

REVISION

MODEL 310R

1977

PILOT'S OPERATING HANDBOOK

REVISION 3

2 APRIL 1982

D1541R3-13

**INSERT THE FOLLOWING REVISED PAGES
INTO THE BASIC MANUAL**

V _{MC} A	<u>Air Minimum Control Speed</u> is the minimum flight speed at which the airplane is controllable with a bank of 50° toward operative engine when one engine suddenly becomes inoperative and the remaining engine is operating at takeoff power.
V _{NE}	<u>Never Exceed Speed</u> is the speed limit that may not be exceeded at any time.
V _{NO}	<u>Maximum Structural Cruising Speed</u> is the speed that should not be exceeded except in smooth air and then only with caution.
V _X	<u>Best Angle-of-Climb Speed</u> is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
V _Y	<u>Best Rate-of-Climb Speed</u> is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

METEOROLOGICAL TERMINOLOGY

°C	Temperature in degrees Celsius.
°F	Temperature in degrees Fahrenheit.
ISA	International Standard Atmosphere in which: (1) The air is a dry perfect gas; (2) The temperature at sea level is 15° Celsius (59° Fahrenheit); (3) The pressure at sea level is 29.92 inches Hg. (1013.2 mb); (4) The temperature gradient from sea level to the altitude at which the temperature is -56.5°C (-69.7°F) is -1.98°C (-3.5°F) per 1000 feet.
OAT	Outside Air Temperature is the free air static temperature, obtained either from inflight temperature indications adjusted for instrument error and compressibility effects or ground meteorological sources.
Pressure Altitude	Altitude measured from standard sea-level pressure (29.92 inches Hg.) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this handbook, altimeter instrument errors are assumed to be zero.
Wind	The wind velocities recorded as variables on the charts of this handbook are to be understood as the headwind or tailwind components of the reported winds.

AIRSPEED LIMITATIONS (See Figure 2-1)**AIRSPEED LIMITATIONS TABLE**

SPEED	KIAS	KCAS	REMARKS
Maneuvering Speed V_A (Knots)	148	150	Do not make abrupt control movements above this speed.
Maximum Flap Extended Speed V_{FE} (Knots) 15° 35°	158 139	160 140	Do not exceed this speed with the given flap setting.
Maximum Gear Operating Speed V_{LO} (Knots)	138	140	Do not extend or retract landing gear above this speed.
Maximum Gear Extended Speed V_{LE} (Knots)	138	140	Do not exceed this speed with landing gear extended.
Air Minimum Control Speed V_{MC_A} (Knots)	80	81	This is the minimum flight speed at which the airplane is controllable with a bank of 5° toward operative engine with one engine inoperative and the remaining engine operating at takeoff power.
Best Single-Engine Rate-of-Climb Speed V_y (Knots)	106	107	This speed delivers the greatest gain in altitude in the shortest possible time with one engine inoperative at sea level, standard day conditions and 5500 pounds weight.
Never Exceed Speed V_{NE} (Knots)	223	227	Do not exceed this speed in any operation.
Maximum Structural Cruising Speed V_{NO} (Knots)	181	183	Do not exceed this speed except in smooth air and then only with caution.

Figure 2-1

SECTION 3
EMERGENCY PROCEDURES
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INTRODUCTION

Section 3 of the Pilot's Operating Handbook describes the recommended procedures for emergency situations. The first part of this section provides emergency procedural action required in an abbreviated checklist form. Amplification of the abbreviated checklist is presented in the second part of this section.

NOTE

Refer to 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.

EMERGENCY PROCEDURES ABBREVIATED CHECKLIST

Procedures in the Abbreviated Checklist portion of this section outlined in black are immediate-action items and should be committed to memory.

SINGLE-ENGINE AIRSPEEDS FOR SAFE OPERATION

Conditions: 1. Takeoff Weight 5500 Pounds		3. Standard Day, Sea Level
2. Landing Weight 5400 Pounds		
(1) Air Minimum Control Speed	80 KIAS	
(2) Recommended Safe Single-Engine Speed	92 KIAS	
(3) Best Single-Engine Angle-of-Climb Speed	95 KIAS	
(4) Best Single-Engine Rate-of-Climb Speed (Wing Flaps UP)	106 KIAS	

Figure 3-1

ENGINE INOPERATIVE PROCEDURES

ENGINE SECURING PROCEDURE

1. Throttle - CLOSE.
2. Mixture - IDLE CUT-OFF.
3. Propeller - FEATHER.
4. Fuel Selector - OFF (Feel For Detent).
5. Auxiliary Fuel Pump - OFF.
6. Magneto Switches - OFF.
7. Propeller Synchrophaser - OFF (Optional System).
8. Alternator - OFF.
9. Cowl Flap - CLOSE.

ENGINE FAILURE DURING TAKEOFF (Speed Below 92 KIAS)

1. Throttles - CLOSE IMMEDIATELY.
2. Brakes - AS REQUIRED.

ENGINE FAILURE AFTER TAKEOFF (Speed Above 92 KIAS With Gear Up Or In Transit)

1. Mixtures - AS REQUIRED for flight altitude.
2. Propellers - FULL FORWARD.
3. Throttles - FULL FORWARD.
4. Landing Gear - CHECK UP.
5. Inoperative Engine:
 - a. Throttle - CLOSE.
 - b. Mixture - IDLE CUT-OFF.
 - c. Propeller - FEATHER.
6. Establish Bank - 5° toward operative engine.
7. Wing Flaps - UP, if extended, in small increments.
8. Climb To Clear 50-Foot Obstacle - 92 KIAS.
9. Climb At Best Single-Engine Rate-of-Climb Speed - 106 KIAS at sea level; 94 KIAS at 10,000 feet.
10. Trim Tabs - ADJUST 5° bank toward operative engine with approximately 1/2 ball slip indicated on the turn and bank indicator.
11. Cowl Flap - CLOSE (Inoperative Engine).
12. Inoperative Engine - SECURE as follows:
 - a. Fuel Selector - OFF (Feel For Detent).
 - b. Auxiliary Fuel Pump - OFF.
 - c. Magneto Switches - OFF.
 - d. Alternator - OFF.
13. As Soon As Practical - LAND.

AMPLIFIED EMERGENCY PROCEDURES**NOTE**

A complete knowledge of the procedures set forth in this section will enable the pilot to cope with various emergencies that can be encountered; however, this does not diminish the fact that the primary responsibility of the pilot is to maintain control at all times. Good judgment and precise action are essential and can only be developed through frequent practice of emergency and simulated single-engine procedures. The pilot must have a thorough knowledge of all emergency procedures so that in the event of an emergency, reaction will be precise and done with confidence. This is required so the pilot can cope with the demands of an emergency situation.

SINGLE-ENGINE AIRSPEEDS FOR SAFE OPERATION

The most critical time for an engine failure condition in a multi-engine airplane is during a two or three second period late in the takeoff run while the airplane is accelerating to a safe engine failure speed. A detailed knowledge of recommended single-engine airspeeds is essential for safe operation of the airplane.

The airspeed indicator is marked with a red radial at the air minimum control speed and a blue radial at the best single-engine rate-of-climb speed to facilitate instant recognition. The following paragraphs present a detailed discussion of the problems associated with engine failures during takeoff.

AIR MINIMUM CONTROL SPEED

The multi-engine airplane must reach the air minimum control speed (80 KIAS) before full control deflections can counteract the adverse rolling and yawing tendencies associated with one engine inoperative and full power operation on the other engine. This speed is indicated by a red radial on the airspeed indicator.

RECOMMENDED SAFE SINGLE-ENGINE SPEED

Although the airplane is controllable at the air minimum control speed, the airplane performance is so far below optimum that continued flight near the ground is improbable. A more suitable recommended safe single-engine speed is 92 KIAS. At this speed, altitude can be maintained more easily while the landing gear is being retracted and the propeller is being feathered.

BEST SINGLE-ENGINE ANGLE-OF-CLIMB SPEED

The best single-engine angle-of-climb speed becomes important when there are obstacles ahead on takeoff. Once the best single-engine angle-of-climb speed is reached, altitude becomes more important than airspeed until the obstacle is cleared. The best single-engine angle-of-climb speed is approximately 95 KIAS with wing flaps and landing gear up.

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INTRODUCTION

Section 4 of the Pilot's Operating Handbook describes the recommended procedures for normal operations. The first part of this section provides normal procedural action required in an abbreviated checklist form. Amplification of the abbreviated checklist is presented in the second part of this section.

NOTE

Refer to 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.

STARTING ENGINES

1. Propellers - CLEAR.
2. Magneto Switches - ON.
3. Engines - START.
4. Auxiliary Fuel Pumps - LOW.
5. Engine Instruments - CHECK.

BEFORE TAXIING

1. Avionics - ON and SET.
2. Wing Flaps - UP.

TAXIING

1. Brakes - CHECK.
2. Flight Instruments - CHECK.

BEFORE TAKEOFF

1. Engine Runup - COMPLETE.
2. Fuel Quantity - CHECK.
3. Fuel Selectors - MAIN TANKS.
4. Cowl Flaps - LOCKED FULL OPEN.
5. Trim Tabs - SET.
6. Wing Flaps - UP.
7. Propeller Synchrophaser - OFF (Optional System).
8. Flight Instruments and Avionics - SET.
9. Lights - AS REQUIRED.
10. All Cabin Doors and Windows - CLOSED.
11. All Warning Lights - CLEAR.
12. Auxiliary Fuel Pumps - ON.
13. Flight Controls - CHECK.
14. Ice Protection - AS REQUIRED.
15. Seat Belts and Shoulder Harness - SECURE.

TAKEOFF

1. Power - SET FOR TAKEOFF (Lean As Required).
2. Engine Instruments - CHECK.
3. Air Minimum Control Speed - 80 KIAS.
4. Takeoff and Climb to 50 Feet - 92 KIAS at 5500 pounds. Refer to Section 5 for speeds at reduced weights.

AFTER TAKEOFF

1. Landing Gear - RETRACT.
2. Best Angle-of-Climb Speed - 85 KIAS at sea level to 89 KIAS at 15,000 feet with obstacle.
3. Best Rate-of-Climb Speed With Wing Flaps Up - 107 KIAS at sea level and 5500 pounds.
Refer to Section 5
for speed at altitude
and at reduced weight.