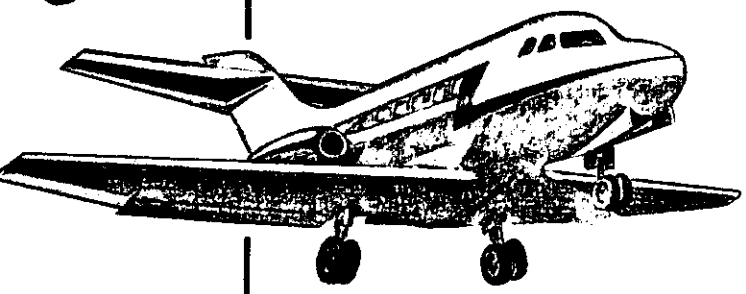
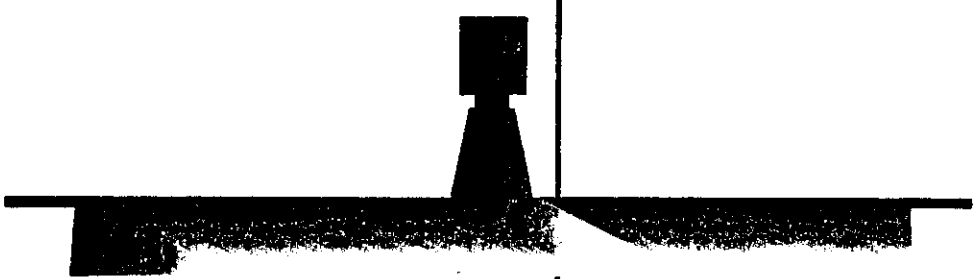
Repl. by 2B

AC 143-2A



GROUND INSTRUCTOR INSTRUMENT

Written Test Guide



DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

GROUND INSTRUCTOR

★ INSTRUMENT ★

WRITTEN TEST GUIDE

REVISED 1968

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

Preface

The Ground Instructor—Instrument—Written Test Guide is one of a series of study aids issued by the Federal Aviation Administration to provide guidelines for airmen preparing for written tests required for certification.

The test guide points out the subject areas covered in the official written test for the instrument ground instructor rating and offers an outline for study. It suggests to the applicant the phases of aeronautical knowledge in which he should be well informed. It lists study materials and tells how to obtain them. A sample test together with the correct answers is also presented.

Issued as FAA Advisory Circular No. 143–2A, this revised edition of the guide supersedes the Ground Instructor—Instrument—Examination Guide dated 1965.

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 55 cents

Contents

Appendix

GROUND INSTRUCTOR—INSTRUMENT—WRITTEN TEST GUIDE

Introduction

This written test guide has been prepared by the Flight Standards Service of the Federal Aviation Administration (FAA) to assist applicants in studying for the Ground Instructor—Instrument—Written Test. It outlines the scope of aeronautical knowledge covered in the test for the instrument ground instructor rating and suggests the subject areas in which the applicant should be well informed.

This guide is not offered as a quick and easy way to gain the knowledge necessary for passing the written test. There is no substitute for diligent study to gain knowledge and understanding in so diversified a subject as aviation ground instruction. The purpose of the guide is to help the student plan his study by providing an outline of the material upon which his efforts should be concentrated and to help him judge his ability to work out, quickly and accurately, problems like those which he will encounter in the written test.

Requirements for Certificates and Ratings

Eligibility requirements for ground instructor certificates are outlined in Part 143 of Federal Aviation Regulations. Ratings are as follows:

Ground Instructor—Basic: Qualifies the holder to instruct in a basic pilot ground school.

Ground Instructor—Advanced: Qualifies the holder to instruct in a basic or advanced pilot ground school.

Ground Instructor—Instrument: Qualifies the holder for ground instruction in an instrument flying school, and for the operation of instrument procedures training devices.

Applicants who do not hold a ground instructor certificate must take both a written test on "Fundamentals of Instructing," and a written test for the rating desired.* Holders of a ground instructor certificate, with one or more ratings, are not required to retake the Fundamentals of Instructing test to obtain additional ratings. An applicant who holds a currently effective teacher certificate issued by a State, county, or city authorizing him to instruct in a junior or senior high school, or who is regularly employed as an instructor in an accredited college or university, shall be relieved of taking the written test on the "Fundamentals of Instructing."

The Written Test

The Instrument Ground Instructor Written Test emphasizes aeronautical knowledge areas which the instrument ground instructor should be prepared to teach. Test items require a knowledge of air traffic and communications procedures, navigation procedures, operating principles of air navigation radio aids, and instrument flight techniques. The applicant plans a flight, using information provided, and then applies his knowledge of regulations, preflight and inflight calculations, current operating procedures, weather, navigation aids, and navigation procedures to this simulated cross-country flight. The official test booklets include appro-

* For study guidance and reference materials for the test on Fundamentals of Instructing, the applicant should consult the *Flight Instructor Examination Guide, Basic-Advanced*, AC 143-1B, available from the Government Printing Office for $1.

priate planning materials similar to those which appear in the Appendix of this guide.

Test items are of the objective, multiple-choice type like those shown in the sample test in this test guide. The applicant marks his answers on a special answer sheet. Directions for taking the test and for marking the answers should be read carefully and understood by the applicant before he begins the test. Incomplete or erroneous personal information on the scoring sheet may delay the scoring process.

Approximately 5 hours are required to complete the test.

The applicant is notified of his grade on Airman Written Examination Report, AC Form 8060–37. The report also contains coded indications of the subject matter involved in the items which the applicant missed on the test. A Written Examination Subject Matter Outline is provided to relate the codes to specific topics. The study outline contained in this Guide is similar to the Subject Matter Outline the applicant receives with AC Form 8060–37. An applicant who receives a failing grade must present the AC Form 8060–37 when appearing for retesting.

An applicant may retake the test after 30 days, or sooner by presenting a statement from an appropriately rated ground instructor, certifying (a) that the applicant has been given 5 hours of additional instruction and (b) that he is now deemed competent to pass the test.

Taking the Test

The test may be taken at Flight Standards District Offices of the FAA and at other designated places.

Bear in mind the following points when taking the test:

1. Test items should be answered in accordance with the latest regulations and procedures.
2. Read every question thoroughly. Comments received from test applicants indicate that unsatisfactory performance on the written test 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 answer for each item.
5. Do not waste too much time on problems that stump you. 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

Persons studying for the Instrument Ground Instructor Test will find the publications listed in this section most helpful. The list identifies material essential to preparing for the test but does not include all material available in the subject areas. Textbooks and reference materials are available from various commercial publishers; and many public and institutional libraries offer study materials in both the teaching and the aeronautical subject areas.

It is the responsibility of each applicant to obtain study material appropriate to his need.

Airman's Information Manual

This publication presents, in three Parts, information necessary for the planning and conduct of flights in the U.S. airway system. Besides providing frequently updated airport and navaid data, the AIM includes instructional and procedural information, and is designed for use in the cockpit. Each part is available as a separate annual subscription at the prices shown below.

Part 1, *Basic Flight Manual and ATC Procedures.* (Issued quarterly) $2.00

Part 2, *Airport Directory.* (Issued semiannually) $2.00

Part 3, *Operational Data and Notices to Airmen.* (Operational data issued every 28 days; Notices to Airmen issued every 14 days) $9.00

FEDERAL AVIATION REGULATIONS:

	Cents
Part 1, *Definitions and Abbreviations*	35
Part 61, *Certification: Pilots and Flight Instructors*	60
Part 91, *General Operating and Flight Rules*	70
Part 95, *IFR Altitudes*	20
Part 97, *Standard Instrument Approach Procedures*	20
Part 135, *Air Taxi Operators and Commercial Operators of Small Aircraft*	30

HANDBOOKS:

Flight Instructor's Handbook, AC 61-16 (60¢). This handbook has been prepared by the Flight Standards Service of the FAA for the information and guidance of pilots preparing to apply for flight instructor certificates, and for use as a reference by certificated ground and flight instructors.

Instrument Flying Handbook, AC 61-27 ($1.75). A basic text for instrument pilots. It deals with training considerations, aerodynamic factors, physiological factors, flight instruments and their use, air navigation aids, communications, the air traffic system, and flight planning.

Aviation Weather, AC 00-6 ($2.25). An excellent reference treating phases of meteorology of interest to the instructor. Aviation weather reports and forecasts are also covered with respect to format and content.

Charts

Instrument Approach Procedure Charts (available for Range, ADF, VOR, VOR/DME, and ILS Approach)—(10¢ per airport set). Individual charts give detailed information on procedure for specific airports.

Enroute Charts: Low-Altitude and High-Altitude—(25¢ each). These charts provide the necessary aeronautical information for enroute instrument navigation.

Low-Altitude Area Charts—(25¢ each). These charts supplement the Enroute Charts by providing departure, arrival, and holding procedures at principal airports.

How To Obtain Study Materials

The study materials listed, except the charts, may be obtained by remitting check or money order to:

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

Charts may be obtained at your local airport or by sending a check or money order to:

U.S. Coast and Geodetic Survey
Washington, D.C. 20235

To cover foreign mailing, add 25 percent to the publication's listed price. Remittances from a foreign country may be made by International Money Order or draft on a United States bank.

STUDY OUTLINE

This study outline indicates the areas of aeronautical knowledge which pertain to the Instrument Ground Instructor Test. It expands the general aeronautical knowledge requirements set forth in the Federal Aviation Regulations, and is based on airman activity for flight under Instrument Flight Rules.

A. FLIGHT PLANNING AND AIRCRAFT PERFORMANCE

1. Estimated time enroute (ETE)
2. Fuel requirements—pounds/gallons (FAR 91.23)
3. Fuel—additional permissible/holding capability
4. True airspeed
5. Groundspeed
6. Wind correction angle
7. Headings—true, magnetic, compass
8. Load—maximum permissible
9. Takeoff weight limitations
10. Landing weight limitations
11. Airport/Facility Directory and legend (AIM)
12. Notices to Airmen/Restrictions to NavAids (AIM)
13. Preferred routes (AIM)
14. SIDs (AIM, Parts I and III)
15. SCATANA (AIM)
16. ADIZ (AIM)
17. ATIS (AIM)
18. Flight plan (FAR 91.83, AIM)
19. Density altitude—determination and use
20. Performance charts—use
21. C. G./weight—effect on performance and stability
22. C. G.—determining moment/index units—distance from datum
23. C. G.—using envelope/tables
24. Wake turbulence (AIM)

B. Aviation Weather and Preflight Weather Briefing

1. Wind—pressure gradient, general circulation, surface friction, etc.
2. Air masses—general characteristics
3. Pressure systems and associated weather
4. Cloud types and characteristics
5. Frontal systems and associated weather
6. Stability
7. Icing—types, effects, conditions for formation, prevention and disposal
8. Freezing rain
9. Frost
10. Fog
11. Factors affecting visibility
12. Turbulence
13. Flight through turbulence
14. Thunderstorms—characteristics, avoidance, etc.
15. Inflight weather information (AIM)
16. SAs—interpretation
17. FAs—interpretation
18. FTs—interpretation
19. FDs—interpretation
20. Weather Depiction Charts—interpretation
21. Low Level Prognostic Charts—interpretation
22. Radar Summary Charts—interpretation
23. Constant Pressure Charts—interpretation
24. Winds Aloft Charts—interpretation
25. PIREPS

C. Interpretation and Use of Flight Instruments

Airspeed Indicator

1. Limitation markings
2. Alternate static pressure source—effect
3. Errors due to aircraft configuration—attitude
4. Relationships between IAS, CAS, EAS, and TAS
5. Mach number

Altimeter

6. Alternate static pressure source—effect
7. Altimeter setting
8. Altitude terms—density, pressure, indicated, absolute, true
9. Effects of changes in temperature and pressure
10. Errors—mechanical/failure to reset

Magnetic Compass

11. Proper use of magnetic compass
12. Errors—acceleration, bank, deviation

Directional Indicator

13. Limits
14. Operating characteristics/types
15. Setting by use of magnetic compass

Attitude Indicator

16. Limits
17. Operating characteristics/types

Turn and Slip Indicator (Turn and Bank)

18. Interpreting needle/ball
19. Angle of bank—rate of turn/radius of turn
20. TAS—rate of turn/radius of turn
21. Calibration

Vertical Speed Indicator

22. Calibration
23. Characteristics and use

Attitude Flying

24. Interpreting attitude/performance from instruments

D. Air Navigation

Facilities (AIM)

1. Radio Beacons/Locators
2. ILS
3. RADAR
4. Lighting systems
5. VOR/VORTAC

Chart Interpretation

6. Enroute Low/High Altitude
7. Low Altitude Area
8. Standard Instrument Departure (SID)
9. Approach and Landing (A/L)

Procedures

10. ADF—Orientation, tracking, time/distance
11. VOR—Orientation, tracking, time/distance
12. VOR—receiver check (AIM)
13. ILS (AIM)
14. RADAR—vectors, transitions, handoffs, traffic information (AIM)
15. RADAR—transponder (AIM)
16. RADAR—approaches (AIM)
17. VASI—approaches (AIM)
18. Speed adjustments (AIM)
19. Emergencies (AIM)
20. Determination of wind while in flight
21. DME (AIM)
22. Determining rate of climb to meet clearance

E. Regulations

FAR 91

1. Preflight (91.5)
2. Portable electronic devices (91.19)
3. VOR equipment check (91.25)
4. Certificates and limitations, etc. (91.27 through 91.31)
5. Equipment requirements (91.33)
6. Compliance with ATC clearances (91.75)
7. ATC light signals (91.77)
8. Altimeter settings (91.81)
9. Flight Plan: alternate requirements (91.83)
10. Positive control areas (91.97)
11. Visual Flight Rules (91.105 and 91.109)
12. ATC clearance and flight plan required (91.115)
13. Takeoff and landing under IFR (91.117)
14. Minimum altitudes for IFR operation (91.119)
15. IFR cruising altitude or flight level (91.121)
16. Course to be flown (91.123)
17. IFR, radio communications (91.125)
18. IFR operations; two-way radio communications failure (91.127)
19. Operation under IFR in controlled airspace; malfunction reports (91.129)
20. Inspection and records (91.169 and 91.173)
21. Altimeter system tests and inspections (91.170)

FAR 61

22. Ratings/Certificates (61.35 and 61.43)
23. Pilot Log (61.39)
24. Recency of experience (61.47)
25. Change of address (61.51)

F. ATC Procedures and Other Items (AIM)

1. Aeronautical terms (glossary)
2. Clearances—taxi, takeoff, enroute and amended
3. Communications—departure, enroute, and arrival
4. Radio and telephone phraseology and techniques
5. Holding
6. Climb/descents
7. Detouring thunderstorms
8. Emergencies
9. Medical Facts
10. VFR operation on IFR flight plan

Sample Test

The following items are typical of those in the official FAA written test. Answers and explanations or references are given on pages 11 and 12.

Note: The sample items, answers, and analyses are based upon procedures and regulations in effect at the time of preparation of this publication. Regulatory and procedural changes subsequent to the date of publication should be checked for their effect on the applicable item.

1. VORs and VORTACs are classified as H, L, and T. If a VOR of the T classification is used for navigation at altitudes above 18,000 feet, undependable navigation signals may be received because —

1—Transmitter signal strength is less than that of the H or L ranges.
2—Course azimuth is not accurate above 18,000 feet.
3—Signals from another range may interfere.
4—Atmospheric conditions affect the signal.

2. During flight in instrument conditions, in a nonradar environment, the pilot is dependent upon the information received from his radio navigation equipment for course guidance. Because of this fact, a pilot must know the capability and limitations of his equipment. With many present-day NavCom systems, unreliable course guidance information will be obtained during which of the following situations?

1—During an ILS back course approach.
2—During reception of voice transmissions.
3—When using the NavCom transmitter.
4—When making an ILS front course approach with OBS set at some value other than the front course inbound bearing.

3. Which of the statements pertaining to the ILS are true?

A. False glide slope courses may be encountered above or below the normal glide slope.
B. Normal glide slope elevation is 2.5° to 3°.
C. Compass locators are required components of an ILS.
D. Removal of the coded identification is an indication that maintenance has taken over the facility.

E. Communication transmissions may be received on the localizer frequency.

1—A, B, D.
2—B, D, E.
3—B, C, E.
4—A, B, C.

4. The Minimum Enroute Altitude (MEA) between the Truckee and Signal Intersections (fig. 9—appendix) is 11,500 feet. Which statement correctly defines the MEA?

1—Provides enroute obstruction clearance for IFR flight.
2—Assures adequate navigation signal coverage and obstruction clearance between airway radio fixes.
3—Provides enroute obstruction clearance and assures navigational signal reception within 50 miles of a VOR.
4—Assures adequate signals to determine specific VOR fixes.

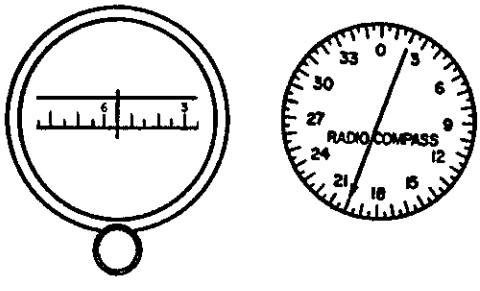
5. You are instructing a student in timed climbing turns. During a turn to the left the needle shows the correct rate of turn, but the ball is to the right of center. In this situation, the student should—

1—Apply or increase right rudder pressure and shallow out the bank.
2—Shallow out the bank to center the ball.
3—Apply or increase right rudder pressure and increase the bank.
4—Add right rudder trim until the ball is centered and maintain the same bank.

6. During a period in the synthetic trainer, you issue the following clearance to your student:

ATC CLEARS FASTWIN ONE TWO XRAY TO THE BRAVO RADIO BEACON. TRACK INBOUND ON A MAGNETIC COURSE OF 265°.

With magnetic heading and ADF indications as shown in the illustration below, which response



outlines an accepted procedure in compliance with this clearance if a 60° interception angle is used?

1—Turn right to magnetic heading 205°. When the relative bearing approaches 060°, turn to magnetic heading 265°.
2—Turn left immediately to magnetic heading 205°. When the relative bearing approaches 300°, turn to magnetic heading 265°.
3—Turn left to magnetic heading 205°. When the relative bearing approaches 060°, turn to magnetic heading 265°.
4—Turn left immediately to establish a relative bearing of 0° and then compute an interception heading.

7. From the list below select the discrepancies that *must* be corrected prior to takeoff for the flight proposed in this test.

A. Vertical speed indicator indicates 250 feet per minute rate of descent.
B. Generator is charging below minimum limit.
C. Clock sweep second hand is inoperative.
D. DME is inoperative.

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

8. The word "unattended," in the recorded voice identification of a VOR range, means that—

1—The range is not monitored.
2—The range is monitored solely through the use of automatic equipment.
3—The VOR range is remotely controlled by an FSS.
4—No two way air-ground communications facility is associated with the VOR range.

9. You advise your students that in the event of inflight failure of the gyroheading indicator, the magnetic compass may be the only source of heading information. With reference to the magnetic compass, which statement is true? (Assume 15° to 18° bank and a TAS of 220 knots or less.)

1—The lead required to roll out of a turn on a heading of south is the same as the lead that is required to roll out of a turn on a heading of north.

2—The amount of turning error in a magnetic compass is determined by the latitude at which the turn is being made.

3—Acceleration error on headings of north and south is the same as the acceleration error on headings of east and west.

4—The amount of lead required to roll out of a turn on a heading of 030° is the same as that required to roll out of a turn on a heading of 060°.

10. Select, from the list below, the correct statements pertaining to a properly calibrated turn and slip instrument.

A. Higher than normal vacuum on a suction driven turn and slip indicator causes the deflection of the turn needle to be greater than normal.

B. To maintain a standard rate of turn, the degree of bank must be held constant regardless of airspeed change.

C. The ball indicates whether the aircraft has the correct angle of bank for its rate of turn.

D. To maintain a standard rate turn, the angle of bank must be increased if the aircraft is accelerated.

E. The turn needle operates on the gyroscopic principle of rigidity in space.

1—A, D, E.
2—B, C, E.
3—A, C, D.
4—A, B, E.

11. Which statement correctly applies to hypoxia?

1—A pilot will normally be aware of hypoxia because of the onset of pain and other warning symptoms.

2—Hypoxia is the complete lack of oxygen supply to the tissues.

3—Hypoxia is the condition resulting from insufficient oxygen supply to the tissues.

4—Hypoxia is accompanied by both decreased pulse and respiration.

12. Select, from the list below, those statements that apply if this IFR flight is made with a VFR CONDITIONS ON TOP clearance.

A. Only Visual Flight Rules apply.

B. Flight must be conducted 3,000 feet or more above the surface and at the appropriate VFR altitude for direction of flight.

C. Only Instrument Flight Rules apply.

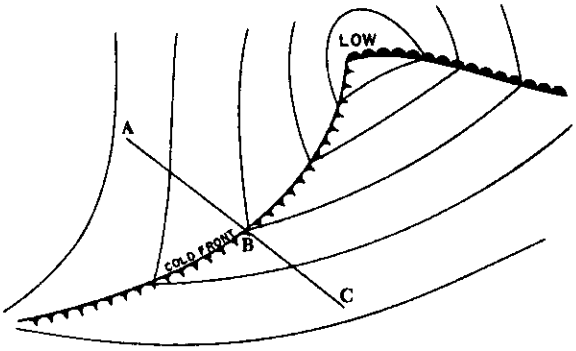
D. Both Visual and Instrument Flight Rules apply.

E. May be approved for daytime operation only.

F. May not be approved for holding.

G. No separation is provided by ATC.

1—A, D, and F.
2—B, D, and G.
3—C, E, and G.
4—D and G.



Refer to the above diagram in answering Test Item 13.

13. A flight is made from A to C at an altitude of 4,000 feet above ground level. In order to maintain the desired ground track, the pilot would have to correct heading to the (refer to the surface diagram above)—

1—Left upon noting a decrease in outside air temperature at some point between B and C.

2—Right upon noting a decrease in outside air temperature at some point between A and B.

3—Right upon noting an increase in outside air temperature at some point between A and B.

4—Left upon noting an increase in outside air temperature at some point between B and C.

The test items which follow are based on the planning and execution of an IFR training flight. They cover some of the elements of preflight and inflight procedures for which your students should be well prepared.

Aircraft Data and Flight Conditions

The route for this flight is from Municipal Airport, Reno, Nevada, via Sparks Six Departure, Verdi Transition, V6N, Sacramento (SAC) VORTAC, V6, Oakland (OAK) VORTAC direct San Francisco (SFO) VORTAC.

The route to the alternate is: SFO direct OAK VORTAC V6 Sacramento (SAC). Assume departure 1420 P.

Note that the distance shown on the FLIGHT TIME ANALYSIS from takeoff to Sparks radiobeacon is based on circling the airport for the required 1,000 feet of altitude.

The Appendix of this guide contains the data required for flight planning. The FLIGHT TIME ANALYSIS (Figure 1 in the Appendix) shows major check points, requested airways and altitudes, magnetic variation, calibrated airspeed, and winds and temperatures to be used. (You may wish to remove this page from the booklet to complete your calculations.) Aircraft data, weather information, and charts may be found in the Appendix, Figures 2 through 14.

14. The computed flight time from takeoff to the SFO VORTAC is—

1—1 hour and 6 minutes.
2—1 hour and 12 minutes.
3—1 hour and 17 minutes.
4—1 hour and 22 minutes.

15. The fuel requirement for this IFR flight is approximately—

1—90 gallons.
2—96 gallons.
3—99 gallons.
4—105 gallons.

During the preflight planning you pose the following weight and balance problem. (Refer to aircraft data, Figures 2 and 3 in the Appendix.)

	Pounds	*Moment/1000*
Empty weight		
Oil 7.5 lb./gal		
5 passengers in seats 1, 2, 3, 4, 5 (170 lb. each)		
Pilot and 1 passenger in Copilot seat (170 lb. each)		
Fuel main tanks (max. consistent with t/o gross weight)		
Baggage	150	

16. Under the loading conditions specified previously, the resultant C.G. moment is approximately—

1—1,187 thousand pound inches.
2—1,186 hundred pound inches.
3—1,227 thousand pound inches.
4—1,169 thousand pound inches.

17. You plan to request 12,000 feet for this flight. Which constant pressure chart would you check to determine the wind flow affecting your operation?

1—850 millibar chart.
2—700 millibar chart.
3—500 millibar chart.
4—400 millibar chart.

18. Which statement correctly interprets portions of the 1845Z SFO Area Forecast? (Refer to Figure 14 in the Appendix.)

1—Freezing level is expected to be 10,000 feet over central California.
2—Scattered rain showers are expected north of the front.
3—Occasional severe turbulence is predicted over mountain areas in northern California.
4—Showers and cloudiness are expected to intensify over central California by Thursday morning.

19. Which condition is forecast by the FT1 issued at 1645Z? (Refer to Figure 13 in the Appendix.)

1—RNO—pronounced wind shift associated with weak frontal passage.
2—SFO—weak frontal passage at 0100Z.
3—SAC—ceiling 14,000 feet scattered after 1300P.
4—OAK—increasing cloudiness and lowering ceilings after frontal passage.

20. According to the forecasts, there is a possibility of structural icing during this flight. With reference to icing, you would be correct in pointing out to your students that clear ice formation is usually associated with temperatures at freezing or below in—

1—A stable air mass containing very small water droplets.
2—Stratus clouds.
3—Ice clouds.
4—Convective type clouds.

21. Assume you will cross the airport at the minimum specified altitude and will make good an average ground speed of 110 knots during the climb to SPARKS. To cross SPARKS initially at 9,000 feet, your aircraft must climb at a rate nearest to: (Refer to SID Chart, Figure 7, and RNO Approach Chart, Figure 11 in the Appendix.)

1—800 feet per minute.
2—700 feet per minute.
3—600 feet per minute.
4—500 feet per minute.

22. Based on the climb requirement established in Test Item 21 (assuming RNO pressure altitude of 5000 feet and temperature reported in the 2200Z SA) the aircraft is (see Figures 5 and 6)—

1—Capable of meeting the requirement in both single and multiengine configuration.
2—Capable of meeting the requirement in multiengine configuration only.
3—Not capable of meeting the requirement.
4—Capable of meeting the requirement in single engine configuration to a pressure altitude of 7500 feet.

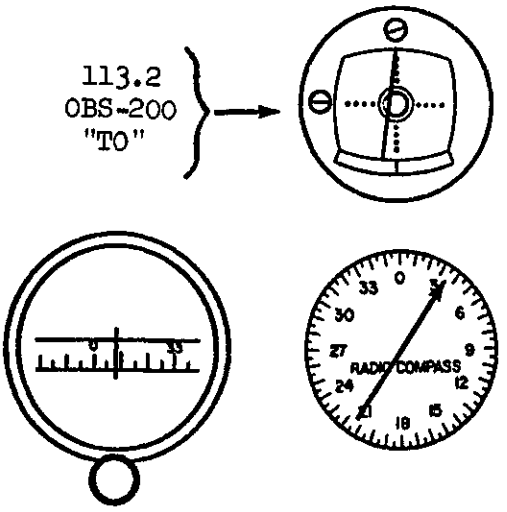
23. Though not required to do so by regulations, the competent instrument pilot should make a sensitivity check on his VOR navigation receivers at the same time he makes the required accuracy check. With respect to an accuracy and sensitivity check utilizing a VOT, which of the following is correct? (Nonautomatic indicating type receiver)—

OBS set at	*To/From*	*CDI*	*Recommended sensitivity*
1—0° (±4°).....	From..	Centered...	10° OBS change to produce R or L full scale CDI deflection.
2—0° (±6°).....	To.....	Centered...	5° OBS change to produce R or L full scale CDI deflection.
3—180° (±4°)....	From..	Centered...	5° OBS change to produce R or L full scale CDI deflection.
4—180° (±6°)....	To.....	Centered...	10° OBS change to produce R or L full scale CDI deflection.

When flight planning is complete and the student is ready for takeoff on runway 16, RNO Tower issues the following clearance:

ATC CLEARS N8712X TO THE OAKLAND VORTAC VIA V6N SACRAMENTO (SAC) VORTAC, V6, OAKLAND (OAK) VORTAC, MAINTAIN ONE TWO THOUSAND. SPARKS SIX DEPARTURE, VERDI TRANSITION. DEPART SPARKS RADIOBEACON AT ONE TWO THOUSAND.

24. During the climb to Sparks, the heading, ADF, and VOR indications are as shown below:



The student should know from these indications that he is to the—

1—Left of course, approaching the 020 radial of LTA.
2—Left of course, and has passed the 020 radial of LTA.
3—Right of course, approaching the 020 radial of LTA.
4—Right of course, and has passed the 020 radial of LTA.

25. After leaving SPARKS Radio Beacon, RNO Approach Control transmits the following instructions: 8712XRAY, CONTACT OAKLAND CENTER 128 POINT 8 NOW. If the student is unable to contact OAKLAND Center on 128.8, he is expected to follow a prescribed procedure to reestablish communications with ATC. From the list below, select the correct order of procedures.

A. Contact any FSS.
B. Recontact the transferring facility.
C. Contact any facility on the International Emergency frequency 121.5 MHz.

1—A, B, C
2—C, B, A
3—C, A, B
4—B, A, C

26. Assume the student arrives at SPARKS RBN at 8,500 feet on a compass heading of 327°. To comply with the SPARKS Six SID he—

1—May proceed on the Verdi transition without holding.
2—Should enter a holding pattern utilizing a teardrop entry and climb to 10,500 feet before proceeding to Verdi.
3—Should enter a holding pattern utilizing a parallel or teardrop entry and climb to 9,000 feet before proceeding to Verdi.
4—Should enter a holding pattern utilizing a teardrop entry and climb to 12,000 feet before proceeding to Verdi.

27. You would be correct in advising the student that the climb to the assigned altitude should be made—

1—As rapidly as practicable to 12,000 feet.
2—At any rate to 12,000 feet.
3—As rapidly as practicable to 11,000 feet then at 500 feet per minute to 12,000 feet.
4—At a maximum rate of 1,000 feet per minute to 12,000 feet.

28. You advise the student that it is a good procedure to determine actual winds at cruising altitude in order to be able to give more accurate estimates to ATC. Assume the following:

Time over Verdi Intersection—2242Z.
Time over Signal Intersection—2254Z.
True Airspeed—197 knots.
Compass heading to maintain course on this leg—243°.
(See Figure 2 in the Appendix for compass deviation.)

The student should determine the wind to be approximately—

1—295° at 22 knots.
2—215° at 23 knots.
3—240° at 23 knots.
4—200° at 21 knots.

29. After passing the Sacramento VORTAC the student makes a position report to Oakland Center. Which represents the proper reporting procedure for this flight? (Assume initial contact has been made.)

1—FASTWIN ONE TWO XRAY SACRAMENTO ONE FOUR, BAY POINT TWO SIX OAKLAND.
2—FASTWIN ONE TWO XRAY SACRAMENTO ONE FOUR, IFR RENO TO SAN FRANCISCO.
3—FASTWIN ONE TWO XRAY SACRAMENTO ONE FOUR, EIGHT THOUSAND, BAY POINT TWO SIX, OAKLAND.
4—FASTWIN ONE TWO XRAY SACRAMENTO ONE FOUR, EIGHT THOUSAND, IFR, SAN FRANCISCO.

30. To avoid excessive radar vectors in establishing approach sequence, the student may be requested to make airspeed adjustments. Which statement is correct?

1—The main purpose of speed adjustment procedures is to reduce speeds of all arriving aircraft.
2—All requests for speed adjustments are expressed in terms of knots, predicated on TAS.
3—When approach clearance is received, the pilot is expected to effect his own speed adjustments.
4—The pilot is required to accept the speed adjustments assigned his flight.

31. If SFO is below landing minimums on arrival, how long may the student hold before proceeding to the alternate? (Assume arrival at calculated ETA.)

1—18 minutes.
2—36 minutes.
3—1 hour and 03 minutes.
4—45 minutes.

32. You advise the student that he is to plan for an ILS approach at San Francisco International Airport. Which of the statements are correct with regard to the aircraft used for this simulated flight? (See Appendix, Figure 12.)

A. The minimum altitude in the holding pattern at the LOM is 1,700 feet.
B. The distance from the LOM to the threshold of runway 28R is 5.7 miles.
C. The time from the LOM to the MM at a groundspeed of 90 knots is 2 minutes and 4 seconds.
D. Minimum descent altitude for R28R is 211 feet MSL.
E. When approaching from OAK VORTAC contact Approach Control on 120.5 MHz.
F. Visual Approach (Glide) Slope Indicator available for runway 19L only.

1—A, B, D.
2—B, D, F.
3—C, D, E.
4—B, C, D.

33. A pilot making an ILS approach uses the visual display of his glide slope and localizer receiver to keep his aircraft within the prescribed approach zone. With reference to the glide slope indicator, what is the recommended maximum allowable "fly up" indication from the middle marker inbound to the landing area?

1—One-quarter scale.
2—Zero.
3—One-half scale.
4—Three-quarter scale.

34. If weather conditions are below VFR minimums on arrival at SFO, the ILS approach will be monitored by Precision Approach Radar (PAR) and advisories will be furnished. The advisories will include—

A. Passing the final approach fix.
B. Distance above or below the prescribed glide path if aircraft elevation exceeds the "safety zone."
C. Distance right or left of the prescribed final approach course if aircraft azimuth exceeds the "safety zone."
D. Any situation which, in the judgment of the controller, is likely to affect the safety of the flight.

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

35. One of the newer landing aids is the Visual Approach Slope Indicator (VASI) which provides a visual glide path within the approach zone. The lights at the 600-foot mark from the threshold are known as the downwind bars, and the lights at the 1,300-foot mark are known as the upwind bars. When approaching on the proper glide slope, the pilot will see—

1—The upwind lights red and the downwind lights white.
2—Both upwind and downwind lights white.
3—Both upwind and downwind lights pink.
4—The upwind lights white and the downwind lights red.

Analysis of Answers to Sample Test Items

Item Answer

1 3 The H, L, and T Classifications are not related to transmitter power. Since the frequency of an L VOR is not protected above 18,000 feet, another VOR on the same frequency may be close enough to produce signal interference which would result in undependable or inadequate indication in the aircraft.

2 3 Since many NavCom transceivers utilize part of the receiver circuitry when the transmitter is operating, unreliable CDI indication may be obtained while transmitting.

3 2 A. All false courses are encountered *above* the normal glide slope.
B. *Airman's Information Manual* (Part I).
C. FAR 91.117. A compass locator may be used, but it is not a required component.
D. *Airman's Information Manual* (Part I).
E. *Airman's Information Manual* (Part I).

Item Answer

4 2 *Airman's Information Manual* (Part I) Glossary. The MEA provides both navigation signal coverage and obstruction clearance between radio fixes.

5 3 To coordinate the skidding turn, the student should apply or increase right rudder pressure and increase the bank to maintain correct rate of turn.

6 1 The aircraft is east-northeast of the station, on a magnetic bearing of 255° to the station. An accepted procedure is to turn right (the shortest distance) to magnetic heading 205° (60° less than the desired track inbound), then turn to magnetic heading 265° when the relative bearing approaches 60°.

7 4 FAR 91.33(d).

8 4 If no air/ground communications facility is associated with the omnirange, "(name) UNATTENDED VOR (VORTAC)" will be heard. *Airman's Information Manual* (Part I).

9 2 Under the airspeed and bank conditions stated in this item, the amount of

Item	Answer	
		turn error is predictable. Turn error is approximately equal to the latitude at which you are flying.
10	3	A. Correct as stated. B. The angle of bank required to maintain a standard rate of turn varies directly with TAS. C. Correct as stated. D. Correct as stated. E. The turn needle utilizes the principle of precession for its indications.
11	3	Airman's Information Manual (Part I).
12	4	See Exam-O-Gram No. 6 in the Appendix.
13	3	The cold front at the surface is in advance of the cold front aloft. Therefore, warm air will be encountered at some point between A and B and the wind shift will produce a crosswind from the right.
14	3	201 miles, ground speeds ranging from 152 knots to 175 knots.
15	2	51.4 gal. to SFO, 14.7 gal. to alternate, 30.0 gal. reserve.
16	1	

	Pounds	Moment/1000
Empty weight	4,940	854.8
Oil 7.5 lb./gal	75	15.0
5 passengers in 1, 2, 3, 4, 5 (170 lb. each)	850	131.0
Pilot and 1 passenger in copilot seat (170 lb. each)	340	32.0
Fuel main tanks (maximum consistent with TOGW)	645	124.3
Baggage	150	30.0
	7,000	1,187.1

17	2	The 700 millibar chart represents approximately the 10,000 foot level.
18	1	Correct as stated.
19	2	Correct as stated.
20	4	Clear ice is most likely to form from the large droplets of water contained in convective type clouds.
21	3	Distance from the airport to Sparks radiobeacon is 11.2 miles (8.9 and 2.3 miles). 3,600 feet to climb in 6 minutes.
22	2	The aircraft is capable of climbing at a rate of slightly more than 350 fpm in single-engine configuration at a pressure altitude of 5,000 feet.
23	1	From full scale left to full scale right covers approximately 20° (10° R or L of center). *Airman's Information Manual* (Part I).
24	2	The magnetic bearing to Sparks radio beacon from the aircraft is 027°. The pilot has selected the 200 OBS setting because he will track to Verdi on that course.
25	4	*Airman's Information Manual* (Part I), "Frequency Utilization Plan."
26	4	The clearance requires that climb to assigned altitude be made in a standard holding pattern if altitude is not attained on initial arrival at Sparks. The type of entry is determined by the aircraft heading on arrival at the holding fix. (In this case, a teardrop entry would be recommended.)
27	3	*Airman's Information Manual* (Part I). The climb should be made as rapidly as practicable to 1,000 feet below the assigned altitude, and then at the rate of 500 fpm.
28	1	The information needed to solve this problem is as follows: MC 239°+18° E VAR=TC—257° CH 243°+0° DEV+18° E VAR=TH—261° TAS 197 knots. GS 180 knots. The resultant wind is approximately 295° at 22 knots.
29	3	*Airman's Information Manual*, Part I, "Radiotelephone Phraseology and Techniques."
30	3	*Airman's Information Manual*, Part I, "Speed Adjustment of Arriving Aircraft."
31	1	Assuming arrival at calculated ETA, approximately 12.1 gallons of fuel in excess of required fuel will remain. At 40 gph this will be equivalent to approximately 18 minutes.
32	2	See SFO ILS Approach Chart.
33	2	*Airman's Information Manual*, Part I, "Instrument Landing System."
34	4	*Airman's Information Manual*, Part I, "Radar Controlled Approaches."
35	1	*Airman's Information Manual*, Part I, "Visual Approach Slope Indicator (VASI)."

APPENDIX

This section contains supplementary data for use with the sample test and additional material of value to the applicant for the Instrument Ground Instructor Rating.

FLIGHT TIME ANALYSIS

CHECK POINTS		ROUTE CRUISE ALT./FLT. LEVEL	TRUE COURSE	AIRSPEED-KTS.		WINDS ALOFT DIRECTION VELOCITY TEMPERATURE	DRIFT CORR ANGLE	GROUND SPEED	DISTANCE N.M.	TIME		FUEL CONSUMPTION GALS.		MISC.
FROM	TO			CAS	TAS					LEG	TOTAL	LEG	TOTAL	
T. O.	Sparks	Climb	-	-	-	--	-	110	16	+9	-	6		
Sparks	Verdi	12,000		165		265/50/-1								
Verdi	Signal	V-6N 12,000				265/50/-1								
Signal	SAC	V-6N 12,000				265/35/-1								
SAC	R10	V-6 8,000				260/25/+8								
R10	Bay Pt.	V-6 8,000				260/25/+8								
Bay Pt.	OAK	V-6 8,000				260/20/+8								
OAK	SFO	Dir	-	-	-	--	-	-	10.0	+5		3.4		

ALTERNATE DATA

SFO	OAK	Climb	-	-	-	--	-	-	10.0	+5				
OAK	SAC	V-6 5,000		165		260/20/+10								

FUEL SUMMARY

	TIME	GALS.
ENROUTE		
ALTERNATE		
RESERVE		
EXTRA		
TOTAL		

For this flight use 18° east variation.

FIGURE 1. *Flight log.*

Data on FASTWIN 8712X

The aircraft is a five- to seven-place twin-engine "Fastwin" typical of various light twins currently in use.

It is appropriately equipped for instrument flight and has the following radio installations:

One automatic direction finder (ADF).

Dual VHF receivers (both with frequency range 108.0–126.9 MHz) with omni visual display of the three element type (course selector, course deviation indicator, and "TO-FROM" indicator) and instrument landing equipment (ILS—localizer and glide slope).

One marker beacon receiver.

Two 360 channel transceivers range (118.0–135.9 MHz).

Empty Weight:

As equipped, 4,940 pounds.

Maximum Allowable Gross Weight:

7,000 pounds.

Oil Capacity:

10 gallons (5 gal./engine).

Usable Fuel:

Main—156 gallons.

Aux.—67 gallons (37.5 gal. in each of 2 aux.).

Fuel Consumption:

40 gal./hr. (20 gal/hr./engine).

Baggage Compartment:

See weight and balance information.

Calibrated Airspeeds:

Best Climb	110 knots	Approach	100 knots
Cruise	165 knots	Stall	70 knots

Altitudes:

All flight altitudes will be in terms of MEAN SEA LEVEL (MSL) unless otherwise specified.

Radio Call:

Fastwin 8712X

De-Icing Equipment:

Aircraft is equipped with propeller anti-icing; wing, vertical and horizontal stabilizer de-icers.

Compass Correction Card:

FOR (MH)	0	30	60	90	120	150	180	210	240	270	300	330
STEER (CH)	1	30	58	90	122	153	179	210	240	272	300	330

Weight and Balance Data:

	Pounds	*Moment/1000*		*Pounds*	*Moment/1000*
Empty weight	4,940	854.8	Fuel—Mains	------	---------
Oil 7.5 lb./gal	75	15.0	Fuel—Auxiliary	------	---------
Passengers 170 lb. each	------	---------	Baggage	------	---------
Pilot and Copilot 170 lb. each	------	---------			

FIGURE 2. *Aircraft data (Fastwin 8712X).*

PASSENGERS		
SEAT NO.	WEIGHT	MOMENT/1000
Co-P	170	16
4	170	22
5	170	22
1	170	29
2	170	29
3	170	29

FUEL		
GALS.	WEIGHT	MOMENT/1000
10	60	12
20	120	24
30	180	36
40	240	48
50	300	59
60	360	71
70	420	83
80	480	94
90	540	105
100	600	116
110	660	127
120	720	138
130	780	148
140	840	159
150	900	169
156	936	175

L & R OUTBOARD FUEL SYSTEM		
GALS.	WEIGHT	MOMENT/1000
10	60	11
20	120	21
30	180	32
40	240	43
50	300	53
60	360	64
67	402	72

BAGGAGE	
WEIGHT	MOMENT/1000
25	5
50	10
75	15
100	20
125	25
150	30
175	35
200	40
225	45

WEIGHTS AND MOMENTS TO DETERMINE ALLOWABLE LIMITS 167.40 Min. To 174.40 Max. (Stay Within Min. and Max. Limits)		
	Minimum	Maximum
Weight	Moment/1000	Moment/1000
5500	921 ----	959
5550	929 ----	968
5600	937 ----	977
5650	946 ----	985
5700	954 ----	994
5750	963 ----	1003
5800	971 ----	1012
5850	979 ----	1020
5900	988 ----	1029
5950	996 ----	1038
6000	1004 ----	1046
6050	1013 ----	1055
6100	1021 ----	1064
6150	1030 ----	1073
6200	1038 ----	1081
6250	1046 ----	1090
6300	1055 ----	1099
6350	1063 ----	1107
6400	1071 ----	1116
6450	1080 ----	1125
6500	1088 ----	1134
6550	1096 ----	1142
6600	1105 ----	1151
6650	1113 ----	1160
6700	1122 ----	1168
6750	1130 ----	1177
6800	1138 ----	1186
6850	1147 ----	1195
6900	1155 ----	1203
6950	1163 ----	1212
7000	1172 ----	1221

FIGURE 3. *Weight and moment data.*

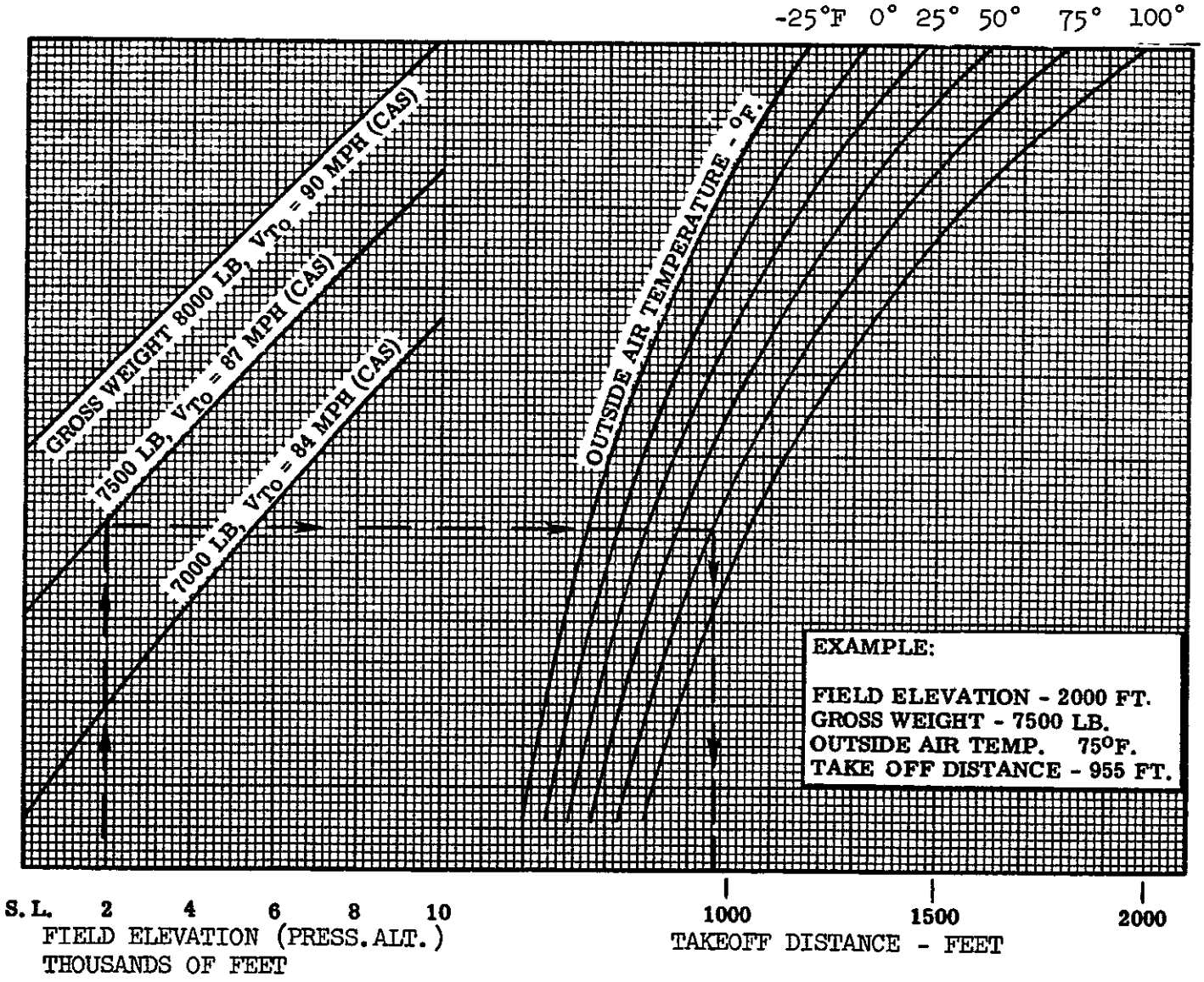


FIGURE 4. *Short-field takeoff distances over 50-foot obstacle (20 mph headwind).*

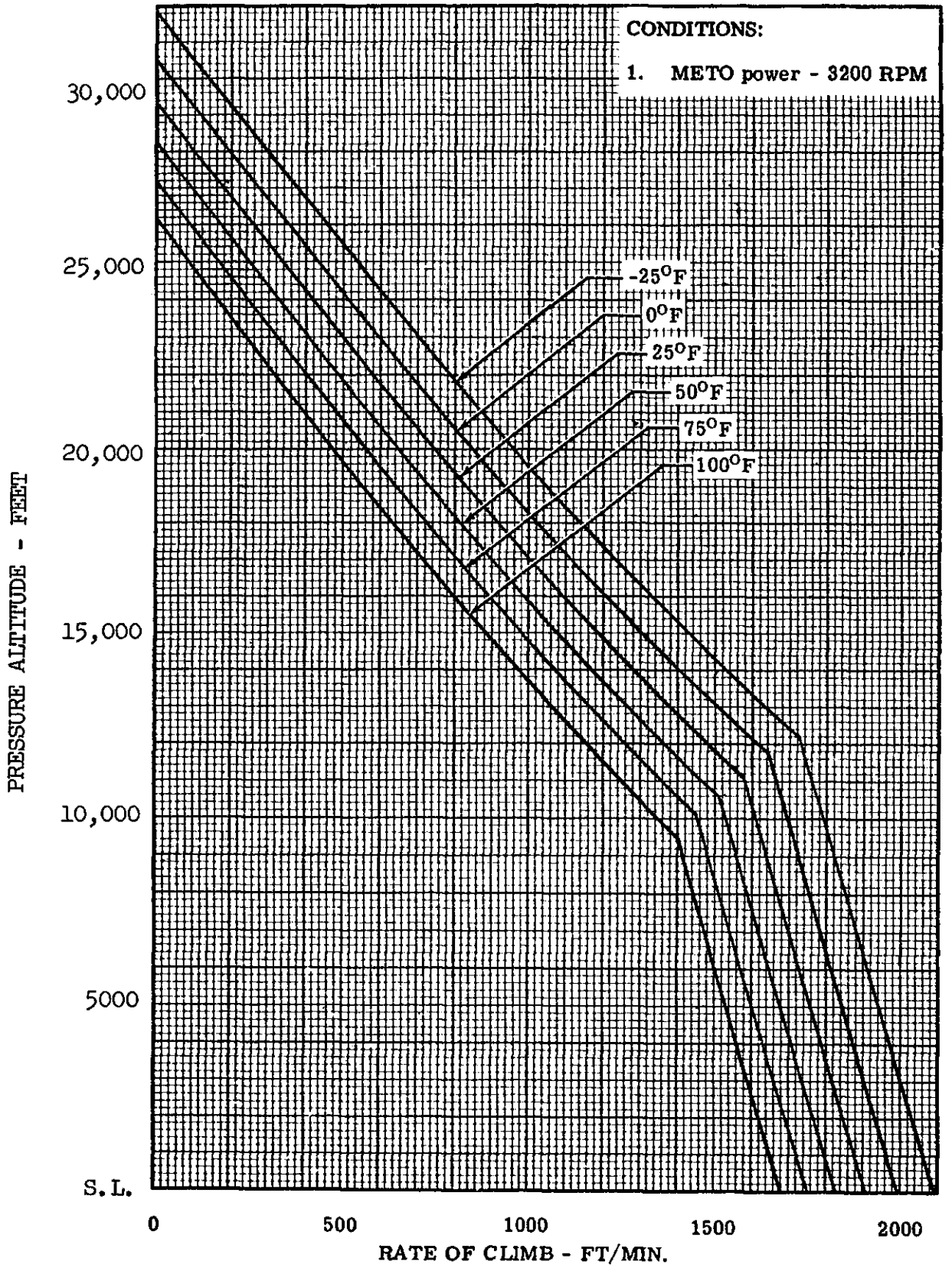


FIGURE 5. *Rate of climb (7,000-pound gross weight).*

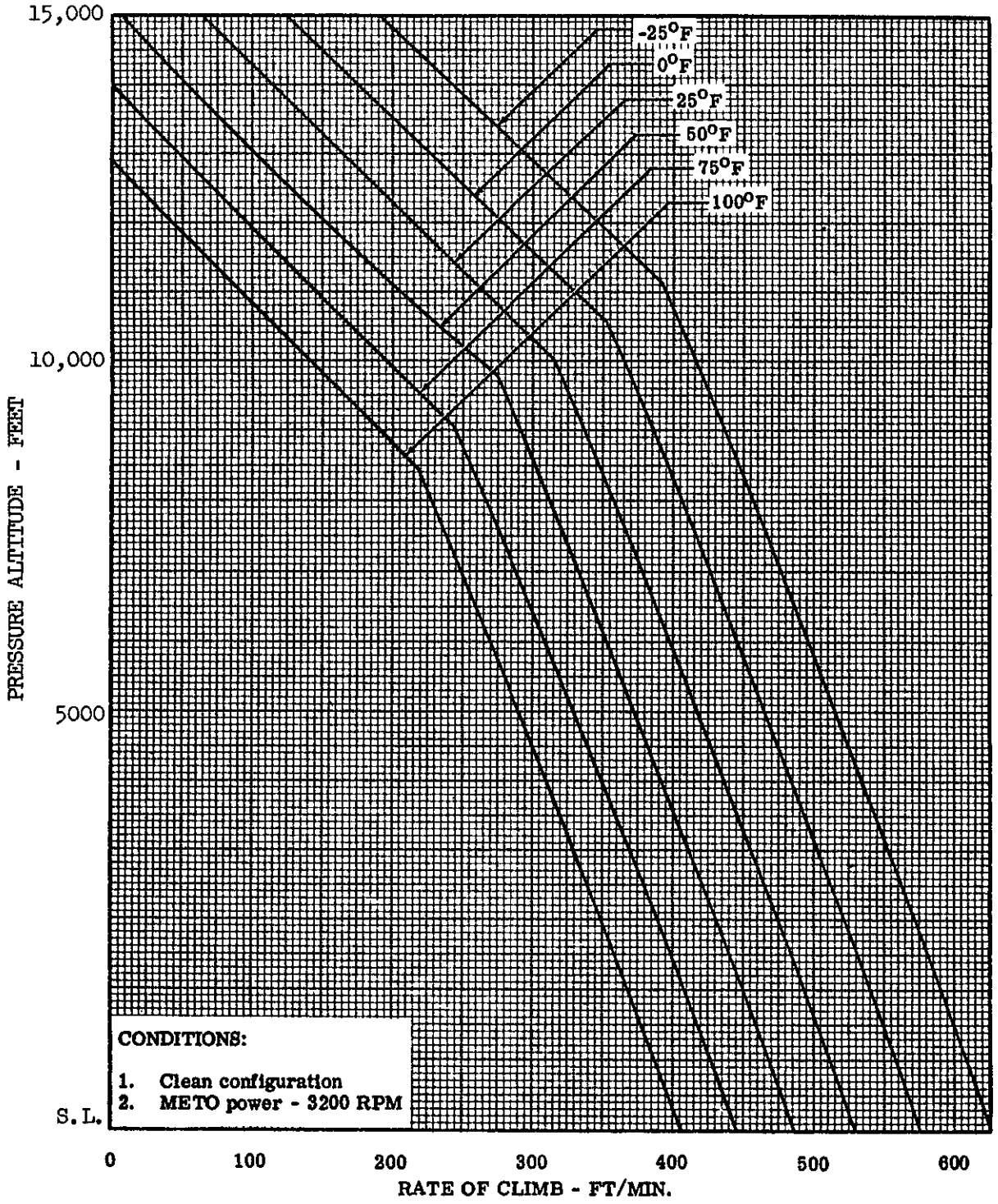


FIGURE 6. *Single-engine rate of climb (7,000-pound gross weight).*

A/G VOICE (FSS) COMMUNICATIONS & AERODROME DATA

Civil Aerodromes with terminal control A/G voice communications are listed below. Aerodromes located within the limits of the ten Area Charts are listed with the specific Area Chart. Frequencies transmit and receive unless otherwise noted. An asterisk (*) follows those tower frequencies also used for approach control. Values defining sectors are outbound radials from the facility. Chart panel identification letter is shown to right of listing. For additional communications data, refer to appropriate supplemental publications.

LAKE TAHOE A
Twr—119.0 122.5R Gnd Con—121.9

RENO App Con—119.2 117.9T 351T A
Twr—118.3 122.5R 278T Gnd Con—121.9

MODESTO CITY - CO F
Stockton App Con—125.1 116.0T
Modesto Twr—120.0 122.7R Modesto Gnd Con—121.7

SACRAMENTO Twr—119.5 122.5R* G
App Con—119.1 (Below 5000') 121.0 (5000' or above)
Dep Con—124.5 Gnd Con—121.9

L E G E N D

AERODROMES

Aerodromes/Seadromes shown in BLUE have an approved Low Altitude Instrument Approach Procedure published. The DOD FLIP Terminal contains only those shown in DARK BLUE. Aerodromes/Seadromes shown in BROWN do not have a published Instrument Approach Procedure.

LAND SEA
Civil
Joint Civil-Military
Military
Heliport

RELATED FACILITIES
Pilot to Forecaster Service (PFSV)
Continuous Operation
Less Than Continuous
Weather Radar (WXR)
PFSV and WXR Combined

ILS Availability

1. Parenthesis around aerodrome *name indicates military landing* rights not available.
2. Aerodrome elevation given in feet above or below mean sea level.
3. Length of longest runway given to nearest 100 feet with 70 feet as the dividing point (Add 00).
4. Aerodrome symbol may be offset for enroute navigation aids.
5. Pvt-Private use, not available to *general public.*

Runway Lighting Capability. Star indicates lighting on prior request
Aerodrome Elev
Name
Radar Services
349 °L 80 Availability
ASR/PAR
ATIS 108.5
Automatic Terminal Information Service and Frequency
Longest Landing Runway Length
(Name)
185 35
No Runway Lighting Capability
Indicates Soft Surface

RADIO AIDS TO NAVIGATION AND COMMUNICATION BOXES

RADIO AIDS TO NAVIGATION

VHF/UHF Aids are depicted in BLUE
LF/MF Aids are depicted in BROWN

COMPASS ROSE Oriented to Magnetic North
VOR TACAN VORTAC
LF/MF Range with simultaneous Voice Signal Capability (Bold tip in "N" Quadrant)
LF/MF Range without simultaneous Voice Signal Capability
LF/MF Range Course Feathered side indicates "A" Quadrant
LF/MF Non-directional Radiobeacon or Marine Radiobeacon
UHF Non-directional Radiobeacon
Compass Locator Beacon
Consolan Station
Marker Beacon
Fan (FM) Bone (BM)
ILS Localizer Course with ATC Function. Feathered side indicates Blue Sector

RADIO AIDS TO NAVIGATION DATA BOXES

Abnormal Status Underprint for Affected Data, e.g., TO BE CMSN, SHUT DOWN, MAY BE CMSN, etc.
DME SHUT DOWN
DME Chan 88
NAME
NAM 000.0 (T)
MN 000
VOR with TACAN compatible DME
Combined VHF/UHF and LF/MF data
(T) Frequency protection
Usable range at 12,000'-25 NM
* Operates less than continuous or On-Request
NAME
NAM *000
Underline indicates No Voice Transmitted on this frequency
TACAN channels are without voice but are not underlined
Norfolk Weather Radio
U.S. Weather Station with Voice Communication
IDENT 000
Commercial Broadcast Station

AIR/GROUND COMMUNICATION BOXES

Shadow box indicates Standard FSS A/G Voice Communications freqs 122.2T, 122.1R, 126.7, 123.6 and 255.4 are available at all altitudes without terrain interference.
Plain box, with freq/s, indicates all Standard FSS freqs are not available, or are not available at all altitudes, due to terrain interference.
126.7
WASHINGTON
Controlling FSS name
This is the best freq to use in the immediate vicinity of this site insuring reception at low altitudes. Other freqs are available from the controlling FSS named, however, altitude may determine their reception.
~~126.7~~ 379T
All Standard FSS freqs except the crossed out 126.7 *are available* at this location. 379T is other FSS frequency available.
Plain box, without frequencies, indicates no Standard FSS frequencies available.
Flight Service Station (FSS)
Remote Communications Outlet (RCO)
Limited Remote Communications Outlet (LRCO)

THE U.S. FEDERAL GOVERNMENT DISCLAIMS RESPONSIBILITY FOR NON-FEDERAL NAVIGATIONAL FACILITIES

FIGURE 8a. *A/G voice communications and aerodrome data.*

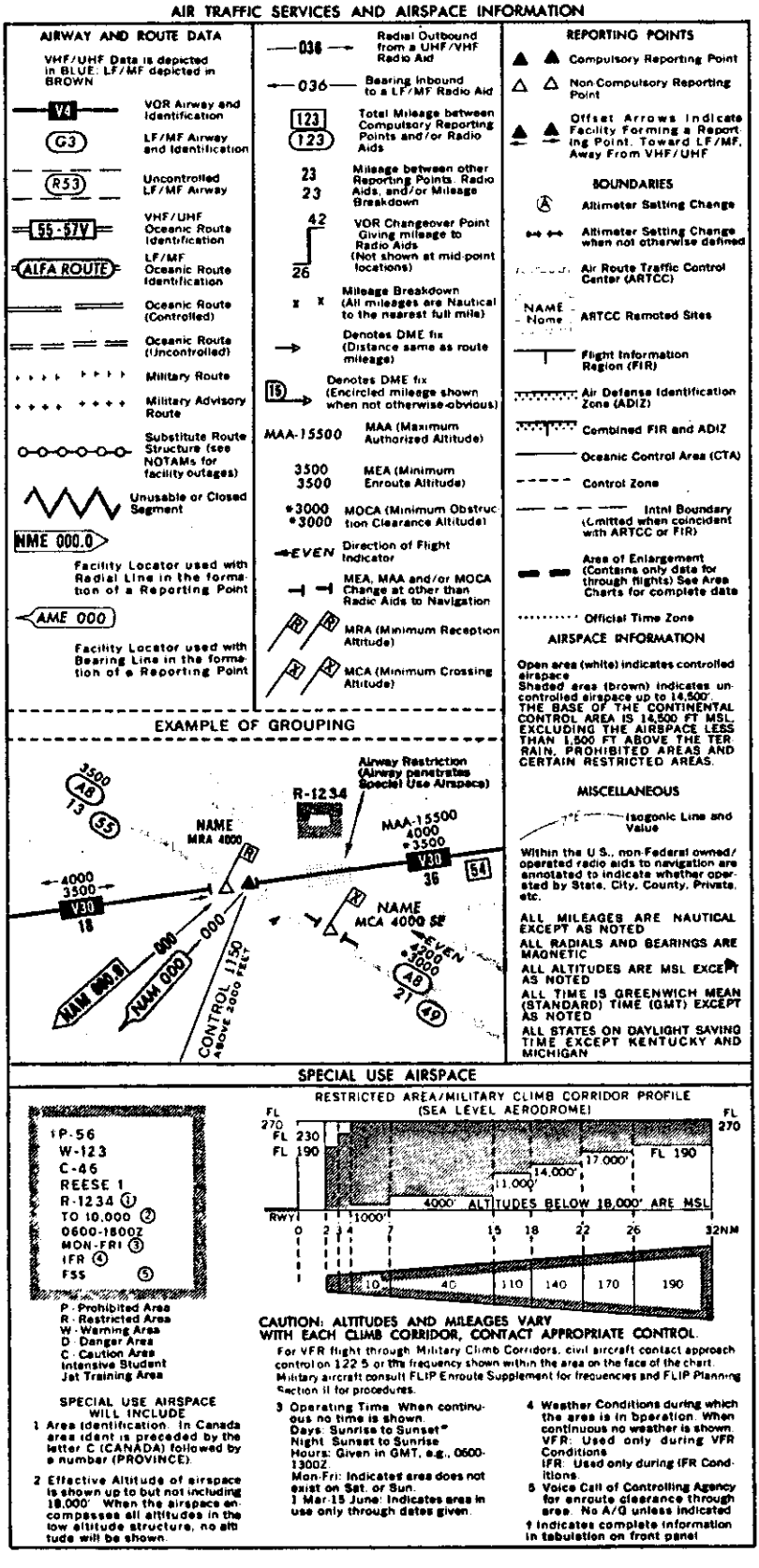


FIGURE 8b. *A/G voice communications and aerodrome data.*

TERMINAL FORECAST

FT1 221645
17Z WED-05Z THU

SFO C15⊕7 2415. 1830Z C18⊕ 2318G. 2100Z 20⊕ 2418G
OCNLY C20⊕. 0100Z WK FROPA 25⊕C14⊕ 2920G. 0500Z
25⊕80⊕C14⊕ 3020G

RNO 14⊕ 3015. 2000Z 60⊕C14⊕ 2820G. 0100Z WK FROPA
C55⊕ 3025G. 0400Z 50⊕C80⊕ 3318G FEW SW- VCNTY

SAC O 2115. 2100Z 14⊕ 2420G. 0200Z WK FROPA 60⊕C12⊕
2418. 0800Z 45⊕C12⊕ 3315. 1400Z 45⊕C14⊕ 3320G

OAK C15⊕8 2315. 1900Z C18⊕ 2418G. 2100Z 20⊕ 2418G
OCNLY C20⊕. 0100Z WK FROPA 25⊕C14⊕ 2918. 0600Z
25⊕80⊕C14⊕ 3015. 1600Z 25⊕80⊕14⊕ 3020G

WINDS ALOFT FORECAST

FD3 WBC 221755
18-24Z WED

LVI	3000	5000 FT	10000FT	15000FT	20000FT	25000FT
FAT	2418	2520+09	2730+03	2845-09	2760-16	2745-31
SFO	2520	2620+10	2625+05	2740-10	2760-17	3040-32
RNO			2640+01	2760-04	2950-14	2850-29

SCHEDULED HOURLY AVIATION WEATHER REPORTS

Ø34 SA342222ØØ
RBL 35⊕8Ø⊕3Ø Ø49/62/22/3Ø27G35/967/HVY CU OVR MTNS N AND SE
→RBL ↘4/11
SAC /-⊕8 Ø8Ø/67/46/2224G31/976/ACSL W FEW CU
RNO M7Ø⊕15Ø⊕35 ØØ1/58/2Ø/2215+31/958BD ALQDS NOTAM FLWS SAC

035 SA352222ØØ
SFO M2Ø⊕/⊕15+ 135/56/45/2518G25/992→SFO ↘3/6

FIGURE 13. *Terminal Forecast.*

AREA FORECAST

FA SFO 221845
11P-23P WED
19Z WED-07Z THU
NRN AND CNTRL CALIF CSTL WATERS WRN NEV

CLDS AND WX. WK COLD FRONT NEAR LAKEVIEW AND SWWD ACRS NRN CALIF WILL MOV TO NEAR AUSTIN-FRESNO LINE SWWD INTO PAC BY 07Z. SFC LOW RPDLY DVLPG NERN NEV.

NRN CALIF ASL 50-70⊖-⊕ LYRS OVR MTNS NRN CALIF NEAR AND N OF FRONT AND SWD ALG SLOPES TO LAKE TAHOE AREA. WIDELY SCTD SNW OR RAIN CHGG TO SNW SHWRS NEAR AND N OF FRONT. CLDNS AND SHWRS SPRDG SWD OVR W SLOPES MOST OF SIERNEVS DURG AFTN AND EVE. A FEW SHWRS PRBL SACRAMENTO VLY IN AFTN AND EVE. ALSO A FEW SHRS CSTL SECS N OF SANTA ROSA MOSTLY NEAR FRONT. LWR ASL 10-20⊖-⊕ CST AND CSTL VLYS MOST OF NRN AND CNTRL CALIF BUT LCLY CLR MORE INLAND SECS CSTL VLYS AND BCMG OCNLY SCTD MOST CSTL VLYS ERY AFTN. CLDNS BCMG MOSTLY 20-30⊖ TO OCNLY BRKN CSTL SECS NRN CALIF LATE AFTN AND EVE AND LCLY N OF FRONT CNTRL CALIF CST BY 07Z. HIR ASL 120-140⊖-⊕ LYRS DVLPG NRN CALIF AND SPRDG OVR MOST OF CNTRL CALIF AS ASL 140-160⊖-⊕ AFDK. SOME ASL 40-60⊖-⊕ IN SACRAMENTO VLY DURG AFTN MOSTLY IN SHWRS IN FOOTHILL AREAS. TOPS TO 230 MSL.

WRN NEV ASL 80-100⊖-⊕ WITH SCTD SNW SHWRS MTNS AND RAIN CHGG TO SNW SHWRS VLYS NEAR AND N OF FRONT NWRN NEV AREA SPRDG SWD OVR MTNS SWRN NEV DURG LATE AFTN AND EVE AS FRONT RCHS THOSE AREAS. HIR ASL 140-160⊖-⊕ LYRS NWRN NEV BCMG GEN SWRN NEV BY EVE. CLDNS BCMG OCNLY SCTD NWRN NEV VLYS A FEW HRS FLWG FROPA. TOPS TO 250 MSL. LCL BLWG DUST WRN NEV.

ICG. OCNL MDT ICG IN SHWRS ABV FRZG LVL. FRZG LVL 100 MSL CNTRL CALIF LWRG TO SFC-50 MSL NEAR OREG BRDR NEAR AND N OF FRONT.

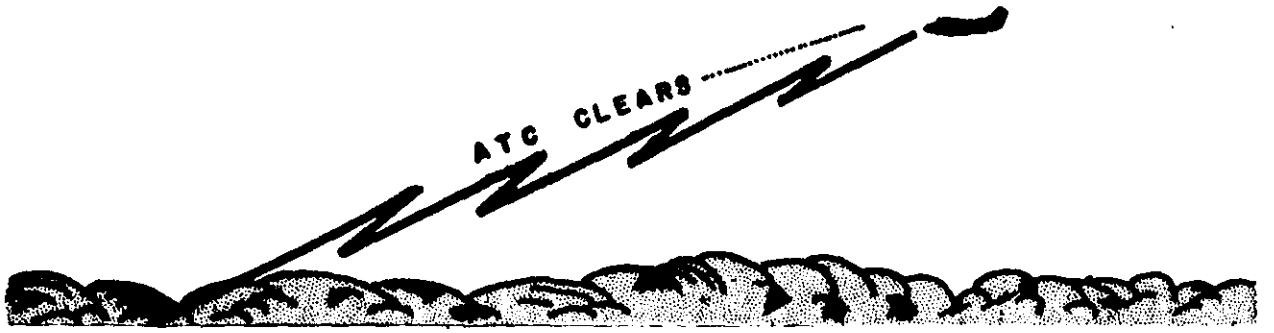
TURBC. OCNL MDT TURBC OVR MTNS AND LCLY IN GUSTY W TO NW SFC WNDS NRN CALIF NWRN NEV SPRDG SWD OVR SWRN NEV SIERNEVS DURG AFTN AND EVE. PSBL BRF SVR TURBC IN STANDING WVS E SLOPES SPRDG SWD OVR CNTRL CALIF SWRN NEV BY 07Z.

OTLK 07Z-19Z THU. SCTD SHWRS CONTG MTNS BUT CLDNS BCMG MOSTLY SCTD VLY SECS WRN NEV NRN AND CNTRL CALIF INCLG CSTL AREAS BY MRNG. SOME 40-60⊖-⊕ NEAR MTNS SAN JOAQUIN VLY AREA AFT MIDN.

FIGURE 14. *Area Forecast.*

FEDERAL AVIATION AGENCY
INSTRUMENT PILOT EXAM-O-GRAM * No. 6

VFR OPERATIONS on an INSTRUMENT FLIGHT PLAN



Analyses of answers to Instrument Pilot Written Examinations indicate that many applicants do not understand certain aspects of VFR and "VFR CONDITIONS ON TOP" operations while on IFR clearances. Applicants for the Instrument Rating should be able to answer the following questions relating to these operations. Answers and explanations follow.

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1. Why request a "VFR CONDITIONS ON TOP" clearance?
2. When would a pilot request a clearance to "VFR CONDITIONS ON TOP"?
3. What restrictions apply to the pilot's choice of altitude while operating on an IFR clearance with provision to "MAINTAIN VFR CONDITIONS ON TOP"?
4. When can a "VFR CONDITIONS ON TOP" request be approved by ATC?
5. What separation from other aircraft is provided to a "VFR CONDITIONS ON TOP" flight?
6. What is the recommended position reporting procedure for "VFR CONDITIONS ON TOP" operation?
7. A pilot is flying on an IFR clearance, with an altitude assignment of "VFR CONDITIONS ON TOP". He anticipates that he will be unable to maintain flight in VFR conditions because of reduced visibility or increasing height of the tops. What should he do?
8. When may a pilot deviate from his route of flight while operating IFR with a "VFR CONDITIONS ON TOP" clearance?
9. Why would a pilot request a VFR climb or descent while on an IFR flight?
10. What are the procedures for radio communications failure during a "VFR CONDITIONS ON TOP" operation?

*Exam-O-Grams are non-directive in nature and are issued solely as an information service to individuals interested in Airman Written Examinations.

EXPLANATIONS (numbers correspond to questions):

1. In preparation for IFR flight above an overcast, or in an area of generally unlimited ceilings and visibility, pilots may request "VFR CONDITIONS ON TOP" to permit them to select an altitude, or altitudes of their choice, rather than specific ATC assigned altitudes. If during flight "in the clear" at a specific assigned altitude, turbulence or unfavorable ground speeds are encountered, or if icing in clouds ahead is expected, a "VFR CONDITIONS ON TOP" clearance may allow the pilot a greater choice of operating altitudes.

2. Departing instrument-rated pilots who wish an IFR clearance only to climb through a layer of overcast or reduced visibility, and then continue flight VFR, may request ATC clearance "TO VFR CONDITIONS ON TOP". - This request may be made through a Flight Service Station, by telephone to ATC, or by request to the Tower before taxiing out. The clearance, which authorizes IFR flight through the cloud layer, will contain a near-by clearance limit, routing, and a request to report reaching "VFR CONDITIONS ON TOP". When the pilot reaches "VFR CONDITIONS ON TOP" and desires to cancel the IFR portion of his flight, he should so state. This type of operation can be combined with a VFR Flight Plan to destination.

3. The pilot may fly at an altitude of his choice, provided the altitude is

   a. at or above the MEA, or MOCA if appropriate, and
   b. at least 1000 feet above the existing meteorological condition (cloud layer, smog, haze, etc.) if any, and
   c. at an altitude appropriate for the direction of flight (odd or even thousand, plus 500 feet) if operating at 3000 feet or more above the surface.

   Pilots should be especially alert for head-on traffic when climbing or descending on the airway centerline.

4. "VFR CONDITIONS ON TOP" may be approved by ATC when specifically requested by the pilot in flight provided pilot reports have not indicated that conditions are unsuitable.

4. (continued)

"VFR CONDITIONS ON TOP" may be approved by ATC when specifically requested by the pilot prior to departure, provided

a. pilot reports have not indicated that conditions are unsuitable, and
b. the pilot is advised of the height of the tops, or that height of tops is unreported, and
c. if height of the tops is unreported, alternate altitude provisions are included in the clearance.

EXCEPTIONS:

ATC will not approve "VFR CONDITIONS ON TOP" operations

a. to provide separation between aircraft holding at night, or
b. to aircraft operating in Positive Controlled Airspace.

5. No separation is provided. However, the pilot may expect to receive traffic information on known IFR traffic. Any time a pilot is flying "in the clear", whether at a specific assigned altitude or at an altitude assignment of "VFR CONDITIONS ON TOP", collision avoidance is the pilot's responsibility.

6. Regardless of the altitude being flown, pilots on IFR Flight Plans report those fixes designated as compulsory reporting points for all altitudes, and additional position reports as requested by ATC. A pilot operating on an IFR Flight Plan with an altitude assignment of "VFR CONDITIONS ON TOP" would report in the following manner:

SKYTWIN FOUR ONE ALPHA OVER OKLAHOMA CITY ONE EIGHT, VFR CONDITIONS ON TOP AT EIGHT THOUSAND FIVE HUNDRED, ESTIMATING SAYRE FOUR EIGHT, AMARILLO.

If position reports are made to a Flight Service Station for relay to the controlling facility (center or approach control), pilots should state that the flight is on an Instrument Flight Plan.

7. Pilots flying with a VFR restriction must not enter IFR weather conditions. In such situations, pilots must request a specific altitude assignment and maintain flight in VFR conditions until an appropriate amended clearance is obtained.

8. Remember that when flying on an IFR clearance with a VFR restriction, a pilot must comply with Instrument Flight Rules plus applicable Visual Flight Rules. A pilot operating "VFR CONDITIONS ON TOP" is expected to remain on the centerline of airways or routes described by his ATC clearance unless

   a. otherwise authorized by ATC, or
   b. maneuvering as necessary to clear the intended flight path, or
   c. the pilot exercises emergency authority.

9. If, at the start of an IFR flight, a pilot wishes to climb in VFR conditions, or if, while flying at a specific assigned altitude, he wishes to climb or descend in VFR conditions, he may request to do so (except in Positive Controlled Airspace). Sometimes such a procedure is considered a practical method of avoiding delay due to other traffic.

10. The procedures are the same as for operation at a specific assigned altitude. Pilot action in compliance with regulations is determined by existing weather conditions (VFR or IFR), as outlined in the Flight Information Manual.

References:

Airman's Information Manual, "Air Traffic Control Procedures."
FAR 91

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