AIRCRAFT DISPATCHER WRITTEN TEST GUIDE

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U.S. DEPARTMENT OF TRANSPORTATION
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Flight Standards Service

CONTENTS

	Page
Introduction	iii
Aircraft Dispatcher Certificate Requirements	1
Certificate Required	1
Eligibility Requirements: General	1
Knowledge Requirements	1
Experience Requirements	1
Skill Requirements	2
Aircraft Dispatcher Qualification Tests	3
The Written Test	3
The Practical Test	3
Aeronautical Knowledge Covered by the Written Test	5
Study Materials	12
Sample Test	15
Analysis of Answers to Sample Test Items	22

APPENDIX

Physiological Training	25
Definitions	27
Figure 1—Airplane Data Constants, Operating and Weight Limitations	30
Figure 2—Loading Tables	31
Figure 3—Wind Component Chart	32
Figure 4—Station Pressure Chart	32
Figure 5—Takeoff EPR, Speeds, and STAB TRIM Setting Chart	33
Figure 6—Takeoff Performance Chart	35
Figure 7—Indicated Mach .80 Cruise Chart	36
Figure 8—Holding: EPR, Airspeed, and Fuel Flow Chart	37
Figure 9—Fuel Dump Time Chart	37
Figure 10—Landing Performance—FLAPS 40 Chart	38
Figure 11—Go Around EPR and Landing Speeds Chart	39
Figure 12—Simplified Flight Planning Chart	40
Figure 13—Short Distance Cruise Altitude Chart	41
Figure 14—Relation of Temperature to ISA Chart	42
Figure 15—STAR Charts Legend	43
Figure 16—SID Charts Legend	43
Figure 17—Enroute High Altitude Chart Legend	44
Figure 18—Enroute High Altitude Chart Legend	45
Figure 19—Enroute Low Altitude Chart Legend	46

Page

Figure 20—Enroute Low Altitude Chart Legend ---- 47
Figure 21—HENLEY TWO DEPARTURE (SID) ---- 48
Figure 22—Enroute High Altitude Chart (H-4 excerpt) ---- 49
Figure 23—Instrument Approach Procedures (Charts) Legend ---- 50
Figure 24—Instrument Approach Procedures (Charts) Legend ---- 50
Figure 25—General Information and Abbreviations ---- 51
Figure 26—Approach Lighting Systems—Legend ---- 51
Figure 27—Aircraft Approach Categories ---- 52
Figure 28—Inoperative Components/Visual Aids Table ---- 52
Figure 29—ILS RWY 17R—Will Rogers World Airport ---- 53
Figure 30—ILS RWY 35R (CAT II) Will Rogers World Airport ---- 54
Figure 31—VOR RWY 12—Will Rogers World Airport ---- 55
Figure 32—Geographical Area Designator Map ---- 56
Figure 33—Key to Aviation Weather Reports ---- 57
Figure 34—Key to Aviation Weather Forecasts ---- 58
Figure 35—Forecast Winds and Temperatures Aloft (FD) ---- 59
Figure 36—Area Forecast (FA) ---- 59
Figure 37—12-Hour Surface Prog. ---- 60
Figure 38—Radar Summary Chart ---- 61
Figure 39—Upper Wind Progs. ---- 62
Figure 40—300 MB Analysis ---- 63
Figure 41—300 MB Prog. Chart ---- 64
Figure 42—Trop Wind Shear Prog. Chart ---- 65
Figure 43—U.S. High Level Significant Weather Prog. (400-150 MB) Chart ---- 66
Figure 44—Flight Time Analysis ---- 67

INTRODUCTION

The aircraft dispatcher is an important member of an airline operation team and should be able to speak the language of the operating crews as well as that of management. Aircraft dispatchers share the responsibility with pilots for flight planning details that affect the safe conduct of a planned operation. After dispatching a flight, important coordinating functions must be performed involving the aircraft and other departments of the airline. The dispatcher also provides advisory information affecting the safe progress of flight.

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

This test guide was prepared by the Flight Standards Service, Federal Aviation Administration, Department of Transportation as Advisory Circular AC 65-4C to assist applicants who are preparing for the Aircraft Dispatcher Written and Practical Tests. It supersedes the Aircraft Dispatcher Written Test Guide, AC 65-4B issued in 1972.

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

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

AIRCRAFT DISPATCHER CERTIFICATE REQUIREMENTS

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

§ 65.51 Certificate required.

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

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

§ 65.53 Eligibility requirements: general.

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

(a) Be at least 23 years of age;

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

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

§ 65.55 Knowledge requirements.

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

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

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

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

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

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

(ii) Cloud forms and their significance; and

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

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

(6) Communications facilities and procedures;

(7) Air navigation facilities and procedures; and

(8) Air traffic control procedures.

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

§ 65.57 Experience requirements.

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

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

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

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

(3) As a flight navigator;

(4) As a meteorologist;

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

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

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

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

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

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

§ 65.59 Skill requirements.

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

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

(1) Weight and balance limitations;

(2) Performance operating limitations;

(3) Using cruise control charts;

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

(5) Using the operations manual;

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

(1) Landing areas;

(2) Lighting facilities; and

(3) Approach and landing facilities and procedures;

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

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

(e) On using the *Airman's Guide* and the *Flight Information Manual;*

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

(g) On emergency procedures."

AIRCRAFT DISPATCHER QUALIFICATION TESTS

THE WRITTEN TEST

Nature of the test

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

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

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

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

Taking the test

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

Test grades are mailed to applicants on AC Form 8080–2, Airman Written Examination Report. The report also contains coded indicators of the knowledge areas which presented difficulty in the test. These coded indicators are related to an enclosed Written Examination Subject Matter Outline for quick and easy identification of knowledge deficiencies. The study outline contained in this guide is similar, but may not be exactly the same as the outline which the applicant receives with AC Form 8080–2. An applicant who receives a failing grade must present the appropriate AC Form 8080–2 for retesting.

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

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

2. Determine which of the alternatives most nearly corresponds with the answer formulated. The answer chosen should completely solve the problem.

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

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

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

THE PRACTICAL TEST

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

RETESTING AFTER FAILURE

An applicant who fails the Aircraft Dispatcher Written or Practical Test may apply for retesting after 30 days following the date the test was failed; or upon presenting a statement from a certificated and appropriately rated ground instructor, or a certificated Aircraft Dispatcher certifying that at least 5 hours of additional instruction covering the subjects failed has been given the applicant and that the applicant is now considered ready for retesting.

AERONAUTICAL KNOWLEDGE COVERED BY THE WRITTEN TEST

FAR PART 1: DEFINITIONS AND ABBREVIATIONS

A10 General definitions (1.1)
A20 Abbreviations; symbols (1.2)

FAR PART 61: CERTIFICATION: PILOTS AND FLIGHT INSTRUCTORS

Subpart A—General

B10 Requirements: certificates; ratings (61.3)
Duration:
B11 CAT II pilot authorization (61.21)
B12 Medical certificates (61.23)
B13 Pilot logbooks: logging flight time (61.51
B14 Recent flight experience: pilot in command; instrument (61.57)

Subpart B—Aircraft Ratings and Special Certificates

B20 Category II pilot authorization (61.67)

Subpart F—Airline Transport Pilots

B30 Eligibility (61.151)
B31 Airplane rating: aeronautical
knowledge (61.153)
experience (61.155)
skill (61.157)
B32 Instruction in air transportation service (61.169)
B33 General privileges; limitations (61.171)

FAR PART 65: CERTIFICATION: AIRMAN OTHER THAN FLIGHT CREWMEMBERS

Subpart C—Aircraft Dispatchers

C10 Certificate required (65.51)
C11 Eligibility requirement: general (65.53)
C12 Knowledge requirements (65.55)
C13 Experience requirements (65.57)
C14 Skill requirements (65.59)

FAR PART 91: GENERAL OPERATING AND FLIGHT RULES

Subpart A—General

D10 Pilot in command: responsibility; authority (91.3)
D11 Preflight action (91.5)
D12 Category II operation; general operating rules (91.6)
D13 Flight crewmembers at stations (91.7)
D14 Interference with crewmembers (91.8)
D15 Fuel requirements: IFR conditions (91.23)
D16 ATC transponder equipment (91.24)
D17 VOR equipment check (IFR) (91.25)
D18 Authorization ferry flight; one engine inoperative (91.45)

Subpart B—Flight Rules

D20 Aircraft speed (91.70)
D21 ATC clearances; instructions (91.75)
D22 ATC light signals (91.77)
D23 Flight plan; information required (91.83)
D24 Operations at airports: with operating control towers (91.87)
D25 Operations at airports: without control towers (91.89)
D26 Terminal Control Areas (91.90)
D30 Weather minimums: basic VFR (91.105)
D31 Weather minimums: special VFR (91.107)
D32 VFR cruising altitudes; flight levels (91.109)
D40 ATC clearance, flight plan required (IFR) (91.115)
D41 Takeoff and landing (IFR): general (91.116)
D42 Limitations on use of IAP (91.117)
D43 Minimum altitudes (IFR) (91.119)
D44 Cruising altitudes or flight levels (IFR) (91.121)
D45 Radio communications (IFR) (91.125)
D46 Two-way communications failure (IFR) (91.127)
D47 Operation in controlled airspace (IFR) malfunction reports (91.129)

Appendix A—Category II Operations

D50 Required instruments; equipment (App. A, 2)
D51 Instruments; equipment approval (App. A, 3)
D52 Maintenance program (App. A, 4)

FAR PART 121: DOMESTIC, FLAG, AND SUPPLEMENTAL AIR CARRIERS AND COMMERCIAL OPERATORS OF LARGE AIRCRAFT

Subpart I—Airplane Performance and Operating Limitations

E10 Applicability (121.171)
E11 Reciprocating engine powered-transport category: takeoff limitations—all engines operating (121.177)
E12 Enroute limitations—one engine inoperative (121.179)
E13 Landing limitations—destination (121.185)
E14 Landing limitations—alternate airports (121.187)
E15 Turbine engine powered-transport category: takeoff limitations (121.189)
E16 Enroute limitations (one engine inoperative) (121.191)
E17 Enroute limitations (two engines inoperative) (121.193)
E18 Landing limitations; destination; alternate airports (121.195, .197)

E19 Carriage of cargo-passenger compartment (121.285)
E20 Demonstration of emergency evacuation procedures (121.291)

Subpart K—Instrument and Equipment Requirements

E30 Flight; navigational equipment (121.305)
E31 Emergency equipment (121.309)
E32 Additional emergency equipment (121.310)
E33 Seat and safety belts (121.311)
Supplemental oxygen-reciprocating engine powered airplanes:
E34 unpressurized cabin (121.327)
E35 pressurized cabin (121.331)
E36 Supplemental oxygen for sustenance: turbine engine powered airplanes (121.329)
E37 Supplemental oxygen for emergency descent; first aid (121.333)
E38 Emergency equipment for extended overwater operations (121.339)
E39 Emergency flotation means (121.340)
E40 Flight recorders (121.343)
Radio equipment (VFR):
E41 routes navigated by pilotage (121.347)
E42 routes not navigated by pilotage; IFR over-the-top (121.349)
E43 Airborne weather radar equipment requirements (121.357)
E44 Cockpit voice recorders (121.359)
E45 Ground proximity warning-glide slope deviation alerting system (121.360)

Subpart M—Airman and Crewmember Requirements

F10 Composition of flight crew (121.385)
F11 Flight attendants (121.391)

Subpart N—Training Program

F20 Applicability and terms used (121.400)
F21 Training programs: general (121.401)
F22 Crewmember emergency training (121.417)

Subpart O—Crewmember Qualifications

F30 General (121.432)
F31 Handling, carriage of dangerous articles (121.433a)
F32 Operating experience (121.434)
F33 Pilot qualification: certificates required (121.437)
F34 Recent experience (121.439)
F35 Line checks (121.440)
F36 Proficiency checks (121.441)
Pilot in command qualification-routes; airports:
F37 domestic; flag (121.443)
F38 supplemental; commercial (121.445)
F39 Pilot route; airport qualifications for particular trips: domestic; flag (121.447)

Subpart P—Aircraft Dispatcher Qualifications and Duty Time Limitations: Domestic and Flag Air Carriers

F40 Aircraft dispatcher qualifications (121.463)
F41 Duty time limitations: domestic; flag (121.465)

Subpart Q—Flight Time Limitations: Domestic Air Carriers

G10 All flight crewmembers (121.471)

Subpart R—Flight Time Limitations: Flag Air Carriers

G20 One or two pilot crews (121.481)
G21 Two pilots; one additional flight crewmember (121.483)
G22 Three or more pilots; one additional flight crewmember (121.485)
G23 Other commercial flying (121.489)

Subpart S—Flight Time Limitations: Supplemental Air Carriers and Commercial Operators

G30 Pilots—airplanes (121.503)
G31 Two pilot crews—airplanes (121.505)
G32 Three pilot crews—airplanes (121.507)
G33 Four pilot crews—airplanes (121.509)
G34 All airmen—airplanes (121.515)
G35 Other commercial flying—airplanes (121.517)
G36 Crew of two pilots; one additional airman (121.521)
G37 Crew of three or more pilots; additional airmen (121.523)
G38 Pilots serving in more than one kind of flight crew (121.525)

Subpart T—Flight Operations

Responsibility for operational control:
H10 domestic (121.533)
H11 flag (121.535)
H12 supplemental; commercial (121.537)
H13 Aircraft security (121.538)
H14 Flight crewmembers at controls (121.543)
H15 Manipulation of controls (121.545)
H16 Admission to flight deck (121.547)
H17 Admission to pilot's compartment-air carrier inspector (121.548)
H18 Flying equipment (121.549)
H19 Admission to flight deck-Secret Service Agents (121.550)
Emergencies:
H20 domestic; flag (121.557)
H21 supplemental; commercial (121.559)
H22 Reporting: potentially hazardous meteorological conditions/irregularities of ground/navigation facilities (121.561)
H23 mechanical irregularities (121.563)
H24 engine inoperative—landing (121.565)
H25 Instrument approach procedures (IFR) (121.567)
H26 Briefing passengers before takeoff (121.571)
H27 Briefing passengers—extended overwater operations (121.573)
H28 Alcoholic beverages (121.575)
H29 Minimum altitudes for use of automatic pilot (121.579)
H30 Forward observer's seat—enroute inspections (121.581)
H31 Carriage of person in custody of law enforcement personnel (121.584)
H32 Carriage of weapons (121.585)
H33 Closing; locking of flight crew compartment door (121.587)
H34 Carry-on baggage (121.589)

Subpart U—Dispatching and Flight Release Rules

I10 Dispatching authority—domestic (121.593)
I11 Dispatching authority—flag (121.595)
I12 Flight release authority—supplemental; commercial (121.597)
I13 Aircraft dispatcher information to PIC; domestic; flag (121.601)
I14 Facilities; services—supplemental; commercial (121.603)
I15 Communication; navigation facilities: domestic; flag (121.607)
I16 Communication; navigation facilities: supplemental; commercial (121.609)
I17 Dispatch or flight release—under VFR (121.611)
I18 Dispatch or flight release—IFR or over-the-top (121.613)
I19 Dispatch or flight release—over water: flag; supplemental; commercial (121.615)
Alternate airport:
I20 for departure (121.617)
I21 for destination, IFR or over the top, domestic (121.619)
I22 for destination: flag (121.621)
I23 for destination: IFR or over the top, supplemental; commercial (121.623)
I24 Alternate airport weather minimums (121.625)
I25 Continuing flight in unsafe conditions (121.627)
I26 Operation in icing conditions (121.629)
I30 Original dispatch or flight release (amendment) (121.631)
I31 Dispatch to/from provisional airports—domestic (121.633)
I33 Dispatch to/from refueling or provisional airports—flag (121.635)
I34 Takeoffs from unlisted: alternate airports—domestic; flag (121.637)
Fuel supply—all operations:
I40 domestic (121.639)
I41 nonturbine; turbopropeller-powered airplanes: flag (121.641)
I42 supplemental; commercial (121.643)
I43 turbine-engine-powered airplanes other than turbopropeller: flag; supplemental; commercial (121.645)
I44 Factors for computing fuel required (121.647)
Takeoff; landing weather minimums;
I45 VFR—domestic (121.649)
I46 IFR—domestic; flag (121.651)
I47 IFR—supplemental; commercial (121.653)
I48 Landing weather minimums, IFR—all certificate holders (121.652)
I49 Applicability of reported weather minimums (121.655)
I50 Flight altitude rules (121.657)
Initial approach altitude:
I51 domestic; supplemental; commercial (121.659)
I52 flag (121.661)
I60 Responsibility for dispatch release—domestic; flag (121.663)
I61 Load manifest (121.665)
I62 Flight plan: VFR, IFR—supplemental; commercial (121.667)

Subpart V—Records and Reports

I70 Dispatch release—flag; domestic (121.687)
I71 Flight release form—supplemental; commercial (121.689)
Load manifest:
I72 domestic; flag (121.691)
I73 supplemental; commercial (121.693)
Disposition of load manifest, dispatch release, and flight plans:
I74 domestic; flag (121.695)
I75 supplemental; commercial (121.697)
I76 Mechanical reliability reports (121.703)
I77 Airworthiness release-aircraft log entry (121.709)
I78 Communications records: domestic; flag (121.711)

Subpart W—Crewmember Certificate: International

I80 Applicability (121.721)
I90 First aid kits (App. A)
I91 Doppler radar; INS (App. G)

AVIATION WEATHER, AC 00-6A

The Earth's Atmosphere (Ch. 1)

J10 Composition
J11 Vertical structure
J12 Standard atmosphere
J13 Density and hypoxia

Temperature (Ch. 2)

J20 Scales
J21 Heat and temperature
J22 Variations

Atmospheric Pressure and Altimetry (Ch. 3)

J30 Pressure
J31 Altimetry

Wind (Ch. 4)

J40 Convection
J41 Pressure gradient
J42 Coriolis force
J43 General circulation
J44 Friction
J45 Jet stream
J46 Local, small scale winds
J47 Wind shear
J48 Wind, pressure systems, and weather

Moisture, Cloud Formation, and Precipitation (Ch. 5)

K10 Water vapor
K11 Change of state
K12 Cloud formation
K13 Precipitation
K14 Land and water effects

Stable and Unstable Air (Ch. 6)

K20 Changes within upward/downward movement
K21 Stability, instability

Clouds (Ch. 7)

K30 Identification
K31 Signposts

Airmasses and Fronts (Ch. 8)

K40 Airmasses
K41 Fronts
K42 Flight planning

Turbulence (Ch. 9)

L10 Convective currents
L11 Obstructions to wind flow
L12 Wind shear
L18 Wake turbulence

Icing (Ch. 10)

L20 Structural
L21 Induction system
L22 Instrument
L23 Icing and cloud types
L24 Other factors
L25 Ground
L26 Frost

Thunderstorms (Ch. 11)

L30 Development
L31 Cycles, stages
L32 Types
L33 Hazards
L34 Thunderstorm flying; radar

IFR Producers (Ch. 12)

L40 Fog
L41 Low stratus clouds
L42 Haze and smoke
L43 Blowing restrictions to visibility
L44 Precipitation
L45 Obscured or partially obscured sky

High Altitude Weather (Ch. 13)

M10 Tropopause
M11 Jet stream
M12 Cirrus clouds
M13 Clear air turbulence
M14 Haze layers
M15 Icing
M16 Thunderstorms

AVIATION WEATHER SERVICES, AC 00-45A

Surface Aviation Weather Reports (Sec. 2)

N10 Type and time of report
N11 Sky condition, ceiling, and visibility
N12 Weather; obstructions to vision
N13 Sea level pressure
N14 Temperature, dewpoint
N15 Wind
N16 Altimeter setting
N17 Remarks
N18 Report identifiers
N19 Reading the report

Pilot and Radar Reports (Sec. 3)

N20 Pilot weather reports (PIREPS)
N21 Radar weather reports (RAREPS)

Aviation Weather Forecasts (Sec. 4)

N30 Terminal forecasts—FT
N31 Area forecasts—FA
N32 TWEB Route Forecasts: Synopsis
N33 Inflight Advisories—WS, WA, WAC
N34 Winds; Temperatures Aloft Forecast—FD
N35 Special Flight Forecast
N36 Hurricane Advisory—WH
N37 Convective Outlook—AC
N38 Severe Weather Watch Bulletin—WW

Surface Analysis (Sec. 5)

N40 Valid time
N41 Isobars
N42 Pressure systems
N43 Fronts
N44 Other information
N45 Use of chart

Weather Depiction Chart (Sec. 6)

O10 Plotted data
O11 Analysis
O12 Use of chart

Radar Summary Chart (Sec. 7)

O20 Echo pattern; coverage
O21 Weather associated with echoes
O22 Intensity; trend of precipitation
O23 Heights of echo bases; tops
O24 Movement of echoes
O25 Additional information
O26 Use of chart

Significant Weather Prognostics (Sec. 8)

O30 Domestic flights
O31 International flights
O32 Using significant weather progs.

Winds and Temperatures Aloft (Sec. 9)

O40 Forecast winds; temperatures aloft—FD
O41 Observed winds aloft
O42 Use of charts

Freezing Level Chart (Sec. 10)

O50 Plotted data
O51 Analysis
O52 Use of chart

Stability Chart (Sec. 11)

O60 Lifted index
O61 K index
O62 Stability analysis
O63 Use of chart

Severe Weather Outlook Chart (Sec. 12)

O70 General thunderstorms
O71 Severe thunderstorms
O72 Tornadoes
O73 Use of chart

Constant Pressure Charts (Sec. 13)

O80 Plotted data
O81 Analysis
O82 Three-dimensional aspects
O83 Use of charts

Constant Pressure Prognostics (Sec. 14)

P10 Height, contours, streamlines
P11 Temperature
P12 Windspeed
P13 Formats
P14 Use of charts

Tropopause, Max Wind, and Wind Shear Charts (Sec. 15)

P20 Observed tropopause chart
P21 Domestic tropopause wind; wind shear progs
P22 International tropopause; wind shear progs

Tables and Conversion Graphs (Sec. 16)

P30 Icing intensities
P31 Turbulence intensities
P32 Locations of turbulence by intensities vs. weather; terrain
P33 Standard conversions
P34 Density altitude computation
P35 Selected contractions

ENROUTE LOW/HIGH ALTITUDE/AREA CHARTS

Legend:

Q10 Aerodromes
Q11 Radio aids to navigation, communication boxes
Q12 Air traffic services; airspace information
Q13 Special use airspace
Q14 Cruising altitudes
Q15 A/G voice communications

Route/Airway

Q20 Identification, route structure
Q21 Substitute; unusable
Q22 Changeover points
Q23 Operational status: VOR/VORTAC/NDB
Q24 Altitudes: MEA, MCA, MRA, MOCA, MAA

INSTRUMENT APPROACH PROCEDURE CHARTS

Q30 Pilot control of airport lighting
Q31 Approach lighting systems—legend
Q32 General information; abbreviations
Q33 Plan view symbols
Q34 Profile
Q35 Inoperative components; visual aids
Q36 Aircraft approach categories
Q37 Takeoff minimums; departure procedures
Q38 IFR alternate minimums
Q39 Civil radar instrument approach minimums
Q40 Interpretation

BASIC FLIGHT MANUAL & ATC PROCEDURES (AIM–1)

Navigation Aids (Ch. 1)

R10 Aeronautical information; NAS
R11 NDB
R12 VOR, VORTAC, DME; equipment check
R13 Class, operational use
R14 Marker beacons
R15 Instrument landing systems
R16 SDF
R17 Maintenance
R18 VHF/UHF DF
R19 Radar: ASR, PAR

Airport, Air Navigation Lighting Marking Aids (Ch. 1)

R20 Rotating beacon
R21 Obstructions
R22 Instrument approach light system
R23 Runway edge light system
R24 Marking
R25 In-runway lighting
R26 VASI

Airspace (Ch. 2)

Distance from clouds, visibility—VFR
R30 uncontrolled airspace
R31 controlled airspace
R32 Control Areas, Transition Area, Terminal Control Area, Positive Control Area, Control Zone
R33 Special Use Airspace—Prohibited Area, Restricted Area, Warning Area, Alert Area, ISJTA, MOA
R34 Airport Advisory/Traffic Areas, temporary flight restrictions

Air Traffic Control (Ch. 3)

R40 Services—control tower, FSS, VFR advisory service, airport
R41 UNICOM, MULTICOM
R42 ATIS
R43 Radar service—traffic information, advisory, assistance, Stage I, II, III
R44 Terminal Control Area operations—Group I, II, III
R45 Transponder operation

Airport Operations

R50 Use of runways, intersection takeoffs
R51 Landings, approaches (instrument option)
R52 Light signals

ATC Clearance/Separations (Ch. 3)

S10 Clearance items
S11 Amended clearance
S12 Special VFR clearance
S13 IFR separation standards
S14 Speed adjustments
S15 Visual separation
S16 VFR restrictions
S17 Runway separation

Preflight (Ch. 3)

S20 Weather briefing, NOTAMs
S21 Flight plan—VFR
S22 DVFR
S23 VFR/IFR (composite)
S24 Flight plan—IFR
S25 Airways/jet routes
S26 Direct flights
S27 VFR operations
S28 Change in IFR flight plan, cancelling
S29 Closing VFR/DVFR flight plan

Departures—IFR (Ch. 3)

T10 Pre-taxi/taxi clearance
T11 Abbreviated IFR departure clearance
T12 Takeoff denial
T13 Departure control; instrument departures
T14 SIDs; filing, ATC clearance, procedures, transitions

Enroute—IFR (Ch. 3)

Communications
T20 Direct: controller/pilots
T21 Frequency change
T22 IFR position reporting, additional reports
T23 Airway/route systems, course changes
T24 Changeover points
T25 Aircraft climbing/descending
T26 Operation in restricted airspace
T27 Holding
T28 STARs—filing, ATC clearance, procedures, transitions

Arrival—IFR (Ch. 3)

U10 Radar approach control, instrument approach
U11 Advance information
U12 Clearance
U13 Procedures
U14 Radar approaches
U15 Simultaneous ILS approaches
U16 Radar monitoring
U17 Timed approaches
U18 Procedure turn
U19 Visual approach
U20 Contact approach
U21 Side-step maneuver
U22 Weather minimums
U23 Missed approach
U24 Landing priority

Emergency Procedures (Ch. 3)

V10 General
V11 VHF/UHF DF approach procedures
V12 Two-way communications failure
V13 Special emergency
V14 Hijack procedures
V15 Fuel dumping
V16 Ditching
V17 Search; rescue

National Security (Ch. 3)

V20 Security control of aircraft—domestic/coastal ADIZ, DEWIZ
V21 SCATANA
V22 Interception pattern, signals

Safety of Flight (Ch. 4)

V30 Enroute Flight Advisory Service (EFAS)
V31 Transcribed weather broadcasts
V32 Scheduled weather broadcasts
V33 In-flight weather advisories
V34 Pilot weather reports (PIREP)
V35 Wake turbulence
V36 Medical facts for pilots
V37 NTSB Part 830

WEIGHT & BALANCE, COMPUTATIONS, PERFORMANCE CHARTS

Weight & Balance (AC 91-23)

W10 Terms & definitions
W11 Stability, balance
W12 Index, graphic limits
W13 CG location, determination
W14 Shift/change of weight
W15 Pallet/cargo loading

Computations

X10 True airspeed, groundspeed, mach
X11 Time enroute
X12 Fuel requirements
X13 Airspeed, mach adjust
X14 Specific range (NAM/1,000)
X15 Density altitude
X16 Rate of climb, descent
X17 Wind drift/speed
X18 Off-course corrections

Performance Charts

Y10 Crosswind, effective wind
Y11 Takeoff EPR
Y12 STAB trim
Y13 Takeoff, distance/speeds
Y14 Takeoff, limiting weights
Y25 Climb EPR
Y26 Cruise EPR, mach
Y27 Fuel flow, consumption
Y28 Descent—time/distance/fuel
Y30 Holding—time, fuel, speed
Y31 Fuel dump—time, weights
Y32 Landing—limiting weights
Y33 Go-around EPR/speeds
Y40 Simplified flight planning
Y41 Short Distance Cruise Altitude Chart

MISCELLANEOUS

Z10 Airport/Facility Directory (AIM-3)
Z11 Restrictions to Enroute Navigation Aids (AIM-4)
Z12 Preferred routes (AIM-3)
Z13 Area navigation
Z14 DME Arc
Z15 Instrument interpretation; indications
Z16 Hydroplaning
Z17 Aircraft performance—factors affecting
Z18 Mach, mach number, critical mach
Z19 Unusual attitude recovery

STUDY MATERIALS

The following materials may be obtained from:

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

AC 61-18E Airline Transport Pilot (Airplane) Written Test Guide
AC 65-4C Aircraft Dispatcher Written Test Guide
AC 00-6A Aviation Weather
AC 00-45A Aviation Weather Services

AC 91-23 Pilot's Weight and Balance Handbook
AC 61-27B Instrument Flying Handbook
AC 91.11-1 Guide to Drug Hazards in Aviation Medicine
Airman's Information Manual, Parts I, II, III, and IV
Federal Aviation Regulations, Parts 1, 61, 65, 91, and 121

The following Advisory Circulars may be obtained free from:

U.S. Department of Transportation
Publications Section, TAD-443.1
Washington, D.C. 20500

AC 00-24 Thunderstorms
AC 00-30 Rules of Thumb for Avoiding or Minimizing Encounters with Clear Air Turbulence
AC 00-50 Low Level Wind Shear
AC 20-32B Carbon Monoxide (CO) Contamination in Aircraft—Detection and Prevention
AC 60-4 Pilot's Spatial Disorientation
AC 90-1A Civil Use of U.S. Government Produced Instrument Approach Charts (90-1A is included in the Instrument Flying Handbook)
AC 90-12A Severe Weather Avoidance
AC 90-14A Altitude—Temperature Effect on Aircraft Performance
AC 90-23D Wake Turbulence
AC 90-54A Cruise Clearances
AC 90-60 Weather Observation Reporting Obscured or Partially Obscured Sky Condition
AC 90-62 Flying DME Arcs
AC 90-64 Automated Radar Terminal System (ARTS) III
AC 91-6 Water, Slush, and Snow on the Runway
AC 91-24 Aircraft Hydroplaning or Aquaplaning on Wet Runways
AC 91-25A Loss of Visual Cues During Low Visibility Landings
AC 91-43 Unreliable Airspeed Indications
AC 95-1 Airway and Route Obstruction Clearance
AC 120-5 High Altitude Operations in Areas of Turbulence
AC 120-28A Criteria for Approval of Category IIIa Landing Weather Minima
AC 120-29 Criteria for Approving Category I and Category II Landing Minima for FAR Part 121 Operators
AC 121-12 Wet or Slippery Runways
AC 121-18 Aviation Security—Carriage of Weapons and Escorted Persons
AC 121-195 (d)-1 Alternate Operational Landing Distances for Wet Runways; Turbojet Powered Transport Category Airplanes

Single copies of Exam-O-Grams may be obtained free from:

Federal Aviation Administration
Flight Standards National Field Office
Examinations Branch
P.O. Box 25082
Oklahoma City, Oklahoma 73125

STUDY MATERIALS

Individuals preparing for the Aircraft Dispatcher Written Test will find the following list of publications and materials helpful. Textbooks and other reference materials are available from many commercial publishers. It is the responsibility of each applicant to obtain appropriate study materials.

AIRMAN'S INFORMATION MANUAL (AIM) Superintendent of Documents (Sup't. Doc's.)

This publication presents, in five 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 Information and ATC Procedures. Issued semiannually.

Part 2—Airport Directory. Issued semiannually.

Part 3—Operational Data and Special Notices. Issued every 56 days.

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

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

Federal Aviation Regulations (FARs) (Sup't. Doc's.)

Part 1, Definitions and Abbreviations

Part 61, Certification: Pilots and Flight Instructors

Part 65, Certification: Airmen Other Than Flight Crewmembers

Part 91, General Operating and Flight Rules

Part 121, Certification and Operations: Domestic, Flag, and Supplemental Air Carriers and Commercial Operators of Large Aircraft

ADVISORY CIRCULARS

00–6A 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. (Sup't. Doc's.)

00–24 Thunderstorms

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

00–30 Rules of Thumb for Avoiding or Minimizing Encounters with Clear Air Turbulence

Brings to the attention of pilots and other interested personnel, the "Rule of Thumb" for avoiding or minimizing encounters with clear air turbulence (CAT). (Free from FAA)

00–45A Aviation Weather Services

Supplements AC 00–6A, Aviation Weather, in that it explains the weather service in general and the use and interpretation of reports, forecasts, weather maps, and prognostic charts in detail. Is an excellent source of study for pilot certification examinations. (Sup't. Doc's.)

00–50 Low Level Wind Shear

Provides guidance for recognizing the meteorological situations that produce the phenomenon widely known as low level wind shear. (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." (Sup't. Doc's.)

90–1A Civil Use of U.S. Government Produced Instrument Approach Charts

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

90–12B 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)

90–23D Wake Turbulence

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

90–54A Cruise Clearance

Provides the aviation community guidance when operating under a "cruise" clearance. (Free from FAA)

90–60 Weather Observation Reporting Obscured or Partially Obscured Sky Condition

Provides pilots with information concerning weather conditions reported by weather observers as obscuration or partial obscuration. (Free from FAA)

90–62 Flying DME Arcs

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

90–64 Automated Radar Terminal System (ARTS) III

Advises the aviation community of the capabilities of the Automated Radar Terminal System and the associated services provided by ARTS III equipped air traffic control facilities. (Free from FAA)

91–6 Water, Slush, and Snow on the Runway

Provides background and guidelines concerning the operation of turbojet aircraft with water, slush, and/or snow on the runway. (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. (Sup't. Doc's.)

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. (Sup't. Doc's.)

91–24 Aircraft Hydroplaning or Aquaplaning on Wet Runways

Provides information to 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)

91–43 Unreliable Airspeed Indications

Alerts pilots to the possibility of erroneous airspeed/Mach indications that may be caused by blocking or freezing of the pitot system and advises of corrective action that can be taken. (Free from FAA)

95–1 Airway and Route Obstruction Clearance

Advises all interested persons of the airspace areas within which obstruction clearance is considered in the establishment of Minimum En Route Instrument Altitudes (MEAs) for publication in FAR Part 95. (Free from FAA)

120–5 High Altitude Operations in Areas of Turbulence

Recommends procedures for use by jet pilots when penetrating areas of severe turbulence. (Free from FAA)

120–28A Criteria for Approval of Category IIIa Landing Weather Minima

States an acceptable means, not the only means, for obtaining approval of Category IIIa minima and the installation approval of the associated airborne system. (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 300¾ 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 121. (Free from FAA)

121–18 Aviation Security—Carriage of Weapons and Escorted Persons

Provides information and guidance for the implementation of amendments to FAR Part 121 regarding the carriage of weapons on aircraft and for the carriage of persons in the custody of law enforcement officers. (Free from FAA)

121.195(d)–1 Alternate Operational Landing Distances for Wet Runways; Turbojet Powered Transport Category Airplanes

Sets forth an acceptable means, but not the only means, by which the alternate provision of section 121.195(d) may be met. (Free from FAA)

SAMPLE TEST

NOTE: These sample test questions are based on regulations and procedures in effect at the time of final editing of this guide. Similar test questions in the official FAA written tests should always be answered in terms of current regulations and procedures. If no correct answer is listed among the choices for a question in the official written test which involves a recent change, credit is always given until such time as a correction can be made.

1. The airplane dispatched has a seating capacity of 255 passengers. What is the minimum number of flight attendants required by FAR Part 121 when only 198 passengers are on board?

1—Two
2—Three
3—Five
4—Six

2. Your company operates only turbojet powered airplanes which have been in operation under FAR Part 121 for 120 days. Within the preceding 12 calendar months, your "operating familiarization" training must have been accomplished in

1—any Group I or Group II airplane operated under Part 121 or by observing 10 hours of training in an approved flight simulator.
2—each of the types of airplanes you will dispatch.
3—at least one of the types of airplanes you will dispatch.
4—a Group II airplane operated under Part 121 or by observing 5 hours of approved simulator training.

3. A flag air carrier airplane lands at an intermediate airport. After what time period is a redispatch required for the subsequent flight?

1—Six hours
2—Four hours
3—Two hours
4—One hour

4. The weather conditions at the departure airport are below the landing minimums listed in the certificate holder's operations specifications. For a four-engine turbojet airplane to be dispatched, an alternate airport must be specified which is at a distance of *not* more than

1—1 hour at normal cruising speed in still air with one engine inoperative.
2—2 hours at normal cruising speed with all engines operating.
3—2 hours at normal cruising speed with one engine inoperative.
4—1 hour at long-range cruising speed with all engines operating.

5. What condition is required to dispatch a turbojet powered, passenger-carrying airplane if the airborne weather radar is inoperative? (Potentially hazardous weather conditions detectable by radar can be expected enroute.)

1—The flight cannot be dispatched unless the airborne weather radar is repaired.
2—VFR conditions must exist along all portions of the proposed route, day or night.
3—The flight may be dispatched under day IFR or night VFR flight conditions.
4—The flight may be dispatched under day VFR flight conditions.

6. What supplemental oxygen requirement must be provided for passengers aboard a turbine engine powered air carrier airplane at a cabin pressure altitude of 10,500 feet?

1—Thirty minutes of oxygen for 10% of the passengers on board.
2—Enough oxygen for each passenger for 20 minutes at that cabin altitude.
3—Twenty minutes of oxygen for 10% of the passengers.
4—Ten minutes of oxygen for each available seat position or 2 hours' duration, whichever is greater.

7. The pilot in command shuts down one engine of a four-engine domestic air carrier airplane. What action should the pilot take regarding continuation of flight?

1—The flight may proceed to any airport if it is deemed as safe as landing at the nearest suitable airport.
2—The flight must terminate at the nearest suitable airport in point of time if that airport is closer than the destination airport.
3—The pilot in command shall return to the departure airport if it is closer than any other suitable airport in point of time.
4—Continuation to the destination airport can only be authorized by the dispatcher or certificate holder's authorized operations personnel.

8. What term is used to describe hydroplaning which might occur when an airplane lands on a runway on which there is standing water?

1—Dynamic hydroplaning
2—Viscous hydroplaning
3—Reverted rubber hydroplaning
4—Hydrostatic hydroplaning

* * * * * *

Test items 9 and 10 are based on information in the loading schedule below.

Item	*Weight*	*Moment 1,000*
Basic Operating Weight/Index	104,500	92,827.0
Passenger load:		
Forward compt.—Full		
Aft compt.—83		
Fuel load:		
Tanks 1 & 3 (Each tank; 12,000 lbs.)		
Tank 2—(Full)		
Cargo load:		
Forward hold (3,500 lbs.)		
Aft hold (2,000 lbs.)		

9. What is the CG in percent of MAC? (Figures 1 and 2, Appendix)

1—25.3% MAC
2—26.7% MAC
3—27.6% MAC
4—28.3% MAC

10. What is the Zero Fuel Weight (ZFW) for this flight? (Figure 1, Appendix)

1—117,040 lbs.
2—124,110 lbs.
3—129,040 lbs.
4—137,500 lbs.

11. What is the Basic Operating Weight (BOW) of this airplane?

1—The maximum authorized weight less disposable fuel.
2—Weight, ready for flight, including crewmembers, but without fuel and payload.
3—Maximum certificated weight less fuel and crewmembers.
4—Empty weight, plus fixed ballast, residual fuel, and oil.

12. Determine the MAX TAKEOFF EPR for all engines using these conditions and Figure 5, Appendix.

Field pressure altitude	500 feet
OAT	68°F.
Sixth stage airbleed	ON
Air-conditioning bleed	ON

	Engines 1 & 3	*Engine 2*
1—	2.11	2.11
2—	2.11	2.07
3—	2.12	2.16
4—	2.16	2.10

* * * * * *

Use this information and referenced figure numbers to answer questions 13 through 17.

Airport information:

Altimeter setting (QNH)	29.92 in. Hg
Outside air temperature (OAT)	80°F.
Surface wind	360°/20 knots
Elevation	2,000 feet

Runway 36R:

Available length	7,500 feet
Stopway	1,200 feet
Clearway	3,800 feet
Gradient (slope)	1% down
Average takeoff EPR	2.09
CG location at takeoff	18.0% MAC
Wing flap setting	20
Takeoff weight	165,000 pounds

13. What is the V_2 speed? (Fig. 5, Appendix)

1—144 knots
2—131 knots
3—148 knots
4—153 knots

14. What should be the STAB TRIM setting in units airplane nose up (ANU)? (Fig. 5, Appendix)

1—6½ ANU
2—6¾ ANU
3—7 ANU
4—7¼ ANU

15. What is the climb limit gross weight? (Fig. 6, Appendix)

1—178,000 pounds
2—180,000 pounds
3—182,000 pounds
4—184,000 pounds

16. What is the runway limit gross weight at brake release? (Fig. 6, Appendix)

1—170,000 pounds
2—174,000 pounds
3—176,000 pounds
4—180,000 pounds

17. What is the maximum allowable takeoff distance?

1— 8,100 feet
2— 8,700 feet
3—11,250 feet
4—11,300 feet

18. What should be the maximum cruise EPR at FL 300 for these conditions? (Fig. 7, Appendix)

Total Air Temperature (TAT) ..... −25°C.
Engine anti-ice (all engines) ..... ON

	Engines 1 & 3	*Engine 2*
1—	2.10	2.10
2—	2.10	2.19
3—	2.03	2.19
4—	2.07	2.08

19. What is the amount of fuel required for a three-engine air carrier airplane to hold for 20 minutes at 10,000 feet MSL, at a gross weight of 145,000 pounds? (Fig. 8, Appendix)

1—2,890 pounds
2—3,050 pounds
3—3,250 pounds
4—3,430 pounds

20. Determine the runway limit gross weight for landing using these conditions. (Fig. 10, Appendix)

Landing runway length ..... 5,600 feet
Field pressure altitude ..... 3,000 feet
Headwind component ..... 20 knots
Antiskid ..... ON
Runway condition ..... Wet
Nose brakes ..... OFF

1—168,000 pounds
2—170,000 pounds
3—172,000 pounds
4—175,000 pounds

21. What should be the maneuvering speed using FLAPS 30, landing gross weight of 145,000 pounds, and calm wind? (Fig. 11, Appendix)

1—127 knots
2—129 knots
3—131 knots
4—133 knots

22. Computations indicate that a domestic air carrier airplane can be stopped on a dry runway in 3,750 feet. What is the minimum length of runway required by FAR Part 121 for a destination airport?

1—6,900 feet
2—6,250 feet
3—5,900 feet
4—5,350 feet

* * * * * *

Your work schedule requires the completion of flight planning arrangements for your company's Flight 76 which is scheduled to depart San Antonio International Airport for Will Rogers World Airport at 0800 CST.

* * * * * *

Complete the Flight Time Analysis worksheet in the Appendix, Figure 44. The appropriate Enroute High Altitude Chart segment and the Standard Instrument Departure (SID) procedure are included in the Appendix, Figures 21 and 22.

NOTE: The Flight Time Analysis worksheet used in Figure 44 is not intended to be an operational form. It is used for an orderly presentation of flight planning data. Similar forms are made available to applicants when taking the official written test. Applicants may use these forms or any other flight planning form of their selection.

* * * * * *

Questions 23 through 26 pertain to computations on the Flight Time Analysis worksheet, Figure 44.

23. What is the estimated time enroute from takeoff at San Antonio International Airport, to landing at Will Rogers World Airport?

1—55 minutes
2—59 minutes
3—1 hour 03 minutes
4—1 hour 11 minutes

24. What is the total fuel necessary from start of taxi at San Antonio International, to landing at Will Rogers World Airport as required by FAR Part 121? (Compute to nearest 100 pounds.)

1—19,300 pounds
2—21,400 pounds
3—22,600 pounds
4—22,900 pounds

25. What is the specific range in nautical air miles per 1,000 pounds of fuel (NAM/1,000) for the enroute portion from level-off to the OKC VORTAC?

1—38.7 NAM/1,000
2—39.3 NAM/1,000
3—46.4 NAM/1,000
4—52.8 NAM/1,000

26. What adjustment to cruise Mach should be made if the flight is to arrive over the OKC VORTAC 25 minutes after passing the MQP VORTAC? (Figure 22, Appendix)

1—Decrease speed to .74 Mach
2—Increase speed to .79 Mach
3—Decrease speed to .77 Mach
4—Increase speed to .80 Mach

27. What should be the recommended flight altitude according to the Short Distance Cruise Altitude Chart for these conditions? (Figure 13, Appendix)

Planned trip distance ..... 355 NAM
Average OAT ..... ISA +10°C.

1—FL 250
2—FL 270
3—FL 310
4—FL 330

28. What is the time and fuel required for a trip distance of 1,480 NM at .82 indicated Mach for these conditions? (Figures 12 and 14, Appendix)

Cruise pressure altitude ..... FL 350
Average OAT ..... −45°C.
Estimated landing weight ..... 135,000 pounds
Wind factor ..... +50 knots

1—2 hours 55 minutes; 25,600 pounds
2—3 hours 15 minutes; 27,500 pounds
3—3 hours 30 minutes; 29,500 pounds
4—3 hours 40 minutes; 30,200 pounds

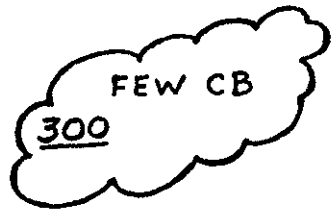
29. Of what potential inflight hazard, if any, should pilots be aware if a flight should pass beneath, or in close proximity to, the anvil portion of a thunderstorm while in clear air?

1—There is a possibility of hail within the clear air area.
2—Severe turbulence most likely would be encountered at two-thirds the height of the thunderstorm.
3—Lightning strikes to aircraft are most frequent in this area within a 5-mile distance.
4—No special hazard to flight exists in the clear air preceding a mature thunderstorm.

30. The information in a CONVECTIVE OUTLOOK provides

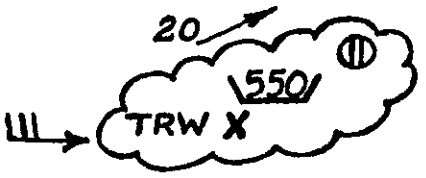
1—a forecast of low level convective activity, wind shear, and restrictions to visibility for the next 12 hours.
2—a forecast of clear air turbulence (CAT) and other existing areas of wind shear conditions for the next 12- to 18-hour period.
3—a general forecast of areas of unstable air masses at the 300 millibar level during the next 18 hours.
4—prospects of both general and severe thunderstorm activity during the next 24 hours.

31. What significant weather conditions are expected by the excerpt from a HI LVL SIG WX PROG chart?



1—Scattered (less than one-tenth coverage) cumulonimbus, tops 30,000 feet: bases are below 24,000 feet.
2—Multi-layered clouds (cirriform) should exist; maximum top of all layers 30,000 feet.
3—Few (less than one-eighth coverage) cumulonimbus, tops 30,000 feet; bases are below 24,000 feet.
4—Multi-layered cirrus stratus clouds with lowest layer at 30,000 feet.

32. What weather conditions are depicted by this excerpt from a Radar Summary Chart?



1—Broken echo coverage, maximum tops are 55,000 feet, intense thunderstorms and rain showers, individual echo movement is northeasterly at 20 knots, and area movement is easterly at 30 knots.
2—Broken cloud coverage, top of highest cell is 55,000 feet, thunderstorms and rain showers increasing in intensity, area movement is northeast at 20 knots, and cell movement is easterly at 30 knots.
3—Broken sky condition, bases of clouds are 5,500 feet, thunderstorms increasing in intensity, individual echo movement is northeasterly at 20 knots, and area movement is easterly at 30 knots.
4—Scattered echo coverage, top of an individual cell is 55,000 feet, rain showers increasing in intensity and moving eastward at 15 knots, cell movement is northeasterly at 20 knots.

33. What wind direction, speed, and OAT relative to ISA should a pilot expect over ABQ at FL 320? (Figure 35, Appendix)

1—280° magnetic @ 122 knots; ISA +3°C.
2—260° true @ 160 knots; ISA
3—280° magnetic @ 130 knots; ISA −3°C.
4—280° true @ 122 knots; ISA −3°C.

34. What is the valid time period for the Area Forecast (FA) and the categorical outlook? (Figure 36, Appendix)

	FA	*Categorical outlook*
1—	6 hours	12 hours
2—	12 hours	6 hours
3—	18 hours	12 hours
4—	24 hours	8 hours

35. What weather conditions are expected to exist at 1800Z for Washington, northwest Oregon, and the northern portions of Utah? (Figure 37, Appendix)

1—Intermittent rain and snow for less than half area coverage.
2—Continuous rain for the western portion of Washington and northwest Oregon; intermittent snow for the eastern portion of Washington and northern portions of Utah.
3—Continuous rain and snow showers for all areas indicating more than half area coverage.
4—Intermittent snow for the western portion of Washington and northwest Oregon; continuous rain for the eastern portion of Washington and northern portions of Utah.

36. The local altimeter setting is 30.08. If the pilot should inadvertently fail to change the setting from 29.92, what should the altimeter indicate when landing at an airport with an elevation of 1,032 feet?

1—2,032 feet
2—1,192 feet
3—1,032 feet
4— 972 feet

37. What conditions are indicated by the station plot for the Dallas-Ft. Worth, Texas area on the 300 MB Analysis Chart? (Fig. 40, Appendix)

1—Windspeed 70 knots; temperature −39°C; temperature-dewpoint spread, 13°C; height of contour surface, 9,370 meters.
2—Windspeed 80 knots; temperature −11°C; temperature-dewpoint spread, 11°C; height of contour surface 29,370 feet MSL.
3—Windspeed 120 knots; temperature −39°C; temperature-dewpoint spread, 3°C; height of contour 25,000 feet MSL.
4—Windspeed 70 knots; temperature ISA −13°C; temperature-dewpoint spread, 13°C; height of contour, 9,370 meters.

38. What is the temperature at the tropopause over the Denver, Colorado (KDEN) area at FL 390? (Fig. 42, Appendix)

1— −63°C.
2— −67°C.
3— −68°C.
4— −69°C.

39. What is the approximate windspeed and temperature at FL 300 over the Miami, Florida (KMIA) area? (Fig. 41, Appendix)

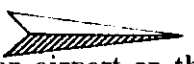
1—70 knots; −30°C.
2—30 knots; −40°C.
3—70 knots; −40°C.
4—30 knots; −38°C.

40. 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 nonstandard temperature variation.
4—standard sea level pressure at 29.92 inches.

41. A particular airport within the United States is *not* listed in the certificate holders operations specifications. The weather conditions at that airport must be equal to, or better than, which of the following conditions before a domestic air carrier flight may takeoff?

1—800–2, 900–1, or 1,000¾
2—900–2, 1,000–1, or 1,200½
3—800–2, 900–1½, or 1,000–1
4—900–3, 1,000–2, or 1,200–1

42. What does this symbol () indicate when it appears at an airport on the Enroute Low Altitude or Area Chart? (Fig. 19, Appendix)

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.

43. 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.

44. Which flight levels would be appropriate for an eastbound flight above FL 260?

1—Flight levels 270, 290, 330, 370, and 410.
2—Flight levels 280, 300, 340, 380, and 420.
3—Flight levels 270, 290, 310, 330, and 350.
4—Flight levels 280, 310, 340, 380, and 410.

45. The altitude which is in effect between radio fixes on a VOR/LF airway, and assures acceptable navigational signal coverage only within 22 nautical miles of a VOR, is the

1—minimum enroute altitude (MEA).
2—minimum reception altitude (MRA).
3—minimum obstruction clearance altitude (MOCA).
4—maximum crossing altitude (MCA).

46. What service is provided for aircraft at airports which have STAGE III terminal radar programs?

1—Radar advisory service for IFR flights only.
2—Radar advisories and sequencing of arriving and departing aircraft on IFR flight plans only.
3—Radar sequencing and separation service for all participating VFR aircraft.
4—STAGE III service provides radar monitoring by departure control of all IFR aircraft.

47. 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.

48. An air carrier airplane has a computed final approach speed of 137 knots during an ILS approach. Should it be necessary to circle to land on another runway at a maneuvering speed of 145 knots, what approach category minimums should be used? (Fig. 27, Appendix)

1—Category C only.
2—Either category C or D.
3—Category C for the ILS, and category D for the circling approach.
4—Category D only.

49. The outer marker is NOTAMed out of service (OTS) for a particular ILS approach procedure. What adjustment, if any, should be made to the published decision height and visibility requirements when no authorized substitutions for the outer marker are available? (Figure 28, Appendix)

1—DH plus 50 feet; no increase to visibility.
2—No increase to the DH; increase visibility ¼ mile.
3—DH plus 50 feet; increase visibility ½ mile.
4—No increase to the DH or visibility is required.

50. Which complete approach and runway lighting systems are installed for Runway 35R at Will Rogers World Airport? (Figures 29 and 26, Appendix)

1—High intensity ALS with sequenced flashers, HIRL, TDZL, and RCL.
2—VASI, high intensity ALS, HIRL, and TDZL.
3—High intensity ALS, HIRL, and RCL.
4—VASI, RCL with sequenced flashers, and TDZL.

ANALYSIS OF ANSWERS TO SAMPLE TEST ITEMS

1—(4)
See FAR 121.391

2—(4)
See FAR 121.463

3—(1)
See FAR 121.595

4—(3)
See FAR 121.617

5—(4)
See FAR 121.357

6—(1)
See FAR 121.329

7—(1)
See FAR 121.565

8—(1)
See Advisory Circular 91-24

9—(2)
Divide total moment (166,261.0) by total weight (183,540) to get a CG location of 905.9 (905.857) inches aft of datum. Subtract LEMAC (858.2″) from the CG location (905.9) to determine its location aft of LEMAC—47.7 inches. Divide 47.7″ by MAC, 178.6″ to obtain a CG of 26.7% of MAC.

10—(3)
Zero fuel weight (ZFW) is the basic operating weight (BOW) plus the payload of cargo and passengers.

BOW	104,500 pounds
Payload	24,540 pounds
ZFW	129,040 pounds

11—(2)
Basic operating weight is the empty weight of the aircraft, plus operating items including crew, ready for flight but without payload and fuel. (See FAA Weight and Balance Handbook, AC 91-23.)

12—(2)
Enter the chart at the 500-foot pressure altitude reference point, and move to the right until the 68°F (20°C) column is intersected. The average EPR setting for engines 1 and 3 should be 2.11 (interpolate between SL and 1,000 feet PA). The EPR setting for engine 2 should be 2.12. No correction factors are applied to engines 1 and 3. Correct engine 2 EPR setting by −.05 (sixth stage bleed air-ON). See note below EPR BLEED CORRECTION table.

13—(3)
Enter the chart in the pressure altitude column at the 1,000 to 3,000-foot reference point. Move right to the first OAT column (−65°F to 83°F). Move downward in the first column to the 20 FLAPS segment of the chart. Interpolate between the 160,000 and 170,000 pound values to obtain a V_2 speed of 148 knots for 165,000 pounds.

14—(1)
Enter the chart at 18% CG. Move right to the FLAPS $^{15}/_{20}$ column, and read 6½ units airplane nose up (ANU) setting.

15—(3)
Refer to the explanation of Takeoff Performance Chart, Figure 6, Appendix.

16—(3)
Follow the example given in the Takeoff Performance Chart, Figure 6, Appendix. Note that the climb limit value may be the limiting weight in certain instances.

17—(3)
See FAR 121.189

18—(4)

Enter the chart at the FL 300 reference point; move to the right, and in the TAT°C. data, interpolate between the −10°C and −20°C TAT values to determine the EPR setting of 2.15 for engines 1 and 3. Use the same procedure to determine the EPR setting of 2.19 for engine 2. Refer to the EPR BLEED CORRECTIONS chart and note that for engine anti-icing ON, the correction factors are −.08 for engines 1 and 3, and −.11 for engine 2. Thus, the corrected EPR settings for engines 1 and 3 are 2.07 (2.15 −.08), and 2.08 (2.19 −.11) for engine 2.

19—(1)

Enter the chart at the 10,000-foot pressure altitude reference point, move to the right and interpolate between the 150,000 and 140,000 pound gross weight columns. Fuel flow per engine should be 2,890 pounds per hour. Total fuel flow would be 8,670 PPH (2,890 x 3 engines). This is equivalent to 144.5 pounds per minute. 144.5 x 20 minutes=2,890 pounds of fuel required.

20—(2)

Refer to Landing Performance—FLAPS 40 chart, Appendix, and apply the conditions given.

21—(3)

Determine the V_{ref} speed of 127 knots at 145,000 pounds gross weight. Enter the MANEUVERING SPEEDS chart and note that the maneuvering speed for FLAPS 30 is $V_{ref}+4$. Thus, the maneuvering speed for the conditions stated is 131 knots (127 knots+4 knots).

22—(2)

A turbine engine powered, transport category, air carrier airplane must be able to stop within 60% of the effective runway length on a dry runway. If a particular airplane can be stopped in 3,750 feet, then a runway with an effective length of 6,250 feet (3,750 feet divided by 60%) is required.

23—(4)

The estimated time enroute is 1 hour and 11 minutes. (Reference analysis on item 24 for specific breakdown of time enroute)

24—(3)

The time and fuel summary is outlined as follows:

Enroute	01:11/12,830 lbs.
Alternate	00:15/ 2,150 lbs.
Reserve	00:45/ 6,430 lbs.
Extra for approach and Missed approach	1,200 lbs.
Totals	02:11/22,610 lbs.

25—(3)

The true airspeed is 454 knots and the total fuel flow is 9.80 thousands of pounds per hour, therefore:

$$\text{NAM/1,000 pounds}=\frac{454 \text{ knots}}{9.80 \text{ pph}}=46.4 \text{ nautical air miles}$$

26—(1)

To fly 163 NM in 25 minutes required a ground speed of 392 knots. The headwind component of 35 knots must be *added* to 392 knots ground speed to obtain a required true airspeed of 427 knots. The OAT at FL 310 is −50°C. for this particular flight. Set up the computer on −50°C. over the mach index and read .74 indicated mach opposite the true airspeed of 427 knots.

27—(3)

Enter the chart at the 355 nautical mile reference point; move up to the ISA +10°C. temperature line; move left to read a flight pressure altitude of 31,000 feet (FL 310).

28—(1)

Enter the chart on the "trip distance" base line and use the plotted lines on the chart as a guide. Read trip fuel on the right of the chart and trip time on the upper left. Apply the ISA +10°C. correction for the OAT of −45°C. at FL 350.

29—(1)

Aviation Weather, AC 00–6A.

30—(4)

Aviation Weather Services, AC 00–45A.

31—(3)

Aviation Weather Services, AC 00–45A.

32—(1)

Aviation Weather Services, AC 00–45A.

33—(4)

Aviation Weather Services, AC 00–45A.

34—(3)

Aviation Weather Services, AC 00–45A.

35—(2)

Aviation Weather Services, AC 00–45A.

36—(2)

Aviation Weather, AC 00–6A.

37—(1)

Aviation Weather Services, AC 00–45A.

38—(4)

Aviation Weather Services, AC 00–45A.

39—(2)

Aviation Weather Services, AC 00–45A.

40—(4)

See FAR 91.81.

41—(3)

See FAR 121.637.

42—(1)

See Enroute High Altitude Chart legend, Appendix.

43—(1)

See AIM, Part 1.

44—(1)

See FAR 91.121, and Enroute High Altitude Chart legend, Figure 18, Appendix.

45—(3)

See AIM, Part 1.

46—(3)

See AIM, Part 1.

47—(2)

See FAR 91.117.

48—(4)

See Aircraft Approach Categories, Figure 27, Appendix.

49—(1)

See Inoperative Components or Visual Aids Table, Figure 28, Appendix.

50—(1)

See Approach Lighting Systems Legend, Figures 29 and 26, Appendix.

APPENDIX

This section contains supplementary material for use with the sample test. Additional material of value to the applicant for the Aircraft Dispatcher 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. Its causes, effects, prevention, and treatment must be completely understood.

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 cockpit duties, the effect of hypoxia may not be noticed. Each person has 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

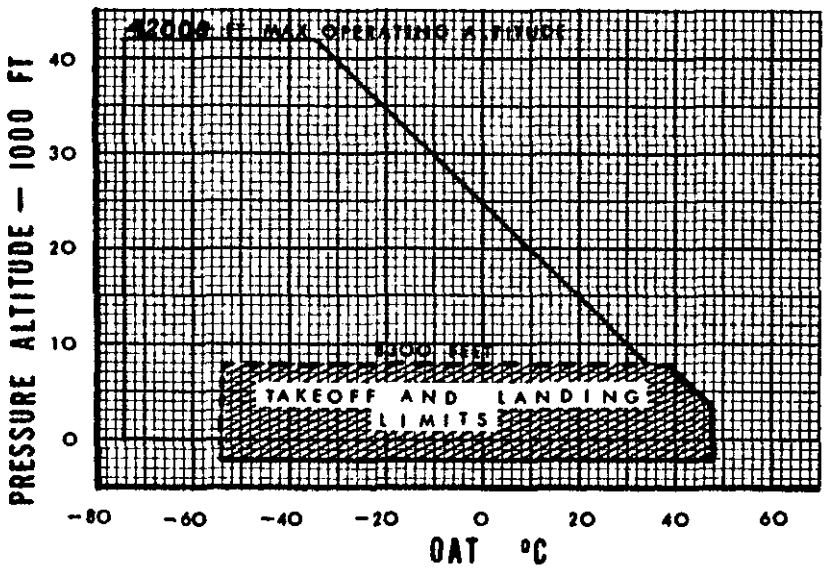
2. 1.15 times the horizontal distance from the point of brake release to a point equidistant between the lift-off point and the point where the airplane attains a height of 35 feet above the takeoff surface with all engines operating.

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. The 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

MAC	178.6 inches
L.E. of MAC	858.2 inches

OPERATING LIMITATIONS

Maximum Takeoff Slope	± 2%
Maximum Takeoff/Landing Tailwind Component	10 knots
Maximum Takeoff/Landing Crosswind Component	27 knots

WEIGHT LIMITATIONS

Basic Operating Weight	104,500 pounds
Maximum Zero Fuel Weight	137,500 pounds
Maximum Taxi Weight	184,700 pounds
Maximum Takeoff Weight (Brake Release)	184,700 pounds
Maximum Inflight Weight (Flaps 30)	154,500 pounds
(Flaps 40)	143,000 pounds
Maximum Landing Weight (Flaps 30)	154,000 pounds
(Flaps 40)	142,000 pounds

FIGURE 1. Airplane Data Constants, Operating and Weight Limitations.

PASSENGER LOADING TABLE

Number of Pass.	Weight Lbs.	Moment / 1000
FORWARD COMPARTMENT CENTROID—582.0		
5	850	495
10	1,700	989
15	2,550	1,484
20	3,400	1,979
25	4,250	2,473
29	4,930	2,869
AFT COMPARTMENT CENTROID—1028.0		
10	1,700	1,748
20	3,400	3,495
30	5,100	5,243
40	6,800	6,990
50	8,500	8,738
60	10,200	10,486
70	11,900	12,233
80	13,600	13,980
90	15,300	15,728
100	17,000	17,476
110	18,700	19,223
120	20,400	20,971
133	22,610	23,243

CARGO LOADING TABLE

	Moment / 1000	
	Forward Hold	Aft Hold
Weight Lbs.	Arm 680.0	Arm 1166.0
6,000		6,966
5,000	3,400	5,830
4,000	2,720	4,664
3,000	2,040	3,498
2,000	1,360	2,332
1,000	680	1,166
900	612	1,049
800	544	933
700	476	816
600	408	700
500	340	583
400	272	466
300	204	350
200	136	233
100	68	117

NOTE: THESE COMPUTATIONS ARE TO BE USED FOR TESTING PURPOSES ONLY.

FUEL LOADING TABLE

TANKS 1 & 3 (EACH)			TANK 2 (3 CELL)					
Weight Lbs.	Arm	Moment / 1000	Weight Lbs.	Arm	Moment / 1000	Weight Lbs.	Arm	Moment / 1000
8,500	992.1	8,433	8,500	917.5	7,799	22,500	914.5	20,576
9,000	993.0	8,937	9,000	917.2	8,255	23,000	914.5	21,034
9,500	993.9	9,442	9,500	917.0	8,711	23,500	914.4	21,488
10,000	994.7	9,947	10,000	916.8	9,168	24,000	914.3	21,943
10,500	995.6	10,451	10,500	916.6	9,624	24,500	914.3	22,400
11,000	996.1	10,957	11,000	916.5	10,082	25,000	914.2	22,855
11,500	996.8	11,463	11,500	916.3	10,537	25,500	914.2	23,312
12,000	997.5	11,970	12,000	916.1	10,993	26,000	914.1	23,767
FULL CAPACITY			**(See note at lower left)			26,500	914.1	24,244
**Note: Computations for Tank 2 weights for 12,500 lbs. to 18,000 lbs. have been purposely omitted.			18,500	915.1	16,929	27,000	914.0	24,678
			19,000	915.0	17,385	27,500	913.9	25,132
			19,500	914.9	17,841	28,000	913.9	25,589
			20,000	914.9	18,298	28,500	913.8	26,043
			20,500	914.8	18,753	29,000	913.7	26,497
			21,000	914.7	19,209	29,500	913.7	26,954
			21,500	914.6	19,664	30,000	913.6	27,408
			22,000	914.6	20,121	FULL CAPACITY		

FIGURE 2. Loading Tables.

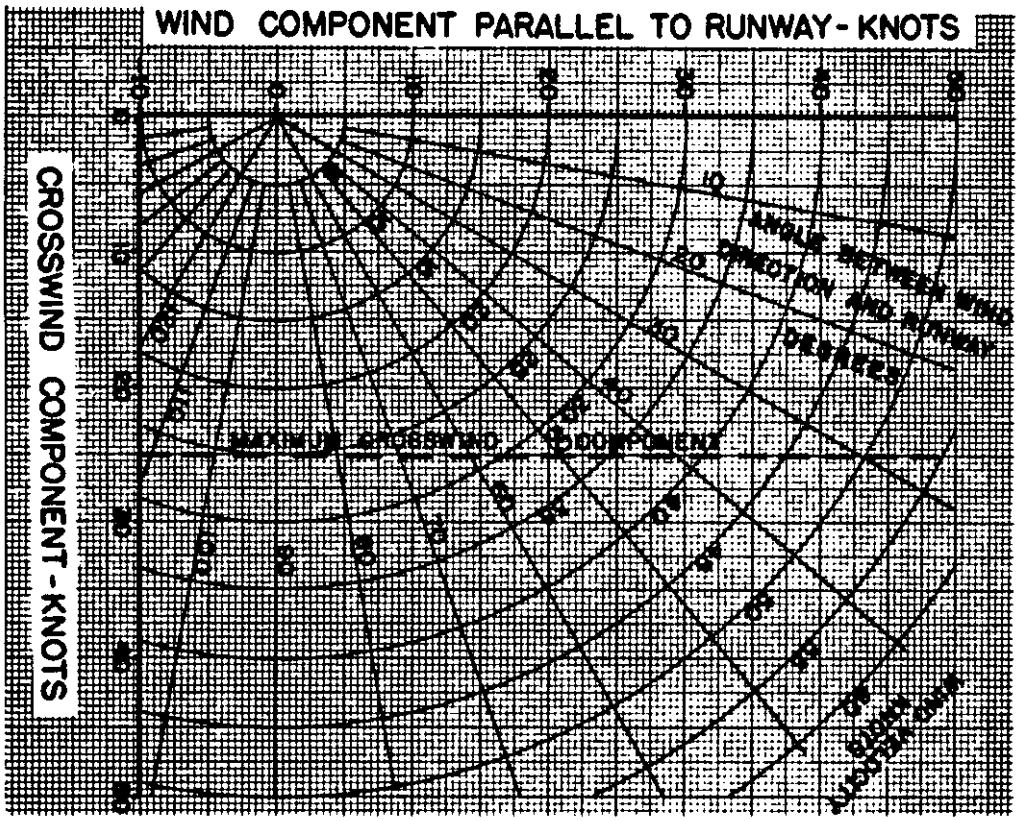


FIGURE 3. Wind Component Chart.

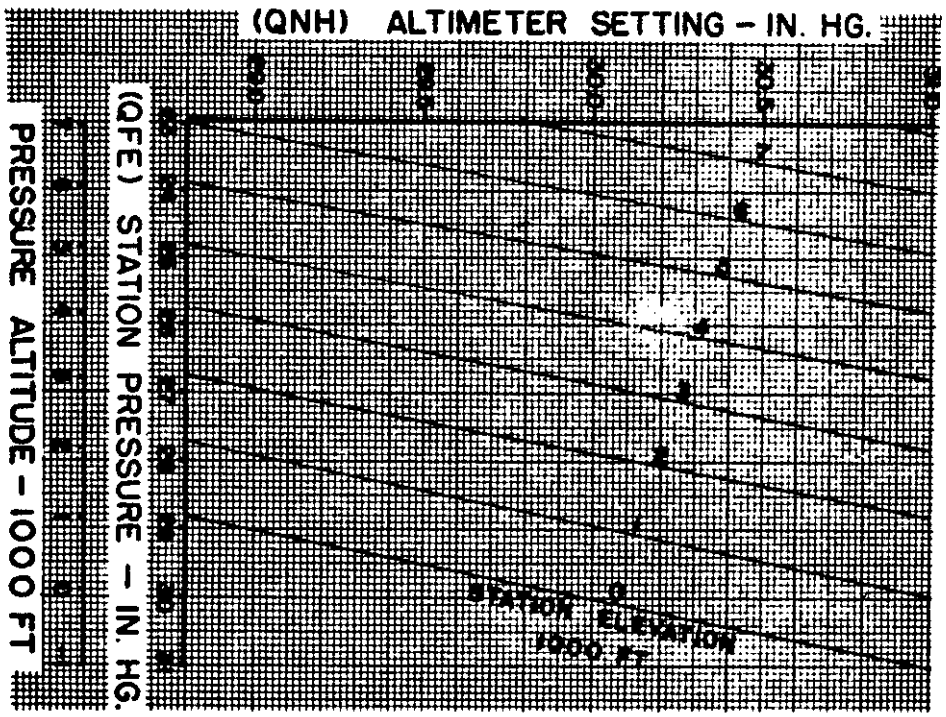


FIGURE 4. Station Pressure Chart.

TAKEOFF EPR, SPEEDS AND STAB TRIM SETTING

MAX TAKEOFF EPR

0 - 60 KNOTS — ENG 1 & 3 AIRBLEED ON; ENG 2 NO AIRBLEED

PRESS ALT FT		OAT °F / °C	-67 TO -9 / -55 TO -23	-4 / -20	5 / -15	14 / -10	23 / -5	32 / 0	41 / 5	50 / 10	59 / 15	68 / 20	77 / 25	86 / 30	95 / 35	104 / 40	113 / 45	120 / 49
-1000	ENG	1 & 3	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.03	1.99	1.94	1.91
		2	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.05	2.00	1.96	1.92
S.L.		1 & 3	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.08	2.03	1.99	1.94	1.91
		2	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.11	2.10	2.05	2.00	1.96	1.92
1000		1 & 3	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.13	2.12	2.12	2.11	2.08	2.03	1.99	1.94	1.91
		2	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.15	2.13	2.13	2.12	2.10	2.05	2.00	1.96	1.92
2000		1 & 3	2.21	2.21	2.21	2.21	2.21	2.20	2.17	2.14	2.14	2.14	2.11	2.08	2.03	1.99	1.94	1.91
		2	2.22	2.22	2.22	2.22	2.21	2.18	2.16	2.16	2.15	2.15	2.12	2.10	2.05	2.00	1.96	1.92
3000		1 & 3	2.26	2.26	2.26	2.25	2.23	2.20	2.17	2.14	2.14	2.14	2.11	2.08	2.03	1.99	1.94	1.91
		2	2.28	2.28	2.28	2.27	2.24	2.21	2.18	2.16	2.16	2.15	2.12	2.10	2.05	2.00	1.96	1.92
3856 & ABOVE		1 & 3	2.31	2.29	2.27	2.25	2.23	2.20	2.17	2.14	2.14	2.14	2.11	2.08	2.03	1.99	1.94	1.91
		2	2.32	2.31	2.29	2.27	2.24	2.21	2.18	2.16	2.16	2.15	2.12	2.10	2.05	2.00	1.96	1.92

EPR BLEED CORRECTIONS	ENG 1 & 3	ENG 2
AIR CONDITIONING	OFF+.04	-
ENGINE ANTI-ICE ON	-	-.03

REDUCE ENG 2 EPR BY .05 WITH 8TH STAGE BLEED ON (IF INSTALLED) FOR 10°C (50°F) OAT & WARMER

V_1, V_R, V_2

ANTI-SKID OPERATIVE

PRESSURE ALT - 1000 FT		OAT (ABOVE CERTIFIED ALTITUDE)									
9 TO 11	°F	-65 TO 25						26 TO 87			
	°C	-54 TO -4						-3 TO 31			
7 TO 9	°F			-65 TO 9		10 TO 75		76 TO 104			
	°C			-54 TO -13		-12 TO 24		25 TO 40			
5 TO 7	°F	-65 TO -10		-8 TO 42		43 TO 97		98 TO 111			
	°C	-54 TO -23		-22 TO 5		6 TO 36		37 TO 44			
3 TO 5	°F	-65 TO 32		33 TO 90		91 TO 113		114 TO 120			
	°C	-54 TO 0		1 TO 32		33 TO 45		46 TO 49			
1 TO 3	°F	-65 TO 83		84 TO 106		107 TO 120					
	°C	-54 TO 28		29 TO 41		42 TO 49					
-1 TO 1	°F	-65 TO 99		100 TO 120							
	°C	-54 TO 37		38 TO 49							

FLAPS	GROSS WEIGHT 1000 LB	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	210	165	175	166	175				
	200	160	171	162	171				
	190	155	167	157	167	158	167		
	180	150	163	152	163	154	163		
	170	144	159	147	159	149	159	150	158
	160	140	154	141	153	143	153	145	153
	150	135	149	136	149	138	149	140	148
	140	129	145	130	145	132	144	134	144
	130	124	140	125	139	126	138	128	138
	120	119	135	120	134	120	134	121	133
15	210	156	166	157	166				
	200	151	162	153	162				
	190	146	158	148	158	149	158		
	180	141	154	143	154	145	154		
	170	136	150	138	150	140	150	141	149
	160	132	146	133	145	135	145	137	145
	150	127	141	128	141	130	141	132	140
	140	122	137	123	137	124	136	126	136
	130	117	133	118	132	118	131	120	131
	120	112	128	113	127	113	127	115	126
20	210	151	161	152	161				
	200	146	157	148	157				
	190	141	153	143	153	144	153		
	180	136	150	138	150	140	149		
	170	132	146	133	146	135	145	136	145
	160	128	142	129	141	131	141	133	141
	150	123	137	124	137	126	136	128	136
	140	118	133	119	133	120	132	122	132
	130	113	129	114	128	114	127	116	127
	120	109	124	109	123	109	123	111	122
25	210	146	157	147	157				
	200	141	153	143	153				
	190	137	149	138	149	139	149		
	180	132	145	134	145	136	145		
	170	127	141	129	141	131	141	132	140
	160	123	137	124	137	126	137	128	136
	150	119	133	120	133	122	133	124	132
	140	114	129	115	129	116	128	118	128
	130	109	125	110	124	110	124	112	123
	120	105	120	106	120	106	119	108	118

STAB TRIM SETTING

CG%	FLAPS 5	FLAPS 15 /20	FLAPS 25
	UNITS AIRPLANE NOSE UP		
10	6 3/4	7 1/2	8 1/4
12	6 1/2	7 1/4	8
14	6 1/4	7	7 3/4
16	6	6 3/4	7 1/2
18	5 3/4	6 1/2	7
20	5 1/2	6	6 1/2
22	5	5 3/4	6 1/4
24	4 3/4	5 1/4	5 3/4
26	4 1/2	4 3/4	5 1/4
28	4	4 1/2	4 3/4
30	3 3/4	4	4 1/4
32	3 1/2	3 3/4	4
34	3 1/4	3 1/4	3 1/2
36	2 3/4	3	3
38	2 1/2	2 1/2	2 1/2
40	2 1/2	2 1/2	2 1/2
42	2 1/2	2 1/2	2 1/2

FLAP RETRACTION/ MANEUVERING SPEEDS

GROSS WEIGHT LB	FLAP POSITION 15	5	2	0
154500 & BELOW	150	160	190	200
154501 TO 176000	160	170	200	210
176001 TO 191000	170	180	210	220
ABOVE 191000	180	190	225	235

FOR MANEUVERS IMMEDIATELY AFTER TAKEOFF EXCEEDING 15° BANK MAINTAIN AT LEAST V_2+10 AT TAKEOFF FLAPS

FIGURE 5. Takeoff EPR, Speeds, and STAB TRIM Setting Chart.

Explanation of Figure 6

Given Factors:

Runway length available	8,300 feet
Slope	1% up
Headwind component	20 knots
Flap position	20
Airport pressure altitude	2,000 feet
Outside air temperature	86°F.
Average takeoff EPR	2.09

For runway limit: start at runway length available line and follow dotted line and arrows. Answer is 174,500 pounds.

For climb limit: start where EPR 2.09 intersects climb limit base line and follow dotted line and arrows. Answer is 181,500 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 174,500 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 181,500 pounds. This value far exceeds the runway limit of 174,500 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.)

TAKEOFF PERFORMANCE

AVERAGE TAKEOFF EPR A/C BLEED ON										
ALT	°F	67 TO 9	4	14	32	50	68	86	104	122
FT	°C	55 TO 23	20	10	0	10	20	30	40	50
00		2.05	2.05	2.05	2.05	2.05	2.05	2.05	1.99	1.90
L.		2.10	2.10	2.10	2.10	2.10	2.10	2.09	1.99	1.90
00		2.15	2.15	2.15	2.15	2.14	2.12	2.09	1.99	1.90
00		2.21	2.21	2.21	2.20	2.15	2.14	2.09	1.99	1.90
00		2.27	2.27	2.26	2.20	2.15	2.14	2.09	1.99	1.90
ABOVE		2.31	2.30	2.26	2.20	2.15	2.14	2.09	1.99	1.90

BASED ON
1. ANTI-SKID OPERATIVE (ANTI-SKID INOP SEE TEXT)
2. A/C BLEED ON
3. AUTOPACK TRIP OPERATIVE
4. ENGINE FAILURE WARNING LIGHT OPERATIVE

NOTE. DETERMINE AVERAGE TAKEOFF EPR FROM TABLE. WITH 6th STAGE BLEED ON AT 10°C (50°F) AND WARMER, REDUCE CLIMB LIMIT WEIGHT BY 4400 LB (2000 KG) & FIELD LIMIT WT BY 1800 LB (800 KG) FOR ENGINE A/I ON REDUCE AVERAGE EPR BY .01

STRUCTURAL WEIGHT LIMITS MUST BE OBSERVED

	CLIMB LIMIT	RUNWAY LIMIT
AUTOPACK TRIP INOP	-2700 LB	-800 LB
ENG FAIL WARN LT INOP	0	-2400 LB

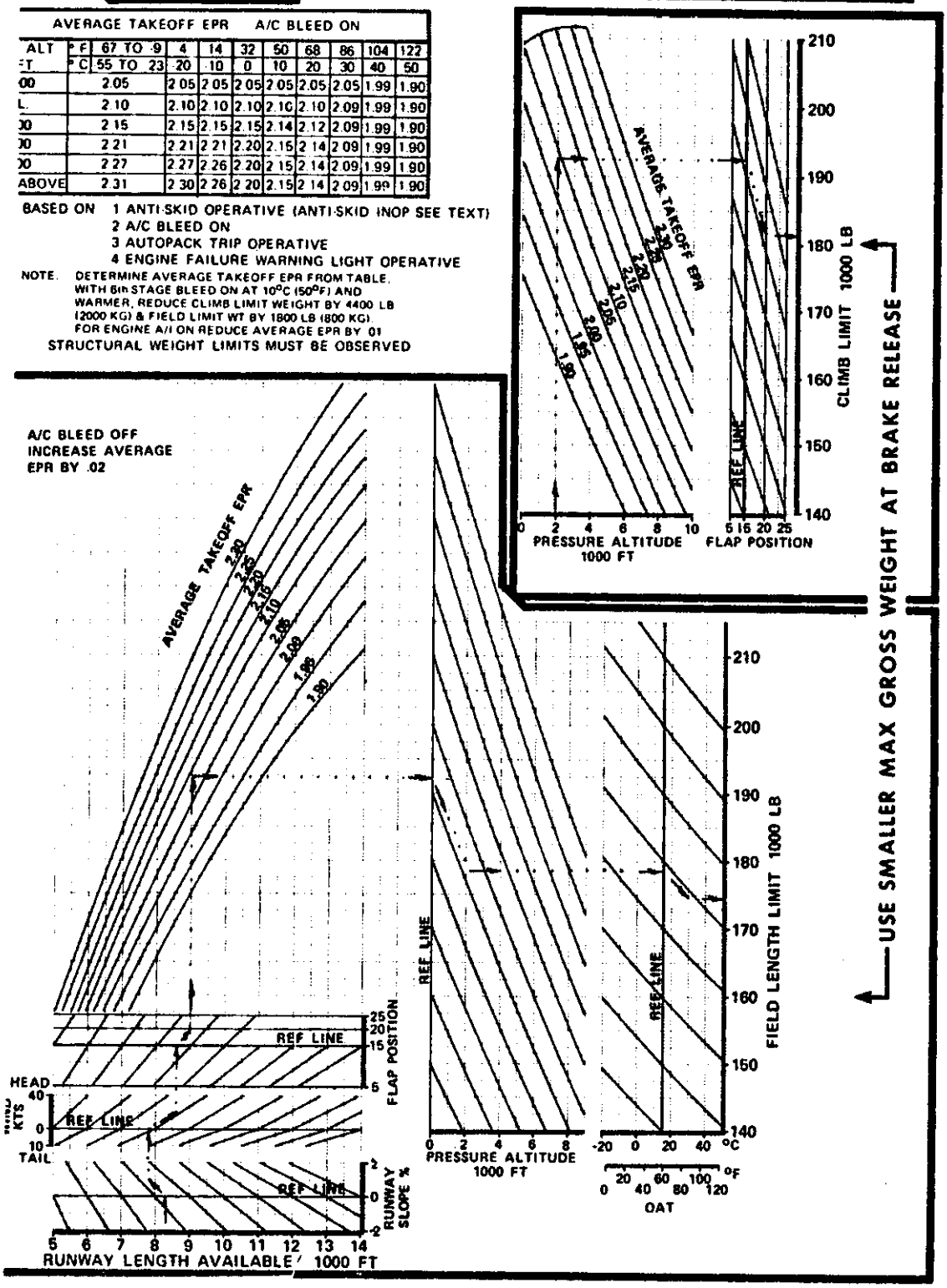


FIGURE 6. Takeoff Performance Chart.

IND. MACH .80 CRUISE
ALL ENGINES 2 AIRBLEEDS
MAX CRUISE THRUST LIMITS

AVG EPR REQUIRED
MAX TAT AT WHICH EPR CAN BE SET
ISA FUEL FLOW LB/HR/ENG

FLIGHT LEVEL 220 TO 310

FLIGHT LEVEL	IAS STD TAT	GROSS WEIGHT 1000 LB 210	205	200	195	190	185	180	175	170	165
310	297 -17	2.19 -38 4139	2.15 -24 3974	2.11 -17 3825	2.08 -12 3697	2.05 -8 3580	2.02 -5 3469	1.99 -2 3368	1.96 0 3282	1.94 2 3207	1.91 4 3137
300	304 -15	2.12 -17 4033	2.08 -12 3901	2.05 -9 3781	2.02 -6 3667	1.99 -3 3562	1.97 -0 3469	1.95 2 3392	1.92 3 3320	1.90 5 3251	1.88 7 3188
290	310 -13	2.06 -9 3992	2.03 -6 3878	2.00 -3 3771	1.98 -1 3675	1.95 1 3594	1.93 3 3519	1.91 5 3448	1.89 6 3381	1.87 8 3321	1.86 9 3265
280	317 -11	2.01 -4 3981	1.98 -1 3884	1.96 1 3800	1.94 2 3722	1.92 4 3649	1.90 6 3580	1.88 7 3516	1.66 8 3458	1.85 10 3402	1.83 11 3347
270	324 -8	1.96 1 4009	1.94 2 3929	1.92 4 3854	1.90 5 3783	1.89 7 3716	1.87 8 3656	1.85 9 3598	1.84 10 3543	1.82 12 3488	1.81 13 3438
260	331 -6	1.92 4 4063	1.91 5 3990	1.89 6 3921	1.87 8 3859	1.86 9 3800	1.84 10 3743	1.83 11 3687	1.82 12 3633	1.80 13 3586	1.79 14 3542
250	338 -4	1.89 6 4131	1.88 7 4066	1.86 9 4006	1.85 10 3947	1.84 11 3891	1.82 12 3836	1.81 13 3785	1.80 14 3739	1.79 15 3694	1.77 16 3651
240	345 -2	1.87 8 4214	1.85 10 4155	1.84 11 4098	1.83 12 4042	1.81 13 3989	1.80 14 3941	1.79 15 3896	1.78 15 3852	1.77 16 3809	1.76 17 3766
230	352 0	1.84 11 4310	1.83 12 4253	1.82 13 4198	1.81 13 4149	1.80 14 4103	1.78 15 4059	1.77 16 4015	1.76 17 3972	1.75 18 3930	1.74 19 3888
220	359 3	1.82 12 4412	1.81 13 4362	1.80 14 4315	1.79 15 4271	1.78 16 4227	1.77 17 4183	1.76 17 4140	1.75 18 4098	1.74 19 4058	1.73 20 4019

MAX CRUISE EPR — ENG 1 & 3 A/C AIRBLEED ON; ENG 2 NO AIRBLEED

FLIGHT LEVEL	ENG	TAT °C -50	-40	-30	-20	-10	0	10	20	30	40
100	1 & 3	2.24	2.22	2.19	2.15	2.09	1.99	1.86	1.74	1.65	1.56
200		2.23	2.21	2.18	2.14	2.08	1.98	1.85	1.73	1.64	1.55
300		2.22	2.20	2.17	2.13	2.07	1.97	1.84	1.72	1.63	1.54
400		2.19	2.17	2.15	2.11	2.04	1.94	1.82	1.70	1.60	1.52
420		2.19	2.17	2.14	2.11	2.04	1.94	1.82	1.69	1.60	1.52
0-420	2	2.25	2.23	2.21	2.17	2.10	2.01	1.89	1.76	1.67	1.59

EPR BLEED CORRECTIONS		ENG 1 & 3	ENG 2
AIR COND AIR BLEED	FL100	OFF + .04	ON - .04
	FL200	OFF + .05	ON - .05
	FL300	OFF + .06	ON - .06
	FL400	OFF + .08	ON - .07
	FL420	OFF + .08	ON - .07
ENG ANTI-ICE ON		- .08	- .11
ENG & WING ANTI-ICE	TWO ENG BLD	- .16	- .11
	ONE	- .16	

FIGURE 7. Indicated Mach .80 Cruise Chart.

EPR
IAS - KTS
FF PER ENG - LB/HR

HOLDING

MINIMUM DRAG AIRSPEED
(200KTS LOWER LIMIT)

PRESSURE ALTITUDE FT	GROSS WEIGHT - 1000 LB								
	200	190	180	170	160	150	140	130	120
25000	1.85	1.81	1.77	1.73	1.69	1.64	1.60	1.55	1.51
	268	261	253	246	238	230	222	213	205
	3600	3400	3210	3030	2860	2680	2510	2340	2180
20000	1.69	1.66	1.62	1.59	1.55	1.51	1.48	1.44	1.40
	265	258	251	244	236	228	220	212	204
	3630	3450	3280	3110	2940	2770	2600	2440	2270
15000	1.56	1.53	1.50	1.47	1.44	1.41	1.38	1.35	1.32
	263	256	249	242	235	227	219	211	203
	3670	3500	3340	3170	3000	2850	2680	2520	2350
10000	1.45	1.43	1.40	1.38	1.35	1.33	1.30	1.28	1.25
	262	255	248	241	234	226	218	210	202
	3800	3640	3460	3310	3140	2970	2810	2640	2480
5000	1.36	1.34	1.32	1.30	1.28	1.26	1.24	1.22	1.20
	260	254	247	240	233	225	218	210	201
	3900	3720	3550	3380	3220	3060	2890	2730	2560

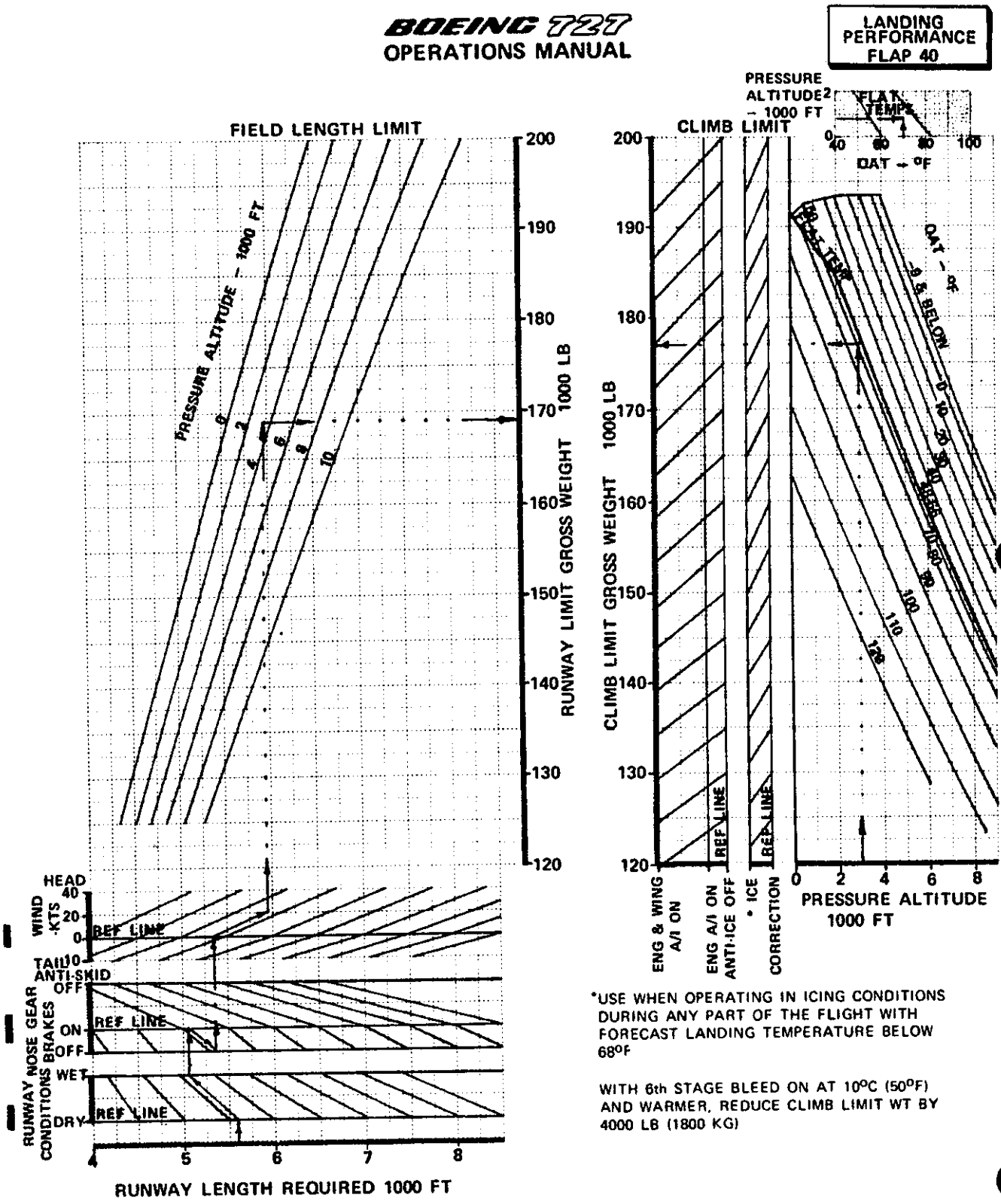
FIGURE 8. Holding: EPR, Airspeed, and Fuel Flow Chart.

INITIAL FUEL WEIGHT 1000 LB	ENDING FUEL WEIGHT - 1000 LB															
	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70
70	28	27	25	23	22	20	18	17	15	13	12	10	8	5	3	0
66	26	25	23	21	20	18	16	15	13	11	10	8	5	3	0	
62	23	23	20	18	17	15	13	12	10	8	7	5	3	0		
58	21	20	18	16	15	13	11	10	8	6	5	3	0			
54	18	16	15	13	12	10	8	7	5	3	2	0				
50	16	15	13	12	10	8	7	5	3	2	0					
46	15	13	12	10	8	7	5	3	2	0						
42	13	12	10	8	7	5	3	2	0							
38	12	10	8	7	5	3	2	0								
34	10	8	7	5	3	2	0									
30	8	7	5	3	2	0										
26	7	5	3	2	0											
22	5	3	2	0												
18	3	2	0													
14	2	0														
10	0															

FUEL DUMP TIME

FUEL JETTISON TIME-MINUTES

FIGURE 9. Fuel Dump Time Chart.



*USE WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WITH FORECAST LANDING TEMPERATURE BELOW 68°F

WITH 6th STAGE BLEED ON AT 10°C (50°F) AND WARMER, REDUCE CLIMB LIMIT WT BY 4000 LB (1800 KG)

FIGURE 10. Landing Performance—FLAPS 40 Chart.

JT8D-15

GO AROUND EPR AND LANDING SPEEDS

GO AROUND EPR

NORMAL BLEED CONDITIONS

PRESSURE ALTITUDE-FT	OAT °F		-82	-10	0	10	18	27	38	47	55	69	73	83	91	100	110	119
	°C		-63	-23	-18	-13	-8	-3	3	8	13	18	23	28	33	38	43	48
	TAT °C		-60	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50
-1000	ENGINE	1&3	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	1.99	1.94	1.89
		2	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.04	2.01	1.97	1.91
SEA LEVEL		1&3	2.07	2.07	2.07	2.07	2.07	2.07	2.07	2.07	2.07	2.07	2.07	2.07	2.04	1.99	1.94	1.89
		2	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.06	2.01	1.97	1.91
1000		1&3	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.09	2.09	2.09	2.08	2.04	1.99	1.94	1.89
		2	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.12	2.12	2.12	2.10	2.06	2.01	1.97	1.91
2000		1&3	2.18	2.18	2.18	2.18	2.18	2.18	2.17	2.13	2.12	2.12	2.10	2.08	2.04	1.99	1.94	1.89
		2	2.20	2.20	2.20	2.20	2.20	2.20	2.19	2.16	2.15	2.15	2.13	2.10	2.06	2.01	1.97	1.91
3000		1&3	2.24	2.24	2.24	2.24	2.23	2.20	2.17	2.13	2.12	2.12	2.10	2.08	2.04	1.99	1.94	1.89
		2	2.27	2.27	2.27	2.27	2.25	2.22	2.19	2.16	2.15	2.15	2.13	2.10	2.06	2.01	1.97	1.91
3900 AND ABOVE		1&3	2.30	2.30	2.28	2.26	2.23	2.20	2.17	2.13	2.12	2.12	2.10	2.08	2.04	1.99	1.94	1.89
		2	2.32	2.32	2.30	2.28	2.25	2.22	2.19	2.16	2.15	2.15	2.13	2.10	2.06	2.01	1.97	1.91

EPR BLEED CORRECTIONS		ENG 1&3	ENG 2
A/C BLEEDS		OFF +.04	ON -.04
ENGINE ANTI-ICE ON		--	-.03
ENGINE AND WING ANTI-ICE	TWO ENGINE BLEEDS	-.09	-.03
	ONE ENGINE BLEED	-.10	-.03

FLAP EXTENSION/ MANEUVERING SPEEDS

FLAPS	BELOW 154,500	154,501 TO 176,000
	APPROACH NORMAL MANEUVERING SPEED	
0	200	210
2	190	200
5	160	170
15	150	160
25	140	150
30	V_{REF}+4	V_{REF}+4
40	V_{REF}*	V_{REF}*

*ADD WIND FACTOR OF:
1/2 HEADWIND COMPONENT
+ GUST (MAX: 20 KTS)

LANDING SPEEDS

GROSS WT 1000 LB	SPEED V_{REF}*
180	147
175	145
170	142
165	139
160	136
155	133
150	130
145	127
140	125
135	122
130	119
125	116
120	113
115	110
110	108

FIGURE 11. Go Around EPR and Landing Speeds Chart.

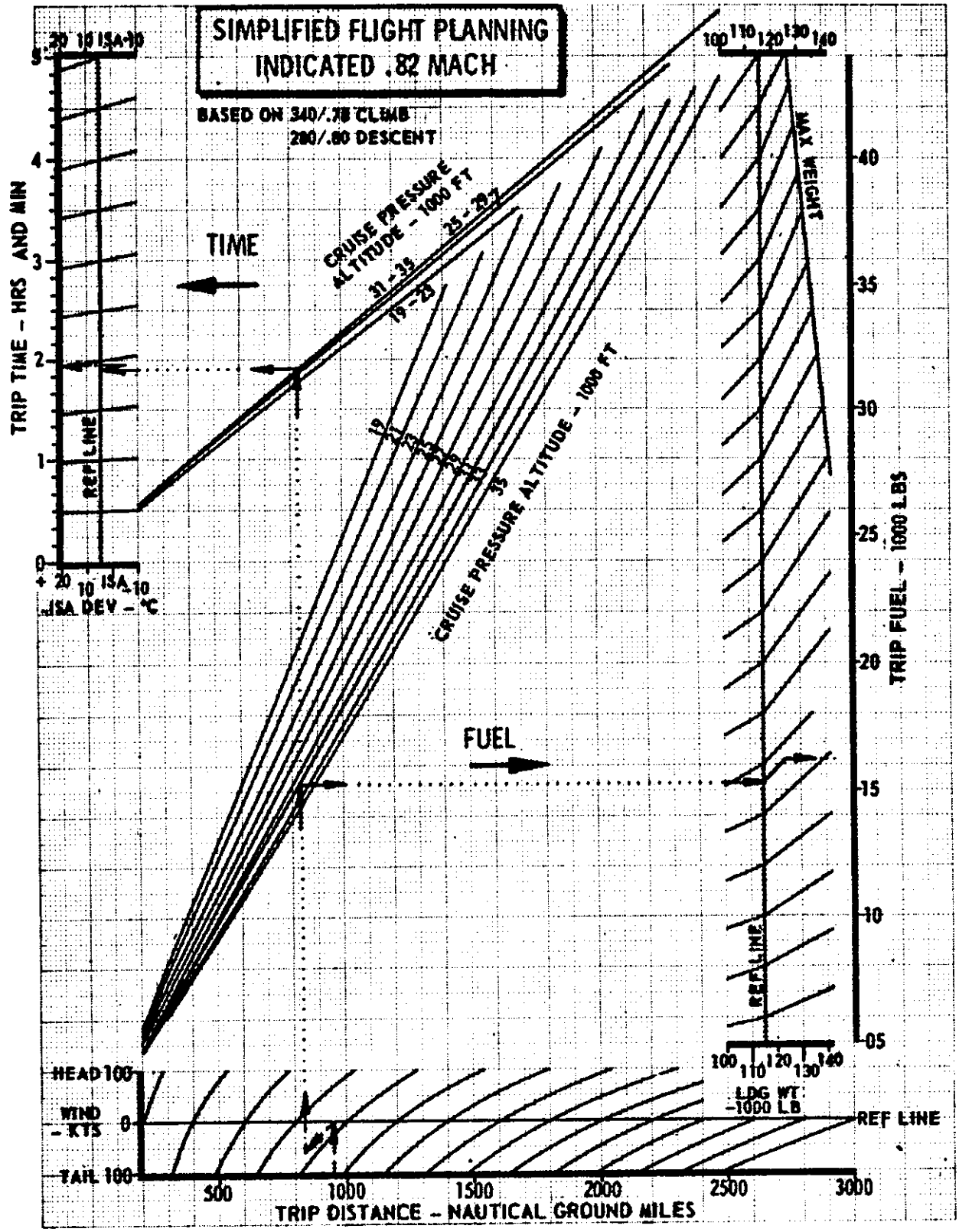
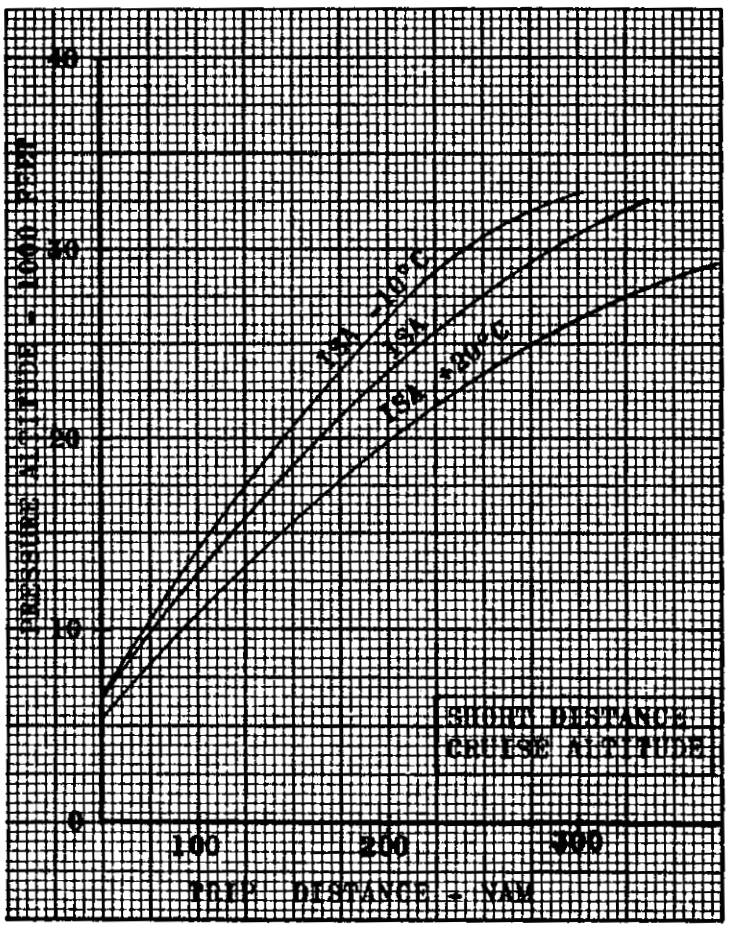


FIGURE 12. Simplified Flight Planning Chart.



NOTE: Chart is based on the maximum altitude at which it is possible to cruise at least 1/3 of the total trip distance. The remaining 2/3 of the trip distance is for climb and descent.

For planning purposes, use 300/.78 for climb and .85/350 (250 below 10,000) for descent.

FIGURE 18. Short Distance Cruise Altitude Chart.

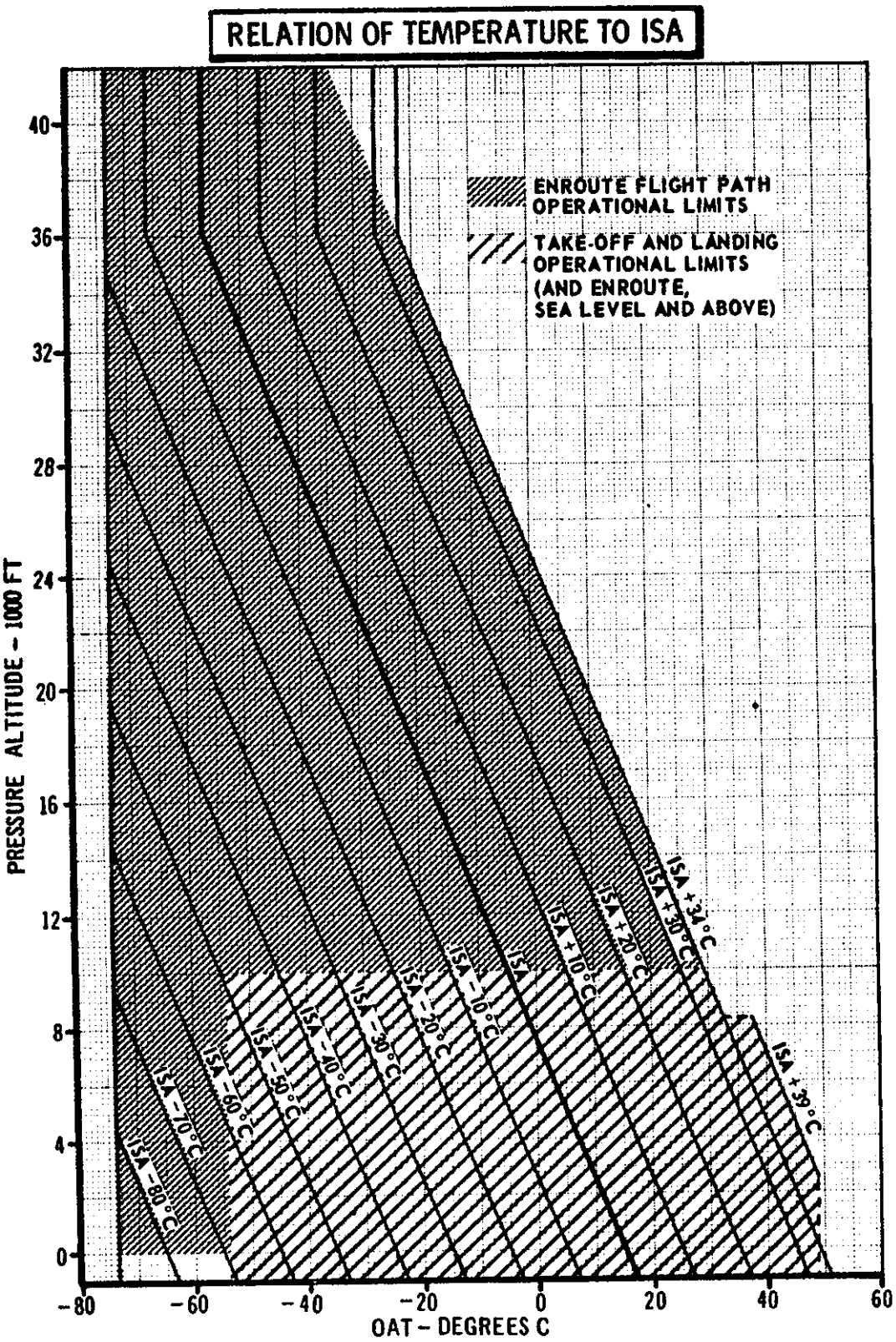


FIGURE 14. Relation of Temperature to ISA Chart.

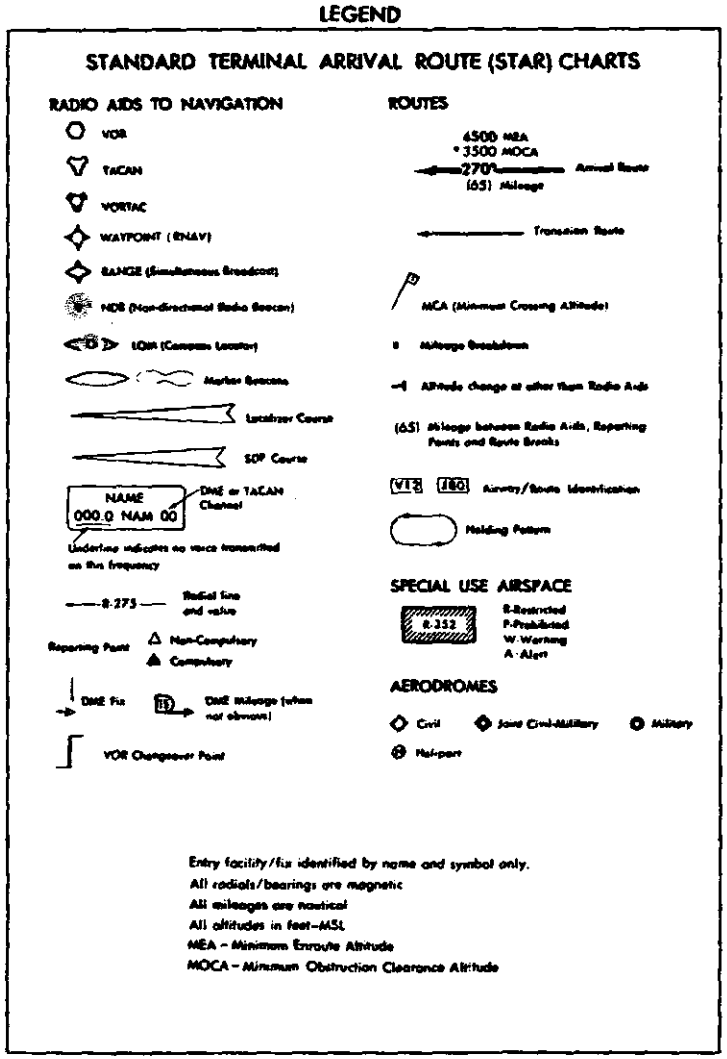


FIGURE 15. STAR Charts Legend.

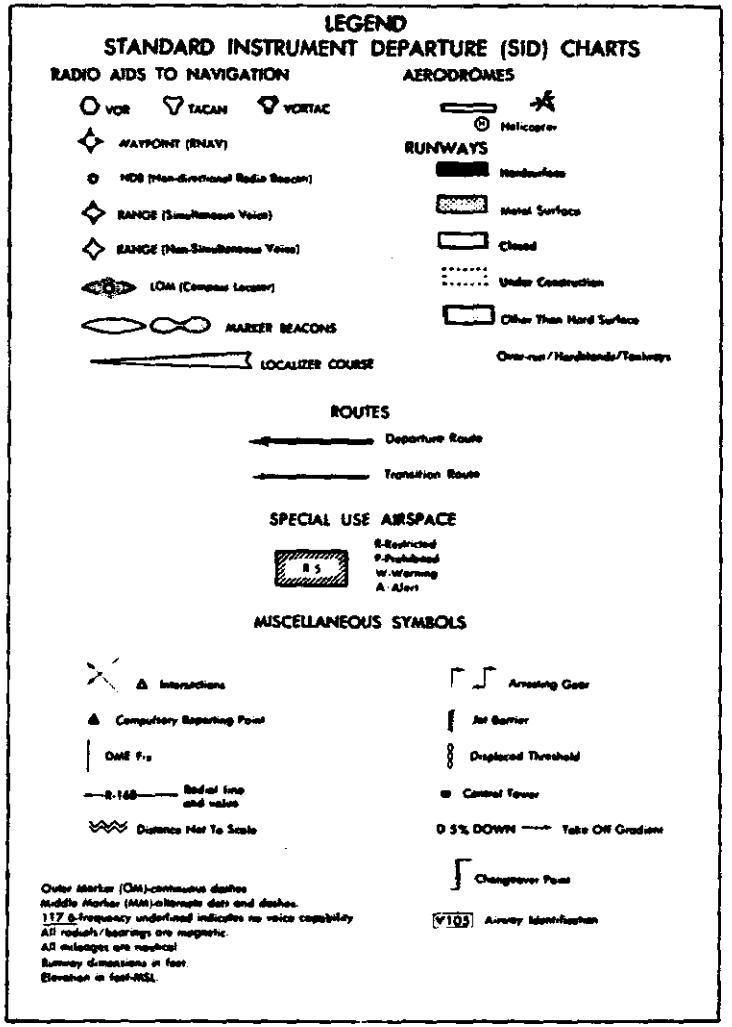


FIGURE 16. SID Charts Legend.

ENROUTE HIGH ALTITUDE - U.S.

For use at and above 18,000' MSL

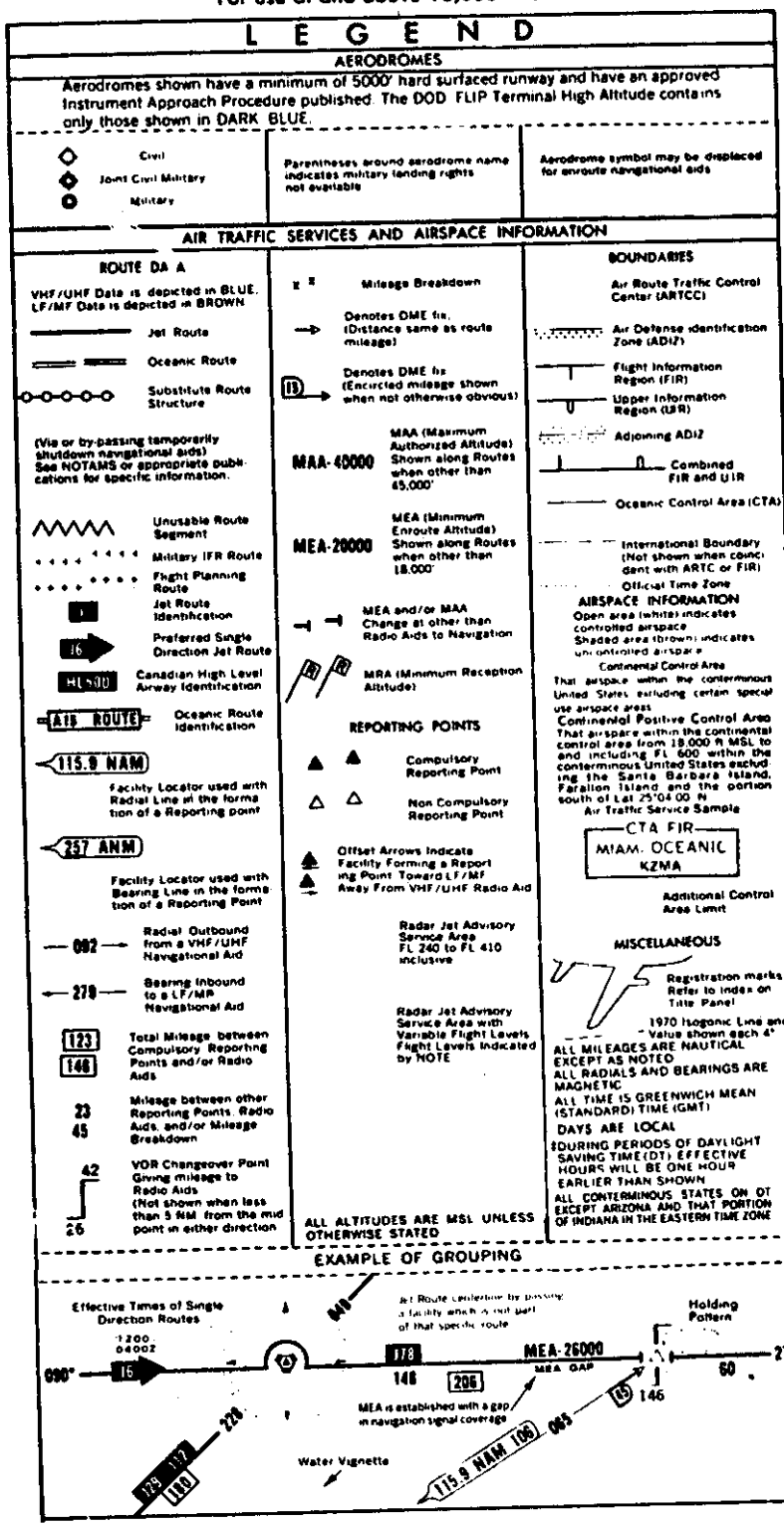


FIGURE 17. Enroute High Altitude Chart Legend.

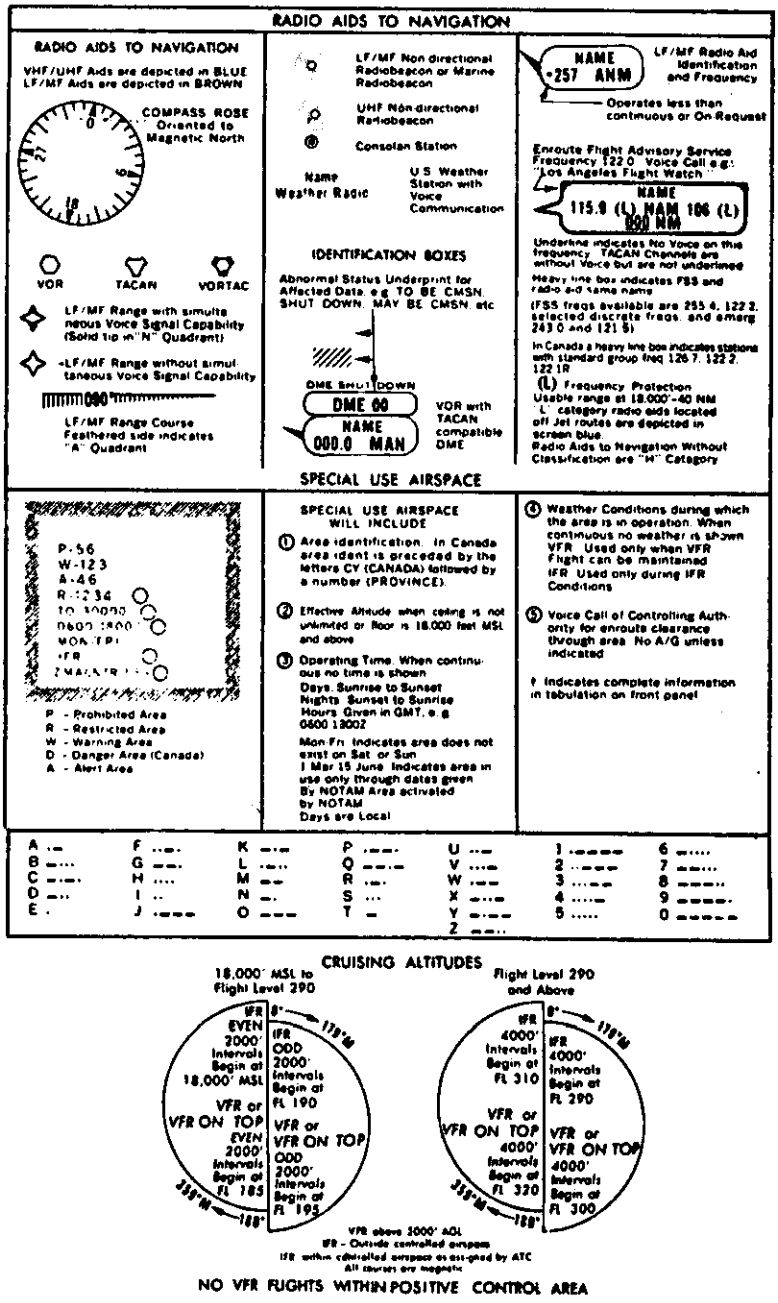


FIGURE 18. Enroute High Altitude Chart Legend.

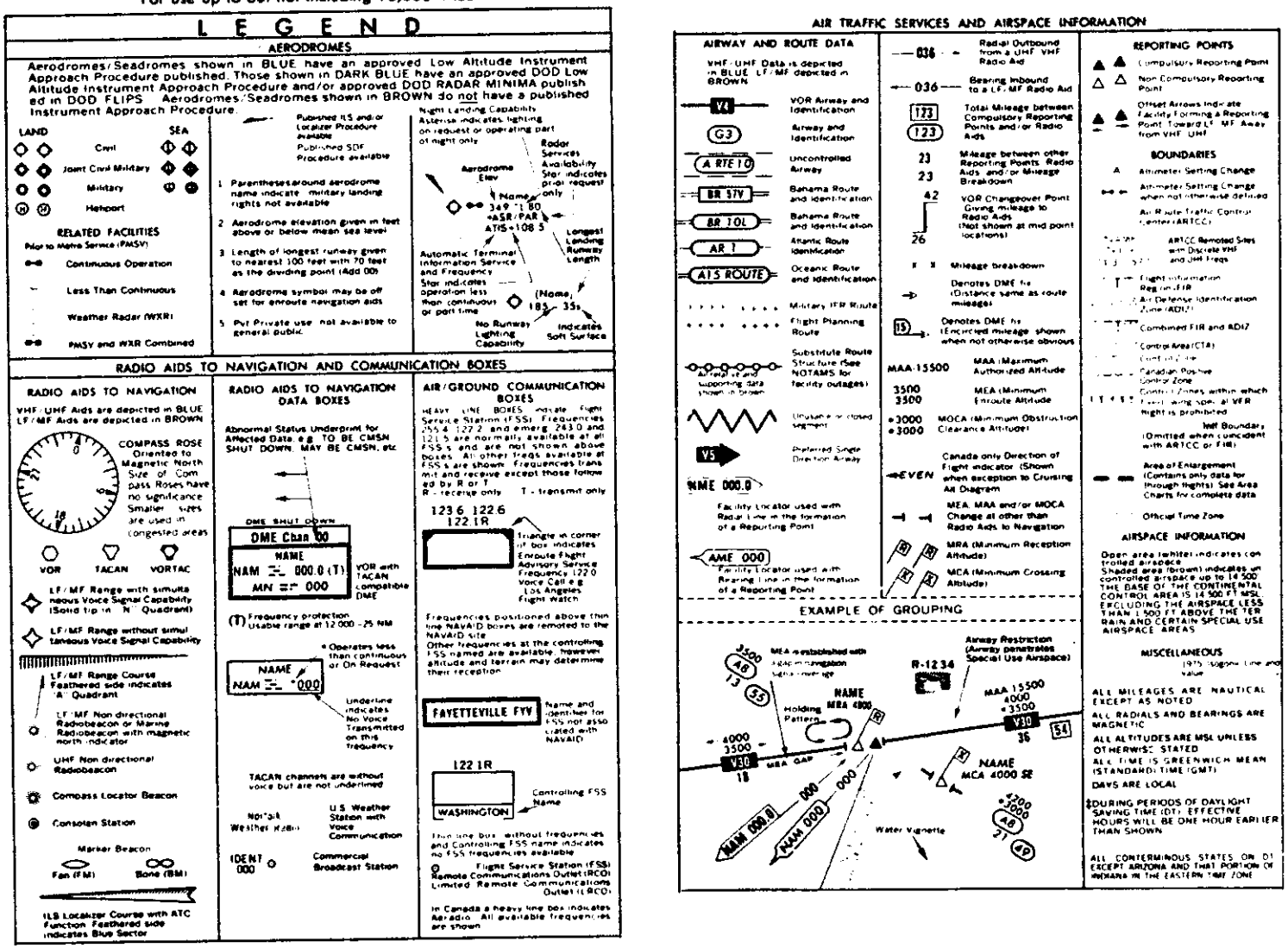
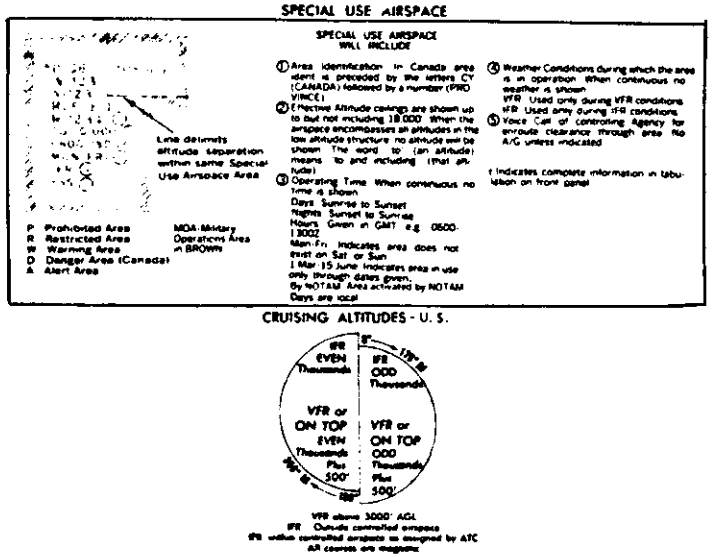


FIGURE 19. Enroute Low Altitude Chart Legend.



ENROUTE LOW ALTITUDE – U. S.

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

A/G VOICE COMMUNICATIONS

Civil airports with terminal A/G communications are listed below, alphabetically by airport name. Airports with proper names are listed by last name. Airports located within the limits of the Area Charts are listed on the Area Chart. Frequencies transmit and receive unless otherwise noted. **An asterisk (*) follows the part-time tower freq remoted to the collocated full-time FSS for use as AAS during hours the tower is closed.** Radials defining sectors are outbound from facility. Chart panel identification letter is shown to right of listing. For additional communications data, refer to AIM.

AKRON, N.Y.
Buffalo App Con—123.8 Buffalo [illegible] A

[illegible] CO, N.Y. ATIS [illegible]
[illegible] Con—[illegible]

MINUTE MAN Boston App Con—124.4 133.0 D
Boston [illegible] Con—124.4

Twr—118.1
[illegible] Con—[illegible]

FIGURE 20. Enroute Low Altitude Chart Legend.

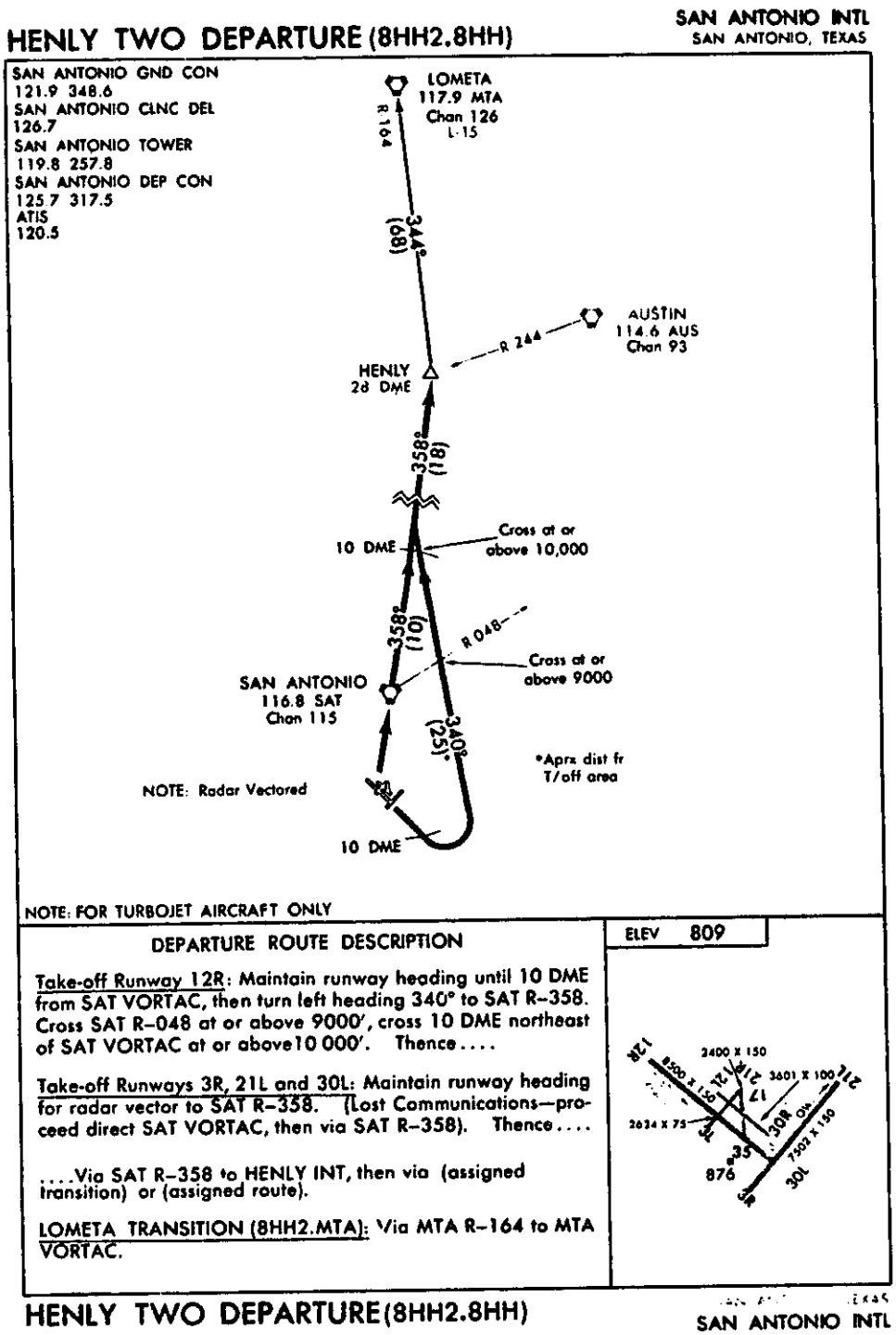


FIGURE 21. HENLY TWO DEPARTURE—(SID).

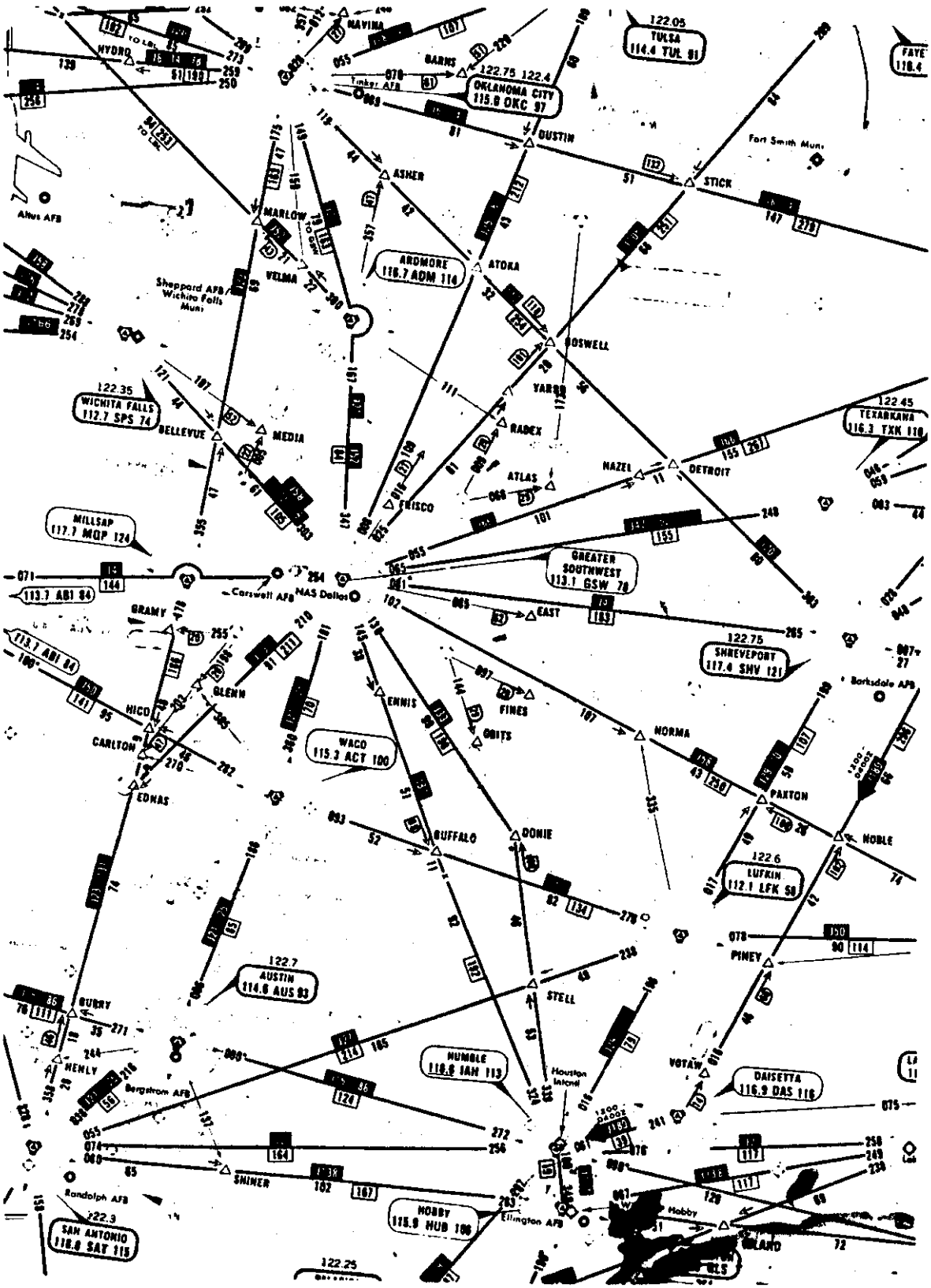


FIGURE 22. Enroute High Altitude Chart (H–4 excerpt).

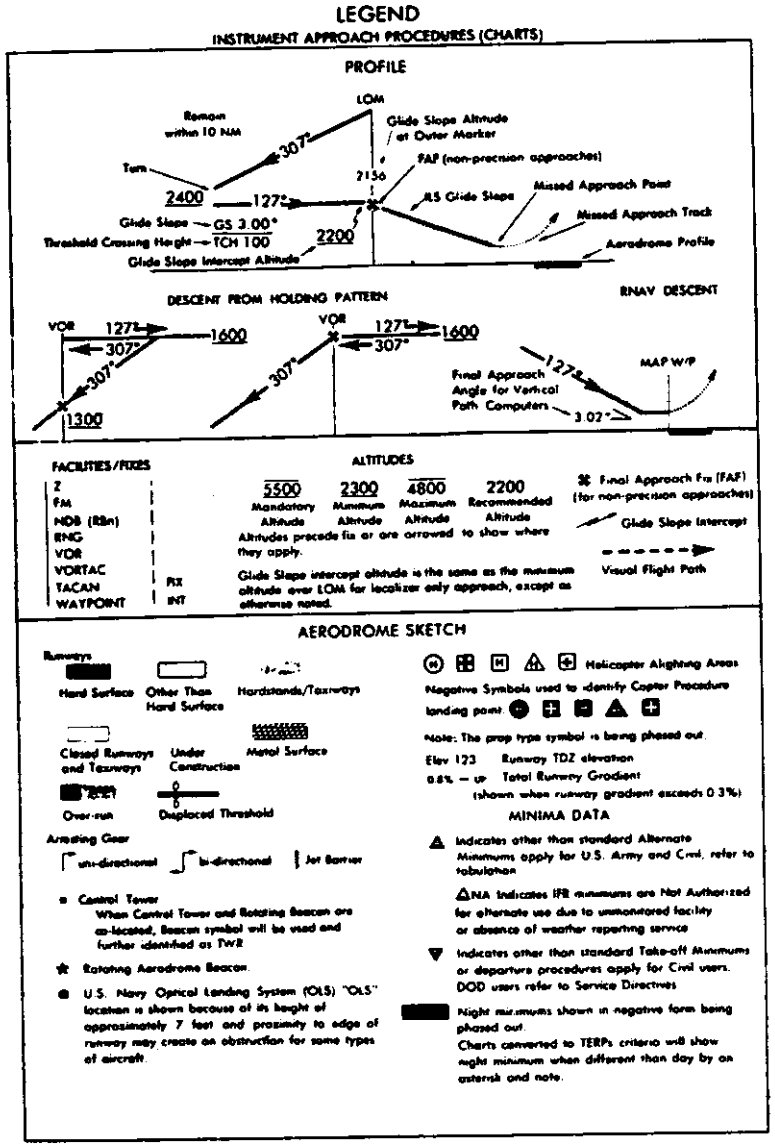


FIGURE 23. Instrument Approach Procedures (Charts) Legend.

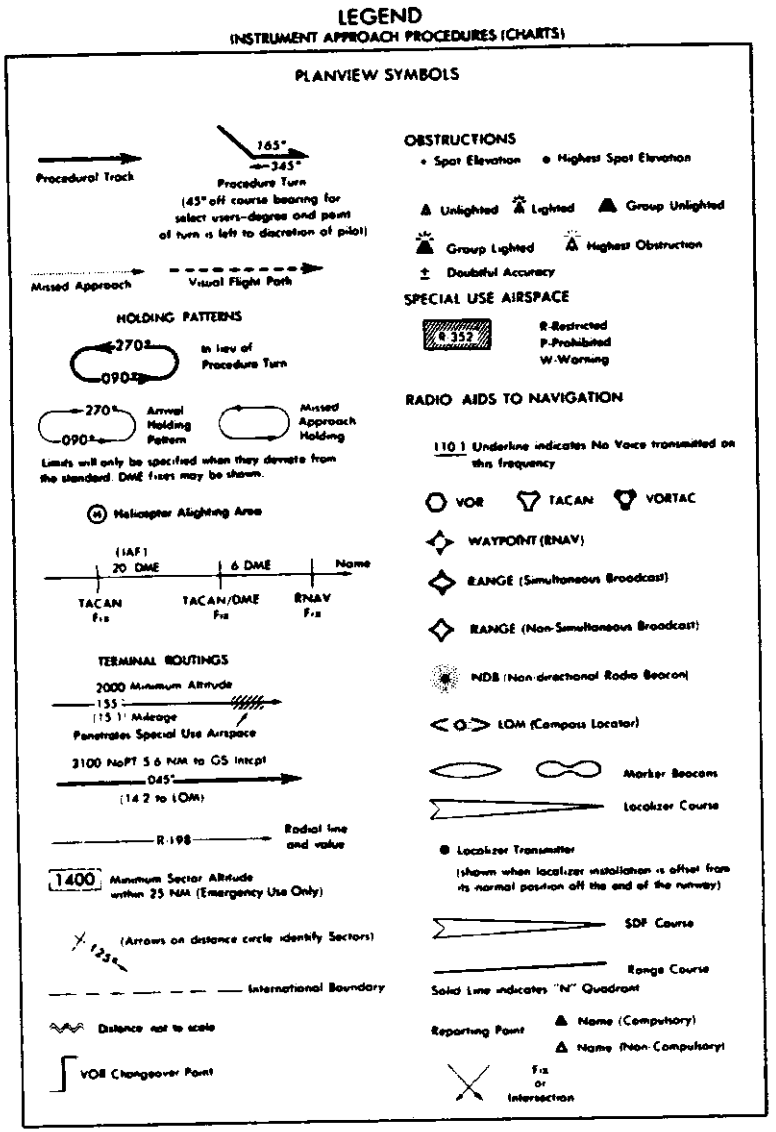


FIGURE 24. Instrument Approach Procedures (Charts) Legend.

LEGEND

INSTRUMENT APPROACH PROCEDURES (CHARTS)

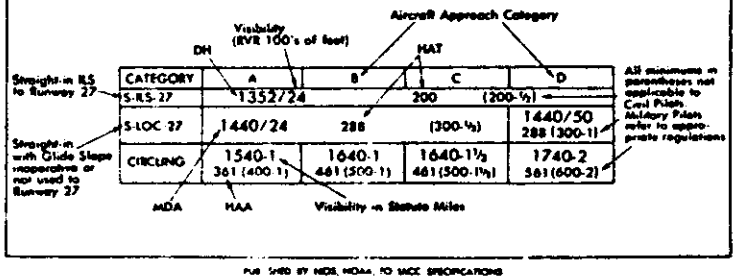
GENERAL INFORMATION & ABBREVIATIONS

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

LANDING MINIMA FORMAT

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



PUB SHED BY NOS, NOAA, TO MCC SPECIFICATIONS

FIGURE 25. General Information and Abbreviations.

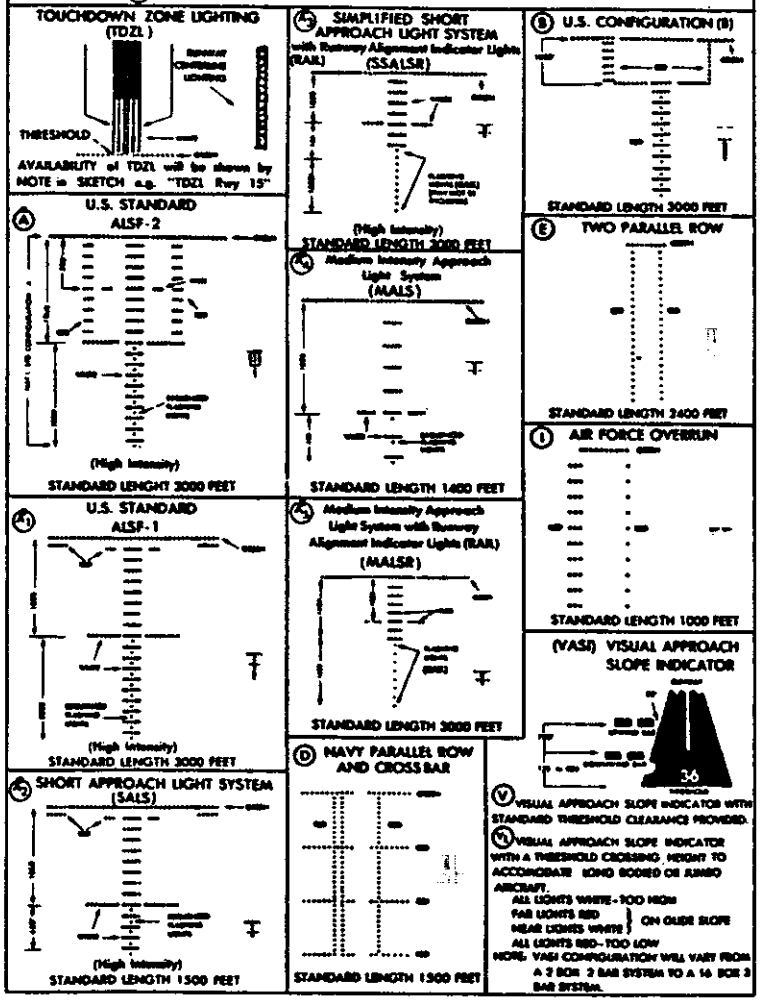
LEGEND

INSTRUM... .. APPROACH PROCEDUR... ...HARTS)

APPROACH LIGHTING SYSTEMS – UNITED STATES

Each approach lighting system indicated on Airport Diagrams will bear system identification letter (A, B, etc.) indicated in legend.

A dot "•" portrayed with approach lighting letter identifier indicates sequenced flashers (F) installed with the approach lights e.g. (A1)



PUBLISHED BY NOS, NOAA, TO MCC SPECIFICATIONS

FIGURE 26. Approach Lighting Systems—Legend.

AIRCRAFT APPROACH CATEGORIES

Minimums are specified for the various aircraft speed/weight combinations. Speeds are based upon a value 1.3 times the stalling speed of the aircraft in the landing configuration at maximum certificated gross landing weight. Thus they are COMPUTED values. See FAR 97.3 (b). An aircraft can fit into only one category, that being the highest category in which it meets either specification. For example, a 30,000 pound aircraft landing weight combined with a computed approach speed of 130 knots would place the aircraft in Category C. If it is necessary, however, to maneuver at speeds in excess of the upper limit of the speed range for each category, the minimum for the next higher approach category should be used. For example, a B-727-100 which falls in Category C, but is circling to land at a speed in excess of 140 knots, should use the approach category "D" minimum when circling to land. See following category limits.

Approach Category — Speed/Weight

A : Speed less than 91 knots; weight less than 30,001 pounds.

B : Speed 91 knots or more but less than 121 knots; weight 30,001 pounds or more but less than 60,001 pounds.

C : Speed 121 knots or more but less than 141 knots; weight 60,001 pounds or more but less than 150,001 pounds.

D : Speed 141 knots or more but less than 166 knots; weight 150,001 pounds or more.

E : Speed 166 knots or more; any weight.

RVR/Meteorological Visibility Comparable Values

The following table shall be used for converting RVR to meteorological visibility when RVR is inoperative.

RVR (feet)	Visibility (statute miles)
1600	1/4
2400	1/2
3200	5/8
4000	3/4
4500	7/8
5000	1
6000	1 1/4

FIGURE 27. Aircraft Approach Categories.

Instrument Approach Procedures (Charts)
INOPERATIVE COMPONENTS OR VISUAL AIDS TABLE
Civil pilots see FAR 91.117 (c)

Landing minimums published on instrument approach procedure charts are based upon full operation of all components and visual aids associated with the particular instrument approach procedure being used. Higher minimums are required with inoperative components or visual aids as indicated below, except where a note specifies that the table does not apply. If more than one component is inoperative, each minimum is raised to the highest minimum required by any single component that is inoperative. Adjustment of minimums for an inoperative OM is not required if an authorized substitution can be made. Authorized substitutions are: published fixes or ASR. ILS glide slope inoperative minimums are published on instrument approach charts as localizer minimums.

(1) ILS and PAR.

Inoperative Component or Aid	Increase DH	Increase Visibility	Approach Category
OM* MM*	50 feet	None	ABC
OM* MM*	50 feet	1/4 mile	D
ALS, SSALSR, MALSR	50 feet	1/4 mile	ABCD

*Not applicable to PAR

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

Inoperative Component or Aid	Increase DH	Increase Visibility	Approach Category
OM MM	50 feet	To 1/2 mile	ABC
OM MM	50 feet	To 3/4 mile	D
ALS	50 feet	To 3/4 mile	ABCD
HIRL, TDZL, RCLS	None	To 1/2 mile	ABCD
RVR	None	To 1/2 mile	ABCD

(3) VOR, VOR/DME, VORTAC, VOR (TAC), LOC, LOC/DME, LDA, LDA/DME, SDF, SDF/DME, RNAV, and ASR.

Inoperative Visual Aid	Increase MDA	Increase Visibility	Approach Category
ALS, SSALSR, MALSR	None	1/2 mile	ABC
HIRL, SALS, MALS	None	1/4 mile	ABC

(4) LOC CAT D only.

Inoperative Component or Aid	Increase MDA	Increase Visibility	Approach Category
ALS, MM	None	1/4 mile	D

(5) NDB and RNG.

Inoperative Visual Aid	Increase MDA	Increase Visibility	Approach Category
ALS, SSALSR, MALSR	None	1/4 mile	ABC

FIGURE 28. Inoperative Components/Visual Aids Table.

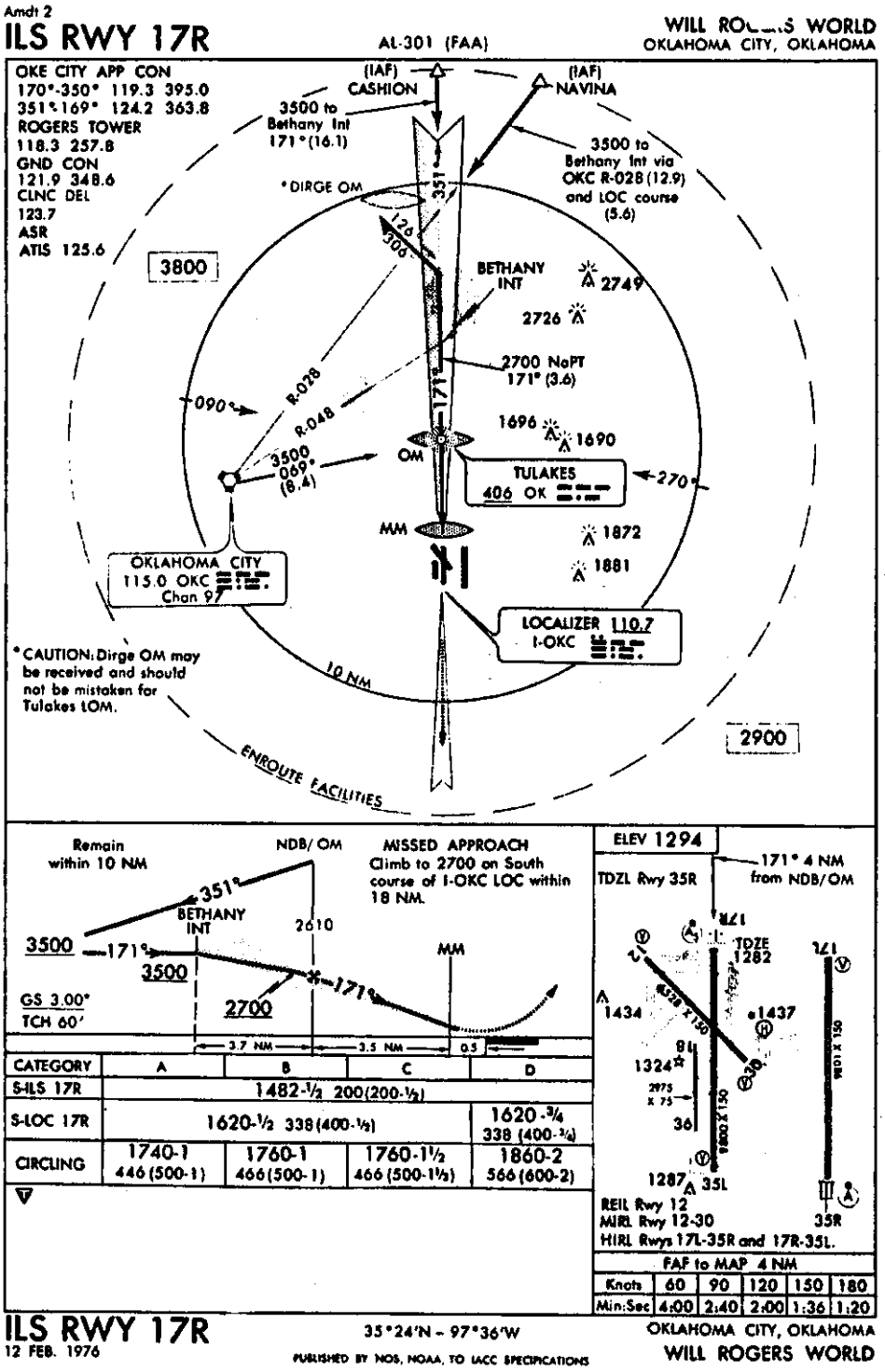


FIGURE 29. ILS RWY 17R—Will Rogers World Airport.

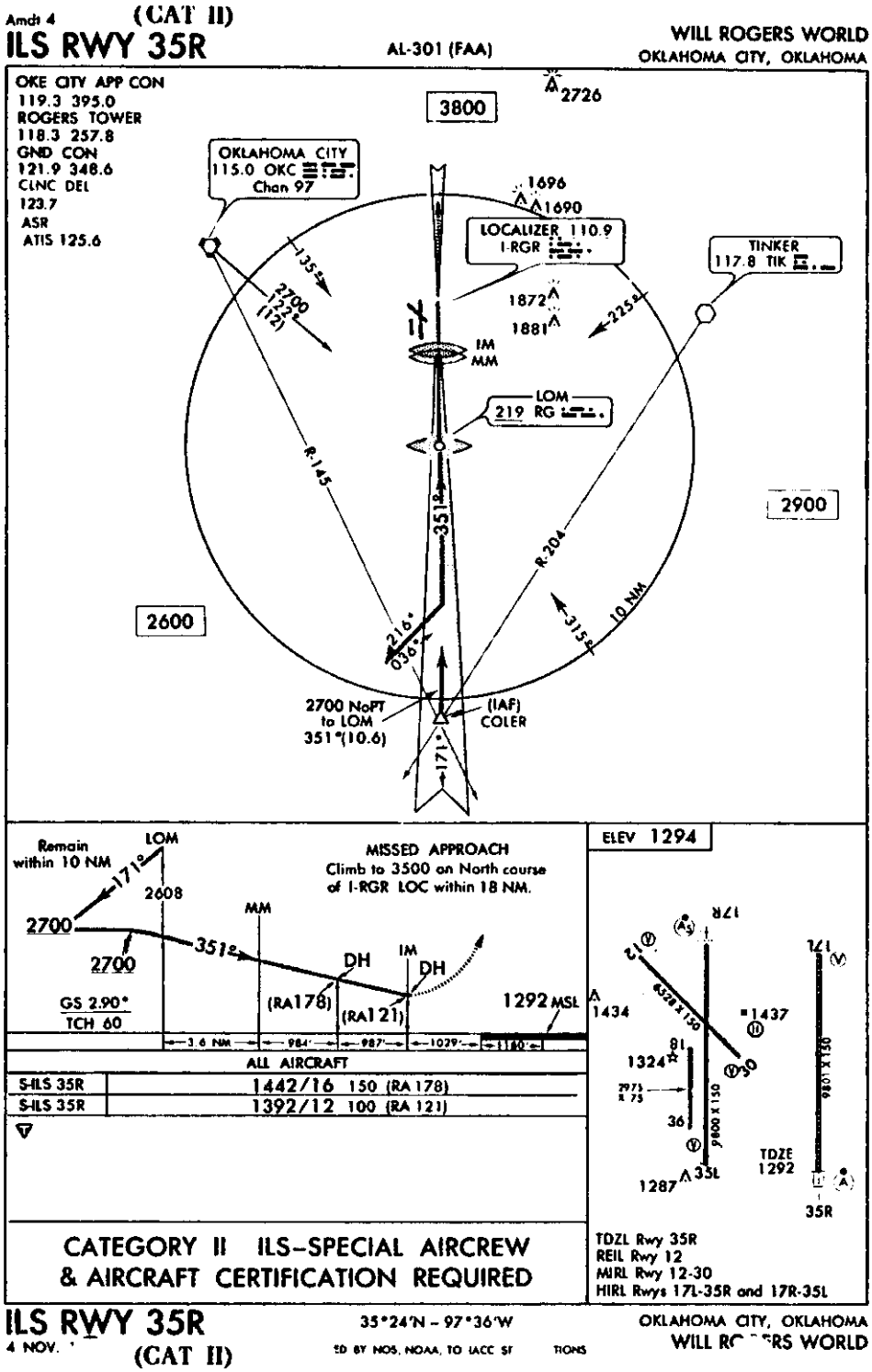


FIGURE 30. ILS RWY 35R (CAT II) Will Rogers World Airport.

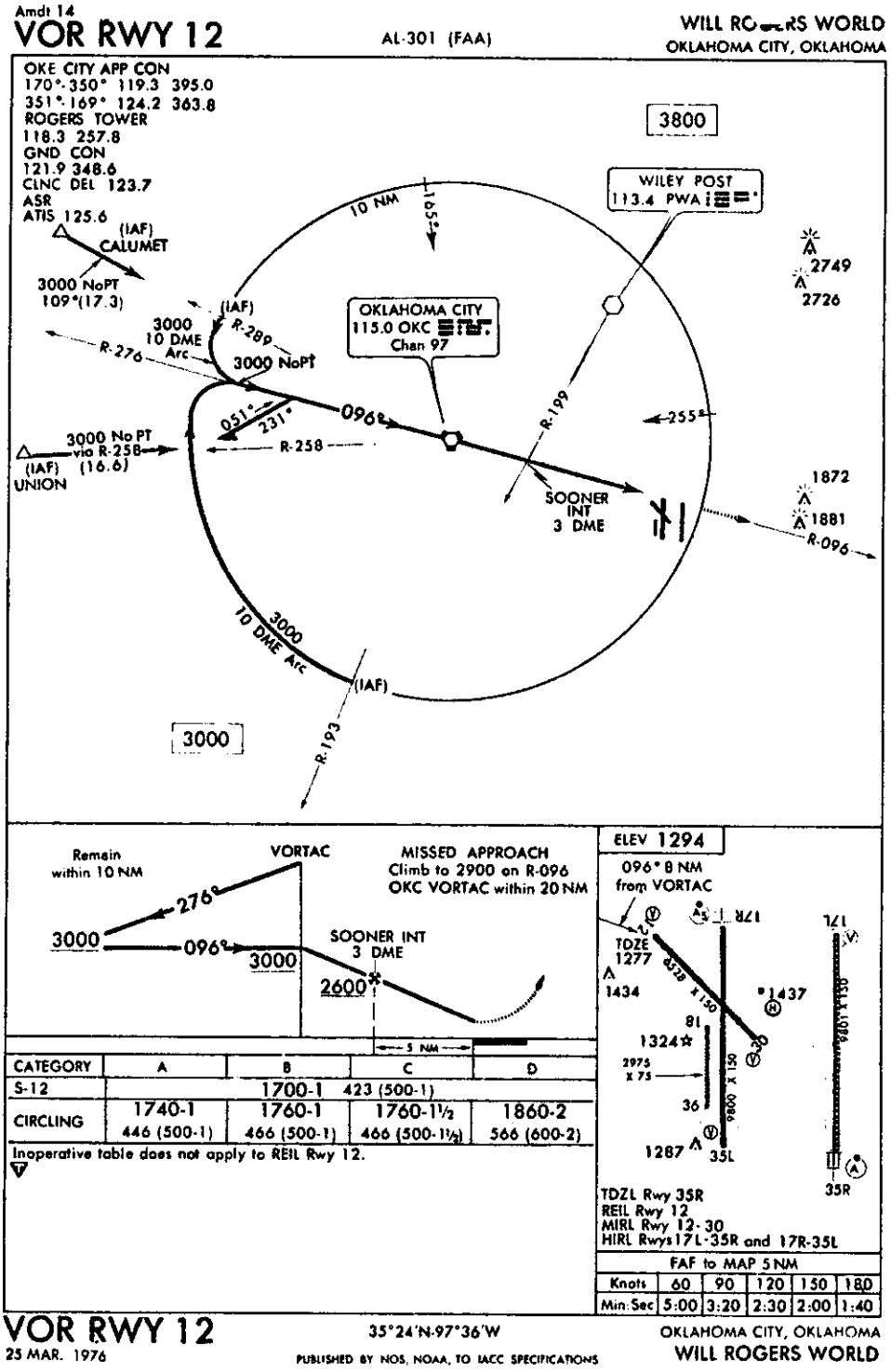


FIGURE 31. VOR RWY 12—Will Rogers World Airport.

FIGURE 32. Geographical Area Designator Map.

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 SCT M25 OVC	1R-K	132	/58/56	/ 18Ø7	/993/	RØ4LVR2ØV4Ø	/UA OVC 55

SKY AND CEILING

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

CLR Clear: Less than Ø.1 sky cover.
SCT Scattered: Ø.1 to Ø.5 sky cover.
BKN Broken: Ø.6 to Ø.9 sky cover.
OVC Overcast: More than Ø.9 sky cover.
— Thin (When prefixed to the above symbols.)
—X Partial obscuration: Ø.1 to less than 1.Ø sky hidden by precipitation or obstruction to vision (bases at surface).
X Obscuration: 1 Ø sky hidden by precipitation or obstruction to vision (bases at surface).

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

E	Estimated height	V	Immediately following numerical value, indicates a variable ceiling.
M	Measured		
W	Indefinite		

VISIBILITY

Reported in statute miles and fractions. (V=Variable)

WEATHER AND OBSTRUCTION TO VISION SYMBOLS

A	Hail	IC	Ice crystals	S	Snow
BD	Blowing dust	IF	Ice fog	SG	Snow grains
BN	Blowing sand	IP	Ice pellets	SP	Snow pellets
BS	Blowing snow	IPW	Ice pellet showers	SW	Snow showers
D	Dust	K	Smoke	T	Thunderstorms
F	Fog	L	Drizzle	T +	Severe thunderstorm
GF	Ground fog	R	Rain	ZL	Freezing drizzle
H	Haze	RW	Rain showers	ZR	Freezing rain

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

WIND

Direction in tens of degrees from true north, speed in knots. ØØØØ indicates calm. G indicates gusty. Peak speed of gusts follows G or Q when gusts or squall 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=36Ø Degrees, 27 knots; 3627G40=36Ø Degrees, 27 knots, peak speed in gusts 4Ø 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 during 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 ASL height data preceding and/or following sky cover contraction to indicate cloud bases and/or tops, respectively. UA precedes all PIREPS.

DECODED REPORT

Kansas City: Record observation, 15ØØ feet scattered clouds, measured ceiling 25ØØ feet overcast, visibility 1 mile, light rain, smoke, sea-level pressure 1013.2 millibars, temperature 58°F, dewpoint 56°F, wind 18Ø°, 7 knots, altimeter setting 29.93 inches. Runway Ø4 left, visual range 2ØØØ feet variable to 4ØØØ feet. Pilot reports top of overcast 55ØØ feet.

*TYPE OF REPORT

The omission of type-of-report data identifies a scheduled record observation for the hour specified in the sequence heading. An out-of-sequence, special observation is identified by the letters "SP" following station identification and a 24-hour clock time group, e.g., "PIT SP ØØ715 —X M1 OVC." A special report indicates a significant change in one or more elements.

FIGURE 33. Key to Aviation Weather Reports.

KEY TO AVIATION WEATHER FORECASTS . . . .

TERMINAL FORECASTS contain information for specific airports on expected ceiling, cloud heights, cloud amounts, visibility, weather and obstructions to vision and surface wind. They are issued 3 times/day and are valid for 24 hours. The last six hours of each forecast are covered by a categorical statement indicating whether VFR, MVFR, IFR or LIFR conditions are expected. Terminal forecasts will be written in the following form:

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 6 miles

WEATHER AND OBSTRUCTION TO VISION: Standard weather and obstruction to vision symbols are used

SURFACE WIND: In tens of degrees and knots; omitted when less than 10

EXAMPLE OF TERMINAL FORECAST

DCA 2210/1Ø: DCA Forecast 22nd day of month—valid time 1ØZ–1ØZ.
1Ø SCT C18 BKN 5SW- 3415G25 OCNL C8 X ½SW: Scattered clouds at 1ØØØ feet, ceiling 18ØØ feet broken, visibility 5 miles, light snow showers, surface wind 34Ø degrees 15 knots Gusts to 25 knots, occasional ceiling 8 hundred feet sky obscured, visibility ½ mile in moderate snow showers.
12Z C5Ø BKN 3312G22: At 12Z becoming ceiling 5ØØØ feet broken, surface wind 33Ø degrees 12 knots Gusts to 22.
Ø4Z MVFR CIG: Last 6 hours of FT after Ø4Z marginal VFR due to ceiling.

AREA FORECASTS are 18-hour aviation forecasts plus a 12-hour categorical outlook prepared 2 times/day giving general descriptions of cloud cover, weather and frontal conditions for an area the size of several states. Heights of cloud tops, and icing are referenced ABOVE SEA LEVEL (ASL); ceiling heights, ABOVE GROUND LEVEL (AGL); bases of cloud layers are ASL unless indicated. Each SIGMET or AIRMET affecting an FA area will also serve to amend the Area Forecast.

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

WINDS AND TEMPERATURES ALOFT (FD) FORECASTS are 12-hour forecasts of wind direction (nearest 10° true N) and speed (knots) for selected flight levels. Temperatures aloft (°C) are included for all but the 3ØØØ-foot level.

EXAMPLES OF WINDS AND TEMPERATURES ALOFT (FD) FORECASTS:
FD WBC 121745
BASED ON 121200Z DATA
VALID 130000Z FOR USE 1800-0300Z. TEMPS NEG ABV 24000

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

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

TWEB (CONTINUOUS TRANSCRIBED WEATHER BROADCAST)—Individual route forecasts covering a 25 nautical mile zone either side of the route. By requesting a specific route number, detailed en route weather for a 12 or 18-hour period (depending on forecast issuance) plus a synopsis can be obtained.

PILOTS . . . report in-flight 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.

FIGURE 34. Key to Aviation Weather Forecasts.

FDUS2 KWBC 231745
DATA BASED ON 231200Z

VALID 240600Z FOR USE 0300-0900Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
ABI		2211+14	2412+09	2416+02	2426-13	2339-26	235641	226751	226961
ABQ			3117+08	3119-01	3025-17	3026-30	781842	782650	282258
AMA		9900	3213+08	3017+00	2724-16	2433-28	234744	225753	225159
ATL	1313	1308+14	9900+08	9900+01	3020-14	3037-27	305742	306551	307462

FIGURE 85. Forecast Winds and Temperatures Aloft (FD).

FA 231240
DFW FA 231240
13Z FRI-07Z SAT
OTLK 07Z-19Z SAT

NMEX OKLA TEX AND CSTL WTRS...

HGTS ASL UNLESS NOTED...

SYNS... MOIST LOW LVL SLY FLOW OVR TEX AND OKLA. A SMALL ALMOST STNRY HI PRES AREA CNTRD NEAR GUP AT 13Z. ALMOST STNRY TROF OF LWR PRES EXTNDS SWWD INTO ERN NMEX.

SIG CLDS AND WX...
CSTL WTRS... GENLY SCT TO BKN CLDS 20-30. OTLK... MOST VFR.

E OF 90 SE MRF GDP ROW DHT LBL LN EXCP FOR CSTL WTRS... VRBL CLDS GENLY BKN TO OVC CIGS 10-20 HIR LYRS ABV 100 BUT LCLY CIGS 5-10 TIL 15Z. OVR SRN AND ERN TEX PTNS SOME FOG WITH VSBYS OCNLY BLO 3 MIS TIL 15Z. BAND OF TSHWRS CB TOPS TO 350 IN 50 MI WIDE BAND ALG FTW TPL 40 SE AUS LN AT 13Z MOVG EWD ABT 20 KTS EXPCTD TO DSIPT BY 16Z. CONDS BCMG SCT TO BKN CU CLDS 25-50 AGL AFT 16Z. TSTMS EXPCTD TO REDVLP ALG THE W PTN OF THIS AREA ARND 21Z WITH SQLN AND HVY TSTMS EXPCTD TO EXTND ACRS WRN OKLA AND INTO NWRN TEX BY 23Z AND MOV EWD ABT 20 KTS. HAIL GUSTY WNDS CIGS ARND 10 VSBYS BRFLY BLO 2 MIS CB TOPS TO 500 IN HVYR TSTMS ALG SQLN. PSBL ISOLD OR SCT TSTMS OVR THE OTHER SECS 21Z-03Z. OTLK VFR EXCP IN TSTMS BCMG MVFR CIG LCLY IFR CIG F 08Z-15Z.

ELSW... CLR OR HI THIN CI CLDS ABV 250. OTLK... VFR.

ICG... NONE OF CONSEQUENCE. FRZG LVL 110-140.

FIGURE 86. Area Forecast (FA).

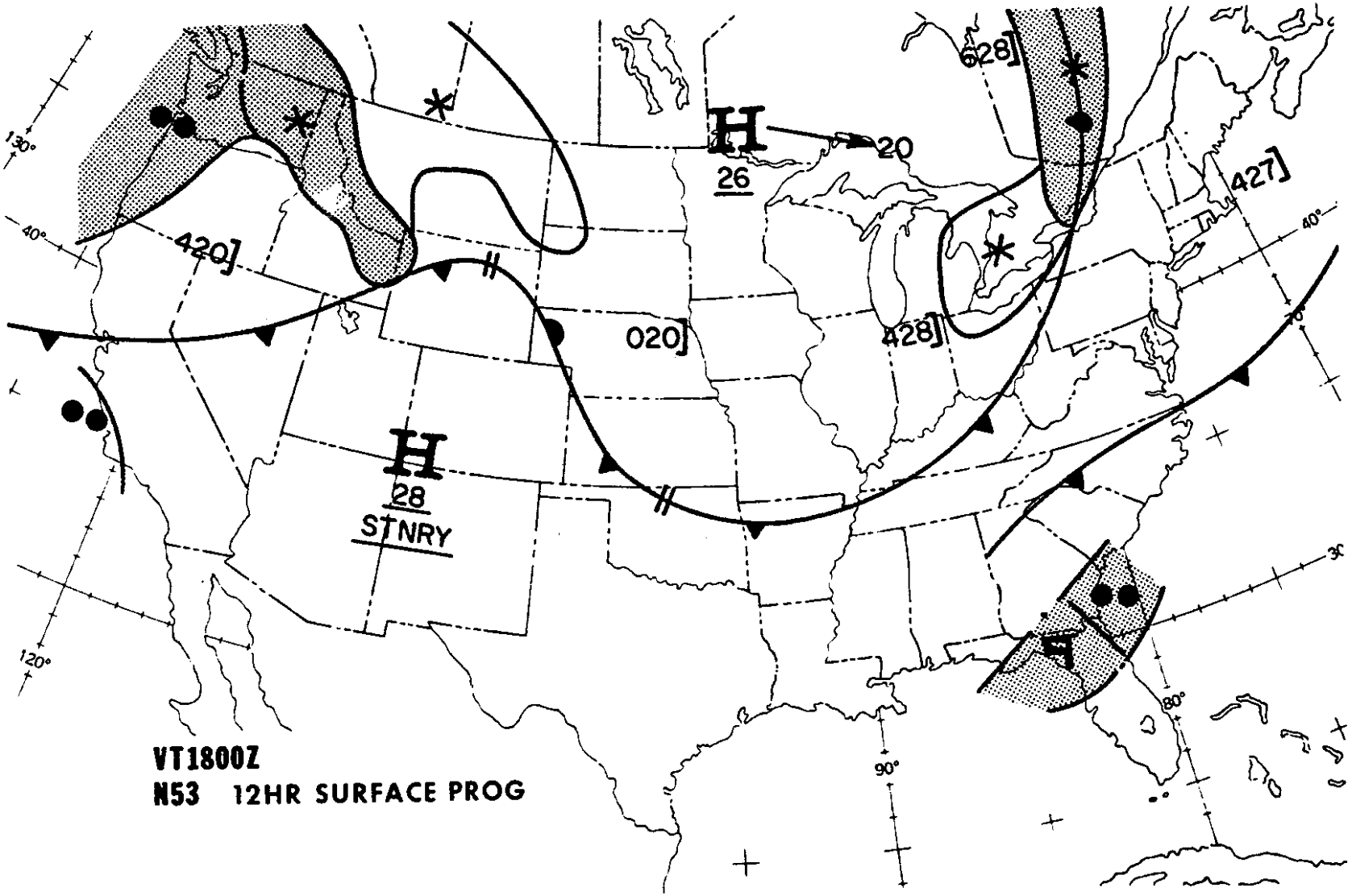


FIGURE 37. 12-Hour Surface Prog.

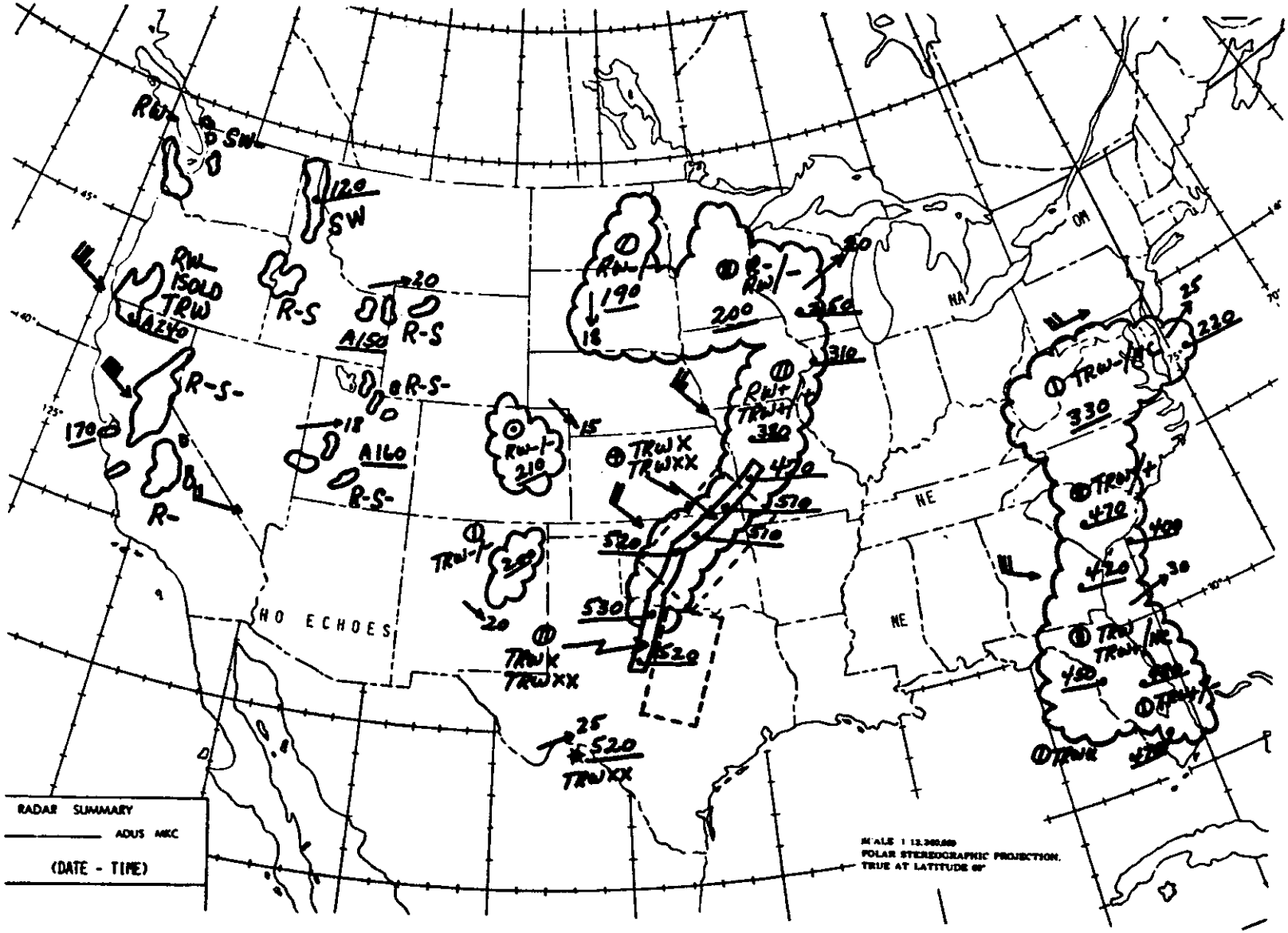


FIGURE 38. Radar Summary Chart.

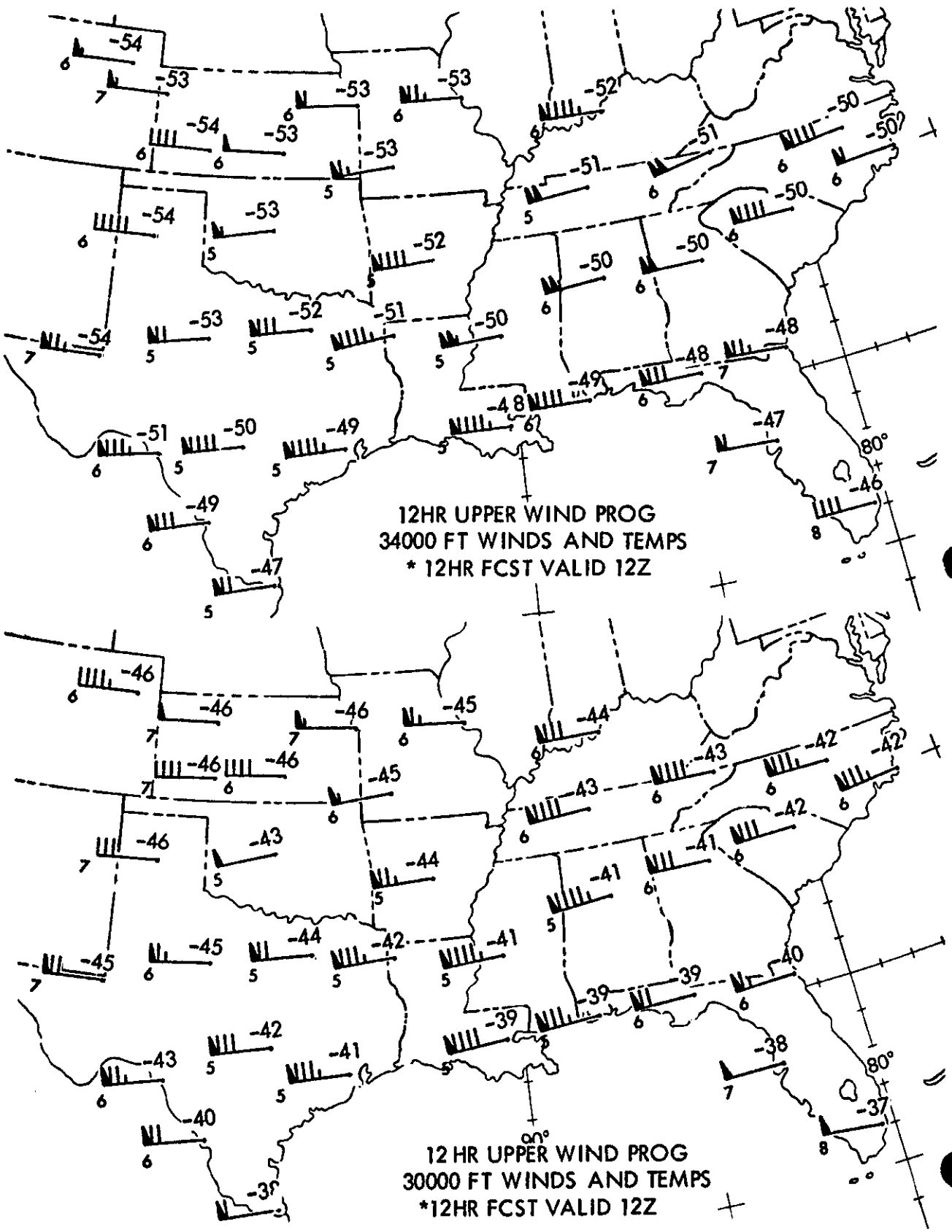


FIGURE 39. Upper Wind Progs.

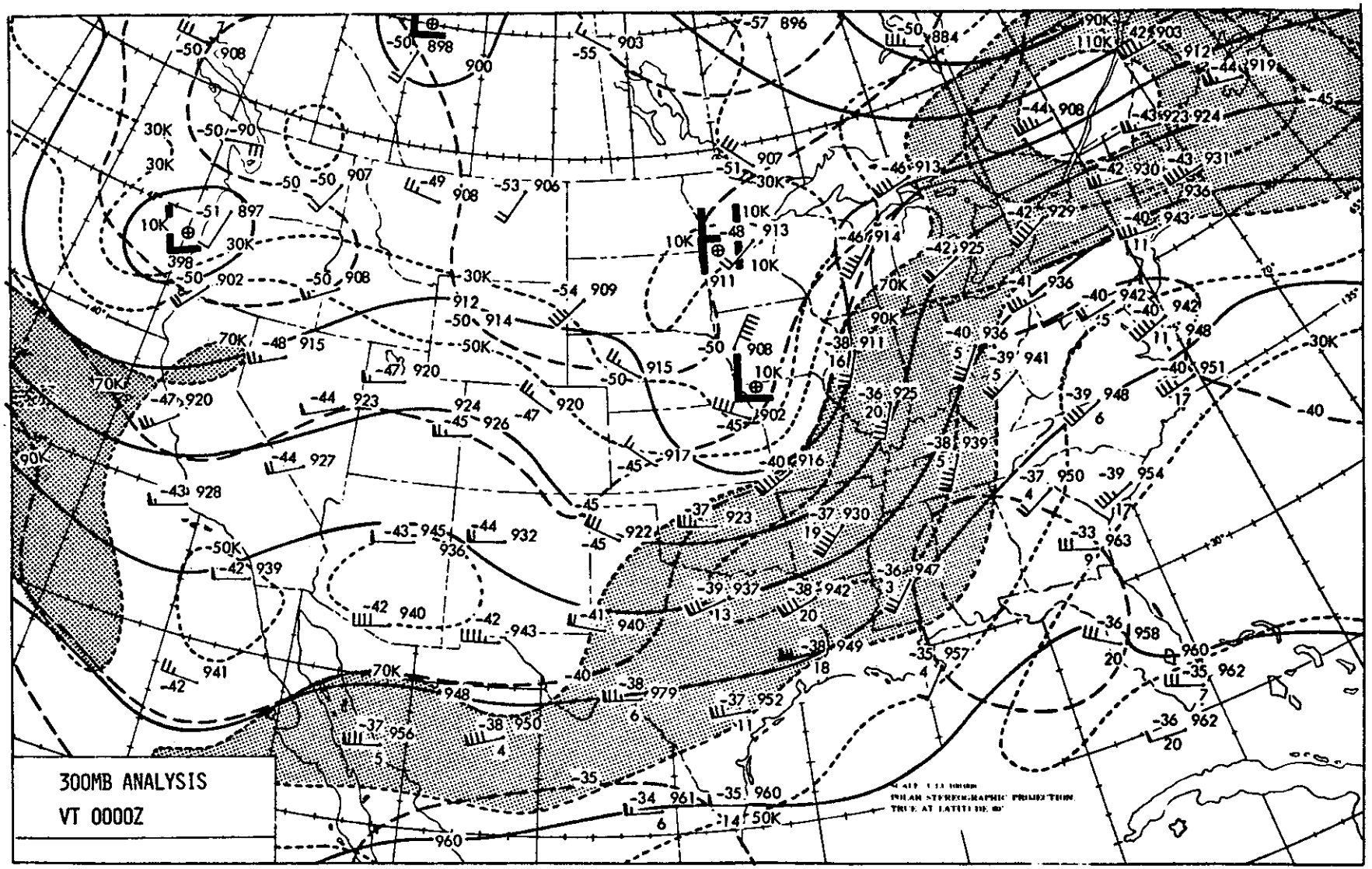


FIGURE 40. 300 MB Analysis.

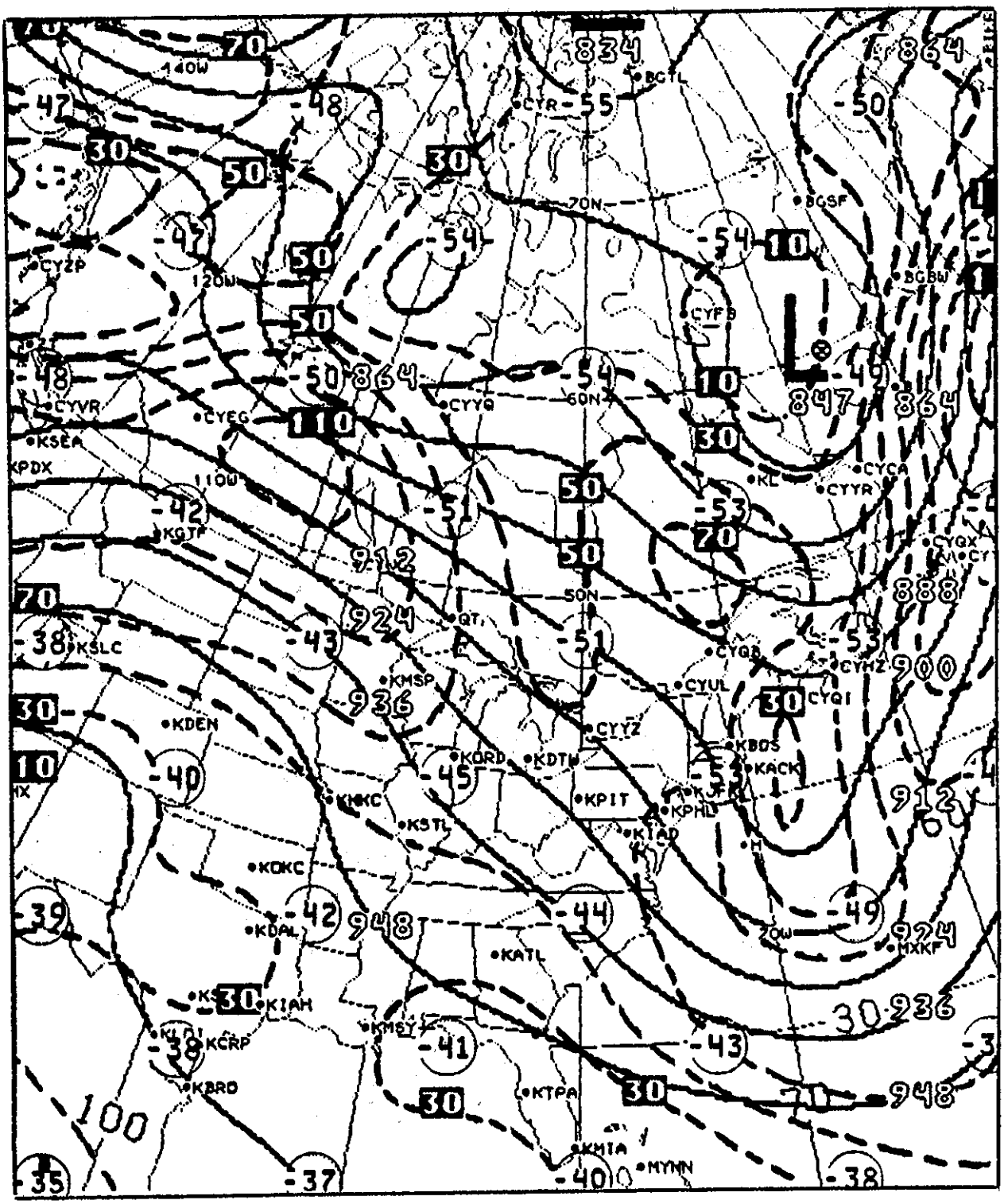


FIGURE 41. 300 MB Prog Chart.

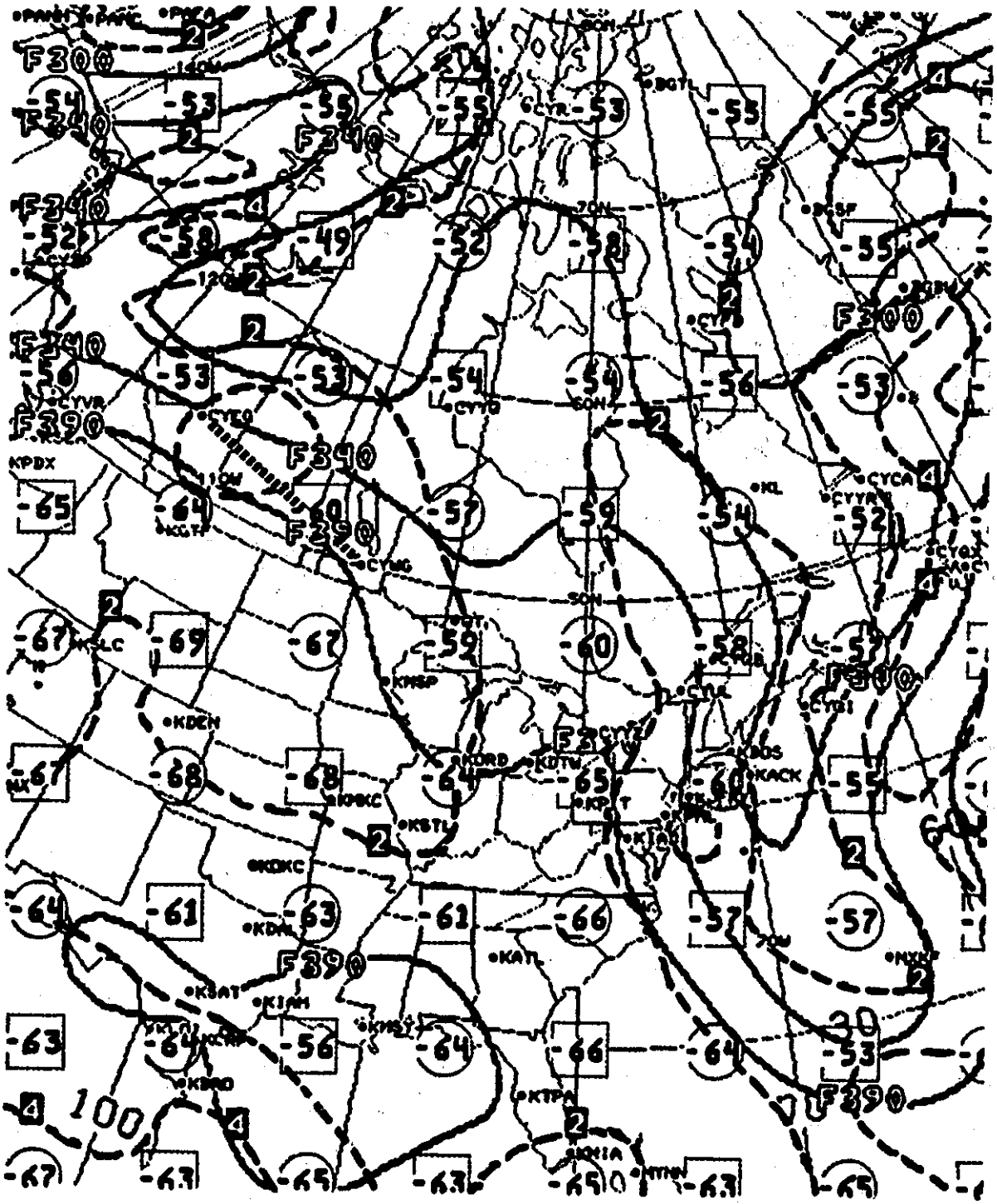


FIGURE 42. Trop Wind Shear Prog Chart.

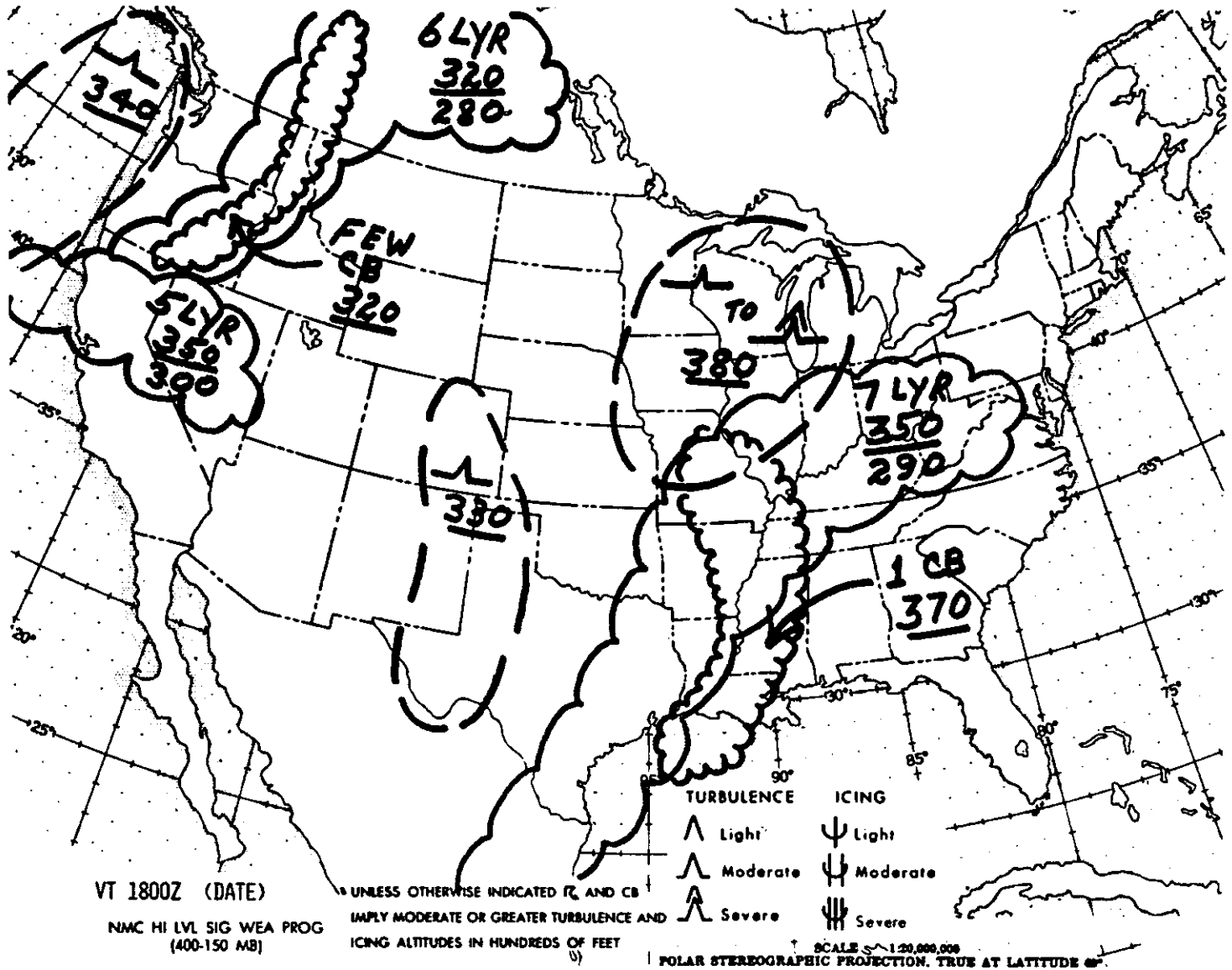


FIGURE 43. U.S. High Level Significant Weather Prog. (400–150 MB) Chart.

*U.S. GOVERNMENT PRINTING OFFICE:1978 735-009/173 1-3

FLIGHT TIME ANALYSIS

CHECK POINTS		ROUTE	MACH NO.	WIND FACTOR	SPEED-KNOTS		DIST N.M.	TIME		FUEL CONSUMPTION (POUNDS)		MISC
FROM	TO	ALTITUDE FLT/LEVEL		TEMPERATURE.	TAS	GRND SPEED		LEG	TOTAL	LEG	TOTAL	
SAN ANTONIO INTL. ARPT.	HENLY INTXN.	8HH2,8HH CLIMB				Av. 300						
HENLY INTXN.	LEVEL-OFF (EDNAS INTXN.)	J23 FL 310				Av. 360				*5,800		*Includes 800 lbs. taxi allowance
LEVEL-OFF (EDNAS INTXN.)	MQP VORTAC	J23 FL 310	.78	-20 knots ISA -3°C.								
MQP VORTAC	OKC VORTAC	J23 FL 310	.78	-35 knots ISA -3°C.								
OKC VORTAC	WILL ROGERS ARPT.	DESCENT	&	APPROACH				:15		1,800		

ALTERNATE AIRPORT DATA

OKC	TUL							:15

NOTE: Use 9,800 lbs./hr. total fuel flow from LEVEL-OFF to the OKC VORTAC.

Use 8,600 lbs./hr. total fuel flow for ALTERNATE and RESERVE requirements.

FLIGHT SUMMARY

TIME	FUEL	
		ENROUTE
		ALTERNATE
		RESERVE
----	1,200	MISSED APPROACH
		TOTAL

FIGURE 44. Flight Time Analysis.

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