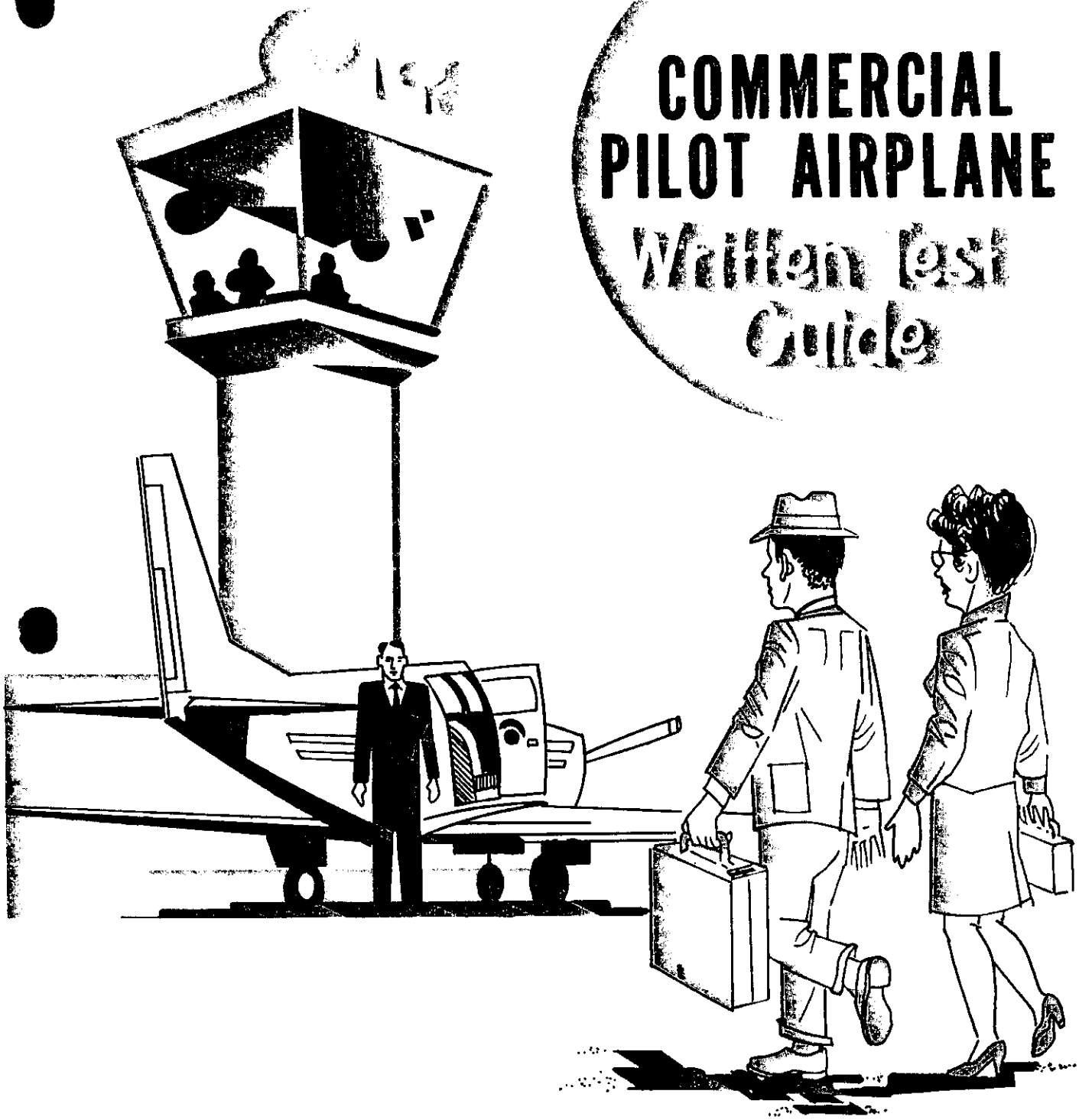
AC 61-71

COMMERCIAL PILOT AIRPLANE

Written Test Guide



U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

COMMERCIAL PILOT

AIRPLANE

WRITTEN TEST GUIDE

FAR PART 61 (REVISED)

1974

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Flight Standards Service

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 85 cents
Stock Number 5011-00070

PREFACE

This Commercial Pilot written test guide has been developed by the Operations Branch of Flight Standards Technical Division to assist applicants who are preparing for the Commercial Pilot-Airplane-Written Test. This guide is based on FAR Part 61 (revised), which became effective November 1, 1973.

This guide outlines the scope of aeronautical knowledge requirements for a commercial pilot; acquaints the applicant with source material that may be used to acquire this knowledge; presents sample test items with answers, explanations, and illustrations representative of those used in the current commercial pilot written test.

Comments regarding this publication should be directed to the U.S. Department of Transportation, Federal Aviation Administration, Flight Standards Technical Division, P.O. Box 25082, Oklahoma City, Oklahoma 73125.

CONTENTS

APPENDIX

COMMERCIAL PILOT WRITTEN TEST GUIDE

INTRODUCTION

This guide is not offered as a quick and easy way to obtain the necessary knowledge for passing the written test; there is NO quick and easy way to obtain the background of experience, knowledge, and skill that the present-day professional pilot must acquire. There can be no substitute for diligent study to attain basic knowledge, unremitting effort to develop competence, and continuous review to remain current in the many areas where technological change is the rule rather than the exception.

The intent of this guide is to define the scope and narrow the field of study, insofar as possible, to the knowledge requisite to the Commercial Pilot Certificate. Thus, the applicant is better able to intelligently direct his study plan.

BASIS FOR THE WRITTEN TEST

Technological advances and refinement have made the modern airplane versatile, reliable, and efficient thereby expanding the phases of air commerce in which the commercial pilot may become involved. Consequently, he often encounters situations involving rapidly changing weather conditions and unfamiliar terrain which demand knowledge of the elements as well as precise navigation.

Many of today's general aviation airplanes have a performance capability which, not too long ago, was found only in the larger and more powerful air carrier and military aircraft.

The increased use of more advanced and refined aircraft by the general aviation segment has outmoded the practice of testing for memory alone. Of course, basic knowledge is still necessary but it must be related to skill. Therefore, written examinations today require the ability to use basic knowledge in practical situations as well as in answering questions based on theoretical problems.

TYPE OF TEST QUESTIONS

The written test contains test items of the "objective, multiple-choice" type and each can be answered by the selection of a single response from among the four presented. This type of test has several advantages, two of which are (1) rapid scoring, making it possible for the applicant to receive his grade quickly, and (2) objective scoring, eliminating any element of individual judgment by the examiner in determining the grade.

TAKING THE WRITTEN TEST

The equipment needed for taking the test includes a protractor or plotter and a computer. The time allowed for completion is 4 hours. While it may be possible to complete the test in less time, it may increase the probability of mistakes.

Always remember the following facts when you are taking the test:

1. The questions are not trick questions. Each statement means exactly what it says. Do not look for hidden meanings. The statement does not concern exceptions to the rule; it refers to the general rule.
2. Always read the statement or question first—before you look at the answers. Be sure you read the entire question carefully. Avoid "skimming" and hasty assumptions as this may lead to an erroneous approach to the problem or failure to consider vital words.
3. Only *one* of the alternate answers given is completely correct. The others may be the result of incorrect computation, misconceptions of rules and principles, or erroneous or incomplete analysis of the problem. Be sure that you consider and understand all factors.
4. Each test item is independent of other test items; that is, the correct response to one item is not based on the correct response to a previous item, although occasionally the same factors may be used.
5. Do not spend too much time on a question which you cannot solve or on one where you have doubt as to the correct answer. By so doing you deprive yourself of the opportunity to mark all those questions which you can

readily answer. You can return to the questions you skipped after you complete those which you can readily answer. This procedure will enable you to make maximum use of the time available. It may mean the difference between a passing and a failing score.

6. In solving a computer problem, select the answer closest to your solution. If you have solved the problem correctly, your solution will be nearest to the correct answer.

ELIGIBILITY FOR TAKING THE TEST

The prerequisites for taking the initial written test are prescribed in Section 61.35, FAR Part 61, which became effective November 1, 1973. Requirements for re-taking the test in the event of failure are prescribed in Section 61.49, FAR Part 61, which became effective November 1, 1973. When reporting for the written test, you should be prepared to present to the person administering the test proof of your eligibility to take it, as well as documentary evidence of your identity. Normally, you will not be permitted to begin the test unless there is sufficient time to complete it.

STUDY OUTLINE

The study outline which follows is the framework for basic aeronautical knowledge that the prospective commercial pilot must know; every question on the FAA written test can be *directly* related to one or more of the topics contained in this outline. This subject matter is predicated on operationally realistic airman activity and encompasses the requirements specified in Federal Aviation Regulations.

A. Federal Aviation Regulations, Part 61

Have a knowledge of:

1. Required certificates/ratings.
2. Certificates and ratings issued.
3. Carriage of narcotic drugs.
4. Duration of pilot certificates.
5. Duration of medical certificates.
6. General limitations.
7. Pilot logbooks.
8. Operations during medical deficiency.
9. Second-in-command qualifications.
10. Recent experience: pilot-in-command.
11. Pilot-in-command proficiency check.
12. Commercial pilot privileges/limitations.

B. Federal Aviation Regulations, Part 91

Have a knowledge of:

1. Responsibility of pilot-in-command.
2. Preflight action.
3. Flight crewmembers at stations.
4. Careless or reckless operation.
5. Liquor and drugs.
6. Dropping objects.
7. Fastening of safety belts.
8. Parachutes and parachuting.
9. ATC transponder equipment.
10. Civil aircraft: certificates required.
11. Aircraft airworthiness.
12. Aircraft operating limitations/markings.
13. Supplemental oxygen.
14. Instrument and equipment requirements.
15. Limited/restricted aircraft limitations.
16. Emergency locator transmitters.
17. Reports on aircraft identification and activity.
18. Operating near other aircraft.
19. Right-of-way rules.
20. Aircraft speeds.
21. Acrobatic flight.
22. Aircraft lights.
23. ATC light signals.
24. Compliance—ATC clearances/instructions.
25. Minimum safe altitude; general.
26. Altimeter settings.
27. Operation—in vicinity of airports, and at airports with or without towers.
28. Flight in terminal control areas.
29. Basic VFR weather minimums.
30. Special VFR weather minimums.

C. Federal Aviation Regulations, Part 135

Have a knowledge of:

1. Applicability.
2. Operating rules.
3. Crewmembers qualification.
4. Aircraft and equipment.

D. National Transportation Safety Board, Part 430

Have a knowledge of:

1. Applicability.
2. Definitions.
3. Immediate notification and information.

4. Preserving wreckage/mail/cargo/records.
5. Reports/statements to be filed.

E. FAA Advisory Circulars

Have a knowledge of:

1. Series 00—General.
2. Series 20—Aircraft.
3. Series 60—Airmen.
4. Series 70—Airspace.
5. Series 90—Air Traffic Control and General Operations.
6. Series 120—Air Carrier and Commercial Operators.
7. Series 150—Airports.
8. Series 170—Air Navigation Facilities.

F. Airman's Information Manual, Part I

Have a knowledge of:

1. Glossary of aeronautical terms.
2. Airport lighting/marking aids.
3. Visual approach slope indicators.
4. Controlled/uncontrolled areas.
5. Special use airspace.
6. Radar traffic information service.
7. Stage I, II, III terminal radar service.
8. Traffic/wind indicators.
9. ADIZ and designated mountainous areas.
10. Medical facts for pilots—hypoxia/hyperventilation/alcohol/carbon monoxide.
11. Good operating practices.
12. Wingtip vortices.

G. Aerodynamics and Principles of Flight

Have a knowledge of:

1. Laws of motion.
2. Functions of the flight controls.
3. Principles of airfoils.
4. Wing planform—
   (a) Area/span/chord.
   (b) Aspect ratio/taper/sweepback.
   (c) Effect of planform on stall patterns.
5. Forces acting on the aircraft.
6. Flight controls/axes of the aircraft.
7. Lift/drag during turns.
8. Lift versus angle of attack.
9. Lift/thrust versus air density.
10. Types of flaps, spoilers, divebrakes.
11. Effect of flaps on lift/drag/trim.
12. Effect of ice/snow/frost on airfoils.
13. Power versus climb/descent/level flight.
14. Gyroscopic precession.
15. Types and effect of drag—induced/parasite/profile.
16. Ground effect.
17. Loads/load factors.
18. Stability—static and dynamic/longitudinal/lateral/directional.
19. Stalls/spins.
20. Relative wind/angle of attack.
21. Effect of wind during turns.
22. Torque effect—P factor.

H. Aircraft/Engine Operation—General

Have a knowledge of:

1. Fuel injection/carburetor principles.
2. Reciprocating engine principles.
3. Preflight/postflight safety practices.
4. Use of mixture/throttle/propeller control.
5. Use of proper fuel grade/type.
6. Fuel system operation.
7. Engine starting/shutdown.
8. Detonation cause/effect.
9. Fuel contamination prevention/elimination.
10. Emergency—engine/systems/equipment/fire.
11. Carburetor icing cause/detection/elimination.
12. Wake turbulence causes/precautions.
13. Proper loading of the aircraft.
14. Interpreting engine instruments.
15. Ignition or electrical system/units.
16. Recovery from critical flight situations.
17. Effect of carburetor heat on mixture.
18. Aircraft operating limitations.
19. Manifold pressure versus RPM.
20. High altitude operations/pressurization.
21. Use of oxygen and oxygen equipment.
22. Mid-air collision avoidance precautions.

I. Aircraft/Engine Performance—General

Have a knowledge of:

1. Takeoff charts.
2. Rate-of-climb charts.
3. Maximum safe crosswind charts:
4. Use of Denalt Computer.

5. Landing charts.
6. Stall speed charts.
7. Airspeed measurement — TAS/IAS/CAS/EAS.
8. Airspeed correction charts.
9. Computing density/pressure/altitudes.
10. Effect of density altitude on performance.
11. Effect of weight/balance on performance.
12. Critical performance speeds—"V Speeds."
13. Effect of wind on aircraft performance.
14. Bank/speed versus rate/radius of turn.
15. Stall speed versus altitude or attitude.
16. Stall speed versus indicated/true airspeed.
17. Obstacle clearance takeoff/landing.
18. Best angle-/rate-of-climb.
19. Computation of gross weight/useful load.
20. Computation of center-of-gravity.
21. Weight addition or removal.
22. Balance, stability, and center-of-gravity.
23. Effect of adverse balance.
24. Shifting of loose cargo.
25. Management of weight and balance control.
26. Weight shifting.

J. Flight Instruments and Systems

Have a knowledge of:

1. Attitude indicator operation/errors.
2. Heading indicator operation/errors.
3. Turn indicator/coordinator.
4. Altimeter operation/errors.
5. Vertical speed indicator operation/errors.
6. Airspeed indicator operation/errors.
7. Vacuum systems/instruments.
8. Pitot-static systems/instruments.
9. Magnetic compass operation/errors.
10. Altimeter setting procedures/significance.
11. Pressure altitude—significance/obtaining.
12. Gyroscopic principles.

K. Airplane Operation

Have a knowledge of:

1. Normal/crosswind takeoffs/landings.
2. Maximum performance takeoffs/landings.
3. Emergency landings.
4. Maneuvering speed.
5. Taxiing in strong surface winds.
6. Flaps operation/systems.
7. Landing gear operation/systems.
8. Controllable pitch propellers—operation/systems.
9. Supercharged engine operation.

SAMPLE WRITTEN TEST

The following test items are included only for the purpose of acquainting you with the format used in the construction of FAA written tests. *KEEP IN MIND THAT THESE SAMPLE ITEMS DO NOT INCLUDE ALL OF THE TOPICS ON WHICH YOU WILL BE TESTED.* For this reason you should concentrate on the section entitled "Study Outline." A KNOWLEDGE OF THE TOPICS MENTIONED IN THIS OUTLINE—NOT JUST THE MASTERY OF THE SAMPLE ITEMS—SHOULD BE USED AS THE CRITERION FOR DETERMINING THAT YOU ARE PROPERLY PREPARED TO TAKE THE FAA WRITTEN TEST.

The correct responses to the sample test items, with explanations are given at the end of the test.

The appendix contains the supplementary materials which will be required from time to time during this test. These materials include aircraft description and performance data, diagrams, charts, and illustrations.

The airplane you are assumed to be flying is a Condor 410, which is a late model, four-place, single-engine airplane. It is equipped with wing flaps, retractable landing gear, and a constant-speed propeller.

NOTE: All test items pertaining to the Federal Aviation Regulations are based on those regulations which were in effect as of January 1, 1974.

* * * * *

1. Assume your second-class medical certificate was issued to you on January 1, 1974. With regard to carrying passengers for hire, your medical certificate is valid until the end of—

   1—January 1975.
   2—December 1975.
   3—January 1976.
   4—December 1976.

2. You decide to cruise with a power setting of 2,200 RPM and 21" Hg, producing 55% BHP (brake horsepower). Using the Cruise Performance Chart for 5,000 feet (Figure 32) you determine that your true airspeed and rate of fuel consumption will be approximately—

1—172 MPH and 11.7 GPH.
2—165 MPH and 10.4 GPH.
3—163 MPH and 6.3 GPH.
4—158 MPH and 10.0 GPH.

3. In order to achieve a true airspeed of 176 MPH at 6,000 feet, with the outside air temperature reported as −8° C., your indicated airspeed should be approximately—

1—164 MPH.
2—159 MPH.
3—178 MPH.
4—152 MPH.

NOTE: Assume the indicated altitude to be the same as pressure altitude.

4. Assume that you plan to take off from an airport where the pressure altitude is currently 5,000 feet, the wind is calm, and the airplane is loaded to maximum allowable gross weight. Using the Takeoff Data Chart in Figure 26, determine the increase in takeoff distance required to clear a 50-foot obstacle when the temperature is 96° F. over that for a similar condition when the temperature is 41° F.

1—205 feet.
2—368 feet.
3—405 feet.
4—791 feet.

5. Refer to the Climb Data Chart, Figure 27, to determine the best indicated airspeed for climb at 5,000 feet (assume standard temperature) for the Condor 410 at a gross weight of 2,800 pounds. By interpolation, you determine the best climb airspeed and resulting rate of climb to be—

1—102 MPH and 1,405 feet per minute.
2—99 MPH and 1,095 feet per minute.
3—101 MPH and 908 feet per minute.
4—97 MPH and 1,210 feet per minute.

6. The primary purpose of the elevator trim tab is to—

1—increase longitudinal stability.
2—reduce control pressures while changing the airplane's pitch attitude.
3—keep the elevator streamlined.
4—relieve elevator control pressures.

7. Of the following airspeed symbols, which one would the pilot be unable to identify by the color coding on the airspeed indicator?

1—V_{SO}.
2—V_{NE}.
3—V_A.
4—V_{FE}.

8. Determine the center-of-gravity in inches aft of datum with the airplane loaded as shown below.

Item	*Weight (lbs.)*	*ARM (in.)*	*Moment (in./lbs.)*
Empty weight	1,320	12.8	16,896.0
Oil (9 qts.)	17	−49.0	−833.0
Pilot (1) front	170	16.0	2,720.0
Passenger (1) rear	170	48.0	8,160.0
Passenger (1) front	170	16.0	2,720.0
Fuel (50 gal.)	300	22.0	?
Baggage	125	75.5	?
Total weight	2,272		?

The CG in inches aft of datum would be—

1—19.70.
2—20.11.
3—20.53.
4—25.43.

9. Assume that the runways at the airport where you plan to land have special markings as shown in Figure 4. Which of the following is a true statement in regard to operating at this airport?

1—Runway 3 and 9 are closed for landings.
2—Runway 3 has a jet overrun at the upwind end of the runway.
3—Takeoffs are not permitted using the full length of Runway 9 because of the displaced threshold.
4—Touchdowns may be made at the beginning of the hard surface on Runway 27.

10. Federal Aviation Regulations require the pilot to adjust his altimeter to 29.92" Hg at and above what altitude?

1—12,000 feet MSL.
2—14,500 feet MSL.
3—18,000 feet MSL.
4—24,000 feet MSL.

EXPLANATIONS OF THE SAMPLE TEST QUESTIONS

NOTE: We wish to re-emphasize that a good performance on this sample test should not be interpreted to mean that you have satisfied the knowledge requirements for the issuance of a Commercial Pilot Certificate. This test is merely to acquaint you with the types of test items in the official written test and to assist you in preparing for that test.

1. **(1)** FAR 61.23 prescribes that for operations requiring a Commercial Pilot Certificate, a Second-Class Medical Certificate expires at the end of the last day of the 12th month after the month in which it was issued. The 12th month after January 1974, is January 1975. Therefore, the medical certificate expires as a *valid* Second-Class Medical Certificate at the end of January 1975, as correctly indicated only in response number 1.

2. **(2)** The Cruise Performance Chart for 5,000 feet shows the power setting of 2,200 RPM at 21" Hg and 55% BHP results in a TAS of 165 MPH while using 10.4 GPH of gasoline—as indicated in the correct answer, response 2. Response 1 is incorrect because it concerns using 23" Hg and 62% BHP. Response 3 lists the figures for 2,100 RPM, 53% BHP, and the 6.3 GPH from the endurance column. Response 4 is wrong because it lists data from the 2,500-foot chart.

3. **(1)** The explanation presented herein is pertinent to the type of computers having a typical True Airspeed Computation scale and may differ slightly from methods used in various other computers. However, the fundamental solutions are similar. On the Airspeed Computation scale set the outside air temperature at −8° C. opposite the 6,000-foot pressure altitude. Directly below 176 MPH TAS on the True Airspeed Scale, read the indicated airspeed of 164 MPH on the Indicated Airspeed Scale. The incorrect figures in responses 2, 3, and 4 may result if you do not make certain that the problem is set up on the Airspeed Computation scale of this computer; or if +8° C. is used instead of −8° C.; or if you read the indicated airspeed on the True Airspeed Scale instead of the Indicated Airspeed Scale.

4. **(2)** With a gross weight of 3,000 lbs., the distance required to clear a 50-foot obstacle on takeoff at 5,000 feet with zero wind and 41° F., according to the chart in Figure 26, is 1,675 feet. This distance will increase 10% for each 25° F. that the temperature is above the standard 5,000-foot temperature (41° F.). Since the temperature is 96° F., we have an increase of 55° (96−41=55). This means that we will have an increase of 22% in takeoff distance. Twenty-two percent of 1,675 feet is 368 feet. Therefore, only response number 2 is correct.

5. **(2)** The Climb Data Chart (Figure 27) lists data for aircraft with gross weight of 2,600 and 3,000 lbs. The gross weight of 2,800 lbs. falls midway between 2,600 and 3,000 lbs. Therefore, for a gross weight of 2,800 lbs., it is necessary to interpolate. Under the 5,000-foot column of the Climb Data Chart, at a gross weight of 2,600 lbs., we find the best climb airspeed to be 97 MPH with a rate of climb of 1,210 FPM. At a gross weight of 3,000 lbs., the chart shows the best climb of 980 FPM with a best climb airspeed of 101 MPH. Therefore, midway between these figures, for a gross weight of 2,800 lbs., the best climb airspeed is 99 MPH and the rate of climb is 1,095 FPM—as listed in correct response 2. All other answers are incorrect.

6. **(4)** Aircraft control is composed of four components: (1) pitch control, (2) bank control, (3) power control, and (4) trim. Trim control is used to relieve any control pressures held after a desired attitude has been attained, hence response 2 is incorrect. Number 1 is incorrect because the elevator controls the aircraft about its pitch axes. Number 3 is also incorrect as the elevator may not be streamlined but offset to maintain a climb or descent. Number 4 is the only correct answer available. An improperly trimmed aircraft requires constant control pressures, produces tension, distracts your attention, and contributes to abrupt and erratic altitude control. The pressures you feel on the controls should be those you apply while controlling a planned change in aircraft attitude, not pressures held because you let the aircraft control you. The elevator trim should be used to relieve elevator control pressures. A change of power or airspeed requires a change of elevator trim.

7. **(3)** Number 3 is the correct answer. Maneuvering speed (V_A) is an important airspeed limitation and is not marked by color-coding on the airspeed indicator. Number 1, the Power-off stalling speed (V_{SO}), is an incorrect response

because it is marked by color-coding as are number 2 designated by the red line which is the never exceed speed (V_{NE}) and number 4, the maximum flap extended speed (V_{FE}) designated by the upper limits of the white arc.

8. (2) The moment for the fuel is 300×22.0 or 6,600.0. The moment for the baggage is 125×75.5 or 9,438.0, giving a total moment of 45,701.0. Dividing 2,272 into this, gives a CG of 20.11″ aft of datum. Therefore, number 2 is the only correct response. Fundamentally, the CG is the point at which all the weights of the aircraft can be considered to be concentrated. The average location of the weights can, therefore, be obtained by dividing the total moments (wt.×arm) by the total weight. The process then involves multiplying each measured weight by its arm to obtain a moment. Extra care must be taken in these types of weight calculations if one or more of the arms is located ahead of the datum. In this event, the algebraic sign of the arm and moment will be negative. It should be remembered that a positive number (the weight) times a negative number (the arm) results in a negative number (the moment). In all these mathematical operations, the significance of the algebraic (+or−) sign must be observed.

9. (4) The AIM contains information which deals with Airport, Air Navigation Lighting, and Marking Aids. Response 1 is incorrect because the "×" symbol does not appear on Runways 3 or 9. Response 2 is incorrect because there are no overrun markings on Runway 3. The displaced threshold on Runway 9 designates the beginning of that portion of the runway usable for landing, thus making response 3 incorrect, since the full length of Runway 9 is available for takeoff. Response 4 is correct since the markings on this runway are all-weather runway markings and both takeoffs and landings are permissible at the beginning of the hard surface of Runway 27.

10. (3) FAR Part 91 states, "Each person operating an aircraft shall maintain the cruising altitude or flight level of that aircraft, as the case may be, by reference to an altimeter that is set, when operating at or above 18,000 feet MSL to 29.92″ hg." Therefore, number 3 is the correct response.

ADDITIONAL QUESTIONS FOR STUDY

The following questions are offered for the sole purpose of creating student interest. Therefore, answers and explanations are not included. The applicant should be aware that these questions do not cover all those subjects found on the Commercial Pilot Airplane Written Tests.

1. FARs stipulate that certain recency of experience requirements are mandatory prior to conducting night operations with passengers aboard. What are these requirements?
2. What experience requirements are necessary regarding a commercial pilot acting as pilot-in-command of a high-performance airplane?
3. What are the recency of experience requirements regarding acting as pilot-in-command under IFR?
4. Will a lower than standard temperature have any effect on the altimeter? What?
5. What effect does high ambient temperature have on aircraft performance?
6. What is the difference between pressure altitude and density altitude?
7. What is the most serious type of aircraft structural icing?
8. What are wingtip vortices and how are they generated? What action can a pilot take to avoid wingtip vortices?
9. Do the FARs require that general aviation aircraft have oxygen aboard?
10. Name three types of oxygen breathing systems normally used.
11. How does a continuous flow system operate?
12. What is the difference between "hypoxia" and "hyperventilation?"
13. What indicated airspeed should be used for landing approaches where there is a high-density altitude?
14. What is the difference between calibrated airspeed and indicated airspeed?
15. What is the relationship between the colored arcs on the airspeed indicator and calibrated airspeed?
16. Does wind affect the airplane's airspeed?
17. Does wind affect the airplane's groundspeed?
18. Does the Center of Gravity location (weight distribution) affect stall speed?
19. What causes an airplane to stall?
20. Is it necessary for the airplane to have a relatively low airspeed for it to stall?

21. Do flaps affect stalling speed? How?
22. Does load factor affect stalling speed?
23. What are aircraft performance charts and where can they be found for a particular airplane?
24. What are the requirements for the notification and reporting of aircraft accidents?
25. Does fuel injection provide better fuel distribution? How?
26. What is detonation and preignition?
27. What is "Best Power" mixture?
28. At what fuel/air ratio do the highest cylinder temperatures occur?
29. What are the results of using an excessively rich mixture at high altitudes?
30. What is ground effect?
31. How does planform affect the stall pattern of an airplane wing?
32. What are the different types of flaps in use today? How do they affect lift, drag, and trim?
33. What is induced drag? Parasite drag? Profile drag?
34. What is the relationship between static and dynamic stability?

RECOMMENDED STUDY MATERIALS

The prospective Commercial Pilot will find the following list of publications useful in his preparation for the written test. In addition, there are many other excellent commercial training aids and other instructional materials which may be helpful.

Airman's Information Manual (AIM). This publication presents, in four parts, information necessary for the planning and conduct of flights in the U.S. National Airspace System. Besides providing frequently updated airport and navaid data, the AIM includes instructional and procedural information and is designed for use in the cockpit.

Each Part is available on a separate annual subscription to better serve the needs of the individual pilot:

Part 1. *Basic Flight Manual and ATC Procedures.* (Annual subscription: $7.00 for U.S., Canada, and Mexico, plus $1.75 for other foreign mailing. GPO.) Catalog No. TD 4.12:pt. 1/. Issued quarterly.

Part 2. *Airport Directory.* (Annual subscription: $7.00 foreign mailing—$1.75 additional. GPO.) Catalog No. TD 4.12:pt. 2/. Issued semi-annually.

Part 3. *Operational Data and Notices to Airmen.* (Annual subscription: $22.00, foreign mailing—$5.50 additional. GPO.) Catalog No. TD 4.12:pt. 3/. Issued every 56 days, supplemented by Part 3A *(Notices to Airmen)* issued every 14 days.

Part 4. *Graphic Notices and Supplemental Data.* (Annual subscription: $9.50 foreign mailing—$2.50 additional. GPO.) Catalog No. TD 4.12:pt. 4/. Issued quarterly.

Handbooks and Technical Manuals

Pilot's Handbook of Aeronautical Knowledge. AC 61-23A. ($5.30 GPO.) Catalog No. TD 4.408:P 64/97. This handbook contains essential, authoritative information used in training and guiding applicants for private pilot certification, flight instructors, and flying school staffs.

Aviation Weather. AC 00-6. ($4.00 GPO.) Catalog No. FAA 5.8/2:W 37. Provides information for pilots and other flight operations personnel whose interest in meteorology is primarily in its application to flying.

Flight Training Handbook. AC 61-21. ($2.10 GPO.) Catalog No. FAA 1.8:F 64/4. This text deals with certain basic flight information such as load factor principles, weight and balance, and related aerodynamic aspects of flight, as well as principles of safe flight. Thus it serves primarily as a text for student pilots, for pilots improving their qualifications, or preparing for additional ratings.

Pilot's Weight and Balance Handbook. AC 91-23. ($1.25 GPO.) Catalog No. TD 4.408:P 64/3. This handbook provides an easily understood text on aircraft weight and balance for pilots who need to appreciate the importance of weight and balance control for safety of flight. The text progresses from an explanation of basic fundamentals to the complete application of weight and balance principles in large aircraft operation.

Instrument Flying Handbook. AC 61-27B. ($3.35 GPO.) Catalog No. 4.8/:In 7/2/971. This handbook provides the pilot with basic information needed to acquire an FAA instrument rating. It is designed for the reader who holds at least a private pilot certificate and is knowledgeable in all areas covered in the "Pilot's Handbook of Aeronautical Knowledge."

Federal Aviation Regulations (FARs). The FAA is phasing out the volume system of publishing the FARs and has started re-issuing them in individual Parts. This conversion will take some time and the

public will be advised of the status of this program in AC 00–2, "Advisory Circular Checklist and Status of Federal Aviation Regulations." This checklist may be obtained free on request from:

U.S. Department of Transportation
Publications Section, TAD–443.1
Washington, D.C. 20590

National Transportation Safety Board, Part 430. This publication deals with procedures required in dealing with accidents and lost or overdue aircraft in the United States, its territories, and possessions. To obtain this publication free-of-charge, send request to:

National Transportation Safety Board
Attn: Publications Branch
Washington, D.C. 20591

Training Aids

VFR and IFR Exam-O-Grams. Brief, timely, and graphic articles developed and published on a continuing basis. They are nondirective in nature and are issued as an information service, particularly to individuals interested in airman written tests. They relate to concepts, practices, and procedures critical to aviation safety and assist in giving safety-oriented information to airman applicants and practicing airmen. Exam-O-Grams are available free of charge but are limited to a single set of VFR and/or IFR Exam-O-Grams per request. Requests for placement on the mailing list should be addressed to:

U.S. Department of Transportation
Federal Aviation Administration
Flight Standards Technical Division
Operations Branch, AAC–240
P.O. Box 25082
Oklahoma City, Oklahoma 73125

How To Obtain GPO Publications

Requests for FAA publications sold through the Superintendent of Documents should be submitted on an order form, if possible, and submitted to:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

A sample order form is included in the back of this Guide. In order to aid the processing of your order, the following suggestions are offered:

1. Place orders for subscription items and single sales items on separate requests.
2. Provide the exact title of the publication, the agency number, and the catalogue number, if given.
3. A check or money order—not cash—payable to Superintendent of Documents in the correct amount should accompany your order.
4. Enclose a self-addressed mailing label if you don't have an order blank.
5. Use GPO Bookstores.

In addition to the mail-order service provided by the Office of the Superintendent of Documents, several retail bookstores have been established throughout the country which constitute a part of the operations of the Superintendent of Documents. The public is encouraged to avail themselves of the services offered by these facilities as many of the more popular publications are stocked in these bookstores. These retail outlets are located at the following addresses:

Atlanta GPO Bookstore
Room 100 Federal Bldg.
275 Peachtree St., NE
Atlanta, Ga. 30303
Phone: 404–526–6947

Birmingham GPO Bookstore
Room 102A 2121 Bldg.
2121 Eighth Ave., N.
Birmingham, Ala. 35203
Phone: 205–325–6056

Boston GPO Bookstore
Room G25 John F. Kennedy Federal Bldg.
Sudbury St.
Boston, Mass. 02203
Phone: 617–223–6071

Canton GPO Bookstore
Federal Office Bldg.
201 Cleveland Ave.
Canton, Ohio 44702
Phone: 216–455–4354

Chicago GPO Bookstore
Room 1463—14th Floor
Everett McKinley Dirksen Bldg.
219 South Dearborn St.
Chicago, Ill. 60604
Phone: 312–353–5133

Cleveland GPO Bookstore
Room171 Federal Bldg.
1240 East 9th St.
Cleveland, Ohio 44199
Phone: 216–522–4934

Dallas GPO Bookstore
Room 1C46 Federal Bldg. – U.S. Courthouse
1100 Commerce St.
Dallas, Texas 75202
Phone: 214–749–1541

Denver GPO Bookstore
Room 1421
Federal Bldg. – U.S. Courthouse
1961 Stout St.
Denver, Co. 80202
Phone: 303–837–3965

Detroit GPO Bookstore
Room 229 Federal Office Bldg.
231 W. Lafayette Blvd.
Detroit, Mich. 48226
Phone: 313–226–7816

Kansas City GPO Bookstore
Room 144 Federal Office Bldg.
601 East 12th St.
Kansas City, Mo. 64106
Phone: 816–374–2160

Los Angeles GPO Bookstore
Room 1015 Federal Office Bldg.
300 North Los Angeles St.
Los Angeles, Ca. 90012
Phone: 213–688–5841

Milwaukee GPO Bookstore
Federal Bldg.
Room 190
517 E. Wisconsin Ave.
Milwaukee, Wisconsin 53202
Phone: 414–224–1300

New York GPO Bookstore
Room 1356
26 Federal Plaza
New York, N.Y. 10007
Phone: 212–264–3826

Philadelphia GPO Bookstore
Federal Office Bldg.
Room 1214
600 Arch St.
Philadelphia, Pa. 19106
Phone: 215–597–0677

San Francisco GPO Bookstore
Room 1023 Federal Office Bldg.
450 Golden Gate Ave.
San Francisco, Ca. 94102
Phone: 415–556–6657

Seattle GPO Bookstore
Federal Bldg.
Room 190
915 Second Ave.
Seattle, Wash. 98174
Phone: 206–442–4274

In addition, persons living within the metropolitan Washington, D.C., area may contact bookstores located at the following locations:

Government Printing Office Bookstore
710 North Capitol St.
Washington, D.C. 20402
Phone: 202–541–2091

Department of Commerce Bookstore
14th & Constitution Ave., NW
Washington, D.C. 20230
Phone: 202–967–3527

USIA Bookstore
1776 Pennsylvania Ave., NW
Washington, D.C. 20547
Phone: 202–632–9668

Department of State Bookstore
21st & C Sts. NW
Washington, D.C. 20520
Phone: 202–632–1437

Pentagon Bookstore
Main Concourse, south end
Washington, D.C. 20310
Phone: 202–541–2998

Forrestal Bookstore
Rm. 1–J–001
James H. Forrestal Bldg.
1000 Independence AVe., SW
Washington, D.C. 20407
Phone: 202–426–7937

APPENDIX

Figure

Miscellaneous Charts and Illustrations

1. Altimeter illustrations
2. Stall speed multiplier and load factor chart
3. Angle of bank vs. airspeed
4. Runway markings
5. Wake turbulence on final approach
6. Wind component chart
7. Stall speed chart
8. Airspeed correction table
9. Denalt computer
10. Pressure altitude and density chart

Aircraft Description and Performance Data

11. Pelican—airplane owner's handbook
12. Pelican—takeoff distance chart
13. Pelican—landing distance chart
14. Pelican—rate of climb chart
15. Pelican—TAS vs. standard altitude chart
16. Pelican—range vs. standard altitude chart
17. Pelican—power setting table
18. Bobwhite—loading graph
19. Bobwhite—normal takeoff chart
20. Bobwhite—performance data
21. Bobwhite—fuel consumption chart
22. Bobwhite—cruising operation
23. Bobwhite—cruising power settings
24. Bobwhite—normal landing chart
25. Condor—airplane owner's manual
26. Condor—takeoff data
27. Condor—climb data
28. Condor—landing distance
29. Condor—loading graph
30. Condor—center of gravity moment envelope
31. Condor—cruise performance (2,500′)
32. Condor—cruise performance (5,000′)
33. Condor—cruise performance (7,500′)
34. Condor—cruise performance (10,000′)
35. Aerodynamics—power and pitch attitude
36. Angle of Bank—rate of turn
37. TAS—Angle of Bank—rate of turn—load factor

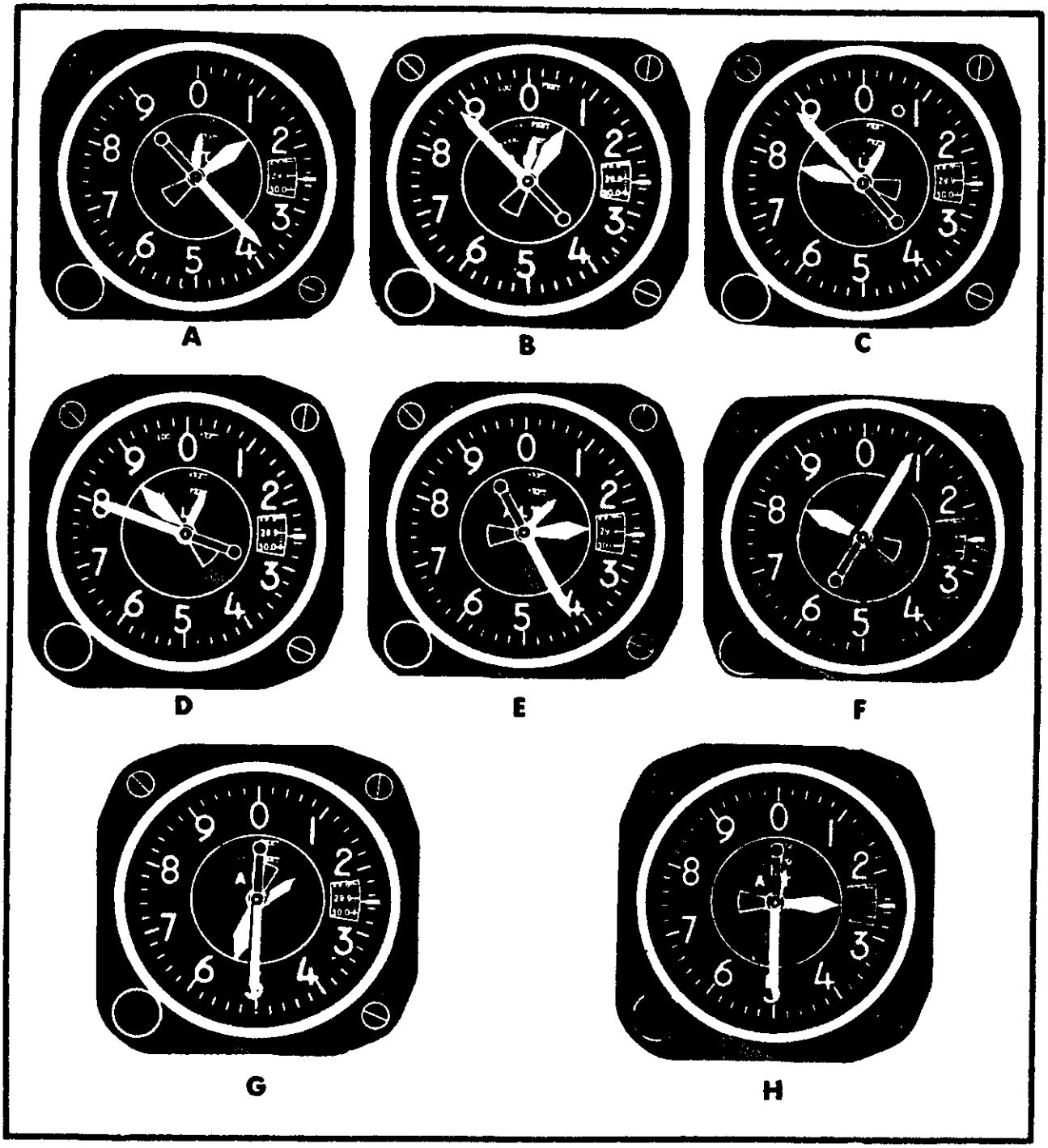


FIGURE 1. Altimeter Illustrations.

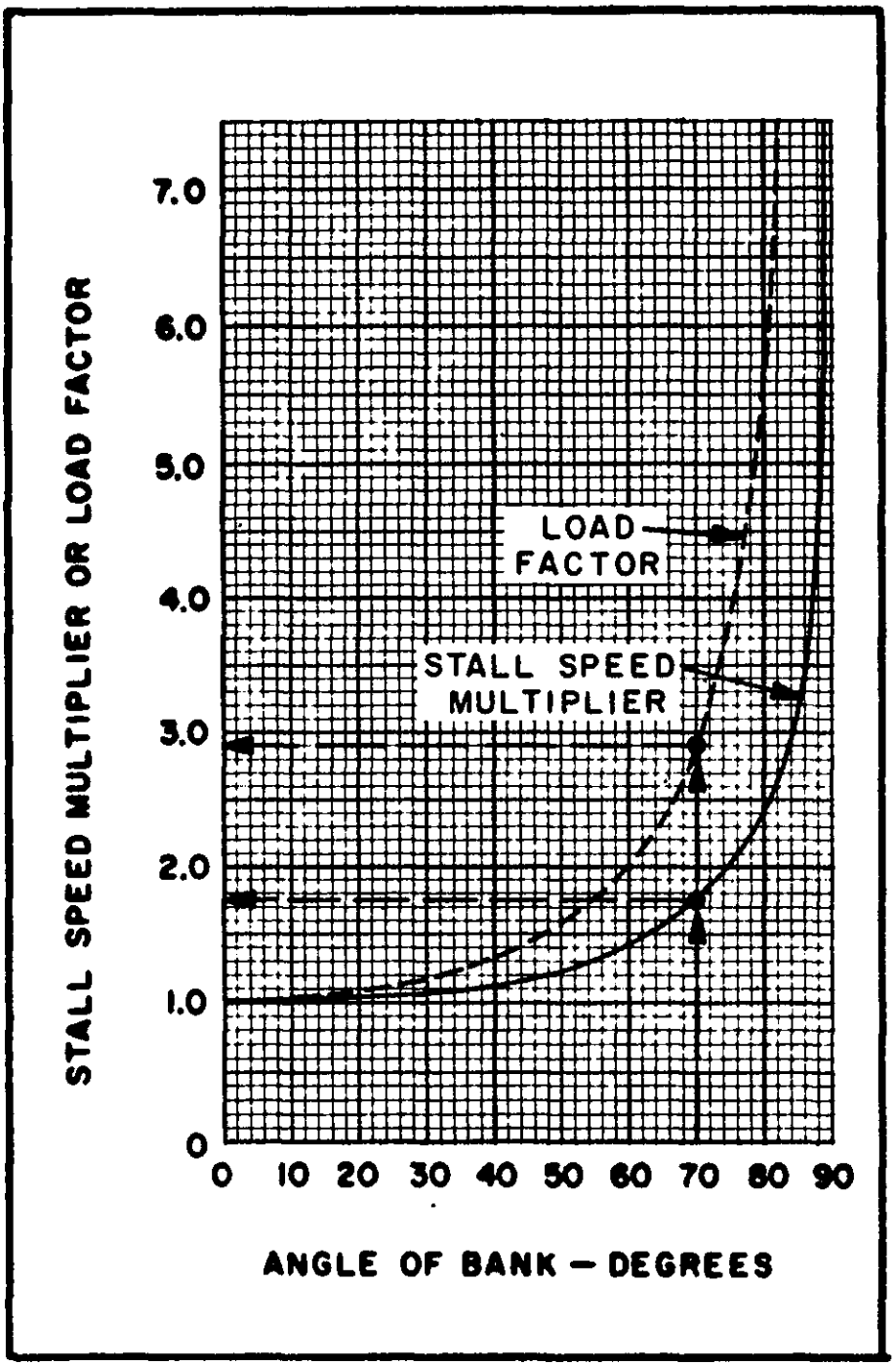


FIGURE 2. Stall Speed Multiplier and Load Factor Chart.

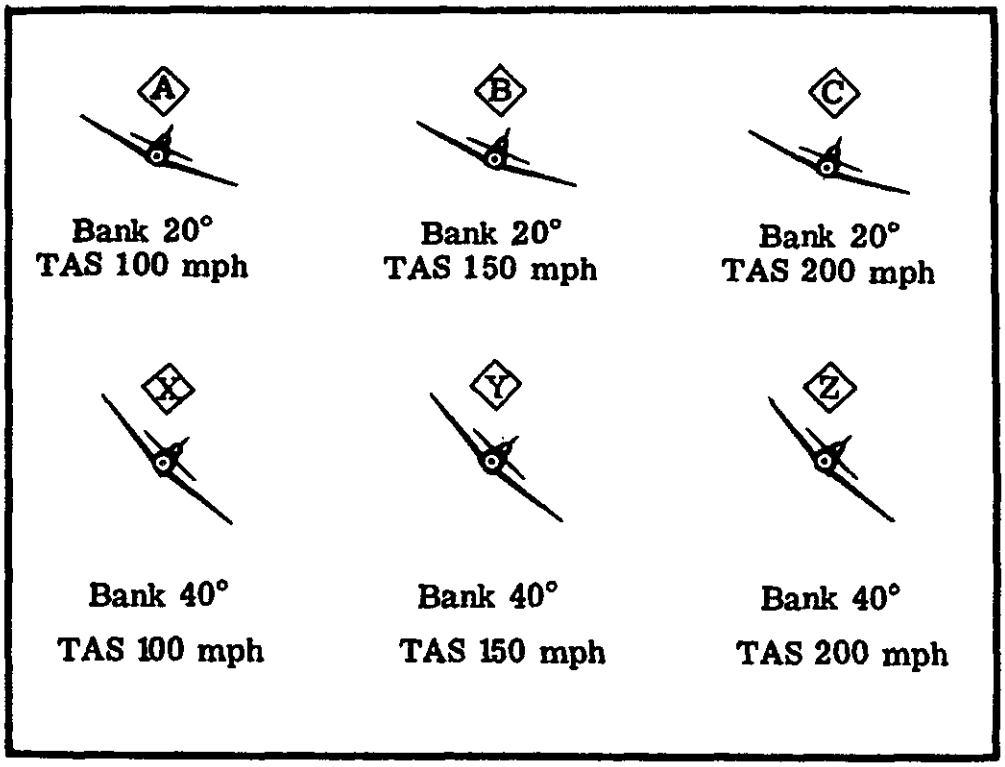


FIGURE 3. Angle of Bank vs. Airspeed.

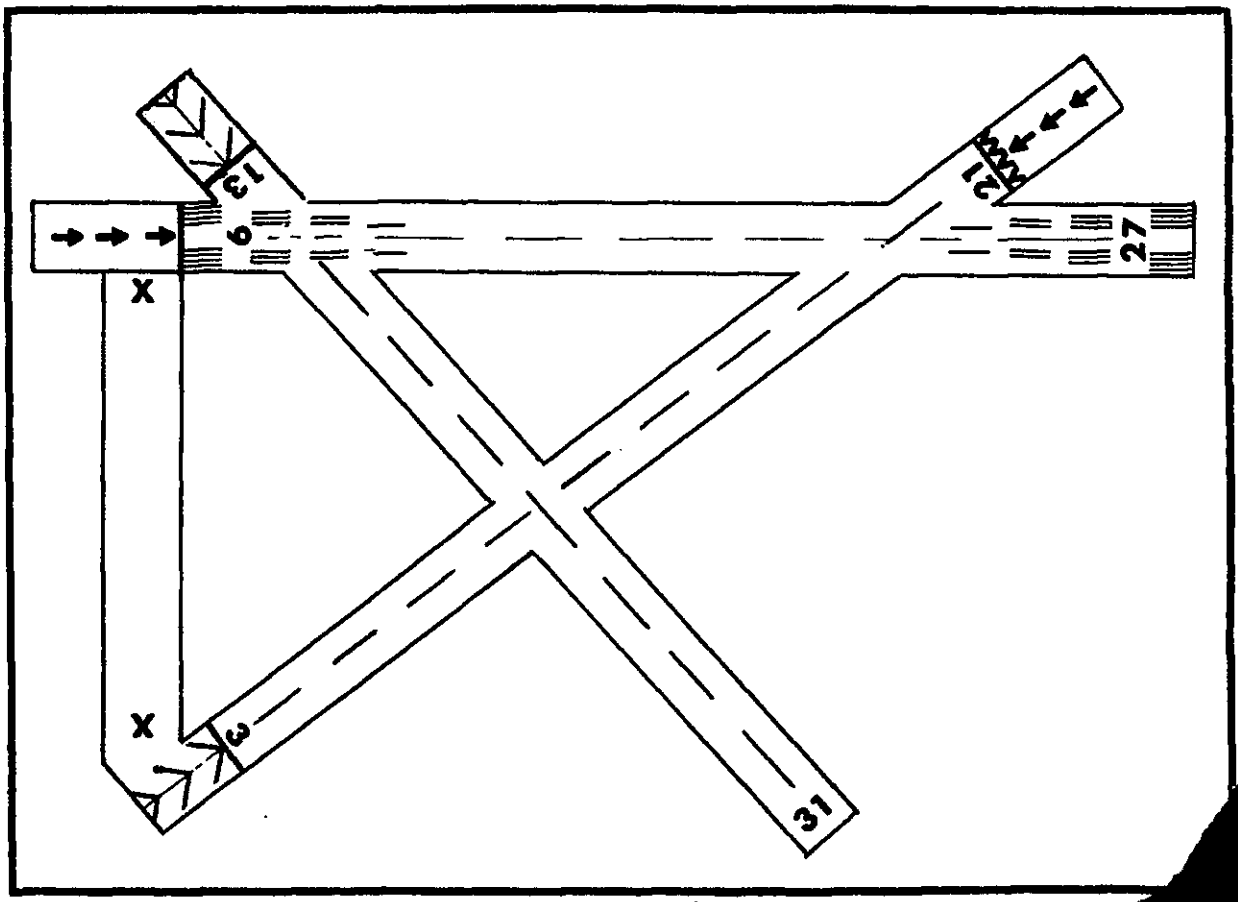


FIGURE 4. Runway Markings.

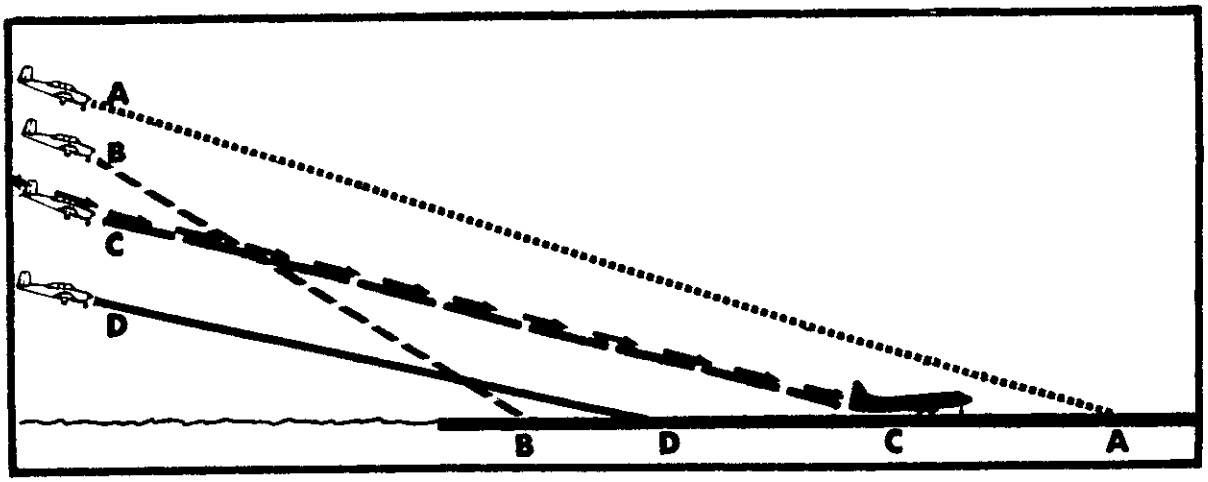


FIGURE 5. Wake Turbulence on Final Approach.

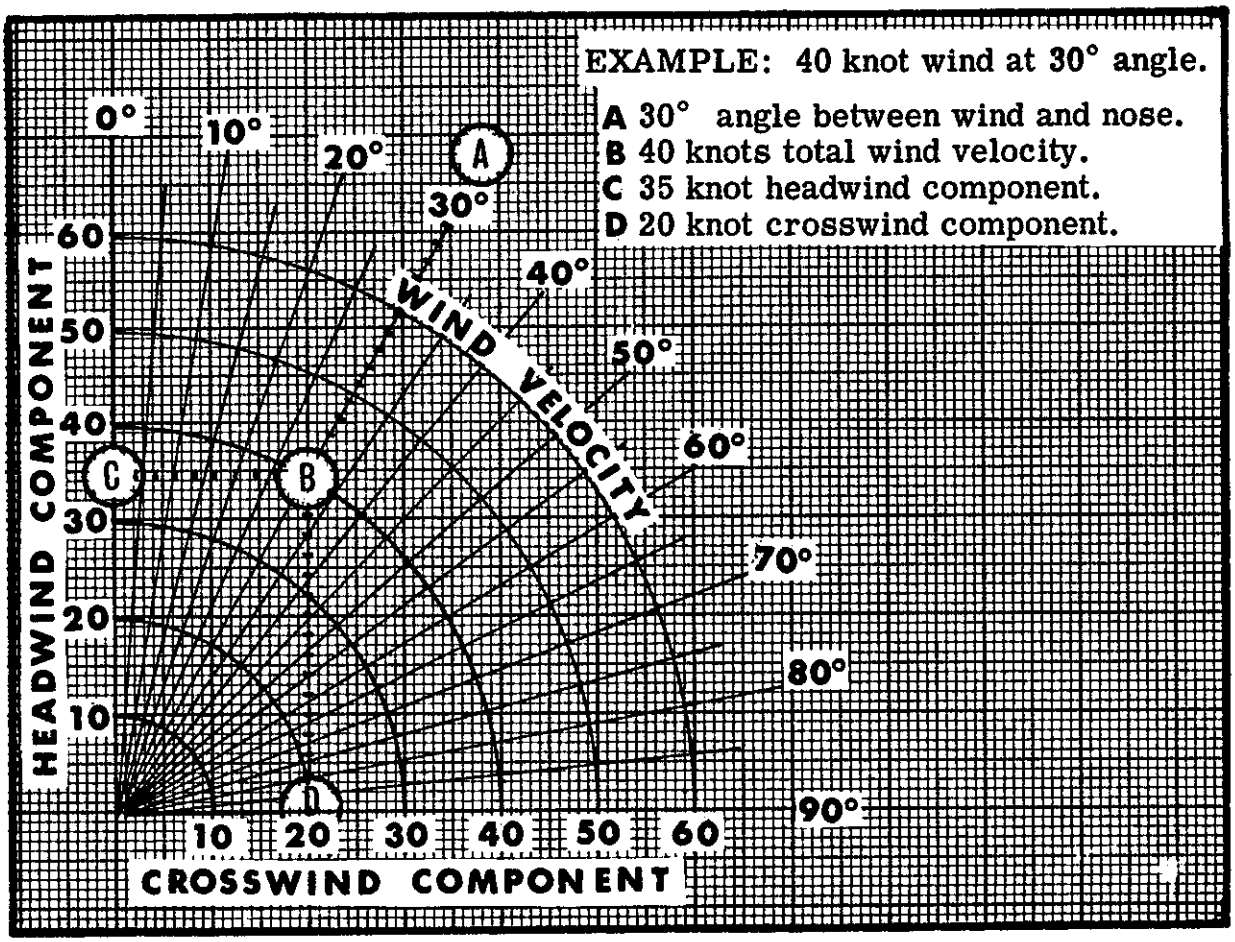


FIGURE 6. Wind Component Chart.

STALL SPEED, POWER OFF

Gross Weight 2900 lbs.	ANGLE OF BANK			
CONFIGURATION	0°	20°	40°	60°
GEAR & FLAPS UP	65	67	75	92
GEAR DOWN FLAPS 20°	60	62	68	84
GEAR DOWN FLAPS 40°	59	61	67	83

SPEEDS ARE MPH, CAS

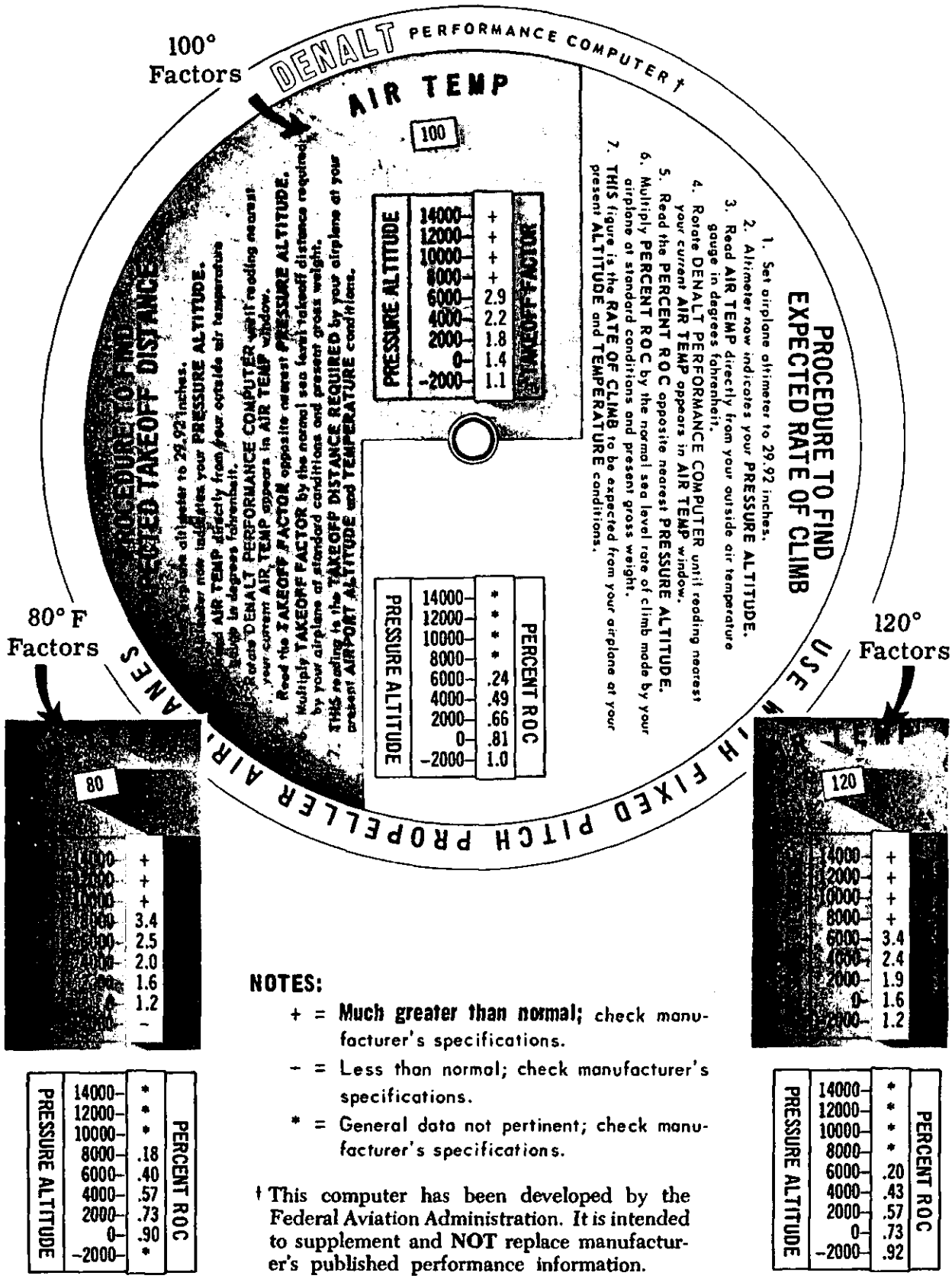
FIGURE 7. Stall Speed Chart.

AIRSPEED CORRECTION TABLE

FLAPS 0°								
IAS - MPH	60	80	100	120	140	160	180	200
CAS - MPH	69	82	100	119	139	160	181	202
***FLAPS 20°**								
IAS - MPH	40	50	60	70	80	90	100	110
CAS - MPH	57	62	68	75	84	93	102	112
***FLAPS 40°**								
IAS - MPH	40	50	60	70	80	90	100	110
CAS - MPH	57	62	68	75	83	92	102	111

*Maximum flap speed 120 MPH - CAS

FIGURE 8. Airspeed Correction Table.



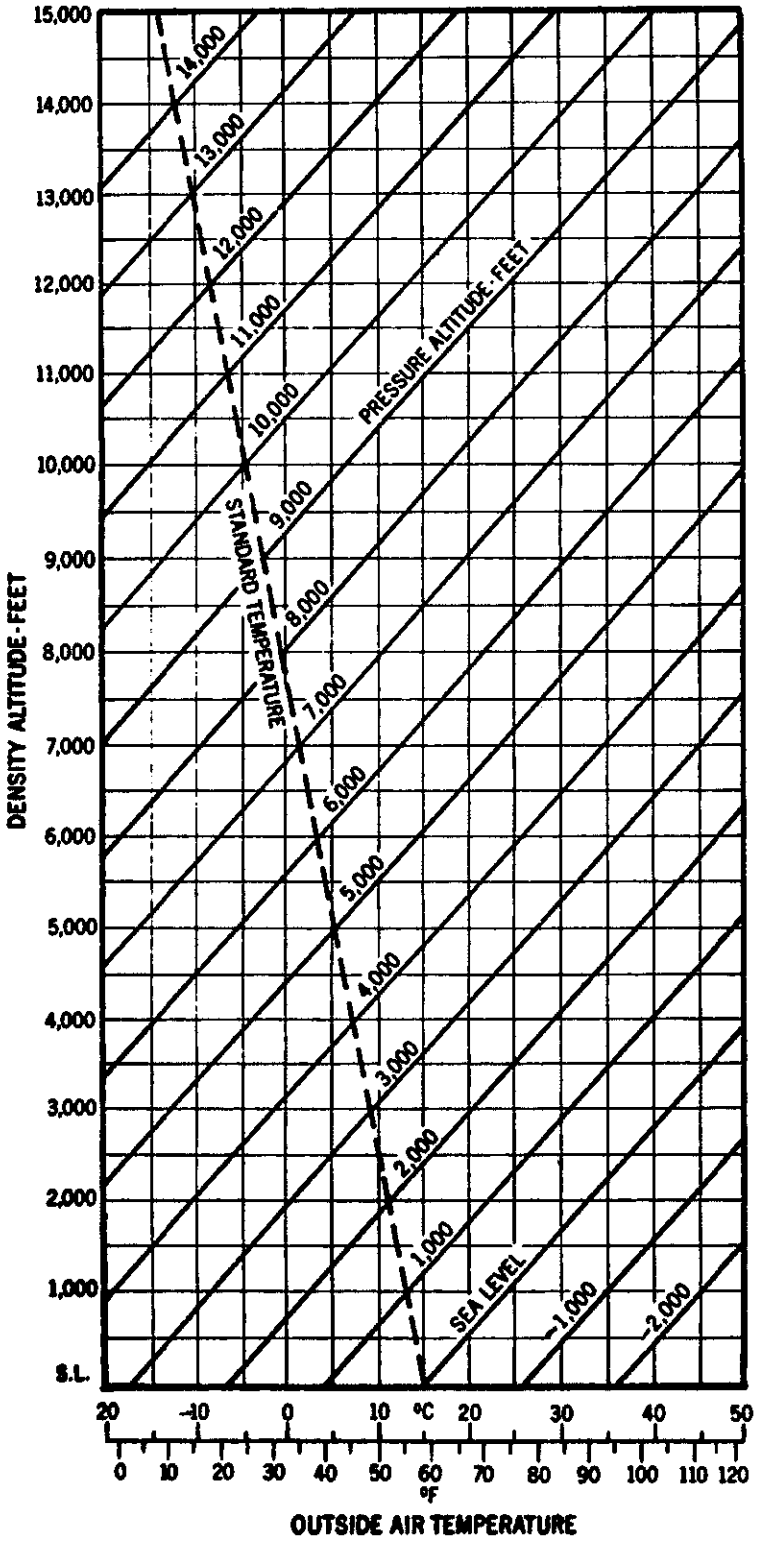
NOTES:

- \+ = **Much greater than normal;** check manufacturer's specifications.
- − = Less than normal; check manufacturer's specifications.
- * = General data not pertinent; check manufacturer's specifications.

† This computer has been developed by the Federal Aviation Administration. It is intended to supplement and NOT replace manufacturer's published performance information.

FIGURE 9. Denalt Computer.

PRESSURE ALTITUDE AND DENSITY CHART



Altitude Setting in Hg.	Altitude Addition For Obtaining Pressure Altitude
28.0	1,825
28.1	1,725
28.2	1,630
28.3	1,535
28.4	1,435
28.5	1,340
28.5	1,340
28.6	1,245
28.7	1,150
28.8	1,050
28.9	955
29.0	865
28.1	770
29.2	675
29.3	580
29.4	485
29.5	390
29.6	300
29.7	205
29.8	110
29.9	20
29.92	0
30.0	−75
30.1	−165
30.2	−225
30.3	−350
30.4	−440
30.5	−530
30.6	−620
30.7	−710
30.8	−805
30.9	−895
31.0	−965

FIGURE 10. Pressure Altitude and Density Chart.

PELICAN AIRCRAFT CORP.

AIRPLANE OWNERS HANDBOOK
(Excerpts)

AIRPLANE DESIGNATION:- Pelican 250.
ENGINE OPERATING LIMITATIONS:- 250 HP at 2575 RPM.
FUEL SYSTEM:- Float-type Carburetor.
Recommended Fuel 91/96 Minimum Grade.
Fuel Capacity Standard Tanks 60 gallons.
Usable Fuel All Flight Conditions 56 gallons.
OIL CAPACITY:- 12 quarts.
PROPELLER:- Constant - speed Hydraulically Controlled.
LANDING GEAR:- Retractable Tricycle Landing Gear.
Electrically Operated.
Emergency Operation - Manual Lever to Extend Gear Only.
WING FLAPS:- Electrically Operated.
EMPTY WEIGHT:- 1,660 lbs.
MAXIMUM GROSS WEIGHT:- 2,900 lbs.
RADIO EQUIPMENT:-

1 VHF Communications Transceiver	118.0 to 135.95 MHz
1 VHF Localizer/VOR Receiver	108.0 to 117.9 MHz
1 ADF Receiver (fixed azimuth)	200 kHz to 1750 kHz

AIRSPEED LIMITATIONS:-

Never exceed speed	227 mph CAS
Maximum structural cruising speed	180 mph CAS
Maximum maneuvering speed	144 mph CAS
Maximum gear operating speed	150 mph CAS
Maximum gear extended speed	150 mph CAS
Maximum flaps extended speed	125 mph CAS

MAXIMUM ALLOWABLE WEIGHT IN BAGGAGE COMPARTMENT - 120 LBS.

FIGURE 11. Pelican – Airplane Owner's Handbook.

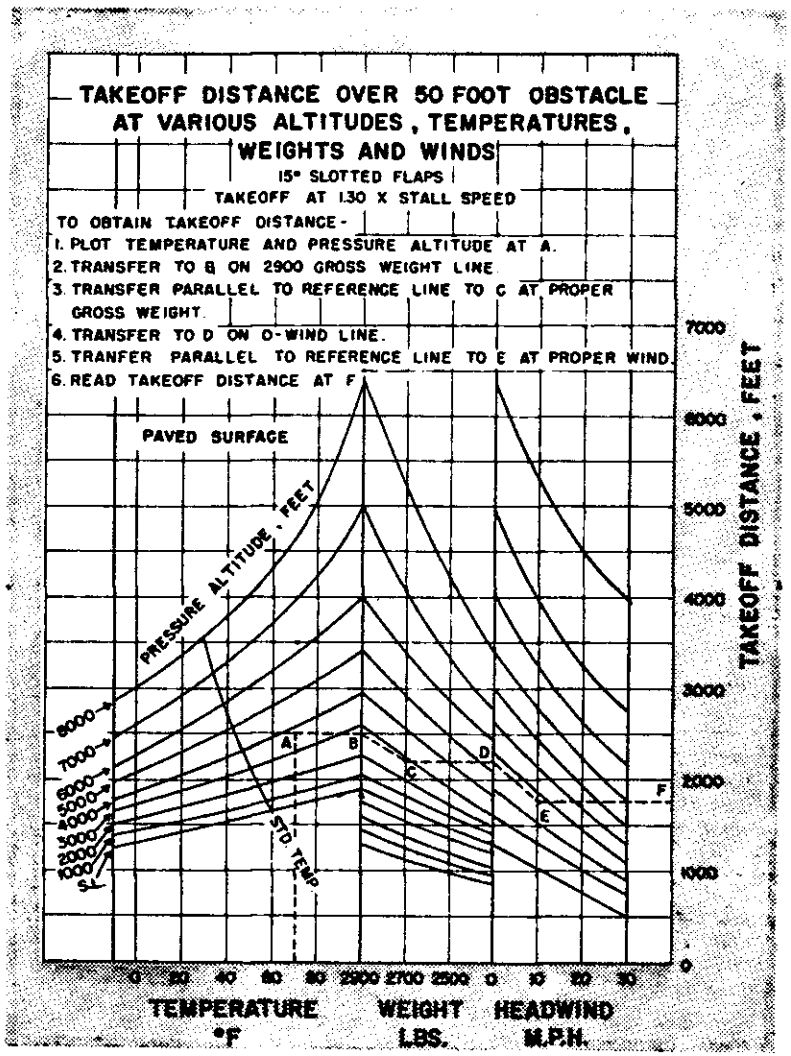


FIGURE 12. Pelican – Takeoff Distance Chart.

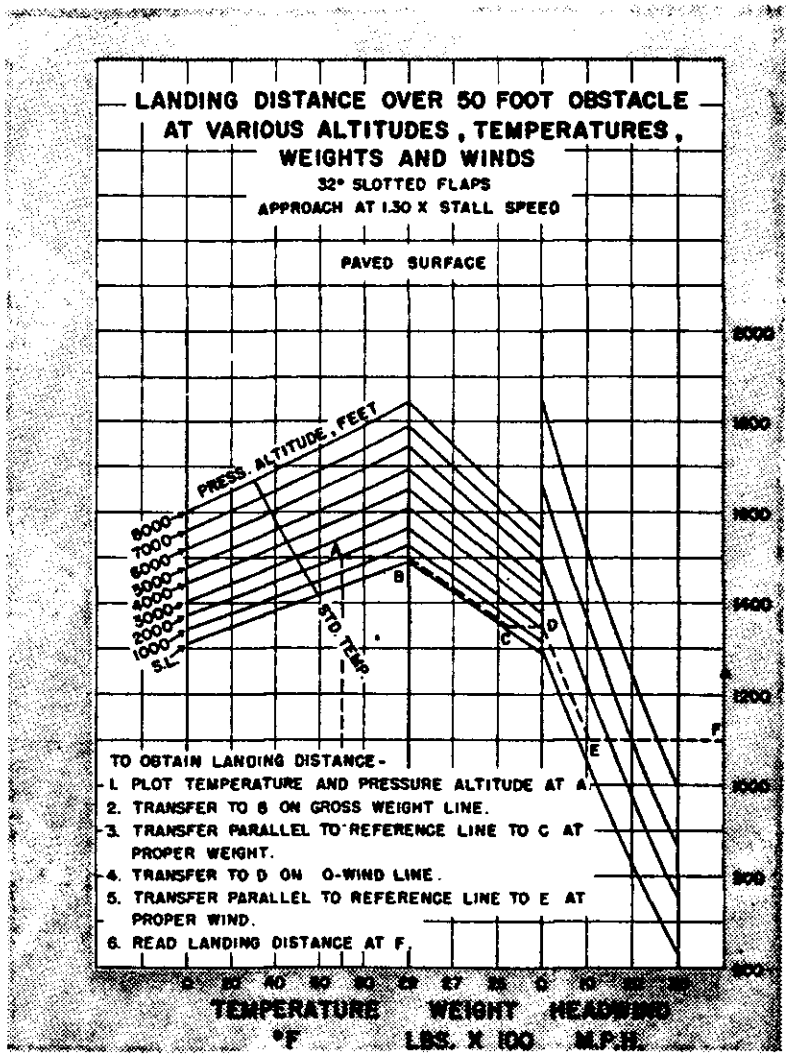


FIGURE 13. Pelican – Landing Distance Chart.

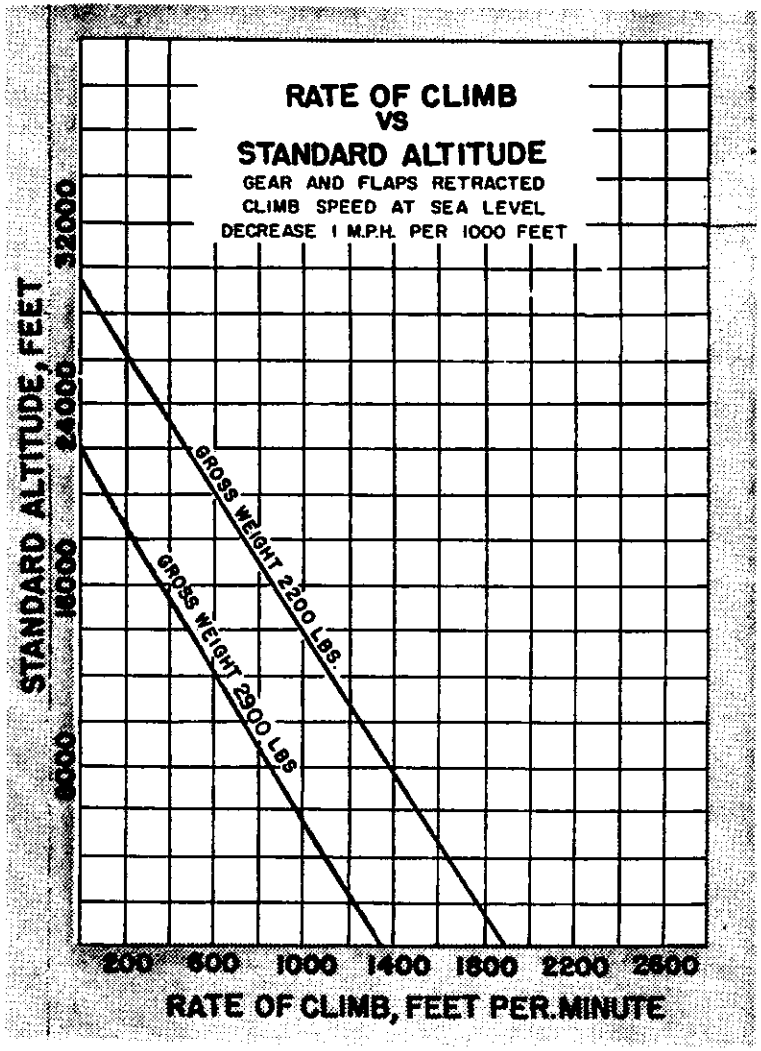


FIGURE 14. Pelican – Rate of Climb Chart.

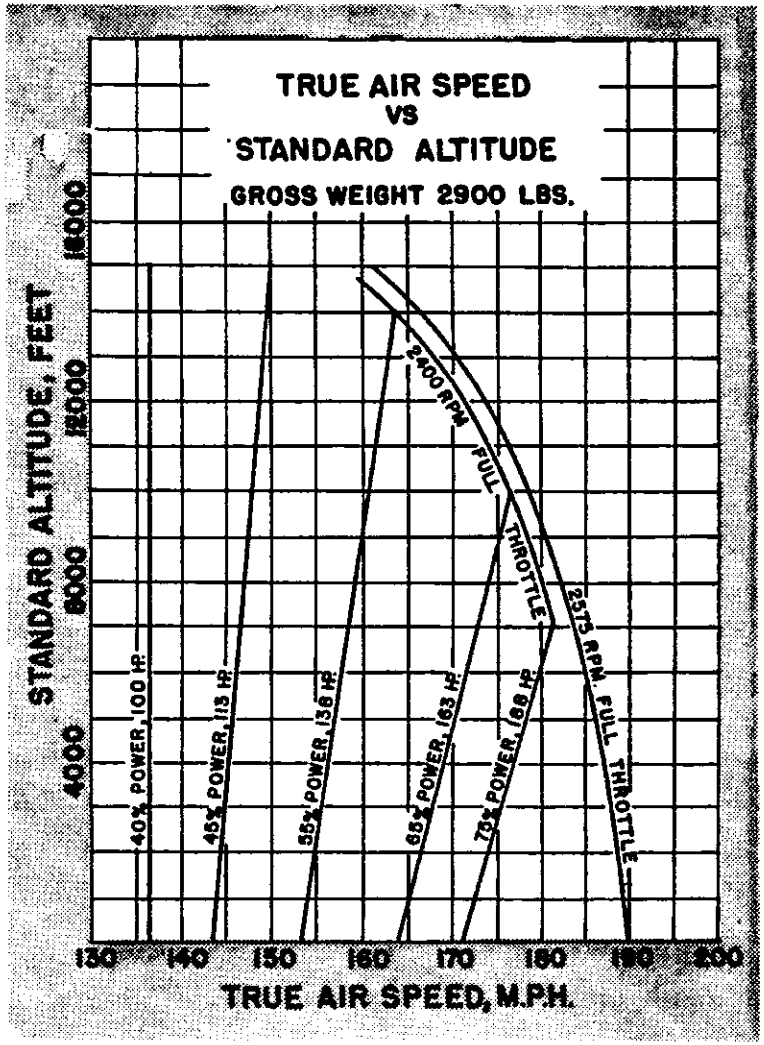


FIGURE 15. Pelican – TAS vs. Standard Altitude Chart.

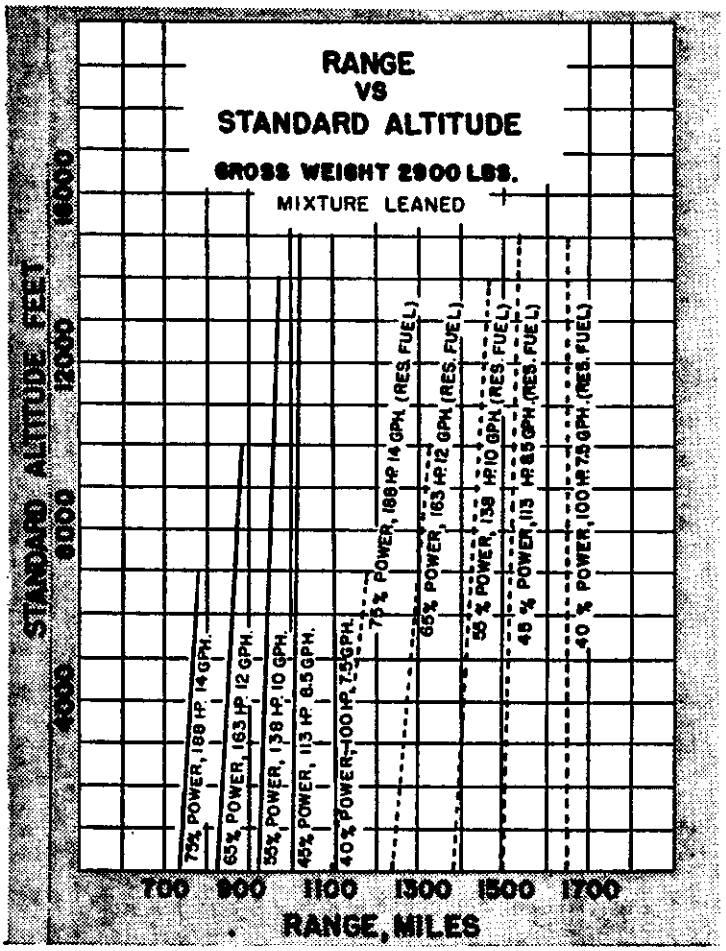


FIGURE 16. Pelican – Range vs. Standard Altitude Chart.

Power Setting Table – Model O-54 -A, 250 HP Engine

Press. Alt. 1000 Feet	Std. Alt. Temp. °F	138 HP – 55% Rated Approx. Fuel 10.3 Gal./Hr. RPM AND MAN. PRESS.				163 HP – 65% Rated Approx. Fuel 12.3 Gal./Hr. RPM AND MAN. PRESS.				188 HP – 75% Rated Approx. Fuel 14.0 Gal./Hr. RPM AND MAN. PRESS.		
		2100	2200	2300	2400	2100	2200	2300	2400	2200	2300	2400
SL	59	21.6	20.8	20.2	19.6	24.2	23.3	22.6	22.0	25.8	25.1	24.3
1	55	21.4	20.6	20.0	19.3	23.9	23.0	22.4	21.8	25.5	24.8	24.1
2	52	21.1	20.4	19.7	19.1	23.7	22.8	22.2	21.5	25.3	24.6	23.8
3	48	20.9	20.1	19.5	18.9	23.4	22.5	21.9	21.3	25.0	24.3	23.6
4	45	20.6	19.9	19.3	18.7	23.1	22.3	21.7	21.0	24.8	24.1	23.3
5	41	20.4	19.7	19.1	18.5	22.9	22.0	21.4	20.8	—	23.8	23.0
6	38	20.1	19.5	18.9	18.3	22.6	21.8	21.2	20.6	—	—	22.8
7	34	19.9	19.2	18.6	18.0	22.3	21.5	21.0	20.4	—	—	—
8	31	19.6	19.0	18.4	17.8	—	21.3	20.7	20.1			
9	27	19.4	18.8	18.2	17.6	—	—	20.5	19.9			
10	23	19.1	18.6	18.0	17.4	—	—	—	19.6			
11	19	18.9	18.3	17.8	17.2	—	—	—	—			
12	16	18.6	18.1	17.5	17.0	—	—	—	—			
13	12	—	17.9	17.3	16.8							
14	9	—	—	17.1	16.5							
15	5	—	—	—	16.3							

To maintain constant power, correct manifold pressure approximately 0.17" Hg for each 10° F. variation in carburetor air temperature from standard altitude temperature. Add manifold pressure for air temperatures above standard; subtract for temperatures below standard.

FIGURE 17. Pelican – Power Setting Table.

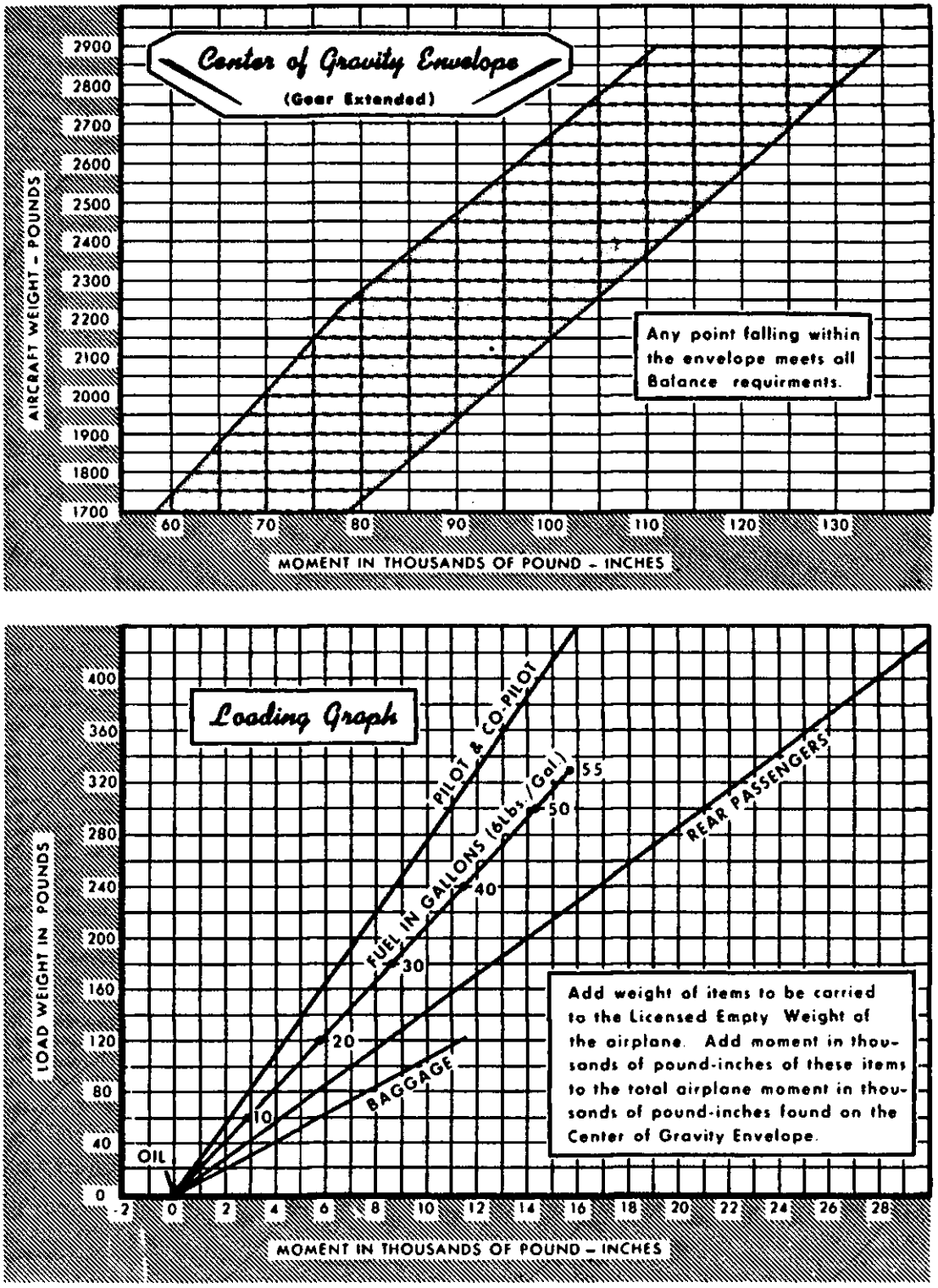


FIGURE 18. Bobwhite – Loading Graph.

NORMAL TAKE-OFF

TO CLEAR 50 FEET
ZERO WIND — GROSS WT. = 2900 LB.
PAVED LEVEL RUNWAY

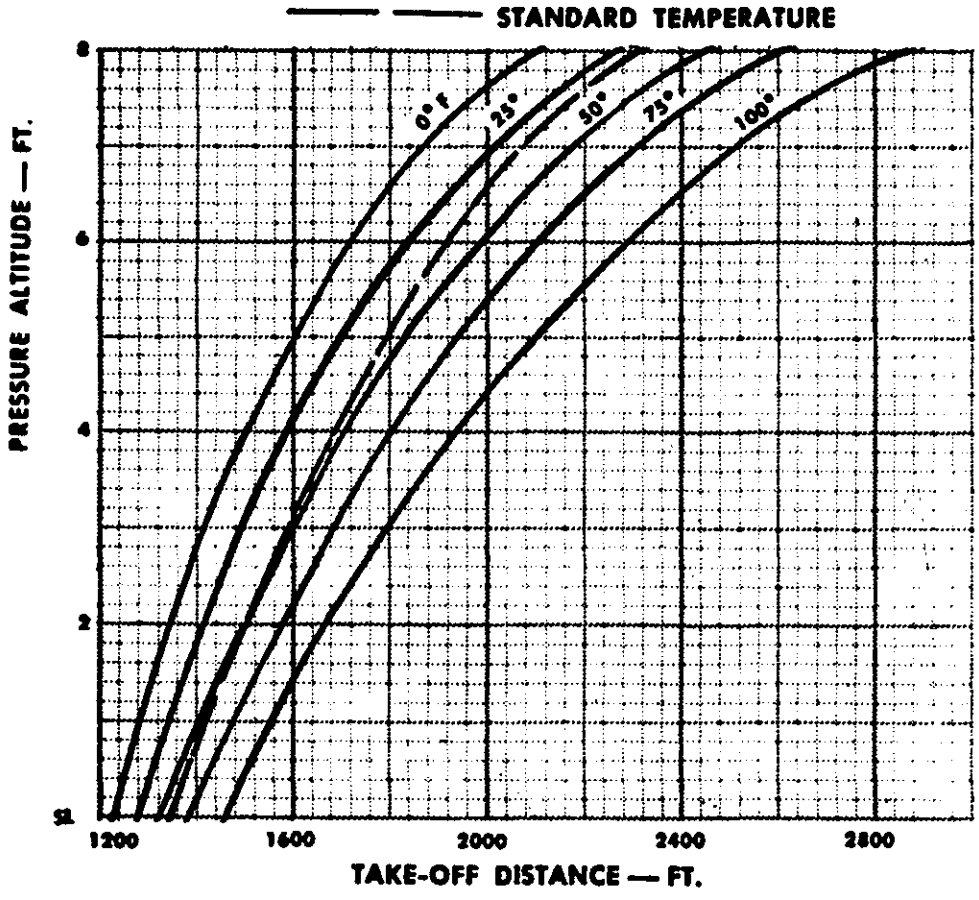


FIGURE 19. Bobwhite – Normal Takeoff Chart.

INSTRUCTIONS
FOR USE OF CRUISE PERFORMANCE DATA

NOTE: NO ALLOWANCES WERE MADE IN THE GRAPHS FOR RESERVES, NOR FOR VARIABLE FACTORS SUCH AS WINDS AND FUEL CONSUMED IN THE WARM-UP AND TAXIING; YOU MUST MAKE ALLOWANCES FOR THESE CONDITIONS AS THEY ACTUALLY EXIST, FROM ONE FLIGHT TO ANOTHER.

HORSEPOWER

TO DETERMINE THE HORSEPOWER BEING DEVELOPED, APPLY THE RPM AND MANIFOLD PRESSURE SETTINGS TO BE USED TO THE CRUISING HORSEPOWER CHART. NOTE THAT THE MANIFOLD PRESSURE REQUIRED TO OBTAIN A GIVEN HORSEPOWER WILL VARY WITH THE OUTSIDE AIR TEMPERATURE.

FUEL CONSUMPTION

TO DETERMINE THE RATE OF FUEL CONSUMPTION, APPLY THE HORSEPOWER BEING USED AND THE CRUISING ALTITUDE TO THE FUEL CONSUMPTION VS. HORSEPOWER CHART.

CRUISING AIRSPEED

TO DETERMINE THE CRUISING AIRSPEED THAT RESULTS FROM THE HORSEPOWER BEING USED, APPLY THE HORSEPOWER AND THE CRUISING ALTITUDE TO THE CRUISING OPERATION CHART.

DENSITY ALTITUDE

EXCEPT WHEN CONTRARY TO THE PROBLEM POSED IN SPECIFIC TEST ITEMS, CONSIDER INDICATED ALTITUDE, PRESSURE ALTITUDE, AND DENSITY ALTITUDE AS BEING IDENTICAL IN DETERMINING CRUISE CONTROL DATA FOR THE AIRPLANE.

FIGURE 20. Bobwhite – Performance Data.

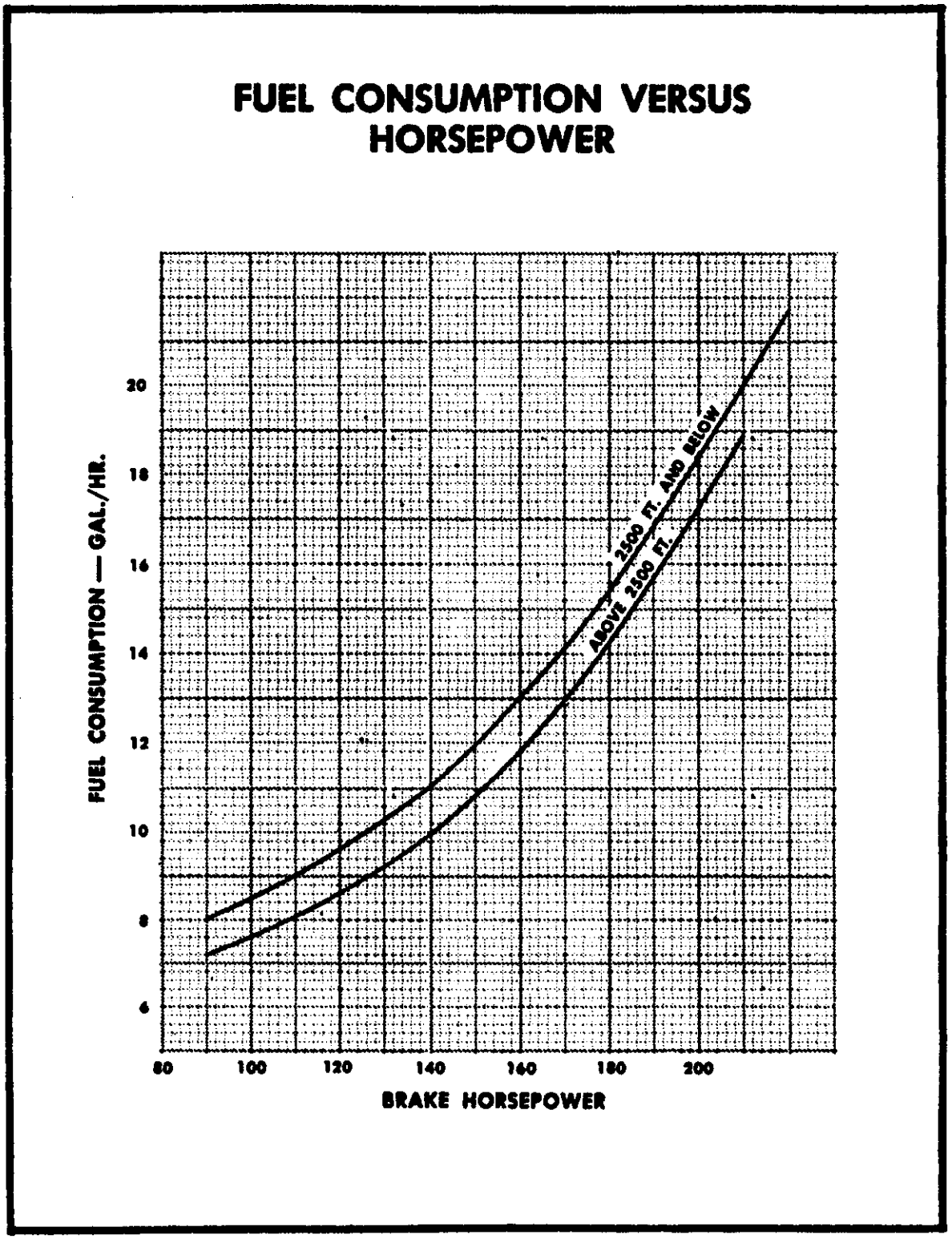


FIGURE 21. Bobwhite – Fuel Consumption Chart.

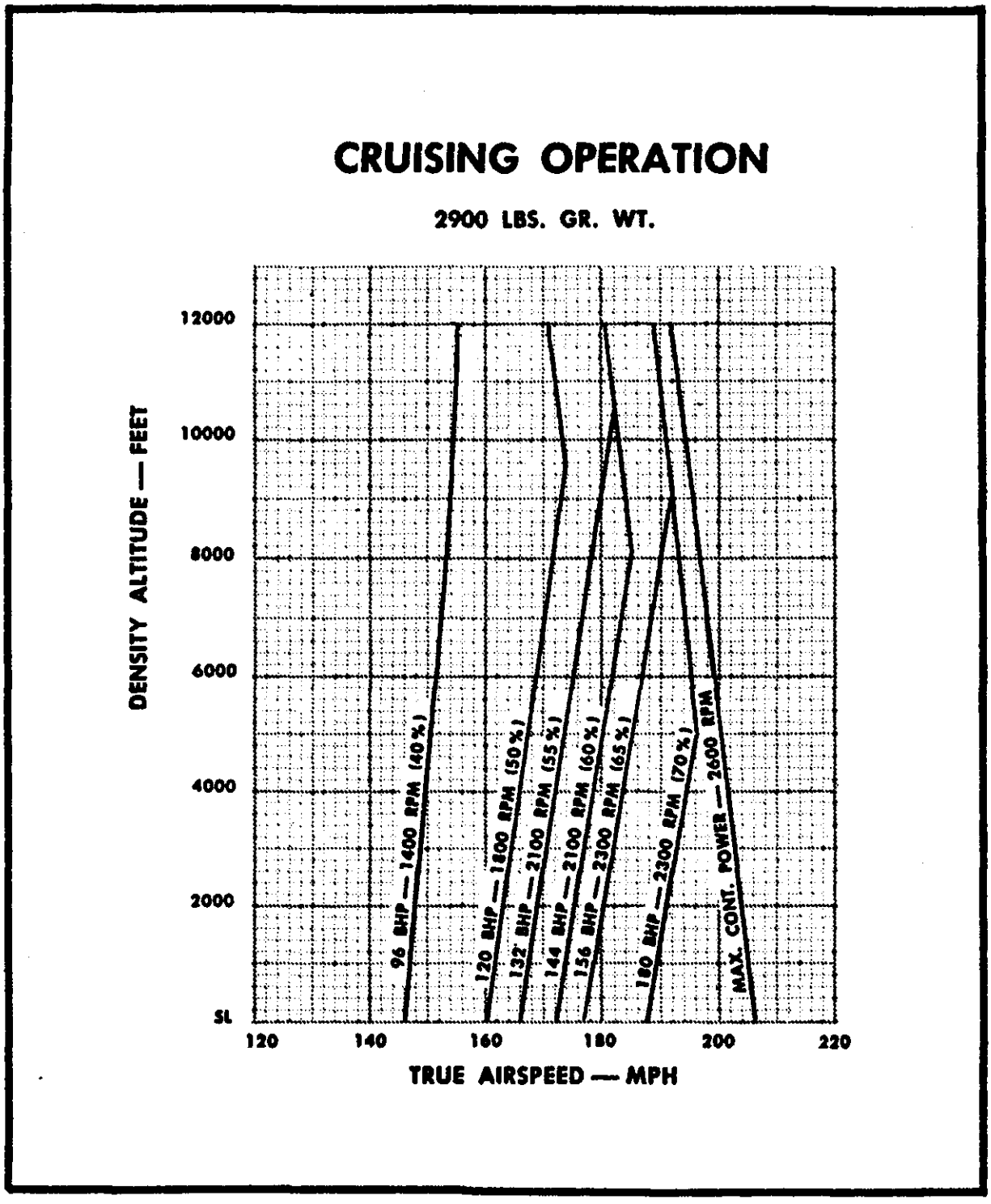


FIGURE 22. Bobwhite – Cruising Operation.

CRUISING POWER SETTINGS

SEA LEVEL			PRESSURE ALTITUDE		2000 FEET		
MP AT 2300 RPM	MP AT 2100 RPM	MP AT 1900 RPM	OAT °F	BHP	OAT °F	MP AT 2300 RPM	MP AT 2100 RPM	MP AT 1900 RPM
21.4	23.6	26.5		156		21.3	23.6	26.3
20.2	22.3	24.8	0	144	0	20.0	22.0	24.5
18.1	21.0	23.3		132		18.7	20.6	22.8
17.9	19.6	21.8		120		17.6	19.3	21.5
21.7	24.0	26.9		156		21.6	24.0	26.7
20.5	22.7	25.2	20	144	20	20.3	22.4	24.9
19.5	21.4	23.7		132		19.1	21.0	23.2
18.2	19.9	22.2		120		17.9	19.6	21.9
22.0	24.4	27.3		156		21.9	24.3	27.1
20.8	23.0	25.6	40	144	40	20.6	22.7	25.3
19.8	21.7	24.1		132		19.4	21.3	23.6
18.5	20.2	22.5		120		18.2	19.9	22.2
22.3	24.7	27.7		156		22.0	24.5	27.3
21.1	23.3	26.0	60	144	50	20.7	22.9	25.5
20.0	22.0	24.5		132		19.5	21.4	23.8
18.7	20.5	22.8		120		18.3	20.0	22.4
22.5	24.9	27.9		156		22.2	24.6	27.5
21.3	23.5	26.1	70	144	60	20.9	23.0	25.7
20.1	22.1	24.6		132		19.6	21.6	24.0
18.8	20.6	22.9		120		18.4	20.2	22.5
22.6	25.1	28.1		156		22.3	24.8	
21.3	23.6	26.3	80	144	70	21.0	23.2	25.8
20.2	22.2	24.8		132		19.7	21.7	24.1
18.9	20.7	23.0		120		18.5	20.3	22.6
22.8	25.2	28.3		156		22.5	25.0	
21.4	23.7	26.5	90	144	80	21.1	23.3	26.0
20.3	22.3	24.9		132		19.8	21.8	24.3
18.9	20.8	23.0		120		18.6	20.4	22.7
22.9	25.4	28.5		156		22.6	25.2	
21.5	23.8	26.6	100	144	90	21.2	23.4	26.2
20.3	22.3	25.1		132		19.9	21.9	24.4
19.0	20.9	23.1		120		18.6	20.5	22.7

4000 FEET					6000 FEET		
21.0	23.3			156	20.9	23.0	
19.8	21.8	24.3	0	144	19.6	21.6	
18.4	20.3	22.5		132	18.3	20.2	22.4
17.4	19.1	21.3		120	17.2	18.9	21.0
21.3	23.7			156	21.2	23.4	
20.1	22.2	24.7	20	144	19.9	22.0	
18.8	20.5	22.9		132	18.7	20.6	22.8
17.7	19.4	21.6		120	17.5	19.2	21.4
21.6	24.0			156	21.4	23.5	
20.4	22.5	25.2	40	144	20.1	22.1	
19.1	21.0	23.3		132	18.8	20.7	23.0
18.0	19.7	21.9		120	17.7	19.4	21.6
21.7	24.1			156	21.5	23.7	
20.5	22.6	25.3	50	144	20.2	22.3	
19.1	21.1	23.5		132	19.0	20.9	23.2
18.1	19.9	22.1		120	17.8	19.5	21.7
21.9	24.3			156	21.6		
20.7	22.8	25.5	60	144	20.3	22.5	
19.3	21.3	23.7		132	19.1	21.0	23.4
18.2	20.0	22.2		120	17.9	19.6	21.9
22.0	24.5			156	21.8		
20.8	23.0		70	144	20.5	22.6	
19.4	21.4	23.8		132	19.2	21.2	23.6
18.3	20.1	22.3		120	18.0	19.8	22.0
22.2	24.7			156	21.9		
20.9	23.1		80	144	20.6	22.8	
19.5	21.5	24.0		132	19.3	21.3	23.7
18.4	20.2	22.4		120	18.1	19.9	22.1
22.3	24.9			156	22.1		
21.0	23.2		90	144	20.7	22.9	
19.8	21.6	24.1		132	19.4	21.4	23.9
18.4	20.3	22.4		120	18.2	20.0	22.2

8000 FEET			PRESSURE ALTITUDE		10000 FEET		
MP AT 2300 RPM	MP AT 2100 RPM	MP AT 1900 RPM	OAT °F	BHP	OAT °F	MP AT 2300 RPM	MP AT 2100 RPM	MP AT 1900 RPM
20.7				156		20.5		
19.4	21.5		0	144	−10	19.1		
18.1	19.9			132		17.7	19.5	
16.9	18.7	20.7		120		16.6	18.2	20.2
21.0				156				
19.7	21.9		20	144	0	19.3		
18.5	20.3			132		17.9	19.7	
17.2	19.0	21.1		120		16.8	18.4	20.4
21.2				156				
19.9	22.0		30	144	10	19.6		
18.6	20.4			132		18.1	19.9	
17.4	19.2	21.3		120		16.9	18.6	20.6
21.3				156				
20.0			40	144	20	19.8		
18.8	20.6			132		18.3	20.1	
17.5	19.3	21.4		120		17.1	18.7	
21.4				156				
20.1			50	144	30	19.8		
18.9	20.7			132		18.4	20.2	
17.6	19.4	21.6		120		17.3	18.9	
21.6				156				
20.3			60	144	40	19.9		
19.0	20.9			132		18.6	20.4	
17.7	19.6	21.7		120		17.4	19.0	
21.7				156				
20.4			70	144	50	20.0		
19.1	21.0			132		18.7	20.5	
17.8	19.7	21.8		120		17.5	19.1	
21.9				156				
20.5			80	144	60	20.2		
19.2	21.1			132		18.8		
17.9	19.8	21.9		120		17.6	19.3	

12000 FEET				
18.9			−10	156
17.8				144
16.4	18.0			132
				120
19.1			0	156
17.8				144
16.6	18.2			132
				120
18.0			10	156
16.7	18.4			144
				132
				120
18.2			20	156
16.9	18.5			144
				132
				120
18.3			30	156
17.1	18.7			144
				132
				120
18.5			40	156
17.2	18.8			144
				132
				120
18.6			50	156
17.3	18.9			144
				132
				120
18.7			60	156
17.4	19.1			144
				132
				120

75 PERCENT POWER — 180 BHP — 2300 RPM

OAT	SEA LEVEL AT 2300 RPM	2000 FEET AT 2300 RPM	4000 FEET AT 2300 RPM
0	23.7	23.6	23.4
20	24.0	23.9	23.8
40	24.4	24.3	24.2
60	24.8	24.7	24.6
80	25.2	25.2	25.0
100	25.7	25.7	25.4

FIGURE 23. Bobwhite — Cruising Power Settings.

NORMAL LANDING

LANDING DISTANCE OVER 50 FT.
POWER OFF APPROACH
FLAPS — 30°, ZERO WIND
GROSS WEIGHT = 2900 LB.
PAVED LEVEL RUNWAY

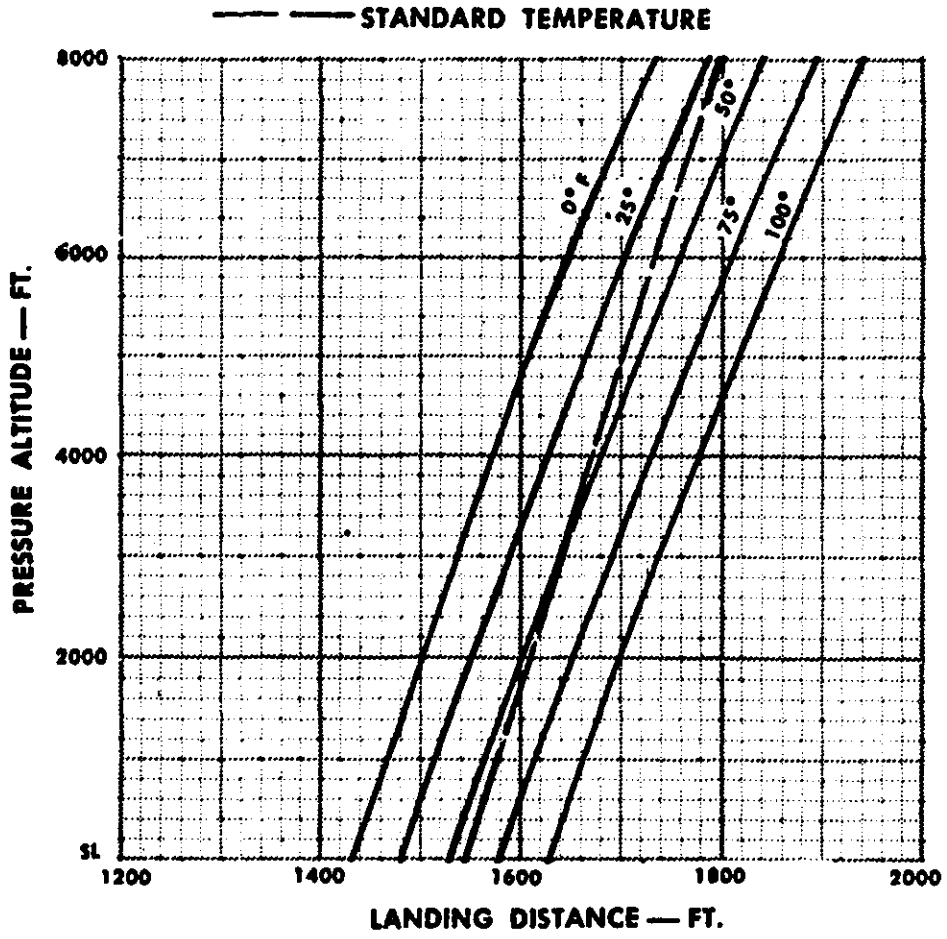


FIGURE 24. Bobwhite – Normal Landing Chart.

CONDOR AIRCRAFT CORP.

AIRPLANE OWNERS MANUAL
(Excerpts)

AIRCRAFT DESIGNATION:- Condor 410.
ENGINE OPERATION LIMITATIONS:- 260 HP at 2625 RPM.
FUEL SYSTEM:- Fuel injection System (Fuel discharged into combustion chamber)
Recommended Fuel 100/130 Minimum Grade.
Fuel Capacity Standard Tanks 65 gallons.
Usable Fuel All Flight Conditions 63.5 gallons.
OIL CAPACITY:- Total 12 quarts.
PROPELLER:- Constant-speed Hydraulically Controlled.
LANDING GEAR:- Retractable Tricycle Landing Gear.
Hydraulic Actuators Powered By Engine Driven Hydraulic Pump.
Emergency Operation:- Manual Hydraulic Pump.
WING FLAPS:- Hydraulically Operated; Powered By Engine Driven Hydraulic Pump.
EMPTY WEIGHT:- 1840 lbs. (moment 63.7)
MAXIMUM GROSS WEIGHT:- 3000 lbs.
LOAD FACTOR:-
Flaps Up + 3.8, -1.52
Flaps Dn. +3.5

RADIO EQUIPMENT:-

1 VHF Communications Transceiver	118.0 to 135.95 MHz
1 VHF Localizer/VOR Receiver	108.0 to 117.9 MHz
1 ADF Receiver (fixed azimuth)	200 kHz to 1750 kHz

AIRSPEED LIMITATIONS:-

Never exceed speed	225 mph CAS
Maximum structural cruising speed	190 mph CAS
Maximum maneuvering speed	132 mph CAS
Maximum gear operating speed	160 mph CAS
Maximum gear extended speed	160 mph CAS
Maximum flap extended speed	
Flaps 10°	160 mph CAS
Flaps 10° - 40°	110 mph CAS

MAXIMUM ALLOWABLE WEIGHT IN BAGGAGE COMPARTMENT - 120 LBS.

FIGURE 25. Condor – Airplane Owner's Manual.

TAKE-OFF DATA

TAKE-OFF DISTANCE WITH 20° FLAPS FROM HARD-SURFACED RUNWAY

GROSS WEIGHT LBS.	IAS AT 50 FT. MPH	HEAD WIND MPH	AT SEA LEVEL & 59°F		AT 2500 FEET & 50°F		AT 5000 FT. & 41°F		AT 7500 FT. & 32 F	
			GROUND RUN	TO CLEAR 50' OBSTACLE	GROUND RUN	TO CLEAR 50' OBSTACLE	GROUND RUN	TO CLEAR 50' OBSTACLE	GROUND RUN	TO CLEAR 50' OBSTACLE
2200	55	0	345	680	405	770	480	885	580	1040
		15	205	460	245	525	295	615	365	725
		30	100	275	120	320	155	380	195	460
2600	60	0	500	915	585	1045	705	1330	855	1470
		15	310	635	370	735	455	870	560	1055
		30	165	385	200	465	255	565	325	695
3000	64	0	695	1210	820	1405	990	1675	1205	2045
		15	450	855	535	1005	660	1215	815	1505
		30	250	555	310	665	390	820	500	1030

NOTE: INCREASE DISTANCES 10% FOR EACH 25°F ABOVE STANDARD TEMPERATURE FOR PARTICULAR ALTITUDE.

FIGURE 26. Condor – Takeoff Data.

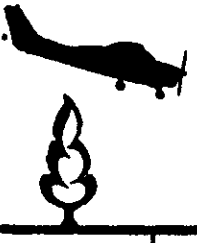
CLIMB DATA

GROSS WEIGHT LBS.	AT SEA LEVEL & 59°F			AT 5000 FT. & 41°F			AT 10000 FT. & 23°F			AT 15000 FT. & 5°F			AT 20000 FT. & -12°F		
	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	GAL. OF FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	FROM S.L. FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	FROM S.L. FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	FROM S.L. FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	FROM S.L. FUEL USED
2200	96	1900	2.0	92	1530	2.9	88	1150	3.9	83	780	5.1	78	410	6.8
2600	100	1540	2.0	97	1210	3.1	93	890	4.4	88	580	6.1	84	250	8.6
3000	105	1270	2.0	101	980	3.4	97	690	5.0	94	400	7.3	90	120	11.5

NOTE: FULL THROTTLE, 2625 RPM, MIXTURE AT RECOMMENDED LEANING SCHEDULE. FLAPS AND GEAR UP. FUEL USED INCLUDES WARM-UP AND TAKE-OFF ALLOWANCE.

FIGURE 27. Condor – Climb Data.

LANDING DISTANCE TABLE



GROSS WEIGHT LBS.	APPROACH IAS MPH	AT SEA LEVEL & 59°F		AT 2500 FT & 50°F		AT 5000 FT & 41°F		AT 7500 FT & 32°F	
		GROUND ROLL	TO CLEAR 50' OBSTACLE	GROUND ROLL	TO CLEAR 50' OBSTACLE	GROUND ROLL	TO CLEAR 50' OBSTACLE	GROUND ROLL	TO CLEAR 50' OBSTACLE
2200	61	355	845	385	980	415	1020	445	1060
2600	66	420	1030	455	1070	490	1110	530	1155
3000	71	485	1110	525	1150	565	1200	610	1255

NOTE: REDUCE LANDING DISTANCES 10% FOR EACH 6 MPH HEADWIND. FLAPS 40° AND POWER OFF.

FIGURE 28. Condor – Landing Distance.

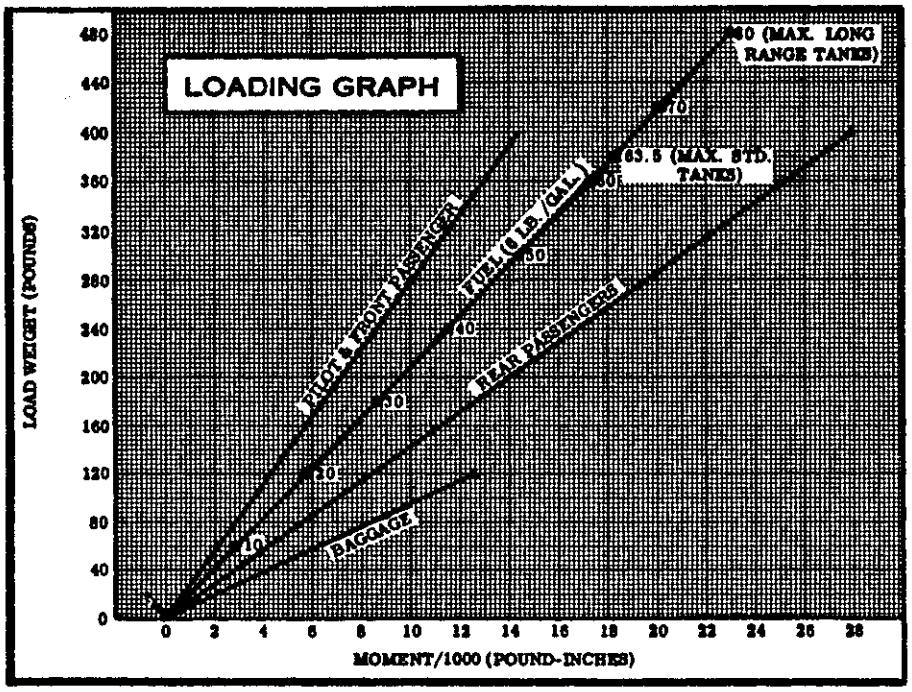


FIGURE 29. Condor – Loading Graph.

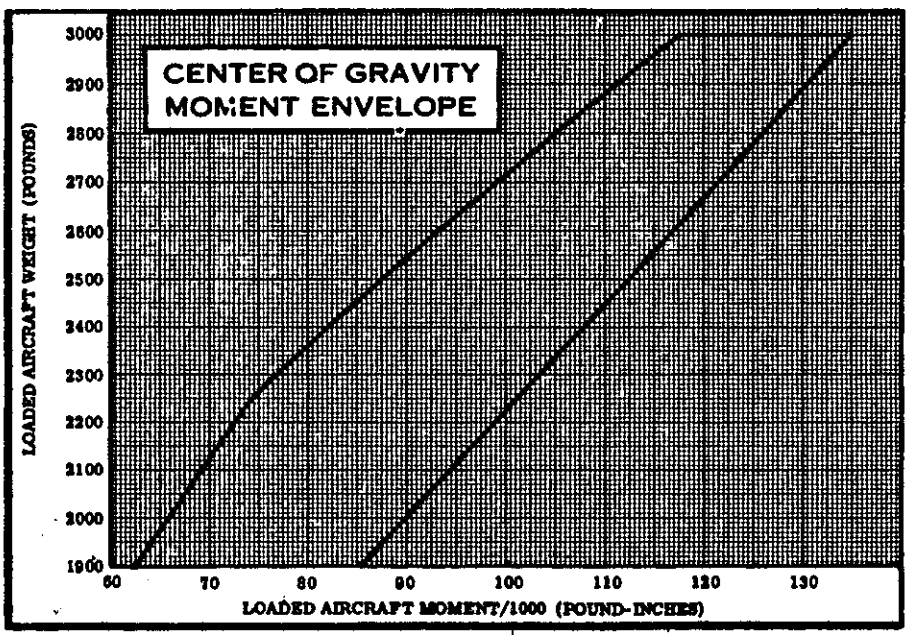


FIGURE 30. Condor – Center of Gravity Moment Envelope.

2500 CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Atmosphere • Zero Wind • Gross Weight - 3000 Pounds

2500 FEET

RPM	MP	% BHP	TAS MPH	Gal/ Hour	63.5 Gal. (No Reserve)		80 Gal. (No Reserve)	
					Endr. Hours	Range Miles	Endr. Hours	Range Miles
2450	24	76	180	14.3	4.4	800	5.6	1010
	23	71	177	13.4	4.7	835	6.0	1050
	22	67	173	12.7	5.0	865	6.3	1090
	21	63	169	11.9	5.3	900	6.7	1135
2300	24	68	174	12.8	4.9	860	6.2	1085
	23	64	170	12.1	5.2	890	6.6	1120
	22	61	166	11.4	5.6	925	7.0	1165
	21	57	163	10.8	5.9	960	7.4	1210
2200	23	60	166	11.3	5.6	930	7.1	1175
	22	56	162	10.7	6.0	965	7.5	1215
	21	53	158	10.0	6.3	1005	8.0	1265
	20	49	154	9.4	6.7	1035	8.5	1305
2100	22	52	157	9.9	6.4	1010	8.1	1275
	21	48	153	9.3	6.8	1045	8.6	1320
	20	45	148	8.7	7.3	1080	9.2	1360
	19	42	144	8.3	7.7	1105	9.7	1390
	18	39	139	7.8	8.1	1130	10.2	1420
	17	35	133	7.3	8.7	1150	10.9	1445
	16	32	126	6.9	9.2	1160	11.6	1460

FIGURE 31. Condor – Cruise Performance – (2,500').

CRUISE PERFORMANCE 5000

NORMAL LEAN MIXTURE

Standard Atmosphere • Zero Wind • Gross Weight - 3000 Pounds

5000 FEET

RPM	MP	% BHP	TAS MPH	Gal/ Hour	63.5 Gal. (No Reserve)		80 Gal. (No Reserve)	
					Endr. Hours	Range Miles	Endr. Hours	Range Miles
2450	24	79	187	14.8	4.3	800	5.4	1010
	23	74	183	14.0	4.5	830	5.7	1050
	22	70	179	13.1	4.8	870	6.1	1095
	21	65	175	12.3	5.2	905	6.5	1140
2300	24	71	180	13.3	4.8	860	6.0	1080
	23	67	177	12.6	5.0	890	6.4	1125
	22	63	173	11.8	5.4	925	6.8	1170
	21	59	169	11.1	5.7	965	7.2	1215
2200	23	62	172	11.7	5.4	935	6.8	1175
	22	58	168	11.0	5.8	970	7.2	1220
	21	55	165	10.4	6.1	1005	7.7	1265
	20	51	160	9.8	6.5	1040	8.2	1310
2100	22	53	163	10.1	6.3	1020	7.9	1290
	21	50	159	9.6	6.6	1055	8.4	1330
	20	46	154	9.0	7.1	1090	8.9	1370
	19	43	150	8.5	7.5	1115	9.4	1405
	18	40	145	8.1	7.9	1140	9.9	1435
	17	37	139	7.6	8.4	1160	10.6	1465
	16	34	132	7.1	8.9	1175	11.2	1480
	15	31	125	6.7	9.4	1180	11.9	1485

FIGURE 32. Condor – Cruise Performance – (5,000').

7500 CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Atmosphere • Zero Wind • Gross Weight-3000 Pounds

7500 FEET

RPM	MP	% BHP	TAS MPH	Gal/ Hour	63.5 Gal. (No Reserve) Endr. Hours	63.5 Gal. (No Reserve) Range Miles	80 Gal. (No Reserve) Endr. Hours	80 Gal. (No Reserve) Range Miles
2450	22	72	186	13.6	4.7	870	5.9	1095
	21	67	182	12.7	5.0	910	6.3	1145
	20	64	178	12.0	5.3	945	6.7	1190
	19	59	173	11.1	5.7	990	7.2	1245
2300	22	65	179	12.2	5.2	930	6.6	1175
	21	61	175	11.5	5.5	970	7.0	1220
	20	57	171	10.8	5.9	1005	7.4	1270
	19	53	167	10.1	6.3	1040	7.9	1320
2200	22	61	175	11.4	5.6	970	7.0	1225
	21	57	171	10.7	5.9	1010	7.5	1275
	20	53	166	10.1	6.3	1045	7.9	1315
	19	50	162	9.5	6.7	1080	8.4	1360
2100	21	52	165	9.8	6.4	1060	8.1	1335
	20	48	160	9.3	6.8	1095	8.6	1380
	19	45	155	8.7	7.3	1125	9.2	1420
	18	42	150	8.3	7.7	1150	9.7	1450
	17	39	145	7.8	8.1	1175	10.2	1485
	16	35	138	7.4	8.6	1190	10.9	1500
	15	32	131	6.9	9.1	1200	11.5	1510

Figure 33. Condor – Cruise Performance – (7,500').

CRUISE PERFORMANCE 10,000

NORMAL LEAN MIXTURE

Standard Atmosphere • Zero Wind • Gross Weight-3000 Pounds

10,000 FEET

RPM	MP	% BHP	TAS MPH	Gal/ Hour	63.5 Gal. (No Reserve) Endr. Hours	63.5 Gal. (No Reserve) Range Miles	80 Gal. (No Reserve) Endr. Hours	80 Gal. (No Reserve) Range Miles
2450	20	65	184	12.3	5.2	950	6.5	1200
	19	61	179	11.5	5.5	995	7.0	1250
	18	57	174	10.7	5.9	1035	7.5	1305
	17	52	169	10.0	6.4	1075	8.0	1355
2300	20	59	177	11.1	5.7	1010	7.2	1275
	19	55	173	10.4	6.1	1050	7.7	1325
	18	51	168	9.8	6.5	1090	8.2	1370
	17	48	162	9.1	6.9	1125	8.7	1420
2200	20	55	173	10.4	6.1	1050	7.7	1325
	19	52	168	9.9	6.4	1085	8.1	1365
	18	48	163	9.2	6.9	1120	8.7	1410
	17	44	158	8.7	7.3	1155	9.2	1450
2100	20	50	166	9.5	6.7	1105	8.4	1390
	19	47	161	9.0	7.0	1135	8.9	1430
	18	44	156	8.5	7.4	1160	9.4	1465
	17	40	150	8.0	7.9	1185	9.9	1495
	16	37	144	7.6	8.4	1205	10.5	1520
	15	34	137	7.1	8.9	1215	11.2	1530
	14	30	126	6.6	9.6	1200	12.0	1510

FIGURE 34. Condor – Cruise Performance – (10,000').

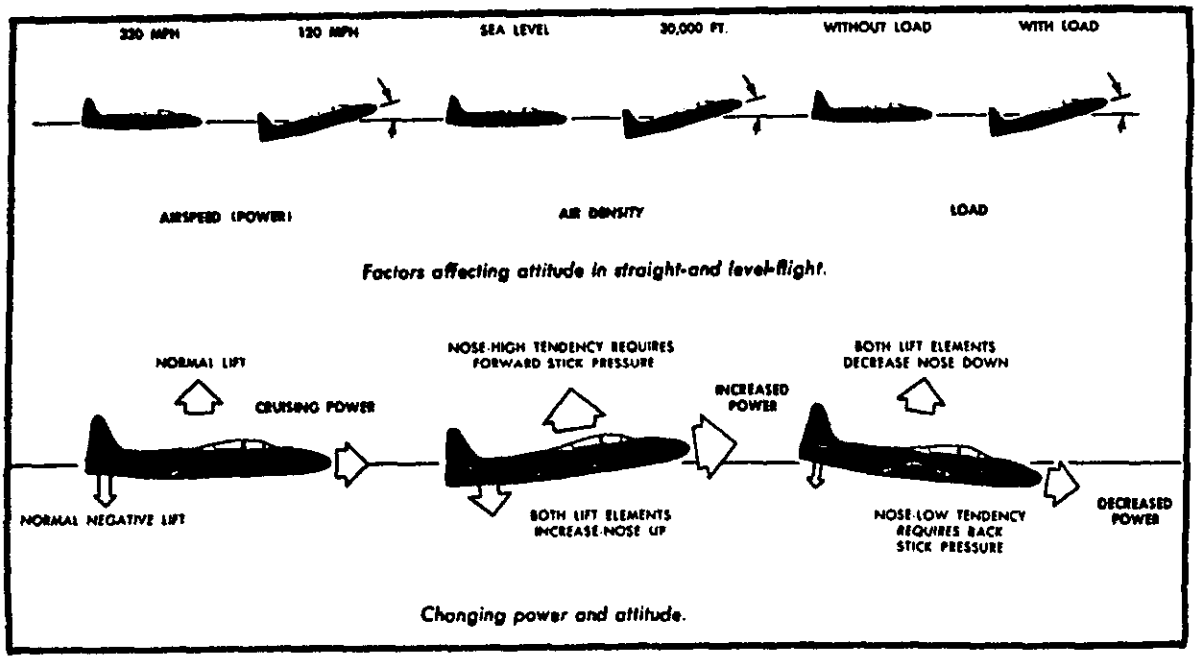


Figure 35. Aerodynamics - power and pitch attitude.

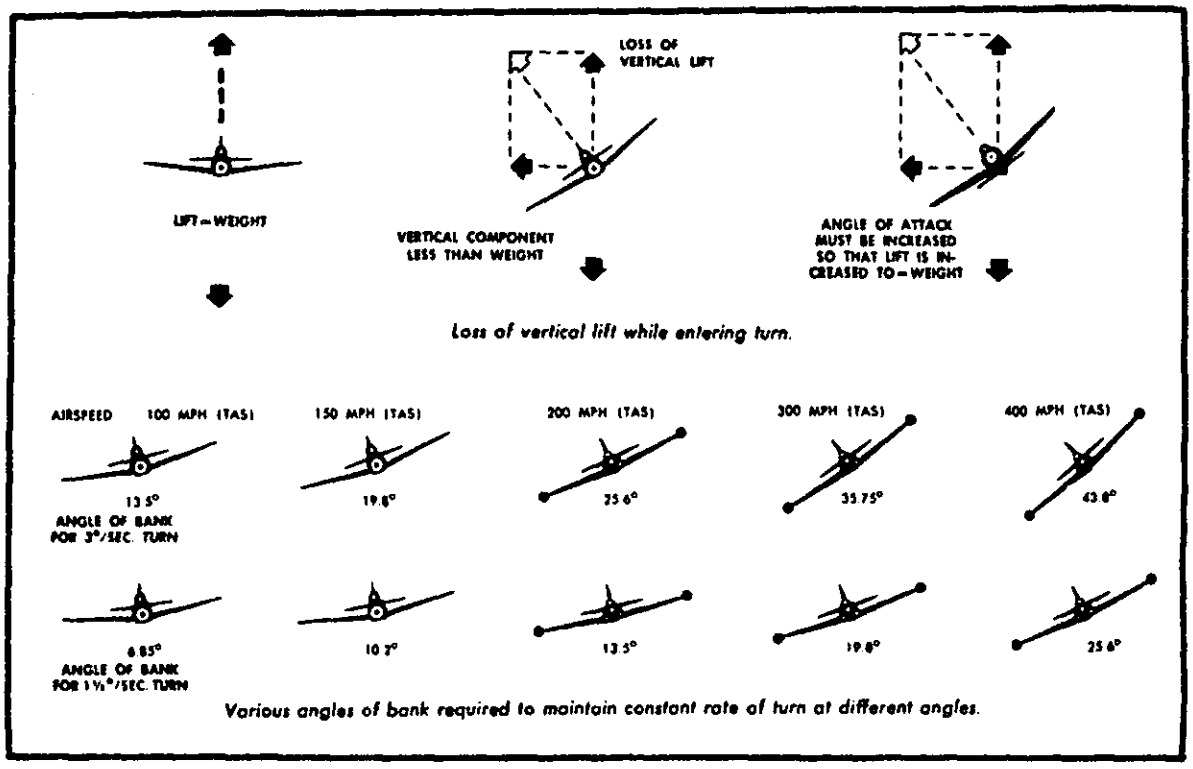


Figure 36. Angle of Bank - rate of turn.

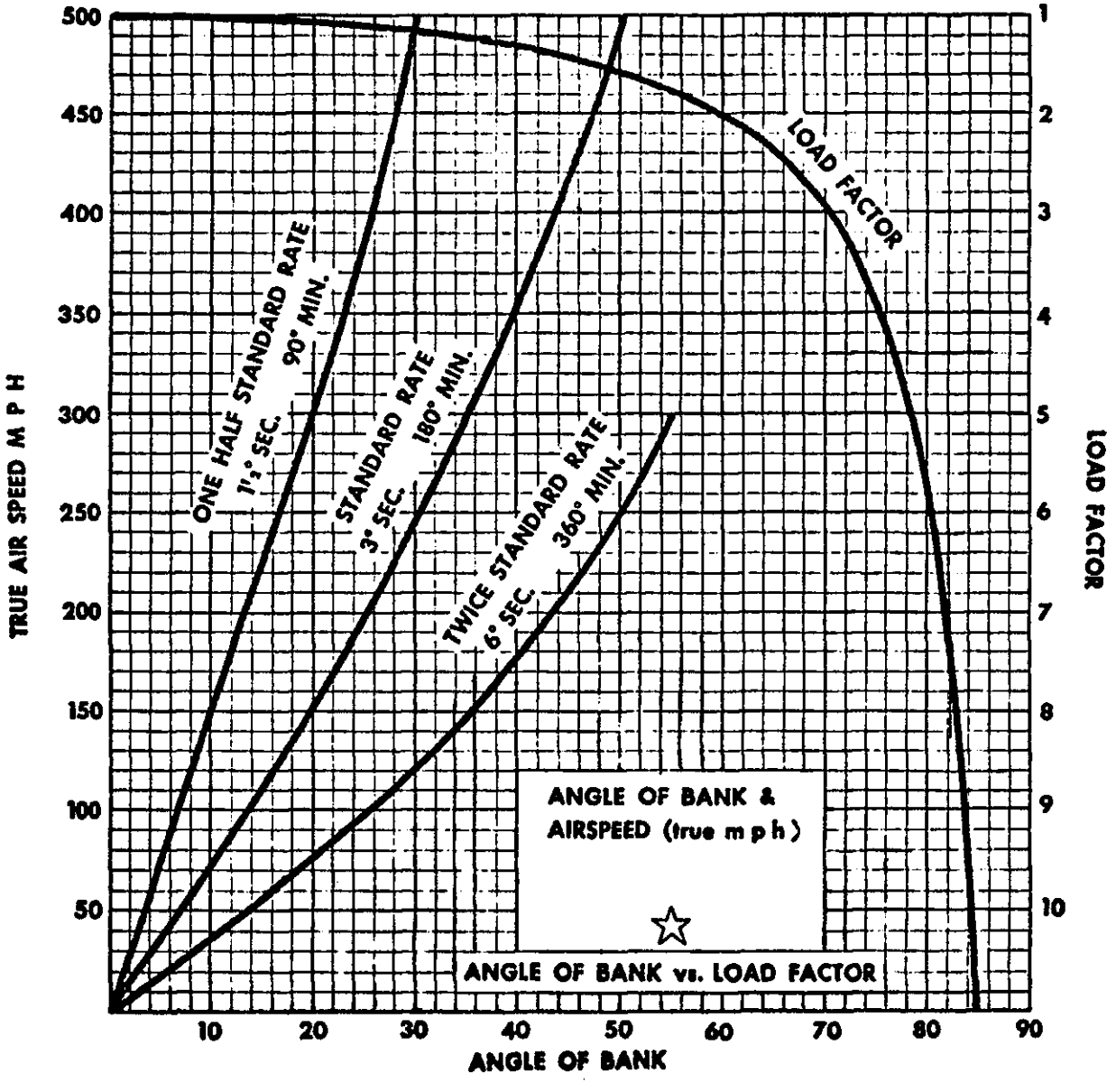


Figure 37. TAS - Angle of Bank - Rate of Turn - Load Factor.

Order Blank

To Superintendent of Documents, Government Printing Office, Washington, D.C. 20402

Date ....., 19.....

Name .....

Street address .....

City .....

State ..... Zip Code .....

FOR USE OF SUPT. OF DOCS.	
.....	Enclosed .....
.....	To be mailed later .....
.....	Subscription .....
	Refund .....
	Coupon Refund .....
	Postage .....

CATALOG NO.	QUANTITY DESIRED	TITLE OF PUBLICATION	PRICE PER COPY	TOTAL
				$.....

FOR ADDITIONAL SPACE ATTACH ANOTHER SHEET. TOTAL AMOUNT ENCLOSED.. $.....

IMPORTANT

Please include your ZIP CODE when filling out the mailing label below.

.....

U.S. GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D.C. 20402

OFFICIAL BUSINESS

RETURN AFTER 5 DAYS

POSTAGE AND FEES PAID
U.S. GOVERNMENT PRINTING OFFICE

U.S.MAIL

Name _____

Street address _____

City and State _____ ZIP Code _____

☆ U.S. GOVERNMENT PRINTING OFFICE : 1974 O—555-978

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Washington, D.C. 20591

Official Business

PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
FEDERAL AVIATION
ADMINISTRATION

DOT 515