GENERAL SPECIFICATIONS

PERFORMANCE

Published figures are for standard airplanes flown at gross weight under standard conditions at sea level, unless otherwise stated. Performance for a specific airplane may vary from published figures depending upon the equipment installed, the condition of engine, airplane and equipment, atmospheric conditions and piloting technique. Each performance figure below is subject to the same conditions as on the corresponding performance chart from which it is taken in the Performance Charts Section.

Takeoff Ground Run (minimum) (ft)	1065
Takeoff Distance Over 50-ft Obstacle (25° flaps) (ft)	1760
Best Rate of Climb Speed (mph)	87
Rate of Climb (ft per min)	649
Service Ceiling (ft)	12,700
Absolute Ceiling (ft)	14,960
Top Speed (mph)	135*
Optimum Cruising Speed (75% power, optimum altitude, leaned to best power) (mph)	133*
Cruising Range (75% power, optimum altitude, leaned to best economy, no reserves) (mi)	720*
Optimum Cruising Range (55% power, optimum altitude, leaned to best economy, no reserves) (mi)	785*
Stalling Speed (flaps down) (mph)	58
Stalling Speed (flaps up) (mph)	64.5
Landing Roll (flaps down) (ft)	595
Landing Roll Over 50-ft Barrier (flaps down) (ft)	1115

WEIGHTS

Gross Weight (lbs)	2325
Empty Weight (Standard) (lbs)	1301**
USEFUL LOAD (Standard) (lbs)	1024**

*With Optional Wheel Fairings installed.
**Weight varies with each aircraft.

POWER PLANT

Engine (Lycoming)	O-320-E3D
Rated Horsepower	150
Rated Speed (rpm)	2700
Bore (inches)	5.125
Stroke (inches)	3.875
Displacement (cubic inches)	319.8
Compression Ratio	7:1
Dry Weight (pounds)	276
Propeller	
McCauley	1C160/BCM7653
Sensenich	74DM6-0-58

FUEL AND OIL

Fuel Capacity (U.S. gal) (standard)	50
Fuel Capacity (U.S. gal) Usable	48
Oil Capacity (qts)	8
Fuel, Aviation Grade (min octane)	80/87

BAGGAGE

Maximum Baggage (lbs)	200
Baggage Space (cubic ft)	24
Baggage Door Size (in.)	20 x 22

DIMENSIONS

Wing Span (ft)	35
Wing Area (sq ft)	170.0
Length (ft)	23.8
Height (ft)	7.3
Wing Loading (lbs per sq ft)	13.7
Power Loading (lbs per hp)	15.5
Propeller Diameter (in.)	
McCauley	76
Sensenich	74
Turning Radius	13.0

LANDING GEAR

Wheel Base (ft)		6.7
Wheel Tread (ft)		10.0
Tire Pressure (psi)	Nose	30
	Main	24
Tire Size	Nose (4 ply rating)	5.00 x 5
	Main (4 ply rating)	6.00 x 6

SECTION 1

LIMITATIONS

The following limitations must be observed in the operation of this airplane.

A. ENGINE
Lycoming O-320-E3D

ENGINE LIMITS
For all operations 2700 RPM, 150 HP

B. FUEL
80/87 octane aviation fuel

C. PROPELLER
Sensenich 74DM6, maximum diameter 74 inches. Minimum diameter 72 inches. Static RPM at maximum permissible throttle setting: Not over 2375, not under 2275. No additional tollerance permitted.

McCauley 1C160/EGM7653, maximum diameter 76 inches. Minimum diameter 74.5 inches. Static RPM at maximum permissible throttle setting: Not over 2400, not under 2300. No additional tollerance permitted.

D. POWER INSTRUMENTS

OIL TEMPERATURE	
Green Arc (Normal Operating Range)	75° F to 245° F
Red Line (Maximum)	245° F
OIL PRESSURE	
Green Arc (Normal Operating Range)	60 PSI to 90 PSI
Yellow Arc (Caution Range)	25 PSI to 60 PSI
Red Line (Minimum)	25 PSI
Red Line (Maximum)	90 PSI
FUEL PRESSURE	
Green Arc (Normal Operating Range)	5 PSI to 8 PSI
Red Line (Minimum)	.5 PSI
Red Line (Maximum)	8 PSI
TACHOMETER	
Green Arc (Normal Operating Range)	500 to 2700 RPM
Red Line (Maximum Continuous Power)	2700 RPM

E. AIRSPEED LIMITATIONS AND AIRSPEED INSTRUMENT MARKINGS (Calibrated Airspeed)

NEVER EXCEED	176 MPH
MAXIMUM STRUCTURAL CRUISE	140 MPH
MANEUVERING	124 MPH
FLAPS EXTENDED	125 MPH
MAXIMUM POSITIVE LOAD FACTOR	(Normal Category) 3.8
MAXIMUM POSITIVE LOAD FACTOR	(Utility Category) 4.4
MAXIMUM NEGATIVE LOAD FACTOR	No inverted maneuvers approved

AIRSPEED INSTRUMENT MARKINGS

Red Radial Line (Never Exceed)	176 MPH (153 KTS)
Yellow Arc (Caution Range) (Smooth Air Only)	140 MPH to 176 MPH (122 KTS to 153 KTS)
Green Arc (Normal Operating Range)	64.5 MPH to 140 MPH (56 KTS to 122 KTS)
White Arc (Flap Down Range)	58 MPH to 125 MPH (50 KTS to 109 KTS)

F. MAXIMUM WEIGHT

Normal Category	2325 LBS
Utility Category	1950 LBS

G. BAGGAGE CAPACITY 200 LBS

H. C. G. RANGE

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

1. Normal Category

Weight (Pounds)	Forward Limit (In. Aft of Datum)	Rearward Limit (In. Aft of Datum)
2325	87.0	93.0
1950	83.0	93.0

2. Utility Category

Weight (Pounds)	Forward Limit (In. Aft of Datum)	Rearward Limit (In. Aft of Datum)
1950	83.0	86.5

Straight line variation between points given.

C. G. RANGE AND WEIGHT INSTRUCTIONS

1. Add the weight of all items to be loaded to the licensed empty weight.
2. Use the loading graph to determine the moment of all items to be carried in the airplane.
3. Add the moment of all items to be loaded to the licensed empty weight moment.
4. Divide the total moment by the total weight to determine the C.G. location.
5. By using the figures of Item 1 and Item 4, locate a point on the C.G. range and weight graph. If the point falls within the C.G. envelope, the loading meets the weight and balance requirements.

SAMPLE LOADING PROBLEM (Normal Category)

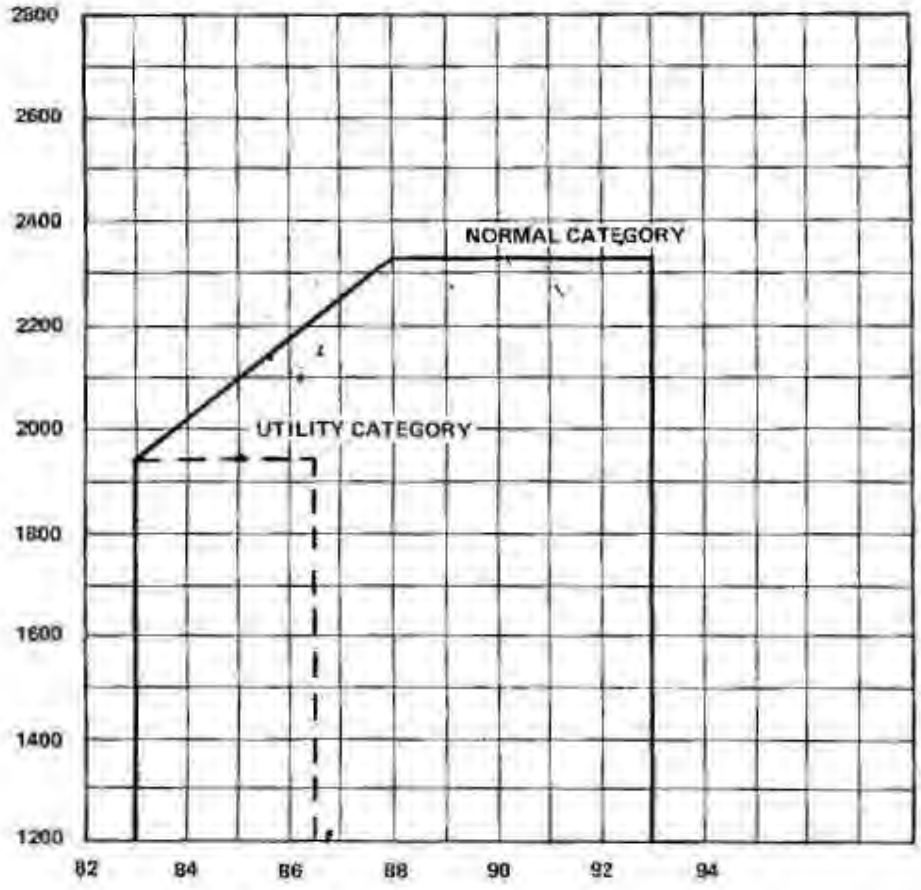
	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Licensed Empty Weight	1439.2	87.2	125411
Oil (8 quarts)	15	27.5	413
Pilot and Front Passenger	340	80.5	27370
Passengers, Aft* (Rear Seat)	340	118.1	40154
Fuel (48 Gal. Maximum)		95.0	
Baggage*		142.8	
Total Loaded Airplane			

The center of gravity (C.G.) of this sample loading problem is at inches aft of the datum line. Locate this point ( ) on the C.G. range and weight graph. Since this point falls within the weight - C.G. envelope, this loading meets the weight and balance requirements.

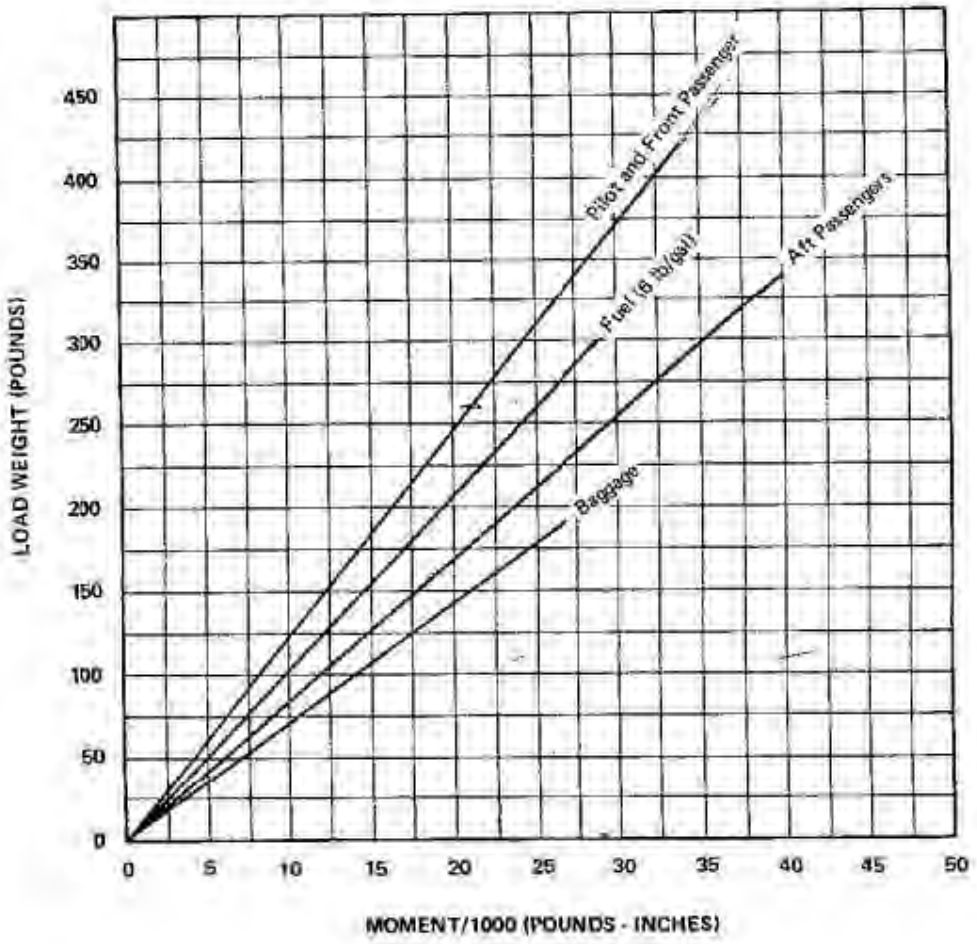
IT IS THE RESPONSIBILITY OF THE PILOT AND AIRCRAFT OWNER TO INSURE THAT THE AIRPLANE IS LOADED PROPERLY.

*Utility Category Operation - No baggage or aft passengers allowed.

C. G. RANGE AND WEIGHT



LOADING GRAPH



TAKEOFF

Just before takeoff the following items should be checked:

1. Fuel - on proper tank
2. Electric fuel pump - on
3. Engine gauges - checked
4. Flaps - set
5. Carburetor heat - off
6. Mixture - set
7. Seat backs - erect
8. Safety belts/harness - fastened
9. Trim tab - set
10. Controls - free
11. Door - latched

The takeoff technique is conventional. The trim tab should be set slightly aft of neutral with the exact setting determined by the loading of the airplane. Allow the airplane to accelerate to 50 to 60 miles per hour, then ease back on the wheel enough to let the airplane fly itself from the ground. Premature raising of the nose or raising it to an excessive angle will result in a delayed takeoff. After takeoff, let the airplane accelerate to the desired climb speed by lowering the nose slightly.

Takeoffs are normally made with flaps up; however, for short field takeoffs and for takeoffs under difficult conditions such as deep grass or a soft surface, distances can be reduced appreciably by lowering the flaps to 25° and rotating at lower airspeeds.

Short Field, Obstacle Clearance:

Lower the flaps to 25°. Apply full power before brake release. Accelerate to 66 MPH CAS and rotate, maintaining 66 MPH CAS until obstacle clearance has been attained. After the obstacle has been cleared accelerate to 87 miles per hour and then slowly retract the flaps.

Short Field, No Obstacle:

Use of partial flaps does not decrease minimum ground roll, therefore, leave the flaps up or lower the flaps to 25° as desired. Apply full power before brake release. Accelerate to 65 MPH CAS with flaps up or 52 MPH CAS with flaps at 25° and rotate. After breaking ground, accelerate to best rate of climb speed of 87 MPH CAS. Slowly retract the flaps while climbing out.

Soft Field, Obstacle Clearance:

Lower the flaps to 25°. Accelerate airplane, lift nose gear off as soon as possible, and lift off at lowest possible airspeed. Accelerate just above the ground to 66 MPH CAS to climb past obstacle clearance height. Continue climbing while accelerating to the best rate of climb speed, 87 miles per hour, and slowly retract the flaps.

Soft Field, No Obstacle:

Lower the flaps to 25°. Accelerate the airplane and lift the nose gear off as soon as possible, then lift off at the lowest possible airspeed. Accelerate just above the ground to the best rate of climb speed, 87 miles per hour. Climb out while slowly retracting the flaps.

CLIMB

The best rate of climb at gross weight will be obtained at 87 miles per hour. The best angle of climb is at 76 miles per hour. At lighter than gross weight, these speeds are somewhat reduced. For climbing en route, a speed of 100 miles per hour is recommended. This will produce better forward speed and increased visibility over the nose during the climb. Shallow turns of a few degrees will also aid forward visibility during climb out.

STALLS

Stall characteristics are conventional. Audible stall warning is provided by a horn located behind the instrument panel which sounds automatically at between 5 and 10 miles per hour above stall speed.

Stall speed at a gross weight of 2325 pounds with power off and full flaps is 58 miles per hour. With flaps up, this speed is increased.

The stall speed chart is at gross weight. Stall speeds at lower weights will be correspondingly less.

STALL SPEED TABLE

Angle of Bank	Flaps 40°	Flaps Retracted
0°	58 MPH	64.5 MPH
20°	60 MPH	67 MPH
40°	66 MPH	74 MPH
50°	72 MPH	80 MPH
60°	82 MPH	91 MPH

Power Off – Gross Weight 2325 Lbs.

CRUISING

The cruising speed is determined by many factors, including power setting, attitude, temperature, loading, and equipment installed on the airplane.

The normal cruising power is 75% of the rated horsepower of the engine. True airspeeds, which may be obtained at various altitudes and power settings, can be determined from the charts in the Performance Charts Section of this manual.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes.

The mixture should be leaned at the pilot's discretion when 75% power or less is being used. If any doubt exists as to the amount of power being used, the mixture should be in the FULL RICH position for all operations.

To lean the mixture, pull the mixture control until the engine becomes rough, indicating that the lean mixture limit has been reached in the leaner cylinders. Then enrich the mixture by pushing the control toward the instrument panel until engine operation becomes smooth.

The continuous use of carburetor heat during cruising flight decreases engine efficiency. Unless icing conditions in the carburetor are severe, do not cruise with carburetor heat on. Apply FULL carburetor heat slowly and only for a few seconds at intervals determined by the icing conditions.

In order to keep the airplane in best lateral trim during cruise flight, the fuel should be used alternately from each tank. It is recommended that one tank be used for one hour after takeoff, the other tank be used for two hours, then return to the first tank. The second tank will contain approximately one half hour of fuel. Do not run tanks completely dry in flight.

The following is a list of some fuel management recommendations:

1. Fuel quantity should be visually checked in both tanks before entering the airplane.
2. Takeoff should be made on the fuller tank to assure best fuel flow, and this tank selected before or immediately after starting to establish an adequate fuel flow before takeoff. The tank with the higher fuel quantity should be selected for landing.
3. Fuel tank selection at low altitude is not recommended since adequate recovery time is essential in the event of an error in fuel selection.
4. The electric fuel pump should be turned on before switching tanks and left on for a short period thereafter.
5. To avoid the necessity of making a hasty selection and to assure a continuous fuel flow, the selector should be changed to another tank before the fuel is exhausted from the tank in use.
6. Operation of the engine driven pump should be checked while taxiing or during the preflight runup by switching off the electric fuel pump and observing the fuel pressure.
7. During cruise, the electric fuel pump should be in the off position so that any malfunction of the engine driven fuel pump is immediately apparent.
8. If signs of fuel starvation should occur at any time during flight, fuel exhaustion should be suspected, at which time the fuel selector should immediately be positioned to the fuller tank and the electric fuel pump switched to the on position.

TURBULENT AIR OPERATION

In keeping with good operating practice used in all aircraft, it is recommended that when turbulent air is encountered or expected, the airspeed be reduced to maneuvering speed to reduce the structural load caused by gusts and to allow for inadvertent speed build-ups which may occur as a result of the turbulence or distractions caused by the conditions.

MANEUVERS

The 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 the Airplane Flight Manual. Except for training maneuvers (steep turns, chandelles, and lazy eights) which are permitted only when the airplane is loaded to the utility category, acrobatic maneuvers are prohibited.

Intentional spins are prohibited. Maneuvering at speeds in excess of 124 mph must be avoided in order to prevent overstressing the airframe.

ENGINE POWER LOSS

The most common cause of engine power loss is mismanagement of fuel. Therefore, the first step to take after engine power loss is to move the fuel selector to the tank not being used. This will often restore power even if there is no apparent reason for the engine to stop on the tank being used.

If changing to another tank does not restore power:

1. Check fuel pressure - if electric fuel pump is off, turn it ON.
2. Push mixture control to full RICH.
3. Check ignition switch. Turn to best operating magneto - LEFT, RIGHT, or BOTH.

APPROACH AND LANDING

Before landing check list:

1. Seat backs - erect
2. Safety belts/harness - fastened
3. Fuel - on proper tank
4. Electric fuel pump - on
5. Mixture - rich
6. Flaps - set (125 MPH)

The airplane should be trimmed to an approach speed of about 80 MPH with flaps up. The flaps can be lowered at speeds up to 125 MPH, if desired, and the approach speed reduced 3 MPH for each additional notch of flaps. Carburetor heat should not be applied unless there is an indication of carburetor icing, since the use of carburetor heat causes a reduction of power which could be critical should a go-around be necessary. Full throttle operation with carburetor heat on is likely to cause detonation.

The amount of flap used during landings and the speed of the airplane at contact with the runway should be varied according to the landing surface, wind conditions, and airplane loading. It is generally good practice to contact the ground at the minimum possible safe speed consistent with existing conditions.

Normally, the best technique for short and slow landings is to use full flap and enough power to maintain the desired airspeed and approach flight path. Reduce the airspeed during flareout and contact the ground at close to stalling speed. After ground contact hold the nose wheel off as long as possible. As the airplane slows down, drop the nose and apply the brakes. There will be less chance of skidding the tires if the flaps are retracted before applying the brakes. Braking is most effective when back pressure is applied to the control wheel, putting most of the airplane weight on the main wheels. In high wind conditions, particularly in strong crosswinds, it may be desirable to approach the ground at higher than normal speeds with partial or no flaps.

STOPPING ENGINE

At the pilot's discretion, the flaps should be raised and the electric fuel pump turned off. After parking, the radios should be turned off and the engine stopped by putting the mixture control in idle cut-off. The throttle should be left full aft to avoid engine vibration while stopping. The magneto and master switches should be turned off and the parking brake set.

AIRSPEED DATA

All airspeeds quoted in this manual are calibrated unless otherwise noted. Calibrated airspeed is indicated airspeed corrected for instrument and position errors. The following table gives the correlation between indicated airspeed and calibrated airspeed if zero instrument error is assumed. This calibration is valid only when flown at maximum gross weight in level flight.

AIRSPEED CORRECTION TABLE

Flaps 0°										
IAS - MPH	60	70	80	90	100	110	120	130	140	150
CAS - MPH	66	74	82	90	99	108	117	126	135	144
Flaps 40°										
IAS - MPH	60	70	80	90	100	110	120			
CAS - MPH	65	73	81	89	98	107	116			

MOORING

The airplane can be moved on the ground with the aid of the optional nose wheel tow bar stowed in the baggage compartment. Tie-down ropes may be attached to rings under each wing and to the tail skid. The aileron and stabilator controls should be secured by looping the seat belt through the control wheel and pulling it snug. The rudder is held in position by its connection to the nose wheel steering and normally does not have to be secured. The flaps are locked when in the full up position and should be left retracted.

WEIGHT AND BALANCE

It is the responsibility of the owner and pilot to determine that the airplane remains within the allowable weight vs. center of gravity envelope while in flight. For weight and balance data, see the Weight and Balance Section of this manual.

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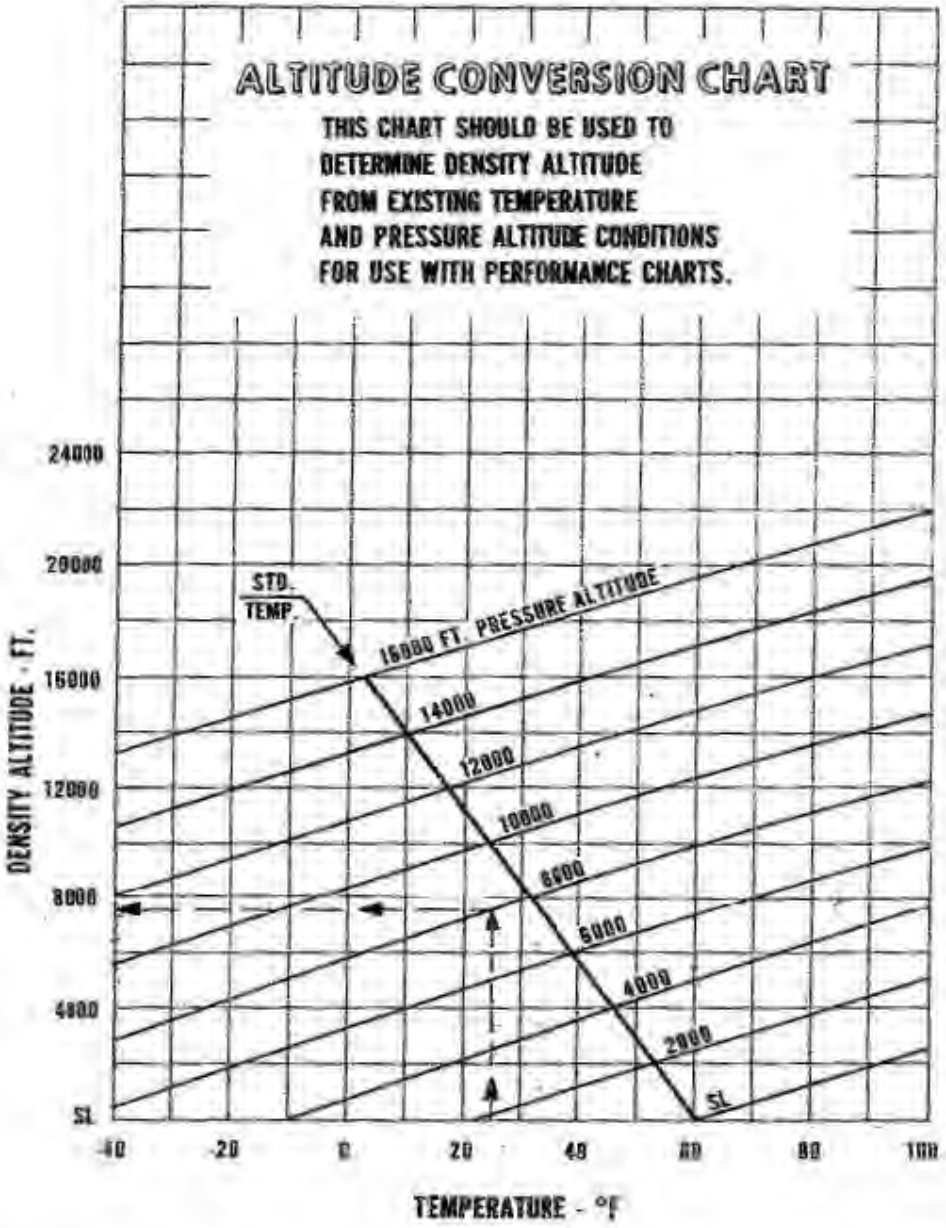

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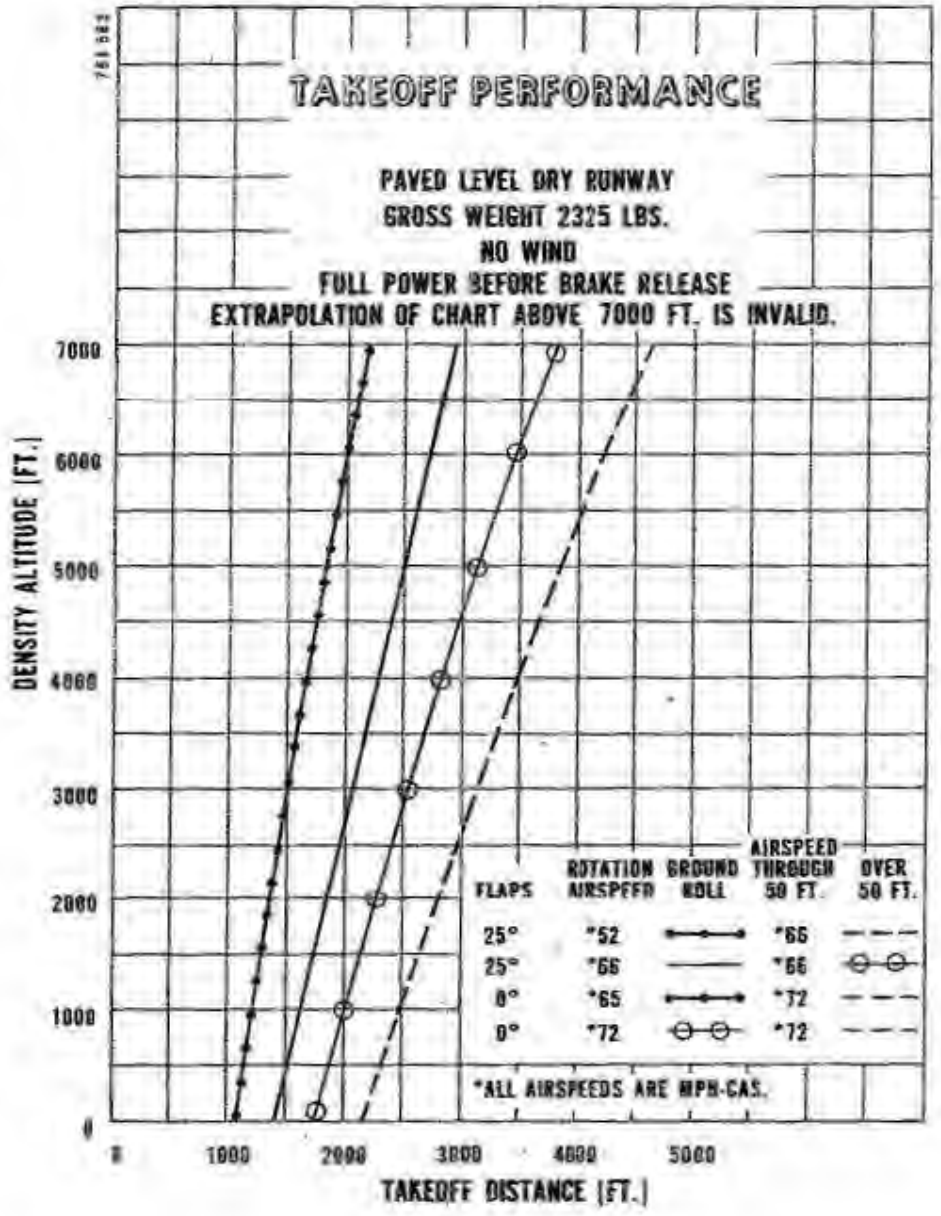

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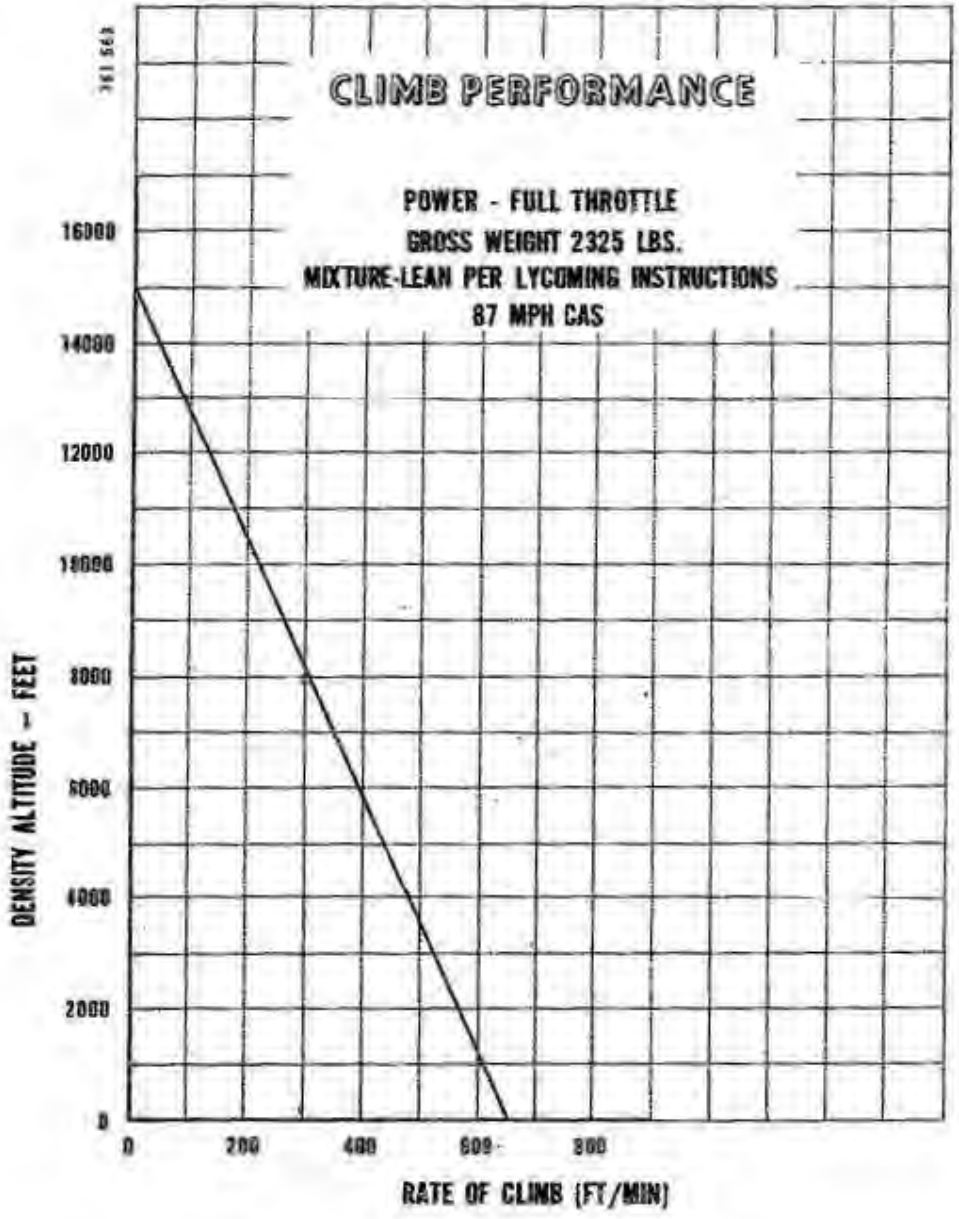

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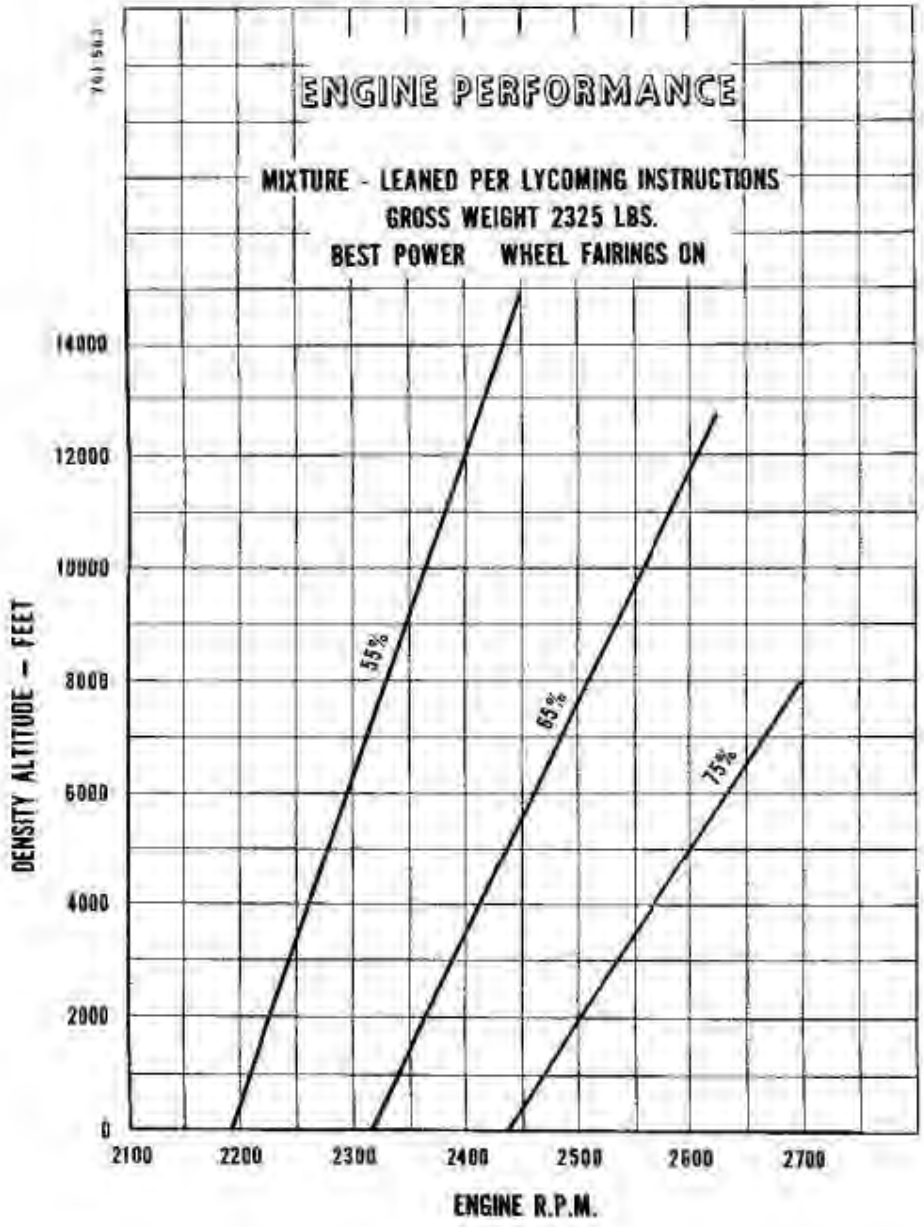

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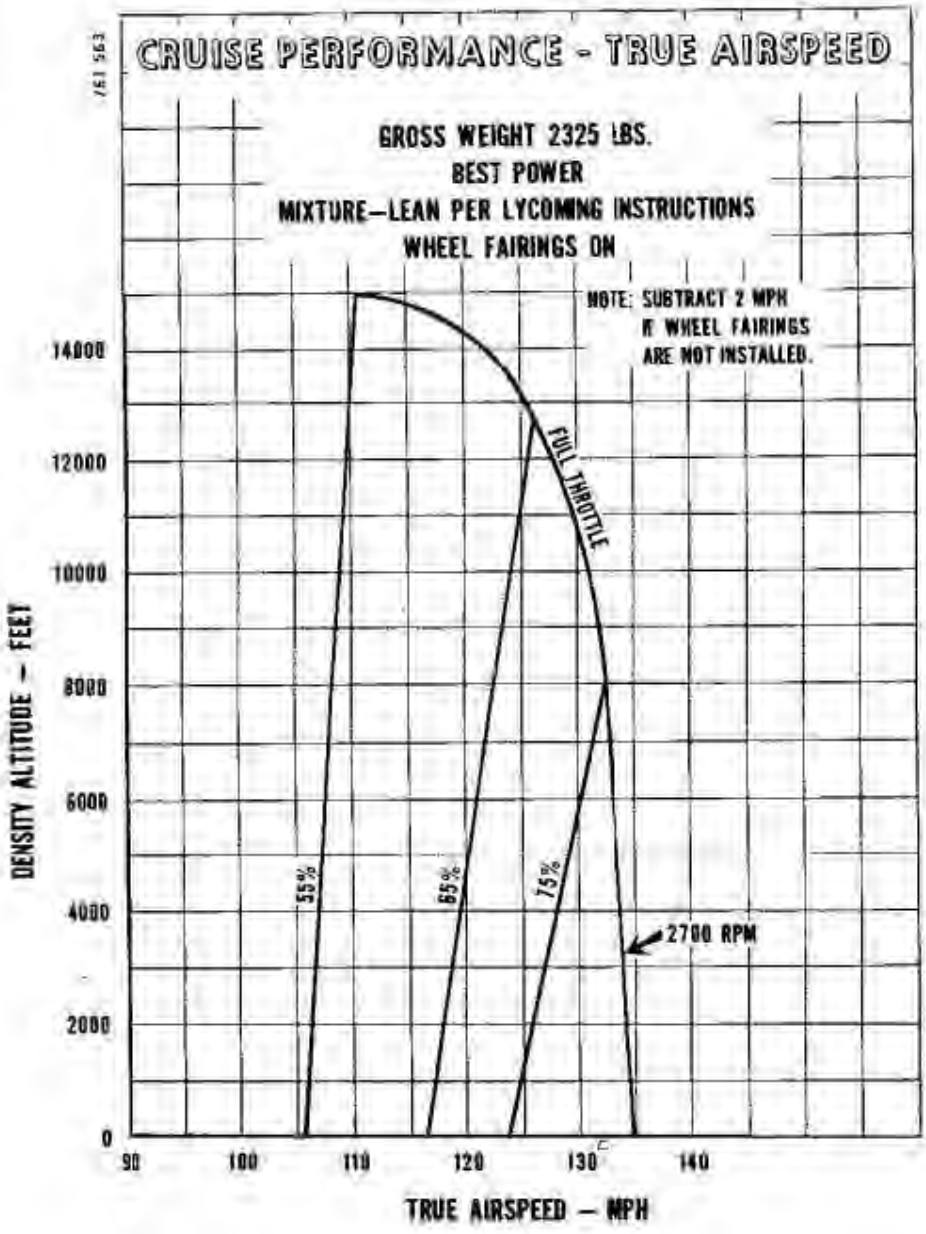

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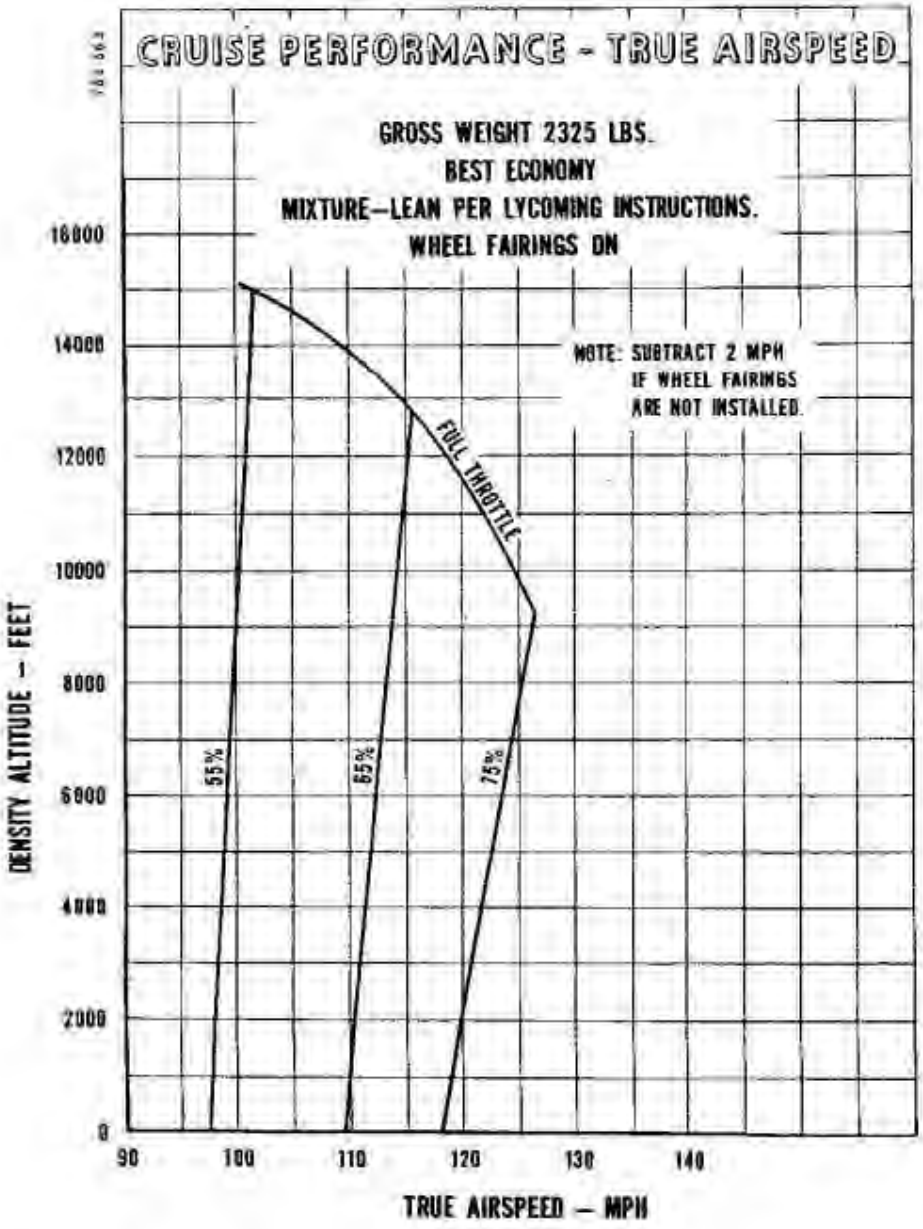

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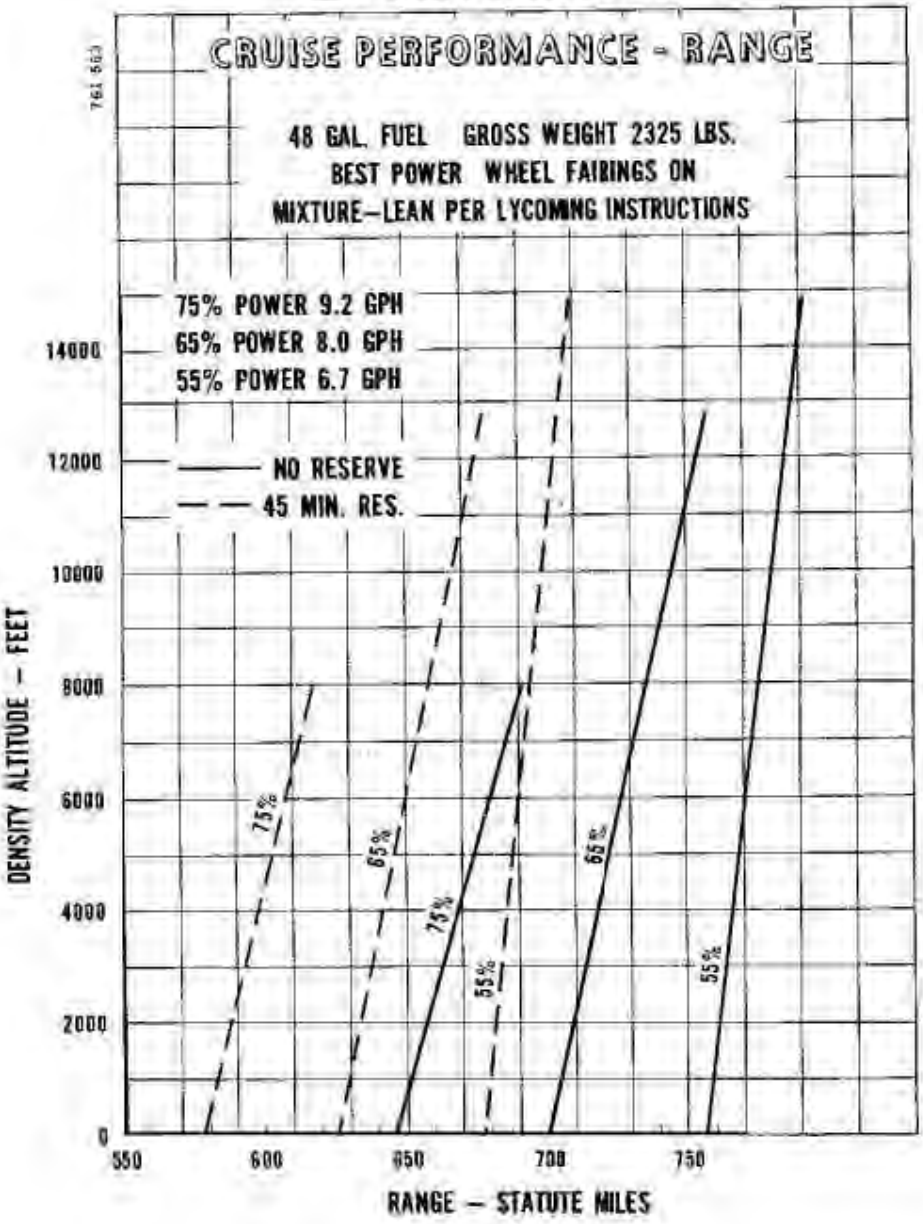

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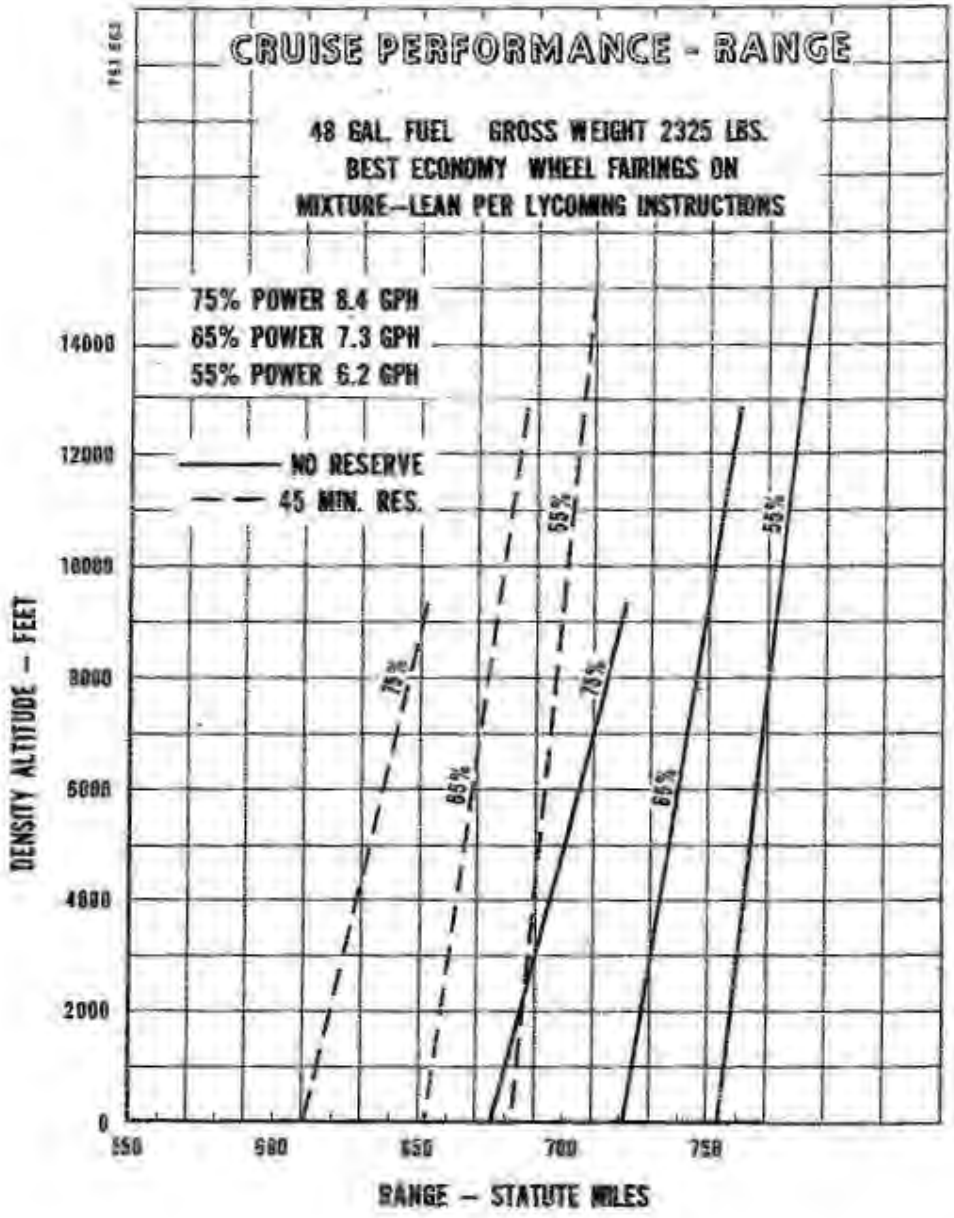

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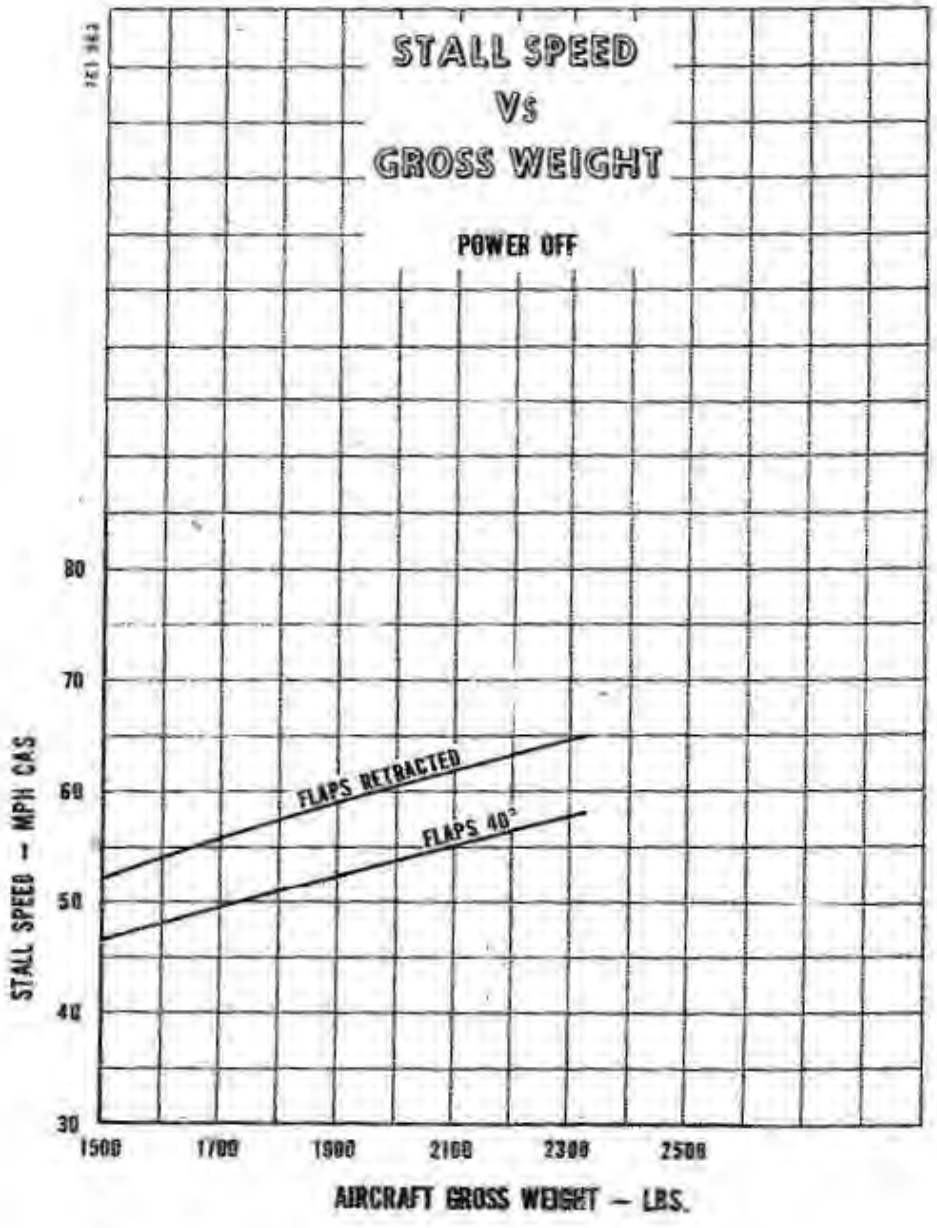

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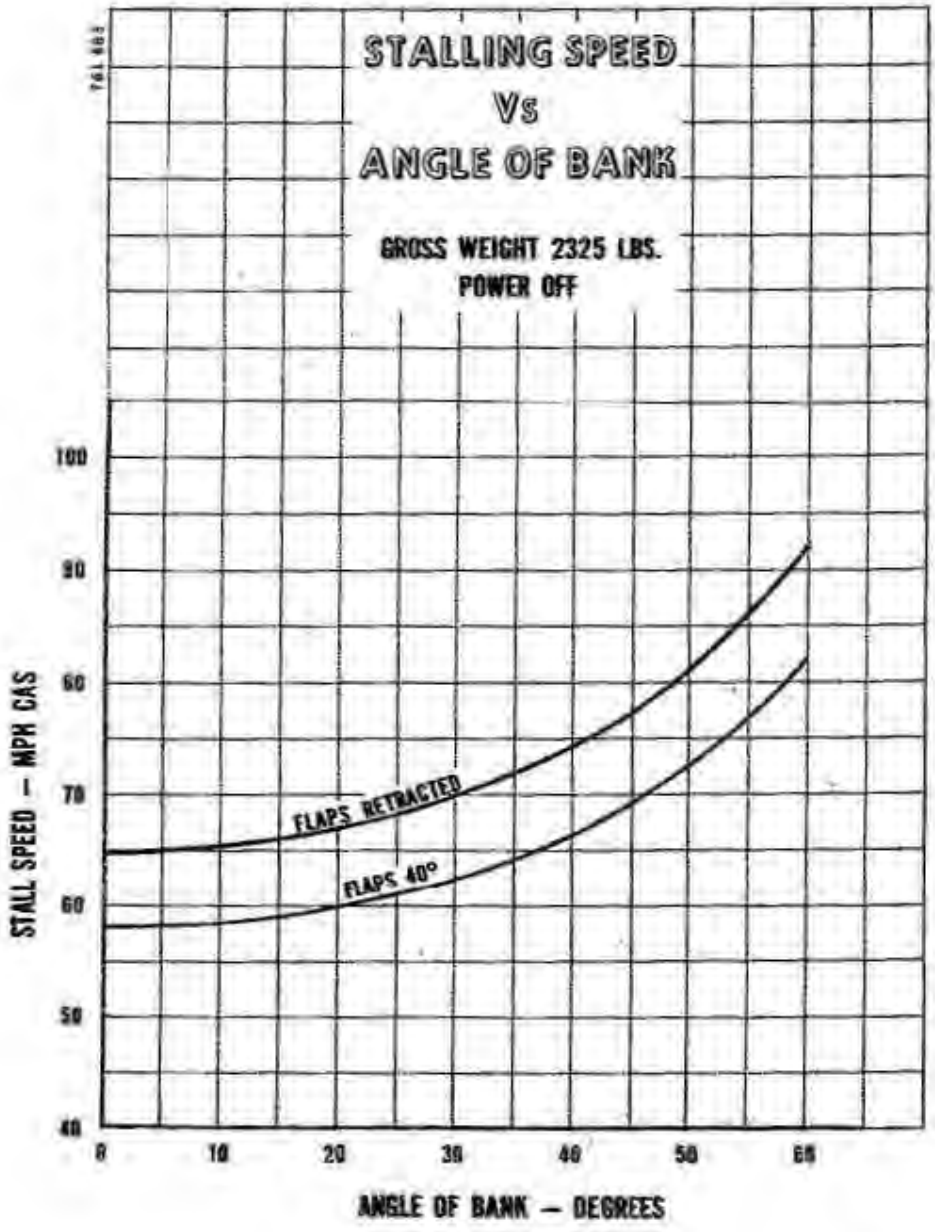

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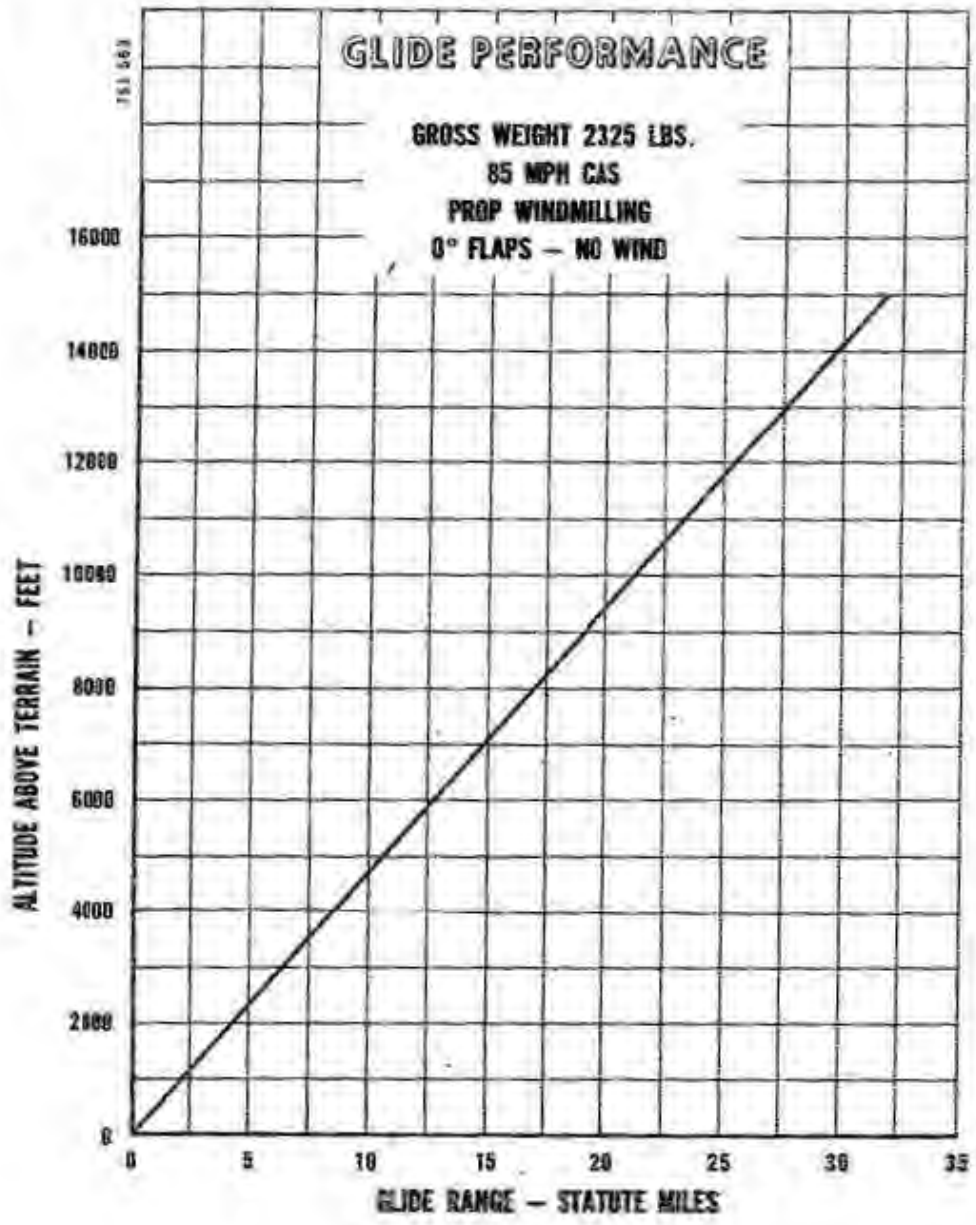

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