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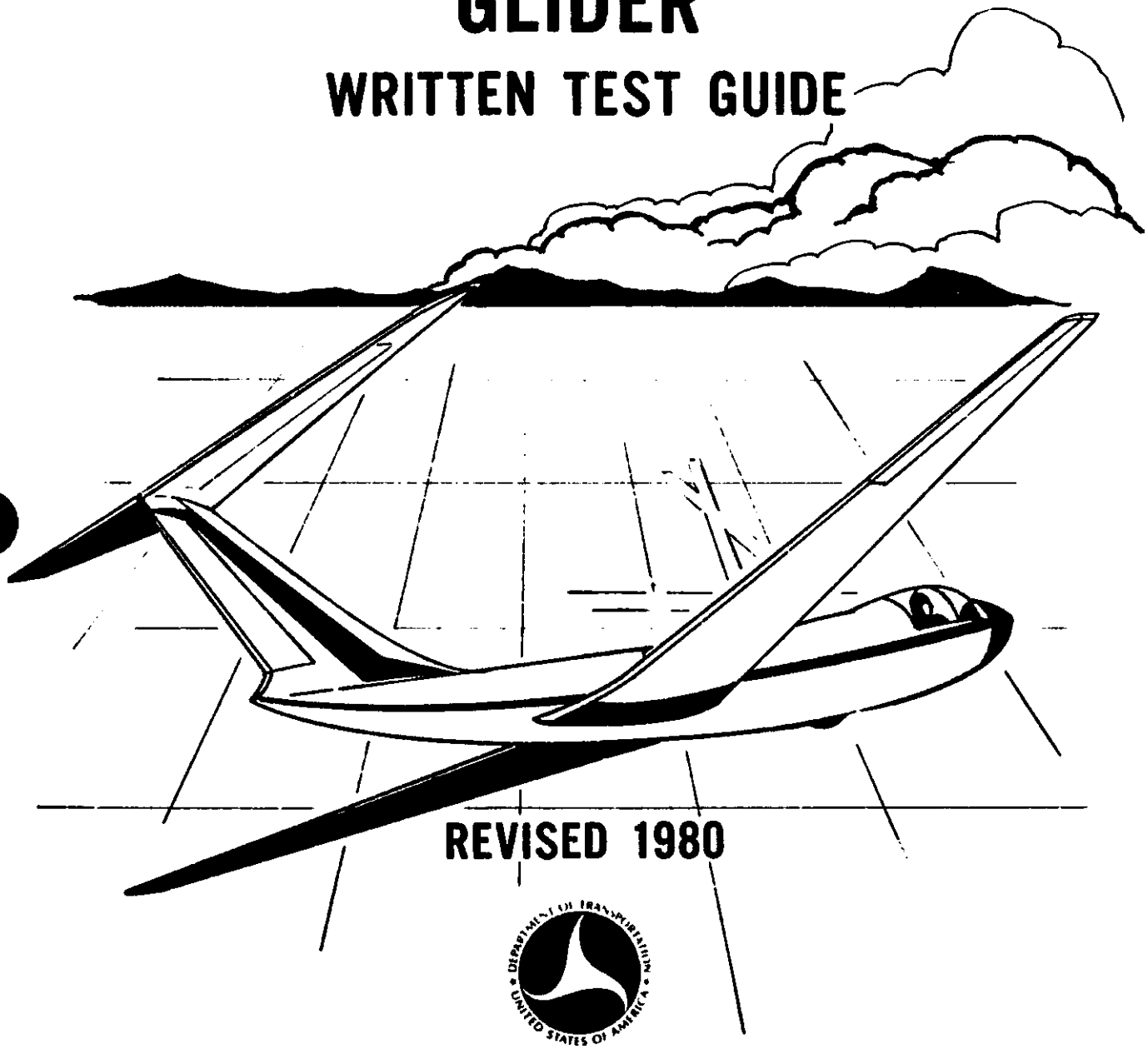
AC 61-81A

PRIVATE and COMMERCIAL PILOT

GLIDER

WRITTEN TEST GUIDE



REVISED 1980

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

PRIVATE AND COMMERCIAL PILOT — GLIDER WRITTEN TEST GUIDE

REVISED 1980

U.S. Department of Transportation
Federal Aviation Administration
Office of Flight Operations

PREFACE

The Office of Flight Operations of the Federal Aviation Administration has developed this guide to assist applicants who are preparing for the Private or Commercial Pilot Certificate with a Glider Rating.

This guide contains a comprehensive study outline and a list of recommended study materials, and explains how these publications can be obtained. It includes study questions and illustrations pertinent to flying a glider.

This guide supersedes AC 61-81 and is issued as Advisory Circular 61-81A to be used by those persons persuing the glider pilot certificate under the provisions of Part 61 of Federal Aviation Regulations.

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

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PRIVATE AND COMMERCIAL PILOT - GLIDER

WRITTEN TEST GUIDE

INTRODUCTION

What qualities are required for a person to become an experienced glider pilot? Although some persons may possess a greater degree of desirable skills than others, skillful glider pilots become so through study, practice, experience, and hard work. Probably more than any other factor, a person's attitude toward flying determines the degree of that person's ability as a pilot.

After the student glider pilot has acquired a certificate, it is imperative that a continuous effort is made to stay current in the latest trends in flying techniques, because the art of soaring is dynamic and changing as is every field of aviation. What is true today may not apply tomorrow. The glider pilot must keep informed about new equipment, procedures, and regulations.

Knowledge and understanding are seldom gained easily. There is no substitute for diligent study to attain the required knowledge, unremitting effort to develop competence, and constant review to remain current in areas where technology changes continuously.

This booklet provides guidance for applicants by outlining the scope of knowledge required; thus, those persons may be better able to plan a course of study. There is a close relationship between FAA written study guides and FAA written tests as a result of both publications being developed by the same personnel.

CERTIFICATION REQUIREMENTS

To be eligible for a Private or Commercial Pilot Certificate with a Glider category rating, the certification process requires that the applicant show evidence that instruction has been received or that a home study course has been completed prior to taking the written test. All applicants except persons holding a Private or Commercial Certificate with a category rating in powered aircraft must pass a written test on the aeronautical knowledge appropriate to the certificate and rating sought. All persons, however, must successfully complete a flight test to demonstrate competence in flying a glider.

Refer to Part 61 of the Federal Aviation Regulations for information pertaining to glider pilot certification.

WRITTEN TESTS

The Private and Commercial Pilot-Glider Written Tests comprehensively test an applicant's knowledge in many areas. These include all subjects in which ground instruction is required for the glider pilot rating. These subject areas are incorporated in the appropriate written tests required by Part 61.

The Private Pilot-Glider Written Test contains 60 test items or questions. Four hours are allowed for taking the test. The Commercial Pilot-Glider Written Test also contains 60 test items or questions and 3 hours and 30 minutes are allowed for taking the test.

All test items are of the objective type and provide four multiple-choice answers to choose from and are answered by selecting one response. This conserves the applicant's time, permits greater coverage of subject matter, lessens the time required for scoring, and eliminates subjective judgment in the determination of grades.

Each item is independent of other test items. A correct response to one item does not depend upon, or influence, the correct response to another.

After completing the test, the applicant's answer sheet is scored by computer at the FAA Aeronautical Center in Oklahoma City. Shortly thereafter, the applicant receives an Airman Written Test Report, which not only includes the score but also lists in code, the subject areas in which items were incorrectly answered. These areas can be determined by reference to the list of Subject Matter Codes which accompanies the report. This method provides a feedback to the applicant and is useful in determining those areas requiring further study.

TAKING THE TESTS

Communication between individuals is at times complicated. Tests involve the use of words; therefore, communication between the test writers and persons being tested may be inadequate if care is not exercised. Considerable effort is expended to write each test item in a clear, concise manner. Applicants should read the information carefully and follow the instructions given in the tests.

Remember the following when taking the test:

1. There are no "trick" questions. Each statement or question means what it says. Do not look for hidden meanings. The item refers to the general rule, not to exceptions to the rule.

2. Read the test item, including all responses, with care. Skimming and hasty assumptions may lead to an erroneous approach to the question because of failure to consider vital words. Select from the alternative responses the one that answers the question or completes a statement fully and correctly.

3. Only one of the responses given is completely correct. Certain alternatives may be the result of using incorrect procedures to solve problems, common misconceptions, or an incomplete knowledge of the subject. Others may appear to be correct to individuals who have not mastered the subject. If the subject matter is understood correctly, answering the items need not be difficult.

4. Do not spend too much time on a difficult test item; proceed to other items which you consider to be less difficult. When easier items are completed, return to those which you found difficult. This procedure will enable you to use the available time to your maximum advantage.

5. In solving problems which require computations or the use of a plotter and computer, select the answer which most nearly agrees with the calculated result. Due to slight differences in navigation or final glide computers and small errors that may exist in the meassurement of distances, true courses, etc., it is possible that an exact agreement with available answers will not occur. Sufficient spread is provided between right and wrong answers, however, so that the selection of the answer which is more nearly that of the calculated result will be correct, provided correct technique and reasonable care were used in making computations.

Computers and plotters that contain information not directly related to their operation may be used only if that information is obscured by suitable masking material.

The use of electronic calculators is subject to the following limitations: (1) prior to, and on completion of the written test, the applicant must actuate the "on/off" switch to ensure erasure of any data stored in memory circuits; (2) the use of electronic calculators incorporating permanent or continuous type memory circuits without erasure capability is not authorized; (3) tape printout of data must be surrendered at the completion of the written test, if the calculator incorporates this design feature; and (4) the use of magnetic cards, tapes, modules, or any other device upon which prewritten programs or information related to the written test can be stored and retrieved, is prohibited.

6. Written tests are administered by FAA General Aviation District Offices (GADO), Flight Standards District Offices (FSDO), and certain Air Carrier District Offices (ACDO). In addition, officially designated individuals have been given the authority to administer certain FAA written tests. The District Office in your area will provide the schedule and location for the administration of the tests given by that office.

RETESTING AFTER FAILURE

An applicant who fails the written test may not apply for retesting until 30 days after the date the test was failed. In the case of the first failure, however, a person may apply for retesting before the 30 days have expired upon presenting a written statement from an authorized instructor certifying that appropriate ground instruction has been given to the applicant and the instructor finds that person competent to pass the test. In addition, the written test report of the previously failed test must be presented at the time of retesting.

RECOMMENDED STUDY MATERIALS

Professionalism in piloting any aircraft is important to flight safety. To enhance this quality in the field of aviation, the prospective pilot should establish a personal aeronautical library. By obtaining materials that are appropriate to preparing for certification, the prospective pilot will be starting an aeronautical library that will be helpful in later flying activities. The following list of publications may not include all material available. Other excellent textbooks, audiovisual training aids, and instructional materials may be obtained from various bookstores and fixed-base operators engaged in flight training.

1. Advisory Circulars. FAA Advisory Circulars inform the aviation public in a systematic way of nonregulatory material of interest. Each circular issued is listed numerically within its subject-number break-

down which corresponds to the subject area of the Federal Aviation Regulations. A brief explanation of the contents is given for each listing in AC 00-2, Advisory Circular Checklist.

The checklist, AC 00-2, available free of charge, lists advisory circulars that are for sale by the Superintendent of Documents as well as those distributed free of charge by the Department of Transportation. The checklist also gives the addresses and phone numbers of the Superintendent of Documents bookstores throughout the United States.

Request AC 00-2, Advisory Circular Checklist, and other free advisory circulars from:

U.S. Department of Transportation
Publications Section, M-443.1
Washington, D.C. 20590

Persons who want to be placed on the mailing list to receive free circulars as issued should write to:

U.S. Department of Transportation
Distribution Requirements Section,
M 482.2
Washington, D.C. 20590

For those publications sold through the Superintendent of Documents, the address is:

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

2. Federal Aviation Regulations. (Supt. Docs.) Part 1, Definitions and Abbreviations; Part 61, Certification: Pilots and Flight Instructors; Part 91, General Operating and Flight Rules. Descriptions, prices, and ordering instructions are contained in AC 00-44, Status of Federal Aviation Regulations, free from M-483.1.

3. National Transportation Safety Board Procedural Regulation, Part 830. This prescribes the required notification and reporting procedures relating to aircraft accidents and lost or overdue aircraft in the United States, its territories, and possessions. It is free of charge upon request from the National Transportation Safety Board, Publications Section, Washington, D.C. 20594.

4. Pilot's Handbook of Aeronautical Knowledge, AC 61-23B (Supt. Docs.) Contains essential authoritative information used in training and guiding private and commercial pilots. It is designed primarily for the airplane pilot. Much of the material, however, is applicable to private and commercial glider pilot applicants.

5. Aviation Weather, AC 00-6A (Supt. Docs.) Contains information on weather phenomena for pilots and for all persons whose interest in meteorology is primarily in its application to flying. It includes material on present aviation weather services, glossary of meteorological terms, a chapter devoted to soaring weather, and many pertinent illustrations.

6. Aviation Weather Services, AC 00-45B (Supt. Docs.) This is a supplement to AC 00-6A, and is periodically updated to reflect changes brought about by the latest technical capabilities and service demands. It not only explains current weather services and the uses of weather charts and printed weather messages, but also is an excellent source of study for pilot certification examinations.

7. Soaring Flight Manual. Published by the Soaring Society of America. Designed to provide ground training for private and commercial glider ratings.

8. The American Soaring Handbook. Published by the Soaring Society of America, this handbook represents the combined efforts of many of the veteran soaring pilots in this country. Each chapter is a separate booklet.

a. Chapter 2--Training
b. Chapter 3--Ground Launch
c. Chapter 4--Airplane Tow
d. Chapter 5--Meteorology
e. Chapter 6--Cross-Country and Wave Soaring
f. Chapter 7--Equipment I. Instruments and Oxygen
g. Chapter 8--Equipment II. Radio, Rope, and Wire

9. The Joy of Soaring. A training manual, published by the Soaring Society of America, designed to promote proficiency and safety in soaring activities by providing a comprehensive and authorative description of training techniques for the beginner or experienced glider pilot.

The American Soaring Handbook, Soaring Flight Manual, and The Joy of Soaring may be obtained from bookstores, sailplane fixed-base operators, or ordered from:

The Soaring Society of America
P.O. Box 66071
Los Angeles, California 90066

10. Airman's Information Manual: Basic Flight Information and ATC Procedures. (Supt. Docs.) Presents information necessary for planning and conducting flights within the National Airspace System. It provides instructional and procedural information pertinent to flight operations. It is sold on a subscription basis and is issued in January and July of each year. Price and ordering instructions are contained in the Advisory Circular Checklist, AC 00-2.

11. Aircraft Wake Turbulence, AC 90-23D. (Free). Presents information on the subject of wake turbulence and suggests techniques enabling pilots to avoid the hazards associated with wingtip vortex turbulence.

12. Aeronautical Charts. The National Ocean Survey publishes and distributes aeronautical charts covering the United States. A "Catalog of Aeronautical Charts and Related Publications" which lists prices and information regarding distribution services may be obtained free from:

Distribution Division (C44)
National Ocean Survey
Riverdale, Maryland 20840

Orders for specific charts or publications should be accompanied by a check or money order made payable to "NOS, Dept. of Commerce."

13. VFR and IFR Exam-O-Grams. Brief, timely and graphic articles developed and published on a continuing basis. They are issued as an information service, particularly to individuals interested in FAA Airman Written Tests. They relate to concepts, practices, and procedures critical to aviation safety, and present safety-oriented information to applicants and to certificated pilots. Exam-O-Grams are sold by the Superintendent of Documents and may be ordered as described in AC 00-2SS.

14. Glider/Sailplane Flight Manuals and Owner's Manuals. Aircraft manufacturers issued operating manuals for each model, which may be obtained from glider/sailplane manufacturing companies or possibly from their dealers and distributors.

STUDY OUTLINE

The study outline which follows is the framework for basic aeronautical knowledge that the prospective private/commercial glider pilot should know. Each 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 based on operationally realistic airman activity and meets the requirements specified in Federal Aviation Regulations, Title 14, Code of Federal Regulations (CFR).

I. FEDERAL AVIATION REGULATIONS

A. Part 1; Definitions
Part 71: Controlled Airspace.

1. Airport traffic area.
2. Ceiling.
3. Flight visibility.
4. Major alteration.
5. Major repair.
6. Pilot in command.
7. Federal airway.
8. Control area.
9. Continental control area.
10. Control zone.
11. Terminal control area.
12. Positive control area.

B. Part 61: Certification: Pilots/ Flight Instructors.

1. Required certificates/ratings.
2. Certificates and ratings issued.
3. Expired pilot certificates/ reissuance.
4. Carriage of narcotic drugs/ marihuana.
5. Duration of pilot certificates.
6. Medical certificates.
7. General limitations.
8. Pilot logbooks.
9. Recent experience: Pilot in command.
10. Glider towing: experience/ instruction.
11. Private pilot privileges/ limitations.
12. Commercial pilot privileges/ limitations.
13. Flight Instructor: records/ authorizations/limitations.

C. Part 91: General Operating Rules-- Subpart A.

1. Responsibility of pilot in command.
2. Pilot in command--more than one pilot.
3. Preflight action.
4. Careless or reckless operation.
5. Liquor and drugs.
6. Dropping objects.
7. Fastening of safety belts.
8. Parachutes and parachuting.
9. Towing gliders: safety/links/ waivers.
10. Civil aircraft: certificates required.
11. Aircraft airworthiness.
12. Aircraft operating limitations/ markings.
13. Supplemental oxygen.
14. Limited/restricted aircraft limitations.
15. Emergency locator transmitters.

D. Part 91: General Flight Rules-- Subpart B.

1. Waivers.
2. Operating near other aircraft.
3. Right-of-way rules.
4. Acrobatic flights.
5. Minimum safe altitudes; general.
6. Altimeter settings.
7. Operation-in vicinity of airport.
8. Operation-airport with control tower.
9. Operation-airport without control tower.
10. Flight in terminal control areas.
11. Temporary flight restrictions.
12. Restricted and prohibited areas.
13. Positive control areas.
14. Basic VFR weather minimums.
15. VFR cruising altitude or flight level.

E. Part 91: Maintenance, Preventative Maintenance, and Alterations--Subpart C.

1. General maintenance and alterations.
2. Maintenance required.
3. Carrying persons after repair/ alteration.
4. Inspections/progressive inspections.
5. Maintenance records/transfer of records.

II. NATIONAL TRANSPORTATION SAFETY BOARD PROCEDURAL REGULATION--PART 830

A. General.

1. Applicability.
2. Definitions.

B. Initial Notification of Aircraft Accidents, Incidents, and Overdue Aircraft.

1. Immediate notification.
2. Information to be given in notification.

C. Preservation of Aircraft Wreckage, Mail, Cargo, and Records.

1. Preservation.

D. Reporting of Aircraft Accidents, Incidents, and Overdue Aircraft.

1. Reports and statements to be filed.

III. FAA ADVISORY CIRCULARS

A. Series 00-General.

B. Series 20-Aircraft.

C. Series 60-Airmen.

D. Series 70-Airspace.

E. Series 90-Air Traffic and General Operating Rules.

IV. FLIGHT INFORMATION/OPERATIONAL PUBLICATIONS

A. AIM--Basic Flight Information and ATC Procedures.

1. Glossary of aeronautical terms.
2. Airport/marking/aids.
3. Controlled/uncontrolled airspace.
4. Operating at non-tower airports.
5. Special use airspace-prohibited, restricted, MOA, alert areas.
6. Aeronautical advisory stations (UNICOM).
7. Radiotelephone phraseology/ technique.
8. Traffic/wind direction indicators.
9. Obtaining weather information/ briefing.
10. Wake turbulence.
11. Medical facts for pilots.

B. Airport/Facility Directory.

1. Parachuting jumping areas.

C. Graphic Notices and Supplemental Data.

1. Terminal area graphic notices.
2. Area Advisories.

D. Notices to Airmen (NOTAMS).

V. WEATHER

A. The Earth's Atmosphere.

1. Composition.
2. Vertical structure.
3. The standard atmosphere.
4. Density.

B. Temperature.

1. Temperature measurement.
2. Heat and temperature.
3. Temperature aloft.
4. Temperature variation.

C. Atmospheric Pressure and Altimetry.

1. Atmospheric pressure measurements.
2. Sea level pressure.
3. Station pressure.
4. Pressure variations.
5. Pressure systems.
6. Altimeters.

D. Wind.

1. Basic theory of general circulation.
2. Convection.
3. Pressure gradient force.
4. Coriolis force.
5. Friction.
6. The jet stream.
7. Local and small scale winds.
8. Large wind system.
9. Wind, pressure systems, and weather.
10. Wind shear.

E. Moisture.

1. Measurements.

a. Relative humidity.
b. Dewpoint.

2. Change of state.
3. Condensation and sublimation products.

F. Stability or Instability.

1. Adiabatic process.
2. Lapse rates.
3. Stability determinations.
4. Effects of stability or instability.

G. Clouds.

1. Composition.
2. Formation and structure.
3. Types.
4. Recognition.

H. Air Masses.

1. Source regions.
2. Classification of air masses.
3. Air mass modification.
4. Summer and winter air mass weather.

I. Fronts.

1. Structure of fronts.
2. Types of fronts.
3. Frontal waves and occlusions.
4. Frontolysis and frontogenesis.
5. Associated weather.

J. Turbulence.

1. Convective currents.
2. Obstructions to wind flow.
3. Wind shear.
4. Clear air turbulence.
5. Categories of turbulence intensities.
6. Wake turbulence.

K. Icing.

1. Structural ice formation.
2. Ice producing cloud types.
3. Accretion rate of in-flight structural icing.
4. Types and intensities of in-flight structural icing.
5. Effects of in-flight structural icing.
6. Structural aircraft icing and frost on the ground.

L. Thunderstorms.

1. Conditions necessary for thunderstorm formation.
2. Thunderstorm structure.
3. Classification of thunderstorms.
4. Thunderstorm hazards.
5. Thunderstorm information from radar.
6. Tornadoes.

M. Obstruction to Vision.

1. Fog.
2. Low stratus clouds.
3. Haze and smoke.
4. Blowing obstructions to vision.
5. Precipitation.
6. Obscured or partially obscured sky.

N. The Nation's Aviation Weather System.

O. Weather Observations.

1. Surface weather observations.
2. Pilot weather reports (PIREPS).
3. Weather radar observations.
4. Upper air observations.

P. Weather Charts.

1. Weather depiction charts.
2. Surface weather charts.
3. Constant pressure charts.
4. Winds aloft charts.
5. Radar summary charts.
6. Prognostic surface and prognostic constant pressure charts.
7. Prognostic significant weather charts.
8. Adiabatic charts.
9. Stability charts.

Q. Aviation Weather Forecasts.

1. Terminal forecasts.
2. Area forecasts.
3. Route forecasts.
4. Winds aloft forecasts.
5. In-flight weather advisories.
6. Severe weather outlooks.
7. Severe weather forecasts.
8. Surface analyses and prognoses.

R. Services to Pilot.

1. FSS Briefing.
2. Transcribed weather broadcasts (TWEB).
3. Pilots automatic telephone weather answering service (PATWAS).

S. Determining Cloud-Height from Reports.

T. Information in a Weather Briefing.

U. Mountain Effects.

1. Turbulence.
2. Weather.

V. Soaring Weather.

1. Thermals.
2. Ridge lift.
3. Mountain waves.

VI. NAVIGATION

A. General.

1. Sectional chart interpretation.
2. Relating chart symbols to FAR.
3. Pilotage/recognition of landmarks.
4. Determining courses/distances on charts.
5. Planning traffic pattern.
6. Computing rates-of-climb/descent.
7. Determining go-ahead points.

B. Radio Navigation.

1. Characteristics of VOR facilities.
2. Tuning VOR receivers.
3. Identifying VOR stations.
4. VOR interpretation/orientation.

C. Radio Communications.

1. VHF radio communications/ phraseology.

VII. AERODYNAMICS AND PRINCIPLES OF FLIGHT

A. Laws of motion.

B. Functions of the Flight Controls.

C. Principles of Airfoils.

D. Wing planform.

1. Area/span/chord.
2. Aspect ratio/taper/sweepback.
3. Effect of planform on stall patterns.

E. Forces Acting on the Aircraft.

F. Flight Controls/Axes of the Aircraft.

G. Lift/Drag During Turns.

H. Lift Versus Angle of Attack.

I. Lift Versus Air Density.

J. Types of Flaps, Spoilers, Divebrakes.

K. Effect of Flaps, Spoilers, Divebrakes.

L. Effect of Ice/Snow/Frost on Airfoils.

M. Aileron Drag.

N. Slipping/Skidding Turns.

O. Types and Effect of Drag/Induced/ Parasite/Profile.

P. Ground Effect.

Q. Loads/Load Factors.

R. Stability (Static and Dynamic) Longitudinal/Lateral/Directional.

S. Stalls/Spins.

T. Relative Wind/Angle of Attack.

U. Effect of Wind During Turns.

VIII. GLIDER/SAILPLANE OPERATION

A. General.

1. Preflight/postflight safety practices.
2. Wake turbulence-causes/precautions.
3. Crosswind takeoff/landing.
4. Proper loading of the aircraft.
5. Use of oxygen and oxygen equipment.
6. Mid-air collision avoidance precautions.
7. Procedures of assembly and disassembly.
8. Towrope/cables/hooks/releases.
9. Standard visual signals.
10. Aero towing procedures.
11. Ground launch procedures (auto).
12. Ground launch procedures (winch).
13. Traffic pattern/landing.
14. Use of speed limiting devices.
15. Off field landings.
16. Sharing thermals.
17. Sharing ridge lift.
18. Cross-country procedures.
19. Emergencies-rope break, towplane power failure, etc.
20. Downwind landing.
21. Rate of descent in still-air chart.
22. Slack in towline.
23. Accidental stall recoveries.
24. Inspection of launch equipment.
25. Aircraft documents and records.
26. Flaps operation.

B. Performance.

1. Performance charts.
2. Flying through or around the wake.
3. Calculating speeds-to-fly.
4. Tow speeds.
5. Computing density/pressure altitudes.

6. Effect of density altitude on performance.
7. Effect of weight/balance on performance.
8. Critical performance speeds.
9. Effect of wind on aircraft performance.
10. Bank/speed versus rate/radius of turn.
11. Stall speed versus altitude or attitude.
12. Stall speed versus indicated/true airspeed.
13. Computation of gross weight/useful load/ballast.
14. Minimum sink speed.
15. Glide ratio L/D.
16. Speed-to-fly.
17. Best-glide speed.
18. Glider performance curves.
19. Airspeed while searching for lift.
20. Flight at critically slow airspeeds.
21. Ridge and mountain soaring/ thermaling.
22. Vg diagram.

IX. INSTRUMENTS AND SYSTEMS

A. Altimeter Operation/Errors.

B. Altimeter Setting Procedures/ Significance.

C. Pitot-Static Systems/Instruments.

D. Magnetic Compass Operation.

E. Airspeed Indicator Operation.

F. Variometer and Audio Device, Function and Adjustment.

G. Oxygen Supply and Pressure Gauge.

H. Turn Indicator/Coordinator.

I. Radio Equipment (Communications/ Navigation).

J. Yaw string.

X. PHYSIOLOGICAL FACTORS RELATED TO FLIGHT

A. Adjustment to the Flight Environment.

1. Ground habits vs. flight habits.
2. Individual differences in pilots.

B. Reaction of the Body to Changes in Atmospheric Pressure.

1. Changes in altitude.
2. Aerosinusitis.

C. Reaction of the Body to Changes in Oxygen Partial Pressure.

1. Hypoxia.
2. Hyperventilation.

D. Self Imposed Stress.

1. Fatigue and its effect on the body during flight.
2. Alcohol and its effect on the body during flight.
3. Drugs and their effects on the body during flight.
4. Scuba diving and its effect on the body during flight.
5. Panic causes and prevention.

E. Sensations of Flight.

1. Body sensory systems involved in equilibrium.

a. Eyes.
b. Inner ear.
c. Skeletal muscles.

2. Sensory illusions in flight- vertigo-spatial disorientation.

F. Oxygen Equipment.

1. Requirements.
2. Types of oxygen.
3. Storage of oxygen.
4. Regulators and masks.
5. Use of oxygen equipment.

EXCERPTS OF REGULATIONS ON CERTIFICATION OF PRIVATE AND COMMERCIAL GLIDER PILOTS

Subpart A—General

§ 61.33 Tests: general procedure.

Tests prescribed by or under this Part are given at times and places, and by persons, designated by the Administrator.

§ 61.35 Written test: prerequisites and passing grades.

(a) An applicant for a written test must—

(1) Show that he has satisfactorily completed the ground instruction or home study course required by this Part for the certificate or rating sought;

(2) Present as personal identification an airman certificate, driver's license, or other official document; and

(3) Present a birth certificate or other official document showing that he meets the age requirement prescribed in this Part for the certificate sought not later than 2 years from the date of application for the test.

(b) The minimum passing grade is specified by the Administrator on each written test sheet or booklet furnished to the applicant.

§ 61.37 Written tests: cheating or other unauthorized conduct.

(a) Except as authorized by the Administrator, no person may—

(1) Copy, or intentionally remove, a written test under this Part;

(2) Give to another, or receive from another, any part or copy of that test;

(3) Give help on that test to, or receive help on that test from, any person during the period that test is being given;

(4) Take any part of that test in behalf of another person;

(5) Use any material or aid during the period that test is being given; or

(6) Intentionally cause, assist, or participate in any act prohibited by this paragraph.

(b) No person whom the Administrator finds to have committed an act prohibited by paragraph (a) of this section is eligible for any airman or ground instructor certificate or rating, or to take any test therefor, under this chapter for a period of one year after the date of that act. In addition, the commission of that act is a basis for suspending or revoking any airman or ground instructor certificate or rating held by that person.

§ 61.39 Prerequisites for flight tests.

(a) To be eligible for a flight test for a certificate, or an aircraft or instrument rating issued under this Part, the applicant must—

(1) Have passed any required written test since the beginning of the 24th month before the month in which he takes the flight test;

(2) Have the applicable instruction and aeronautical experience prescribed in this Part;

(3) Hold a current medical certificate appropriate to the certificate he seeks or, in the case of a rating to be added to his pilot certificate, at least a third-class medical certificate issued since the beginning of the 24th month before the month in which he takes the flight test;

(5) Have a written statement from an appropriately certificated flight instructor certifying that he has given the applicant flight instruction in preparation for the flight test within 60 days preceding the date of application, and finds him competent to pass the test and to have satisfactory knowledge of the subject areas in which he is shown to be deficient by his FAA airman written test report. However, an applicant need not have this written statement if he—

(i) Holds a foreign pilot license issued by a contracting State to the Convention on International Civil Aviation that authorizes at least the pilot privileges of the airman certificate sought by him;

(ii) Is applying for a type rating only, or a class rating with an associated type rating; or

(iii) Is applying for an airline transport pilot certificate or an additional aircraft rating on that certificate.

(b) Notwithstanding subparagraph (1) of paragraph (a) of this section, an applicant for an airline transport pilot certificate or an additional aircraft rating on that certificate who has been, since passing the written examination, continuously employed as a pilot, or as a pilot assigned to flight engineer duties by, and is participating in an approved pilot training program of a U.S. air carrier or commercial operator, or who is rated as a pilot by, and is participating in a pilot training program of a U.S. scheduled military air transportation service, may take the flight test for that certificate or rating.

§ 61.49 Retesting after failure.

An applicant for a written or flight test who fails that test may not apply for retesting until after 30 days after the date he failed the test. However, in the case of his first failure he may apply for retesting before the 30 days have expired upon presenting a written statement from an authorized instructor certifying that he has given flight or ground instruction as appropriate to the applicant and finds him competent to pass the test.

Subpart D—Private Pilots

§ 61.101 Applicability.

This subpart prescribes the requirements for the issuance of private pilot certificates and ratings, the conditions under which those certificates and ratings are necessary, and the general operating rules for the holders of those certificates and ratings.

§ 61.103 Eligibility requirements: general.

To be eligible for a private pilot certificate. a person must—

(a) Be at least 17 years of age, except that a private pilot certificate with a free balloon or a glider rating only may be issued to a qualified applicant who is at least 16 years of age;

(b) Be able to read, speak, and understand the English language, or have such operating limitations placed on his pilot certificate as are necessary for the safe operation of aircraft, to be removed when he shows that he can read, speak, and understand the English language;

(c) Hold at least a current third-class medical certificate issued under Part 67 of this chapter, or, in the case of a glider or free balloon rating, certify that he has no known medical defect that makes him unable to pilot a glider or free balloon, as appropriate;

(d) Pass a written test on the subject areas on which instruction or home study is required by § 61.105;

(e) Pass an oral and flight test on procedures and maneuvers selected by an FAA inspector or examiner to determine the applicant's competency in the flight operations on which instruction is required by the flight proficiency provisions of § 61.107; and

(f) Comply with the sections of this Part that apply to the rating he seeks.

§ 61.105 Aeronautical knowledge.

An applicant for a private pilot certificate must have logged ground instruction from an authorized instructor, or must present evidence showing that he has satisfactorily completed a course of instruction or home study in at least the following areas of aeronautical knowledge appropriate to the category of aircraft for which a rating is sought.

(c) *Gliders.*

(1) The accident reporting requirements of the National Transportation Safety Board and the Federal Aviation Regulations applicable to glider pilot privileges, limitations, and flight operations;

(2) Glider navigation, including the use of aeronautical charts and the magnetic compass;

(3) Recognition of weather situations of concern to the glider pilot, and the procurement and use of aeronautical weather reports and forecasts; and

(4) The safe and efficient operation of gliders, including ground and aero tow procedures, signals, and safety precautions.

§ 61.107 Flight proficiency.

The applicant for a private pilot certificate must have logged instruction from an authorized flight instructor in at least the following pilot operations. In addition, his logbook must contain an endorsement by an authorized flight instructor who has found him competent to perform each of those operations safely as a private pilot.

(d) *In gliders.*

(1) Preflight operations, including line inspection;

(2) Ground (auto or winch) tow or aero tow (the applicant's certificate is limited to the kind of tow selected);

(3) Precision maneuvering, including steep turns and spirals in both directions;

(4) The correct use of critical sailplane performance speeds;

(5) Flight at critically slow airspeeds, and the recognition of and recovery from imminent and full stalls entered from straight and from turning flight; and

(6) Accuracy approaches and landings with the nose of the glider stopping short of and within 200 feet of a line or mark.

§ 61.115 Glider rating: aeronautical experience.

An applicant for a private pilot certificate with a glider rating must have logged at least one of the following:

(a) Seventy solo glider flights, including 20 flights during which 360° turns were made.

(b) Seven hours of solo flight in gliders, including 35 glider flights launched by ground tow, or 20 glider flights launched by aero tows.

(c) Forty hours of flight time in gliders and single-engine airplanes, including 10 solo glider flights during which 360° turns were made.

Subpart E—Commercial Pilots

§ 61.121 Applicability.

This subpart prescribes the requirements for the issuance of commercial pilot certificates and ratings, the conditions under which those certificates and ratings are necessary, and the limitations upon these certificates and ratings.

§ 61.123 Eligibility requirements: general

To be eligible for a commercial pilot certificate, a person must—

(a) Be at least 18 years of age;

[(b) Be able to read, speak, and understand the English language, or have such operating limitations placed on his pilot certificate as are necessary for safety, to be removed when he shows that he can read, speak, and understand the English language;]

(c) Hold at least a valid second-class medical certificate issued under Part 67 of this chapter, or, in the case of a glider or free balloon rating, certify that he has no known medical deficiency that makes him unable to pilot a glider or a free balloon, as appropriate;

(d) Pass a written examination appropriate to the aircraft rating sought on the subjects in which ground instruction is required by § 61.125;

(e) Pass an oral and flight test appropriate to the rating he seeks, covering items selected by the inspector or examiner from those on which training is required by § 61.127; and

§ 61.125 Aeronautical knowledge.

An applicant for a commercial pilot certificate must have logged ground instruction from an authorized instructor, or must present evidence showing that he has satisfactorily completed a course of instruction or home study, in at least the following areas of aeronautical knowledge appropriate to the category of aircraft for which a rating is sought.

(c) *Gliders.*

(1) The regulations of this chapter pertinent to commercial glider pilot operations, privilege, and limitations, and the accident reporting requirements of the National Transportation Safety Board;

(2) Glider navigation, including the use of aeronautical charts and the magnetic compass, and radio orientation;

(3) The recognition of weather situations of concern to the glider pilot from the ground and in flight, and the procurement and use of aeronautical weather reports and forecasts; and

(4) The safe and efficient operation of gliders, including ground and aero tow procedures, signals, critical sailplane performance speeds, and safety precautions.

§ 61.127 Flight proficiency.

The applicant for a commercial pilot certificate must have logged instruction from an authorized flight instructor in at least the following pilot operations. In addition, his logbook must contain an endorsement by an authorized flight instructor who has given him the instruction certifying that he has found the applicant prepared to perform each of those operations competently as a commercial pilot.

(d) *Gliders.*

(1) Preflight duties, including glider assembly and preflight inspection;

(2) Glider launches by ground (auto or winch) or by aero tows (the applicant's certificate is limited to the kind of tow selected);

(3) Precision maneuvering, including straight glides, turns to headings, steep turns and spirals in both directions;

(4) The correct use of sailplane performance speeds, flight at critically slow airspeeds, and the recognition of and recovery from stalls entered from straight flight and from turns; and

(5) Accuracy approaches and landings, with the nose of the glider coming to rest short of and within 100 feet of a line or mark.

AIRMAN WRITTEN TEST APPLICATION

PRIVACY ACT STATEMENT

The information on this form is required under the authority of the Federal Aviation Act (Section 602). Certification cannot be completed unless the data is complete.

Disclosure of your Social Security Account Number (SSAN) is optional. If you do not supply your SSAN, a substitute number or identifier will be assigned to give your record a unique 9-digit number for internal control of airman records.

If your SSAN has been previously given, it is already in the system. Requests for removal must be in writing. If you do not wish your SSAN on future records, please do not disclose SSAN on airman written test, airman certification, and/or medical certification applications.

Routine uses of records maintained in the system, including categories of users and the purposes of such uses: To determine that airmen are certified in accordance with the provision of the Federal Aviation Act of 1958. Repository of documents used by individual and potential employers to determine validity of airmen qualifications. To support investigative efforts of investigation and law enforcement agencies of Federal, State, and local Governments. Supportative information in court case concerning individual status and/or qualifications in law suits. To provide data for the Comprehensive Airman Information System (CAIS). To provide documents for microfilm and microfiche backup records.

INSTRUCTIONS TO APPLICANT:

* ATTENTION: READ THE FOLLOWING PARAGRAPH CAREFULLY BEFORE COMPLETING THIS APPLICATION:

  WHOEVER, IN ANY MATTER WITHIN THE JURISDICTION OF ANY DEPARTMENT OR AGENCY OF THE UNITED STATES KNOWINGLY AND WILLFULLY FALSIFIES, CONCEALS OR COVERS UP BY ANY TRICK, SCHEME, OR DEVICE A MATERIAL FACT, OR MAKES ANY FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OR REPRESENTATIONS, OR MAKES OR USES ANY FALSE WRITING OR DOCUMENT KNOWING THE SAME TO CONTAIN ANY FALSE, FICTITIOUS OR FRAUDULENT STATEMENT OR ENTRY, SHALL BE FINED NOT MORE THAN $10,000 OR IMPRISONED NOT MORE THAN 5 YEARS, OR BOTH (U.S. CODE, TITLE 18, SEC. 1001.)

* CERTAIN TEST QUESTIONS INVOLVING REGULATIONS, ATC PROCEDURES, ETC., ARE FREQUENTLY OUTDATED BY VERY RECENT CHANGES. IN THESE INSTANCES, APPLICANTS ARE GIVEN CREDIT FOR THE QUESTION DURING THE PERIOD THAT IT TAKES TO DISTRIBUTE A REVISED QUESTION.

* DO NOT TEAR SHEETS APART.

* TURN TO PAGE 4 AND COMPLETE THE PERSONAL DATA SECTION. BE SURE THAT YOUR SIGNATURE IS ON THE PROPER LINE. BEFORE COMMENCING TEST, READ INSTRUCTIONS FOR MARKING THE ANSWER SHEET.

INSTRUCTIONS TO FAA PERSONNEL:

Sample

* REFER TO PAGE 3 OF THE APPLICATION FOR COMPLETION OF TIME WAIVER AND SECTION WAIVER BLOCK WHEN REQUIRED

DEPARTMENT OF TRANSPORTATION — FEDERAL AVIATION ADMINISTRATION

AIRMAN WRITTEN TEST APPLICATION

DATE OF TEST (MONTH / DAY / YEAR)	TITLE OF TEST	TEST NO.
01 / 01 / 91	PRIVATE PILOT TEST - GLIDER	15916

PLEASE PRINT ONE LETTER IN EACH SPACE—LEAVE A BLANK SPACE AFTER EACH NAME

NAME (LAST, FIRST, MIDDLE): PHILLIPS, ROBERT WALKER

DATE OF BIRTH (MONTH / DAY / YEAR): 05 / 05 / 20

MAILING ADDRESS NO. AND STREET, APT. #, P.O. BOX, OR RURAL ROUTE: 24081 SOUTH 1ST ST

DESCRIPTION — HEIGHT: 69 | WEIGHT: 160 | HAIR: BR | EYES: BN

CITY, TOWN OR POST OFFICE, AND STATE: DUNCAN, OKLA — ZIP CODE: 73018

BIRTHPLACE (City and State, or foreign country): SALAMANCA NEW YORK

CITIZENSHIP: U.S.A.

SOCIAL SECURITY NO.: 157 16 2461 5

IF A SOCIAL SECURITY NUMBER HAS NEVER BEEN ISSUED CHECK THIS BLOCK → ☐

Is this a retest? ☑ No ☐ Yes, date of last test

Have you taken or are you taking an FAA approved course for this test? ☐ No ☑ Yes (If "yes" give details below)

Graduation date: DEC 1990 — NAME OF SCHOOL: MOHAWK AIRWAYS — CITY AND STATE: SALAMANCA, N Y

CERTIFICATION: I CERTIFY that all of the statements made in this application are true, complete, and correct to the best of my knowledge and belief and are made in good faith. Signature: Richard P. Walker

— — DO NOT WRITE IN THIS BLOCK — — FOR USE OF FAA OFFICE ONLY — —

Applicant's identity established by: OKLA DRIVERS LICENSE

CARD A										CARD B					
CATEGORY	TEST NUMBER	TAKE NO.	SECTIONS 1 2 3 4 5 6 7	EXPIRATION MONTH	DAY	YEAR	CERTIFICATED SCHOOL NUMBER	MECH EXP DATE BY SECTION 1	2	3	ID	FIELD OFFICE DESIGNATION
												SIGNATURE of FAA Representative

INSTRUCTIONS FOR MARKING THE ANSWER SHEET. Completely darken only one circle for each question. DO NOT USE (X) OR (✓). Use black lead pencil furnished by examiner. To make corrections, open answer sheet so erasure marks will not show on page 2. Then erase incorrect response on page 4. On page 2 (copy) mark the incorrect response with a slash (/). Questions are arranged in VERTICAL sequence as indicated by the arrows.

1	① ② ③ ④	23	① ② ③ ④	45	① ② ③ ④	67	① ② ③ ④	89	① ② ③ ④	111	① ② ③ ④	133	① ② ③ ④
2	① ② ③ ④	24	① ② ③ ④	46	① ② ③ ④	68	① ② ③ ④	90	① ② ③ ④	112	① ② ③ ④	134	① ② ③ ④
3	① ② ③ ④	25	① ② ③ ④	47	① ② ③ ④	69	① ② ③ ④	91	① ② ③ ④	113	① ② ③ ④	135	① ② ③ ④
4	① ② ③ ④	26	① ② ③ ④	48	① ② ③ ④	70	① ② ③ ④	92	① ② ③ ④	114	① ② ③ ④	136	① ② ③ ④
5	① ② ③ ④	27	① ② ③ ④	49	① ② ③ ④	71	① ② ③ ④	93	① ② ③ ④	115	① ② ③ ④	137	① ② ③ ④
6	① ② ③ ④	28	① ② ③ ④	50	① ② ③ ④	72	① ② ③ ④	94	① ② ③ ④	116	① ② ③ ④	138	① ② ③ ④
7	① ② ③ ④	29	① ② ③ ④	51	① ② ③ ④	73	① ② ③ ④	95	① ② ③ ④	117	① ② ③ ④	139	① ② ③ ④
8	① ② ③ ④	30	① ② ③ ④	52	① ② ③ ④	74	① ② ③ ④	96	① ② ③ ④	118	① ② ③ ④	140	① ② ③ ④
9	① ② ③ ④	31	① ② ③ ④	53	① ② ③ ④	75		97	① ② ③ ④	119	① ② ③ ④	141	① ② ③ ④
10	① ② ③ ④	32	① ② ③ ④	54	①				① ② ③ ④	120	① ② ③ ④	142	① ② ③ ④
11	① ② ③ ④	33	① ② ③ ④	55	① ②				③ ④	99	① ② ③ ④	121	① ② ③ ④	143	① ② ③ ④
12	① ② ③ ④	34	① ② ③ ④	56	① ② ③ ④	78	① ② ③ ④	100	① ② ③ ④	122	① ② ③ ④	144	① ② ③ ④
13	① ② ③ ④	35	① ② ③ ④	57	① ② ③ ④	79	① ② ③ ④	101	① ② ③ ④	123	① ② ③ ④	145	① ② ③ ④
14	① ② ③ ④	36	① ② ③ ④	58	① ② ③ ④	80	① ② ③ ④	102	① ② ③ ④	124	① ② ③ ④	146	① ② ③ ④
15	① ② ③ ④	37	① ② ③ ④	59	① ② ③ ④	81	① ② ③ ④	103	① ② ③ ④	125	① ② ③ ④	147	① ② ③ ④
16	① ② ③ ④	38	① ② ③ ④	60	① ② ③ ④	82	① ② ③ ④	104	① ② ③ ④	126	① ② ③ ④	148	① ② ③ ④
17	① ② ③ ④	39	① ② ③ ④	61	① ② ③ ④	83	① ② ③ ④	105	① ② ③ ④	127	① ② ③ ④	149	① ② ③ ④
18	① ② ③ ④	40	① ② ③ ④	62	① ② ③ ④	84	① ② ③ ④	106	① ② ③ ④	128	① ② ③ ④	150	① ② ③ ④
19	① ② ③ ④	41	① ② ③ ④	63	① ② ③ ④	85	① ② ③ ④	107	① ② ③ ④	129	① ② ③ ④		
20	① ② ③ ④	42	① ② ③ ④	64	① ② ③ ④	86	① ② ③ ④	108	① ② ③ ④	130	① ② ③ ④		
21	① ② ③ ④	43	① ② ③ ④	65	① ② ③ ④	87	① ② ③ ④	109	① ② ③ ④	131	① ② ③ ④		
22	① ② ③ ④	44	① ② ③ ④	66	① ② ③ ④	88	① ② ③ ④	110	① ② ③ ④	132	① ② ③ ④		

Sample

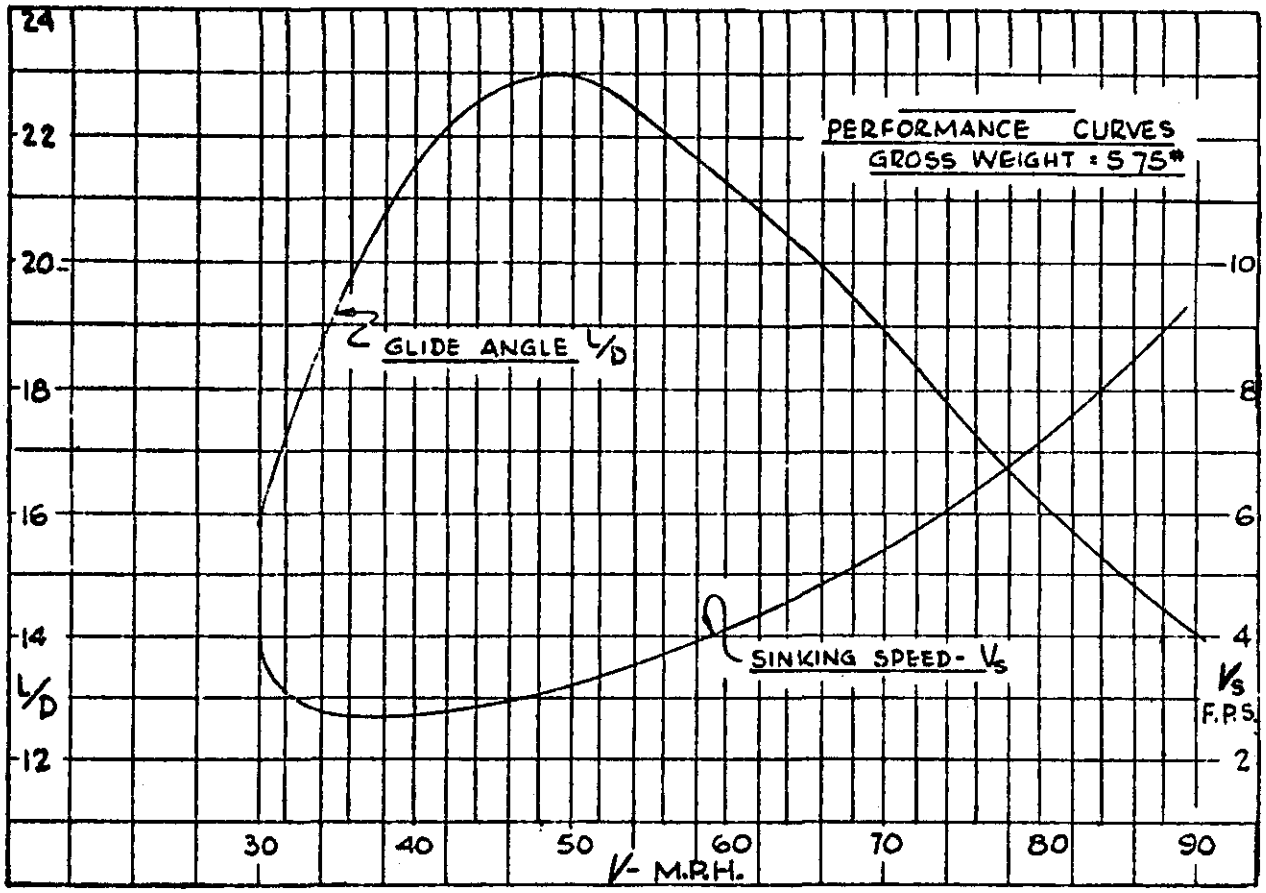

PERFORMANCE CURVES
GROSS WEIGHT = 575#
GLIDE ANGLE L/D
SINKING SPEED - Vs
L/D
Vs F.P.S.
V - M.P.H.
24
22
20
18
16
14
12
10
8
6
4
2
30
40
50
60
70
80
90

Figure 1

SAMPLE WRITTEN TEST QUESTIONS

1. A chair-type parachute must have been packed by a certificated and appropriately rated parachute rigger within the preceding

   1- 30 days.
   2- 60 days.
   3- 90 days.
   4- 120 days.

2. A glider in free flight is required to yield the right of way to which of the following?

   1- An airplane towing a glider.
   2- An airplane in distress.
   3- A glider converging from the left.
   4- A glider which is at a lower altitude in the same thermal.

3. Glider pilots should use supplemental oxygen during the entire time when flying above what altitude?

   1- 5,000 feet MSL.
   2- 8,000 feet MSL.
   3- 10,000 feet MSL.
   4- 14,000 feet MSL.

4. Whether a glider has had an annual inspection and has been approved for return to service can be determined by referring to the

   1- appropriate notation on a Repair and Alteration Form.
   2- relicensing date on the Airworthiness Certificate.
   3- appropriate notation on the glider maintenance records.
   4- issuance date of the Airworthiness Certificate.

5. Information concerning the reporting of aircraft accidents, incidents, and overdue aircraft are contained in

   1- Federal Aviation Regulations, Part 91.
   2- Department of Transportation Regulations, Part 300.
   3- National Transportation Safety Board Regulations; Part 830.
   4- Federal Aviation Regulations, Part 13.

6. When acrobatic flight is to be performed, the flight visibility must be at least

   1- 3 miles.
   2- 7 miles.
   3- 5 miles.
   4- 10 miles.

7. The chemical imbalance in the body resulting from a lack of carbon dioxide is known as

   1- hypoxia.
   2- hyperventilation.
   3- vertigo.
   4- carbon monoxide poisoning.

8. Assume that the glider is designed for an L/D of 22 to 1 at 50 MPH in still and stable air. What would the approximate glide ratio be with a direct headwind of 25 MPH?

   1- 44 to 1.
   2- 33 to 1.
   3- 22 to 1.
   4- 11 to 1.

9. If a knot develops in a towrope which has a normal tensile strength of 1,000 lbs., what would be the approximate strength of the rope?

   1- 500 lbs.
   2- 750 lbs.
   3- 955 lbs.
   4- 1,000 lbs.

10. What is the minimum allowable strength of a towline used for an aerotow of a glider having a certificated gross weight of 1,040 lbs?

    1- 560 lbs.
    2- 832 lbs.
    3- 1,000 lbs.
    4- 1,400 lbs.

11. Refer to Figure 1. Note that the glider has a normal L/D of 23 to 1 at an airspeed of 50 MPH. What would be the effective L/D in respect to the ground with a 16 MPH tailwind?

    1- 30 to 1.
    2- 25 to 1.
    3- 23 to 1.
    4- 18 to 1.

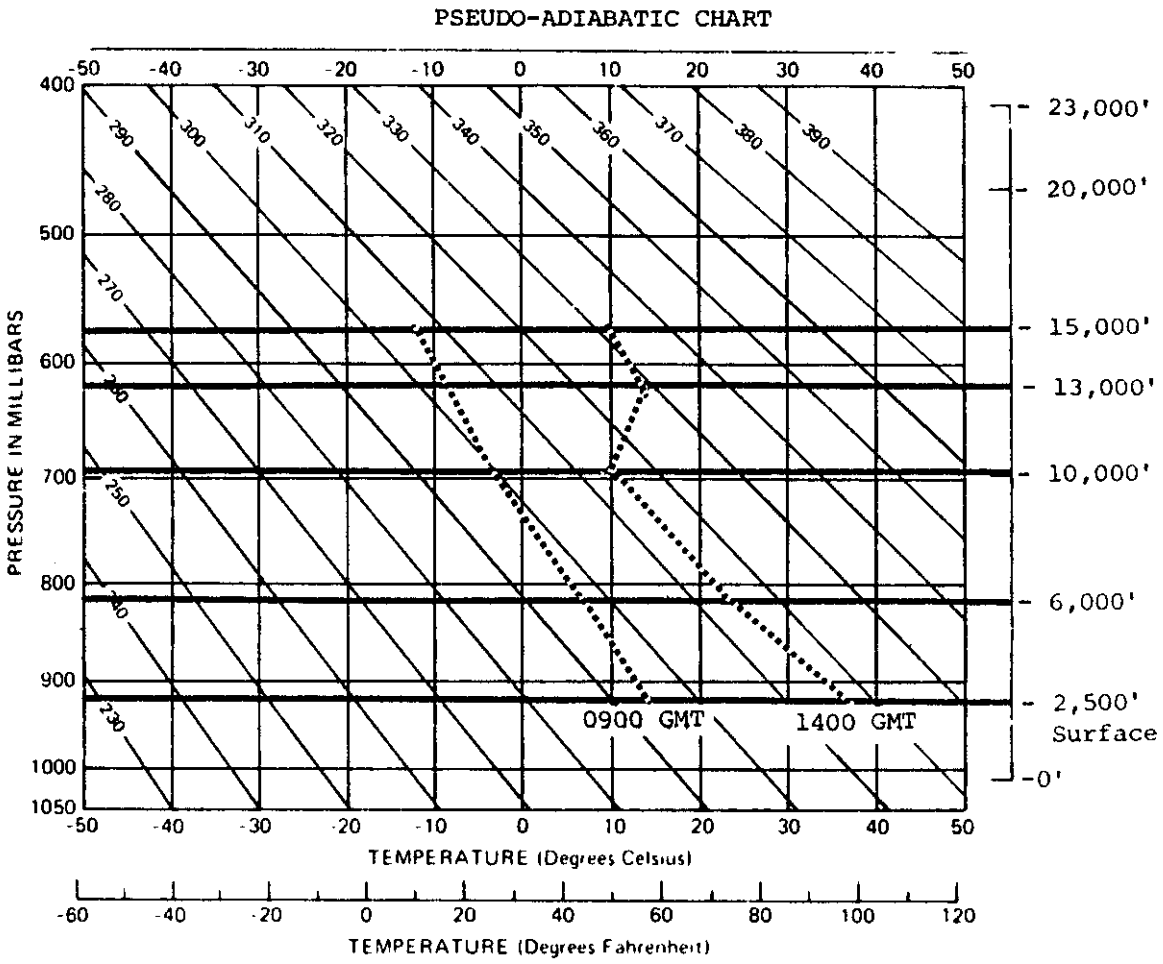

PSEUDO-ADIABATIC CHART
PRESSURE IN MILLIBARS
400
500
600
700
800
900
1000
1050
-50 -40 -30 -20 -10 0 10 20 30 40 50
290 300 310 320 330 340 350 360 370 380 390
280
270
260
250
240
230
0900 GMT
1400 GMT
23,000'
20,000'
15,000'
13,000'
10,000'
6,000'
2,500'
Surface
0'
TEMPERATURE (Degrees Celsius)
-60 -40 -20 0 20 40 60 80 100 120
TEMPERATURE (Degrees Fahrenheit)

Figure 2

12. Refer to the Pseudo-Adiabatic Chart, Figure 2, and the soundings taken at 0900 GMT. What temperature change would be necessary for thermal convection to occur between the surface and 6,000 feet?

1- Increase of less than 5° F.
2- Increase of more than 5° F.
3- Decrease of less than 12° F.
4- Decrease of more than 12° F.

13. Refer to Figure 2 and the soundings taken at 0900 GMT from 2,500 feet to 15,000 feet. At what surface temperature would neutral stability occur between the surface and 10,000 feet?

1- 25° F.
2- 58° F.
3- 68° F.
4- 85° F.

14. Consider the following glider maintenance and repair operations.

A. Repairing a limit of four adjacent wing or control surface ribs.
B. Making fabric patches, including rib stitching.
C. Replacing defective safety wiring.
D. Repairing or replacing main seat support braces and brackets.
E. Removing and installing wings and tail surfaces.

Which of the above operations may be performed by a commercial glider pilot without the supervision of a certificated mechanic?

1- A, C, D.
2- B, D, E.
3- A and B.
4- C and E.

15. What is one typical characteristic of atmospheric stability?

1- Intermittent precipitation.
2- Cumuliform clouds.
3- Continuous light drizzle.
4- Thunderstorms.

16. Assume excessive towline slack was allowed to develop during a glider tow. How is the slack eliminated?

1- Lower the nose to remove the slack without breaking the towline.
2- Yaw the nose to one side with rudder while keeping the wings level with the ailerons.
3- Increase the pitch attitude until the towline becomes taut.
4- Execute a shallow-banked, coordinated turn to either side.

17. While maintaining the "speed-to-fly" airspeed, a glider pilot may expect

1- the fastest cross-country speed.
2- the longest cross-country flight.
3- the flattest glide.
4- the best glide speed for cross-country flight.

18. Assume during the landing roll the glider swerves to the left. Which full control movement would most likely correct this swerve?

1- Right rudder; right stick.
2- Left rudder; right stick.
3- Right rudder; back stick.
4- Left rudder; back stick.

19. During a winch launch, which factor would most likely result in pitch oscillations?

1- Insufficient up-elevator control pressure.
2- Excessive slack in tow line.
3- Winching speed too fast.
4- Winching speed too slow.

20. Is it a good operating procedure to release from a low-tow position?

1- No. The glider will enter the towplane's slipstream when the pilot makes the normal climbing turn after release.
2- No. The towline may strike the towplane.
3- No. The tow ring may strike the glider after release.
4- Yes. Low-tow is the proper position for release.

PERFORMANCE

Max. Speed	98 mph	Stall (Dual)	35 mph
Airplane Tow	98 mph	L/D mph Solo	22.25 to 1 at 45
Auto Winch	69 mph	L/D mph Dual	22.25 to 1 at 52
Dive Brake			
Extend. Max.	98 mph	Sink Speed Solo	2.6 fps at 38
Stall (solo)	31 mph	Sink Speed Dual	3.1 fps at 42

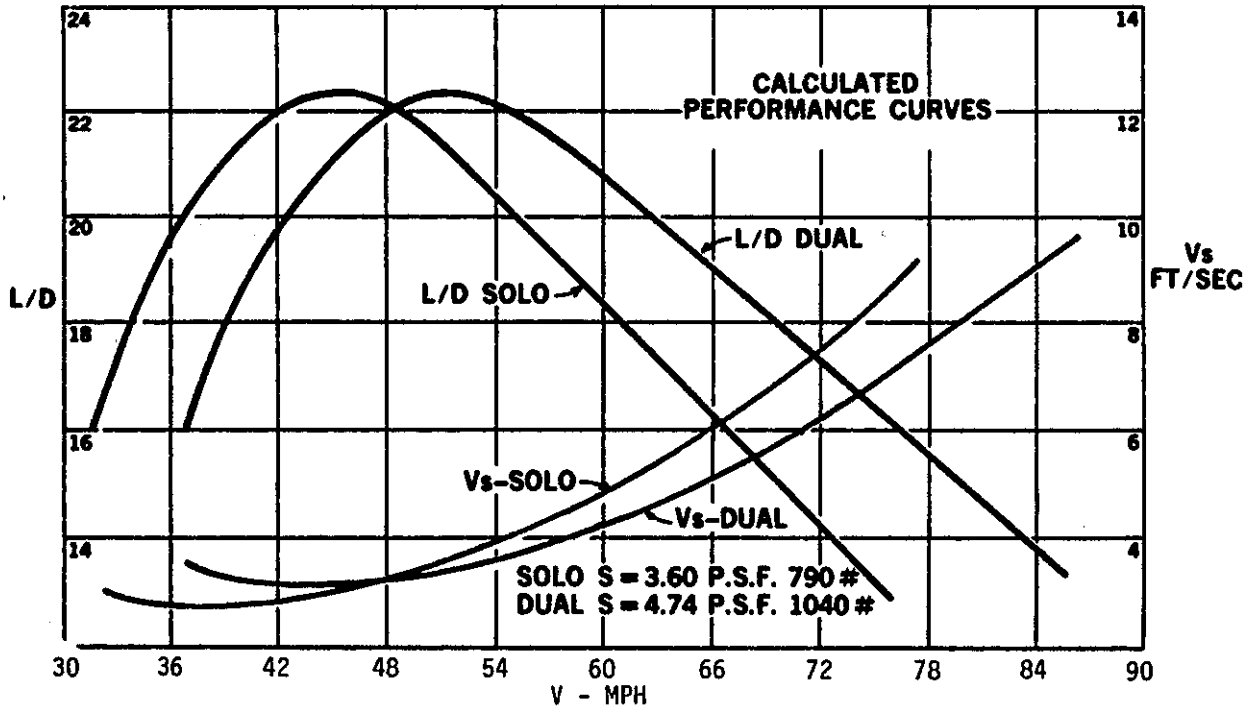
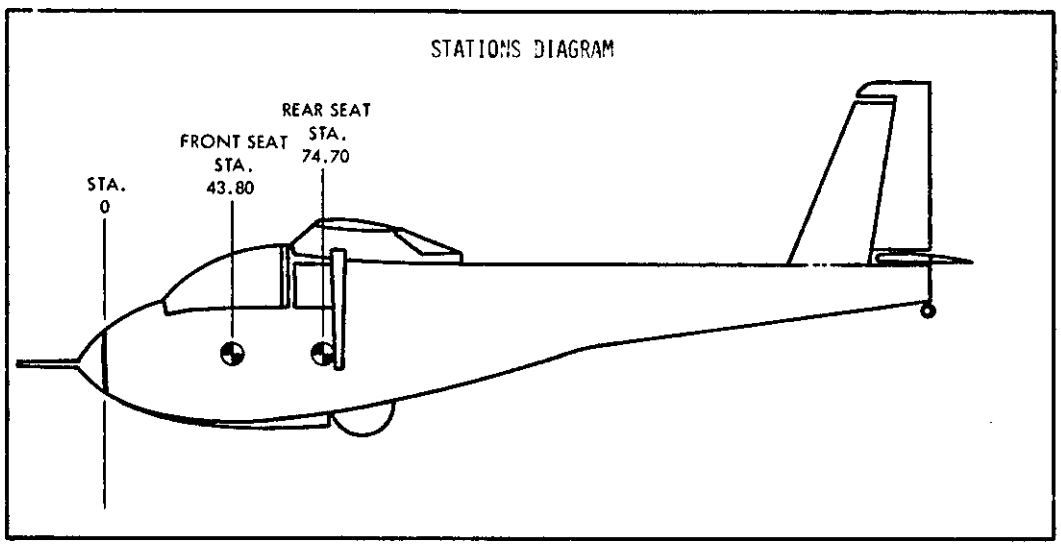


Figure 3



Empty Weight . . . . . 740 lbs.
Empty Weight Sta. . . . . 96.47"
Maximum Gross Weight . . . . . 1,170 lbs.

Figure 4

21. Refer to Figure 3. If the airspeed of the glider is increased from 54 MPH to 60 MPH, the lift-drag ratio would

1- decrease and the rate of sink would increase.
2- increase and the rate of sink would decrease.
3- decrease and the rate of sink would decrease.
4- increase and the rate of sink would increase.

22. Refer to Figure 4.

Given:	POUNDS	ARM INCHES	MOMENT IN./LBS.
Empty Weight	?	?	?
Pilot (front)	118	?	?
Student (rear)	154	?	?
Oxygen gear	55	83.0	?

Determine: Center of gravity aft of Datum (STA 0).

1- 79.0"
2- 79.80"
3- 86.81"
4- 87.60"

23. When preparing for an auto tow with a strong crosswind, where should the glider and towrope be positioned?

1- Directly behind the tow car.
2- Obliquely to the line of takeoff on the downwind side of the tow car.
3- Directly behind the tow car and crabbed into the wind with the wing runner holding the upwind wingtip.
4- Obliquely to the line of takeoff on the upwind side of the tow car.

24. During an auto tow, at which point should the glider pilot establish the maximum pitch attitude for the climb?

1- 200 feet above the ground.
2- Immediately after takeoff.
3- 100 feet above the ground.
4- Between 300 and 400 feet above the ground.

25. Which procedure would most likely ensure a safe "off-field" landing?

1- Maintain an approach speed at least 10% above stall speed.
2- Use an overhead circling approach, not a standard pattern.
3- Land into the wind, regardless of the type of terrain.
4- Maintain an approach speed of at least 20% above stall speed.

26. In regard to the center of gravity (CG) of a glider and its effect on spin characteristics, which statement is true?

1- If the CG is too far aft a flat spin may develop.
2- If the CG is too far forward spin entry will be impossible.
3- The location of the CG does not affect the spin characteristic unless the glider is over gross weight.
4- If the CG is too far aft spins will degenerate into high-speed spirals.

27. When soaring in the vicinity of a mountain ridge, in which area will potentially hazardous vertical and rotor-type air currents normally be encountered?

1- Upwind side when flying with the wind.
2- Lee side when flying with the wind.
3- Lee side when flying into the wind.
4- Upwind when flying into the wind.

28. During which period is a sea-breeze front suitable for soaring flight most likely to develop?

1- At sunset.
2- During the early forenoon.
3- At sunrise.
4- During the late afternoon.

ADDITIONAL QUESTIONS FOR STUDY

These questions are intended to direct study to selected areas, but by no means cover all subject areas.

1. How often is an inspection required for a sailplane which is used for hire?
2. What certificates are required to be in the possession of a pilot when flying solo in a sailplane?
3. What are the right-of-way rules which apply to glider operation?
4. What "recent experience" is required to act as pilot in command of a glider for solo flight? for carrying passengers?
5. Describe the general safety rules which apply to the use of oxygen.
6. According to regulations, what are the differences in preparing for a cross-country flight as opposed to a flight in the vicinity of the departure airport?
7. Differentiate between an airport traffic area and a control zone.
8. What information, which would be useful to a sailplane pilot, can be found in the Airman's Information Manual.
9. A magnetic compass, when used for in-flight navigation, has certain inherent characteristics which tend to present erroneous headings. Explain these characteristics.
10. As used in navigation, what is the difference between a true course and a magnetic course?
11. If a sailplane covered a distance of 62 nautical miles in 1 hour 23 minutes, what was the average ground-speed of this sailplane?
12. Draw a profile of a proposed cross-country flight for a sailplane, including altitudes at "go ahead" points considering winds.
13. What is the basic purpose of applying weather reports and forecasts to a proposed flight and analyzing the weather as the flight progresses?
14. If atmospheric instability exists, what weather conditions can be expected?
15. What effect does a change in air density have on the operation of a sailplane?
16. List the requirements for the occurrence of standing waves with appreciable vertical currents.
17. What effect does mountain ridge shape and size have on the strength of the lee waves produced?
18. What is the effect of wind and wind shear on thermals?
19. The maximum strength of both the thermals and the downdrafts depends mainly upon what atmospheric phenomena?
20. How is lift generated by a sailplane wing?
21. If a rope break occurred at an altitude below 200 feet above ground level, what would be the recommended course of action?
22. What is the recommended procedure if it becomes necessary to land the sailplane while being towed by the towplane?
23. What is the recommended procedure to use during landing with the towrope attached to the sailplane?
24. Explain the meaning of glide ratio or L/D. What effect does airspeed and wind have on glide ratio?
25. If too low on final approach, what is the recommended procedure? If too high on final approach?
26. At what altitude is supplemental oxygen required?
27. How is the maximum speed for an auto or a winch tow determined?
28. What is the recommended procedure to use during an auto or a winch tow if the tow cable cannot be released from the sailplane?
29. What is the recommended normal procedure for releasing from a winch tow? An airplane tow?
30. During a winch tow, how is the airspeed of the sailplane increased or decreased?