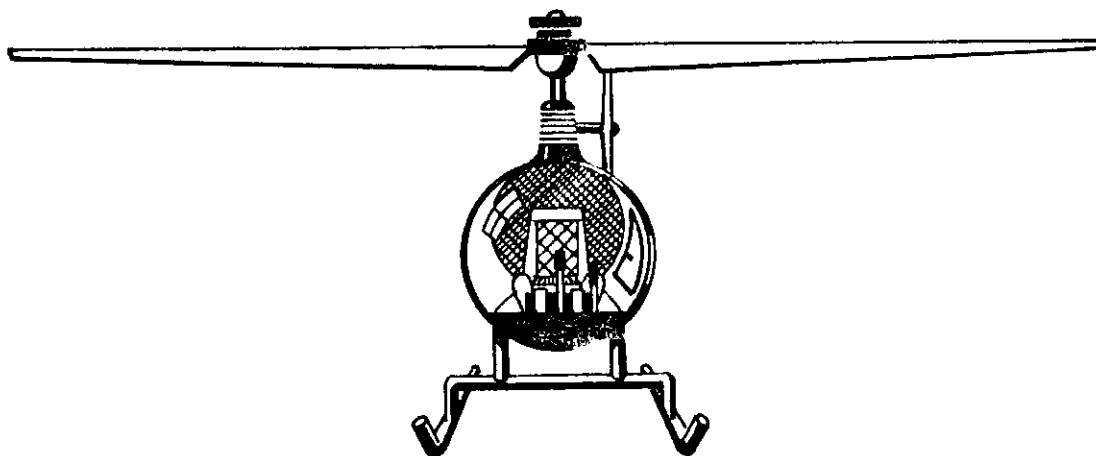


TAD 494.4

**PRIVATE AND COMMERCIAL PILOT  
ROTORCRAFT--HELICOPTER**

**WRITTEN TEST GUIDE  
(PART 61 REVISED)**



1974

**U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION  
FLIGHT STANDARDS SERVICE**



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ROTORCRAFT—HELICOPTER  
WRITTEN TEST GUIDE**



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**U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION  
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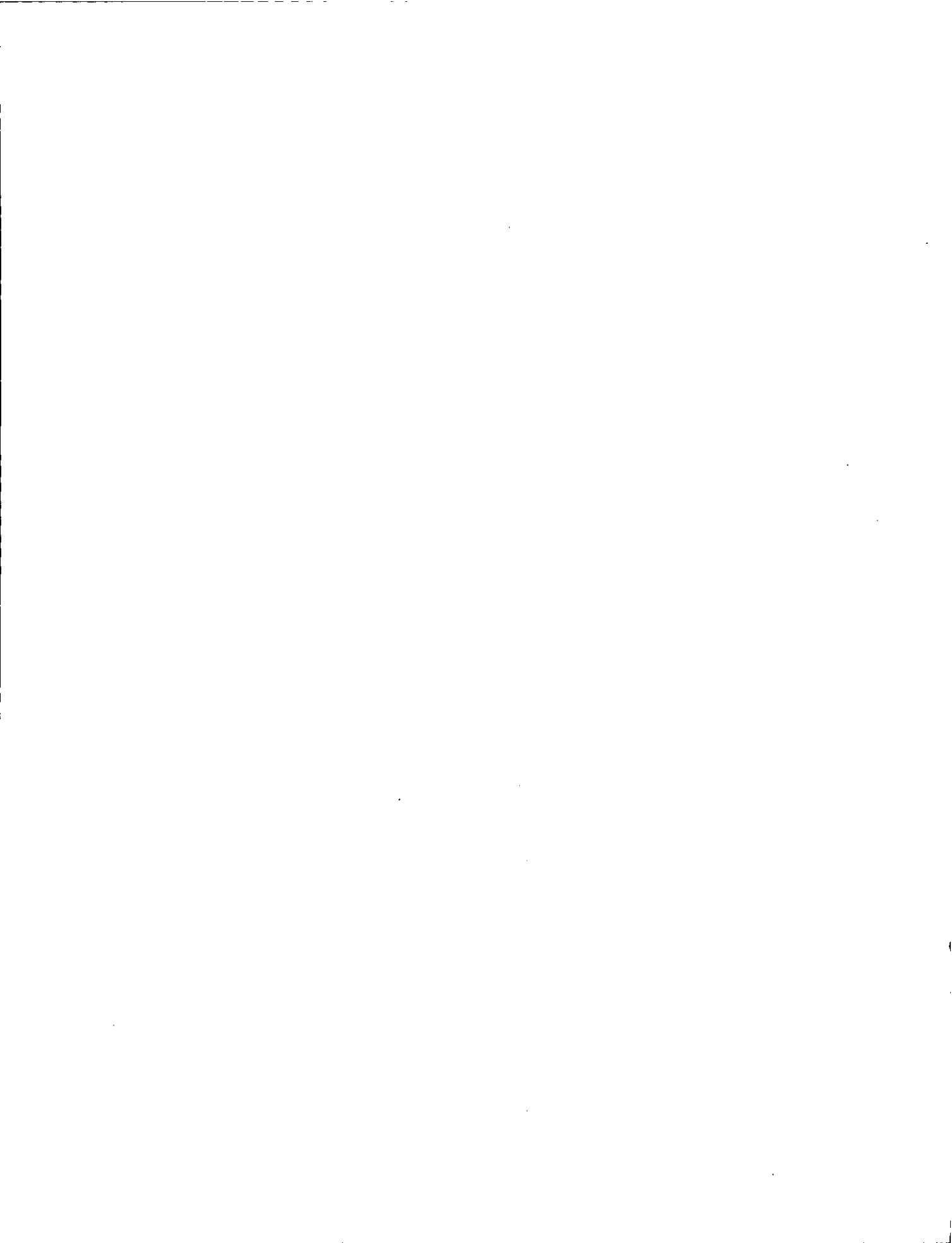


## Preface

This test guide was developed to assist applicants who are preparing for the Private or Commercial Pilot Certificate with a Rotorcraft-Helicopter Rating under the provisions of Federal Aviation Regulations, Part 61 (revised), which became effective November 1, 1973.

This guide is issued as Advisory Circular 61-73 and describes the type and scope of required aeronautical knowledge covered in the written test, lists reference materials available, and explains how these publications can be obtained. It includes study questions and illustrations representative of those used in the private and commercial helicopter written tests.

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

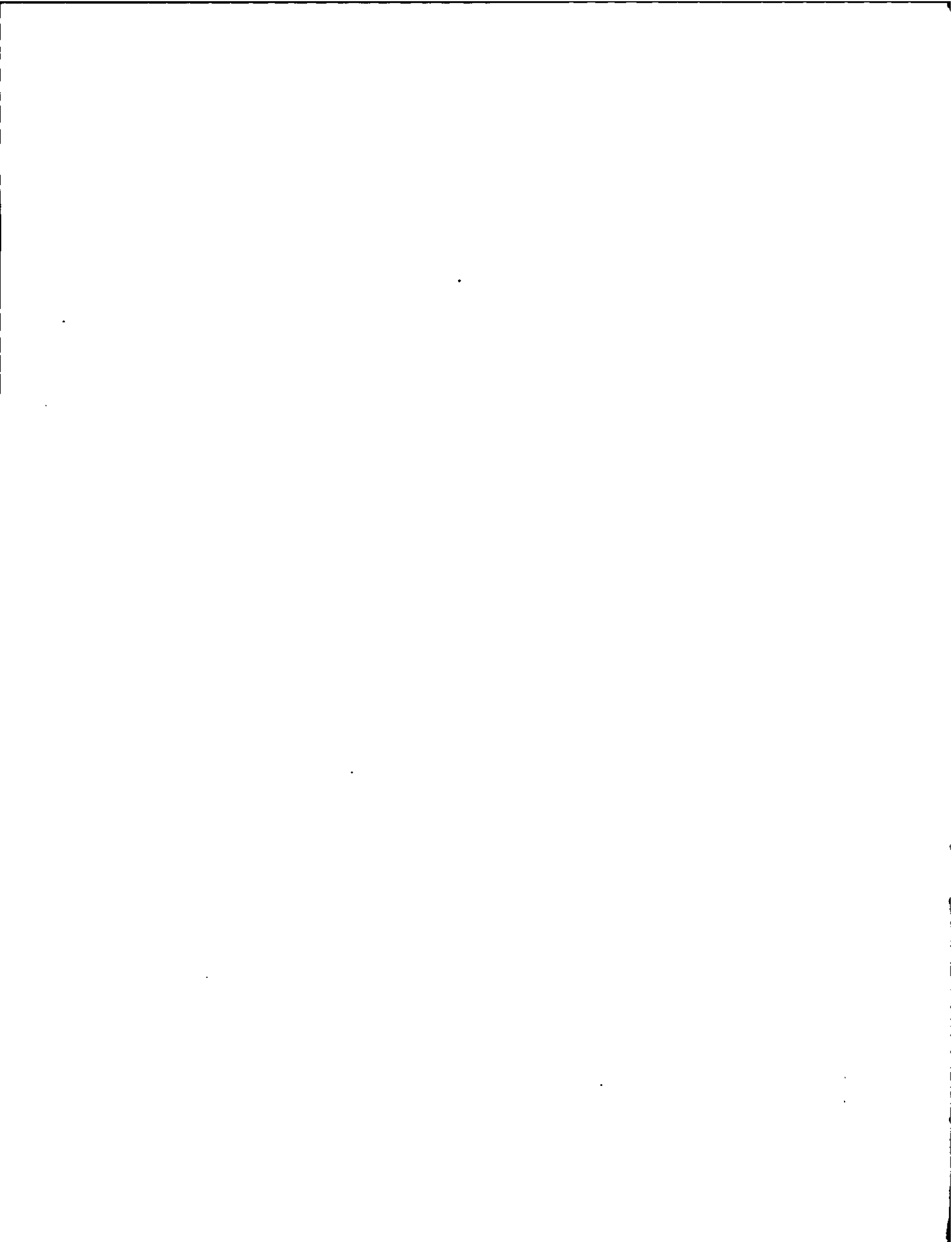
	<i>Page</i>
Preface .....	i
Introduction .....	1
Certification .....	1
The Written Tests .....	1
Taking the Tests .....	1
Recommended Study Materials .....	2
How to Obtain GPO Publications .....	3
Study Outline .....	5
Sample Test Items .....	11
Additional Questions for Study .....	15

## Appendices

APPENDIX A—List of Current VFR Exam-O-Grams .....	23
APPENDIX B—List of Current IFR Exam-O-Grams .....	24
APPENDIX C—Order Blank .....	25

## List of Illustrations

1. OMNI Components .....	17
2. Loading Chart .....	18
3. Loading Chart .....	18
4. Center of Gravity Chart .....	19
5. Center of Gravity Chart .....	19
6. Height Velocity Diagram .....	20
7. Hover Ceiling Chart (IN GROUND EFFECT) .....	20
8. Take-off Distance Chart .....	21
9. Landing Distance Chart .....	21
10. Pressure Altitude and Density Chart .....	22





# PRIVATE AND COMMERCIAL PILOT ROTORCRAFT-HELICOPTER WRITTEN TEST GUIDE

## Introduction

There is "no" quick and easy way to obtain the background of experience, knowledge, and skill that the Private or Commercial pilot must acquire. These essentials are attained through conscientious study and practice over a period of time. Therefore, in a continuing effort to provide guidance and assistance to applicants who are preparing for the written tests, the Flight Standards Service of the Federal Aviation Administration has developed this test guide. By using this guide applicants should be able to intelligently direct their study plan.

## Certification

The certification process requires the applicant to pass a written test and a pilot flight test appropriate to the certificate sought. Review the applicable sections of Federal Aviation Regulations, Part 61, for *specific* information pertaining to certification.

Requirements for retaking the test after failure are also prescribed in Part 61.

## The Written Tests

The Rotorcraft-Helicopter tests are designed to integrate technical information of several subjects into test items which relate to a successfully planned and executed cross-country flight. The single section tests require the applicant to employ all pertinent flight information and apply his knowledge of air traffic rules, weather, navigation, radio, operation of aircraft and engines, etc., in planning a safe, efficient flight.

There are 40 test items in the Private Pilot Test and 3 hours are allowed for taking this test. The Commercial Pilot Test contains 60 test items and 4 hours are allowed for taking this test. All test items are of the objective, multiple-choice type and each item can be answered by the selection of a single response as the correct choice. That is, the correct response of one test item does not depend upon, or influence, the correct response of another test item.

## Taking The Test

The tests may be taken at General Aviation District Offices of the Federal Aviation Administration and at other designated places.

When reporting for the written test, 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.*

The equipment needed for taking the test includes a straight edge, a plotter or protractor, and a computer (preferably one with a wind vector face). It is also desirable to have a pair of dividers for accurate measurement.

Consider the following points while taking the tests:

1. Test items should be answered in accordance with the latest regulations and procedures.
2. Read the information, instructions, and each test question carefully. Do not try to solve the problem before understanding the question. Be sure the objectives of the test item is fully understood, then work the problem or analyze the choices and select the answer believed to be the most correct.
3. Do not consider a complicated problem a "trick" question; each question has a specific objective. There are no trick questions. The questions and answers mean exactly what is stated, and refer to the general rule rather than to the exception to the rule.
4. There is only one correct and complete answer to each item. The alternate answers are derived from incorrect computations, or based upon common misconceptions, or lack of knowledge about the subject.
5. If you find that you have considerable difficulty with a particular test item do not spend too much time on it. Go on to the questions that you can answer readily, then return to the difficult items.
6. For a computer problem, select the answer closest to your own solution. If you have solved the problem correctly, your answer will be closer

to the correct answer than to any of the other choices. The correct answer is an average of solutions obtained by using several types of computers.

7. When marking the test answer sheet be sure that the number of the question matches the number on the answer sheet and that you mark one and only one answer block per question. An answer block for a test question that is left blank, a partially erased answer block, or more than one answer block marked is scored as wrong. Carefully check your answer sheet before you turn it in.

### Recommended Study Materials

The prospective helicopter pilot will find the following list of publications useful in his preparation for the written test. All of these items may be obtained from a GPO bookstore or from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. In addition, there are many excellent textbooks and other reference materials produced commercially that may be obtained from the publishers, various bookstores and fixed-based operators engaged in flight training.

1. **BASIC HELICOPTER HANDBOOK**, AC 61-13A. This handbook provides information for the applicant who is preparing for the private, commercial, or flight instructor pilot certificate with a helicopter rating. (\$1.90 GPO.) Catalog No. FAA 5.8/2 :H36.

2. **PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE**, AC 61-23A. This handbook contains essential, authoritative information used in training and guiding applicants for private and commercial pilot certification, flight instructors, and flying school staffs. (\$5.30 GPO.) Catalog No. TD 4.408:P 64/5.

3. **AVIATION WEATHER**, AC 00-6. This handbook contains information on weather phenomena for pilots and other flight operations personnel whose interest in meteorology is primarily in its application to flying. Reprinted in 1969. (\$4.00 GPO.) Catalog No. FAA 5.8/2:W 37.

4. **WAKE TURBULENCE**, AC 90-23D. This circular alerts pilots to the hazards of wake turbulence which trail behind aircraft in flight, and recommends related operational procedures. Free upon request from: U.S. Department of Transportation, Publications Section, TAD 443.1, Washington, D.C. 20590.

5. **TERRAIN FLYING**, AC 91-15. This pocket-size booklet is designed primarily for the private pilot with an airplane rating. However, the helicopter pilot should find this booklet beneficial since it contains observations, opinions, warn-

ings, and advice from veteran pilots regarding flight over various types of terrain. (\$1.40 GPO.) Catalog No. TD 4.2:T27.

6. **AIRMAN'S INFORMATION MANUAL**. This manual (AIM) presents, in four parts, information necessary for planning and conducting flights within the National Airspace System. Besides providing frequently updated airport and NAVAID data, AIM includes instructional and procedural information, and is designed for use in the cockpit.

To better serve the needs of the individual pilot, each part is available on a separate annual subscription basis.

Part 1. *Basic Flight Manual and ATC Procedures* (Annual Subscription \$7.00, Foreign Mailing—\$1.75 additional—GPO). Issued quarterly. Catalog No. TD 4.12:pt.1/.

Part 2. *Airport Directory*. Annual Subscription \$7.00, Foreign Mailing—\$1.75 additional—GPO). Issued semi-annually. Catalog No. TD 4.12:pt.2/.

Parts 3 and 3A. *Operational Data and Notices to Airmen* (Annual Subscription \$22.00, Foreign Mailing—\$5.50 additional GPO). Part 3 is issued every 56 days and Part 3A is issued every 14 days. Catalog No. TD 4.12:pt.3/.

Part 4. *Graphic Notices and Supplemental Data*. (Annual Subscription \$9.50, Foreign Mailing—\$2.50 additional GPO). Issued quarterly. Catalog No. TD 4.12:pt.4/.

7. **FEDERAL AVIATION REGULATIONS**. Suggested Parts for study are:

Part 1—*Definitions and Abbreviations* (\$3.00 plus \$0.75 additional foreign mailing GPO.)  
Part 61—*Certification: Pilots and Flight Instructors*, (\$5.05 plus \$1.30 additional foreign mailing. GPO.)

Part 71—*Designation of Federal Airways, Area Low Routes, Controlled Airspace and Reporting Points*, Volume XI (\$5.00 plus \$1.25 additional foreign mailing. GPO.)

Part 91—*General Operating and Flight Rules* (\$11.30 plus \$2.85 additional foreign mailing. GPO.)

Part 135—*Air Taxi Operators and Commercial Operators of Small Aircraft*, Volume VIII. (\$5.00 plus \$1.25 additional foreign mailing. GPO.)

Note: FAA is phasing out the Volume system and is reissuing the FARs as individual Parts. For information regarding the status of this conversion obtain a copy of the latest edition of Advisory Circular 00-2 from:

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

8. **NATIONAL TRANSPORTATION SAFETY BOARD, NTSB PART 430.** This publication deals with procedures required in the notification and reporting of accidents and lost or overdue aircraft within the United States, its territories, and possessions. It is free, upon request, from the National Transportation Safety Board, Publications Unit, Washington, D.C. 20591.

9. **VFR/IFR PILOT EXAM-O-GRAMS.** These brief summaries provide concise information about certain concepts and procedures that are critical to aviation safety.

A list of the Exam-O-Grams presently available appears in appendices A and B. These summaries are free and may be obtained from.

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

10. **PILOT'S WEIGHT AND BALANCE HANDBOOK, AC 91-23.** This handbook provides an easily understood text on aircraft weight and balance. It progresses from an explanation of basic fundamentals to the complete application of weight and balance principles in large aircraft operations. It also contains a section pertaining to helicopter weight and balance. (\$1.25 GPO.) TD4.408:P64/3.

11. **HELICOPTER FLIGHT MANUALS AND OWNERS MANUALS.** These manuals may be obtained from individual aircraft manufacturing companies or from local dealers and distributors.

### How To Obtain GPO Publications

Requests for publications sold through the Superintendent of Documents should be submitted on an order form, if possible. A sample order form is included in the back of this guide, which may be duplicated by the user, or may be obtained *free* upon request from:

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

In order to aid the processing of your order, the following suggestions are offered:

1. Send orders for subscription items and single sales items on separate requests.

2. Give the exact title of the publication, the agency identification number, and the catalog number.

3. Send a check or money order—NOT CASH—in the *correct* amount. (Include an additional 25% of the total order price to cover postage for foreign mailing.)

4. Enclose a self-addressed mailing label, if a letter is used, when you don't have an order form.

5. Use GPO Bookstores.

In addition to the mail-order service provided by the Office of the Superintendent of Documents, several GPO bookstores have been established throughout the country which constitute a part of the operations of the Superintendent of Documents. These GPO bookstores are located at the following addresses:

Atlanta GPO Bookstore  
Room 100 Federal Bldg.  
275 Peachtree St., NE  
Atlanta, Ga. 30303

Birmingham GPO Bookstore  
Room 102A 2121 Bldg.  
2121 Eighth Ave., N.  
Birmingham, Ala. 35203

Boston GPO Bookstore  
Room G25 John F. Kennedy Federal Bldg.  
Sudbury St.  
Boston, Mass. 02203

Canton GPO Bookstore  
Federal Office Bldg.  
201 Cleveland Ave.  
Canton, Ohio 44702

Chicago GPO Bookstore  
Room 1463—14th Floor  
Everett McKinley Dirksen Bldg.  
219 South Dearborn St.  
Chicago, Ill. 60604

Cleveland GPO Bookstore  
Room 171 Federal Bldg.  
1240 East 9th St.  
Cleveland, Ohio 44199

Dallas GPO Bookstore  
Room 1C46 Federal Bldg.—U.S. Courthouse  
1100 Commerce St.  
Dallas, Texas 75202

Denver GPO Bookstore  
Room 1421  
Federal Bldg.—U.S. Courthouse  
1961 Stout St.  
Denver, Co. 80202

Detroit GPO Bookstore  
Room 229 Federal Office Bldg.  
231 W. Lafayette Blvd.  
Detroit, Mich. 48226

Jacksonville GPO Bookstore  
Room 158, Federal Bldg.  
400 West Bay Street  
Jacksonville, Fla. 32202

Kansas City GPO Bookstore  
Room 144 Federal Office Bldg.  
601 East 12th St.  
Kansas City, Mo. 64106

Los Angeles GPO Bookstore  
Room 1015 Federal Office Bldg.  
300 North Los Angeles St.  
Los Angeles, Ca. 90012

Milwaukee GPO Bookstore  
Federal Bldg.  
Room 190  
517 E. Wisconsin Ave.  
Milwaukee, Wis. 53202

New York GPO Bookstore  
Room 1356  
26 Federal Plaza  
New York, N.Y. 10007

Philadelphia GPO Bookstore  
Federal Office Bldg.  
Room 1214  
600 Arch St.  
Philadelphia, Pa. 19106

San Francisco GPO Bookstore  
Room 1023 Federal Office Bldg.  
450 Golden Gate Ave.  
San Francisco, Ca. 94102

Seattle GPO Bookstore  
Federal Bldg.  
Room 1056  
909 First Ave.  
Seattle, Wash. 98174

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

U.S. Department of Commerce Bookstore  
14th & Constitution Ave., NW  
Washington, D.C. 20230

USIA Bookstore  
1776 Pennsylvania Ave., NW  
Washington, D.C. 20547

U.S. Department of State Bookstore  
21st & C Sts. NW  
Washington, D.C. 20520

Pentagon Bookstore  
Main Concourse, south end  
Washington, D.C. 20310

Forrestal Bookstore  
Rm. 1-J-001  
James H. Forrestal Bldg.  
100 Independence Ave., SW  
Washington, D.C. 20407

## STUDY OUTLINE

### Private or Commercial Pilot Rotorcraft-Helicopter Knowledge Areas

#### I. FEDERAL AVIATION REGULATIONS

##### A. Parts 1; 71: Definitions/Controlled Airspace.

1. Air commerce.
2. Airport traffic area.
3. Ceiling.
4. Commercial operator.
5. Flight level.
6. Flight visibility.
7. Interstate air commerce.
8. Large aircraft.
9. Major alteration.
10. Major repair.
11. Pilot in command.
12. Second in command.
13. Federal airway.
14. Control area.
15. Continental control area.
16. Control zone.
17. Terminal control area.
18. Positive control area.

##### B. Part 61: Certification: Pilots and 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. Duration of medical certificates.
7. General limitations.
8. Pilot logbooks.
9. Operations during medical deficiency.
10. Second in command qualifications.
11. Recent experience: pilot in command.
12. Pilot in command proficiency check.
13. Falsification, reproduction, alteration.
14. Change of address.
15. Private pilot privileges/limitations.
16. Commercial pilot privileges/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. Flight crewmembers at stations.
5. Interference with crewmembers.
6. Careless or reckless operation.
7. Liquor and drugs.
8. Dropping objects.
9. Fastening of safety belts.
10. Portable electronic devices.
11. ATC transponder equipment requirements.
12. Civil aircraft: certificates required.
13. Aircraft airworthiness.
14. Aircraft operating limitations/markings.
15. Instrument and equipment requirements.
16. Limited/restricted aircraft limitations.
17. Report: aircraft identification/activity.

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

1. Waivers.
2. Operating near other aircraft.
3. Right-of-way rules.
4. Aircraft lights.
5. Complying-ATC clearances/instructions.
6. ATC light signals.
7. Minimum safe altitudes; general.
8. Altimeter settings.
9. Flight plan; information required.
10. Operation-in vicinity of airport.
11. Operation-airport with control tower.
12. Operation-airport without control tower.
13. Flight in terminal control areas.
14. Temporary flight restrictions.
15. Flight test areas.
16. Restricted and prohibited areas.
17. Positive control areas; route segments.
18. Basic VFR weather minimums.
19. Special VFR weather minimums.
20. VFR cruising altitude or flight level.
21. ATC transponder test/inspection.

##### 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. Inspectors/progressive inspections.
5. Altimeter system tests/inspections.

6. Maintenance records/transfer of records.
7. Rebuilt engine maintenance records.
8. ATC transponder test/inspection.

**F. Part 135: Air Taxi Operators and Commercial Operators of Small Aircraft (Commercial Pilots only).**

1. Subpart A-general.
2. Subpart B-rules-ATCO certificate holder.
3. Subpart C-operating rules.
4. Subpart D-crewmember qualifications.
5. Subpart E-aircraft and equipment.

**II. NATIONAL TRANSPORTATION SAFETY BOARD PROCEDURAL REGULATION-PART 430**

**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.**

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

**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 Control and General Operations.
- F. Series 120-Air Carrier and Commercial Operators and Helicopters (Commercial Pilots only).
- G. Series 150-Airports.
- H. Series 170-Air Navigation Facilities.

**IV. AIRMAN'S INFORMATION MANUAL**

- A. Part 1: Basic Flight Manual and ATC Procedures.
  1. Glossary of aeronautical terms.
  2. Airport lighting/marking/aids.
  3. Air navigation radio aids.
  4. Visual approach slope indicator.
  5. Controlled/uncontrolled airspace.
  6. Operating at nontower airports.

**7. Special use airspace-prohibited, restricted, intensive student jet training area (ISJTA), alert areas.**

8. Automatic terminal information service.
9. ATC departure/enroute/arrival procedures.
10. Radar traffic information service.
11. Terminal radar program for VFR aircraft.
12. Aeronautical advisory stations (UNICOM).
13. Radiotelephone phraseology/technique.
14. Traffic/wind direction indicators
15. Obtaining weather information/briefing.
16. Flight plan.
17. ADIZ and designated mountainous areas.
18. Medical facts for pilots.
19. Good operating practices.

**B. Part 2: Airport Directory.**

1. Obtaining airport/heliport data.
2. FSS/weather service telephone numbers.

**C. Part 3: Operational Data and Notices to Airmen.**

1. Obtaining radio facility/FSS data.
2. Special notices/special operations.
3. Notices to airmen (NOTAMS).

**D. Part 4: Graphic Notices and Supplemental Data.**

1. Terminal radar service areas.
2. Terminal area graphic notices.
3. Restrictions to en-route navigation aids.
4. VOR receiver checkpoints.
5. Parachuting jumping areas.
6. Olive branch routes.

**V. AVIATION 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. Structures.
2. Types.
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. Ice producing cloud types.
2. Structural ice formation.
3. Types and intensities of in-flight structural icing.

4. Accretion rate of in-flight structural icing.
5. Effects on in-flight structural icing.
6. Structural aircraft icing and frost on the ground.
7. Structural anti-icing and deicing.
8. Instrument and powerplant icing.
9. Fuel and oil anti-icing.

#### L. Thunderstorms.

1. Conditions necessary for formation.
2. Structure.
3. Classification.
4. Hazards.
5. Information from radar.
6. Tornadoes.
7. Do's and don'ts of thunderstorm flying.

#### M. Common IFR Producers.

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 Reporting System.

#### O. Weather Observations.

1. Surface weather observations.
2. Pilot 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.

#### Q. Aviation Weather Forecasts.

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

#### R. Services to Pilots.

1. FSS briefing.
2. Automatic terminal information service.
3. Pilots automatic telephone weather answering service (PATWAS).
4. Transcribed weather broadcasts.
5. En-route flight advisory service.

## **VI. GENERAL AERODYNAMICS**

- A. Airfoil.
- B. Chord Line.
- C. Relative Wind.
- D. Pitch Angle.
- E. Angle of Attack.
- F. Lift.
- G. Drag (airfoil).
- H. Stall.
- I. Lift and Angle of Attack.
- J. Lift and Velocity of Airflow.
- K. Lift and Air Density.
- L. Lift and Weight.
- M. Thrust and Drag.

## **VII. AERODYNAMICS OF FLIGHT**

- A. Powered Flight.
  - 1. Forces acting on the helicopter.
    - a. Hovering flight.
    - b. Vertical flight.
    - c. Forward flight.
    - d. Sideward flight.
    - e. Rearward flight.
  - 2. Torque.
  - 3. Auxiliary rotor.
  - 4. Gyroscopic precession.
  - 5. Dissymmetry of lift.
  - 6. Blade flapping.
  - 7. Coning.
  - 8. Axis of rotation.
  - 9. Coriolis effect.
  - 10. Translating tendency or drift.
  - 11. Ground effect.
  - 12. Translational lift.
  - 13. Transverse flow effect.
  - 14. Pendular action.
- B. Autorotation.
  - 1. Rotor RPM during autorotation.
  - 2. Flares during autorotation.

## **VIII. LOADS AND LOAD FACTORS**

- A. Lift Components of a Turn.
- B. Loads.
- C. Load Factor.

## **IX. FUNCTIONS OF THE CONTROLS**

- A. Collective Pitch Control.
- B. Throttle Control.

- C. Collective Pitch-Throttle Coordination.
- D. Antitorque Pedals.
- E. Heading Control.
- F. Cyclic Pitch Control.

## **X. OTHER HELICOPTER COMPONENTS AND THEIR FUNCTIONS**

- A. Transmission System
- B. Clutch.
  - 1. Centrifugal clutch.
  - 2. Friction or belt drive system clutch.
- C. Freewheeling Unit.
- D. Swash Plate Assembly.
- E. Main Rotor System.
  - 1. Fully articulated rotor systems.
  - 2. Semirigid rotor systems.
  - 3. Rigid rotor systems.

## **XI. HELICOPTER OPERATIONS**

- A. General.
  - 1. Preflight/postflight safety practices.
  - 2. Use of proper grade/type fuel.
  - 3. Fuel system operation.
  - 4. Fuel contamination-prevention/elimination.
  - 5. Rotor and engine operating limitations.
  - 6. Helicopter operating limitations.
- B. Engine.
  - 1. Reciprocating engine principles.
  - 2. Engine starting/shutdown.
  - 3. Detonation cause/effect.
  - 4. Carburetor/fuel injection principles.
  - 5. Carburetor ice-cause/detection/elimination.
  - 6. Manifold pressure versus RPM.
  - 7. Interpreting engine instruments.
  - 8. Emergency-engine/systems/equipment/fire.
- C. Weight and Balance.
- D. Helicopter Performance.
  - 1. Effect of high density altitude on helicopter performance.
    - a. Hovering flight.
    - b. Takeoff.
    - c. Rate of climb.
    - d. Landing.
  - 2. Effect of gross weight on helicopter performance.
  - 3. Effect of wind on helicopter performance.
  - 4. Practical methods for predicting helicopter performance.
    - a. Manifold pressure and payload.
    - b. Manifold pressure and hovering ceiling.



- c. Payload and wind.
- d. Hovering and skid height.
- e. Hovering ceiling and gross weight.
- f. Service ceiling and gross weight.

#### E. Some Hazards of Helicopter Flight.

1. Retreating blade stall.
2. Settling with power.
3. Ground resonance.
4. Abnormal vibrations.
  - a. Low-frequency vibrations.
  - b. Medium-frequency vibrations.
  - c. High-frequency vibrations.
5. Transition from powered flight to autorotation.
6. Height-velocity curve.
7. Antitorque system failure.
  - a. Antitorque system failure in forward cruising flight.
  - b. Antitorque system failure while hovering.
8. Wake turbulence.
9. Mid-air collisions.

#### F. Precautionary Measures and Critical Conditions.

1. General precautionary rule.
2. Rotor RPM operating limits.
3. Extreme attitudes and overcontrolling.
4. Flight technique in hot weather.
5. Effect of altitude on instrument readings.
6. High altitude pilot technique.
7. Tall grass and water operations.
8. Carburetor icing.
  - a. Conditions favorable for carburetor icing.
  - b. Indications of carburetor icing.
  - c. Carburetor air temperature gage.
  - d. Use of carburetor heat.
  - e. Fuel injection.

#### G. Flight Maneuvers.

1. Hovering flight.
2. Taxiing-air and surface.
3. Takeoffs/approaches/landings.
4. Slope takeoff/landing.
5. Autorotations.
6. Rapid deceleration/quick stop.
7. Confined area/pinnacle operations.
8. Ground reconnaissance.

### XII. FLIGHT INSTRUMENTS AND SYSTEMS

- A. Attitude Indicator Operation/Errors.
- B. Heading Indicator Operation/Errors.
- C. Turn Indicator.
- D. Vertical Velocity Indicator Operation/Errors.

- E. Airspeed Indicator Operation/Errors.
- F. Altimeter Operation/Errors.
- G. Vacuum Systems/Instruments.
- H. Pitot-static Systems/Instruments.
- I. Magnetic Compass Operation/Errors.
- J. Altimeter Setting Procedure/Significance.
- K. Pressure Altitude-Significance/Obtaining.
- L. Gyroscopic Principles.

### XIII. RADIO COMMUNICATIONS

- A. VHF/UHF Radio Communications/Phraseology.
- B. Position Reporting Procedure.
- C. Tower/FSS/Enroute-Advisories/Instructions.
- D. FSS Communications Procedures.
- E. Obtaining Emergency Assistance.
- F. Lost Procedure When Radio is Inoperative.
- G. Use of Proper Communications Frequencies.

### XIV. NAVIGATION

#### A. General.

1. Sectional chart interpretation.
2. Relating chart symbols to regulations.
3. Pilotage/recognition of landmarks.
4. Determining courses/distances on charts.
5. Planning traffic pattern.
6. Navigation computer principles.
7. Computing heading/courses.
8. Computing time, distance, speed, fuel.
9. Computing rates of climb/descent.
10. Computing wind direction/speed in-flight.
11. Computing off-course corrections.
12. Selecting VHF cruising altitudes.

#### B. Radio.

1. Characteristics of VOR facilities.
2. Tuning VOR receivers.
3. Identifying VOR stations.
4. VOR interpretation/orientation.
5. Intercepting VOR radials.
6. Tracking VOR radials.
7. Groundspeed checks using VOR radials.
8. VOR frequency interference.
9. VOR test signals/VOR receiver checks.
10. Characteristics of ADF facilities.
11. Computing off-course corrections.
12. Identifying stations used for ADF.
13. ADF/RMI interpretation/orientation.
14. Intercepting, tracking ADF/RMI bearings.
15. Use of compass locators.



## SAMPLE TEST ITEMS

The following test items are included only for the purpose of acquainting you with the format used in the construction of FAA written tests and as a sampling of your aeronautical knowledge. They do not direct attention to all of the topics on which you will be tested in the official tests. For this reason you should concentrate on the section entitled "Study Outline". A knowledge of all of the topics presented in the outline—not just the ability to answer these few sample test items—should be your goal as you prepare for the written tests in either of the two certification areas.

Some of the following test items refer to certain illustrations located in the appendices of this guide. The illustrations are representative of those used in the Private and Commercial Rotorcraft-Helicopter Written Tests.

### Items, Answers, and Explanations

1. Federal Aviation Regulations require careful pre-flight planning

- 1—on all flights for hire.
- 2—on all flights which carry passengers.
- 3—on all IFR and VFR cross-country flights.
- 4—only on IFR cross-country flights.

*Answer. Response 3.* FAR 91.5 *Preflight Action*, states: "Each pilot in command shall, before beginning a flight, familiarize himself with all available information concerning that flight. This information must include, for a flight under IFR or a flight not in the vicinity of an airport, available weather reports and forecasts, fuel requirements, alternatives available if the planned flight cannot be completed, and any known traffic delays of which he has been advised by ATC."

2. Assume that you have a second-class medical certificate dated June 3, 1974, and your Commercial Pilot Certificate was issued July 1, 1974. Under these circumstances, you could continue to exercise the privileges of

- 1—a commercial pilot until July 1, 1975, and those of a private pilot until July 1, 1976.
- 2—a commercial pilot until June 3, 1975, and those of a private pilot until June 3, 1976.
- 3—either a private or commercial pilot until August 1, 1975.

- 4—neither a private nor a commercial pilot after June 3, 1975.

*Answer. Response 1.* A Commercial Pilot Certificate has no specific expiration date and the issuance date is irrelevant to this situation. However, to be valid, the pilot must possess a current appropriate medical certificate. For operations requiring a Commercial Pilot Certificate, the second-class medical certificate expires at the end of the last day of the 12th month after the month in which it is issued. Thus, commercial pilot privileges may be exercised until July 1, 1975. For operations requiring only a Private Pilot Certificate, a second-class medical certificate expires at the end of the last day of the 24th month after the month in which it is issued. In this case, private pilot privileges may be exercised until July 1, 1976.

3. In planning a cross-country flight you determine that the total distance is 105 statute miles and that your average groundspeed will be 70 mph. The Helicopter Flight Manual shows the total fuel capacity is 29.8 gals. with 2.3 gals. unusable. If you start with full fuel tanks and consume 10.5 gals. per hour, how much usable fuel will remain at the completion of the flight?

- 1—8.7 gals.
- 2—11.7 gals.
- 3—14.0 gals.
- 4—16.1 gals.

*Answer. Response 2.* This may be solved arithmetically or by use of a slide rule computer. At a groundspeed of 70 mph it will take 1 hour and 30 minutes to travel the distance of 105 miles. In 1-1/2 hours at the rate of consumption of 10.5 gph, the amount of fuel used will be 15.8 gals. With only 27.5 gals. usable ( $29.8 - 2.3 = 27.5$ ), the remaining usable fuel at the end of the flight will be 11.7 gals.

4. Certain maintenance inspections are required by regulations to be performed periodically. Completion of an "annual" inspection and the authorization for the return of the aircraft to service will always be indicated by the

- 1—issuance date of the Airworthiness Certificate.
- 2—completion date of the 100-hour inspection form.
- 3—notation in the Aircraft and Engine records.

4—completion of appropriate portions of a Repair and Alteration Form.

*Answer. Response 3.* An Airworthiness Certificate is issued when the aircraft is deemed airworthy at the time of manufacture or after substantial alteration or repair. Only when this certificate has been issued within the preceding 12 months will it indicate compliance with annual inspection requirements. Therefore, response number 1 is incorrect. Number 2 is incorrect because although an annual inspection each 12 months will satisfy the requirements of a 100-hour inspection, a 100-hour inspection will not suffice for an annual inspection. Number 3 is correct because FAR stipulates that appropriate entries be made in maintenance records (logbooks) each time inspection or maintenance is done on the aircraft or engine. Number 4 is also incorrect since the Repair and Alteration Form is used for the description and approval of work done on a repaired or altered aircraft unit.

**EXCERPTS FROM THE HELICOPTER FLIGHT MANUAL**

Fuel 100/130 octane Maximum gross weight— 1,600 pounds

ITEMS	MOMENT	
	WEIGHT 1000/INCH (POUNDS)	POUNDS
Basic Helicopter Wt.	935	94.3
Fuel, Main (Full Tank-25 gal.)	150	?
Fuel, Aux. (Full Tank-19 gal.)	114	?
Pilot	?	?
Passenger	?	?
<b>TOTALS</b>	<b>?</b>	<b>?</b>

\* \* \* \* \*

5. You plan to make a flight in the helicopter described above. Your weight is 180 lbs. and the weight of your passenger is 170 lbs. Using the loading charts (See figures 2 and 3.) and the center of gravity charts (See figures 3 and 4.), how much fuel can be carried under these conditions?

(NOTE: A gallon of fuel weighs 6 lbs.)

- 1—A maximum of 8.5 gals.
- 2—Not more than 25 gals.
- 3—The aircraft is over gross weight as loaded.
- 4—A full load.

*Answer. Response 4.* This problem can be computed as follows:

ITEMS	MOMENT	
	WEIGHT (POUNDS)	1000/INCH POUNDS
1. Basic helicopter	935	94.3
2. Pilot	180	15.0
3. Passenger	170	14.2
<b>SUB TOTALS</b>	<b>1,285</b>	<b>123.5</b>
4. Fuel Main (full tank-25 gal.)	150	16.0
<b>SUB TOTALS</b>	<b>1,435</b>	<b>139.5</b>
5. Fuel Aux. (full tank-19 gal.)	114	12.0
<b>TOTALS</b>	<b>1,549</b>	<b>151.5</b>
Maximum gross weight	1,600	
	<u>-1,549</u>	

51 lbs. (Aircraft is below maximum weight by this amount.)

When plotting the total weight of 1,549 lbs. and the total moment on 151.5 on the center of gravity chart (See figure 5.) you find that the aircraft is within weight and moment limits with fuel tanks filled to capacity.

6. Based on the Hovering Ceiling Chart (See figure 7.), and the following set of conditions, what hovering performance could you expect while operating in ground effect?

- Gross Weight ----- 1,600 lbs.
- Pressure altitude ----- 2,000 ft.
- Temperature ----- 100° F.
- Wind ----- Calm

- 1—Hovering should be possible when operating in either dry or 80% relative humidity.
- 2—Hovering should be possible only when operating in dry air.
- 3—Hovering should not be possible when operating in either dry air or 80% relative humidity.
- 4—Hovering should be possible when operating in either dry air or 80% relative humidity, but a running landing would be recommended.

*Answer. Response 2.* Based on the chart and conditions provided with this test item, it can be determined that hovering should be possible in ground effect up to a pressure altitude of 3,000 ft.

in dry air and up to 1,300 ft. with a relative humidity of 80% or greater. Therefore, hovering should be possible at a pressure altitude of 2,000 ft. in dry air only. Responses 1, 3, and 4 all contain incorrect or partially incorrect statements.

7. If you are tuned to a VOR and have the course selector set properly to follow the 025 radial outbound from the station, which of the following represents the proper indications of the OMNI components (See Figure 1.) assuming you are on course?

*Answer. Response 2.* The proper procedure when flying directly away (following a radial outbound) from a VOR/VORTAC station is to set the course selector to the radial desired, in this case to 025. Therefore, responses 3 and 4 would be incorrect. Since the test item states that you are on course (outbound) your TO-FROM indicator would read FROM. Therefore, response 1 is incorrect.

8. Based on the Airspeed vs. Altitude Chart (See figure 6.), which of the following airspeed-altitude combinations should be avoided?

	Airspeed	Altitude
A	15 mph	450 ft.
B	40 mph	20 ft.
C	45 mph	50 ft.
D	50 mph	100 ft.

The combinations to be avoided are

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

*Answer. Response 3.* Airspeed vs. altitude or height vs. velocity performance information is required by regulations for each model of helicopter certificated. This information is generally presented by charts, and portrays those airspeed-altitude combinations which are considered unsafe in the event an autorotative landing should become necessary. The airspeed-altitude combinations listed under C and D both lie within the shaded areas of the chart provided and should be avoided. The airspeed-altitude combinations listed under A and B both lie within the unshaded areas and are considered safe for the purpose of autorotative landings. Responses 1, 2, and 4 are incorrect because they contain one or more of the safe combinations.

SA35 031 700  
 PHX 20M150300TRW—  
 100/75/68/0608/998

9. Based on the Aviation Weather Report above, at what approximate indicated altitude (MSL)

would you expect to find the base of the ceiling at Phoenix Sky Harbor International Airport where the field elevation is 1,128 ft?

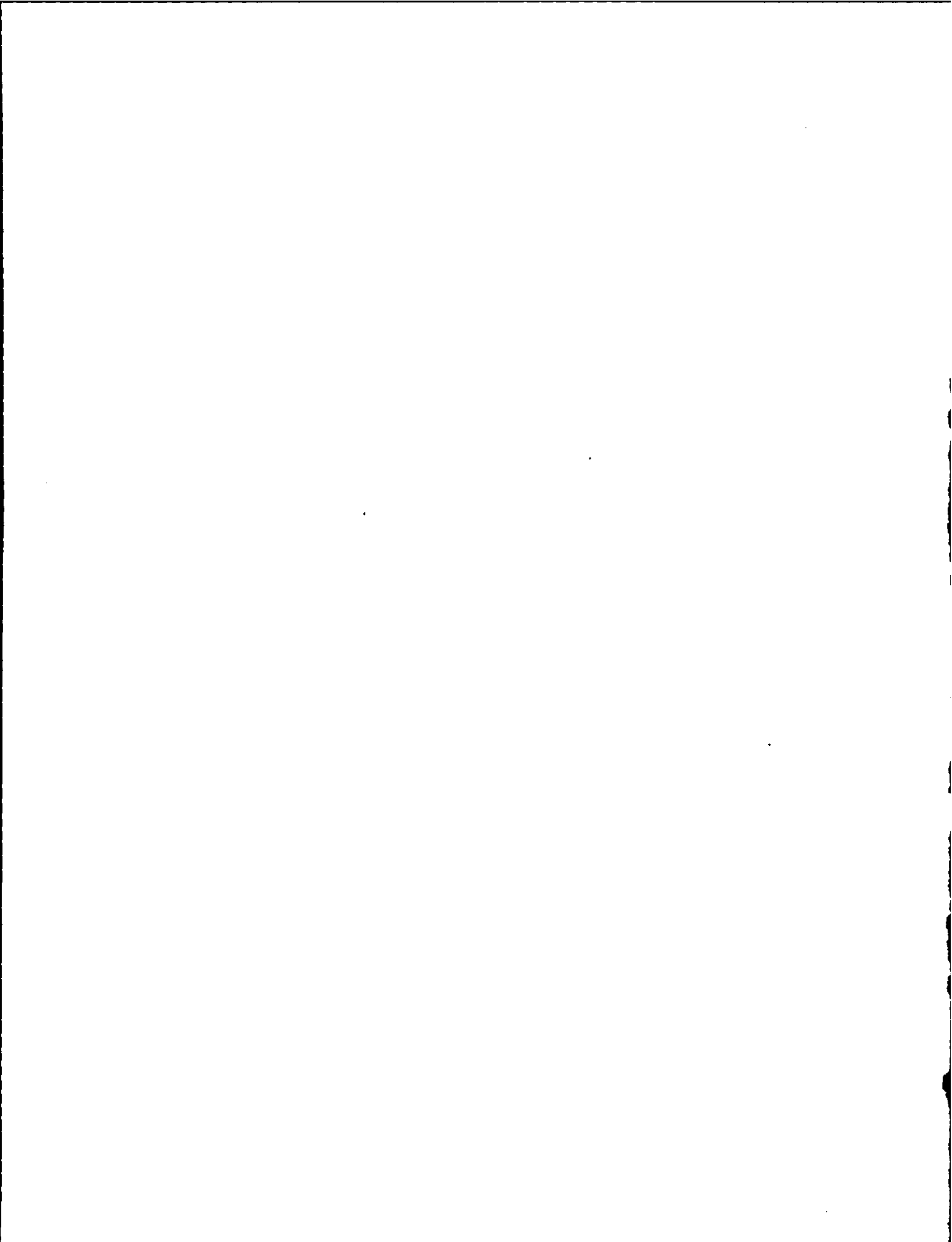
- 1—1,500 ft. msl.
- 2—2,628 ft. msl.
- 3—3,000 ft. msl.
- 4—4,128 ft. msl.

*Answer. Response 2.* Ceiling is defined in Federal Aviation Regulations, Part 1, as the height above the earth's surface of the lowest layer of clouds or obscuring phenomena that is reported as "broken", "overcast", or "obscuration", and not classified as "thin" or "partial". In an Aviation Weather Report a letter preceding height of cloud layer identifies the ceiling layer and indicates how ceiling height was obtained. Sky cover symbols are given in ascending order and the figures preceding symbols are heights of cloud layers in hundreds of feet above the surface. Therefore, in the example above, 20M150300 means that the cloud layers are at 200 ft., 1,500 ft. and 3,000 ft. The M150 identifies the ceiling as a measured 1,500-ft. broken ceiling. To determine the height of the ceiling above mean sea level (msl) you must add 1,500 to the field elevation of the reporting station PHX (Phoenix Sky Harbor International Airport). 1,500 ft. + 1,128 ft. = 2,628 ft. msl, the correct answer.

10. Using the temperature and altimeter setting for PHX in the Aviation Weather Report for item 9, you determine the density altitude to be approximately

- 1—sea level.
  - 2—1,072 ft.
  - 3—2,400 ft.
  - 4—3,900 ft.
- NOTE: Field elevation at Phoenix Sky Harbor International Airport is 1,128 ft. Also, use the Density Altitude Chart. (See figure 10.)

*Answer. Response 3.* To work this problem, pressure altitude must be determined before you can determine the density altitude. You are given the altimeter setting (29.98) and the temperature (75° F.) in the PHX Aviation Weather Report. Field elevation which normally is found on the navigation chart, is given in the "NOTE". With this information you go to the Pressure Altitude and Density Chart (See figure 10.) to first determine the pressure altitude then the density altitude. 29.98 falls between 29.92 and 30.0 and by interpolation you determine that 56 ft. must be subtracted from 1,128 ft. for a pressure altitude of 1,072 ft. You plot 1,072 ft. on the 75° temperature line and determine the density altitude at PHX to be approximately 2,400 ft.



## ADDITIONAL QUESTIONS FOR STUDY

Because the following questions are offered for the sole purpose of encouraging study, answers and explanations are not included. Here again, the applicant should be aware that these questions do not cover all those subject areas found on the written tests.

1. What are basic VFR weather minimums for operating a helicopter?
2. What current documents must be in your personal possession any time you are acting as pilot in command?
3. How soon after consuming alcoholic beverages may you act as a crewmember of a civil aircraft?
4. How can you determine the pressure altitude at a airport prior to takeoff?
5. Under what circumstances may a private pilot receive compensation when acting as pilot in command of an aircraft?
6. What is the difference between control zones and control areas?
7. Which is considered to be more susceptible to icing, an engine equipped with a conventional float type carburetor or one equipped with a fuel injector unit?
8. Before takeoff you set the altimeter to the current altimeter setting for that airport. What should the altimeter read?
9. When should lighted position lights be displayed?
10. What altitude should be maintained when operating a helicopter under VFR in level cruising flight at an altitude of more than 3,000 ft. above the surface and below 18,000 feet msl while on a magnetic course of 0° through 170°?
11. What do the rules contained in Part 430 of the National Transportation Safety Board Procedural Regulation pertain to?
12. What action should you take if a control tower directs a flashing red light at you while you are on the final approach to land?
13. Are "Airport Traffic Areas" depicted on aeronautical charts?
14. Who has the responsibility of determining that the helicopter you plan to fly is in condition for safe flight?
15. Are transponders required when operating a helicopter within Terminal Control Areas (TCAs)?
16. What can a pilot do to greatly assist the weather briefer when requesting weather information by telephone?
17. What type weather is most likely to develop when the temperature/dewpoint spread is 4° and decreasing?
18. Scheduled weather broadcasts occur how often?
19. What type weather conditions should one expect to be associated with an advancing warm front that contains moist and stable air?
20. What is a "Squall Line"?
21. Severe turbulence is most likely to occur in what type clouds.
22. What is "settling with power," and how can a recovery from this situation be best accomplished?
23. What causes retreating blade stall?
24. What action should the pilot take if the antitorque system fails while the helicopter is hovering or in flight?
25. What is ground resonance and what action should a pilot take if it is encountered?
26. For navigation purposes, in both instances shown below, which fact must be determined first?
  1. True course or true heading.
  2. Groundspeed or true airspeed.
27. Where can you find information about any "Special Use Airspace" that may be located in the area or along the route where you plan to fly?

**28.** Which "Part" of the Airman's Information Manual should you use to determine type fuel, available servicing, and other information for an airport you wish to use?

**29.** Are you familiar with the errors of a magnetic compass?

**30.** How do you file, open and close VFR and IFR flight plans?



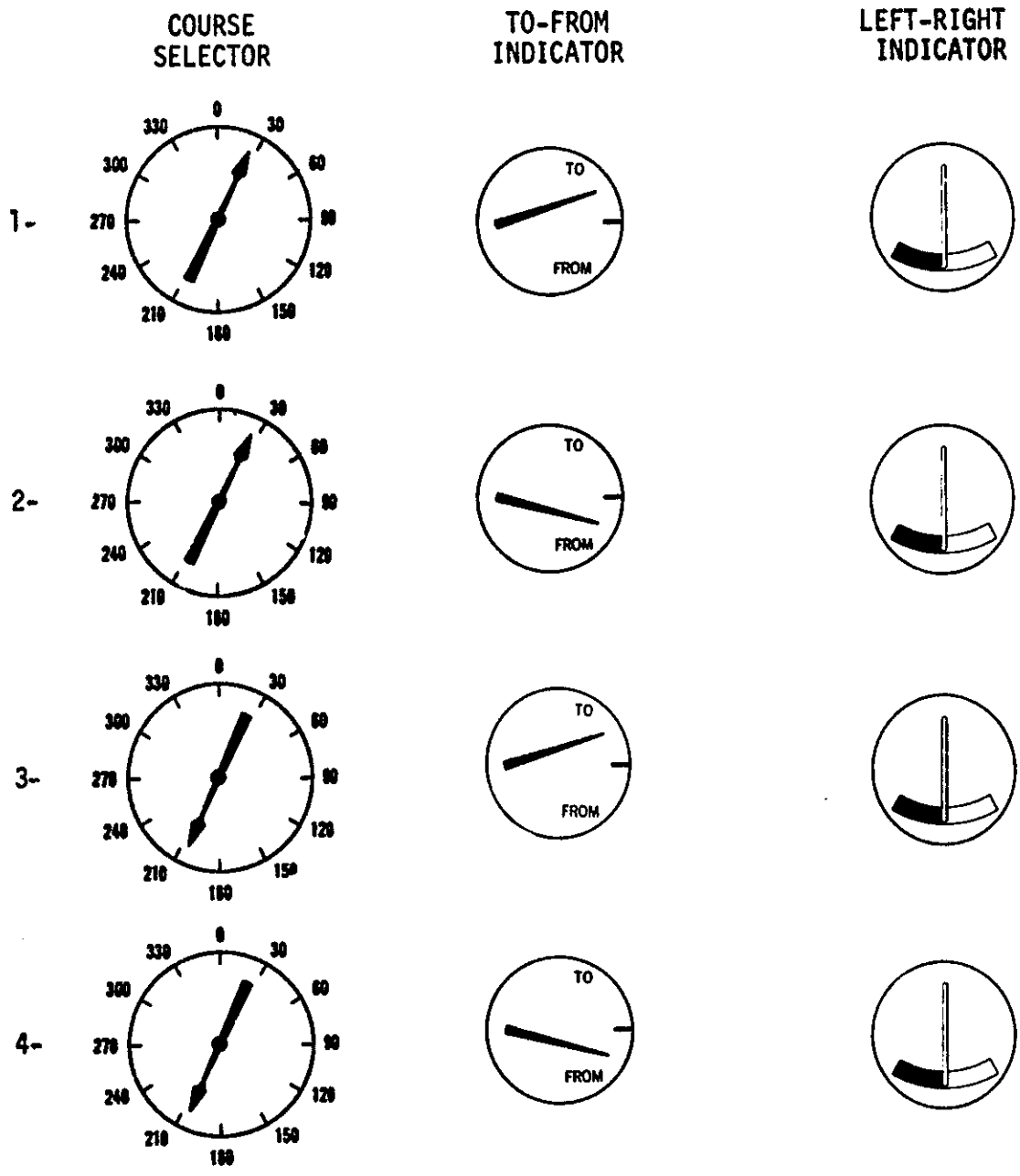
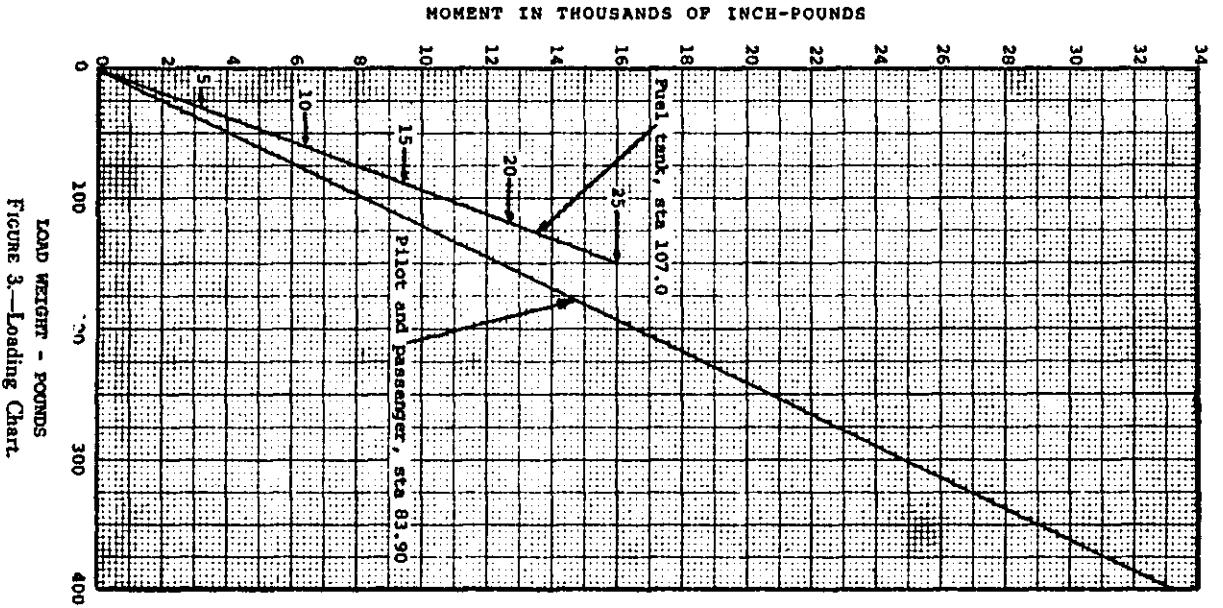
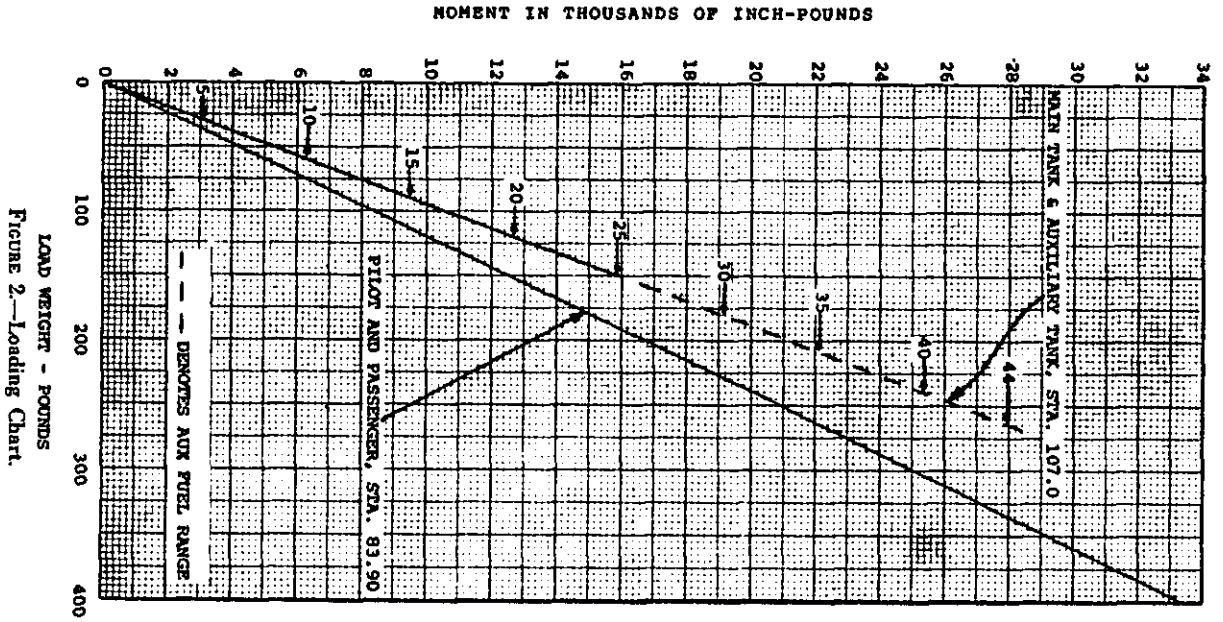


FIGURE 1.—OMNI Components



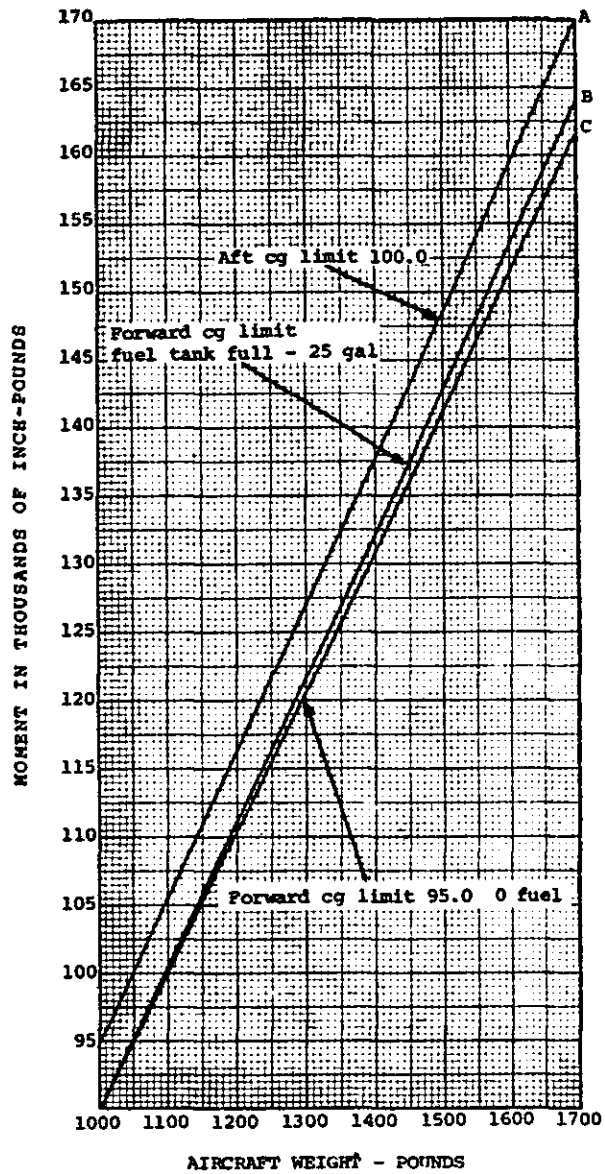


FIGURE 4.—Center of Gravity Chart.

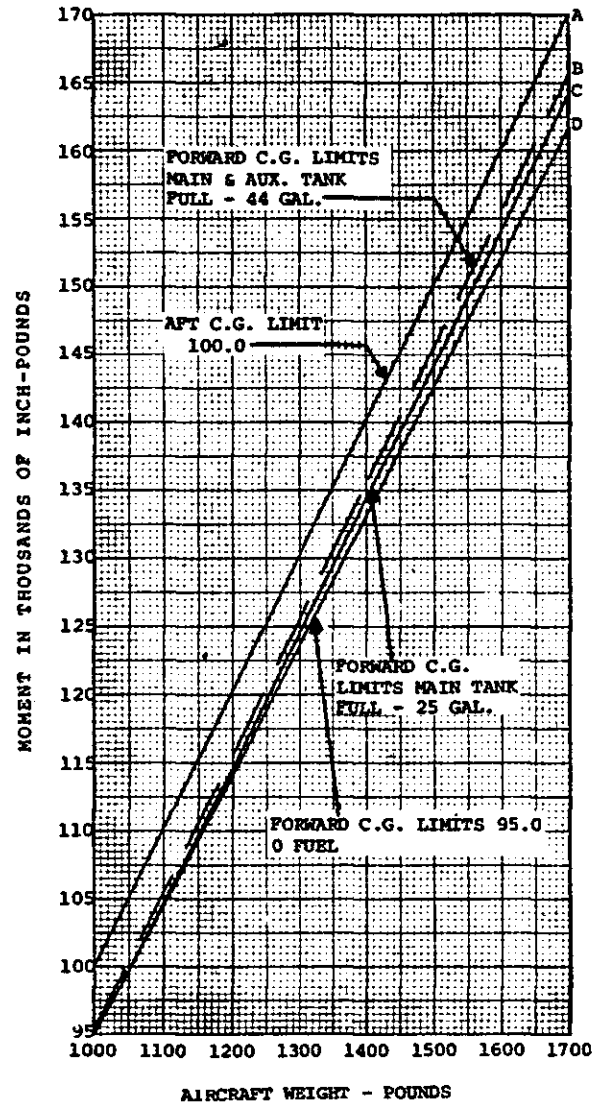


FIGURE 5.—Center of Gravity Chart.

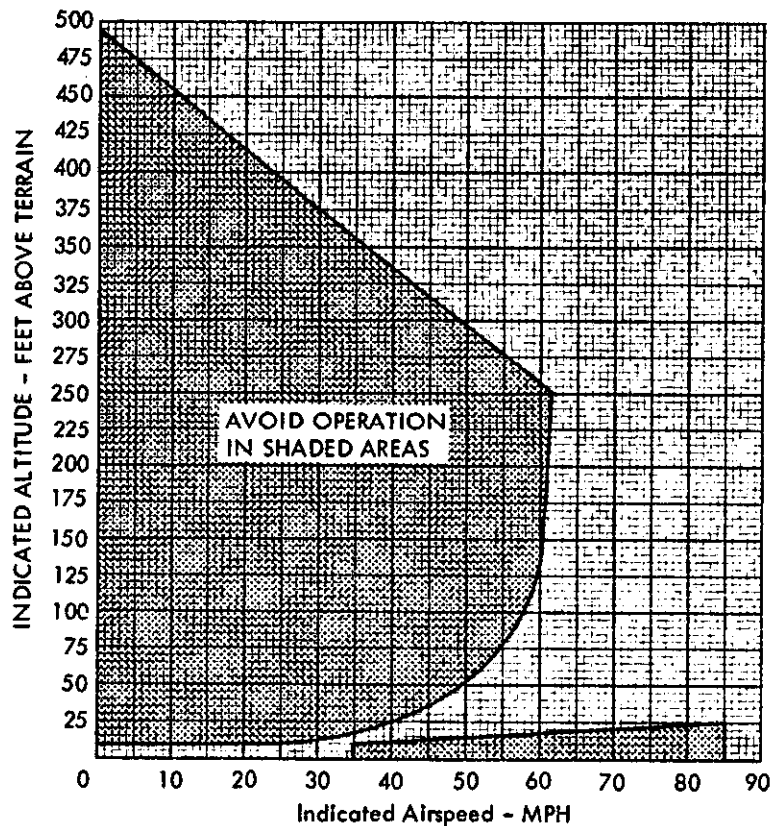


FIGURE 6.—Height Velocity Diagram.

Gross Weight Lbs.	Temperature		Hovering Ceiling Hp - Ft.	
			Dry Air	80% R. H.
1600	-20°F	-28.9°C	6700	6500
	20°F	-6.7°C	5500	5200
	60°F	15.6°C	4300	3900
	100°F	37.8°C	3000	1300
1500	-20°F	-28.9°C	8100	7900
	20°F	-6.7°C	7100	6800
	60°F	15.6°C	5900	5600
	100°F	37.8°C	4800	2900
1400	-20°F	-28.9°C	9900	9700
	20°F	-6.7°C	8700	8400
	60°F	15.6°C	7400	7100
	100°F	37.8°C	6300	4400
1300	-20°F	-28.9°C	11700	11400
	20°F	-6.7°C	10400	10100
	60°F	15.6°C	9400	9000
	100°F	37.8°C	8200	6100

FIGURE 7.—Hover Ceiling Chart (IN GROUND EFFECT).

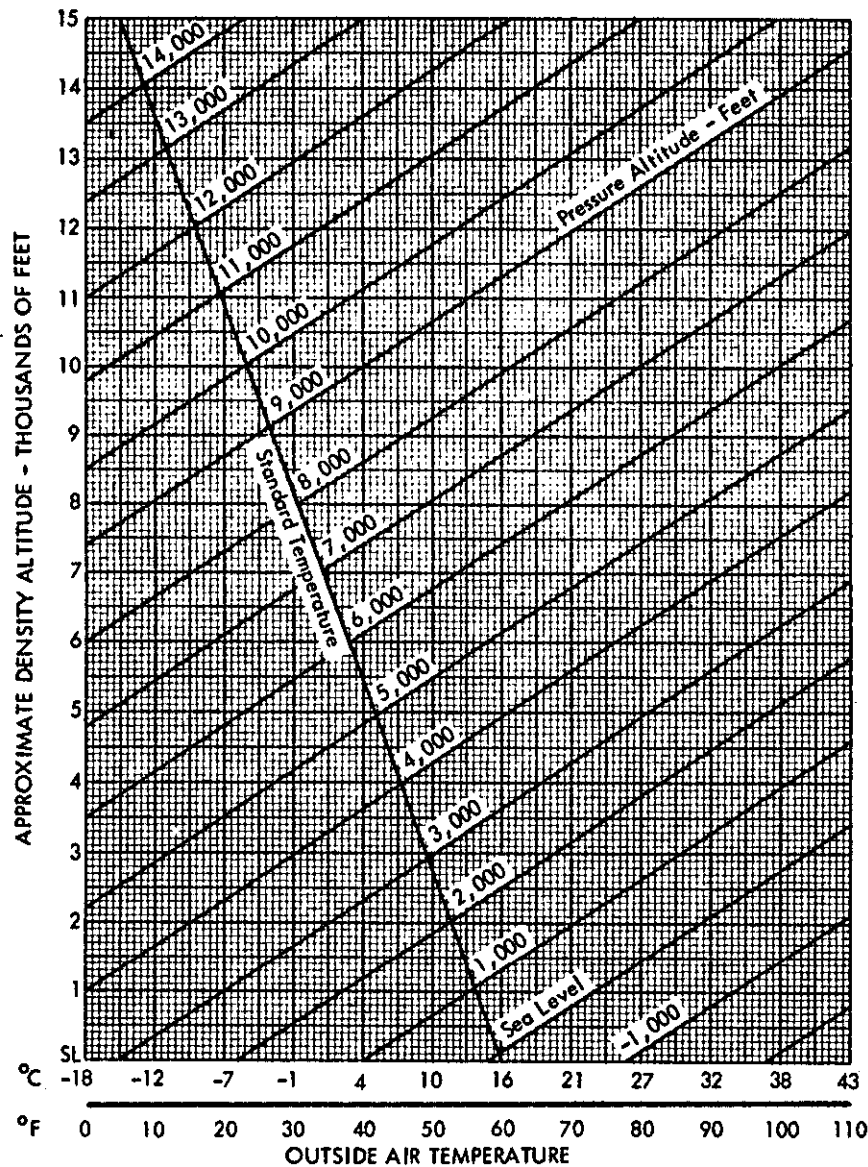
TAKE-OFF DISTANCE- FEET TO CLEAR 50 FOOT OBSTACLE					
		AT 50 MPH		3200 RPM	
Gross Weight Pounds	Pressure Altitude Feet	At -13°F -25°C	At 23°F -5°C	At 59°F 15°C	At 95°F 35°C
2150	SL	373	401	430	458
	2000	400	434	461	491
	4000	428	462	494	527
	6000	461	510	585	677
	8000	567	674	779	896
2500	SL	531	569	613	652
	2000	568	614	660	701
	4000	611	660	709	759
	6000	654	727	848	986
	8000	811	975	1144	1355
2850	SL	743	806	864	929
	2000	770	876	929	1011
	4000	861	940	1017	1102
	6000	939	1064	1255	1538
	8000	1201	1527	-	-

FIGURE 8.—Take-off Distance Chart.

TOTAL LANDING DISTANCE IN FEET OVER 50 FOOT OBSTACLE					
		POWER-OFF AT 50 MPH			
Gross Weight Pounds	Pressure Altitude Feet	At -25°C -13°F	At -5°C 23°F	At 15°C 59°F	At 35°C 95°F
2150	SL	243	253	265	277
	2000	253	267	278	293
	4000	264	278	294	319
	6000	278	293	310	327
	8000	293	310	330	350
2500	SL	248	258	270	282
	2000	258	272	283	298
	4000	269	283	299	314
	6000	283	298	315	332
	8000	298	316	335	355
2850	SL	282	294	307	320
	2000	293	309	322	338
	4000	306	322	340	357
	6000	322	340	358	378
	8000	340	359	380	403

FIGURE 9.—Landing Distance Chart.

Set Altimeter to 29.92 In. Hg  
When Reading Pressure Altitude



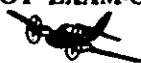
Altitude  
Setting  
in Hg.

Altitude  
Correction

28.0	1,825
28.1	1,725
28.2	1,630
28.3	1,535
28.4	1,435
28.5	1,340
28.6	1,245
28.7	1,150
28.8	1,050
28.9	955
29.0	865
29.1	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.

VFR PILOT EXAM-O-GRAMS



4/72

Exam-O-Grams are brief and timely explanations of important aeronautical knowledge items. These items include concepts and procedures that are critical to aviation safety, common misconceptions among airman applicants, and areas which cause general difficulty in written tests.

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VFR EXAM-O-GRAMS

No.	Title and Revision Date	No.	Title and Revision Date
2	VFR Cruising Altitudes - 10/71	35	UNICOM Frequencies and Uses - 11/67
4	Preflight Planning for a VFR Cross-Country Flight (Series 1) - 10/71	36	Commonly Misunderstood Areas of Aeronautical Knowledge (Series 1) - 1/72
5	Preflight Planning for a VFR Cross-Country Flight (Series 2) - 10/71	37	Commonly Misunderstood Areas of Aeronautical Knowledge (Series 2) - 1/72
6	Preflight Planning for a VFR Cross-Country Flight (Series 3) - 3/71	38	Mixture Control -- Fuel/Air Ratio - 11/66
15	How to Use VOR (Series 1) - 8/64	39	Simple ADF for VFR Navigation - 8/67
16	How to Use VOR (Series 2) - 8/64	40	Visual Approach Slope Indicator (VASI) - 5/67
17	Common Misconceptions (Series 1) - 10/71	41	Controlled Airspace (Series 1) - 10/71
18	Lost Procedures -- Pilotage - 9/64	42	Controlled Airspace (Series 2) - 10/71
19	Emergency or Lost Procedures (Radio) - 7/69	43	ATIS (Automatic Terminal Information Service) - 5/70
20	Ceiling and Visibility - 8/64	44	How High the Clouds? - 7/69
21	Flying into Unfavorable Weather - 7/69	45	Airspeeds and Airspeed Indicator Markings (Series 2) - 1/69
22	Potential Midair Collisions - 10/71	46	Aviation Weather Reports -- Remarks - 1/71
23	Interpreting Sectional Charts (Ser. 1) - 11/70	47	Ground Effect - 10/69
26	Common Misconceptions (Series 2) - 6/71	48	Midair Collisions (Series 3) - 11/69
27	The Effect of Wind on an Airplane - 2/65	49	Use of Oxygen in General Aviation Aircraft - 1/71
28	Factors Affecting Stall Speed - 9/65	50	Interpreting Sectional Charts (Series 2) - 10/71
29	Potential Midair Collisions (Series 2) - 4/65	51	Interpreting Sectional Charts (Series 3) - 4/71
33	Use of Performance Charts - 4/66	52.	Sky Cover and Ceiling - 4/72
34	How to Obtain Proper Weather Briefing - 10/71		

In this set of Exam-O-Grams the following issues have been deleted: Nos. 1, 3, 7, 8, 9, 10, 11, 12, 13, 14, 24, 25, 30, 31, and 32. They have been discontinued since the subject areas which they cover are now adequately treated in one or more of the following FAA publications:

- Pilot's Handbook of Aero. Knowledge, AC 61-23A
- Aviation Weather - AC 00-6 (\$4)
- Airman's Information Manual (annual subscription)
- Other pertinent FAA Advisory Circulars

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**DEPARTMENT OF TRANSPORTATION**  
**FEDERAL AVIATION ADMINISTRATION**  
**IFR PILOT EXAM-O-GRAMS**



1/73

Exam-O-Grams are brief and timely explanations of important aeronautical knowledge items. These items include concepts and procedures that are critical to aviation safety, common misconceptions among airman applicants, and areas which cause general difficulty in written tests.

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IFR Exam-O-Grams

No.	Title and Revision Date	No.	Title and Revision Date
2	Use and Abuse of Radar - 2/71	24	The Attitude Indicator - 5/70
5	Aviation Weather Reports and Forecasts - 2/71	25	The ATC Transponder - 2/71
6	VFR Operations on an Instrument Flight Plan - 9/69	26	Runway Marking - 10/71
7	COI Interpretation - 9/69	27	Radar Approaches (ASR and PAR) - 2/70
8	Minimum IFR Altitudes - 2/71	28	Category II Taxiway Holding Lines - 7/69
10	Altimetry - 12/67	29	When an Alternate Airport is Not Required - 3/70
11	Communications Procedures for Pilots on Instrument Flight Plans - 2/71	30	VORTAC Area Navigation - 5/70
13	The IFR Chart Legend (Series 2) - 2/71	31	Is Your Instrument Flight Really Legal - 10/70
14	VOR Quiz - 8/65	32	Aircraft Performance Charts - 3/71
15	The Weather Depiction Chart is for You - 2/71	33	Runway and Displaced Threshold Lighting - 1/72
16	The Low Level Prognostic Charts - 1/72	34	IFR Departure Clearances - 9/71
17	The Radar Summary Chart - 2/71	35	Clearance Delivery Procedures - 1/72
18	Rate of Turn - 1/67	36	Lost Communications Procedures - Altitude Requirements - 1/72
19	Telephone Weather Briefing - 6/71	37	Lost Communications Procedures - Route Requirements - 9/72
21	IFR Weight and Balance Computations - 9/67		
22	VOR Receiver Accuracy Check - 9/68		
23	Fundamental ADF Procedures - 1/71		

Exam-O-Grams Nos. 1, 3, 4, 9, and 20 have been deleted since the subject areas are adequately treated in other FAA publications. The material in Exam-O-Gram No. 1 is covered in AC 90-1A. This Advisory Circular, and certain other free Advisory Circulars, and the Advisory Circular Checklist may be obtained from: U.S. Department of Transportation  
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