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Private Pilot

Written Test Guide

REVISED 1971

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

PRIVATE PILOT

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Flight Standards Service

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FOREWORD

The *Private Pilot Written Test Guide,* prepared by the Federal Aviation Administration, presents a wide variety of learning experiences designed to assist applicants who are preparing for the Private Pilot (Airplane) Written Test. Included in the Guide are:

a. Seventy-one exercises which cover the material presented in each section and chapter of the *Pilot's Handbook of Aeronautical Knowledge.*

b. A sample written test presented in a fashion similar to the current Private Pilot Written Test.

Source material for the exercises and a sample test may be found in the *Pilot's Handbook of Aeronautical Knowledge.*

The treatment of this guide is such that an applicant may record the results of his study and problem solving with a minimum amount of writing.

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

Conscientious study of the *Pilot's Handbook of Aeronautical Knowledge,* and the problem solving practice provided in this Guide, should lay a firm foundation of aeronautical knowledge for the prospective private pilot and enhance his ability to apply this knowledge in a manner that will contribute to his competence as a private pilot.

The *Pilot's Handbook of Aeronautical Knowledge* makes no attempt to cover the Federal Aviation Regulations appropriate to the private pilot; therefore, a thorough study of these regulations will be required, since they are part of the aeronautical knowledge requirement for certification as a private pilot. (See list of additional study materials on pages 81 and 82.)

The *Pilot's Handbook of Aeronautical Knowledge* is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The price is $1.75.

CONTENTS

Exercises

General Instructions for the Exercises

These exercises are organized by section and chapter to parallel the arrangement of material in the 1971 edition of the *Pilot's Handbook of Aeronautical Knowledge*. For example: Exercise 8, Chapter 4, Section II, refers to the same chapter and section in the Handbook. Directions accompany each exercise and should provide adequate guidance for their completion.

Although some exercises contain statements which require completion in your own words, they are drawn directly from statements in the same chapter in the Handbook. If your words do not agree exactly with the answers given, but have the same meaning, they are acceptable. For those statements which require more than one word for completion, multiple spaces are provided as clues. (Note: The Private Pilot Written Test is a multiple-choice type test and does not require statements in your own words.)

Review exercises are provided at the end of most sections. To derive the maximum benefit from these review exercises, it is recommended that you attempt to complete them without referring to the Handbook or to the preceding exercises.

SECTION I. PRINCIPLES OF FLIGHT

Chapter 1. Forces Acting on the Airplane

Exercise 1. ***Terms***

The following terms are important in this chapter. Match the correct definitions below with the terms numbered 1 through 15. Write the letter corresponding to the correct definition or description in the space beside the term.

1. _____ Lift
2. _____ Weight
3. _____ Thrust
4. _____ Drag
5. _____ Airfoil
6. _____ Angle of Incidence
7. _____ Relative Wind
8. _____ Angle of Attack
9. _____ Airspeed
10. _____ Burble Point
11. _____ Camber
12. _____ Leading Edge
13. _____ Trailing Edge
14. _____ Chord
15. _____ Air Density

a. A device which gets a useful reaction (produces lift) from air moving over its surface.

b. The angle between the wing chord line and the direction of the relative wind.

c. The forward acting force on an airplane in flight (opposes drag).

d. An imaginary straight line joining the leading and trailing edges of an airfoil.

e. The direction of air flow with respect to the wing.

f. That angle of attack which causes a swirling of air over the top surface of the wing.

g. The curvature (as seen in a cross section) of an airfoil.

h. The upward acting force on an airplane in flight (opposes weight).

i. The weight of air by volume (affected by pressure, temperature, and humidity).

j. The angle formed by the longitudinal axis of the airplane and the chord line of the wing (angle at which wing is mounted on fuselage).

k. The forward edge of an airfoil.

l. The velocity (speed) of air passing over the wing.

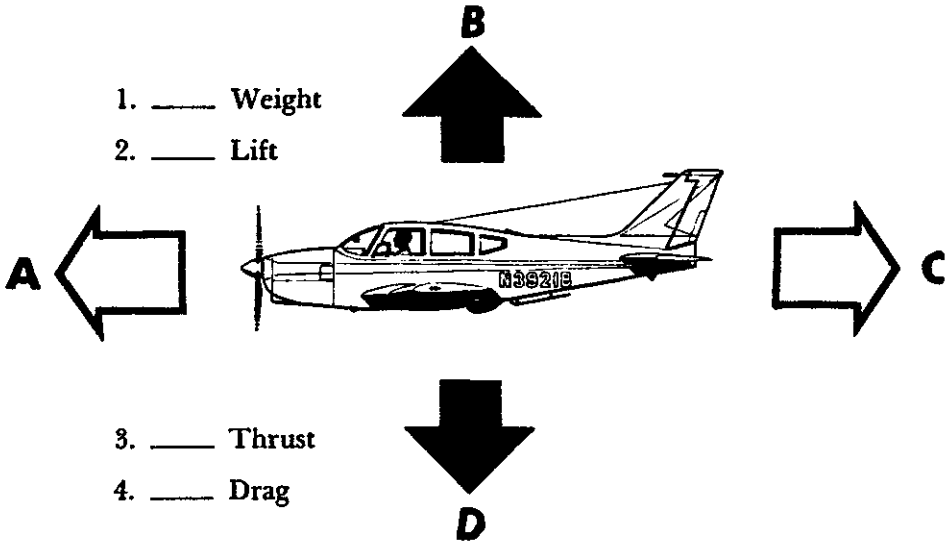
m. The downward acting force on an airplane in flight (opposes lift).

n. The rear edge of an airfoil.

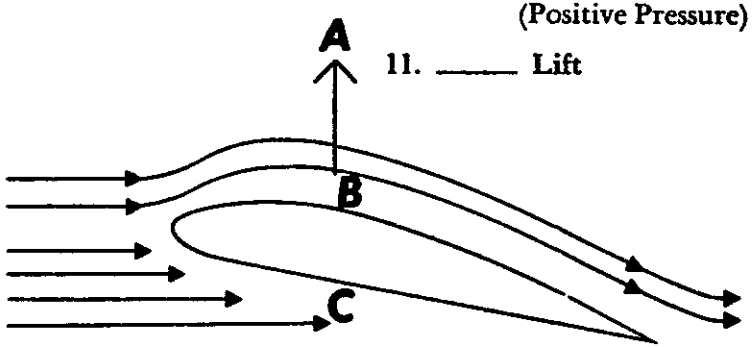
o. The backward acting force on an airplane in flight (opposes thrust).

Exercise 2. ***Identification***

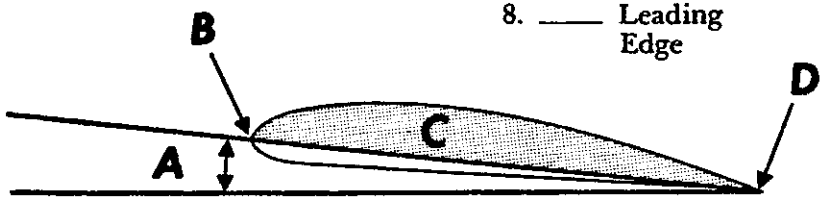
The following illustrations show significant items in this chapter. Beside each illustration, you will find terms which denote important parts of the illustration. Write the letter which correctly identifies the listed part in the space provided.



1. ____ Weight
2. ____ Lift
3. ____ Thrust
4. ____ Drag

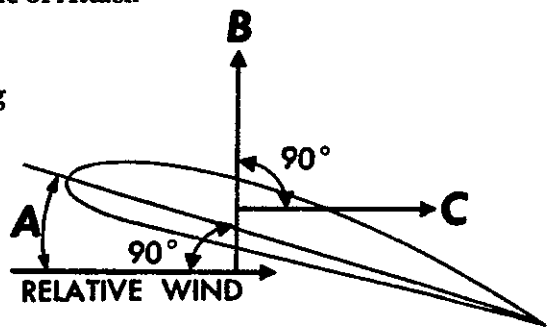


9. ____ Area of Low Pressure
10. ____ Area of High Pressure (Positive Pressure)
11. ____ Lift



5. ____ Trailing Edge
6. ____ Chord Line
7. ____ Angle of Incidence
8. ____ Leading Edge

LINE PARALLEL TO LONGITUDINAL AXIS



12. ____ Angle of Attack
13. ____ Lift
14. ____ Drag

Chapter 2. Function of the Controls

Exercise 3. ***Terms***

The following terms are important in this chapter. Choosing from the list below, write, in the space provided, the term which would correctly complete each statement.

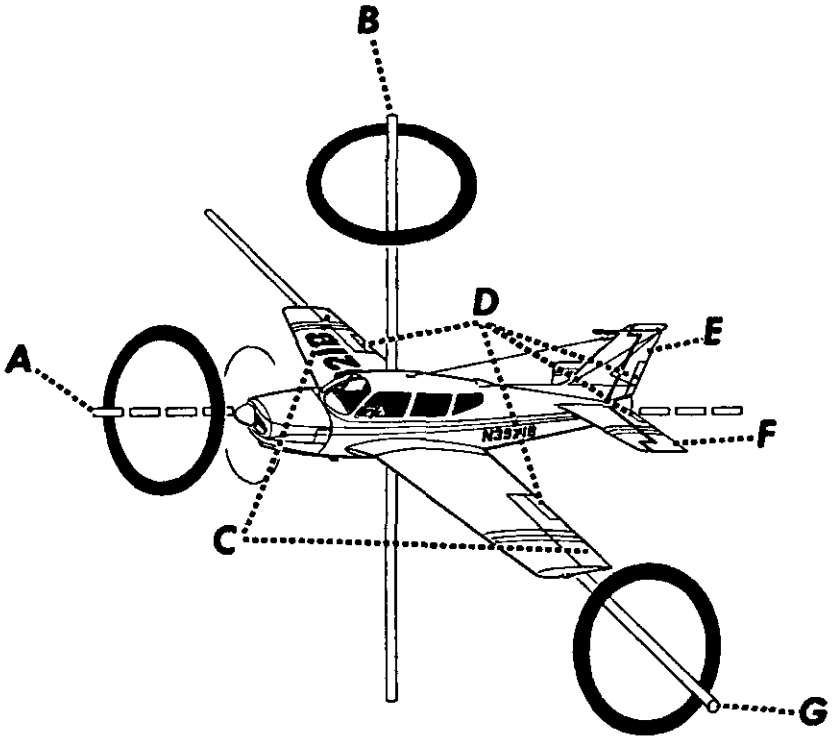
LONGITUDINAL AXIS	RUDDER
VERTICAL AXIS	TRIM TAB
LATERAL AXIS	ROLL
AILERONS	YAW
ELEVATORS	PITCH

1. The control surfaces which produce a rolling movement about the longitudinal axis are called _____
2. The imaginary line which extends crosswise wing-tip to wing-tip is the _____
3. The _____ control the movement or pitch of the airplane about its lateral axis.
4. The _____ is an imaginary line which passes vertically through the center of gravity.
5. The imaginary line that extends lengthwise through the fuselage from nose to tail is the _____
6. A _____ is a small adjustable hinged surface on the trailing edge of the aileron, elevator or rudder control surfaces.
7. The movement produced about the vertical axis by the rudder is _____
8. _____ is movement about the lateral axis produced by the elevators.
9. The _____ controls the yawing movement about the vertical axis.
10. The ailerons produce _____ which is movement about the longitudinal axis.

Exercise 4. ***Identification***

The following illustration contains many of the items covered in Exercise 3. Write, in the spaces provided, the letters which correctly identify the items listed.

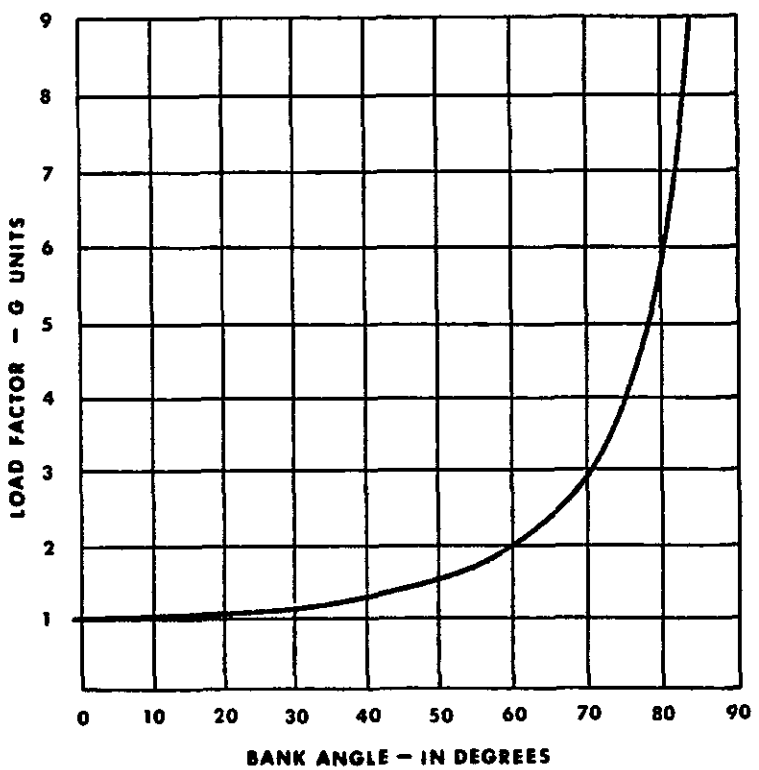
1. ____ Ailerons
2. ____ Trim Tabs
3. ____ Longitudinal Axis
4. ____ Rudder
5. ____ Lateral Axis
6. ____ Vertical Axis
7. ____ Elevator



Exercise 5. ***Interpretation***

The chart below illustrates the increase in the load factor as the angle of bank increases. Write, in the spaces provided, the approximate load factor for the angles of bank listed.

LOAD FACTOR CHART



1. 20° _____
2. 40° _____
3. 60° _____
4. 80° _____

The chart below illustrates the increase in stall speed as the angle of bank increases. Write, in the spaces provided, the stall speeds with flaps at 40°, for the angles of bank listed.

STALLING SPEEDS

POWER OFF, MPH T.I.A.S.

Gross Weight 2200 lbs — CONDITION	ANGLE OF BANK 0°	20°	40°	60°
Flaps Up	58	60	66	82
Flaps Down 10°	56	58	64	79
Flaps Down 40°	52	54	59	73

5. 0° _____
6. 20° _____
7. 40° _____
8. 60° _____

Exercise 6. ***Statements***

The following statements, when completed, will emphasize important points in this chapter. Write, in the blank spaces provided, the words which will correctly complete the statements.

1. The _____ _____ is the actual load supported by the wings at any given time divided by the weight of the airplane and its contents.

2. Each airplane has a _____ _____ _____ _____ (limit load factor) which should not be exceeded.

3. When the load on the wings increases, the _____ _____ of the pilot also increases.

4. The load factor for an airplane in a 60° bank in level flight is _____.

5. One additional cause of large load factors is _____ _____ _____.

6. At high speeds the _____ _____ of the wings is so great that a sudden movement of the controls may increase the load factor beyond safe limits.

7. The _____ speed is the maximum speed at which an airplane can safely execute certain maneuvers, withstand abrupt application of the controls, or fly in rough air.

Section I. Review

Exercise 7. ***Review***

The following statements concern items which you have already studied in completing Exercises 1 through 6. Underline the word of each pair in parentheses which will make the statement correct. (Remember the recommendation that you attempt to complete this exercise without referring to the Handbook or the preceding exercises.)

1. An airplane wing which is producing lift will have an area of low pressure on the (upper, lower) surface of the wing.

2. The angle between the wing chord line and the relative wind is the angle of (incidence, attack).

3. Lift, the upward acting force on an airplane in flight, opposes (weight, drag).

4. As the angle of bank increases, the stalling speed (increases, decreases).

5. The angle between the wing chord line and a line parallel to the longitudinal axis is the angle of (incidence, attack).

6. The (lateral, vertical) axis is an imaginary line which extends crosswise from wing-tip to wing-tip.

7. Limit load factors are more likely to be exceeded at (high, low) speeds.

8. The rudder produces a (rolling, yawing) movement of the airplane.

9. Trim tabs, which are adjustable from the cockpit, are usually placed on the (elevators, wings).

10. The (ailerons, elevators) produce a pitching movement of the airplane.

SECTION II. WEATHER

Chapter 4. Weather Information for the Pilot

Exercise 8. *Statements*

The following statements, when completed, will emphasize important points in this chapter. Write, in the blank spaces provided, the words which will correctly complete the statements.

1. To avoid hazardous flight conditions, private pilots must have a fundamental knowledge of the atmosphere and _____ behavior.

2. The decision as to whether a particular flight may be hazardous due to weather conditions rests with the _____.

3. Most weather stations make observations and forward reports to central stations as frequently as each _____.

4. The National Weather Service issues scheduled forecasts including Area Forecasts _____ _____ daily.

5. When requesting weather information for flight purposes, it is important that you identify yourself as a _____.

Chapter 5. Nature of the Atmosphere

Exercise 9. *Terms*

The following terms (or figures) are important in this chapter. Write the letter corresponding to the correct definition or description in the space beside the term.

1. ____ Atmosphere
2. ____ Stratosphere
3. ____ Troposphere
4. ____ Normal Lapse Rate
5. ____ Nitrogen
6. ____ Oxygen
7. ____ 18,000 Feet

a. A temperature decrease of approximately 3½° F. per 1,000 feet.

b. The upper layer of the atmosphere.

c. Essential to human life.

d. Approximately four-fifths of the atmospheric gases.

e. A body of air composed mainly of the gases nitrogen and oxygen.

f. The region in which all weather occurs.

g. Atmospheric pressure is half as great as at sea level.

Chapter 6. Significance of Atmospheric Pressure

Exercise 10. ***Statements***

The following statements, when completed, will emphasize important points in this chapter. Write, in the blank spaces provided, the words which will correctly complete the statements.

1. Although the average pressure exerted by the atmosphere is approximately 15 pounds per square inch at sea level, the actual pressure at a given place and time depends upon the altitude, _____, and density of the air column.
2. The normal atmospheric pressure at sea level is _____ inches of mercury.
3. In order to base atmospheric pressures on a common level, weather stations translate their barometer readings into terms of _____ _____ pressure.
4. In general, a marked fall in barometric pressure indicates the approach of _____ weather.
5. Altitude has a significant effect on atmospheric pressure in that as the altitude increases, the atmospheric pressure _____.
6. A decrease in atmospheric pressure causes an increase in the _____ altitude.
7. As density altitude increases, aircraft performance (its ability to take off, climb, etc.) _____.
8. In addition to the atmospheric pressure effect, density altitude will also change as the _____ changes.
9. Normal atmospheric pressure at sea level expressed in millibars is _____.
10. As a space-saving measure, the weather bureau would show a barometric pressure of 1,033.2 millibars as _____; of 986.2 millibars as _____; of 964.5 millibars as _____.

Chapter 7. Wind

Exercise 11. ***Terms***

The following terms are important in this chapter. Write the letter corresponding to the correct definition or description in the space beside the term.

1. ____ Wind
2. ____ Earth's Rotation
3. ____ "Low"
4. ____ "High"
5. ____ Clockwise Circulation
6. ____ Counterclockwise Circulation
7. ____ Convection Currents
8. ____ On-shore Wind
9. ____ Off-shore Wind
10. ____ Turbulence
11. ____ 2,000 Feet
12. ____ Isobars
13. ____ Wind Arrows

a. General direction of air movement about a high pressure area.
b. Causes air in the northern hemisphere to flow to the right of its normal pattern.
c. Rough air caused by convective currents or wind gusts.
d. Air movement overland toward the water.
e. Recommended minimum clearance for crossing mountain ridges or peaks.
f. Surface wind direction symbols on a weather map.
g. Lines on a weather map connecting points of equal pressure and indicating approximate direction of winds above the surface.
h. Air movement over water toward the land.
i. The horizontal movement of air in the atmosphere.
j. A region of pressure which is generally above normal.
k. General direction of air movement about a low pressure area.
l. A region of pressure which is generally below normal.
m. Local circulations due to uneven heating of air over the surface.

Chapter 8. Moisture and Temperature

Exercise 12. *Statements*

The following statements, when completed, will emphasize important points in this chapter. Write, in the blank spaces provided, the words which will correctly complete the statements.

1. The amount of moisture that can be present in the atmosphere depends upon the _____ of the air.

2. The ratio of the amount of moisture present in any given volume of air to the amount of moisture possible under the same temperature and pressure is called _____ _____.

3. For the pilot, the _____ and _____ are the practical indicators of relative humidity.

4. When the temperature cools to the dewpoint, the water vapor present in the air will _____ in the form of fog or clouds.

5. Air may reach the saturation point by rising, since unsaturated air cools as it ascends at the rate of _____ degrees Fahrenheit for every 1,000 feet of altitude.

6. Air can rise for three reasons: Being _____ by the earth's surface; by moving _____ a sloping terrain; and by flowing over another _____ of _____.

7. Of greatest significance to the pilot is the likelihood of low clouds and _____ when the surface temperature and dewpoint are close together.

8. A temperature of 20 degrees Centigrade would equal _____ degrees Fahrenheit; minus 10 degrees Centigrade would equal _____ degrees Fahrenheit; 30 degrees Centigrade would equal _____ degrees Fahrenheit; 30 degrees Fahrenheit would equal _____ degree Centigrade; 102 degrees Fahrenheit would equal _____ degrees Centigrade; 48 degrees Fahrenheit would equal _____ degrees Centigrade.

9. Density altitude increases with temperature since heated air _____ and is therefore less dense.

10. As temperature increases, aircraft performance (ability to take off, climb, etc.) _____

11. Since aircraft performance also decreases with high humidity, it is apparent that air density _____ as humidity increases.

12. Pilots should beware particularly of "high, _____, and _____" conditions.

Chapter 9. Results of Condensation

Exercise 13. ***Terms***

The following terms are important in this chapter. Choosing from this list, write, in the spaces provided, the terms which will correctly complete the accompanying statements.

ALTOSTRATUS	MANEUVERING SPEED	ANVIL SHAPE
FROST	CUMULUS	CEILING
VISIBILITY	STRATUS	CIRRUS
OVERCAST	CUMULONIMBUS	SCATTERED
SQUALL LINES	CONDENSATION	PRECIPITATION
FOG	BROKEN	

1. Clouds or fog are caused by _____ of the moisture in the air when the temperature and dewpoint are close together.
2. Dew, frost, rain, snow, hail, etc. are forms of _____ _____.
3. _____ can interfere with the smooth flow of air over wing surfaces and should always be wiped off before flight.
4. One of the most dangerous weather hazards to flight, which is likely to occur when the surface temperature is within a few degrees of the dewpoint, is _____.
5. Clouds having a lumpy or billowing appearance due to vertical currents are called _____.
6. _____ clouds develop horizontally and usually lie in sheets or layers.
7. Smooth layers of clouds at levels from 5,000 to 20,000 feet would be designated as _____.
8. Clouds which form above 20,000 feet are usually referred to as _____.
9. One of the most dangerous of all cloud types due to its extreme turbulence, possible hail, and icing conditions is the _____, commonly known as a thunderstorm.
10. Lines of thunderstorms usually caused by a cold front are called _____.
11. Normally, a safe airspeed for flying through turbulence is an airspeed not greater than the _____ _____ for the particular airplane.
12. One of the best means of identifying a thunderstorm, particularly when only the upper portion is visible, is the characteristic _____ of the top of the cloud.
13. When clouds cover less than six-tenths (6/10) of the sky, they are referred to as _____.
14. The height above ground of the lowest layer of broken or overcast clouds not classified as "thin" is the _____.
15. Clouds are reported as _____ when they cover six-tenths (6/10) to nine-tenths (9/10) of the sky.
16. Clouds are reported as _____ when they cover more than nine-tenths (9/10) of the sky.
17. _____ (the greatest horizontal distance at which a prominent object can be distinguished with the naked eye) is reported in miles or fractions of miles.

Chapter 10. Air Masses and Fronts

Exercise 14. ***Terms***

The following terms (or symbols) are important in this chapter. Choosing from the list below, write, in the space provided, the term or symbol which will correctly complete the statement.

WEATHER DEPICTION CHART

AIR MASSES	HIGH
COLD FRONT	STATIONARY FRONT
FRONT	SQUALL LINE
OCCLUDED FRONT	UNSTABLE AIR
WARM FRONT	WIND SHIFT

1. Large, high pressure systems which stagnate over large areas of land or water are called _____ _____. As _____ _____ move they are modified through heating or cooling from below by lifting or subsiding absorbing or losing moisture.

2. The boundary between two air masses is called a frontal zone or _____.

3. Where warmer air is replacing colder air, the boundary is called a _____ _____; when colder air is replacing warmer air, it is called a _____ _____; if the boundary is not moving it is called a _____ _____.

4. When an air mass is trapped between two colder air masses and is forced aloft it is called an _____ _____.

5. Sudden storms, gusty winds and turbulence generally characterize the _____ _____.

6. The wind in a _____ pressure area blows in a clockwise spiral.

7. If the boundary of cold air in a cold front is fast moving, friction may retard it causing a narrow band of turbulent weather or _____ _____ along its forward edge.

8. One of the characteristics of a cold air mass is pronounced turbulence in the lower levels and it is called _____ air.

9. When two "highs," are adjacent the winds are in almost direct opposition at their boundary causing a _____ _____ when the boundary passes.

10. Cirrus clouds may appear 500 miles in advance of a _____ _____.

11. The _____ _____ _____ portrays graphically areas of low ceiling and restricted visibility, areas of marginal ceilings, and areas of good ceilings and visibilities.

Exercise 15. ***Characteristics***

The following are descriptive statements of air masses. Write the word "COLD" in front of those which are characteristic of cold air masses and the word "WARM" in front of those which are characteristic of warm air masses.

_____ 1. Clouds are of the stratus and stratocumulus type.

_____ 2. Ceilings behind front are generally unlimited.

_____ 3. Precipitation is usually in the form of a drizzle.

_____ 4. Turbulence, if any, will be light.

_____ 5. Precipitation is usually in the form of showers or thunderstorms (hail).

_____ 6. Ceilings are generally low.

_____ 7. Turbulence is usually pronounced, particularly in the lower levels.

_____ 8. Clouds are of the cumulus and cumulonimbus type.

_____ 9. Visibilities are normally excellent except during precipitation.

_____ 10. Visibilities are normally poor with possibility of fog, haze, smoke, etc.

Chapter 11. Aviation Weather Forecasts and Reports

Exercise 16. ***Terms***

The following terms are important in this chapter. Choosing from the list below, write, in the spaces provided, the terms which will correctly complete the accompanying statements.

AREA FORECASTS
TERMINAL FORECASTS
SIGMET
AIRMET (ADVISORY FOR LIGHT AIRCRAFT)
AVIATION WEATHER REPORTS (SEQUENCE REPORTS)
WINDS ALOFT FORECASTS

1. A weather advisory announcing weather phenomena of such severity as to affect the safety of all aircraft (including transport category), is called a _____

2. _____ are transmitted hourly by teletype and *normally* represent the very latest weather information available.

3. Because of terrain effect, no _____ _____ will be made for levels less than 1,500 feet above station elevation.

4. _____, predicting the general weather for groups or portions of states, are issued every 6 hours by several forecast offices, covering the 50 states.

5. A warning of weather phenomena which is not considered severe enough to be classified as a SIGMET is called an _____.

6. _____, predicting weather for more than 420 terminals with high aviation activity, are issued every 6 hours for a 12 hour period.

Exercise 17. *Interpretation*

The following is a sample Aviation Weather Report. Write the Plain Language Interpretations for the items listed below in the spaces provided. (See "Key to Aviation Weather Reports" on page 92.)

DCA M1ØD25Ø3R-F 986/72/5Ø/1825Ø33/988 CIG LWR S

1. Sky cover _____
2. Visibility _____
3. Precipitation _____
4. Obstructions to vision _____
5. Barometric pressure _____
6. Temperature _____
7. Dewpoint _____
8. Wind _____
9. Altimeter setting _____
10. Remarks: _____

Section II. Review

Exercise 18. *Review*

The following statements concern items which you have already studied in completing Exercises 8 through 17. These statements may be true or false. Circle the letter "T" preceding the statement if it is true, "F" if it is false.

1. T F The symbol  represents a cold front on the weather map.
2. T F Hazardous weather conditions are usually of *little* significance to a pilot.
3. T F Density altitude increases as atmospheric pressure decreases.
4. T F Rough air or turbulence can be extremely hazardous in the vicinity of thunderstorms.
5. T F The general direction of air movement about a high pressure area is in a clockwise direction.
6. T F An increase in humidity will normally result in an increase in aircraft performance.
7. T F Cumulonimbus clouds are usually layer-like in structure and occur mostly below 5,000 feet.
8. T F "Scattered clouds" would mean that less than six-tenths of the sky was covered.
9. T F Visibilities in a cold air mass are usually good except during precipitation.
10. T F A SIGMET has no significance for the private pilot.
11. T F Aviation Weather Reports are transmitted by teletype only twice daily.
12. T F The symbol ⓓ indicates a ceiling formed by broken clouds.
13. T F The normal lapse rate (temperature decrease with altitude) is 3½° F. per 1,000 ft.
14. T F An area where atmospheric pressures are generally below normal is called a "high."
15. T F A visibility figure of 3/4 in an Aviation Weather Report indicates three-fourths of a mile.

SECTION III. NAVIGATION

Chapter 12. Navigation Aids

Exercise 19. *Terms*

The following table contains a list of navigational methods and their uses. Choosing from the right-hand column, write the letter corresponding to the correct use in the space beside the method.

METHOD OF NAVIGATION	POSITION DETERMINED BY:
1. _____ Pilotage	a. Use of radio aids.
2. _____ Dead Reckoning	b. Reference to the sun, moon, stars, etc.
3. _____ Radio Navigation	c. Computing distance and direction from a known position.
4. _____ Celestial Navigation	d. Reference to visible landmarks.

Exercise 20. *Characteristics*

The following are descriptive terms or statements about the four aeronautical charts which are of greatest interest to private pilots. Write the letter denoting the appropriate chart (s) in the space in front of each term or statement. Use the following code:

S — SECTIONAL A — AERONAUTICAL PLANNING
W — WORLD ALL — IF APPLICABLE TO ALL
L — LOCAL AERONAUTICAL CHARTS

_____ 1. Scale: About 8 statute miles per inch.

_____ 2. Difficult for inexperienced pilots to use when navigating by pilotage.

_____ 3. Designed for planning long flights.

_____ 4. Identified by city name only.

_____ 5. Identified as AP-9.

_____ 6. Scale: About 80 statute miles per inch.

_____ 7. More topographical detail than any other chart.

_____ 8. Scale: About 4 statute miles per inch.

_____ 9. Should be discarded when obsolete.

_____ 10. For VFR flight use in highly congested areas.

_____ 11. Primarily for use in pilotage.

_____ 12. Most widely used by private pilots.

_____ 13. Identified by names of principal cities or geographical features.

_____ 14. Identified by prefix WAC and number.

_____ 15. Scale: About 16 statute miles per inch.

Chapter 13. Chart Reading

Exercise 21. ***Statements***

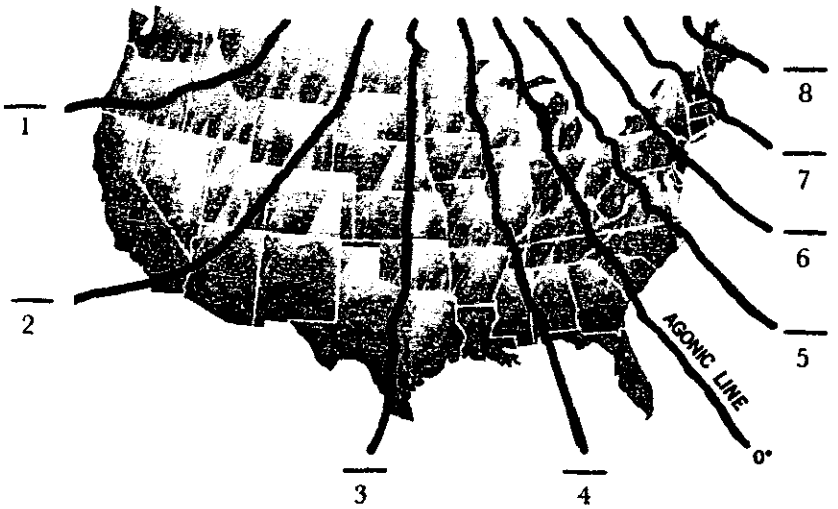
The following statements, when completed, will emphasize important points in this chapter. Write, in the blank spaces provided, the word or words which will correctly complete the statements. (These statements pertain to the Dallas-Ft. Worth Sectional Chart furnished with this guide).

1. In many respects, an aeronautical chart is similar to an automobile _____ map.
2. In addition to various aeronautical symbols this chart shows many other prominent _____ which are easily recognizable from the air.
3. The elevation of land surface (relief) is shown on the chart by _____ contour lines drawn at _____ foot intervals.
4. Different contour levels are emphasized by various _____ corresponding to a color legend appearing on each chart.
5. Information concerning VHF radio facilities and frequencies is colored _____.
6. Low and medium frequency radio facility information is shown in a _____ color.
7. In addition to the facility name, VOR's and VORTAC's are identified by a three letter code which is their _____ _____ in International Morse Code.
8. For more positive identification and to enhance their value as landmarks, the symbols for airports having permanent type _____ _____ runways contain runway patterns.
9. For the most part, the lighting aids represented on sectional charts pertain to rotating or _____ _____.
10. Where significant obstructions are shown, the accompanying blue figure indicates the elevation above _____ _____ of the _____ of the obstruction.

Chapter 14. Measurement of Direction

Exercise 22. ***Identification***

The following illustration contains isogonic lines at 5° intervals for the conterminous United States. Label the lines in the space at the end of each with the amount of variation and indicate whether easterly or westerly (for example: 10° E).



Exercise 23. *Terms*

The following terms are important in this chapter. Write the letter corresponding to the correct definition or description in the space beside the term.

1. _____ Equator
2. _____ Parallels
3. _____ Latitude
4. _____ Meridians
5. _____ Longitude
6. _____ Time Zone
7. _____ 12:00 CST
8. _____ 2200 E
9. _____ Course Measurement
10. _____ True Course
11. _____ True Heading
12. _____ Variation
13. _____ Isogonic Line
14. _____ Magnetic Heading
15. _____ West Variation
16. _____ East Variation
17. _____ Deviation
18. _____ Compass Heading

a. Should be made at a meridian near the midpoint of the course.

b. Changes approximately every 15 degrees of longitude.

c. Imaginary circle equidistant from North and South Pole.

d. True Heading corrected for variation.

e. Direction nose of airplane actually points in flight.

f. Compass deflection due to magnetic influence within the airplane.

g. SUBTRACT—"East is Least" (True to Magnetic).

h. 10 P.M. Eastern Standard Time.

i. 11:00 A.M. Mountain Standard Time.

j. Magnetic heading corrected for deviation.

k. Angle between true north and magnetic north.

l. Line on a chart connecting points of equal variation.

m. Lines running east and west and parallel to the equator.

n. Lines running from North Pole to South Pole.

o. Direction measured by reference to true north.

p. Distance in degrees north or south of the equator.

q. ADD—"West is Best" (True to Magnetic).

r. Degrees of distance east and west from prime meridian.

Exercise 24. *Problem Solving*

This exercise will provide practice in converting true headings (TH) and magnetic headings (MH) to compass headings (CH). The true heading and variation is given for each problem; the Compass Deviation Card below applies to all problems. Compute the magnetic and compass headings and write your answers in the spaces provided.

FOR (MH)	0	30	60	90	120	150	180	210	240	270	300	330
STEER (CH)	2	28	56	88	120	152	183	212	240	268	298	328

	TH	VARIATION	MH	CH
1.	160°	10° E	____	____
2.	316°	8° W	____	____
3.	062°	12° E	____	____
4.	228°	16° W	____	____
5.	012°	13° E	____	____
6.	180°	17° E	____	____
7.	076°	2° W	____	____
8.	192°	14° E	____	____

Chapter 15. Basic Calculations

Exercise 25. *Terms*

The following terms, in addition to many of those you learned in Exercise 23, need to be understood before attempting the basic calculations required in aerial navigation. Write the correct term in the space following each definition.

1. The actual path made over the ground in flight. _____
2. The angle between heading and track. _____
3. The correction applied to the course to make the track coincide with the course. _____
4. The rate of the plane's progress through the air. _____
5. The rate of the plane's progress over the ground. _____

Exercise 26. ***Problem Solving***

Proficiency in all the types of basic calculations presented here is necessary for the private pilot. Using simple arithmetic, or a computer, solve the following problems. (Note: In all cases, you are to write in the missing figures based on the information given. The first problem of each type has been completed as an example.)

TIME–SPEED–DISTANCE

	GROUNDSPEED	TIME	DISTANCE
1.	180	2:06	378
2.	110	1:36	_____
3.	205	1:48	_____
4.	170	3:24	_____
5.	160	_____	464
6.	208	_____	42
7.	195	_____	585
8.	_____	2:12	360
9.	_____	1:30	240
10.	_____	1:18	260

KNOTS/MILES PER HOUR

	KNOTS	MPH
11.	20	23
12.	40	_____
13.	46	_____
14.	34	_____
15.	_____	115

FUEL CONSUMPTION

	FUEL RATE (*mph*)	TIME IN FLIGHT	FUEL CONSUMED (*gal*)
16.	10	2:12	22
17.	16	1:42	_____
18.	8	2:30	_____
19.	_____	3:20	40
20.	_____	2:00	25

	Given	*Find*
21.	Distance = 403 miles Groundspeed = 155 mph Fuel rate = 12 gph	Time in flight = Fuel consumed =

Chapter 16. The Wind Triangle

Exercise 27. *Interpretation*

Using the Dallas-Ft. Worth Sectional Chart supplied with this guide, determine the true course (TC), by use of a protractor, and the distance in statute miles for each of the following routes (direct except for number 5). Write your figures in the spaces beside each pair of airports. (Note: Be sure to use the center of the airport symbols when drawing your course lines, and the statute miles scale at the bottom of the chart for measuring distances. Draw the course lines in a prominent manner since these same routes will be used in later exercises.)

	FROM	TO	TC	DIST (*sm*)
1.	Taylor Airport (Albany) 32°44′N–99°17′W	Graham Airport 33°06′N–98°33′W		
2.	Sweetwater Airport 32°28′N–100°27′W	Cisco Airport 32°25′N–99°00′W		
3.	Mineral Wells Airport 32°47′N – 98°04′W	Kickapoo Airport (Wichita Falls) 33°52′N – 98°29′W		
4.	Kickapoo Airport 33°52′N – 98°29′W	Arledge Airport 32°54′N – 99°43′W		
5.	Kickapoo Airport 33°52′N – 98°29′W (via Guthrie VOR 33°47′N – 100°20′W	Lubbock Muni. Aprt 33°40′N – 101°50′W		

Exercise 28. *Problem Solving*

Using the true courses and distances for the five routes designated in Exercise 27 (Kickapoo to Guthrie only in number 5), and the wind and true airspeed (TAS) information given in this exercise, construct a wind triangle for each route. Find the wind correction angle (WCA), true heading, groundspeed (GS), and time en route and write your answers in the spaces provided. (Transfer your true course and distance figures from Exercise 27.)

		TC	WIND (*mph*)	TAS	WCA	TH	GS	DIST	TIME
1.	Taylor to Graham	___	130° 25	140	___	___	___	___	___
2.	Sweetwater to Cisco	___	225° 14	155	___	___	___	___	___
3.	Mineral Wells to Kickapoo	___	355° 7	134	___	___	___	___	___
4.	Kickapoo to Arledge	___	082° 15	134	___	___	___	___	___
5.	Kickapoo to Guthrie VOR	___	060° 18	162	___	___	___	___	___

Section III. Review

Exercise 29. ***Review***

The following statements concern items which you have already studied in completing Exercises 19 through 28. Underline the word of each pair in parentheses which would make the statement correct. (Remember the recommendation that you attempt to complete this exercise without referring to the Handbook or the preceding exercises.)

1. Aerial navigation solely by reference to visible landmarks is called (pilotage, dead reckoning).
2. The (Sectional, WAC) Chart is the most common chart in use by the private pilot.
3. The Sectional Chart has a scale of approximately (four, eight) miles to the inch.
4. New editions of sectional charts are ordinarily published every (six, twelve) months.
5. Elevation figures accompanying obstructions represent height above (sea level, ground).
6. Measurement in degrees north or south of the equator is referred to as (longitude, latitude).
7. A true heading corrected for variation results in a (compass, magnetic) heading.
8. Easterly variation should be (added, subtracted) when it is applied to the true heading.
9. (Heading, Track) is the actual path made over the ground by an airplane in flight.
10. The rate of an airplane's progress through the air is called (groundspeed, airspeed).

Exercise 30. ***Review***

Complete the following navigation problem through the use of a wind triangle and the other basic calculations which you have practiced in this section. Write your answers in the spaces provided.

GIVEN:		FIND:	
TC	= 092°	TH =	
Wind	= 136° @ 18 mph	MH =	
TAS	= 185 mph	CH =	
Variation	= 12° E	GS =	
Deviation	= See Page 20	Time =	
Distance	= 294 statute miles	Fuel consumed =	
Fuel rate	= 12 gph		

SECTION IV. AIRCRAFT AND ENGINE OPERATION

Chapter 17. Airplane Structure

Exercise 31. *Statements*

The following statements, when completed, will emphasize important points in this chapter. Write, in the blank spaces provided, the words which will correctly complete the statements.

1. Airplanes manufactured under a standard classification should not be subject to structural failure if properly maintained and flown within the _____ clearly specified.
2. The required structural strength is based on the airplane's _____.
3. Airplane strength is measured basically by the total _____ which the wings are capable of carrying without permanent damage.
4. The wing must support not only the weight of the airplane but also the additional loads imposed by turns, pull-outs from dives, and _____ _____.
5. The positive limit load factors (introduced in Exercise 6) for the various categories of airplanes are: Normal, _____ times gross weight; Utility, _____ times gross weight; Acrobatic, _____ times gross weight.
6. FAA Regulations require that an aircraft shall not be flown unless within the preceding _____ calendar months it has been given an annual inspection.
7. An airplane that is used commercially, that is, to carry passengers for hire, or for flight instruction purposes, must have had an inspection within each _____ hours.
8. A careful pilot will always conduct a routine inspection _____ each flight.

Exercise 32. *Terms*

The following terms represent some of the significant items to be checked on a preflight inspection.* Write the letter corresponding to the associated action in the space beside the term.

1. ____ Master and ignition switches
2. ____ Landing gear handle
3. ____ Propeller
4. ____ Engine
5. ____ Fuel
6. ____ Landing gear
7. ____ Wing, fuselage, and tail surfaces
8. ____ Pitot-static system
9. ____ Control surfaces
10. ____ Airplane loading

a. Check for nicks, cracks, hub security.
b. Check for cowling closed and secure, oil quantity.
c. Check covering for holes, wrinkles, wear, and rot.
d. Check visually for quantity and contamination.
e. Check that static vents are open and pitot tube is unobstructed.
f. Check for proper movement, set tabs for takeoff.
g. Check that weight and weight distribution do not exceed limitations.
h. Check "off."
i. Check "down."
j. Check tire condition and inflation, strut and brake condition.

* (This list is not to be considered complete. The applicable Airplane Flight Manual should be referred to for further items of importance.)

Chapter 18. Engine Operation

Exercise 33. *Terms*

The following terms are important in this chapter. Choosing from the list below, write, in the space provided, the term which will correctly complete the statement.*

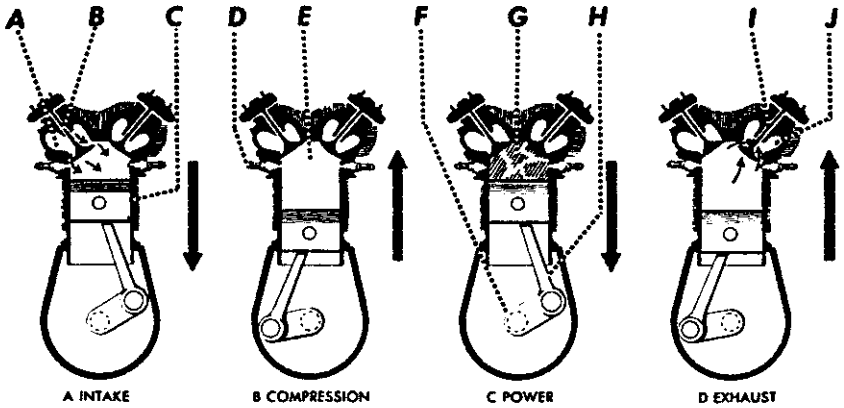
AIR COOLED	MAGNETOS
CARBURETOR HEAT	MANIFOLD PRESSURE
CARBURETOR ICING	MANIFOLD PRESSURE GAUGE
CHECKLIST	MIXTURE CONTROL
"CLEAR"	OCTANE RATINGS
DETONATION	OIL PRESSURE
DUAL IGNITION SYSTEM	OIL PRESSURE GAUGE
FUEL CONTAMINATION	QUICK-DRAIN VALVES
FUEL INJECTION	RPM
LEANING	TACHOMETER
LOWER RATING	TRANSPARENT CONTAINER
LOW PROPELLER RPM	VOLUME OF AIR

1. Most airplane engines are _____.
2. The pilot should be aware that a variation in _____ _____ beyond normal limits indicates probable engine trouble.
3. Aviation gasoline is classified by _____ _____ and performance number ratings.
4. Using aviation gasoline of a _____ than specified is harmful since it may cause loss of power, excessive heat, burned spark plugs, burned and stuck valves, high oil consumption and detonation.
5. The fuel-air mixture in most engines can be changed by adjusting the _____ in the cockpit.
6. The amount of fuel entering the carburetor depends on the _____ and not the weight of air.
7. The manufacturer's recommendations should always be followed in _____ the fuel mixture.
8. _____, which occurs when the fuel explodes instead of burning evenly, may be produced by low grade fuel.
9. Water is often the cause of _____ _____.
10. In checking for fuel contamination, the pilot should drain fuel into a _____ and check for dirt or water.
11. It is recommended that airplane fuel tanks be equipped with _____.
12. _____ are self-contained units which supply current to the spark plugs without depending on the airplane battery.
13. Most modern airplane engines have a _____ _____ which requires two spark plugs in each cylinder.
14. During low or closed throttle settings, with high humidity and a temperature of 20° F to 70° F, an engine induction system is particularly susceptible to _____.
15. When indications of icing are noted, _____ _____ should be applied immediately.
16. The _____ _____ system is generally considered to be less susceptible to icing than the carburetor system.
17. A standard precautionary call used by the pilot when preparing to start an engine is the word _____.
18. It is imperative that the _____ _____ be checked for a pressure indication immediately after the engine starts.
19. Always follow the manufacturer's recommendations when performing checks (engine run-up, before takeoff, etc.) and use a _____. Do not rely on memory.
20. The throttle controls the power output of the engine which is registered on the _____ _____ when the engine is equipped with a constant-speed propeller.
21. The _____ registers the engine RPM.
22. During engine operation, a combination to avoid is a high throttle setting and a _____.
23. When decreasing power on engines equipped with constant-speed propellers, you should first decrease _____ _____, and then decrease _____.
24. When increasing power on engines equipped with constant-speed propellers, you should first increase _____ and then increase _____.

* Some items in this list are used twice.

Exercise 34. ***Identification***

The following illustration shows the basic elements of airplane engine operation. Write, in the spaces provided, the letters which correctly identify the items listed.



1. _____ Spark plug
2. _____ Fuel mixture being drawn into cylinder
3. _____ Burned gases being expelled from cylinder
4. _____ Exhaust valve
5. _____ Piston
6. _____ Connecting rod
7. _____ Intake valve
8. _____ Fuel mixture being compressed
9. _____ Crankshaft
10. _____ Fuel mixture after being ignited

Section IV. Review

Exercise 35. ***Review***

The following statements concern items which you have already studied in completing Exercises 31 through 34. These statements may be true or false. Circle the letter "T" preceding the statement if it is true; circle the letter "F" if it is false. (Remember the recommendation that you attempt to complete this exercise without referring to the Handbook or to the previous exercises.)

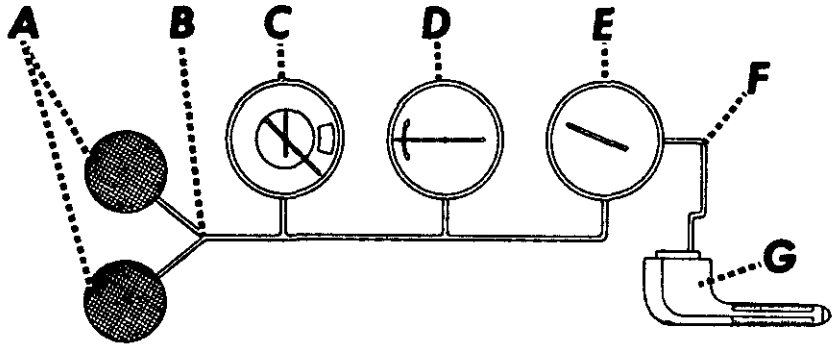
1. T F The required structural strength for an airplane is based on its intended use.
2. T F The wings support only a part of the weight of the airplane in flight.
3. T F FAA Regulations require that an aircraft to be flown must have had an "annual" inspection within the preceding 12 calendar months.
4. T F The preflight inspection of a propeller should include checking for nicks, cracks, and security.
5. T F The check for fuel contamination should utilize a transparent container to allow a visual inspection of a fuel sample.
6. T F Gross weight, regardless of weight distribution, is the only significant factor in loading an airplane.
7. T F The piston is moving toward the crankshaft during the power stroke of a four-cycle combustion engine.
8. T F The unburned fuel-air mixture enters the cylinder through the intake valve.
9. T F Aviation gasoline is classified by SAE weight.
10. T F Detonation occurs when the fuel-air mixture explodes instead of burning evenly.
11. T F Most modern airplane engines utilize a single ignition system.
12. T F During engine operation, a combination to avoid is a high manifold pressure setting and a low RPM setting.

SECTION V. FLIGHT INSTRUMENTS

Chapter 19. The Pitot-Static System Flight Instruments

Exercise 36. ***Identification***

The following illustration shows a simplified diagram of a pitot-static system with the instruments operated from it. Write, in the spaces provided, the letters which correctly identify the items listed.



1. _____ Altimeter
2. _____ Airspeed Indicator
3. _____ Pitot Pressure Chamber (Pitot Tube)
4. _____ Static Line
5. _____ Vertical Speed Indicator
6. _____ Static Vents
7. _____ Pitot Line

Exercise 37. ***Statements***

The following statements, when completed, will emphasize important points in this chapter. Write, in the blank spaces provided, the word which will correctly complete the statement.

1. Both the _____ tube openings and the _____ vent openings should be checked during the preflight inspection to see that they are not obstructed.
2. The difference in _____ at various levels causes the altimeter to indicate changes in altitude.
3. Colder than standard temperature will place the aircraft _____ than the altimeter indicates.
4. The altimeter indication, when set to the reported altimeter setting, should not differ from the field elevation by more than plus or minus _____ feet.
5. A change in the altimeter setting from 29.52 to 30.02 should cause a change of approximately _____ feet in the altimeter indication.
6. When a rapid or large _____ change is made by the aircraft, the vertical speed indicator may lag behind the correct indication.

Exercise 38. ***Terms***

The following terms are important in this chapter. Write the letter corresponding to the correct definition or description in the space beside the term.

1. _____ Absolute Altitude
2. _____ Indicated Altitude
3. _____ Pressure Altitude
4. _____ True Altitude
5. _____ MSL
6. _____ Density Altitude
7. _____ Pitot pressure
8. _____ Static pressure
9. _____ Indicated Airspeed
10. _____ Calibrated Airspeed
11. _____ True Airspeed

a. Indicated Airspeed corrected for installation and instrument error.

b. The true height of the aircraft above sea level.

c. Mean Sea Level, 10,900 MSL is 10,900 feet above sea level.

d. The altitude of an aircraft above the surface of the terrain over which it is flying.

e. The direct reading from the Airspeed Indicator.

f. Indicated (or Calibrated if there is an instrument or installation error) Airspeed corrected for pressure and temperature.

g. Atmospheric pressure at flight level.

h. Impact pressure in flight.

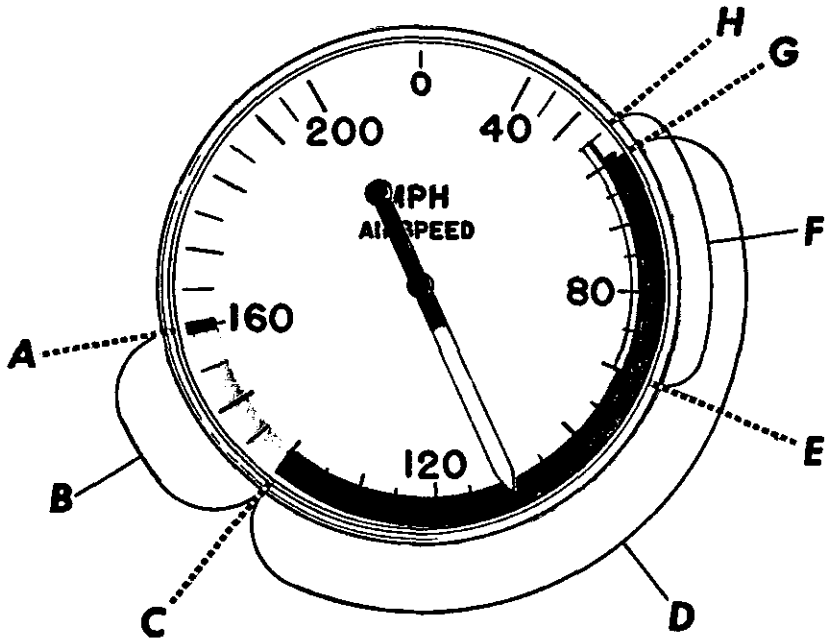
i. Pressure Altitude corrected for nonstandard temperature. (Increases as temperature increases.)

j. The direct reading from the altimeter.

k. The direct reading from the altimeter when set to 29.92.

Exercise 39. ***Identification***

The following illustration shows an Airspeed Indicator with a *color coded* marking. Next follows a list of important airspeed limitations which can be determined from the color codings. Write the letter which identifies the correct limitation or range in the space provided.



1. _____ Maximum Flaps Extended Speed

2. _____ Normal Operating Range

3. _____ Power-Off Stall Speed in Landing Configuration

4. _____ Power-Off Stall Speed With Flaps Up And Gear Retracted (if retractable)

5. _____ Never Exceed Speed

6. _____ Caution Range

7. _____ Flap Operating Range

8. _____ Maximum Structural Cruising Speed

9. Write, in the following spaces, five airspeed limitations which are *not* marked on the Airspeed Indicator:

a. _____

_____

b. _____

_____

c. _____

_____

d. _____

_____

e. _____

_____

Chapter 20. Gyroscopic Flight Instruments

Exercise 40. ***Terms***

The following terms are important in this chapter. Choosing from this list, write, in the space provided, the term which would correctly complete the statement.

TURN AND BANK INDICATOR	HEADING INDICATOR
SKID	"TUMBLE" OR "SPILL"
SLIP	15 MINUTES
COORDINATED TURN	ATTITUDE INDICATOR
3° PER SECOND	DIRECT INDICATION
2-MINUTE TURN NEEDLE	STRAIGHT-AND-LEVEL FLIGHT
HORIZON BAR	INDIRECT INDICATION

1. The _____ incorporates a needle and a ball and indicates both rate and quality of turn.

2. In a _____, the ball assumes a position midway between the reference markers.

3. During a _____, excessive centrifugal force causes the ball to move to the outside of the turn.

4. During a _____, the lack of centrifugal force causes the ball to move to the inside of the turn.

5. The turn needle gives only an _____ _____ of the airplane's angle of bank.

6. A standard rate turn is _____ _____

7. The _____ normally requires a one needle width deflection for a standard rate turn.

8. The _____ is a directional instrument used to supplement the Magnetic Compass.

9. The Heading Indicator should be checked against the Magnetic Compass at least every _____.

10. Most gyro instruments found in light planes will _____ _____ with excessive pitch or bank.

11. The _____, also called the artificial horizon, gives a picture of the attitude of the real aircraft.

12. The actual horizon is represented in the Attitude Indicator by a _____.

13. The Attitude Indicator gives a _____ _____of both the pitch and bank attitudes of the airplane.

14. The Attitude Indicator should be uncaged only in _____ _____

Chapter 21. Magnetic Compass

Exercise 41. *Statements*

The following statements, when completed, will emphasize important points in this chapter. Write, in the blank spaces provided, the word or words which will correctly complete the statements. (Statements concerning turning and deceleration errors are applicable to the northern hemisphere.)

1. The number 3 on a Magnetic Compass card represents _____ degrees and the number 30 represents _____ degrees.

2. Although the Magnetic Compass contains adjustable compensating magnets, it is usually impossible to entirely eliminate _____ error on all headings.

3. If the airplane is on a northerly heading and a turn is made toward east or west, the initial indication of the compass _____ or indicates a turn in the _____ direction.

4. If the airplane is on a southerly heading and a turn is made toward east or west, the compass needle will indicate a _____ amount of turn than has actually been made.

5. If the airplane is on an east or west heading, an increase in airspeed causes the compass to indicate a turn toward the _____; a decrease in airspeed causes the compass to indicate a turn toward the _____.

6. Turning errors are not apparent when entering a turn from _____ or _____ headings; errors due to changing airspeed are not apparent on _____ and _____ headings.

7. Magnetic Compass indications are reliable only when flying _____ and _____ at a constant speed.

Section V. Review

Exercise 42. *Review*

The following statements concern items which you have already studied in completing Exercises 36 through 41. Underline the word or phrase of each pair in parentheses which would make the statement correct. (Remember the recommendation that you attempt to complete this exercise without referring to the Handbook or the preceding exercises.)

1. The pitot-static system operates the (Airspeed Indicator, Attitude Indicator).

2. The (Turn and Bank Indicator, Altimeter) is a gyro operated instrument.

3. Colder than standard temperatures will place the aircraft (higher, lower) than the altimeter indicates.

4. Density altitude will (increase, decrease) with an increase in temperature.

5. (Maneuvering, Maximum Structural Cruising) Speed is *NOT* marked on the Airspeed Indicator.

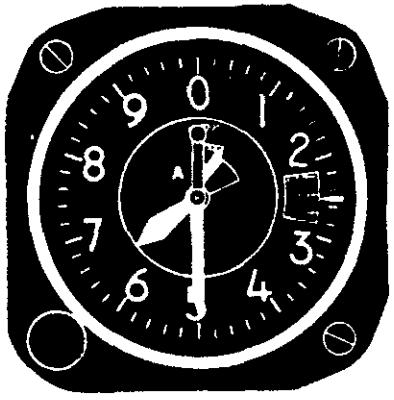
6. The ball in the Turn and Bank Indicator will be displaced to the outside of the turn during a (slip, skid).

7. Turning errors in the Magnetic Compass are *NOT* apparent when entering a turn from (north or south, east or west) headings.

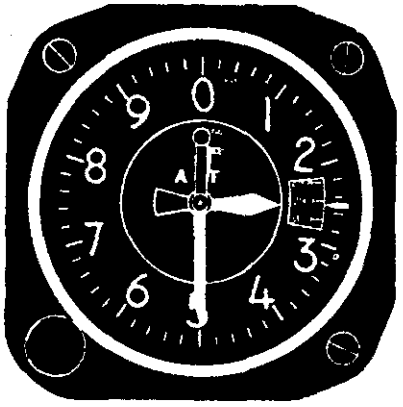
8. A change in the altimeter setting from 29.52 to 30.52 should cause a change of approximately (100, 1,000) feet in the altimeter indication.

Exercise 43. *Review*

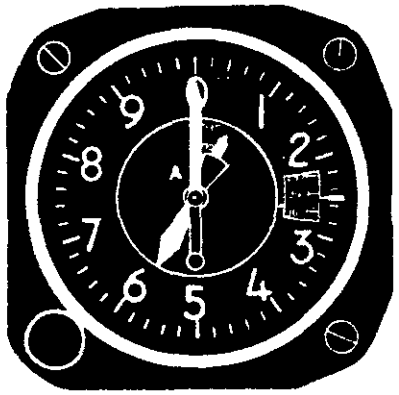
The illustrations on this page present six different altimeter indications. Write the altitude indicated in the illustrations beneath each altimeter. (Remember the 3rd or smallest hand moves only one number for each 10,000 feet.)



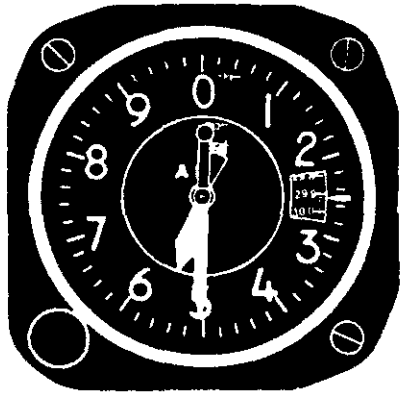
1. _____ *FT.*



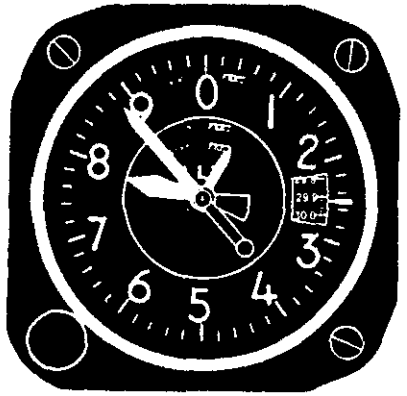
2. _____ *FT.*



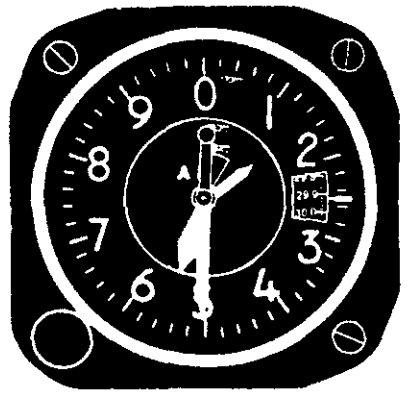
3. _____ *FT.*



4. _____ *FT.*



5. _____ *FT.*



6. _____ *FT.*

Exercise 44. ***Review***

The illustrations on this page show 4 sets of flight instruments (Airspeed Indicator, Altimeter, and Turn-and-Bank Indicator). Write, in the space provided, the letter corresponding to the set which correctly indicates the flight maneuver listed.

1. _____ A skidding turn

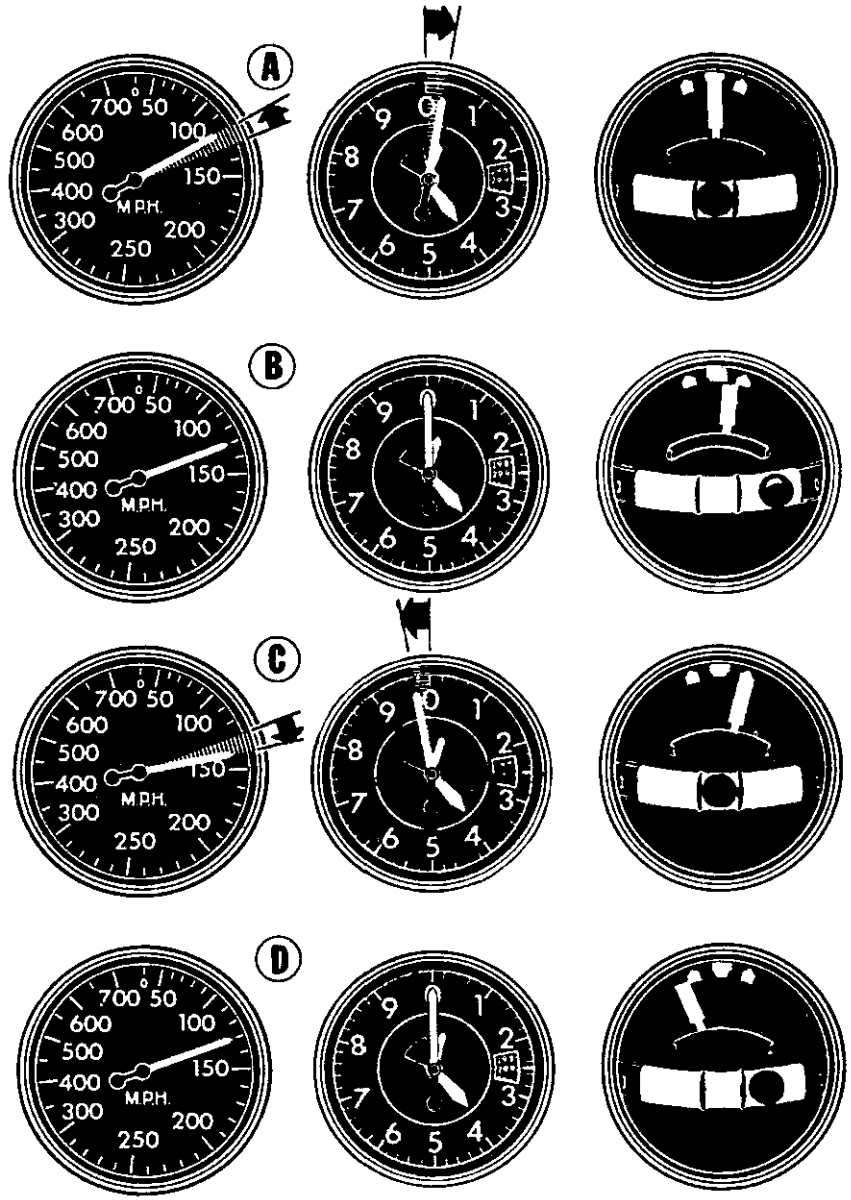
2. _____ A right turn in level flight (although uncoordinated)

3. _____ A straight-ahead climb

4. _____ A slipping turn

5. _____ A descending right turn

6. _____ A left turn in level flight (although uncoordinated)



SECTION VI. AIRCRAFT PERFORMANCE

Chapter 22. Weight and Balance

Exercise 45. ***Terms***

The following terms are important in this chapter. Write the letter corresponding to the correct definition or description in the space beside the term.

1. ____ Empty weight
2. ____ Useful load
3. ____ Gross weight
4. ____ Maximum allowable gross weight
5. ____ Unusable fuel
6. ____ Usable fuel
7. ____ "CG"
8. ____ CG range
9. ____ Permanent aircraft record
10. ____ Loading placards

a. The empty weight plus the useful load.

b. A source for the latest empty weight and CG.

c. Fuel included in the empty weight.

d. Fuel included in the useful load.

e. (Pay load). The weight of pilot, passengers, baggage, usable fuel and oil, cargo, etc.

f. The maximum load for which the airplane is certificated.

g. The point at which the airplane will balance.

h. The allowable range of balance.

i. The weight of the basic airplane (includes unusable fuel).

j. Signs posted in the aircraft to give directions for loading.

Exercise 46. ***Characteristics***

The following descriptive terms or statements pertain to the undesirable characteristics of an airplane which is loaded so that the "CG" falls outside the allowable range. Write the word "FORWARD" in the space in front of those which are characteristic of airplanes loaded so that the "CG" falls ahead of the allowable range; and the word "AFT" for those which are characteristic of airplanes loaded so that the "CG" falls behind the allowable range.

1. _____ Higher stick forces
2. _____ Violent stall characteristics
3. _____ Decreased performance
4. _____ Very light stick forces (easy to overstress the airplane)
5. _____ Higher stalling speeds
6. _____ Decreased longitudinal stability
7. _____ Excessive loads on the nose wheel

Exercise 47. ***Problem Solving***

Given the following information, determine whether this airplane would be loaded within the maximum allowable gross weight. (Remember the weight of the unusable fuel is included in the empty weight.)

MAXIMUM ALLOWABLE GROSS WEIGHT	2,200 lbs.
Empty Weight	1,290 lbs.
Oil (8 quarts)	
Pilot and Front Seat Passenger	365 lbs.
Rear Seat Passengers	300 lbs.
Fuel (42 gallons total, only 37 gallons usable)	
Baggage	40 lbs.
TOTAL	

Based on your computations, underline the word or figure, of each pair in parentheses, which would make each of the following statements correct.

1. Eight quarts of oil would weigh (15, 60) pounds.

2. The usable fuel would weigh (252, 222) pounds.

3. This airplane would be (32, 62) pounds (over, under) the maximum allowable gross weight.

Chapter 23. Aircraft Performance

Exercise 48. ***Characteristics***

The following terms describe factors which affect takeoff distances. In comparison with a standard sea-level, no-wind takeoff distance, write, in the space provided, the word "INCREASE" if the factor would lengthen the takeoff distance, or the word "DECREASE" if the factor would shorten the takeoff distance.

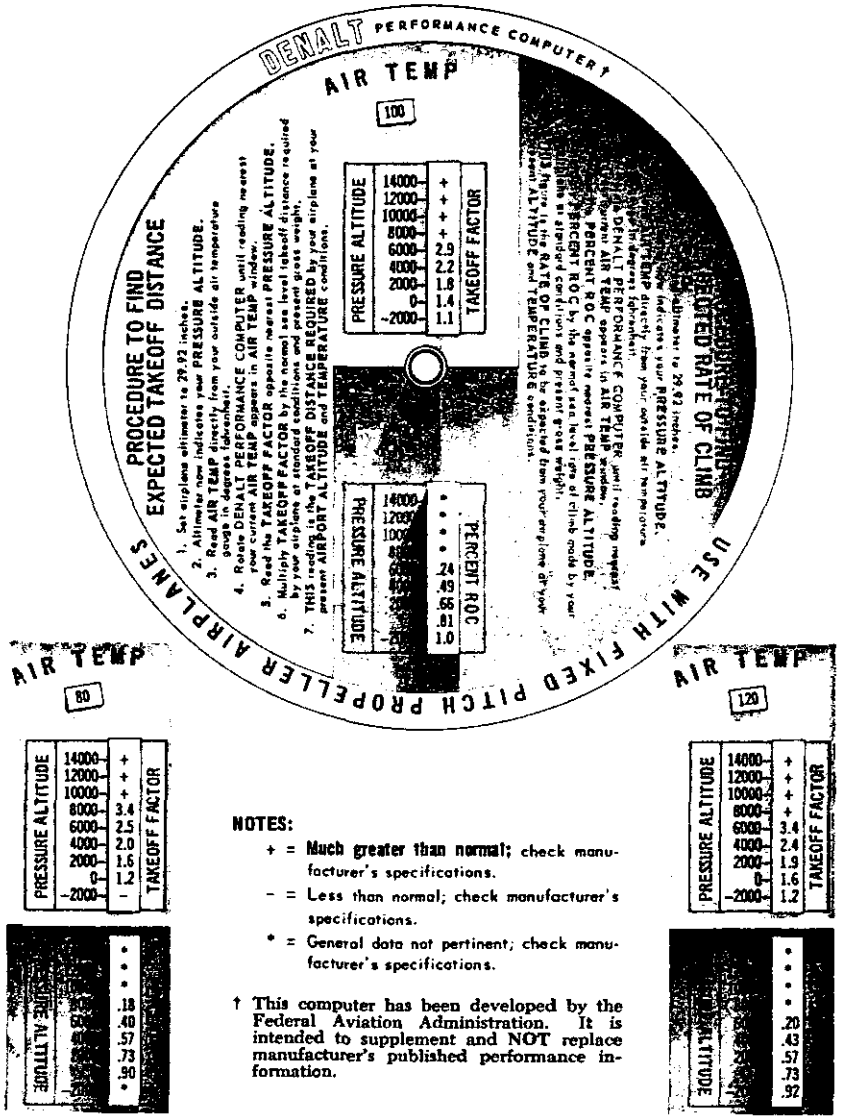
1. _____ Higher temperature
2. _____ Muddy runway
3. _____ Higher pressure altitude
4. _____ Higher humidity
5. _____ Lower gross weight
6. _____ 10-knot headwind component

Exercise 49. ***Interpretation***

Based on the information given in each of the following conditions, use the Denalt Computer • readings on this page to determine the expected takeoff distance and rate of climb. Write the computed figures in the spaces provided. (Instructions are printed on the computer and the first item has been completed as an example.)

	STANDARD SEA-LEVEL PERFORMANCE					
	TAKEOFF DISTANCE (*ft*)	RATE OF CLIMB (*fpm*)	PRESSURE ALTITUDE (*ft*)	TEMP (°*f*)	COMPUTED DIST (*ft*)	COMPUTED ROC (*fpm*)
1.	750	600	4,000	100	1,650	294
2.	1,000	550	2,000	100	_____	_____
3.	880	820	6,000	80	_____	_____
4.	1,250	725	8,000	80	_____	_____
5.	650	510	0	120	_____	_____
6.	1,150	940	4,000	120	_____	_____

•This computer has been developed by the Federal Aviation Administration to replace the Koch Chart. Two versions are available. One is for fixed-pitch propeller aircraft, and the other is for variable pitch propellers. It is for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The price is 50c. When ordering, specify either fixed pitch or variable pitch.



NOTES:

+ = **Much greater than normal;** check manufacturer's specifications.

− = Less than normal; check manufacturer's specifications.

* = General data not pertinent; check manufacturer's specifications.

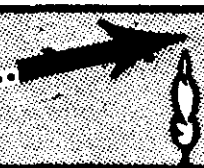
† This computer has been developed by the Federal Aviation Administration. It is intended to supplement and NOT replace manufacturer's published performance information.

Exercise 50. ***Interpretation***

Based on the information given in each of the following conditions, use the Takeoff Data Chart below to determine the takeoff distances. Write the figures for the ground run and the distance required to clear a 50-foot obstacle in the spaces provided. Remember to increase distances 10% for each 25° Fahrenheit above standard temperature for the particular altitude. (The first item has been completed as an example.)

	GROSS WEIGHT (*lbs*)	PRESSURE ALTITUDE (*ft*)	TEMP °*f*	HEAD-WIND (*mph*)	GROUND ROLL (*ft*)	DISTANCE TO CLEAR 50-FT OBSTACLE (*ft*)
1.	2,200	5,000	65	15	825	1,551
2.	2,200	2,500	76	0	_____	_____
3.	2,200	7,500	84	30	_____	_____
4.	1,900	0	60	15	_____	_____
5.	2,200	5,000	90	0	_____	_____

TAKE-OFF DATA



TAKE-OFF DISTANCE WITH FLAPS UP FROM HARD SURFACE RUNWAY

GROSS WEIGHT LBS.	IAS AT 50 FT.	HEAD WIND MPH	AT SEA LEVEL & 59°F		AT 2500 FT. & 50°F		AT 5000 FT. & 41°F		AT 7500 FT. & 32°F	
			GROUND RUN	TO CLEAR 50' OBSTACLE	GROUND RUN	TO CLEAR 50' OBSTACLE	GROUND RUN	TO CLEAR 50' OBSTACLE	GROUND RUN	TO CLEAR 50' OBSTACLE
1600	56	0	380	725	460	845	555	1000	680	1205
		15	215	470	265	560	330	670	415	820
		30	95	265	125	320	160	395	210	495
1900	61	0	560	1000	675	1185	820	1420	1015	1755
		15	335	675	415	805	515	980	645	1230
		30	165	400	210	490	275	610	360	785
2200	66	0	780	1370	945	1615	1155	1995	1435	2495
		15	490	945	605	1130	750	1410	950	1805
		30	260	590	330	710	425	915	560	1205

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

Exercise 51. ***Interpretation***

Based on the information given in each of the following conditions, use the Climb Data Chart below to determine these two climb performance factors. Write the figures for best climb speed and rate of climb in the spaces provided. (The first item has been completed as an example.)

(The Climb Data Chart is primarily useful in determining Best Rate-of-Climb Airspeed and the resulting rate of climb.)

	GROSS WEIGHT (*lbs*)	PRESSURE ALTITUDE (*ft*)	BEST CLIMB SPEED (*mph*)	RATE OF CLIMB (*fpm*)
1.	2,200	5,000	77	520
2.	1,900	0	_____	_____
3.	1,900	10,000	_____	_____
4.	2,200	0	_____	_____
5.	1,600	10,000	_____	_____

CLIMB DATA

GROSS WEIGHT LBS.	AT SEA LEVEL & 59°F			AT 5000 FT. & 41°F			AT 10000 FT. & 23°F			AT 15000 FT. & 50°F		
	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	GAL. OF FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	GAL. OF FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	GAL. OF FUEL USED	BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	GAL. OF FUEL USED
1600	71	1220	1.0	69	955	1.8	67	690	2.6	65	425	3.8
1900	75	940	1.0	73	710	2.1	71	475	3.3	69	245	5.2
2200	78	730	1.0	77	520	2.4	75	310	4.1	74	105	7.6

NOTE: FLAPS UP, FULL THROTTLE, AND MIXTURE LEANED FOR SMOOTH OPERATION ABOVE 5000 FT.
FUEL USED INCLUDES WARM-UP AND TAKEOFF ALLOWANCE.

Exercise 52. ***Interpretation***

Based on the information given in each of the following conditions, use the Cruise Performance Chart on this page to determine the significant factors related to cruising operation. Write the figures for the % BHP, TAS, and Gallons Per Hour Fuel Consumption in the spaces provided. If the condition given should fall in the shaded area, write "Not Recommended" across the spaces. (The first item has been completed as an example.)

	MIXTURE	PRESSURE ALTITUDE (*ft*)	RPM	% BHP	TAS (*mph*)	FUEL USED (*gph*)
1.	Rich	5,000	2,500	65	123	10.0
2.	Lean	5,000	2,500	_____	_____	_____
3.	Lean	7,500	2,300	_____	_____	_____
4.	Rich	2,500	2,600	_____	_____	_____
5.	Lean	10,000	2,650	_____	_____	_____

CRUISE PERFORMANCE WITH RICH MIXTURE

ALT	RPM	BHP	% BHP	TAS MPH	Gal./ Hour	Endr. Hours	Mi./ Gal.	Range Miles
2500	2700	128	88	136	12.6	2.9	10.8	400
	2600	114	78	130	11.1	3.3	11.7	430
	2500	101	70	124	10.1	3.7	12.3	455
	2400	90	62	118	9.2	4.0	12.8	475
	2300	79	55	112	8.5	4.4	13.2	490
	2200	70	48	106	7.8	4.7	13.6	500
	2100	61	42	98	7.2	5.2	13.9	515
5000	2700	118	81	135	12.1	3.1	11.2	415
	2600	106	73	129	10.9	3.4	11.8	430
	2550	100	69	126	10.4	3.6	12.2	450
	2500	94	65	123	10.0	3.7	12.4	455
	2400	84	58	117	9.1	4.0	12.8	475
	2300	74	51	111	8.4	4.4	13.2	490
	2200	65	45	104	7.7	4.8	13.5	500
	2100	57	40	98	7.1	5.2	13.8	510

CRUISE PERFORMANCE WITH LEAN MIXTURE

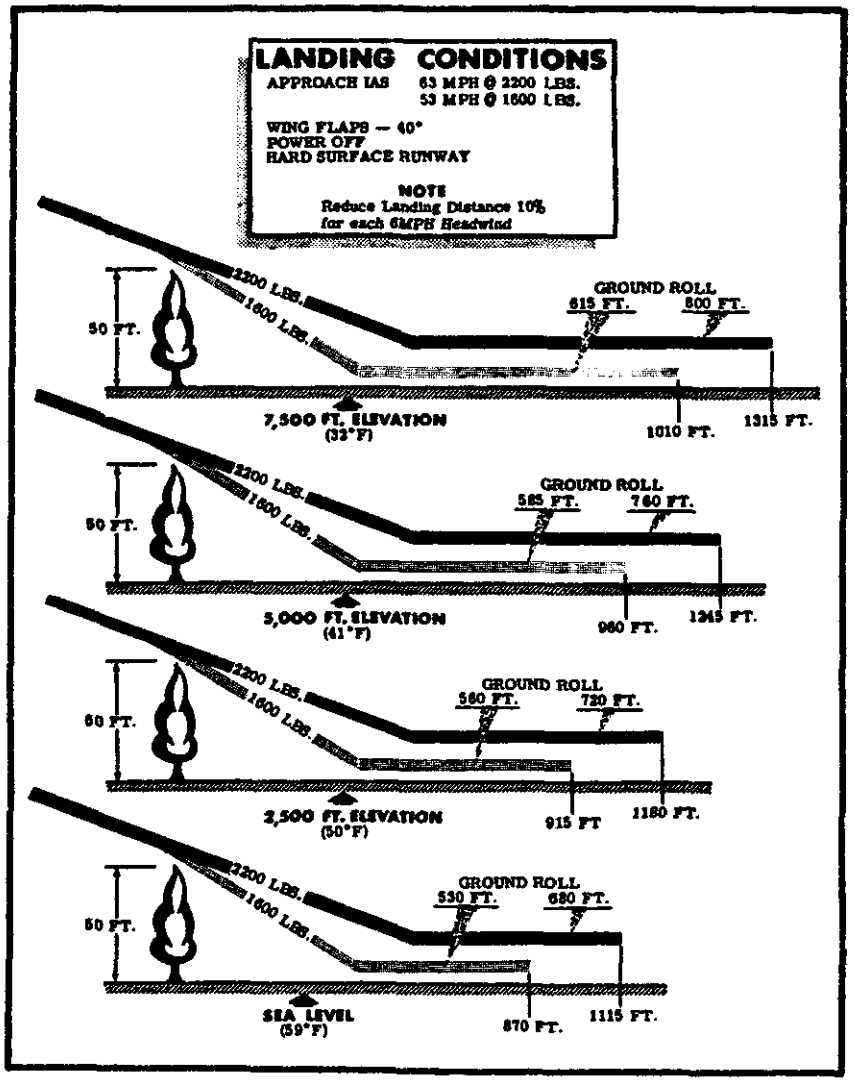
2500	2700	128	88	136	11.2	3.3	12.2	450
	2600	114	78	130	9.9	3.7	13.1	485
	2500	101	70	124	8.8	4.2	14.0	520
	2400	90	62	118	7.8	4.7	15.1	560
	2300	79	55	112	6.9	5.3	16.2	600
	2200	70	48	106	6.1	6.1	17.4	645
	2100	61	42	98	5.4	6.9	18.6	685
5000	2700	118	81	135	10.3	4.6	13.1	485
	2600	106	73	129	9.2	4.0	14.0	520
	2550	100	69	126	8.7	4.2	14.5	535
	2500	94	65	123	8.3	4.5	14.9	550
	2400	84	58	117	7.3	5.1	16.1	595
	2300	74	51	111	6.5	5.7	17.1	635
	2200	65	45	104	5.7	6.5	18.3	680
	2100	57	40	98	5.0	7.4	19.5	720
7500	2650	103	71	131	9.1	4.1	14.5	535
	2600	98	68	129	8.6	4.3	15.0	555
	2500	87	60	122	7.6	4.8	16.0	590
	2400	78	54	116	6.8	5.4	17.0	630
	2300	69	48	109	6.0	6.2	18.2	670
	2200	61	42	103	5.3	7.0	19.4	720
	2100	54	37	96	4.7	7.9	20.5	755
10,000	2650	96	66	130	8.4	4.4	15.5	575
	2600	91	63	127	7.9	4.7	16.0	590
	2500	81	56	120	7.1	5.2	17.0	630
	2400	73	50	115	6.4	5.8	18.0	665
	2300	64	44	108	5.6	6.6	19.2	710
	2200	57	39	101	5.0	7.4	20.3	750
	2100	51	35	95	4.4	8.3	21.4	790
12,500	2600	84	58	125	7.3	5.0	17.0	630
	2500	76	52	119	6.6	5.6	18.0	665
	2400	68	47	113	5.9	6.2	19.0	700
	2300	61	42	106	5.3	7.0	20.1	745
	2200	54	37	100	4.7	7.8	21.1	780

NOTE: Shaded areas are cruising RPM settings that are not recommended for the given altitude.

Exercise 53. ***Interpretation***

Based on the information given in each of the following conditions, use the Landing Conditions Chart on this page to determine the significant factors related to landing. Write the figures for approach IAS, distance to clear a 50-foot obstacle, and landing roll in the spaces provided. Remember to reduce distances (only) 10% for each 6 mph of headwind. All conditions given are based on full (40°) flaps, power off, and a hard-surfaced runway. (The first item has been completed as an example.)

	GROSS WEIGHT (*lbs*)	PRESSURE ALTITUDE (*ft*)	HEAD-WIND (*mph*)	APPROACH IAS (*mph*)	DIST TO CLEAR 50 FT OBSTACLE (*ft*)	GROUND ROLL (*ft*)
1.	2,200	5,000	20	63	872	532
2.	2,200	5,000	0	_____	_____	_____
3.	1,600	2,500	11	_____	_____	_____
4.	2,200	0	18	_____	_____	_____
5.	1,600	7,500	0	_____	_____	_____



Section VI. Review

Exercise 54. ***Review***

Based on the conditions given for the following hypothetical flight, use the charts in Exercises 50 through 53 to determine the performance in each phase. Write your figures in the spaces provided.

GIVEN:

TAKEOFF CONDITIONS		CRUISE CONDITIONS	
Gross Weight	1900 lbs.	Cruising Altitude	5,500 ft.
Pressure Altitude	0	Mixture	Lean
Temperature	60° F	% BHP	65%
Headwind	15 mph	Cruising duration (time)	4 hrs.

LANDING CONDITIONS	
Pressure Altitude	2,500 ft.
Headwind	6 mph
Flaps	40°
Runway (Hard-Surfaced)	3,200 ft.

FIND:

1. Ground roll on take-off _____ ft.
2. Takeoff distance to clear 50-foot obstacle _____ ft.
3. Best initial rate of climb IAS _____ mph
4. Rate of climb (average sea level and 5,000 feet) _____ fpm
5. Time to climb to cruising altitude (compute from 4) _____ min.
6. Cruising rpm (5,000 ft.) _____ rpm
7. Cruising TAS (5,000 ft.) _____ mph
8. Rate of fuel consumption (5,000 ft.) _____ gph
9. Fuel used (add 2.3 gallons for climb) _____ gal.
10. Landing gross weight (compute) _____ lbs.
11. Approach IAS (use 1,600 lbs.) _____ mph
12. Landing distance to clear 50-foot obstacle (use 1,600 lbs.) _____ ft.
13. Landing ground roll (use 1,600 lbs.) _____ ft.

SECTION VII. AIRMAN'S INFORMATION MANUAL

Chapter 24. Airman's Information Manual

Exercise 55. *Statements*

The following statements, when completed, will emphasize important points in this chapter. Write, in the blank spaces provided, the words which will correctly complete the statements.

1. Each part of AIM is published at varying intervals during the _____, depending on the frequency of change of _____.
2. The Airport Directory (Part 2) of AIM is issued _____.
3. Part 1 of AIM — entitled Basic Flight Manual and ATC Procedures contains basic fundamentals required to fly in the _____ _____ _____.
4. Information concerning Health and Medical Facts of interest to pilots is covered in Part _____ of AIM.
5. The Airport Directory (Part 2) contains a listing of all airport facilities and services, except _____ in codified form.
6. Radiotelephone phraseology and techniques in radio communications most germane to the private pilot is covered in Part _____ of AIM.
7. If a fuel rating is 100 or above, it is referred to as a _____ _____ rather than an octane rating.
8. The Airport/Facility Directory contains a tabulated listing of all major _____, heliports, and seaplane bases that have terminal navaids and _____ facilities (control towers) available at the airports.

Exercise 56. *Identification*

Using the airport traffic control light signal table shown in the Airman's Information Manual (Part 1) excerpts of the Pilot's Handbook, write the correct light signals in the spaces provided in the following table:

	COLOR & TYPE OF SIGNAL	ON THE GROUND	IN FLIGHT
1.		Stop	Give way to other aircraft and continue circling
2.		Return to starting point on airport	
3.		Cleared for takeoff	Cleared to land
4.		Taxi clear of (runway) in use	Airport unsafe—Do not land
5.		Cleared to taxi	Return for landing (to be followed by steady green at proper time)
6.		GENERAL WARNING SIGNAL. EXERCISE EXTREME CAUTION.	

Exercise 57. ***Terms***

The following terms are taken from the excerpts of the *Airman's Information Manual,* in Chapter 24 of the Handbook. They emphasize important points in the chapter. Choosing from this list, write, in the spaces provided, the terms which would correctly complete the accompanying statements.

LINE-OF-SIGHT	ROTATING BEACON
VOR	FLASHING AMBER LIGHT
121.9 MHz	OIL BURNER ROUTES
FSS	AIRPORT ADVISORIES
ATIS	122.8 MHz
HYPERVENTILATION	MAGNETIC
FLASHING LIGHTS	CHANNEL

1. Flight Service Stations provide _____ _____ which contain essential landing or takeoff information but do not constitute air traffic control.
2. A _____ _____ _____ at an airport indicates that clockwise (right-hand) traffic is in effect.
3. During the hours of daylight, the lighting of the _____ _____ means that ground visibility is less than 3 miles and/or that the ceiling is less than 1,000 feet.
4. _____ is the standard frequency for UNICOM located at airports without a control tower or FSS.
5. Airport runways are numbered to correspond to their _____ bearing.
6. When originating a radiotelephone call-up to any air-ground facility, indicate the _____ on which reply is expected, if other than normal.
7. Pilots of aircraft departing from or arriving at certain terminal areas can receive the continuous _____ broadcasts at times when cockpit duties are least pressing and listen to numerous repeats.
8. _____ , or overbreathing is a disturbance of respiration that may occur in individuals as a result of emotional tension or anxiety.
9. During the hours of darkness, _____ _____ outlining the tetrahedron or wind tee means that ground visibility is less than 3 miles and/or that the ceiling is less than 1,000 feet.
10. _____ _____ _____ indicate locations for Military Low Level Navigational/Bombing Training Flights by jet aircraft.
11. A VHF navigational facility which provides omnidirectional course information is called a _____ .
12. The AIM Airport/Facility Directory Legend lists _____ as a ground control frequency.
13. VHF radio transmissions are subject to _____ _____ _____ restrictions.
14. _____ is the abbreviation for an FAA Flight Service Station.

Exercise 58. ***Terms***

The following aeronautical terms are of great significance and they appear in the Airman's Information Manual. Write the letter corresponding to the correct or partial definition in the space beside the term.

1. ..... Alert Area
2. ..... Airport Traffic Area
3. ..... Vortices
4. ..... Direction Finder
5. ..... Continental Control Area
6. ..... VASI
7. ..... Control Areas
8. ..... Control Zones
9. ..... Restricted Area
10. ..... Prohibited Area

a. A vortex core is the center of a trailing mass of disturbed air created by the wing of an aircraft as it produces lift.

b. The area which includes that airspace above the conterminous United States at and above 14,500 MSL, excluding airspace less than 1,500 feet above the terrain and Prohibited and most Restricted Areas.

c. DF equipment is of particular value in locating lost aircraft and in helping to identify aircraft on radar.

d. Areas that consist of airspace that does not include the Continental Control Area.

e. Airspace which is depicted on aeronautical charts to inform nonparticipating pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity, and pilots should be particularly alert.

f. Provides descent guidance during an approach to a landing.

g. Penetration of these areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants.

h. The airspace within a circular limit defined by a five statute mile horizontal radius from the geographical center of an airport at which an operative airport traffic control tower is located and extending upward from the surface to, but not including, 3,000 feet above the surface.

i. Designated airspace within which the flight of aircraft is prohibited.

j. Controlled airspace extending upward from the *surface* of the earth. Control zones may include one or more airports and are normally areas five statute miles in radius with extensions as necessary to include arrival and departure paths.

Exercise 59. ***Interpretation***

Based on the excerpts of the Sectional Chart Bulletin, NOTAMS, Airport Directory, Airport/Facility Directory, and FSS and WB Telephone Numbers on pages 49 through 56, and the Dallas-Ft. Worth Sectional Chart supplied with this Guide, determine the correct information as requested in the following items. Write the information in the space provided.

1. Sherman Municipal Airport – UNICOM on _____.
2. Abilene VORTAC frequency (VOR) _____.
3. Lubbock Regional Airport – Status Runway 35L _____ _____.
4. Abilene-Butterfield Trail Airport – Remarks for Runway 19 _____.
5. Ft. Worth, Saginaw Airport – Number of runways _____ surface _____, length _____.
6. Denton Municipal Airport – Elevation _____ MSL, Fuel available _____ or _____.
7. Midland Airpark – Traffic direction for Runways 25, 29, and 34 _____, Height of obstruction 10 nautical miles west by northwest _____ above the surface.
8. Stephenville - Clark Muncipal Airport – Airport lighting _____ _____ _____ and _____ _____ _____.
9. Stamford-Arledge Field – Storage Available? _____ Fuel available _____ or _____.
10. Terrell Wallace Airport – UNICOM available? _____.
11. Wichita Falls Kickapoo Airport longest hard surfaced runway is _____ and the length is _____.
12. Abilene Municipal Airport – Type of servicing available: _____, _____, _____, and _____ _____ _____ repairs.
13. Abilene Municipal Airport – Communication Frequencies: Tower (primary) _____, Ground Control _____.
14. Dallas Red Bird Airport non-directional radio beacon frequency is _____.
15. Britton VORTAC – Frequency _____.
16. Dallas-Love Field – Remarks: Right hand traffic on Runways _____ _____ _____ _____.
17. Fort Worth-Greater Southwest International Field – Tower voice call _____, Communication frequencies: Tower (primary) _____, Ground Control _____, Traffic Information _____.
18. Wichita Falls Air Terminal – Remarks: Rectangular traffic pattern direction for Runways 17 and 33 is _____ hand.
19. Standard FSS transmitting frequencies: Airport Advisories _____, Emergency _____
20. Dallas Flight Service Station telephone number _____ _____. Pilot's Automatic Telephone Weather Answering Service (PATWAS) number _____.

SECTIONAL CHART BULLETIN

The purpose of this Bulletin is to provide a tabulation of the major changes in aeronautical information that have occurred since the last publication date of each Sectional Aeronautical Chart. The general policy is to include only those changes to controlled airspace and special use airspace that present a hazardous condition or impose a restriction on the pilot; major changes to airports and radio navigational facilities, thereby providing the VFR pilot with the essential data necessary to update and maintain his chart current. When the Sectional Aeronautical Chart is republished, the corrective tabulation will be removed from this Bulletin.

AIRMAN'S INFORMATION MANUAL (AIM) EXCERPTS

•DALLAS—FT. WORTH

5th Edition, February 4, 1971

Add UNICOM on 122.8 O'Brien Airpark 32°29'N, 96°51'W. Add obstn 1636' MSL (296' AGL) 35°06'58"N, 98°17'45"W. Correct arpt name on inset from Meacham to Mangham 32°51'N, 97°12'W. Delete Electra arpt 34°03'N, 98°58'W. Delete Eagle Mtn Lake VOR freq 108.4 ident EWX 32°56'58"N, 97°26'29"W. Delete Lubbock South arpt 33°26'N, 101°51'W.

Part 3–A—NOTICES TO AIRMEN

This part is issued every 14 days and is primarily designed to supplement Part 3 of the AIM. It contains appropriate notices from the daily NOTAM Summary, new or revised Oil Burner Routes and other items considered essential to flight safety.

NOTE: Data preceded by a checkmark (✓) are considered permanent and will usually be cited only once. Such information should be noted on charts and records. Temporary information is normally carried twice unless re-submitted.

NOTE: Data are arranged in alphabetical order by State (and *within the State by City or locality*).

NEW OR REVISED DATA: New or revised data are indicated by underlining the first line of the affected item. The new information is not necessarily limited to the underlined portion, which is used only to attract attention to the new insert.

TEXAS

SPECIAL NOTICE: Extensive Laser operns will be conducted for an indefinite period from the McDonald Observatory located at 30°40'17"N, 104°01'30"W near Marfa VOR in conjunction with a scientific moon project. Pilots should avoid flying from surface to FL 240 within a rectangular area bounded by lines 4NM N and 10NM S of an E/W line through the location of the McDonald Observatory and 13NM E and 13NM W of a N/S line through the location of the McDonald Observatory. Permanent eye damage may result if a person is exposed to the Laser beam. Hrs of opern may be obtained by contacting El Paso, Marfa, Salt Flat, Wink, Midland, Pecos, Ft Stockton, Cotulla or Rock Springs Rdo and Albuquerque ARTCC. The location of the Observatory is further described as being on the 340° rad 22.5NM NNW of Marfa VOR.

BRIDGEPORT MUNI AIRSTRIP: Dynamite blasting at quarry SW of arpt.

COLLEGE STATION RDO: Colocated TACAN ident "CLL" operg on test basis UFN.

CORPUS CHRISTI INTL ARPT: Rnwy 13–31 clsd due constr UFN. RVR rnwy 13 inop til aprxly Aug 1971. (9–70)

DALLAS, DALLAS LOVE FIELD: Two cranes operg 3000' NW apch end rnwy 13L 60' high flagged and lgtd.

DALLAS, WHITE ROCK ARPT: Rnwy 35 threshold lgtd.

LUBBOCK, REGIONAL ARPT: Terminal turbojet wind component restrictions lndg rnwy 8L–26R when wet, zero tail wind to a 10 knot crosswind.

LUFKIN, ANGELINA COUNTY ARPT: Rnwy 15 clsd to air carrier lndgs day/ngt.

PALACIOS MUNI ARPT: Rnwy 9 does not meet FAA air carrier lndg standards due to obstns in apch area.

PEARLAND ARPT: Rnwy lgts inop UFN.

PERRYTON MUNI ARPT: Rnwy 13–31 clsd UFN.

QUANAH MUNI ARPT: Dynamite blasting at Quarry 5 miles NW of arpt.

WICHITA FALLS, KICKAPOO ARPT: Obstr lgtd poles 75' AGL located 1100' S apch end rnwy 32. Lgts create glare to pilots when burning, when not burning the poles are hazardous. (9–70)

WICHITA FALLS, KICKAPOO ARPT: First 1000' rwy 32 and first 500' rwy 14 unlgtd UFN. 2000' lgtd.

AIRPORT FACILITY DIRECTORY LEGEND

LOCATION

The airport location is given in nautical miles (to the nearest mile) and direction from center of referenced city.

ELEVATION

Elevation is given in feet above mean sea level and is based on highest usable portion of the landing area. When elevation is sea level, elevation will be indicated as "00." When elevation is below sea level, a minus sign (−) will precede the figure.

RUNWAYS

The runway surface length, and weight bearing capacity are listed for the longest instrument runway or sealane, or the longest active landing portion of the runway or strip, given to the nearest hundred feet, using 70 feet as the division point, i.e., 1468 feet would be shown as "14"; 1474 feet would be shown as "15". Runway lengths prefixed by the letter "H" indicates that runways are hard surfaced (concrete; asphalt; bitumen, or macadam with a seal coat). If the runway length is not prefixed, the surface is sod, clay, etc. The total number of runways available is shown in parenthesis. (However, only hard surfaced runways are counted at airfields with both hard surfaced and sod runways.)

RUNWAY WEIGHT BEARING CAPACITY

● Runway strength data shown in this publication is derived from available information and is a realistic estimate of capability at an average level of activity. It is not intended as a maximum allowable weight or as an operating limitation. Many airport pavements are capable of supporting limited operations with gross weights of 25–50% in excess of the published figures. Permissible operating weights, insofar as runway strengths are concerned, are a matter of agreement between the owner and user. When desiring to operate into any airport at weights in excess of those published in this publication, users should contact the airport management for permission.

Add 000 to figure following S, T, TT and MAX for gross weight capacity, e.g., (S–000).

S–Runway weight bearing capacity for aircraft with single-wheel type landing gear. (DC–8), etc.

T–Runway weight bearing capacity for aircraft with twin-wheel type landing gear. (DC–6), etc.

TT–Runway weight bearing capacity for aircraft with twin-tandem type landing gear. (707), etc.

Quadricycle and twin-tandem are considered virtually equal for runway weight bearing considerations, as are single-tandem and twin-wheel.

Omission of weight bearing capacity indicates information unknown. Footnote remarks are used to indicate a runway with a weight bearing greater than the longest runway.

LIGHTING

B: Rotating Light (Rotating beacon). (Green and white, split-beam and other types.) Omission of B indicates rotating light is either not available or not operating standard hours (sunset-sunrise).

L: Field Lighting. An asterisk (*) preceding an element indicates that it operates on prior request only (by phone call, telegram or letter). Where the asterisk is not shown, the lights are in operation or available sunset to sunrise or by request (radio call). L by itself indicates temporary lighting, such as flares, smudge pots, lanterns.

1—Portable runway lights (electrical)

2—Airport Boundary

3—Runway Floods

4—Low Intensity Runway

5—Medium Intensity Runway

6—High Intensity Runway

7—Instrument Approach (neon)

7A—Medium Intensity Approach Lights (MALS)

7B—Medium Intensity Approach Light System with Rails. (MALSR)

8A, B, or C—High Intensity Instrument Approach (ALS)

9—Sequence Flashing Lights (SFL)

10—Visual Approach Slope Indicator (VASI)

11—Runway end identifier lights (threshold strobe) (REIL)

12—Short approach light systems (SALS)

13—Runway alignment lights (RAIL)

14—Runway centerline

15—Touchdown zone

Because the obstructions on virtually all lighted fields are lighted, obstruction lights have not been included in the codification.

SERVICING

S1: Storage.

S2: Storage, minor airframe repairs.

S3: Storage, minor airframe and minor powerplant repairs.

S4: Storage, major airframe and minor powerplant repairs.

S5: Storage, major airframe and major powerplant repairs.

FUEL

(Fuel data includes each grade available.)

Code	Grade
F12	80/87
F15	91/98
F18	100/130
F22	115/145
F30	Kerosene, freeze point −40°F
F34	Kerosene, freeze point −58°F
F40	Wide-cut gasoline, freeze point −60°F
F45	Wide-cut gasoline without icing inhibitor, freeze point −60°F

OXYGEN

Ox1	High Pressure
Ox2	Low Pressure
Ox3	High Pressure—Replacement Bottles
Ox4	Low Pressure—Replacement Bottles

OTHER

S—NOTAM Service is provided. Applicable only to airports with established instrument approach procedures, or high volume VFR activity.

AOE—Airport of Entry.

FSS—The name of the associated FSS is shown in all instances. When the FSS is located on the named airport, "on fld" is shown following the FSS name. When the FSS can be called through the local telephone exchange, (Foreign Exchange) at the cost of a local call, it is indicated by "(LC)" (local call) with the phone number immediately following the name of the FSS, i.e., "FSS: WICHITA (LC481-5867)." When an Interphone line exists between the field and the FSS, it is indicated by "(DL)" (direct line) immediately following the name of the FSS, i.e., "FSS: OTTO (DL)."

IFR—Airport with approved FAA Standard Instrument Approach Procedure.

RVV—Runway Visibility Values, applicable runway provided.

RVR—Runway Visual Range, applicable runway provided.

VASI—Visual Approach Slope Indicator, applicable runway provided.

AIRPORT REMARKS

"**FEE**" indicates landing charges for private or non-revenue producing aircraft. In addition, fees may be charged for planes that remain over a couple of hours and buy no services, or at major airline terminals for all aircraft.

"**Rgt tfc 13–31**" indicates right turns should be made on landings and takeoffs on runways 13 and 31.

Remarks data is confined to operational items affecting the status and usability of the airport, traffic patterns and departure procedures.

Obstructions.—Because of space limitations only the more dangerous obstructions are indicated. Natural obstructions, such as trees, clearly discernible for contact operations, are frequently omitted. On the other hand, all pole lines within at least 15:1 glide angle are indicated.

FLIGHT SERVICE STATIONS

Flight Service Stations are listed alphabetically by state in the Airport/Facility Directory RCO's and LRCO's where available shown at the facility site following the three letter identifier. If located at other than a facility site, they are listed alphabetically.

Flight Service Stations (FSS) and Combined Station/Tower (CS/T) provide information on airport conditions, radio aids and other facilities, and process flight plans. CS/T personnel are not certificated pilot weather briefers; however, they provide factual data from weather reports and forecasts. Airport Advisory Service is provided at the pilot's request on 123.6 by FSSs located at airports where there are no control towers in operation. (See Part 1 ARRIVALS.)

In addition, they provide an aviation weather briefing service. Flight and weather briefing services are also provided by calling the telephone numbers listed in the Chapter entitled "FSS-CS/T Information and Weather Bureau Telephone Numbers", located in Part 2 Airport Directory.

Civil communication frequencies used in the flight service station air/ground system are now operated simplex on 122.0, 122.2, 122.3, 122.6, 123.6 and emergency 121.5 plus 122.1 and 123.6 receive only as follows:

a. 122.0 is assigned at selected FSSs as a weather channel for both general aviation and air carriers.

b. 123.6 is designated as an airport advisory channel at all FSSs which provide this service at nontower locations. 123.6 is still in commission at some FSSs collocated with towers for the purpose of providing part-time Airport Advisory Service.

c. Some FSS's use 123.65 or certain 50 KHz channels in the 122–123 MHz band (such as 122.05). Pilots using the FSS A/G system should refer to this directory or appropriate charts to determine frequencies available at the FSS or remoted facility through which they wish to communicate.

Part time FSS hours of operation are shown in remarks under facility name.

COMMUNICATIONS

Clearance is required prior to taxiing on a runway, taking off, or landing at a tower controlled airport.

When operating at an airport where the control tower is operated by the U.S. Government, two-way radio communication is required unless otherwise authorized by the tower. (When the tower is operated by someone other than the U.S. Government, two-way radio communication is required if the aircraft has the necessary equipment.)

Frequencies transmit and receive unless specified as: T—Transmit only, R—Receive only, X—On request. **Primary frequencies are listed first in each frequency grouping, i.e., VHF, LF.** Emergency frequency 121.5 is available at all TOWER, APPROACH CONTROL and RADAR facilities, unless indicated as not available in remarks.

Radar available is listed under "RADAR SERVICES" Radar beacons are indicated by "(BCN)" after "RADAR SERVICES", when available.

COMMUNICATIONS REMARKS

Remarks data are confined to operational items affecting the status and usability of navigational aids, such as: ILS component restrictions, part time tower hours of operation, frequency sectorization, VOT frequencies, proposed changes to navigational aids, etc.

AIRPORT FACILITY DIRECTORY

SERVICES AVAILABLE

TOWER

Pre-Taxi Clearance Procedure
Clearance Delivery (CLRNC DEL).
Approach Control (APP CON) Radar and Non-Radar.
Departure Control (DEP CON) Radar and Non-Radar.
VFR Advisory Service (VFR ADV) Non-Radar.
Radar Advisory Service for VFR Acft (Stage I).
Radar Advisory and Sequencing Service for VFR Acft (Stage II).
Radar Sequencing and Separation Service for VFR Acft (TCA).
Surveillance Radar Approach (ASR).
Precision Radar Approach (PAR).
Ground Control (GND CON).
VHF Direction Finding (VHF/DF).

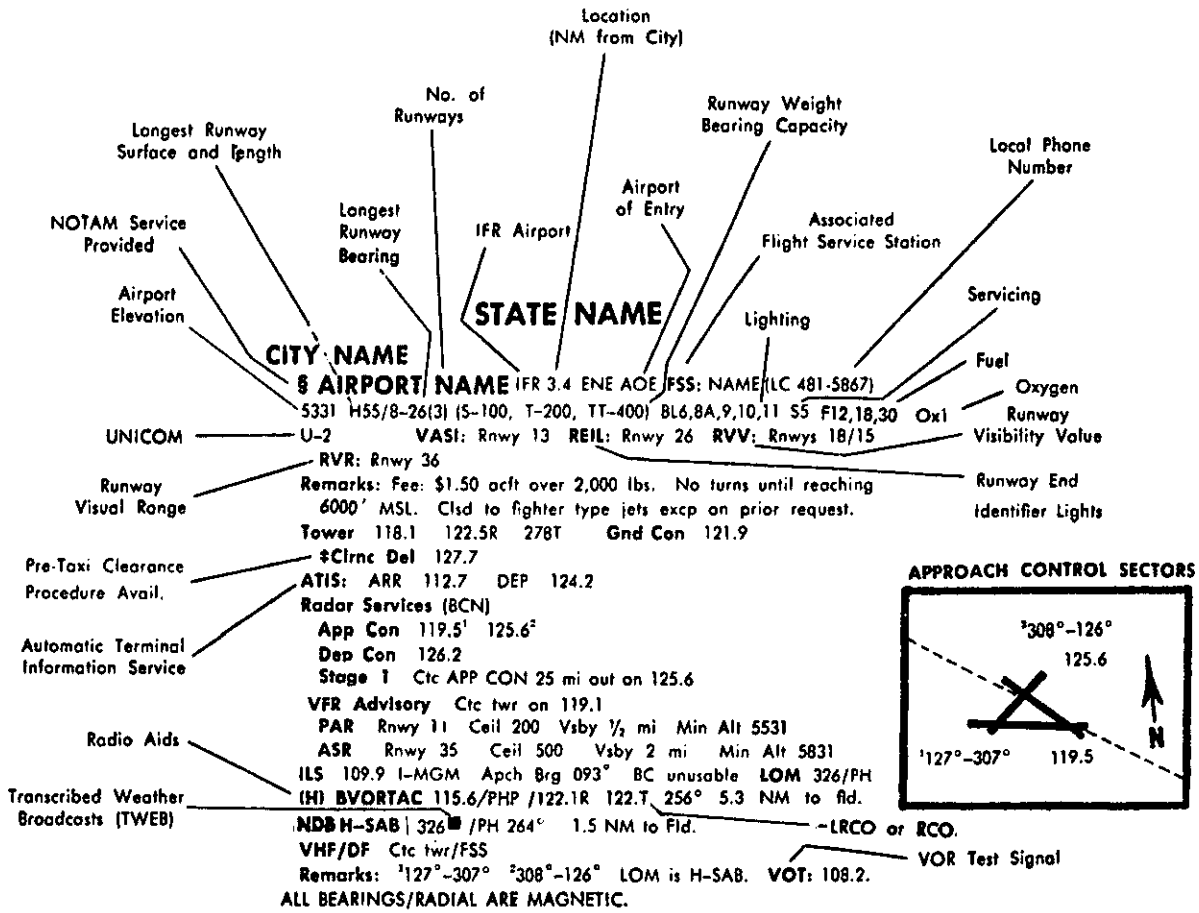
EXCERPTS

UNICOM

A private aeronautical advisory communications facility operated for purposes other than air traffic control, transmits and receives on one of the following frequencies:

U-1—122.8 MHz for Landing Areas (except heliports) without an ATC Tower or FSS;
U-2—123.0 MHz for Landing Areas (except heliports with an ATC Tower or FSS;
U-3—123.05 MHz for heliports with or without ATC Tower or FSS;
U-4—122.85 MHz for landing areas not open to the public;
U-5—122.95 MHz for landing areas not open to the public.

SAMPLE



AIRPORT DIRECTORY

TEXAS

ABERNATHY, MUNI (F83) 5E 33°50'45'' 101°45'45'' FSS: LUBBOCK
3327 H50/3-21 (2) (S-8) S5 F12

ABILENE, BUTTERFIELD TRAIL (2F0) 6NW 32°31'40'' 99°46'35'' FSS: ABILENE
1670 H25/13-31 (1) (S-6) L4 S5 F12, 18 U-1
REMARKS: ATTENDED DALGT. P-LINE IN RWY 19 APCH. 500FT DIRT OVERRUN RWY 31.

ALBANY, TAYLOR 1N 32°44'15'' 99°17'45'' FSS: ABILENE
1473 H30/16-34 (1) (S-4) F12, 18
REMARKS: UNATTENDED. P-LINE IN RWY 34 APCH.

ANDREWS, COUNTY (E11) 1NE 32°19'15'' 102°32'00'' FSS: MIDLAND
3176 H47/15-33 (3) (S-23) L4 S5 F12, 18 U-1
REMARKS: ATTENDED DAYLIGHT. RWY 33 THRESHOLD DISPLACED 765'. P-LINE IN RWY 2 APCH. P-LINE IN RWY 12 APCH. P-LINE IN RWY 30 APCH. P-LINE IN RWY 33 APCH. 200 FT DIRT OVRNS NW END OF RWY 33.

§ **ARLINGTON,** MUNI (F54) 5S 32°35 49'' 97°05'36'' IFR FSS: FORT WORTH
630 H40/16-34 (1) (S-17) BL5 S5 F12, 18
VFR ADV: CTC FT WORTH A/C
REMARKS: RGT TFC RWY 34. 1521 FT/2349 FT MSL/ TWR 6.5NM ESE. 1074 FT/1679 FT MSL/AND 1113 FT 1743 FT MSL/ TWRS 10NM NW. 1559 FT/2349 FT MSL/ TWR 8NM SE.

§ **BIG SPRING,** HOWARD COUNTY (HCA) 4NE 32°18'09'' 101°26'12'' IFR FSS: MIDLAND
2564 H55/16-34 (2) (S-50,D-80,DT-150) BL5 S5 F12, 18 U-1 (LC AM3-3601)
VFR ADV: CTC WEBB A/C 118.4
REMARKS: ATTENDED DAWN-DUSK ON CALL DUSK-DAWN.

§ **BRECKENRIDGE,** STEPHENS COUNTY (BKD) 2S 32°43'01'' 98°53'34'' FSS: MINERAL WELLS
1282 H38/17-35 (3) (S-6) BL5 S5 F12, 18 U-1

CISCO, MUNI (3F2) 3N 32°25'00'' 99°00'00'' FSS: MINERAL WELLS
1612 H26/17-35 (1) (S-4) F12, 18 U-1
REMARKS: UNATTENDED. FUEL AVBL ON CALL.

CLARK FIELD MUNI See STEPHENVILLE

§ **COLEMAN,** MUNI (COM) 2NE 31°50'45'' 99°24'15'' FSS: ABILENE
1697 H39/15-33 (1) (S-22) BL5 S5 F12, 18 U-1

§ **CORSICANA,** MUNI (CRS) 6SE 32°02'00'' 96°24'00'' FSS: DALLAS
440 H34/14-32 (1) (S-26) BL5 S5 F12, 18 U-1
REMARKS: ATTENDED DALGT.

CROSBYTON, PAUDLER (E00) 2E 33°39'00'' 101°13'00'' FSS: LUBBOCK
3009 H26/17-35 (1) (S-13) F12, 18
REMARKS: ATTENDED DAYLGT.

CRYSTAL CITY, MUNI 1NE 28°42'00'' 99°49'12'' FSS: COTULLA
610 H35/12-30 (1) (S-21) BL5 S5 F12, 18 U-1
REMARKS: ATTENDED DAWN-DUSK THRFTR FONE DR4-3224. P-LINE IN RWY 30 APCH.

CUERO, MUNI (T71) 1E 29°05'00'' 97°16'00'' FSS: PALACIOS
214 H28/14-32 (1) (S-11) L4 F12, 18
REMARKS: ATTENDED IRREGULARLY. RWY 14 THRESHOLD DISPLACED 250'. RWY 32 THRESHOLD DISPLACED 200'. P-LINE IN RWY 32 APCH.

CULBERSON COUNTY See VAN HORN

CURTIS FIELD See BRADY

CURTIS RANCH FLD See BRADY

CUT AND SHOOT See CONROE

CYPRESS RIVER See JEFFERSON

DALHART, MILLER AIRFLD 6NE 36°05'30'' 102°24'55'' FSS: DALHART
3950 H65/17-35 (1) (S-76,D-130)
REMARKS: UNATTENDED. RWY 17 THRESHOLD DISPLACED 1000'.

§ **DALHART,** MUNI (DHT) 4SW 36°01'00'' 102°33'00'' FSS: DALHART ON FLD
IFR
3989 H90/17-35 (3) (S-5) BL5 S5 F12, 18, 30
REMARKS: P-LINE IN RWY 3 APCH.

TEXAS—Continued

DALLAS, ADDISON (ADS) 10N 32°58'06'' 96°50'12'' FSS: Dallas
IFR
643 H72/15-33 (1) (S-80,D-100,DT-160) BL5, 7A, 11 S5 F12, 18, 22, 30, 34 OX1,2 U-2 (LC FL2-8491)
REIL: RWY 33
REMARKS: (†) P-LINE IN RWY 21 APCH.

§ **DALLAS,** LOVE FIELD (DAL) 6NW 32°50'49'' 96°51'12'' FSS: DALLAS ON FLD
IFR LRA
487 H88/13R-31L (3) (S-100,D-200,DT-350) BL6, 8, 10, 11, 14, 15 S5 F12, 15, 18, 22, 30, 40 OX1,2,3,4 U-2
VASI: RWY 31R, 13R REIL: RWY 31R RVR: RWY 13L, 31L
REMARKS: (†) RGT TFC RWY 31R, 13R, 18, 36.

§ **DALLAS,** GARLAND (F02) 10NE 32°52'00'' 96°40'40'' FSS: DALLAS
IFR
614 H35/13-31 (1) (S-20) BL4 S5 F12, 18, 40 U-1 (LC FL2-8491)
VFR ADV: CTC DALLAS A/C
REMARKS: RWY 31 THRESHOLD DISPLACED 181'.

DEL RIO, DAVIS RANCH 40N 29°55'15'' 100°50'00'' FSS: COTULLA
1630 21/3-21 (2)
REMARKS: ATTENDED MON-FRI DALGT.

§ **DEL RIO,** INTERNATIONAL (DRT) 2NW 29°22'00'' 100°55'00'' IFR AOE FSS: COTULLA
999 H35/13-31 (1) (S-21) BL5 S5 F12, 18, 40 OX1 U-1 (LC PR5-3687)
VFR ADV: CTC LAUGHLIN A/C 119.6
REMARKS: ATTENDED DAWN-DUSK. RGT TFC RWY 13.

DENTON, MUNI (F16) 4W 33°11'45'' 97°11'45'' FSS: FORT WORTH
652 H41/17-35 (1) (S-20) BL5 S5 F12, 18 U-1
REMARKS: ATTENDED DALGT. FUEL AVBL ON CALL NGTS.

§ **FORT STOCKTON,** PECOS COUNTY (FST) 2NW 30°55'00'' 102°55'00'' IFR FSS: WINK
3010 H60/11R-29L (1) (S-24) BL5 S5 F12, 18, 34 U-1
REMARKS: ATTENDED DAWN-DUSK. P-LINE IN RWY 29R APCH.

§ **FORT WORTH,** MEACHAM FIELD (FTW) 6N 32°49'03'' 97°21'29'' IFR FSS: FORT WORTH ON FLD
692 H52/17-35 (3) (S-37.5) BL4 S5 F12, 18, 22, 45 OX1,2
RVV: RWY 17
REMARKS: (†).

FORT WORTH, SYCAMORE STRIP 9S 32°37'42'' 97°21'12'' FSS: FORT WORTH
760 34/17-35 (1) F12
REMARKS: ATTENDED IREG EVENINGS AND WEEKENDS. RGT TFC RWY 17. RNWY LGTS AVBL BY PRIOR ARNGMT.

FORT WORTH, LUCK FIELD (F71) 9S 32°35'51'' 97°19'34'' FSS: FORT WORTH
700 H35/16-34 (1) (S-4) BL4 S5 F12, 18 U-1
REMARKS: ATTENDED DAYLIGHT. P-LINE IN RWY 34 APCH. P-LINE IN RWY 17 APCH. P-LINE IN RWY 35 APCH. RGT TFC RWY 16, 17.

§ **FORT WORTH,** OAK GROVE (F72) 13S 32°34'35'' 97°18'00'' IFR FSS: FORT WORTH
690 H29/17-35 (1) (S-11) BL5 S5 F12, 18 OX1,2 U-1
VFR ADV: CTC FT WORTH A/C
REMARKS: RGT TFC RWY 35. 500 FT OVRN ON N END RNWY 35.

FORT WORTH, RUSSELL FIELD (F20) 7SE 32°39'17'' 97°18'57'' FSS: FORT WORTH
710 26/17-35 (2) S5 F12, 18 (LC MA4-8444)
REMARKS: ATTENDED DAYLIGHT.

FORT WORTH, SAGINAW 9N 32°51'45'' 97°22'40'' FSS: FORT WORTH
770 H26/18-36 (1) (S-5) S5 F12, 18 U-1 (LC MA4-8444)
REMARKS: ATTENDED DAYLIGHT. P-LINE IN RWY 31 APCH. RGT TFC RWY 31, 36. TFC PTN TO W OF FLD.

EXCERPTS

AIRPORT DIRECTORY

TEXAS—*Continued*

§ **GRAHAM, MUNI (E15)** 2E 33°06'00" 98°33'00" IFR FSS: MINERAL WELLS
1123 H33/17-35 (1) (S-8) BL4 S5 F12, 18 U-1
REMARKS: ATTENDED DAYLGT. P-LINE IN RWY 17 APCH. P-LINE IN RWY 6 APCH. 300 FT TWR 3/4 NM SW OF ARPT.

GRAHAM, ROSSER RANCH 7SW 33°00'55" 98°37'30" FSS: MINERAL WELLS
1112 36/17-35 (1) BL5, 10
VASI: RWY 35

GRAND PRAIRIE, MUNI (F67) 4SW 32°41'54" 97°02'48" FSS: DALLAS
590 H34/17-35 (1) (S-30) BL5 S5 F12, 18 U-1
REMARKS: ATTENDED DALGT. RGT TFC RWY 17.

GRANDPAPPY POINT **See DENISON**

GRAPEVINE, SOUTHLAKE 5W 32°55'00" 97°08'00" FSS: FORT WORTH
605 14/15-33 (2)
REMARKS: UNATTENDED.

GRAWUNDER FIELD **See BELLVILLE**

GREATER SOUTHWEST INTL, DALLAS-FT WORTH FL **See FORT WORTH**

HAMILTON, MUNI (T21) 2S 31°40'15" 98°08'45" FSS: WACO
1320 H36/17-35 (1) (S-30) BL5 F12, 18
REMARKS: UNATTENDED. RWY 17 THRESHOLD DISPLACED 425'.

HILLSBORO, MUNI (F74) 3N 32°03'00" 97°07'00" FSS: WACO
663 H35/15-33 (1) (S-4) L4 F18
REMARKS: ATTENDED DAYLGT.

LAMESA, JOHNSON FLYING SERVICE (E12) 3N 32°46'00" 101°56'50" FSS: MIDLAND
3003 26/15-33 (2) S3 F15
REMARKS: ATTENDED DALGT.

LAMESA, MUNI 2NE 32°45'15" 101°55'10" FSS: MIDLAND
2997 H43/15-33 (2) (S-20) L4 S5 F12, 18 U-1
REMARKS: RWY 15 THRESHOLD DISPLACED 270'. P-LINE IN RWY 24 APCH. P-LINE IN RWY 15 APCH. P-LINE IN RWY 33 APCH.

LAMPASAS 3N 31°06'27" 98°11'45" FSS: AUSTIN
1215 H30/16-34 (1) (S-14) BL4 F12, 18 U-1
REMARKS: ATTENDED ON CALL FONE 242-5506.

LUBBOCK, TOWN & COUNTRY AIRPARK (F82) 6S 33°29'08" 101°48'44" FSS: LUBBOCK
3270 H26/17-35 (1) (S-13) L5 S5 F12, 18
REMARKS: P-LINE IN RWY 8 APCH. P-LINE IN RWY 17 APCH.

§ **LUBBOCK, REGIONAL (LBB)** 5N 33°39'36" 101°49'26" FSS: LUBBOCK ON FLD
IFR
3269 H85/17R-35L (6) (S-100,D-170,DT-350) BL6, 8 S5 F12, 15, 18, 22, 30 0X1,2,3,4 U-2
RVV: RWY 17R RVR: RWY 17R
REMARKS: (†) RWY 35L THRESHOLD DISPLACED 900'. RGT TFC RWY 17R, 26R, 35R, 8R. ARPT CLSD TO ALL MILITARY TYPE JET ACFT.

LUCK FIELD **See FORT WORTH**

§ **MIDLAND, AIRPARK (MDD)** 3N 32°01'45" 102°06'15" FSS: MIDLAND
2805 H58/7-25 (3) (S-42,D-70,DT-130) L5 S3 F12, 18 U-1
REMARKS: ATTENDED 0600-2100. RWY 7 THRESHOLD DISPLACED 434'. RGT TFC RWY 25, 29, 34. 1137 FT /4049 FT MSL/ TWR 10 NM WNW.

§ **MIDLAND, ODESSA REGIONAL AIR TERMINAL (MAF)** 9SW 31°56'27" 102°12'05" IFR FSS: MIDLAND ON FLD
2870 H83/10-28 (4) (S-106,D-170,DT-320) BL6, 8 S5 F12, 18, 22, 30 0X1,2,3,4 U-2
RVV: RWY 10
VHF/DF: CTC FSS
REMARKS: (†) RWY 28 THRESHOLD DISPLACED 705'. P-LINE IN RWY 22 APCH. P-LINE IN RWY 16L APCH. P-LINE IN RWY 34R APCH. P-LINE IN RWY 16R APCH. P-LINE IN RWY 34L APCH. 1137 FT /4049 FT MSL/ TWR 10 NM NNW.

§ **MINERAL WELLS (MWL)** 4E 32°46'59" 98°03'34" IFR FSS: MINERAL WELLS ON FLD
964 H42/13-31 (3) (S-30) BL5 S5 F12, 18
REMARKS: (†) ATTENDED DAYLIGHT. RGT TFC RWY 13, 17.

TEXAS—*Continued*

§ **OLNEY, MUNI (ONY)** 4SW 33°21'00" 98°49'00" FSS: WICHITA FALLS
1274 H55/17-35 (3) (S-43,D-50,DT-84) BL4 F12, 18 U-1
REMARKS: ONLY 3800 FT OF S CENTRAL PORTION OF RWY 17-35 LGTD.

ORANGE, BROWN (2OR) 4SW 30°04'10" 93°48'05" FSS: BEAUMONT
14 50/8-26 (4) BL5 S3 F12, 18 U-1
REMARKS: ATTENDED MON-SAT DALGT. LANDING FEE. P-LINE IN RWY 31 APCH. 1031 FT /1049 FT MSL/ TWR 10 NM WNW. 1021 FT /1047 FT MSL/ TWR 9 NM NNE. 1022 FT /1049 FT MSL/ TWR 9 NM NNW.

§ **PLAINVIEW, HALE COUNTY (PVW)** 1S 34°10'06" 101°42'58" IFR FSS: AMARILLO
3372 H52/4-22 (2) (S-25,D-37) BL5 S5 F12, 18, 30 0X1,2,3,4 U-2 (LC CA3-2148)
REMARKS: (†) ATTENDED 0600-2200. P-LINE IN RWY 12 APCH.

PLANO, DALLAS NORTH (F26) 5NW 33°04'44" 96°44'18" FSS: DALLAS
710 H31/16-34 (1) (S-8) L4 S5 F12, 18
REMARKS: ATTENDED DAYLIGHT.

REAGAN COUNTY **See BIG LAKE**

REBEL FIELD **See MERCEDES**

REDBIRD **See DALLAS**

REDDELL AIRPARK **See EL CAMPO**

REDWING AERODROME **See HOUSTON**

REECE RANCH **See ITASCA**

§ **SHERMAN, MUNICIPAL (SWI)** 1SE 33°37'45" 96°35'15" IFR FSS: DALLAS
745 H40/16-34 (1) (S-19) BL5 S5 F12, 18 U-1
VFR ADV: CTC PERRIN A/C 123.8,126.8
REMARKS: ATTENDED DAYLIGHT. RGT TFC RWY 34.

§ **SNYDER, WINSTON FIELD (SNK)** 2SW 32°42'00" 100°57'00" FSS: MIDLAND
2434 H48/17-35 (2) (S-24) BL5 S5 F12, 18 U-1
REMARKS: P-LINE IN RWY 8 APCH. P-LINE IN RWY 17 APCH.

STAMFORD, ARLEDGE FIELD (F56) 5SE 32°54'40" 99°44'09" FSS: ABILENE
1558 H32/17-35 (1) (S-4) BL5 S5 F12, 18 U-1
REMARKS: ATTENDED DAYLIGHT.

EXCERPTS

§ **STEPHENVILLE, CLARK FIELD MUNI (SEP)** 1E 32°13'00" 98°11'00" FSS: MINERAL WELLS
1318 H42/14-32 (1) (S-30) BL5 S5 F12, 18 U-1
REMARKS: ATTENDED MON-SAT DALGT SUNDAYS HALF DAYS.

§ **SWEETWATER, MUNI (SWW)** 3W 32°28'02" 100°28'02" FSS: ABILENE
2386 H62/16-34 (2) (S-50,D-80) BL5 F12, 18 U-1
REMARKS: P-LINE IN RWY 3 APCH.

TERRELL, WALLACE 3W 32°44'00" 96°19'10" FSS: DALLAS
493 23/15-33 (1) F12
REMARKS: P-LINE IN RWY 33 APCH.

WICHITA FALLS, TOM DANAHER 6SW 33°49'50" 98°34'20" FSS: WICHITA FALLS
986 H38/17-35 (1) (S-10) F12, 18
REMARKS: UNATTENDED.

WICHITA FALLS, KICKAPOO (T47) 3S 33°51'45" 98°29'28" FSS: WICHITA FALLS
985 H35/14-32 (1) (S-5) L4 S5 F12, 18 U-1
VFR ADV: CTC SHEPPARD A/C
REMARKS: ATTENDED DAYLIGHT. P-LINE IN RWY 14 APCH.

§ **WICHITA FALLS, SHEPPARD AFB/ WICHITA FALLS AIR TRML (SPS)** 6N 33°59'06" 98°29'31" IFR FSS: WICHITA FALLS ON FLD
1015 H131/15R-33L (3) (S-155,D-220,DT-550) BL6, 8, 10 S5 F12, 18, 22, 40 0X1,2,3,4 U-2
VASI: RWY 15R RVV: RWY 33L RVR: RWY 33L
VHF/DF: CTC FSS
REMARKS: (†) RGT TFC RWY 15R.

AIRPORT FACILITY DIRECTORY

TEXAS

ABILENE FSS 121.5 122.1R 122.3 122.6 123.6

§ABILENE MUNI *IFR* 3SE **FSS: ABILENE on Fld**
1789 H72/17L-35R(3) (S-80, T-110, TT-160) BL5,6,8A,9 S5 F12,18,30 Ox2 U2 **RVV:** Rnwy 35L
Remarks: Rgt tfc rnwys 22, 17R, 35R, 30. Rnwy 12-30 is txwy used for lgt acft dalgt hrs only.
Tower[1] 120.1 122.7R **Gnd Con** 121.9
Radar Services: (BCN)
App Con 126.5 134.1 113.7T 122.5R 124.1
Dep Con 125.0
Stage II Arr acft ctc App Con 124.1 25 mi out. Dep acft and overflights ctc App Con 121.3.
ASR
ILS 110.3 I-ABI Apch Brg 350° **LOM: 353/AB**
(H) BVORTAC 113.7/ABI 105° 10NM to fld.
Remarks: [1]Opers 0700-2300 lcl time.

BIG SPRING (L) BVORTAC 114.3/BGS/122.1R **FSS:** MIDLAND

BRIDGEPORT (L) BVORTAC 116.5/BPR/122.1R **FSS:** FORT WORTH

BRITTON (L) BVORTAC 117.0/BRT/122.1R **FSS:** FORT WORTH

§DALLAS LOVE FIELD *IFR* 5NW **FSS: DALLAS on Fld**
486 H88/13R-31L (3) (S-100, T-150, TT-350) BL5,6,8A,9,10,11,14,15 S5 F22,40 Ox1,2,3,4 U2 **VASI:** Rnwy 13R 31R **REIL:** Rnwy 31R **RVR:** Rnwy 13L 31L
Remarks: U.S. Customs lndg rgts arpt 0830-1700 lcl time Mon-Sat. Req arrival notice be forwarded customs when filing flt plan in Canada, Mexico or Cuba. Prior lndg approval from customs required. Phone R19-3607. Rgt hand tfc rnwy 13R, 31R, 18, 36. Rnwy 13R-31L and 13L-31R grooved.
Tower 118.7 124.3 122.5R **Gnd Con** 121.9[6] 121.65[7]
‡ **Clrnc Del** 120.0
ATIS 120.7
Radar Services: (BCN)
Dallas-Ft Worth App Con 118.9[2] 125.8[2] 123.9[2] 119.8[2] 122.5R
Dallas-Ft Worth Dep Con 125.2[2] 119.4[2] 122.5R
Stage II Ctc App Con 25 mi out 125.8[4] 119.8[2]
ASR
ILS 110.3 I-DAL Apch Brg 128° **LOM:** 371/DA
ILS[4] 111.7 I-LVF Apch Brg 310° **LOM:** 275/LV
Dallas (L) BVORTAC[5] 114.6/DAL 220° 15.6 NM to fld.
Remarks: [1]Acft apchg and dptg N and E of Dal lclzr crs extndd 308-127°. [2]Acft apchg and dptg from S and W of Dallas 128-307°. [4]No voice on lclzr and BC unusable beyond 8NM. [5]No sked wea bcst avbl 2200-0500 lcl time. [6]E of rnwy 13L-31R [7]W of rnwy 13L-31R. **VOT:** 111.0.

§RED BIRD *IFR* 6SW **FSS: DALLAS (LC FL2-8491)**
660 H54/13-31(2) (S-35, T-60, TT-110) BL5 S5 F12,18,40 U2
Remarks: 1521' (2349' MSL) twr 7.5 NM SW. 1559' (2349' MSL) twr 8 nmi SW. 500' overrun NW end rnwy 13-31. P-line SE.
Tower[8] 120.3 122.4R **Gnd Con: 121.7**
Radar Services:
Dallas-Ft Worth App Con 118.9[2] 125.8[2] 123.9[2] 119.8[2]
Dallas-Ft Worth Dep Con 125.2
VFR Advisory Ctc twr
NDB HW 287/RBD
Remarks: [2]Acft apchg and dptg N and E of DAL lclzr crs extndd 308-127°. [3]Acft apchg and dptg from S and W of Dallas 128-307°. [5]Oper 0600-2200 lcl time.

DYESS NDB MHW 201/DYS **FSS:** ABILENE

TEXAS—*Continued*

FORT WORTH
§GREATER SOUTHWEST INTL DALLAS-FT. WORTH FLD IFR 16NE **FSS: FORT WORTH (DL)**
568 H90/17-35(2) (S-75, T-125, TT-220) BL5,6,8A,9 S3 F12,18,22,30 Ox1,2,3,4 U2 **RVR:** Rnwy 13
Remarks: 1074' (1679' MSL) twr 10.5 NM WSW.
Southwest Tower 120.5 122.7R **Gnd Con** 121.8
Radar Services: (BCN)
Dallas-Ft Worth App Con 124.5 122.7R
Dallas-Ft Worth Dep Con 125.2 122.7R
Stage I Ctc App Con 25 NM out on 124.5
ASR
ILS[1] 109.5 I-GSW Apch Brg 129° **LOM:** 219/GS
Greater Southwest (H) BVORTAC 113.1/GSW at fld.
VHF/DF Ctc twr.
Remarks: [1]G/S unusable below 768' MSL. **VOT:** 111.8

GUTHRIE (L) BVORTAC[1] 112.4/GTH/122.1R **FSS:** CHILDRESS
Remarks: [1]Oper test basis til aprxly Jan 5.

HYMAN (L) BVOR 110.4/HYM/122.1R **FSS:** MIDLAND

LUBBOCK FSS 121.5 122.1R 122.2 122.6

§ LUBBOCK REGIONAL *IFR* 4NE **C5/T:** LUBBOCK on Fld
3269 H85/17R-35L(5) (S-100, T-170, TT-350) BL5,6,8A,9 S5 F12,15,18,22,30 Ox1,2,3,4 U2 **RVR:** Rnwy 17R
Remarks: Rnwy 35L threshold displaced 900' N. Clsd to tactical mil jet acft. Rgt tfc rnwys 8R, 17R, 26R, 35R. Rnwy 8R-26L restricted to single engine acft. E 1500' of txwy to rnwy 26R not visible to twr. Sfc areas rnwy 17L-35R, parallel txwy & E ramp not visible from ctl twr. Acft are requested to report when clear of rnwy 17L-35R after lndg.
Tower 119.9[2] 118.8[2] 122.5R **Gnd Con** 121.9
Radar Services: (BCN)
App Con 118.1 125.8 112.9T 109.5T 110.8T
Dep Con 119.3
Stage I Ctc App Con 118.1
ASR
ILS 109.5 I-LBB Apch Brg 169° **LOM:** 219/LB
(L)BVORTAC 110.8/LBB 112° 5.2 NM to Rnwy 12
Remarks: [2]17L-35R, 8R-26L. [3]17R-35L, 8L-26R. ILS BC marker Bcn "Globe" emits steady tone.

MINERAL WELLS FSS 121.5 122.1R 122.2 122.6 123.6

WICHITA FALLS FSS 121.5 122.1R 122.2 122.6 123.6 **DF**

WICHITA FALLS
§SHEPPARD AFB/WICHITA FALLS AIR TRML *IFR* 5N **FSS: WICHITA FALLS on Fld**
1015 H131/15R-33L(3) (S-155, T-220, TT-550) BL6,8A,9,10 S5 F18,30,45 U2 **VASI:** 15R **RVV:** Rnwy 15 **RVR:** Rnwy 33L
Remarks: Rgt tfc rnwys 17 & 15R. J-bar and A-Gear rnwys 15R-33L, 15L-33R.
Sheppard Tower 119.1 127.55 122.5R 112.7T 109.7T **Gnd Con** 121.9
Radar Services:
Sheppard App Con 118.2 112.7T 109.7T
Sheppard Dep Con 118.2 120.4
Stage I Ctc App Con 25 mi out on 125.5
ILS 109.7 I-SPS Apch Brg 329° **LOM: 296/SP**
Wichita Falls (H) BVORTAC 112.7/SPS 078° 5.1 NM to fld.
Wichita Falls NDB HW 296/SP 329° 3.9NM to rnwy 33.
Remarks: LOM is SP NDB.

WINK FSS 121.5 122.1R 122.6 123.6 **DF**

WINK (H) BVORTAC 112.1/INK **FSS:** WINK

EXCERPTS

FSS–CS/T AND WEATHER SERVICE TELEPHONE NUMBERS

Flight Service Stations (FSS) and Combined Station/Tower (CS/T) provide information on airport conditions, radio aids and other facilities, and process flight plans. CS/T personnel are not certificated pilot weather briefers; however, they provide factual data from weather reports and forecasts. Airport Advisory Serviice is provided at the pilot's request on 123.6 by FSSs located at airports where there are not control towers in operation. (See Part 1 ARRIVALS.)

The telephone area code number is shown in parentheses. Each number given is the preferred telephone number to obtain flight weather information. Automatic answering devices are sometimes used on listed lines to given general local weather information during peak workloads. To avoid getting the recorded general weather announcement, use the selected telephone number listed.

- ● Indicates Pilot's Automatic Telephone Weather Answering Service (PATWAS) or telephone connected to the Transcribed Weather Broadcast (TWEB) providing transcribed aviation weather information.
- ◆ Indicates a restricted number, use for aviation weather information
- ▬ Call FSS for "one call" FSS/WBO briefing service.
- ★ Automatic Aviation Weather Service (AAWS).

EXCERPTS

Location and Identifier		Area Code	Telephone
TEXAS			
Abilene ABI	FSS	(915)	677-4336/7
Alice ALI	FSS	(512)	664-4291
Amarillo AMA (Air Terminal)	FSS	(806)	335-1608▬
Austin AUS (Robert Mueller)	FSS	(512)	GR 8-6695▬
Beaumont BPT (Jefferson Co)	CS/T	(713)	727-4148
	WB	(713)	722-7011◆
			(0630-2130)
Brownsville BRO (Rio Grande Valley Intl)	CS/T	(512)	LI 6-6421
			GA5-1115
			(Harlingen Exchange)
	WB	(512)	542-8231◆
Childress CDS	FSS	(817)	WE 7-3892
College Station CLL (Easterwood)	FSS	(713)	VI 6-8784/5
Corpus Christi	WB	(512)	883-3008◆
Cotulla COT	FSS	(512)	TR 9-2417
Dalhart DHT	FSS	(806)	CH 9-2006
Dallas Love Field DAL	FSS	(214)	FL 2-8491▬
	FSS	(214)	FL 7-4343★
Del Rio	WB	(512)	775-2115
El Paso ELP (Intl)	FSS	(915)	778-6448▬
	FSS	(915)	778-4487★
Fort Worth FTW (Meacham)	FSS	(817)	MA 4-8471▬
	FSS	(817)	MA6-3071★

Location and Identifier		Area Code	Telephone
TEXAS (Con't.)			
Galveston GLS (Scholes)	FSS	(713)	SH 4-3255
	WB	(713)	765-5448◆
Gregg County GGG (Longview)	CS/T	(214)	MI 3-2612
Houston HOU (Intl)	FSS	(713)	643-4351▬
	WB	(713)	644-1507★
Lubbock LBB	CS/T	(806)	PO 2-5802
	WB	(806)	762-2380◆
Lufkin LFK (Angelena Co)	FSS	(713)	NE 4-3544
McAllen MFE (Miller Fld)	FSS	(512)	MU 2-2878/9
Midland MAF (Air Terminal)	FSS	(915)	563-2611▬
Mineral Wells MWL	FSS	(817)	FA 5-5922
Palacios PSX	FSS	(512)	972-2218
Port Arthur	WB	(713)	722-0288◆
San Angelo SJT (Mathis)	CS/T	(915)	944-1538
	WB	(915)	944-1112◆
San Antonio SAT (Intl)	FSS	(512)	826-9561▬
Tyler TYR (Pounds)	CS/T	(214)	597-8051
Victoria VCT	WB	(512)	575-1276◆
Waco ACT	CS/T	(817)	752-4811
	WB	(817)	754-1582◆
Wichita Falls SPS (Sheppard AFB/Wichita Falls Air Trml)	FSS	(817)	322-0751▬
Wink INK	FSS	(915)	LA 7-3351

SECTION VIII. FLIGHT COMPUTER

Chapter 25. Slide Rule Face

Exercise 60. ***Problem Solving***

The following problems are designed to be solved by a flight computer. (Note: In all cases, you are to write in the missing figures based on the information given. The first problem of each type has been completed as an example.)

TIME – SPEED – DISTANCE

	GROUNDSPEED (*mph*)	TIME FLOWN	DISTANCE (*statute miles*)
1.	127	2:05	264
2.	184	_____	294
3.	146	_____	550
4.	172	_____	315
5.	155	_____	600
6.	168	_____	280
7.	110	3:08	_____
8.	133	4:26	_____
9.	_____	3:04	365
10.	_____	1:58	324

FUEL CONSUMPTION: TOTAL FLIGHT TIME AVAILABLE

	USABLE FUEL	RATE OF CONSUMPTION (*gph*)	TIME AVAILABLE
11.	42	13.7	3:04
12.	60	8.6	_____
13.	52	9.3	_____
14.	39	7.8	_____
15.	45	12.0	_____

FUEL CONSUMPTION: FUEL REQUIRED

	TIME TO FLY	RATE OF CONSUMPTION (*gph*)	FUEL REQUIRED (*gal*)
16.	4:04	9.5	38.6
17.	2:22	12.7	_____
18.	3:44	11.0	_____
19.	1:52	11.8	_____
20.	4:00	7.4	_____

TRUE AIRSPEED

	PRESSURE ALTITUDE	OUTSIDE AIR TEMPERATURE (°C)	INDICATED AIRSPEED (*IAS*)	TRUE AIRSPEED (*TAS*)
21.	6,500	0	140	154
22.	4,500	+20	160	_____
23.	9,500	−10	122	_____
24.	7,500	− 5	145	_____
25.	5,500	−15	145	_____

KNOTS/MPH

	KNOTS	MPH
26.	10	11.5
27.	22.5	_____
28.	50	_____
29.	24	_____
30.	_____	45

Chapter 26. Wind Face

Exercise 61. ***Problem Solving***

The following wind triangle problems are to be solved on a flight computer. (Note: In all cases you are to determine and write in the missing figures based on the information given. Refer to the Compass Deviation Card on page 20 for deviation. Solution to the first problem is given as an example.)

	TRUE COURSE	TRUE AIRSPEED (*mph*)	WIND DIR./SPEED (*knots*)	TRUE HEADING	VARIATION	MAGNETIC HEADING	COMPASS HEADING	GROUND-SPEED (*mph*)
1.	270°	150	320°/20	277°	7° E	270°	268°	135
2.	095°	130	180°/10	_____	4° W	_____	_____	_____
3.	101°	124	260°/25	_____	12° W	_____	_____	_____
4.	340°	148	034°/33	_____	9° W	_____	_____	_____
5.	132°	100	360°/20	_____	17° E	_____	_____	_____

SECTION IX. RADIO COMMUNICATIONS

Chapter 27. Radio Communications

Exercise 62. *Terms*

The following terms are important in this chapter. Choosing from the list below, write, in the space provided, the term which would correctly complete each statement.

SCHEDULED WEATHER BROADCASTS	150 MILE RADIUS
AIRMETS	IN-FLIGHT SERVICE
AVIATION WEATHER	PIREP

1. A radio report given by a pilot on weather conditions along his route of flight is called a _____.

2. _____ _____ _____ are presented by Flight Service Stations at 15 minutes past each hour.

3. PIREPS, SIGMETS, and _____ are included in scheduled weather broadcasts by the FAA Flight Service Stations (FSSs).

4. Scheduled weather broadcasts begin with a station name, the time, and the title _____ _____.

5. The term _____ _____ refers to any information or assistance provided by a Flight Service Station via two-way radio.

6. The 15-minute-past-the-hour Scheduled Weather Broadcast is a broadcast of weather reports from the stations within approximately a _____ _____ _____ of the broadcasting station.

Exercise 63. *Identification—Radio Frequencies*

The following table contains a list of frequency blocks assigned for aviation use. Choosing from the frequency list, write the corresponding letter in the space beside the assigned use.

ASSIGNED USE	FREQUENCIES
1. ____ Private aircraft to towers	a. 122.8, 123.0 MHz
2. ____ Airport utility (ground control)	b. 200 to 415 kHz
3. ____ VOR stations (may include any voice)	c. 108.0 - 117.95 MHz
4. ____ Low and medium frequency beacons	d. 121.5 MHz
5. ____ Emergency	e. 122.4, 122.5, and 122.7 MHz
6. ____ Aircraft to Flight Service Stations (FSS)	f. 121.6 - 121.9 MHz
7. ____ Air Traffic Control	g. 118.0 - 121.4, 123.6 - 128.8, 132.05 - 135.95 MHz
8. ____ UNICOM	h. 122.1, 123.6 MHz

Exercise 64. ***Characteristics***

The following table is to illustrate the reception distances for VHF radio transmissions. Write the figure representing the normal reception distance (maximum usable) in the blank spaces provided.

ALTITUDE OF AIRCRAFT *(above ground station)*	RECEPTION DISTANCE *(statute miles)*
1,000 feet	_____ miles
3,000 feet	_____ miles
5,000 feet	_____ miles
10,000 feet	_____ miles

Exercise 65. ***Terms***

The following terms are commonly used radio-telephone phraseologies. Write the letter corresponding to the correct meaning in the space beside the term.

1. ____ Affirmative
2. ____ Verify (confirm)
3. ____ Over
4. ____ Negative
5. ____ Roger
6. ____ Acknowledge
7. ____ Correction
8. ____ Out

a. This conversation is ended. I do not expect a response from you.

b. This transmission is ended and I expect a response from you.

c. Check or confirm with orginator.

d. A change due to an error in earlier transmission.

e. Let me know that you have received and understand this message.

f. Yes.

g. That is not correct; no.

h. I have received all of your last transmission.

Chapter 28. Radio Guidance in VFR Flying

Exercise 66. *Statements*

The following statements, when completed, will emphasize important points in this chapter. Write, in the blank spaces provided, the word or words which will correctly complete the statements.

1. In recent years the VHF _____ or _____ has replaced the low-frequency range as the basic radio aid to navigation.

2. An airplane equipped with a VOR receiver can still use a _____ station for bearing information just as it uses a normal VOR station.

3. VOR's project courses in all directions (360) from the station and these courses are called _____.

4. A radial is a line of _____ bearing extending _____ a VOR.

5. VOR signals, like other VHF transmissions, follow an approximate _____ course.

6. VOR stations are assigned a _____ letter identification which is normally broadcast in _____.

7. The _____ _____ is the basic component of a VOR receiver which enables the pilot to select a course to fly.

8. The _____ Indicator or ambiguity meter tells the pilot whether his course is leading toward or away from the station.

9. The Deviation Indicator (vertical needle), another basic component of the VOR receiver, is commonly called the _____ Indicator.

10. A VOR station should be positively _____ by code or voice and the _____ Indicator should be stabilized to insure a *dependable* signal.

11. To fly a selected course *to* a VOR station, the omnibearing (course) selector should be set _____ degrees opposite the radial (the reciprocal). The Left-Right Needle should be _____ and the To-From Indicator should indicate _____.

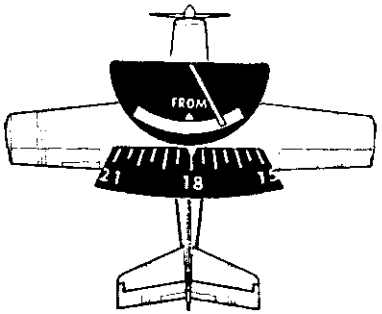
12. To fly a selected course *from* a VOR station, the omnibearing (course) selector should be set the same as the _____ selected, the Left-Right Needle should be _____, and the To-From Indicator should indicate _____.

13. One of the advantages of an automatic direction finder (ADF) radio receiver is that it may be tuned to a commercial _____ _____.

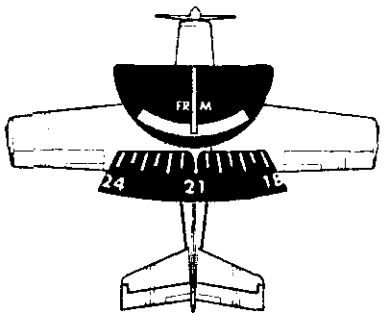
14. The most common use of ADF for the private pilot is that of _____ by flying the needle to the station.

Exercise 67. ***Interpretation***

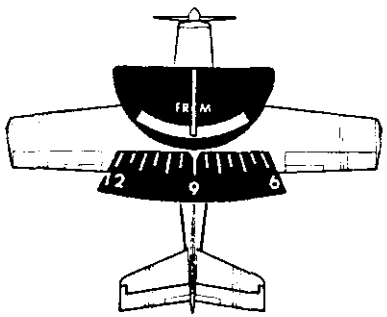
The illustration on page 63 shows eight airplanes in relationship to a VOR station. Based on the simulated indications of the omnireceivers below, numbered 1 through 8, write, in the space provided, the letter corresponding to the appropriate airplane position.



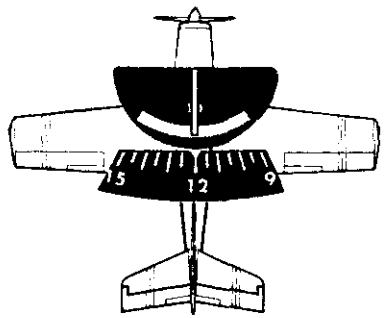
1. _____



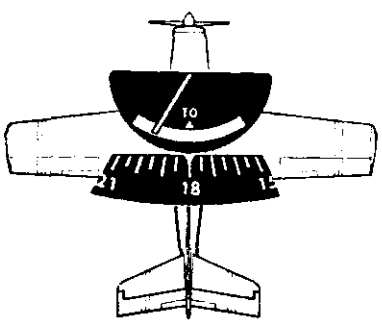
2. _____



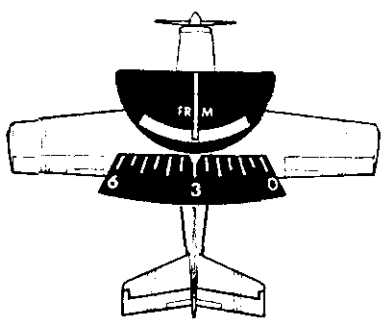
3. _____



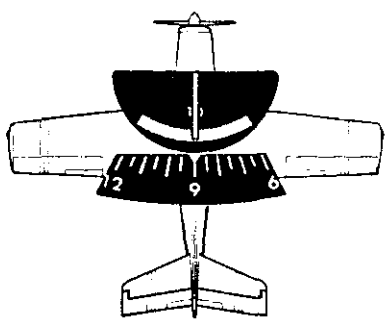
4. _____



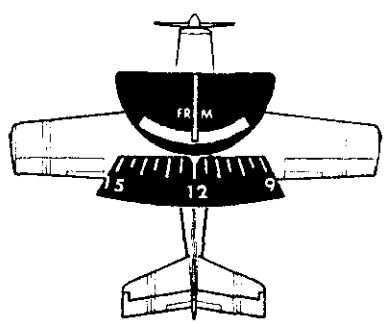
5. _____



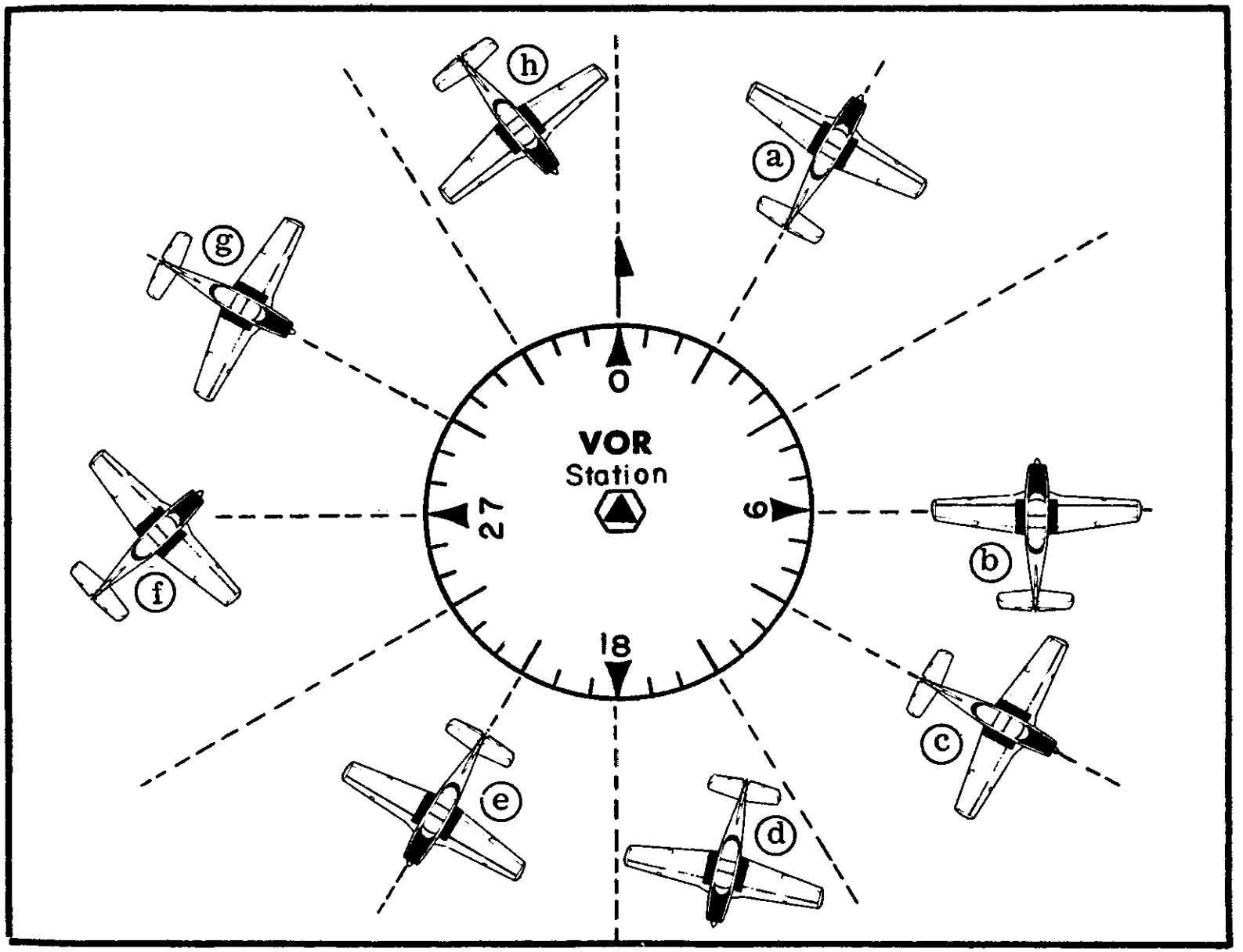
6. _____



7. _____



8. _____


h
a
g
0
VOR
Station
27
9
18
f
b
c
e
d

Chapter 29. Emergency Radio Procedures

Exercise 68. ***Statements***

The following statements, when completed, will emphasize important points in this chapter. Choosing from the list of terms below, write, in the blank spaces provided, the word or words which will correctly complete each statement.

ALTER	RIGHT
MAYDAY	LEFT
MAGNETIC	CONFESS
TRIANGULAR PATTERN	COMMUNICATE
VHF/DF STATION	CLIMB
HOMER	COMPLY

1. A pilot in distress who needs help immediately should begin his emergency message with the word _____

2. A ground-based VHF radio receiver capable of indicating the bearing from its antenna to a transmitting aircraft is known as a _____

3. A common voice call for a DF station is the location name followed by the word _____

4. A good rule to apply in most situations where the pilot thinks he is lost is "Don't _____ course radically without first determining position."

5. The course given by the DF station to the pilot is the _____ course to the station.

6. The _____ is designed to alert radar stations of an airplane in distress.

7. The triangular pattern should be flown to the _____ if both the radio transmitter and receiver are inoperative.

8. A triangular pattern should be flown to the _____ if the radio receiver is still operative.

IN AN EMERGENCY, REMEMBER THE FOUR C's.

9. _____ your predicament to any ground station. You should not wait too long. Give search and rescue a chance.

10. _____ with the ground link station and pass as much of the distress message as possible on the first transmission. They need information for best search and rescue action.

11. _____ to a high altitude, if possible, to get better radar and DF (direction finding) detection.

12. _____ with advice and instructions received.

Section IX. Review

Exercise 69. ***Review***

The following statements concern items which you have already studied in completing Exercises 62 through 68. These statements may be true or false. Circle the letter "T" preceding the statement if it is true; circle the letter "F" if it is false. (Remember the recommendation that you first attempt to complete this exercise without referring to the Handbook or the previous exercises.)

1. T F Scheduled Weather Broadcasts by Flight Service Stations are presented on the hour and 30 minutes past the hour.

2. T F 122.4, 122.5, and 122.7 MHz are frequencies assigned to control towers.

3. T F 121.7 and 121.9 MHz are frequencies assigned to UNICOM stations.

4. T F The VORTAC maximum VHF reception distance for an aircraft radio at 3,000 feet above the ground station is 100 statute miles.

5. T F "Over" in radio-telephone phraseology means: "This transmission is ended and I expect a response from you."

6. T F The common term for "yes" in radio-telephone phraseology is "affirmative."

7. T F The basic aid to radio navigation is the VOR or VORTAC.

8. T F Courses transmitted from a VOR station are commonly referred to as bearings.

9. T F Basic components of a VOR receiver are the omnibearing selector, the To-From Indicator, and the Left-Right Indicator.

10. T F To fly a selected course (radial) *to* a VOR station, the omnibearing selector should be set to the reciprocal of the radial selected.

11. T F To fly a selected course (radial) away *from* a VOR station, the omnibearing selector should be set to the radial selected.

12. T F An ADF receiver cannot be tuned to a commercial broadcast station.

13. T F An omnibearing selector can only be set to 180 different courses.

14. T F "Mayday" is an emergency voice call.

15. T F In situations where a pilot thinks he is lost, the best procedure is to alter course immediately.

16. T F The course given to the pilot from a DF station is the "TRUE" course to the station.

17. T F A triangular course, with both the radio transmitter and receiver inoperative, should be flown to the left.

18. T F One of the most important things to remember in a lost situation is to confess your predicament to a ground station.

SECTION X. FLIGHT PLANNING

Chapter 30. Preflight Planning

Exercise 70. ***Terms***

The following terms are important in this chapter. Write the letter corresponding to the correct definition or description in the space beside the term.

1. ____ Alternate course of action
2. ____ Necessary preflight planning materials
3. ____ Course line
4. ____ Check points
5. ____ ADIZ
6. ____ TWEBS
7. ____ 3,000 feet
8. ____ Airport/Facility Directory
9. ____ NOTAMS
10. ____ Airplane Flight Manual
11. ____ Permanent aircraft record
12. ____ FSS and Weather Bureau Telephone Numbers
13. ____ Sectional Chart Distance Scale
14. ____ VFR flight plan
15. ____ Arrival report

a. Shows the most current airplane empty weight and C. G.

b. Contains information that will assist search and rescue operations in the event of an emergency. (Use is recommended for all cross-country flights.)

c. Printed on the bottom of a Sectional Chart and should be used to measure distances on the chart.

d. Air Defense Identification Zone.

e. Sectional Charts, *Airman's Information Manual,* computer, plotter, and appropriate special equipment.

f. Closing the flight plan by notifying the FSS. DO NOT FORGET.

g. Line between airports or turning points to be drawn on the Sectional Chart or Charts.

h. Tune receiver to a Low/Medium frequency "H" radio beacon for continuous transcribed weather broadcasts.

i. A procedure to be followed if a flight cannot be completed as planned.

j. Locations shown on an aeronautical chart which should be easily recognizable from the air.

k. A separate section of the *Airman's Information Manual* which includes numbers for aviation weather information only.

l. Shows proper procedure for loading the airplane fuel, passengers and baggage.

m. Issued every 14 days. Carry information on hazardous conditions or changes that have been made since issuance of the Airport/Facility Directory.

n. Shows airport location, elevation, runway and lighting facilities, UNICOM availability, fuel types, and other information on facilities available at an airport.

o. The elevation (above terrain) at or above which an airplane must conform to an established cruising altitude.

Exercise 71. ***Interpretation***

Based on the narrative information that follows, fill out completely the Flight Plan on page 69.

This VFR flight will originate at the Wichita Falls Air Terminal and terminate at the Terrell Airport, Terrell, Texas. The planned takeoff time is 0830 CST. The airplane will be flown at a true airspeed of 127 mph and an altitude of 5,500 feet which will result in a groundspeed of 135 mph. The route of flight will be from Wichita Falls to the Dallas VORTAC (DAL) via Victor Airway 15 West and thence direct to Terrell for a distance of 155 statute miles. The airplane will be a blue and gold "JOHNSTAR" based at Wichita Falls with an identification number of 2708B and will have three passengers aboard, in addition to yourself, the pilot, a resident of Wichita Falls. The fuel tanks will contain 37 gallons of usable fuel;fuel consumption rate will be 8.2 gph. Five minutes should be added to the computed cruising time for total time enroute. You will close your flight plan with the Dallas FSS.

FEDERAL AVIATION AGENCY

FLIGHT PLAN

Form Approved.
Budget Bureau No. 04-R072.3

	1. TYPE OF FLIGHT PLAN: ☐ FVFR ☐ VFR ☐ IFR ☐ DVFR	2. AIRCRAFT IDENTIFICATION				
3. AIRCRAFT TYPE/SPECIAL EQUIPMENT 1/	4. TRUE AIRSPEED KNOTS	5. POINT OF DEPARTURE	6. DEPARTURE TIME PROPOSED (Z)	6. DEPARTURE TIME ACTUAL (Z)	7. INITIAL CRUISING ALTITUDE	
8. ROUTE OF FLIGHT						
9. DESTINATION *(Name of airport and city)*	10. REMARKS					
11. ESTIMATED TIME EN ROUTE HOURS / MINUTES	12. FUEL ON BOARD HOURS / MINUTES	13. ALTERNATE AIRPORT(S)	14. PILOT'S NAME			
15. PILOT'S ADDRESS AND TELEPHONE NO. OR AIRCRAFT HOME BASE	16. NO. OF PERSONS ABOARD	17. COLOR OF AIRCRAFT	18. FLIGHT WATCH STATIONS			

CLOSE FLIGHT PLAN UPON ARRIVAL

1/ SPECIAL EQUIPMENT SUFFIX
A — DME & 4096 Code transponder
B — DME & 64 Code transponder
D — DME
L — DME & transponder—no code
T — 64 Code transponder
U — 4096 Code transponder
X — Transponder—no code

FAA Form 7233—1 (4-66) FORMERLY FAA 398

0052-027-8000

ANSWERS TO EXERCISES

Exercise 1

1. h
2. m
3. c
4. o
5. a
6. j
7. e
8. b
9. l
10. f
11. g
12. k
13. n
14. d
15. i

Exercise 2

1. D
2. B
3. A
4. C
5. D
6. C
7. A
8. B
9. B
10. C
11. A
12. A
13. B
14. C

Exercise 3

1. ailerons
2. lateral axis
3. elevators
4. vertical axis
5. longitudinal axis
6. trim tab
7. yaw
8. Pitch
9. rudder
10. roll

Exercise 4

1. C
2. D
3. A
4. E
5. G
6. B
7. F

Exercise 5

1. 1.1
2. 1.3
3. 2.0
4. 5.8
5. 52
6. 54
7. 59
8. 73

Exercise 6

1. load factor
2. maximum permissible load factor
3. effective weight
4. 2
5. severe vertical gusts
6. lifting capacity
7. maneuvering

Exercise 7

1. upper
2. attack
3. weight
4. increases
5. incidence
6. lateral
7. high
8. yawing
9. elevators
10. elevators

Exercise 8

1. weather
2. pilot
3. hour
4. four times
5. pilot

Exercise 9

1. e
2. b
3. f
4. a
5. d
6. c
7. g

Exercise 10

1. temperature
2. 29.92
3. sea level
4. bad
5. decreases
6. density
7. decreases
8. temperature
9. 1,013.2
10. 332, 862, 645

Exercise 11

1. i
2. b
3. l
4. j
5. a
6. k
7. m
8. h
9. d
10. c
11. e
12. g
13. f

Exercise 12

1. temperature
2. relative humidity
3. temperature, dewpoint
4. condense
5. 5½
6. heated, up, body, air
7. fog
8. 68, 14, 86, –1, 39, 9
9. expands
10. decreases
11. decreases
12. hot, humid

Exercise 13

1. condensation
2. precipitation
3. Frost
4. fog
5. cumulus
6. Stratus
7. altostratus
8. cirrus
9. cumulonimbus
10. squall lines
11. maneuvering speed
12. anvil shape
13. scattered
14. ceiling
15. broken
16. overcast
17. Visibility

Exercise 14

1. air masses, air masses
2. front
3. warm front, cold front, stationary front
4. occluded front
5. cold front
6. high
7. squall line
8. unstable
9. wind shift
10. warm front
11. Weather Depiction Chart

Exercise 15

1. warm
2. cold
3. warm
4. warm
5. cold
6. warm
7. cold
8. cold
9. cold
10. warm

Exercise 16

1. SIGMET
2. Aviation Weather Reports
3. Winds Aloft Forecasts
4. Area Forecasts
5. AIRMET
6. Terminal Forecasts

Exercise 17

1. measured ceiling 1,000 feet broken; overcast at 2,500 feet
2. 3 miles
3. light rain
4. fog
5. 998.6 millibars
6. 72
7. 50
8. 180° at 25 knots, Gusts to 33 knots
9. 29.88 inches
10. ceiling lower to the south

Exercise 18

1. T
2. F
3. T
4. T
5. T
6. F
7. F
8. T
9. T
10. F
11. F
12. T
13. T
14. F
15. T

Exercise 19

1. d
2. c
3. a
4. b

Exercise 20

1. S
2. W
3. A
4. L
5. A
6. A
7. L
8. L
9. All
10. L
11. S
12. S
13. S
14. W
15. W

Exercise 21

1. road
2. landmarks
3. brown, 1,000
4. tints
5. blue
6. magenta
7. call sign
8. hard surfaced
9. flashing lights
10. sea level, top

Exercise 22

1. 20°E
2. 15°E
3. 10°E
4. 5°E
5. 5°W
6. 10°W
7. 15°W
8. 20°W

Exercise 23

1. c
2. m
3. p
4. n
5. r
6. b
7. i
8. h
9. a
10. o
11. e
12. k
13. l
14. d
15. q
16. g
17. f
18. j

Exercise 24

1. 150° 152°
2. 324° 322°
3. 050° 047°
4. 244° 244°
5. 359° 001°
6. 163° 165°
7. 078° 075°
8. 178° 181°

Exercise 25

1. track
2. drift angle
3. wind correction angle
4. airspeed
5. groundspeed

Exercise 26

2. 176
3. 369
4. 578
5. 2:54
6. :12
7. 3:00
8. 164
9. 160
10. 200
12. 46
13. 53
14. 39
15. 100
17. 27.2
18. 20
19. 12
20. 12.5
21. 2:36, 31

Exercise 27

1. 60° 50
2. 93° 86
3. 341° 78
4. 228° 96
5. 267°/265° 192

Exercise 28

1. 60°, 10°R, 70°, 129, 50, :23
2. 93°, 4°R, 97°, 164, 86, :32
3. 341°, 1°R, 342°, 127, 78, :37
4. 228°, 4°L, 224°, 146, 96, :40
5. 267°, 3°R, 270°, 177, 106, :36

Exercise 29

1. pilotage
2. Sectional
3. eight
4. six
5. sea level
6. latitude
7. magnetic
8. subtracted
9. track
10. airspeed

Exercise 30

TH = 096°

MH = 084°

CH = 082°

GS = 171 mph

Time = 1:43

Fuel Consumed = 20.6

Exercise 31

1. limitations
2. use
3. load
4. rough air
5. 3.8, 4.4, 6.0
6. 12
7. 100
8. before

Exercise 32

1. h
2. i
3. a
4. b
5. d
6. j
7. c
8. e
9. f
10. g

Exercise 33

1. air cooled
2. oil pressure
3. octane ratings
4. lower rating
5. mixture control
6. volume of air
7. leaning
8. Detonation
9. fuel contamination
10. transparent container
11. quick-drain valves
12. Magnetos
13. dual ignition system
14. carburetor icing
15. carburetor heat
16. fuel injection
17. "clear"
18. oil pressure gauge
19. checklist
20. manifold pressure gauge
21. tachometer
22. low propeller RPM
23. manifold pressure, RPM
24. RPM, manifold pressure

Exercise 34

1. D
2. A
3. J
4. I
5. C
6. H
7. B
8. E
9. F
10. G

Exercise 35

1. T
2. F
3. T
4. T
5. T
6. F
7. T
8. T
9. F
10. T
11. F
12. T

Exercise 36

1. C
2. E
3. G
4. B
5. D
6. A
7. F

Exercise 37

1. pitot, static
2. pressure
3. lower
4. 75
5. 500
6. pitch

Exercise 38

1. d
2. j
3. k
4. b
5. c
6. i
7. h
8. g
9. e
10. a
11. f

Exercise 39

1. E
2. D
3. H
4. G
5. A
6. B
7. F
8. C
9. a. maneuvering speed
   b. best rate of climb speed
   c. best angle of climb speed
   d. landing gear operating speed
   e. minimum control speed

Exercise 40

1. Turn and Bank Indicator
2. coordinated turn
3. skid
4. slip
5. indirect indication
6. 3° per second
7. 2-minute turn needle
8. Heading Indicator
9. 15 minutes
10. "tumble" or "spill"
11. Attitude Indicator
12. horizon bar
13. direct indication
14. straight-and-level flight

Exercise 41

1. 30, 300
2. deviation
3. lags, opposite
4. greater
5. north, south
6. east, west; north, south
7. straight, level

Exercise 42

1. Airspeed Indicator
2. Turn and Bank Indicator
3. lower
4. increase
5. Maneuvering
6. skid
7. east or west
8. 1,000

Exercise 43

1. 6,500
2. 2,500
3. 6,000
4. 5,500
5. 7,880
6. 15,500

Exercise 44

1. D
2. B
3. A
4. B
5. C
6. D

Exercise 45

1. i
2. e
3. a
4. f
5. c
6. d
7. g
8. h
9. b
10. j

Exercise 46

1. forward
2. aft
3. forward
4. aft
5. forward
6. aft
7. forward

Exercise 47

1. 15
2. 222
3. 32, over

Exercise 48

1. increase
2. increase
3. increase
4. increase
5. decrease
6. decrease

Exercise 49

2. 1800, 363
3. 2200, 328
4. 4250, 130
5. 1040, 372
6. 2760, 404

Exercise 50

2. 1040, 1777
3. 672, 1446
4. 335, 675
5. 1386, 2394

Exercise 51

2. 75, 940
3. 71, 475
4. 78, 730
5. 67, 690

Exercise 52

2. 65, 123, 8.3
3. 48, 109, 6.0
4. Not Recommended
5. 66, 130, 8.4

Exercise 53

2. 63, 1245, 760
3. 53, 732, 448
4. 63, 780, 476
5. 53, 1010, 615

Exercise 54

1. 335
2. 675
3. 75
4. 825
5. 7
6. 2,500
7. 123
8. 8.3
9. 35.5
10. 1,687
11. 53
12. 824
13. 504

Exercise 55

1. year, information
2. semiannually
3. National Airspace System
4. 1
5. communications
6. 1
7. performance rating
8. airports, communication

Exercise 56

1. Steady red
2. Flashing white
3. Steady green
4. Flashing red
5. Flashing green
6. Alternating red and green

Exercise 57

1. Airport Advisories
2. flashing amber light
3. rotating beacon
4. 122.8 MHz
5. magnetic
6. channel
7. ATIS
8. Hyperventilation
9. flashing lights
10. Oil Burner routes
11. VOR
12. 121.9 MHz
13. line-of-sight
14. FSS

Exercise 58

1. e
2. h
3. a
4. c
5. b
6. f
7. d
8. j
9. g
10. i

Exercise 59

1. 122.8 MHz
2. 113.7 MHz
3. displaced 900′ north
4. Power line in Runway 19 approach
5. 1, hard, 2,600 feet
6. 652, 80/87, 100/130
7. right, 1,137
8. rotating beacon, medium intensity runway
9. Yes, 80/87, 100/130
10. No
11. 14-32, 3,500 feet
12. storage, major airframe, major powerplant repairs
13. 120.1 MHz, 121.9 MHz
14. 287 KHz
15. 117.0 MHz.
16. 13R, 31R, 18, 36
17. southwest, 120.5 MHz 121.8 MHz, 124.5 MHz
18. right
19. 123.6 MHz, 121.5 MHz
20. FL2-8491, FL7-4343

Exercise 60

2. 1:36
3. 3:46
4. 1:50
5. 3:52
6. 1:40
7. 345
8. 590
9. 119
10. 165
12. 6:58
13. 5:36
14. 5:00
15. 3:45
17. 30
18. 41
19. 22
20. 29.6
22. 176
23. 139
24. 161
25. 152
27. 26
28. 57.5
29. 27.6
30. 39

Exercise 61

2. 101°, 105°, 104°, 128

3. 106°, 118°, 118°, 151

4. 352°, 001°, 003°, 122

5. 122°, 105°, 104°, 114

Exercise 62

1. PIREP

2. Scheduled Weather Broadcasts

3. AIRMETS

4. Aviation Weather

5. In-flight service

6. 150 mile radius

Exercise 63

1. e
2. f
3. c
4. b
5. d
6. h
7. g
8. a

Exercise 64

45

80

100

140

Exercise 65

1. f
2. c
3. b
4. g
5. h
6. e
7. d
8. a

Exercise 66

1. omnirange, VOR
2. VORTAC
3. radials
4. magnetic, from
5. line-of-sight
6. three, code
7. omnibearing selector
8. To-From
9. Left-Right
10. identified, To-From
11. 180, centered, To
12. radial, centered, From
13. broadcast station
14. homing

Exercise 67

1. d
2. e
3. b
4. g
5. h
6. a
7. f
8. c

Exercise 68

1. mayday
2. VHF/DF station
3. HOMER
4. alter
5. magnetic
6. triangular pattern
7. left
8. right
9. Confess
10. Communicate
11. Climb
12. Comply

Exercise 69

1. F
2. T
3. F
4. F
5. T
6. T
7. T
8. F
9. T
10. T
11. T
12. F
13. F
14. T
15. F
16. F
17. T
18. T

Exercise 70

1. i
2. e
3. g
4. j
5. d
6. h
7. o
8. n
9. m
10. l
11. a
12. k
13. c
14. b
15. f

Exercise 71

1. VFR
2. 2708B
3. Johnstar
4. 110
5. Wichita Falls Air Terminal
6. 1430
7. 5,500
8. via V15 W DAL/ direct Terrell
9. Terrell Airport, Terrell, Texas
10. Will close Flight Plan with Dallas FSS
11. 1:14
12. 4:30
13. – – – –
14. Yourself
15. Wichita Falls, Texas
16. 4
17. Blue and Gold
18. – – – –

ADDITIONAL STUDY MATERIALS

Required

In addition to the *Pilot's Handbook of Aeronautical Knowledge*, portions of the Private Pilot Written Test are also drawn from *Federal Aviation Regulations* and *National Transportation Safety Board Investigation Regulations.* Applicants for the Private Pilot certificate must demonstrate a knowledge of those Regulations applicable to his certificate.

Federal Aviation Regulations

Part 1—Definitions and Abbreviations. A listing of definitions and abbreviations applicable to all Federal Aviation Regulations.

Part 61—Certification: Pilots and Flight Instructors. Contains the requirements and procedures for pilot certification and the privileges and limitations of the various certificates.

Part 91—General Operating and Flight Rules. The applicant must demonstrate a thorough knowledge of this Regulation with the exception of that portion which pertains to Instrument Flight Rules.

The applicant is responsible for knowing applicable portions of Parts 61 and 91, which in turn will require a knowledge of some portions of Parts 1 and 71.

The regulations are published by FAA in Volumes containing related FAR Parts. As amendments are issued, they will be furnished as page revisions to the pertinent Parts by numbered transmittal sheets.

The applicable volume structure is:

Volume	*FAR Part*	*Price*
I	1	$1.50 (Foreign mailing—50 cents additional.)
VI	91, 93, 99, 101, 103, 105.	$5.00 (Foreign mailing—$1.25 additional.)
IX	61, 63, 65, 67, 141, 143, 147.	$6.00 (Foreign mailing—$1.50 additional.)
XI	71, 73, 75, 77, 95, 97, 157, 169, 171.	$2.75 (Foreign mailing—75 cents additional.)

National Transportation Safety Board Procedural Regulation, Part 430. Prescribes the procedures and requirements pertaining to aircraft accidents and certain other incidents involving aircraft. May be obtained free of charge from NTSB Publication Branch, NE 55, 800 Independence Ave., S.W., Washington, D.C., 20591.

Optional

Airman's Information Manual (AIM) ($29.50). An FAA publication developed as a pilot's operational manual presenting information necessary for the planning and conduct of a flight in the National Airspace system. (Excerpts of this manual are presented on pages 49 through 56 of this study guide.)

AIM is divided into four basic parts, each of which may be purchased separately.

Part I, Basic Flight Manual and ATC Procedures ($4.00).

Part 2, Airport Directory ($4.00).

Part 3, Operational Data and Notices to Airmen;

Part 3-A, Notices to Airmen ($20.00).

Part 4, Graphic Notices and Supplemental Data ($1.50).

Aviation Weather ($4.00). A detailed study of weather phenomena from the viewpoint of the pilot.

VFR Pilot Exam-O-Grams

Exam-O-Grams are brief, timely, and graphic articles developed and published as an information service for individuals interested in Operations Airman Written Tests. They serve to:

a. Clarify subjects critical to aviation safety that are not widely known, or are commonly misunderstood, as revealed by analysis of accidents, incidents, and violations, and of incorrect answers on Operations Airman Written Tests.

b. Supply training information in aeronautical knowledge areas in which gaps exist.

c. Disseminate new information to the aviation community.

HOW TO OBTAIN STUDY MATERIALS

VFR Exam-O-Grams and IFR Exam-O-Grams are nondirective in nature, and are issued solely as an information service to individuals interested in Airman Written Tests. They are available *free of charge* (single copy only per request) by ordering from:

Department of Transportation
FAA Aeronautical Center
Flight Standards Technical Division
Operations Branch, AC-240
P.O. Box 25082
Oklahoma City, Oklahoma 73125

(Indicate in your request if you wish to be placed on the mailing list for future issues.)

HOW TO GET GPO PUBLICATIONS PROMPTLY

(1) Use an order form, not a letter, unless absolutely necessary. Order forms, *which may be duplicated by the user,* are included in the catalog "FAA Publications," sent free upon request from:

Distribution Unit, TAD 484.3
Department of Transportation
Washington, D. C. 20590

(2) Send separate orders for a subscription and a non-subscription item.
(3) Give the exact name of the publication and the agency number.
(4) Send a money order or check, not cash. Send the exact amount.
(5) Enclose a self-addressed mailing label if you have no order blank.
(6) Use special delivery when needed.
(7) Use GPO bookstores — they give priority mail order service.

The retail GPO bookstores now in being are located at the following addresses:

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219 South Dearborn Street
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450 Golden Gate Avenue
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Dallas, Texas 75202

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300 North Los Angeles Street
Los Angeles, California 90012

GPO Bookstore, USIA
First Floor, USIA Building
1776 Pennsylvania Avenue, N.W.
Washington, D.C. 20547

There are many excellent commercially prepared textbooks, audio-visual training aids, and programmed instruction courses, which may be helpful in preparation for the written test.

THE PRIVATE PILOT WRITTEN TEST

Nature of the Written Test

The Private Pilot Written Test is based on a typical cross-country flight. Its approach is realistic in that the test items concern activities relating to a successfully planned and executed cross-country flight – prelight planning, starting, taxiing, takeoff and climb to altitude, radio communications, enroute navigation procedures, descent, landing, and post-flight procedures.

Great emphasis is given to systematic and thorough preflight planning. The pilot employs all pertinent flight information in planning his trip, and then applies his knowledge of air traffic rules, weather, navigation, radio, and operation of aircraft and engines, insofar as it contributes to safe efficient flight.

Type of Test Items

The written test contains only test items of the objective multiple-choice type as illustrated by the sample test in this Guide. Test items can be answered by marking the appropriate space on a special answer sheet with a scoring pencil furnished with the test. This method conserves the applicant's time, eliminates any element of individual judgment in determining grades, and saves time in scoring.

Taking the Written Test

The equipment the applicant should have for taking the test (although not mandatory) is as follows:

1. An 18 inch or longer ruler or straight edge.
2. A navigation plotter or protractor.
3. A flight computer.

Scratch paper and a special scoring pencil will be furnished with the test.

The applicant is allowed adequate time for taking the Private Pilot (Airplane) Written Test, so do not rush. Hurrying through the test will only increase the probability of mistakes.

Keep in mind the following points when taking the test:

1. There are no "trick" items in the test. Each statement means exactly what it says and no more. Do not look for hidden meanings. The statements or questions do not concern exceptions to the rule; they refer to the general rule.

2. Always read the statement or question first – before you look at the alternate responses listed below it. Be sure you read the entire stem (initial statement or question of the test item) carefully, and understand its intent. Avoid "skimming" and hasty assumptions. This can lead to a completely erroneous approach to the test item or a failure to consider vital words.

3. Work out your own answer before choosing from the list of alternate responses the one which you consider to be the best. Remember that only one of the alternate answers or responses is completely correct. Others may be correct as far as they go, but are not complete or are answers based on erroneous assumptions, misconceptions, or incorrect procedures and interpretations.

4. Do not spend too much time on a test item which you cannot solve or on one where you have considerable doubt as to the correct response. By doing so you may deprive yourself of the opportunity to respond to all those test items which you can promptly solve or answer. You may always go back to the test items which you have skipped after you have finished those which you can readily answer. You might have completed 5 or 10 test items during the time you deliberate over one that you are not sure of.

5. In solving problems which require computations or the use of a computer or plotter, select the response which is nearest the result you get. Due to slight differences in individual computers and the small errorrs you may make in determining distances, courses, etc., it is possible that you will not get an exact agreement every time. However, sufficient spread is provided between the correct and incorrect responses so that the correct choice should be evident, provided you have used correct technique and reasonable care in making your computations. (Note: When the test is constructed, problems involving measurements and computations are double-checked by several types of plotters and computers. Any of the several types which are in common use should prove satisfactory.)

6. Test items which involve regulations should be considered on the basis of the current regulation at the time you take the test. In the event there are no correct responses (test not yet revised to reflect a recent change in regulations), you will automatically be given credit for the test item.

Sample Written Test

General Instructions for the Sample Written Test

The test items in the sample test are presented for one purpose – to familiarize you with the nature of the FAA Written Tests. Although the sample test is longer than the present FAA Private Pilot (Airplane) Written Test, the ability to answer these sample test items *does not* indicate that you are fully prepared to take the current test.

You should concentrate on the material covered in the workbook section of this guide, plus the pertinent Regulations. A thorough knowledge of all of the topics covered in the workbook – not just the mastery of the sample test items – should be your criterion for determining that you are properly prepared for the test. Proper preparation requires considerable time and effort and should be under the guidance of a competent instructor.

Correct answers to the sample test items, along with explanations or references for the answers, are presented at the end of the sample test.

Supplementary information used for the sample test includes some of the charts and illustrations in the workbook section; the Area Weather Reports and Forecasts (including key), the hypothetical airplane description on page 89; and the Dallas-Ft. Worth Sectional Chart supplied with this guide. Appropriate references will be made to the supplementary material when it is necessary for the solution of a test item. (Note: The reader should bear in mind that the sample test items pertaining to Federal Aviation Regulations are based on regulations in effect on June 1, 1971.)

PROPOSED CROSS-COUNTRY FLIGHT

You are a private pilot living in Lubbock, Texas. Since you have business appointments scheduled for the same day in Wichita Falls, Texas, and Grand Prairie, Texas, you decide to rent an airplane from a local flying service for the trip. You are to take three business associates with you and plan to make a passenger stop to leave one at Mineral Wells, Texas, enroute from Wichita Falls to Grand Prairie.

You realize the importance of careful flight planning and make sure that you have the latest Dallas-Ft. Worth Sectional Chart and *Airman's Information Manual.* You plan to file VFR flight plans for each flight.

The airplane you are assumed to be flying (herein designated as the Johnstar) is a single-engine, four-place airplane. It features a fixed, tricycle landing gear, four-position wing flaps, and a complete panel of flight instruments including Attitude Indicator (gyro-horizon) and a Heading Indicator (directional gyro).

You will construct your route as follows:

LEG I

Lubbock Regional Airport (formerly West Texas Air Terminal) to Kickapoo Airport, Wichita Falls via Guthrie VOR

LEG II

Kickapoo Airport direct to Mineral Wells Airport

LEG III

Mineral Wells Airport direct to Greater Southwest International Airport (Dallas/Ft. Worth)

The places named can be located by referring to the following latitude and longitude coordinates:

	Latitude North	Longitude West
Lubbock Regional Airport	33°40′	101°49′
Guthrie VOR	33°46′	100°20′
Kickapoo Airport, Wichita Falls	33°52′	98°29′
Mineral Wells Airport	32°47′	98°04′
Greater Southwest Intl. Airport, Dallas, Ft. Worth	32°50′	97°03′

NOTE: Compute all distances on the statute mile scale at the bottom of the chart. When airports are involved, the center of the airport symbol should be used as a measuring point.

Your preflight activities include:

1. A study of pertinent information in the *Airman's Information Manual.*
2. A review of the Airplane Flight Manual and Owner's Handbook.
3. A review of your map to familiarize yourself with the route topography, with particular emphasis on terrain and obstruction elevations.
4. A utilization of all available weather information; Weather Bureau or FSS briefings (in person or by phone), posted weather reports and forecasts, scheduled weather broadcasts, etc.
5. A check for pertinent NOTAMS other than those listed in AIM. (Flight Service Stations have the latest NOTAMS.)
6. A review of VOR checkpoints.
7. Filing of Flight Plan.
8. Preflight check of the Airplane.

The next pages are supplemental information to be used with the sample examination. GO NOW TO PAGE 97 FOR THE FIRST TEST ITEM.

JOHN AVIATION COMPANY
NORMAL, OKLAHOMA
FAA IDENTIFICATION NO. N2708B JOHN JR-9 (JOHNSTAR)
NORMAL AND UTILITY CATEGORIES

AIRPLANE FLIGHT MANUAL

1. LIMITATIONS

THE FOLLOWING LIMITATIONS MUST BE OBSERVED IN THE OPERATION OF THIS AIRPLANE:

MANEUVERS—NORMAL CATEGORY

GROSS WEIGHT—2,200 lbs.

FLIGHT LOAD FACTOR, FLAPS UP— +3.8 −1.52

FLIGHT LOAD FACTOR, FLAPS DOWN— +3.5

ENGINE LIMITS: 145 BHP AT 2700 RPM

AIRSPEED LIMITS (CAS - CALIBRATED AIRSPEED IS INDICATED AIRSPEED CORRECTED FOR SYSTEM AND INSTRUMENT ERROR.)

	CAS
MAXIMUM—NEVER EXCEED	— AS MARKED ON AIRSPEED INDICATOR.
CAUTION RANGE	— AS MARKED ON AIRSPEED INDICATOR.
NORMAL OPERATING RANGE	— AS MARKED ON AIRSPEED INDICATOR.
FLAP OPERATING RANGE	— AS MARKED ON AIRSPEED INDICATOR.
MANEUVERING SPEED	— 113 MPH

(NOTE: CAS IS USED FOR ALL AIRSPEED INDICATOR MARKINGS)

MAXIMUM ALLOWABLE GROSS WEIGHT: 2,200 POUNDS

EMPTY WEIGHT: 1,290 POUNDS

2. SPECIFICATIONS

FUEL: 80/87 OCTANE, TWO 21-GALLON WING TANKS WITH 18.5 GALLONS USABLE IN EACH TANK.

OIL: 2 GALLONS SAE 40 ABOVE 50°, SAE 20 BELOW 50°.

THE AIRPLANE IS TO BE FLOWN IN ACCORDANCE WITH THE FAA APPROVED AIRPLANE FLIGHT MANUAL WHICH MUST BE KEPT IN THE AIRPLANE.

RADIO EQUIPMENT

THE AIRCRAFT IS EQUIPPED WITH:

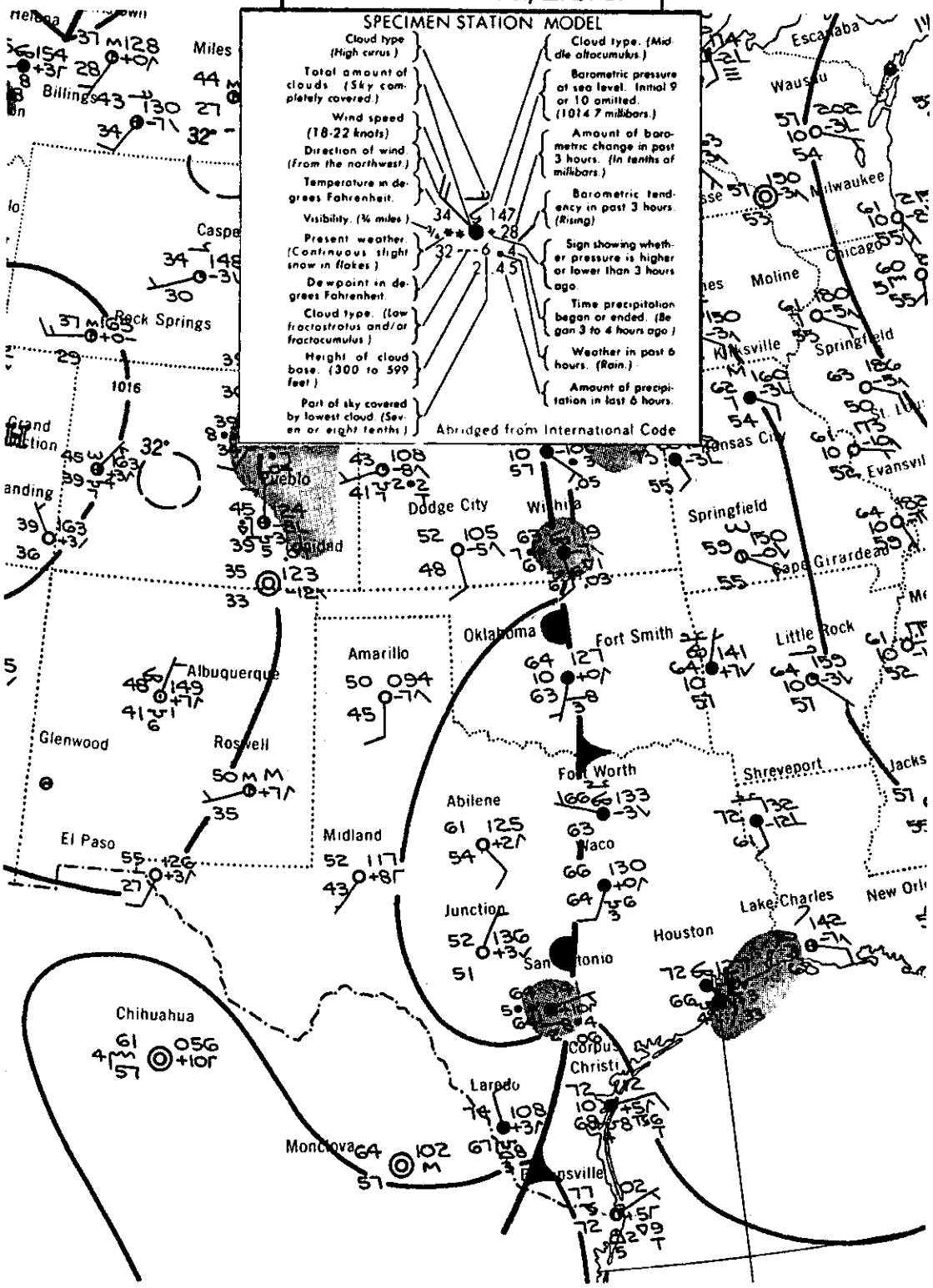
1. A COMMVOR MODEL D TRANSCEIVER MANUFACTURED BY THE SLOAN RADIO CORPORATION, COMBINING COMMUNICATION AND NAVIGATION (OMNI) FUNCTIONS IN ONE UNIT.

FREQUENCIES

TRANSMITTER		RECEIVER
118.3 MHz	122.5 MHz	108.1 MHz TO 126.8 MHz
119.9 MHz	122.6 MHz	
121.5 MHz	122.7 MHz	
121.7 MHz	122.8 MHz	
121.9 MHz	123.0 MHz	
122.1 MHz	123.6 MHz	

2. A POINTRITE ADF FREQUENCIES — (200 TO 1750 KHz)

SURFACE WEATHER MAP AND STATION WEATHER AT 1:00 A. M., E. S. T.



Plain Language Interpretation of the Area Forecast
For the Period 7 A.M. to 7 P.M., CST
For northwestern, northcentral, and northeastern Texas and Oklahoma

CLOUDS AND WEATHER: The stationary front which was located along the Oklahoma City – San Antonio line at midnight is now moving eastward as a weak cold front. Thunderstorms will occur along and ahead of the front and move eastward with the front. In the early forenoon, thunderstorms and rain showers will be located generally along a line from Oklahoma City to Fort Worth to Waco. By mid-afternoon, the area of thunderstorms should have moved to the extreme eastern portion of the area. Ceilings in the thunderstorm areas may be as low as 500 feet, with visibilities of ½ to 1 mile due to rain and fog. Following frontal passage, ceilings should be generally unlimited and visibilities good. Ahead of the frontal system, surface winds should be southeasterly and gusty, to 25 knots. Behind the front, winds should be westerly to northwesterly, except southerly along the Texas – Oklahoma Border, at approximately 10 to 15 knots.

ICING: There will be locally moderate icing in clouds above the freezing level. The freezing level will be 13,000 to 15,000 feet.

TURBULENCE: Turbulence will be moderate to severe in the vicinity of thunderstorms. Behind the front turbulence should be light.

OUTLOOK: For the period 7 P.M. today until 7 A.M. tomorrow, the front will continue to move eastward and will be beyond this area by midnight.

Station Designers

LBB – Lubbock

ABI – Abilene

MWL – Mineral Wells

FTW – Fort Worth

GSW – Greater Southwest International Airport

SPS – Wichita Falls

KEY TO AVIATION WEATHER REPORTS.....

LOCATION IDENTIFIER AND TYPE OF REPORT*	SKY AND CEILING	VISIBILITY WEATHER AND OBSTRUCTION TO VISION	SEA-LEVEL PRESSURE	TEMPERATURE AND DEW POINT	WIND	ALTIMETER SETTING	RUNWAY VISUAL RANGE	CODED PIREPS
MKC	15⊕M25⊕	1R-K	132	/58/56	/18Ø7	/993/	RØ4LVR2ØV4Ø	/⊕55

SKY AND CEILING

Sky cover symbols are in ascending order. Figures preceding symbols are heights in hundreds of feet above station.

Sky cover symbols are:

- ○ Clear: Less than 0.1 sky cover
- ◐ Scattered: 0.1 to less than 0.6 sky cover.
- ◑ Broken: 0.6 to 0.9 sky cover.
- ⊕ Overcast: More than 0.9 sky cover.
- — Thin (When prefixed to the above symbols.)
- –X Partial obscuration: 0.1 to less than 1.0 sky hidden by precipitation or obstruction to vision (bases at surface.)
- X Obscuration: 1.0 sky hidden by precipitation or obstruction to vision (bases at surface)

Letter preceding height of layer identifies ceiling layer and indicates how ceiling height was obtained. Thus:

A	Aircraft	R	Radar.
B	Balloon	W	Indefinite
E	Estimated	"V"	Immediately following numerical value indicates a varying ceiling.
M	Measured		

VISIBILITY

Reported in Statute Miles and Fraction.. (V-Variable)

WEATHER AND OBSTRUCTION TO VISION SYMBOLS

A	Hail	IC	Ice Crystals	RW	Rain Showers
BD	Blowing Dust	IF	Ice Fog	S	Snow
BN	Blowing Sand	IP	Ice Pellets	SG	Snow Grains
BS	Blowing Snow	IPW	Ice Pellet Showers	SP	Snow Pellets
D	Dust	K	Smoke	SW	Snow Showers
F	Fog	L	Drizzle	T	Thunderstorm
GF	Ground Fog	R	Rain	T+	Severe Thunderstorm
H	Haze			ZL	Freezing Drizzle
				ZR	Freezing Rain

Precipitation intensities are indicated thus:
-- Very Light; -Light; (no sign) Moderate; + Heavy

WIND

Direction in tens of degrees from true north, speed in knots. 0000 indicates calm. G indicates gusty. Peak speed follows G or Q when gusts or squalls are reported. The contraction WSHFT followed by local time group in remarks indicates windshift and its time of occurrence. (Knots X 1.15=statute mi/hr.)

EXAMPLES: 3627 360 Degrees, 27 Knots;
3627G40 360 Degrees, 27 Knots Peak speed in gusts 40 knots.

ALTIMETER SETTING

The first figure of the actual altimeter setting is always omitted from the report.

RUNWAY VISUAL RANGE (RVR)

RVR is reported from some stations. Extreme values for 10 minutes prior to observation are given in hundreds of feet. Runway identification precedes RVR report.

CODED PIREPS

Pilot reports of clouds not visible from ground are coded with MSL height data preceding and/or following sky cover symbol to indicate cloud bases and/or tops respectively.

DECODED REPORT

Kansas City: Record observation, 1500 feet scattered clouds, measured ceiling 2500 feet overcast, visibility 1 mile, light rain, smoke, sea level pressure 1013.2 millibars, temperature 58°F, dewpoint 56°F, wind 180°, 7 knots, altimeter setting 29.93 inches, Runway 04 left, visual range 2000 ft. variable to 4000. Pilot reports top of overcast 5500 feet. (MSL).

*TYPE OF REPORT

The omission of type-of-report data identifies a scheduled record observation for the hour specified in the sequence heading; the time of an out-of-sequence, special observation is given as "S" followed by a time group (24-hour clock GMT) e.g., "PIT S 0715-XM..." A special indicates a significant change in one or more elements. Local reports are identified by "LCL" and a time group. Locals are transmitted on local teletypewriter circuits only.

TERMINAL FORECASTS contain information for specific airports on ceiling, cloud heights, cloud amounts, visibility, weather condition and surface wind. They are written in a form similar to the AVIATION WEATHER REPORT.

CEILING: Identified by the letter "C"
CLOUD HEIGHTS: In hundreds of feet above the station (ground)
CLOUD LAYERS: Stated in ascending order of height
VISIBILITY: In statute miles, but omitted if over 8 miles
SURFACE WIND: In tens of degrees and knots; omitted when less than 10.

EXAMPLE OF TERMINAL FORECASTS

C15◑	Ceiling 1500', broken clouds	○11/2GF	Clear, visibility one and one-half miles, ground fog.
20◐C70⊕6K 3230G	Scattered clouds at 2000', ceiling 7000' overcast, visibility 6 miles, smoke, surface wind 320 degrees 30 knots, gusty.	C5X1/4S+	Sky obscured, vertical visibility 500 ft. visibility one-fourth mile, heavy snow.

AREA FORECASTS are 12-hour forecasts plus 12-hour OUTLOOKS (18 hour outlook in FA valid at 1300Z) of cloud, weather and frontal conditions for an area the size of several states. Heights of cloud tops, icing, and turbulence are ABOVE SEA LEVEL (ASL); ceiling heights, ABOVE GROUND LEVEL (AGL); bases of cloud layers are ASL unless indicated. Area Forecasts are amended by SIGMET's or AIRMET's.

SIGMET or AIRMET warn airmen in flight of potentially hazardous weather such as squall lines, thunderstorms, fog, icing, and turbulence. SIGMET concerns severe and extreme conditions of importance to all aircraft. AIRMET concerns less severe conditions which may be hazardous to some aircraft or to relatively inexperienced pilots. Both are broadcast by FAA on NAVAID voice channels.

WINDS AND TEMPERATURES ALOFT (FD) FORECASTS are computer prepared forecasts of wind direction (nearest 10° true N) and speed (knots) for selected flight levels. Temperatures aloft (°C) are included for all levels (≥2500 ft. above station elevation) except the 3000-foot level.

EXAMPLES OF WINDS AND TEMPERATURES ALOFT (FD) FORECASTS:

FD WBC 121745
BASED ON 121200Z DATA
VALID 130000Z FOR USE 1800-0300Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
BOS	3127	3425-07	3420-11	3421-16	3516-27	3512-38	311649	292451	283451
JFK	3026	3327-08	3324-12	3322-16	3120-27	2923-38	284248	285150	285749

At 6000 feet ASL over JFK wind from 330° at 27 knots and temperature minus 8° C.

PILOTS report in-flight weather to nearest FSS

Terminal Forecasts

Period 0500C–1700C (5 A.M.–5 P.M. CST)

```
FT1 181045
11Z-23Z MON

LBB 5ØØ7. 0800C O 2710
ABI C35ØØ6ØØ7 2415. 1000C 8ØØ 2612
GSW 1ØØ2TRW 1320G25 VRBL 1620G25. 1100C FROPA 4ØØC8ØØ7 OCNL R--
2710G15. 1300C 9ØØ 3010G15.
```

Aviation Weather Reports

(Teletype Sequence Reports)

0700C

```
Ø29 SA29181300  CIRCUIT 8029, 18TH DAY OF MONTH, 1300 GREENWICH
                TIME (Z) OR 0700 CENTRAL STANDARD TIME (C)
LBB 6ØØ7 129/54/46/2508/997
ABI E8ØØ15 133/59/52/3404/997
MWL S E5Ø1TRWF 128/64/63/3212G18/993/TB06 OVHD MOVG EWD LTGIC
ALQDS
FTW M13Ø35Ø1Ø 127/7Ø/68/1212G18/991/ØVØ
GSW M11Ø7 127/71/66/1315G24/993/RB27 RE43
Ø3Ø (CIRCUIT 8030)
SPS 8ØØ/-Ø15+ 132/81/61/1922G27
```

0800C

```
Ø29 SA29181400
LBB O15+ 132/57/42/2708/998/FEW CU SE
ABI E9ØØ15 133/61/5Ø/2908/997/CLDS DRK SE
MWL M25Ø/Ø1Ø 129/65/59/3012G18/995/TSTM SE MOVG E
FTW M2ØØ5ØØ1Ø 128/72/65/2210G16/993/RB34 RE5Ø TSTM E MOVG SE
CLDS DRK SW WSHFT 0740C
GSW M2ØØ7TRW- 127/7Ø/68/162ØG26/993/LN TSTMS SW-NE MOVG E
Ø3Ø
SPS /Ø15+ 135/8Ø/55/1715G2Ø/998
```

1300C

```
Ø29 SA29181900
LBB O25 134/61/4Ø/2710/999
ABI O15+ 134/64/46/2810/999
MWL E9ØØ15 133/66/5Ø/3508G12/998
FTW E1ØØØ15 131/68/52/2906/997
GSW O12 13Ø/69/5Ø/3110G15/996
Ø3Ø
SPS O2Ø 135/78/5Ø/1810/998
```

In-flight Weather Advisories

FL GSW 181100 (5 A.M.)
SIGMET ALFA 1. OVR N CNTRL AND NERN TEX ALG AND E OF CLD FRNT MOD TO SVR TURBC IN TSTMS WITH HAIL TO 1 INCH DIAM. TSTMS FRMG PSBLY SLD LNS.

(Interpretation of Above SIGMET)

Over north central and northeastern Texas along and east of cold front, moderate to severe turbulence can be expected in thunderstorms with hail to 1 inch in diameter. Thunderstorms forming possibly in solid lines.

FL GSW 181300 (7 A.M.)
AIRMET ALPHA 2. IMDT FLWG TO 50 MI W OF CLD FRNT IN N CNTRL TEX OCNL MOD TURBC BLO 60 DUE TO RTHR STG GUSTY SFC WNDS. LGT RN SHWRS MAY RMN BRFLY AFT FROPA.

(Interpretation of Above AIRMET—Formerly Designated ADVISORIES FOR LIGHT AIRCRAFT)

Immediately following to 50 miles west of cold front in north central Texas, occasional moderate turbulence will exist below 6,000 feet due to strong, gusty surface winds. Rain showers may remain briefly after frontal passage.

Pilot Reports

SPS PIREP 0738 GTH-SPS BLO SCTD CLDS 55 LGT TURBC.BE35

(Interpretation of SPS PIREP)

Originating station Wichita Falls. Time 7:38 A.M. CST. From Guthrie to Wichita Falls below scattered clouds at 5,500 feet MSL light turbulence reported by a Beech Bonanza.

GSW PIREP 0810 SPS-V61 GSW INCLR AT 115 TIL BPR OVC HVY RN MOD TURBC TO GSW. DC-6

(Interpretation of GSW PIREP)

Originating station Greater Southwest. Time 8:10 A.M. CST. From Wichita Falls to Greater Southwest Airport via Victor 61 Bridgeport direct Greater Southwest at 11,500 feet MSL clear until Bridgeport. Broken clouds variable to overcast for remainder of flight with heavy rain and moderate turbulence reported by a DC-6.

Winds Aloft Forecasts

0600C–1200C

FD WBC 181150 FOR USE 12ØØ-18ØØZ. TEMPS NEG ABV 24ØØØ

FT	3ØØØ	6ØØØ	9ØØØ	12ØØØ	18ØØØ	24ØØØ	3ØØØØ
LBB		28Ø5+Ø8	3112+Ø6	3312+Ø4	3513-Ø6	3517-17	351928
GSW	99ØØ	99ØØ+1Ø	36Ø5+Ø8	3312+Ø6	3316-Ø5	3312-15	332225

1200C–1800C

18-24Z

FT	3ØØØ	6ØØØ	9ØØØ	12ØØØ	18ØØØ	24ØØØ	3ØØØØ
LBB		281Ø+1Ø	3Ø1Ø+Ø8	311Ø+Ø4	3412-Ø5	3416-16	342Ø26
GSW	3498	331Ø+Ø8	3112+Ø7	3Ø12+Ø5	3Ø16-Ø5	3Ø18-15	3Ø2Ø25

("9900" is used to indicate winds of less than 5 knots. It is spoken of as "light and variable.")

SAMPLE TEST ITEMS

1. What principal advantage does the Sectional Aeronautical Chart have over the World Aeronautical Chart for the type of flight proposed in this test?

1—More radio aids to navigation are presented on the Sectional Chart.
2—The larger scale allows the use of more detail in presenting ground features.
3—The solution of dead reckoning problems is simplified.
4—A larger surface area is covered by the Sectional Chart.

2. Approximately how much greater in statute miles is the distance for Leg I than the total distance for Legs II and III?

1—55 miles.
2—44 miles.
3—36 miles.
4—66 miles.

NOTE: See page 87

3. What is the elevation of the highest obstruction within 10 statute miles of either side of your proposed route from the Guthrie VOR to Kickapoo Airport?

1—2,049 feet above ground level.
2—2,049 feet above sea level.
3—1,803 feet above sea level.
4—1,803 feet above ground level.

4. Preflight action as required by Federal Aviation Regulations for all flights away from the vicinity of an airport shall include a study of the weather, taking into consideration fuel requirements and—

1—the filing of a VFR flight plan.
2—the designation of an alternate airport.
3—an operational check of your navigational radios.
4—an alternate course of action if the flight cannot be completed as planned.

Federal Aviation Regulation Part 91 prescribes that, when an aircraft is operated VFR in level cruising flight at 3,000 feet or more above the surface, it must observe a cruising altitude appropriate to the magnetic course being flown.

---

5. Since the magnetic course on all three legs of this flight will fall between 0° and 179°, which of the following suggested cruising altitudes would be appropriate?

1—Odd thousands.
2—Even thousands.
3—Even thousands plus 500 feet.
4—Odd thousands plus 500 feet.

NOTE: Assume that you maintain a terrain clearance of at least 3,000 feet.

6. Which altimeters on page 34 indicate an altitude that would be appropriate for all three legs of this proposed cross-country?

1—1, 2, 3, 4, 5, and 6.
2—2 and 4.
3—4 and 6.
4—2, 4, and 6.

7. For VFR flight below 10,000 feet MSL in controlled airspace, the minimum flight visibility and proximity to cloud requirements are:

1—Visibility 3 miles; 500 feet under, 1,000 feet over, and 2,000 feet horizontally from the clouds.
2—Visibility 3 miles; clear of the clouds.
3—Visibility 1 mile; 500 feet under, 1,000 feet over, 2,000 feet horizontally from the clouds.
4—Visibility 1 mile; clear of the clouds.

8. Based on the information furnished you, which of the airports that you propose to use can be determined to have more than one hard-surfaced runway?

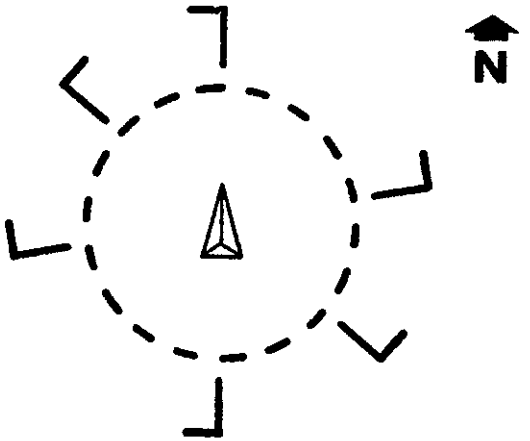
1—Lubbock, Mineral Wells, and Greater Southwest.
2—Mineral Wells and Greater Southwest only.
3—Lubbock and Greater Southwest only.
4—Greater Southwest only.

NOTE: See the Airman's Information Manual excerpts on pages 49–56.

9. Federal Aviation Regulations are specific regarding right-of-way rules. Assume that during your flight you encounter a large 4-engine military transport at your altitude. The transport is approaching from your right on an apparent collision course. Which airplane should give way, and why should it give way?

1—You should give way since it is a military airplane.
2—You should give way since your aircraft is in a different category.
3—You should give way since the military airplane is on your right.
4—The military airplane should give way since your airplane is to its left.

10. Assume your airport of intended landing displays this segmented circle.



What direction would traffic be for the northwest-southeast runway?

1—Left-hand for 13 and left-hand for 31.
2—Right-hand for 13 and right-hand for 31.
3—Left-hand for 13 and right-hand for 31.
4—Right-hand for 13 and left-hand for 31.

11. If the average groundspeed for the three legs is 123 mph and the average rate of fuel consumption is 8.6 gph, the total amount of fuel consumed (discounting that used for taxiing, takeoffs, and landings) should be approximately—

1—21 gallons.
2—25 gallons.
3—19 gallons.
4—23 gallons.

12. Which of the airports at which you propose to land should be able to supply fuel with the correct octane rating for your airplane?

1—All three of them.
2—Mineral Wells and Greater Southwest only.
3—Kickapoo and Greater Southwest only.
4—Greater Southwest only.

NOTE: See the Airplane Flight Manual excerpts, on page 89, and the AIM excerpts on pages 49–56.

13. Before beginning a cross-country flight, the pilot in command is required to familiarize himself with all available information appropriate to the intended flight. What is the most current source of airport runway information available to the pilot?

1—The WAC Chart.
2—Airman's Information Manual.
3—The front side of the Sectional Chart.
4—The back side of the Sectional Chart.

14. What is the only frequency which will allow you to receive both the VOR navigation signal and voice from Guthrie Radio?

1—122.2 MHz.
2—122.1 MHz.
3—112.4 MHz.
4—121.5 MHz.

15. What are the engine limitations that must be observed in the operation of the JOHNSTAR?

1—145 brake horsepower at 2,700 RPM.
2—135 brake horsepower at 2,750 RPM.
3—145 brake horsepower at 2,750 RPM.
4—135 brake horsepower at 2,700 RPM.

NOTE: See the Airplane Flight Manual excerpts on page 89.

16. In order to determine the amount of baggage that may be carried on this flight, you base your computations on the following known weights:

	Pounds
Airplane Empty Weight	1,290
Pilot	170
Three Passengers	
Passenger A	135
Passenger B	160
Passenger C	145
Fuel—42 gallons (5 gallons unusable and included in empty weight)	—
Oil—2 gallons (at 7.5 lbs./gal.)	—

What is the maximum allowable weight of baggage that you may carry?

1—69 pounds.
2—63 pounds.
3—33 pounds.
4—73 pounds.

NOTE: See the Airplane Flight Manual excerpts on page 89.

17. In order for an aircraft to carry passengers for hire, it must have been inspected and approved for return to service within the preceding—

1—12 calendar months and 100 hours of time in service.
2—6 calendar months.
3—100 hours of time in service.
4—12 calendar months.

18. Which of the airports at which you will be operating require a minimum ceiling of 1,000 feet and a minimum visibility of 3 miles for takeoff and landing if you do not have an air traffic control clearance?

1—Lubbock and Greater Southwest only.
2—Lubbock, Mineral Wells, and Greater Southwest.
3—Kickapoo, Mineral Wells, and Greater Southwest only.
4—All of them.

Refer to altimeter illustration "2" on page 34 for the following test item.

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19. Assume this altimeter indication appeared in an airplane as it flew over Kickapoo Airport. Assume further that the altimeter setting is correct and the instrument is indicating an accurate elevation above sea level. What height would the aircraft be above the surface of the airport?

1—250 feet.
2—2,500 feet.
3—1,515 feet.
4—500 feet.

Refer to the Airspeed Indicator on page 31 in answering test items 20 and 21.

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20. What is the power-off stalling speed (flaps up) as depicted by this Airspeed Indicator?

1—55 mph.
2—50 mph.
3—100 mph.
4—59 mph.

21. What is the maximum speed for normal operation?

1—130 mph.
2—140 mph.
3—150 mph.
4—160 mph.

22. If an airplane is in straight and level, undisturbed flight, the load factor is 1 since the wings are supporting the weight of the airplane only. The load factor is increased (greater than 1) in—

1—turns only.
2—pull-outs from dives and turns only.
3—rough (turbulent) air and turns only.
4—turns, pull-outs from dives, and rough (turbulent) air.

23. You check to determine that all required aircraft documents that must be carried in your airplane are aboard. These include—

1—current Airworthiness Certificate, Owner's Manual, and aircraft and engine logbooks.

2—Registration Certificate, current Airworthiness Certificate, and FAA approved Airplane Flight Manual or other placards, markings, and listings containing all the airplane operating limitations.

3—aircraft and engine logbooks, current Airworthiness Certificate, and Airplane Flight Manual.

4—Registration Certificate, current Airworthiness Certificate, and engine logbooks.

24. Assume that the compass heading of an airplane in the Lubbock traffic pattern is the same as that indicated on the Magnetic Compass, below. What would be the approximate *true* heading of this same airplane?

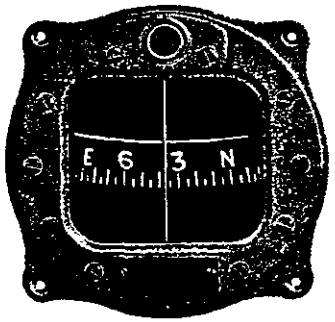
1—50°.

2—28°.

3—48°.

4—46°.

NOTE: Use the Compass Deviation Card on page 20 to determine deviation.



25. Assume the elevation of the Guthrie VOR to be 2,400 feet. At what range could you expect normal voice reception from this station when cruising at the altitude indicated by altimeter "4" on page 34?

1—100 statute miles.

2—80 statute miles.

3—130 statute miles.

4—140 statute miles.

You arrive at the airport at 7:00 a.m. (0700C) planning to take off at 0830C, weather permitting. This gives you ample time for flight planning, a weather briefing, and a thorough preflight inspection.

The next 5 test items are based on the weather information on pages 90–95.

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26. The Area Forecast for the period 7 A.M. to 7 P.M. CST, on page 91, indicates that the front pictured on the weather map on page 90 will move eastward as a cold front. Should a squall line precede the front, it will normally be characterized by—

1—fog, low stratus clouds, and stable air.

2—hail, fog, and freezing precipitation.

3—cold surface temperatures and stratus clouds.

4—cumulus-type clouds, turbulence, and precipitation.

27. Your attention is naturally attracted to the In-flight Advisories, and the PIREPS, on page 94. Comparing the AIRMET ALPHA 2 with the PIREP from SPS you conclude that—

1—the PIREP concerns a flight conducted well above the altitudes designated by the AIRMET.
2—neither will be effective at your proposed takeoff time of 0830.
3—the turbulence which was forecast in the AIRMET does not affect the area west of Wichita Falls.
4—neither pertains to your proposed route of flight.

28. The Terminal Forecast on page 93 predicts a clear sky for Lubbock at 0800C. What visibility is forecast for 0800C?

1—15 miles.
2—6 miles.
3—10 miles.
4—Over 8 miles.

29. Referring to the Winds Aloft Forecast on page 95, you estimate the Winds Aloft for 0800C at 6,000 feet MSL for Lubbock to be from 280° at approximately 6 mph, and at 9,000 feet MSL to be from—

1—330° at 14 mph.
2—310° at 14 mph.
3—330° at 12 mph.
4—331° at 2 mph.

30. A check of the 7:00 A.M. Aviation Weather Report for Wichita Falls, on page 93, indicates that—

1—the ceiling was 8,000 feet.
2—an overcast ceiling existed.
3—the visibility was 8 miles.
4—there were scattered clouds at 8,000 feet and a high thin overcast but no ceiling existed.

31. You plan to monitor the voice feature of the Guthrie VOR enroute to Kickapoo to keep advised of the latest weather. Scheduled weather broadcasts will be available from Guthrie—

1—every 30 minutes at 15 and 45 minutes after the hour.
2—every hour at 15 minutes after the hour.
3—on the hour and on the half-hour.
4—every hour on the hour.

32. The Wichita Falls VOR could be utilized as an aid in locating the Kickapoo Airport. What radial of this VOR intersects the Kickapoo Airport?

1—317°.
2—135°.
3—147°.
4—127°.

Following your study of the weather information at the Lubbock Weather Bureau Office, you received a briefing from the forecaster. His forecast indicates that the weather along your proposed route is VFR. You file your flight plan from Lubbock to Kickapoo with the Lubbock FSS (Flight Service Station).

It is good practice to compute takeoff performance, particularly when operating from short obstructed runways. This takes into consideration gross weight, atmospheric conditions, surface winds, and runway features.

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33. For a takeoff from a 2,500 foot runway, assuming a gross weight of 2,200 pounds, wind calm, elevation 2,500 feet, and temperature 50°F, approximately how much runway would be *remaining* at lift-off?

1—885 feet.
2—945 feet.
3—1,555 feet.
4—1,615 feet.

NOTE: Refer to the Takeoff Data Chart on page 40.

34. Assume a takeoff is made at maximum allowable gross weight from an airport with an elevation of 5,000 feet MSL and a temperature of 41°F. Climbing at full throttle and best climb airspeed, what approximate time would be required to climb to 10,000 feet MSL?

1—9½ minutes.
2—12 minutes.
3—16 minutes.
4—5 minutes.

NOTE: Refer to the Climb Data Chart on page 41.

35. Assume a cruising altitude of 7,500 feet, 60% BHP with lean mixture, and standard atmospheric conditions. What should be the approximate TAS and rate of fuel consumption?

1—127 mph and 7.9 gph.
2—124 mph and 7.5 gph.
3—120 mph and 5.2 gph.
4—122 mph and 7.6 gph.

NOTE: Refer to the Cruise Performance Chart on page 42.

You choose 5,500 feet as a cruising altitude from Lubbock to Wichita Falls. Your TAS will be 120 mph and your rate of fuel consumption will be 7.2 gph.

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36. Based on the information given above, what should be your approximate groundspeed at cruising altitude from Lubbock to the Guthrie VOR?

1—114 mph.
2—126 mph.
3—136 mph.
4—134 mph.

NOTE: Use the 0600-1200C Lubbock Winds Aloft Forecast for 6,000 Feet on page 95.

37. Assume that enroute from Lubbock to Guthrie, you tune your VOR receiver to the Guthrie VOR when within reception distance and rotate the bearing selector until the LEFT-RIGHT needle centers with a "TO" indication. If on course, your bearing selector should then indicate approximately—

1—085°.
2—075°.
3—265°.
4—255°.

38. To carry passengers with you on this trip, you must meet certain recency of experience requirements. These requirements are that within the preceding 90 days, in an aircraft of the same category, class, and type, you must have made at least—

1—5 takeoffs and landings to a full stop.
2—3 takeoffs and landings to a full stop.
3—5 takeoffs and landings which may be either touch-and-go or full stop.
4—3 takeoffs and landings which may be either touch-and-go or full stop.

39. When tuned to the Guthrie VOR, how can you positively identify that you have the correct station?

1—Radio tuned to 112.4 MHz.
2—Reception of a weather broadcast.
3—Reception of any transmission.
4—Radio tuned to 112.4 MHz and reception of coded signal.

40. If you have reason to utilize the Plainview VOR after departure from Lubbock, you should tune your receiver to a frequency of—

1—112.9 MHz.
2—116.4 MHz.
3—110.6 MHz.
4—112.4 MHz.

NOTE: Check the Sectional Chart Bulletin on page 49.

41. Assuming an average cruising groundspeed of 126 mph from Lubbock Airport to Kickapoo Airport with an additional 5 minutes estimated for takeoff and climb, what figure would you enter in Block 10 of the flight plan?

1—1:24.
2—1:37.
3—1:42.
4—1:32.

NOTE: See the Flight Plan on page 69.

After filing your flight plan and conducting a thorough preflight inspection of the airplane, you start your engine and contact Lubbock tower for taxi and takeoff instructions.

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42. You should establish radio contact with Lubbock ground control by transmitting and receiving on the frequency—

1—122.5 MHz.
2—121.7 MHz.
3—121.9 MHz.
4—121.5 MHz.

NOTE: See the Radio Equipment data on page 89, and the Airport/Facility Directory excerpt on page 55.

Lubbock Ground Control instructions are as follows: "CLEARED TO RUNWAY ONE SEVEN LEFT, WIND TWO TWO ZERO AT SEVEN, ALTIMETER TWO NINER NINER EIGHT, TIME ZERO EIGHT THREE ZERO."

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43. From Ground Control's instructions, you know that you are cleared to taxi to—

1—and line up on Runway 17R, but must await takeoff clearance.

2—Runway 17R, but must obtain clearance to cross any runway intersecting the taxi route.

3—Runway 17R and take off unless subsequently instructed otherwise.

4—*but not on* Runway 17R and to cross runways intersecting the taxi route.

44. The usable length of the runway to which you have been cleared is—

1—3,000 feet.
2—8,500 feet.
3—7,602 feet.
4—3,400 feet.

NOTE: See pages 49 and 55.

45. After adjusting your altimeter to the setting which was broadcast by Lubbock Ground Control, it should indicate approximately—

1—zero.
2—85 feet.
3—3,269 feet.
4—3,291 feet.

46. At 0850C, following takeoff from Lubbock and level-off at cruising altitude, you cross the highway north of Lorenzo on course. You next fix your position at 0858C as crossing the highway north of Crosbyton on course. Your groundspeed is approximately—

1—113 mph.
2—129 mph.
3—133 mph.
4—123 mph.

47. As you approach Guthrie, you prepare to call "Guthrie Radio" for the latest weather. The correct procedure for making this contact would be to transmit—

1—and receive on 122.1 MHz.
2—on 122.1 MHz and receive on 112.4 MHz.
3—on 122.1 MHz and receive on 122.2 MHz.
4—on 121.5 MHz and receive on 112.4 MHz.

You contact Guthrie and receive a weather briefing from the Childress FSS (controlling FSS for Guthrie) which indicates the weather is as forecast for the remainder of your route to Wichita Falls.

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48. While flying straight-and-level on this leg, you notice that your magnetic compass holds steady and appears to be giving a correct indication of your heading. You also notice that when the nose of the airplane is lowered and airspeed is increased, the Magnetic Compass indicates a turn toward the north; when the nose is raised and airspeed is decreased, the Magnetic Compass indicates a turn toward the south. This action of the compass is probably due to—

1—unusual mineral deposits in the area.
2—the yaw produced by torque when changing from level flight to a descent or climb.
3—a malfunctioning and it should not be relied on to give accurate indications of your heading.
4—the normal acceleration and deceleration error and it should give reliable indications of your heading while in steady, straight-and-level flight.

49. If you decided to detour by way of Munday, Texas, on the leg from Guthrie to Kickapoo Airport, what would be the approximate true course from the Guthrie VOR to the town of Munday?

1—109°.
2—129°.
3—119°.
4—139°.

NOTE: Munday is approximately 45 miles southeast of the Guthrie VOR.

50. Assuming a groundspeed of 130 mph and that you remain on course, what will be your approximate enroute time from over the Guthrie VOR until crossing the highway north of Lake Kemp (which is on the eastern edge of the lake extending in a north-south direction)?

1—:29.
2—:27.
3—:33.
4—:31.

51. Kickapoo UNICOM advises that they have a temporary obstruction 200 feet from the south end of hard-surfaced Runway 14–32 and the turf runway is soft from rain. *Assume* the following conditions:

No landing obstacles (approach)
Weight--1,900 lbs.
Flaps—full
Indicated airspeed—58 mph
Elevation—2,500 feet (To allow margin of safety)
Headwind component—12 mph

Based on these conditions, what would be your approximate landing *roll?*

1—512 feet.
2—448 feet.
3—576 feet.
4—878 feet.

NOTE: Use the Landing Conditions Chart on page 43. Interpolate between 2,200 and 1,600 pounds.

You complete your business appointment at Wichita Falls and are back at the airport at 1330 to continue your trip to Greater Southwest with a passenger stop planned for Mineral Wells.

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52. Based on the 1300C Aviation Weather Reports on page 93, the surface wind at Mineral Wells should be from approximately—

1—080° at 12 knots.
2—350° at 8 knots and gusty.
3—350° at 8 mph and gusty.
4—300° at 12 mph and gusty.

53. You departed Lubbock Airport with full fuel tanks and the flight to Kickapoo consumed 13 gallons. The total flying time remaining (Kickapoo to Greater Southwest including passenger stop) is estimated to be 1 hour and 30 minutes at an average fuel consumption rate of 8.5 gph. If you do not refuel, approximately how much endurance will you have after arrival over Greater Southwest Airport?

1—1:55.
2—1:00.
3—1:40.
4—1:20.

NOTE: Refer to the Airplane Flight Manual excerpts on page 89.

54. You may encounter areas of stratus clouds on this flight and you visualize the possibility of carburetor icing. Since your airplane is equipped with a fixed-pitch propeller, you realize that the indication of carburetor icing would likely be—

1—a decrease in engine RPM only.
2—engine roughness only.
3—a loss of power only.
4—any of the above.

55. If you determine that carburetor icing does exist, which of the following methods would constitute the best *immediate* procedure?

1—Apply full "hot" carburetor heat to remove the existing ice and then follow the procedure as recommended by the manufacturer.
2—Climb or descend to another cruising level.
3—Move the carburetor heat control toward the full "hot" position until you get the maximum RPM increase.
4—Alternately move the carburetor heat control from the full "cold" position to the full "hot" position until you're sure the ice has been removed.

56. Flying at 5,500 feet MSL, with a true airspeed of 125 mph, what will be your approximate *compass* heading and groundspeed from Kickapoo Airport to Mineral Wells Airport?

1—148° and 126 mph.
2—175° and 136 mph.
3—154° and 136 mph.
4—161° and 125 mph.

NOTE: Use the GSW 1200C-1800C Winds Aloft Forecast for 6,000 Feet on page 95 and the Compass Deviation Card on page 20.

57. Assume you encounter severe turbulence in the wake of a large aircraft in the vicinity of Mineral Wells. You reduce your indicated airspeed to the maneuvering speed for the JOHNSTAR. This speed is—

1—113 mph.
2—100 mph.
3—140 mph.
4—80 mph.

You land at Mineral Wells and after leaving your passenger at the terminal are airborne again at 1450C.

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58. The *most* important rule to remember in the event of a power failure on takeoff after becoming *airborne,* is to—

1—maintain safe airspeed.

2—gain altitude immediately.

3—turn back to the takeoff field.

4—determine the wind direction.

59. Enroute to Greater Southwest Airport, you detour north of course to avoid Meacham Field on the north edge of Fort Worth. You decide to intercept and fly inbound to the GSW VORTAC on the 270° radial. Which VOR receiver indication(s) on page 62 would illustrate that you have used approved procedures and have intercepted this course?

1—3 and 7.

2—7 only.

3—3 only.

4—6 only.

60. In the event you were to *pass* within a 5 statute mile radius of Meacham Field, Regulations require, unless otherwise authorized, that your minimum altitude should be no less than—

1—2,000 feet MSL.

2—3,000 feet MSL.

3—3,692 feet MSL.

4—2,692 feet MSL.

61. Contemplating your final landing, you remember that stall speed increases as the bank increases. How much would the wings level stalling speed (10° flaps) of your airplane increase should you inadvertently progress to a 60° bank on the final turn with power off?

1—23 mph.

2—4 mph.

3—8 mph.

4—2 mph.

NOTE: Refer to the Stall Speed Chart on page 6.

62. Since you observe numerous aircraft in the Fort Worth Area, you decide to contact Fort Worth Approach Control for traffic information. The recommended procedure would be to transmit—

1—on 122.7 MHz and receive on 124.5 MHz.

2—and receive on 124.5 MHz.

3—and receive on 121.5 MHz.

4—on 120.5 MHz and receive on 125.2 MHz.

NOTE: Refer to the Radio Equipment data on page 89; and the Airport/Facility Directory on page 55.

Approach Control provides you with numerous radar traffic advisories as you progress toward your destination, and then instructs you to contact Greater Southwest Tower approximately 5 miles west of the airport.

After reporting your position 5 miles west, you receive the following Tower message: "JOHNSTAR TWO SEVEN ZERO EIGHT BRAVO, GREATER SOUTHWEST TOWER, LEFT TRAFFIC RUNWAY THREE ONE, WIND THREE TWO ZERO AT ONE FIVE GUSTS TO TWO ZERO, ALTIMETER TWO NINER NINER SEVEN, NUMBER TWO TO LAND FOLLOW BOEING SEVEN - O - SEVEN ON THREE MILE FINAL."

---

63. In compliance with the Greater Southwest Tower message, you should plan to land on Runway 31 turning on final approach from a—

1—right base leg heading of approximately 200°.
2—left base leg heading of approximately 040°.
3—left base leg heading of approximately 200°.
4—right base leg heading of approximately 040°.

64. As you enter the traffic pattern, you cannot recall the maximum speed for lowering the flaps, but then remember that this speed is—

1—marked by a radial yellow line on the airspeed indicator.
2—not marked on the airspeed indicator.
3—indicated only on a placard on the instrument panel.
4—represented by the higher airspeed limit of the white arc on the airspeed indicator.

65. Assume that after entering the traffic pattern, you hear no further radio transmissions. Just prior to turning onto final approach, you observe an alternating red and green light signal from the control tower. You should interpret this to mean—

1—that the airport is unsafe and you should not land.
2—that you should give way to other aircraft and continue circling.
3—nothing if the last radio message received cleared you to land.
4—that you should proceed with your approach but exercise extreme caution.

66. Light aircraft are particularly susceptible to wing tip vortices or wake turbulence. The most severe wake turbulence is produced by—

1—small aircraft during takeoff or landing.
2—large aircraft during takeoff or landing.
3—small aircraft in cruising flight.
4—large aircraft in cruising flight.

67. As you turn on final approach, you note that your Turn and Bank Indicator appears as illustrated in "D" on page 35. You should interpret this indication to mean that you are probably in a—

1—slipping turn to the right.
2—skidding turn to the left due to excessive aileron pressure and insufficient rudder pressure.
3—skidding turn to the left due to excessive rudder pressure.
4—slipping turn to the left.

68. You receive a steady green light from the tower and land as cleared. While completing your landing roll on the runway, you notice a *flashing red light* from the tower. You should—

1—not use the first available taxiway—it is unsafe.
2—taxi clear of the runway on the first available taxiway or suitable area.
3—exercise extreme caution.
4—stop as soon as practicable.

If a flight plan has been filed, it is mandatory that an arrival or completion notice be filed (flight plan closed).

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69. Relative to the preceding statement, which of the following statements is true?

1—At airports with control towers, the tower will automatically close your flight plan *only* if it is the airport of destination specified in the flight plan.
2—The arrival notice must be filed by the pilot within an hour after arrival on a standard form provided for this purpose.
3—The pilot should request the FSS to close the flight plan.
4—At all airports with a control tower, the tower automatically will close your flight plan as soon as the landing is complete.

70. The most important reason for servicing fuel tanks to full capacity upon completion of a flight is because this procedure—

1—prevents drying and cracking of the fuel cell inner liner which occurs when it is exposed to the air.
2—minimizes the possibility of corrosion and structural damage due to moisture forming on and dripping from the outer walls of fuel tanks.
3—prevents the fuel evaporation which occurs in partially-filled tanks.
4—minimizes the possibility of fuel contamination from condensation of water on inner walls of partially-filled tanks.

ANSWERS AND EXPLANATIONS FOR SAMPLE TEST ITEMS

The correct response is listed immediately after the test item number. Explanatory statements will generally contain the reasoning for the correct solution or cite a reference for the source of the correct response. Instances where incorrect responses have been designed to show a misapplication of data such as reversing wind direction, adding rather than subtracting variations, etc., will be pointed out. (For brevity, the *Pilot's Handbook of Aeronautical Knowledge* will be referred to as the *Pilot's Handbook* and *Federal Aviation Regulations* will be referred to as FAR. When page number references are listed without identification, they pertain to this Guide).

1 – (2) *The Pilot's Handbook,* Chapter 12, states: "Sectional Aeronautical Charts (scale: About 8 statute miles per inch) – fairly complete detail, primarily for use in pilotage, most widely used by private pilots." The WAC Chart contains all the radio aids to navigation that are contained on the Sectional Chart and covers a larger surface area. The solution of dead reckoning problems is the same regardless of the chart used as long as the true course and variation can be detemined from the charts.

2 – (1) Leg I measures 192 statute miles and Leg II measures 78 statute miles. Leg III measures 59 statute miles. Legs II and III total 137 statute miles, or 55 miles less than the distance of Leg I. Forty-four (44) miles would have been your incorrect response if you had used the nautical mile scale rather than the statute mile scale on the Sectional Chart. (Remember, your statute mile solution may not agree exactly unless you used the mileage scale on the chart itself.)

3 – (2) A tower which measures 2,049 feet *above sea level* appears approximately 3½ miles to the left of your course as you approach Kickapoo Airport. The Sectional Chart legend states: "Numerals without parenthesis indicate elevation above sea level of top". Therefore, response number 1 is incorrect. There is another obstruction with an elevation of 1,803 feet about 2 miles left of course and 12 miles east of Guthrie, but it is not the highest.

4 – (4) FAR 91.5 states in part: "Each pilot in command shall, before beginning a flight, familiarize himself with all available information concerning that flight. This information must include . . . alternatives available if the planned flight cannot be completed. . . ." Responses 1, 2, and 3 are not mandatory for a VFR cross-country.

5 – (4) FAR 91.109 states in part: ". . . each person operating an aircraft under VFR in level cruising flight, at an altitude of more than 3,000 feet above the surface, shall maintain the appropriate altitude prescribed below:

(a) When operating below 18,000 feet MSL and–

(1) On a magnetic course of zero degrees through 179 degrees, any odd thousand foot MSL altitude + 500 feet (such as 3,500, 5,500, or 7,500); . . . ."

6 – (3) Only altimeters 4 and 6 indicate altitudes of odd-thousand + 500 feet. Although altimeter 2 could be appropriate for a portion of your flight (since the aircraft would be less than 3,000 feet above the surface) the elevation for the beginning of the flight is greater than 2,500 feet.

7 – (1) FAR 91.105 Basic VFR weather minimums states in part "(a) Except as provided in 91.107, no person may operate an aircraft under VFR when the flight visibility is less, or at a distance from clouds that is less, than that prescribed for the corresponding altitude in the following table:"

The corresponding altitude listed in the table is:
More than 1,200 feet above the surface but less than 10,000 feet MSL within controlled airspace – visibility – 3 statute miles; distance from clouds – 500 feet below or 1,000 feet above, and 2,000 feet horizontally from, any cloud formation. Therefore, response number 1 is the correct answer.

8–(1) The Airport Directory and Airport/Facility Directory excerpts furnished with this Guide on pages 53-55 indicate that Lubbock has 5 hard surfaced runways; Mineral Wells, 3; and Greater Southwest, 2.

9–(3) FAR 91.67 states in part:

> "(c) *Converging.* When aircraft of the same category are converging at approximately the same altitude (except head-on, or nearly so) the aircraft to the other's right has the right of way."

FAR 1.1 defines "category" as follows:

> "(1) As used with respect to the certification, ratings, privileges, and limitations of airmen, means a broad classification of aircraft. Examples include: airplane; rotocraft; glider; and lighter-than-air; . . . . ."

10–(3) Response 1 is only partially correct because traffic is right-hand on runway 31. Response 2 is incorrect since traffic is left-hand on runway 13. Response 4 is completely wrong as it lists incorrect traffic directions for both runways.

11–(4) At an average groundspeed of 123 mph for a distance of 329 statute miles, the enroute time would be 2:41. With a fuel consumption rate of 8.6 gph this results in 23 gallons.

12–(1) The Airport and Airport/Facility Directories on pages 53-55, show an F-12 code for 80/87 grade fuel for all four airports. The Airplane Flight Manual excerpt on page 89 indicates a fuel specification of 80/87 for the JOHNSTAR. In addition to F-12, Lubbock Regional also has F-15 (91/98), F-18 (100/130), and F-22 (115/145) grade gasoline. All of these airports have F-18 (100/130) grade fuel.

13–(2) The *Pilot's Handbook*, Section VII, AIM excerpts presents a "Checklist for Maintaining Currency of Sectional Charts." The checklist points out that you should rely on the *Airman's Information Manual* for the most current airport information. Remember: NOTAMS are the source of the latest information.

14–(3) Except for stations with "no voice" the omni frequency carries voice transmissions. The Sectional Chart and the Airport/Facility Directory on page 55 indicate the current frequency is 112.4 MHz and this station is capable of voice transmissions. Additional information concerning proper FSS communications frequencies may be found on page 51 of this guide.

15–(1) The Airplane Flight Manual excerpts for the JOHNSTAR on page 89 gives the correct limitation. This is the normal source for airplane and engine limitations.

16–(2) Although the JOHNSTAR has a total fuel capacity of 42 gallons, 5 gallons are unusable and are therefore included in the empty weight. (See Section VI of Pilot's Handbook) Adding 222 pounds (37 gallons of fuel at 6 lbs/gal.) and 15 pounds (2 gallons of oil at 7.5 lbs/gal.) to the weights listed, the total is 2,137 pounds less baggage. Since the Airplane Flight Manual excerpt on page 89 indicates a maximum allowable gross weight of 2,200 pounds, this leaves 63 pounds for baggage. If you had incorrectly added the weight for the full 42 gallons, your answer would have been 33 pounds–a wrong answer.

17–(1) FAR 91.169 states in part:

> "(a) . . . no person may operate an aircraft unless, within the preceding 12 calendar months, it has had–
>
> (1) An annual inspection . . . and has been approved for return to service . . . ."
>
> "(b) . . . no person may operate an aircraft carrying any person (other than a crewmember) for hire . . . unless, within the preceding 100 hours of time in service, it has been inspected . . . and approved for return to service . . . ."

Although responses 3 and 4 are partially true, they do not include the complete requirement as does response 1.

18–(2) Your Sectional Chart indicates that Lubbock, Mineral Wells, and Greater Southwest Airports all lie within Control Zones. (The areas outlined by dashed blue lines.) Kickapoo does not.

FAR 91.105 states in part:

"(a) *Distance from clouds.* Except as provided in FAR 91.107, no person may operate an aircraft under VFR–

• • • • • • •

(c) . . . . within a control zone, beneath the ceiling when the ceiling is less than 1,000 feet;"

Visibility requirements have been stated in the explanation to sample test item 7. FAR 91.107 does provide for operations within a control zone with minimums less than these, but only by an appropriate ATC clearance.

19–(3) Altimeter "2" indicates 2,500 feet above sea level (MSL). The Sectional Chart shows Kickapoo Airport to be at an elevation of 985 feet. The aircraft is therefore 1,515 feet above the surface at this point. Altimeters are set to indicate "feet above sea level," not "feet above ground."

20–(4) The *Pilot's Handbook*, Section V Chapter 19, describes and illustrates the color-coded marking system of the air-speed indicator. The lower limit of the green arc depicts the power-off stalling speed with flaps up (landing gear not applicable in this case). Response 1, fifty-five (55) mph, is the power-off stalling speed with flaps down.

21–(2) The maximum speed for normal operation (Maximum Structural Cruising Speed) is depicted by the upper limit of the green arc. Response 4, one hundred sixty (160) mph, is the Never-Exceed Speed.

22–(4) The *Pilot's Handbook*, Chapter 3, states:
"So long as the airplane is moving at a constant airspeed in a straight line, the load supported by the wings remains constant. When the airplane assumes a curved flight path – all types of turns, pullouts from dives, and abrupt or excessive back pressure on the elevator control – the actual load supported by the wings will be much greater because of the centrifugal force produced by the curved flight."

"One additional cause of large load factors is severe vertical gusts."

23–(2) FAR 91.27 states in part:

"(a) . . . . . , no person may operate a civil aircraft unless it has within it–

(1) An appropriate and current airworthiness certificate . . . and

(2) A registration certificate issued to its owner."

FAR 91.31 states in part:

"(b) No person may operate a U.S. registered civil aircraft unless there is available in the aircraft a current FAA approved Aircraft Flight Manual for that aircraft, placards, listings, instrument markings, or any combination thereof, containing each operating limitation prescribed for that aircraft by the Administrator, ..."

24–(1) To determine *true heading* from *compass heading*, both deviation and variation must be applied. Based on the deviation card, the magnetic heading in this case would be 39°. The Sectional Chart indicates the variation in the Lubbock area to be 11° E. Easterly variation is *subtracted* to convert TRUE to MAGNETIC. It must be *added* in this case since we are converting MAGNETIC to TRUE. Therefore, 50° is the correct response. Incorrect response 2, 28°, would result from a misapplication of the variation. Incorrect responses 3 and 4 could result from mis-reading the compass and/or misapplication of the deviation.

25–(2) Altimeter "4" indicates 5,500 feet above sea level or 3,100 feet above the assumed station elevation. The *Pilot's Handbook*, Section IX, Chapter 27, presents a table of normal VHF reception distances based on altitude above the station.

26–(4) The *Pilot's Handbook*, Section II Chapter 10, states:
"*In some cases, an almost continuous line of thunderstorms may* form along the front" [cold] "or ahead of it. These lines of thunderstorms, 'squall lines,' contain some of the most turbulent weather experienced by pilots." Fog and stratus type clouds as indicated by responses 1, 2, and 3 are generally associated with a warm front.

27–(3) Based on the weather forecast and Aviation Weather Reports available, it is doubtful that the moderate turbulence forecast by AIRMET ALPHA 2 would exist as far west as Wichita Falls. With the additional evidence of only light turbulence, as presented by the PIREP, you can safely conclude that the forecast moderate turbulence does not exist in the area west of Wichita Falls.

28–(4) Referring to the Key to Aviation Weather Reports on page 92, you note that the absence of a visibility figure in Terminal Forecasts indicates that the visibility is over 8 miles. (The Key to Aviation Weather Reports is always furnished with the Private Pilot Written Test.) If you mistook the wind speed in the figure 2710 for visibility, you may have chosen incorrect response number 3.

29–(1) The *Pilot's Handbook*, Section II, Chapter 11, explains how to interpret Winds Aloft Forecasts. The figure representing the Lubbock 9,000-foot wind at 0800 is 3312. This indicates a direction of 330° at 12 knots. Twelve (12) knots is approximately 14 mph. If you had mistakenly interpreted the figure 12 as mph, you would have chosen incorrect response number 3. (The Key to Aviation Weather Reports also includes an explanation of the Winds Aloft Forecast.)

30–(4) The 0700C Aviation Weather Report for Wichita Falls shows a sky cover of 8,000 feet scattered, high thin overcast, and a visibility of more than 15 miles. The *Pilot's Handbook*, Section II, Chapter 9, states "The height above ground of the lowest layer of clouds reported as broken or overcast and not classified as 'thin' is the ceiling."

31–(2) The *Pilot's Handbook*, Section IX, Chapter 32, explains the times for scheduled Weather Broadcasts.

32–(2) If you draw a line from the Wichita Falls VOR, located approximately 11 statute miles NE of the Kickapoo Airport, through the Kickapoo Airport, you will note that it intersects the compass rose encircling the VOR at approximately the 135° point. This is the 135° radial of the Wichita Falls VOR. Response number 1, 315° is the magnetic course from Kickapoo Airport to the Wichita Falls VOR, not the radial.

33–(3) Since the temperature of 50° F is standard for the elevation of 2,500 feet, and the gross weight is given as 2,200 lbs., the takeoff ground run can be read directly from the Takeoff Data Chart without interpolation or treatment for temperature variation. (See the *Pilot's Handbook*, Section VI, Chapter 23.) From the Takeoff Data Chart you determine that the ground run is 945 feet. Deducting this figure from a runway length of 2,500 feet and assuming you started your takeoff at the end of the runway, you should have 1,555 feet of runway remaining at lift-off. Incorrect responses 1, 2, and 4 might result from a careless or incomplete reading of the stem of the test item or the Takeoff Data Chart.

34–(2) The Climb Data Chart for the conditions given shows a rate of climb at 5,000 feet of 520 feet per minute and at 10,000 feet of 310 feet per minute. Since the climb is to be performed from 5,000 to 10,000 feet, you should interpolate and find a mid-figure of 415 feet per minute. Dividing 5,000 feet (the altitude to be gained) by 415 feet (the rate of climb in feet per minute) results in 12 minutes. If you had assumed the rate of climb to be 520 feet per minute for the entire 5,000 feet you would have chosen incorrect response number 1. If you had assumed the rate of climb for the entire 5,000 feet to be 310 feet per minute, you would have chosen incorrect response number 3.

35–(4) The *Pilot's Handbook*, Section VI, Chapter 23, explains how to interpret a Cruise Performance Data Chart. Based on the conditions given, the Cruise Performance Chart indicates a true airspeed of 122 mph and a rate of fuel consumption of 7.6 gph. Again, it can be pointed out that an incomplete or careless reading of the test item stem or the Cruise Performance Chart could result in a choice of incorrect responses 1, 2, or 3. All of these conditions may be found on the Cruise Performance Chart, but not for the specific situation as outlined.

36–(2) This is a standard dead reckoning problem. (See the *Pilot's Handbook*, Section III, or Section VIII, Chapter 31.) Given a true airspeed of 120 mph, and a cruising altitude of 5,500 feet, you must determine the other factors necessary for the dead reckoning computation. From the course drawn on the chart, and the wind given in the Winds Aloft Forecast, you determine the true course to be 085° and the wind to be from 280° at 5 knots or approximately 6 mph. The resulting groundspeed will be approximately 126 mph, whether you use a flight computer or the wind triangle method.

37–(2) You have determined that the true course from Lubbock to the Guthrie VOR is 085°. However, this is a magnetic course of approximately 075°, since Guthrie is in the area between the 10° and 10°30′ variation lines. The Sectional Chart shows that bearings (radials) are magnetic at VOR stations. In other words, as you can note by studying those on the Sectional Chart, they are aligned with magnetic north, not true north. If you failed to take the variation into account, you might have chosen incorrect response number 1. Response number 4 is incorrect since this selection would give a "from" indication.

38–(1) FAR 61.47 states in part:

"... No person may act as pilot in command of an aircraft carrying passengers unless, within the preceding 90 days, he has made at least 5 takeoffs and 5 landings to a full stop in an aircraft of the same category, class, and type ...."

39–(4) The only positive method of identifying an omnirange is by its Morse Code identification or by the recorded automatic voice identification which is always indicated by use of the word 'VOR' following the range's name. Reliance on determining the identification of an omnirange should never be placed on listening to voice transmissions by the Flight Service Station (FSS) or approach control facility involved. Many VOR's are remotely controlled by a parent FSS. Some voice transmissions through the remoted station may carry the name of the parent facility only. As an example, Guthrie VOR is a remoted station of Childress. If you call "CHILDRESS RADIO", you have to tell them what frequency you are listening to – "REPLY ON GUTHRIE VOR".

40–(1) Plainview VOR is located approximately 27 miles north of Lubbock Airport. 110.8 is the frequency of the Lubbock VORTAC, and the frequency 112.1R shown above station box is a frequency on which you could transmit but not receive. The Sectional Chart Bulletin (AIM excerpt) on page 49 does not list any changes in aeronautical information for Plainview VOR, but it is a source of information that a pilot should remember to check.

41–(2) Block 10 of the flight plan is for the estimated time enroute. You have determined the distance from the Lubbock Airport via the Guthrie VOR to the Kickapoo Airport to be 192 statute miles. Based on an average groundspeed of 126 mph, this results in a time of 1:32. Adding the 5 minutes as instructed, your response should be 1:37. If you used the nautical miles scale instead of the statute miles scale for measuring your distance, your result would be incorrect response number 1.

42–(3) The Airport/Facility Directory entry for Lubbock Airport indicates the ground control frequency of 121.9 MHz. The description of the radio equipment aboard the JOHNSTAR shows that you have this frequency available. Remember, although 121.5 MHz is a standard frequency for most facilities, it should be used only in an emergency.

43–(4) You should have no difficulty in interpreting your taxi instructions as cleared to Runway 17R. FAR 91.87 states in part:

"(h) *Clearance required.* . . . . A clearance to 'taxi to' the runway is a clearance to cross all intersecting runways but is not a clearance to 'taxi on' the assigned runway."

44–(2) The Airport Facility Directory excerpt on page 55, lists Runway 17R - 35L as the longest hard surfaced runway at Lubbock, which is 8,500 feet in length. The remarks concern the displaced threshold on 35L. Although there were no NOTAMS concerning Runway 17R, the NOTAMS should always be checked.

45–(3) The altimeter setting as broadcast by Lubbock ground control is the station pressure corrected to Mean Sea Level. (See the Pilot's Handbook, Section V, Chapter 19.) If your altimeter is calibrated accurately, it should then indicate the elevation at Lubbock Municipal Airport. The Sectional Chart shows this to be 3,269 feet. Setting the altimeter to zero as in response 1 would be contrary to Federal Aviation Regulations.

46–(2) Since the stem of the test item states that you have leveled off at cruising altitude prior to the time check, you can assume that you are maintaining a constant airspeed. The distance travelled between the two checkpoints is slightly over 17 statute miles and the period of time was 8 minutes. This should result in a groundspeed of approximately 129 mph. When short distances such as this are involved, even a fraction of a mile or a minute should be considered for the utmost accuracy in groundspeed checks. See the *Pilot's Handbook*, Section VIII, Chapter 30, for an explanation of inflight groundspeed checks. If you had inadvertently used the nautical mile scale in measuring the distance, your result would have been incorrect response 1, 113 mph.

47–(2) This combination of frequencies provides you with voice communication as well as radio navigation guidance. (See the *Pilot's Handbook*, Section IX, Chapter 32.) There is no assurance that Guthrie can transmit on 122.2 MHz from the information that you have available. The frequency 122.1R appears above the Guthrie VOR station box. Response 1 is incorrect since 122.1 MHz is not a transmitting frequency for ground stations.

48–(4) This is a normal error of the magnetic compass and does not indicate malfunctioning. Yaw, when properly corrected for, should not produce a compass error. An unusual mineral deposit would normally cause the compass to swing or turn in only one direction. See the *Pilot's Handbook*, Section V, Chapter 19, for a complete explanation of the magnetic compass.

49–(3) Your first step should be to draw a line from the Guthrie VOR to the town of Munday. (See the *Pilot's Handbook*, Section III, Chapter 14.) Using a plotter or protractor, you measure the course angle as it crosses the 100° meridian. Another method would be to note the magnetic bearing at the point where the course line intersected the Guthrie VOR compass rose. However, if you failed to apply variation, you would have chosen incorrect response 1. Incorrect response 2 would have resulted from misapplying the variation.

50–(4) The distance involved is slightly over 67 statute miles. All that remains is a simple time-distance calculation based on the given groundspeed. Again, if you had inadvertently used the nautical mile distance scale, you would have chosen an incorrect response—in this case, response 2.

51–(1) See the *Pilot's Handbook*, Section VI, Chapter 23, for an explanation of how to interpret a Landing Data Chart. The important thing to remember in using a chart of this type is that you must interpolate for weights between those listed for an accurate determination. Since only ground roll, not total landing distance, is requested, you can see that it lies halfway between 560 feet and 720 feet before applying headwind factor. Therefore, 640 feet reduced by 20% for the headwind component results in 512 feet. Incorrect responses 2 and 3 could have resulted from failure to interpolate.

52–(2) 3508 is properly interpreted only by response 2. Response 3 is incorrect since the wind is always reported in knots.

53–(4) The Airplane Flight Manual indicates the total usable fuel to be 37 gallons. Deducting 13 gallons, you have 24 gallons remaining. At 8.5 gph this should provide an endurance of 2:50. If you had mistakenly used 42 gallons as the total *usable* fuel, your result would have been incorrect response 1.

54–(4) The *Pilot's Handbook*, Section IV, Chapter 18, states: "For airplanes with fixed-pitch propellers, the first indication of carburetor icing is loss of rpm . . . a roughness in engine operation may develop later." Concurrent with loss of rpm is loss of power.

55–(1) The reference for the correct response is the same as in item 54. A change in altitude might be a recommended procedure, in time, but it would not constitute the best immediate procedure. When ice is present, the full "hot" position should be used as the first step; not partial or alternating "hot" positions.

56–(3) This is another dead reckoning problem similar to the one in item 36, but with a different true airspeed and utilizing the Greater Southwest Winds Aloft Forecast. Again, the first step is to determine your true course; in this case, 161°. A flight computer or wind triangle solution based on a forecast wind of 330° at 11.5 mph (10 knots) should result in a true heading of 162° and a groundspeed of 136 mph. Applying a variation of 10°W (to the nearest full degree) and deviation as indicated by the card, you should arrive at the correct result. Misapplication of variation would result in incorrect response 2.

57–(1) The *Pilot's Handbook*, Section I, Chapter 3, explains the reason for this action. The Airplane Flight Manual excerpt is the only source in this instance for determining the maneuvering speed. Remember, it is not marked on the airspeed indicator. Incorrect responses 2 and 3 are maximum flaps extended speed and maximum structural cruising speed, respectively.

58–(1) MAINTAIN SAFE AIRSPEED! This is a cardinal rule. Without flying speed, other actions may be impossible. Remember, a successful emergency landing is usually possible, except perhaps in very rough terrain, if touchdown is made with the aircraft in a level attitude and at a reduced but safe airspeed.

59–(2) Only the indications shown in set 7 are correct. (See the *Pilot's Handbook*, Section IX, Chapter 33.) Although the indications in set 3 show the correct course selection of 090°, the To-From indicator would place this position east of the station.

60—(3) FAR 91.85 states in part:

> "(b) Unless otherwise authorized or required by ATC, no person may operate an aircraft within an airport traffic area except for the purpose of landing at, or taking off from, an airport within that area."

FAR 1.1 defines a normal airport traffic area as follows:

> ". . . that airspace within a horizontal radius of 5 statute miles from the geographical center of any airport at which a control tower is operating, extending from the surface up to, but not including, 3,000 feet above the surface."

The Sectional Chart shows the elevation of Meacham Field to be 692 feet. Therefore, a minimum altitude of 3,692 feet is necessary to avoid the airport traffic area.

61—(1) The *Pilot's Handbook*, Section I, Chapter 3, explains the effect of increased bank on stall speed. The use of the Stall Speed Chart is self-explanatory. The incorrect responses could result from incomplete or careless reading of the test item stem or the Stall Speed Chart.

62—(1) The Airport/Facility Directory entry for Greater Southwest International lists 124.5 as the traffic information frequency. Although the radio equipment of the JOHNSTAR does not permit you to transmit on 124.5, you find that Fort Worth Approach Control also receives 122.7 MHz, a frequency you do have available. Traffic advisories, furnished by radar equipped approach control facilities such as Fort Worth, are a valuable aid to the VFR pilot in avoiding other aircraft in high density terminal areas. (See *Pilot's Handbook*, Section VII, AIM excerpts.)

63—(2) The tower instruction clearly specifies "left traffic." Therefore, your heading on a left base leg should be approximately 90° greater (or added clockwise) than the runway heading of 310°. Incorrect response 3 contains a heading for a right base leg. See *Pilot's Handbook*, Section IX, Chapter 32, for a review of radio communication procedures.

64—(4) The *Pilot's Handbook*, Section V, Chapter 19, describes and illustrates the color-coded marking system of the airspeed indicator. Incorrect response 1 is completely fictitious. There is no radial yellow line on the airspeed indicator. A yellow arc, however, marks the caution range.

65—(4) The *Pilot's Handbook*, Section VII, Chapter 25, presents a chart of traffic control light signals. Incorrect response 1 would be indicated by a flashing red signal. Incorrect response 2 would be indicated by a steady red signal. NEVER DISREGARD A LIGHT SIGNAL AIMED AT YOU BY A CONTROL TOWER.

66—(2) See the *Pilot's Handbook*, Section VII, Chapter 25, for an illustrated explanation of wake turbulence. The most severe wake turbulence is produced by large aircraft in landing or takeoff configuration. Light aircraft are especially affected if they should encounter this type of turbulence. The heavier and slower the aircraft, the greater the intensity of the air circulation in the vortex cores. Therefore, responses 1, 3, and 4 are incorrect. Since vortices are not formed until lift is produced, they will not be generated on a takeoff roll until just before liftoff, or by a landing aircraft after it is solidly on the ground. Vortices settle downward and spread laterally. When it is necessary to operate behind a large aircraft, try to remain above the flight path of that aircraft.

67—(3) The *Pilot's Handbook*, Section V, Chapter 20, explains the operation of the Turn and Bank (or Turn and Slip) Indicator. The left turn is uncoordinated since the bank is too shallow for the rate of turn. This condition is normally brought about by rudder pressure. A slipping turn in the same direction would be characterized by the ball being on the opposite side.

68—(2) See the reference for item 65. The use of caution should be a standard rule when observing any red light signal, but the signal in this case has a more specific meaning.

69—(3) The *Pilot's Handbook*, Section X, Chapter 35, states: "The one thing you must not forget is to *close your flight plan upon arrival.* Do this by telephone with the nearest FSS, if possible, to avoid radio congestion. If there is no FSS near your point of landing, you may close it by radio with the nearest FSS" [indicated in the remarks block of your flight plan] "on arriving over your destination." Although a tower will close your flight plan and advise the FSS *upon request*, the best procedure is to contact the FSS directly. There is no standard form required.

The flight plan itself also carries in bold letters the reminder "CLOSE FLIGHT PLAN UPON ARRIVAL."

70—(4) The *Pilot's Handbook,* Section IV, Chapter 18, states: ". . . have the fuel tanks completely filled after each flight, or at least after the last flight of the day. This will prevent moisture condensation within the tank since no airspace will be left." Incorrect responses 1 and 3 may occur with partially-full fuel tanks, but neither should be considered the *most* important reason for end-of-flight servicing to full capacity.

REMEMBER ! ! The mastery of the sample test items alone should not be used as a criterion for determining that you are properly prepared to take the actual FAA Written Test. Your knowledge of the material on which the workbook section of this guide is based and of the appropriate Federal Aviation Regulations should be the final yardstick.

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