

Table of Contents

Chapter 1: Introduction to Balloon Flight Training

Purpose of Balloon Flight Training	1-1
Role of the FAA	1-1
Role of the Pilot Examiner.....	1-3
Role of the Flight Instructor	1-3
Sources of Flight Training	1-4
Practical Test Standards (PTS)	1-5
Flight Safety Practices	1-5
Collision Avoidance	1-5
Runway Incursion Avoidance	1-6
Use of Checklists	1-7
Positive Transfer of Controls.....	1-7
Aeronautical Decision-Making (ADM)	1-7
Hazardous Attitudes & Antidotes.....	1-8
Stress Management.....	1-9
Risk Assessment Analysis	1-9
Evaluating ADM Skills	1-9
Crew Resource Management (CRM).....	1-9
Single-Pilot Resource Management (SRM).....	1-10
Human Resources	1-10
Risk Management.....	1-11
Effective Situational Awareness.....	1-12
The Decision-Making Process	1-13
Defining the Problem	1-13
Choosing a Course of Action	1-13
The DECIDE Model	1-13
The OODA Loop	1-14
Balloon Certificate Eligibility Requirements.....	1-15
Sport Pilot	1-15
Private Pilot.....	1-16
FAA WINGS Program	1-19
Introduction to IACRA.....	1-19
Chapter Summary	1-19

Chapter 2: Hot Air Balloon Design, Systems, & Theory

Introduction	2-1
History	2-1
Physics	2-2
Why Do Balloons Fly?.....	2-2
Balloon Components	2-3
Envelope	2-4
Thermal Airships	2-6
Heater System	2-6

Instruments	2-9
Fuel Tanks.....	2-10
Support Equipment	2-11
Aircraft Documents.....	2-15
Airworthiness Certificate	2-15
Certificate of Aircraft Registration	2-16
Aircraft Owner/Operator Responsibilities.....	2-16
Aircraft Maintenance	2-17
Balloon Inspections.....	2-17
Preventative Maintenance	2-18
Repairs and Alterations.....	2-18
Airworthiness Directives (ADs).....	2-19
Choosing a Balloon	2-19
Advantages of Balloon Sizes	2-19
Selecting a New or Used Balloon	2-20
Balloon Brands.....	2-20
Chapter Summary	2-20

Chapter 3: Preflight Planning

Introduction	3-1
Purpose of Flight	3-1
Weather.....	3-1
Navigation	3-4
Performance Planning.....	3-10
Special Conditions	3-13
Cold Weather Flying.....	3-13
Mountain Flying.....	3-14
The Ground Crew.....	3-15
Flying in New Territory.....	3-16
Equipment.....	3-16
Personal Preparation	3-17
Chapter Summary	3-17

Chapter 4: Weather Theory & Reports

Introduction	4-1
The Atmosphere.....	4-1
Composition	4-1
The Standard Atmosphere	4-2
Measurement of Atmospheric Pressure.....	4-2
Temperature	4-3
Temperature Scales	4-3
Temperature Variations	4-4
Heat Transfer	4-4
Air Masses	4-5
Characteristics	4-6
Pressure Systems.....	4-6
Fronts	4-8
Types of Fronts	4-8
Winds & Currents	4-12

Atmospheric Circulation	4-12
Wind Patterns	4-16
Convective Currents	4-16
The Jet Stream	4-17
Local and Small-Scale Winds	4-17
Clouds	4-18
Cloud Formation	4-18
Ceilings & Visibilities	4-23
Temperature/Dew Point Relationship	4-23
Fog	4-24
Atmospheric Stability & Instability	4-26
Types of Stability	4-27
Effects of Stable & Unstable Air	4-27
Weather Hazards	4-28
Turbulence	4-28
Obstructions & Wind	4-30
Thunderstorms	4-32
Thunderstorms	4-37
How to Obtain Weather Information	4-37
Sources for Weather Information	4-37
Interpreting Weather Charts & Reports	4-38
Additional Weather Information	4-45
Additional Weather Information	4-47
Chapter Summary	4-54

Chapter 5: The National Airspace System

Introduction	5-1
Airspace Classification	5-2
Uncontrolled Airspace	5-2
Controlled Airspace	5-3
Special Use Airspace	5-6
Other Airspace Areas	5-10
Temporary Flight Restrictions (TFR)	5-10
Radio Communications	5-13
Phonetic Alphabet	5-13
Radio Procedures	5-14
Chapter Summary	5-16

Chapter 6: Layout to Launch

Introduction	6-1
Preflight Operations	6-1
Checklists	6-1
Weather Brief	6-2
Performance Planning/Fuel Planning	6-4
The Chase Crew	6-4
Number of Crewmembers	6-4
Clothing	6-4
Types of Flight	6-5
Direction of Flight	6-5

The Crew Briefing	6-5
The Crown Line.....	6-6
Launch Site	6-8
Location and Obstacles	6-8
Landing Sites	6-9
Launch Site Surface.....	6-9
Balloon Placement & Wind Direction	6-10
Removing the Balloon from the Vehicle.....	6-10
Assembly	6-11
Layout	6-13
Spread Layout.....	6-13
Strip Layout.....	6-14
Progressive Fill	6-14
Inflator Fan Placement.....	6-15
Safety Restraint/Quick-Release.....	6-16
Passenger Briefing.....	6-16
Inflation.....	6-16
Inflation Styles.....	6-16
The Inflation	6-17
Prelaunch Check.....	6-18
Launch	6-18
Uncommanded (False) Lift.....	6-19
False Lift	6-20
False Heavy (Downward Lift).....	6-21
Diminished Capacity	6-21
Landowner Relations	6-22
Chapter Summary	6-23

Chapter 7: In-flight Maneuvers

Introduction	7-1
The Standard Burn.....	7-1
Straight & Level Flight.....	7-3
Ascents & Descents	7-4
Ascents	7-4
Descents	7-5
Maneuvering	7-7
Winds Below	7-7
Direction.....	7-7
Contour Flying	7-8
Minimum Safe Altitude Requirements.....	7-8
Contour Flying Techniques.....	7-11
Use of Instruments.....	7-13
In Flight Emergencies	7-13
Loss/Malfunction of Vent or Deflation Line.....	7-13
Loss/Malfunction of Pilot Light	7-13
Fuel Leak	7-14
Tethering/Mooring	7-14
Inflight Crew Management	7-17
Crew Behavior	7-17

Pilot/Crew Communications	7-17
Use of a Very High Frequency (VHF) Radio	7-18
Landowner Relations	7-18
Identification of Animal Populations	7-18
Chapter Summary	7-20

Chapter 8: Landing & Recovery

Introduction	8-1
The Approach	8-1
Step-Down Approach	8-4
Low Approach	8-5
Obstacles and Approach Angles	8-5
Some Basic Rules of Landing	8-6
Congested Areas	8-6
Practice Approaches	8-7
Thermal Flight	8-8
Landings	8-9
Landing Considerations	8-9
Ground Assistance	8-9
High-Wind Landing	8-9
Water Landings	8-10
Passenger Briefings & Management	8-10
Stand in the Appropriate Area of the Basket	8-10
Face the Direction of Travel	8-11
Place Feet and Knees Together, with Knees Bent	8-11
“Hold On Tight” in Two Places	8-12
Stay in the Basket	8-12
Recovery	8-12
Landowner Relations	8-12
Packing the Balloon	8-13
Refueling	8-15
Logging of Flight Time	8-16
Crew Responsibilities	8-17
Chapter Summary	8-18

Chapter 9: Aeromedical Factors

Introduction	9-1
Environmental & Health Factors Affecting Pilot Performance	9-1
Hypoxia	9-1
Symptoms of Hypoxia	9-2
Middle Ear & Sinus Problems	9-4
Spatial Disorientation & Illusions	9-5
Motion Sickness	9-6
Stress	9-6
Fatigue	9-6
Dehydration & Heatstroke	9-8
Alcohol	9-8
Drugs	9-9
Scuba Diving	9-10

Vision in Flight	9-10
Empty-Field Myopia	9-12
Night Vision	9-12
Chapter Summary	9-13

Chapter 10: The Instructional Process

Introduction	10-1
Flight Instructor Characteristics & Responsibilities	10-2
Instructor Responsibilities	10-2
Flight Instructor Responsibilities	10-3
The Learning Process	10-7
Definition of Learning	10-7
Characteristics of Learning	10-7
Principles of Learning	10-8
How People Learn	10-8
Levels of Learning.....	10-10
Transfer of Learning.....	10-11
Habit Formation	10-11
Theories of Forgetting.....	10-11
The Teaching Process.....	10-12
Preparation	10-12
Presentation.....	10-13
Review & Application	10-14
Teaching Methods	10-14
Organizing Material.....	10-14
Introduction	10-14
Development.....	10-15
Conclusion	10-16
Lecture Method	10-16
Demonstration-Performance Method	10-16
Computer-based Training	10-17
Techniques of Flight Instruction.....	10-18
The Telling-and-Doing Technique.....	10-18
Critique & Evaluation.....	10-19
Purpose of a Critique	10-19
Methods of Critique	10-20
Student-Led Critique	10-20
Self-Critique	10-20
Ground Rules for Critiquing	10-20
Characteristics of an Effective Critique	10-20
Evaluation	10-22
Oral Quizzes	10-22
Characteristics of Effective Questions	10-22
Written Tests	10-23
Test Development	10-23
Planning Instructional Activities.....	10-24
Course of Training.....	10-24
Objectives & Standards	10-25
Blocks of Learning	10-25

Training Syllabus.....	10-26
Syllabus Format & Content	10-26
How to Use a Training Syllabus	10-26
Lesson Plans	10-27
Characteristics of a Well-Planned Lesson	10-28
How to Use a Lesson Plan Properly	10-30
Lesson Plan Formats	10-31
Chapter Summary	10-31

Chapter 11: The Gas Balloon

Introduction	11-1
The History of Gas Ballooning	11-1
Balloon Systems	11-3
Netted Balloon Systems.....	11-3
Quick Fill Balloon Systems	11-3
Lifting Gases	11-4
Components of the Gas Balloon	11-5
Envelope	11-5
Gondola	11-5
Support Cabling	11-6
Equipment.....	11-6
Theory of Gas Ballooning.....	11-7
Physics of Gas Ballooning	11-7
Weather Considerations for Gas Ballooning	11-9
Meteorological Differences From Hot Air Ballooning.....	11-9
Meteorological Flight Planning.....	11-9
The Practice of Gas Ballooning.....	11-11
Gas Balloon Regulations	11-11
Flight Planning	11-12
Layout & Inflation	11-12
Launch	11-13
In-flight Procedures	11-14
Landing, Retrieval, & Packup.....	11-15
The America's Challenge Race, 2006	11-17
Chapter Summary	11-20

Appendix A: Vapor Pressures of LP Gases **A-1**

Appendix B: Pibal Plotting Grid..... **B-1**

Appendix C: Balloon Flight Checklist **C-1**

Appendix D: Pibal Velocity Versus Size **D-1**

Appendix E: Log Book Endorsement Formats..... **E-1**

Appendix F: Lift Table for Helium & Hydrogen at Standard Temperatures & Pressures **F-1**

Glossary **G-1**