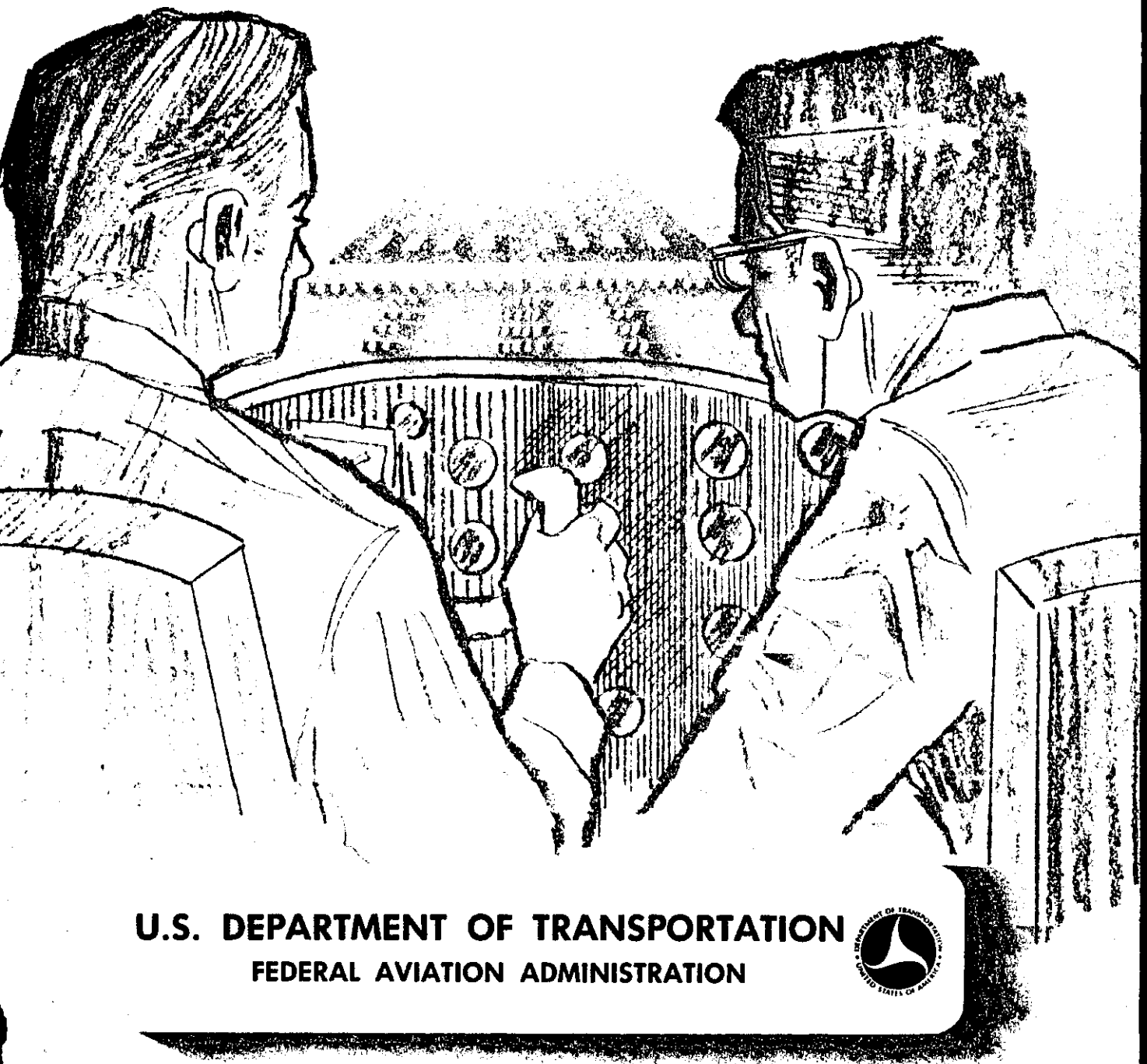
AC 61-70

FLIGHT INSTRUCTOR Instrument—Airplane

WRITTEN TEST GUIDE



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

FLIGHT INSTRUCTOR
INSTRUMENT–AIRPLANE
WRITTEN TEST GUIDE

1974

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

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Preface

The Flight Standards Service of the Federal Aviation Administration has developed this guide to assist applicants who are preparing for the Flight Instructor Certificate with an Instrument – Airplane rating.

This guide contains a comprehensive study outline and a list of recommended study materials and explains how these publications can be obtained. It includes study questions and illustrations pertinent to the subject of instrument flight instructing.

This guide is issued as Advisory Circular 61–70 and should be used by those persons pursuing the rating under the provisions of FAR Part 61 (revised), which became effective November 1, 1973.

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

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FLIGHT INSTRUCTOR INSTRUMENT – AIRPLANE WRITTEN TEST GUIDE

Introduction To Flight Instruction

What is required to become a skilled and effective flight instructor? Although some people possess in a greater degree than others those traits desirable in an instructor, no one is born a natural instructor. Good flight instructors become so through study, experience, and hard work. Probably more than any other single factor, the flight instructor's own attitude toward flight instruction determines what kind of job he will do.

After the prospective flight instructor has acquired his rating, it is imperative that he make a continuous effort to stay abreast of the latest trends in aviation, regulations, and practices. This is extremely important for the flight instructor because aviation is not static, it is dynamic and changing, and what holds true today may not necessarily apply tomorrow. The flight instructor must keep himself informed about new techniques, new equipment, new procedures, and regulatory changes.

Knowledge and understanding are seldom gained quickly or easily. This is particularly true in the diversified field of instrument flight instruction. There can be no substitute for diligent study to attain basic knowledge, unremitting effort to develop competence, and continuous review to remain current in the many areas where technological change is the rule rather than the exception.

The purpose of this guide is to provide guidance to the applicant by outlining the scope of knowledge required. By using this guide the applicant is better able to intelligently direct his study plan. Because both are developed by the same personnel, there is a direct relationship between FAA written study guides and FAA written tests.

Certification Requirements

To be eligible for a Flight Instructor Certificate with an Instrument–Airplane rating, the certification process requires that the applicant pass a Flight Instructor Instrument–Airplane Written Test and a Fundamentals of Instructing Written Test. However, if the applicant already holds a valid FAA Flight or Ground Instructor Certificate which he acquired after passing a written test on Fundamentals of Flight Instruction or Ground Instructor Fundamentals, he is not required to take the separate test on Fundamentals of Instructing when applying for an additional instructor certificate or rating.

It is not necessary to take the Fundamentals of Instructing test on the same day as the Flight Instructor Instrument–Airplane Written Test and it is immaterial which test is taken first. The certification process also requires the applicant to pass a practical test in which he must demonstrate his competency to instruct students during instrument flight.

For *specific* information pertaining to flight instructor certification, review the applicable sections of Federal Aviation Regulations, Part 61 (revised), which became effective November 1, 1973.

Written Tests

The Flight Instructor Instrument–Airplane Written Test and the Fundamentals of Instructing Written Test are very comprehensive because, to be effective, they must test an applicant's knowledge in many subject areas. These areas include all subjects in which ground instruction is required for an airplane pilot instrument rating. In addition, the applicant must be knowledgeable in the areas of Fundamentals of Instructing such as the Learning Process, Elements of Effective Teaching, Student Evaluation, Quizzing and Testing, Course Development, Lesson Planning, and Classroom Instructing Techniques. These subject areas are incorporated in the appropriate written tests.

The Flight Instructor Instrument–Airplane Written Tests may contain as many as 100 test items and up to 5 hours are allowed for taking this test. The Fundamentals of Instructing Written Tests contain 50 test items and 3 hours are allowed for taking this test.

All test items are the objective, multiple-choice type, and can be answered by the selection of a single response. This type of test conserves the applicant's time when taking the test, permits greater coverage of subject matter, lessens the time required for scoring, and eliminates subjective judgment in determining grades.

Each item is independent of other test items. That is, a correct response to one test item does not

depend upon, or influence, the correct response to another test item.

After completing the test, the applicant's answer sheet is forwarded to the U.S. Department of Transportation, Federal Aviation Administration, Aeronautical Center for scoring by ADP computers. Shortly thereafter, the applicant will receive an Airman Written Test Report which not only includes his score but lists, in code, the subject areas in which he experienced difficulty. Those subject areas can be determined by reference to the *Subject Matter Outline* which accompanies the report. This method provides an essential feedback to the applicant and can be effectively used to strengthen his knowledge in weak areas.

Taking The Tests

Communication between individuals, through the use of words, is a complicated process. Since tests involve the use of written language, communication between the test writers and the persons being tested becomes a problem if care is not exercised. Considerable effort is expended to write each test item in a clear, precise manner. Therefore, applicants should carefully read the information and instructions given in the tests, as well as in each test item.

Always remember the following when taking the test:

1. There are no "trick" questions. Each statement means exactly what it says. Do not look for hidden meanings. The statement does not concern exceptions to the rule; it refers to the general rule.

2. Carefully read the entire test item, statement, or question before looking at the answers below it. Skimming and hasty assumptions can lead to a completely erroneous approach to the problem because of failure to consider vital words. Look through the list of alternative answers or phrases and select the one that answers the question fully and correctly.

3. Only one of the alternative answers given is completely correct. The others may be the result of using incorrect procedures to solve problems, common misconceptions, or incomplete knowledge of the subject. If the subject matter is understood correctly, answering the questions should not be difficult.

4. If considerable difficulty is experienced with a particular test item, do not spend too much time on it, but continue with other items which are considered less difficult. When easier items are completed, go back and complete the items which you found to be more difficult. This procedure will enable the applicant to use the total time available to maximum advantage in demonstrating knowledge and understanding of the subject.

RECOMMENDED STUDY MATERIALS

Professionalism in flight instruction is as important as it is in any field classified as a profession. To enhance professionalism in the field of flight instruction the prospective flight instructor should establish and maintain a current technical library. By obtaining study materials that are beneficial and appropriate to preparing for certification, the prospective flight instructor will be starting an aeronautical library for career use. The following lists essential reference materials but does not include all the useful material that is available. Other excellent textbooks, audio-visual training aids, and instructional materials produced commercially may be obtained from various bookstores and fixed-base operators engaged in flight training.

1. *Instrument Flying Handbook.* AC 61-27B ($3.35—GPO.) Catalog No. TD/4./8: In 7/2/971. Provides basic information for acquiring the knowledge necessary to fly by reference to instruments and to operate in the National Airspace System.

2. *Flight Instructor's Handbook.* AC 61-16A ($2.00—GPO.) Catalog No. TD 4.408: In 7/3. Gives guidance and information to pilots who are preparing for flight instructor certification and for use as a reference by certificated flight instructors.

3. *Aviation Instructor's Handbook.* [Available in the near future.] In the process of being developed to supplant Flight Instructor Handbook AC 61-16A. It is being designed to provide currently certificated flight and ground instructors and applicants for such certificates, with comprehensive, accurate, and easily understood information on learning and teaching, and to relate this information to the aviation instructor's task of conveying aeronautical knowledge and skill to his students.

4. *Flight Training Handbook.* AC 61-21. ($2.10—GPO.) Catalog No. FAA 1.8:F 64/4. Provides information and direction in the introduction and performance of training maneuvers for pilots who are requalifying or preparing for additional ratings, and for flight instructors. It also contains information relating to aerodynamics and aeromedical aspects of flight. This publication is being redeveloped and expanded for future availability.

5. *Pilot's Handbook of Aeronautical Knowledge.* AC 61-23A ($5.30—GPO.) Catalog No. TD 4.408:P 64/5. Contains essential, authoritative information used in training and guiding applicants for pilot certification, flight instructors, and flying school staffs.

6. *Airman's Information Manual (AIM).* Presents, in four parts, information necessary for planning and conducting flights within the National Airspace System. Besides providing frequently updated airport and NAVAID data, AIM includes instructional and procedural information, and is designed for use in the cockpit. Each Part is available on a separate annual subscription basis to better serve the needs of the individual pilot.

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

Part 2. *Airport Directory* (Annual Subscription $7.00, Foreign Mailing—$1.75 additional. GPO). Issued semi-annually. Catalog No. TD 4.14:pt. 2/.

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

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

7. *Aviation Weather.* AC 00-6. $4.00—GPO.) Catalog No. FAA 5.8/2: W37. Contains information on weather phenomena for pilots and other flight operations personnel whose interest in meteorology is primarily in its application to flying.

8. *Federal Aviation Regulations.* Suggested Parts for study are:

Part 1, Definitions and Abbreviations ($3.00 plus $0.75 additional foreign mailing. GPO.)

Part 23, Airworthiness Standards—Normal, Utility, and Acrobatic Category Airplanes. ($3.55 plus $0.90 additional foreign mailing. GPO).

Part 61, Certification: Pilots and Flight Instructors. ($5.05 plus $1.30 additional foreign mailing. GPO).

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

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

Part 95, IFR Altitudes, Volume XI. ($5.00 plus $1.25 additional foreign mailing. GPO.)

Part 97, Standard Instrument Approach Procedures, Volume XI. ($5.00 plus $1.25 additional foreign mailing. GPO.)

9. *National Transportation Safety Board. NTSB Part 430.* (Free.) This publication deals with required notification and reporting procedures relating to accidents and lost or overdue aircraft in the United States, its territories, and possessions. Upon request it is free of charge from the National Transportation Safety Board, Publications Unit, Washington, D.C. 20591.

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

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

10. *Wake Turbulence.* AC 90-23D (Free). Presents information on the subject of wake turbulence and suggests techniques that may help pilots avoid the hazards associated with wingtip vortex turbulence. Upon request, it is free of charge from the U.S. Department of Transportation, Publications Section, TAD-443.1, Washington, D.C. 20590.

11. *Instrument Rating (Airplane) Written Test Guide.* AC 61-8C ($1.45—GPO.) Catalog No. TD 4.8: In 7/4/972. Provides guidance for pilots who are preparing for the Instrument Rating (Airplane).

12. *Denalt Performance Computer (Fixed Pitch Propeller).* Safety Education Series No. 8. ($0.70 GPO. FAA d.8/2:C 73). A computer used to determine takeoff and climb performance, based on density altitude, in an airplane with fixed-pitch propellers. It is intended to supplement and *not* replace manufacturer's published performance information.

13. *Denalt Performance Computer (Variable Pitch Propeller).* Safety Education Series No. 8. ($0.70 GPO. FAA 5.8/2:C 73/2). A computer used to determine takeoff and climb performance, based on density altitude, in an airplane with variable pitch propellers. It is intended to supplement and *not* replace manufacturer's published information.

14. *Civil Use of U.S. Government Produced Instrument Approach Charts,* AC 90-1A. Describes and clarifies the Instrument Approach Charts.

15. *Flight Test Guide—Instrument Pilot (Airplane).* AC 61-56 ($0.55—GPO.) Catalog No. TD 4.408: In 7/2/973. A publication designed to assist the instrument pilot applicant in preparing for the Instrument Rating Flight Test. The instrument flight instructor should find this guide helpful in preparing students for the Instrument Rating Flight Test.

16. *Charts* for instrument navigation (see page 6 for ordering instructions).

(a) *En-route Low Altitude Charts and En-route High Altitude Charts.* ($0.50 each.) These charts provide the necessary aeronautical information for en-route instrument navigation.

(b) *Instrument Approach Procedure Charts.* (Available for ADF, VOR, and ILS approach—$0.15 per airport). These charts portray the aeronautical data which is required to execute instrument approaches to airports.

(c) *Low Altitude Area Charts.* ($0.50 each.) These charts supplement the Instrument Enroute Charts by giving departure, arrival, and holding procedures at principal airports.

(d) *Standard Terminal Arrival Routes (STARs)*Q. ($1.00 each.) This publication consists of Standard Terminal Arrival Routes and is designed for use with Enroute High, Low, and Area Charts.

(e) *Standard Instrument Departure (SIDs).* (Eastern $1.30 each and Western $1.85 each.) This publication consists of Standard Instrument Departures from Civil Aerodromes and is designed for use with En-route High, Low, and Area Charts.

17. *VFR and IFR Exam-O-Grams.* Brief, timely, and graphic articles developed and published on a continuing basis. They are nondirective in nature and are issued as an information service particularly to individuals interested in FAA Airman Written Tests. They relate to concepts, practices, and procedures critical to aviation safety, and assist in giving safety oriented information to airman applicants and practicing airmen. Exam-O-Grams are available free of charge but are limited to a single copy per request. Requests for placement on the mailing list should be addressed to:

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

18. *Airplane Flight Manuals and Owners Manuals.* Aircraft manufacturers issue manuals for each aircraft model. They may be obtained from individual aircraft manufacturing companies or from local dealers and distributors.

19. *Advisory Circulars.* The FAA issues Advisory Circulars to inform the aviation public in a systematic way of non-regulatory material of interest. Advisory Circulars in the following subjects are recommended for the Flight Instructor and can be obtained free of charge from:

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

Subject Number and Subject Matter

00	General
20	Aircraft
60	Airmen
70	Airspace
90	Air Traffic Control and General Operations
170	Air Navigational Facilities

HOW TO OBTAIN GPO PUBLICATIONS

1. Use an order form, not a letter unless absolutely necessary when ordering Government publications. Order forms (sample appears on page 93), which may be duplicated by the user, or may be obtained *free* upon request from:

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

2. Send separate orders for subscription and nonsubscription items.

3. Give the exact name, Advisory Circular identification number, and GPO catalog number when ordering publications.

4. Send a check or money order for the *exact* amount made out to the Superintendent of Documents, DO NOT SEND CASH. (Include an additional 25% of the total order price to cover postage for foreign mailing.)

5. If a letter is used to request publications enclose a self-addressed mailing label.

6. Use special delivery when needed.

7. All prices are subject to change. The latest *Advisory Circular Checklist and Status of Regulations,* AC 00-2 should be consulted for current pricing of publications. It is very important that the *correct* amount be enclosed with the order.

8. Several GPO bookstores have been established throughout the country for the sale of Government publications. GPO bookstores are located at the following addresses:

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Room 102A, 2121 Building
2121 Eighth Avenue North
Birmingham, AL 35203

GPO Bookstore
Federal Building, Room 1015
300 North Los Angeles Street
Los Angeles, CA 90012

GPO Bookstore
Federal Building, Room 1023
450 Golden Gate Avenue
San Francisco, CA 94102

GPO Bookstore
Federal Building
U.S. Courthouse, Room 1421
1961 Stout Street
Denver, CO 80202

GPO Bookstore
Room 100, Federal Building
275 Peachtree Street, NE
Atlanta, GA 30303

GPO Bookstore
Everett McKinley Dirksen Building
Room 1463, 14th Floor
219 South Dearborn Street
Chicago, IL 60604

GPO Bookstore
Room G25,
John F. Kennedy Federal Building
Sudbury Street
Boston, MA 02203

GPO Bookstore
Federal Office Building, Room 229
231 W. Lafayette Blvd.
Detroit, MI 48226

GPO Bookstore
Federal Building, Room 144
601 East 12th Street
Kansas City, MO 64106

GPO Bookstore
Room 110
26 Federal Plaza
New York, NY 10007

GPO Bookstore
Federal Office Building
201 Cleveland Avenue SE
Canton, OH 44702

GPO Bookstore
Federal Office Building, Room 171
1240 East Ninth Street
Cleveland, OH 44114

GPO Bookstore
Main Lobby
U.S. Post Office and Courthouse
Ninth and Chestnut Streets
Philadelphia, PA 19107

GPO Bookstore
Room 1C46, Federal Building
U.S. Courthouse
1100 Commerce Street
Dallas, TX 75202

GPO Bookstore
Federal Office Building, Room 1056
909 First Avenue
Seattle, WA 98104

GPO Bookstore
Federal Office Building, Room 190
517 E. Wisconsin Avenue
Milwaukee, WI 53202

GPO Bookstore
710 North Capitol Street NW
Washington, D.C. 20402

GPO Bookstore
(U.S. Department of Commerce)
14th and Constitution Avenue NW
Washington, D.C. 20230

GPO Bookstore
(USIA)
1776 Pennsylvania Avenue NW
Washington, D.C. 20547

GPO Bookstore
(U.S. Department of State)
21st and C Streets, NW
Washington, D.C. 20520

GPO Bookstore
(Pentagon)
Main Concourse, South End
Washington, D.C. 20310

GPO Bookstore
James Forrestal Building
Room 1-J-001
1000 Independence Avenue SW
Washington, D.C. 20407

Mail Orders may also be directed to:
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

CHARTS

The National Ocean Survey publishes and distributes Aeronautical Charts of the United States.

A "Catalog of Aeronautical Charts and Related Publications" which lists prices and information regarding distribution service may be obtained free, upon request, from:

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

Orders for specific charts or publications are made to the address given above and should be accompanied by a check or money order made payable to, "NOS, U.S. Department of Commerce".

STUDY OUTLINE

Fundamentals of Instructing

I. THE LEARNING PROCESS

A. Definition of Learning.

B. Characteristics of Learning.
1. Learning is purposeful.
2. Learning comes through experience.
3. Learning is multifaced.
4. Learning is an active process.

C. Laws of Learning.
1. Law of readiness.
2. Law of exercise.
3. Law of effect.
4. Law of primacy.
5. Law of intensity.
6. Law of recency.

D. How People Learn.
1. Perceptions.
2. Factors which affect perception.
3. Insights.
4. Motivation.

E. Levels of Learning.

F. Learning Skills.
1. Physical skills involve more than muscles.
2. Desire to learn.
3. Patterns to follow.
4. Perform the skill.
5. Knowledge of results.
6. Progress follows a pattern.
7. Duration and organization of lesson.
8. Evaluation versus critique.
9. Application of skill.

G. Forgetting and Retention.
1. Theories of forgetting.
2. Retention of learning.

H. Transfer of Learning.

I. Habit Formation.

J. Obstacles to Learning During Flight Instruction.

K. The Instructor's Role in Flight Training.

II. HUMAN BEHAVIOR

A. Control of Human Behavior.

B. Human Needs.
1. Physical needs.
2. Social needs.
3. Egoistic needs.
4. Self-fulfillment needs.

C. Defense Mechanisms.
1. Rationalization.
2. Flight.
3. Aggression.
4. Resignation.

D. The Instructor's Role in Human Relations.
1. Keep students motivated.
2. Keep students informed.
3. Approach students as individuals.
4. Give credit when due.
5. Criticize constructively.
6. Be consistent.
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A. Basic Elements of Communication Process.
1. Source.
2. Symbols.
3. Receiver.

B. Barriers to Effective Communications.
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2. Confusion between the symbol and the thing symbolized.
3. Overuse of abstractions.

IV. THE TEACHING PROCESS

A. Preparation.

B. Presentation.

C. Application.

D. Review and Evaluation.

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A. Organizing Material.
1. Introduction.
2. Development.
3. Conclusion.

B. Lecture Method.
   1. Types of lectures.
   2. Teaching lecture.
   3. Preparing the teaching lecture.
   4. Suitable language.
   5. Types of delivery.
   6. Use of notes.
   7. Formal versus informal lectures.
   8. Advantages and disadvantages of the lecture.

C. Guided Discussion Method.
   1. Use of questions in a guided discussion.
   2. Planning a guided discussion.
   3. Student preparation for a guided discussion.
   4. Guiding a discussion-instructor technique.

D. Demonstration–Performance Method.
   1. Explanation phase.
   2. Demonstration phase.
   3. Student performance and instructor supervision phases.
   4. Evaluation phase.

E. The "Telling and Doing" Technique in Flight Instruction.
   1. Instructor tells–instructor does.
   2. Student tells–student does.
   3. Student does–instructor evaluates.

F. Programed Instruction.

VI. THE INSTRUCTOR AS A CRITIC

A. Purpose of a Critique.

B. Characteristics of an Effective Critique.
   1. A critique should be objective.
   2. A critique should be flexible.
   3. A critique should be acceptable.
   4. A critique should be comprehensive.
   5. A critique should be constructive.
   6. A critique should be well organized.
   7. A critique should be thoughtful.
   8. A critique should be specific.

C. Methods of Critique.
   1. Instructor–student critique.
   2. Student–led critique.
   3. Small–group critiques.
   4. Individual student critique.
   5. Written critique.
   6. Self–critique.

D. Ground Rules For Critiquing.

VII. EVALUATION

A. Oral Quizzing.
   1. Characteristics of effective questions.
   2. Types of questions to avoid.
   3. Answering students' questions.

B. Written Tests.
   1. Characteristics of a good test.
   2. Written test items.
   3. Effective item writing.
   4. Principles to follow.

C. Performance Tests.
   1. Uses of performance testing.
   2. Demonstrations of piloting ability.

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B. Reasons for Using Instructional Aids.

C. Guidelines for Use of Instructional Aids.

D. Types of Instructional Aids.
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   2. Models.
   3. Charts.
   4. Projected material.

E. Future Developments.

IX. FLIGHT INSTRUCTOR RESPONSIBILITIES

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   2. Acceptance of the student.
   3. Personal appearance and habits.
   4. Demeanor.
   5. Safety practices and accident prevention.
   6. Proper language.
   7. Self-improvement.

B. Helping Student Pilots Learn.
   1. Providing adequate instruction.
   2. Demanding an adequate standard of performance.
   3. Emphasizing the "positive".

C. The Flight Instructor as a Practical Psychologist.
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   2. Normal reactions to stress.
   3. Abnormal reaction to stress.
   4. Instructor's actions regarding seriously abnormal students.

D. Student Pilot Supervision and Surveillance.

E. Flight Instructor Endorsements.

F. Flight Test Recommendations.

G. Airplane Checkouts.

H. Refresher Training.

X. THE INTEGRATED METHOD OF FLIGHT INSTRUCTION

A. Definition.

B. Objectives.

1. Development of habit patterns.
2. Accuracy of flight control.
3. Operating efficiency.
4. Emergency capability.

C. Procedures.

D. Precautions.

E. Flight Instructor Qualifications.

XI. PLANNING INSTRUCTIONAL ACTIVITY

A. Course of Instruction.

1. Determination of standards and objectives.
2. Identification of blocks of learning.

B. Syllabus.

1. Sample ground training syllabus.
2. Sample flight training syllabus.

C. Lesson Plan.

1. Characteristics of a well-planned lesson.
2. How to use a lesson plan properly.
3. Lesson plan items.

STUDY OUTLINE

Flight Instructor Instrument–Airplane

I. AERONAUTICAL TERMS. Refer to Federal Aviation Regulations, Part I, Airman's Information Manual, Part I, or other FAA publications.

II. PHYSIOLOGICAL FACTORS RELATED TO INSTRUMENT FLIGHT

A. Adjustment to the Flight Environment.
1. Ground habits vs. flight habits.
2. Individual differences in pilots.
3. Importance of physiological factors to the instrument pilot.

B. Reaction to the Body to Changes in Atmospheric Pressure.
1. Changes in altitude.
2. Aerotitis.
3. Aerosinusitis.

C. Reaction of the Body to Changes in Oxygen Partial Pressure.
1. Hypoxia.
a. Causes of carbon monoxide poisoning.
b. Effects of carbon monoxide poisoning.
c. Prevention and treatment if carbon monoxide poisoning occurs.

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

E. Sensations of Instrument Flight.
1. Body sensory systems involved in equilibrium.
a. Eyes.
b. Inner ear.
c. Skeletal muscles.
2. Sensory illusions in flight–vertigo–spatial disorientation.
a. Flight factors contributing to sensory illusions.
b. Flight factors contributing to visual illusions.
c. Combating sensory illusions.

F. Principles and Problems of Vision.
1. Reactions to illumination levels and techniques of seeing.
2. Instrument lighting.
3. Use of lights in adverse weather.
4. Lightning in thunderstorms.

G. Noise, Vibration, and Temperature.

H. Cabin Pressurization and Decompression.

I. Oxygen Equipment.
1. Requirements.
2. Types of oxygen.
3. Storage of oxygen.
4. Regulators and masks.

III. REGULATIONS AND ATC SYSTEMS AND PROCEDURES

A. Aircraft.
1. Required aircraft certificates and documents.
2. FCC station license.
3. Equipment and checks.
a. Required instruments and equipment for IFR flight.
b. Required VOR checks.
c. ADF checks.
d. ATC transponder requirements.
e. ATC transponder tests and inspections.
f. Altimeter system tests and inspections.
g. Automatic altitude reporting requirements.
h. Communication checks.
i. Portable electronic devices.
j. Emergency locator transmitter.
k. Supplemental oxygen.

B. Airman.
1. Pilot certificates and ratings required for IFR flight.
2. FCC radiotelephone operators permit.
3. Duration of certificates.

4. Instrument rating requirements.
5. Recent flight experience.
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7. Responsibility and authority of pilot-in-command.
8. Flight instructor records.
9. Flight instructor authorizations and limitations.
10. Renewal of flight instructor certificate.
11. Emergency action.
    a. Deviation from rules.
    b. Required reports.
12. Notification and reporting of aircraft accidents, incidents, and overdue aircraft.

C. Instrument Flight Rules.

1. Visual flight on VFR and IFR flight plans.
2. Information required on IFR flight plans and compliance with ATC clearances.
3. Standard takeoff and landing and alternate minimums, IFR.
4. Limitations on use of instrument approach procedures.
5. Minimum IFR altitudes.
6. IFR cruising altitudes/flight levels.
7. VFR on top operation.
8. Courses to be flown.
9. IFR, radio communications.
    a. Required reports.
    b. Other reports.
10. IFR, two-way radio communication failure.
11. Malfunction reports while IFR in controlled airspace.
12. Alternate airport requirements for IFR operations.
13. Fuel requirements for IFR operations.
14. Altimeter setting.
15. Aircraft speed.

D. Airspace and Airway Route System.

1. Controlled airspace.
    a. Control zones.
    b. Control areas.
    c. Continental control area.
    d. Positive control area.
    e. Transition areas.
    f. Jet advisory areas.
    g. Terminal control areas.
    h. Terminal radar service areas (TRSA).
2. Uncontrolled airspace.
    a. VFR and IFR requirements.
    b. IFR altitudes/flight levels.
3. Special use airspace.
    a. Prohibited areas.
    b. Restricted areas and climb corridors.
    c. Warning areas.
    d. Intensive student jet training area (ISJTA).
    e. Alert areas.
4. National security airspace.
    a. ADIZ.
    b. Scatana.
5. Other airspace areas.
    a. Airport traffic areas.
    b. Airport advisory areas.
    c. Temporary flight restrictions.
6. Victor (VOR) airways.
    a. Limits.
        (1) Width.
        (2) Base.
        (3) Top.
    b. Radials and bearings.
    c. Route identification.
        (1) Airway.
        (2) Military route.
        (3) Substitute route.
        (4) Unusable route.
    d. Altitude limits.
        (1) MOCA.
        (2) MEA.
        (3) MRA.
        (4) MCA.
        (5) MAA.
    e. Segment limits.
        (1) Mileage breakdown.
        (2) Minimum altitude change.
        (3) VOR change over points.
        (4) Altimeter setting boundary.
        (5) Time zone boundary.

E. Airport, Air Navigation Lighting, and Marking Aids.

1. Aeronautical beacons.
2. Airport rotating beacons.
3. Auxiliary lights.
4. Obstruction lights.
5. Daylight beacon operation.
6. Lighted traffic indicators.
7. Instrument approach light system.
8. Visual approach slope indicators (VASI).
9. Runway end identifier lights (REIL).
10. Airport runway marking.
11. In-runway lighting (centerline).

F. ATC Services Available to Pilots.

1. Automatic terminal information service (ATIS).
2. Ground control.
3. Clearance delivery.
4. Control towers (CT).
5. Departure control.
6. Air route traffic control centers (ARTCC).

7. Flight service stations (FSS).
8. Approach control (AC).
9. Terminal control area (TCA).
10. Jet advisory service.
11. Radar traffic information service.
12. Aeronautical advisory stations (UNICOM).
13. Traffic advisory practices at nontower airports.

IV. WEATHER

A. The Earth's Atmosphere
1. Composition.
2. Vertical structure.
3. The standard atmosphere.
4. Density.

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

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

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

E. Moisture.
1. Measurements.
   a. Relative humidity.
   b. Dewpoint.
2. Change of state.
3. Condensation and sublimation products.

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

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

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

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

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

K. Icing.
1. Structural ice formation.
2. Ice producing cloud types.
3. Accretion rate of in-flight structural icing.
4. Types and intensities of in-flight structural icing.
5. Effects of in-flight structural icing.
6. Structural aircraft icing and frost.
7. Structural anti-icing and de-icing.
8. Instrument and powerplant icing.

L. Thunderstorms.
1. Conditions necessary for thunderstorm formation.
2. Thunderstorm structure.
3. Classification of thunderstorms.
4. Thunderstorm hazards.
5. Thunderstorm information from radar.
6. Do's and don'ts of thunderstorm flying.
7. Tornadoes.

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

N. National Weather Service.

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

P. Weather Charts.
1. Weather depiction charts.
2. Surface weather charts.
3. Constant pressure charts.

4. Winds aloft charts.
5. Radar summary charts.
6. Prognostic surface and prognostic constant pressure charts.
7. Prognostic significant weather charts.

Q. Aviation Weather Forecasts.

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

R. Services to Pilot.

1. FSS briefing.
2. Enroute flight advisory service.
3. Transcribed weather broadcasts (TWEB).
4. Pilots automatic telephone weather answering service (PATWAS).

V. NAVIGATION

A. *Navigation Computer Operation.*

1. Calculator side.
   a. Time, speed, and distance.
   b. Fuel consumption.
   c. Conversions.
      (1) Scale: knots/mph.
      (2) Temperature: Celsius/Fahrenheit.
      (3) Time: hours/minutes/seconds.
      (4) Airspeed.
         (i) Indicated.
         (ii) Calibrated.
         (iii) Equivalent.
         (iv) True.
      (5) Altitude.
         (i) Indicated.
         (ii) True.
         (iii) Pressure.
         (iv) Density.
         (v) Standard.
2. Wind face side.
   a. Definitions.
      (1) Courses.
      (2) Headings.
      (3) Bearings.
      (4) Track.
   b. Wind triangles on the computer.
3. Practice problems.
   a. Time-speed-distance.
   b. Fuel consumption.
   c. True airspeed.
   d. Compressibility.
   e. Conversion.
   f. True headings and ground speeds.
   g. Drift corrections.
   h. Off-course corrections.
   i. Variation and deviation.
   j. Time and distance to radio stations.

B. Navigation Charts for Instrument Flight.

1. Area charts.
   a. Purpose.
   b. Legend.
2. Enroute low altitude.
   a. Purpose.
   b. Legend.
3. RNAV charts.
   a. Purpose.
   b. Legend.
4. Standard instrument departures (SIDs).
   a. Purpose.
   b. Legend.
5. Standard terminal arrival routes (STARs).
   a. Purpose.
   b. Legend.
6. Instrument approach procedure charts.
   a. Purpose.
   b. Legend.
   c. Civil radar instrument approach minimums.
   d. Nonstandard IFR takeoff minimums and departure procedures.
   e. Nonstandard IFR alternate minimums.

C. Radio Navigation.

1. Basic principles of air navigation radio aids.
   a. Low/medium frequency (L/MF) radio range.
   b. Nondirectional radiobeacon (NDB).
   c. VHF omnidirectional range (VOR).
   d. Distance measuring equipment (DME).
   e. Area navigation (RNAV).
   f. Class of NAVAIDS.
   g. Marker beacons.
   h. Instrument landing systems (ILS).
   i. Simplified directional facility (SDF).
   j. Maintenance of FAA NAVAIDS.
   k. NAVAIDS with voice.
   l. RADAR control.
   m. Air traffic control beacon system (ATCRBS).
   n. Surveillance radar.
   o. Precision radar.
2. Airport, air navigation lighting and marking aids.
   a. Aeronautical (light) beams.
   b. Rotating beacons.
   c. Auxiliary lights.
   d. Obstruction lights.
   e. Daylight beacon operation.
   f. Lighted tetrahedron and traffic indicators.

(2) Distances.
d. Estimated and actual groundspeed and time.
e. Alternate course of action.
4. Required information on flight plan.
a. Type of flight plan.
(1) Composite VFR-IFR.
(2) IFR.
b. Aircraft identification.
c. Aircraft type/special equipment.
d. True airspeed.
e. Point of departure.
f. Proposed time of departure.
g. Selection of initial cruising altitude.
h. Selection of route.
(1) Airways.
(2) Direct (off airway).
(3) Non-controlled airspace.
i. Destination airport and city.
j. Remarks.
k. Estimated time enroute.
l. Fuel on board.
m. Alternate airport if required.
n. Pilots name and address.
o. Number of persons aboard.
p. Color of aircraft.
5. Filing an IFR flight plan.
6. Determining possible delays.
7. Aircraft performance.
a. Takeoff distance.
b. Climb performance.
c. Cruise performance.
d. Landing distance.
8. Aircraft operating limitations.
a. Weight and balance.
b. Instrument limit markings.
c. Limiting placards.
d. Turbulent air penetration.
e. Maximum safe crosswinds.
9. Preflight action for aircraft.
a. Documents.
b. Equipment and systems.

G. Departure—IFR.
1. Pre-takeoff procedures.
a. Cockpit organization.
b. Communication.
(1) ATIS.
(2) Clearance delivery.
(3) Ground control.
c. Clearance acceptance.
d. Takeoff minimums.
2. Takeoff and departure procedures.
a. Communication.
(1) Tower.
(2) Departure control.
(3) Other.
b. Takeoff and takeoff denial.
c. Compliance with clearance.
d. Departure.
(1) Non-tower, non-radar airports.
(2) Radar vectors.
(3) Standard instrument departure.
e. Transition to enroute navigation.

H. En-route—IFR.
1. Procedures.
a. Compliance with clearance.
b. Normal navigation.
(1) Communication.
(2) Handoff.
c. Radar environment.
(1) Communication.
(2) Handoff.
(3) Use of transponder "IDENT".
d. Altitudes.
(1) Climbs/descents.
(2) VFR on top.
(3) Cruise.
(4) Maintain.
(5) Off-airways.
e. Delays.
(1) Clearance limit.
(2) Holding.
2. Weather in flight.
a. VFR/IFR.
b. Weather services.
(1) FSS scheduled and special broadcasts.
(2) Automatic (TWEBs).
(3) PIREPS.
c. Effects on changing pressure and/or temperature on flight instruments.
d. Effects of weather on aircraft performance.
e. Effects of weather changes on flight.
3. Deviations from flight plan.
a. Time/airspeed tolerances.
b. Cancellation of IFR flight plan.
c. Change in alternate, altitude, or route.
4. Advance information on instrument approach.

I. Arrivals—IFR.
1. Transitions to approaches.
a. Standard terminal arrival routes (STARs).
b. Radar vectors.
c. Normal navigation.
d. Holding.
e. Speed adjustments.
2. Communications.
a. Airport terminal information service (ATIS).
b. Airport advisory service.
c. Approach control.

d. Terminal radar service.
e. Radar traffic information.
f. Approach clearance.
g. Control tower.

3. Instrument approach procedures.
a. Types.
(1) ILS and LOC.
(2) VOR and VOR/DME (TAC).
(3) NBD (ADF).
(4) Radar.
(5) Timed.
(6) Visual.
(7) Contact.
(8) Parallel ILS.
(9) VHF/UHF direction finding.
(10) RNAV.
b. Approach minimums.
(1) Straight in.
(2) Circling.
(3) Inoperative components.
c. Radar monitoring.
d. Landing priority.
e. Visual approach slope indicator (VASI).
f. Missed approach.

J. Unusual Flight Conditions.
1. Wake turbulence.
a. Causes.
b. Avoidance.
2. Mid-air collision avoidance.
3. Emergency deviation.
a. Thunderstorms.
b. Icing.
c. Turbulence.
4. Communication failure.
a. Route procedure.
b. Altitude procedure.
c. Approach procedure.
5. Malfunction reports and equipment failure.
6. Distress assistance.
7. Lost procedures.
a. Emergency pattern for radar identification.
b. Communication VHF/UHF.
8. NTSB Procedural Regulations, Part 430, rules pertaining to notification and reporting of aircraft accidents, incidents, and overdue aircraft.
a. Immediate notification.
b. Manner of notification.
c. Reports.

SAMPLE TEST ITEMS WITH ANSWERS AND EXPLANATIONS

The first ten test items are included for one purpose—to familiarize applicants with the *type* of questions that he may expect to find in the tests required for a Flight Instructor Certificate with an Instrument-Airplane Rating. Keep in mind that these sample items contain only a few of the topics found on the FAA written test. It is for this reason that concentration of study on the subjects in the study outline "Fundamentals of Instructing" and study outline "Flight Instructor Instrument-Airplane" should be emphasized. A knowledge of all the topics mentioned in these outlines—not just the mastery of these sample test items—should be used as the criterion for determining that you are properly prepared to take the FAA written tests.

There are two tests involved in the certification process. One test examines basic knowledge in "Fundamentals of Instructing" and the other examines knowledge in "Flight Instructor Instrument-Airplane" subject matter. If the applicant for this certificate and rating already possesses a Flight Instructor Certificate he will not be required to take the "Fundamentals of Instructing" written test.

Fundamentals of Instructing

Written Test

1. Evoking "insights" as applied to learning is one of the flight instructor's major responsibilities. Insights as applied to learning—

   1—concern the ability of the student to discover the reason for a procedure or a maneuver he has learned.

   2—concern the analysis of the student by his instructor.

   3—pertain to the student's grasp of theoretical principles taught in ground school.

   4—involve the grouping of perceptions into meaningful wholes.

Correct answer 4. Instruction speeds the learning process by teaching the relationship of perceptions as they occur, and so promoting the development of insight by the student. The mental relating and grouping of associated perceptions is called insight.

2. Motivation is probably the dominant force which governs the student's progress and ability to learn. One of the more effective means of properly motivating a student is to—

   1—keep him aware of the progress and praise his good performance.

   2—assign him tasks which are somewhat beyond his ability.

   3—tell him that he will fail if he does not work.

   4—remind him of his final goal in order to keep his interest high.

Correct answer 1. In group instruction, praising and giving credit to students who have performed well not only encourages those praised, but also motivates others in the group to greater efforts. Negative motivations in the form of reproof and threats should be avoided with all but the most overconfident and impulsive students.

3. Reviews are an integral part of each lesson; before the completion of the instruction period, the instructor should recapitulate what has been covered during the lesson, in order to—

   1—identify the blocks of learning which constitute the necessary parts of the total objective.

   2—insure that the student is aware of his progress.

   3—emphasize the competitive nature of the learning situation.

   4—improve the students grades based upon the objectives and goals of the lesson plan and syllabus.

Correct answer 2. Review and evaluation are integral parts of each lesson. Before the completion of the instruction period, the instructor should recapitulate what has been covered during the lesson, and require the student to demonstrate the extent to which he has met the lesson objectives. The student should be aware of his progress and the advances and deficiencies noted at the conclusion of the lesson.

4. In a good instrument flight curriculum, the presentation of maneuvers should be arranged—

   1—in the order that they appear in the instrument flight syllabus.

2—in the order in which they would occur or be used in practical everyday instrument flying.

3—so that each teaches an extension of the principles learned in previous instrument maneuvers.

4—in any expedient order as long as no required instrument maneuvers are omitted.

Correct answer 3. Using the "building block" principle of teaching dictates that the presentation of maneuvers must be made in a sequence and at a stage of training where their association by the student with other maneuvers already learned will be assembled to form correct insights and provide mastery of advanced skills. A maneuver which incorporates the elements used in the preceding maneuvers and extends their application, or associates them with other flight elements, provides much more effective training than does a maneuver which is completely foreign to the preceding maneuver.

5. It is a major responsibility of the instructor to organize demonstrations and explanations so that the student will—

1—have better opportunities to understand the interrelationships of the many kinds of experiences he has perceived.

2—be able to learn through trial and error practice of the procedures.

3—experience a minimum amount of difficulty in memorizing the steps of a procedure.

4—be required to memorize the steps of a procedure and then practice until the performance becomes automatic.

Correct answer 1. It is essential to keep each student constantly receptive to new experiences, and to help him realize the way that each piece relates to all other pieces of the total pattern of the task to be learned. It is a major responsibility of the instructor to organize his demonstrations and explanations, and the directed student practice, so that the learner has better opportunities to understand the interrelationships of the many kinds of experiences he has perceived.

Flight Instructor Instrument–Airplane

Written Test

1. Accident reporting procedures are contained in—

1—Federal Aviation Regulations, Part 61.

2—Federal Aviation Regulations, Part 91.

3—National Transportation Safety Board, Safety Investigation Regulations, Part 430.

4—Federal Aviation Regulations, Part 63.

Correct answer 3. See NTSB, Safety Investigation Regulations, Part 430. All flight instructors should be familiar with rules pertaining to aircraft accidents, inflight hazards, overdue aircraft, and safety investigation.

2. A student asks: "Assuming other conditions remain the same, will an increase in relative humidity affect the takeoff distance or climb performance of an airplane?" A correct reply to this question would be—

1—"No, humidity has no effect on airplane performance."

2—"Yes, because the presence of additional water vapor in the air increases the effective horsepower of the engine and the thrust of the propeller."

3—"Yes, because the presence of additional water vapor in the air decreases air density; therefore the takeoff distance will be increased and the climb performance reduced."

4—"Yes, because the presence of additional water vapor in the air increases the air density; therefore the takeoff distance will be decreased and the climb performance improved."

Correct answer 3. Low atmospheric pressure, high temperature, and high humidity all result in a decrease in air density and an increase in density altitude. Contrary to prevailing opinion, moist air is less dense than dry air. Water vapor actually weighs less than dry air—approximately $\frac{5}{8}$ as much. Takeoff distance is increased and rate of climb is decreased because of the loss of engine power and propeller efficiency, and the higher true airspeed necessary to obtain the required lift in the thinner air.

3. Acceleration and deceleration errors of the magnetic compass will predominate on headings which are—

1—northerly and easterly.

2—easterly and westerly.

3—northerly and southerly.

4—southerly and westerly.

Correct answer 2. When flying on an easterly or westerly heading, it is important that a constant airspeed be maintained to get an accurate reading on the magnetic compass. If airspeed is increased, even though the airplane is moving straight ahead, the compass card will erroneously indicate a turn toward north. If the airspeed is decreased the compass will give an erroneous indication of a turn toward the south.

4. For maintaining level flight at constant thrust, which of the four pitch instruments would be the *least* appropriate for determining the need for a pitch change.

   1—Altimeter.

   2—Vertical speed indicator.

   3—Attitude indicator.

   4—Airspeed indicator.

Correct answer 3. The attitude indicator shows the attitude of the airplane in relation to the horizon but does not indicate whether the attitude needs to be changed in order to maintain level-flight. On the other hand, a change on the altimeter, vertical speed, or airspeed indicates that level flight is not being maintained and that the pitch attitude should be increased or decreased.

5. Which of the following IFR position reports made to the Indianapolis Center over Louisville VORTAC, while enroute to St. Louis via Evansville, contains all of the essential information and is given in the correct sequence?

   1—"STINSON FOUR ONE ONE TWO YANKEE, LOUISVILLE ZERO FIVE. SIX THOUSAND, EVANSVILLE FIVE SEVEN, ST. LOUIS."

   2—"STINSON FOUR ONE ONE TWO YANKEE, SIX THOUSAND, LOUISVILLE ZERO FIVE, INSTRUMENT FLIGHT PLAN, ST. LOUIS, EVANSVILLE FIVE SEVEN."

   3—"STINSON FOUR ONE ONE TWO YANKEE, LOUISVILLE ZERO FIVE, SIX THOUSAND, IFR ST. LOUIS, EVANSVILLE FIVE SEVEN."

   4—"STINSON FOUR ONE ONE TWO YANKEE, LOUISVILLE NOW, INSTRUMENT FLIGHT RULES. SIX THOUSAND EVANSVILLE FIVE SEVEN, ST. LOUIS."

Correct answer 1. The type of flight plan is not required in IFR position reports made direct to ARTC centers or approach control.

Additional Questions For Study

Answers and explanations are not included with the following questions. These questions are intended to direct study to selected areas, but by no means cover all subject areas.

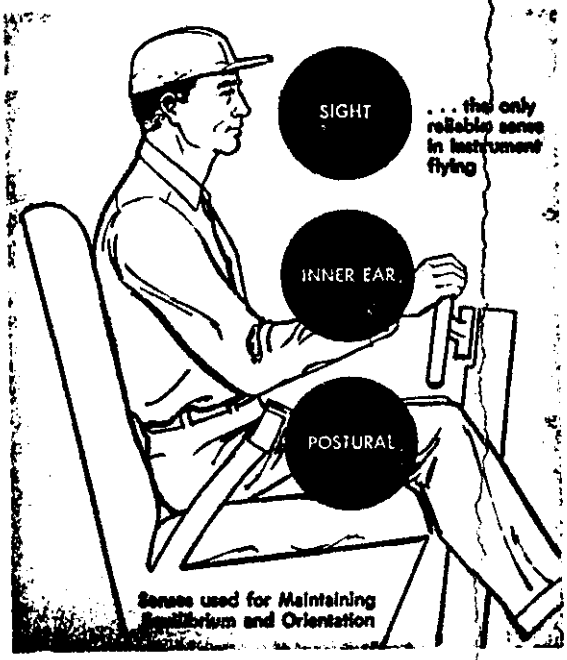
1. When has "learning" occurred?
2. Which force is probably most dominant in governing students progress and ability to learn?
3. The ability for the body to maintain equilibrium and orientation depends upon signals from what three primary sensory sources?
4. If you have not logged instrument time in the preceding thirteen months, what recent experience is required to act as pilot in command under IFR?
5. Under what conditions is an alternate airport required to be listed on an IFR flight plan?
6. If conditions are such that an alternate airport is not required to be listed on an IFR flight plan, what fuel reduction can be made for that IFR flight?
7. What emphasis by the pilot, should be placed on "Prognostic Surface Charts" during a preflight weather check?
8. What is the basic purpose of applying weather reports and forecasts to a proposed flight and analyzing the weather as the flight progresses?
9. If atmospheric instability exists what weather conditions can be expected?
10. Define the term "bearing" as it is applied to aerial navigation.
11. What effect does a change in air density have on airspeed?
12. How can time to the station be determined using the "double-the-angle-on-bow" method?
13. What effect would loss of the sense antenna have on the operation of an ADF receiver?
14. What methods can be used and what time limitations must be met for a VOR operational check required for IFR flight?
15. During straight-and-level flight at a constant airspeed, which instruments provide the most pertinent and essential information to indicate that you are maintaining this flight condition?
16. What are the three fundamental skills involved in all instrument flight maneuvers?
17. When using the vertical speed indicator as a rate instrument, what precautions should be taken?
18. How is a constant airspeed climb entered from cruising airspeed?
19. How is the rate of descent changed in a constant airspeed descent?
20. Do "Standard Takeoff Minimums" apply to all airports?
21. What route, altitude, and descent time should be adhered to in the event of two-way radio communications failure while operating under IFR in IFR weather conditions?

22. Is cancellation of an IFR flight plan permissible if operating in VFR conditions on top of an overcast?
23. What voice reports are required by regulation when operating IFR?
24. What approach minimums apply at an alternate airport after a missed approach has been executed at a destination airport?
25. What are the restrictions when changing altitudes during IFR flight?
26. Is ATC approval always required during IFR flights when deviating from assigned routes?
27. What is the difference between a contact approach, visual approach, and timed approach from a holding pattern?
28. Does a clearance for an instrument approach constitute a clearance to land at that airport?
29. At some airports where the final approach course coincides with Precision Approach Radar, under what conditions will ATC monitor the approaches and furnish advisories to the pilot?
30. Assume that you have been given a vector to intercept the localizer for an ILS approach, but you have not been cleared for the approach. If during this time the localizer needle begins to center, indicating that you are approaching the localizer, is it permissible to turn and follow the localizer inbound?
31. After executing a precision approach, is it permissible to circle the airport for a landing?
32. Is it permissible to pass over an airport or runways of that airport during "circling to land" after executing an approach?
33. At what point is a descent from MDA permitted during a circling approach?
34. If straight-in minimums are not published, is it permissible to land straight in?
35. What missed approach procedure should be followed at locations where ATC radar service is provided?

APPENDIX

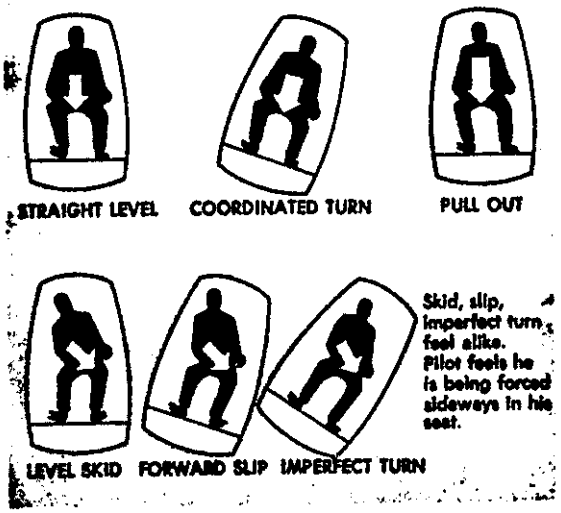
The appendix contains selected illustrations to familiarize applicants with certain material pertaining to instrument flight instruction, and to encourage further study in these subject areas. Because certain data may become obsolete, *under no circumstances* should any information herein be used for operational purposes.

APPENDIX A
SENSATIONS OF FLIGHT



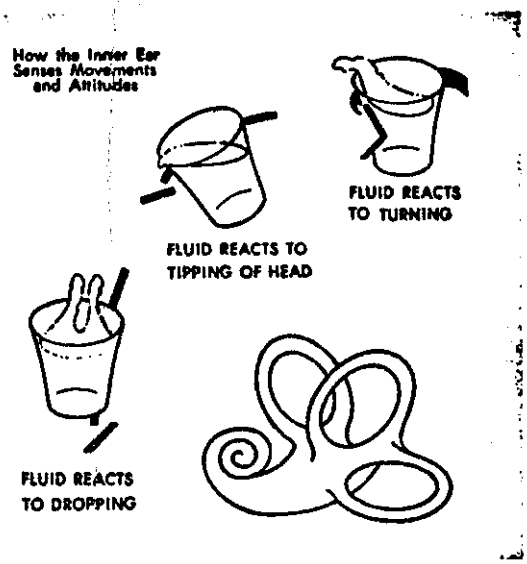
Sight—the only reliable sense during instrument flying.

Figure 1



Sensations felt from centrifugal force.

Figure 2



The inner ear and motion sense.

Figure 3

APPENDIX B
AERODYNAMICS

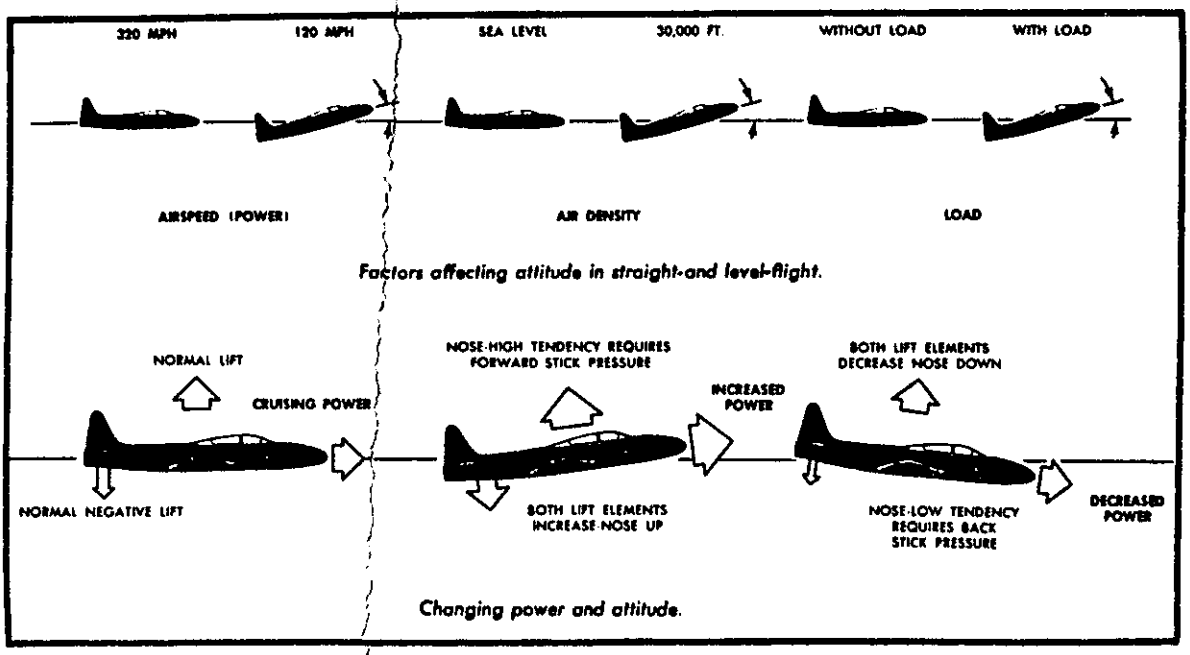


Figure 4

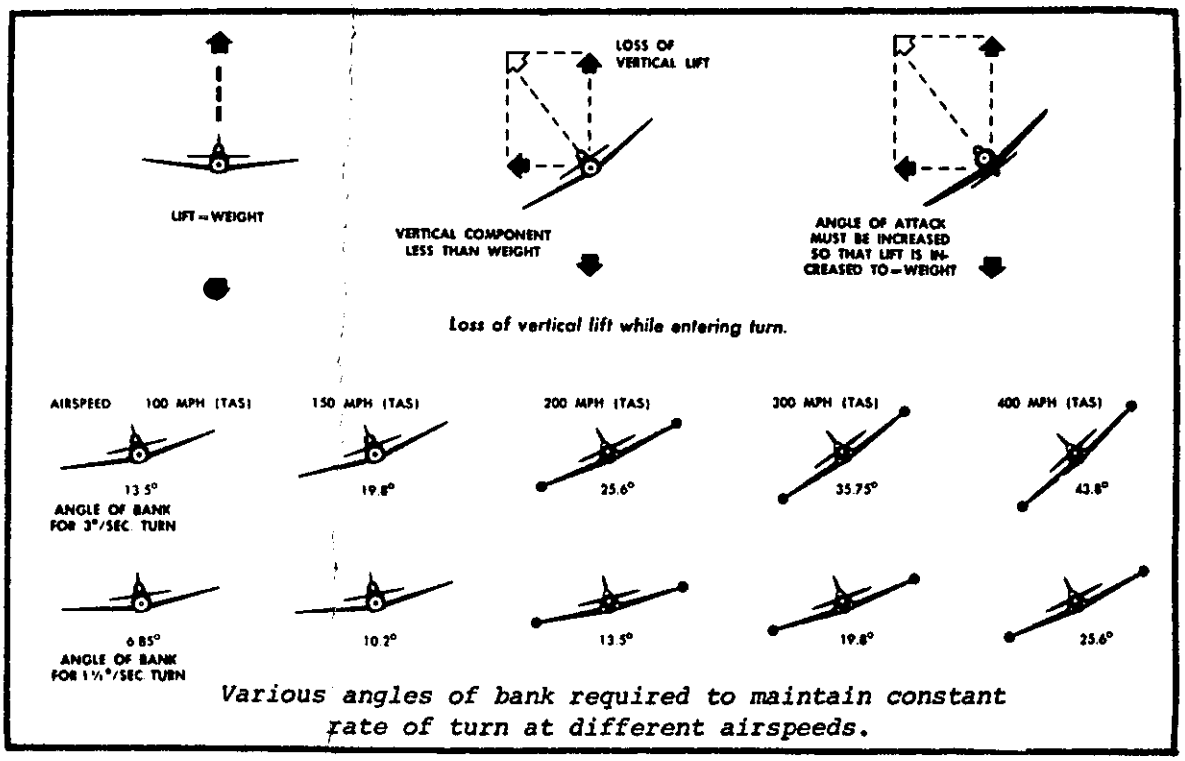


Figure 5

APPENDIX C

ATTITUDE FLYING

SOME TIPS FOR TEACHING ATTITUDE FLYING

The pilot should know the approximate attitude (using either or both inside and outside visual references) for control of the aircraft. He should also know the approximate power settings required to attain the desired performance.

● 1. ELEVATOR AND THROTTLE. (Pitch and power control.)

a. There are only two basic power conditions for flight. They are:

(1) Power is variable. (Adjustable)
(2) Power is fixed. (By choice or by accident.)

b. When power is variable and available for the purpose of controlling speed, then:

POWER CONTROLS SPEED
and
ELEVATOR CONTROLS ALTITUDE OR RATE. (Vertical Velocity)
(Note: A constant altitude equals ZERO rate.)

EXAMPLES:

(1) LEVEL FLIGHT.
Power controls speed.
Elevator controls altitude.
(2) RATE CLIMBS AND DESCENTS. (V/V and A/S constant.)
Power controls speed.
Elevator controls vertical velocity. (Rate)
(3) ILS APPROACH
Power controls speed.
Elevator controls vertical velocity. (Glide Path)

c. The conditions under which power IS NOT variable or available to control speed, are:

(1) When the power is fixed.
(2) When the power is in transit.

EXAMPLES:

(1) When the throttle is closed or the engine fails.
Elevator controls speed.
Power is fixed. (This is a constant A/S descent.)
(2) When using full throttle on take off.
Elevator controls speed.
Power is fixed. (This is a constant A/S climb.)
(3) The power is in transit when transitioning from one specified maneuver to another, e.g., the initial interception of the glide slope.

● 2. BANK CONTROL.

The bank attitude of the aircraft (including zero bank) is controlled by use of the ailerons.
Proper use of the rudder will prevent yawing and slipping.
In the statements below, coordinated flight is assumed.

a. During straight flight.
Control the desired heading with the ailerons.
b. During turn entries and recoveries.
Increase or decrease bank to the desired angle with ailerons.
c. During an established turn.
Control the rate of turn and the angle of bank with ailerons.

Figure 6

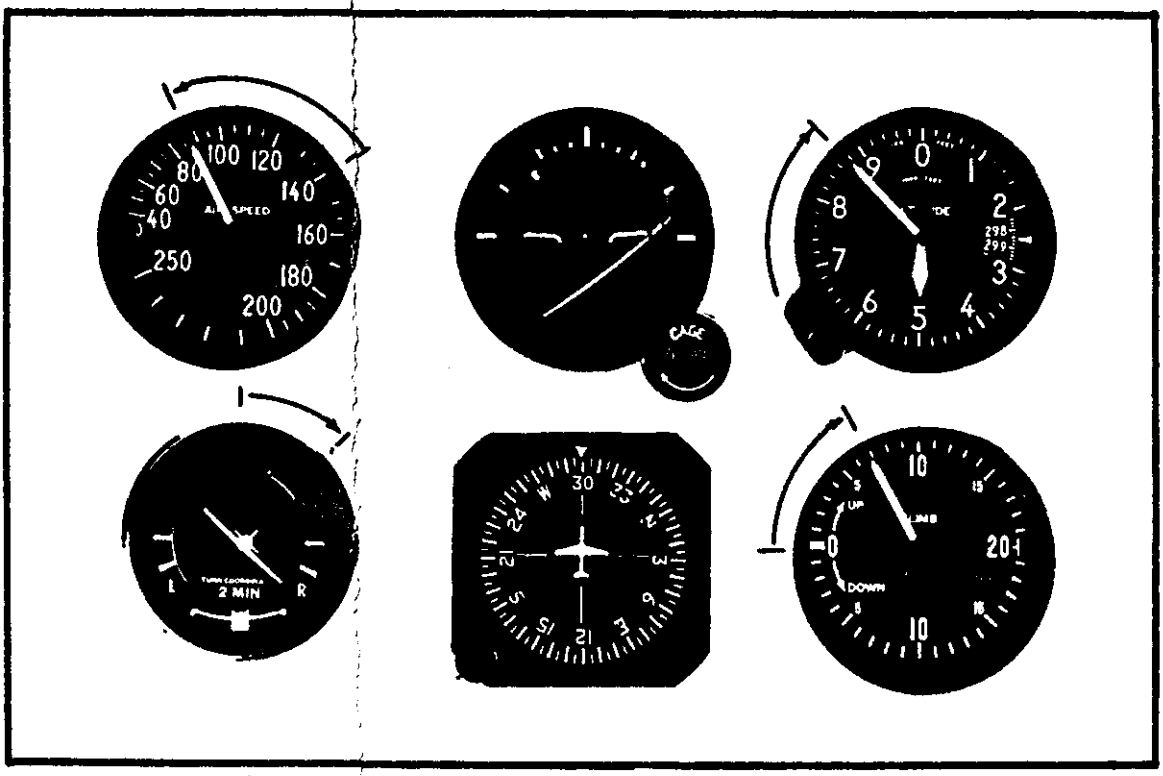


Figure 7

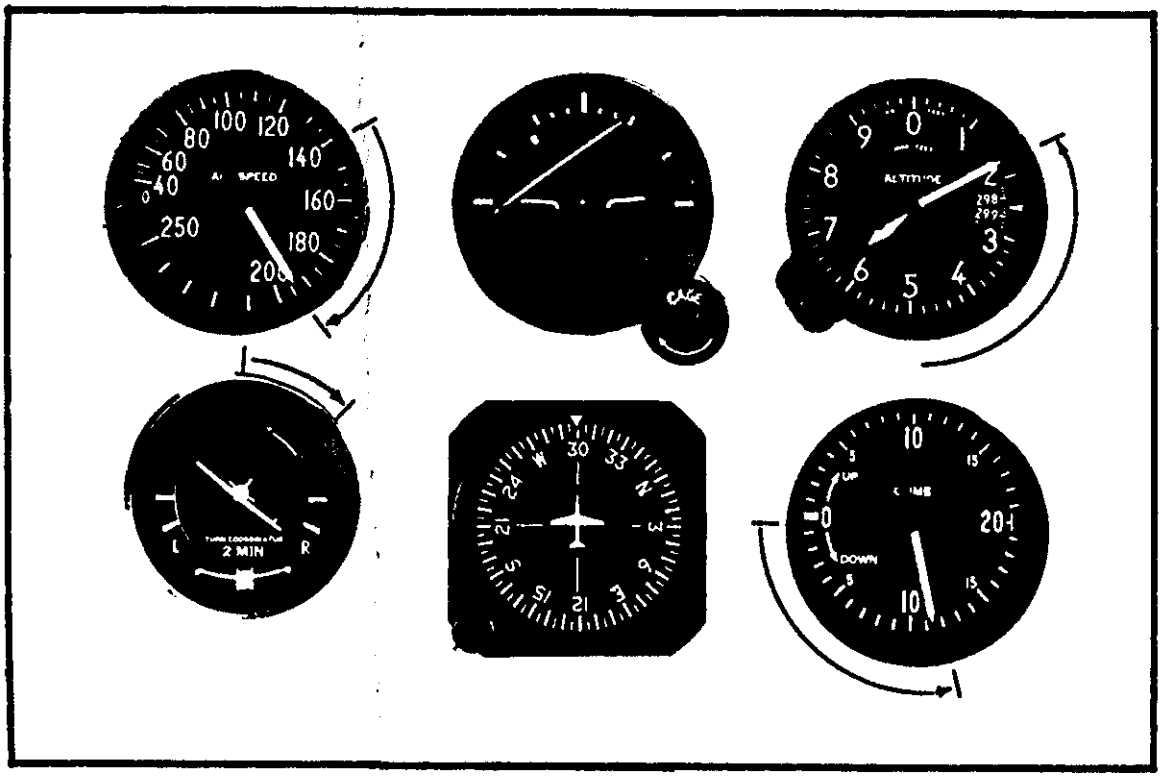


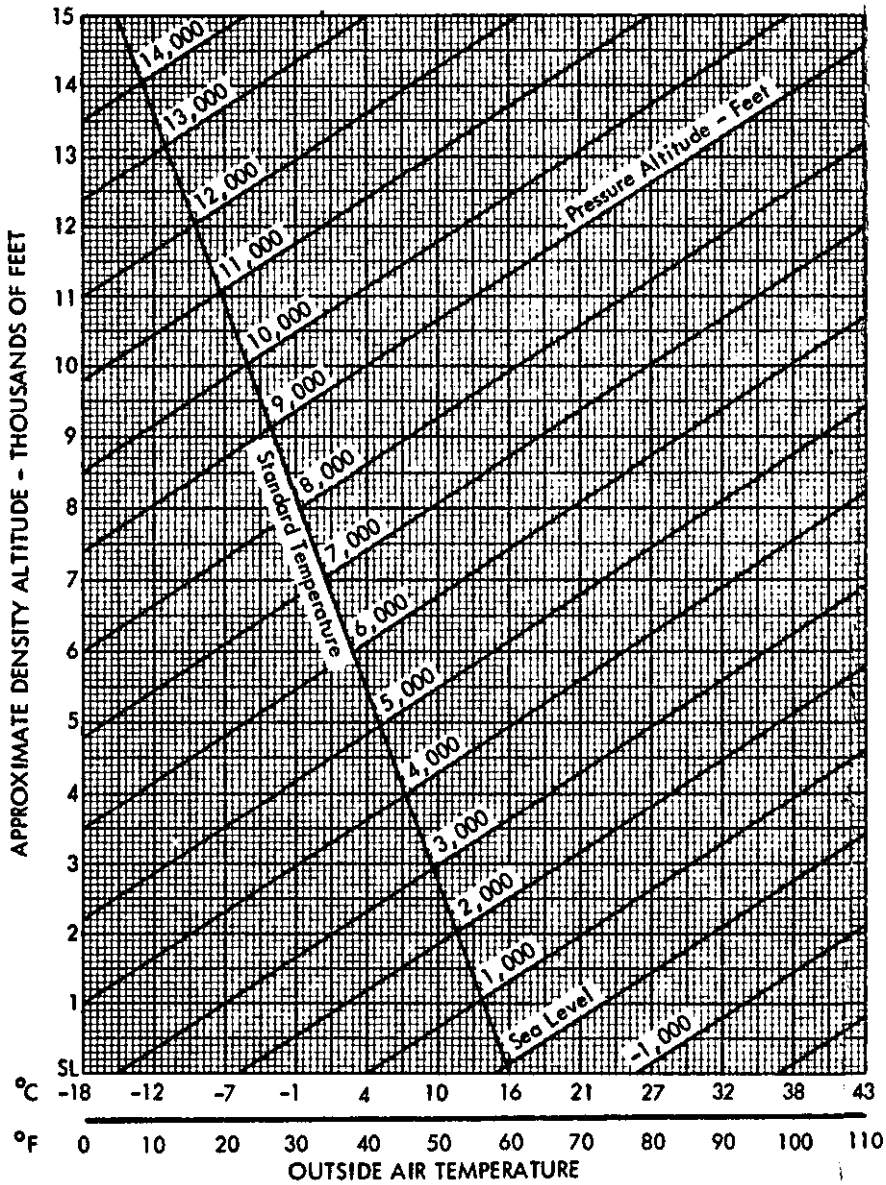
Figure 8

APPENDIX D

OPERATION AND PERFORMANCE

PRESSURE ALTITUDE AND DENSITY CHART

Set Altimeter to 29.92 In. Hg.
When Reading Pressure Altitude



Altitude Setting in Hg.	Altitude Correction
28.0	1,825
28.1	1,725
28.2	1,630
28.3	1,535
28.4	1,435
28.5	1,340
28.6	1,245
28.7	1,150
28.8	1,050
28.9	955
29.0	865
29.1	770
29.2	675
29.3	580
29.4	485
29.5	390
29.6	300
29.7	205
29.8	110
29.9	20
29.92	0
30.0	-75
30.1	-165
30.2	-225
30.3	-350
30.4	-440
30.5	-530
30.6	-620
30.7	-710
30.8	-805
30.9	-895
31.0	-965

Figure 9

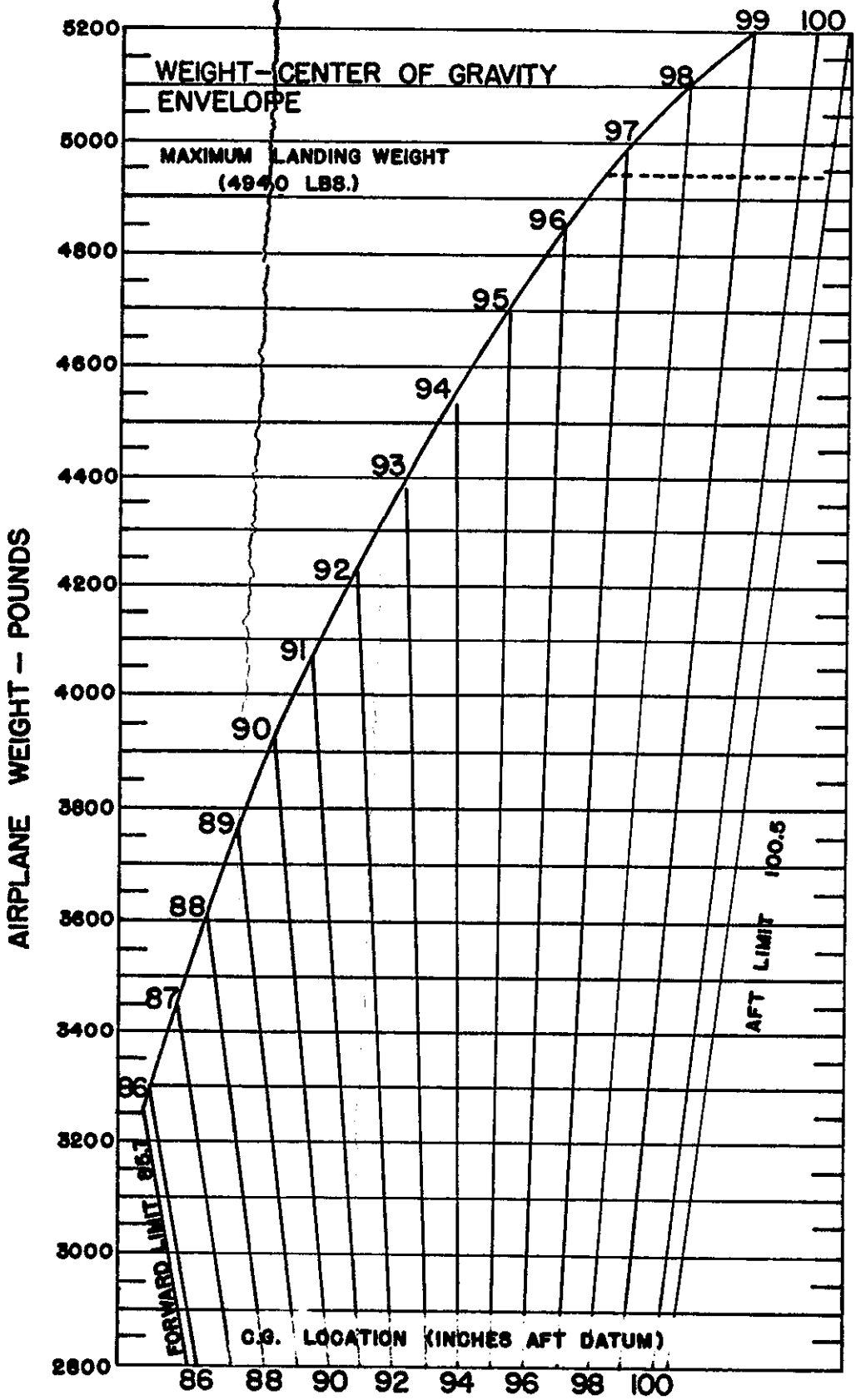

WEIGHT-CENTER OF GRAVITY ENVELOPE
MAXIMUM LANDING WEIGHT (4940 LBS.)
AIRPLANE WEIGHT — POUNDS
C.G. LOCATION (INCHES AFT DATUM)
FORWARD LIMIT 86.1
AFT LIMIT 100.5
5200
5000
4800
4600
4400
4200
4000
3800
3600
3400
3200
3000
2800
86
88
90
92
94
96
98
99
100

Figure 10

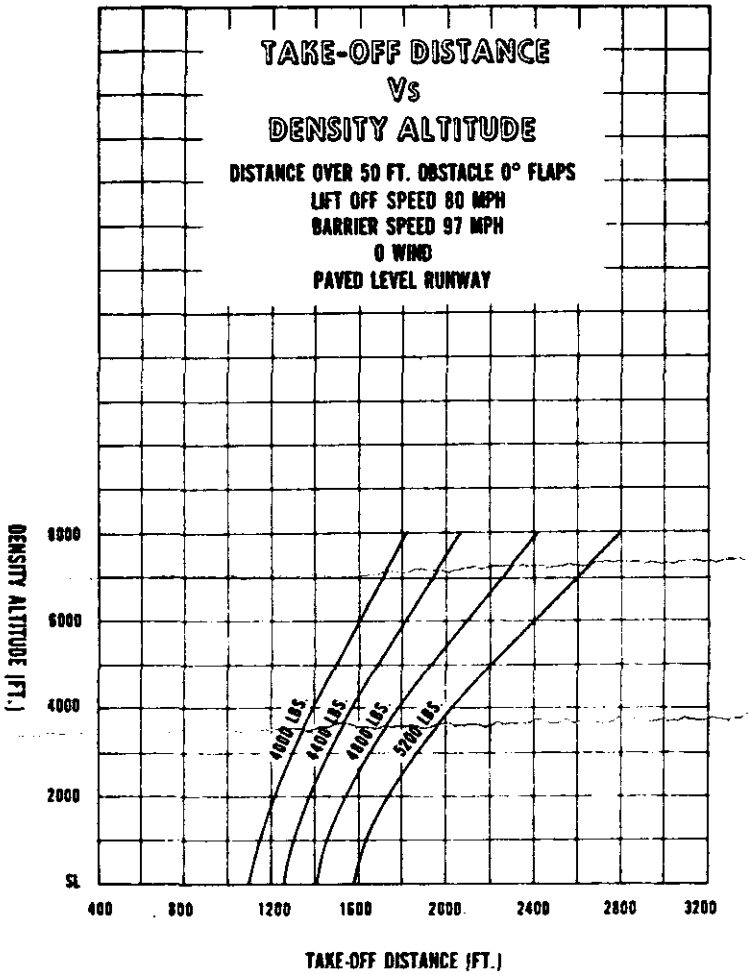


Figure 11

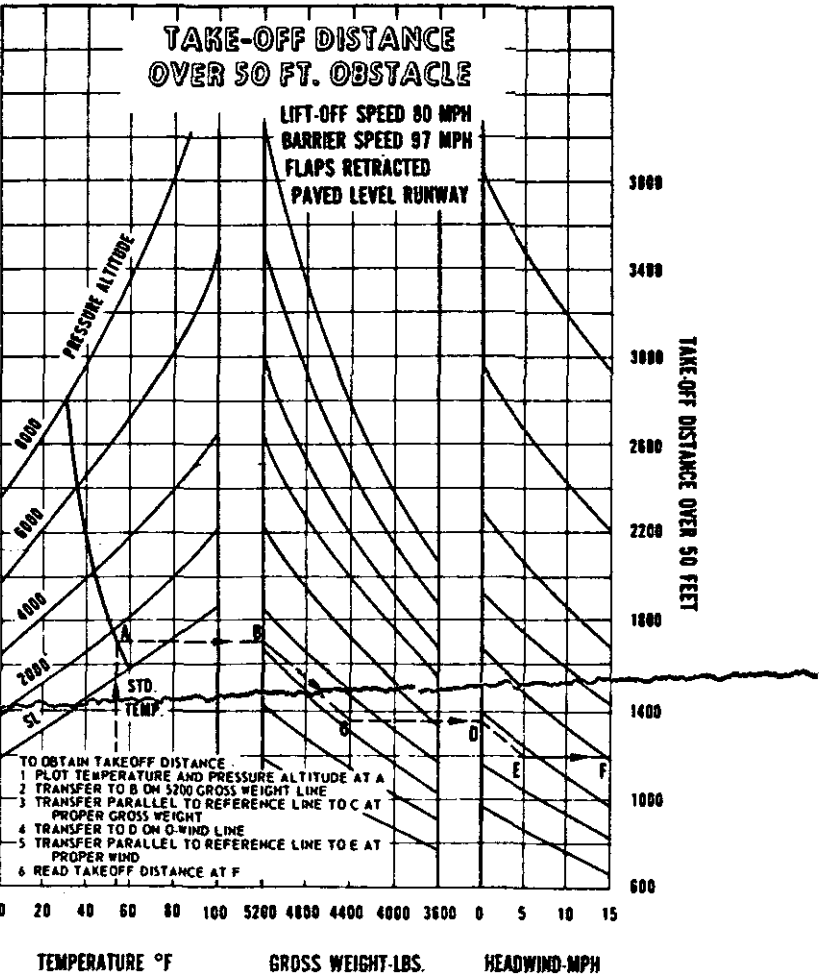


Figure 12

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 3400 Pounds

5000 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	*64 GAL(NO RESERVE) ENDR. HOURS	*64 GAL(NO RESERVE) RANGE MILES	89 GAL(NO RESERVE) ENDR. HOURS	89 GAL(NO RESERVE) RANGE MILES
2500	24	76	187	15.8	4.1	760	5.6	1055
	23	72	184	15.0	4.3	785	5.9	1090
	22	68	180	14.2	4.5	815	6.3	1130
	21	64	176	13.4	4.8	840	6.6	1165
2400	24.5	73	185	15.2	4.2	775	5.8	1080
	23	67	180	14.1	4.5	815	6.3	1135
	22	64	176	13.4	4.8	840	6.6	1165
	21	60	171	12.7	5.1	865	7.0	1205
2300	24.5	68	181	14.3	4.5	810	6.2	1125
	23	63	175	13.3	4.8	845	6.7	1175
	22	60	171	12.6	5.1	870	7.1	1210
	21	56	166	11.9	5.4	890	7.5	1240
2200	24.5	64	176	13.4	4.8	840	6.6	1165
	23	59	170	12.4	5.1	875	7.2	1215
	22	56	165	11.8	5.4	895	7.5	1245
	21	52	160	11.2	5.7	915	8.0	1275
	20	49	154	10.6	6.1	935	8.4	1300
	19	46	148	10.0	6.4	950	8.9	1320
	18	42	140	9.3	6.8	960	9.5	1335
	17	39	131	8.7	7.3	960	10.2	1330

*These columns show, for comparative purposes, typical reduced fuel load conditions.

Figure 13

CRUISE PERFORMANCE

NORMAL LEAN MIXTURE

Standard Conditions — Zero Wind — Gross Weight- 3400 Pounds

7500 FEET

RPM	MP	% BHP	TAS MPH	GAL/ HOUR	*64 GAL(NO RESERVE) ENDR. HOURS	*64 GAL(NO RESERVE) RANGE MILES	89 GAL(NO RESERVE) ENDR. HOURS	89 GAL(NO RESERVE) RANGE MILES
2500	22.5	71	190	14.9	4.3	815	6.0	1135
	21	65	183	13.7	4.7	855	6.5	1190
	20	61	178	12.9	5.0	880	6.9	1225
	19	57	173	12.2	5.3	910	7.3	1260
2400	22.5	67	185	14.1	4.5	840	6.3	1170
	21	62	178	13.0	4.9	880	6.9	1225
	20	58	173	12.3	5.2	905	7.3	1260
	19	54	167	11.6	5.5	925	7.7	1290
2300	22.5	63	180	13.2	4.8	870	6.7	1210
	21	58	173	12.2	5.2	905	7.3	1260
	20	54	167	11.5	5.6	930	7.7	1290
	19	51	161	10.9	5.9	945	8.2	1315
2200	22.5	59	175	12.4	5.2	900	7.2	1250
	21	54	167	11.5	5.6	930	7.7	1290
	20	51	161	10.9	5.9	945	8.2	1315
	19	47	154	10.2	6.2	965	8.7	1340
	18	44	146	9.6	6.6	975	9.2	1355
	17	41	137	9.0	7.1	970	9.9	1350

*These columns show, for comparative purposes, typical reduced fuel load conditions.

Figure 14

ALTITUDE CONVERSION

EXAMPLE: IF AMBIENT TEMP. IS 80 °F AND PRESSURE ALT. IS 4000 FEET, THE STANDARD ALT. IS 6000 FEET AND $1/\sqrt{\sigma}$ IS 1.093

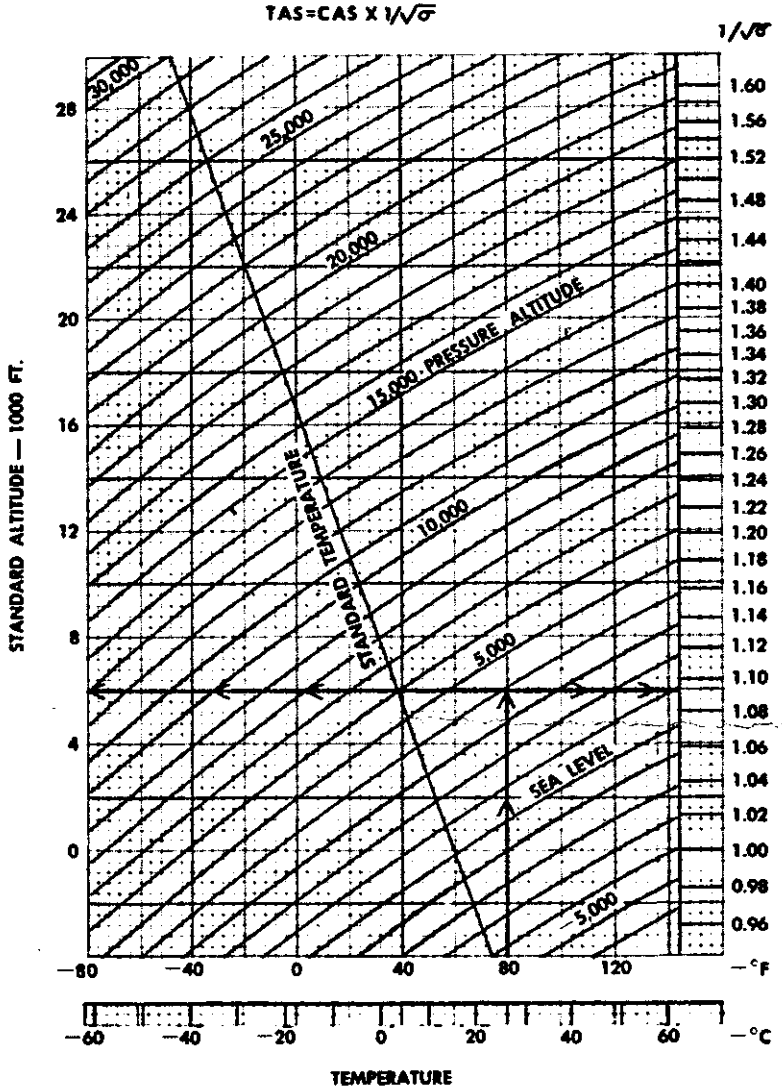


Figure 15

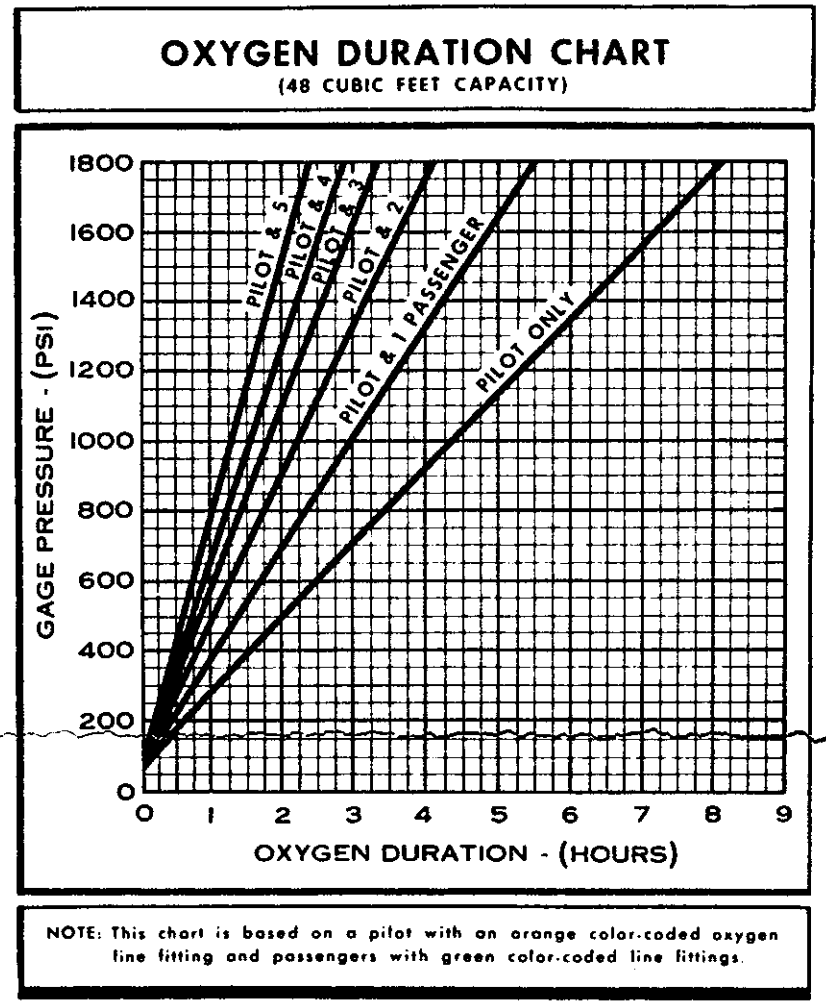


Figure 16

FLIGHT TIME ANALYSIS

CHECK POINTS		ROUTE CRUISE ALT./FLT. LEVEL	Mag Avg Course	AIRSPEED-KTS.		WINDS ALOFT DIRECTION VELOCITY TEMPERATURE	DRIFT CORR ANGLE	GROUND SPEED	DISTANCE N.M.	TIME		FUEL CONSUMPTION LBS./GALS.		MISC.
FROM	TO			EAS OR MACH NO.	TAS					LEG	TOTAL	LEG	TOTAL	
Stapleton Airport	Byers	Radar Vector	---	---	---	-------	---	---	---	12.0	12	50*	50	*Includes taxi and warm up.
Byers	TXC	VL4 9000	083		175	**								
TXC	SLN	"			"									
SLN	MKC	"	078°		"									
MKC	K.C. Muni	-----	---	---	---	-------	---	---	---	4.8				

ALTERNATE DATA

KC Muni	MKC	-----	---	---	---	-------	---	---	---	7.0	7.0			
MKC	SLC				172	Mag. Wind 220°=11 kts								

FUEL SUMMARY

	TIME	LBS./GALS.
ENROUTE		
ALTERNATE		
RESERVE		
EXTRA		
TOTAL		

** Obtain wind aloft from 12 hr. upper wind prog., Figure 8. Use average of DEN and HLC winds for flight to Salina (SLN), use average of HLC and MKC winds for flight from Salina to Kansas City. Use fuel burn of 143 lb/hr unless fuel burn is shown on Flight Time Analysis.

Figure 17

APPENDIX E
WEATHER

```
     SA21 031800
MLC SP A14030@2RW-F 078/63/59/1407/978/RB30 CIG RGD/ 71903 59 UA 1744
20 SO MLC RW+ MDT TURBC 30 C210
ADM SP M60@45@4RW-F 63/62/1312/972/RB50 / IR84102 61
DAL SP M100@15@5RW--F 69/67/1510/969 PCPN INTMT PRESFR ///00 62
FTW SP M16@1RF 68/65/1810/969→FTW↘9/22 10/6 10/9 11/26
GSW SP M10@7RW- 052/68/68/1715G23/970/TB16E46 MOVD NE PRESFR
PK WND 17/23 52 RW- OCNL RW
AC
CLL E157-9↖476/78.1818G26/977/ 827 62→CLL↘11/20
TPL 90E20@8 73/68/2220/971/ RE30
LFK SP A3@4F 089/72/68/1012/980/PRESFR CIG RGD/ 83441 61
TYR M18@10 72/67/1820/977 ///03 60
GGG M11@17@7 68/64/1310/982/ ///73 59
OKC M12@10 052/63/57/1411/970 UA 1743 TUL-OKC LGT TURBC 20 CSNA UNK
TUL M20@10 082/66/56/1415/978/PRESFR
PNC E15@10 07↑@65/56/1510/976/ 729 56
ACT M20@35@10IRW- 055/72/66/1916G24/970/ T W-N MOVG E B26
PK WND 17/34 39 RB12


   SA NEAR WEST 031802
SPS 70@250@10 055/57/50/2822/971/CB NE-E TB01E21 RB01E10 PK WND
25/34 03→SPS↘11/2
HBR SP 10@B13@25@10 041/53/51/2414/967/RE40 WSHFT 1748/ 81407 53VI
GAG E4@10@7TRW-- 082/35/33/3518/977/ T E MVG E/ 20781 35
CDS 50@90@E250@12 054/51/38/3315G24/971/ 81402 45→CDS↘11/11
MAF 110@250@20+ 080/52/20/2817/984→MAF↘9/3 12/1
LBB
AMA M7@5S--F 072/36/33/3614/977/SB38
DDC SP M4@2ZRW-F 115/32/28/0115/987/UA 1757 DURGD DDC MDT RIME ICG BLO
50 BE99
GCK S B6@50@4L-F 119/33/30/0216/987/ 81529 33→GCK↘11/7
DHT W2X3/16S-BSF 090/30/30/3520/981/ 72028 90402 29→DHT↘12/1
TCC W0X1/4SBSF 119/32/32/0225G35/988/ 21006 32 ↘ 0401
HOB 400120@250@25 39/17/3018/984
INK 250-@10+ 107/51/21/2715G24/990/ FEW CU/ 000 43
CSM M5@7 58/M/1514/966
```

Figure 18

```
     SA21 031900
MLC SP B11030@3RW--F 062/62/59/0605/973/TE47 MOVD NE NO GSIS CIG RGD
ADM M3@1TRW-F 63/62/1415/966/TB22 S MOVG N PK WND 12/18 22
DAL M10@15@5RW-F 70/67/1710G19/963 PRESFR
FTW M17@100@300@7 67/63/2713G28/966/RE25 WND SHFTD GRDLY-FTW>9/22 10/6
10/9 11/26
GSW 5@E20@70@12TRW- 058/63/63/2511/966/ TB15 N-E-S MOVG NE OCNL
LTGICCG PK WND 24/30 33 BINOVC PRES UNSTDY RE03B19
ACT 25@E40@12 048/68/58/2614/968/ TE24 N MOVD NE TCU NE-SE
PK WND 23/26 15 RE15 WND 220V300
CLL E15@7 060/74/71/1810/971/RB45RE55 PRESFRF/-CLL>11/20
TPL E25@10 63/55/3015/969
LFK SP E5@7 072/72/67/1210/975
M20@10 73/67/1815/970
GGG SP M7@16@7 69/65/1315/975
OKC M15@12 027/65/57/1612/963/PRESFR CIG RGD
TUL M24@10 064/67/57/1416/973 UA 1844 RVS @50-55.  VCNTY
    OKM MDT RW ALQDS MOVG N
PNC E13@10 048/54/56/1414/969/ PRESFR

   SA NEAR WEST 031902
SPS E70@250@10 051/60/>0/2618/970-SPS>11/2
HBR SP 15@25@25@@12 029/55/53/2>14/964
GAG S A5@12R- 072/35/33/0322/974/PK WND 01/22 55/UA 182> GAG-OKC
28@35 E65@ ABV TOPS UNKN
CDS 5@@25@@12 049/55/38/3212G20/969-CDS>11/11
MAF 45@25@@20+ 075/53/20/2818/983-MAF >9/3 12/3
LBB 17@E200@15 046/>1/33/3>13/973-LBB>11/22
AMA SP M6@10@5L--S--F 059/36/34/0117G27/973
DDC SP M5@3ZRW-F 104/32/27/E021>G2>/983
GCK SP A8@>0@>ZL-F 108/33/30/0215/984/LEZLB4> @V@-GCK>11/7
DHT W2X3/16S--BSF 082/31/31/3520G30/978-DHT>12/1
TCC W@X1/4SF 115/32/31/3612G25/987
HOB E4@@25@@25 43/18/3120G30/982 TCU NW-N
INK 5@@25@@10@+ 098/54/20/2617/987
CSM SP 10@E10@@7 49/M/3015G24/963


ADM SP 2008 30@M37@10TRW-- 2614/964/T NE MOVG NE RW+ NE

OKC SP 2010 7@M35@5@@8RW- 2010/958/CB NE-SE MOVG NNE BINOVC W
```

```
-NOSUM 031928
 E-FTW 9/22 DFW ARPT CLSD
E-FTW 10/6 DFW GP 17L-35R OTS
E-FTW 10/9 9-27 CLSD
E-FTW 11/26 F54 16-34 CLSD TIL 12/26
E-CLL 11/20 ILS BC 16 OTS

-NOSUM NEAR WEST 031928
E-SPS 11/2 LAW 1ST 1000 35 CLSD
E-CDS 11/11 RWY LGTS PPO
-MAF 9/3 E02 16-34 CLSD
-MAF 12/3 LOC OTS 19-2100
E-LBB 11/22 THR 8 DSPLCD 550
E-GCK 11/7 LBL THR 21 DSPLCD 1280
-DHT 12/1 GUY NDB OTS
```

Figure 19

FA031240
GSW FA 031240
13Z MON-07Z TUE
OTLK 07Z TUE-19Z TUE

NMEX OKLA TEX AND CSTL WTRS

HGTS ASL UNLESS NOTED

SYNS...CDFNT AT 13Z NR A GAG-CDS-MOUTH OF PECOS LN WL MOV EWD ABT 15 KTS TO NR A FSM-TYR-PSX-MFE LN BY 07Z. MOIST SLY FLO CONTG E OF FNT.

SIGCLDS AND WX...
NRN NMEX.
70-120 BKN TO OVC WITH SCT SNW SHWRS. MTNS FQTLY OBSCD ABV 70 AND ELSW CIGS LCLY BLO 1 THSD FT VSBY BLO 3 MIS IN SNW SHWRS AND FOG. TOPS SHWRS 200. CLRG WRN PTN ARND 18Z AND ERN PTN AFT 00Z. OTLK...VFR.

SRN HLF NMEX AND TEX W OF PECOS RVR.
CLR TO 100 SCT VRBL BKN. OTLK...VFR.

OKLA TEX W OF CDFNT EXCP TEX W OF PECOS RVR.
CLDS 30-50 BKN TO OVC NWRN TEX BCMG OCNLY 10 OVC NRN OKLA. CIGS LWRG IN SCT RAIN SHWRS WITH RAIN CHG TO SNW THIS AFTN AND ERY TNGT. PTNS OVR SRN TEX SCT CLDS 50 OR HIR. OTLK...VFR SRN PTNS. MVFR TO OCNL IFR NRN TEX AND OVR OKLA.

OKLA TEX E OF CDFNT.
WDSPRD CLDS 10 TO 20 OVC WITH CIGS FQTLY BLO 10 VSBY OCNLY BLO 3 MIS FOG CNTRL AND ERN TEX AND ERN OKLA TIL 18Z. SCT SHWRS AND A FEW TSTMS ALG CSTL PLNS AND ALG AND ABT 150 MIS E OF CDFNT WL SPRD OVR ALL OF AREA BY 18Z WITH TSTM ACTVTY BCMG MORE INTNS DURG AFTN. PSBLY SVR TSTMS NRN TEX AND OKLA THIS AFTN AND TNGT. TOPS BLDPS 200-250 BLDG RPDLY TO ABV 300 AFT 18Z. OTLK...IFR.

CSTL WTRS.
SCT CLDS 20-30 WITH SCTD SHWRS AND TSTMS. TSTM TOPS 250-300 INCRG TO ABV 350 AFT 18Z. OTLK...MOSTLY MVFR.

ICG...LGT TO LCLY MDT MXD ICGICIP ABV FRZ LVL. FRZ LVL SFC NRN NMEX SLPG 140 SRN TEX.

WMS CNCL
ZCZC
OKC
NOT IN SYS
170 TWEB 301408 GSW-SHV. SCT-BKN CLDS ABV 10 THSD WITH FEW PATCHES OF FOG LCLY LWRG VSBY BLO 3 MI TIL LATE MRNG. CONDS WL LWR DURG AFTN TO ARND 2-3 THSD SCT-BKN AND WL BCM OVC AFDK. CHC OF TSTMS IN SHV AREA AFTN.

Figure 20

```
FT 031040
DAL 031111 C10⊕ 1614G . 17Z C18⊕ 1818G30 SLGT CHC C10⊕2TRW. 19Z
    C30⊕ 1818G32 OCNL C10⊕2TRW CHC C>X1/2T+RW+A 3335G60. 00Z CFP
    C20⊕ 3315G CHC C10⊕2TRW. 05Z MVFR..
GSW 031111 C10⊕ 1614G . 17Z C18⊕ 1818G30 SLGT CHC C10⊕2TRW. 19Z
    C30⊕ 1818G32 OCNL C10⊕2TRW CHC C>X1/2T+RW+A 3335G60. 00Z CFP
    C20⊕ 3315G CHC C10⊕2TRW. 05Z MVFR..
ACT 031111 C10⊕7 1415G VRBL C6⊕3F. 17Z C18⊕ 1716G SLGT CHC C10⊕2TRW.
    19Z C25⊕ 1816G CHC C6X1TRW+ 3330G45. 01Z CFP C25⊕ 3315G CHC
    C12⊕2TRW. 05Z MVFR..
CLL 031111 C6⊕3F 1612 OCNL C3X1/2F. 16Z C12⊕ 1614G. 18Z C30⊕ 1814G.
    21Z 35⊕C100⊕ 1814G OCNL C10⊕2TRW+. 05Z MVFR..
LFK 031111C6⊕4F VRBL C3X1/2F. 16Z C12⊕ 1514. 18Z C25⊕ 1814G OCNL
    C10⊕1TRW+ 3225G45. 05Z MVFR..
TYR 031111 C6⊕ 1512 OCNL C4⊕2F. 16Z C12⊕5F 1714. 18Z C25⊕ 1814G
    CHC C8X1TRW+ 3330G50. 05Z MVFR..
GGG 031111 C6⊕ 1110 OCNL C4⊕2F. 16Z C12⊕>F 1714. 18Z C2>⊕ 1814G
    CHC C8X1TRW+ 3330G50. 05Z MVFR..
MLC 031111 C20⊕ 1812G22 CHC C10⊕1TRW. 02Z CFP C15⊕ 3613 CHC C7⊕2R-F.
 05Z IFR..
ADM 031111 C20⊕ 1812G23 CHC C10⊕1TRW. 00Z CFP C15⊕ 3614 CHC C7⊕2R-F.
 05Z IFR..
OKC 031111 C18⊕30⊕ 1613G23 CHC TRW. 18Z C30⊕ 2015G25 CHC C10⊕1TRW.
 22Z CFP C15⊕ 3515G25 CHC C7⊕2R-F. 05Z IFR..
TUL 031111 18⊕C30⊕ 1611G21 CHC C15⊕3TRW. 23Z CFP C15⊕ 3614G24
 CHC C7⊕2R-F. 05Z IFR..
PNC 031111 15⊕C30⊕ 1612 ⊕V⊕ SLGT CHC TRW. 17Z CFP C15⊕ 3513G23
 CHC C7⊕2R-F. 05Z IFR..
HBR 031111 C13⊕ 1415 CHC C8⊕3TRW. 18Z CFP C15⊕ 3415G25 CHC C7⊕2R-F.
 05Z IFR..

   FT NEAR WEST 031045
SPS 031111 C15⊕ 1718G . 15Z C25⊕ 1818G32 OCNL C10⊕1TRW+ CHC C>X1/2
    T+RW+A 3435G60. 19Z CFP C18⊕ 3416G CHC C10⊕2TRW. 23Z C25⊕ 3515G
    CHC C15⊕3RW-. 05Z MVFR..
GAG 031111 C40⊕ 1713G23. 13Z CFP C15⊕ 3615G25 CHC C7⊕2R-F. 05Z IFR..
MAF 031111 250⊕ 3012. 18Z 100⊕250-⊕ 3218G30. 01Z 250-⊕ 3315.
 05Z VFR..
LBB 031111 C40⊕ 3214 ⊕V⊕ CHC RW-. 16Z C30⊕ 3315G30 CHC RW-.
 21Z 15⊕C25⊕ 3618 CHC RW-. 03Z C15⊕ 0218 CHC C10⊕3R-S-. 05Z IFR..
AMA 031111 C40⊕ 3415 CHC RW-. 16Z C25⊕ 3615G30 CHC RW-. 21Z C15⊕
 0118 OCNL C10⊕3R-S-. 03Z C10⊕5S- 0318 OCNL C5X1/2S-F. 05Z IFR..
DDC 031111 C10⊕ 3618G28 CHC C5⊕2R- OR S-. 17Z C50⊕ 3615G25 BRF SW-.
 00Z C50⊕ 3615 ⊕V⊕.
GCK 031111 C12⊕ 3618G28 CHC C5⊕2S-. 17Z C50⊕ 3615G25 BRF SW-.
 00Z C50⊕ 3615 ⊕V⊕.
TCC 031111 C40⊕. 12Z CFP C30⊕6R- 3620. 13Z 10⊕C20⊕5S-F 3620 VRBL
 C5X1/2SF. 19Z 10⊕C25⊕ 3420 OCNL C10X1SW-. 23Z 30⊕ 3415. 02Z O.
 05Z VFR..
HOB 031111 C120⊕. 17Z 50⊕120⊕ 3320G30. 02Z O. 05Z VFR..
INK 031111 250⊕ 3112. 18Z 250-⊕ 3318G30. 01Z 250-⊕ 3315. 05Z VFR..


GAG FT AMD 1 031711 1725Z C12⊕7 3616G CHC OCNL C4⊕3TRW-IP.
 20Z C12⊕7 3616G VRBL C3X1ZR-S-. 05Z IFR BCMG MVFR..
LBB FT AMD 1 031611 1620Z 20⊕250⊕ 3512. 18Z C30⊕ 3514G25. 01Z 100⊕C250⊕
 3612. 05Z VFR..
DDC FT AMD 1 1711 031725Z C4⊕3RW-F 0120G30 OCNL 50C12⊕5RW-
 CHC TRW-. 22Z 50C10⊕5S- 0115G25 VRBL C2X1S-. 09+ IFR..
```

Figure 21

FDUS3 KWBC 301945
DATA BASED ON 301200Z

VALID 011200Z FOR USE 0900-1500Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
ABI		2016+12	2019+09	2017+04	2016-11	2117-23	222038	232247	242656
ABQ			2014+12	2224+03	2236-12	2241-24	234340	234550	236258
ALS				2325+03	2244-12	2249-24	225340	225650	237359
AMA		2414	2422+11	2324+05	2126-11	2228-24	222839	222948	233957
ATL	3013	3018+11	3020+07	2920+01	2923-13	3027-25	313441	313750	304059
BHM	3009	2914+13	2814+08	2714+02	2814-12	3018-25	312540	312849	293059
BLD	1512	1816+03	2239+01	2248-04	2260-17	2273-29	238843	239752	730261
BNA	2710	2820+11	2826+06	2831+00	2835-14	2938-26	304441	304550	294259
BOI		1620+01	2127-05	2346-11	2165-25	2173-35	218147	219154	219359
BRO	1416	1517+11	1514+06	1510+01	9900-10	2305-22	251237	271946	293557
CRP	1519	1619+11	1615+06	1611+02	9900-10	2308-22	251538	272047	293357
DAL	1817	2218+12	2116+08	2114+02	1911-11	2211-23	241439	251648	241757
DEN			2420+11	2539+02	2344-13	2350-25	235841	236451	237959
DRT	1517	1519+11	1619+09	1716+04	1913-10	2215-22	241938	252347	273456
DSM	1225	1619+05	2116+03	2519-01	2839-13	2852-25	296741	297650	298560
ELP		1906	2010+10	2017+04	2121-10	2223-23	232439	242649	244457
GCK		2518+12	2523+11	2424+05	2328-11	2332-24	233640	243950	254857
GJT			2010+07	2234-01	2262-15	2270-26	227842	228551	720061
HLC		2518+10	2422+11	2424+04	2428-11	2434-24	244340	254850	265558
HOU	1615	1712+10	1710+06	1507+02	9900-11	2505-23	271238	271647	282157
ICT	2420	2427+12	2429+11	2427+04	2422-11	2526-24	253240	263649	264058
IND	0412	3012+04	2823+01	2833-04	2951-16	2960-27	307142	307650	307658
INK		1910+10	2015+11	2017+05	2020-10	2120-23	222038	232348	253956
JAN	2406	2206+13	2106+07	1905+02	9900-12	3007-24	321639	301948	272760
JAX	3409	3412+12	3511+07	3510+01	3311-12	3217-25	322540	313249	294459
JFK	3231	3244-10	3151-12	3059-15	3082-23	7902-35	791846	791651	790054
JOT	0828	0405+04	2914+00	2829-04	2851-16	2960-27	297342	308150	309059
LIT	2323	2424+13	2420+08	2417+03	2513-11	2816-24	302339	292649	282859
LOU	3207	2918+06	2826+02	2835-03	2948-15	2955-27	306342	306750	306558
LRD	1419	1521+11	1618+07	1614+02	1907-10	2210-22	241737	262246	293556
MEM	2517	2620+13	2620+08	2619+02	2720-12	2923-24	302940	303149	283259
MIA	0707	0912+10	0810+06	0609+02	3608-10	3116-22	303137	303946	294857
MKC	1918	2224+10	2426+08	2526+02	2730-11	2838-24	284840	285249	285659
MOB	9900	1305+12	1305+07	1306+02	9900-12	3207-24	311739	302248	273359
MSY	1208	1310+11	1210+06	1209+01	9900-12	3205-23	311538	292147	273158
OKC	2218	2425+13	2426+10	2324+04	2119-11	2219-24	242039	242248	242458
PRC			2231+04	2241-02	2249-14	2259-26	237142	237751	228061
SAT	1520	1621+12	1618+07	1714+02	1908-10	2211-22	241738	262147	282856
SAT	1520	1621+12	1618+07	1714+02	1908-10	2211-22	241738	262147	282856
SGF	2226	2430+12	2529+08	2526+03	2625-11	2830-24	293840	294149	294259
SHV	2115	2214+12	2111+07	1909+02	1806-11	2605-23	291239	281548	262059
SLC		1815	1919+02	2246-07	2271-19	2282-30	229344	720253	710961
STL	1412	2211+10	2520+06	2730+00	2845-13	2951-25	305941	306149	305959
TLH	0305	9900+12	9900+07	9900+02	9900-12	3211-24	312139	302848	294059
TUS		2008+15	2017+07	2125+01	2233-12	2238-24	234540	234850	225760

Figure 22

```
MKC UA 1353 DURGD 35 NE MKC HEAVY TO MDT TURBC 100-40
TOPS OF EVERYTHING 170. BE100

MAF UA 1400 32N MAF MDT TURBC OCNL GRATER THAN MDT 110 B7

MLC UA 1700 VCNTY EUFAULA CIGS 10-18AGL CRB ICG C150

FTW UA 1705
6NW GSW LGT-MDT TURBC 20 C500

DAL UA 2024 20E GSW SVR TURBC 330-370 B727

TUL UA 2033 24 SW TUL AND W AND SW R-- 8-12@ AGL

DAL UUA 2058 TYR MDT TURBC A ALT MISG B727

TYR UA 2107 10 S TYR MDT-SVR TURBC HAIL 90 CV60
```

```
NNNNZCZC
UBUS1 KGSW 0316A5
OKLA OKC UA
     OKC 1615 35W OKC LGT-MDT TURBC SVR WAVE EFFECT 370 G159
TEX  AMA UA 1615 OVR AMA @140 HIR NW
     AMA UA 1621 DURGC NW BND LGT TURBC 240-260 @260 C500
     BGS PIREP 40 W FST 1600 280@V@ WND 2465 LGT-MDT CAT 330 OVR
     BSM PIREP A0SW BSM 1622 15@60 CLR ABV CAT NONE 070 RF4
     FTW UA
     FTW UUA 1615 8S FTW SVR TURBC 50 PA31
     FWH PIREP 10S FWH 1620 SVR TURB 050 NAVAHO
     GLS UA 1624 DURGC NW BND TOPS GLS-HOU 140 ISOLD BLDPS 180-2
     PSX UA 1606 AAP-PSX 12-15@ SCTD RW-
     REE PIREP 2SW GTH 1618 LO @ BLO 100@150 LGT-OCNL MDT TURBC
      NEG ICG 100 02
NMEX ABQ UA
     ABQ UUA 1627 100 W ABQ LGT TO MDT TURBC FL230-260 DC9.
     40E ABQ LGT TO MDT TURBC FL170-200 DC9
     CVS PIREP 50W CVS 1615 @220 F-111
     CVS PIREP OVR CVS 1605 520@110 F-111
```

Figure 23

00-041200Z

MS...A FEW EXPCD THIS AFTN AND EVE S CNTRL AND ERN
RN ARK CNTRL AND ERN TEX AND WRN LA.

TMS...RT OF A LN 60E DRT BWD CDS GAG CNU CGI CBM PNS. ALSO
RT OF LN OMK LKV SFO.

6

030800
-031400

ECHO 2. FLT PRCTN. OVR PTNS ERN AND CNTRL TEX DUE LOW
ND OCNL RESTRD VSBY WITH CONDS SPRDG NWD INTO ERN OKLA BY 10Z.
E OF A PRX-DRT-COT LN CIGS FQTLY BLO 1 THSD FT VSBY OCNLY
MIS FOG. CONDS SPRDG NWD AND BY 10Z GENLY E OF A PNC-DRT-COT
TG BYD 14Z.

031400
-031800

ECHO 3. FLT PRCTN. OVR CNTRL AND ERN TEX DUE LOW CIGS
NL RESTRD VSBY. OVR TEX GENLY E OF 60S ADM-DRT-COT LN
QTLY BLO 1 THSD FT VSBY OCNLY BLO 3 MIS PCPN OR FOG.
IPVG BY 18Z. CNL AT 18Z

031950
-040200

ECHO 5. FLT PRCTN. CNTRL AND ERN OKLA AND NERN TEX
E OF END-LFK LN CIGS FQTLY BLO 1 THSD FT VSBYS FQTLY
MI. CONDS IPVG TEX PTN BY 00Z BUT CONTG OKLA PTN PAST

031425
-031900

FOXTROT 1. FLT PRCTN. WRN OKLA WRN TEX SCTD EMBDD TSTMS.
D ABT 100 MI W OF ENID BROWNWOOD LN SCTD EMBDD TSTMS. CB
O 300. TSTMS MOVG EWD 20 KT AND CONTG PAST 19Z

032030
-040100

FOXTROT 3. FLT PRCTN. ERN OKLA ERN TEX NMRS TSTMS. LN NMRS
2030Z 25 WD NR PNC 30E DAL TO CLL MOVG EWD 25 KT. CB TOPS
. TSTMS MOVG TO EXTRM ERN OKLA AND EXTRM ERN TEX BDR SECS
AND CONTG

Figure 24

SDUS KNKA 031357
AMA 1320 AREA3RWS/+ 3[illegible]6/102 101/117 144/104 203/66 310/102 2715 MT
250 AT 58/56 MOSTLY R[illegible]- SNOW NRN PTN
011 01111 01121 01111 011 0

OKC 1331 AREA3R-/NC 3[illegible]05/145 146/55 140W 2620 MT220 AT 255/94
AND AT 320/112
0110 1101 011110 011100

SDUS KNKA 031957
AMA 1932 AREA3R-S/NC 334/120 62/165 223/100 284/122 ELEMENTS 2232
MT 220 AT 347/72 S WRN HLF AND MSTLY R- ERN HLF
112 12111 12111 10000 000 0

OKC 1933 LN10 TRW++/NC 348/100 332/50 185/80 10W 2625 CELLS 2035
MT 320 AT 337/40
AREA4 TRW+/NC 290/125 120/130 200W CELLS 2035 MT 300 AT 119/53
1440 0641 114411 014421 +22

MKC WW 032108
MKC 032108

BULLETIN

TORNADO WATCH NUMBER 560
ISSUED 3.08 PM CST DEC 3 1973

A....THE NATIONAL WEATHER SERVICE HAS ISSUED A TORNADO WATCH FOR...

PORTIONS OF EASTERN TEXAS

THE THREAT OF TORNADOES AND SEVERE THUNDERSTORMS WITH LARGE HAIL AND DAMAGING WINDS WILL EXIST IN THESE AREAS FROM CURRENT UNTIL 7.00 PM CST THIS MONDAY AFTERNOON AND EVENING.

THE GREATEST THREAT OF TORNADOES AND SEVERE THUNDERSTORMS IS IN AN AREA 70 MILES....60 NAUTICAL EAST AND WEST OF A LINE FROM 45 MILES....40 NAUTICAL....NORTH OF TYLER TEXAS TO 25 MILES...20 NAUTICAL...EAST OF COLLEGE STATION TEXAS.

PERSONS IN OR CLOSE TO THE TORNADO WATCH AREA ARE ADVISED TO BE ON THE WATCH FOR LOCAL WEATHER DEVELOPMENTS AND FOR LATER STATEMENTS AND WARNINGS.

C...TORNADOES AND A FEW SVR TSTMS WITH HAIL SFC AND ALF TO 2 IN.

EXTRM TURBC AND SFC WND GUSTS TO 70K. A FEW CBS WITH MAX TOPS TO 550.

MEAN WIND VECTOR 21045

Figure 25

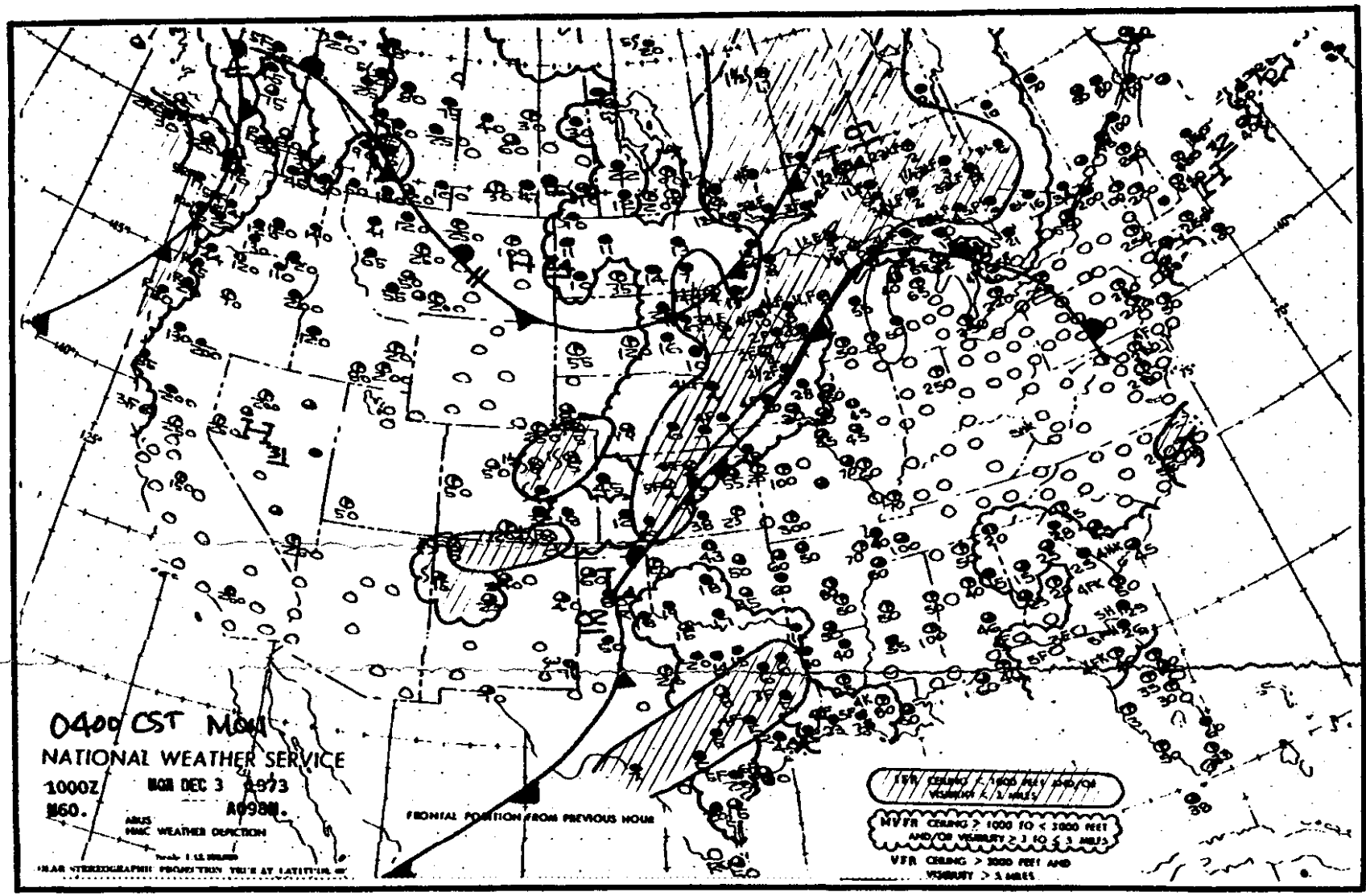

0400 CST MON
NATIONAL WEATHER SERVICE
1000Z MON DEC 3 1973
M60. A098M.
ABUS
HMC WEATHER DEPICTION
FRONTAL POSITION FROM PREVIOUS HOUR
MVFR CEILING > 1000 TO < 3000 FEET
AND/OR VISIBILITY > 3 TO ≤ 5 MILES
VFR CEILING > 3000 FEET AND
VISIBILITY > 5 MILES

Figure 26

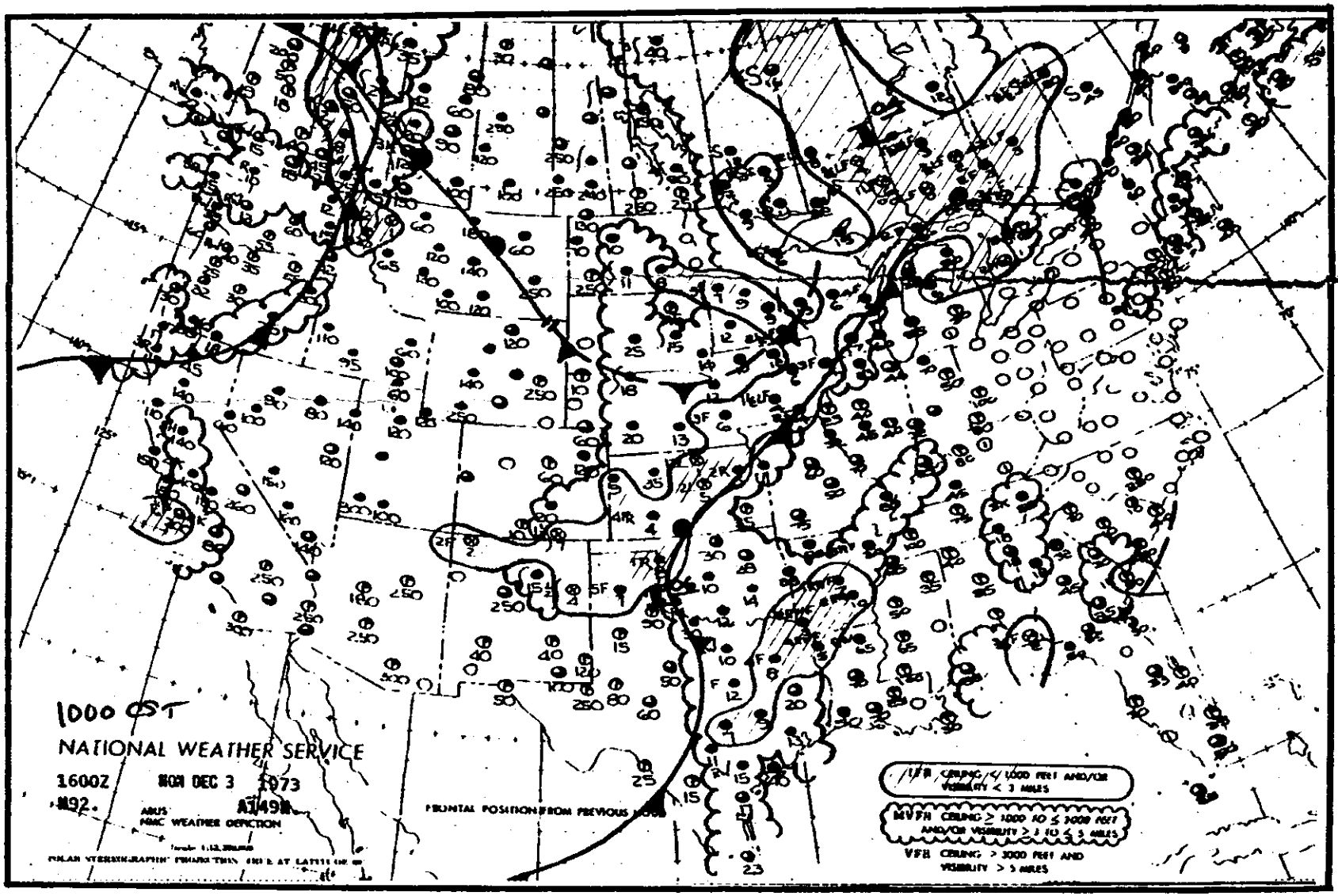

1000 CST
NATIONAL WEATHER SERVICE
1600Z MON DEC 3 1973
M92
A1498
FRONTAL POSITION FROM PREVIOUS HOUR
VFR CEILING < 1000 FEET AND/OR VISIBILITY < 3 MILES
MVFR CEILING ≥ 1000 TO ≤ 3000 FEET AND/OR VISIBILITY ≥ 3 TO ≤ 5 MILES
VFR CEILING > 3000 FEET AND VISIBILITY > 5 MILES

Figure 27

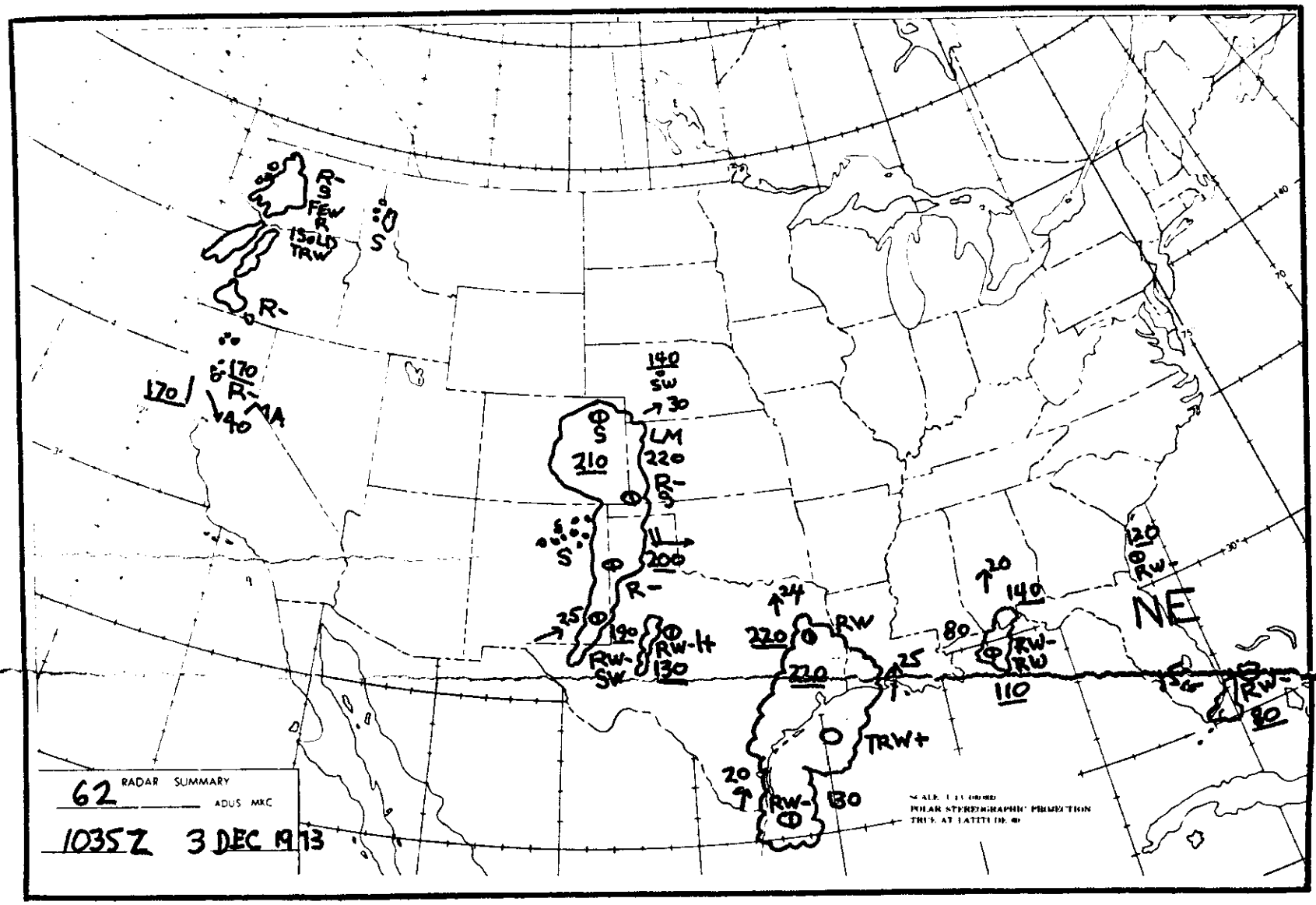


Figure 28

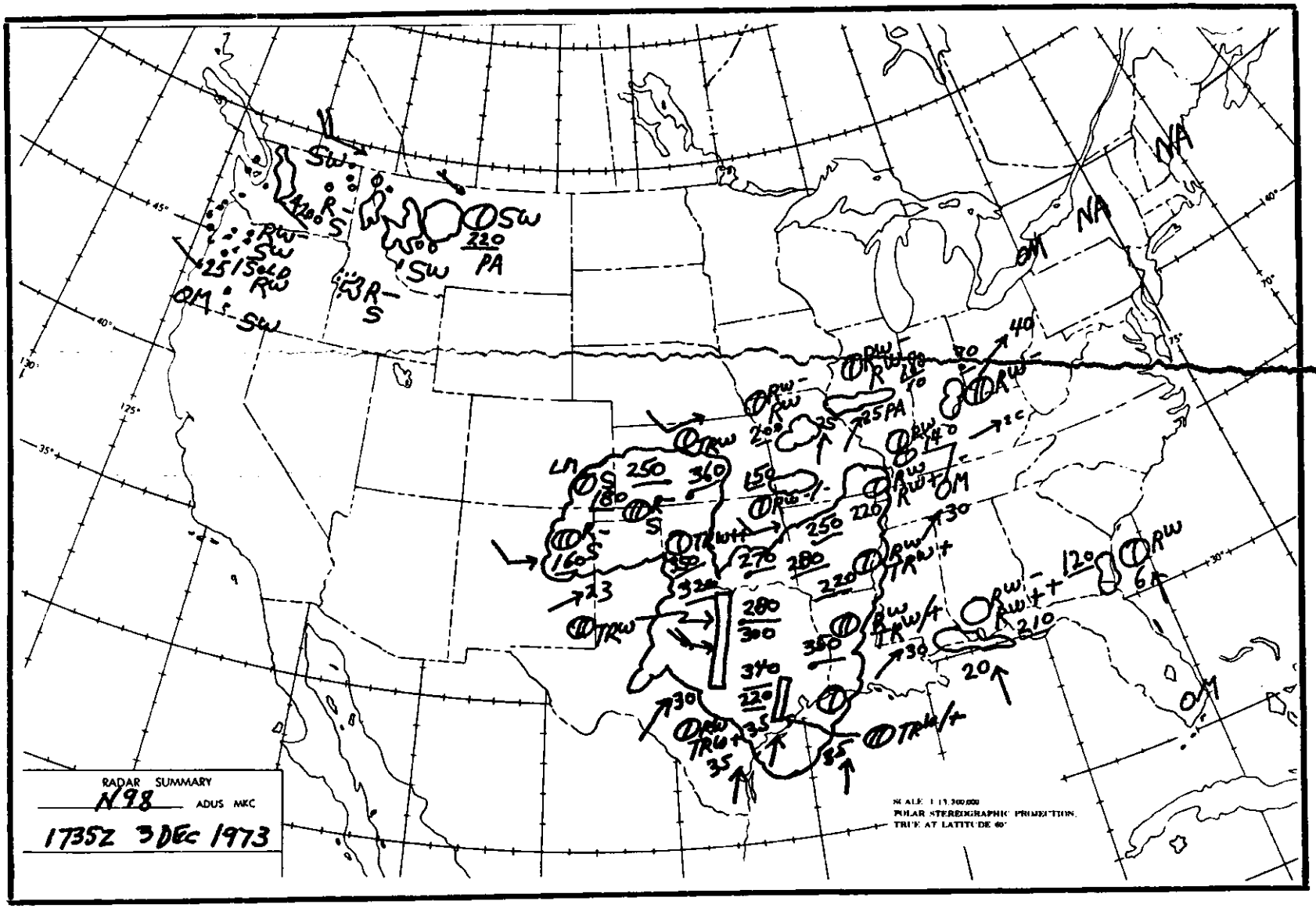

RADAR SUMMARY
N98 ADUS MKC
1735Z 3 DEC 1973
POLAR STEREOGRAPHIC PROJECTION
TRUE AT LATITUDE 60°

Figure 29

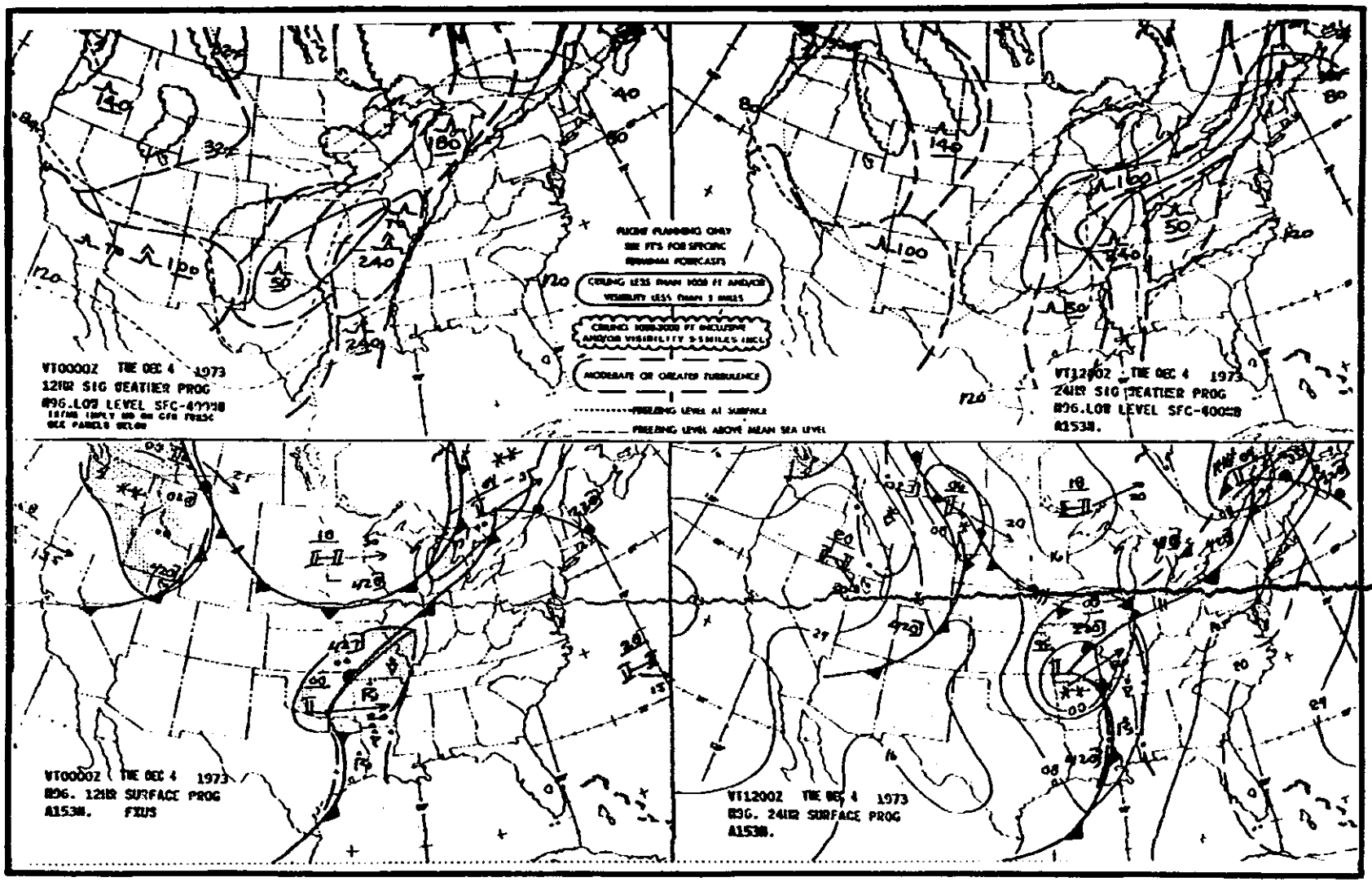

VT00002 TUE DEC 4 1973
12HR SIG WEATHER PROG
B96.LOW LEVEL SFC-400MB
A1538.
FLIGHT PLANNING ONLY
SEE FT'S FOR SPECIFIC
TERMINAL FORECASTS
CEILING LESS THAN 1000 FT AND/OR
VISIBILITY LESS THAN 3 MILES
CEILING 1000-3000 FT INCLUSIVE
AND/OR VISIBILITY 3-5 MILES INCL
MODERATE OR GREATER TURBULENCE
FREEZING LEVEL AT SURFACE
FREEZING LEVEL ABOVE MEAN SEA LEVEL
VT12002 TUE DEC 4 1973
24HR SIG WEATHER PROG
B96.LOW LEVEL SFC-400MB
A1538.
VT00002 TUE DEC 4 1973
B96. 12HR SURFACE PROG
A1538. FXUS
VT12002 TUE DEC 4 1973
B96. 24HR SURFACE PROG
A1538.

Figure 30

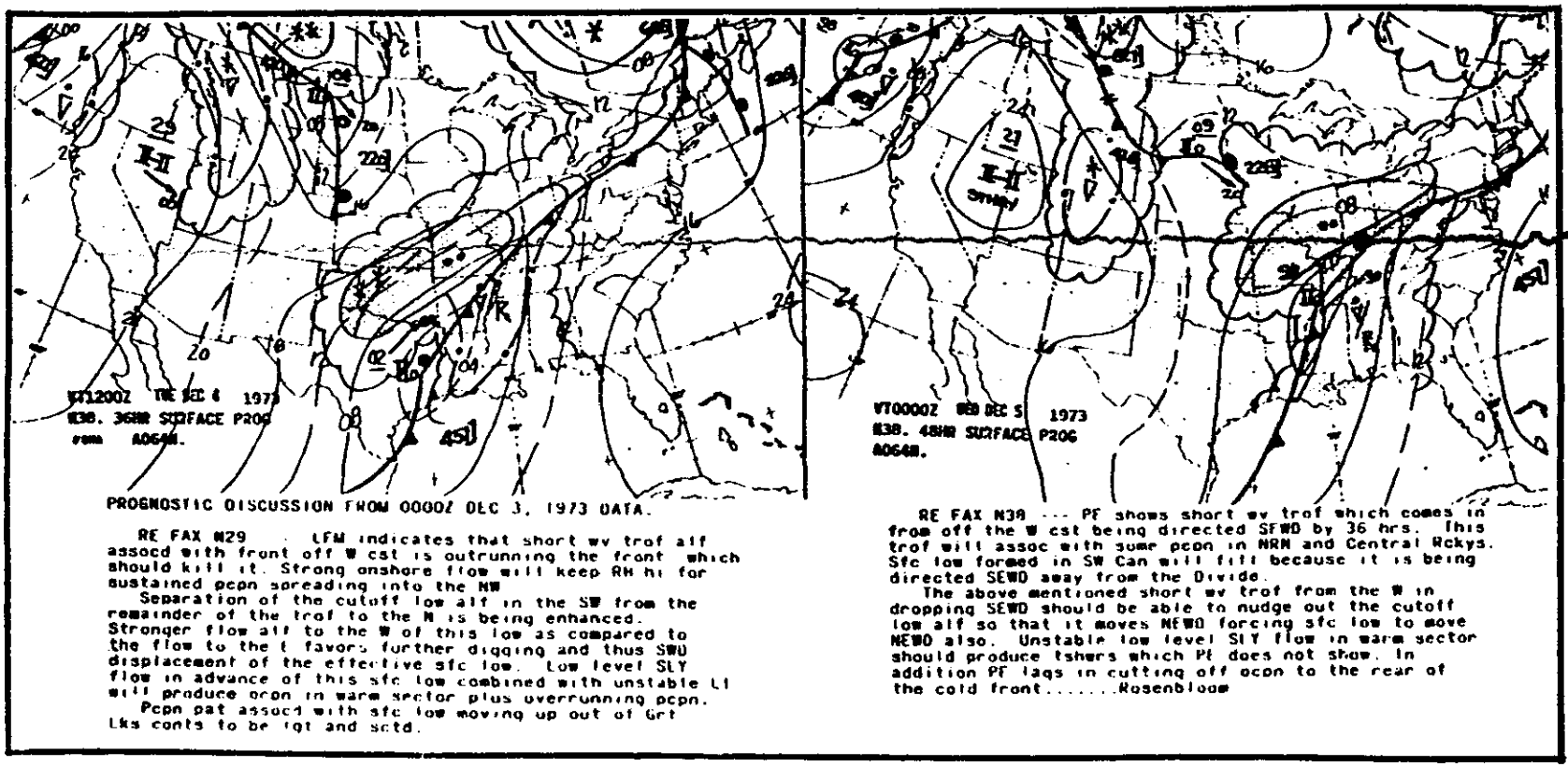

VT1200Z THE DEC 6 1973
H38. 36HR SURFACE PROG
from A0648.
VT0000Z WED DEC 5 1973
H38. 48HR SURFACE PROG
A0648.
PROGNOSTIC DISCUSSION FROM 0000Z DEC 3, 1973 DATA.
RE FAX N29 ... LFM indicates that short wv trof alf assocd with front off W cst is outrunning the front which should kill it. Strong onshore flow will keep RH hi for sustained pcpn spreading into the NW
Separation of the cutoff low alf in the SW from the remainder of the trof to the N is being enhanced. Stronger flow alf to the W of this low as compared to the flow to the E favors further digging and thus SWD displacement of the effective sfc low. Low level SLY flow in advance of this sfc low combined with unstable LI will produce pcpn in warm sector plus overrunning pcpn.
Pcpn pat assocd with sfc low moving up out of Grt Lks conts to be lgt and sctd.
RE FAX N38 --- PF shows short wv trof which comes in from off the W cst being directed SEWD by 36 hrs. This trof will assoc with some pcpn in NRN and Central Rckys. Sfc low formed in SW Can will fill because it is being directed SEWD away from the Divide.
The above mentioned short wv trof from the W in dropping SEWD should be able to nudge out the cutoff low alf so that it moves NEWD forcing sfc low to move NEWD also. Unstable low level SLY flow in warm sector should produce tshwrs which PF does not show. In addition PF lags in cutting off pcpn to the rear of the cold front.....Rosenbloom

Figure 31

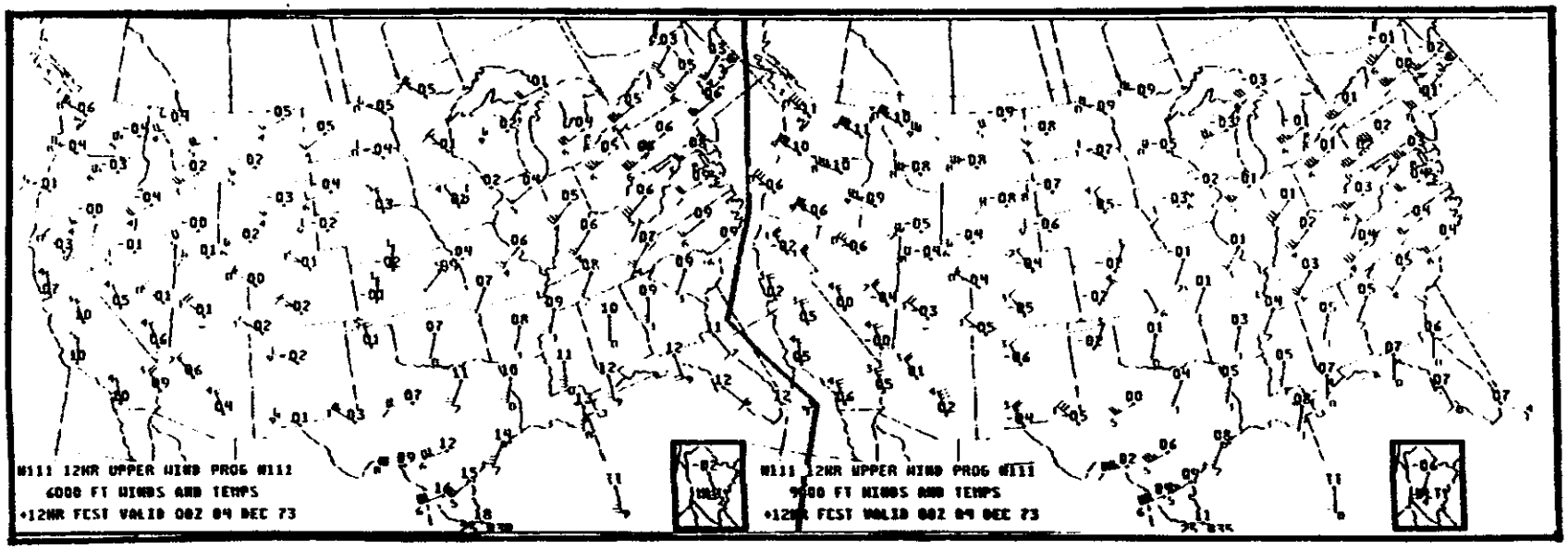


Figure 32

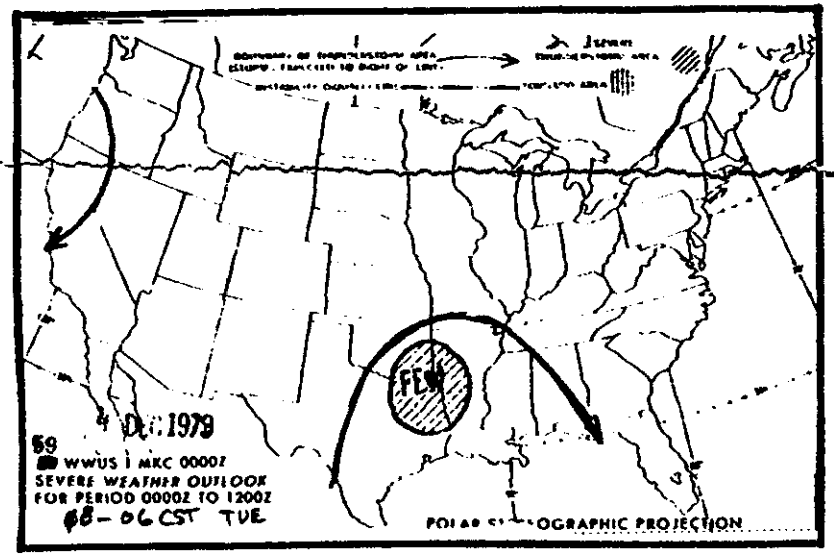


Figure 33

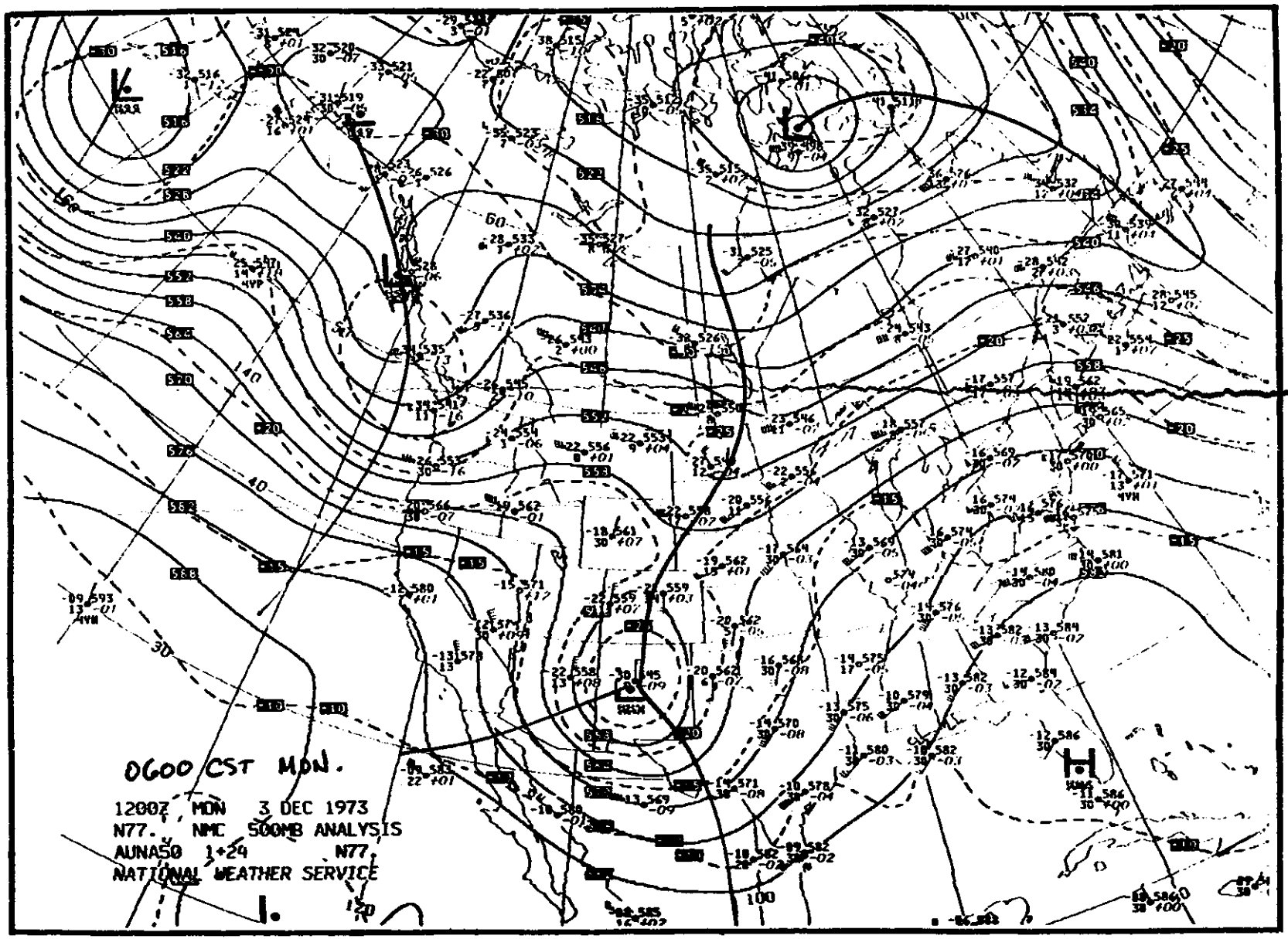

0600 CST MON.
12002 MON 3 DEC 1973
N77. NMC 500MB ANALYSIS
AUNA50 1+24 N77
NATIONAL WEATHER SERVICE

Figure 34

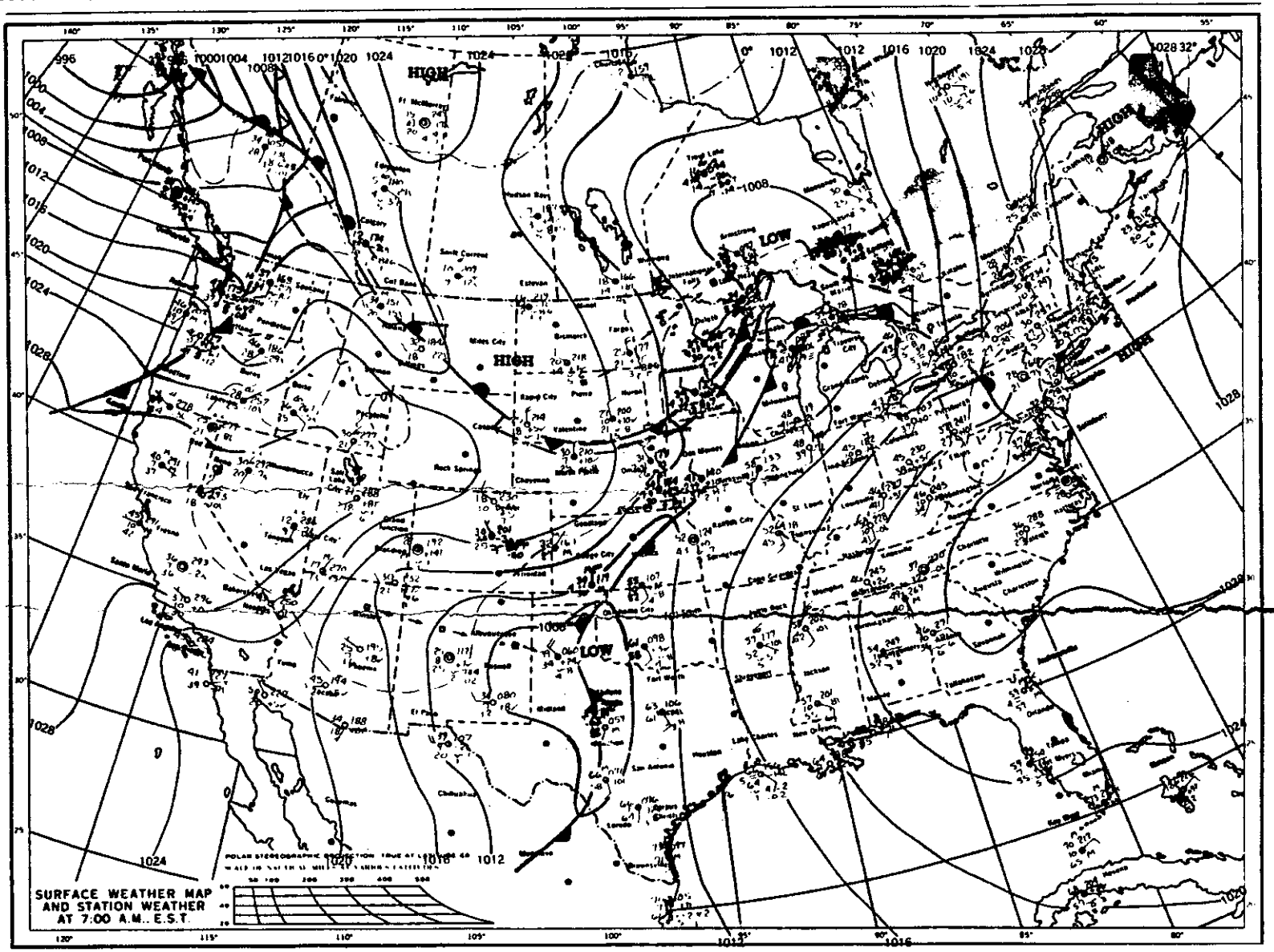

HIGH
LOW
HIGH
LOW
HIGH
SURFACE WEATHER MAP
AND STATION WEATHER
AT 7:00 A.M., E.S.T.

Figure 35

APPENDIX F

AIRMAN'S INFORMATION MANUAL

AIRMAN'S INFORMATION MANUAL (AIM)

The Airman's Information Manual has been designed primarily as a pilot's operational and information manual for use in the National Airspace System of the United States (unless otherwise indicated). It is divided into four basic parts, each of which may be purchased separately. Frequency of issuance, area of coverage, annual subscription costs and highlights of the contents of each part follow.

Part 1—Basic Flight Manual and ATC Procedures

Issued: Quarterly (Feb., May, Aug., Nov). *Coverage:* Entire U.S. unless otherwise indicated.

This part contains the basic fundamentals required to fly in the U.S. National Airspace System. Among other data it also contains adverse factors affecting Safety of Flight; Health and Medical Facts of interest to pilots; ATC information affecting rules, regulations and procedures; a Glossary of Aeronautical terms; Air Defense Identification Zones (ADIZ); Designated Mountainous Areas; and Emergency Procedures.

Annual Subscription: $7.00 for U.S., Canada and Mexico, plus $1.75 for other foreign mailing.

Part 2—Airport Directory

Issued: Semiannually (Mar. and Sept.). *Coverage:* Conterminous U.S., Puerto Rico and Virgin Islands (Note: similar information for Alaska and Hawaii appears in Alaska Supplement and Pacific Chart Supplement, respectively—See Special Notice Section, Part 3 for availability.)

Part 2 contains a Directory of all airports, seaplane bases, and heliports available for civil use. It includes all their services, *except communications*, in codified form. (Those airports with communications are also listed in Part 3.) A list of new and permanently closed airports which updates Part 2 is contained in Part 3. Also included in Part 2 are U.S. Entry and Departure Procedures, including Airports of Entry and Landing Rights Airports; and a listing of Flight Service Station and National Weather Service Telephone Numbers.

Annual Subscription: $7.00 for U.S., Canada and Mexico, plus $1.75 for other foreign mailing.

Parts 3 and 3A—Operational Data and Notices to Airmen

Issued: Part 3, every 56 days and Part 3A, every 14 days (between issues of Part 3). *Coverage:* Part 3, Conterminous U.S., Puerto Rico and Virgin Islands (Note: Similar information for Alaska and Hawaii appears in Alaska Supplement and Pacific Chart Supplement, respectively—See Special Notice Section, Part 3 for availability. Part 3A coverage is the same as Part 3 except that Notice-to-Airmen data for Puerto Rico and Virgin Islands appears in the International NOTAMS publication).

Part 3 contains an Airport-Facility Directory of all major airports with control towers and/or instrument landing systems; a tabulation of Air Navigation Radio Aids; Special, General, Area Notices; Notices to Airmen and FDC NOTAMS; a tabulation of New and Permanently Closed Airports (which updates Part 2), and supplemental data to Part 4.

Part 3A contains current Notices to Airmen considered essential to the safety of flight, and FDC NOTAMS as well as supplemental data to Parts 3 and 4.

Annual Subscription: $22.00 for U.S., Canada and Mexico, plus $5.50 for other foreign mailing.

Part 4—Graphic Notices and Supplemental Data

Issued: Quarterly (Jan., April, July, Oct.). *Coverage:* Conterminous U.S., Puerto Rico and Virgin Islands (Note: similar information for Alaska and Hawaii appears in Alaska Supplement and Pacific Chart Supplement, respectively—See Special Notice Section, Part 3 for availability).

Part 4 contains a list of abbreviations used in the AIM; a tabulation of Parachute Jump Areas; locations of VOR Receiver Check Points (both Ground and Airborne); Restrictions to Enroute Navigation Aids; Preferred Routes; Area Navigation Routes; Special Notice—Area Graphics; Terminal Area Graphics: Heavy Wagon and Oil Burner Routes and other data not requiring frequent change.

Annual Subscription: $9.50 for U.S., Canada and Mexico, plus $2.50 for other foreign mailing.

Where to Purchase AIM

The four basic parts described above are available from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Orders should be accompanied by check or money order made payable to the Superintendent of Documents.

Errors, Omissions, or Changes

Errors, omissions, or suggested changes should be forwarded to the Federal Aviation Administration, Flight Services Division, AAT-430, Washington, D.C. 20591.

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

Figure 36

ORDER FORM

AIRMAN'S INFORMATION MANUAL (AIM)

(See first page for details of coverage)

— Check box(s) for Parts desired —

☐ **PART 1—BASIC FLIGHT MANUAL AND ATC PROCEDURES**

Issued: Quarterly (Feb., May, Aug., Nov.)

Annual Subscription: $7.00 for U.S., Canada and Mexico, plus $1.75 for other foreign mailing.

☐ **PART 2—AIRPORT DIRECTORY**

Issued: Semiannually (Mar. and Sept.)

Annual Subscription: $7.00 for U.S., Canada and Mexico, plus $1.75 for other foreign mailing.

☐ **PART 3 and 3A—OPERATIONAL DATA AND NOTICES TO AIRMEN**

Issued: Part 3, every 28 days.
Part 3A, every 14 days (between issues of Part 3).

Annual Subscription: $22.00 for U.S., Canada and Mexico, plus $5.50 for other foreign mailing.

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Issued: Quarterly (Jan., Apr., July, Oct.)

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Government Printing Office
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Figure 37

ABBREVIATIONS

Note: "s" may be added for plural, or as appropriate.

AAS..... Airport Advisory Service
AAWS.... Automatic Aviation Weather Service
A/C..... Approach Control
acft..... aircraft
ADF..... Automatic Direction Finder
admin.... administration
AGL..... above ground level
AID..... Airport Information Desk
AIM..... Airman's Information Manual.
alt..... altitude
amdt..... amendment
apch..... approach
apchg..... approaching
App Con.. Approach control
aprxly.... approximately
arpt..... airport
ARSR..... Air Route Surveillance Radar.
ARTCC... Air Route Traffic Control Center
ASDE..... airport surface detection equipment
ASR..... Arpt Surveillance Radar.
ATC..... air traffic control
ATCT..... air traffic control tower
ATIS..... Automatic Terminal Information Service
auto..... automatic
aux..... auxiliary
AVASI.... abbreviated Visual Approach Slope Indicator
avbl..... available
awy..... airway

BC..... back course
bcn..... beacon
bcst..... broadcast
bldg..... building
bndry..... boundary
brg..... bearing

clsd..... closed
Co..... county
Comlo.... Compass locator
comsnd... commissioned
comsng... commissioning
const .... construction
cont..... continuous/continuously
crs..... course
CS/T..... combined station/tower
ctc..... contact

dcmsnd .. decommissioned
DEP CON. Departure control
DF..... direction finder
DL..... interphone (direct line)
DME..... UHF standard (TACAN compatible) distance measuring equipment
dsplcd.... displaced
DVFR..... Defense Visual Flight Rule.

efctv..... effective
elev..... elevation
emerg.... emergency
eng..... engine
equip..... equipment

FL..... Flight Level.
fld..... field
FM..... fan marker
fone..... telephone
freq..... frequency
FSS..... Flight Service Station

Gnd Con .. ground control
GS G/S... glide slope
GWT..... gross weight

hr..... hour

IATSC.... International Aeronautical Telecommunication Switching Center
ident..... identification
IFR..... Instrument Flight Rules
IFSS..... International Flight Service Station
ILS..... instrument landing system
indef..... indefinite
info..... information
inop..... inoperative
inst..... instrument
int..... intersection
intl..... international

J-bar..... jet runway barrier

kHz..... kilo Hertz

lat..... latitude
LC..... foreign exchange (local call)
lctd..... located
lctn..... location
LDA..... Localizer type directional aid
lgt..... light
LMM..... compass locator at middle marker ILS
loc ..... localizer
LOM..... compass locator at outer marker ILS
long..... longitude
LRCO.... Limited Remote Communications Outlet.

MAA..... maximum authorized altitude
mag..... magnetic
maint..... maintain, maintenance
max..... maximum
MCA..... minimum crossing altitude
MEA..... minimum enroute IFR altitude
meml..... memorial
mHz..... mega Hertz
mi..... mile
min..... minimum or minute
MM..... middle marker ILS
MOCA.... minimum obstruction clearance altitude
MRA..... minimum reception altitude
MSL..... mean sea level
muni..... municipal

natl..... national
navaid.... navigational aid
NDB..... Non-directional rdo bcn
NM..... nautical mile/s
Nr..... number

obstn..... obstruction
oct..... octane
OM..... outer marker ILS
oper ..... operate
opn..... operation

PAR..... Precision Apch Radar
permly.... permanently
p-line..... pole line

quad..... quadrant

rad..... radial
RAPCON.. radar approach control (USAF)
RATCC... radar air traffic control center (NAVY)
RBN..... radio beacon
RCAG..... Remote Center air/Ground
RCO..... Remote Communications Outlet.
rcv..... receive
rcvg..... receiving
rcvr..... receiver
rdo..... radio
reconst ... reconstruction
relctd..... relocated
req ..... operates on request.
rgt..... right
rnwy/rwy.. runway
RRP..... Runway Reference Point
ruf..... rough
RVR..... runway visual range
RVV..... runway visibility values

SDF..... Simplified Directional Facility
SID..... Standard Instrument Departure.
SIF..... Selective Identification Feature (of the basic Mark X radar beacon system)
sked..... schedule
SM..... statute mile/s
SR..... sunrise
SS..... sunset
STAR.... Standard Terminal Arrival Route
STOL... Short take-off and landing rnwy

T..... true (after a bearing)
TACAN... UHF navigational facility—omnidirectional course and distance information
TCA..... Terminal Control Area
TCH..... Threshold Crossing Height
tfc..... traffic
til..... until
tkof..... take-off
tmprly.... temporarily
tmpry.... temporary
TRACON.. Terminal Radar approach control
Tri-Vas... Tri-color visual approach slope aid
TRSA..... Terminal Radar Service Area
tsmt..... transmit
tsmtg..... transmitting
tsmtr..... transmitter
TV..... television
twr..... tower
TWEB.... transcribed weather broadcast
twy ..... taxiway

UHF..... Ultra high frequency
unavbl... unavailable
unctld.... uncontrolled
unlgtd.... unlighted

VASI..... Visual Approach Slope Indicator
VFR..... visual flight rules
VHF..... Very high frequency
VOT..... a VOR Receiver testing facility
vsby..... visibility

WS..... Weather Service
wt..... weight

Z..... Greenwich mean time.

Figure 38

FSS–CS/T AND NATIONAL 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 Service 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 ADVISORIES AT NON TOWER AIRPORTS.)

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/WSO briefing service.

Automatic Aviation Weather Service (AAWS).

Location and Identifier		Area Code	Telephone
ALABAMA			
Anniston ANB	FSS	(205)	831-2303
Birmingham BHM	FSS	(205)	595-6151▬
	FSS	(205)	595-2101★
Dothan DHN	FSS	(205)	794-6683
Huntsville	WS	(205)	772-9308◆
Mobile MOB (Bates)	FSS	(205)	344-3610
	WS	(205)	342-2762◆
Montgomery MGM (Dannelly)	FSS	(205)	269-4368
	WS	(205)	265-0589◆
Muscle Shoals MSL	FSS	(205)	383-6541▬
	FSS	(205)	381-2500★
Tuscaloosa TCL	FSS	(205)	758-3628
	FSS	(205)	759-4138★
ARIZONA			
Douglas DUG (Bisbee-Douglas)	FSS	(602)	364-8458
Flagstaff	WS	(602)	774-2851
Phoenix PHX (Sky Harbor)	FSS	(602)	261-4295▬
Prescott PRC	FSS	(602)	445-2160
Tucson TUS	FSS	(602)	792-6359▬
Winslow	WS	(602)	289-3592
Yuma YUM	FSS	(602)	726-2601▬
ARKANSAS			
El Dorado ELD (Goodwin)	FSS	(501)	863-5128
Fayetteville FYV (Drake)	FSS	(501)	HI 2-8277
Ft. Smith FSM	CS/T	(501)	MI 6-7868/69
		(501)	782-0343▬
	(answered in Fayetteville)		
	WS	(501)	646-5731
ARKANSAS (Con't)			
Harrison HRO	FSS	(501)	EM 5-3433
Jonesboro JBR	FSS	(501)	WE 5-3471
	(0600-2200 Other hrs. Memphis)		
Little Rock	WS	(501)	374-1546◆
Pine Bluff PBF (Grider)	FSS	(501)	JE 5-0652
Texarkana TXK	CS/T	(501)	774-4151▬
CALIFORNIA			
Arcata ACV	FSS	(707)	839-1545
Bakersfield BFL (Meadows)	FSS	(805)	399-1787▬
(No wea bcst avbl 2300-0500 lcl time)			
Bishop	WS	(714)	873-3213
			(0545-1915)
Blythe BLH	FSS	(714)	948-6151
Crescent City CEC (McNamara Fld)	FSS	(707)	464-2514
	(0600-2200 other hrs Arcata)		
Daggett DAG	FSS	(714)	254-2223
Eureka	WS	(707)	442-2171◆
Fresno FAT (Air Terminal)	FSS	(209)	251-8269▬
Imperial IPL	FSS	(714)	352-8740
Los Angeles LAX (International)	FSS	(213)	776-2727▬
		(213)	670-1000▬
Van Nuys		(213)	781-5213▬
Long Beach		(213)	639-2618▬
		(714)	542-3585▬
Burbank		(213)	845-3211▬
Fullerton		(714)	879-8381
Santa Ana		(714)	546-5901

Figure 39

AIRPORT/FACILITY DIRECTORY

The Airport Directory in this publication is limited to airports with control towers and/or instrument landing systems. See Part 2 for a complete listing of all public use airports.

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., 1469 feet would be shown as "14"; 1470 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, D, DT and MAX for gross weight capacity, e.g., (S-000).

S–Runway weight bearing capacity for aircraft with single-wheel type landing gear. (DC-3), etc.

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

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

Quadricycle and dual-tandem are considered virtually equal for runway weight bearing considerations, as are single-tandem and dual-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 Beacon. Green and white, split-beam and other types.

L: Field Lighting. An asterisk (*) may precede an ele*ment to indicate that it operates on prior request only* (by phone call).

4—Low Intensity Runway
5—Medium Intensity Runway
6—High Intensity Runway
7—Instrument Approach (neon)
7A—*Medium Intensity Approach Lights* (MALS)
8—High Intensity Instrument Approach (ALS)
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

S2: Minor airframe repairs.
S3: Minor airframe and minor powerplant repairs.
S4: Major airframe and minor powerplant repairs.
S5: Major airframe and major powerplant repairs.

FUEL

(Fuel data includes each grade available.)

Code	Grade
F12	80/87
F15	91/96
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

Figure 40

OTHER

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

AOE—Airport of Entry—A customs Airport of Entry where permission from U.S. Customs is not required, however, at least one hour advance notice of arrival must be furnished.

AVASI—Abbreviated Visual Approach Slope Indicator—2 boxes.

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.

LRA—Landing Rights Airport—Application for permission to land must be submitted in advance to U.S. Customs. At least one hour advance notice of arrival must also be furnished.

REIL—Runway end identifier lights (threshold strobe).

RVV—Runway Visibility Values, applicable runway provided.

RVR—Runway Visual Range, applicable runway provided.

TPA—Traffic Pattern Altitude—This information is provided for only those airports without a 24-hour operating control tower or FSS.

TRI-VAS—Tri-Color Visual Approach Slope Aid.

VASI—Visual Approach Slope Indicator, applicable runway provided.

TCH—Threshold Crossing Height.

RPP—Runway Reference Point.

AIRPORT REMARKS

Aircraft Categories—*Category I*—Light-weight, single-engine, personal-type propeller driven aircraft. (Does not include higher performance single-engine aircraft such as the T-28.)

Category II—Light-weight, twin engine, propeller driven aircraft weighing 12,500 pounds or less such as the Aero Commander, Twin Beechcraft, DeHavilland Dove, Twin Cessna. (Does not include such aircraft as a Lodestar, Learstar, DC-3).

Category III—All other aircraft such as the higher performance single-engine, heavy twin-engine, four engine and turbojet aircraft.

"**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 are 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 Station (FSSs) and Combined Station/Tower (CS/Ts) are listed alphabetically by state in the Airport/Facility Directory. At certain locations the preflight briefing and flight plan processing responsibilities of the CS/T have been reassigned to an adjacent FSS. At these locations the adjacent FSS will be listed as the 'Associated FSS,' otherwise, the CS/T will be listed. Limited Remote Communications Outlet (LRCO) and Remote Communications Outlet (RCO), where available at the facility, are shown following the three letter identifier. If located at other than a facility site they are listed alphabetically.

FSSs and CS/Ts provide information on airport conditions, radio aids and other facilities, and process flight plans. Airport Advisory Service is provided at the pilot's request on 123.6 by FSSs located at non-tower airports or when the tower is not in operation. (See Part 1, ADVISORIES AT NON TOWER AIRPORTS.)

Aviation weather briefing service is provided by FSSs and CS/Ts; however, CS/T personnel are not certified weather briefers and therefore provide only factual data from weather reports and forecasts. Flight and weather briefing services are also available by calling the telephone numbers listed in the chapter entitled 'FSS-CS/T Information and Weather Service Office Telephone Numbers,' located in Part 2."

Limited Remote Communications Outlet (LRCO)—Unmanned satellite air/ground communications facility, which may be associated with a VOR. These outlets effectively extend service range of the FSS and provide greater communication reliability.

Remote Communications Outlet (RCO)—An unmanned satellite air to ground communications stations remotely controlled and providing UHF and VHF communications capability to extend the service range of an FSS.

Civil communications frequencies used in the FSS air/ground system are now operated simplex on 122.0, 122.2, 122.3, 122.4, 122.6, 122.7, 123.6; emergency 121.5; plus receive-only on 122.05, 122.1, 122.15 and 123.6.

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

b. 122.2 is assigned to all FSSs as a common en route simplex service.

c. 123.6 is assigned as the airport advisory channel at non-tower FSS locations, however, it is still in commission at some FSSs collocated with towers to provide part-time Airport Advisory Service.

d. 122.1 is the primary receive-only frequency at VORs. 122.05, 122.15 and 123.6 are assigned at selected VORs meeting certain criteria.

e. Some FSSs are assigned 50KHz channels for simplex operation in the 122–123 MHz band (e.g. 122.35).

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 com-

Figure 41

munication 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.

COMMUNICATIONS REMARKS

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

VOICE CALL

The voice call for contact with the air traffic control tower is listed at each airport assigned such a facility.

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) Service provided by Non Radar Approach Control.
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 Aircraft Terminal Control Area (TCA).
Radar vectoring and sequencing on a full time basis of all IFR and VFR acft, (Stage III—Terminal Radar Service Area-TRSA.)
Ground Control (GND CON).
VHF Direction Finding (VHF/DF).

RADIO NAVIGATION AIDS

Included in this section is a tabulation listed by facility name of all Air Navigation Radio Aids in the National Airspace System and those upon which the FAA has approved an instrument approach. Private or military Navigation Radio Aids not in the National Airspace System are not tabulated.

AUTOMATIC TERMINAL INFORMATION SERVICE (ATIS)

ATIS is continuous broadcast of recorded non-control information in selected areas of high activity. See Part 1.

FLIGHT SERVICE STATION (FSS)

Airport Advisory Service (AAS).
En Route Weather Advisory Service (Flight Watch).
Island, Mountain and Lake Reporting Service.
Remote Weather Radar Display (WR).
VHF Direction Finding (DF).

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.

NOTE.—UNICOM used for communications must be licensed by the Federal Communication Commission in order to be listed in this publication.

RADIO CLASS DESIGNATIONS

Identification of VOR/VORTAC/TACAN Stations by Class (Operational Limitations):

Normal Usable Altitudes and Radius Distances

Class	Altitudes	Distance (miles)
T	12,000′ and below	25
L	Below 18,000′	40
H	Below 18,000′	40
H	14,500′ — 17,999′	100*
H	18,000′ — FL 450	130
H	Above FL 450	100

*Applicable only within the contiguous 48 States.

(H)=High (L)=Low (T)=Terminal

NOTE: An H facility is capable of providing L and T service volume and an L facility additionally provides T service volume.

The term VOR is, operationally, a general term covering the VHF omnidirectional bearing type of facility without regard to the fact that the power, the frequency-protected service volume, the equipment configuration, and operational requirements may vary between facilities at different locations.

AB ---------- Automatic Weather Broadcast (also shown with ■ following frequency).
B ---------- Scheduled Broadcast Station (broadcasts weather at 15 minutes after the hour.
DME ------- UHF standard (TACAN compatible) distance measuring equipment.
H ---------- Non-directional radio beacon (homing), power 50 watts to less than 2,000 watts.
HH -------- Non-directional radio beacon (homing), power 2,000 watts or more.
H-SAB ----- Non-directional radio beacons providing automatic transcribed weather service.
ILS -------- Instrument Landing System (voice, where available, on localizer channel).
LDA ------- Localizer Directional Aid.
LMM ------- Compass locator station when installed at middle marker site.
LOM ------- Compass locator station when installed at outer marker site.
MH -------- Non-directional radio beacon (homing) power less than 50 watts.
S ---------- Simultaneous range, homing signal and/or voice.
SABH ------ Non-directional radio beacon not authorized for IFR or ATC. Provides automatic weather broadcasts.
SDF -------- Simplified Direction Facility.
TACAN ----- UHF navigational facility—omnidirectional course and distance information.
VOR -------- VHF navigational facility—omnidirectional, course only.
VOR/DME -- Collocated VOR navigational facility and UHF standard distance measuring equipment.
VORTAC --- Collocated VOR and TACAN navigational facilities.
W ---------- Without voice on radio facility frequency.
Z ---------- VHF station location marker at a LF radio facility.

Figure 42

AIRPORT/FACILITY DIRECTORY

SAMPLE

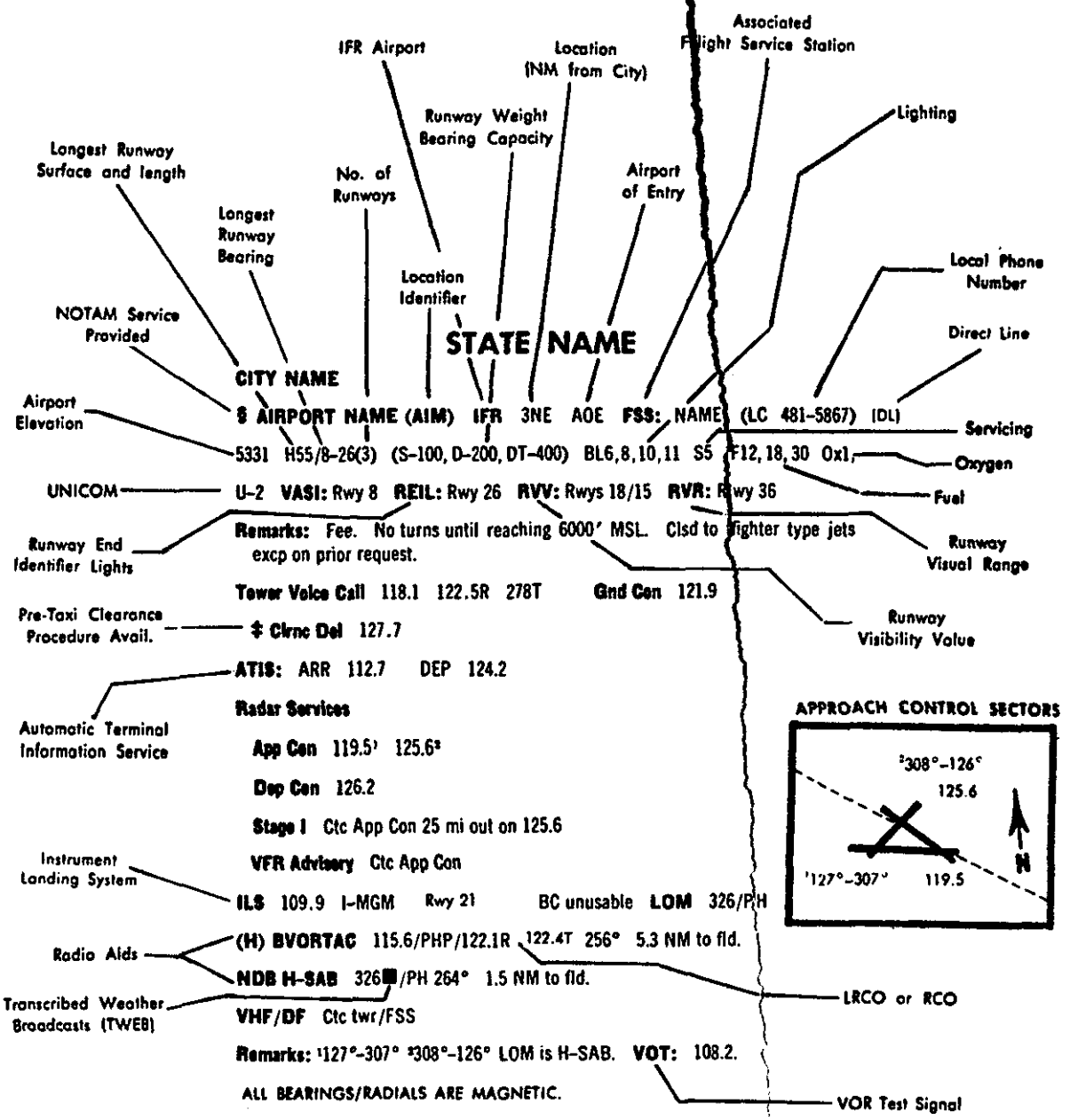


Figure 43

ALABAMA

ALEXANDER CITY NDB MHW 382/ALX FSS: MONTGOMERY

ANNISTON FSS 121.5 122.2 123.6 122.3

ANNISTON

§ ANNISTON-CALHOUN COUNTY (ANB) *IFR* 6 SW
FSS: ANNISTON on fld
611 H50/5-23(1) (S-30, D-48, DT-75) BL5 S5 F12,18,34 Ox2 U2
Remarks: Attended 0600-2200 thereafter by prior req phone 831-4410. Rgt tfc rnwy 5.
LOC 111.5 I-ANB Rwy 5 BC unusable
L-BVORTAC 083° 9.4NM to fld (see Talladega)
Anniston NDB BMH 278/ANB on fld

BIRMINGHAM FSS 121.5 122.2 123.65 122.1R (WR) DF

§ BIRMINGHAM MUNI (BHM) *IFR* 5NE LRA FSS: BIRMINGHAM on fld
643 H100/5-23(2) (S-175, D-205, DT-350) BL6,8,10 S5 F12,18,30 Ox2 U2 **VASI:** Rwy 23. **RVR:** Rwy 5. **RVV:** Rwy 5
Remarks: Rwy 23 thr dsplcd 1770', only acft with S-60, D-100, DT-150 GWT or less on portion of rwy 23 NE of dsplcd thr. A-gear lctd 1000' from rwy 5 thr and 600' from rwy 23 thr, cable aprxly 3 inches above surface. VASI rwy 23 TCH-46', RRP-1050'.
Birmingham Tower 118.7 **Gnd Con** 121.9
§ Clrnc Del 121.7
ATIS: 119.4
Radar Services:
App Con 119.9 (050-229°) 124.5 (230-049°)
Dep Con 124.9
Stage II Ctc app con 15 NM out
ILS[1] 110.3 I-BHM Rwy 5 **LOM:**[2] 224/BH
Birmingham (H) BVORTAC 114.4/BHM 126° 9.5NM to fld.
NDB H-SAB 052° 4.5 to fld. (see McLendon).
Remarks: [1]BC unusable beyond 10 NM. [2]LOM is McLendon NDB.
VOT: 110.0

BROOKWOOD (L) BVORTAC 111.0/OKW FSS: BIRMINGHAM

CAIRNS (L) VOR 111.2/OZR FSS: DOTHAN

CAPSHAW NDB MHW 350/CWH FSS: MUSCLE SHOALS

CRAIG (L) BVOR 112.5/SEM FSS: MONTGOMERY

DECATUR (L) BVOR 112.8/DCU/122.1R FSS: MUSCLE SHOALS

DOTHAN FSS 121.5 122.1R 122.2 122.5 DF

§ DOTHAN (DHN) *IFR* 6NW FSS: DOTHAN on fld
401 H85/13-31(2) (S-75, D-105, DT-180) BL6 S5 F12,18,34
Remarks: Rwy lgts on req thru FSS after 2400. Fee for acft over 12,500 lbs. Rwy 18-36 (S-75, D-105, DT-190).
Dothan Tower[1] 118.4 **Gnd Con** 121.7
Radar Services:
Cairns App Con 125.4
Cairns Dep Con 125.4 133.45
ILS 108.3 I-DHN Rwy 31 BC unusable
Dothan (L) BVORTAC 111.6/DHN 334° 11.9NM to rwy 36
VHF/DF: Ctc FSS.
Remarks: [1]Twr opers 0700-2300 lcl time, FSS will provide AAS other hrs on freq 118.4.

DUNAWAY NDB HW 414/DWY FSS: ANNISTON

EUFAULA (L) BVORTAC 109.2/EUF/122.1R FSS: DOTHAN

GADSDEN (L) BVORTAC 112.3/GAD/122.1R FSS: ANNISTON

HAMILTON (L) BVORTAC 110.4/HAB/122.1R FSS: MUSCLE SHOALS

HUNTSVILLE

§ HUNTSVILLE-MADISON CO JETPORT CARL T JONES FLD (HSV) *IFR* 10SW FSS: MUSCLE SHOALS (LC 539-6597)
629 H80/8R-36L(2) (S-130, D-160, DT-250) BL6,8 F12,18,30 S5 U-2 **RVR:** Rwy 18R.

ALABAMA—Continued

Remarks: Rnwy 18R, 36R rgt tfc. Wildlife refuge south and west of arpt.
Huntsville Tower 119.7 **Gnd Con** 121.9
Radar Services:
Clrnc Del: 120.35
App Con 118.05 (181-359°) 125.6 (360-180°)
Dep Con 118.05 (181-359°) 125.6 (360-180°)
TRSA: See graphic in AIM Part 4
ILS[1] 109.3 I-HSV Rwy 18R **LMM:** 219/SV
Huntsville (L) BVORTAC 112.2/HSV/122.2 215° 10.9NM to fld
Remarks: [1]LOC BC unusable above 5000' and below 3000' beyond 17 NM.

McLENDON NDB H-SAB 224/8H FSS: BIRMINGHAM

MOBILE FSS 121.5 122.1R 122.2 123.6 (WR) DF

MOBILE

§ BATES FLD (MOB) *IFR* 10W LRA FSS: MOBILE on Fld
218 H68/14-32(3) (S-50, D-70, DT-110) BL5,6,8 S5 F12,18,22,34 Ox1,2,3,4 U2 **RVR:** Rwy 14 **RVV:** Rwy 14
Remarks: Rwy 18-36 rstd to 12,500 lbs or less. The additional 1019' SE end rwy 14-32 permly clsd. Rwy 9-27 (S-70, D-87, DT-139).
Bates Tower 118.3 **Gnd Con** 121.9
Radar Services:
Mobile App Con 118.5 (320-139°) 121.0 (140-319°)
Mobile Dep Con 125.7
TRSA: See graphic in AIM Part 4
ILS 109.9 I-MOB Rwy 14 BC unusable **LOM:**[1] 248/MO
Mobile (H) BVORTAC 115.3/MOB 108° 6.3NM to fld.
NDB BH 140° 4.6NM to rwy 14 (see Wilmer).
VHF/DF: Ctc FSS.
Remarks: [1]LOM is Wilmer NDB.

§ MOBILE AEROSPACE (BFM) *IFR* 3S FSS: MOBILE (LC 344-3610)
26 H96/14-32(2) (S-75, D-100, DT-157) BL5,6,8,10,12 S5 F12,18,30 U-2 **VASI:** Rwy 14
Remarks: Attended 0700-2100. Rgt hand tfc rwy 14 and 36.
Mobile Aerospace Tower[1] 119.6 **Gnd Con** 121.7
Radar Services:
Mobile App Con 118.5 (320-139°) 121.0 (140-319°)
Mobile Dep Con 125.7 (320-139°) 121.0 (140-319°)
Brookley (L) BVORTAC 112.8/BFM on fld
Remarks: [1]Twr opers 0800-1900 lcl.

MONROEVILLE (L) BVORTAC 116.8/MVC/122.1R FSS: MOBILE

MONTGOMERY FSS 121.5 122.1R 122.2 122.4 DF

MONTGOMERY

§ DANNELLY FLD (MGM) *IFR* 7SW LRA FSS: MONTGOMERY on Fld
221 H90/9-27(3) (S-105, D-116, DT-180) BL5,6,8,10 S5 F12,18,34 Ox1,2, U2 **RVR:** Rwy 9. **RVV:** Rwy 9. **VASI:** Rwy 9,27
Remarks: Rnwy 15-33 restricted to acft 12,500 lbs or less. No 180° turns rwy 9-27 by acft DC-9 class or larger. Arpt clsd to sked acft heavier than 155,000 lbs max gross tndg weight. A-gear installed 1,000' inboard from rwy 9-27. VASI rwy 9 TCH 42', RRP 987'. VASI lctd right side rwy 27 TCH 46', RRP 993'.
Dannelly Tower[1] 119.7 **Gnd Con** 121.9
Radar Services:
Montgomery App Con 121.1 124.0 112.1T
Montgomery Dep Con 125.5 121.1
TRSA See graphic in AIM Part 4
ILS 109.9 I-MGM Rwy 9 **LOM:** 245/MG
Montgomery (H) BVORTAC 112.1/MGM 318° 5.6NM to fld.
VHF/DF Ctc FSS.
Remarks: [1]Twr opers 0600-2300 lcl, FSS will provide AAS other hrs on freq 119.7.

Figure 44

NATIONAL FLIGHT DATA CENTER

FDC NOTAM'S

THE LISTING BELOW INCLUDES, IN PART, CHANGES IN FLIGHT DATA, PARTICULARLY OF A REGULATORY NATURE, THAT AFFECTS STANDARD INSTRUMENT APPROACH PROCEDURES, AERONAUTICAL CHARTS AND SELECTED FLIGHT RESTRICTIONS, PRIOR TO THEIR NORMAL PUBLICATION CYCLE. THEREFORE, THEY SHOULD BE REVIEWED DURING PRE-FLIGHT PLANNING.

THIS CHAPTER DIFFERS FROM THE NOTICES TO AIRMEN SECTION IN THE PRECEDING PAGES, WHICH CONTAINS NON-REGULATORY DATA PRIMARILY INTENDED TO NOTIFY AIRMEN OF CHANGES, DELETIONS, ADDITIONS AND RESTRICTIONS TO COMPONENTS OF THE NATIONAL AIRSPACE SYSTEM.

LEGEND

FDC ---------- NATIONAL FLIGHT DATA CENTER
1/1035 ---------- ACCOUNTABILITY NUMBER ASSIGNED TO THE MESSAGE ORIGINATOR BY NFDC
FI/T ---------- FLIGHT INFORMATION/TEMPORARY
FI/P ---------- FLIGHT INFORMATION/PERMANENT

THE FOLLOWING LISTING CONTAINS ALL FDC NOTAMS
THRU 3/886

ALABAMA

FDC 3/67 FI/T BIRMINGHAM MUNI BIRMINGHAM ALA. ILS RWY 5 AMDT 28 BTN 1200-2300GMT SI ILS AND SI LOC RWY 5 MINS NA. STD TKOF MINS APPLIES. NML MINS IN EFF DURG IFR WX CONDS.

FDC 3/791 FI/T BATES FIELD MOBILE ALA ILS RWY 14 AMDT 22 SI VSBY ALL CATS RVR 4000FT. SI LOC VSBY CAT A B C RVR 4000FT CAT D RVR 5000FT. NDB RWY 14 AMDT 20 SI VSBY CAT A B C RVR 5000FT. RADAR-1 AMDT 2 ASR SI RWY 14 VSBY CAT A B C RVR 5000FT.

FDC 3/876 FI/T BIRMINGHAM MUNI BIRMINGHAM ALA ILS RWY 5 AMDT 28 S-LOC 5 AND S-5 LOC/VOR MDA 1060FT HAT 456FT ALL CATS. MIN ALT OVR 2MI FIX 1060FT.

FDC 3/885 FI/T MARION COUNTY HAMILTON ALA VOR RWY 18 ORIG ALL SI MDA 1260FT HAT 812FT CRCG CAT A B C MDA 1340FT HAA 892FT SI CAT B C D AND CRCG CAT A B C INCR VSBY 1/4MI TKOF MINS RWY 18 400FT CIG 1MI VSBY RWY 36 500FT CIG 1MI VSBY.

ARKANSAS

FDC 3/865 FI/T TEXARKANA MUNI-WEBB FIELD TEXARKANA ARK ILS RWY 22 AMDT 3 S-ILS DH 634FT VSBY 3/4MI HAT 250FT ALL CATS. S-LOC VSBY 3/4MI CAT A B C. ALL SIAPS TKOF VSBY 3/4MI RWY 22.

CALIFORNIA

FDC 3/711 FI/T SAN FRANCISCO INTERNATIONAL SAN FRANCISCO CALIF LOC BC-A AMDT 2 NA.

FDC 3/817 FI/P TORRANCE MUNI TORRANCE CALIF. ALL SIAPS ADD FLW TO IFR DEP PROC RWY 11L DEP REQUIRES A MIN CLB RATE OF 270FT PER NM UNTIL RCHG 500FT. 400FT CIG AND 1MI VSBY REQUIREED RWY 11R/29L. THIS IS VOR RWY 11L AMDT 10 LOC RWY 29R AMDT 2 RNAV RWY 29R AMDT 4.

FDC 3/855 FI/P LIVERMORE MUNI LIVERMORE CALIF. VOR/DME-A ORIG CAT-A VSBY 11/2MI ALTN MIN 1200FT AND VSBY 2MI. REVISE NOTE 2 TO READ USE OAK ALSTG INCR ALL MDA AND HAA 80FT INCR CAT A B VSBY 1/4MI. THIS IS AMDT 1.

COLORADO

FDC 3/527 FI/T STAPLETON INTL DENVER COLO. ILS RWY 35 AMDT 15 CAT 2 MINS NA.

CONNECTICUT

FDC 3/267 FI/T TWEED-NEW HAVEN NEW HAVEN CONN. ILS RWY 2 AMDT 2 TRNL RTE ADDISON VORTAC TO SALTY INT NA.

FDC 3/689 FI/P TWEED-NEW HAVEN NEW HAVEN CONN. AMD ALL SIAPS BY ADDING NOTE CRCG MINS NA IN SECTOR W OF RWY 02 CLKWS TO RWY 20.

DISTRICT OF COLUMBIA

FDC 3/98 FI/T WASHINGTON NATIONAL WASHINGTON DC. ILS RWY 36 AMDT 2. DH 214FT HAT 200FT RVR 2400FT DAY/NGT ALL CATS. LOC MIN AS PUBLD. VOR RWY 36 AMDT 3/RADAR-1 RWY 36 AMDT 17 AND NDB RWY 36 ORIG MINS AS PUBLD.

FDC 3/832 FI/T DULLES INTL ARPT WASHINGTON D.C. VOR RWY 19R ORIG MISSED APCH RVSD TO 2.9MI AFT PSG HRN VORTAC CLBG RIGHT TURN TO INTCP HRN R-246 CLB TO 4000FT PROCD TO BLUE RIDGE INT HOLD W LEFT TURN 110 DEG INBD.

FDC 3/835 FI/T DULLES INTL ARPT WASHINGTON D.C. ILS RWY 19L AMDT 1 MISSED APCH RVSD TO ILS DH 502 LOC 3.9MI AFT PSG STERLING OM CLB TO 2000FT DRCT TO CHANTILLY LOM HOLD S RIGHT TURN 007 DEG INBD.

FDC 3/836 FI/T DULLES INTL ARPT WASHINGTON D.C. ILS RWY 19R AMDT 10 MISSED APCH RVSD TO ILS DH 469 LOC 3.6 AFT PSG BROADPUN OM CLB STRAIGHT AHD TO 1000FT CLBG RIGHT TURN TO 4000FT INTCP HRN R-246 TO BLUE RIDGE INT HOLD W LEFT TURN 110 DEG INBD.

FDC 3/837 FI/T WASHINGTON NATL ARPT WASHINGTON D.C. VOR RWY 36 AMDT 23 MISSED APCH RVSD TO 4.6MI AFT PSG OXON NDB/INT OR 1.0 DME CLBG LEFT TURN TO 2000FT DRCT TO GEORGETOWN NDB/INT/5.9 DME HOLD NW RIGHT TURN 144 DEG INBD.

FDC 3/853 FI/T DULLES INTL ARPT WASHINGTON D.C. ILS RWY 1R AMDT 11 MISSED APCH RVSD TO ILS DH 513 LOC 4.6MI AFT PSG IA LOM CLB STRAIGHT AHD TO 700FT CLBG RGT TURN TO 2000FT INTCP HRN R-055 TO DCA R-331 ASHBURN INT. HLD NE RGT TURN 235 DEG INBD.

FDC 3/854 FI/T DULLES INTL ARPT WASHINGTON D.C. LOC BC RWY 1L AMDT 21 MISSED APCH RVSD TO 5.5 AFT PSG PIPELINE INT CLB STRAIGHT AHD TO 700FT CLBG LEFT TURN TO HDG 325 DEG TO 4000FT INTCP HRN R-284 TO MRB R-183 ROUND HILL INT. HLD W RGT TURN 104 DEG INBD.

FLORIDA

FDC 3/17 FI/T HERNDON ORLANDO FLA ILS NDB RADAR-1 RWY 7 SI VSBY INCRD 1/4MI OR EQUIVALENT RVR ALL CATS.

FDC 3/385 FI/T DAYTONA BEACH REGIONAL DAYTONA BEACH FLA ILS RWY 6L AMDT 17 SI ILS VSBY RVR 4000FT ALL CATS. SI LOC VSBY CAT A B C RVR 4000FT CAT D RVR 5000FT. NDB RWY 6L AMDT 14 CAT A B C RVR 5000FT.

FDC 3/535 FI/T DESTIN-FT WALTON BEACH DESTIN FLA RADAR-1 AMDT 1 RWYS 14 AND 32 SI AND CRCG MDA 500FT HAT/HAA 478FT. NDB RWY 14 AMDT 1 SI AND CRCG MDA 500FT HAA 478FT.

FDC 3/543 FI/T HERNDON ORLANDO FLA VOR RWY 13 AND VOR RWY 31 NA 1100 TO 2300Z.

FDC 3/544 FI/T MCCOY AFB ORLANDO FLA VOR RWYS 18L/18R ORIG AND VOR/DME RWY 36R ORIG SI AND CRCG MDA 1300FT HAT/HAA 904FT VSBY 2MI ALL CATS 1100 TO 2300Z.

Figure 45

NOTICES TO AIRMEN

This part is issued every 14 days. It contains appropriate notices from the daily NOTAM Summary, and other items considered essential to flight safety.

This section contains Notices to Airmen that are expected to remain in effect for at least seven days. Temporary notices without published duration dates are normally carried twice unless resubmitted.

NOTE: Data preceded by a checkmark (✓) are considered permanent and will be published one time only in this section. Data should be noted on charts and records.

NOTE: Notices 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.

Special Notice—Preferred Route correction: Effective September 13, 1973 amend High Altitude Route published in AIM dated August 30, 1973 as follows:

LOS ANGELES

Newark J146 GLD PWE J64 BDF SBN CRL J584 HL584 J584 STW 295 STW V226 BUDD LAKE 1100–0300.

ALABAMA

AUBURN, OPELIKA ARPT: Tmpry ATCT and FSS will oper on Oct 13, 27 and Nov 3, 10. Freqs 123.1 lcl ctl, 121.8, 122.5R gnd ctl, 121.5 emgcy. Hours 1000–1800 lcl.

SELMA, SELFIELD ARPT: Rotg bcn inop. Rwy 12–30 clsd. (6–73)

TALLADEGA MUNI ARPT: Rwy 3–21 clsd to acft 40,000 lbs GWT or over. (3–73)

TUSKEGEE—MOTON FIELD ARPT: Const in progress. Arpt clsd til aprxly Dec 1973. (3–73)

ALASKA

SPECIAL NOTICE: Pilots flying aircraft equipped with SCR–718 altimeters will assure that the altimeter is turned off within 200 NM of Clear, Alaska and Thule, Greenland.

For complete information on Alaska consult the Alaska Supplement.

ARIZONA

BISBEE MUNI ARPT: Rwy lgts 2–20 inop. (8–73)

GRAND CANYON NATIONAL PARK ARPT: ATCT deactivated until aprxly 1 June 74.

GRAND CANYON NATIONAL PARK: All pilots are requested to avoid flying below the canyon rim and to maintain a distance 1500′ above and horizontally from all scenic overlooks, parks, trails and Grand Canyon Village.

ARKANSAS

EL DORADO, GOODWIN FLD: Threshold rwy 22 displaced 413′. (6–73)

FORDYCE MUNI ARPT: Rwy 04 thr dsplcd 100′. (8–73)

HELENA/WEST HELENA - THOMPSON - ROBBINS ARPT: Rwy 17–35 clsd UFN. (0–73)

CALIFORNIA

SPECIAL NOTICE: Do not mistake dirt strip on large island, Lake Berryessa, lctd lat 38–34 long 122–13 for airport. Strip is unauthorized and unsafe.

ANO NUEVO ISLAND: Avoid low flying in the vicinity and over island. Biological research of wild life in progress.

AUBURN MUNI ARPT' Rwy lgts rwy 7–25 inop. (8–73)

BAKERSFIELD, MEADOWS FIELD: REIL rwy 12L OTS. (1–73)

BIG BEAR CITY ARPT: Clsd. (9–73)

BLYTHE ARPT: Intensive airline jet acft training in progress 24 hrs daily. Inbound acft report 20 miles out on 123.6 and guard 123.6 for arpt advisory service, UFN. Use other freqs for other purposes. Unicom is not for arpt advisory use.

BUTTONWILLOW, KERN COUNTY ARPT #15: Crop dusting operns in progress. (3–73)

CHICO MUNICIPAL ARPT: Glider operns weekends in ctl zone dalgt hrs thru Sep operg off asph apron W rwy 13–31. (4–73)

FAMOSO, POSO-KERN COUNTY ARPT #16: Crop dusting operns in progress. (3–73)

✓LIVERMORE: Control zone hrs 0700–2100 lcl time daily eff Oct 14, 1973.

LONG BEACH/DAUGHERTY FLD: Rwy 16L–34R clsd til aprxly Oct 11. (8–73)

LOS ANGELES INTL ARPT: ILS/OM "I-LAX" serving rwy 25L shutdown til aprxly Dec 20. (8–73)

LOST HILLS, KERN COUNTY ARPT #9: Crop dusting operns in progress. (3–73)

✓NAPA CO. ARPT: Rwy 18–36 redesignated 18R–36L. Rgt tfc 18R and 36L.

Figure 46

VOR RECEIVER CHECK POINTS

The list of VOR airborne check points and ground check points are included in this section. Use of these Check Points is explained in Part 1.

NOTE: The information is provided in the following order: Facility name (plus airport name, if needed); bearing in degrees magnetic from the VOR; location of the check point (distances in nautical miles); and altitude (in feet MSL, if any). Facilities are listed in alphabetical order, in the state where the AIRPORTS are located.

ALABAMA

Airborne—

Montgomery (Dannelly Arpt): 321°; 6.1 NM over rotg bcn atop control tower; 1300'.

Talladega (Calhoun County Arpt, Anniston): 084°; 9.5 NM over center of segmented circle; 2000'.

Tuskegee (Auburn-Opelika Muni Arpt): 054°; 14.5 NM over lgt bcn on arpt, 1700'.

Ground—

Brookley (Mobile Aerospace Arpt, Mobile): 311°; 1.68 mi on runup area for rwy 14.

Dothan (Dothan Arpt): 334°; 2.0 mi on ramp in front of Admin Bldg.

Cairns (Ft. Rucker-Cairns AAF): Lctn #1—041° runup area on twy int rnwy 13 and 18. Lctn #2—061° runup area on twy N of apch end rnwy 24. Lctn #3—063° runup area on twy S of apch end rnwy 24. Lctn #4—080° runup area on twy W of apch end rnwy 36. Lctn #5—062° on runup area twy N of apch end rnwy 6.

Mobile (Bates Fld): Lctn #1: 107°; 6.9 mi, int of N/S and E/W twys. E of rnwy 18–36. Lctn #2: 109°; 6.4 mi, int of W ramp and W twy. Lctn #3: 102°; 6.2 NM corner of Coast Guard Ramp at int twy to rnwy 14.

Monroeville (Monroeville County Arpt): 048°; 0.3 mi, middle of twy at the holding line.

Muscle Shoals (Muscle Shoals Arpt): 288°; 6.0 mi on turnaround apch end rwy 20.

Tuscaloosa (Van de Graaff Arpt): 241°; 4.3 mi, on centerline of twy midway between ramp and rnwy.

Tuskegee (Auburn-Opelika Muni Arpt): 055°; 14.5 NM compass rose in front of trml bldg.

ARIZONA

Airborne—

Gila Bend (Gila Bend AF Aux Fld): 191°; 5.5; over apch end of rnwy 35; 2000'.

Prescott (Prescott Muni Arpt): 124°; 5.0 NM over approach end rnwy 29; 7000'.

Tucson (Tucson Int'l Arpt): 258°; 6 NM; main rnwy intersection; 4000'.

Winslow (Winslow Muni Arpt): 107°; 5.0 NM; over approach end rnwy 29; 6000'.

Yuma (MCAS/Yuma Intl Arpt): 166°; 6.5 mi centerline rnwy 17–35; 1500'.

Ground—

Douglas (Bisbee-Douglas Intl Arpt): 160°; int of SW ramp and twy T–2.

Flagstaff (Pullman Arpt, Flagstaff): 158°; 0.5 NM—twy entrance to T-hangars midfield.

Kingman (Muni Arpt): 220°; center of runup area east of apch end of rnwy 03.

Libby (Libby AAF/Sierra Vista Muni Arpt): Lctn #1—212° runup area rwy 2. Lctn #2—109° compass rose rwy 29. Lctn #3—083° 150' east of fuel island center of civilian ramp.

ARKANSAS

Airborne—

Blytheville (Muni Arpt): 094°; 5.8 mi. over hangar adj to Admin Bldg; 1300'.

Fayetteville (Drake Fld): 182°; 14.8 mi, white circle on arpt; 2500'.

Flippin: 051°; 5.0 mi, dual water twr at Mountain Home; 1000'.

Fort Smith (Muni Arpt): 233°; 5.2 NM, water tank at N edge of arpt; 1500'.

Monticello: 305°; 5.7 mi over white water twr; 1500'.

Texarkana (Muni/Webb Fld): 122°; 5.1 mi, over int rnwys 13–31 and 4–22; 1400'.

Ground—

El Dorado (Goodwin Fld): 228°; 3.8 NM, parking ramp at center twy.

Harrison (Boone Co. Arpt): 131°; 4.3 NM at int of N/S and E/W twys in front of trml bldg.

Little Rock (Adams Fld): 315°; 4.5 mi, on taxi strip adj to junction rnwy 14.

Jonesboro (Muni Arpt): 226°; 3.9 NM NE corner of terminal ramp.

Pine Bluff (Grider Fld): 180°; 4 mi int of ctr twy and N/S rnwy.

Walnut Ridge (Muni Arpt): 051°; 1.7 mi, taxi strip at parking ramp adj to tetrahedron.

CALIFORNIA

Airborne—

Bakersfield (Meadows Fld): 127°; 5 NM over apch end rnwy 30R; 2000'.

Daggett (Barstow-Daggett Arpt): 224°; 11 NM over concrete block in center of demsnd LFR; 3000'.

El Toro (Orange County Arpt, Santa Ana) 254°; 7 NM over int rwys 19R and midfield twy; 1500'.

Fortuna (Arcata Arpt, Arcata-Eureka): 358°; over intersection of rnwys; 1200'.

Fortuna (Rohnerville Arpt): 128°; over apch end of rnwy 11; 1400'.

Fresno (Air Trml): 133°; over apch end rnwy 11; 1300'.

Imperial (Imperial County Arpt): 313°; 6 NM apch end of rnwy 32; 1500'.

Maxwell (Willows-Glen Co. Arpt): 342°; over apch end rnwy 34; 1100'.

Merced (Muni Arpt): 288°; over end rnwy 30; 1200'.

Napa (Muni Arpt): 047°; over arpt bcn; 1000'.

Oxnard (Ventura County Arpt): 253°; 7.5 mi, over red and white smokestack on beach; 1100'.

Palm Springs (Muni Arpt): 222°; 5 NM over ctl twr; 1500'.

Red Bluff (Muni Arpt): 329°; over centerline rnwy 33; 1400'.

Figure 47

RESTRICTIONS TO ENROUTE NAVIGATION AIDS

Radio Facility Restrictions are cited until cancelled by the Associated Station.

Restricted areas are defined in degrees from magnetic North.

ALABAMA

EUFAULA VORTAC: *DME portion unusable 245-315°* below 1300' MSL beyond 30 NM, below 1900' MSL beyond 35 NM, below 2400' MSL beyond 40 NM.

GADSDEN VORTAC: VOR portion unusable 340-047° below 5000' MSL; 237-245° and 309-339° all sectors and altitudes.

MOBILE, BROOKLEY AFB VORTAC: VOR portion unusable beyond 30 mi below 2,000 MSL.

MOBILE VORTAC: VOR portion unusable 023-033°.

ARIZONA

BUCKEYE VORTAC: Unusable beyond 28 nmi below 4000' MSL 060-075°, beyond 35 nmi below 5000' MSL 230-260°, beyond 35 nmi below 7000' 280-320°, beyond 37 nmi below 6000' MSL 320-360°.

COCHISE VORTAC: Unusable beyond 35 NM below 10,000' MSL 005-015°, beyond 25 NM below 10,000' MSL 015-030°, beyond 35 NM below 10,000' MSL 030-040°, beyond 30 NM below 9,000' MSL 190-220°, beyond 25 NM below 9,200' MSL 220-240°.

DOUGLAS VORTAC: DME portion unusable beyond 26 NM below 10,000' MSL 045-065°; beyond 28 NM below 9500' MSL 065-095°; beyond 35 NM below 11,300' MSL 355-010°.

FLAGSTAFF VOR: Unusable beyond 30 nmi below 8300' MSL 030-110°, beyond 35 nmi below 10,200' MSL 110-155°, beyond 30 nmi below 9300' MSL 155-245°, beyond 30 nmi below 11,900' MSL 245-325°, beyond 15 nmi below 14,100' MSL 325-030°.

GRAND CANYON VOR: Unusable 340-080° beyond 30 NM below 10,800' MSL, 030-060° beyond 25 NM below 9500' MSL, 060-100° beyond 20 NM below 9000' MSL, 230-270° beyond 15 NM below 10,000 MSL.

KINGMAN VOR: Unusable beyond 25 NM below 9,000' MSL 085-130°, beyond 15 NM below 10,000' MSL 130-180°, beyond 30 NM below 7,000' MSL 180-255°, beyond 35 NM below 9,000' MSL 255-315°, beyond 20 NM below 8,000' MSL 315-085°.

PHOENIX VORTAC: Unusable beyond 25 nmi below 6000' MSL 210-245° and beyond 30 nmi below 5500' MSL 300-315°.

PRESCOTT VORTAC: Unusable beyond 29 nmi below 9300' MSL 055-080° beyond 35 nmi below 8500' MSL 125-140° beyond 30 nmi below 9500' MSL 140-160° beyond 35 nmi below 9500' MSL 160-175° beyond 30 nmi below 9500' MSL 175-185° beyond 23 nmi below 9100' MSL 185-195° beyond 18 nmi below 9100' MSL 195-220° beyond 25 nmi below 9100' MSL 220-235° beyond 30 nmi below 8800' MSL 265-275°.

SAN SIMON VORTAC: Unusable beyond 30 nmi below 8000' MSL 350-360°, beyond 30 nmi below 8000' MSL 020-050°, beyond 28 nmi below 11,300' MSL 150-190°, beyond 30 nmi below 9000' MSL 190-220°, beyond 30 nmi below 9900' MSL 235-250°.

TUCSON VORTAC: Unusable beyond 28 NM below 10,200' MSL 040-095° and beyond 32 NM below 10,700' MSL 325-020°.

YUMA VORTAC: Unusable beyond 27 nmi below 3600' MSL 280-300°.

ARKANSAS

HOT SPRINGS VOR: Unusable 346-055° beyond 20 NM below 3500' MSL; 056°-140° beyond 20 NM below 6500' MSL; 141-227° beyond 20 NM below 3500' MSL; 141-227° beyond 26 NM below 5500' MSL; 228-311° beyond 20 NM below 3500' MSL; 312-345° beyond 15 NM below 5500' MSL; 312-345° beyond 32 NM below 9500' MSL.

PINE BLUFF VORTAC: VOR portion unusable 054-079° beyond 35 NM below 5000' MSL, 170-185° beyond 30 NM below 2000' MSL, 236-249° beyond 20 NM below 6000' MSL or beyond 26 NM below 8000' MSL.

CALIFORNIA

ARCATA VOR: Unusable 090-150° beyond 20 NM below 6000'.

AVENAL VORTAC: DME portion unusable beyond 40 nmi below 3000' MSL 320-065° below 4000' MSL, 065-095° below 4500' MSL, 095-125° below 8500' MSL, 125-170° below 7500' MSL, 170-198° below 7000' MSL, 195-230° below 8000' MSL, 230-305°.

BIG SUR VORTAC: VOR portion unusable 215-235° beyond 16 nmi below 10,000' MSL. DME portion unusable beyond 35 nmi below 9000' MSL 320-085°.

BISHOP VOR: Unusable below 000-030° beyond 18 NM; 030-080° beyond 15 NM, 080-100° beyond 8 NM; 100-130° beyond 15 NM below 16,000' MSL; 170-260° beyond 15 NM, 260-280° beyond 20 NM.

BLYTHE VORTAC: Unusable beyond 30 NM below 6000' MSL 280-295°, beyond 20 NM below 6000' MSL 295-315°, beyond 30 NM below 6000' MSL 315-325°, beyond 30 NM below 5000' MSL 325-018°.

CHANDLER NDB: Unusable beyond 40 nmi 095-120°, beyond 35 nmi 200-235°.

CONCORD VOR: Unusable 090-125°.

FILLMORE VORTAC: Unusable beyond 20 nmi below 9000' MSL 280-310° and beyond 25 nmi below 10,400' MSL 310-360°.

FORT JONES VORTAC: VOR portion unusable 080-135° from 9 NM to 19 NM below 13,000' MSL and beyond 19 NM all altitudes; 200-300° from 8 NM to 19 NM below 14,000' MSL and beyond 19 NM all altitudes; 321° and 337° from 9NM to 19NM below 15,000' MSL. DME portion unusable beyond 30 NM below 12,000' MSL 020-060°; beyond 20 NM below 16,000' MSL 060-120°; beyond 35 NM below 12,000' MSL 120-180°; beyond 20 NM below 16,000' MSL 180-290°.

FORTUNA VORTAC: VOR portion unusable 050-070° beyond 35 mi below 9500' MSL, 150-180° beyond 20

Figure 48

PREFERRED IFR ROUTES

A system of preferred routes has been established to guide pilots in planning their route of flight, to minimize route changes during the operational phase of flight, and to aid in the efficient orderly management of the air traffic using federal airways. The preferred IFR routes which follow are designed to serve the needs of airspace users and to provide for a systematic flow of air traffic in the major terminal and en route flight environments. Cooperation by all pilots in filing preferred routes will result in fewer traffic delays and will better provide for efficient departure, en route and arrival air traffic service.

The following lists contain preferred IFR routes for the low altitude stratum and the high altitude stratum. The high altitude list is in two sections; the first section showing terminal to terminal routes and the second section showing single direction route segments. Also, on some high altitude routes low altitude airways are included as transition routes.

The following will explain the terms/abbreviations used in the listing:

1. Preferred routes beginning/ending with an airway number indicate that the airway essentially overlies the airport and flight are normally cleared directly on the airway.

2. Preferred IFR routes beginning/ending with a fix indicate that aircraft may be routed to/from these fixes via a Standard Instrument Departure (SID) route, radar vectors (RV), or a Standard Terminal Arrival Route (STAR).

3. Preferred IFR routes for major terminals selected are listed alphabetically under the name of the departure airport. Where several airports are in proximity they are listed under the principal airport and categorized as a metropolitan area; e.g., New York Metro Area.

4. Preferred IFR routes used in one direction only for selected segments, irrespective of point of departure or destination, are listed numerically showing the segment fixes and the direction and times effective.

5. Where more than one route is listed the routes have equal priority for use.

6. Official location identifiers are used in the route description for VOR/VORTAC navaids.

7. Intersection names are spelled out.

8. Navaid radial and distance fixes (e.g., ARD201113) have been used in the route description in an expediency and intersection names will be assigned as soon as routine processing can be accomplished. Navaid radial (no distance stated) may be used to describe a route to intercept a specified airway (e.g., MIV MIV101 V30); another navaid radial (e.g., UIM UIM255 GSW081); or an intersection (e.g., GSW081 Fitch).

9. Where two navaids, an intersection and a navaid, a navaid and a navaid radial and distance point, or any navigable combination of these route descriptions follow in succession, the route is direct.

10. The effective times for the routes are in GMT. Pilots planning flight between the terminals or route segments listed should file for the appropriate preferred IFR route.

11. (90–170 incl) altitude flight level assignment in hundred of feet.

12. The notations "pressurized" and "unpressurized" for certain low altitude preferred routes to Kennedy Airport indicate the preferred route based on aircraft performance.

● A solid dot ● prefixes new or revised data

LOW ALTITUDE

(L29, 23)—Enroute chart numbers.

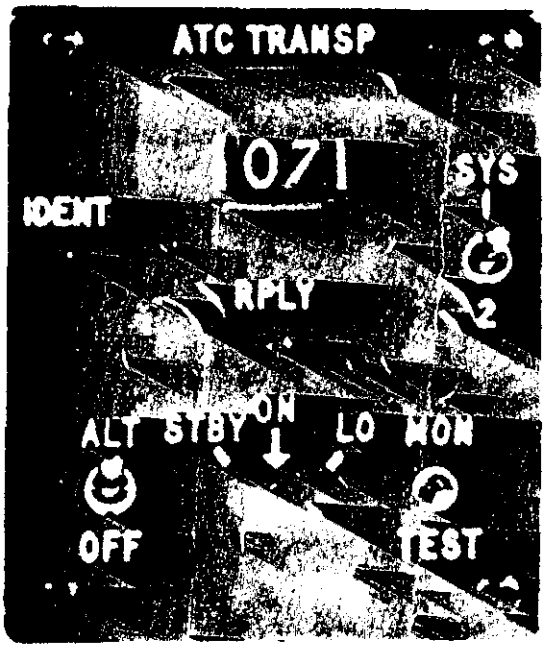
Terminals	Route	Effective Times (GMT)
ALBANY		
Boston	(60–170 incl) V2 GDM V431 (L25)	1000–0300
Kennedy	V489 V157 Empire (pressurized) (L–25) V91 V487 CMK (unpressurized) (L–25)	1000–0300
La Guardia	(80–170 incl) V91 V487 CMK (L–25)	1000–0300
Newark	(80–170 incl) ALB205 SAX034 Monroe (L–25)	1000–0300
ATLANTA METRO AREA		
Chicago	(60–170 incl) V97 Nelson V51W HCH V51 CGT (L–14,20,21,23)	1200–0300
Cincinnati	(80–170 incl) V97 LEX V57 FLM (L–20,22)	1200–0300
Dallas	ATL V18 MLU V94 SCY V15 Hubbard (L–20,14,18,17,13)	0000–2359
Washington	(60–170 incl) AHN V66 FML V454 LVL V157 Ironsides (L–20,22)	1200–0100
BALTIMORE—See Washington/Baltimore Metro		
BOSTON METRO AREA		
Albany	(60–170 incl) V14 (L25)	1000–0300
Buffalo	(60–170 incl) MHT V490 UCA V2 ROC V2N Ehmann (L–25)	1000–0300
Cleveland	(60–170 incl) MHT V490 UCA V2 SYR V84 GEE V464 V115 TDT V72 YNG V6N Norman (L–25,23)	1000–0300
Kennedy	(80–170 incl) V292 PUT V308 ORW V16 Bohemia (L–25)	1000–0300
LaGuardia	(60–170 incl) V3 CMK (L–25)	1000–0300
Newark	(80–170 incl) V205 Monroe (L–25)	1000–0300

Figure 49

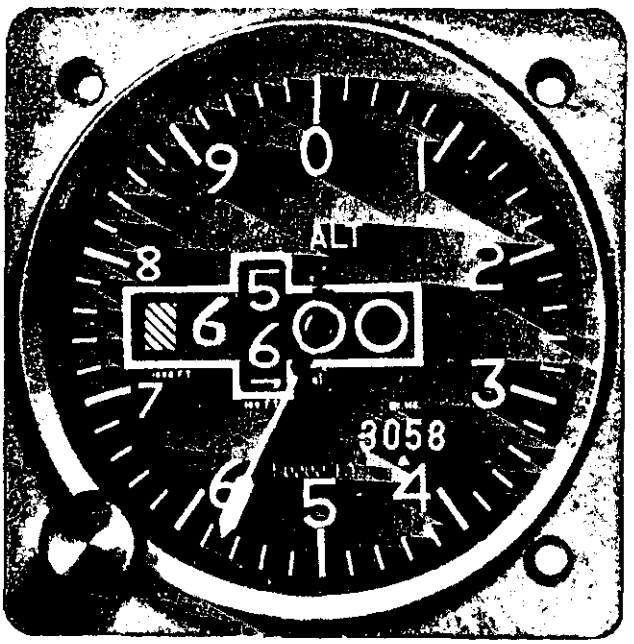
APPENDIX G

RADIO NAVIGATION

TRANSPONDER



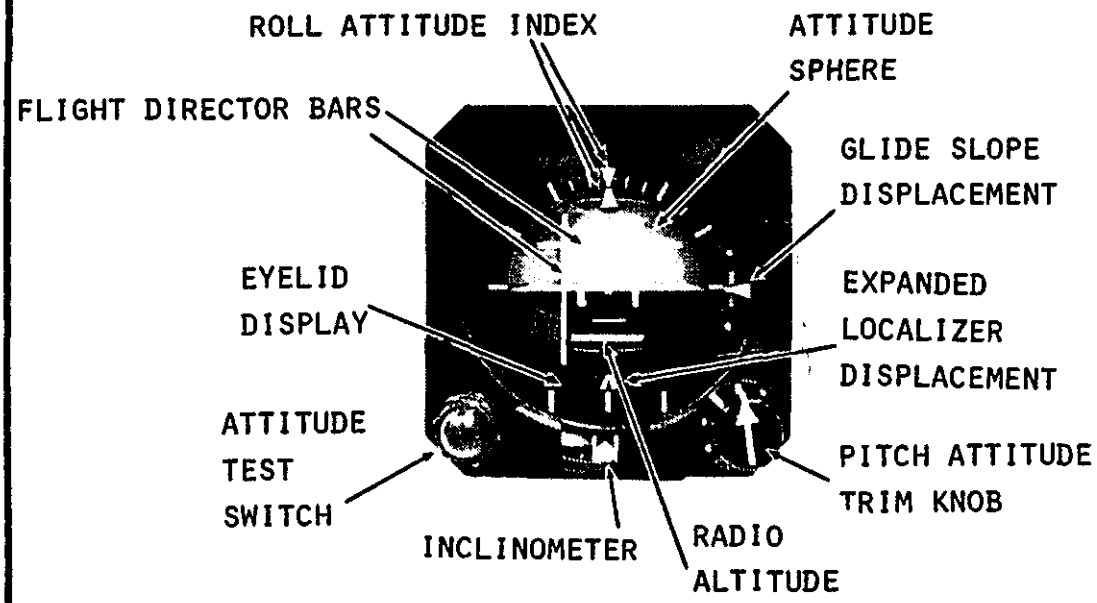
ENCODING ALTIMETER



SOME TRANSPONDERS ARE EQUIPPED WITH A CODE C AUTOMATIC ALTITUDE REPORTING CAPABILITY. THIS SYSTEM CONVERTS AIRCRAFT ALTITUDE IN 100 FOOT INCREMENTS, TO CODED DIGITAL INFORMATION WHICH IS TRANSMITTED TOGETHER WITH CODE C FRAMING PULSES TO THE INTERROGATING RADAR FACILITY. THE MANNER IN WHICH TRANSPONDER PANELS ARE DESIGNED DIFFERS, THEREFORE, A PILOT SHOULD BE THOROUGHLY FAMILIAR WITH THE OPERATION OF HIS TRANSPONDER SO THAT ATC MAY REALIZE ITS FULL CAPABILITIES.

Figure 50

FLIGHT DIRECTOR INDICATOR



RADIO DEVIATION INDICATOR

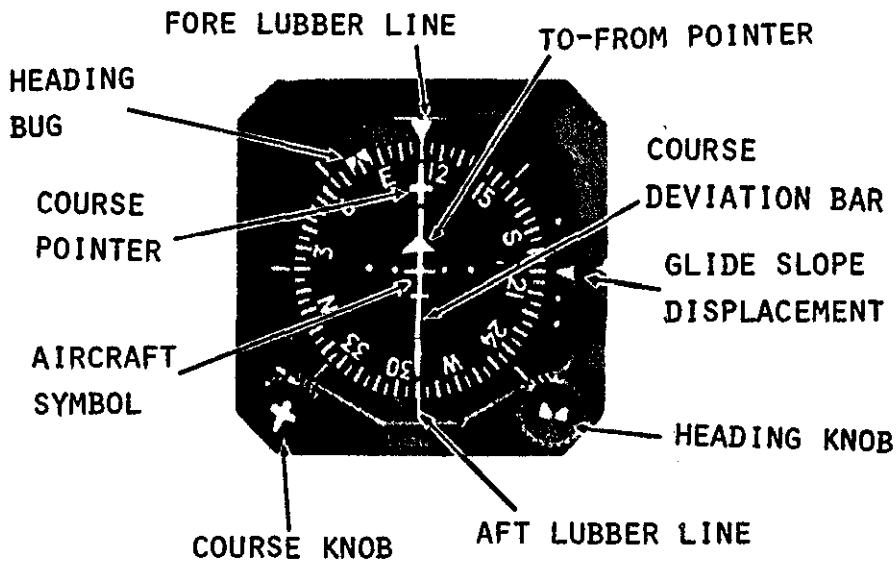
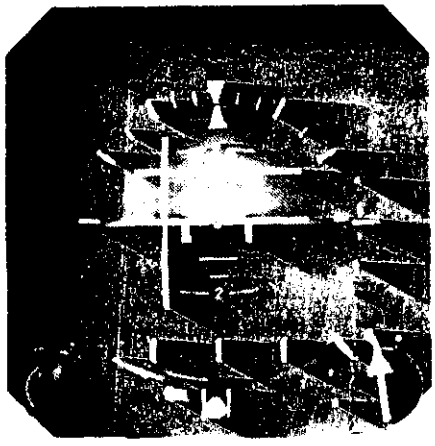


Figure 51

FLIGHT DIRECTOR PROGRAMMED TO HEADING SELECT (HDG) AND PITCH ATTITUDE TRIM (PAT)

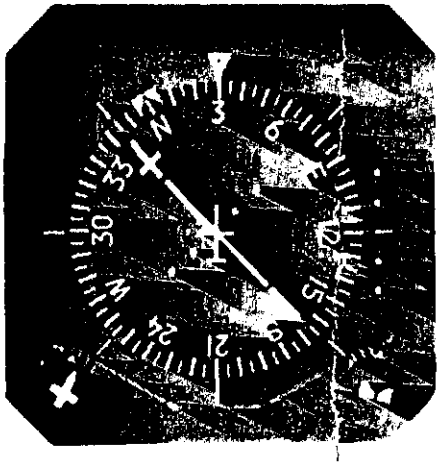


COMMAND

FLY LEFT AND UP

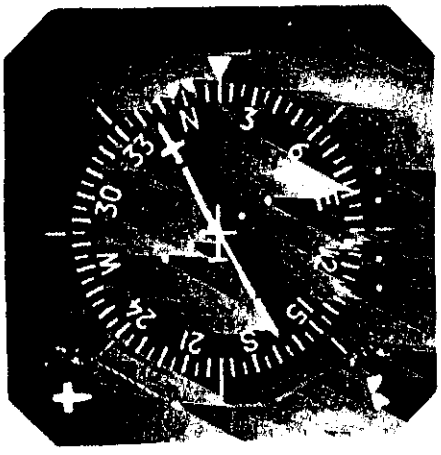
COMMAND

EXECUTED



SITUATION

AIRCRAFT RIGHT OF DESIRED HEADING AND BELOW DESIRED PITCH ATTITUDE.

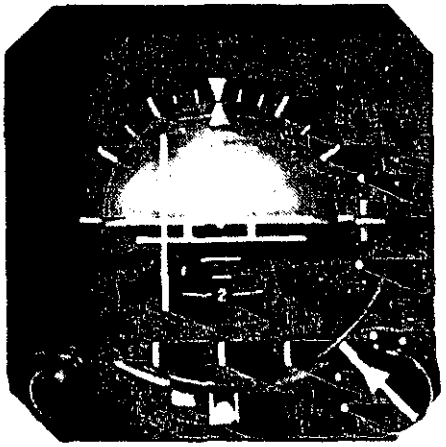


SITUATION

AIRCRAFT IN LEFT BANK AND NOSE-UP ATTITUDE, TURNING TOWARD DESIRED HEADING AND CLIMBING.

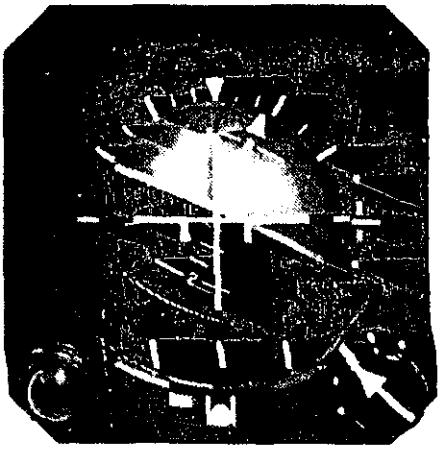
Figure 52

FLIGHT DIRECTOR PROGRAMMED TO VOR/LOCALIZER (V/L) WITH ALTITUDE HOLD (ALT)



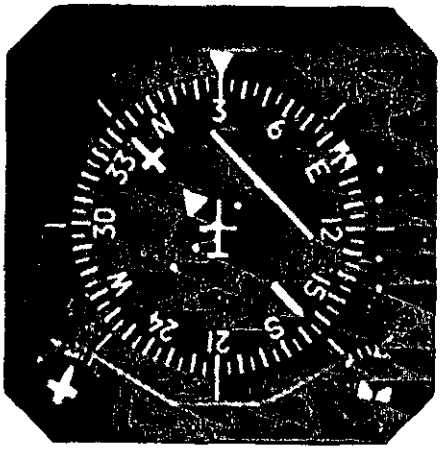
COMMAND

FLY LEFT AND DOWN



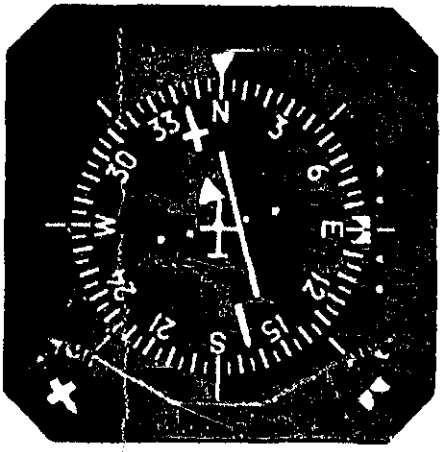
COMMAND

EXECUTED



SITUATION

AIRCRAFT LEFT OF COURSE APPROACHING DESIRED VOR RADIAL, AND ABOVE ENGAGED ALTITUDE.

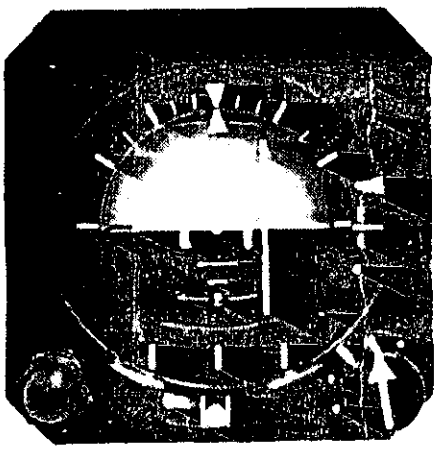


SITUATION

AIRCRAFT IN LEFT BANK, NOSE-DOWN ATTITUDE, INTERCEPTING VOR RADIAL AND APPROACHING DESIRED ALTITUDE.

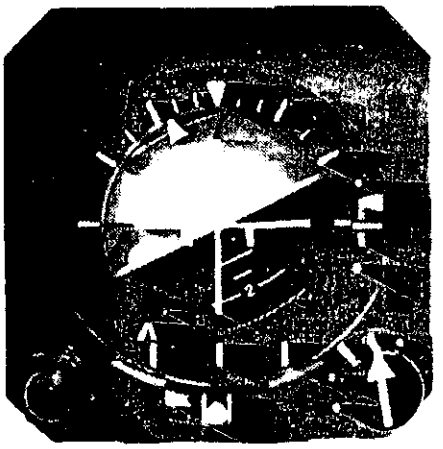
Figure 53

FLIGHT DIRECTOR PROGRAMMED TO VOR/LOCALIZER (V/L), ALTITUDE HOLD (ALT), AND GLIDE SLOPE ARM (GS ARM)



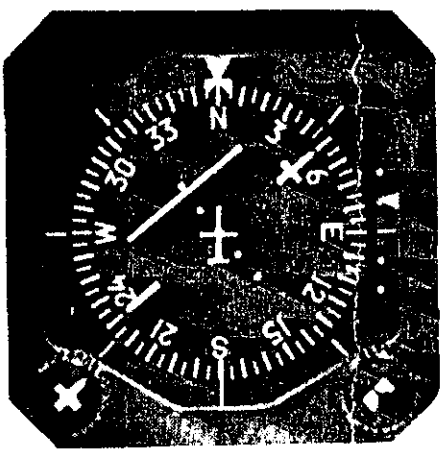
COMMAND

FLY RIGHT, MAINTAIN ALTITUDE.



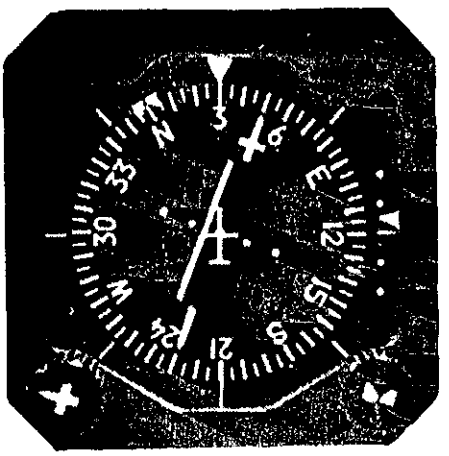
COMMAND

EXECUTED



SITUATION

RUNWAY TO RIGHT, LOCALIZER IS CAPTURED AND IN FRONT OF AIRCRAFT. APPROACHING CENTERLINE OF LOCALIZER AND GLIDE SLOPE.

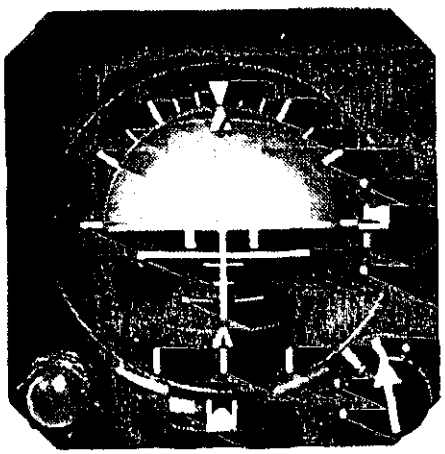


SITUATION

AIRCRAFT IN RIGHT BANK, NOSE-LEVEL ATTITUDE, INTERCEPTING CENTERLINE OF LOCALIZER AND GLIDE SLOPE.

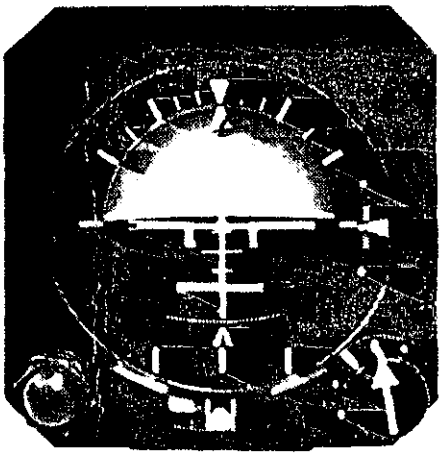
Figure 54

FLIGHT DIRECTOR PROGRAMMED TO VOR/LOCALIZER (V/L), GLIDE SLOPE (GS), AND GLIDE SLOPE EXTENSION (GS EXT)



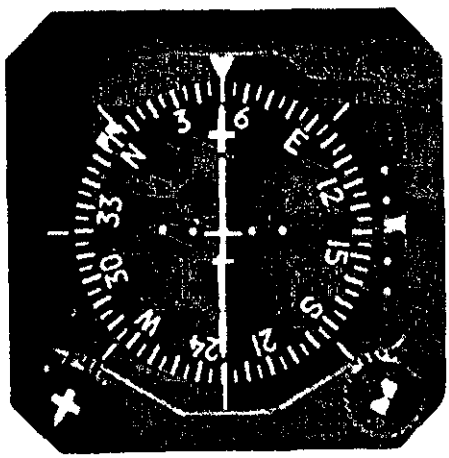
COMMAND

WINGS LEVEL, FLY DOWN.



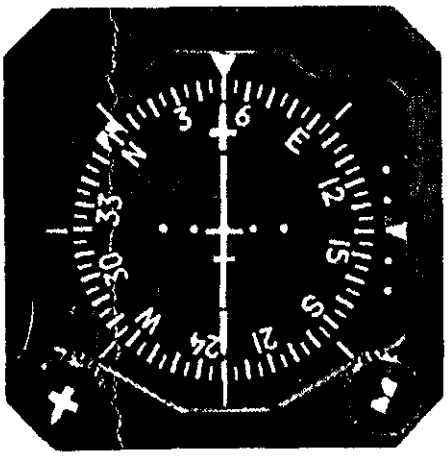
COMMAND

EXECUTED



SITUATION

AIRCRAFT ON LOCALIZER CENTER-LINE, GLIDE SLOPE CAPTURED AT PREDETERMINED DISTANCE BELOW GLIDE SLOPE.



SITUATION

AIRCRAFT IN WINGS LEVEL, NOSE-DOWN ATTITUDE, FLYING ON CEN-TERLINES OF LOCALIZER AND GLIDE SLOPE.

Figure 55

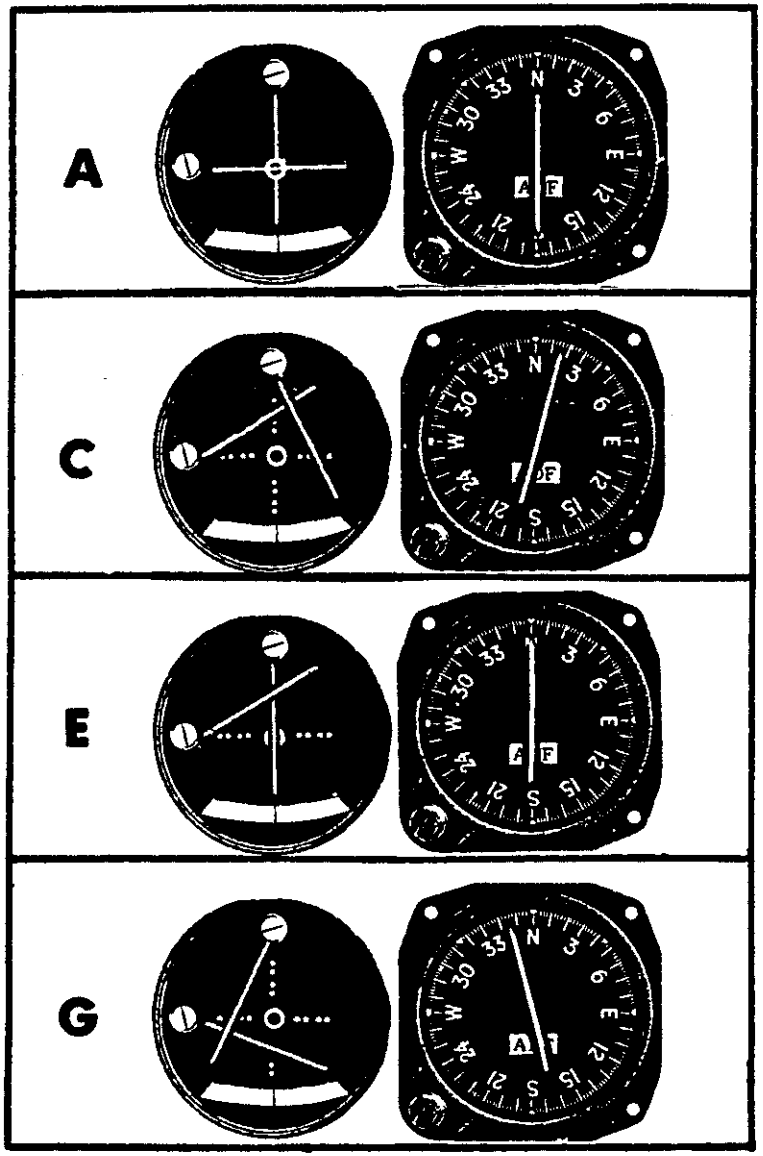


Figure 56

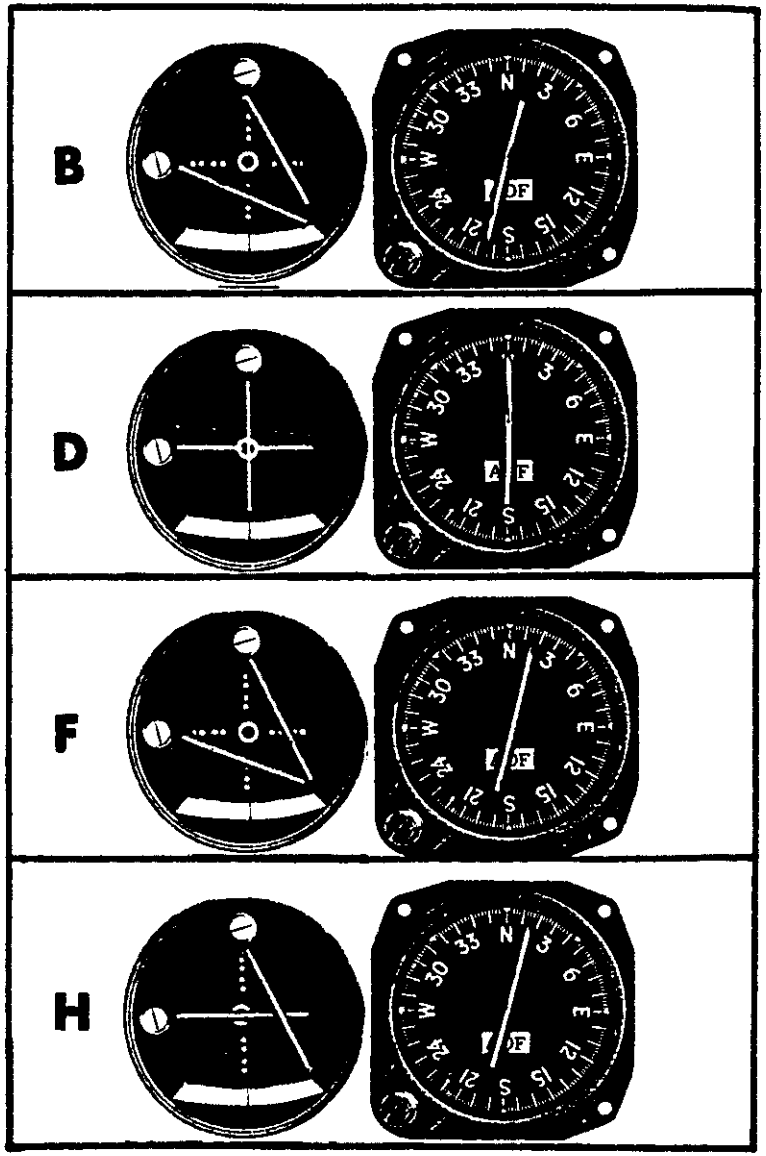


Figure 57

TRANSITION, APPROACH, AND MISSED APPROACH

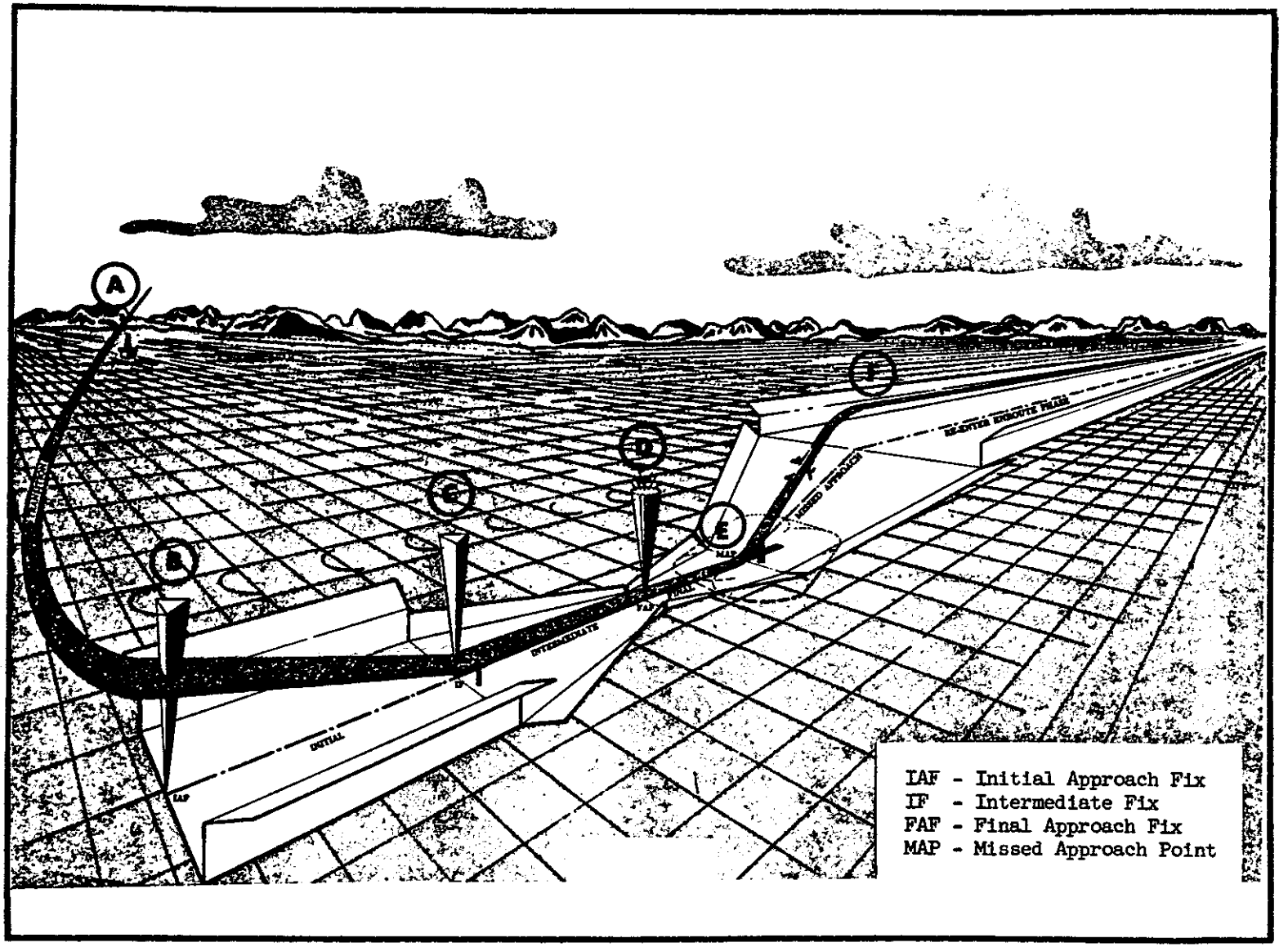


Figure 58

ADF APPROACH INDICATIONS

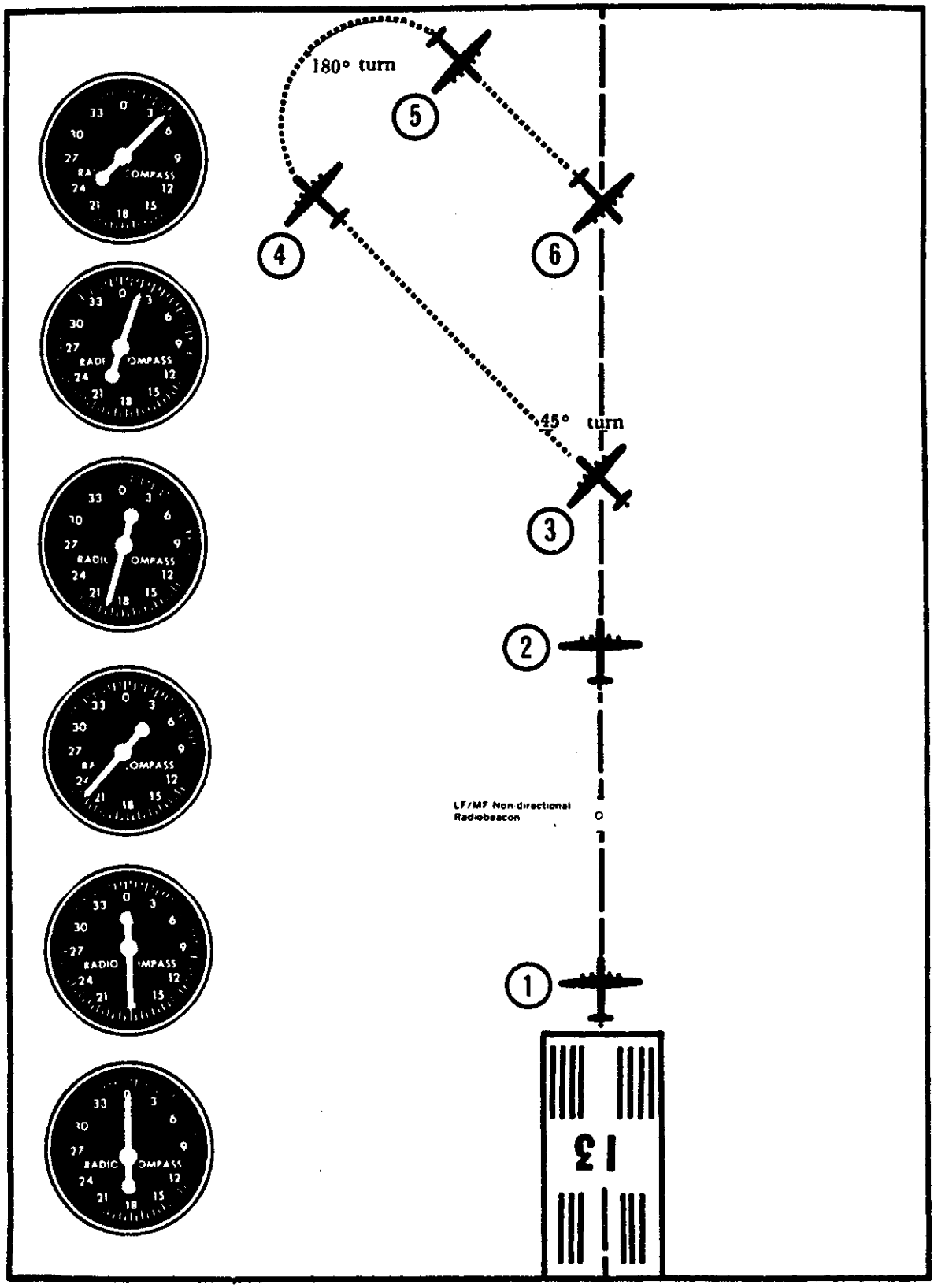


Figure 59

RMI INDICATIONS

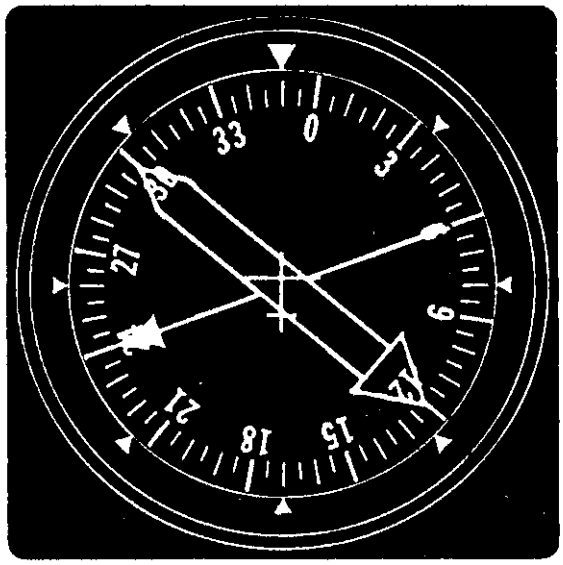


Figure 60

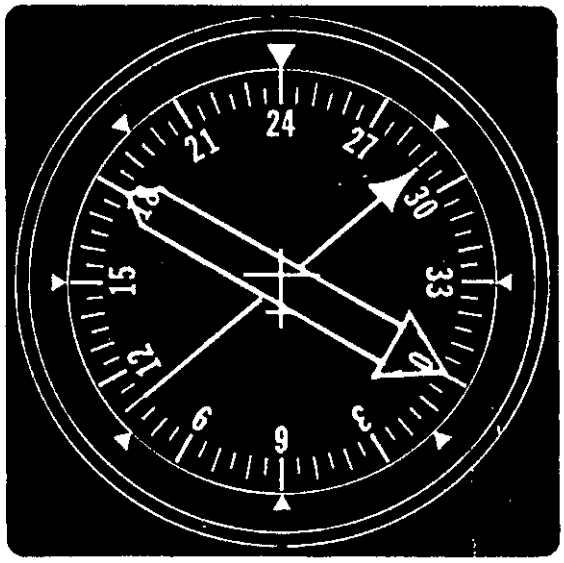


Figure 61

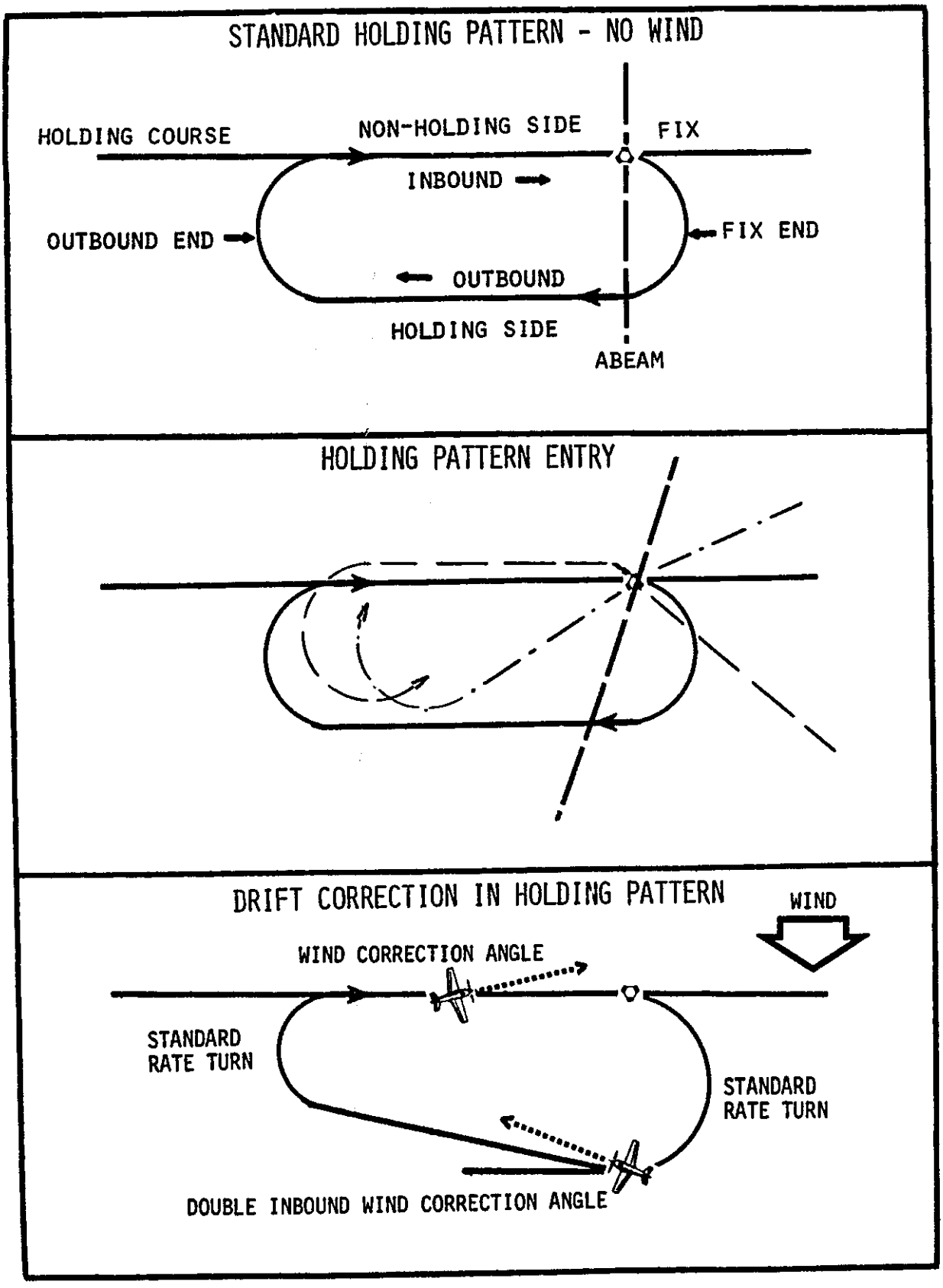
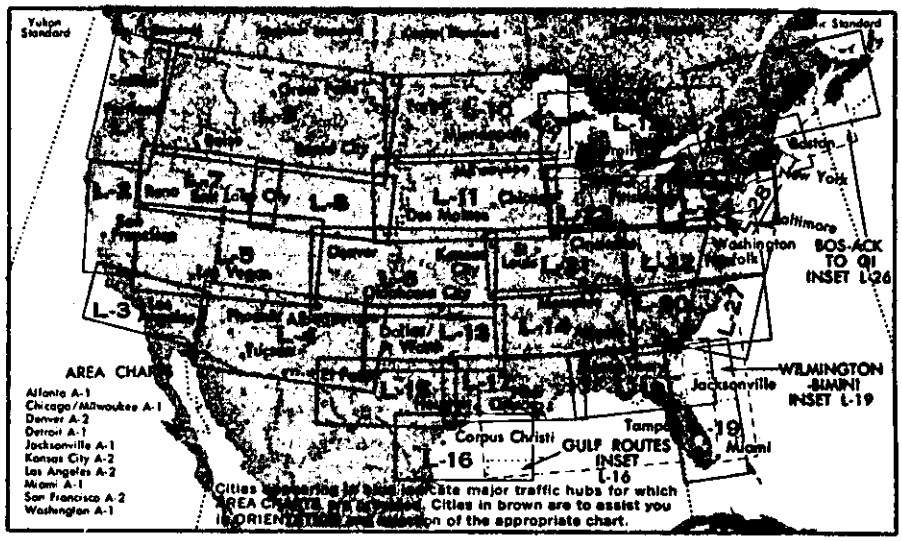

STANDARD HOLDING PATTERN - NO WIND
HOLDING COURSE
NON-HOLDING SIDE
FIX
INBOUND
OUTBOUND END
FIX END
OUTBOUND
HOLDING SIDE
ABEAM
HOLDING PATTERN ENTRY
DRIFT CORRECTION IN HOLDING PATTERN
WIND
WIND CORRECTION ANGLE
STANDARD
RATE TURN
STANDARD
RATE TURN
DOUBLE INBOUND WIND CORRECTION ANGLE

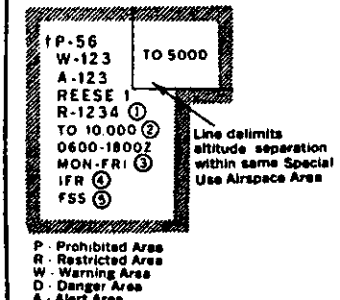
Figure 62

APPENDIX H
CHARTS

UNITED STATES



SPECIAL USE AIRSPACE



SPECIAL USE AIRSPACE WILL INCLUDE

① Area identification. In Canada area ident is preceded by the letters CY (CANADA) followed by a number (PROVINCE).

② Effective Altitude of airspace is shown up to but not including 18,000'. When the airspace encompasses all altitudes in the low altitude structure, no altitude will be shown.

③ Operating Time. When continuous no time is shown.
Days: Sunrise to Sunset
Night: Sunset to Sunrise
Hours: Given in GMT, e.g., 0500-1300Z.
Mon-Fri: Indicates area does not exist on Sat. or Sun.
1 Mar-15 June: Indicates area in use only through dates given.
Days are Local

④ Weather Conditions during which the area is in operation. When continuous no weather is shown.
VFR: Used only during VFR Conditions.
IFR: Used only during IFR Conditions.

⑤ Voice Call of Controlling Agency for enroute clearance through area. No A/G unless indicated.

† Indicates complete information in tabulation on front panel

AIR ROUTE TRAFFIC CONTROL CENTER/REMOTE CONTROL FREQUENCIES

CHICAGO CENTER
127.8 126.6 125.2
Aurora 133.6 127.8 120.8
Bradford 126.8
Chicago Heights 132.95
Des Plaines 127.75 127.1 120.2
Ft Wayne 124.1
Gary 133.7 128.4
Goshen 133.9 128.2 127.55
Grand Rapids 132.85 128.5 127.7
Hagerstwn 128.05 120.4
Jamesville 133.0
Joliet 127.95
Madison 124.0
Milford 125.05
Northbrook 133.2
South Bend 135.9

CLEVELAND CENTER
Akron 125.3
Oakwood 127.5 125.1 124.6 120.4
Blue Knob 128.45 124.6 121.2

Brookville 128.15 126.8 125.7 120.8
Dolphus
Detroit South 125.6 120.9
Findlay 133.8 127.9
Litchfield 135.1 118.25
Mansfield 118.6
Mans Township 126.95 120.6
Mt Hope 118.6
Toledo 123.9
Warren (1) 127.15
Warren (2) 132.4 121.4

INDIANAPOLIS CENTER
124.4
Brookville 134.7 124.6 119.45
London, Ohio 135.8 135.1
Marietta 127.1
Zanesville 134.6 128.8
West Point 135.45
Zanesville 124.45

KANSAS CITY CENTER
Chandler 132.1 124.8

NEW YORK CENTER
Big Flat 128.2
Binghamton 136.1 133.2 125.1 118.8
Flint MM 135.45 134.8 125.4
Gladstone 135.8 127.7
Millsville 135.65 128.7
North Mountain 133.5 122.6
North Philadelphia 135.25
Philipsburg 133.15
Ship Bottom 126.9 125.6
Wildwood 133.7

WASHINGTON CENTER
Clinton 135.0
Dixonville 133.1 127.25
Dunn Loring 127.2 134.0 120.25 118.75
Elkton 127.25
Fort Church 134.5 123.6 123.9 118.6

Figure 63

UNITED STATES GOVERNMENT
FLIGHT INFORMATION PUBLICATION

ENROUTE LOW ALTITUDE – U. S.

For use up to but not including 18,000' MSL

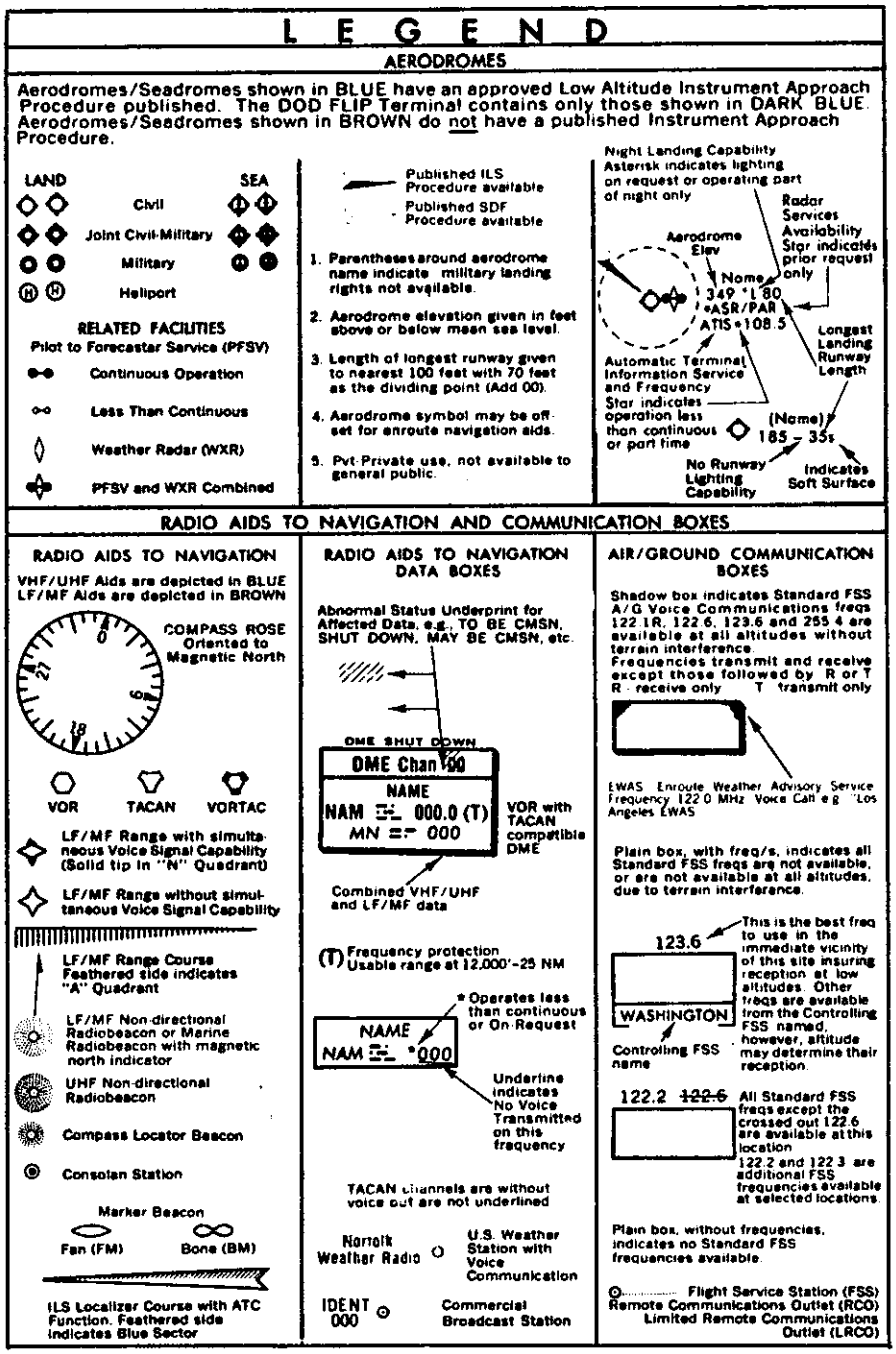


Figure 64

ENROUTE LOW ALTITUDE – U. S.

For use up to but not including 18,000' MSL

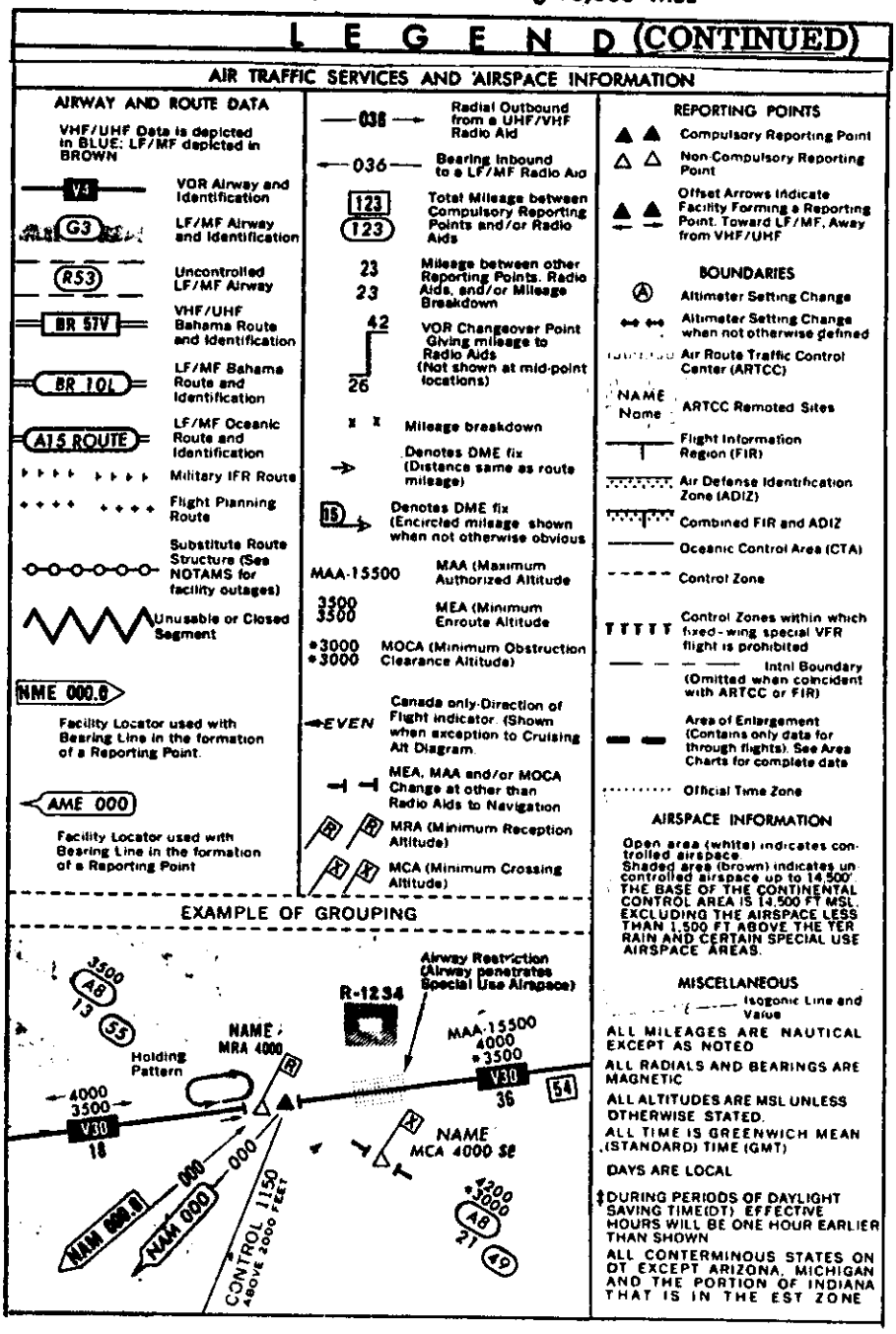


Figure 65

UNITED STATES GOVERNMENT
FLIGHT INFORMATION PUBLICATION

ENROUTE LOW ALTITUDE – U. S.

For use up to but not including 18,000' MSL

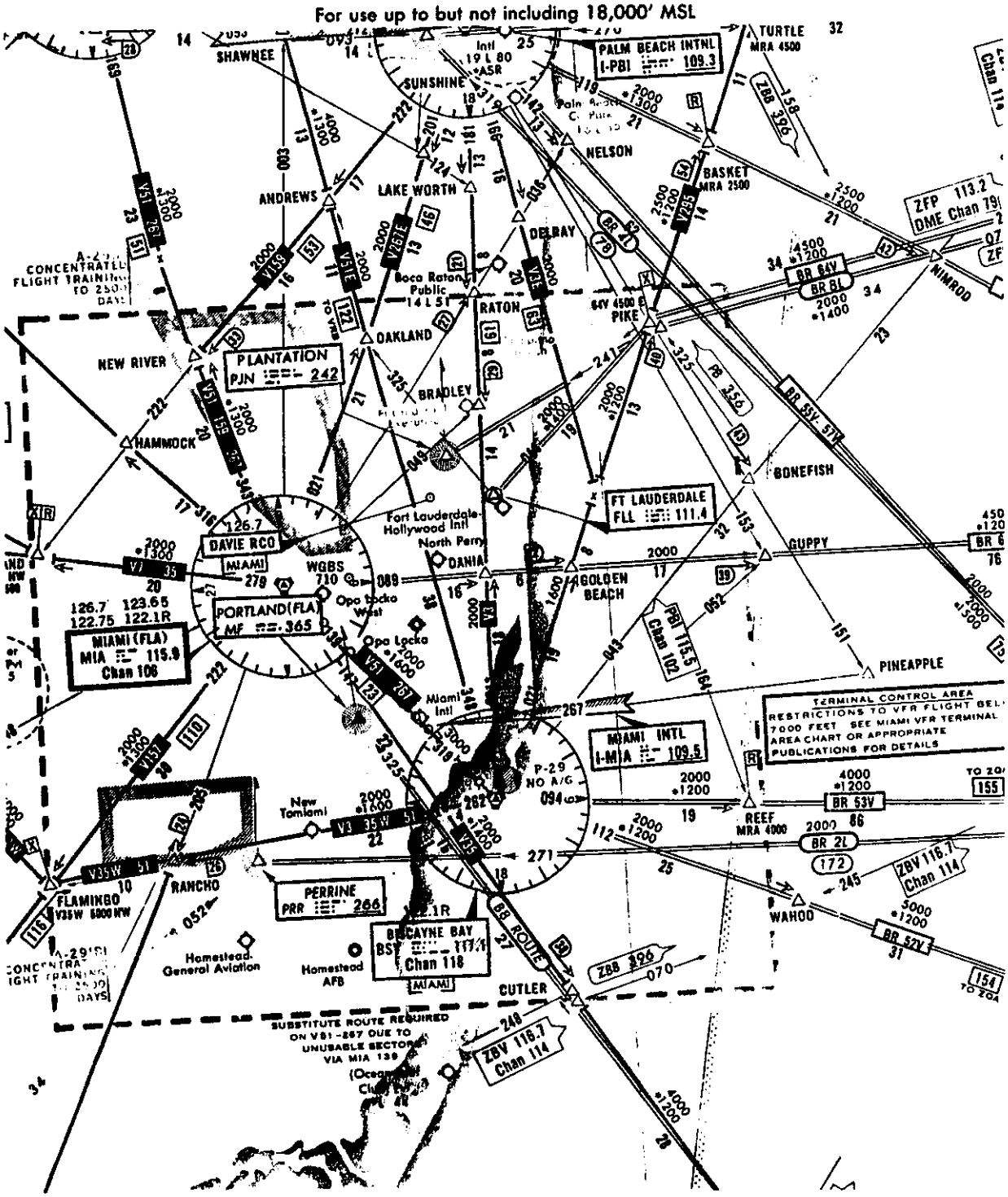


Figure 66

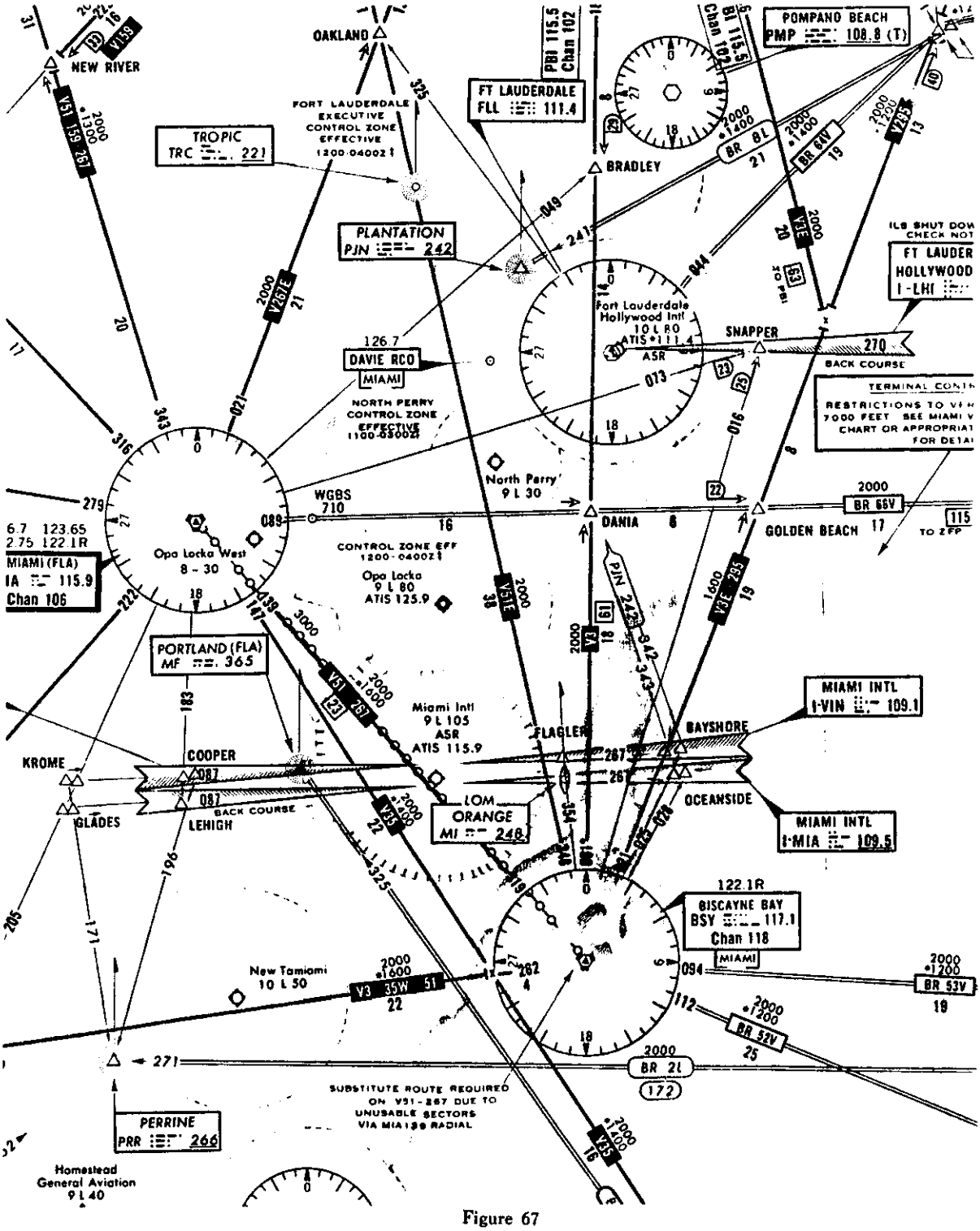

NEW RIVER
OAKLAND
FORT LAUDERDALE EXECUTIVE CONTROL ZONE EFFECTIVE 1200-0400Z‡
TROPIC TRC 221
FT LAUDERDALE FLL 111.4
PBI 115.5 Chan 102
BI 115.5 Chan 102
POMPANO BEACH PMP 108.8 (T)
BRADLEY
PLANTATION PJN 242
126.7
DAVIE RCO
MIAMI
NORTH PERRY CONTROL ZONE EFFECTIVE 1100-0300Z‡
Fort Lauderdale Hollywood Intl
10 L RO
ATIS 111.4
ASR
SNAPPER
270
BACK COURSE
FT LAUDER HOLLYWOOD I-LHI
TERMINAL CONTR
RESTRICTIONS TO VI H 7000 FEET SEE MIAMI V CHART OR APPROPRIAT FOR DETAI
North Perry
9 L 30
WGBS 710
DANIA
GOLDEN BEACH
TO ZFP
6.7 123.65
2.75 122.1R
MIAMI (FLA)
IA 115.9
Chan 106
Opa Locka West
8 - 30
CONTROL ZONE EFF 1200-0400Z‡
Opa Locka
9 L 80
ATIS 125.9
PORTLAND (FLA) MF 365
Miami Intl
9 L 105
ASR
ATIS 115.9
FLAGLER
BAYSHORE
MIAMI INTL I-VIN 109.1
MIAMI INTL I-MIA 109.5
KROME
COOPER
GLADES
LEHIGH
BACK COURSE
LOM
ORANGE MI 248
OCEANSIDE
122.1R
BISCAYNE BAY BSY 117.1
Chan 118
MIAMI
New Tamiami
10 L 50
PERRINE PRR 266
SUBSTITUTE ROUTE REQUIRED ON V51-267 DUE TO UNUSABLE SECTORS VIA MIA 139 RADIAL
Homestead General Aviation
9 L 40

Figure 67

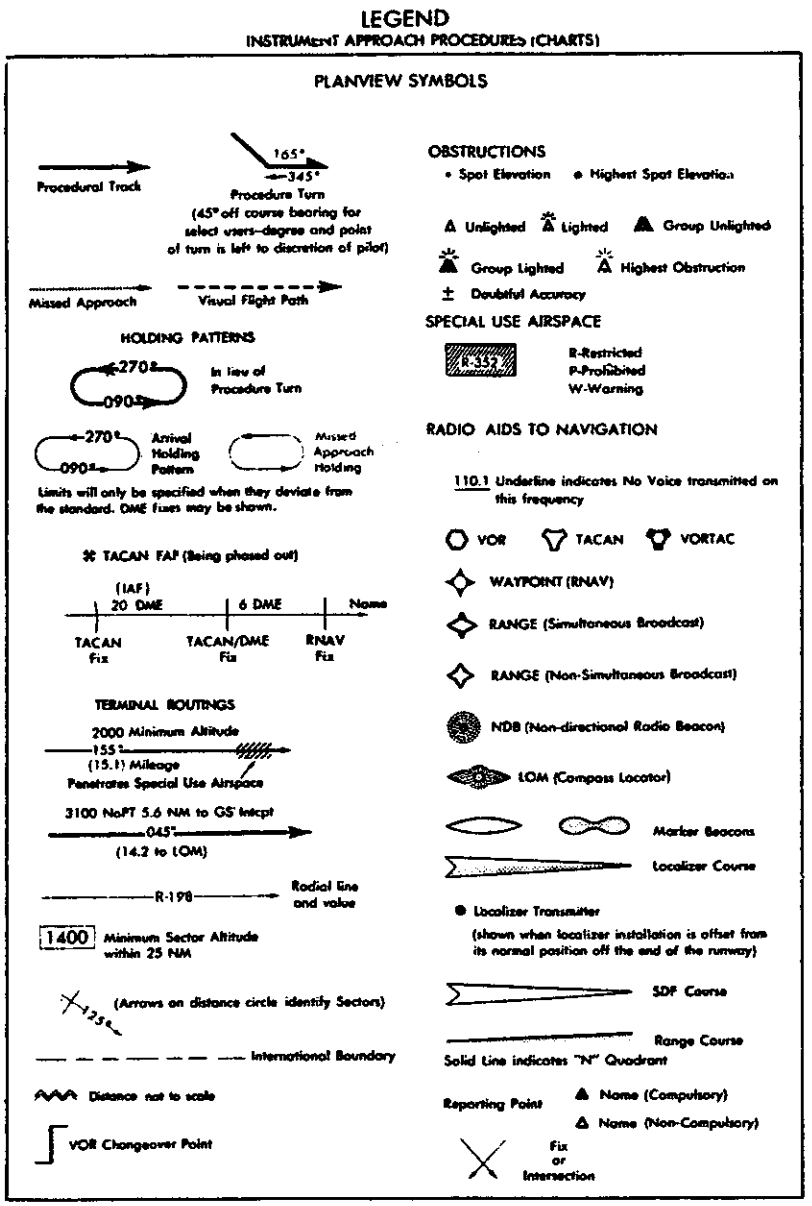


Figure 68

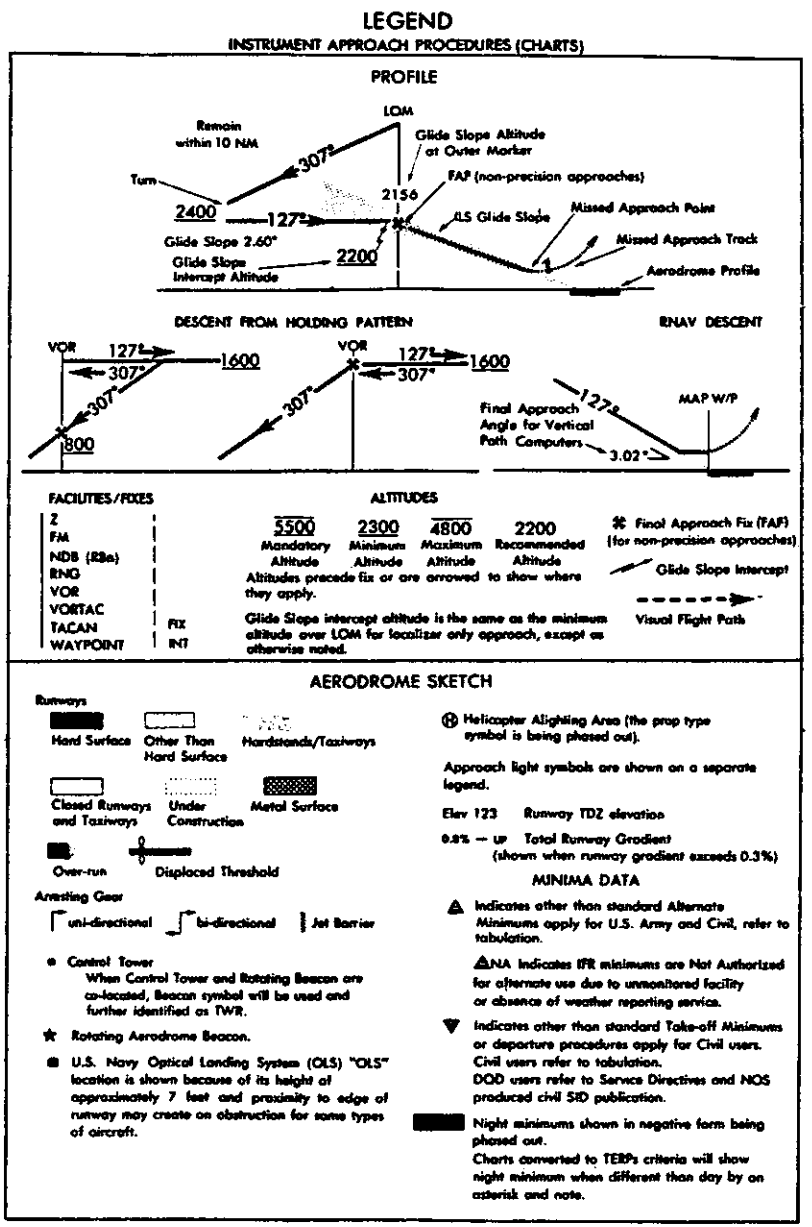


Figure 69

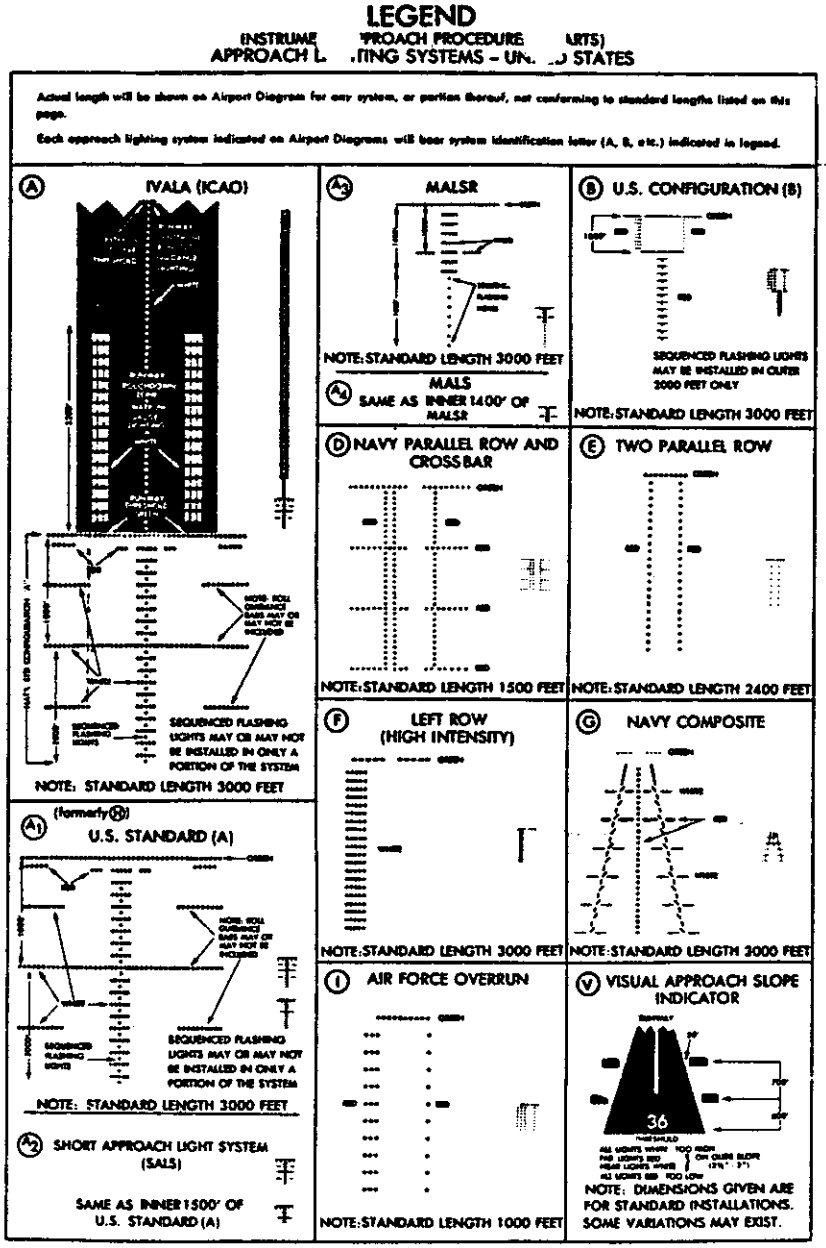


Figure 70

LEGEND
INSTRUMENT APPROACH PROCEDURES (CHARTS)

GENERAL INFORMATION & ABBREVIATIONS

All distances in nautical miles (except Visibility Data which is in statute miles and Runway Visual Range which is in hundreds of feet).
Runway dimensions in feet.
Elevations in feet Mean Sea Level.
All radials/bearings are Magnetic.

ADF	Automatic Direction Finder
ALS	Approach Light System
ARR	Arrival
ASR/PAR	Published Radar Minimums at this Aerodrome.
BC	Back Course
C	Circling
CAT	Category
CHAN	Channel
DH	Decision Height
DME	Distance Measuring Equipment
DR	Dead Reckoning
FAF	Final Approach Fix
FM	Fan Marker
GS	Glide Slope
HAA	Height Above Aerodrome
HAT	Height Above Touchdown
HIRL	High Intensity Runway Lights
IAF	Initial Approach Fix
ICAO	International Civil Aviation Organization
Intcp	Intercept
INT, INTXN	Intersection
IVALA	Intergrated Visual Approach and Landing Aid
LDA	Localizer Type Directional Aid
Ldg	Landing
LDIN	Lead in Light System
LOC	Localizer
MALS	Medium Intensity Approach Light System
MALSR	Medium Intensity Approach Light Systems with Runway Alignment Indicator Lights
MAP	Missed Approach Point
MDA	Minimum Descent Altitude
MIRL	Medium Intensity Runway Lights
NA	Not Authorized
NDB	Non-directional Radio Beacon
NoPT	No Procedure Turn Required (Procedure Turn shall not be executed without ATC clearance)
RA	Radio Altimeter setting height
Radar Required	Radar vectoring required for this approach
Radar Vectoring	May be expected through any portion of the Nav Aid Approach, except final.
RAIL	Runway Alignment Indicator Lights
RBn	Radio Beacon
REIL	Runway End Identifier Lights
RCLS	Runway Centerline Light System
RNAV	Area Navigation
RRL	Runway Remaining Lights
RTB	Return To Base
Runway Touchdown Zone	First 3000' of Runway.
RVR	Runway Visual Range
S	Straight-in
SALS	Short Approach Light System
(S) SALS	(Simplified) Short Approach Light System
SDF	Simplified Directional Facility
TA	Transition Altitude
TAC	TACAN
TDZ	Touchdown Zone
TDZL	Touchdown Zone Lights
TLv	Transition Level
W/P	Waypoint (RNAV)

LANDING MINIMA FORMAT

In this example airport elevation is 1179, and runway touchdown zone elevation is 1152.

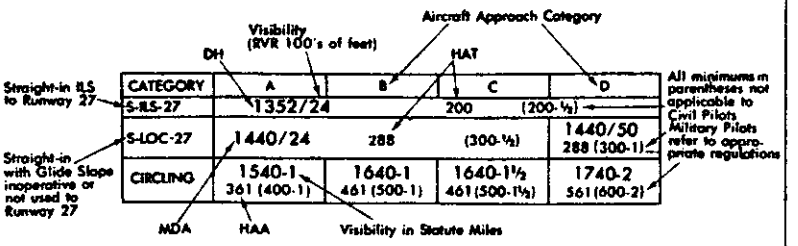


Figure 71

INSTRUMENT APPROACH PROCEDURES (CHARTS)

INOPERATIVE COMPONENTS OR VISUAL AIDS TABLE

Civil pilots see FAR 91.117(c)

Tables 1 and 2 shall be applied to all procedures charted with either old or revised format (old format indicates ILS glide slope inoperative minimums as a note). Landing minimums shown on revised Instrument Approach Procedure Charts showing aircraft approach category A, B, C, and D are based upon full operation of all components and visual aids associated with the particular instrument approach procedure being used. Higher minimums are required with inoperative components or visual aids as indicated below, except where a note specifies that the table is not applicable. If more than one component is inoperative, each minimum is raised to the highest minimum required by any single component that is inoperative.

ILS glide slope inoperative minimums are published on instrument approach charts as localizer minimums.

(1) ILS and PAR.

Inoperative Component or Aid	Increase DH	Increase Visibility	Approach Category
OM* MM*	50 feet	None	ABC
OM* MM*	50 feet	¼ mile	D
ALS	50 feet	¼ mile	ABCD
SALS, MALSR	50 feet	¼ mile	ABC

*Not applicable to PAR

(2) ILS with visibility minimum of 1,800 or 2,000 feet RVR.

Inoperative Component or Aid	Increase DH	Increase Visibility	Approach Category
OM MM	50 feet	To ½ mile	ABC
OM MM	50 feet	To ¾ mile	D
ALS	50 feet	To ¾ mile	ABCD
HIRL, TDZL, RCLS	None	To ½ mile	ABCD
RVR	None	To ½ mile	ABCD

(3) VOR, VOR/DME, LOC, LDA, and ASR.

Inoperative Visual Aid	Increase MDA	Increase Visibility	Approach Category
ALS, SALS, MALSR	None	½ mile	ABC
HIRL, MALS, REILS	None	¼ mile	ABC

(4) NDB (ADF) and RNG.

Inoperative Visual Aid	Increase MDA	Increase Visibility	Approach Category
ALS, MALSR	None	¼ mile	ABC

(5) LOC Approaches.

Inoperative Component or Aid	Increase MDA	Increase Visibility	Approach Category
ALS, MM	None	¼ mile	D

Figure 72

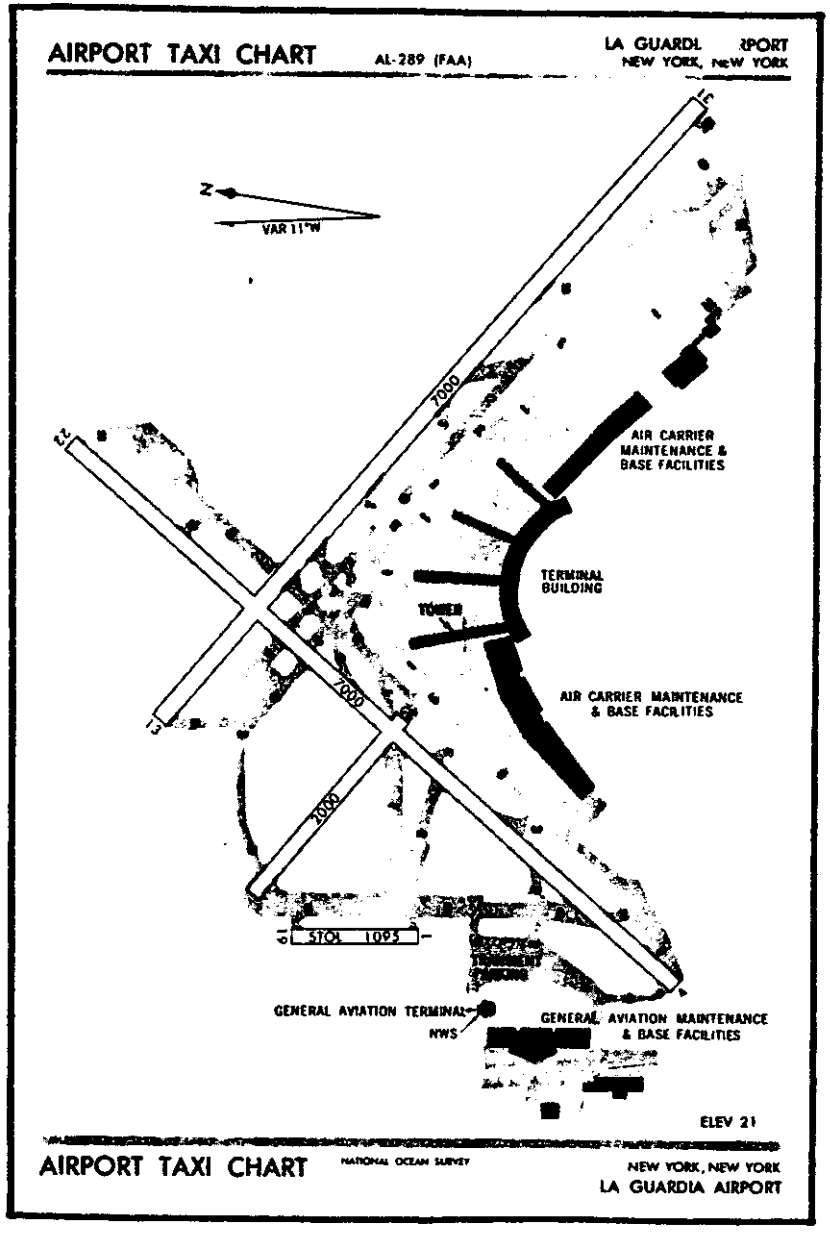


Figure 73

CIVIL RADAR INSTRUMENT APPROACH MINIMUMS

If a radar instrument approach is conducted at any of the below named airports, it shall be in accordance with the instrument procedure published in Part 97 of the Regulations of the Administrator of the Federal Aviation Administration unless an approach is conducted in accordance with a different procedure authorized for such airport by the Administrator of the Federal Aviation Administration. Initial approaches shall be made over specified routes. Minimum altitude (s) shall correspond with those established for en route operation in the particular area or as established in the published procedure. Positive identification must be established with the radar controller. From initial contact with radar to final authorized landing minimums, the instructions of the radar controller are mandatory except when (A) visual contact is established on final approach at or before descent to the authorized landing minimums, or (B) at pilot's discretion if it appears desirable to discontinue the approach. Except when the radar controller may direct otherwise prior to final approach, a missed approach shall be executed as established in the published procedure when (A) communication on final approach is lost for more than 5 seconds during a precision approach, or for more than 15 seconds during a surveillance approach; (B) directed by radar controller; (C) visual contact is not established upon descent to authorized landing minimums; or (D) if landing is not accomplished.

CITY, STATE AIRPORT ELEV PROC DATE	CONDITION RUNWAY	LANDING MINIMA DATA BY AIRCRAFT CATEGORY											
		A			B			C			D		
ABILENE, TEX. Abilene Muni Apt 1789 27 JULY 1972	ASR	MDA	VIS	HAT	MDA	VIS	HAT	MDA	VIS	HAT	MDA	VIS	HAT
	S dn 35L	2160	1	382	2160	1	382	2160	1	382	2160	1	382
	S dn 35R	2160	1	385	2160	1	385	2160	1	385	2160	1	385
	S dn 17L	2160	1	371	2160	1	371	2160	1	371	2160	1	371
	S dn 17R	2300	1	530	2300	1	530	2300	1	530	2300	1¼	530
		MDA	VIS	HAA	MDA	VIS	HAA	MDA	VIS	HAA	MDA	VIS	HAA
	C dn	2340	1	551	2340	1	551	2340	1½	551	2340	2	551
	Inoperative table does not apply to HIRL Rwys 17L,35R,17R,35L and ALS Rwy 35L												
		A			B			C			D-E		
ALBUQUERQUE, N. MEX. Albuquerque International Airport 5352 6 APRIL 1972	ASR	MDA	VIS	HAT	MDA	VIS	HAT	MDA	VIS	HAT	MDA	VIS	HAT
	S dn 3	5700	1	388	5700	1	388	5700	1	388	5700	1	388
	S dn 8	5700	1	384	5700	1	384	5700	1	384	5700	1	384
	S dn 17	5700	1	382	5700	1	382	5700	1	382	5700	1	382
	S dn 35	5700	RVR24	386	5700	RVR24	386	5700	RVR24	386	5700	RVR50	386
		MDA	VIS	HAA	MDA	VIS	HAA	MDA	VIS	HAA	MDA	VIS	HAA
	C dn*	5780	1	428	5820	1	468	5840	1½	488	5920	2	568
	*Category E, not authorized East of Runway 17-35 ▽												
ALEXANDRIA, LA. Esler Field 108 26 JULY 1973		A			B			C			D		
	ASR	MDA	VIS	HAA	MDA	VIS	HAA	MDA	VIS	HAA	MDA	VIS	HAA
	C dn	540	1	432	560	1	452	560	1½	452	660	2	552
	▽												
AMARILLO, TEX. Amarillo Air Terminal 3605 16 AUG. 1973		A			B			C			D		
	ASR	MDA	VIS	HAT	MDA	VIS	HAT	MDA	VIS	HAT	MDA	VIS	HAT
	S dn 3	4060	RVR24	455	4060	RVR24	455	4060	RVR24	455	4060	RVR50	455
	S dn 13	3980	1	381	3980	1	381	3980	1	381	3980	1	381
	S dn 21	3980	½	376	3980	½	376	3980	½	376	3980	1	376
	S dn 31	3960	1	362	3960	1	362	3960	1	362	3960	1	362
		MDA	VIS	HAA	MDA	VIS	HAA	MDA	VIS	HAA	MDA	VIS	HAA
	C dn	4100	1	495	4100	1	495	4100	1½	495	4200	2	595
	Cat E Straight in Rwy 3, MDA 4060, visibility RVR 50, HAT 455 Rwy 21 MDA 3980, visibility 1 mile, HAT 376 Circling MDA 4300, visibility 2 mile HAA 695 ▽												
AUSTIN, TEX. Robert Mueller Muni 632 5 JULY 1973		A			B			C			D		
	ASR	MDA	VIS	HAT	MDA	VIS	HAT	MDA	VIS	HAT	MDA	VIS	HAT
	S dn 12R	1200	1	571	1200	1	571	1200	1	571	1200	1¼	571
	S dn 16R	1300	1	668	1300	1	668	1300	1¼	668	1300	1½	668
	S dn 30L	900	RVR24	289	900	RVR24	289	900	RVR24	289	900	RVR50	289
		MDA	VIS	HAA	MDA	VIS	HAA	MDA	VIS	HAA	MDA	VIS	HAA
	C dn	1300	1	668	1300	1	668	1300	1½	668	1300	2	668
	▽												

SOUTHWEST

NATIONAL OCEAN SURVEY

Figure 74

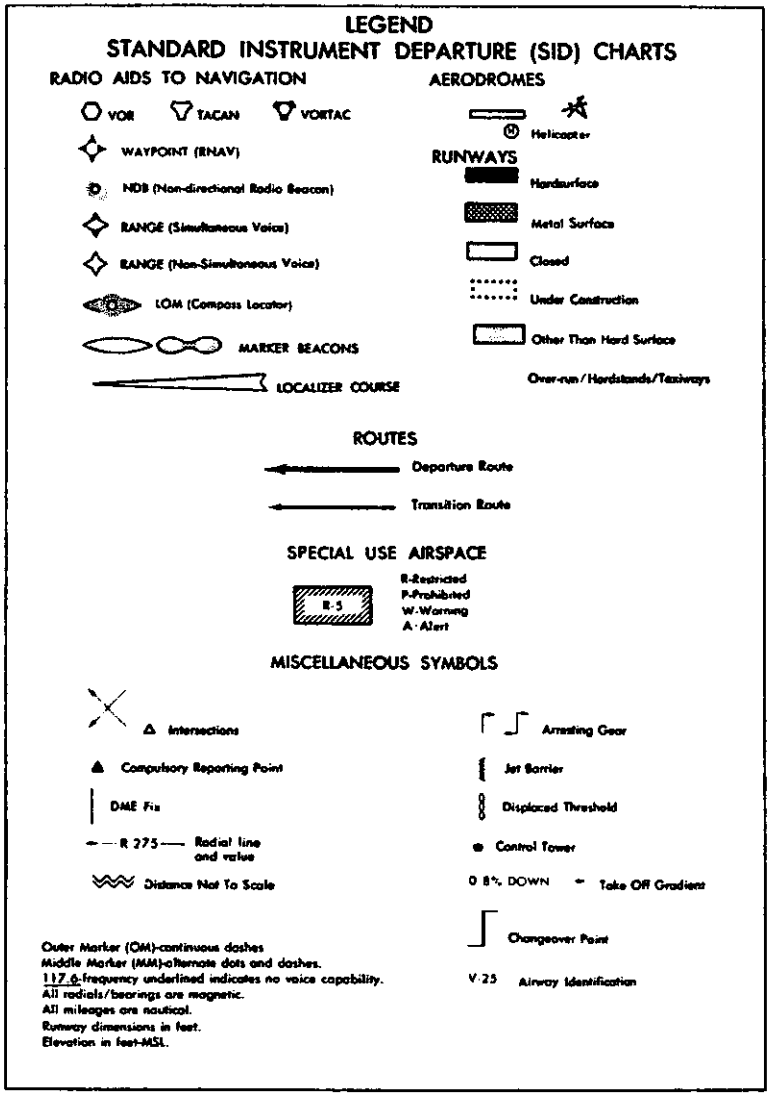


Figure 75

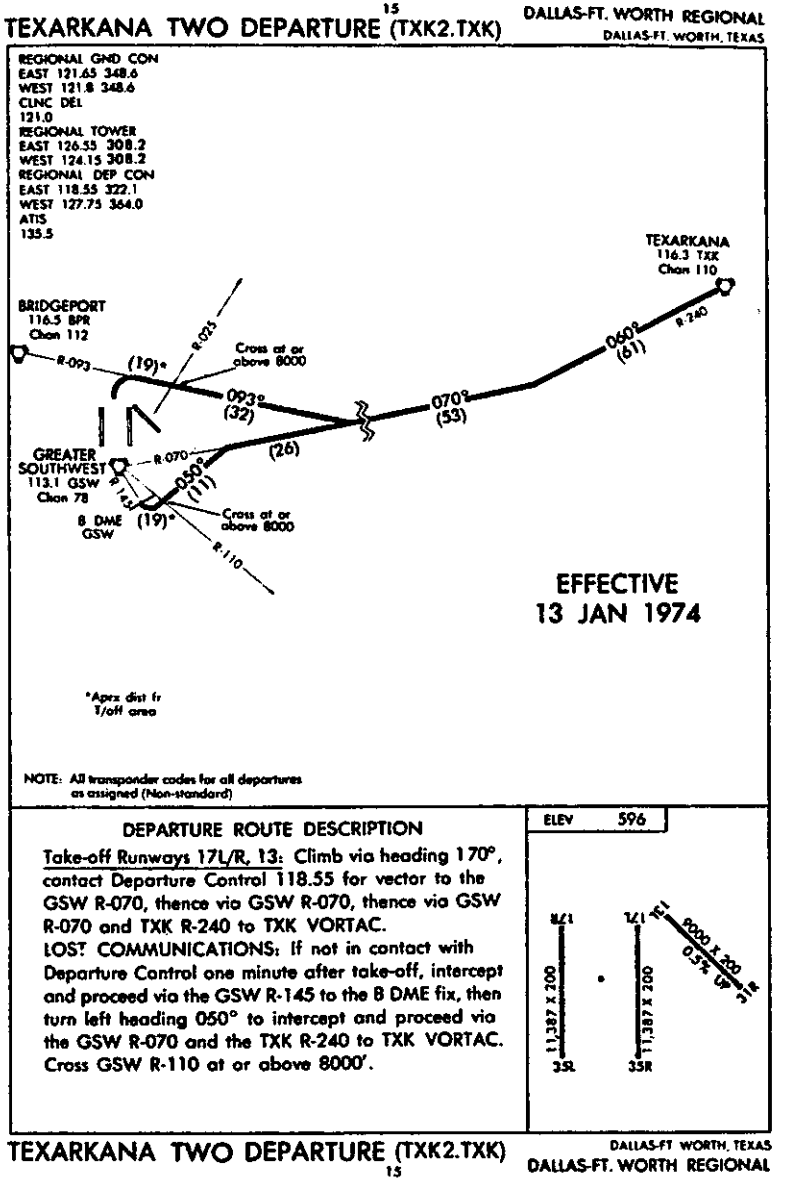


Figure 76

LEGEND

STANDARD TERMINAL ARRIVAL ROUTE (STAR) CHARTS

RADIO AIDS TO NAVIGATION

- VOR
- TACAN
- VORTAC
- WAYPOINT (RNAV)
- RANGE (Simultaneous Broadcast)
- NDB (Non-directional Radio Beacon)
- LOM (Compass Locator)
- Marker Beacons
- Localizer Course
- SDF Course
- NAME 000.0 NAM 00 — DME or TACAN Channel
- Underline indicates no voice transmitted on this frequency
- R-275 — Radial line and value
- Reporting Point — Non-Compulsory / Compulsory
- DME Fix — DME Mileage (when not obvious)
- VOR Changeover Point

ROUTES

- 4500 MEA
- *3500 MOCA
- 270° — Arrival Route
- (65) Mileage
- Transition Route
- MCA (Minimum Crossing Altitude)
- Mileage Breakdown
- Altitude change at other than Radio Aids
- (65) Mileage between Radio Aids, Reporting Points and Route Breaks
- V12, J80 — Airway/Route Identification
- Holding Pattern

SPECIAL USE AIRSPACE

- R 352 — R-Restricted, P-Prohibited, W-Warning, A-Alert

AERODROMES

- Civil
- Joint Civil-Military
- Military
- Heli-port

Entry facility/fix identified by name and symbol only.
All radials/bearings are magnetic
All mileages are nautical
All altitudes in feet–MSL
MEA – Minimum Enroute Altitude
MOCA – Minimum Obstruction Clearance Altitude

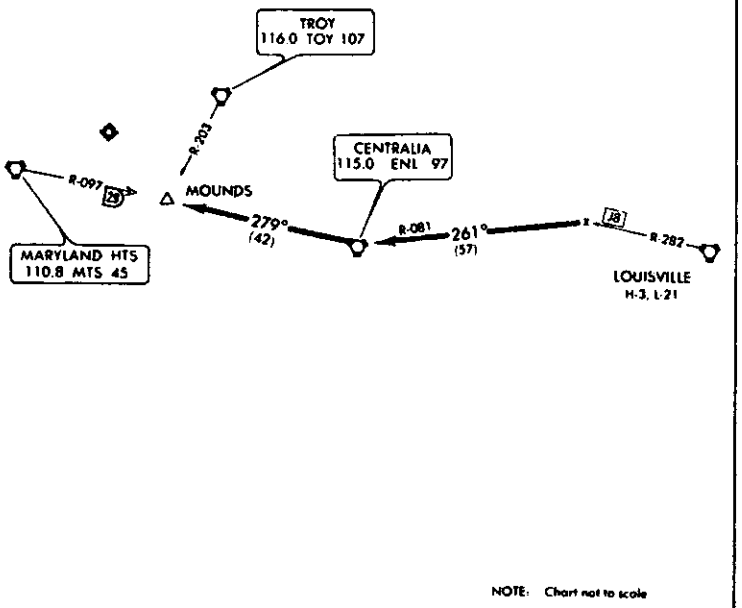
Figure 77

91

SAMSVILLE ONE ARRIVAL (3EJ.SAMS1)

LAMBERT-ST. LOUIS INTERNATIONAL
ST. LOUIS, MISSOURI

ST LOUIS APPROACH CONTROL
125.15 360.6
ATIS 109.7 110.3 120.45 353.9



NOTE: Chart not to scale

From the intersection of J8 and CENTRALIA R-081 via CENTRALIA R-081 to CENTRALIA VORTAC, then via CENTRALIA R-279 and MARYLAND HEIGHTS R-097 to MOUNDS INT. Radar vector to final approach course.

SAMSVILLE ONE ARRIVAL (3EJ.SAMS1)
91
ST LOUIS, MISSOURI
LAMBERT-ST. LOUIS INTERNATIONAL

Figure 78

INSTRUMENT APPROACH PROCEDURES (CHARTS)
WESTERN UNITED STATES

▽ IFR TAKE-OFF MINIMUMS AND DEPARTURE PROCEDURES

FAR 91.116(c) prescribes take-off rules and establishes standard take-off minimums as follows:

(1) Aircraft having two engines or less – one statute mile.

(2) Aircraft having more than two engines – one-half statute mile.

Aerodromes within this geographical area with IFR take-off minimums other than standard are listed below alphabetically by aerodrome name. Departure procedures and/or ceiling visibility minimums are established to assist pilots conducting IFR flight in avoiding obstructions during climb to the minimum enroute altitude.

Take-off minimums and departure procedures apply to all runways unless otherwise specified.

AERODROME NAME	TAKE-OFF MINIMUMS
ARCATA Arcata-Eureka, California	Rwy 1, 500-1 Rwy 13, 300-1 Rwy 31, RVR/24 Rwy 1, left turn within 1 NM. Rwy 13, right turn within 1 NM. All aircraft climb on ACV R-178 CW through R-291 to V27.
AURORA STATE Aurora, Oregon	Climb runway heading to 500 then direct to UBG VORTAC before proceeding on course V23 climb on course.
BAKER MUNI Baker Oregon	600-1 Climb visually over the airport to 3900, climb on BKE R-297 within 10 NM to cross BKE VORTAC at or above: SE bound V4, V45, 7000; W bound V182, 10,000; NW bound V4, 7000; NW bound V357, 6000. All maneuvering N side of BKE R-297.
BARSTOW-DAGGETT Daggett, California	Rwys 21, 25, 800-1 Rwys 21, 25, turn right and cross airport NE bound. Climb direct to DAG VORTAC thence on assigned route.
BELLINGHAM INTL Bellingham, Washington	Climb direct to BLI VORTAC before proceeding on course; V23 SE bound, climb visually to 400 over the airport before proceeding on course.
BEND MUNI Bend, Oregon	Turn left, climb direct to RDM VORTAC, continue climb on R-141 within 10 NM to cross RDM VORTAC at or above 5000: NW bound V165, 8000; W bound V121/V536, 5300.
BERMUDA DUNES Bermuda Dunes, California	Rwy 29 turn right and cross airport SE bound. Climb direct to TRM VORTAC continue climb on R-107 within 10 NM to MCA for direction of flight.
BISBEE-DOUGLAS INTL Douglas, Arizona	Climb to 5700 in holding pattern thence assigned route.
BISHOP Bishop, California	2 miles Climb visually within 2 NM of Bishop Airport to Cross BIH VOR at or above 8000, Climb SE bound on R-140 to 10,000, turn left, proceed to BIH VOR continuing climb in a one minute holding pattern on R-140 (320° inbound), right turns to the following MCAs: NW bound direct to Nichols Int, 13,000; N bound direct to Coaldale VORTAC, 15,500; SW bound direct to Friant VORTAC, 15,000.
BLYTHE Blythe, California	Rwy 26 requires a climb rate of 280 ft. per NM to 1500 feet. Departures 180° CW through 040° and 070° CW through 095°, climb via the BLH R-130 within 10 NM of VOR to recross VOR at or above 3000, then via assigned route. All maneuvering west of course.
BOEING FIELD INTL KING COUNTY Seattle, Washington	Climb visually over the airport to 300 then direct to SEA VORTAC, continue climb on R-227 within 10 NM to cross SEA VORTAC at or above: E bound V2N, 4300; E bound V2, 2000; E bound V25/V4, 4000; SE bound V45, 4000, or comply with published BFI SIDs.

(Continued on page 2)

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Figure 79

INSTRUMENT APPROACH PROCEDURES (CHARTS)
WESTERN UNITED STATES

Δ IFR ALTERNATE MINIMUMS

(Not applicable to USAF/USN)

Standard alternate minimums for nonprecision approaches are 800-2 (NDB, VOR, LOC, TACAN, LDA, VORTAC, VOR/DME or ASR); for precision approaches 600-2 (ILS or PAR). Aerodromes within this geographical area that require alternate minimums other than standard or alternate minimums with restrictions are listed below. NA-means IFR minimums are not authorized for alternate use due to unmonitored facility or absence of weather reporting service. U. S. Army pilots refer to Army Reg. 95-1 for additional application. Civil pilots see FAR 91.83. USAF/USN pilots refer to appropriate regulations.

AERODROME NAME	ALTERNATE MINIMUMS
ARCATA Arcata-Eureka, California	NDB-A, 1000-2
BAKER MUNI Baker, Oregon *Category D, 1400-2	VOR-A, 1700-2 VOR/DME Rwy 12*
BARSTOW-DAGGETT Daggett, California	VOR Rwy 21, 1400-2
BLYTHE Blythe, California Category D, 1000-2	VOR-2
BOEING FIELD INTL KING COUNTY Seattle, Washington	NDB-A, 1000-2 NDB-B, 1200-2 ILS Rwy 13R, 1000-2 LOC BC Rwy 31L, 1000-2 RADAR-1, 1000-2
BOISE AIR TERMINAL Boise, Idaho *Category E 800-2.	ILS Rwy 10L*
BRACKETT FIELD La Verne, California *NA when control zone not effective.	VOR-A, 1000-2* VOR/DME-A, 1000-2*
BRYCE CANYON Bryce Canyon, Utah	VOR-A, 1800-2
BUCHANAN FIELD Concord, California NA when control zone not effective.	VOR Rwy 19R, 1000-2
CHICO MUNI Chico, California NA when control zone not effective except for operators with approved weather reporting service.	VOR Rwy 31, 1000-2 VOR Rwy 13 VOR/DME Rwy 13
CLATSOP COUNTY Astoria, Oregon	VOR Rwy 7, 900-2
DERBY FIELD Lovelock, Nevada	VOR-A, 2000-2
ELKO MUNI Elko, Nevada	VOR-A, 1800-2 VOR/DME-A 1200-2
EL MONTE El Monte, California *Categories C and D. NA when control zone not in effect except for operators with approved weather reporting service.	VOR-A, 1600-2*
EL TORO MCAS Santa Ana, California Category A, B, 800-2; C, 900-2; D, 1100-2; E, 1800-2. NA when control tower closed.	ILS Rwy 34R
ELY-YELLAND FIELD Ely, Nevada	VOR-A, 3000-3
EPHRATA MUNI Ephrata, Washington Category D, 1200-2	VOR Rwy 20 VOR/DME Rwy 2
FELTS FIELD Spokane, Washington	NDB-B, 1100-2 RADAR-1, 1500-2 VOR/DME-A, 1100-2
FULLERTON MUNI Fullerton, California *NA when control zone not effective, except for operators with approved weather reporting service.	RNAV Rwy 24, 900-2* VOR-A*
GILLESPIE FIELD San Diego (Santee), California NA when control zone not effective except for operators with approved weather reporting service.	RNAV Rwy 27R, 2500-2

(Continued on page 2)

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Figure 80

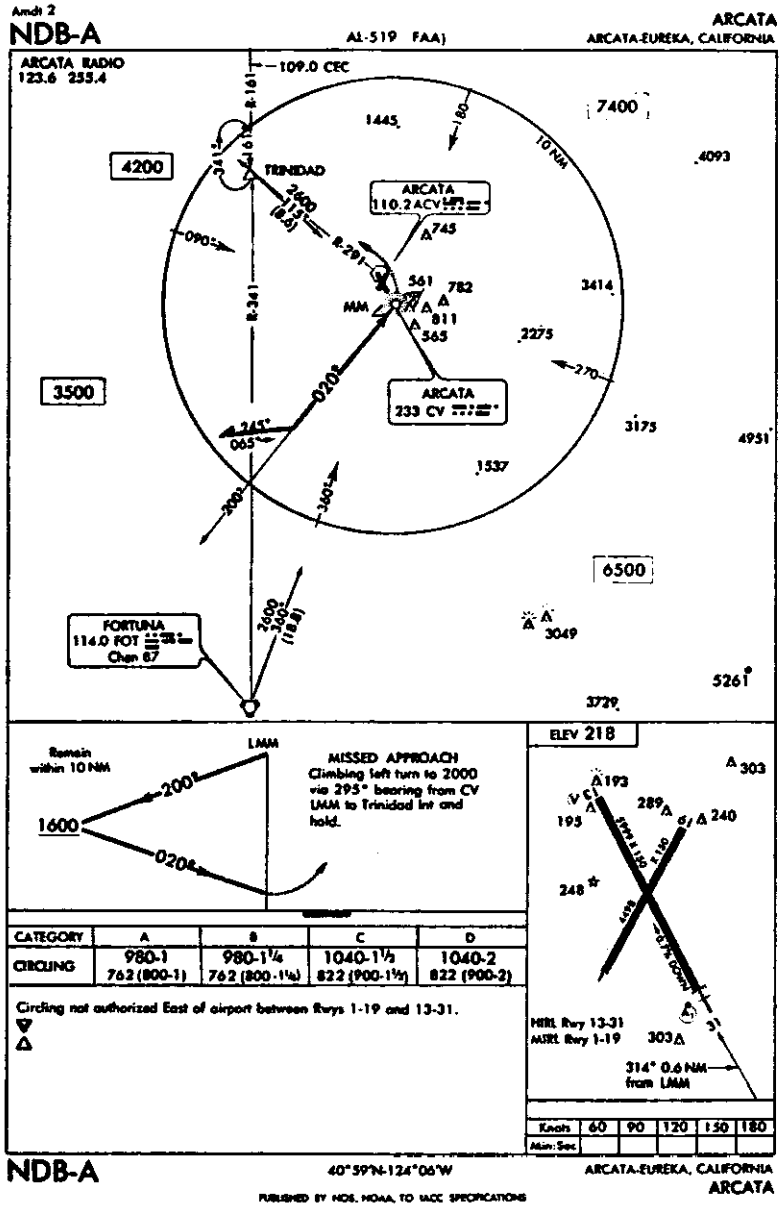


Figure 81

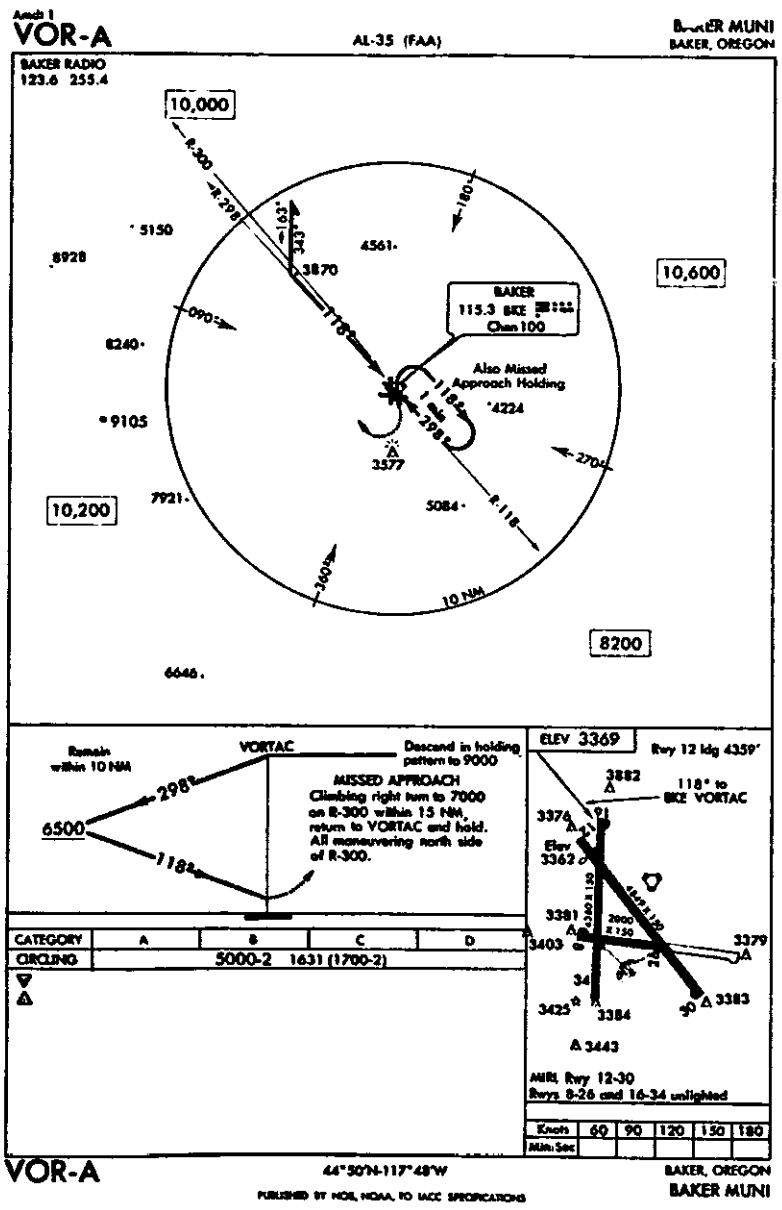


Figure 82

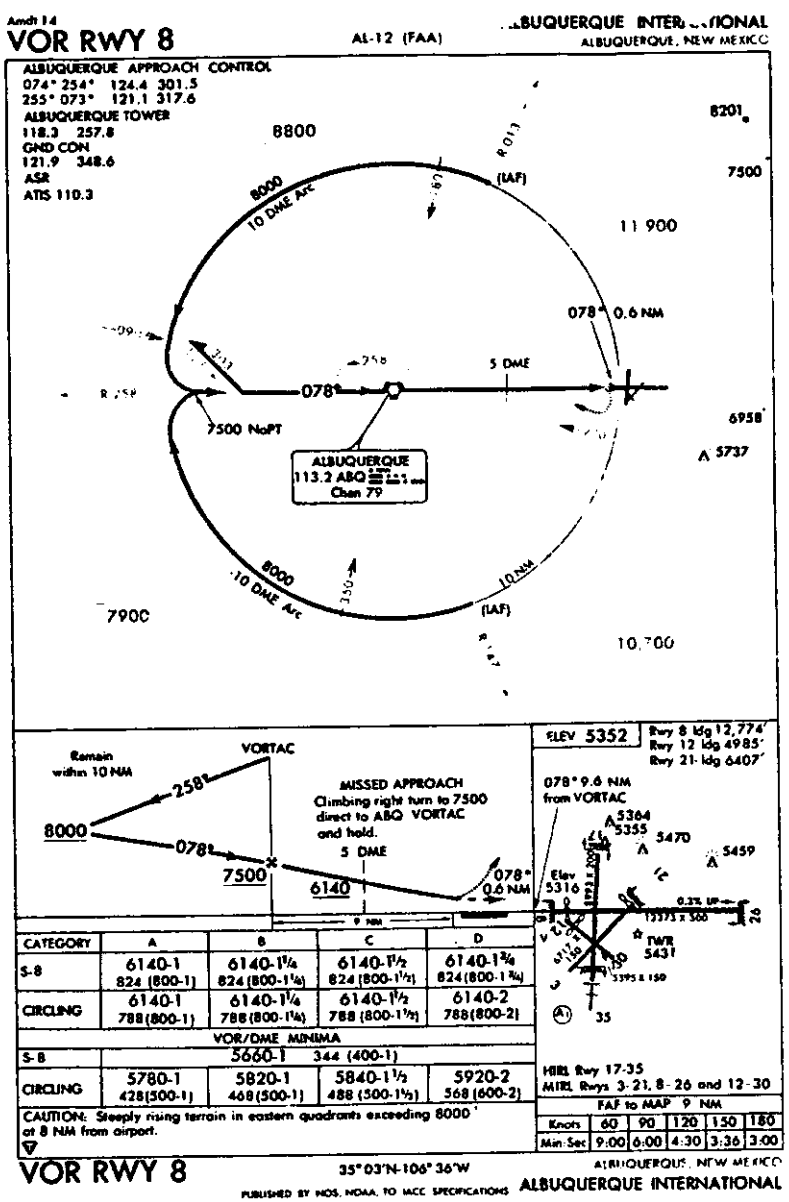


Figure 83

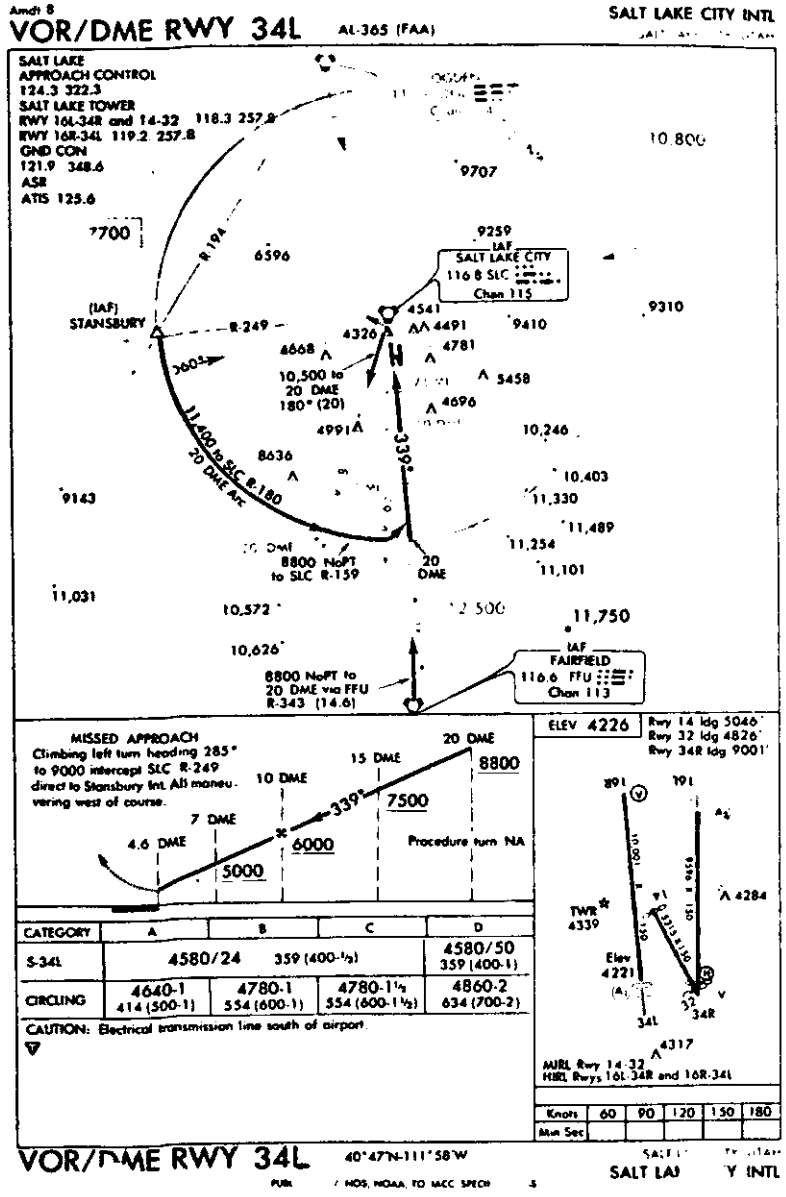


Figure 84

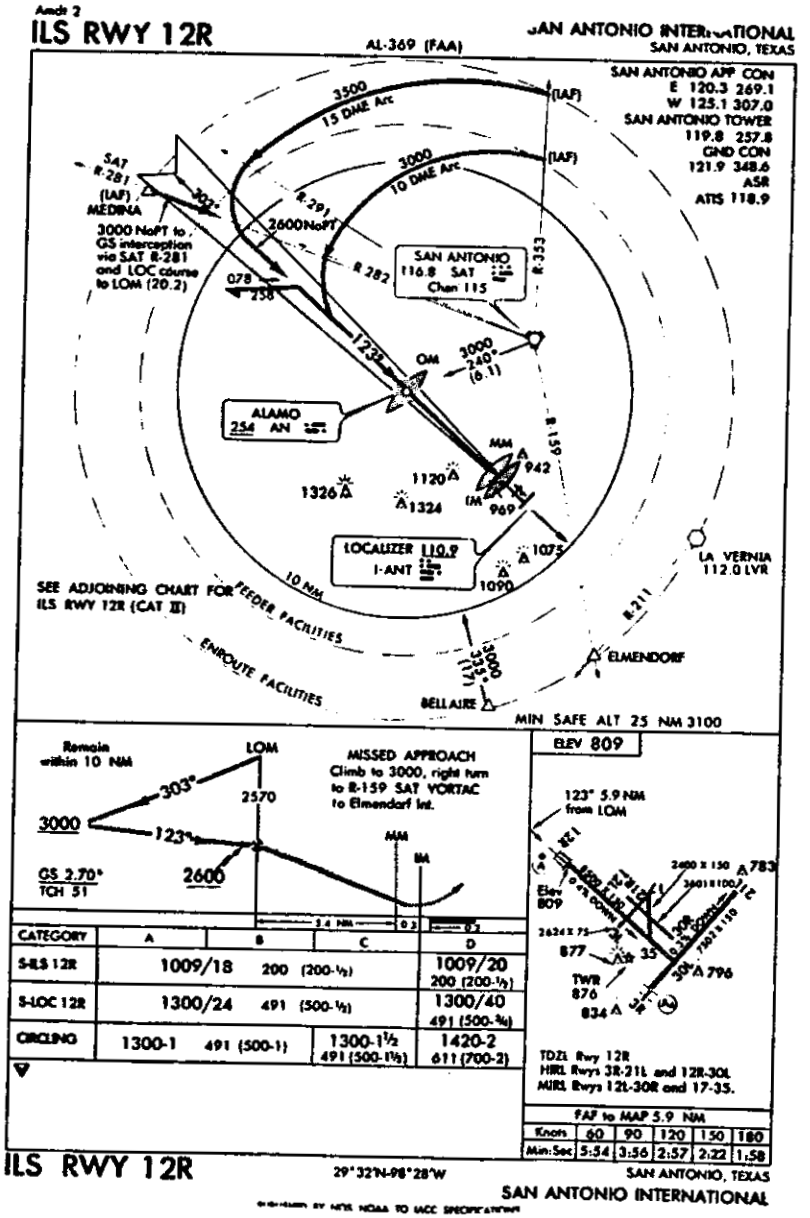
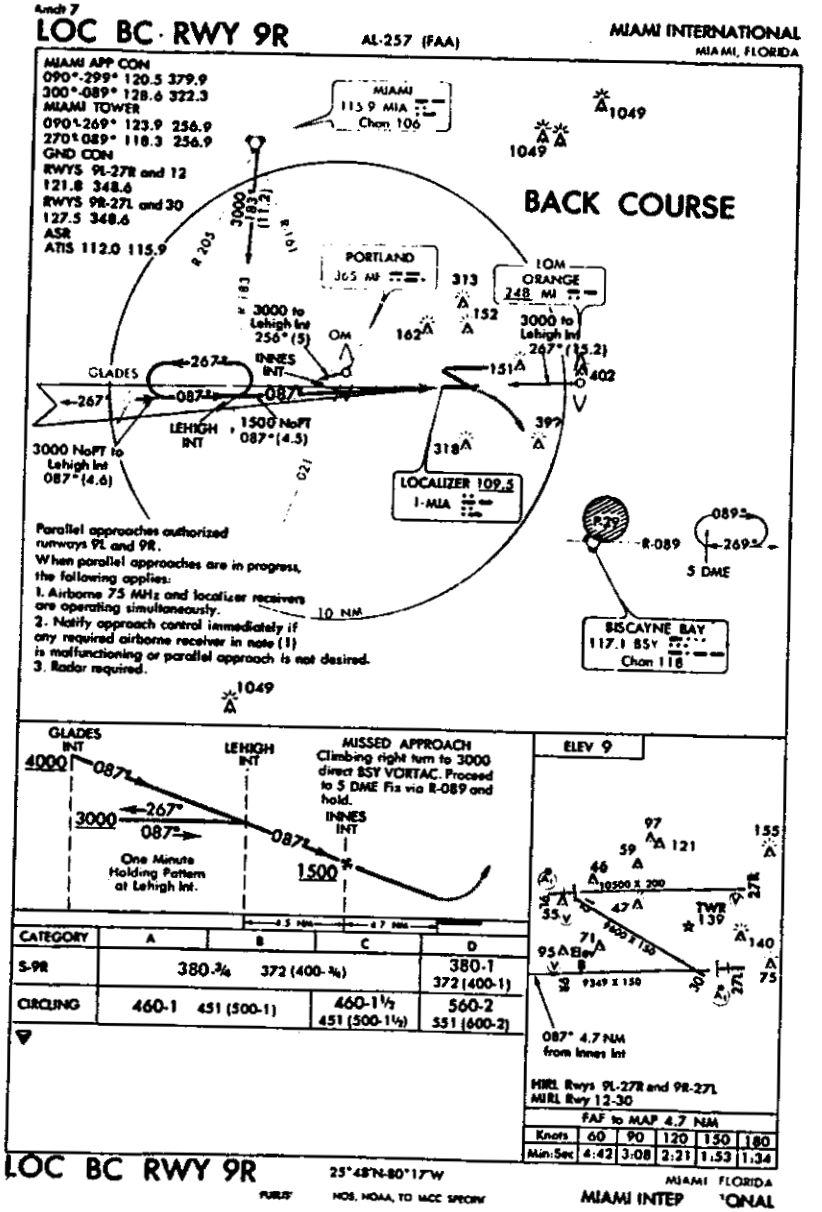


Figure 85



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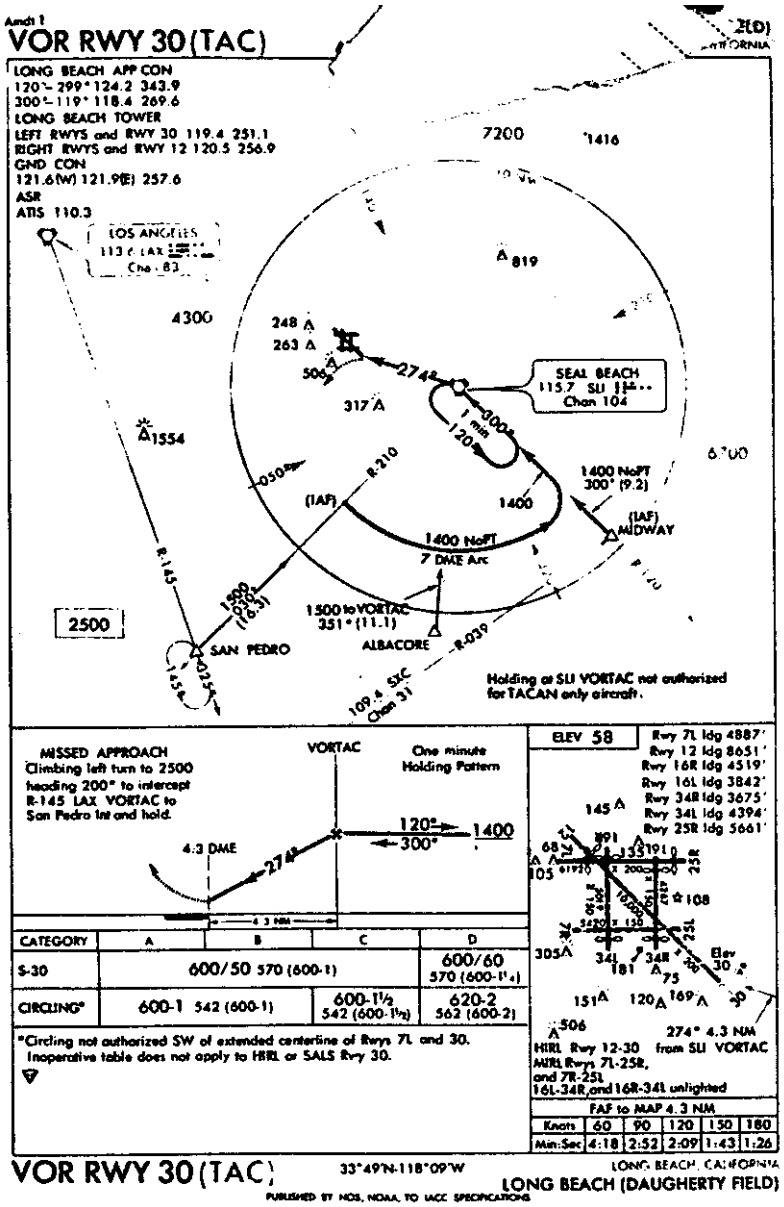

Figure 87

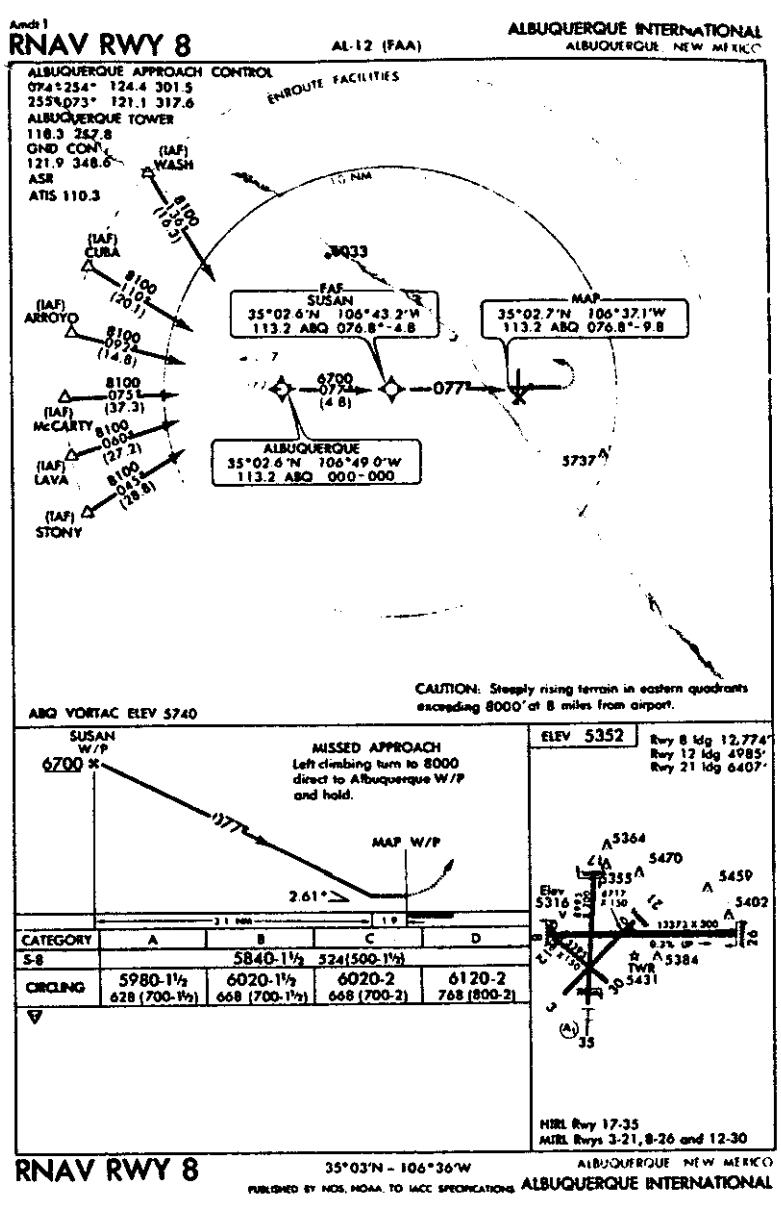

Figure 88