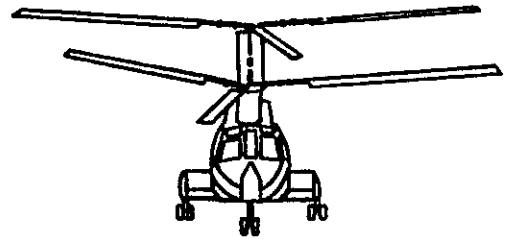


Airline Transport Pilot

WRITTEN TEST GUIDE

AC 61-42



HELICOPTER

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

PREFACE

This guide is prepared by the Flight Standards Service of the Federal Aviation Administration to assist applicants who are preparing for the Airline Transport Pilot, Rotorcraft/Helicopter (VFR and/or IFR) Written Tests. It describes the type and scope of required aeronautical knowledge covered by the written tests, lists reference materials available from the U.S. Government Printing Office, and presents sample test questions.

This guide is included in the FAA Advisory Circular System as AC 61-42 and supersedes the *Airline Transport Pilot (Helicopter) Written Examination Guide* issued in 1962.

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INTRODUCTION

Consistent with the advances in helicopter instrument flight capability, FAR 61 has recently been amended to provide standards for the issuance of a rotorcraft (helicopter) instrument rating. In the airline transport pilot area, the holder of a rotorcraft (helicopter) rating is limited to "VFR only," and his certificate is so endorsed in the absence of instrument qualifications. However, the amendment further establishes aeronautical knowledge, experience, and skill standards to provide the basis for certifying helicopter pilots for instrument flight operations. Satisfaction of these requirements results in the elimination of the VFR restriction. Two qualifying written tests are therefore required, relating to the "VFR only" restriction and the removal of the restriction. These tests carry the following titles and coded designations:

Airline Transport Pilot, Rotorcraft/Helicopter (VFR)

Airline Transport Pilot Rotorcraft/Helicopter (IFR)

The purpose of the written tests is to evaluate the applicant's aeronautical knowledge in terms of the knowledge expected of a career pilot engaged in airline transport helicopter operations.

The variety of equipment used and the number of unique operations to which the versatile helicopter may be adapted require a pilot to have a comprehensive background of information. As a result, the scope of the written tests is extremely broad.

The applicant is expected to know the essential components of rotary-wing systems and their aerodynamic functions. He must understand normal operating procedures, operating limitations, and emergency procedures. He must have a sound working knowledge of weather and of the problems associated with operation under marginal weather conditions. Whether he flies a metropolitan route for an air carrier or flies cargo to a remote construction site, the helicopter pilot must be capable of evaluating the effect of the weather on his operation. When the airman has the skill and knowledge necessary to become rated as an airline transport helicopter pilot, he must accept greater responsibilities. As pilot-in-command, he is responsible for the lives of his passengers and for the property of the company or air carrier. His performance should therefore reflect the high level of proficiency expected of the professional pilot.

REQUIREMENTS FOR CERTIFICATES AND RATINGS

For the convenience of the applicant, the eligibility requirements specified by the Federal Aviation Regulations are listed.

Note.—These requirements are reprinted from Part 61 of the Federal Aviation Regulations in effect at the time of final editing of this test guide.

“§ 61.141 Eligibility requirements: general.

To be eligible for an airline transport pilot certificate, a person must—

- (a) Be at least 23 years of age;
- (b) Be of good moral character;
- (c) Be able to read, write, and understand the English language and speak it without accent or impediment of speech that would interfere with two-way radio conversation;
- (d) Be a high school graduate, or its equivalent in the Administrator's opinion, based on the applicant's general experience and aeronautical experience, knowledge, and skill;
- (e) Have a first-class medical certificate issued under Part 67 of this chapter within the 6 months before the date he applies; and
- (f) Comply with the sections of this Part that apply to the rating he seeks.

“§ 61.151 Rotorcraft rating: aeronautical knowledge.

(a) An applicant for an airline transport pilot certificate with a rotorcraft category and a gyroplane class rating, or a rotorcraft category and a helicopter class rating limited to VFR only must pass a written test on—

- (1) So much of this chapter as relates to air carrier rotorcraft operations;
- (2) Rotorcraft design, components, systems and performance limitations;
- (3) Basic principles of loading and weight distribution and their effect on rotorcraft flight characteristics;
- (4) Air traffic control systems and procedures relating to rotorcraft;
- (5) Procedures for operating rotorcraft in potentially hazardous meteorological conditions; and

(6) Flight theory as applicable to rotorcraft.

(b) In addition to the requirements of paragraph (a) of this section, an applicant for an airline transport pilot certificate with a rotorcraft category and helicopter class rating not limited to VFR must pass a written test on the items listed under paragraphs (b) through (m) of § 61.143.

“§ 61.153 Rotorcraft rating: aeronautical experience.

(a) An applicant for an airline transport pilot certificate with a rotorcraft rating must hold a commercial pilot certificate, or its equivalent as determined by the Administrator.

(b) In addition, such an applicant must have had at least 1200 hours of flight time as a pilot within the 8 years before the date he applies including at least—

- (1) 5 hours in rotorcraft within the 60 days before that date;
- (2) 500 hours of cross-country flight time;
- (3) 100 hours at night, including at least 15 hours in rotorcraft; and
- (4) 200 hours in rotorcraft, including at least 75 hours as pilot in command or as second in command performing the duties and functions of a pilot in command under the supervision of a pilot in command, or any combination thereof.

(c) In addition to the requirements of paragraphs (a) and (b) of this section, an applicant for an airline transport pilot certificate with a rotorcraft category and a helicopter class rating not limited to VFR must have at least 75 hours of instrument time under actual or simulated instrument conditions of which at least 50 hours were completed in flight with at least 25 hours in helicopters as pilot in command, or as second in command performing the duties and functions of a pilot in command under the supervision of a pilot in command, or any combination thereof.”

design, refinements of control, and improvements in helicopter performance. Manufacturers and helicopter flight schools frequently have material of interest that is available upon request.

FEDERAL AVIATION REGULATIONS

Part 61, Certification: Pilots and Flight Instructors (\$0.60)

Part 91, General Operating and Flight Rules (\$0.60)

Part 127, Certification and Operations of Scheduled Air Carriers with Helicopters (\$0.35)

STUDY MANUALS

Airman's Information Manual (AIM)

Part 1—Basic Flight Manual and ATC Procedures.

This part is issued quarterly and contains basic fundamentals required to fly in the National Airspace System; adverse factors affecting Safety of Flight; Health and Medical Facts of interest to pilots; ATC information affecting rules, regulations, and procedures; a Glossary of Aeronautical Terms; U.S. Entry and Departure Procedures, including Airports of Entry and Landing Rights Airports; Air Defense Identification Zones (ADIZ); Designated Mountainous Areas; SCATANA, and Emergency Procedures.

Annual subscription price \$2.00

Basic Helicopter Handbook, AC 61-13 (\$0.75)

This handbook was developed by the Flight Standards Service of the Federal Aviation Administration to assist applicants preparing for helicopter written tests. It presents essentials of helicopter aerodynamics, basic performance characteristics, and analyses of flight maneuvers.

Aerodynamics for Naval Aviators, NAVAIR 00-80T-80 (\$3.50)

This U.S. Navy publication presents elements of aerodynamics of interest to fixed-wing pilots. It also contains sections on "Helicopter Stability and Control" and "Helicopter Problems."

Instrument Flying Handbook, AC 61-27 (\$1.75)

An FAA text oriented to civilian instrument flying, the handbook presents the basic information needed to acquire an instrument

rating. It should also serve as a base reference for all pilots who need to review instrument flying techniques and procedures.

Aviation Weather, AC 00-6 (\$2.25)

This comprehensive handbook is from the Superintendent of Documents, U.S. Government Printing Office.

It provides basic information on meteorology from the viewpoint of the pilot's needs.

HOW TO OBTAIN REFERENCE MATERIALS

The study materials listed may be obtained by remitting check or money order to:

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

To cover foreign mailing for those publications not showing a foreign price, add 25 percent to the publication's listed price. Remittance to a foreign country may be made by International Money Order or draft on a United States bank payable to the issuing Agency.

STUDY OUTLINES

Airline Transport Pilot Rotorcraft/Helicopter

A. Federal Aviation Regulations:

1. Part 61—Certification: Pilots and Flight Instructors

a. Subpart E—Airline Transport Pilot

2. Part 91—General Operating and Flight Rules

a. Subpart B—Flight Rules, General and VFR

3. Part 127—Certification and Operations of Scheduled Air Carriers with Helicopters

a. Subpart A—General

b. Subpart B—Certification: Certification Specifications

c. Subpart C—Requirements for Airports and Facilities

d. Subpart D—Air Carrier Manual

e. Subpart F—Operating Limitations

f. Subpart G—Special Airworthiness Requirements

g. Subpart H—Instrument and Rating Requirements

h. Subpart J—Airman and Crewmember Requirements

i. Subpart K—Training Program

j. Subpart L—Flight Crewmember Certification

k. Subpart M—Flight Time Limitations

TYPE OF TESTS

the tests for the ATP Rotorcraft/ Ratings are of the single-section type. are of the objective, multiple-choice those shown in the sample tests in this because the Airline Transport Pilot (r) Certificate is issued with a "VFR" this test stresses areas of aeronauti- edge appropriate to this limitation. required for the removal of the VFR emphasizes instrument flight proce- related techniques.

the applicant takes the tests, appropriate materials in a supplementary booklet sued to him; certain materials may cluded in the test booklet. Similar for illustrative purposes are included ndix of this test guide.

licant should read carefully the direc- aking the particular test and for res- answers on the special answer sheet. nd other information should be accu- red in the appropriate spaces on the et.

des are mailed to applicants on AC 3-37, Airman Written Examination The report also contains coded indica- e knowledge areas which presented i the test. These coded indicators are an enclosed Written Examination tter Outline for quick and easy iden- f knowledge deficiencies. The study tained in this guide is similar to the xamination Subject Matter Outline applicant receives with AC Form An applicant who receives a failing : present the appropriate AC Form . retesting.

THE TESTS

may be taken at Flight Standards fices of the Federal Aviation Admin- id at other designated places.

the following points while taking

1. Test items should be answered in accord- ance with the latest regulations and procedures.

2. Read every question thoroughly. Com- ments received from test applicants indicate that unsatisfactory performance on written tests is frequently the result of failure to read carefully rather than lack of knowledge. Do not try to solve the problem before understanding the question.

3. Do not consider a complicated problem a "trick" question; each question has a specific objective. There are no trick questions.

4. There is only one correct and complete an- swer for each item.

5. Do not waste time on difficult problems. 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.

REFERENCE MATERIALS

The following list of publications and ma- terials is provided as a basic guide for the bene- fit of persons who wish to prepare for the writ- ten tests. All these items may be obtained from the Superintendent of Documents, U.S. Govern- ment Printing Office. Textbooks and other reference materials are also available from many commercial publishers. It is the responsibility of each applicant to obtain the study materials appropriate to his needs.

The applicant should also be familiar with a representative transport category helicopter flight manual. The professional helicopter pilot will also find useful information in publications and trade periodicals issued by various manufacturers of rotary-wing aircraft.

In the rapidly expanding helicopter industry, much information is available about changes in

- l. Subpart N—Flight Operations
- m. Subpart O—Flight Release Rules
- n. Subpart P—Records and Reports

B. Rotary Wing Aerodynamics and Theory of Flight:

- 1. General aerodynamics—
 - a. Weight/Lift
 - b. Thrust/drag
 - c. Airfoils
- 2. Aerodynamics of helicopter powered flight—
 - a. Forces acting on helicopter
 - (1) Hovering
 - (2) In vertical, forward, rearward, and sideward flight
 - b. Torque
 - c. Gyroscope precession
 - d. Dissymmetry of lift
 - e. Blade coning
 - f. Coriolis effect
 - g. Translating tendency
 - h. Ground effect
 - i. Translational lift
 - j. Transverse flow effect
 - k. Pendular action
 - l. Normal vibrations
 - m. Stability
- 3. Aerodynamics of autorotation—
 - a. Hovering autorotation
 - b. Autorotation from altitude
 - (1) Factors effecting rate of descent
 - (2) Glide range
- 4. Precautionary, critical, and emergency conditions—
 - a. Rotor and engine RPM limits
 - b. Carburetor icing
 - c. Effect of high density altitude, load, and wind
 - d. Hovering over high grass and water
 - e. Effect of turbulence
 - f. Abnormal vibrations
 - g. Retreating blade stall
 - h. Settling with power
 - i. Ground resonance
 - j. Height velocity curve
 - k. Anti-torque failure
 - l. Emergency landings
- 5. Rotor systems—
 - a. Single and tandem
 - b. Fully articulated, semi-rigid, and rigid

- c. Flight control systems
- d. Stability augmentation and automatic flight control

C. Operating Procedures:

- 1. Performance charts—
 - a. Takeoff
 - b. Climb
 - c. Enroute
 - d. Landing
 - e. Weight and balance
- 2. Operating techniques—
 - a. Takeoff, approach, and landing
 - (1) Land and water operations
 - (2) High altitude operations
 - (3) Snow or other obstructions to vision
 - b. Autorotations
 - c. Confined area operations
 - (1) Pinnacle
 - (2) Barrier
 - (3) Slope
- 3. Computations—
 - a. Flight time
 - b. Fuel requirements
 - c. Headings, courses, ETAs
 - d. Weight and balance

D. Aviation Weather:

- 1. Air mass and frontal characteristics
- 2. Thunderstorm features
- 3. Icing hazards
- 4. Aviation weather reports
- 5. Aviation weather forecasts
- 6. Wind and pressure systems
- 7. Fog
- 8. Pressure and density altitude
- 9. Effect of temperature on altitude
- 10. Weather depiction chart

Airline Transport Pilot Rotorcraft/Helicopter (IFR)

A. Federal Aviation Regulations:

- 1. Part 61—Certification: Pilots and Flight Instructors
 - a. Subpart A—General
 - b. Subpart E—Airline Transport Pilots
- 2. Part 91—General Operating and Flight Rules
 - a. Subpart A—General
 - b. Subpart B—Flight Rules, General and IFR
- 3. Part 127—Certification and Operations of Scheduled Air Carriers with Helicopters.

NOTE.—Same Subparts included in VFR examination. Test items will emphasize IFR applications.

B. Air Navigation Aids—Operation and Use:

1. VOR/VORTAC
2. ADF
3. ILS
4. Doppler
5. Decca
6. Other

C. Air Traffic Control Procedures:

1. Preflight
2. Departure
3. Enroute
4. Arrival
5. Emergency Procedures

D. Instrument Flight Problems:

1. Computations—

- a. Time, fuel, and payload data
- b. Weight and balance

2. Radio navigation—

- a. Charts—data interpretation
- b. Orientation and tracking techniques
- c. Instrument approach procedures
 - (1) Types of approaches
 - (2) Approach charts—data interpretation

3. Weather reports and forecasts—

- a. AIRMETS, SIGMETS, and PIREPS
- b. Hourly sequence reports
- c. Area forecasts
- d. Terminal forecasts

18. The JFK scheduled airway observation for 0400 CST appears as follows:

JFK M10⊕15⊕3E-F 893/32/29/0428G33/
920 PRESFR EB35.

Select the statement below which correctly interprets certain elements of this observation.

- 1—Temperature/dew point spread is 3° C.
- 2—Barometric pressure is 992.0 millibars.
- 3—Pressure is falling rapidly.
- 4—Ceiling is 1,500 feet.

* * * * *

Certain of the following test items are based upon performance charts and other data contained in the appendix of this guide. You will be directed to the appropriate source to derive the information required. This material is reproduced from an approved FAA Flight Manual pertaining to a transport category helicopter of single rotor design, powered by dual turbine engines.

19. The pressure altitude at a heliport is 5,000 feet and the temperature is +30°C. Determine the density altitude. (Use Density Altitude Chart in Appendix, Figure 1, or navigation computer.)

- 1—7,800 feet.
- 2—4,800 feet.
- 3—7,500 feet.
- 4—8,200 feet.

20. What is the power required to hover out of ground effect under the conditions outlined below (Appendix, Figure 2)?

Pressure altitude ----- 3,000 feet
Gross weight ----- 17,200 pounds
Temperature ----- +25° C
Headwind ----- 10 knots
Rotor speed ----- 100%

- 1—1810 SHP.
- 2—1840 SHP.
- 3—1870 SHP.
- 4—1920 SHP.

21. Refer to the Appendix, Figure 3. Determine the power required to hover in ground effect under the identical conditions outlined in test item 20.

- 1—1680 SHP.
- 2—1710 SHP.
- 3—1760 SHP.
- 4—1820 SHP.

22. At what pressure altitude is the forward climb performance reduced to zero under the following conditions (Appendix, Figure 4)?

Maximum continuous power
Gross weight: 16,000 pounds
Temperature: +50° C

- 1—5,000 feet.
- 2—6,000 feet.
- 3—6,500 feet.
- 4—7,000 feet.

23. What is the landing distance on a hard surface runway from a 50 ft. height to a stop with one engine inoperative under the conditions outlined below (Appendix, Figure 5)?

Gross weight ----- 16,800 pounds
Pressure altitude ----- 3,500 feet
Approach speed ----- 25 knots I.A.S.
Approach R.O.D. ----- 1,200 F.P.M.
Standard temperature
Zero wind

- 1—365 feet.
- 2—340 feet.
- 3—320 feet.
- 4—325 feet.

24. Consider the following weight and balance data:

	Weight	Moment/100
Empty weight -----	11,950	30,250
Crew -----	340	301
Fuel -----	2,000	5,098
Passengers -----	3,410	10,345
Baggage -----	300	446
	18,000	46,440

Under the above load conditions, the center of gravity is located (Appendix, Figure 6)

- 1—at the forward C.G. limit.
- 2—at the main rotor centroid.
- 3—3.5 inches aft of the main rotor centroid.
- 4—3 inches aft of the forward C.G. limit.

25. Assume that the 300 pounds of baggage is moved to a point which is 260 inches aft of the datum. The amount and direction of displacement of the center of gravity resulting from this weight movement is

- 1—1.9 inches aft.
- 2—0.2 inches forward.
- 3—1.1 inches aft.
- 4—2.2 inches forward.

26. Which of the following is included in the "empty weight" of a helicopter used in air carrier operations?

- 1—Engine oil.
- 2—Operating crew.
- 3—Hydraulic fluid.
- 4—Reserve fuel.

27. During autorotation, with collective full down, rotor RPM can be increased by which control application?

- 1—Forward cyclic.
- 2—Collective.
- 3—Power.
- 4—Back cyclic.

28. Which of the following actions will result in recovery from settling with power?

- 1—Increase collective pitch.
- 2—Increase forward speed and/or partially lower collective pitch.
- 3—Reduce collective pitch to minimum and increase throttle.
- 4—Maintain constant collective pitch and increase throttle.

29. Equalization of lift over the entire rotor disc in a fully articulated rotor system is achieved by

- 1—blade flapping.
- 2—transverse flow effect.
- 3—coriolis effect.
- 4—blade coning.

30. The resultant of lift and centrifugal force is

- 1—flapping.
- 2—torque.
- 3—thrust.
- 4—coning.

II

Airline Transport Pilot Rotorcraft/Helicopter (IFR) Written Test

1. If authority for scheduled air carrier helicopter IFR operations is granted, complete procedures are specified in

- 1—FAR Part 127.
- 2—FAR Part 121.
- 3—FAR Part 91.
- 4—the air carrier operations specifications.

2. You are number one for takeoff when you receive a flashing white light from the control tower. You should

1—taxi off the runway and hold your position.

2—return to the starting point on the airport.

3—start your takeoff.

4—hold on the runway for further clearance.

3. Unless your aircraft is maintained under an approved continuous maintenance program, regulations require that an accuracy check be made on the VOR receiver within the preceding

1—10 flight hours and within 10 days of an IFR flight.

2—5 flight hours and within 5 days of an IFR flight.

3—15 flight hours and within 15 days of an IFR flight.

4—7 days of an IFR flight, regardless of flight hours.

4. Which of the following statements is correct regarding VOR accuracy checks?

1—An FAA approved test signal at the airport of departure must be utilized.

2—Maximum error using a designated airborne checkpoint is $\pm 4^\circ$.

3—Dual systems may be checked against each other when tuned to the same VOR station—maximum error $\pm 4^\circ$.

4—Maximum error using a prominent landmark along a VOR airway centerline is $\pm 4^\circ$.

5. To serve as pilot-in-command of a scheduled air carrier helicopter flight under IFR conditions, you must have acquired within the preceding 6 months at least

1—6 hours of instrument flight time in an airplane.

2—6 hours of instrument time, 3 hours of which may have been in a synthetic trainer.

3—2 hours of instrument flight time in either an aircraft or a helicopter.

4—6 hours of instrument flight time under instrument or simulated instrument weather conditions in a helicopter.

6. Which statement is true concerning FAA radar controlled approaches?

1—An "Airport Surveillance Radar" approach provides elevation guidance only.

2—A "Precision Approach Radar" approach provides elevation and azimuth guidance.

3—A "Precision Approach Radar" approach provides azimuth guidance only.

4—An “Airport Surveillance Radar” approach provides highly accurate elevation and azimuth guidance.

7. At an airport where “clearance delivery” procedures have been implemented, you should contact the clearance delivery controller

- 1—at run-up position.
- 2—while taxiing out.
- 3—prior to taxiing.
- 4—on “Departure Control” frequency.

8. The IFR altitude which meets the minimum obstruction clearance requirements and assures acceptable navigational signals between fixes is the

- 1—Minimum Reception Altitude.
- 2—Minimum Enroute Altitude.
- 3—Minimum Obstruction Clearance Altitude.
- 4—Maximum Authorized Altitude.

9. A pilot is planning an IFR flight from an airport that is outside controlled airspace. He must file a flight plan prior to

- 1—takeoff, if the weather is below VFR minimums at the departure point.
- 2—encountering IFR weather.
- 3—takeoff, if the weather is below VFR minimums at the destination.
- 4—entering controlled airspace.

10. For *all* IFR flights on Victor Airways, regulations require that you

- 1—request an altitude appropriate to your magnetic course.
- 2—fly the centerline of the airway except to avoid other aircraft or when otherwise authorized by ATC.
- 3—designate in your flight plan all VORs along your proposed route of flight.
- 4—monitor the voice of the appropriate VOR.

11. The transponder code to be used in an emergency is

- 1—0000.
- 2—7700.
- 3—1100.
- 4—2200.

12. Which of the following should be reported to ATC without request?

- A. Time leaving an assigned holding fix or point.
- B. Completion of procedure turn on final approach.

C. Time and altitude reaching a holding fix.

D. Arrival at a newly assigned altitude.

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

13. SIGMETs and AIRMETS are in-flight advisories issued by the U.S. Weather Bureau. They are broadcast on

- 1—121.5 MHz.
- 2—Enroute FSS air/ground channels.
- 3—Enroute ARTCC air/ground channels.
- 4—NAVAID voice channels.

14. You are enroute on an IFR flight when you notice that your ADF is inoperative. Report this malfunction

- 1—when you close your flight plan.
- 2—immediately to ATC.
- 3—at the next scheduled reporting point.
- 4—prior to reaching your clearance limit.

15. The complete instrument landing system includes which of the following components?

- 1—Localizer, glide slope, outer marker, middle marker, and high intensity lights.
- 2—Localizer, glide slope, outer marker, outer locator, and middle locator.
- 3—Localizer, glide slope, outer marker, middle marker, and approach lights.
- 4—Localizer, glide slope, outer marker, middle locator, and approach lights.

16. Which requirements must be met to make a “Contact Approach”?

- A. Clear of clouds.
 - B. ATC Authorization received.
 - C. One mile visibility.
 - D. Be able to maintain visual reference to the ground.
- 1—A and D only.
 - 2—B, C, and D only.
 - 3—A, B, and C only.
 - 4—A, B, C, and D.

17. While enroute IFR, you can receive scheduled weather reports on

- 1—ARTCC frequencies on the hour and 30 minutes past the hour.
- 2—NAVAID voice channels 15 minutes and 45 minutes past the hour.
- 3—FAA tower frequencies on the hour and 30 minutes past the hour.
- 4—“Discrete Frequencies” every 15 minutes.

18. A pilot on an IFR jet flight who becomes lost and has complete radio failure can alert the civilian and military radar systems by flying a

1—left rectangular pattern, each leg timed for 2 minutes.

2—right triangular pattern, each leg timed for 1 minute.

3—left triangular pattern, each leg timed for 1 minute.

4—left triangular pattern, each leg timed for 3 minutes.

19. If the definition of a minimum IFR altitude is given as *the lowest altitude at which adequate signals can be received to determine VOR and VORTAC fixes* the altitude defined is the

1—MEA.

2—MRA.

3—MOCA.

4—MCA.

20. During an IFR flight on a Victor Airway, you are flying in VFR conditions and observe a large thunderstorm directly ahead. Regulations permit you to alter course to avoid this storm if you

1—fly to the right to circumnavigate the storm.

2—can remain VFR while off course.

3—are flying with a “VFR on Top” clearance.

4—obtain authorization from ATC.

ANALYSIS OF ANSWERS TO SAMPLE TESTS

AIRLINE TRANSPORT PILOT ROTORCRAFT/HELICOPTER (VFR) WRITTEN TEST

1—(2) The reference is FAR 127.191.

2—(4) The reference is FAR 127.175. Note further in the regulation that at least two of the landings must have been from an approach with simulated one-engine inoperative in multi-engine helicopters or in autorotation in single-engine helicopters. For night operations, at least one of these two landings specified must have been at night.

3—(1) The reference is FAR 127.245.

4—(3) The reference is FAR 127.173.

5—(4) The reference is FAR 127.113. The regulation does not say when and how to use the checklist. This is a matter of pilot judgment. The experienced pilot uses the checklist for the obvious reason that it reduces the load on his memory.

6—(2) The reference is FAR 127.177. When a pilot serves in more than one helicopter type, the check must be given alternately in a helicopter of each type in which he serves.

7—(1) The reference is FAR 127.181.

8—(2) The reference is FAR 127.107.

9—(3) The reference is FAR 127.13.

10—(4) The reference is FAR 127.201.

11—(2) Performance is directly related to air density. As temperature and humidity increase, air density decreases with a resultant adverse effect on performance.

12—(1) Fog of this type is formed as a result of radiational cooling of the ground on clear, calm nights. The ground cools the lower layers of air in contact with it to the dew point temperature.

13—(1) Air in a high pressure area is subsiding. As it subsides, it moves away from or

diverges from high pressure toward surrounding areas of low pressure.

14—(3) Clear ice is formed by the relatively slow freezing of large, supercooled water droplets. It is most frequently encountered in cumuloform type clouds at temperatures only slightly below freezing.

15—(4) In preparing to take off or land, a pilot needs to know the wind direction referenced to magnetic north because runways are oriented in this direction. All other reported winds are in terms of true direction.

16—(1) A high degree of convective activity is associated with unstable air, resulting in rough or turbulent air. Where sufficient moisture is present, such convective activity may also produce thunderstorms with resultant showery precipitation.

17—(2) Correct as shown.

18—(3) Choice 1; spread is 3°F. Choice 2; barometric pressure is 989.3 millibars. Choice 3; correct as stated. The abbreviation for pressure rising rapidly is PRESRR. Choice 4; official ceiling is measured 1,000 feet.

19—(1) Read directly from chart or computer scale.

20—(3) Read directly from chart, using the plotted example for guidance.

21—(2) Read directly from chart.

22—(2) Read directly from chart.

23—(4) Read directly from chart using the plotted example for guidance.

24—(1) Divide total moment (4,644,000) by gross weight (18,000). The C.G. location is therefore 258 inches aft of the datum. Inspection of Figure 6 reveals that at the gross weight of 18,000 pounds this C.G. location is exactly at the forward limit.

25—(1) Movement of the baggage to the new location increases the total moment to a new value of 4,877,400. The new C.G. is at 259.9 inches which is 1.9 inches aft of the previous location.

26—(3) The empty weight does *not* include the crew or payload but *does* include the following: *Fixed ballast, Unusable oil, Undrainable oil, Engine coolant, Hydraulic fluid.*

27—(4) Assuming a constant collective pitch setting, the overall greater angle of attack of the rotor disc produced by the back cyclic control movement increases rotor RPM.

28—(2) Settling with power involves high vertical rates of descent at low airspeed and the addition of power may produce an even greater

rate of descent. Recovery can be accomplished by increasing forward speed and/or partially lowering collective pitch.

29—(1) Dissymmetry of lift is created by horizontal flight or by wind during hovering flight and is the difference in lift that exists between the advancing blade half of the disc area and the retreating half. The flapping action varies the blade angle of attack in such manner as to equalize the lift dissymmetry.

30—(4) Prior to takeoff, the rotor blades rotate in a plane nearly perpendicular to the mast. The introduction of lift to the rotor system commencing with lift-off causes the rotor blades to assume a conical path. The degree of coning is a function of the amount of lift and the rotor RPM.

ANALYSIS OF ANSWERS TO SAMPLE TEST

AIRLINE TRANSPORT PILOT ROTORCRAFT/HELICOPTER (IFR)

WRITTEN TEST

- 1—(4) The reference is FAR 127.243.
- 2—(2) Refer to Part I of the Airman's Information Manual.
- 3—(1) The reference is FAR 91.25.
- 4—(3) The reference is FAR 91.25.
- 5—(4) The reference is FAR 61.47.
- 6—(2) Refer to Part I of the Airman's Information Manual.
- 7—(3) Refer to Part I of the Airman's Information Manual.
- 8—(2) The MEA provides *both* navigation signal coverage and obstruction clearance between radio fixes. Reference is Part I of the Airman's Information Manual.
- 9—(4) Refer to Part I of the Airman's Information Manual. If weather conditions are below VFR minimums, a pilot must submit a complete flight plan and receive an air traffic clearance prior to departure from within, or prior to entering a control area or control zone.
- 10—(2) The reference is FAR 91.123.
- 11—(2) Emergency operation of the transponder is described in Part I of the Airman's Information Manual under ATC Procedures.
- 12—(3) IFR position reporting procedures are described in Part I of the Airman's Information Manual. These "without request" reports are listed under *Additional Reports*.
- 13—(4) The reference is Part I of the Airman's Information Manual under the *Weather* Section.
- 14—(2) The reference is FAR 91.129.
- 15—(3) The reference is Part I of the Airman's Information Manual.
- 16—(4) The contact approach is described in IFR Exam-O-Gram No. 20, and also in Part I of the Airman's Information Manual.
- 17—(2) Refer to Part I of the Airman's Information Manual.
- 18—(3) The reference is Part I of the Airman's Information Manual under Emergency Procedures.
- 19—(2) The reference is Part I of the Airman's Information Manual.
- 20—(4) The reference is FAR 91.123.

DENSITY ALTITUDE CHART

NOTE:

The value of $\sqrt{\frac{\rho}{\rho_0}}$ is a conversion factor used to obtain true airspeed from calibrated airspeed by correcting for density altitude. Multiply the calibrated airspeed by $\sqrt{\frac{\rho}{\rho_0}}$ to obtain true airspeed. For example, if the IAS were 100 knots and $\sqrt{\frac{\rho}{\rho_0}}$ were 1.06, the TAS would be 106 knots.

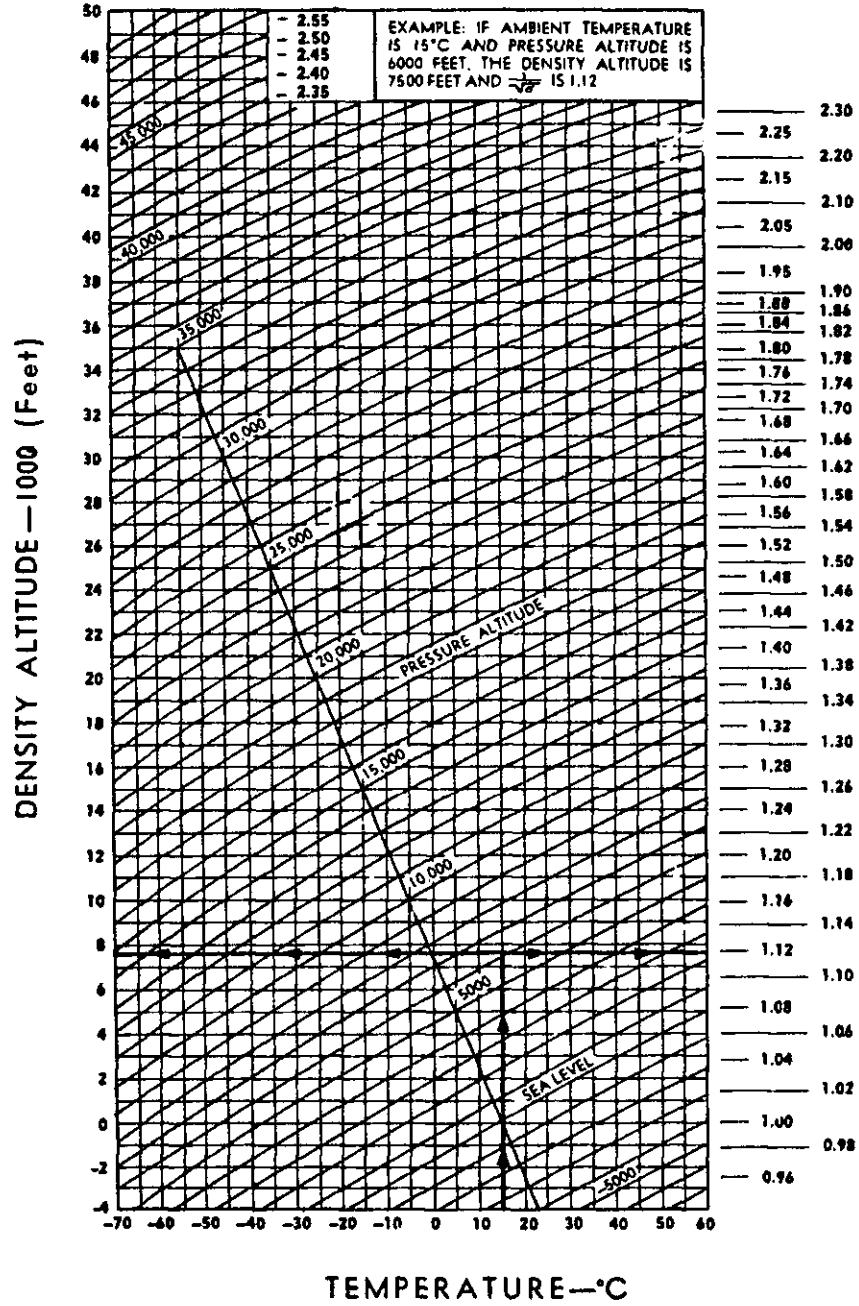


FIGURE 1. Density Altitude Chart

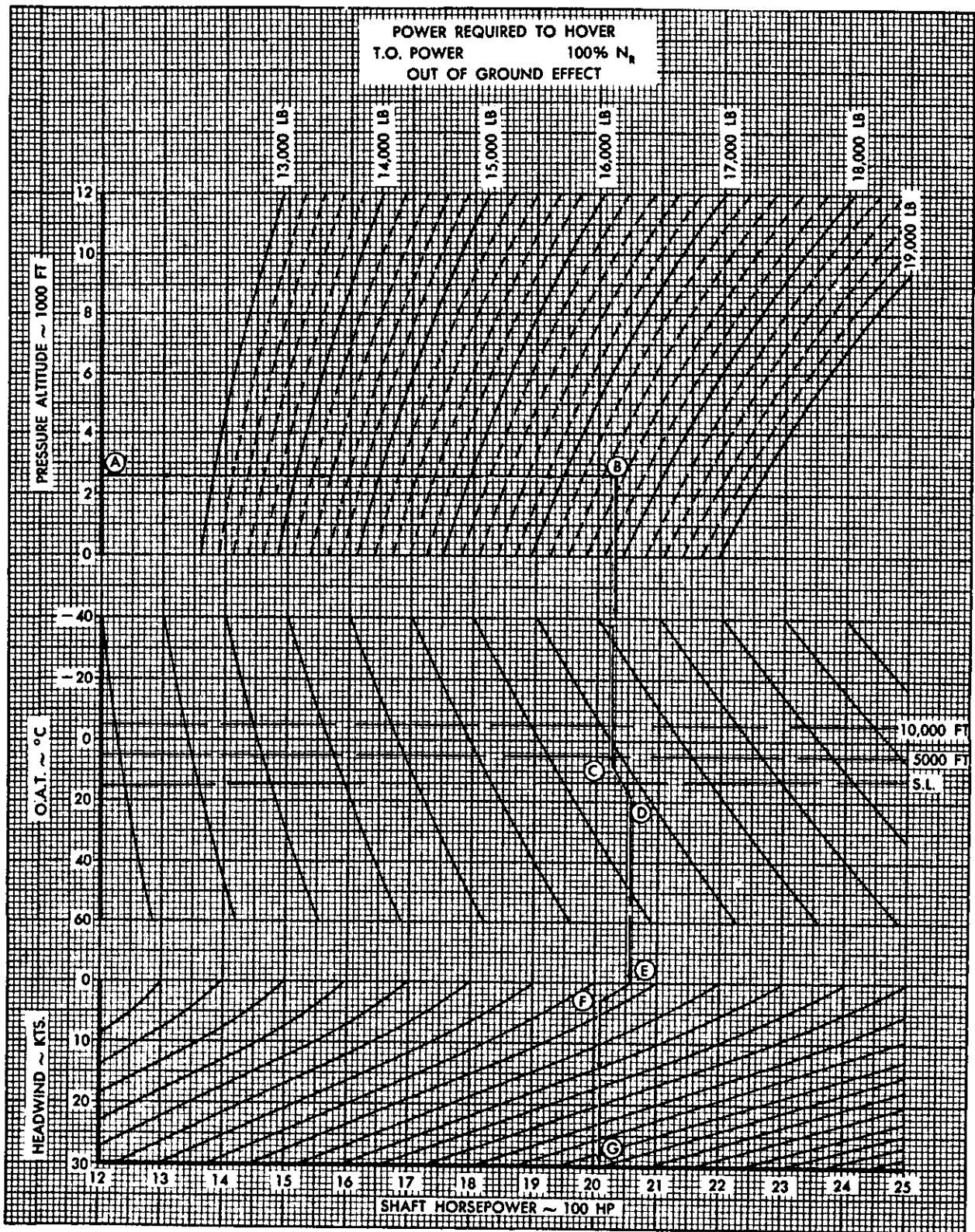


FIGURE 2. Power Required To Hover—Out of Ground Effect

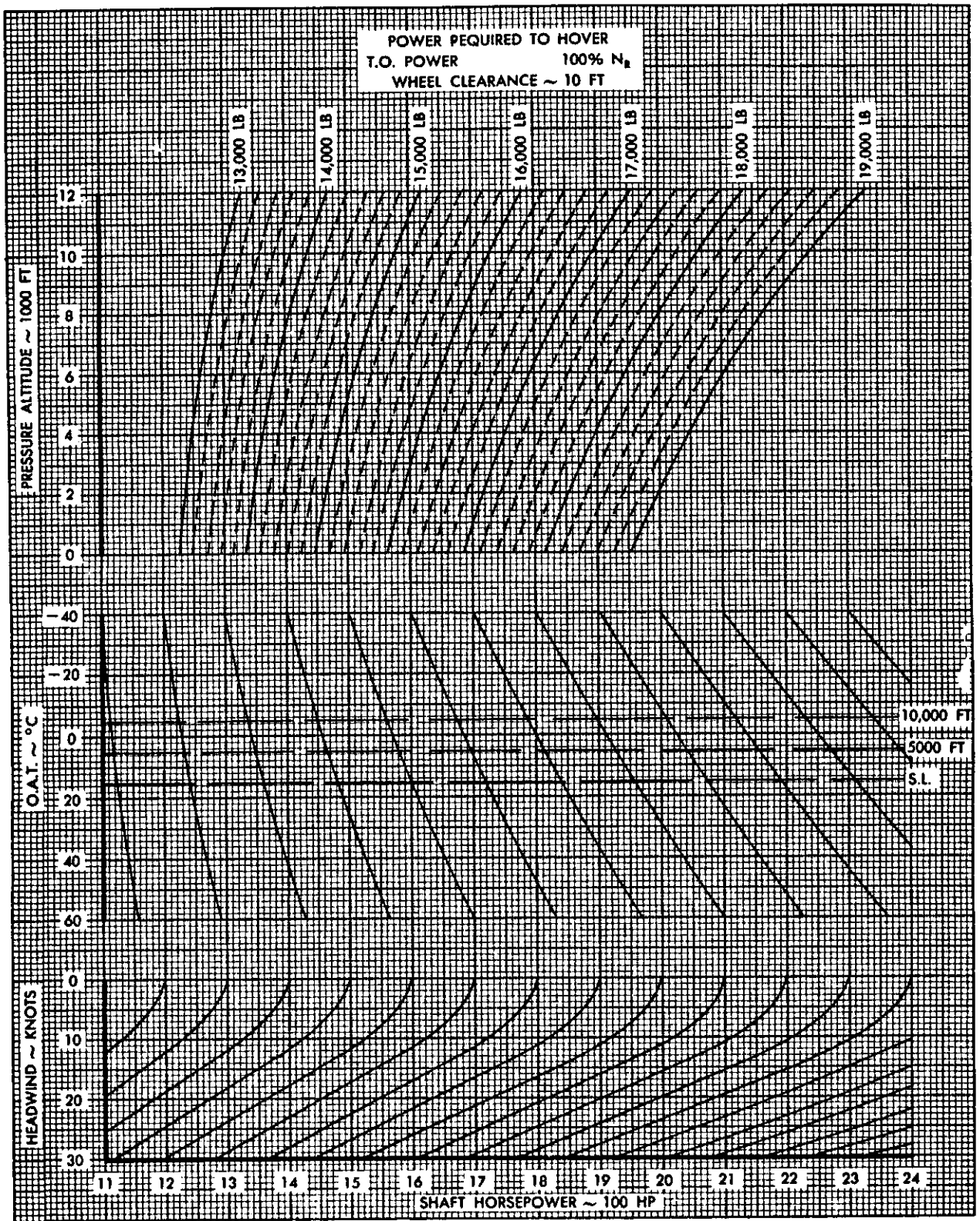


FIGURE 3. Power Required To Hover—In Ground Effect

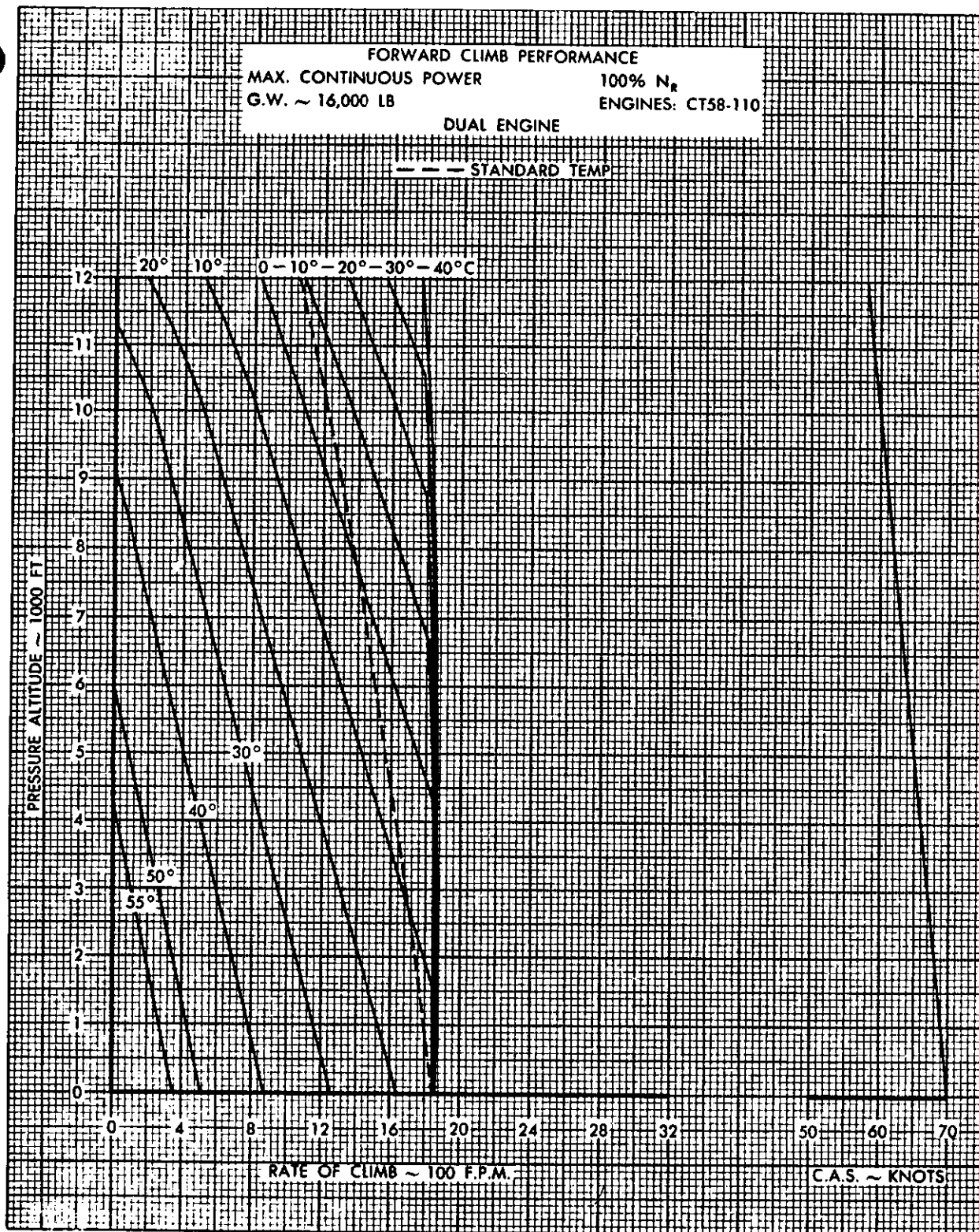


FIGURE 4. Forward Climb Performance

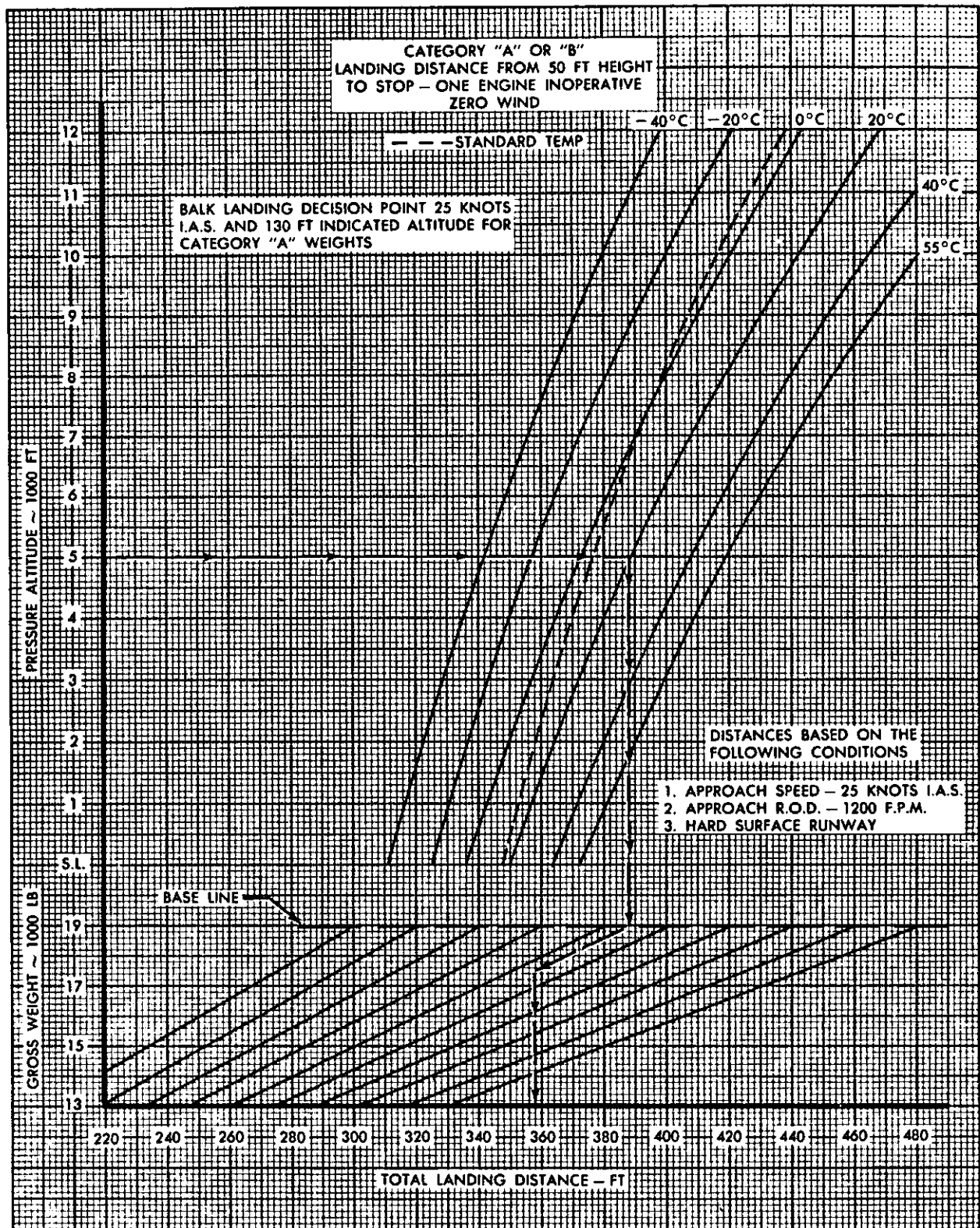


FIGURE 5. Landing Distance From 50 Ft. Height

CENTER OF GRAVITY LIMITS
AT VARIOUS GROSS WEIGHTS

NOTE: DATUM IS 267.4 INCHES FORWARD OF ROTOR CENTROID

THIS CHART NOT TO BE USED FOR OPERATING WEIGHT
DETERMINATION. SEE FIGURES 1 AND 3.

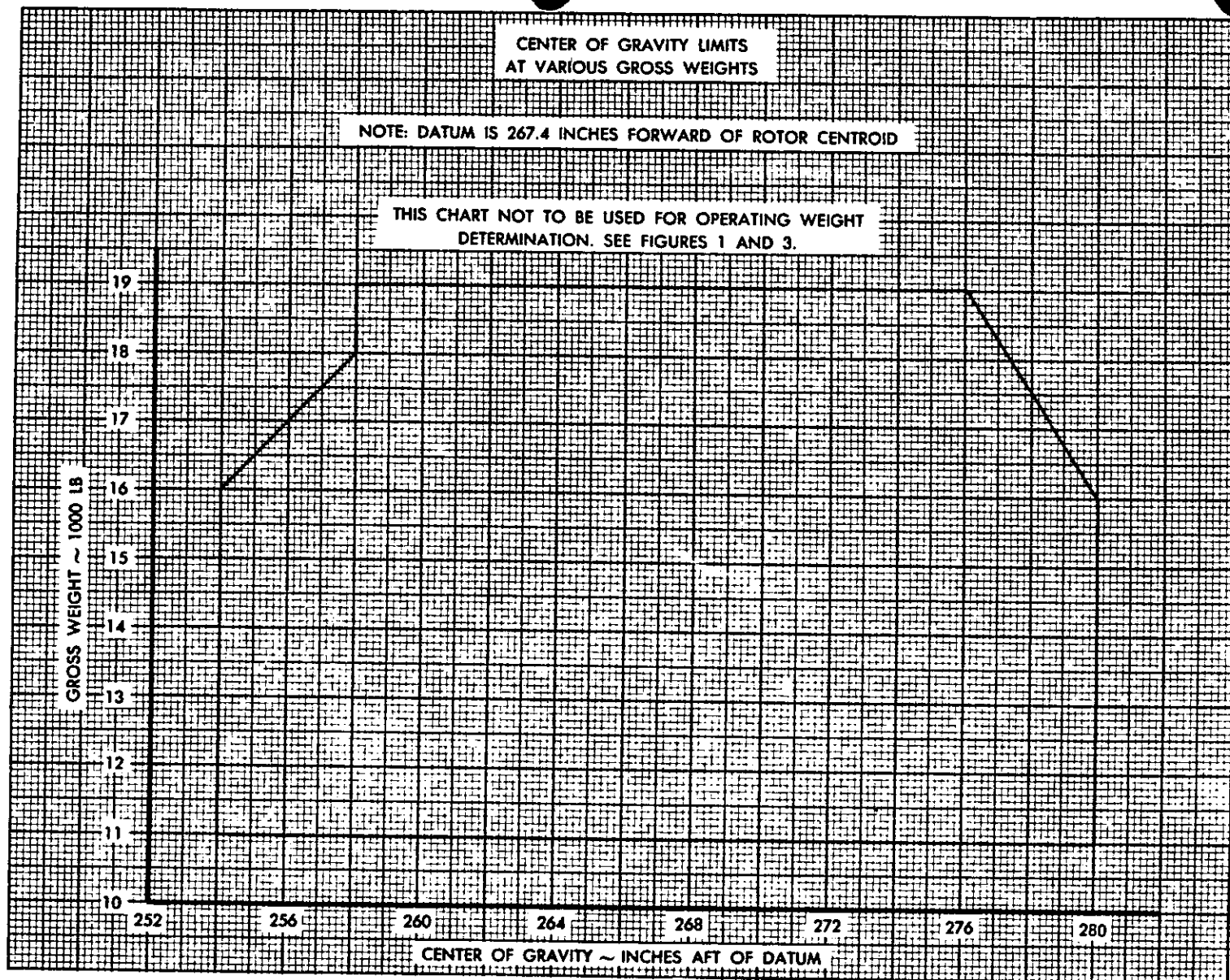


FIGURE 6. Center of Gravity Limits