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ADVISORY CIRCULAR

SUBJECT: AIRLINE TRANSPORT PILOT (AIRPLANE) WRITTEN EXAMINATION GUIDE

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1. PURPOSE. This circular announces the availability of a revised Airline Transport Pilot (Airplane) Written Examination Guide.

2. DESCRIPTION OF THE PUBLICATION. This examination guide provides information to applicants and other persons interested in Federal Aviation Agency certification of Airline Transport Pilots. It guides prospective applicants toward a clear understanding of the requirements, reference materials, examinations, and examination procedures.

3. HOW TO GET THIS PUBLICATION.

   a. Order copies of this publication from:

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      Airline Transport Pilot (Airplane) Written Examination Guide
      Dated 1966

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C. W. Walker
Director
Flight Standards Service

AIRLINE TRANSPORT PILOT (AIRPLANE)

WRITTEN TEST GUIDE

Revised 1975

U.S. DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration
Flight Standards Service

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AIRLINE TRANSPORT PILOT (AIRPLANE) WRITTEN TEST GUIDE

INTRODUCTION

In a continuing effort to provide guidance and assistance, the Federal Aviation Administration offers this test guide to applicants who are preparing for the Airline Transport Pilot (Airplane) Written Test. It supersedes AC 61-18C, 1971, and is issued as Advisory Circular 61-18D.

The guide describes the type and scope of aeronautical knowledge covered by the written test, includes study material, lists appropriate references for study, and presents sample test questions. As a further convenience to the applicant, those portions of the present Federal Aviation Regulations concerning general eligibility and aeronautical 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 regulation excerpts may be checked with the appropriate FAA office.*

The written test for the Airline Transport Pilot (Airplane) Certificate places major emphasis on the specific requirements and duties of an airline transport pilot in accordance with the requirements stipulated in Federal Aviation Regulations, Part 61. This test guide outlines the aeronautical knowledge needed to obtain an Airline Transport Pilot Certificate (ATPC) and stresses requirements relating specifically to airline operations. Pilots wishing to acquire this certificate only for its advantage to them in their line of aviation activity must expect to be examined on the same basis as an applicant seeking the certificate for use as an airline pilot.

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, Okla. 73125.

ELIGIBILITY REQUIREMENTS FOR CERTIFICATE

The following excerpts from the Federal Aviation Regulations, Part 61, pertaining to eligibility, are given for the convenience of the applicant.

"§ 61.151 Eligibility requirements: general.

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

(a) Be at least 23 years of age;

(b) Be of good moral character;

(c) Be able to read, write, and understand the English language and speak it without accent or impediment of speech that would interfere with two-way radio conversation;

(d) Be a high school graduate, or its equivalent in the Administrator's opinion, based on the applicant's general experience and aeronautical experience, knowledge, and skill;

(e) Have a first-class medical certificate issued under Part 67 of this chapter within the 6 months before the date he applies; and

(f) Comply with the sections of this Part that apply to the rating he seeks."

"§ 61.153 *Airplane rating: aeronautical knowledge.*

An applicant for an airline transport pilot certificate with an airplane rating must, after meeting the requirements of §§ 61.151 (except paragraph (a) thereof) and 61.155, pass a written test on—

(a) The sections of this Part relating to airline transport pilots and Part 121, subpart C of Part 65, and §§ 91.1 through 91.9 and subpart B of Part 91 of this chapter, and so much of Parts 21 and 25 of this chapter as relate to the operations of air carrier aircraft;

(b) The fundamentals of air navigation and use of formulas, instruments, and other navigational aids, both in aircraft and on the ground, that are necessary for navigating aircraft by instruments;

(c) The general system of weather collection and dissemination;

(d) Weather maps, weather forecasting, and weather sequence abbreviations, symbols, and nomenclature;

(e) Elementary meteorology, including knowledge of cyclones as associated with fronts;

(f) Cloud forms;

(g) National Weather Service Federal Meteorological Handbook No. 1, as amended;

(h) Weather conditions, including icing conditions and upper-air winds, that affect aeronautical activities;

(i) Air navigation facilities used on Federal airways, including rotating beacons, course lights, radio ranges, and radio marker beacons;

(j) Information from airplane weather observations and meteorological data reported from observations made by pilots on air carrier flights;

(k) The influence of terrain on meteorological conditions and developments, and their relation to air carrier flight operations;

(l) Radio communication procedure in aircraft operations; and

(m) Basic principles of loading and weight distribution and their effect on flight characteristics."

"§ 61.155 Airplane rating: aeronautical experience.

(a) An applicant for an airline transport pilot certificate with an airplane rating must hold a commercial pilot certificate or a foreign airline transport pilot or commercial pilot license without limitations, issued by a member state of ICAO, or he must be a pilot in an Armed Force of the United States whose military experience qualifies him for a commercial pilot certificate under § 61.73 of this Part.

(b) An applicant must have had—

(1) At least 250 hours of flight time as pilot in command of an airplane, or as copilot of an airplane performing the duties and functions of a pilot in command under the supervision of a pilot in command, or any combination thereof, at least 100 hours of which were cross-country time and 25 hours of which were night flight time; and

(2) At least 1500 hours of flight time as a pilot, including at least—

(i) 500 hours of cross-country flight time;

(ii) 100 hours of night flight time; and

(iii) 75 hours of actual or simulated instrument time, at least 50 hours of which were in actual flight.

Flight time used to meet the requirements of subparagraph (1) of this paragraph may also be used to meet the requirements of subparagraph (2) of this paragraph. Also, an applicant who has made at least 20 night takeoffs and landings to a full stop may substitute one additional night takeoff and landing to a full stop for each hour of night flight time required by subparagraph (2)(ii) of this paragraph. However, not more than 25 hours of night flight time may be credited in this manner.

(c) If an applicant with less than 150 hours of pilot in command time otherwise meets the requirements of paragraph (b)(1) of this section, his certificate will be endorsed "Holder does not meet the pilot-in-command flight experience requirements of ICAO," as prescribed by Article 39 of the "Convention on International Civil Aviation." Whenever he presents satisfactory written evidence that he has accumulated the 150 hours of pilot-in-command time, he is entitled to a new certificate without the endorsement.

(d) A commercial pilot may credit toward the 1500 hours total flight time requirement of subparagraph (b)(2) of this section the following flight time in operations conducted under Part 121 of this chapter:

(1) All second-in-command time acquired in airplanes required to have more than one pilot by their approved Aircraft Flight Manuals or airworthiness certificates; and

(2) Flight engineer time acquired in airplanes required to have a flight engineer by their approved Aircraft Flight Manuals, while participating at the same time in an approved pilot training program approved under Part 121 of this chapter.

However, the applicant may not credit under subparagraph (2) of this paragraph more than 1 hour for each 3 hours of flight engineer flight time so acquired, nor more than a total of 500 hours.

(e) If an applicant who credits second-in-command or flight engineer time under paragraph (d) of this section toward the 1500 hours total flight time requirement of subparagraph (b)(2) of this section—

(1) Does not have at least 1200 hours of flight time as a pilot including no more than 50 percent of his second-in-command time and none of his flight engineer time; but

(2) Otherwise meets the requirements of subparagraph (b)(2) of this section,

his certificate will be endorsed "Holder does not meet the pilot flight experience requirements of ICAO," as prescribed by Article 39 of the "Convention on International Civil Aviation." Whenever he presents satisfactory evidence that he has accumulated 1200 hours of flight time as a pilot including no more than 50 percent of his second-in-command time and none of his flight engineer time, he is entitled to a new certificate without the endorsement."

TYPE OF TEST

The Airline Transport Pilot (Airplane) Written Test is an integrated, single-section type which takes a practical, operational approach to the problems that arise in planning and conducting airline transport operations. Test items present problems from flight planning to arrival at destination.

Appropriate planning materials will be issued to the applicant prior to the test. Similar materials are included in this test guide for illustrative purposes.

Test Items and Scoring

Test items are multiple-choice type, similar to those shown in the sample test in this guide.

Answers should be marked on the Airman Written Application (AC Form 8080–3). Directions should be read very carefully before the beginning of the test. Incomplete or erroneous personal information entered on the answer sheet delays the scoring process.

All answer sheets are graded by a computer which is programmed to indicate the areas missed. It prints the subject matter codes on the test result form, so that the applicant can determine the areas in which difficulty was experienced. A subject matter outline is mailed with the test result form. An applicant must present the Airman Written Test Report (AC Form 8080–2) for a flight test or for retesting in the event of written test failure.

Taking the Test

The written test may be taken at FAA Flight Standards District Offices and other designated places. After completing the test, the applicant must surrender the answer sheet (together with the supplementary booklet and any papers used for computations or notations) to the proctor before leaving the test room.

When taking the test, the applicant should keep in mind these points:

1. Each question or problem should be read carefully before looking at the possible answers. The

applicant should clearly understand the problem before attempting to solve it.

2. After formulating an answer, the applicant should then determine which of the alternatives most nearly corresponds with that answer. The answer chosen should completely resolve the problem.

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

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

5. Do not make any marks in the test booklet or the supplementary booklet of information.

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 *charts, Exam-O-Grams,* and *free advisory circulars,* 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 appropriate study materials.

Free FAA publications may be obtained from "Department of Transportation, Publications Section, TAD–443.1, Washington, D.C. 20590."

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

Charts

ENROUTE LOW AND HIGH ALTITUDE CHARTS (75 cents each). These charts provide necessary aeronautical information for enroute instrument navigation in the established airway structure.

AREA CHARTS (50 cents each). These charts supplement the Enroute Charts by providing departure, arrival, and holding procedures at principal airports.

INSTRUMENT APPROACH PROCEDURE CHARTS (20 cents per airport set). Individual charts give detailed information on the procedure for each type of approach at the airport.

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
Riverdale, Md. 20804.

Exam-O-Grams

Exam-O-Grams may be obtained free of charge from:

FAA Aeronautical Center
Flight Standards Technical Division
Operations Branch, AAC–240
P.O. Box 25082
Oklahoma City, Oklahoma 73125.

Federal Aviation Regulations (FARs)

Part 1, Definitions and Abbreviations

Part 61, Certification: Pilots and Flight Instructors

Part 91, General Operating and Flight Rules

Part 121, Certification and Operation: Air Carriers and Commercial Operators of Large Aircraft

To obtain the latest information regarding FAR prices, number of changes, and ordering information, send for a free copy of "Advisory Circular 00–44, Status of Federal Aviation Regulations" from:

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

If you are presently on one of FAA's advisory circular mail lists you will automatically receive this AC. If not, and you wish to be placed on the mail list to receive revised copies as issued, send your name and address to:

U.S. Department of Transportation
Distribution Requirements Section, TAD–482.3
Washington, D.C. 20590

AIRMAN'S INFORMATION MANUAL (AIM)

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.

Part 2—Airport Directory. Issued semiannually.

Part 3—Operational Data. Issued every 90 days.

Part 3A—Notices to Airmen. Issued every 14 days.

Part 4—Graphic Notices and Supplemental Data. Issued quarterly.

ADVISORY CIRCULARS

00-6—*Aviation Weather*

Provides an up-to-date and expanded text for pilots and other flight operations personnel whose interest in meteorology is primarily in its application to flying. (GPO)

00-17—*Turbulence in Clear Air*

Provides information on atmospheric turbulence and wind shear, emphasizing important points pertaining to the common causes of turbulence, the hazards associated with it, and the conditions under which it is most likely to be encountered. (Free from FAA)

00-24—*Thunderstorms*

Contains information concerning flights in or near thunderstorms. (Free from FAA)

20-32B—*Carbon Monoxide (CO) Contamination in Aircraft—Detection and Prevention*

Provides information on the potential dangers of carbon monoxide contamination from faulty engine exhaust systems or cabin heaters of the exhaust gas heat exchanger type. (Free from FAA)

60-4—*Pilot's Spatial Disorientation*

Acquaints pilots flying under visual flight rules with the hazards of disorientation caused by the loss of reference with the natural horizon. (Free from FAA)

61-27B—*Instrument Flying Handbook*

Provides the pilot with basic information needed to acquire an FAA instrument rating. It is designed for the reader who holds at least a private pilot certificate and is knowledgeable in all areas covered in the "Pilot's Handbook of Aeronautical Knowledge." (GPO)

61-77—*Airline Transport Pilot—Airplane Practical Test Guide*

Describes the practical test requirements for the Airline Transport Pilot Certificate (Airplane) and associated class and type ratings. (GPO)

90-1A—*Civil Use of U.S. Government Produced Instrument Approach Charts*

Clarifies landing minimums requirements and revises instrument approach charts. (Free from FAA)

90-12A—*Severe Weather Avoidance*

Warns all pilots concerning flight in the vicinity of known or forecasted severe weather, severe turbulence, and hail, and advises them that air traffic control facilities, even though equipped with radar, might not always have the capability nor be in a position to provide assistance for circumnavigation of areas of severe weather. (Free from FAA)

90-14A Altitude—*Temperature Effect on Aircraft Performance.*

Introduces the Denalt Performance Computer and reemphasizes the hazardous effects density altitude can have on aircraft. (Free from FAA)

90-22C—*Automatic Terminal Information Service (ATIS).*

Provides updated information concerning the operation of Automatic Terminal Information Service. (Free from FAA)

90-23D—*Wake Turbulence*

Alerts pilots to the hazards of aircraft trailing vortex wake turbulence and recommends related operational procedures. (Free from FAA)

90-38A—*Use of Preferred IFR Routes*

Outlines the background, intent, and requested actions pertaining to the use of preferred IFR routes. (Free from FAA)

90-41C—*Revised Standard Instrument Departure/Arrival Procedures.*

Describes the revised Standard Instrument Departure (SID) and Standard Terminal Arrival Route (STAR) program which basically eliminates the ability to file the STARs in a flight plan and informs pilots that altitudes and airspeeds will no longer be embedded within the body of a STAR. (Free from FAA)

90-62—*Flying DME Arcs*

Describes procedures and techniques for intercepting DME arcs from radials, maintaining DME arcs, and intercepting radials and localizers from DME arcs. (Free from FAA)

91.11-1—*Guide to Drug Hazards in Aviation Medicine.*

Lists all commonly used drugs by pharmacological effect on airmen with side effects and recommendations. (GPO)

91-23—*Pilot's Weight and Balance Handbook*

Provides an easily understood text on aircraft weight and balance for pilots who need to appreciate the importance of weight and balance control for safety of flight. Progresses from an explanation of basic fundamentals to the complete application of weight and balance principles in large aircraft operations. (GPO)

91-24—*Aircraft Hydroplaning or Aquaplaning on Wet Runways*

Provides information on the problem of aircraft tires hydroplaning on wet runways. (Free from FAA)

91-25A—*Loss of Visual Cues During Low Visibility Landings*

Provides information concerning the importance of maintaining adequate visual cues during the descent below MDA or DH. (Free from FAA)

120–29—*Criteria for Approving Category I and Category II landing Minima for FAR 121 Operators*

Sets forth criteria used by FAA in approving turbojet landing minima of less than 300–¾ or RVR 4,000 (Category I) and Category II minima for all aircraft. (Free from FAA)

121–12—*Wet or Slippery Runways*

Provides uniform guidelines in the application of the "wet runway" rule by certificate holders operating under FAR Part 121. (Free from FAA)

NOTICE

To obtain the latest information on how to order FAA's advisory circulars, Airman's Information Manual, and other FAA material, consult the latest advisory circular checklist, AC 00–2. A copy of this checklist may be obtained free of charge by sending your request to:

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

For your convenience in ordering publications that are sold through the Superintendent of Documents, an order form is included at the back of this guide.

AERONAUTICAL KNOWLEDGE COVERED BY THE WRITTEN TEST

AIM—Airman's Information Manual AW—Aviation Weather FAR—Federal Aviation Regulations
EOG—IFR Pilot Exam-O-Gram AC—Advisory Circular IFH—Instrument Flying Handbook

FAR Part 61—PILOT CERTIFICATION

A01. *Subpart A, General—61.1–61.60*
- Certificates and ratings required
- Flight time (Logging)
- Certificate reports
- Category II
  - authorization; duration

A02. *Subpart F, ATP—61.151–61.171*
- Eligibility
- Application
  - aeronautical knowledge; experience; skill
- Tests
- Instruction
- Privileges and limitations

A03. *FAR Part 1*
- Definitions, abbreviations
- Symbols

FAR PART 65—AIRCRAFT DISPATCHER

B01. *Subpart A, General—65.1–65.21*
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- Falsification

B02. *Subpart C—Aircraft Dispatcher 65.51–65.61*
- Certificate required
- Eligibility
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  - knowledge; experience; skill

FAR PART 91—OPERATIONS

C01. *Subpart A—General—91.1–91.55*
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- Preflight action
- Category II operations
- Crewmembers at stations
- Interference with crewmembers
- VOR equipment check
- Ferry flight with inoperative engine

C02. *Subpart B—Flight Rules—91.61–91.129*
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  - speed; lights
- ATC
  - clearance; altitude and flight levels
- Operations
  - at airports; TCA; PCA; VFR; IFR
- Communications failure

C03. *Appendix A—Category II Operations*
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- Instruments and equipment requirements
- Maintenance; equipment testing

FAR PART 121

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D02. *Subpart B—Domestic and Flag Certification 121.21–121.29*

D03. *Subpart C—Supplemental and Commercial Operators Certification—121.41–121.61*

D04. *Subpart D—Rules for Certificate Holders 121.71–121.83*
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  - availability; use; amendment
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  - availability; amendment
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D06. *Subpart F—Areas and Routes, Supplemental and Commercial Operators—121.111–121.127*
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D08. *Subpart H—Aircraft Requirements 121.151–121.163*
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D09. *Subpart I—Airplane Performance and Operating Limitations—121.171–121.207*
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- Turbine engine powered limitations—takeoff; enroute with one or two engines inoperative; landing

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- Emergency evacuation

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D12. *Subpart K—Instrument and Equipment Requirements—121.311–121.337*
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- Passengers and crew oxygen

D13. *Subpart K—Instrument and Equipment Requirements—121.339–121.359*
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- Flight navigator
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D20. *Subpart R—Flight Time Limitations (Flag)—121.480–121.493*

D21. *Subpart S—Flight Time Limitations (Supplemental and Commercial Operators) 121.500–121.525*

D22. *Subpart T—Flight Operations 121.531–121.555*
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- Operations in special conditions

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D26. *Subpart U—Dispatching and Flight Release—121.625–121.637*
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- Weather considerations
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- Flight plan

D28. *Subpart V—Records and Reports 121.681–121.713*
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- Mechanical reliability report
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- Ground control (AIM–1, 3)
- Clearance del.; taxi
- Departure control (AIM–1, 3)
- Takeoff and landing control (AIM–1, 3)
- Approach control (AIM–1, 3)
- VHF direction finding (DF) (AIM–1)
- ATIS (AIM–3, AC 90–22C)
- Use of runways (AIM–1)
- Light signals (91.77, AIM–1)

F05. *Flight Service Station Facility (AIM–1)*
- Weather services
- Flight plan service (AIM–3, Enroute Chart)
- Airport advisory service (AIM–3)
- VHF direction finding (DF) (AIM–1)

F06. *Air Route Traffic Control Center (ARTCC) (AIM–1)*
- Position reporting; clearances
- Aircraft control (Enroute Chart) geographic area; frequencies
- Advisories; services; assistance; SIDS; STARS

F07. *Controlled Airspace (AIM–1, Enroute and Area Charts)*
- Terminal control area (AC 91–30)
- Control areas; continental control area
- Airport traffic area; control zone
- Positive control area
- IFR altitudes/flight levels

F08. *Special Use Airspace*
- Prohibited area; restricted area; climb corridor; warning area; intensive student jet training area; alert area

F09. *National Security: ADIZ; SCATANA (AIM–1); Jet (VOR) Airways (High Altitude En route and Area Charts)*
- Limits
- Radials and bearings
- Route identification airway; military route; substitute route; unusable route
- Altitude limits MOCA; MEA; MRA; MCA; MAA
- Facilities: VOR; VORTAC; NDB
- Intermediate fixes: intersections; DME
- Segment limits

F10. *Area Navigation (AIM–3, EOG–30)*
- Area navigation route (RNAV)
- Waypoints
- Use

F11. *Direct Flight (AIM–1)*

F12. *Emergency Procedures (AIM–1)*

COMPUTATIONS AND CHARTS

G01. *Weight and Balance (AC 91–23)*
- Terms and definitions
- Balance, stability, and CG
- CG in percent of MAC
- Index and graphic limits
- Shift/change of weight
- Control of loading (Large aircraft)

G02. *Computer Operations*
- Time—speed/rate—distance, fuel
- Altitude—airspeed/Mach adjust
- Specific range
- Off course corrections
- Determine wind/drift

G03. *Performance*
- Takeoff, climb, cruise
- Holding, landing, crosswind
- Fuel, flow, airspeed, time
- Trip planning, EPR

MISCELLANEOUS

H01. *Instrument Interpretation*

H02. *Interpretation of Enroute and Instrument Approach Charts*

H03. *Aircraft Instrument Approach Category (TERPS)*

H04. *Medical Facts (AIM–1)*

H05. *Aircraft Control; Turbulence*
- Wake, CAT, thunderstorms

H06. *Aircraft Performance*
- Atmospheric factors, other factors

H07. *NTSB Part 430, Reports*

SAMPLE TEST

The following sample test is similar in format to the official FAA written test. It is important to remember, however, that these items do not direct attention to all of the topics on which you will be tested in the official test. It is for this reason that you should concentrate on the section titled "Aeronautical Knowledge Covered By The Written Test." A knowledge of all of the topics presented, 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 in a separate section, which includes an analysis 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 preparation 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 concerned with the planning, dispatch, and operation of an air carrier flight from Miami, Florida, to Houston, Texas. As pilot in command, you are expected to make judgments based upon compliance with pertinent regulations, sound operating procedures, and information supplied with this test.

* * * * *

1. As pilot in command on this flight, your recent experience within the preceding 90 days, must include at least

1—six hours of flight duty in a similar type aircraft.

2—three takeoffs and three landings in any type aircraft.

3—five takeoffs and five landings to a full stop in a similar type aircraft.

4—three takeoffs and three landings in the same type aircraft.

2. For each airplane in which you are to serve as pilot in command in an FAR Part 121 operation, you must have satisfactorily completed

1—either recurrent flight training or a proficiency check within the preceding 6 calendar months.

2—either recurrent flight training or a proficiency check within the preceding 12 calendar months.

3—both a proficiency check and recurrent flight training within the preceding 24 calendar months.

4—recurrent flight training and a proficiency check, taken alternately, within the preceding 18 calendar months.

3. You are a commercial pilot holding a DC–3 type rating. Upon the successful completion of a flight test for the Airline Transport Pilot Certificate and type rating in a DC–9, you may instruct other pilots in air transportation service in

1—any airplane in which you are rated, but only if you hold a Flight Instructor Certificate.

2—any airplane, providing your student is training for an Airline Transport Pilot Certificate.

3—the DC–9 only, unless you hold a Flight Instructor Certificate.

4—the DC–3 and DC–9 only, unless you hold a Flight Instructor Certificate.

4. Which is the primary method of disseminating aeronautical information concerning the National Airspace System?

1—NOTAM system.
2—Airman's Information Manual.
3—Aeronautical Charts.
4—Flight Service Stations.

5. Which is the correct indication and acceptable tolerance when performing a ground check of the aircraft VOR equipment using a VOT frequency?

TO/FROM	*CDI (BEARING)*	*TOLERANCE*
1—TO	180°	±6°
2—FROM	000°	±4°
3—TO	000°	±4°
4—FROM	180°	±6°

6. The local altimeter setting is 29.82. If you should inadvertently set 29.92 in the Kollsman window, which altitude will you read on the altimeter?

1—Pressure altitude.

2—True altitude.

3—Field elevation.

4—Absolute altitude.

7. Which is a correct interpretation of the Miami Area Forecast (Figure 24) with regard to expected clouds, icing, turbulence, or other weather in southern Georgia and northern Florida?

1—After 1700Z, the ceiling in northern Florida will be generally 3,000 feet broken.

2—In northern Georgia, there will be light to moderate icing in the clouds up to 10,000 feet.

3—There will be no important turbulence except in thunderstorms.

4—The broad band of convergence over northern Florida and southern Georgia will dissipate.

8. Refer to the 1400Z, 1500Z, and 1600Z Aviation Weather Reports (Figures 27 and 28) and select the response which is a correct interpretation with regard to reported ceiling, visibility, and precipitation at Jacksonville, Dallas, Miami, or Tallahassee.

1—At 1500Z, JAX reports a ceiling of 700 feet and light rain which began at 1430Z.

2—At 1600Z, DAL reports an indefinite ceiling of 100 feet and visibility restricted by smoke.

3—At 1400Z, MIA reports an obscured sky condition and 6 miles visibility in haze.

4—At 1500Z, TLH reports a ceiling of 10,000 feet and 2 miles visibility in light rain and fog.

9. Which is a correct interpretation of the Radar Summary Chart (Figure 31) with regard to the movement, intensity, or height of echoes in northeast Florida and southeast Georgia?

1—The height of the echo tops in northeast Florida is 35,000 feet.

2—The area of echoes in northeast Florida is moving east at 35 knots.

3—The area of echoes in southeast Georgia is moving southeast at 20 knots.

4—The intensity of the echoes in southern Florida is decreasing.

10. Which condition does a prognostic chart depict?

1—Forecast weather to exist at a specific time in the future.

2—A representation of weather conditions existing at the time of observation.

3—Interpretation of conditions in specific areas located between reporting points.

4—Existing analysis at the time of observation.

11. The recorded temperature at an airport situated 5,000 feet MSL is +14° C. Assuming the normal lapse rate, at what altitude above sea level will the temperature be 0° C?

1—10,000 feet

2—11,000 feet

3—12,000 feet

4—13,000 feet

12. Choose the response that correctly describes a feature of aircraft wake turbulence.

1—Vortex generation commences with the takeoff roll.

2—Vortices move laterally prior to settling below the flight path.

3—Vortex strength is maximum when an aircraft is heavy, clean, and slow.

4—Vortex strength dissipates rapidly in ground effect.

13. The center of gravity operating range in percent of MAC at a weight 145,000 pounds in the takeoff configuration is (Figure 2)

1— 8.5% to 36.0%.

2—10.5% to 34.5%.

3—11.0% to 36.1%.

4—13.0% to 35.0%.

14. Compute the CG for this flight based on the loading schedule outlined below. Refer to Figures 1 and 2 for loading tables.

	Weight	*Moment/1,000*
Basic operating weight (BOW)	98,250 lbs.	99,266
Fuel* (total)	36,000 lbs.	———
Forward cargo	4,500 lbs.	———
Aft cargo	5,850 lbs.	———
Forward passengers	3,400 lbs.	———
Aft passengers	17,000 lbs.	———

* Equal amount each tank.

The computed CG is

1—16.0% MAC.

2—16.5% MAC.

3—17.2% MAC.

4—17.9% MAC.

15. In the loading situation in test item 14, how much cargo, to nearest 10 pounds, must be shifted

to achieve a CG location at 20% MAC (distance moved—485")?

1—1,150 pounds
2—1,270 pounds
3—1,680 pounds
4—1,700 pounds

16. What is the zero fuel weight for this flight?

1—106,150 pounds
2—118,000 pounds
3—125,000 pounds
4—129,000 pounds

* * * * *

Complete the flight time analysis in the Appendix (Figure 40). Appropriate chart segments for this routing between Miami and Houston are also included in the Appendix (Figures 14 and 15).

NOTE: The flight time analysis form used in Figure 40 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.

* * * * *

17. The estimated time for this flight from takeoff at Miami to landing at Houston is (Figure 40)

1—2 hours 05 minutes.
2—2 hours 10 minutes.
3—2 hours 15 minutes.
4—2 hours 20 minutes.

18. The estimated fuel burn for this flight from engine start to landing is (Figure 40)

1—20,300 pounds.
2—21,050 pounds.
3—21,800 pounds.
4—22,550 pounds.

19. Your fuel load is 36,000 pounds. After consideration of enroute and reserve requirements, how much fuel is available for a possible holding delay enroute? (Figure 40)

1—3,100 pounds
2—4,300 pounds
3—5,700 pounds
4—8,600 pounds

20. Assume the following fuel loading for a particular flight:

Fuel burn to destination	15,500 pounds*
Alternate, reserve, extra	26,500 pounds

*Taxi fuel included (Figure 1).

The maximum allowable payload for this flight is

1—25,250 pounds.
2—26,750 pounds.
3—28,250 pounds.
4—29,750 pounds.

21. Determine the runway limit gross weight at brake release under the following conditions (Figure 3).

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% MAC

1—136,000 pounds
2—138,500 pounds
3—140,000 pounds
4—142,000 pounds

22. Using the same data given in the previous test item, determine the climb limit gross weight (Figure 3).

1—139,250 pounds
2—142,500 pounds
3—153,000 pounds
4—157,000 pounds

23. In determining takeoff weight limitations, the maximum takeoff distance of a domestic air carrier turbine powered airplane departing from an airport runway 6,000 feet long with 1,000 feet of stopway and 2,000 feet of clearway is

1—6,000 feet.
2—7,000 feet.
3—8,000 feet.
4—9,000 feet.

24. Based on the conditions stated in the previous test item, what is the maximum allowable "accelerate-stop" distance?

1—6,000 feet
2—7,000 feet
3—8,000 feet
4—9,000 feet

25. What will be the takeoff EPR for No. 2 engine under the following conditions? (Figures 4 and 6)

Field elevation	5,300 ft.
Altimeter setting	29.80
Outside Air Temperature	30° F.
Engine anti-ice	ON

1—2.05
2—2.02
3—1.95
4—1.92

26. Given the following information, what is the rotate speed and the minimum maneuvering speed for a 20° bank immediately after takeoff? (Figure 4)

Takeoff gross weight	150,000 lbs.
Flap setting	15°
Center of gravity	15.8% MAC
Field elevation (pressure altitude)	1,500 ft.
Temperature	89° F.

1—136 knots and 161 knots
2—128 knots and 142 knots
3—128 knots and 152 knots
4—119 knots and 133 knots

27. Based on the following conditions, what is the weight of an airplane (to the nearest 100 pounds) when it reaches FL 330? (Figures 8 and 9)

Departure airport elevation	Sea level
Brake release weight	165,500 pounds
Average climb temperature	ISA −15° C.

1—159,000 pounds
2—159,200 pounds
3—159,700 pounds
4—160,000 pounds

28. From the Simplified Flight Planning Chart (Figure 7), determine the trip time and fuel under the following conditions.

Distance	1,200 miles
Wind component	50 knots, headwind
Cruise altitude	FL 310
Landing weight	130,000 pounds
Average temperature	ISA −5° C.

1—2 hours 50 minutes and 24,200 pounds.
2—2 hours 55 minutes and 25,400 pounds.
3—3 hours 00 minutes and 26,000 pounds.
4—3 hours 05 minutes and 26,800 pounds.

29. Which reported surface wind would cause you to exceed the maximum tailwind component of 10 knots for this airplane for a Runway 8 takeoff? (Figure 5)

1—320°/25 knots
2—300°/10 knots
3—350°/15 knots
4—290°/10 knots

30. After checking the weather, you can determine if a departure alternate is required for an air carrier flight by inspecting the

1—landing minimums for the departure airport in the company operations specifications.
2—departure alternate section of FAR Part 121.
3—alternate airport section of the AIM.
4—alternate airport weather minimums for the departure airport in the company operations specifications.

31. If a departure alternate is required for a three-engine operation, it may be located a maximum distance from the departure airport of

1—1 hour at normal cruising speed in still air with one engine inoperative.
2—1 hour at normal cruising speed in still air with two engines inoperative.
3—2 hours at normal cruising speed in still air with one engine inoperative.
4—2 hours at normal cruising speed in still air with two engines inoperative.

32. For which speed variation should you notify ATC?

1—When the groundspeed changes more than 5 knots.
2—When the true airspeed changes more than 5 knots.
3—When the flight planned true airspeed is expected to vary more than 10 knots.
4—Any time you change airspeed, regardless of the amount, if the change will affect a proposed ETA over a compulsory reporting point.

33. One engine of a three-engine turbojet powered air carrier airplane is shut down in flight. As pilot in command, you

1—may continue to the destination only if the dispatcher authorizes this course of action.
2—must return to the departure airport if you have not completed your climb to en route altitude.
3—may proceed to any airport you select if you decide this is as safe as landing at the nearest suitable airport.
4—are required by regulations to land at the nearest suitable airport.

34. During flight at FL 310, the altitude must be maintained by reference to an altimeter which is set to the

1—current reported altimeter setting of a station within 100 miles.
2—altimeter setting for the lowest usable flight level.
3—current altimeter setting corrected for non-standard temperature variation.
4—standard sea level pressure at 29.92 inches.

35. The minimum enroute altitude for a domestic air carrier passenger carrying aircraft operating VFR off airways over mountainous terrain is

1—2,000 feet AGL, day and night.

2—1,500 feet AGL day, 2,000 feet AGL night.

3—1,000 feet AGL day, 2,000 feet AGL night.

4—1,000 feet AGL day, 1,000 feet AGL night.

36. ATC issues you a clearance with this climb restriction ". . . CROSS ALPHA VORTAC AT NINE THOUSAND . . . CROSS BRAVO INTERSECTION AT TWELVE THOUSAND. . . ." The distance between the two fixes is 7 NM and the average groundspeed is 325 knots. To comply with this clearance, your minimum average rate of climb should be

1—2,000 feet/minute.

2—2,300 feet/minute.

3—2,600 feet/minute.

4—2,900 feet/minute.

37. Determine the specific range (NAM/1,000 pounds of fuel) based on the data below:

FL	300
Mach	.82
OAT	−35° C. (true)
Total fuel flow	8,680 pounds/hour

1—53.2 NAM/1,000 pounds.

2—55.1 NAM/1,000 pounds.

3—56.7 NAM/1,000 pounds.

4—57.8 NAM/1,000 pounds.

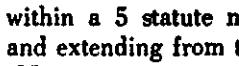
38. Which airspace does a Transition Area include when designated in conjunction with an airport which has a prescribed instrument approach procedure?

1—Where specified, that airspace extending upward from 700 feet or more above the surface and terminating at the base of the overlying controlled airspace.

2—That airspace extending from the surface and terminating at the base of the Continental Control Area.

3—Areas designated as Group I or Group II for which all aircraft are subject to the operating rules in FAR Part 91.

4—The airspace within a 5 statute mile radius of the airport and extending from the surface to 3,000 feet AGL.

39. What does this symbol () indicate when it appears at an airport on the Enroute Low Altitude or Area Chart?

1—The localizer is used with another NAVAID to identify an intersection.

2—A back course localizer approach is available for this particular airport.

3—A published SDF (Simplified Direction Finding) procedure is available.

4—The localizer provides only course guidance for the published ILS approach procedure.

40. A certain published instrument approach procedure requires an RVR of 1,800 feet as the visibility criterion. If the RVR equipment is inoperative, what visibility would be required in lieu of the published RVR?

1—A slant range visibility of 1,800 feet for the final approach segment of the published approach procedure.

2—A ground visibility of ½ statute mile.

3—A ground visibility of ¼ statute mile.

4—An RVV of 1,800 feet.

41. The aerodrome sketch for Houston International Airport (Figure 19) indicates that Runway 8 has which approach and runway lighting systems installed?

1—Medium Intensity Approach Lights, 3-Bar Visual Approach Slope Indicator, Touchdown Zone Lighting, High Intensity Runway Lights, and Runway Centerline Lighting.

2—High Intensity Approach Lights with Sequenced Flashers, Touchdown Zone Lighting, High Intensity Runway Lights, and Runway Centerline Lighting.

3—High Intensity Approach Lights with Sequenced Flashers, 2-Bar Visual Approach Slope Indicator, and Runway Centerline Lighting.

4—Medium Intensity Approach Lights with Sequenced Flashers and Runway Centerline Lighting.

42. The altitude loss for a malfunctioning automatic pilot with an approach coupler is 20 feet. The reported weather is below basic VFR minimums. You are making an ILS approach using the approach coupler. The minimum altitude to which the autopilot may be used is

1— 40 feet AGL.

2— 50 feet AGL.

3— 70 feet AGL.

4—150 feet AGL.

43. A supplemental air carrier operating a reciprocating engine powered transport category airplane must be able to land and stop within what percent of the effective runway at the destination and alternate airports respectively?

1—50% at destination and 60% at alternate.

2—60% at destination and 60% at alternate.

3—60% at destination and 70% at alternate.

4—70% at destination and 70% at alternate.

44. The computed speed range of a particular airplane places it in Approach Category B, while the weight places it in Category C. Which approach category is appropriate for determining landing minimums for this airplane?

1—A
2—B
3—C
4—D

45. Determine the approximate landing weight under these conditions. (Figures 10 and 8)

Elevation of landing airport	Sea level
Cruise altitude	FL 310
Cruise temperature	−30° C.
Airplane weight (cruise) at 1600Z	150,000 pounds
Estimated landing time	1715Z

1—130,500 pounds
2—135,000 pounds
3—140,500 pounds
4—145,000 pounds

46. Under the following conditions, what is the field length limit gross weight (Figure 11)?

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

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

* * * * *

The following four test items apply to a flag air carrier flight from New York (KJFK) to Lisbon (LPPT).

* * * * *

47. What is the approximate wind direction and velocity at the 300-millibar level (Figure 36) at a position 46°N./40°W?

1—230°/75 knots
2—220°/90 knots
3—200°/60 knots
4—180°/70 knots

48. Refer to the Tropopause/Vertical Wind Shear Chart (Figure 37). If an aircraft is maintaining FL 330 on the route shown, what is its relation to the tropopause? It would

1—be below the tropopause at a position 45°N./28°W.
2—remain above the tropopause for the entire route.
3—remain below the tropopause for the entire route.
4—be below the tropopause at a position 45°N./57°W.

49. Refer to the Significant Weather Prog. Charts (SFC—400 MB, and 400—150 MB—Figures 37 and 38). An aircraft maintaining FL 330 and the route shown can expect to encounter which conditions?

1—Layered cirroform clouds in the vicinity of 45°N./42°W.
2—Light turbulence in the vicinity of 42°N./16°W.
3—Moderate turbulence near 46°N./33°W.
4—Moderate to severe icing between KJFK and KACK.

50. What is the flight time enroute based on the following data?

Total distance	2,960 NM
Time and distance for climb	25 min./160 NM
Time and distance for descent	16 min./100 NM
Cruise	.82 Mach
Average temperature (true)	−47° C.
Average wind factor	+40 knots

1—5 hours 30 minutes
2—5 hours 36 minutes
3—5 hours 44 minutes
4—5 hours 53 minutes

ANSWERS AND ANALYSES TO SAMPLE TEST ITEMS

Item	Answer	Analysis
1	4	FAR 121.439.
2	2	FAR 121.433.
3	3	FAR 61.169 and FAR 61.171.
4	3	AIM Part 1. Aeronautical information concerning the National Airspace System is disseminated by three methods. The primary method is aeronautical charts.
5	2	FAR 91.25 and AIM Part 1.
6	1	Pressure altitude is indicated when standard sea level pressure (29.92") is set.
7	3	Refer to the MIA Area Forecast, Figure 24, and Aviation Weather, AC 00–6.
8	1	Refer to the Aviation Weather Report for the particular station, Figures 27 and 28, and Aviation Weather, AC 00–6.
9	3	Refer to the Radar Summary Chart, Figure 31, and Aviation Weather, AC 00–6.
10	1	Aviation Weather, AC 00–6.
11	3	Aviation Weather, AC 00–6.
12	3	AIM Part 1, Wake Turbulence, and AC 90–23D, Wake Turbulence.
13	3	See referenced chart. Range in percent of MAC is 25.1% at the stated gross weight.
14	3	Basic operating weight ___ 98,250 *Weight* / 99,266 *Moment/1,000* Fuel— Tank #1 12,000 / 11,970 Tank #2 12,000 / 10,993 Tank #3 12,000 / 11,970 Forward cargo ____ 4,500 / 3,060 Aft cargo __ 5,850 / 6,822 Forward passengers 3,400 / 1,993 Aft passengers 17,000 / 17,490 165,000 / 163,564 $\frac{163,564,000}{165,000} = 991.3 = CG$ in inches $\frac{991.3 - 960.2}{31.1}$ $\frac{31.1}{180.7} = 17.2\%$ MAC
15	4	Desired CG location ____ 20.0% MAC 36.1" Present CG location ____ −17.2% 31.1" 2.8% 5.0" (Weight shifted) 1,701 lbs. / 165,000 lbs. (Total weight) = (CG change) 5" / 485" (Distance moved)
16	4	Total weight 165,000 lbs. Fuel load − 36,000 lbs. Zero fuel wt. 129,000 lbs.
17	4	*From* *To* *Time* *Fuel(lbs.)* MIA SRQ :31 8,000
18	4	SRQ CRAB :17 2,550 CRAB LEV :42 6,300 LEV Top of Descent :30 4,500 TOD Airport :20 1,200 2:20 22,550 For TAS, set Mach Index of computer opposite true air temperature which is given on the flight time analysis (Figure 40).
19	3	Enroute fuel 22,550 plus reserve 6,750 plus missed approach 1,000 = 30,300 lbs. Ramp fuel 36,000 − required 30,300 Extra 5,700 lbs.
20	1	150,000 lbs. (max. ldg. wt.) + 15,500 lbs. (fuel burn to destination) = 165,500 lbs. (actual taxi wt., which

Item	Answer	Analysis
		is below max. taxi wt. limit of 170,000 lbs.). 150,000 lbs. (max. ldg. wt.) – 26,500 lbs. (res. fuel) = 123,500 lbs. (actual zero fuel wt., which is below max. zero fuel wt. limit of 136,000 lbs.). 123,500 lbs. (actual zero fuel wt.) – 98,250 lbs. (basic operating wt.) = 25,250 lbs. (max. allowable payload).
21	1	Refer to the Explanation of Takeoff Performance Chart, page 30, and to the Takeoff Performance Chart (Figure 3). Note that the runway limit gross weight must be reduced by 1,500 lbs. since the CG is forward of 14%.
22	3	Follow the directions given in Explanation of Takeoff Performance Chart, page 30. Note that the climb limit value may be the limiting weight in some cases.
23	3	FAR 121.189. The takeoff distance must not exceed the length of the runway plus the length of any clearway. The length of the clearway included must not be greater than one-half the length of the runway.
24	2	FAR 121.189. 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 6,000 feet (runway length) plus 1,000 feet (stopway length).
25	2	A field elevation of 5,300 feet and an altimeter setting of 29.80 result in a station pressure of 24.50" (Figure 6). The tabular value of 2.05 is decreased by .03 since engine anti-ice is ON.
26	3	It is important to read and evaluate all notes on a chart or table. The inset table in Figure 4 prescribes a speed of at least V_2+10 at the takeoff flap setting when exceeding 15° bank.
27	4	From the "TIME AND FUEL FROM BRAKE RELEASE TO CLIMB SPEED" chart (Figure 8), read 970 lbs. of fuel used. From the "ENROUTE CLIMB" chart (Figure 9), read 4,549 lbs. of fuel used in climb to FL 330. The brake release weight less 5,519 lbs. yields a weight of 159,981 lbs. at FL 330.
28	4	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 −5° C. correction.
29	1	Refer to Figure 5. The angular difference between the wind direction and runway 8 is 120°. Applying this angular difference and the 25 knot wind velocity to the crosswind chart indicates the tailwind component would be approximately 13 knots, exceeding the 10 knot tailwind limitation.
30	1	FAR 121.617.
31	3	FAR 121.617.
32	3	AIM Part 1—increasing or decreasing the speed of an aircraft constitutes a change in flight plan. Therefore, at any time the average true airspeed at cruising altitude between reporting points varies, or is expected to vary from that given in the flight plan by plus or minus 10 knots, air traffic control should be advised.
33	3	FAR 121.565.
34	4	FAR 91.81.
35	3	FAR 121.657.
36	2	At a ground speed of 325 knots, 1.3 minutes are required to fly 7 NM. To climb 3,000 feet in 1.3 minutes, the minimum average rate of climb should be 3,000 ÷ 1.3 or 2,300 feet/minute.
37	3	TAS in this situation is 492 knots. Divide this value by 8.68 (thousands of pounds of fuel) to determine the NAM/1,000 pounds.

Item	Answer	Analysis
38	1	AIM Part 1—Transition areas are designated to contain IFR operations in controlled airspace during portions of the terminal operation and while transitioning between the terminal and enroute environment.
39	1	Chart legend and IFR Exam-O-Gram 39.
40	2	FAR 91.117.
41	2	Houston approach chart (Figure 19) and Approach Chart Legend (Figure 18).
42	3	FAR 121.579. When reported weather conditions are less than basic VFR, no person may use an automatic pilot with an approach coupler for ILS approaches at an altitude above the terrain that is less than 50 feet higher than the maximum altitude loss specified in the Airplane Flight Manual for the malfunction of the automatic pilot with approach coupler under approach conditions.
43	3	FAR 121.185 and FAR 121.187.
44	3	An airplane can fit into only one category, that being the highest category in which it meets either specification. Also, if a Category C airplane is circling to land at a speed above the upper "C" speed limit, the Category D minimums should be used. See AC 90-1A.
45	3	Referring to the "DESCENT PLANNING" chart (Figure 8), determine that 16 minutes and 600 lbs. of fuel are required to descend from FL 310. For a 1715Z landing, the descent must start at 1659Z. According to the "CRUISE PLANNING" chart (31,000 ft.) (Figure 10), the average total fuel flow at an average gross weight of 145,000 lbs. for 59 minutes (1600Z to 1659Z) is approximately 8,900 lbs. The landing weight is 150,000 lbs. minus (600 lbs. + 8,900 lbs.) or 140,500 lbs.
46	1	Enter the referenced chart (Figure 11) 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.
47	1	Wind flows approximately parallel to the solid contour lines. At the point described (46°N./40°W.) the angle this contour makes with the nearest meridian is approximately 230°. The wind velocity can be determined to be approximately 75 knots by noting the position of the described point in relation to the 60K and 80K dashed isotachs.
48	1	At a position 45°N./28°W., the tropopause is somewhat above the 250-millibar level which corresponds to a height of 34,000 feet under standard conditions. 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 chart also shows: a. Intersections of the tropopause in 50-millibar intervals from 300 to 150. Standard heights of the pressure surfaces are given in the inset box at the top of the chart. b. 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. c. Tropopause and 150-millibar level temperatures are enclosed in rectangles and circles, respectively.
49	3	See Appendix III of Aviation Weather, AC 00-6, for abbreviations and symbols used on prognostic charts. Choice 1—Incorrect; isolated CB (cumulonimbus) are indicated.

Item	Answer	Analysis
		Choice 2—Incorrect; no turbulence is indicated at FL 330. Choice 3—Correct. Choice 4—Incorrect; the symbol indicates moderate turbulence between KJFK and KACK.
50	**4**	TAS for cruise is 480 knots and GS is, therefore, 520 knots. Time for cruise portion (2,700 NM) is 5 hours, 12 minutes. Climb and descent times increase total time to 5 hours, 53 minutes.

APPENDIX

This section contains supplementary data necessary for use with the sample test. Additional material of value to the applicant for the Airline Transport Pilot (Airplane) Written Test is also included.

PHYSIOLOGICAL TRAINING

The following articles concerning Hypoxia and Hyperventilation are excerpted from the Physiological Training Manual of the Civil Aeromedical Institute (CAMI). If further information is desired, write the Chief, Physiological Operations and Training Section, AAC–143, Civil Aeromedical Institute, FAA Aeronautical Center, P.O. Box 25082, Oklahoma City, Oklahoma 73125.

Hypoxia

"Hypoxia is probably our most important physiological problem. It can be the most dangerous physical flying problem due to its insidious onset. Hypoxia, therefore, is one of the basic and most vital problems to the aviator. He must completely understand its causes, effects, prevention, and treatment.

Hypoxia can be defined as a lack of sufficient oxygen available to the body cells. The degree of hypoxia depends upon the reduction of the partial pressure of oxygen in the air sacs. This reduction of oxygen pressure becomes apparent in the Physiological Deficient Zone which extends from about 12,000 feet to 50,000 feet. Interference with the supply of oxygen to the cells of the body affects normal processes. The amount of oxygen in the cells may become inadequate due to various conditions.

The most important single characteristic of hypoxia at altitude is that if the aircrew member is engrossed in his duties, he may not notice the effect that hypoxia is having on his body. Each person will experience his individual symptoms of hypoxia; therefore, in order to detect hypoxia, you must know your reactions. Some of the common symptoms to look for are:

1. An increased breathing rate.
2. Light-headed or dizzy sensations.
3. Tingling or warm sensations.
4. Sweating.
5. Loss of vision or reduced vision; sleepiness.
6. Cyanosis (blue coloring of skin, fingernails, and lips).
7. Behavior changes.

Time of Useful Consciousness (T.U.C.) is the time from the onset of hypoxia until deterioration of the individual's effective performance. At altitudes below 30,000 feet this time may differ considerably from the time of total consciousness (the time it takes to "pass out"). Above 35,000 feet the times become closer and eventually coincide for all practical purposes. Various factors will determine T.U.C., some of which are:

1. Altitude. T.U.C. decreases with increasing altitude.
2. Rate of Ascent. In general, the faster the rate, the shorter the T.U.C.
3. Physical Activity. Exercise decreases T.U.C. considerably.
4. Day-to-Day Factors. Physical fitness or ability to tolerate hypoxia will change from day to day; therefore, changing your T.U.C.

The following T.U.C.'s given for various altitudes represent *average* times without supplemental oxygen:

15–18,000 feet	30 minutes or more
22,000 feet	5 to 10 minutes
25,000 feet	3 to 5 minutes
28,000 feet	2½ to 3 minutes
30,000 feet	1 to 2 minutes
35,000 feet	30 to 60 seconds

An immediate realization of your hypoxia symptoms and the obtaining of a proper amount of supplemental oxygen by emergency oxygen equipment procedures are necessary to combat hypoxia.

If oxygen is administered within a matter of 3 to 5 minutes to a person who is unconscious from hypoxia, recovery is usually rapid and complete. However, a hypoxic reaction may be followed by a state of shock during which there is a weak pulse, sweating, low blood pressure, and pooling of blood in dilated capillaries. This condition will require the usual treatment for shock."

Hyperventilation

"The respiratory center of the brain reacts to the amount of carbon dioxide found in the blood stream. When you are in a physically relaxed state, the amount of carbon dioxide in your blood stimulates the respiratory center and your breathing rate is stabilized at about 12 to 16 breaths a minute. When physical activity occurs, the body cells use more oxygen and more carbon dioxide is produced. Excessive carbon dioxide enters the blood and consequently the respiratory center responds to this excess. Breathing increases in depth and rate to remove the excess carbon dioxide. When the excess is removed, the respiratory center changes the breathing back to normal.

The same process is involved when a maximum effort is made to hold the breath. While the breath is being held, the body cells continue to manufacture carbon dioxide which enters the blood. The amount in the blood finally becomes so great that in spite of conscious efforts, the respiratory center overrides it and breathing is resumed.

Hyperventilation, or overbreathing, is a disturbance of respiration that may occur in individuals as a result of physical exertion, emotional tension, or anxiety. It is a condition in which the respiratory rate and depth are abnormally increased. This results in an excessive loss of carbon dioxide from the lungs, lowering the normal carbon dioxide tension of 40 mm. Hg. The most common symptoms are dizziness, hot and cold sensations, tingling of the hands, legs, and feet, tetany, nausea, sleepiness, and, finally, unconsciousness. After becoming unconscious, the breathing rate will be exceedingly low until enough carbon dioxide is produced to stimulate the respiratory center. Hyperventilation is a normal response to hypoxia. However, the excessive breathing does little good. Hyperventilation combined with hypoxia is very serious.

Should symptoms occur which you cannot definitely identify as either hypoxia or hyperventilation, the following steps should be taken:

Check your oxygen equipment immediately and put the regulator on 100% oxygen.

After three or four deep breaths of oxygen, the symptoms should improve markedly, if the condition experienced was hypoxia. (Recovery from hypoxia is extremely rapid.)

If the symptoms persist, you should consciously slow your breathing rate to an abnormally slow rate for 30 to 45 seconds, and then resume your breathing at a normal rate."

DEFINITIONS

Speed of sound—the speed at which sound waves travel through a medium, which is solely a function of temperature.

Mach number—the ratio of the true airspeed to the speed of sound.

$$\text{Mach No. (M)} = \frac{\text{True Airspeed (TAS)}}{\text{Speed of Sound}}$$

Speed of Sound = Mach 1.00

Subsonic—less than the speed of sound.

Transonic—airflow on aircraft components may be partly subsonic and partly supersonic. Mach numbers from 0.75 to 1.20.

Supersonic—*definite* supersonic airflow on all parts of the aircraft. Mach numbers from 1.20 to 5.00.

Critical Mach number—the highest flight speed possible without supersonic flow over any part of the aircraft.

Mean Aerodynamic Chord (MAC)—is the mean chord of the wing which is established by the manufacturer for engineering design and weight and balance purposes.

Specific range—is the nautical miles of flying distance per pound of fuel. The specific range can be defined by the following relationships:

$$\text{specific range} = \frac{\text{nautical air miles}}{\text{lbs. of fuel}} \quad \text{or} \quad \frac{\text{nautical air miles/hr.}}{\text{lbs. of fuel/hr.}}$$

$$\text{thus, specific range} = \frac{\text{TAS, knots}}{\text{fuel flow, lbs./hr.}}$$

Because of high fuel flow in jet aircraft, specific range is usually expressed as nautical *air* miles per 1,000 lbs. of fuel. (NAM/1,000 lbs.)

Clearway—expressed in terms of a clearway plane, extending from the end of the runway with an upward slope not exceeding 1.25 percent, above which no object nor any terrain protrudes.

Stopway—an area beyond the runway, not less in width than the runway, for use in decelerating the airplane during an aborted takeoff. A stopway can be used for increasing the accelerate-stop distance.

Takeoff Distance—(turbine engine powered airplanes)—The greater of:

1. The horizontal distance from the point of brake release to a point where the airplane attains a height of 35 feet above the takeoff surface, assuming an engine failure at the V_1 speed, or

2. 1.15 times the horizontal distance from the point of brake release to the point where the airplane attains a height of 35 feet above the takeoff surface with all engines operating.

The takeoff distance available, used in entering the chart, is the sum of the runway length plus the actual or maximum allowable clearway length. The length of the clearway used must not be greater than one-half the length of the runway.

Takeoff Run—(turbine engine powered airplanes)—The greater of:

1. The horizontal distance from the point of brake release to a point equidistant between the lift-off point and the point where the airplane attains a height of 35 feet above the takeoff surface, assuming an engine failure at V_1 speed, or

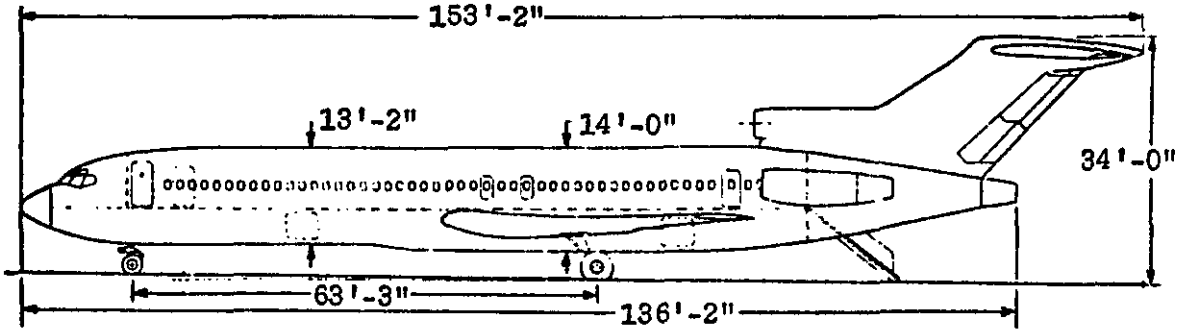
2. 1.15 times the horizontal distance from the point of brake release to a point equidistant between the lift-off point and the point where the airplane attains a height of 35 feet above the takeoff surface with all engines operating.

The takeoff run, used in entering the chart, must not exceed the length of the runway.

Accelerate-Stop Distance—The horizontal distance to accelerate from a standing start to the V_1 speed and thereafter, assuming an engine failure at this speed, to bring the airplane to a full stop. The accelerate-stop distance, used in entering the chart, must not exceed the length of the runway plus the length of the stopway.

Balanced Field Length—The condition where the takeoff distance is equal to the accelerate-stop distance. This distance must not exceed the length of the runway.

Unbalanced Field Length—The condition where the takeoff distance and accelerate-stop distance are not equal.



AIRPLANE DATUM CONSTANTS

Mean Aerodynamic Chord applicable to this airplane:

MAC = 180.7 inches

Leading edge of MAC = 960.2 inches

FUEL DUMPING

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

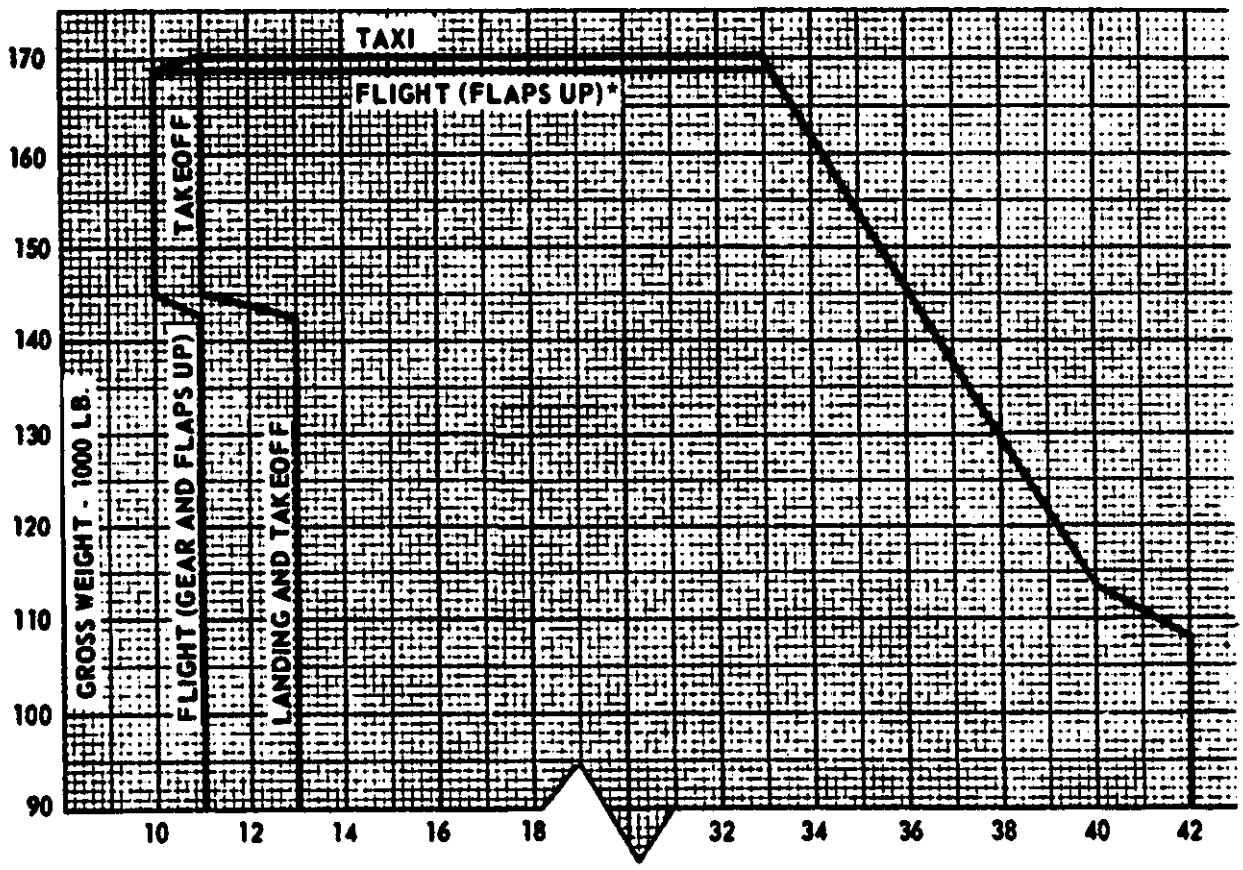
Tank # 1 ---------- 600 lbs/min
Tank # 2 ---------- 1100 lbs/min
Tank # 3 ---------- 600 lbs/min

WEIGHT LIMITATIONS

Basic Operating Weight ---------- 98,250 Lbs.
Maximum Zero Fuel Weight ---------- 136,000 Lbs.
Maximum Landing Weight ---------- 150,000 Lbs.
Maximum Takeoff Weight ---------- 169,000 Lbs.
Maximum Taxi Weight ---------- 170,000 Lbs.

CARGO LOADING			PASSENGER LOADING			
	Moment/1,000				Moment/1,000	
Pounds	Fwd	Aft	Number	Pounds	Fwd	Aft
100	68	117	1	170	99	175
200	136	234	2	340	199	350
300	204	350	3	510	299	525
400	272	466	4	680	399	700
500	340	583	5	850	498	874
600	408	700	6	1,020	598	1,049
700	476	816	7	1,190	698	1,224
800	544	933	8	1,360	797	1,399
900	612	1,049	9	1,530	897	1,574
1,000	680	1,166	10	1,700	997	1,749
2,000	1,360	2,332	20	3,400	1,993	3,498
3,000	2,040	3,498	30	5,100		5,247
4,000	2,720	4,664	40	6,800		6,996
5,000	3,400	5,830	50	8,500		8,745
6,000	4,080	6,996	100	17,000		17,490
7,000	4,760	8,162				
8,000	5,440	9,328				

FIGURE 1. Airplane Data and Loading Tables.



FUEL LOADING TABLE

TANKS 1 and 3			TANK 2 (3 cell)					
WEIGHT Lbs.	ARM	MOMENT 1,000	WEIGHT Lbs.	ARM	MOMENT 1,000	WEIGHT Lbs.	ARM	MOMENT 1,000
8,500	992.1	8,433	8,500	917.5	7,799	20,000	914.9	18,298
9,000	993.0	8,937	9,000	917.2	8,255	20,500	914.8	18,753
9,500	993.9	9,442	9,500	917.0	8,711	21,000	914.7	19,209
10,000	994.7	9,947	10,000	916.8	9,168	21,500	914.6	19,664
10,500	995.4	10,451	10,500	916.6	9,624	22,000	914.6	20,121
11,000	996.1	10,957	11,000	916.5	10,082	22,500	914.5	20,576
11,500	996.8	11,463	11,500	916.3	10,537	23,000	914.5	21,034
12,000	997.5	11,970	12,000	916.1	10,993	23,500	914.4	21,488
FULL			* * * * *	* * * *	* * * * *	24,000	914.3	21,943
			18,500	915.1	16,929	24,500	914.3	22,400
			19,000	915.0	17,385	25,000	914.2	22,855
			19,500	914.9	17,841	FULL		

FIGURE 2. CG Chart and Loading Tables.

Explanation of Figure 3

Given Factors:

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

Use 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 pounds.

Climb Limit: Regulations specify that certain climb gradients or profiles must be met during the takeoff and climb phases. (See FAR 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 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 Factors:

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	153,000 pounds

(The Climb Limit value is the limiting weight in this case.)

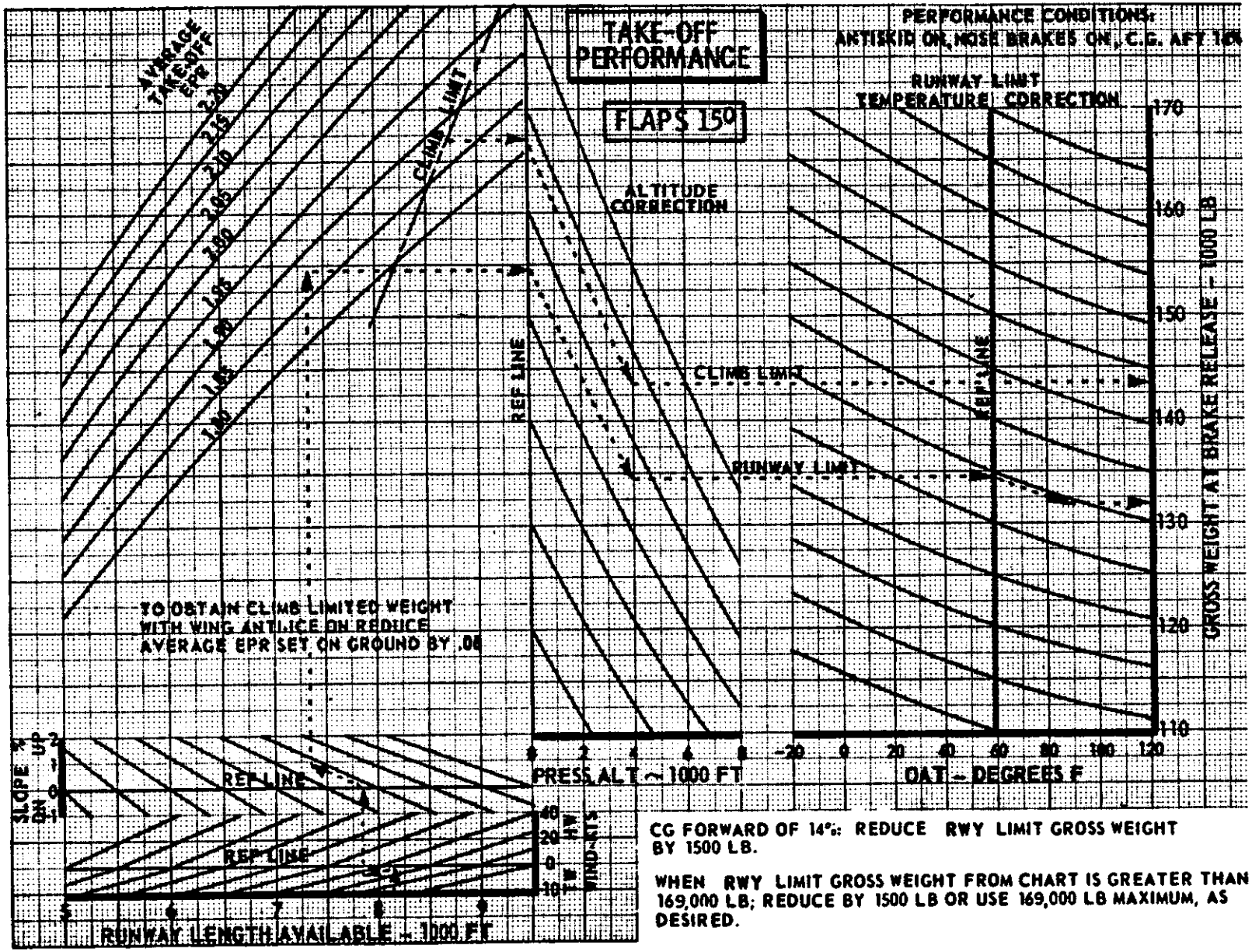


FIGURE 3. Takeoff Performance Chart.

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.	FIELD PRESSURE - 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 49	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°	8½	8	7½	7	6½	6	5½	5	4½	4¼	3¾	3¼	2¾	2¼	2	1½	1
	15°	7	8½	8	7½	7	6½	6	5½	5	4½	4	3½	3	2½	2	1½	1
	25°	7½	9	8½*	8	7½	7	6½	5¾	5½	4¾	4½	3¾	3	2½	2	1½	1

* USE 8 UNITS ON AIRPLANES WITHOUT EXTENDED GREEN BAND

FIGURE 4. Takeoff Data.

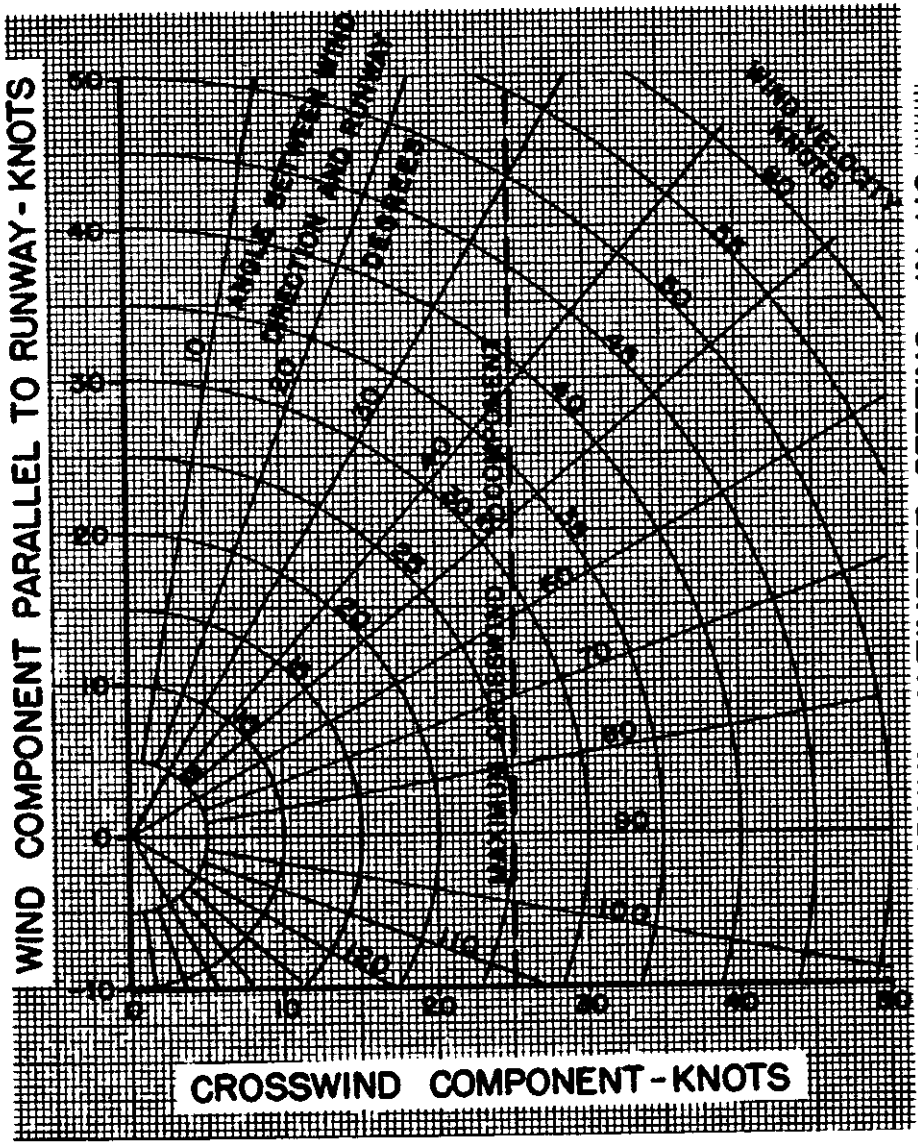


FIGURE 5. Wind Component Chart.

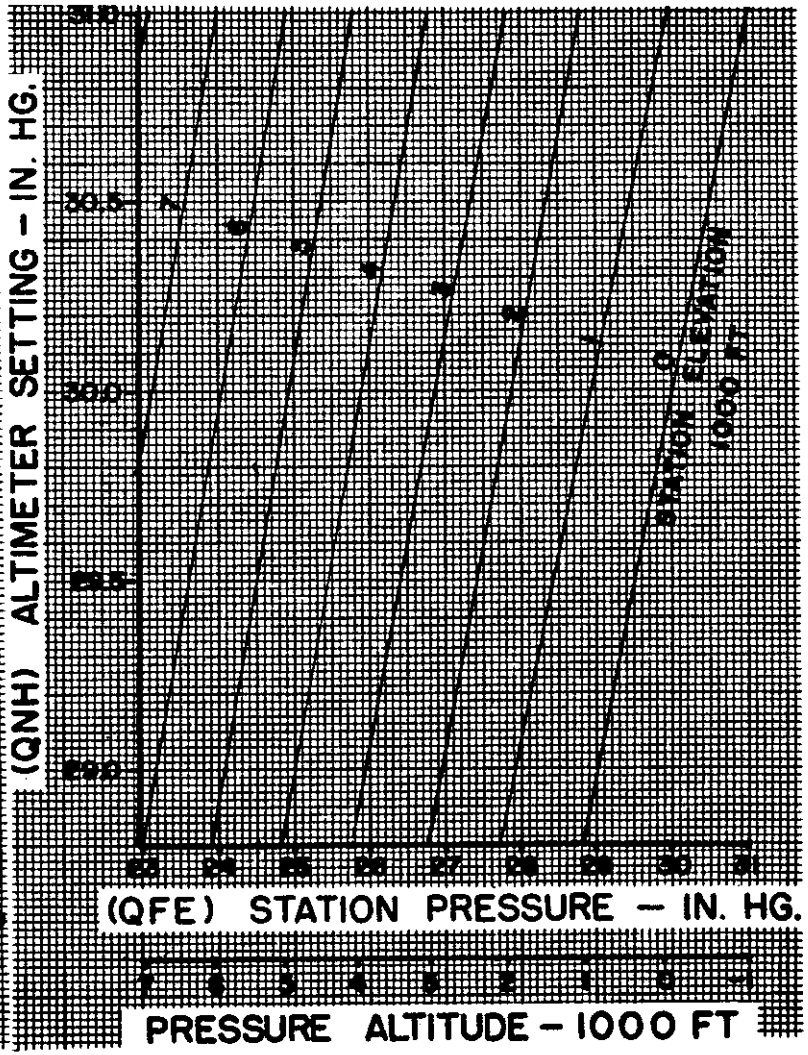


FIGURE 6. Station Pressure Chart.

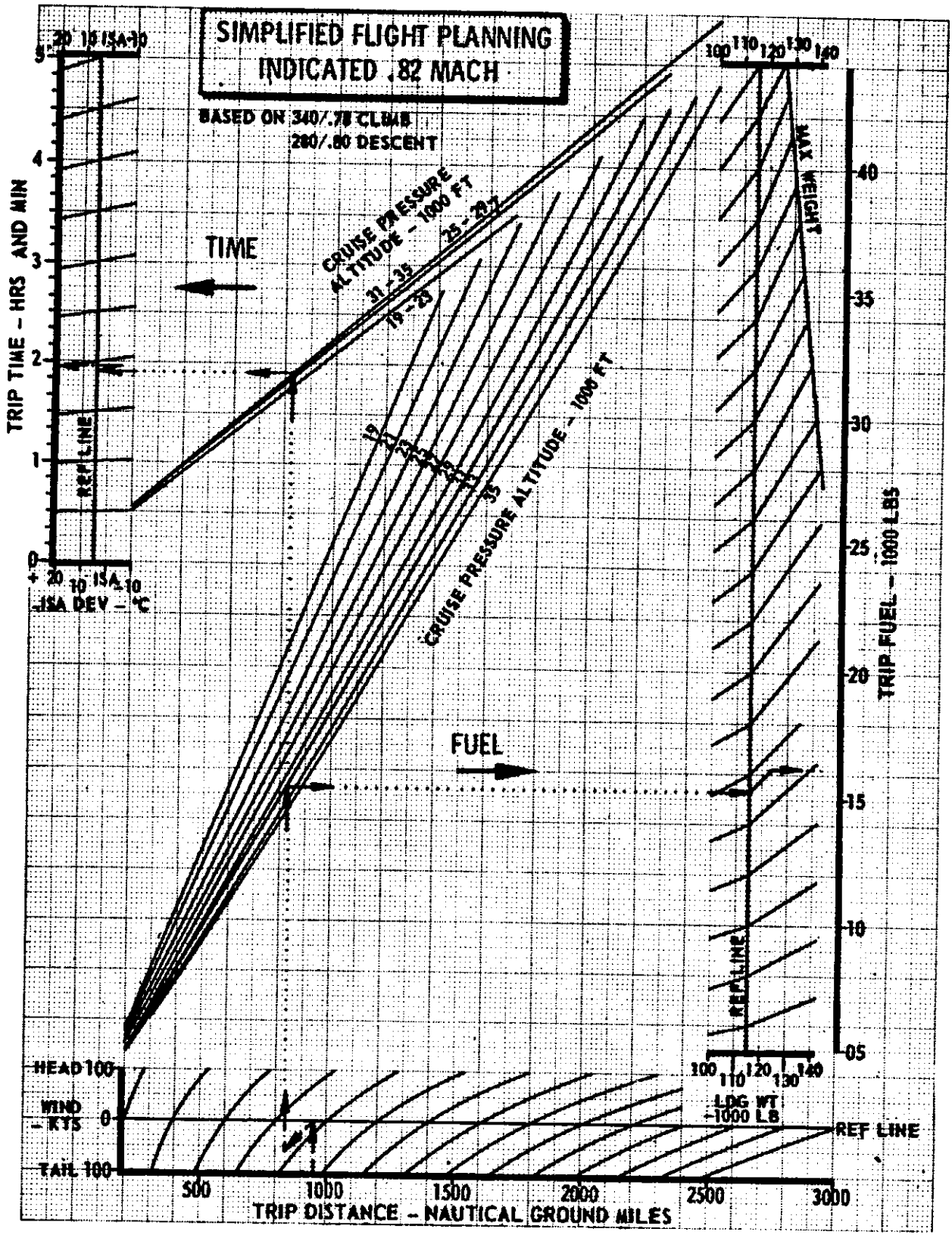


FIGURE 7. Simplified Flight Planning Chart.

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

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

FIGURE 8. Climb and Descent Planning.

PRESS. ALT-FT	CLIMB DATA	DEVIATION FROM ISA - DEGREE (C)							
		-15	-10	-5	-0	5	10	15	20
40000	TIME MIN FUEL LBS DIST NAM AVTAS KTS			3 ENGINES 2 BLEEDS					
39000	TIME MIN FUEL LBS DIST NAM AVTAS KTS			START CLIMB WEIGHT 165,000 LB					
38000	TIME MIN FUEL LBS DIST NAM AVTAS KTS								
37000	TIME MIN FUEL LBS DIST NAM AVTAS KTS	28 5964 180 385	33 6719 216 392						
36000	TIME MIN FUEL LBS DIST NAM AVTAS KTS	24 5392 153 380	27 5877 175 386	31 6498 205 393	37 7368 247 400				
35000	TIME MIN FUEL LBS DIST NAM AVTAS KTS	22 5043 137 377	24 5438 154 382	27 5916 176 388	31 6519 205 395	37 7340 245 402	45 8599 308 410		
33000	TIME MIN FUEL LBS DIST NAM AVTAS KTS	19 4549 115 370	21 4854 128 375	23 5210 144 381	25 5632 162 386	28 6146 186 392	32 6794 216 398	38 7661 257 405	47 8958 321 414
31000	TIME MIN FUEL LBS DIST NAM AVTAS KTS	17 4170 100 364	18 4426 110 368	20 4720 122 373	22 5059 137 378	24 5456 154 384	27 5934 175 389	31 6536 202 395	36 7336 239 401
29000	TIME MIN FUEL LBS DIST NAM AVTAS KTS	14 3799 86 355	16 4016 94 360	17 4260 104 364	19 4537 115 369	21 4855 128 374	23 5229 143 378	25 5685 163 383	29 6257 187 389
28000	TIME MIN FUEL LBS DIST NAM AVTAS KTS	14 3611 79 351	15 3810 87 355	16 4032 95 360	17 4283 105 364	19 4568 116 368	21 4902 130 373	23 5304 146 377	26 5797 167 382
27000	TIME MIN FUEL LBS DIST NAM AVTAS KTS	13 3434 73 347	14 3617 80 351	15 3821 87 355	16 4049 96 359	17 4307 106 364	19 4609 118 368	21 4968 132 372	24 5401 150 377
20000	TIME MIN FUEL LBS DIST NAM AVTAS KTS	8 2372 42 322	8 2479 45 326	9 2596 49 329	10 2725 53 332	10 2870 58 336	11 3035 63 339	12 3223 70 342	13 3440 77 346

NOTE: 1. Enter chart at cruise flight level.
2. Subtract 150 lbs. fuel and $\frac{1}{2}$ min. of time for each 1000 feet that departure airport is above sea level.

FIGURE 9. Enroute Climb Chart.

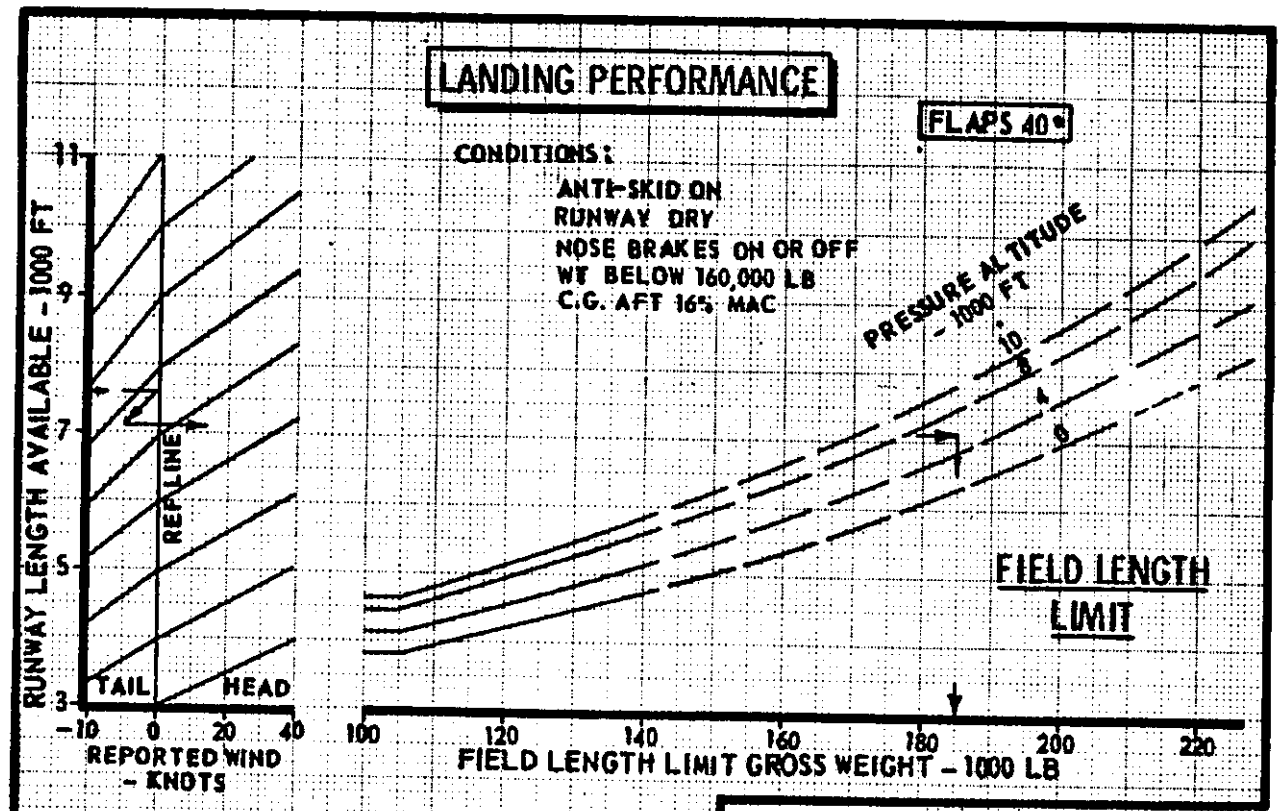
IND. MACH .82 CRUISE
PLANNING
3 ENGINES 2 AIRBLEEDS

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 10. Cruise Planning Chart.



FIELD LENGTH WEIGHT CORRECTIONS

DISPATCH CONDITION	ANTI-SKID	RUN-WAY	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 11. Landing Performance Chart.

ENROUTE HIGH ALTITUDE - U.S.

For use at and above 18,000' MSL

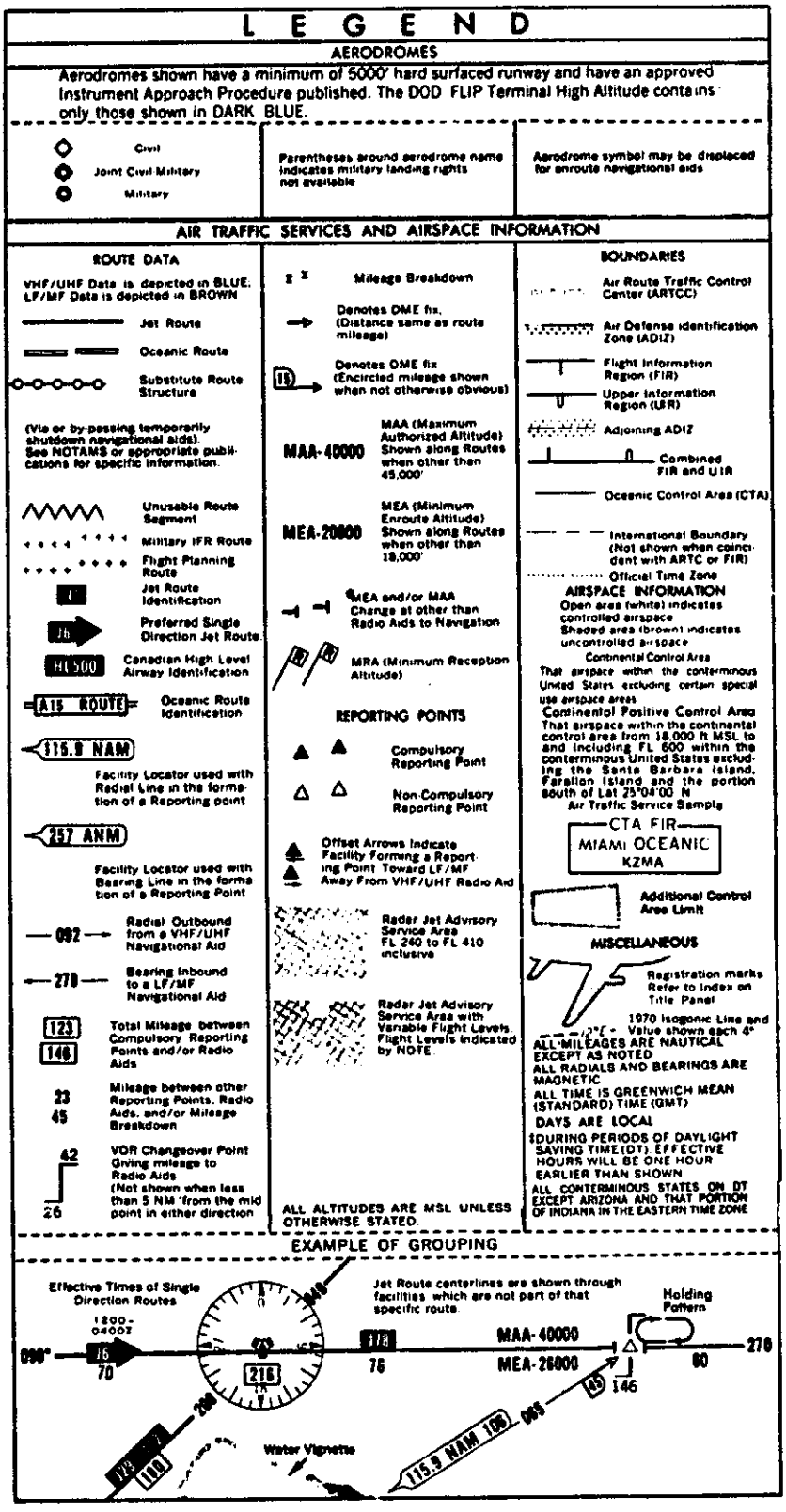


FIGURE 12. Enroute Chart Legend.

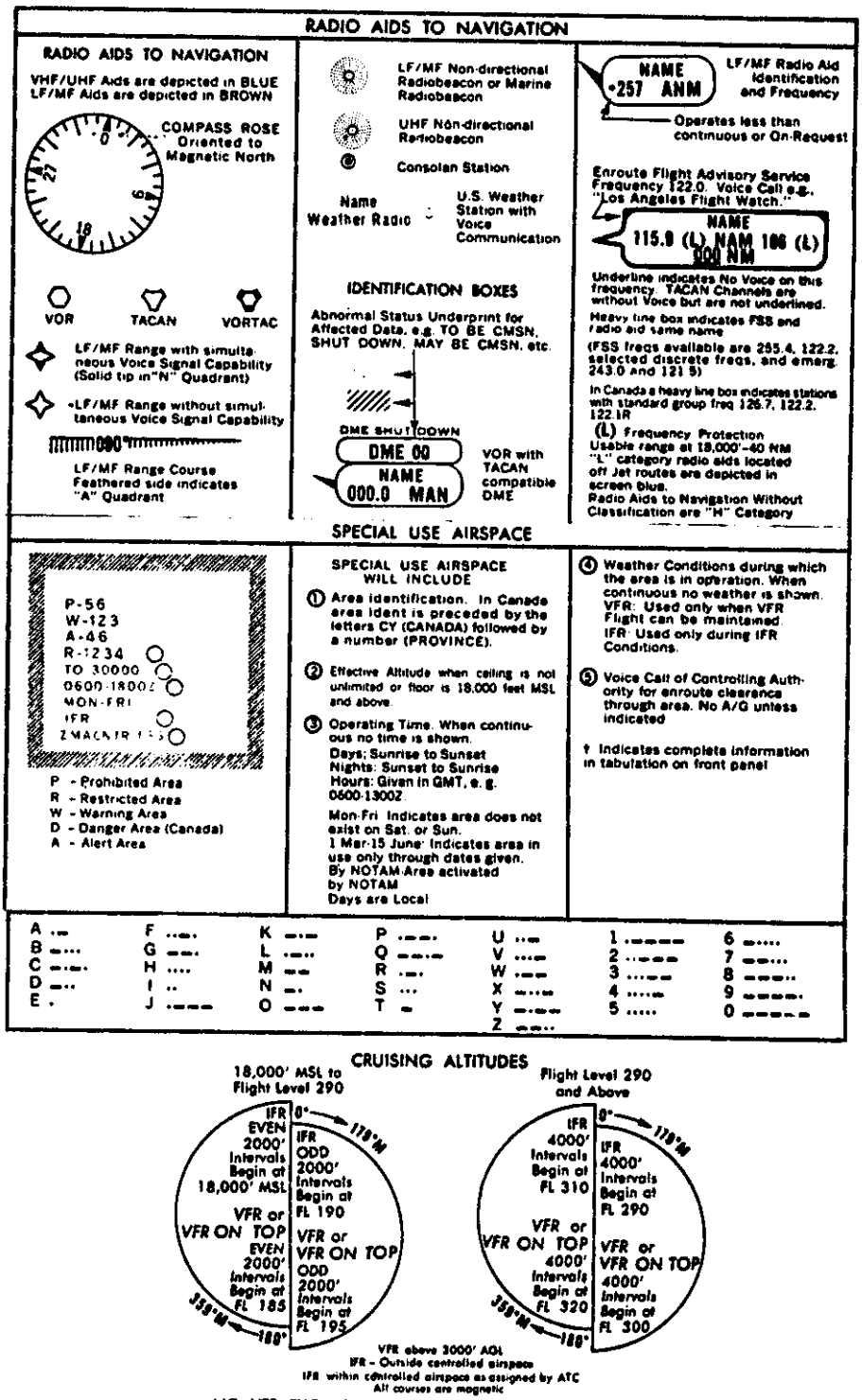


FIGURE 13. Enroute Chart Legend.

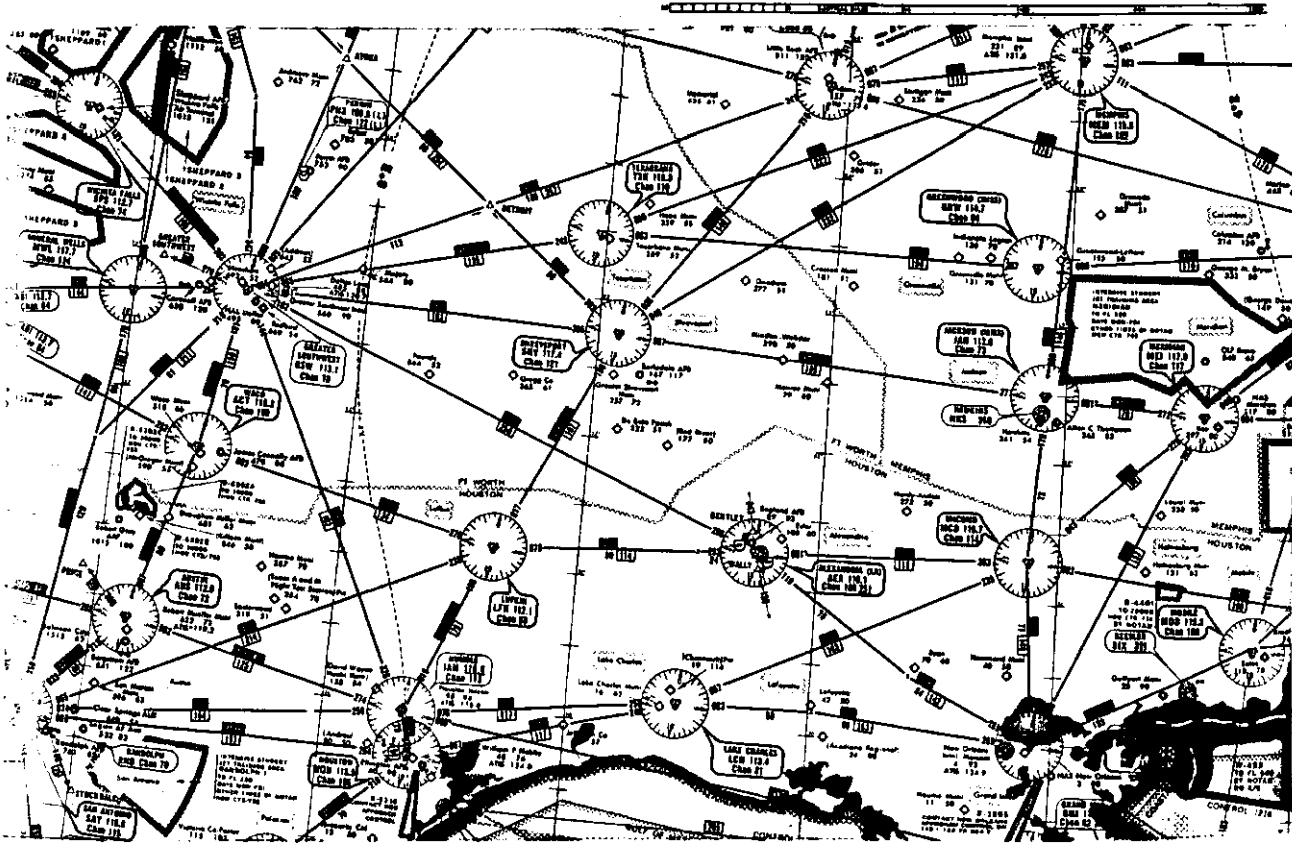


FIGURE 13. Segment—Enroute high altitude chart

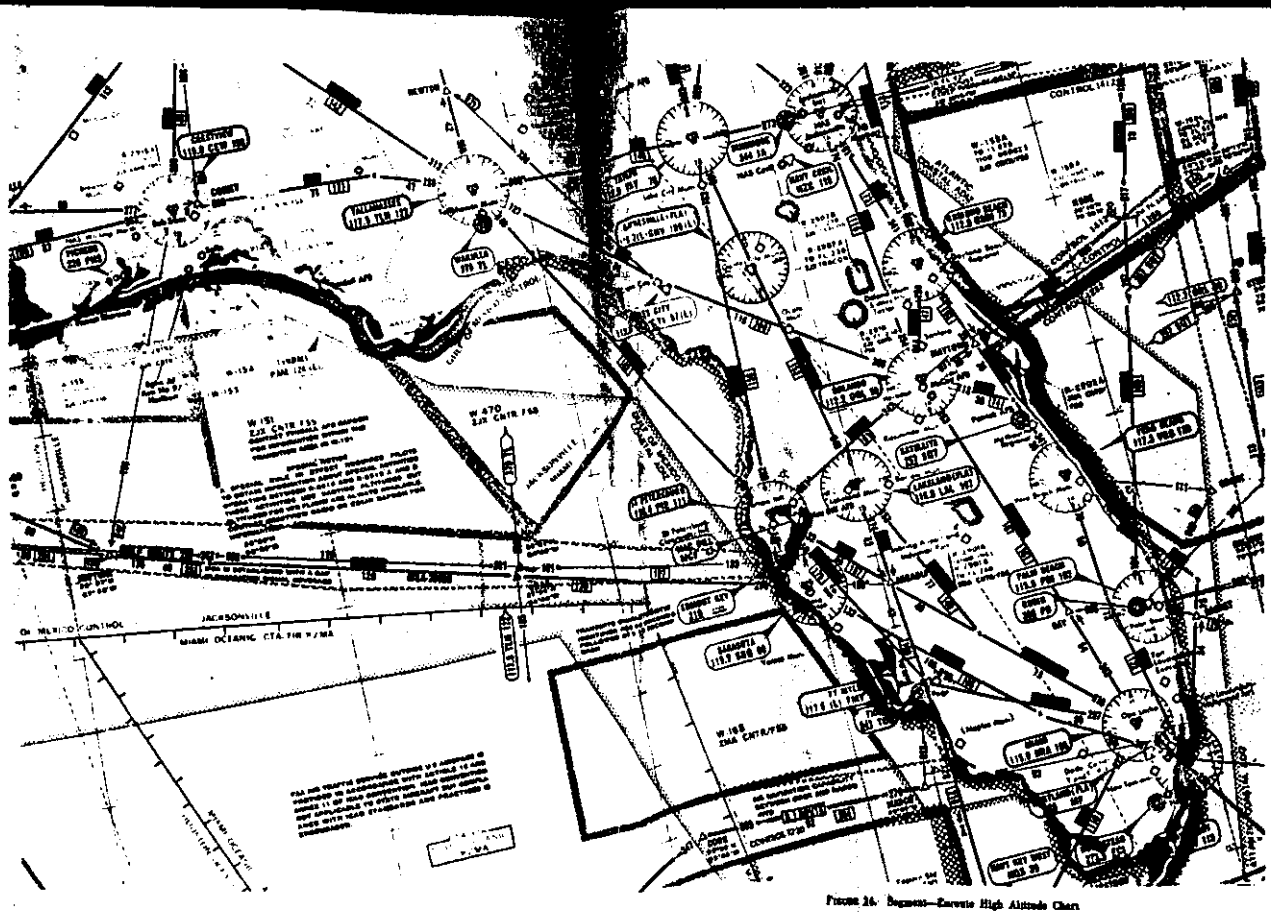


FIGURE 24. Segment—Enroute High Altitude Chart

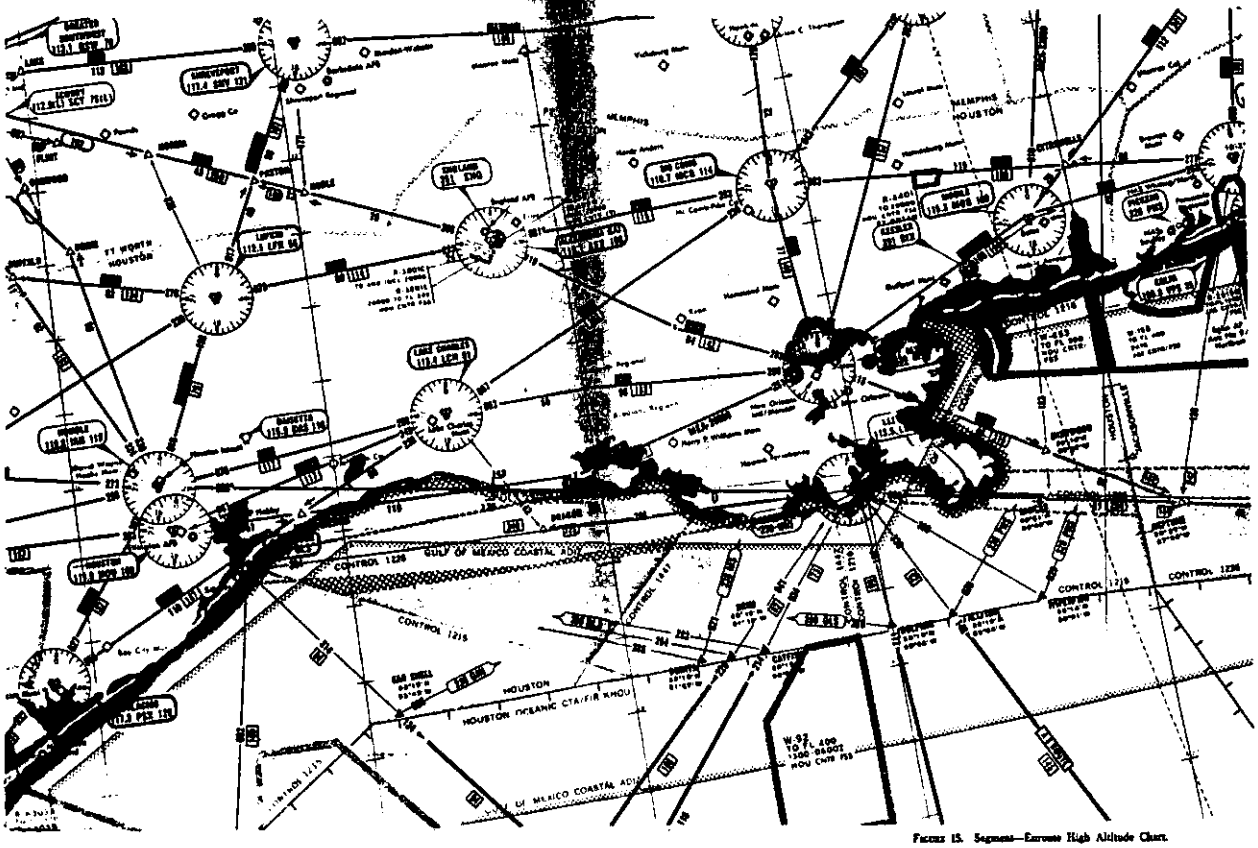


FIGURE 15. Segment—Enroute High Altitude Chart.

LEGEND

INSTRUMENT APPROACH PROCEDURES (CHARTS)

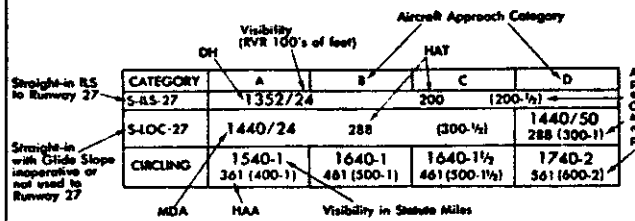
GENERAL INFORMATION & ABBREVIATIONS

★Indicates control tower operates non-continuously.
All distances in nautical miles (except Visibility Data which is in statute miles and Runway Visual Range which is in hundreds of feet).
Runway dimensions in feet.
Elevations in feet Mean Sea Level.
All radials/bearings are Magnetic.

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

LANDING MINIMA FORMAT

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

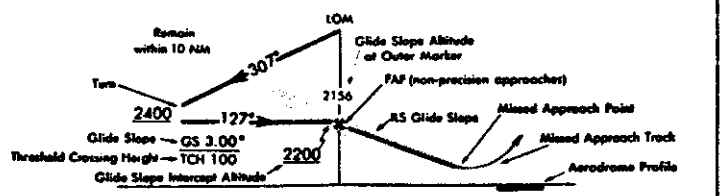


PUBLISHED BY NOS, NOAA, TO IACC SPECIFICATIONS

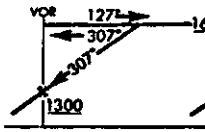
LEGEND

INSTRUMENT APPROACH PROCEDURES (CHARTS)

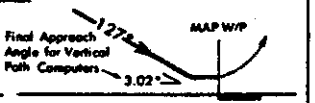
PROFILE



DESCENT FROM HOLDING PATTERN



RNAV DESCENT



FACILITIES/FIXES

Z	
FM	
NDB (RBn)	
RNG	
VOR	
VORTAC	
TACAN	FIX
WAYPOINT	INT

ALTITUDES

5500	2300	4800	2200
Mandatory Altitude	Minimum Altitude	Maximum Altitude	Recommended Altitude

Altitudes precede fix or are arrowed to show where they apply.

Glide Slope intercept altitude is the same as the minimum altitude over LOM for localizer only approach, except as otherwise noted.

※ Final Approach Fix (FAF) (for non-precision approaches)

Glide Slope Intercept

Visual Flight Path

AERODROME SKETCH

Runways

Hard Surface — Other Than Hard Surface — Hardstands/Taxiways

Closed Runways and Taxiways — Under Construction — Metal Surface

Over-run — Displaced Threshold

Arresting Gear: uni-directional — bi-directional — Jet Barrier

Helicopter Alighting Area

Negative Symbols used to identify Copter Procedure landing point.

Note: The prep type symbol is being phased out.

Elev 173 — Runway TDZ elevation

0.8% — up — Total Runway Gradient (shown when runway gradient exceeds 0.3%)

- Control Tower. When Control Tower and Rotating Beacon are co-located, Beacon symbol will be used and further identified as TWR.
- ★ Rotating Aerodrome Beacon.
- ※ U.S. Navy Optical Landing System (OLS) "OLS" location is shown because of its height of approximately 7 feet and proximity to edge of runway may create an obstruction for some types of aircraft.

Approach light symbols are shown on a separate legend.

MINIMA DATA

- ▲ Indicates other than standard Alternate Minimums apply for U.S. Army and Civil, refer to tabulation.
- ▲NA Indicates IFR minimums are Not Authorized for alternate use due to unmonitored facility or absence of weather reporting service.
- ▼ Indicates other than standard Take-off Minimums or departure procedures apply for Civil users. Civil users refer to tabulation. DOD users refer to Service Directives and NOS produced civil SID publication.

Night minimums shown in negative form being phased out. Charts converted to TERPs criteria will show night minimum when different than day by an asterisk and note.

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FIGURE 16. Legend—Approach Charts.

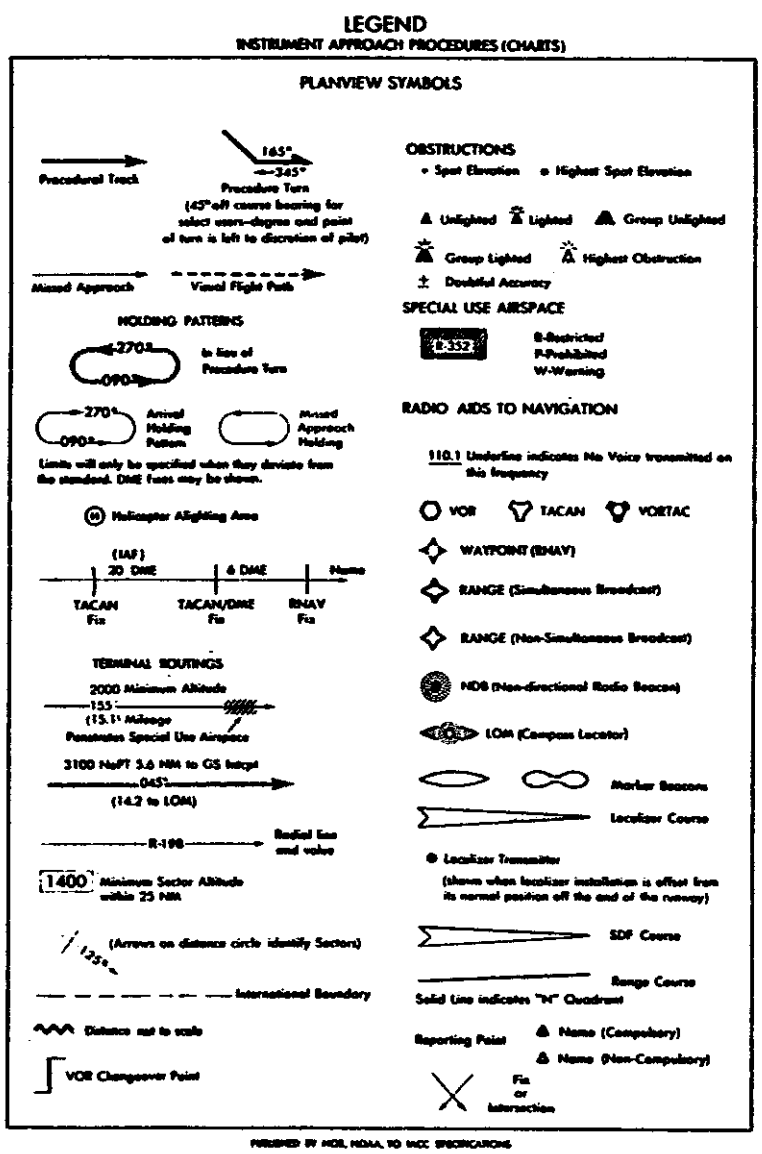

FIGURE 17. Legend—Approach Charts.

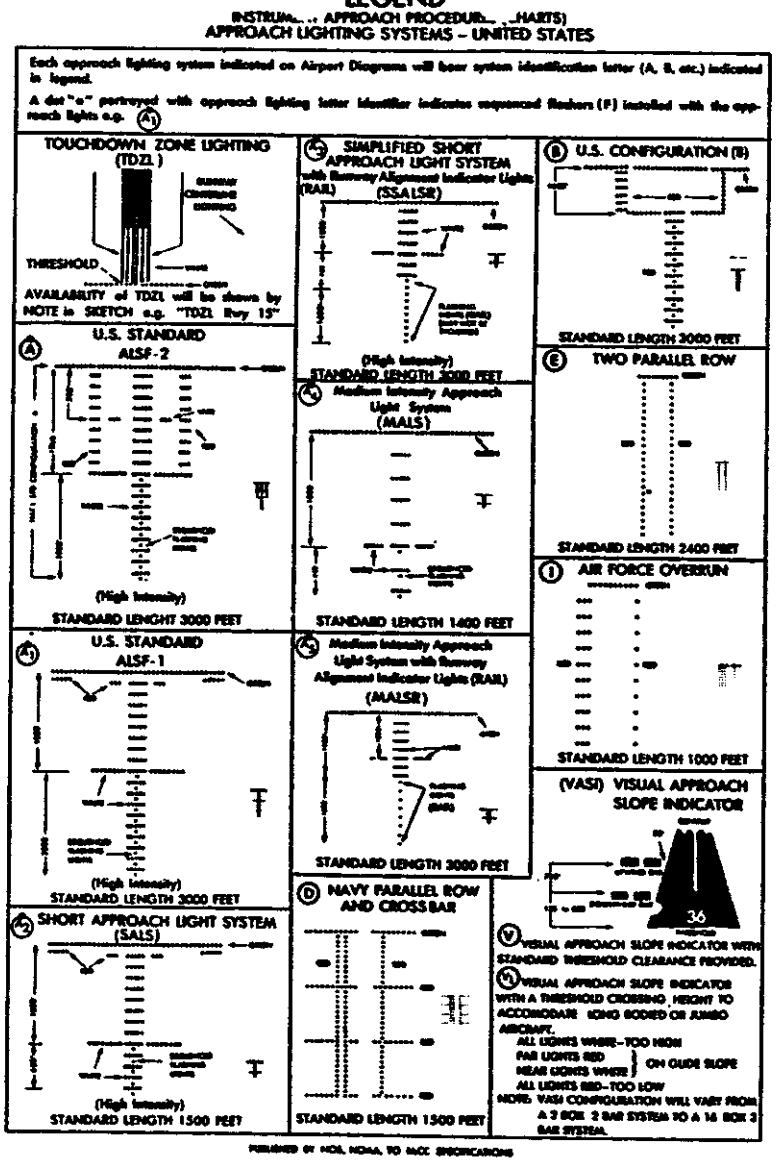

FIGURE 18. Approach Light Systems.

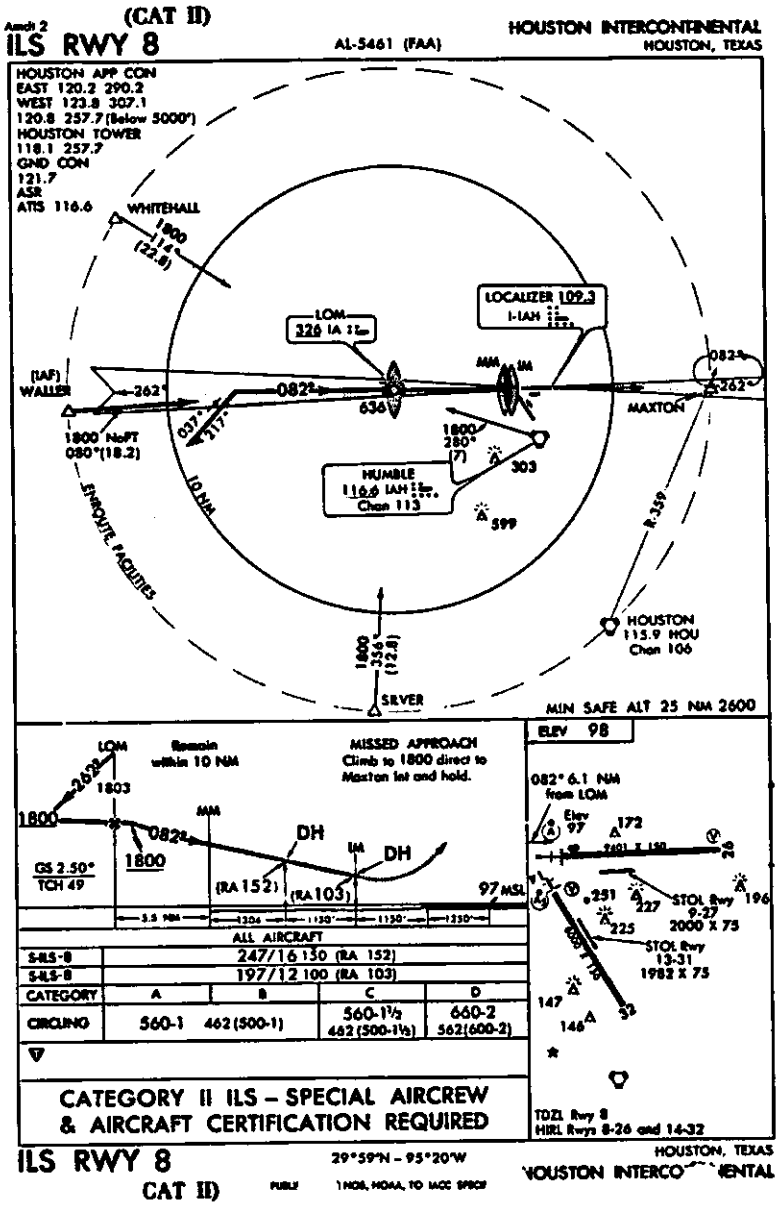

FIGURE 19. Approach Chart—Houston.

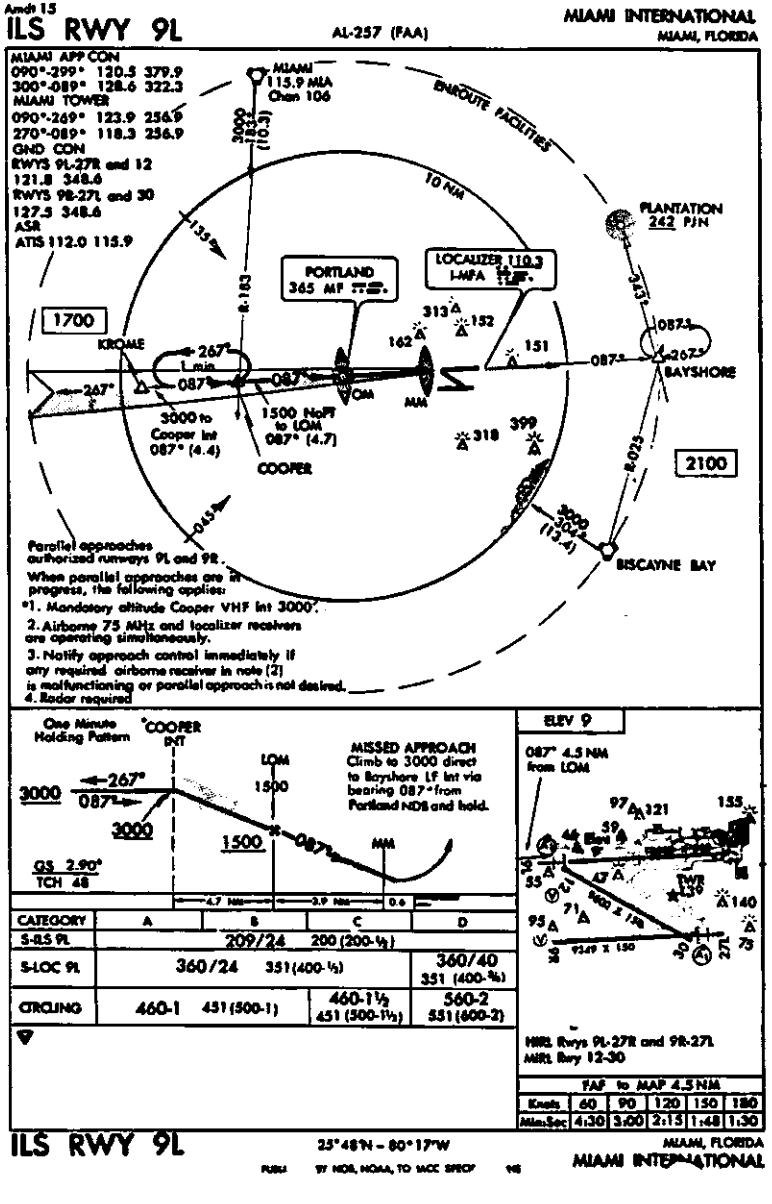

FIGURE 20. Approach Chart—Miami.

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

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 cover
- — Thin (When prefixed to the above symbols)
- –X Partly obscured: 0.1 to less than 1.0 sky hidden by precipitation or obstruction to vision (bases at surface)
- X Obscured: 1.0 sky hidden by precipitation or obstruction to vision (bases at surface)

CEILING

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

A	Aircraft	R	Radar
B	Balloon (ceiling, pilot, or roob)	W	Indefinite
E	Estimated	"V"	Immediately following numerical value indicates a variable ceiling height
M	Measured		

VISIBILITY

Reported in statute miles and fractions (V-Variable). The symbol + indicates visibility greater than that being reported.

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 GMT time group in remarks indicates windshift and its time of occurrence. (Knots X 1.15 = statute mi/hr.)

EXAMPLES: 3627 360 degrees, 27 knots;
3627G48 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, 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 feet 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 "SP" followed by a time group (24-hour clock GMT) e.g., PIT SP 0715 -XM1⊕... 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.

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Revised

FIGURE 21. Key to Aviation Weather Reports.

KEY TO AVIATION WEATHER FORECASTS.....

TERMINAL FORECASTS are 18-hour forecasts containing information for specific airports on ceiling, cloud heights, cloud amounts, visibility, weather conditions, and surface wind. They are written in a form similar to the AVIATION WEATHER REPORT. They have additional 6-hour categorical outlooks of VFR, MVFR (Marginal VFR), and IFR conditions.

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, but omitted when less than 10

EXAMPLE OF TERMINAL FORECASTS

C15⊕	Ceiling 1500 feet, broken clouds	O11/2GF	Clear, visibility 1½ miles, ground fog
C5X1/4S+	Sky obscured, vertical visibility 500 feet, visibility ¼ mile, heavy snow	29⊖C7B⊖6K 3230G	Scattered clouds at 2000 feet, ceiling 7000 feet overcast, visibility 6 miles, smoke, surface wind 320 degrees 30 knots, gusty.

AREA FORECASTS are 18-hour forecasts of cloud, weather, and frontal conditions for an area the size of several states. Heights of cloud tops and icing are ABOVE SEA LEVEL (ASL); ceiling heights, ABOVE GROUND LEVEL (AGL); bases of cloud layers are ASL unless noted. Area Forecasts may be amended; but SIGMETs and AIRMETs also are considered as amendments to Area Forecasts. Area Forecasts have additional 12-hour categorical outlooks of VFR, MVFR (Marginal VFR), and IFR conditions.

SIGMET or AIRMET warns 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 are forecast for all levels shown except that no forecasts are issued for the 3000-foot level or other levels within 2500 feet of a station's elevation.

EXAMPLES OF WINDS AND TEMPERATURES ALOFT (FD) FORECASTS.

FD WBC 121745
BASED ON 1212Z 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	3428-11	3421-16	3516-27	3512-38	311649	292451	283451
JFK	3926	3327-09	3324-12	3322-16	3129-27	2923-38	284248	285158	285749

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

PILOTS . . . report inflight weather to nearest FSS. The latest surface weather reports are available by phone at the nearest pilot weather briefing office by calling at H+10.

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Revised

FIGURE 22. Key to Aviation Weather Forecasts.

ACT - Waco, Texas

CRP - Corpus Christi, Texas

DAL - Dallas, Texas

GSW - Fort Worth, Texas

HOU -Houston, Texas

JAX - Jacksonville, Florida

MCN -Macon, Georgia

MGM - Montgomery, Alabama

MIA -Miami, Florida

MSY - - - - - - - - - - - - - - - - - New Orleans, Louisiana

ORL -Orlando, Florida

PBI - Palm Beach, Florida

SAT -San Antonio, Texas

TLH -Tallahassee, Florida

TPA -Tampa, Florida

TXK -Texarkana, Texas

NOTE: In the near future, sky cover symbols on the Area Forecasts, Terminal Forecasts, and Aviation Weather Reports will be replaced by contractions as follows: ○ - - CLR; ◑ - - SCT; ◍ - - BKN; ⊕ - - OVC.

FIGURE 23. Station Identifiers.

MIA FA 211240
13Z TUE-07Z WED
OTLK 07Z WED-19Z WED

FLA E OF 85 DEGS GA AND CSTL WATERS

HGTS ASL UNLESS NOTED

SYNS. BROAD ZONE CONVERGENCE NRN FLA/SRN GA. WK CDFNT ENE/WSW NRN GA WL MOV SLOLY SEWD.

SIGCLDS AND WX. GA AND NRN THIRD FLA CIG 3-8 BKN VRBL OVC VSBY 1 TO 4 MI IN FOG CONDS VRBL TO CIG 1 HND OBSC 1/8 IN FOG AND SMOKE. OCNL R-L- SRN GA/NRN FLA IMPVG BY 15Z/16Z TO 5-8 SCT VRBL BKN 12-20 BKN 5F AND BY 17Z GENLY 25-30 SCT AGL 300 BKN PATCHY 100 BKN. FEW RW/TRW LKLY MSTLY NRN FLA WITH CB TOPS TO 350. OTLK. VFR XCPT MVFR 10Z-15Z.

CSTL WTRS NRN THIRD FLA/SRN GA 15-25 SCT VRBL BKN SCTD RW FEW TRW TOPS 200-300. OTLK. VFR.

SRN TWO THIRDS FLA 15-25 SCT LCLY CLR OVR LAND WITH FEW PTCHS 2 TO 5GF. CNTRL FLA PTCHY CIG 80 BKN. FEW SHWRS SE CST AND KEYS. AFT 15Z GENLY 25-35 SCT VRBL BKN 300 BKN PTCHS 100 BKN SCTD SHWRS FEW TSHWRS CNTRL FLA W CST SPRDG INLAND DURG AFTN. LCLY CIG 10-20 BKN 2 TO 5 RW/TRW TOPS TO 350. OTLK. VFR.

CSTL WTRS OF SRN TWO THIRDS FLA 15-25 SCT VRBL BKN 300 BKN FEW SHWRS SERN WTRS AND SCTD SHWRS FEW TSHWRS GLFCSTL WTRS. OTLK VFR.

ICG. LGT TO MDT ICGIC ABV FRZG LVL 100 N GA TO 140 S FLA.

- -

MIA WA 211250
211300-211700Z

AIRMET ALFA 1. FLT PRCTN. NRN THIRD OF FLA AND OVR GA TIL 15Z/17Z LOW ST CIGS AND OCNLY LOW VSBYS IN FOG AND SRN GA/NRN FLA SOME RAIN.

FIGURE 24. Area Forecasts and AIRMET (MIA).

MSY FA 211240
13Z TUE-07Z WED
OTLK 07Z WED-19Z WED

LA MISS ALA TENN ARK FLA W OF 85 DEG CSTL WTRS

HGTS ASL UNLESS NOTED

SYNS. WK CDFNT E TENN TO S ARK WL MOV SWD AND LOSE IDENTITY AS HI PRES SYS BLDS SEWD INTO THE ERN U.S.

SIGCLDS AND WX. TENN W OF LOUISVILLE-NASHVILLE LN CIG 1 HND OBSC VSBY 1/4 FOG VRBL PTLY OBSC VSBY 1/2 FOG TOPS 15 WL IPV TO 10 SCT VRBL BKN VSBY 3 FOG BY 16Z AND TO SKC VSBY 7 BY 18Z. TENN E OF A LOUISVILLE-NASHVILLE LN CIG 4-8 OVC VSBY 1-3 FOG TOPS 30-50 WL IPV TO CIG 15 BKN VRBL OVC VSBY 3-6 FOG BY 17Z AND FTHR IPV TO CIG 25 BKN VRBL SCT VSBY 7 BY 20Z. OTLK VFR.

ARK. GNDFG WITH VSBYS 1-3 MI OCNLY CIG 1 HND OBSC VSBY 1/4 IN FOG WL IPV TO SKC VSBY 7 BY 16Z. OTLK. VFR.

LA MISS ALA FLA W OF 85 DEG.
E OF NEW ORLEANS-BIRMINGHAM LN CIG 10-20 OVC VRBL BKN VSBYS 3-5 FOG LCLY CIG 4 OVC VSBY 2 FOG WL IPV TO CIG 25 BKN VRBL SCT BY 17Z AND MOSTLY CLRG BY 00Z. A FEW SHWRS WITH TOPS TO 200 NEAR THE COAST TIL 16Z. CLD TOPS 30. W OF NEW ORLEANS-BIRMINGHAM LN FQTLY PTLY OBSC VSBY 1/2 FOG VRBL CIG 2 HND OVC VSBY 1/2 FOG WL IPV TO 30 SCT TO SKC AND VSBY 7 MI BY 16Z. OTLK. VFR EXCP MVFR TO IFR IN GNDFG 09Z-15Z.

CSTL WTRS
30 SCT 100 SCT VRBL BKN. A FEW SHWRS WITH TOPS 200 E OF 90W. OTLK. VFR.

ICG. NONE OF IMPORTANCE. FRZLVL 80 TENN SLPG TO 120 CSTL WTRS.

- -

MSY WA 211250
211300-211700Z

AIRMET ALFA 1. FLT PRCTN. OVR LAND AREA CIGS FQTLY BLO 1 THSD AND/OR VSBYS FQTLY BLO 2 MI IPVG BY 17Z.

FIGURE 25. Area Forecasts and AIRMET (MSY).

GSW FA 211240
13Z TUE-07Z WED
OTLK 07Z WED-19Z WED

OKLA NMEX TEX AND CSTL WTRS

HGTS ASL UNLESS NOTED

SYNS. SMALL WKNG LOW PRES AREA CNTRD NEAR DALLAS AT 13Z MOVG SEWD ABT 10 KTS.

SIGCLDS AND WX. NE OF 60 NW TEXARKANA ARDMORE FORT SILL 40 NE GAGE LN GENLY CIG NEAR ZERO OBSC VSBY 1/4 TO 1 IN FOG TOPS 20-50. CONDS IPVG AFT 16Z GENLY PTLY OBSC VSBY 1 TO 5 IN FOG AFT 19Z AND VSBYS 7 MI OR BTR BY 21Z. OTLK. MVFR BCMG IFR WITH FOG INCRG BY 09Z.

ALG COAST AND INLAND TO ABT 100 MIS PATCHY GNDFG WITH CSDRBL DENSE GNDFG ALG AND WITHIN ABT 30 MIS OF THE COAST CONDS PTLY OBSC VSBY 1 TO 3 MIS IN GNDFG LCLY NEAR CIG ZERO OBSC VSBY ZERO IN FOG. CONDS IPVG AFT 14Z GENLY 8 SCT VSBY 2-5 FOG BY 16Z AND VSBYS 7 MIS OR BTR BY 17Z. OTLK. FOG INCRG BCMG IFR AFT 09Z.

ELSW CONTD CLR. OTLK. VFR.

ICG. NONE OF CONSEQUENCE. FRZG LVL 90-120. SHLW LYR NEAR SFC WITH BLO FRZG TEMPS OVR OKLA AND THE TEX PNHDL TIL 17Z.

- -

GSW WA 211250
211300-211700Z

AIRMET ALPHA 3. FLT PRCTN. WDSPRD DENSE FOG TIL 17Z NE OF 60 NW TEXARKANA ARDMORE FORT SILL 40 NE GAGE LN.

GSW WA 211250
211300-211700Z

AIRMET BRAVO 1. FLT PRCTN. CSDRBL DENSE FOG ALG THE TEX COAST AND INLAND ABT 30 MIS TIL 15Z. CNL AFT 15Z.

FIGURE 26. Area Forecasts and AIRMETs (GSW).

SA 211400

ACT O15+ 180/44/37/2208/0006→ACT↘ 12/9
CRP O12 183/58/49/2508/0007
DAL O10 176/42/38/3406/0006/KALQDS
HOU 30⊙2K 186/59/51/0405/0008
JAX SP M4⊕2F 193/70/68/2405/0104
MCN 4⊙M22⊕4GF 202/62/61/3303/0112
MGM 20⊙5GF 195/60/58/00000/0111/VSBY 1E
MIA O6K 206/75/69/1105/0114/FEW CU CI
MSY 20⊙2GFK 190/66/63/00000/0009
ORL 1000⊙300-⊙7 195/71/68/1809/0111→ORL↘12/10
PBI O9+ 200/74/70/1805/0112/ TCU E-SE
SAT O15 183/47/37/2307/0007
TLH M10⊕2RW-F 182/65/65/0504/0007/T MOVD E TE53 PK WND 18/0815
TPA 4⊙E1000⊙3000⊙8 198/71/68/2103/0112/ ⊙V⊙→TPA↘11/6
TXK O7 176/43/49/0405/0004

SA 211500

ACT O15+ 193/51/39/2208/0100/ 230→ACT↘ 12/9
CRP O12 190/63/51/2307/0009
DAL O10 189/44/39/3408/0009/KALQDS/ 230
HOU 35⊙3K 190/61/53/0000/0009
JAX M7⊕2R-F 207/70/68/2307/0114/RB30/317 16//
MCN SP 3⊙M22⊕4F 209/62/61/2403/0114/ 222 15// ⊙V⊙
MGM SP M16⊙5GF 202/64/61/0604/0113/ 217 1500
MIA 20⊙280⊙8 204/77/69/1012/0114/0005 1201
MSY SP 20⊙3GFK 195/69/66/2404/0111/ 314 1500
ORL 1000⊙E280⊙12 205/76/68/1810/0114/ 314 1156→ORL↘12/10
PBI O9+ 200/78/70/1606/0112/ TCU E-SE/ 102 1200
SAT O15+ 193/54/39/2206/0100
TLH M2⊙10⊕2R-F 196/66/65/1805/0111/RE05B45/ 220 16//
→TLH 12/17 OM OTS 18-1930
TPA 8⊙E300⊙10 206/73/67/2006/0114/ 320 1602→TPA↘11/6
TXK O10 183/48/42/0606/0006

FIGURE 27. Aviation Weather Reports.

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SA 211600

ACT O15+ 200/57/38/2710/013→ACT↘ 12/9
CRP 30⊙12 193/67/53/2110/010
DAL O10 205/48/40/3407/014/KALQDS
HOU 35⊙5K 193/64/54/0104/010
JAX 7⊙M11⊕2R-F 213/70/68/2606/016
MCN 20⊙8 209/68/60/3205/014 ⊙V⊙
MGM M14⊙6KH 206/67/60/3406/014/⊙V⊙
MIA 20⊙28⊙10 202/79/69/1210/013
MSY M11⊙3K 200/70/66/3106/012
ORL 25⊙E100⊙28⊙⊙14+ 202/79/68/2009/013→ORL↘12/10
PBI S M25⊙9+ 193/80/69/1513/010
SAT O15+ 200/59/40/2510/013
TLH M3⊙12⊕2R-F 203/67/65/0000/013/⊙V⊙ →TLH↘12/17
TPA 20⊙E120⊙300⊙10 204/76/69/2009/012→TPA↘11/6
TXK O20 193/55/45/0407/009
```

```
FT211040

ATL 211111 C1X1/8F BRF 1/4F. 15Z C2⊕1/2F. 16Z C5⊕V⊙1F. 17Z
25⊙7. 01Z O5H. 05Z MVFR BCMG IFR AFT 07Z..
DAL 211111 O. 19Z O 0210. 05Z VFR..
HOU 211111 C20⊙2FK. 14Z 30⊙3K. 16Z 40⊙6KH. 22Z O7 3110.
05Z VFR BCMG MVFR GFK BY 10Z..
JAX 211111 C4⊕3F OCNLY C2⊕1F. 15Z 5⊙C12⊙6GFK ⊙V⊙. 16Z C20⊙7.
MIA O OCNLY 25⊙. 15Z 25⊙ 1310 OCNLY C25⊙. 00Z O OCNL 25⊙.
05Z VFR..
MSY 211111 C20⊕3FK CHC BRF RW-. 16Z 30⊙6K ⊙V⊙. 22Z O. 05Z
VFR BCMG IFR AFT 09Z..
ORL 211111 100⊙7 ⊙V⊙. 15Z 35⊙C300⊙ ⊙V⊙ CHC FEW RW OR TRW
AFTN. 05Z VFR..
TLH 211111 30⊙20⊙C80⊕4F OCNLY C3⊙20⊖2R-F. 15Z 10⊙C20⊙5F. 17Z
25⊙C100⊙7 ⊙V⊙ CHC FEW RW OR TRW. 03Z 10⊙C100⊖7. 05Z MVFR..
TPA 211111 C100⊙7 CHC OCNL C6⊙. 15Z 30⊙100⊙C300⊙ ⊙V⊙ FEW
C15⊙3RW-/
```

FIGURE 28. Aviation Weather Reports and Terminal Forecasts.

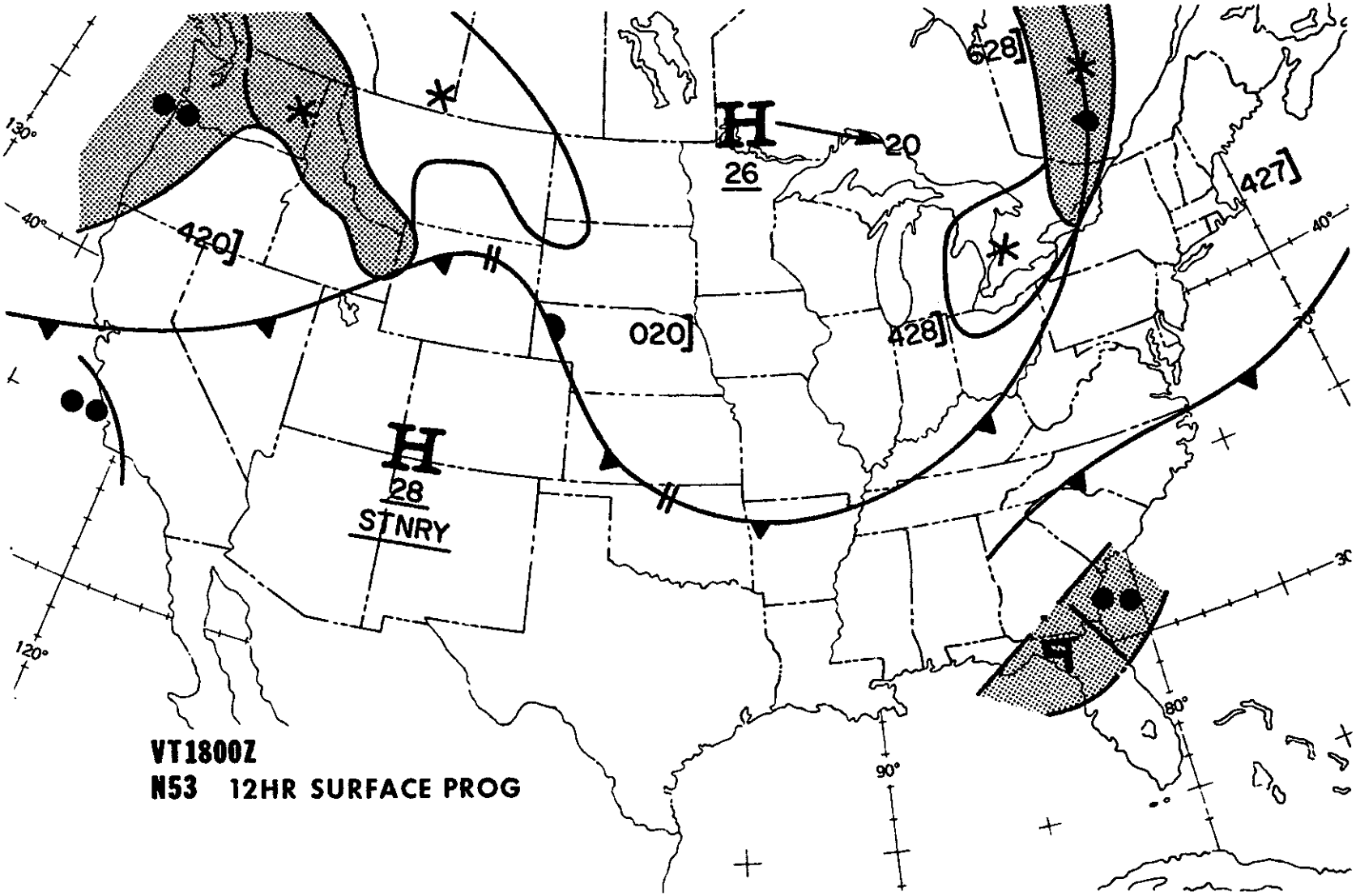


FIGURE 29. 12-Hour Surface Prog.

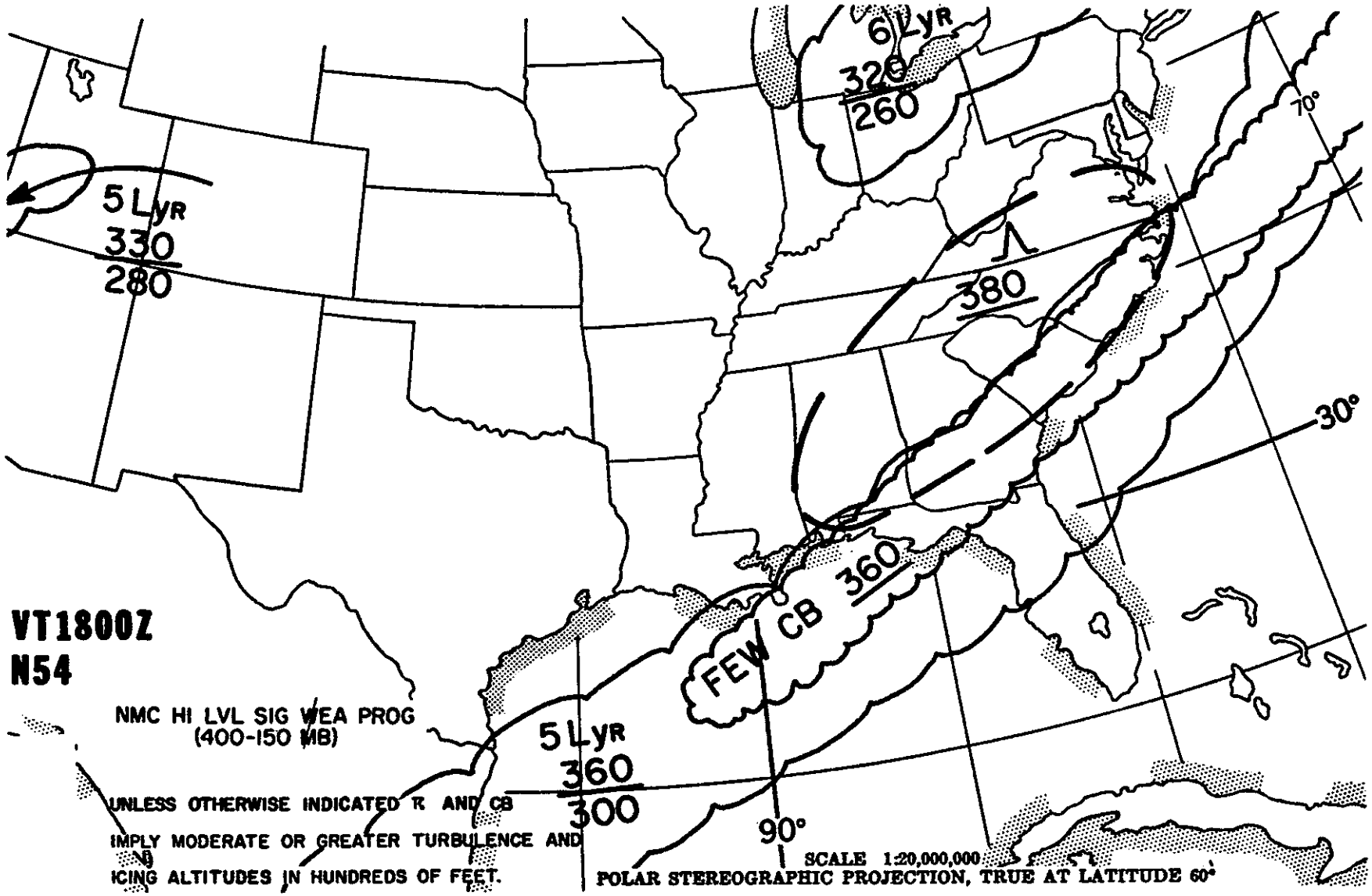


FIGURE 30. High Level Significant Weather Prog. (400-150 MB).

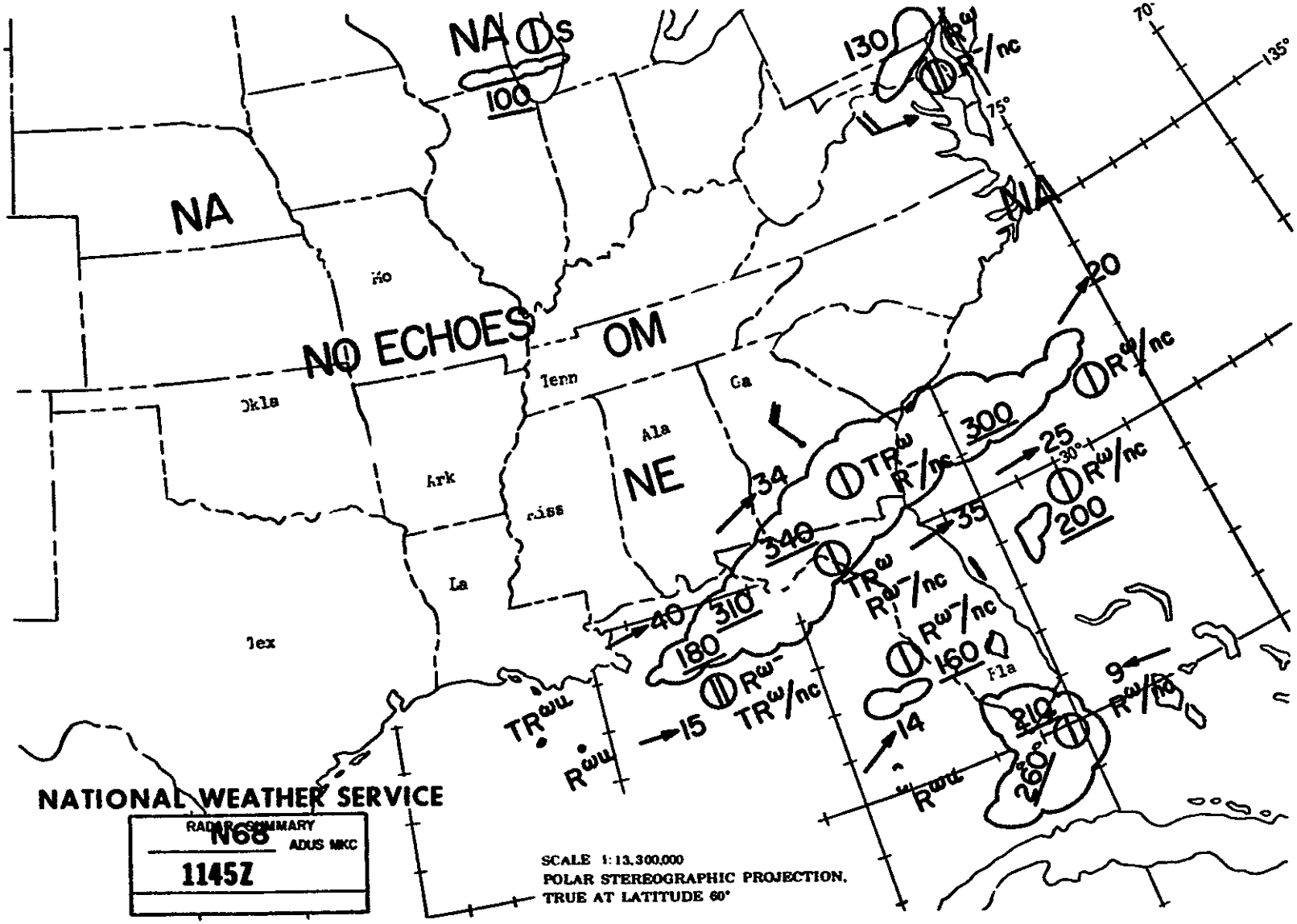
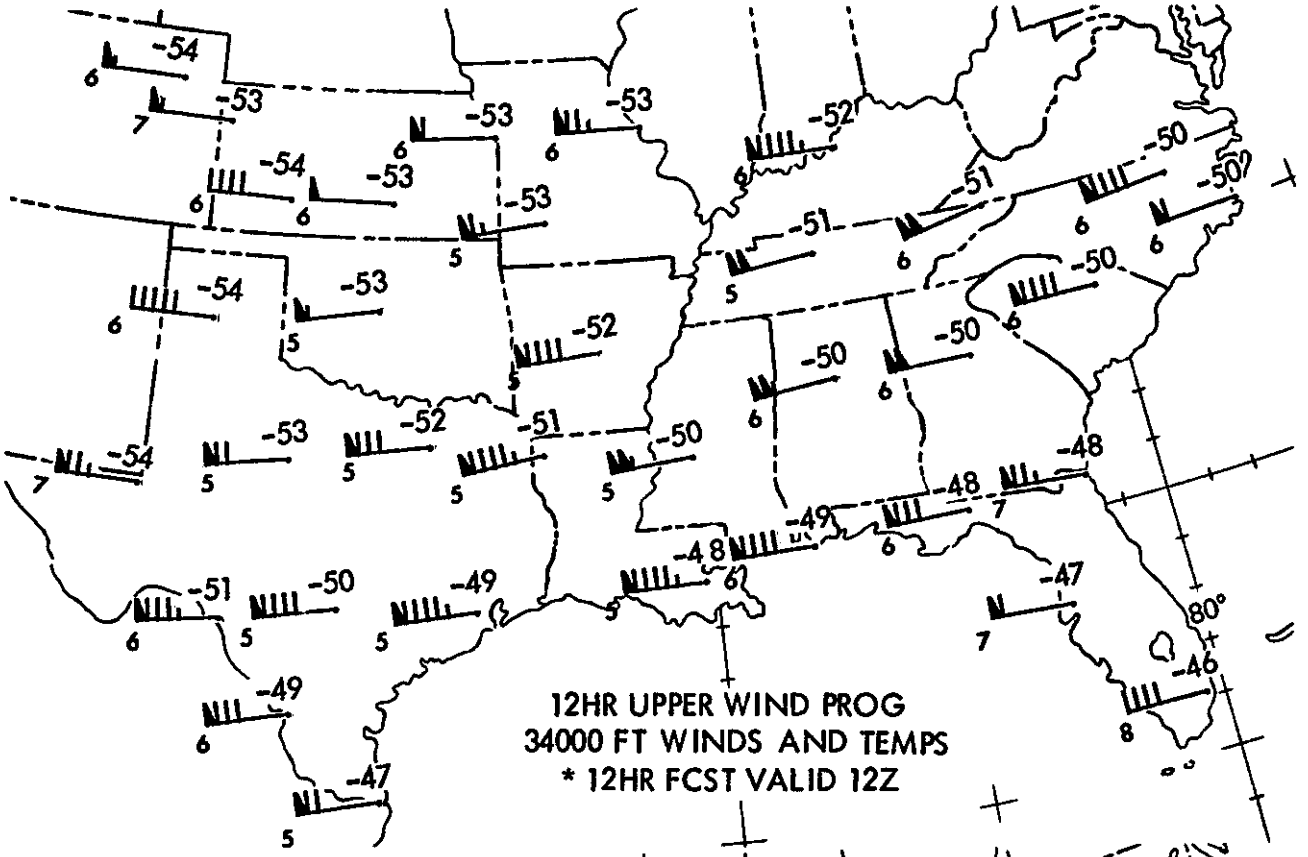


FIGURE 31. Radar Summary Chart.



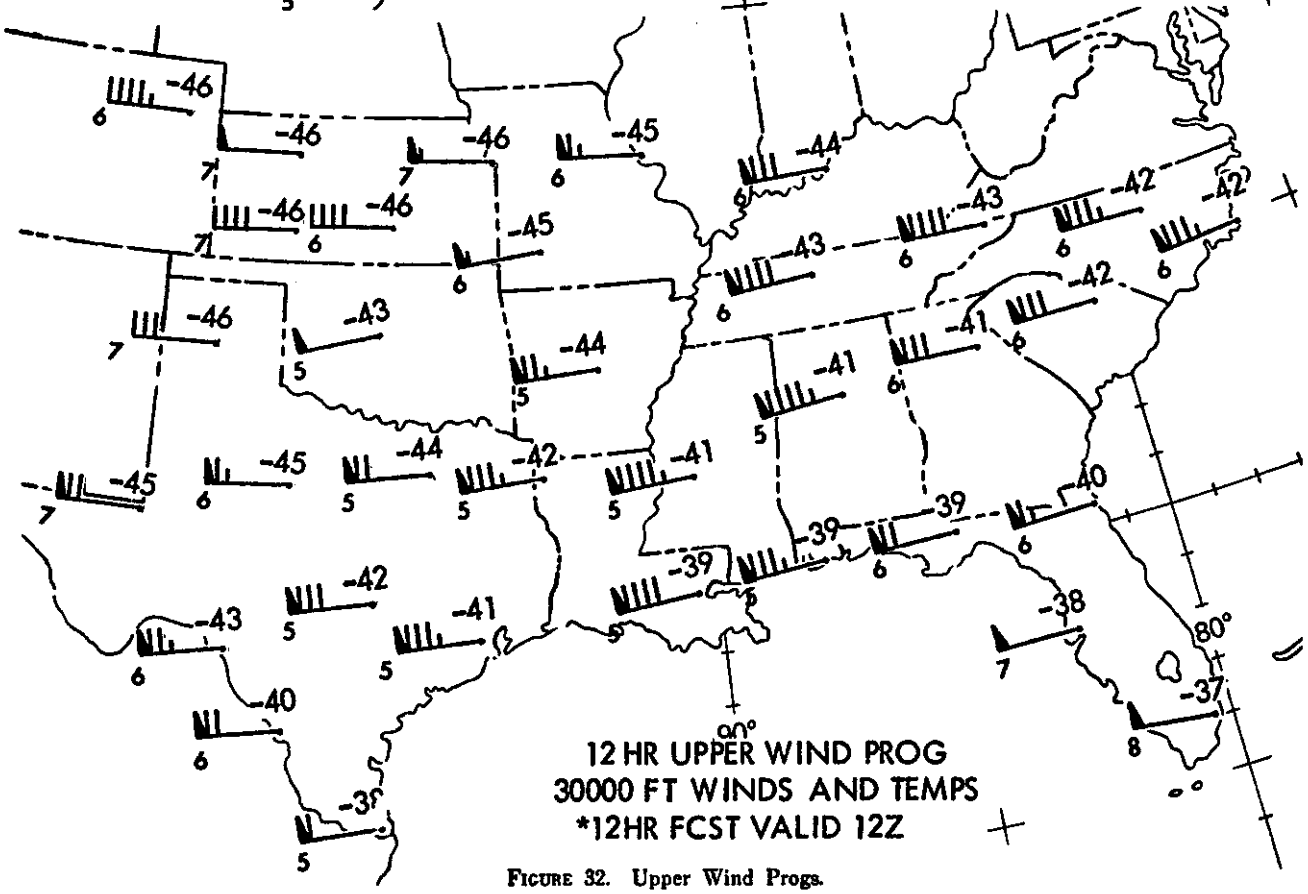


FIGURE 32. Upper Wind Progs.

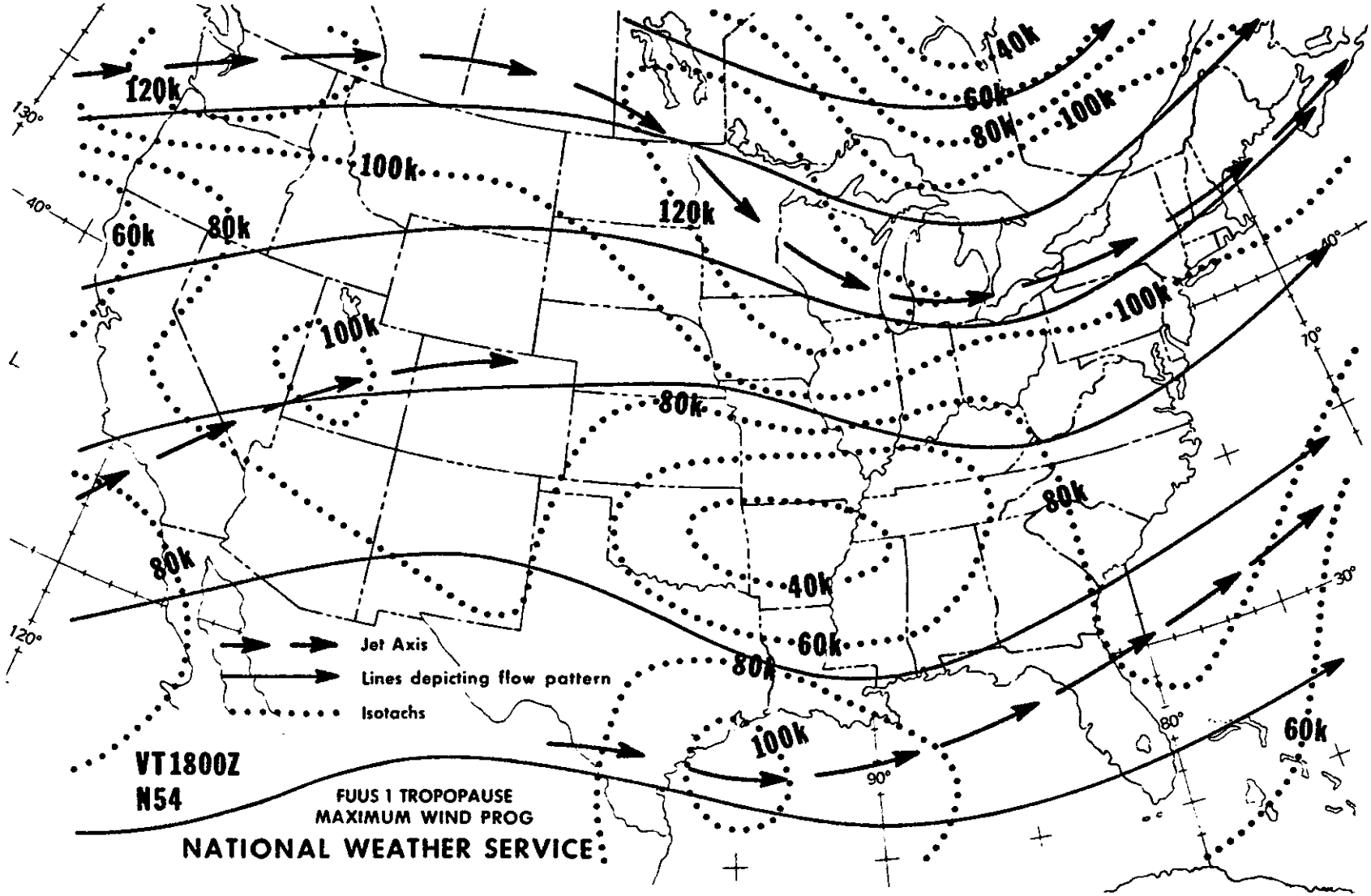


FIGURE 33. Tropopause Maximum Wind Prog.

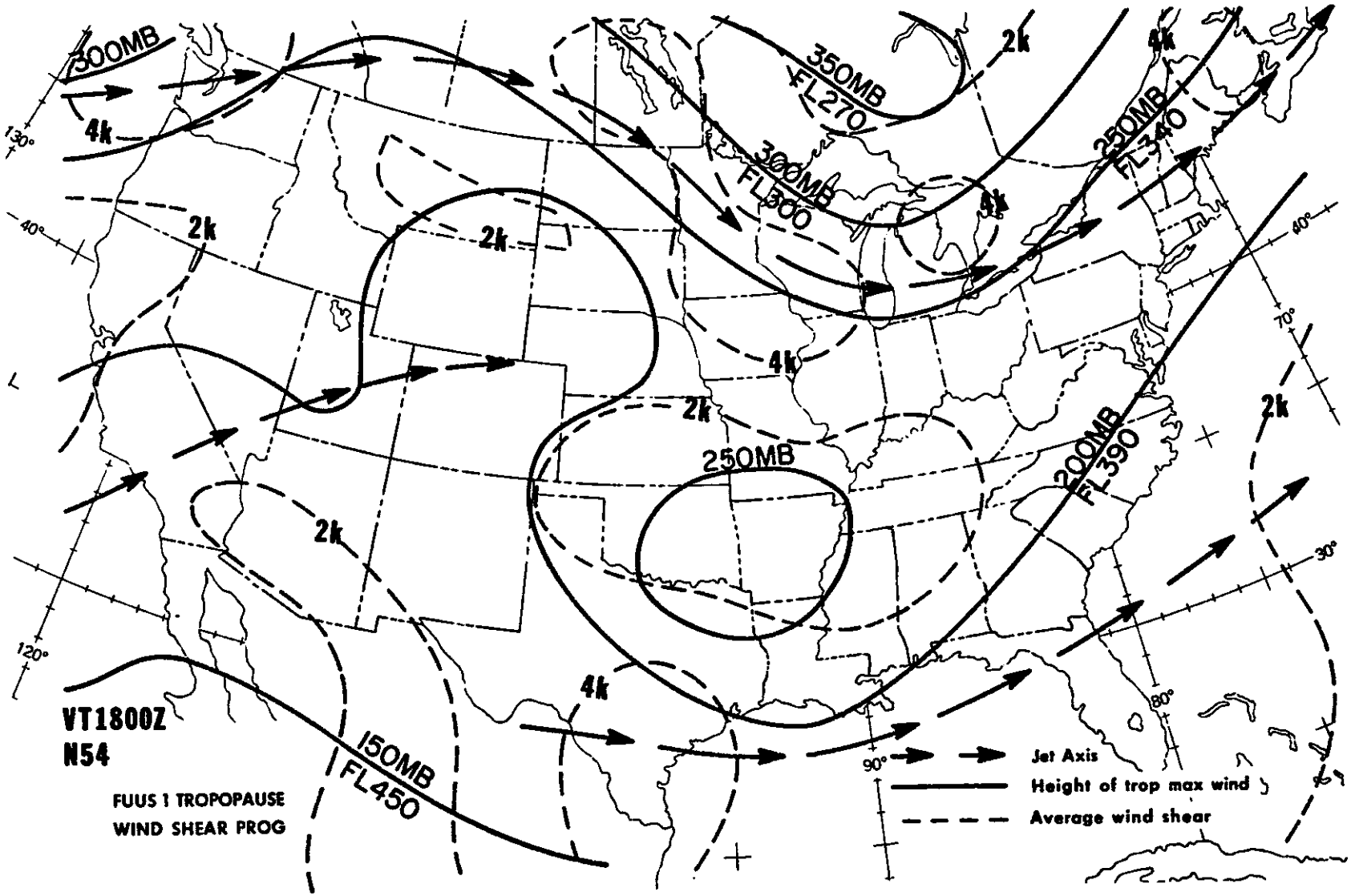


FIGURE 34. Tropopause Wind Shear Prog.

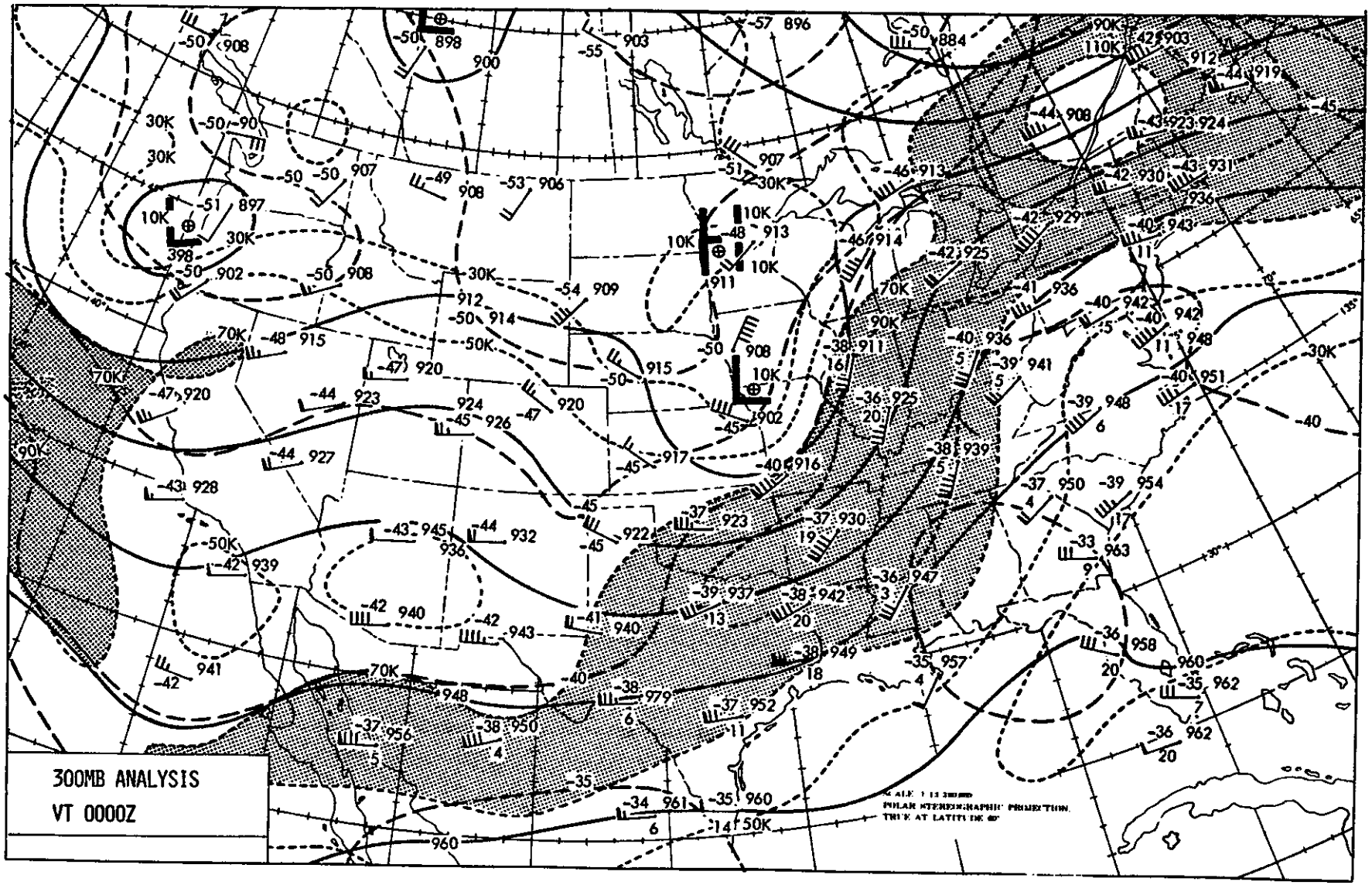


FIGURE 35. 300 MB Analysis.

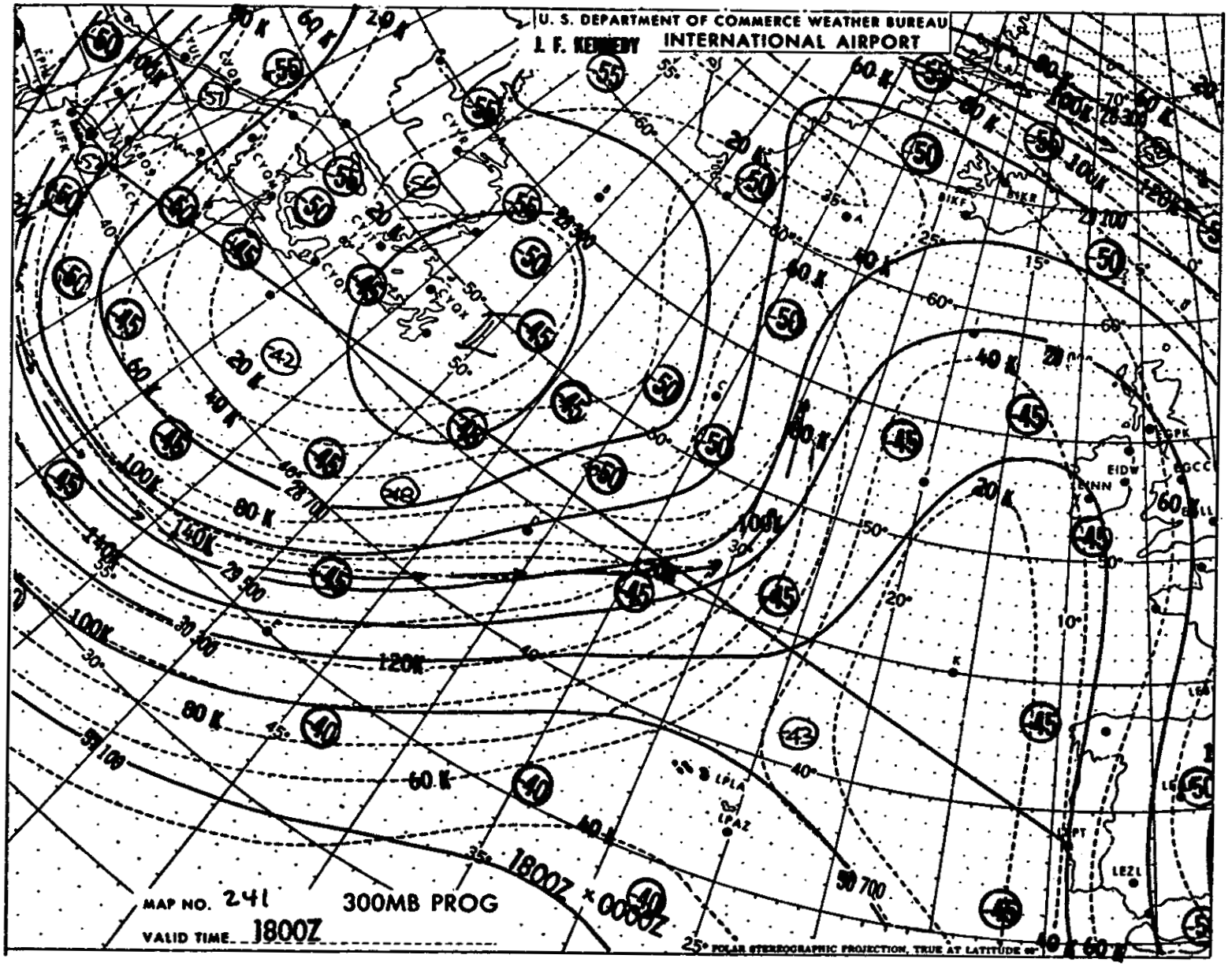


FIGURE 36. 300 MB Prog.

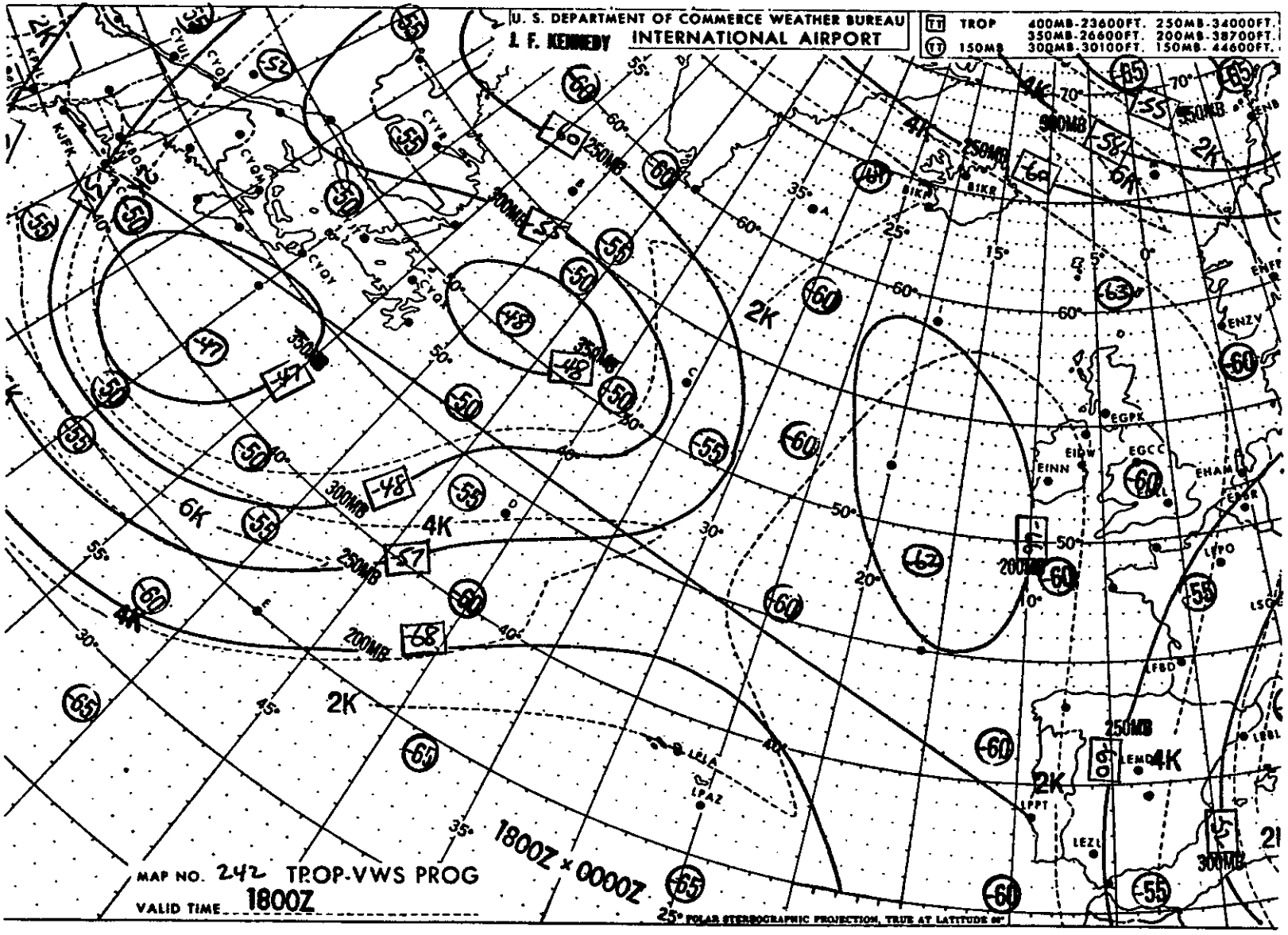


FIGURE 37. Tropopause/Vertical Wind Shear Chart.

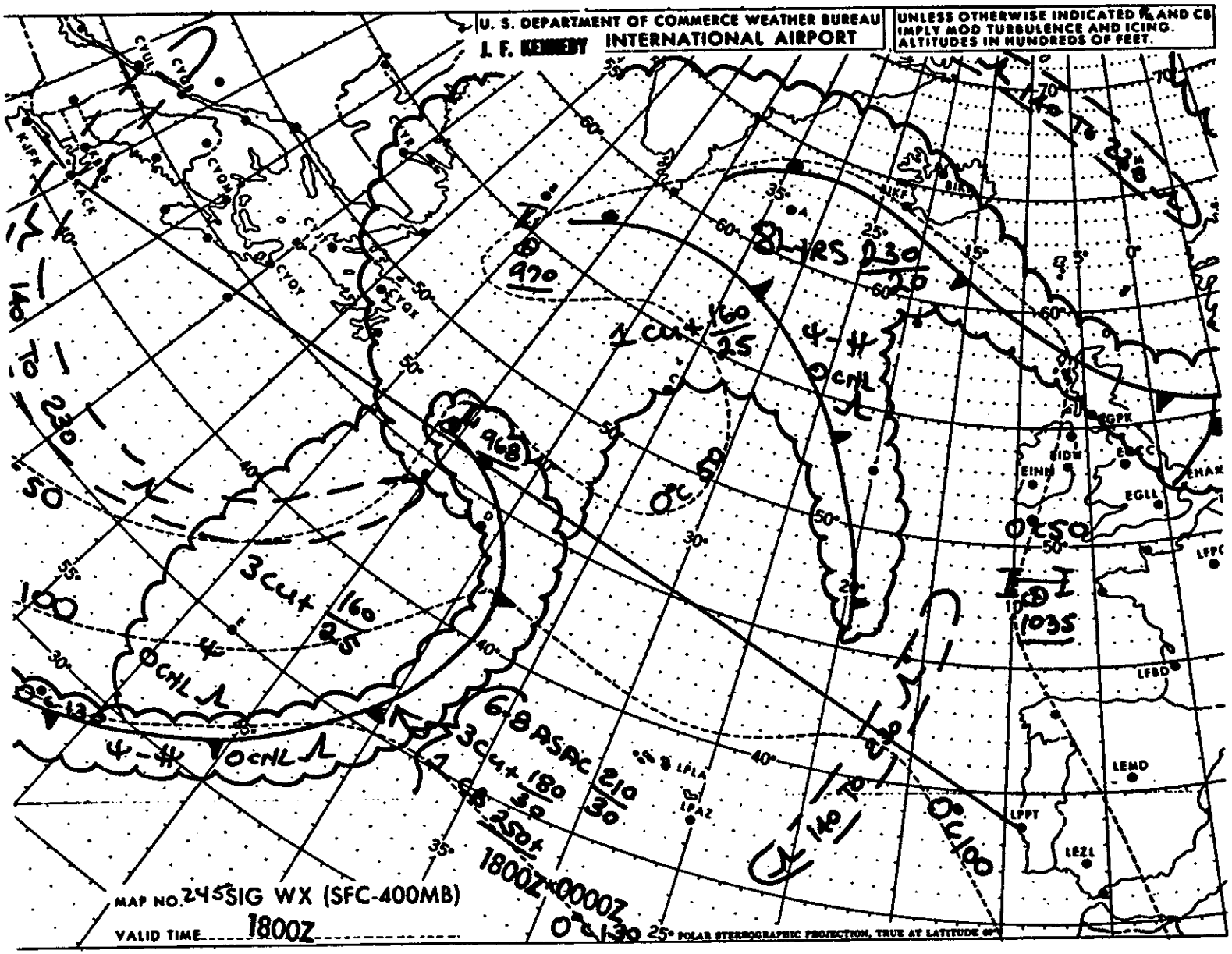


FIGURE 38. Significant Weather Prog. (SFC–400 MB).

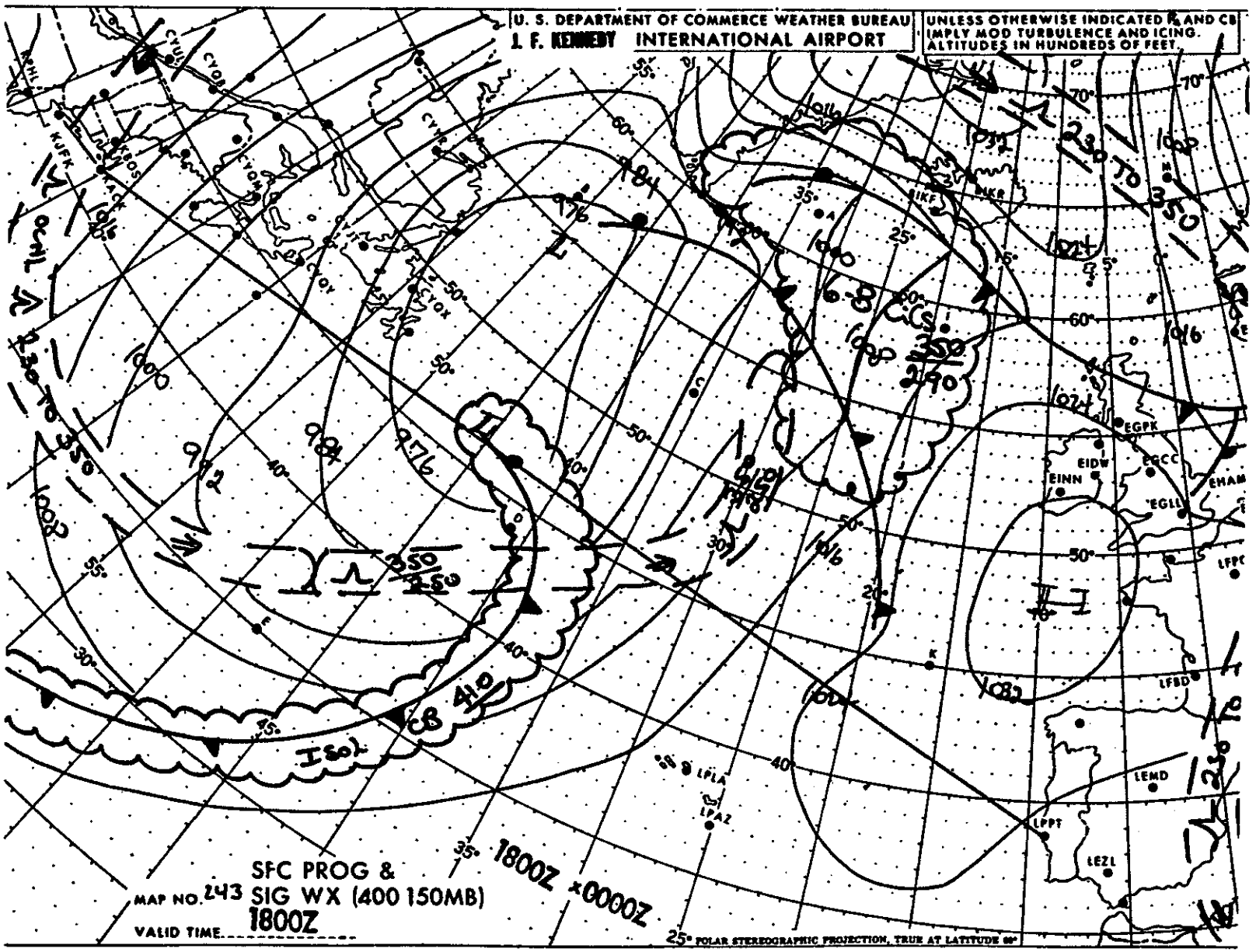


FIGURE 39. Significant Weather Prog. (400–150 MB).

FLIGHT TIME ANALYSIS

CHECK POINTS		ROUTE CRUISE ALT./FLT. LEVEL	TRUE COURSE	AIRSPEED-KTS.		Wind Factor & True Temperature	DRIFT CORR ANGLE	GROUND SPEED	DISTANCE N.M.	TIME		FUEL CONSUMPTION LBS.		MISC.
FROM	TO			MACH NO.	TAS					LEG	TOTAL	LEG	TOTAL	
MIAMI	SRQ	Climb FL 310	- - -	- -	- - -	- - - - - -	- - -	- - -	- -	:31		*8,000		*Taxi fuel included
SRQ	CRAB INT.	J-86 FL 310		.82		-60 knots -40°C.								
CRAB INT.	LEV	J-86 FL 310		.82		-70 knots -40°C.								
LEV	TOP OF DESCENT	J-86 FL 310	- - -	.82	- - -	-80 knots -40°C.	- - -	- - -	204					
T.O.D.	HOUSTON INTL.	RADAR & ILS APPROACH	- - -	- - -	- - -	- - - - - -	- - -	- - -	- -	:20		1,200		

ALTERNATE DATA

FUEL SUMMARY

	TIME	LBS.
ENROUTE		
ALTERNATE		
RESERVE		
MISSED APPROACH	- -	1,000
TOTAL		

*Includes taxi fuel

INSTRUCTIONS:
1. Use information listed above in your flight plan computations.
2. For cruise and reserve fuel computations, use 9,000 pounds per hour.

FIGURE 40. Flight Time Analysis.

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