								

Figure 5-10. Landing Distance