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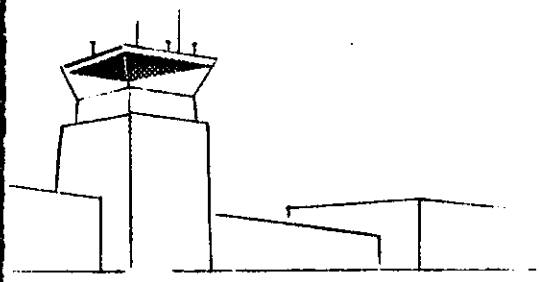
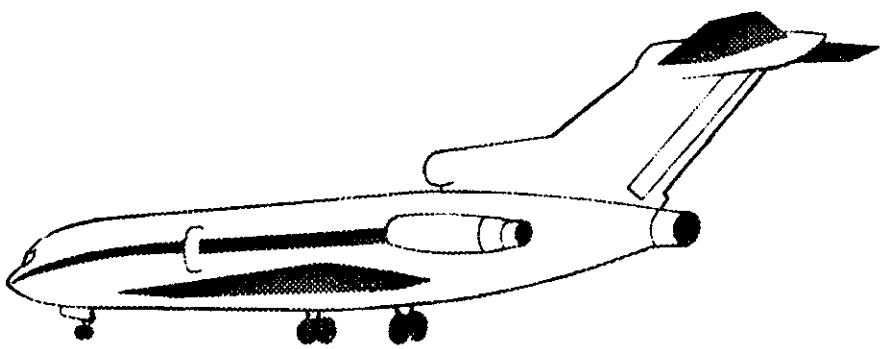
AIRCRAFT DISPATCHER

written test guide

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION





AIRCRAFT DISPATCHER WRITTEN TEST GUIDE

REVISED 1972

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
FLIGHT STANDARDS SERVICE

PREFACE

This test guide was prepared by the Flight Standards Service, Federal Aviation Administration, Department of Transportation as Advisory Circular AC 65–4B to assist applicants who are preparing for the Aircraft Dispatcher Written and Practical Tests. It supersedes the Aircraft Dispatcher Written Test Guide, AC 65–4A issued in 1969.

This guide outlines the type and scope of knowledge covered in the tests, lists reference materials available from the Superintendent of Documents, U.S. Government Printing Office, and presents sample questions. As a convenience to applicants, those portions of the Federal Aviation Regulations concerning the eligibility, knowledge, and experience requirements for the certificate have been included. Applicants should be aware, however, that regulations are subject to amendment. Any question regarding the currency of these quoted excerpts may be checked with the appropriate FAA office.

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

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INTRODUCTION

The Aircraft Dispatcher is an important member of the airline operation team and must be able to speak the language of the operating crews as well as that of management. He shares responsibility with the pilot for flight planning details that affect the safe conduct of the planned operation. After dispatching the flight, he performs important coordination functions involving the aircraft and other departments of the airline. He also provides the pilot with advisory information affecting the safe progress of the flight.

The Aircraft Dispatcher should, therefore, possess knowledge across the broad spectrum of airline operation as reflected in the section of this guide titled "Aeronautical Knowledge Covered by the Written Test." It is recognized that certain topics concerning domestic flight operations have no counterpart in international flight operations and vice versa; however, the applicant who is fully educated in the subject areas listed will be adequately prepared for the written test.

AIRCRAFT DISPATCHER CERTIFICATE REQUIREMENTS

Certification requirements for the Aircraft Dispatcher Certificate are excerpted from the Federal Aviation Regulations, Part 65.

§ 65.51 Certificate required.

(a) *No person may serve as an aircraft dispatcher* (exercising responsibility with the pilot in command in the operational control of a flight) in connection with any civil aircraft in air commerce unless he has in his personal possession a current aircraft dispatcher certificate issued under this subpart.

(b) Each person who holds an aircraft dispatcher certificate shall present it for inspection upon the request of the Administrator or an authorized representative of the National Transportation Safety Board, or of any Federal, State, or local law enforcement officer.

§ 65.53 Eligibility requirements: general.

To be eligible for an aircraft dispatcher certificate, a person must—

(a) Be at least 23 years of age;

(b) Be able to read, speak, and understand the English language, or have an appropriate limitation placed on his certificate;

(c) Comply with §§ 65.55, 65.57, and 65.59.

§ 65.55 Knowledge requirements.

(a) An applicant for an aircraft dispatcher certificate must pass a written test on—

(1) The regulations of this chapter that apply to the duties of an aircraft dispatcher;

(2) The general system of collecting and disseminating weather information;

(3) Interpreting aviation weather reports, including abbreviations and symbols, as prescribed in [National Weather Service Federal Meteorological Handbook No. 1] as amended;

(4) The fundamentals of meteorology as applied to aircraft operations, particularly as to—

(i) Surface and upper air weather maps and general characteristics of air masses, pressure systems, and frontal systems, including their symbols and nomenclature;

(ii) Cloud forms and their significance; and

(iii) Icing, turbulence, thunderstorms, fog and low ceilings, winds aloft, pressure pattern flying, the influence of terrain on meteorological conditions, and general principles of forecasting and analysis;

(5) Principles of aircraft navigation with particular respect to instrument operation and procedures;

(6) Communications facilities and procedures;

(7) Air navigation facilities and procedures; and

(8) Air traffic control procedures.

(b) A report of the test is sent to the applicant. A passing grade is evidence, for a period of 24 months after the date the test is given, that the applicant has complied with this section.

§ 65.57 Experience requirements.

An applicant for an aircraft dispatcher certificate must present documentary evidence satisfactory to the Administrator that he has the experience prescribed in any one of the following paragraphs:

(a) A total of at least 2 of the 3 years before the date he applies, in scheduled air carrier operations, scheduled military aviation operations, or any other aircraft operations that the Administrator finds provides equivalent experience—

(1) As a pilot member of a flight crew;

(2) As a flight radio operator or ground radio operator;

(3) As a flight navigator;

(4) As a meteorologist;

(5) Performing the duties of an aircraft dispatcher or his assistant; or

(6) Performing other duties that the Administrator finds provide equivalent experience.

(b) A total of at least 2 of the 3 years before the date he applies, as an air route traffic controller or a certificated air traffic control tower operator.

(c) A total of at least 1 of the 2 years before the date he applies, as an assistant in dispatching scheduled air carrier aircraft performing the duties of an aircraft dispatcher under the direct supervision of a certificated dispatcher.

(d) Within 90 days before the date he applies, successful completion of a course of instruction approved by the Administrator as adequate for the training of an aircraft dispatcher.

An applicant is entitled to credit any combination of experience in paragraph (a), or paragraphs (a) and (b), of this section, if the aggregate of that experience is at least 2 years.

§ 65.59 Skill requirements.

An applicant for an aircraft dispatcher certificate must pass a practical test—

(a) With respect to any one type of large aircraft used in air carrier operations, on—

(1) Weight and balance limitations;

(2) Performance operating limitations;

(3) Using cruise control charts;

(4) Fuel and oil capacities and rates of consumption; and

(5) Using the operations manual;

(b) On the characteristics of air routes and airports with particular reference to—

(1) Landing areas;

(2) Lighting facilities; and

(3) Approach and landing facilities and procedures;

(c) On the use and limitations of sensitive-type altimeters;

(d) On applying available weather forecasts and reports to determine whether a flight can be made safely;

(e) On using the *Airman's Guide* and the *Flight Information Manual* [Editorial note: Now the *Airman's Information Manual*];

(f) On dispatching and assisting a flight under adverse weather conditions; and

(g) On emergency procedures.

AIRCRAFT DISPATCHER QUALIFICATION TESTS

The Written Test

Nature of the test

The Aircraft Dispatcher Written Test is a single-section type, which permits a practical or operational approach to the problems that arise in planning and conducting transport flight operations.

The multiple choice questions in this guide are developed from typical situations involving preflight, inflight, and postflight duties of the Aircraft Dispatcher.

Material furnished the applicant for use during the test may include the following:

> Significant Weather Map; Constant Pressure Charts; Area Forecasts; Terminal Forecasts; Sequence Reports; Segments of En route Charts; Instrument Approach Procedure Charts; excerpts from *Airman's Information Manual;* Aircraft Particulars; Minimum Equipment List for Dispatch; Aircraft Performance Data.

Taking the test

The written test may be taken at FAA General Aviation and Air Carrier District Offices of the Flight Standards Service, and at certain other designated places. After completing the test, the answer sheet and papers used for computations or notations will be surrendered to the proctor before leaving the test room.

Test grades are mailed to applicants on AC Form 8060–37, Airman Written Examination Report. The report also contains coded indicators of the knowledge areas which presented difficulty in the test. These coded indicators are related to an enclosed Written Examination Subject Matter Outline for quick and easy identification of knowledge deficiencies. The study outline contained in this guide is similar, but may not be exactly the same as the outline which the applicant receives with AC Form 8060–37. An applicant who receives a failing grade must present the appropriate AC Form 8060–37 for re-testing.

The applicant should keep in mind the following points when taking the test:

1. Read each question or problem carefully without looking at the possible answers. The applicant should clearly understand the problem before formulating the steps toward its solution.

2. He should then determine which of the alternatives most nearly corresponds with the answer he has formulated. The answer chosen should completely solve the problem.

3. From the answers given it may appear that there is more than one possible answer; however, only one answer is correct and complete. The other answers are either incomplete or derived from popular misconceptions.

4. If a particular test item proves difficult, it is best to proceed to another question. When the less difficult questions have been answered, the others should then be reconsidered.

5. There are no "trick" questions in the test.

THE PRACTICAL TEST

Prior to certification, the applicant must complete the practical test described in FAR 65.59. Whereas the written test is broad and general in scope, the practical test focuses attention on the specifics of the dispatching problem at the local level. The applicant must be thoroughly familiar with the contents of a typical air carrier operations manual for a particular aircraft. He must also know how to use the *Airman's Information Manual* and be aware of the characteristics of air routes and airports. He may be asked to complete the simulated dispatch of a flight over a route in his dispatch area and should be prepared to provide a thorough weather briefing on the proposed operation.

RETESTING AFTER FAILURE

An applicant who fails the Aircraft Dispatcher Written or Practical Test may apply for retesting after 30 days following the date

he failed the test; or upon presenting a statement from a certificated and appropriately rated ground instructor, or a certificated Aircraft Dispatcher certifying that he has given the applicant at least 5 hours of additional instruction in each of the subjects failed and now considers that the applicant is ready for retesting.

AERONAUTICAL KNOWLEDGE COVERED BY THE WRITTEN TEST

I. FEDERAL AVIATION REGULATIONS

A. FAR 1, 61, and 65

1. General definitions (1.1).
2. Abbreviations and symbols (1.2).
3. Airline Transport Pilots—logging of instrument time and recency of experience (61.41, 61.47).
4. Medical certificates—duration (61.43).
5. Instruction and privileges (61.163, 61.165).
6. Aircraft Dispatcher (65).

B. FAR 91

1. Aircraft speed limitations (91.70).
2. Compliance with ATC clearances, etc. (91.75).
3. Altimeter settings (91.81).
4. Operating on or in the vicinity of an airport (91.85 through 91.89).
5. Operating in Positive Control and Jet Advisory areas (91.97, 91.99).
6. Visual Flight Rules (91.105 through 91.109).
7. Takeoff and landing under IFR (91.116, 91.117).
8. Minimum and cruising altitudes—IFR operations (91.119, 91.121).
9. IFR, radio communications (91.125).
10. IFR operations; two-way radio communications failure (91.127).
11. Operation under IFR in controlled airspace; malfunction reports (91.129).

C. FAR 121—Performance, Special Airworthiness, Instrument and Equipment Requirements

1. Manual requirements (121.131 through 121.141).
2. Performance, reciprocating engine powered airplanes (121.171 through 121.187).
3. Performance, turbine engine powered airplanes (121.189 through 121.197).
4. Fire precautions (121.221).
5. Cargo location and security (121.285 through 121.287).
6. Landing gear, aural warning (121.289).
7. Instruments and equipment (121.301 through 121.311 and 121.313 through 121.325).
8. Supplemental oxygen (121.327, 121.329, 121.333, 121.337).
9. Overwater operations and icing conditions (121.339 through 121.341).
10. Recorders, flight and voice (121.343, 121.359).
11. Radio equipment and weather radar (121.345 through 121.357).

II. AIRMAN'S INFORMATION MANUAL—BASIC FLIGHT MANUAL AND ATC PROCEDURES

A. Chapter 1. General.

B. Chapter 2. Navigation Aids.

C. Chapter 3. The Airspace.

D. Chapter 4. Air Traffic Control.

E. Chapter 5. Safety of Flight.

III. FLIGHT PLANNING AND AIR NAVIGATION

A. Aviation Weather

1. Elementary meteorology.
2. Air masses and fronts.
3. Thunderstorms.
4. Icing hazards and ice formation.
5. Common "IFR" producers.
6. Aviation weather reports.
7. Aviation weather forecasts.

8. Weather charts: Surface, Depiction, Radar, Constant Pressure, Significant Weather, Upper Wind Progs.
9. High altitude weather features.
10. Pressure, density, and true altitude details.

B. Computations

1. Flight time en route.
2. Required fuel.
3. Dispatched endurance.
4. Actual and allowable payload determination.
5. Weight and balance—weight limitations.
6. Weight and balance—location of center of gravity (CG).
7. Weight and balance—shifting, adding, or removing weight.
8. Performance charts—graphs.
9. Performance information — tabulated.
10. Off-course and return to course.
11. Wind experienced en route—direction and speed.
12. Wind components—head, tail, crosswind.
13. Airspeed adjustments to maintain schedule or arrival.
14. Specific range—turbojet airplanes.
15. Estimated time of arrival (ETA).
16. Pressurized airplane climb—cabin time or rate.
17. Flight progress.
18. Cruise control techniques.

C. Miscellaneous

1. Definition of Mach number and critical Mach number.
2. Subsonic, transonic, supersonic flight regimes.
3. Determination of Mach number or True Airspeed from given information.
4. Interpretation of En route and Instrument Approach Charts.

D. FAR 121—Personnel requirements; qualifications and duty time limitations

1. Airman and crewmember requirements (121.381 through 121.395).
2. Emergency evacuation duties (121.397).
3. Crewmember and dispatcher training program (121.400; 121.411 through 121.419; 121.422, 121.424, 121.427).
4. Crewmember qualification (121.431 through 121.434; and 121.437 through 121.447).
5. Aircraft dispatcher qualifications and duty limitations (121.461 through 121.465).
6. Flight time limitations: domestic air carrier (121.470, 121.471).
7. Flight time limitations: flag air carrier (121.480 through 121.491).
8. Flight time limitations: supplemental air carrier and commercial operator (121.500 through 121.509; 121.513 through 121.525).

E. FAR 121—Flight Operations

1. Responsibility for operational control (121.533 through 121.537).
2. Operation: flight deck duty, etc. (121.543 through 121.549).
3. Emergencies: domestic and flag air carriers (121.557).
4. Emergencies: supplemental air carriers (121.559).
5. Reporting conditions in flight (121.561, 121.563).
6. Engine inoperative: landing: reporting (121.565).
7. Briefing of passengers (121.333, 121.571, 121.573).
8. Minimum altitudes for use of the automatic pilot (121.579).

F. FAR 121—Dispatching and Flight Release Rules

1. Dispatching and flight release authority (121.591 through 121.597).
2. Familiarity with weather conditions and information to pilot-in-command (121.599, 121.601).
3. Equipment, facilities and service (121.603 through 121.609).
4. Dispatch and flight release (121.611 through 121.615).
5. Alternate airport for departure (121.617).

6. Alternate airports (121.619, 121.-621, 121.623).
7. Alternate airport weather minimums (121.625).
8. Flight in unsafe conditions (121.-627, 121.629).
9. Dispatch rules: original, redispatch, or amendment (121.631 through 121.635).
10. Takeoffs from unlisted and alternate airports (121.637).
11. Fuel supply: all operations: domestic air carriers (121.639, 121.-647).
12. Fuel supply: (turbojet) flag and supplemental air carriers (121.641 through 121.645).
13. Takeoff and landing weather minimums (121.649 through 121.655).
14. Flight altitude rules (121.657 through 121.661).
15. Responsibility for dispatch release, load manifest, and flight plan (121.663 through 121.667).

G. FAR 121—Records and Reports

1. Records (121.683, 121.685, 121.-711).
2. Releases (121.687, 121.689, 121.-709).
3. Load manifests (121.691 through 121.697).
4. Reports (121.703, 121.705).

REFERENCE MATERIALS

The following list of publications and materials is provided for the benefit of individuals who wish to prepare for the written test. Except for free *advisory circulars* and *charts*, all of these items are available through the U.S. Government Printing Office.

Textbooks and other reference materials are also available from many commercial publishers. It is the responsibility of each applicant to obtain study materials appropriate to his needs.

Free FAA publications may be obtained from "Department of Transportation, Distribution Unit, TAD-484.3, Washington, D.C. 20590."

NOTE.—References listed were available at the time this publication went to press.

FEDERAL AVIATION REGULATIONS (FARs)

The subscription prices listed include automatic revision service to all Parts contained in the Volume ordered. The FAR Parts contained in each Volume are listed in the "Advisory Circular Checklist and Status of Federal Regulations," obtainable free on request from FAA.

	Price	*Additional for Foreign Mailing*
Vol. I, Part 1, Definitions and Abbreviations	$ 2.50	$0.75
Vol. IX, Part 65, Certification: Airmen Other Than Flight Crewmembers	$ 6.00	$1.50
Vol. VI, Part 91, General Operating and Flight Rules	$ 9.00	$2.25
Vol. VII, Part 121, Certification and Operations: Air Carriers and Commercial Operators of Large Aircraft	$10.50	$2.75

FLIGHT INFORMATION PUBLICATIONS

Airmen's Information Manual—This publication presents in four parts, information necessary for the planning and conduct of a flight in the National Airspace System. It is designed to be used in the cockpit for preflight and inflight operations by pilots and contains both instructional and procedural information. The subscription consists of:

Part 1—Basic Flight Manual and ATC Procedures. Issued quarterly ($7.00; Foreign $8.75).

Part 2—Airport Directory. Issued semiannually ($7.00; Foreign $8.75).

Part 3—Operational Data. Issued every 56 days, and

Part 3A—Notices to Airmen. Issued every 14 days. ($22.00; Foreign $27.50).

Part 4—Graphic Notices and Supplemental Data. Issued semiannually ($9.50; Foreign $12.00).

Terminal Air Traffic Control—7110.8C (two-year subscription with changes issued quarterly) $13.50 domestic; $17.00 foreign—GPO (TD 4.308: T 27/971).

En Route Air Traffic Control—7110.9C (two-year subscription with changes issued quarterly) $8.00 domestic; $10.00 foreign—GPO (TD 4.308 En 1/971).

These FAA Handbooks prescribe air traffic control procedures and phraseology for use by personnel providing terminal and en route air traffic control services. Although written for the air traffic controller, the handbooks are excellent for the study of standard communication procedures by others who need to be familiar with them.

STUDY MANUALS

Aviation Weather, AC 00-6 ($4.00—GPO Catalog No. FAA 5.8/2:W37). An excellent reference treating all phases of meteorology of interest to the Aircraft Dispatcher. Aviation weather reports and forecasts are also covered in detail with respect to format and content.

Air Navigation, AF Manual 51–40, Volume I ($4.00). This U.S. Air Force publication is an excellent reference for basic navigation.

Aircraft Performance—Reciprocating and Turboprop Engine Aircraft, AF Manual 51–9 ($1.50). This U.S. Air Force publication contains much material having civil aviation applications.

Pilot's Weight and Balance Handbook, AC 91–23 ($1.25—GPO Catalog No. TD 4.408: P 64/3). An excellent treatment of the subject from the standpoint of the pilot and aircraft owner or operator.

Civil Use of U.S. Government Instrument Approach Procedure Charts, AC 90–1A (Free from FAA). Describes instrument approach procedure charts.

CHARTS

Instrument Approach Procedure Charts (10¢ per airport set). Individual charts give detailed information on procedure for each type of approach at the airport.

En route Charts (35¢ each). These charts provide the necessary aeronautical information for en route instrument navigation (IFR) in the established airway structure.

Area Charts (10¢ each). These charts supplement the En route Charts by giving departure, arrival, and holding procedures at principal airports.

Checks or money orders for charts should be made payable to "NOS, Dept. of Commerce, C–44" and sent to: Distribution Division (C–44), National Ocean Survey, Washington, D.C. 20235.

HOW TO OBTAIN GPO PUBLICATIONS

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

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

(2) Send separate orders for subscription and non-subscription items.

(3) Give the exact name of the publication and in the case of a single publication the GPO catalog number, e.g., TD 4.408:In 7/3 or FAA 5/8:W 37.

(4) Send a check or money order made payable to the Superintendent of Documents. Send the exact amount (no cash). (Include an additional 25 percent of the total order to cover postage for foreign mailing.)

(5) Enclose a self-addressed mailing label if you have no order blank.

(6) Use special delivery when needed.

(7) Use GPO bookstores.

Mail orders may be directed to the Washington headquarters of the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Several retail bookstores for GPO publications have also been established throughout the country. The GPO bookstores are located at the following addresses:

GPO Bookstore
2121 8th Ave. North
Birmingham, Ala.
35203

GPO Bookstore
Federal Building
Room 1015
300 N. Los Angeles St.
Los Angeles, Calif.
90012

GPO Bookstore
Federal Building
Room 1023
450 Golden Gate Ave.
San Francisco, Calif.
94102

GPO Bookstore
Federal Building
Room 1421
1961 Stout St.
Denver, Colo. 80202

GPO Bookstore
Pueblo Memorial
Airpark
Pueblo, Colo. 81001

GPO Bookstore
Federal Building
Room 100
275 Peachtree St.,
N.E.
Atlanta, Ga. 30303

GPO Bookstore
Federal Office
Building
Room 1463 14th Floor
219 South Dearborn
St.
Chicago, Ill. 60604

GPO Bookstore
Room G–25
J.F.K. Federal
Building
Government Center
Boston, Mass. 02203

GPO Bookstore
Federal Building
Room 135
601 East 12th Street
Kansas City, Mo.
64106

GPO Bookstore
26 Federal Plaza
Room 110
New York, N.Y. 10007

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

SAMPLE TEST

The following sample test is similar in format to the official FAA written test. It is important to remember, however, that these test items do not direct attention to all of the topics on which you will be tested in the official test. For this reason, you should concentrate on the section entitled "Aeronautical Knowledge Covered by the Test." A knowledge of all of the topics presented in the outline—not just the ability to answer these few sample test items—should be your goal as you prepare for the written test.

The increased performance of present day transport category aircraft requires greater emphasis on high-altitude meteorology, high-speed aerodynamics, and turbine equipment. Applicants should, therefore, expect to encounter test items dealing with these areas in the written test.

Answers to the sample test items are given at the end of the test, along with a detailed analysis, or explanation, of each test item.

NOTE—The reader should be aware that the sample test items are based on regulations and *procedures in effect at the time of* final editing of this guide. Similar test items in the official FAA written tests should always be answered in terms of current regulations and procedures.

SITUATION

You are a certificated Aircraft Dispatcher employed by an airline whose central dispatch office is located at the John F. Kennedy International Airport. The company is an air carrier, authorized to operate in scheduled transportation under pertinent regulations as a domestic and flag carrier.

The domestic route structure provides service between metropolitan areas in the mid-west and the east coast, while the international structure provides service to west European terminals. Domestic routes are served by four-engine turbine powered aircraft and three-engine turbine powered aircraft. International routes are served by four-engine turbine powered aircraft.

* * * * *

1. The airplane dispatched has a seating capacity of 120 passengers. What is the minimum number of flight attendants required by FAR 121 if 100 passengers are aboard?

1—Two.
2—Three.
3—Four.
4—Five.

2. Assume that your company operates only turbojet powered airplanes which have been in operation under Part 121 for more than 90 days. As an aircraft dispatcher, your "operating familiarization" must have been accomplished within the preceding 12 calendar months in—

1—each of the types of airplanes you will dispatch.
2—at least one of the types of airplanes you will dispatch.
3—a Group II airplane operated under Part 121 or by observing 5 hours of approved simulator training.
4—any Group I or Group II airplane operated under Part 121 or by observing 5 hours of approved simulator training.

3. An aircraft dispatcher must specifically authorize the flight of a flag air carrier airplane from an intermediate airport, if it remains at that airport for more than—

1—1 hour.
2—2 hours.
3—4 hours.
4—6 hours.

4. Assume these conditions: (1) a three-engine turbine powered air carrier airplane; (2) weather conditions at the airport of take-off below the landing minimums listed in the certificate holder's operations specifications. Under these conditions, an alternate must be specified which is at a distance of not more than—

1—1 hour at normal cruising speed in still air with one engine inoperative.

2—1 hour at long range cruising speed with all engines operating.

3—2 hours at normal cruising speed with one engine inoperative.

4—2 hours at normal cruising speed with all engines operating.

5. The airborne weather radar is inoperative on a passenger-carrying turbojet powered airplane in your company's fleet. Thunderstorms are forecast along the route of flight. You may dispatch this airplane only if the—

1—radar is repaired prior to dispatch.

2—flight can be completed in VFR conditions, day or night.

3—flight can be completed in VFR or IFR conditions during daylight hours.

4—flight can be completed in VFR conditions during daylight hours.

6. Assume a cabin altitude of 14,000 feet for 50 minutes. How much supplemental oxygen must be provided for the passengers on a turbine engine powered air carrier airplane?

1—Enough oxygen for 10 percent of the passengers for 20 minutes.

2—Adequate oxygen for each passenger for the entire 50 minute flight segment.

3—Sufficient oxygen for 30 minutes for 30 percent of the passengers.

4—One hour oxygen supply for 20 percent of the passengers.

7. An emergency arises which requires immediate decision and action. If the pilot-in-command and dispatcher are in communication, which statement is correct?

1—The dispatcher and pilot-in-command shall make a joint decision, share responsibility for any action taken, and file a joint written report with the Administrator within 10 days.

2—The pilot-in-command shall make a decision, take whatever action he considers necessary, and send a written report to the Administrator within 10 days after returning to his home base.

3—The dispatcher shall make a decision and direct the emergency action to be followed by the pilot-in-command, and 10 days thereafter, file a written report with the air carrier's operations manager.

4—The pilot shall take no action unless the dispatcher approves it, and 10 days subsequent to the emergency, submit a written report to the air carrier's operations manager.

8. One engine of a three-engine turbojet powered air carrier airplane is shut down in flight. The pilot-in-command—

1—may continue to the destination only if the dispatcher authorizes this course of action.

2—must return to the departure airport if he has not completed his climb to en route altitude.

3—may proceed to any airport that he selects if he decides this is as safe as landing at the nearest suitable airport.

4—is required by regulations to land at the nearest suitable airport.

9. Instruction in which of the following is *not* required in the initial training of an aircraft dispatcher?

1—Emergency assignment of duties of individual crewmembers.

2—Provisions of appropriate Federal Aviation Regulations.

3—The certificate holder's operating manual.

4—The certificate holder's operating specifications.

10. Which of the following is correct in regard to Standard Instrument Departures (SIDs)?

1—A SID may not be issued to the pilot of an air carrier flight unless he specifically requests it.

2—The pilot of any civil aircraft may be issued a SID whenever ATC considers it appropriate.

3—SIDs are published for all airports located in high density traffic areas and having complex departure routes.

4—Standard Instrument Departures are published only for those airports having Standard Terminal Arrival Routes.

* * * * * *

You report to the Operations Office at 1100 Eastern Standard Time on February 8 (1600Z) and survey the weather conditions for the area in which the flight will be dispatched.

* * * * * *

11. From a review of the JFK Area Forecast (Figure 2, Appendix), you determine that—

1—ceilings in southeastern Pennsylvania and southern New Jersey will gradually lower during the forecast period.

2—the high pressure area over the upper Hudson Valley will remain stationary.

3—ceilings will remain constant in northeastern Pennsylvania and southeastern New York from 0100Z to 1900Z Sunday.

4—by 1900Z Sunday, mixed precipitation and ceilings of 200 to 500 feet will be prevalent in western Pennsylvania.

12. Which statement correctly interprets the Terminal Forecasts (Figure 4, Appendix)?

1—At ORD, after 1600Z, the ceiling is expected to vary from 800 to 200 feet.

2—The surface wind velocity at CLE is expected to decrease during the forecast period.

3—At MKE, at the beginning of the forecast period, the visibility is expected to be 5 miles in haze and smoke.

4—The visibility at ORD, at the beginning of the forecast period, is expected to be 2 miles.

13. From an inspection of the NMC High Level Weather Prog Chart (Figure 5, Appendix) you determine that—

1—occasional light icing can be expected in the vicinity of 35°N./87°W.

2—the cloud coverage in the vicinity of 42°N./90°W. is 6/8 cirrus.

3—an 8/10 sky coverage exists in southern Illinois.

4—the sky condition in southern Wisconsin is 6/10 cirrus coverage with the cloud bases at 36,000 feet.

* * * * *

Your work schedule requires the completion of flight planning arrangements for your company's Flight 105 which is scheduled to depart John F. Kennedy International Airport for Chicago-O'Hare International Airport at 1230 EST.

* * * * *

Complete the flight time analysis in the Appendix, Figure 34. An appropriate Chart segment for this routing between JFK and ORD is also included in the Appendix, Figure 28.

NOTE.—The flight time analysis form used in Figure 34 is not intended to be an operational form. It is used here for an orderly presentation of flight planning data. Similar forms are made available to applicants when they take the official written test. Applicants may use these forms or any other flight planning form of their selection.

* * * * * *

14. The estimated time en route from JFK to ORD is—

1—1 hour 41 minutes.

2—1 hour 44 minutes.

3—1 hour 47 minutes.

4—1 hour 51 minutes.

15. What is the minimum weight of fuel required for this flight? (Include 1,000 pounds for missed approach.)

1—27,100 pounds.

2—27,700 pounds.

3—28,300 pounds.

4—28,900 pounds.

* * * * *

Test items 16, 17, and 18 are based on information given in the loading schedule below.

Item	*Weight/ Pounds*	*Moment/ 1000*
Basic Operating Weight (BOW)	88,350	80,552.3
Forward Cargo	3,000	———
Aft Cargo	4,000	———
Forward Passengers (20)	3,400	———
Aft Passengers (54)	9,180	———
Fuel Tank #1	11,500	———
Tank #2	11,500	———
Tank #3	11,500	———
Total	———	———

* * * * *

16. Compute the ramp CG in percent of MAC (Figures 9 and 10, Appendix).

1—17.6% MAC.

2—17.0% MAC.

3—16.4% MAC.

4—15.8% MAC.

17. You determine the zero fuel weight for this flight to be—

1—121,460 pounds.

2—117,600 pounds.

3—106,740 pounds.

4—107,930 pounds.

18. What is the estimated landing weight at ORD?

1—124,800 pounds.
2—125,050 pounds.
3—125,330 pounds.
4—125,950 pounds.

19. If only structural weight limitations were considered, the maximum payload for this aircraft would be (Figure 9, Appendix).

1—24,500 pounds.
2—25,000 pounds.
3—29,110 pounds.
4—29,650 pounds.

20. The basic operating weight of an aircraft is defined as its—

1—maximum authorized weight less disposable fuel.
2—weight, ready for flight, including fuel and payload.
3—weight, ready for flight, including crew but without payload and fuel.
4—empty weight, plus fixed ballast, residual fuel, and residual oil.

21. Assume the following conditions: (1) runway length—9,000 feet; (2) stopway length—2,000 feet; (3) clearway length—5,000 feet. In determining the takeoff weight limitations of a turbine engine powered transport category airplane certificated after August 29, 1959, the "accelerate-stop" distance must not exceed—

1— 9,000 feet.
2—10,000 feet.
3—10,500 feet.
4—11,000 feet.

22. Based on the conditions stated in the previous test item, what is the maximum allowable takeoff distance?

1— 9,000 feet.
2—11,000 feet.
3—13,500 feet.
4—14,000 feet.

23. An airplane is departing on Runway 22 and the tower-reported wind is 190° at 30 knots. What is the crosswind component (Figure 11, Appendix)?

1—18 knots from the left.
2—20 knots from the right.
3—15 knots from the left.
4—23 knots from the right.

24. The temperature at FL–310 is −36° C. What is the relationship of this temperature to International Standard Temperature (ISA) (Figure 12, Appendix)?

1—Standard.
2—Five degrees warmer than standard.
3—Ten degrees colder than standard.
4—Ten degrees warmer than standard.

25. Determine the station pressure if the altimeter setting is 29.60 and the airport elevation is 410 feet (Figure 13, Appendix).

1—26.4 in. Hg.
2—28.6 in. Hg.
3—30.0 in. Hg.
4—29.2 in. Hg.

26. Determine the stabilizer trim setting in units airplane nose up if the CG is 20% MAC and the flap setting is 25° (Figure 14, Appendix).

1—5½.
2—6.
3—6½.
4—7.

27. Determine the average EPR for takeoff at John F. Kennedy International Airport under these conditions (Figures 13, 14 and 32, Appendix).

Temperature	+45° F.
Altimeter setting	29.95.
Engines 1 and 3	A/C "ON"
Engine 2	NO BLEED.

1—1.95.
2—1.92.
3—1.94.
4—1.93.

28. Based on the following conditions, what is V_R and V_2 for a normal takeoff (Figure 14, Appendix)?

Pressure altitude	600 feet.
Temperature	+20° F.
Weight	156,000 pounds.
Flaps	25°.
CG	13.5%

1—V_R 122 knots; V_2 138 knots.
2—V_R 128 knots; V_2 145 knots.
3—V_R 120 knots; V_2 135 knots.
4—V_R 118 knots; V_2 138 knots.

29. A close examination of the Takeoff Performance Chart (Figure 16, Appendix) reveals that—

1—higher than standard temperatures increase the climb limit weight.

2—a headwind will decrease the effective runway length.

3—higher than standard temperatures decrease the allowable brake release gross weight.

4—with regard to effective runway length, up-slope will tend to balance the effect of tailwind.

30. Determine the runway limit gross weight at brake release under the following conditions (Figure 16, Appendix).

Airport pressure altitude	3,000 feet.
Runway length available	7,000 feet.
Headwind	20 knots.
Runway slope	1% up.
Average EPR	1.90.
Temperature	85° F.
CG	13%.

1—136,000 pounds.

2—138,500 pounds.

3—140,000 pounds.

4—142,000 pounds.

31. Using the same data given in the previous test item, determine the climb limit gross weight (Figure 16, Appendix).

1—139,250 pounds.

2—142,500 pounds.

3—153,000 pounds.

4—157,000 pounds.

32. From the Simplified Flight Planning Chart (Figure 17, Appendix), determine the trip time and fuel under the following conditions.

Distance	1,400 NM.
Tailwind	50 knots.
Cruise altitude	FL–310.
Landing weight	126,000 pounds.
Average temperature	ISA +10° C.

1—2 hours 47 minutes and 24,200 pounds.

2—3 hours 56 minutes and 25,400 pounds.

3—3 hours 04 minutes and 26,600 pounds.

4—3 hours 12 minutes and 27,100 pounds.

33. Based on the following conditions, what is the weight of an airplane (to the nearest 100 pounds) when it reaches FL–330 (Figures 18 and 19, Appendix)?

Departure airport elevation	Sea level.
Brake release weight	150,500 pounds.
Average climb temperature	ISA −15° C.

1—145,000 pounds.

2—145,200 pounds.

3—145,700 pounds.

4—146,000 pounds.

34. Assume these conditions:

Flight level	310.
Mach	.82.
OAT	−40° C.
Total fuel flow	8,860 lbs./hr.

What is the Nautical Air Miles (NAM)/1,000 pounds of fuel?

1—54.8 NAM/1,000 pounds.

2—52.6 NAM/1,000 pounds.

3—49.7 NAM/1,000 pounds.

4—48.6 NAM/1,000 pounds.

35. Assuming an indicated Mach .82 cruise and a constant gross weight, select the correct general statement regarding fuel flow (see Planning Charts, Figures 21, 22, and 23 in Appendix). A lower fuel flow occurs when—

1—altitude is increased or temperature is decreased.

2—both altitude and temperature are increased.

3—temperature is increased or altitude is decreased.

4—both altitude and temperature are decreased.

36. If the true air temperature is −30° C. and an aircraft is cruising at FL–290 at 490 knots true airspeed, what is the Mach number?

1—.84.

2—.83.

3—.82.

4—.81.

37. Assuming the same temperature, flight level, and true airspeed as that given in the previous test item, what is the calibrated airspeed?

1—286 knots.

2—298 knots.

3—304 knots.

4—312 knots.

38. What is the required holding fuel for a three-engine flag air carrier turbojet under

the conditions listed below (Figure 24, Appendix)?

Estimated weight upon arrival at alternate ..... 120,000 pounds.
Average temperature ..... ISA standard.
Alternate airport elevation .. 3,500 feet.

1—3,210 pounds.
2—3,340 pounds.
3—3,450 pounds.
4—3,680 pounds.

39. Determine the approximate landing weight under these conditions (Figures 22 and 18, Appendix).

Elevation of landing airport ..... Sea level.
Cruise altitude ..... FL-290.
Cruise temperature ..... −30° C.
Airplane weight (cruise) at 1600Z ..... 150,000 pounds.
Estimated landing time .... 1715Z.

1—130,000 pounds.
2—135,000 pounds.
3—140,000 pounds.
4—145,000 pounds.

40. Under the following conditions, what is the field length limit gross weight (Figure 25, Appendix)?

Runway length available ..... 7,200 feet.
Headwind component ..... 12 knots.
Pressure altitude .. 2,000 feet.
CG ..... 17% MAC.
Dispatched weight .. Under 160,000 pounds.
Anti-skid ..... Off.
Nose brake ..... Off.
Runway surface conditions ..... Dry.

1—152,000 pounds.
2—147,000 pounds.
3—140,000 pounds.
4—135,000 pounds.

41. Assume that ATC follows normal practice and conforms to the "hemispheric rule" in assigning a flight level. Which of the following responses include three flight levels appropriate for a westbound IFR flight.

1—FL-280, FL-300, FL-320.
2—FL-280, FL-300, FL-350.
3—FL-260, FL-280, FL-310.
4—FL-260, FL-280, FL-300.

42. Which statement is true regarding the instrument approach chart for Chicago-O'Hare Airport (Figure 33, Appendix)?

1—Precision Approach Radar monitor is available for an ILS approach to Runway 14L.
2—The distance from the final approach fix (FAF) to the localizer missed approach point (MAP) is 5.0 NM.
3—Runway 14L has centerline lighting.
4—Visual Approach Slope Indicators are installed on Runways 14L and 14R.

43. At a departure airport, the pressure altitude is 2,000 feet and the temperature is +20° C. What is the approximate density altitude?

1—3,000 feet.
2—2,500 feet.
3—3,500 feet.
4—4,000 feet.

* * * * * *

The following seven test items apply to a flight from New York (KJFK) to Paris (LFPO).

* * * * * *

44. The approximate wind direction and velocity at the 300-millibar level (Figure 6, Appendix) at a position 50°N./43°W. is—

1—008°/88 knots.
2—180°/76 knots.
3—230°/75 knots.
4—280°/80 knots.

45. Select the correct statements regarding the tropopause (boundary between the troposphere and stratosphere).

A. The strongest jet streams exist in the "break" region between the polar and tropical tropopause.
B. The average height of the tropopause is greater in the polar regions than in the tropics.
C. The tropopause is higher in summer than in winter.
D. The tropopause is generally free of turbulence.

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

46. One of the following is a characteristic of jet streams.

1—In middle and high altitudes the strength of jet streams is greater in summer than in winter.

2—As a jet stream migrates southward, its core rises and its speed increases.

3—Severe clear air turbulence occurs to a maximum degree on the warm side of a jet stream and above the jet core.

4—The core of strongest winds in jet streams is found above 40,000 feet at all latitudes.

47. Refer to the Tropopause/Vertical Wind Shear Chart (Figure 7, Appendix). If an aircraft is maintaining FL–330 on the route shown, it would—

1—remain below the tropopause for the entire route.

2—be below the tropopause at a position 52°N./30°W.

3—be below the tropopause at a position 47°N./56°W.

4—remain above the tropopause for the entire route.

48. Refer to the Surface Prog. and Significant Weather Chart (700–150 MB) (Figure 8, Appendix). Which of the following statements is correct?

1—Severe turbulence can be expected near LFPO (49°N./3°E.).

2—Occasional moderate turbulence can be expected on the great circle route near 50°N./45°W.

3—An aircraft maintaining FL–310 for the entire route (KJFK to LFPO) will remain above all clouds.

4—A low pressure center is expected in the vicinity of 52°N./25°W.

49. Assuming the following conditions, compute the estimated flight time from KJFK to LFPO.

Total distance	2,600 NM.
Cruise altitude	FL–330.
Average temperature	−50° C.
Average cruise speed	Mach .82.
Time and distance for climb	30 min./200 NM.
Time and distance for descent	20 min./115 NM.
Cruise wind factor	+80 knots.

1—4 hours 32 minutes.

2—4 hours 41 minutes.

3—4 hours 58 minutes.

4—5 hours 12 minutes.

50. Basing your computation on the en route time you determined in the preceding test item and on the data given below, what is the total fuel burn from KJFK to LFPO?

Average fuel flow in climb	14,000 lbs./hr.
Average fuel flow in cruise	11,500 lbs./hr.
Average fuel flow in descent	6,000 lbs./hr.

1—51,500 pounds.

2—53,200 pounds.

3—56,500 pounds.

4—59,200 pounds.

ANALYSIS OF ANSWERS TO SAMPLE TEST ITEMS

1—(2)

See FAR 121.391.

2—(3)

See FAR 121.463.

3—(4)

See FAR 121.595.

4—(3)

See FAR 121.617.

5—(4)

See FAR 121.357.

6—(1)

See FAR 121.329.

7—(2)

See FAR 121.557.

8—(3)

See FAR 121.565.

9—(1)

See FAR 121.415.

10—(2)

The pilot of any civil aircraft may be issued, and is expected to accept, a Standard Instrument Departure (SID) unless he specifies "NO SID" either orally or in the "remarks" section of his flight plan. See the *Airman's Information Manual, Part I.*

11—(1)

Choice 1 - Correct, as stated under "clouds and weather."

Choice 2 - Incorrect; the high pressure area will continue moving eastward.

Choice 3 - Incorrect; ceilings are expected to lower rapidly in northeastern Pennsylvania and southeastern New York from 0100Z to 1900Z Sunday.

Choice 4 - Incorrect; under "outlook," mixed precipitation should move into southeastern Pennsylvania and extreme southern New Jersey between 0200Z and 0500Z Sunday.

12—(3)

Choice 1 - Incorrect; the ceiling at ORD is expected to vary from 800 feet to 500 feet after 1600Z.

Choice 2 - Incorrect; the surface wind velocity is expected to increase by 1700Z.

Choice 3 - Correct; refer to the Key to Aviation Weather Reports and Forecasts (Figs. 1a and 1b, Appendix).

Choice 4 - Incorrect; the visibility at ORD at the beginning of the forecast period should be 4 miles.

13—(2)

Choice 1 - Incorrect; the symbol on the chart in this area indicates light turbulence.

Choice 2 - Correct.

Choice 3 - Incorrect; the sky coverage is given in eighths, not tenths. The coverage is eight-eighths cirrus and cirrostratus.

Choice 4 - Incorrect; in the area referred to, the sky coverage is six-eighths cirrus with cloud bases at 30,000 feet.

14—(3)

The flight time from JFK to ORD is 1 hour and 47 minutes.

15—(2)

The time and fuel summary is reproduced below:

En route	01:47/17,100 lbs.
Alternate	00:15/2,900 lbs.
Reserve	00:45/6,700 lbs.
Extra for approach and missed approach	1,000 lbs.
TOTAL	02:47/27,700 lbs.

16—(3)

Divide total moment (126,751,300 lbs.-in.) by total weight (142,430 lbs.) to get a CG location of 889.9 inches aft of the datum. Subtract LEMAC from the CG to determine its location aft of LEMAC (889.9″ − 860.2″ = 29.7″ aft of LEMAC). Dividing this figure

(29.7") by MAC (180.7") yields a CG of 16.4% of MAC.

17—(4)

Zero fuel weight is the basic operating weight plus the payload of cargo and passengers. On this flight, the zero fuel weight is:

Basic operating weight	88,350 lbs.
Payload	19,580 lbs.
Zero fuel weight	107,930 lbs.

18—(3)

The ramp weight reduced by the estimated weight of fuel consumed (including taxi fuel) from JFK to ORD (17,100 lbs.) results in an estimated landing weight of 125,330 lbs.

19—(4)

The difference between basic operating weight (88,350 lbs.) and maximum zero fuel weight (118,000 lbs.) is the maximum payload (29,650 lbs.).

20—(3)

See the FAA Pilot's Weight and Balance Handbook, AC 61-13, for the definition of "basic operating weight" and other aircraft weight terms.

21—(4)

FAR 121.189 states, "The accelerate-stop distance must not exceed the length of the runway plus the length of any stopway." In this case the accelerate-stop distance is 9,000 feet (runway length) plus 2,000 feet (stopway length).

22—(3)

FAR 121.189 states, "The takeoff distance must not exceed the length of the runway plus the length of any clearway except that the length of any clearway included must not be greater than one-half the length of the runway." Since in this case the runway length is 9,000 feet and the clearway length is 5,000 feet, the "length of the runway plus half the length of the runway" figure must be used (9,000 feet plus 4,500 feet).

23—(3)

You may use either a computer, or Figure 11 in the Appendix, to plot the problem. The crosswind component is 15 knots from the left.

24—(4)

The intersection of 31,000 feet and −36° C. falls on the ISA +10° C. line.

25—(4)

Enter the chart on altimeter setting line (29.60); plot a line to the right to station elevation (410 feet); plot a line down to station pressure (29.2 in. Hg).

26—(4)

On the stabilizer trim setting chart, read 7 units airplane nose up at the intersection of 20% MAC and 25° flaps.

27—(1)

From Figure 13, determine that the station pressure at Kennedy (see Figure 32 for field elevation) is approximately 30 inches Hg. In Figure 14, no EPR bleed corrections are required since engines 1 and 3 have air conditioning "ON" and engine 2 has "NO BLEED." Read the average takeoff EPR at the intersection of 45° F. OAT and 30 inches Hg.

28—(1)

Enter the chart at the bottom of the "Pressure Altitude" column (600 feet is in the −1,000 to 1,000 ft. box); move right to first temperature box (−60° F. to +90° F.); move down to box opposite 25° flaps; interpolate chart to determine V_R and V_2 for 156,000 lbs. V_R is 121 knots and V_2 is 137 knots; add 1 knot to each since the CG is forward of 14%.

29—(3)

Choice 1 - Incorrect; higher than standard temperatures have no effect on climb limit weight.

Choice 2 - Incorrect; a headwind increases the effective runway length.

Choice 3 - Correct; from an inspection of the "runway limit temperature correction" portion of the chart, it is evident that higher than standard temperatures decrease allowable brake release gross weight.

Choice 4 - Incorrect; the reverse is true—a runway down-slope will tend to balance the effect of a tailwind.

30—(1)

Refer to the Explanation of Takeoff Performance Chart, Figure 15, and to the Takeoff Performance Chart, Figure 16, of the Appendix. Note that the runway limit gross weight must be reduced by 1,500 lbs. since the CG is forward of 14%.

31—(3)

Follow the directions given in Explanation of Takeoff Performance Chart. Note that the

climb limit value may be the limiting weight in some cases.

32—(1)

Enter the chart on the "trip distance" base line and use the plotted lines on the chart as a guide. Read trip fuel on the right of the chart and trip time on the upper left, applying the ISA +10° C. correction.

33—(4)

From the "TIME AND FUEL FROM BRAKE RELEASE TO CLIMB SPEED" chart (Figure 18, Appendix), read 840 lbs. of fuel used. From the "EN ROUTE CLIMB START CLIMB WT" chart (Figure 19, Appendix) read 3,640 lbs. of fuel used in climb to FL–330. The brake release weight less 4,480 lbs. yields a weight of 146,020 lbs. at FL–330.

34—(1)

True airspeed is 486 knots and fuel flow is 8.86 thousands of pounds per hour, therefore:

$$\text{NAM/1,000 pounds} = \frac{486}{8.86} = 54.8$$

35—(1)

An inspection of the Indicated Mach .82 Cruise planning charts for 28,000 feet, 29,000 feet, and 31,000 feet reveals that either increases in altitude or decreases in temperature result in lower fuel flow.

36—(4)

Follow the instructions on your computer for determining Mach number from true airspeed and temperature. Most computers have a Mach index.

37—(2)

Determine 298 knots calibrated airspeed by setting up your computer with the given altitude, temperature, and true airspeed.

38—(1)

In regard to "holding fuel," FAR 121.645 states that a flag air carrier turbojet must carry sufficient fuel to ". . . . fly for 30 minutes at 1,500 feet above the alternate airport . . . . under standard temperature conditions." On the "HOLDING ALL ENGINES—2 AIR-BLEEDS" chart (Figure 24, Appendix) determine that the fuel flow per engine under the stated conditions is 2,140 pounds per hour. Fuel for the required 30 minutes holding is

$$\frac{3 \times 2{,}140}{2} = 3{,}210 \text{ pounds.}$$

39—(3)

Referring to the "DESCENT PLANNING" chart (Figure 18, Appendix) determine that 15 minutes and 600 lbs. of fuel are required to descend from FL–290. For a 1715Z landing, the descent must start at 1700Z. According to the "CRUISE PLANNING" chart (29,000 ft.) (Figure 22, Appendix) the average total fuel flow at an average gross weight of 145,000 lbs. for 1 hour (1600Z to 1700Z) is approximately 9,400 lbs. The landing weight is 150,000 lbs. minus (600 lbs. + 9,400 lbs.) or 140,000 lbs.

40—(1)

Enter the referenced chart (Figure 25, Appendix) on the "runway available" line at 7,200 feet on the upper left and use the sample plot as a guide. The uncorrected field length limit is 206,000 pounds. Applying the appropriate "field length weight correction" of −54,000 lbs. results in a field length limit gross weight of 152,000 lbs.

41—(3)

Refer to the En route High Altitude Chart Legend (Figure 26, Appendix) for the the "hemispheric rule".

42—(3)

Choice 1 – Incorrect; Precision Approach Radar (PAR) is not available; however, Airport Surveillance Radar (ASR) is installed.

Choice 2 – Incorrect; the distance from the final approach fix to the localizer missed approach point is 5.2 NM.

Choice 3 – Correct.

Choice 4 – Incorrect; only runways 18, 22, 9R, and 27L have Visual Approach Slope Indicators (VASI) installed.

43—(1)

An aeronautical computer can be used to determine density altitude.

44—(3)

The wind flow is parallel to the heavy black contour line. At the point described (50°N./43°W.) the angle this contour makes with the nearest meridian is approximately 230 degrees. The wind velocity can be determined to be approximately 75 knots by noting the relationship of the described point to the 80K dashed isotach.

45—(4)

The reference for this sample test item is Aviation Weather, AC 00–6. Choices A and C are correct.

Choice B – Incorrect; the average height of the tropopause is greater in the tropics than in the polar regions.

Choice D – Incorrect; the boundary between the troposphere and stratosphere is characteristically a region of turbulence.

46—(2)

The reference is Aviation Weather, AC 00–6.

Choice 1 – Incorrect; the reverse of the statement is true, *e.g.*, the strength of the jet streams is greater in winter than in summer.

Choice 2 – Correct.

Choice 3 – Incorrect; the maximum occurrence of clear air turbulence is below and on the cold side of a jet stream.

Choice 4 – Incorrect; the core of strongest winds in jet streams is usually between 25,000 and 40,000 feet.

47—(2)

The Tropopause Vertical Wind Shear Chart, when used in conjunction with the 300-millibar chart, provides wind and temperature information—vertically and horizontally—within the layer from 300 millibars to 150 millibars. The following data is shown on this chart:

1. Intersections of the tropopause in 50-millibar intervals from 300 to 150 millibars. Standard heights of the pressure surfaces are given in the inset box at the bottom of the chart.
2. Mean vertical wind shear for the layer from 300 to 150 millibars at intervals of 2 knots/1,000 feet, shown by dashed lines. The mean vertical wind shear is an arithmetic mean of the forecast values of the shear below and above the layer of maximum wind. It is not drawn for values less than 2 knots.
3. Tropopause and 150-millibar level temperatures are enclosed in rectangles and circles, respectively.

At the position stated (52°N./30°W.), the tropopause is at the 250-millibar level (34,000 feet under standard conditions); therefore, at FL–330, the aircraft is below the tropopause.

48—(2)

Choice 1 – Incorrect; the symbol indicates moderate turbulence near LFPO.

Choice 2 – Correct.

Choice 3 – Incorrect; in the vicinity of 52°N./30°W., the flight will encounter cirroform layers with tops at 32,000 feet.

Choice 4 – Incorrect; a cold front is expected in the described area. A low pressure center would be labelled "L".

49—(3)

The true airspeed for cruise is 475 knots and the groundspeed, with the cruise wind factor added, is 555 knots. The time for climb (200 NM) is 30 minutes and that for descent (115 NM) is 20 minutes, totaling 50 minutes for 315 NM. The time required for the cruise portion (2,285 NM) at 555 knots is 4 hours and 8 minutes. The total estimated flight time is, therefore, 4 hours, 58 minutes.

50—(3)

Climb	14,000 lbs./hr.	00:30	7,000 lbs.
Cruise	11,500 lbs./hr.	04:08	47,500 lbs.
Descent	6,000 lbs./hr.	00:20	2,000 lbs.
Total Fuel Burn			56,500 lbs.

APPENDIX

KEY TO AVIATION WEATHER REPORTS.....

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

SKY AND CEILING

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

Sky cover symbols are:

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

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

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

VISIBILITY

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

WEATHER AND OBSTRUCTION TO VISION SYMBOLS

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

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

WIND

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

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

ALTIMETER SETTING

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

RUNWAY VISUAL RANGE (RVR)

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

CODED PIREPS

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

DECODED REPORT

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

***TYPE OF REPORT**

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

FIGURE 1a. Key to aviation weather reports.

KEY TO AVIATION WEATHER FORECASTS.....

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

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

EXAMPLE OF TERMINAL FORECASTS

C15◉	Ceiling 1500', broken clouds	O11/2GF	Clear, visibility one and one-half miles, ground fog.
20⊘C70⊘6K 3230G	Scattered clouds at 2000', ceiling 7000' overcast, visibility 6 miles, smoke, surface wind 320 degrees 30 knots, gusty.	C5X1/4S+	Sky obscured, vertical visibility 500 ft. visibility one-fourth mile, heavy snow.

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

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

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

EXAMPLES OF WINDS AND TEMPERATURES ALOFT (FD) FORECASTS:

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

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
BOS	3127	3425-07	3420-11	3421-16	3516-27	3512-38	311649	292451	283451
JFK	3026	3327-08	3324-12	3322-16	3120-27	2923-38	284249	285150	285749

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

PILOTS report in-flight weather to nearest FSS

FIGURE 1b. Key to aviation weather forecasts.

STATION IDENTIFIERS

ALB ALBANY, N.Y. ALBANY AIRPORT
BOS BOSTON, MASS. LOGAN AIRPORT
JFK J.F. KENNEDY INTERNATIONAL AIRPORT, N.Y.
EWR NEWARK, N.J. NEWARK AIRPORT
PHL PHILADELPHIA, PA. PHILADELPHIA INTERNATIONAL AIRPORT
CLE CLEVELAND, OHIO, CLEVELAND-HOPKINS AIRPORT
DTW DETROIT, MICH. DETROIT-METROPOLITAN AIRPORT
FWA FORT WAYNE, IND. BAER FIELD
ORD CHICAGO, ILL. CHICAGO-O'HARE INTERNATIONAL AIRPORT
MKE MILWAUKEE, WIS. GENERAL MITCHELL FIELD

FA JFK 081245
13Z SAT-01Z SUN

ERN PA SERN NY CONN NJ CSTL WTRS

HGTS ASL UNLESS NOTED

SYNS. HI PRES CNTRD UPR HUDSON VLY RDGD SWD OVR N.J. CNTR WILL CONT MOVG EWD.

CLDS AND WX. SERN PA SRN NJ ADJ CSTL WTRS 250⊕ BCMG BY 17Z 30⊕200⊕V⊕ AND BY 22Z 25-30⊕120⊕. NERN PA SERN NY W OF THE CTSKLS 250-⊕V⊕ LWRG GRDLY TO 120⊕. RMNDR SERN NY CONN NRN NJ RMNDR CSTL WTRS 250-⊕V⊕ BCMG 200⊕V⊕

ICG. FRZLVL AT OR NR SFC. LGT RIME ICGIC.

TURBC. BCMG OCNL LGT BLO 60 BY 16Z

OTLK 01Z-19Z SUN. AREA OF MXD PCPN SPRDG INTO W AND S PTN SERN PA AND EXTRM S NJ 02Z-05Z SPRDG NEWD THRU RMNDR AREA BY 12Z AS SNW THRU EXTRM NERN PA INTO SERN NY AND CONN AND MXD PCPN RMNDR AREA. CIGS LWRG RPDLY IN PCPN TO 3-10 VSBYS 1-3 VRBL BLO 1 IN SNW. AFT 1 TO 3 HRS OF SNW CIGS AND VSBYS FQTLY BLO 1 THSD FT AND 2 MIS.

FIGURE 2. Station identifiers and area forecast (JFK).

FA CHI 081245
13Z SAT-01Z SUN

WIS MICH ILL IND LK MICH US PTNS OF LKS SUPR AND HURON

SYNS. AT 13Z LOW PRES CNTR OVR SERN MO MOVG EWD ABT 25 KTS ACRS SRN ILL AND RCHG ERN KY BY 01Z.

AIRMET. SNW ANC FOG WITH CIGS BLO 1 THSD FT AND VSBY BLO 2 MI OVR SRN THIRD WIS AND NW THIRD ILL SPRDG EWD INTO NERN THIRD ILL BY 18Z NWRN IND BY 19Z AND NERN IND BY 00Z. OVR RMDR ILL CIGS BLO 1 THSD AND VSBY BLO 2 MI IN RAIN AND FOG. SRN THIRD WIS AND NW THIRD ILL FQT MDT MXD RIME AND CLR ICGICIP SPRDG EWD. ELSW IN ILL IND SRN LK MICH AND SRN LWR MICH LCL MDT RIME ICGIC GRDLY INCREASING.

CLDS AND WX. WIS. OVR SRN THIRD WIS C8-15⊕1-3S-F LCLLY C4X1/2S-F. CONDS IMPVG AFT 21Z TO C15⊕3-5SW-F. OVR RMDR WIS C60⊕.

MICH. C20-30⊕7 LCLLY OVR NRN LWR MICH NRN LK MICH AND UPR MICH C10⊕3-5SW-. CONDS LWRG OVR SRN LK MICH AND SRN LWR MICH TO C15⊕3-5S- CHC ZL- BY 20Z.

ILL. OVR NWRN THIRD ILL C8-15⊕1-3S-F LCLLY C4X1/2S-F. THESE CONDS WILL SPRD EWD OVR NERN THIRD ILL BY 18Z PRCDD BY C15-25⊕3-5HK. TOPS 80-100 INCRG TO 140-160 DURG THE PRD IN MERGG LYRS. CONDS IPVG OVR NWRN ILL AFT 21Z TO C15⊕3-5SW-F. OVR RMDR ILL C4-6⊕1-3R-F LCLLY C2-4X1/4-1R-F. OVR CNTRL ILL CHC MXD ZL- OR S-.

IND. C15-25⊕3-6HK LCLLY OVR W CNTRL AND SWRN IND R-. CONDS GRDLY DTRTG FM W AND BCMG OVR NWRN IND C5-8⊕1/2-2S- BY 19Z AND OVR NERN IND BY 00Z.

ICG. OVR SRN WIS NWRN ILL FQT MDT MXD RIME AND CLR ICGICIP. OVR RMDR ILL IND SRN LK MICH AND SRN LWR MICH LCL MDT RIME ICGIC GRDLY INCRG DURG THE PRD. FRZLVL 40-60 SRN IND SRN ILL SLPG TO 20-40 CNTRL IND CNTRL ILL AND TO SFC-20 NRN IND NRN ILL. FRZLVL AT SFC LK MICH AND MICH.

TURBC. OVR ILL AND IND LCL MDT TURBC DVLPG 8 THSD BY 18Z.

OTLK 01Z-19Z SUN. LOW CNTR CONTG TO MOV EWD AS HIGH PRES SPRDS INTO WIS AND ILL BY 06Z. CONDS GRDLY BCMG ⊕V⊖ OVR ILL BY 06Z AND OVR IND MICH AND LK MICH BY 19Z.

FIGURE 3. Area forecast (CHI).

```
FTUS 081045

ALB 081123 250-Ⓓ.  21Z C200Ⓓ..
BOS 081123 250-Ⓓ 3610..
JFK 081123 250-Ⓓ.  21Z C200⊕ 0610..
EWR 081123 250-Ⓓ4K OCNL 3K.  16Z 250-Ⓓ7.  21Z C200⊕8 0610..
PHL 081123 250-Ⓓ4K.  16Z C200Ⓓ7.  21Z C30Ⓓ140⊕ 0510..
FWA 081123 C18⊕3HK 0810 CHC S- AFT 14Z.  20Z C8⊕2S-F 0415 OCNL
    C5X1/2S-F..
ORD 081123 C18⊕4HK 0710 CHC S-.  16Z C8⊕2S-F 0415 OCNL C5X1/2S-F..
MKE 081123 C12⊕5HK 0710 CHC S-.  17Z C8⊕2S-F 0415 CHC C5X1/2S-F..
CLE 081123 250-Ⓓ6HK.  17Z C80Ⓓ7 0812.  22Z C8⊕2S- 0812 VRBL C5X1S..


SA 220815ØØ

ALB 28Ø-⊕2Ø 243/18/11/ØØØØ/Ø22
BOS M
JFK 3ØØⒹ12 227/31/15/Ø6Ø5/Ø19
EWR 3ØØ-Ⓓ8 227/32/15/Ø1Ø6/Ø19
PHL E25Ø⊕5HK 217/31/18/Ø9Ø7/Ø16
CLE 25ⒹE'Ø⊕21/2HK 15Ø/29/2Ø/11Ø7/993
DTW M28⊕11/2HK 152/27/21/Ø5Ø8/994/RØ3LVR6Ø+
FWA M19⊕21/2H 125/29/23/Ø7Ø9/986
ORD M14Ⓓ1S-HK 138/34/27/Ø4Ø9/991/R14RVR60+
MKE M15Ⓓ28⊕6HK 155/32/28/Ø41Ø/995


SA 220816ØØ

ALB 28Ø-Ⓓ2Ø 23Ø/22/13/Ø3Ø5/Ø18
BOS 3ØØ-Ⓓ12 215/31/11/25Ø7/Ø16
JFK 3ØØ-Ⓓ12 217/32/15/1ØØ3/Ø16
EWR 3ØØ-Ⓓ6HK 217/34/17/Ø5Ø5/Ø16
PHL E25Ø⊕6HK 213/34/18/Ø9Ø7/Ø15
CLE M1ØⒹ8Ø⊕21/2HK 148/32/24/11Ø6/993
DTW S 3ØⒹE22Ø⊕11/2HK 148/29/22/Ø8Ø9/993/RØ3LVR6Ø+
FWA M19⊕21/2H 117/3Ø/24/Ø71Ø/984
ORD S M11⊕3S--HK 135/33/28/Ø311/99Ø
MKE M17⊕6HK 155/32/28/Ø3Ø9/995
```

FIGURE 4. Terminal forecasts and surface weather reports.

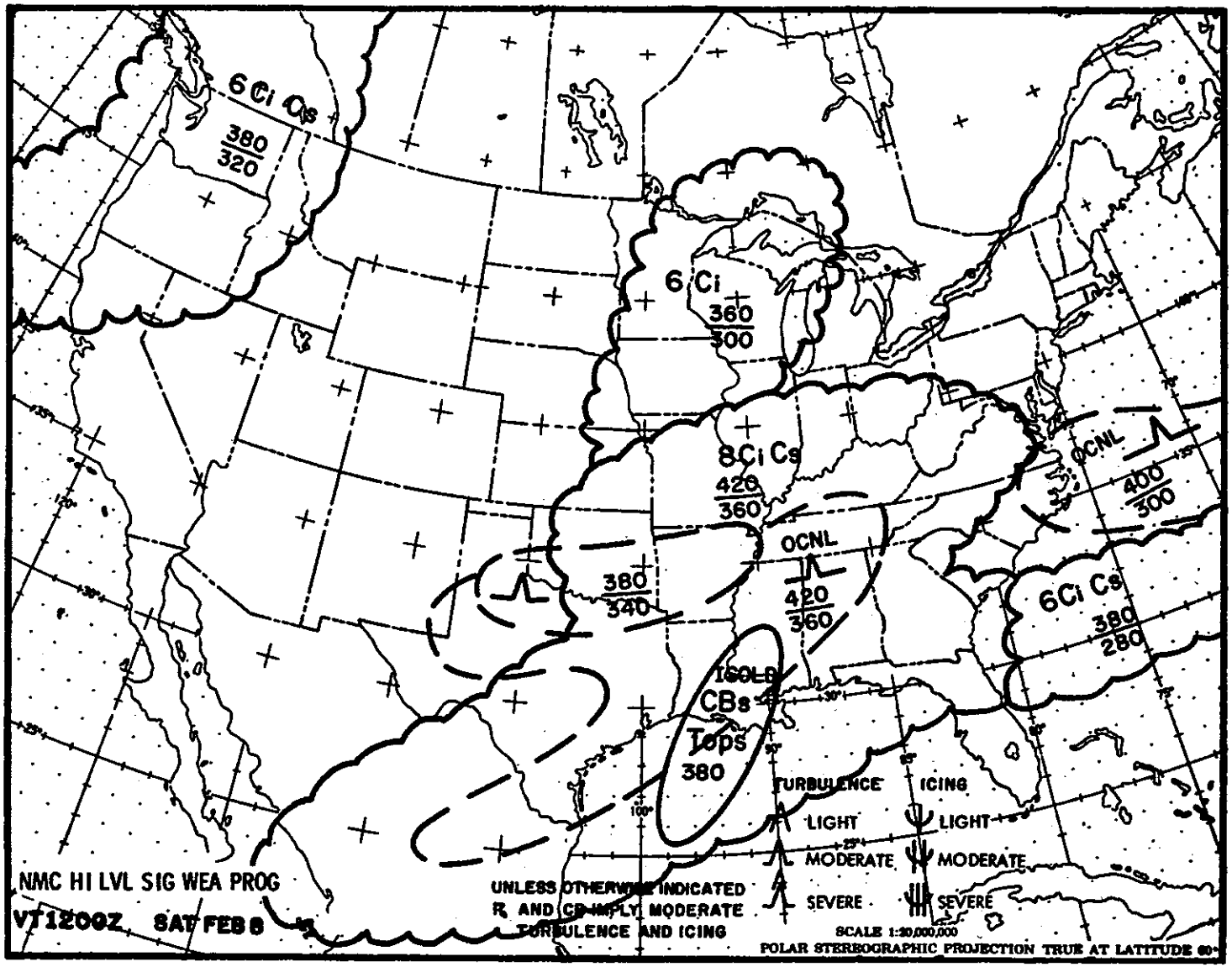


FIGURE 5. NMC high level weather prognostic chart.

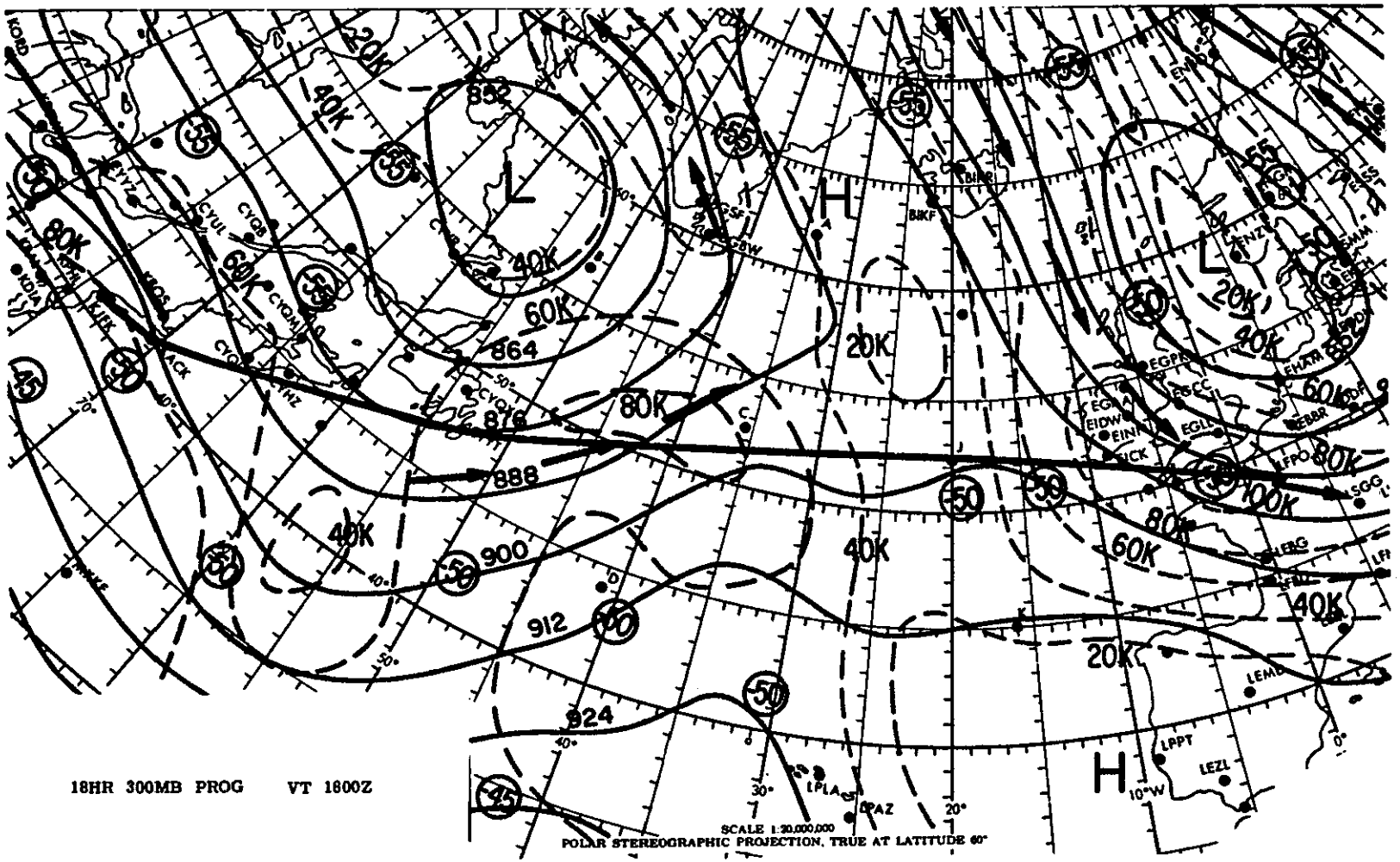


FIGURE 6. 300 millibar prognostic chart.

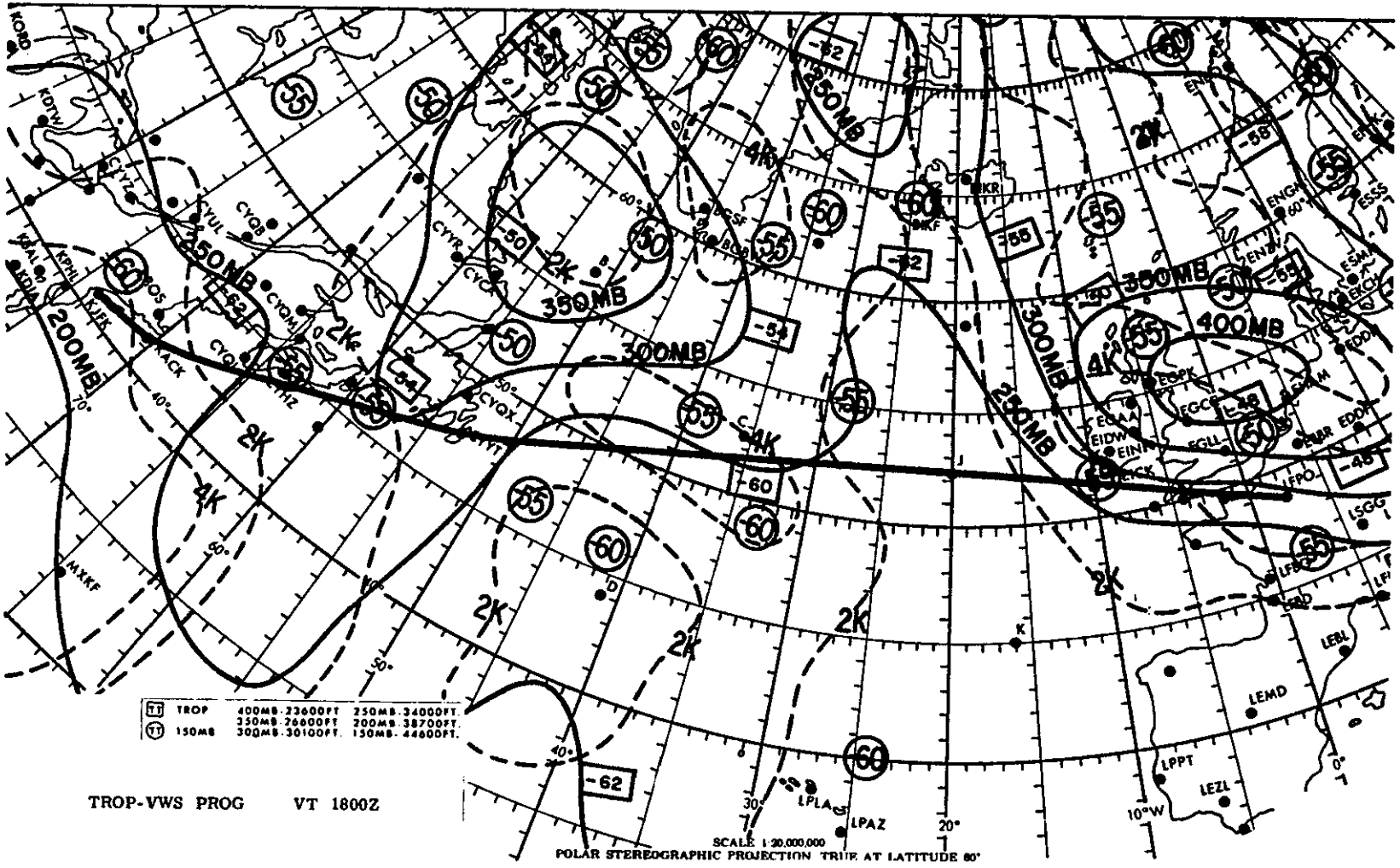


FIGURE 7. Tropopause/vertical wind shear chart.

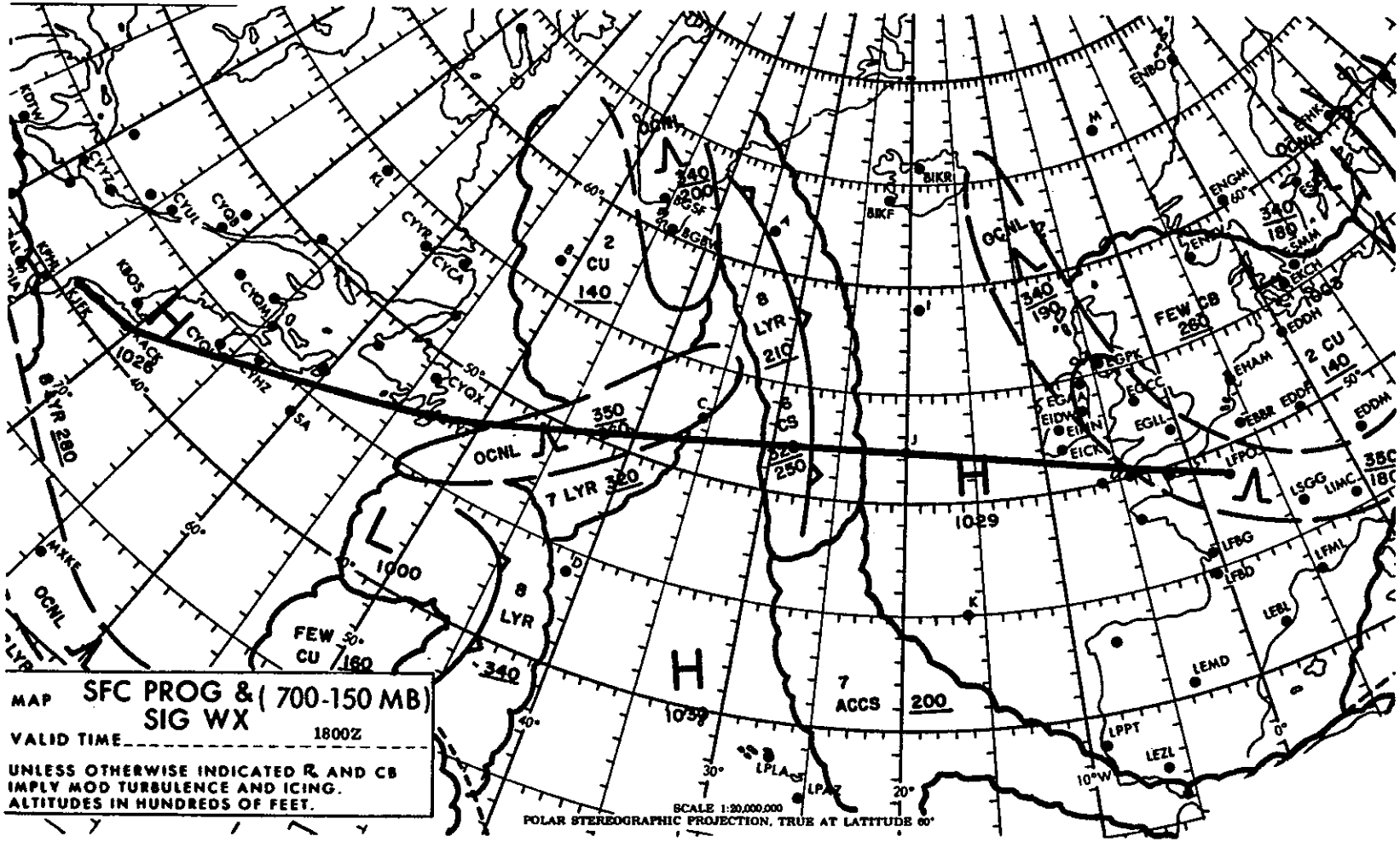
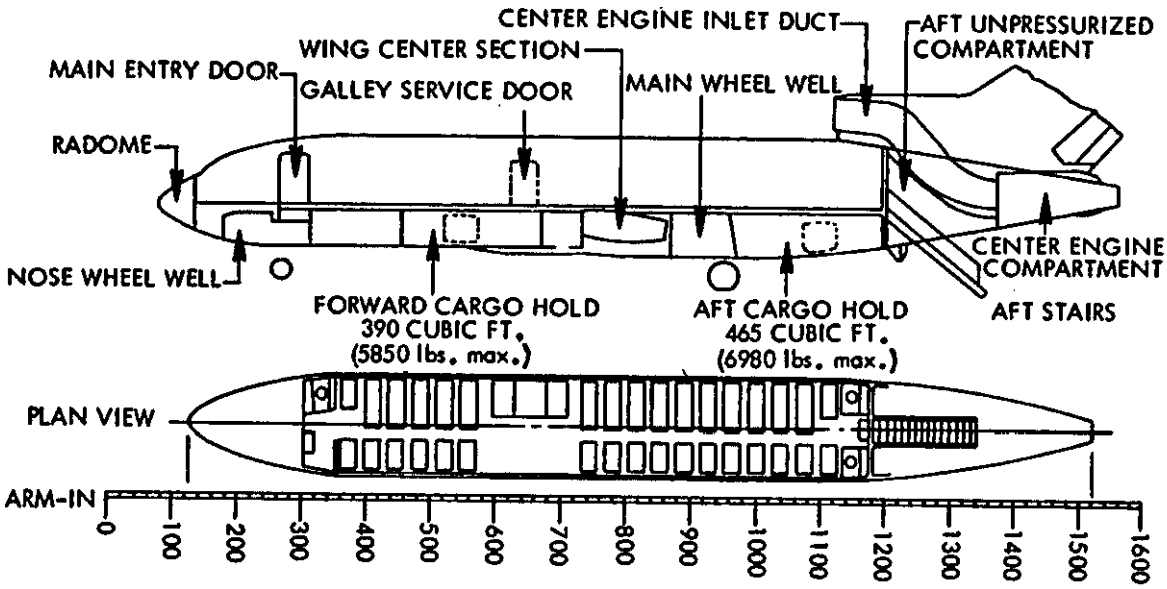


FIGURE 8. Significant weather prognostic chart (700–150 MB).



WEIGHT LIMITATIONS

Basic operating weight..... 88,350 pounds
Maximum taxi weight.....161,000 pounds
Maximum takeoff weight.....160,000 pounds
Maximum landing weight.....142,500 pounds
Maximum zero fuel weight.....118,000 pounds

FUEL LOADING TABLE

Weight	*Tank 1 and 3*		*Tank 2 (3 Cell)*		*Weight*
Lb.	*Arm*	*Moment 1000*	*Arm*	*Moment 1000*	*Lb.*
8,500	892.1	7,583	817.5	6,949	8,500
9,000	893.0	8,037	817.2	7,355	9,000
9,500	893.9	8,492	817.0	7,762	9,500
10,000	894.7	8,947	816.8	8,168	10,000
10,500	895.4	9,402	816.6	8,574	10,500
11,000	896.1	9,857	816.5	8,982	11,000
11,500	896.8	10,313	816.3	9,387	11,500
12,000	897.5	10,770	816.1	9,793	12,000
18,500	906.8	16,776	815.1	15,079	18,500
19,000	907.8	17,248	815.0	15,485	19,000
19,500	908.9	17,724	814.9	15,891	19,500
20,000	910.1	18,202	814.9	16,298	20,000
20,500	911.7	18,690	814.8	16,703	20,500
21,000	913.4	19,181	814.7	17,109	21,000
21,500	915.5	19,683	814.6	17,514	21,500

AIRPLANE DATUM CONSTANTS

Mean Aerodynamic Chord applicable to this airplane:

MAC = 180.7 inches

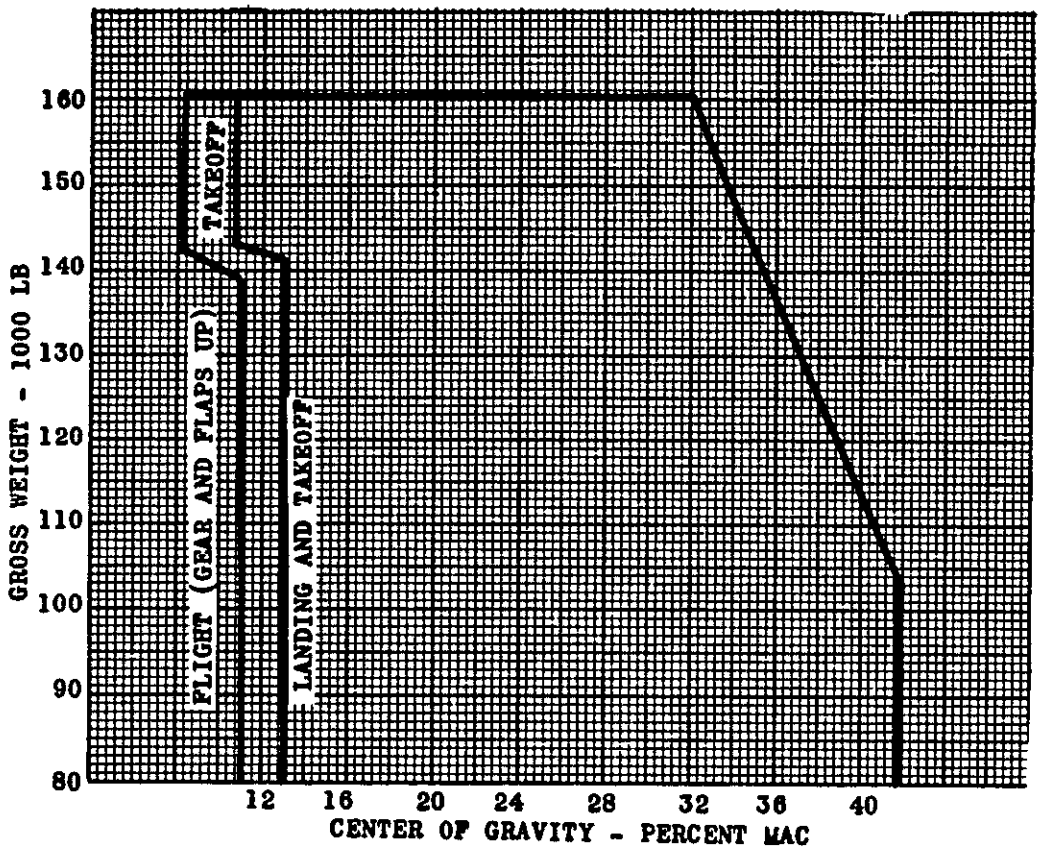
Leading edge of MAC = 860.2 inches

FUEL DUMPING

Fuel dumping rates with all boost pumps on, all dump valves open, and both nozzle valves open are:

Tank # 1..... 600 lbs/min
Tank # 2.....1100 lbs/min
Tank # 3..... 600 lbs/min

FIGURE 9. Airplane data.



CARGO LOADING TABLE		
	Moment 1000	
Weight Lb.	*Forward Hold Arm 581*	*Aft Hold Arm 1066*
6,000		6,396
5,000	2,905	5,330
4,000	2,324	4,264
3,000	1,743	3,198
2,000	1,162	2,132
1,000	581	1,066
900	523	959
800	465	853
700	407	746
600	349	640
500	290	533
400	232	426
300	174	320
200	116	213
100	58	107

PASSENGER LOADING TABLE		
Number of Pass.	*Weight Lb.*	*Moment 1000*
FWD. COMP. CENTROID 486.3		
5	850	418
10	1,700	827
15	2,550	1,240
20	3,400	1,653
25	4,250	2,067
29	4,930	2,397
AFT. COMP. CENTROID 928.8		
5	850	789
10	1,700	1,579
15	2,550	2,368
20	3,400	3,158
25	4,250	3,947
30	5,100	4,736
35	5,950	5,526
40	6,800	6,315
45	7,650	7,105
50	8,500	7,894
54	9,180	8,526

FIGURE 10. CG chart and loading tables.

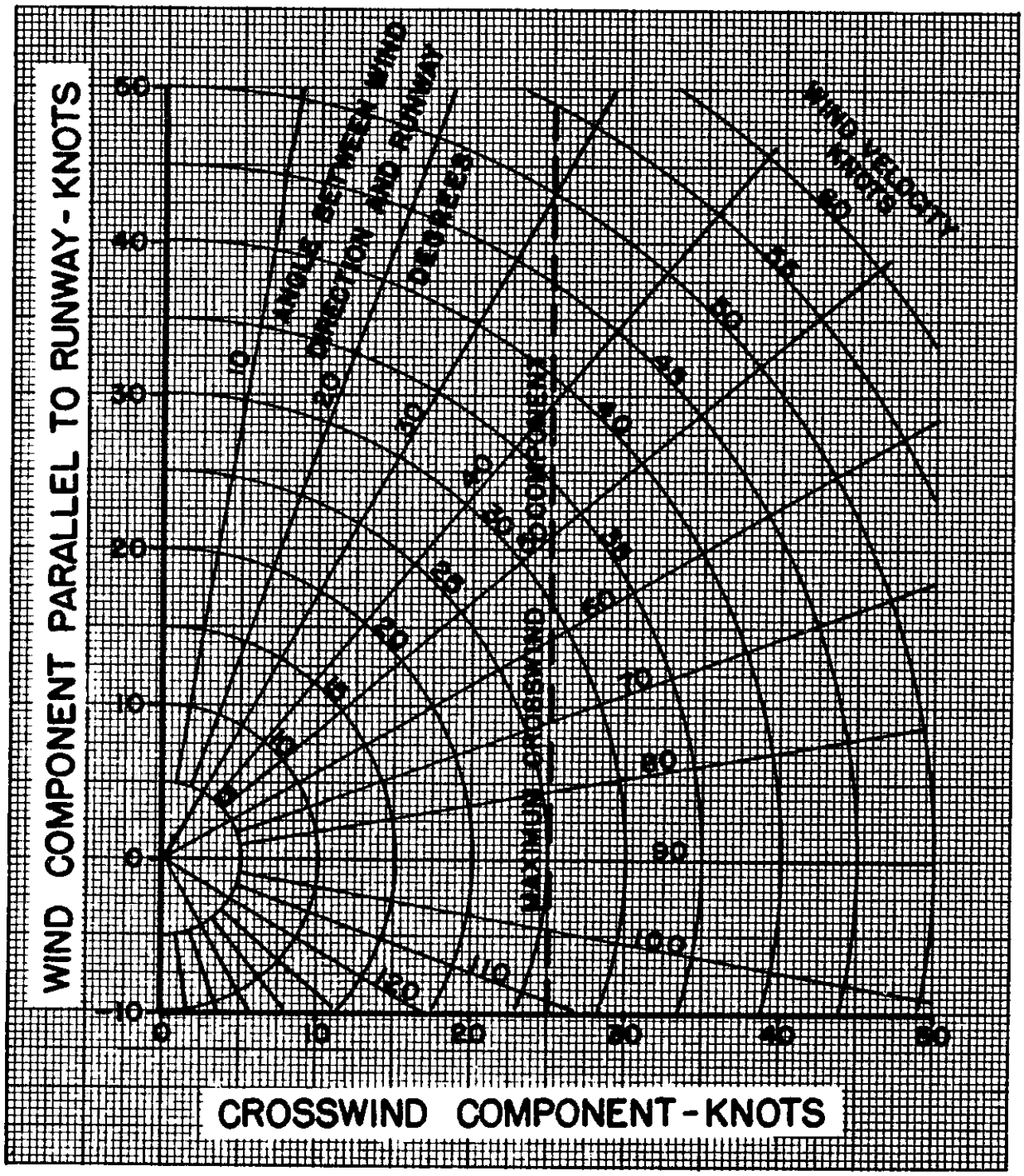


FIGURE 11. Wind component chart.

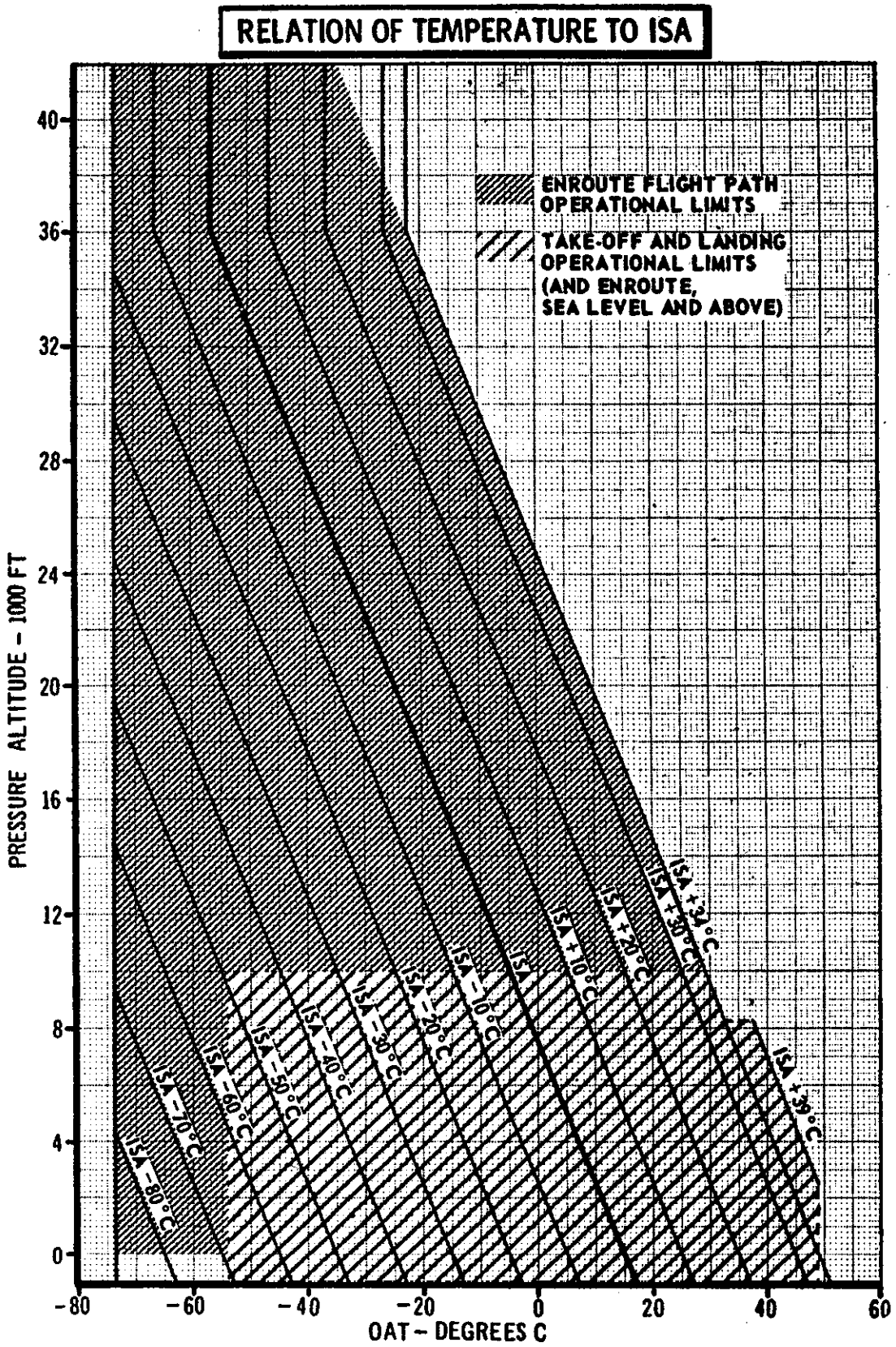


FIGURE 12. Relation of temperature to ISA.

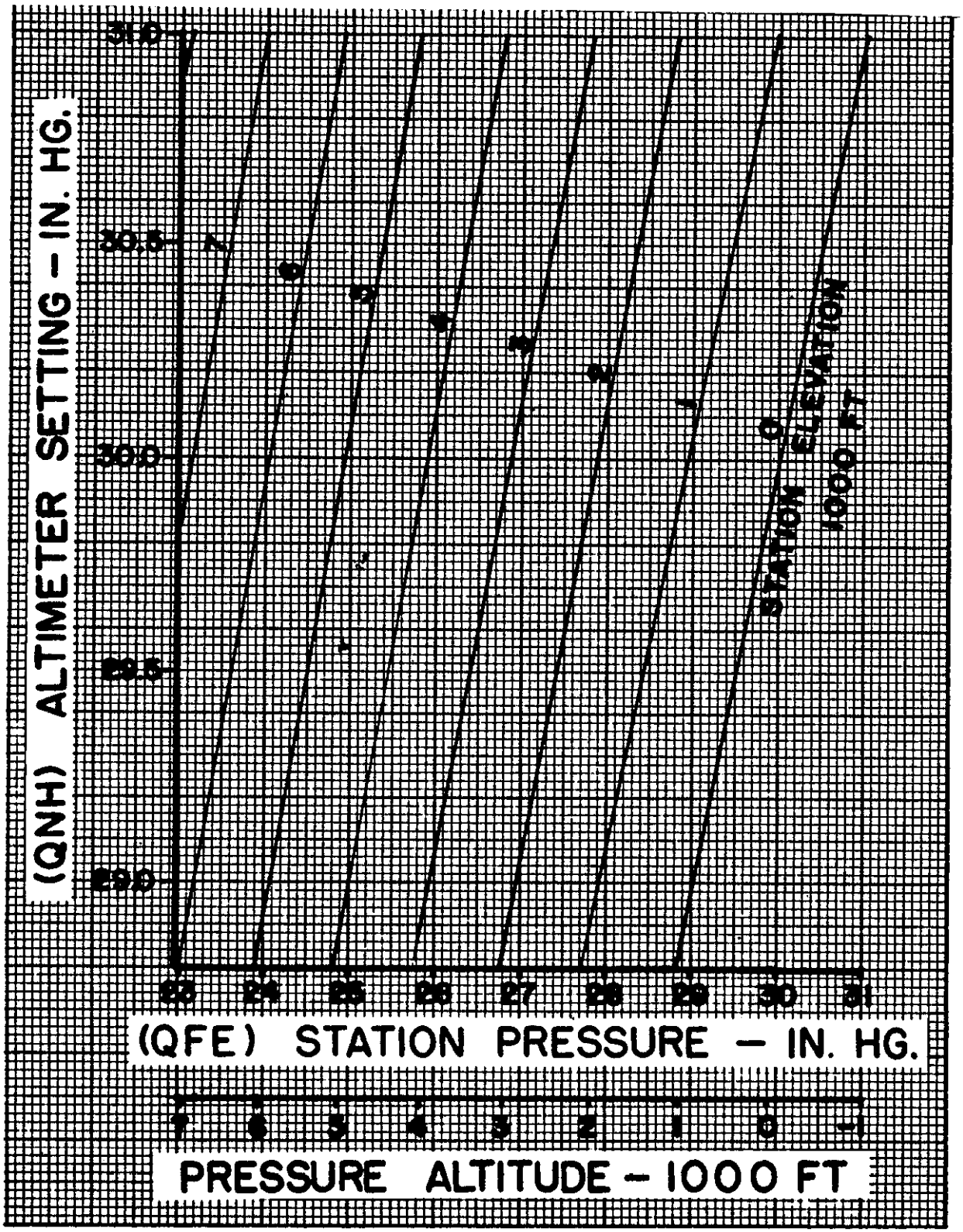


FIGURE 13. Relation of altimeter setting to station pressure.

TAKEOFF

EPR

ENG 1 & 3 - A/C ON
ENG 2 - NO BLEED

EPR BLEED CORRECTIONS	ENG 1 & 3	ENG 2
AIR CONDITIONING	OFF: +.03	ON: -.03
ENGINE ANTI-ICE ON		-.03

O.A.T. DEG F.	STATION PPESSUPE - INCHES Hg.											O.A.T. DEG F.
	22	23	24	25	26	27	28	29	30	31	32	
70	1.97	1.96	1.96	1.96	1.95	1.94	1.93	1.93	1.93	1.92	1.89	70
60	1.97	1.96	1.96	1.96	1.95	1.95	1.95	1.95	1.95	1.92	1.89	60
50	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.95	1.92	1.89	50
40	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.00	1.95	1.92	1.89	40
30	2.05	2.05	2.05	2.05	2.05	2.05	2.04	2.00	1.95	1.92	1.89	30

$V_1 = V_R$ | V_2

ANTI-SKID AND NOSE BRAKES OPERATIVE.

PRESSURE ALTITUDE -1000 FT		OAT			
9 TO 10	°F		-60 TO -25	-24 TO 20	21 TO 88
	°C		-51 TO -32	-31 TO -7	-6 TO 29
7 TO 9	°F	-60 TO -31	-30 TO 10	11 TO 69	50 TO 100
	°C	-51 TO -35	-34 TO -12	-11 TO 9	10 TO 38
5 TO 7	°F	-60 TO 5	6 TO 40	41 TO 75	76 TO 108
	°C	-51 TO -15	-14 TO 4	5 TO 24	25 TO 42
3 TO 5	°F	-60 TO 35	36 TO 65	66 TO 102	103 TO 115
	°C	-51 TO 2	3 TO 18	19 TO 39	40 TO 46
1 TO 3	°F	-60 TO 60	61 TO 95	96 TO 120	
	°C	-51 TO 16	17 TO 35	36 TO 49	
-1 TO 1	°F	-60 TO 90	91 TO 120		
	°C	-51 TO 32	33 TO 49		

FLAPS	WEIGHT - 1000 LBS	$V_1=V_R$	V_2	$V_1=V_R$	V_2	$V_1=V_R$	V_2	$V_1=V_R$	V_2
5°	170	144	160	145	160	147	159		
	160	139	156	140	155	142	155		
	150	134	151	136	151	137	150	138	149
	140	128	147	130	146	132	146	134	145
	130	122	142	124	141	126	141	128	140
	120	116	137	118	136	120	136	122	135
	110	109	132	111	131	113	131	116	130
15°	170	136	150	137	149				
	160	131	147	133	146	134	145		
	150	127	142	128	142	129	141		
	140	121	139	123	138	124	137	125	136
	130	116	134	117	133	119	132	120	131
	120	110	130	112	129	113	128	115	127
	110	104	126	106	125	107	123	109	122
25°	160	123	138	124	137	125	136		
	150	118	135	119	133	121	133		
	140	113	131	115	130	116	129	117	128
	130	108	127	110	126	111	125	112	124
	120	103	122	104	122	106	121	107	120
	110	98	118	99	117	100	116	102	115

ADD 1 KNOT FOR CG FWD OF 14% OR GROSS WEIGHT IN EXCESS OF 160,000 LBS

AFTER TAKEOFF NORMAL MANEUVERING SPEEDS - KTS IAS

FLAPS	BELOW MAX LANDING WT	ABOVE MAX LANDING WT
0	200	210
2	190	200
5	160	170
15	150	160
25	140	150

FOR MANEUVERS IMMEDIATELY AFTER TAKE-OFF EXCEEDING 15° BANK, MAINTAIN AT LEAST V_2 + 10 AT TAKE-OFF FLAPS

ENGINE LIMITS

N_1 RPM - 100.1%	
N_2 RPM - 100.0%	
STARTING EGT	
	420°C ABOVE 15°C OAT
	350°C BELOW 15°C OAT
MAX CONT EGT - 535°C	
TAKE-OFF EGT - 570°C	

STAB. TRIM SETTING - UNITS AIRPLANE NOSE UP

FLAPS	CG 10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
5°	8¼	8	7½	7	6½	6	5½	5	4½	4¼	3¾	3¼	2¾	2¼	2	1¼	1
15°	9	8½	8	7½	7	6½	6	5½	5	4½	4	3½	3	2½	2	1½	1
25°	9¼	9	8½*	8	7½	7	6½	5¾	5½	4¾	4½	3¾	3	2¼	2	1½	1

* USE 8 UNITS ON AIRPLANES WITHOUT EXTENDED GREEN BAND

FIGURE 14. Takeoff data.

Takeoff Performance Flaps 15°—Gross Weight at Brake Release

Given:

Runway length available	8,150 feet
Tailwind component	4 knots
Slope	1% UP
Airport pressure altitude	4,000 feet
Outside air temperature	+88°F.
Average takeoff EPR	1.88

For runway limit: start at runway length available line and follow dotted line and arrows. Answer is 132,000 pounds.

For climb start: start where EPR 1.88 intersects climb limit baseline and follow dotted line and arrows. Answer is 143,500 pounds.

Explanation of Chart

Gross weight at brake release for this aircraft under the conditions specified on the chart is seen to be influenced by either *Runway* or *Climb* limitations. The following explanation of these limits is offered.

Runway Limit. Based on the runway length available, the operating variables (wind, runway slope, pressure altitude, and temperature) together with average takeoff EPR directly influence the gross weight at brake release. In the plotted example, this value is seen to be 132,000 lbs.

Climb Limit. Regulations specify that certain climb gradients or profiles must be met during the takeoff and climb phases. (See FAR Part 25.121.) This chart, therefore, shows the weights for various combinations of power (EPR) and pressure altitude at which the aircraft is able to equal the prescribed climb gradients. In the plotted example, the gross weight at brake release which would meet the climb restrictions imposed by the regulations is 143,500 pounds. This value far exceeds the runway limit of 132,000 pounds. Of these two weights, the *smaller value* is *always* used and in *most* cases, this is the *runway limit.* Structural weight limitations, of course, must not be exceeded.

NOTE.—Under certain conditions, the climb limit gross weight at brake release will be *less than* the runway limit value and thus it becomes the limiting value. Plot the example below which shows this relationship:

Given

Runway length available	9,250 feet
Wind	Calm
Slope	0
Airport pressure altitude	3,000 feet
Outside air temperature	+59°F.
Average takeoff EPR	1.90

Solution

Runway limit gross weight at brake release	156,000 pounds.
Climb limit gross weight at brake release	153,500 pounds.

(The climb limit value is the limiting weight in this case.)

FIGURE 15. Explanation of takeoff performance chart (fig. 16).

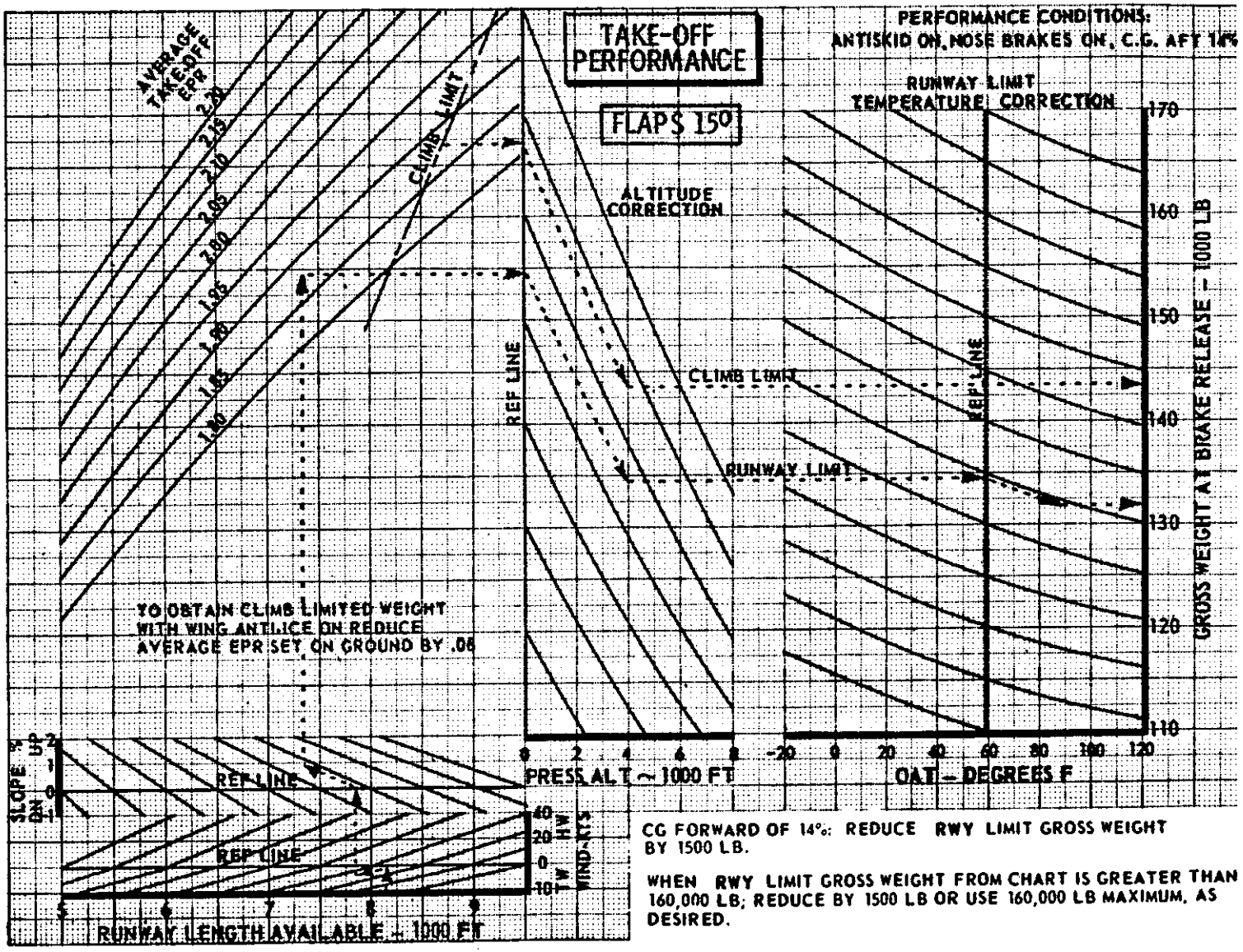


FIGURE 16. Takeoff performance chart.

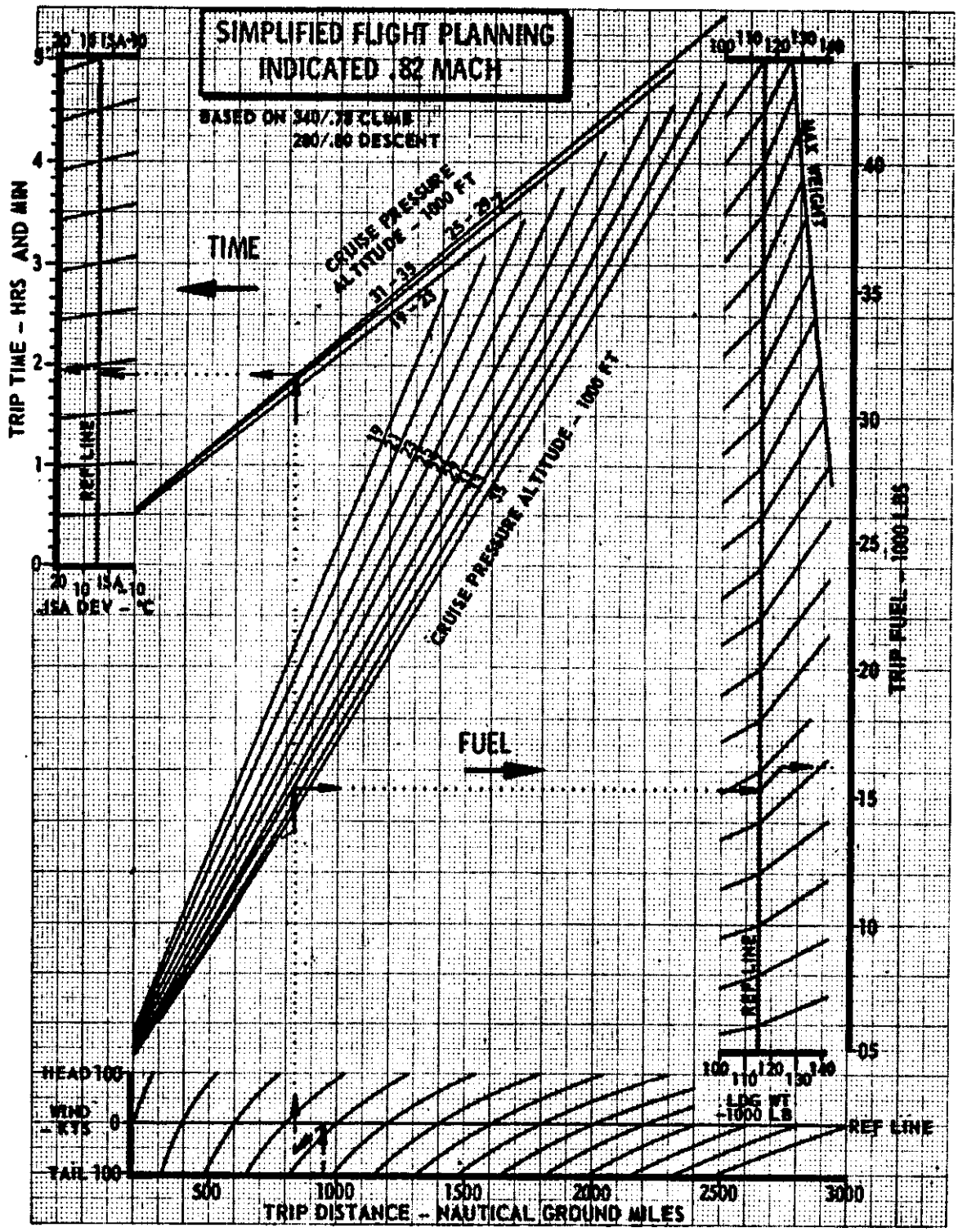


FIGURE 17. Simplified flight planning chart.

340/.78 CLIMB

GROSS WT -1000 LB	FIELD ELEVATION			
	S.L. FUEL LB	2000 FT FUEL LB	4000 FT FUEL LB	6000 FT FUEL LB
170	1030	1090	1150	1210
165	970	1020	1080	1140
160	920	980	1030	1090
155	880	930	980	1030
150	840	890	940	990
145	800	840	890	940
140	770	810	850	900
135	740	780	820	870
130	710	750	790	830
125	690	720	760	800
120	660	690	730	770
115	640	670	700	740
110	620	650	680	710
105	600	620	650	680
100	590	610	630	660

TIME AND FUEL FROM BRAKE RELEASE TO CLIMB SPEED

TIME = APPROX 3 MIN

PRESS ALT - 1000 FT	TIME-MIN	FUEL-LBS	DIST-NAM
39	20	850	124
37	19	800	112
35	18	700	101
33	17	650	92
31	16	600	86
29	15	600	80
27	14	550	74
25	13	550	68
23	12	500	63
21	11	500	58
19	10	450	52
17	10	450	46
15	9	400	41
10	6	300	26
5	3	150	13

DESCENT PLANNING

.80/280

FIGURE 18. Climb and descent planning.

PRESS. ALT-FT	CLIMB DATA	DEVIATION FROM ISA - DEGREE(C)								
		-15	-10	-5	-0	5	10	15	20	25
40000	TIME MIN									
	FUEL LBS									
	DIST NAM									
	AVTAS KTS									
39000	TIME MIN	25	31							
	FUEL LBS	5367	6157							
	DIST NAM	177	218							
	AVTAS KTS	423	429							
38000	TIME MIN	21	23	27	33					
	FUEL LBS	4749	5194	5787	6661					
	DIST NAM	145	167	197	243					
	AVTAS KTS	422	427	433	438					
37000	TIME MIN	18	20	23	26	31	39			
	FUEL LBS	4357	4752	5190	5748	6506	7663			
	DIST NAM	128	144	165	193	231	292			
	AVTAS KTS	421	426	431	437	442	448			
36000	TIME MIN	17	18	21	23	27	32	39	52	
	FUEL LBS	4145	4456	4830	5289	5871	6647	7775	9742	
	DIST NAM	116	130	147	169	197	236	294	401	
	AVTAS KTS	420	425	430	436	441	447	453	459	
35000	TIME MIN	15	17	19	21	24	28	34	42	
	FUEL LBS	3952	4236	4574	4983	5491	6144	7031	8354	
	DIST NAM	107	120	135	154	178	209	253	321	
	AVTAS KTS	420	425	430	435	440	446	451	458	
34000	TIME MIN	14	16	18	20	22	26	30	37	47
	FUEL LBS	3788	4053	4366	4740	5199	5777	6536	7592	9217
	DIST NAM	100	112	125	142	163	190	226	279	362
	AVTAS KTS	419	424	429	434	439	445	450	456	463
33000	TIME MIN	13	15	16	18	21	24	28	33	41
	FUEL LBS	3640	3889	4181	4529	4952	5478	6153	7059	8360
	DIST NAM	94	104	117	132	151	175	207	250	314
	AVTAS KTS	418	423	428	433	438	443	449	455	461
32000	TIME MIN	13	14	15	17	19	22	26	30	37
	FUEL LBS	3503	3739	4014	4340	4734	5220	5834	6639	7754
	DIST NAM	88	98	110	124	141	163	190	228	281
	AVTAS KTS	417	422	426	432	437	442	448	453	460
31000	TIME MIN	12	13	15	16	18	21	24	28	34
	FUEL LBS	3375	3598	3859	4167	4537	4989	5555	6285	7274
	DIST NAM	83	92	103	116	132	152	177	210	256
	AVTAS KTS	415	420	425	430	435	441	446	452	458
30000	TIME MIN	11	12	14	15	17	19	22	26	31
	FUEL LBS	3253	3466	3713	4005	4354	4778	5304	5976	6873
	DIST NAM	79	87	97	109	124	142	165	195	236
	AVTAS KTS	414	419	424	429	434	439	444	450	456
29000	TIME MIN	11	12	13	14	16	18	21	24	29
	FUEL LBS	3137	3340	3576	3853	4184	4583	5075	5700	6527
	DIST NAM	74	82	92	103	117	134	155	182	219
	AVTAS KTS	413	417	422	427	432	437	443	448	454
28000	TIME MIN	10	11	12	14	15	17	20	23	27
	FUEL LBS	3025	3219	3444	3708	4021	4397	4858	5441	6207
	DIST NAM	70	78	87	97	110	126	145	170	203
	AVTAS KTS	411	416	420	425	430	435	441	446	452

ENROUTE CLIMB
START CLIMB WT
150,000 LB

NOTE: 1. Enter chart at cruise flight level.

2. Subtract 150 lbs. fuel and ½ minute for each 1,000 feet that departure airport is above sea level.

FIGURE 19. En route climb chart (150,000 lbs.).

PRESS. ALT-FT	CLIMB DATA	DEVIATION FROM ISA ~ DEGREE(C)								
		-15	-10	-5	-0	5	10	15	20	25
40000	TIME MIN					ENROUTE CLIMB				
	FUEL LBS					START CLIMB WT				
	DIST NAM					155,000 LB				
	AVTAS KTS									
39000	TIME MIN									
	FUEL LBS									
	DIST NAM									
	AVTAS KTS									
38000	TIME MIN	23	27	34						
	FUEL LBS	5246	5865	6855						
	DIST NAM	165	195	246						
	AVTAS KTS	423	428	434						
37000	TIME MIN	20	22	26	30	38				
	FUEL LBS	4745	5166	5706	6438	7566				
	DIST NAM	140	160	186	222	281				
	AVTAS KTS	422	427	432	438	444				
36000	TIME MIN	18	20	22	26	30	37	48		
	FUEL LBS	4430	4784	5217	5761	6480	7506	9252		
	DIST NAM	125	141	161	187	222	274	366		
	AVTAS KTS	421	426	431	436	442	448	454		
35000	TIME MIN	16	18	20	23	27	31	39	52	
	FUEL LBS	4203	4521	4903	5372	5969	6765	7920	9922	
	DIST NAM	115	129	146	168	196	234	292	397	
	AVTAS KTS	420	425	430	436	441	447	453	460	
34000	TIME MIN	15	17	19	21	24	28	34	42	58
	FUEL LBS	4016	4308	4656	5078	5602	6280	7201	8567	10982
	DIST NAM	107	119	135	153	177	209	254	322	448
	AVTAS KTS	419	424	429	434	440	445	451	458	465
33000	TIME MIN	14	16	18	20	22	26	30	37	47
	FUEL LBS	3849	4121	4443	4830	5306	5909	6701	7806	9505
	DIST NAM	100	111	125	142	163	191	228	281	366
	AVTAS KTS	418	423	428	433	439	444	450	456	463
32000	TIME MIN	13	15	16	18	21	24	28	33	41
	FUEL LBS	3697	3953	4254	4614	5053	5602	6308	7259	8632
	DIST NAM	94	104	117	132	151	176	208	252	318
	AVTAS KTS	417	422	427	432	437	443	448	455	461
31000	TIME MIN	13	14	15	17	19	22	26	31	37
	FUEL LBS	3556	3798	4082	4420	4829	5335	5977	6824	8003
	DIST NAM	88	98	110	124	141	163	192	230	285
	AVTAS KTS	416	421	426	431	436	441	447	453	459
30000	TIME MIN	12	13	15	16	18	21	24	28	34
	FUEL LBS	3423	3653	3922	4241	4625	5096	5688	6457	7507
	DIST NAM	83	92	103	116	132	152	178	212	260
	AVTAS KTS	414	419	424	429	434	440	445	451	457
29000	TIME MIN	11	12	14	15	17	20	22	26	32
	FUEL LBS	3298	3517	3772	4074	4436	4877	5427	6135	7092
	DIST NAM	78	87	97	109	124	143	166	197	240
	AVTAS KTS	413	418	423	428	433	438	443	449	455
28000	TIME MIN	11	12	13	15	16	18	21	25	29
	FUEL LBS	3177	3386	3629	3915	4257	4671	5183	5838	6715
	DIST NAM	74	82	92	103	117	134	155	183	222
	AVTAS KTS	411	416	421	426	431	436	441	447	453

NOTE: 1. Enter chart at cruise flight level.

2. Subtract 150 lbs. fuel and ½ minute for each 1,000 feet that departure airport is above sea level.

FIGURE 20. En route climb chart (155,000 lbs.).

IND. MACH .82 CRUISE

PLANNING
3 engines 2 airbleeds

28,000 FT

ISA=-40.5 DEG C

GROSS WT	OAT-DEG C	-60	-55	-50	-45	-40	-35	-30	-25	-20
165000 LB	MACH/TAS TOTAL FF	.820/464 9423	.820/469 9558	.820/474 9693	.820/480 9828	.820/485 9963	.820/490 10095	.803/485 9816		
160000 LB	MACH/TAS TOTAL FF	.820/464 9246	.820/469 9381	.820/474 9513	.820/480 9645	.820/485 9777	.820/490 9906	.813/491 9864		
155000 LB	MACH/TAS TOTAL FF	.820/464 9084	.820/469 9216	.820/474 9345	.820/480 9474	.820/485 9603	.820/490 9732	.820/495 9858		
150000 LB	MACH/TAS TOTAL FF	.820/464 8922	.820/469 9051	.820/474 9177	.820/480 9306	.820/485 9432	.820/490 9558	.820/495 9684	.809/493 9546	
145000 LB	MACH/TAS TOTAL FF	.820/464 8775	.820/469 8901	.820/474 9027	.820/480 9150	.820/485 9276	.820/490 9399	.820/495 9522	.817/499 9585	
140000 LB	MACH/TAS TOTAL FF	.820/464 8628	.820/469 8754	.820/474 8877	.820/480 9000	.820/485 9123	.820/490 9243	.820/495 9366	.820/500 9486	.804/495 9225
135000 LB	MACH/TAS TOTAL FF	.820/464 8490	.820/469 8610	.820/474 8733	.820/480 8853	.820/485 8973	.820/490 9093	.820/495 9213	.820/500 9333	.812/500 9258
130000 LB	MACH/TAS TOTAL FF	.820/464 8358	.820/469 8478	.820/474 8598	.820/480 8718	.820/485 8835	.820/490 8955	.820/495 9072	.820/500 9189	.819/505 9288
125000 LB	MACH/TAS TOTAL FF	.820/464 8226	.820/469 8346	.820/474 8463	.820/480 8580	.820/485 8697	.820/490 8814	.820/495 8928	.820/500 9045	.820/505 9159
120000 LB	MACH/TAS TOTAL FF	.820/464 8115	.820/469 8232	.820/474 8349	.820/480 8466	.820/485 8580	.820/490 8694	.820/495 8808	.820/500 8922	.820/505 9036
115000 LB	MACH/TAS TOTAL FF	.820/464 8007	.820/469 8121	.820/474 8238	.820/480 8352	.820/485 8466	.820/490 8577	.820/495 8691	.820/500 8802	.820/505 8916
110000 LB	MACH/TAS TOTAL FF	.820/464 7902	.820/469 8016	.820/474 8130	.820/480 8244	.820/485 8355	.820/490 8466	.820/495 8577	.820/500 8688	.820/505 8799
105000 LB	MACH/TAS TOTAL FF	.820/464 7806	.820/469 7917	.820/474 8031	.820/480 8142	.820/485 8253	.820/490 8364	.820/495 8472	.820/500 8583	.820/505 8691
100000 LB	MACH/TAS TOTAL FF	.820/464 7710	.820/469 7821	.820/474 7932	.820/480 8043	.820/485 8151	.820/490 8259	.820/495 8370	.820/500 8478	.820/505 8586

FIGURE 21. Cruise planning chart (28,000 ft.).

IND. MACH .82 CRUISE

PLANNING
3 engines 2 airbleeds

29,000 FT

ISA=-42.5 DEG C

GROSS WT	OAT-DEG C	-60	-55	-50.	-45	-40	-35	-30	-25	-20
165000 LB	MACH/TAS TOTAL FF	.820/464 9309	.820/469 9444	.820/474 9576	.820/480 9708	.820/485 9840	.810/484 9723			
160000 LB	MACH/TAS TOTAL FF	.820/464 9120	.820/469 9249	.820/474 9381	.820/480 9510	.820/485 9642	.820/490 9766			
155000 LB	MACH/TAS TOTAL FF	.820/464 8934	.820/469 9063	.820/474 9189	.820/480 9318	.820/485 9444	.820/490 9573	.808/488 9432		
150000 LB	MACH/TAS TOTAL FF	.820/464 8769	.820/469 8895	.820/474 9021	.820/480 9147	.820/485 9270	.820/490 9393	.818/494 9477		
145000 LB	MACH/TAS TOTAL FF	.820/464 8607	.820/469 8730	.820/474 8853	.820/480 8976	.820/485 9099	.820/490 9219	.820/495 9342	.806/491 9132	
140000 LB	MACH/TAS TOTAL FF	.820/464 8454	.820/469 8574	.820/474 8697	.820/480 8817	.820/485 8937	.820/490 9057	.820/495 9174	.815/497 9171	
135000 LB	MACH/TAS TOTAL FF	.820/464 8307	.820/469 8427	.820/474 8547	.820/480 8664	.820/485 8781	.820/490 8901	.820/495 9018	.820/500 9132	.801/493 8829
130000 LB	MACH/TAS TOTAL FF	.820/464 8163	.820/469 8283	.820/474 8400	.820/480 8514	.820/485 8631	.820/490 8745	.820/495 8862	.820/500 8976	.810/499 8865
125000 LB	MACH/TAS TOTAL FF	.820/464 8031	.820/469 8148	.820/474 8262	.820/480 8379	.820/485 8493	.820/490 8604	.820/495 8718	.820/500 8832	.818/504 8895
120000 LB	MACH/TAS TOTAL FF	.820/464 7902	.820/469 8016	.820/474 8127	.820/480 8241	.820/485 8352	.820/490 8466	.820/495 8577	.820/500 8688	.820/505 8796
115000 LB	MACH/TAS TOTAL FF	.820/464 7788	.820/469 7899	.820/474 8013	.820/480 8124	.820/485 8232	.820/490 8343	.820/495 8454	.820/500 8562	.820/505 8670
110000 LB	MACH/TAS TOTAL FF	.820/464 7677	.820/469 7788	.820/474 7899	.820/480 8007	.820/485 8118	.820/490 8226	.820/495 8334	.820/500 8442	.820/505 8547
105000 LB	MACH/TAS TOTAL FF	.820/464 .7575	.820/469 7683	.820/474 7791	.820/480 7899	.820/485 8007	.820/490 8115	.820/495 8220	.820/500 8328	.820/505 8433
100000 LB	MACH/TAS TOTAL FF	.820/464 7476	.820/469 7584	.820/474 7689	.820/480 7797	.820/485 7902	.820/490 8010	.820/495 8115	.820/500 8220	.820/505 8322

FIGURE 22. Cruise planning chart (29,000 ft.).

IND. MACH .82 CRUISE

PLANNING
3 engines 2 airbleeds

31,000 FT

ISA=-46.4 DEG C

GROSS WT	OAT-DEG C	-65	-60	-55	-50	-45	-40	-35	-30	-25
165000 LB	MACH/TAS TOTAL FF	.820/458 9015	.820/464 9147	.820/469 9279	.820/474 9411	.820/480 9540	.815/482 9558			
160000 LB	MACH/TAS TOTAL FF	.820/458 8802	.820/464 8931	.820/469 9060	.820/474 9189	.820/480 9315	.820/485 9441	.806/481 9225		
155000 LB	MACH/TAS TOTAL FF	.820/458 8595	.820/464 8721	.820/469 8847	.820/474 8973	.820/480 9096	.820/485 9222	.816/488 9267		
150000 LB	MACH/TAS TOTAL FF	.820/458 8400	.820/464 8523	.820/469 8646	.820/474 8769	.820/480 8889	.820/485 9012	.820/490 9132	.804/486 8904	
145000 LB	MACH/TAS TOTAL FF	.820/458 8214	.820/464 8334	.820/469 8454	.820/474 8574	.820/480 8691	.820/485 8811	.820/490 8928	.815/492 8937	
140000 LB	MACH/TAS TOTAL FF	.820/458 8034	.820/464 8154	.820/469 8271	.820/474 8388	.820/480 8505	.820/485 8619	.820/490 8736	.820/495 8850	
135000 LB	MACH/TAS TOTAL FF	.820/458 7875	.820/464 7992	.820/469 8106	.820/474 8220	.820/480 8334	.820/485 8448	.820/490 8562	.820/495 8673	.811/495 8595
130000 LB	MACH/TAS TOTAL FF	.820/458 7719	.820/464 7833	.820/469 7944	.820/474 8058	.820/480 8169	.820/485 8280	.820/490 8391	.820/495 8502	.820/500 8610
125000 LB	MACH/TAS TOTAL FF	.820/458 7575	.820/464 7686	.820/469 7797	.820/474 7908	.820/480 8016	.820/485 8127	.820/490 8235	.820/495 8343	.820/500 8451
120000 LB	MACH/TAS TOTAL FF	.820/458 7434	.820/464 7542	.820/469 7650	.820/474 7758	.820/480 7866	.820/485 7974	.820/490 8079	.820/495 8187	.820/500 8292
115000 LB	MACH/TAS TOTAL FF	.820/458 7302	.820/464 7410	.820/469 7515	.820/474 7623	.820/480 7728	.820/485 7833	.820/490 7938	.820/495 8043	.820/500 8145
110000 LB	MACH/TAS TOTAL FF	.820/458 7173	.820/464 7281	.820/469 7383	.820/474 7488	.820/480 7593	.820/485 7695	.820/490 7800	.820/495 7902	.820/500 8004
105000 LB	MACH/TAS TOTAL FF	.820/458 7062	.820/464 7167	.820/469 7269	.820/474 7371	.820/480 7473	.820/485 7575	.820/490 7677	.820/495 7776	.820/500 7878
100000 LB	MACH/TAS TOTAL FF	.820/458 6954	.820/464 7056	.820/469 7158	.820/474 7257	.820/480 7359	.820/485 7458	.820/490 7557	.820/495 7656	.820/500 7755

FIGURE 23. Cruise planning chart (31,000 ft.).

HOLDING
ALL ENGINES
2 AIRBLEEDS

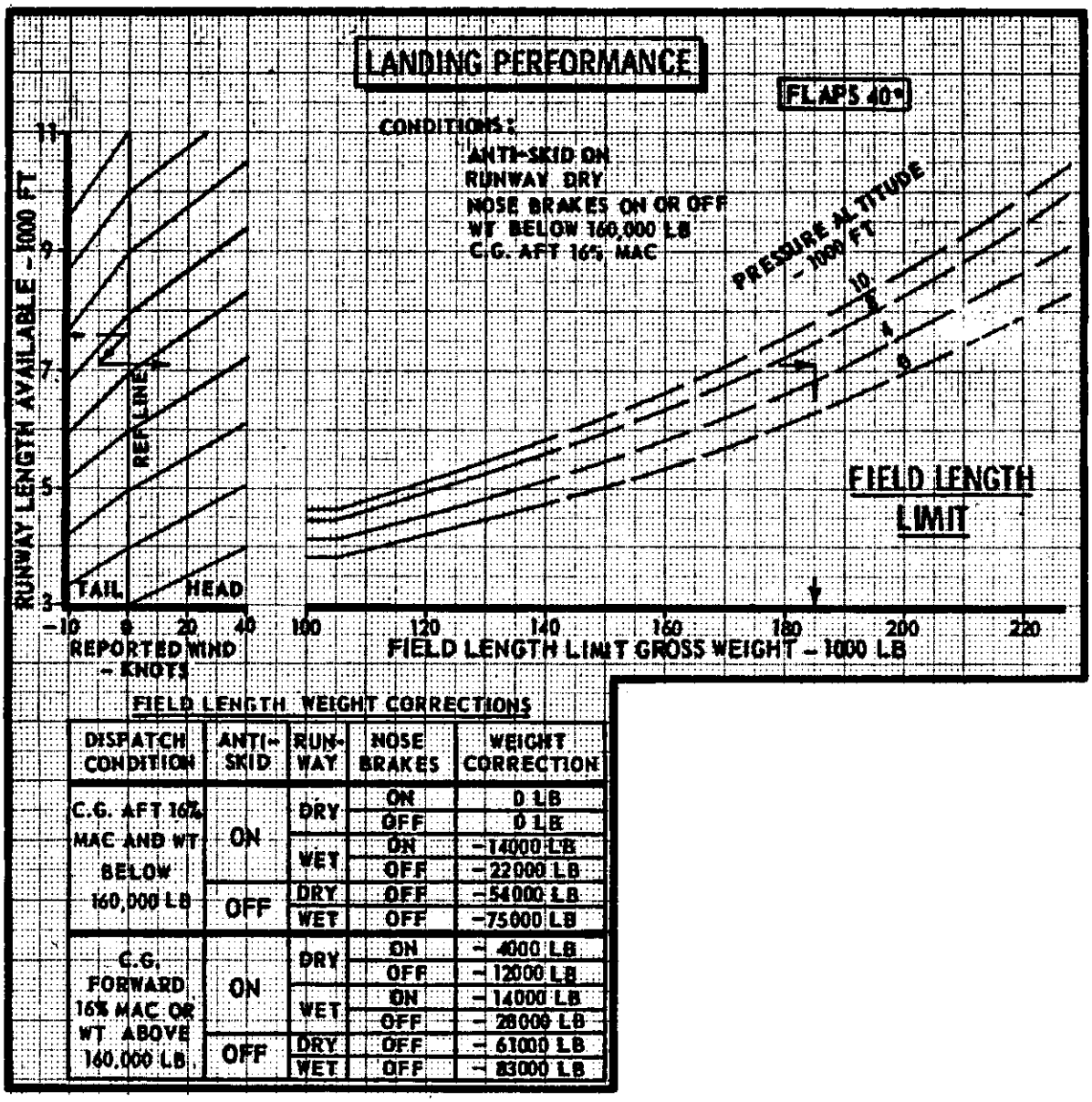
EPR
IAS - KTS
FF PER ENGINE - LBS/HR
STD. DAY TAT - °C

MINIMUM DRAG AIRSPEED
(200 LOWER LIMITS)

FUEL FLOW BASED ON ISA.
ADJUST FUEL FLOW + 1%
PER ± 5°C ISA DEVIATION

PRESSURE ALTITUDE -FT	GROSS WEIGHT -1000 LB					
	150	140	130	120	110	100
40000				2.00 200 2000 -37	1.89 200 1770 -37	1.80 200 1610 -37
35000	1.98 223 2450 -35	1.92 215 2260 -36	1.86 206 2070 -37	1.79 200 1870 -38	1.71 200 1700 -38	1.64 200 1560 -38
30000	1.79 220 2350 -28	1.74 212 2180 -29	1.69 204 2030 -31	1.62 200 1840 -31	1.56 200 1700 -31	1.51 200 1580 -31
25000	1.64 218 2330 -21	1.60 210 2170 -22	1.55 202 2010 -23	1.49 200 1830 -23	1.44 200 1700 -23	1.40 200 1590 -23
20000	1.51 217 2340 -13	1.47 209 2190 -14	1.43 201 2040 -15	1.39 200 1880 -15	1.35 200 1770 -15	1.32 200 1650 -15
15000	1.40 216 2400 -6	1.38 208 2250 -6	1.35 200 2110 -6	1.31 200 1960 -6	1.28 200 1840 -6	1.25 200 1740 -6
10000	1.32 215 2480 3	1.30 207 2340 3	1.27 200 2200 2	1.24 200 2050 2	1.22 200 1940 2	1.20 200 1960 2
5000	1.26 214 2580 12	1.24 207 2430 12	1.22 200 2280 11	1.19 200 2140 11	1.18 200 2030 11	1.16 200 1930 11
1500	1.22 214 2650 17	1.21 206 2500 17	1.19 200 2360 17	1.17 200 2240 17	1.15 200 2130 17	1.14 200 2030 17

FIGURE 24. Holding data.



FIELD LENGTH WEIGHT CORRECTIONS

DISPATCH CONDITION	ANTI-SKID	RUNWAY	NOSE BRAKES	WEIGHT CORRECTION
C.G. AFT 16% MAC AND WT BELOW 160,000 LB	ON	DRY	ON	0 LB
			OFF	0 LB
		WET	ON	−14000 LB
			OFF	−22000 LB
	OFF	DRY	OFF	−54000 LB
		WET	OFF	−75000 LB
C.G. FORWARD 16% MAC OR WT ABOVE 160,000 LB	ON	DRY	ON	− 4000 LB
			OFF	− 12000 LB
		WET	ON	− 14000 LB
			OFF	− 28000 LB
	OFF	DRY	OFF	− 61000 LB
		WET	OFF	− 83000 LB

FIGURE 25. Landing performance data.

ENROUTE HIGH ALTITUDE - U.S.

For use at and above 18,000' MSL

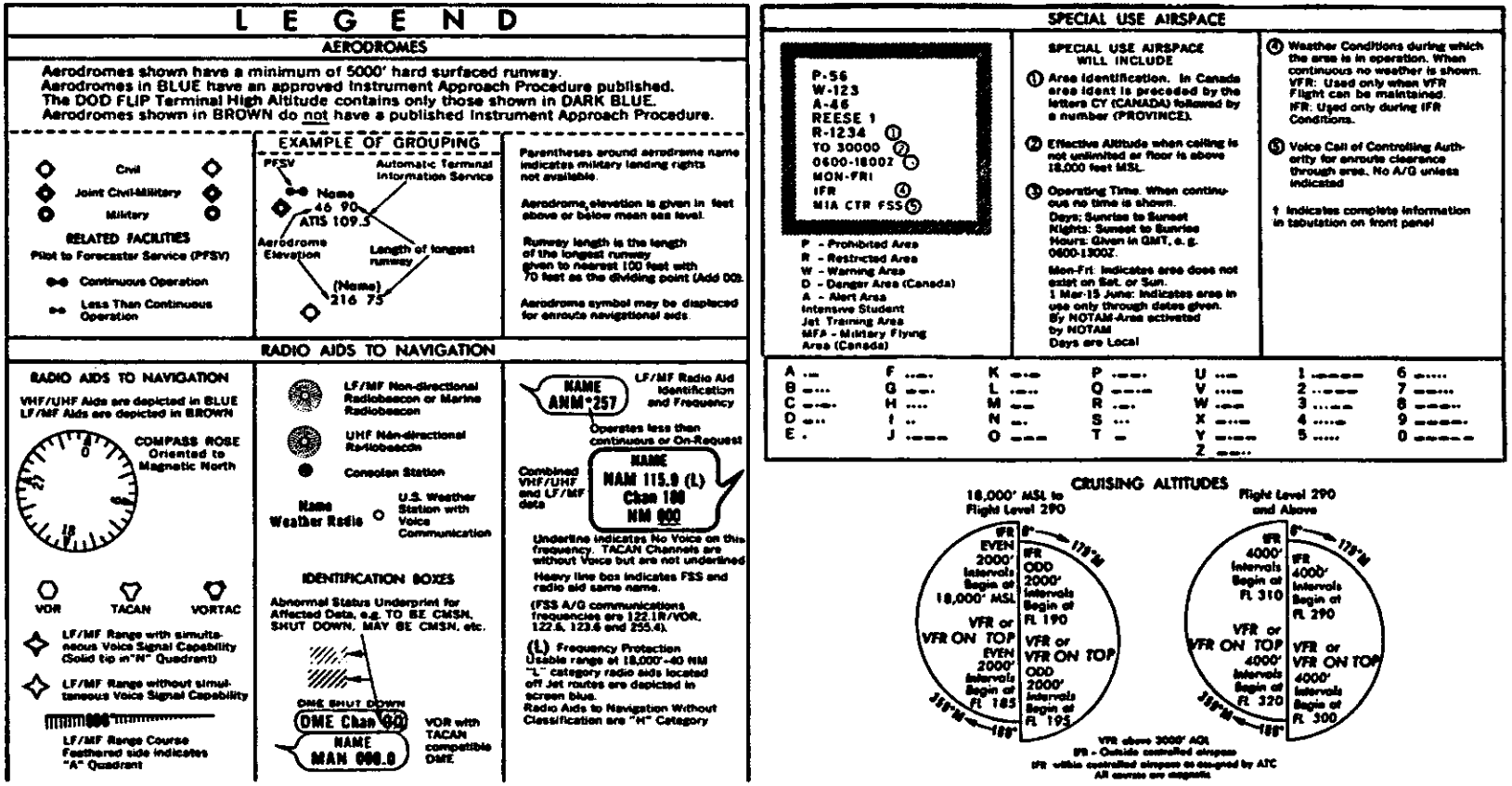


FIGURE 26. En route high altitude chart legend.

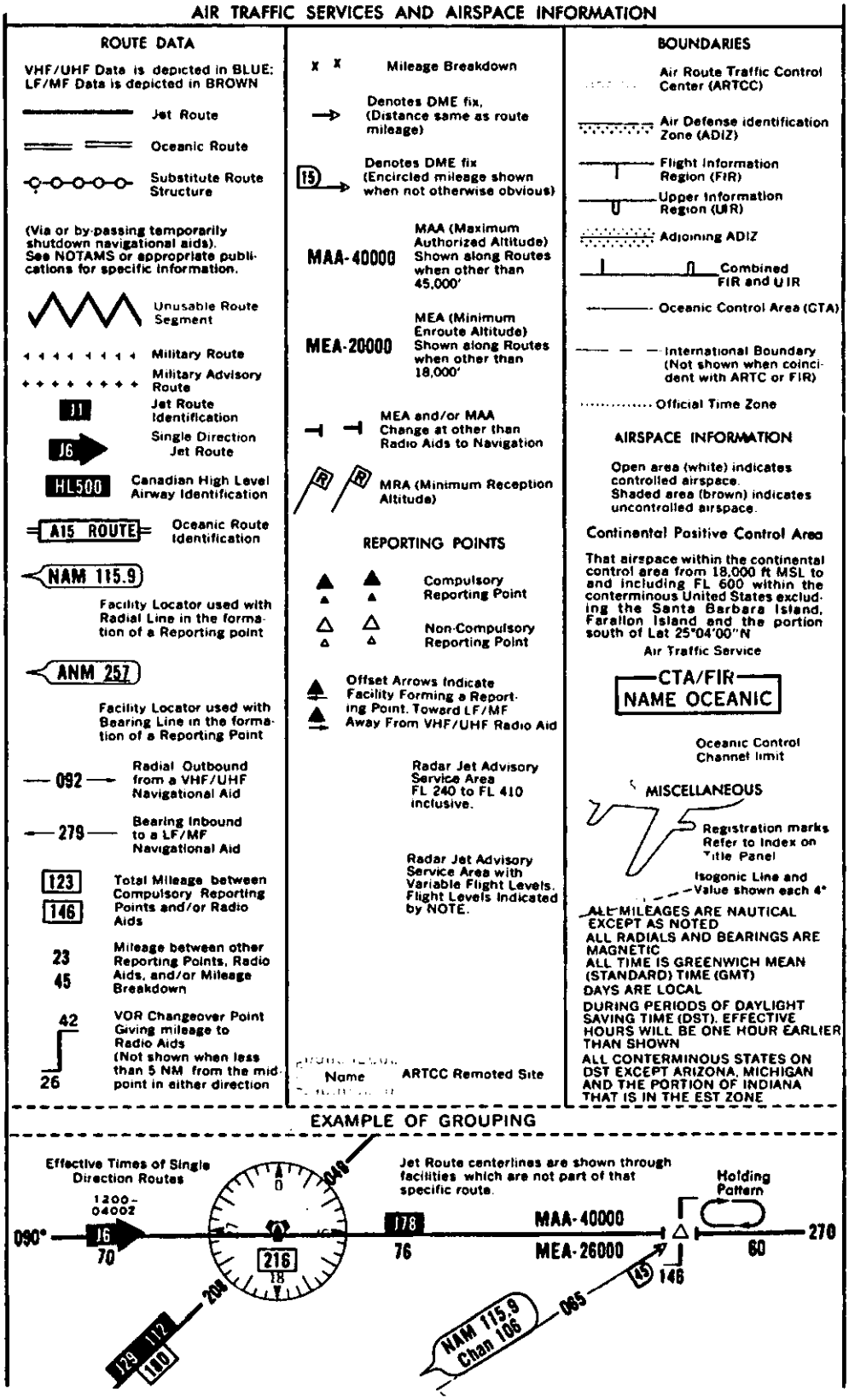


FIGURE 27. En route high altitude chart legend.

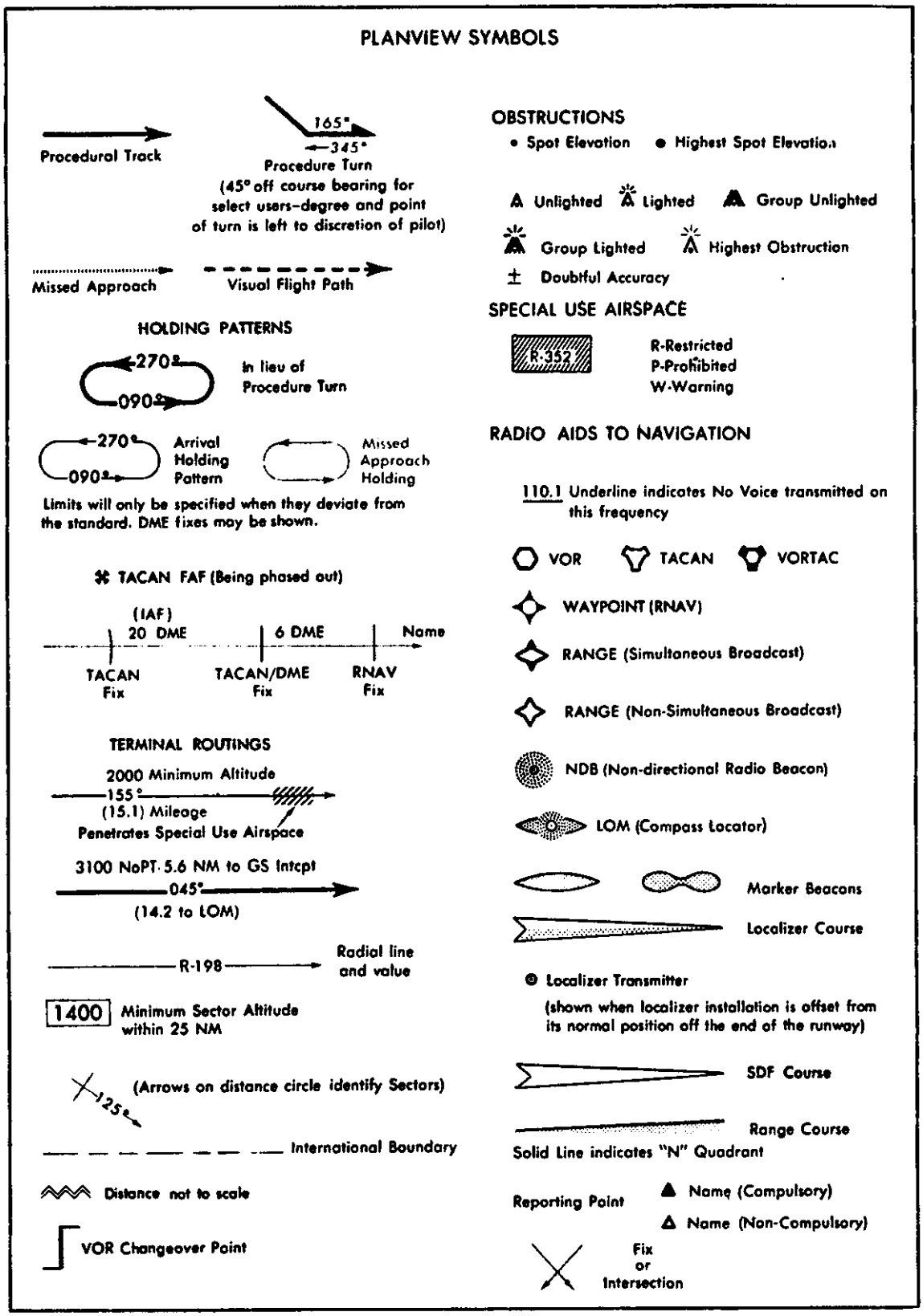


FIGURE 29. Legend for instrument approach procedures charts.

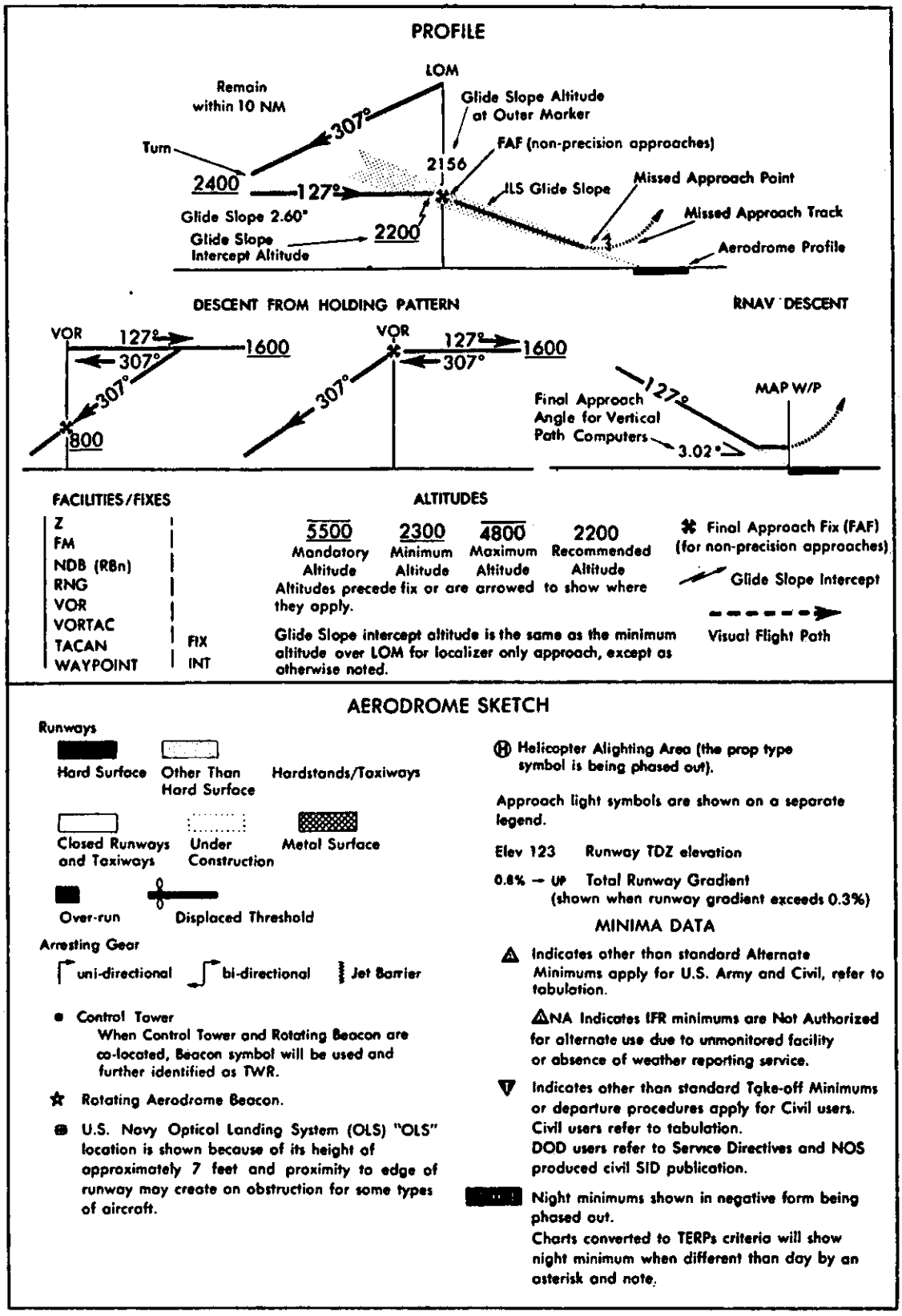


FIGURE 30. Legend for instrument approach procedures charts.

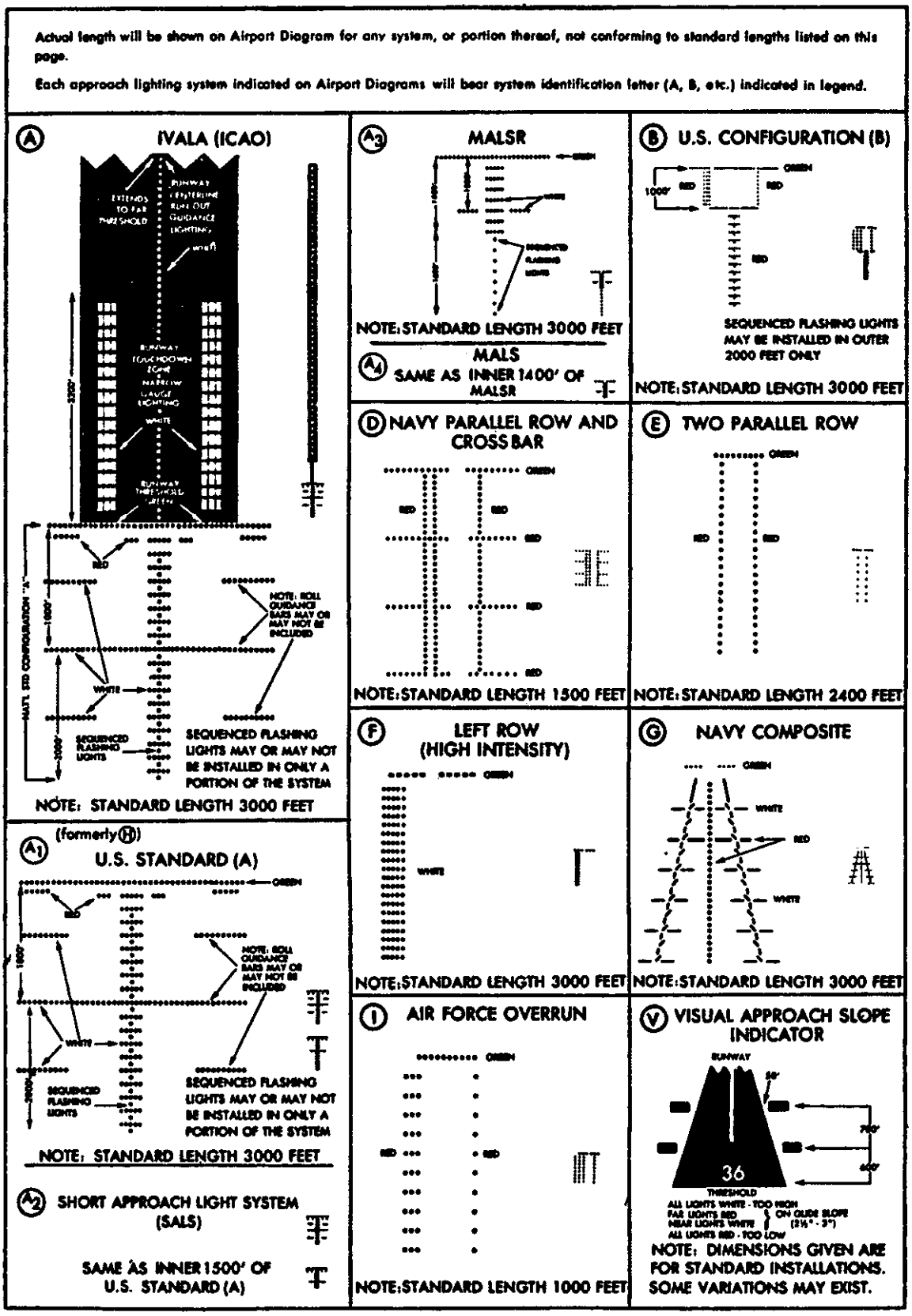
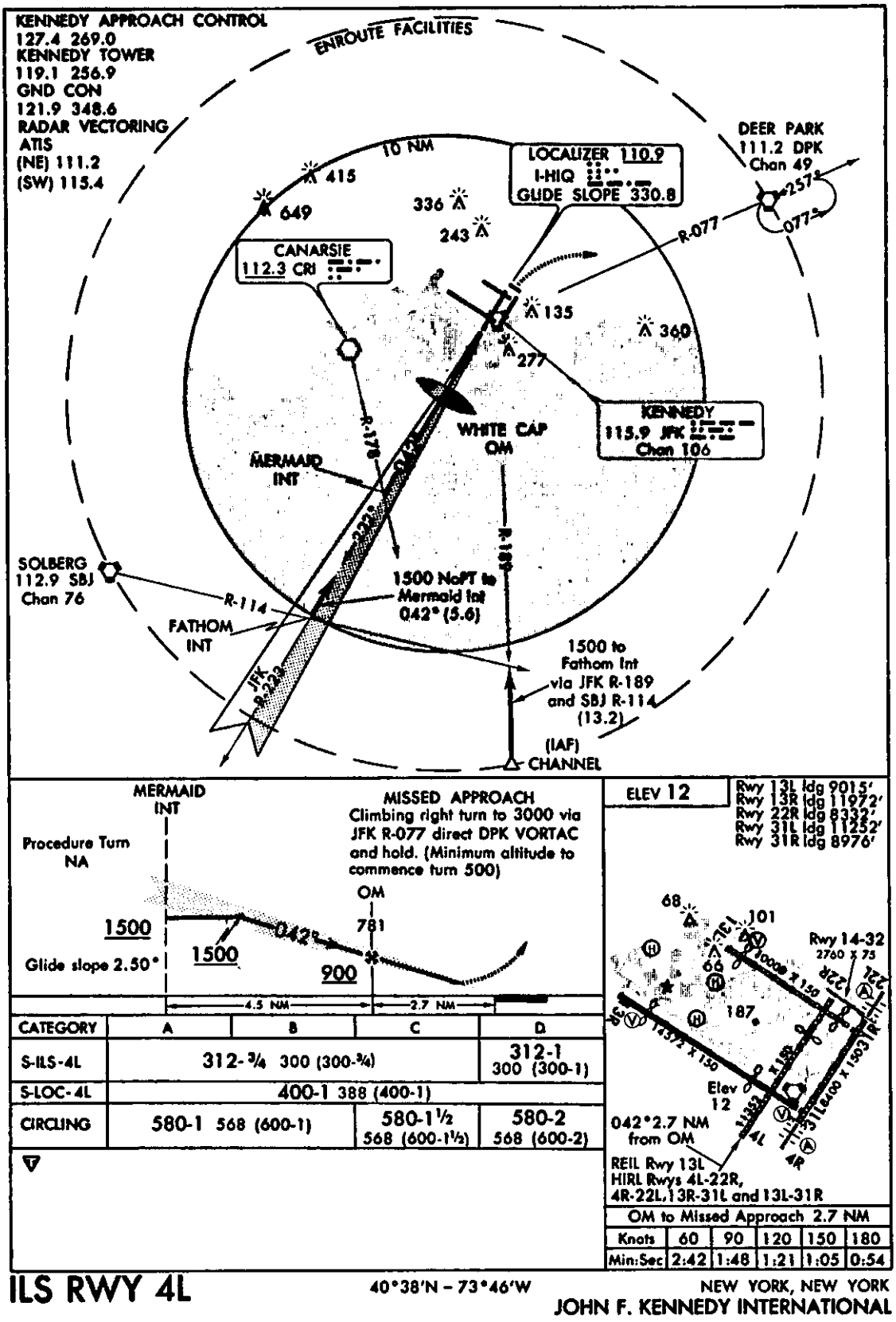


FIGURE 31. Legend for approach lighting systems—U.S.



CATEGORY	A	B	C	D
S-ILS-4L	312-¾ 300 (300-¾)			312-1 300 (300-1)
S-LOC-4L	400-1 388 (400-1)			
CIRCLING	580-1 568 (600-1)		580-1½ 568 (600-1½)	580-2 568 (600-2)

ILS RWY 4L 40°38'N – 73°46'W NEW YORK, NEW YORK
JOHN F. KENNEDY INTERNATIONAL

FIGURE 32. John F. Kennedy instrument approach procedure chart.

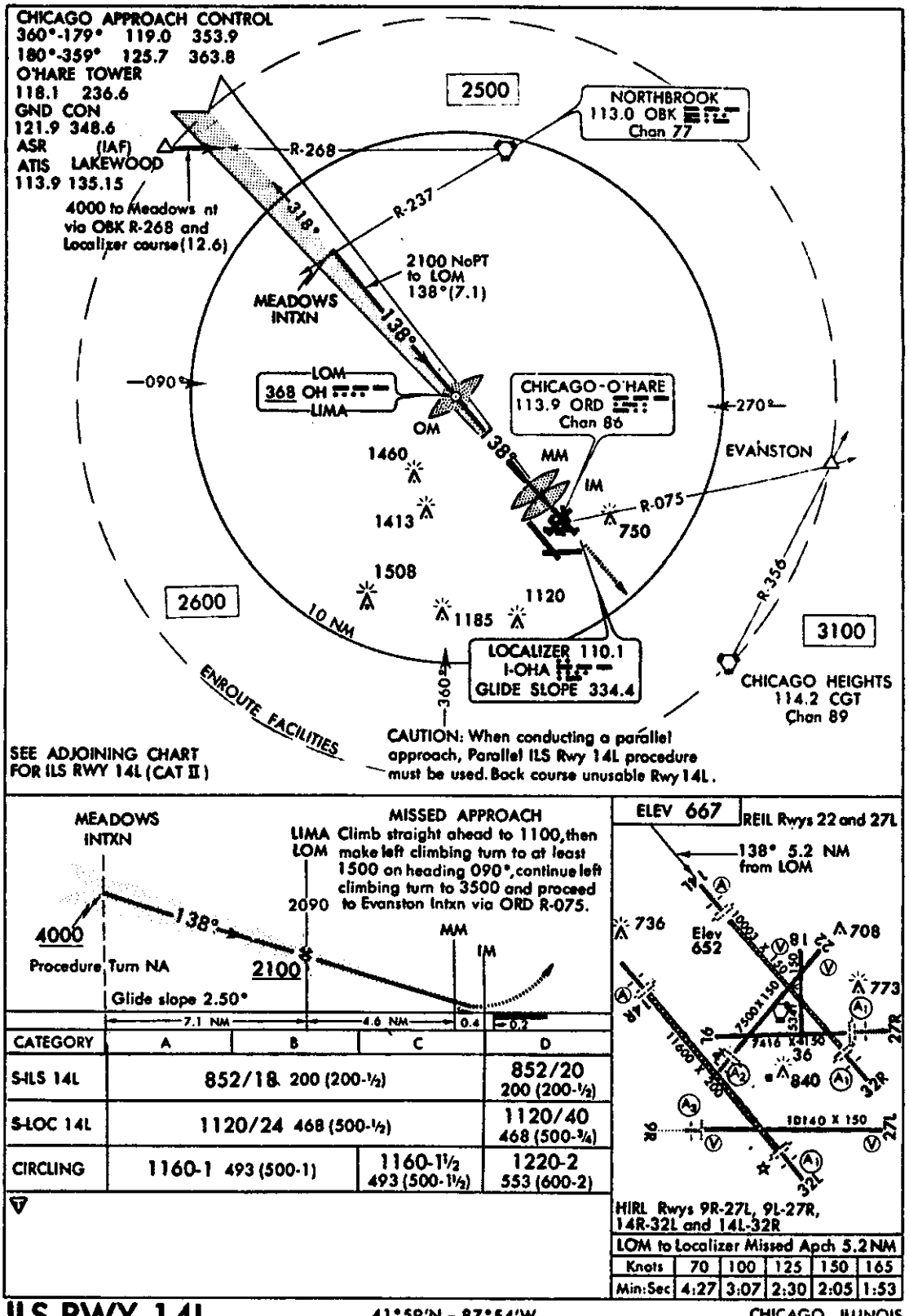


FIGURE 33. Chicago-O'Hare instrument approach procedure chart.

FLIGHT TIME ANALYSIS

CHECK POINTS		ROUTE CRUISE ALT./FLT. LEVEL	TRUE COURSE	AIRSPEED-KTS.		WINDS ALOFT DIRECTION VELOCITY TEMPERATURE	DRIFT CORR ANGLE	GROUND SPEED	DISTANCE N.M.	TIME		FUEL CONSUMPTION LBS./CALS.		MISC.
FROM	TO			IAS OR MACH NO.	TAS					LEG	TOTAL	LEG	TOTAL	
JFK	HOU	Radar Vector 763 FL 310									:11		2,800*	*Includes taxi fuel
HOU	DKK	736 FL 310		.82		-60 kts. -40°C.								
DKK	FNT	736 FL 310		.82		-70 kts. -40°C.								
FNT	PMM	794 FL 310		.82		-70 kts. -40°C.								
PMM	ORD	Descent, Approach, and Landing								:20		3,000		

ALTERNATE DATA

ORD	General Mitchell Airport										:15			

FUEL SUMMARY

	TIME	LBS./CALS.
ENROUTE		
ALTERNATE	:15	2,900
RESERVE		
EXTRA		
TOTAL		

FAA AC 78-6199

Use 8,900 lbs./hr. fuel flow where fuel is not given.

FIGURE 34. Flight time analysis.

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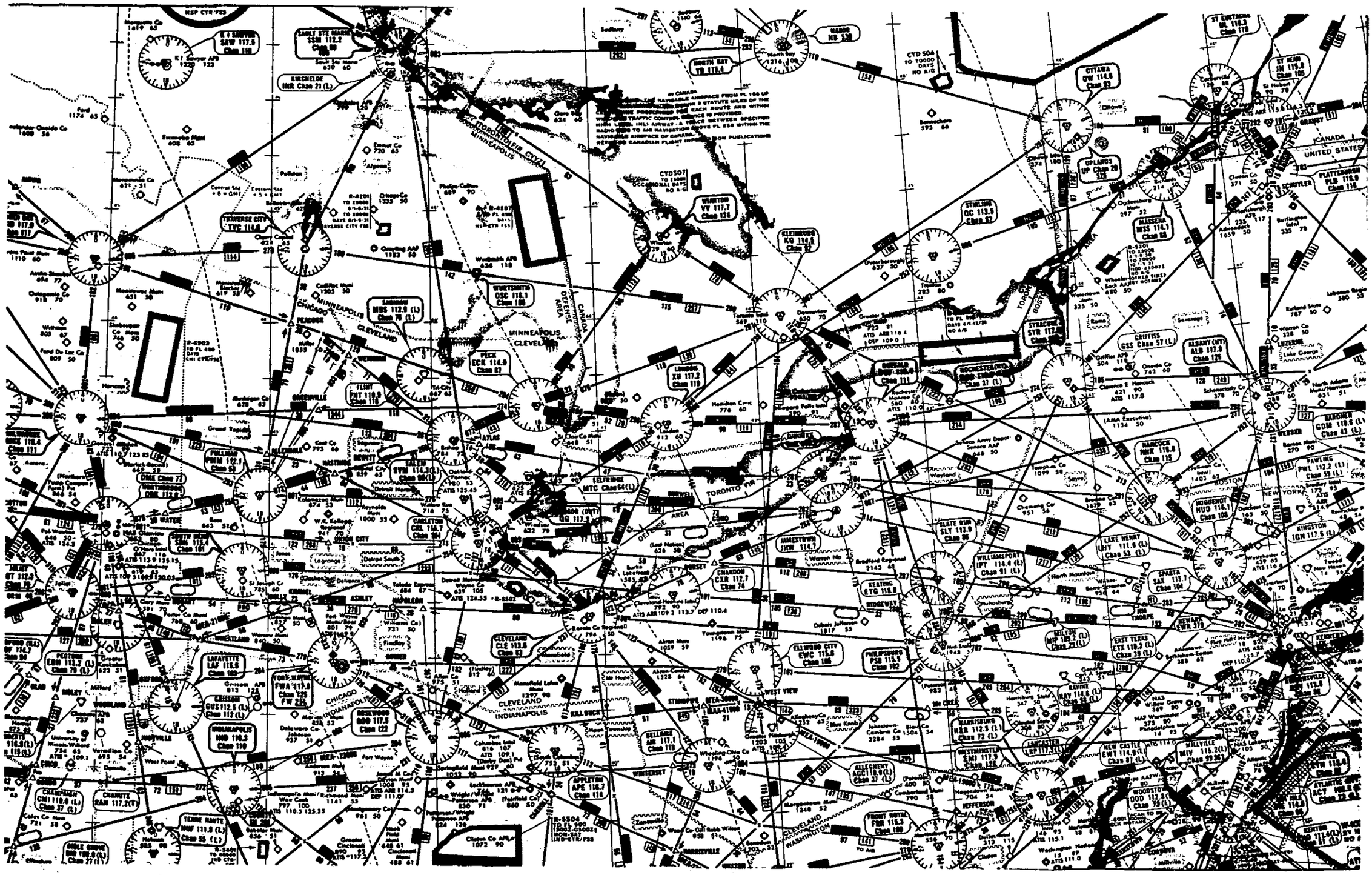

FIGURE 28. Segment—en route high altitude chart.