



EXPEDITION / AIR RANGER

HANDBOOK – 2ND EDITION



ACKNOWLEDGEMENT

Special thanks to Eric A. Herrera and the Men / Air Rangers of Outpost 96, Parker, Colorado for the ongoing update of the Air Rangers program scope, technical / written materials and theme uniforms as depicted in this, the Second Edition of the Expedition - Air Rangers Handbook (July 2001).

INTRODUCTION

The updated Expedition / Air Rangers program is a new youth curriculum targeted to encompass the fifteen to seventeen age brackets of young men. This program is designed to follow the updated Royal / Expedition Rangers - Air Rangers study outline & Merits. In addition to the Air Rangers aviation study program, the Expedition core curriculum (highlighted by the Spirit Challenge) remains the cornerstone of the program giving main attention to keeping a Christian perspective and assist in preparing the young person for adulthood. The Expedition / Air Ranger program also welcomes interested Commanders, Parents and/or Aviation Professionals who wish to assist with the program.

This updated program differs from its predecessor in that it follows a classroom / activities based criteria that, where resources merit, outlines the execution of instructor led Private Pilot Basic Ground School (as executed under FAR Part 61 guidelines). This program can also be deployed on a recreational basis and not held to actual CFI Ground Instructor led study. Instead, a general appreciation of aviation can be pursued at the discretion of local Wing / Outpost. Both the instructor led (Part 61) and recreational deployments of the updated Air Ranger program should prove most helpful in the appreciation of aeronautics and the passing of the FAA Private Pilot Written exam. In order to accomplish a consistent deployment of instructor led and/or recreational classroom activities, the written materials have been refined to that of the Jeppesen Discovery Series written and video materials (Private Pilot Manual, Airman Study Guide, FARs, etc.). The video based materials would be most helpful to outposts that do not have licensed CFI Ground instructors available and deploy the recreational study. The recreational / video approach can be deployed by commanders with limited aviation experience. Jeppesen Sanderson has been extremely helpful in making the Discovery Series materials available to the Expedition / Air Rangers program. Your Wing command can contact the Marketing Department of the Jeppesen Sanderson Corporation (800-621-5377) for more information on available materials.

The new Air Rangers program is designed to be deployed on a Sectional basis. This approach allows for the combining of resources across a metropolitan geographic area. It is recommended that a host outpost be established and the program be offered all eligible young men in that Sectional locality. Each Sectional deployment of the Air Rangers program is considered a "Wing". Each Wing is made up of Squadrons (aka patrols). It is recommended that each Squadron be made up of at least eight young men. Squadron names and/or designations to be established at the discretion of both the young men and wing commanders.

In addition to the refined materials, theme uniforms in the form of flight suits have been developed to celebrate the aeronautical aspects of the new program. Patch and awards placements are to be strictly adhered to maintain consistency with that of the traditional Royal Rangers khaki uniform.

This updated handbook will provide the general directions of study, advancement and scope of the program. The information includes the following perspective: Scope, Core Spirit Challenge and Aviation curriculum, Advancement, Extracurricular Activities, Uniforms, and Needed Materials.



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PROGRAM SCOPE

It is recommended that the program be offered on a year round schedule. Outpost/Wing meetings should be held a minimum of three Mondays a month in a combination of permanent classroom and part-time airport environments. In addition to the weekly Wing meetings, one Saturday each month should be scheduled for aviation theme and/or community activities. Typical Wing meetings should be approximately two hours in length and split aviation ground school and core Spirit Challenge curriculum. The new program allows for regular entry points where new Air Ranger(s) can be inserted into the program. Each Ranger will be required to advance at a group rate but will acquire Merits through performance and personal effort. Each merit and level of classroom training is accompanied by both written and practical testing. (In the case of non-CFI Ground certified instructor led programs, merits can also be earned thru self-paced study and the accomplishment of required tasks and/or written materials as depicted under each specific merit). The Expedition Ranger core curriculum (Spirit Challenge) provides a mentored / structured approach to assist in preparing the young person for adulthood with a Christian leadership perspective. The program registration fee should include the purchase of an Air Rangers Manual/Handbook and the minimal required aviation classroom material. Uniforms and ongoing program costs should be covered during the initial orientation. Purchase of uniforms should be required within a reasonable timeframe of joining the program (i.e. 60 days). It is also recommended that orientations be made available to brief prospective Expedition-Air Rangers and their parents of scope, needed commitment and cost.

In addition to the aviation and core curriculum, workshops should be made available to provide accelerated training in the basic ideals of overall Royal Rangers program (this to benefit young men who have not previously participated in Royal Rangers).

CORE EXPEDITION CURRICULUM / SPIRIT CHALLENGE

- The core Expedition Curriculum is designed specifically to help prepare the Ranger for adult life through biblical dialogue and the examination of common real life situations.
- The Main topics include: The Light-for-the-Lost Junior Councilmen Program, The Christian and Relationships, The Christian and the World, A Christian Perspective on Issues, Occult Religions and End-Time Events.
- Each Unit includes both special speaker elements as well as a complete array of sub-topics to study.
- The core program has a wide series of available elective Merits toward advancement:: Safety, Survival Skills, Camp Safety, Fire Craft, Hide Tanning, Pioneering, Winter Camping, Archery Merit, Bird Study, Fishing, Forestry, Insect, Wildlife, Astronomy, Hunter Safety, Weather, Pathfinder, Environment, Geology, Backpacking Basics, Kayaking, etc.

The Air Ranger will be exposed to the Spirit Challenge materials in a Commander led environment. Advancement is achievable to the completion of both Spirit Challenge and Aviation Study.



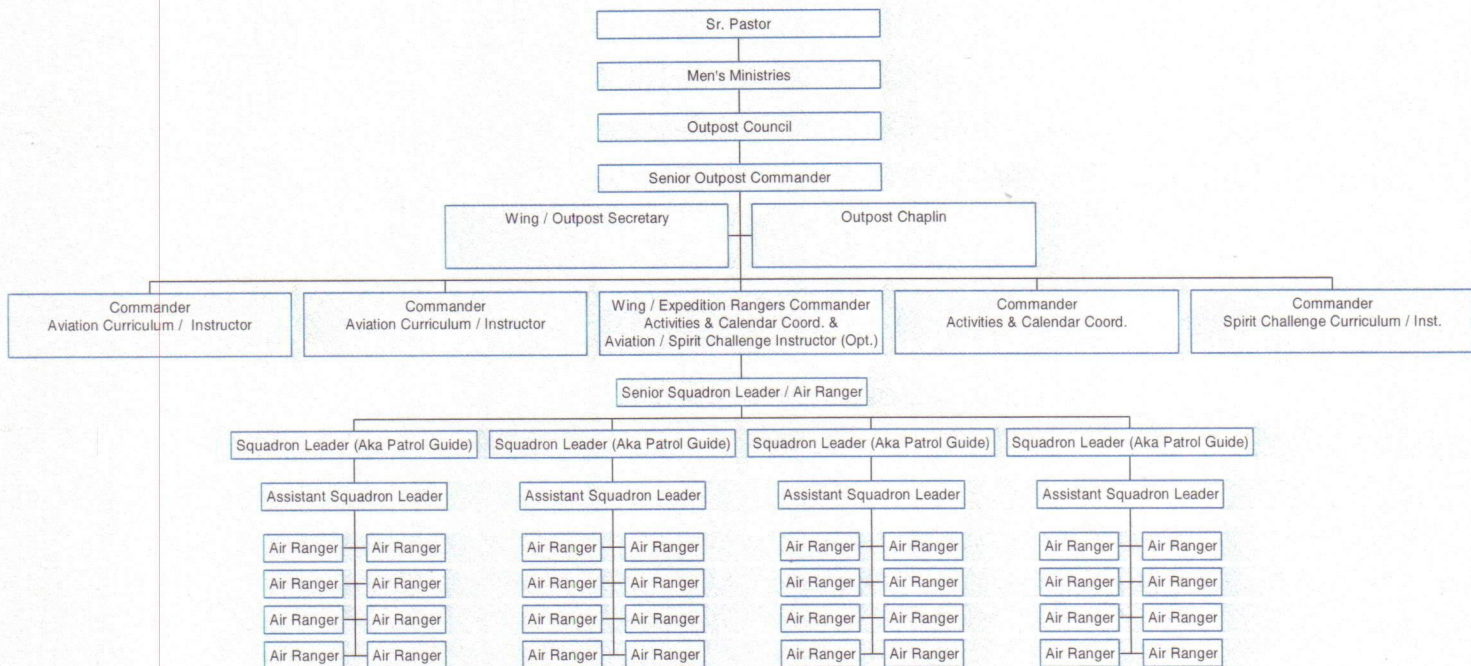
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AIR RANGER WING STRUCTURE

The new Expedition / Air Ranger Wing is designed to be deployed on a section-wide basis. A host church / outpost is established within a section, this allowing for the incorporation of resources from a number of outposts. If an Air Ranger is already part of an existing outpost, he can continue to wear his original outpost identification on the flightsuit uniform. Each Air Ranger deployment will be assigned a Wing designation. Wing designations are assigned by the Royal Rangers National leadership in succession of national deployments. The Wing designation is worn on the right sleeve of the flight suit theme uniform on a wedge shaped patch between the District and Outpost designations.

The leadership of an Expedition / Air Rangers Wing is made up of the following:



WING LEADERSHIP

- Senior Pastor:** Senior Pastor from the hosting church (input from other participating church pastors is encouraged).
- Men's Ministries:** Men's ministries committee.
- Church / Outpost Council:** Church council of the hosting church. (contributions from other participating churches to be included).
- Sr. Outpost Commander:** The senior commander over the host Outpost (All Age / Ranger Programs).
- Air Ranger Wing Commander:** Senior commander over the Expedition / Air Ranger program.
- Commanders:** Christian Men whom have successfully completed the Leadership Training Course (LTC).
- Lt. Commanders:** Christian Men whom have not yet attended LTC. Air Rangers can serve as Lt. Commanders once they have attained the age of eighteen and can become commanders w/ completion of LTC and age 21. This post can be held by a Christian non-Royal Ranger, Commander or Air Ranger.
- Wing Secretary:** (aka Sr. Patrol Guide) The senior Air Ranger position appointed by the Wing Commanders.
- Sr. Squadron Leader:** This Air Ranger position is awarded for enhanced aeronautical and/or Spirit Challenge knowledge. Once earned it is a permanent position and is considered part of the training staff.
- Air Ranger Ground Instructor:** (aka Patrol Guide) An Air Ranger position voted in by his peers to lead a squadron.
- Squadron Leader:** (aka Assistant Patrol Guide) An Air Ranger position voted in by his peers to assist in leading a squadron.



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AVIATION – BASIC PRIVATE PILOT GROUND CLASSROOM ACTIVITIES

AVIATION GROUND TRAINING MATERIALS

- Bible
- Expedition / Air Rangers Handbook (includes core Expedition Ranger materials)
- GFD Jeppesen Private Pilot Manual
- Jeppesen FAR/AIM (Included w/ Private Pilot Man.)
- Jeppesen Private Pilot Airman Study Guide
- CSG E6-B Computer
- PJ-1 Rotating Azimuth Plotter (Fixed Azimuth can also be used)
- VFR Flight Sectional Chart (for your locality)
- Class B Airspace Chart (for your locality)
- Private Pilot Log Book (if actual flight instruction is intended)
- Private Pilot Student Record Folder



Talk to your Air Ranger Wing leadership for information on obtaining the above ground training materials.

Note: The Expedition-Air Ranger program is not to be considered a flight school. Actual flight instruction is outside the current program and should be pursued via a local certified flight training facility.

Each of the topics outlined under the Private Pilot Ground curriculum corresponds with specific merits needed for advancement. Advancements also require additional elective merit(s) as well as accomplishments pertaining to the Spirit Challenge core program.

CLASSROOM TOPICS

Jeppesen Private Pilot Manual / Discovery Series

- Intro to Airplanes – 1 hour
- Basic Aerodynamics – 2 hours
- Aviation Careers – 2 hours
- Aviation Physiology – 2 hours
- Aircraft Systems – Airplanes, Power Plants & Related – 4 hours
- Aviation Airspace – 3 hours
- Weather – 6 hours
- Navigation – 6 hours
- Air Traffic Control – 6 hours
- Aviation Regulations – 4 hours
- Weight & Balance – 3 hours
- Flight Planning – 3 hours

Note: If the classroom led instruction is administered by a CFI rated ground instructor(s), and all practice testing has been successfully accomplished, the Air Ranger should now be capable of taking the “FAA Private Pilot Written Exam”. All information is available thru the Jeppesen Discovery Series materials.

Should your local Outpost / Wing choose to follow a recreational / non-CFI Ground instructor led approach, the Air Ranger will still have accomplished an enhanced knowledge of aeronautical study. If the Air Ranger desires to take the FAA Private Pilot Written Exam, he should pursue a sign-off authorization to do so thru a local certified ground school and /or CFI rated ground instructor.



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PREPARING TO FLY

With the FAA Private Pilot Written Exam passed, and the Air Ranger desires training toward a Private Pilot Rating, it will then be the responsibility of the Air Ranger and his Parents to pursue private flight instruction. The Air Ranger program advancements are designed to reward the pursuit of either a Private Pilot Rating and/or Remote Control (RC) aircraft flight and competitions.

EXPEDITION - AIR RANGER ADVANCEMENT / REQUIRED MERITS

Advancement in the Expedition – Air Ranger program is a combination of aviation theme required merits, elective merits, completion of Spirit Challenge lessons and the pursuit of either actual flight and/or remote control (RC) aircraft. Merits can be earned thru either successful completion of instructor led aviation ground classroom training or via home study and turned in materials.

Quester

- Earn one of the Air Rangers required merits:
✓ _____

- Successfully complete five Spirit Challenge Lessons from “The Bible and Today’s Issues”:
✓ _____
✓ _____
✓ _____
✓ _____

Adventurer

- Earn two of the Air Rangers required merits not yet achieved:
✓ _____
✓ _____

- Successfully complete ten Spirit Challenge Lessons from “The Bible and Today’s Issues”:
✓ _____ ✓ _____
✓ _____ ✓ _____
✓ _____ ✓ _____
✓ _____ ✓ _____

Voyager

- Earn three of the Air Rangers required merits not yet achieved:
✓ _____
✓ _____
✓ _____

- Successfully complete ten Spirit Challenge Lessons from “The Bible and Today’s Issues”:
✓ _____ ✓ _____
✓ _____ ✓ _____
✓ _____ ✓ _____
✓ _____ ✓ _____



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Discoverer

- Earn three of the Air Rangers required merits not yet achieved:
 - ✓ _____
 - ✓ _____
 - ✓ _____

- Successfully complete fifteen Spirit Challenge Lessons from “The Bible and Today’s Issues”:

✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____

Navigator

- Earn four of the Air Rangers required merits not yet achieved:
 - ✓ _____
 - ✓ _____
 - ✓ _____
 - ✓ * _____

* Note: In Wings located near or about mountainous terrain, the “Mountain Flying Merit” is an additional requirement to complete the Navigator Rank.

- Successfully complete fifteen Spirit Challenge Lessons from “The Bible and Today’s Issues”:

✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____

REQUIRED AVIATION MERITS COMPLETE!!!

Achievement Medal (Total - 15 Merits and 75 Spirit Challenge Lessons)

- Earn / complete three additional Air Rangers elective merits not yet achieved:
 - ✓ _____
 - ✓ _____
 - ✓ _____

- Successfully complete twenty additional Spirit Challenge Lessons from “The Bible and Today’s Issues”:

✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____
✓ _____	✓ _____



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EXPEDITION – AIR RANGERS REQUIRED / SPECIAL INTEREST MERITS

Introduction to Airplanes Merit	Basic Aerodynamics Merit	Aviation Careers Merit	Aircraft Systems Merit
Aviation Weather Fundamentals Merit	Weight and Balance Merit	Air Traffic Control Merit	Navigation Merit
Airplane Performance Merit	Flight Planning Merit	Flight Preparation Merit	Solo Flight Merit
Flight Proficiency Merit	* Mountain Flying Merit (Under Development)		

Note: The Mountain Flying Merit is normally elective study. However, in localities where mountain flying is prevalent, it is required.

EXPEDITION – AIR RANGERS ELECTIVE SPECIAL INTEREST MERITS

Aviation History Merit	Flight Physiology Merit	Federal Aviation Regulations Merit	Aviation Merit
Mountain Flying Merit (Under Development)	Rotorcraft Merit (Under Development)	WWII Aircraft Merit (Under Development)	

Additional elective study merits can be pursued via the Expedition Rangers core curriculum handbook.



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EXPEDITION - AIR RANGER ADVANCED AVIATION STUDY AWARDS

- **Bronze Wing Award:** Rangers or Commanders who successfully complete the Aviation Ground curriculum and pass the FAA written exam, earn the privilege to wear the Royal Rangers “**Bronze Wing Award**”.

Note: If an Air Ranger or Commander attains solo status (Aircraft or Remote Control Model) prior to passing the FAA Private Pilot Written Test he will have earned the privilege to wear the “Bronze Wing Award”. He however he cannot attain Silver Wing Status until completing the Aviation Ground study curriculum and pass the FAA Private Pilot Written Exam.

- **Silver Wing Award:** Rangers or Commanders who complete their first solo flight during the process of obtaining a Private Pilot’s license or builds and competes in two Remote Control model AMA sanctioned events, earn the privilege to wear the Royal Rangers “**Silver Wing Award**”.
- **Gold Wing Award:** Rangers or Commanders who obtain their Private Pilot rating will earn the privilege to wear the Royal Rangers “**Gold Wing Award**”.
- **Air Ranger - Ground Instructor:** Air Rangers who successfully complete the ground instruction and/or Spirit Challenge curriculums, demonstrates extended efforts and passes heightened proficiency tests on aviation and/or Spirit Challenge subject matter can earn the three available ranks of “**Air Ranger - Ground Instructor**” (**Spirit Challenge, Aviation & Master Rank**). The three ranks are designed to mentor the Ranger into heightened leadership roles. This rank is signified by three distinctly different shades of green bands worn on the flight suit epaulet. The light to dark green progressive bands signify Aviation Air Ranger Instructor, Spirit Challenge Air Ranger Instructor, with the dark green band signifying proficiency in both disciplines and are ranked as Master Air Rangers Instructor (both Spirit Challenge and Aviation capable).



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- **Air Ranger Medal of Excellence:** Rangers who progress to the completion of all Aviation / Spirit Challenge Required / Elective Merits can also earn the “**Air Ranger Medal of Excellence**”. This award represents the highest honor obtainable directly under the Air Ranger specific study.

EXTRACURRICULAR ACTIVITIES

The Expedition-Air Rangers program includes regularly scheduled activities. They are in addition to the weekly Wing meetings and will focus on both aviation and personal growth.

Examples of Planned activities are as follows:

- Church involvement, Youth and/or scheduled events
- Community Involvement (Scheduled events and/or fund raisers)
- Control Tower Visits
- Air Shows (Regional and/or National)
- Museums
- Flight Training Centers (Commercial & Private)
- Aviation Maintenance Facilities (Commercial Airline and Private Industry)
- Military bases
- Merit Related (i.e. Spirit Challenge, etc.)

PROPOSED JUNIOR LEADERSHIP TRAINING COURSE

Today, JLTC is specifically geared to the Trail Ranger curriculum. It is proposed that JLTC discipline be expanded to include Air, Sea and Trail Rangers knowledge sets.

Junior Leadership Training Course: To open the JLTC advancement to the Air (or Sea) Ranger program(s), it is proposed that JLTC sessions be held in hosting districts and/or Sections specific to the Air and/or Sea Ranger knowledge set(s). Such sessions would be conducted in the same manner as those currently geared to Trail Rangers. Each district and/or section who hosts the Air and/or Sea programs should be inclined to offer a yearly academy and/or JLTC session to accommodate each discipline of study (i.e. Air, Sea or Trail). Each session should include identical core study criteria (i.e. Spirit Challenge, Ranger Ideals, etc.). However, in addition to the core study, each academy and/or session would include topics specific to that of the theme program (Air, Sea or Trail). This achievement would be celebrated in the traditional manner via the JLTC patch worn under the flightsuit left breast zippered pocket.



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Air Ranger Uniform Specifications

Class "A" Uniform

Class "B" Uniform

Class "A" Uniform: Flightsuit is worn with an ascot and black beret bearing the Royal Ranger or Wing insignia.

Class "B" Uniform: Flightsuit is worn with forest green hi-crew or turtleneck and Green Garrison Cap.

Class "C" Uniform: Green Camo BDUs worn with Challengers T-shirt and Ball Cap.

Note: All classes of uniform are worn with black lace-up boots.

Left Sleeve

Royal Rangers emblem: Worn centered on the outside of the left sleeve 1/2-inch below the shoulder seam.

Squadron/patrol patch: Worn centered on the left sleeve pen pocket flap.

Left Breast Zippered Pocket

Merit awards: Worn left-justified over the left breast zippered pocket with the bottom row parallel to the upper tip of the pocket. If there are more than one row of awards they are to be split above and below to the parallel to the top tip of the left zippered pocket. They are arranged spaced evenly in rows with a maximum of two rows. There is no priority in their arrangement.

Advancement pins: Highest-earned advancement pin is worn centered 1/4-inch above Merit awards.

Bronze, Silver or Gold Wing Awards: Worn one half-inch and center above the advancement pins.

Ribbon awards: Worn centered over left breast zippered pocket parallel to the upper tip of the pocket. (Includes: Gold Medal of Achievement, Medal of Excellence, Gold Hawk Award, Silver Hawk Award, Medal of Valor, Junior Leaders' Service Award, God and Life, God and Church, God and Family.)

Junior Leadership Training patch: Worn centered below the left breast zippered pocket.

Right Breast Zippered Pocket

Expedition Ranger patch: Worn right-justified over the right breast zippered pocket with the bottom edge of the patch parallel to the upper tip of the pocket.

Air Rangers Patch: Worn centered, directly below the Expedition Rangers patch, over the right breast zippered pocket.

Activity patch: Worn left-justified under the right breast zippered pocket with the top edge of the patch parallel to the lower tip of the right zippered pocket.

Frontiersman Camping Fellowship pin: Worn centered over Challengers patch.

Ranger of the Year: If you receive this award, the pin is to be worn centered below the Challengers patch over the right zippered pocket.

Right Sleeve

District patch: Worn centered on outside of right sleeve 1/2-inch below the shoulder seam.

Air Ranger Wing Designation: Wedge shaped patch that is worn between the District patch and the Outpost numerals. This patch signifies in the Air Ranger Wing designation on which it was launched nationally.

Outpost numeral(s): Worn centered under the district patch with its top even with the lowest point of the district patch's arch.

American Flag Patch: Worn one half-inch below the Outpost numeral(s).

Left and Right Epaulets / Collars:

Guide / Squadron leader (or Junior Commander) bars: Worn on the outer-ends of the right and left epaulets.

(If no epaulets are available on the flightsuit, bars may be worn centered on the front rounds of the left and right collar).

Air Ranger Ground Instructor Bands: Worn on the outer-ends of the left and right epaulets. Bars can be worn over the epaulet bands.



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Air Ranger Uniform Examples

Class “A” Uniform

Class “B” Uniform

Class “C” Uniform



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EXPEDITION – AIR RANGERS REQUIRED MERITS (DETAILED DESCRIPTIONS)

Air Traffic Control

Required Study:

- **FAR/AIM Part 1** - Definitions and Abbreviations
- **FAR Part 71** - Designation of Class A, B, C, D, and E Airspace Areas: Airways; Routes; and Reporting points.
- **FAR Part 73** - Special Use Airspace.
- **FAR Part 91** - Subpart B (Flight Rules General)

- **Jeppesen Private Pilot Manual – Chapter 4 “The Flight Environment”**
 - Section A (Safety of Flight)
 - Section B (Airports)
 - Section C (Aeronautical Charts)
 - Section D (Airspace)

- **Jeppesen Private Pilot Manual – Chapter 5 “Communication and Flight Information”**
 - Section A (Radar and ATC Services)
 - Section B (Radio Procedures)
 - Section C (Sources of Flight Information)

Answer the following Questions:

1. Diagram and describe precision and non-precision runways. Include displaced threshold, overrun, threshold marker, touchdown zone markers, fixed distance marker, and runway markers.
2. Diagram an airport traffic pattern. Include traffic pattern altitude, crosswind, downwind, base, final, wind sock, traffic and pattern indicators.
3. Diagram and describe class A, B, C, D, E, and G airspace.
4. Define the ATC light gun signals, in the air and on the ground.
5. Define the following terms:

Active Runway

ATIS

ATC Clearance

Radar Contact/radar Service

Mayday

Pilot-in-Command (PIC)

Phonetic Alphabet (recite)

Flight Service Station (FSS)



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Aircraft Systems

Required Study:

- FAR/AIM Part 1 - Definitions and Abbreviations
- Jeppesen Private Pilot Manual – Chapter 2 “Airplane Systems”
 - Section A (Airplanes)
 - Section B (The Powerplant and Related Systems)
 - Section C (Flight Instruments)

Answer the following Questions:

1. Draw a diagram which explains how a four-stroke combustion engine functions. Explain the function each engine control the pilot must operate to start and fly an aircraft.
2. List the major parts of the aircraft ignition system and the safety advantages of such a system.
3. Draw a diagram of the pitot-static pressure system of an aircraft showing the instruments that depend on static pressure. What instrument uses ram-air pressure in addition to the static pressure?
4. Name the primary flight instruments of an aircraft and what energy sources each instrument depends upon. (Do not forget both compasses.).
5. Why is turbocharging more important to an aircraft engine than a car engine in producing power?
6. What two types of propellers are there for small private aircraft? Explain how their efficiency compares to each other during climb and level cruise. What engine instruments and controls are necessary for each?



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Airplane Performance

Required Study:

- FAR/AIM Part 1 - Definitions and Abbreviations
- Jeppesen Private Pilot Manual – Chapter 8 “Airplane Performance”
 - Section A (Predicting Performance)
 - Section B (Weight and Balance)
 - Section C (Flight Computers)

Answer the following Questions:

1. List the factors that affect density altitude and what that effect is.
2. What aircraft performance characteristics are affected by density altitude, and how are they affected?
3. Describe how you would determine density altitude.
4. List the factors that affect landing and takeoff performance.
5. Define what is meant by *Crosswind Component*, and tell how to determine the safe operation for a given wind and aircraft.
6. Explain, as a pilot, how you should avoid wake turbulence created by large aircraft and why.
7. Explain the factors you should consider when selecting cruise settings.



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Aviation

Required Study / Review:

- Aviation History (by Annie Millbrooke - Jeppesen) or Equivalent
- Jeppesen Private Pilot Manual – Chapter 2 “Airplane Systems”
- Jeppesen Private Pilot Manual – Chapter 3 “Aerodynamic Principals”

Answer the following Questions:

1. Identify at least seven different types of aircraft, using their proper names.
2. Make a sketch of an airfoil and explain how it creates lift.
3. Using a model airplane, explain the effects of the following on a plane in flight:
 - Drag
 - Lift
 - Thrust
 - Gravity
4. Make a list of the major parts of an airplane and explain the purpose of each.
5. Explain the difference between a piston, a jet, and a rocket type of airplane engine.
6. Explain the purpose and importance of the following instruments on an instrument panel: compass, oil pressure, altimeter, turn and bank indicator, airspeed indicator, tachometer, gyro horizon, and temperature gauge.
7. Explain in detail the proper procedure for each of the following: takeoff, banking and turning, and landing.
8. Visit an airport and make a list of the equipment and facilities used.
9. Take a flight with an FAA certified instructor.
Note: Enrolling in a flight course until you make your solo flight may substituted for the above requirement.



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Aviation Careers

Required Study:

- Jeppesen Private Pilot Manual – Chapter 1 “Discovering Aviation”
 - Section A (Pilot Training)
 - Section B (Aviation Opportunities)

- Obtain information on the following aviation career categories from the FAA, the library, or other sources.
 - Pilots and Flight Engineers
 - Flight Attendants
 - Airline Non-Flying Careers
 - Aircraft Manufacturing
 - Aviation Maintenance and Avionics
 - Government Careers

Free brochures on the above topics may be obtained at a government bookstore in your area or by sending a self-addressed mailing label with your request to:

Superintendent of Documents, Retail Distribution Division
Consigned Branch
8610 Cherry Lane
Laurel, MD 20707

Answer the following Questions:

1. Choose an occupation from five of the seven categories listed previously (five occupations, total) that you might be interested in and write a summary (at least one page) including:
 - Job title and description
 - Working conditions
 - Job requirements (education, licenses, etc.)
 - Pay range
 - Advancement opportunities
 - Why you selected the particular occupation



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- How you could obtain the necessary skills, education, and other requirements for the job. Be as specific as possible, answering questions (as appropriate to the occupation) such as:
 - What school would I need to attend and for how long?
 - How would I pay for tuition (parents, working part-time, scholarship, etc)?
 - Where / how will I live during my training / schooling?
 - How would I build my skills / flight time, etc.?
 - Do I plan on having a family? When and what will I do while I am training / building time?
 - What is my goal, and how long would it take me to reach it?

Aviation History

Required Study/Review:

- Aviation History (by Annie Millbrooke - Jeppesen) or Equivalent
- Jeppesen Private Pilot Manual – Chapter 1 “Discovering Aviation”
 - Section A (Pilot Training)

Answer the following Questions:

1. Explain how many years it has been since the first successful airplane flight at Kitty Hawk, North Carolina. Who built the airplane that was flown there? What was the occupation of the builders? What city were the builders from?
2. Explain how many “wings” did the Kitty Hawk first flight airplane have? How far did it fly?
3. Compare the modern small private airplane to the first-flown Kitty Hawk airplane. List seven major improvements in today’s airplanes.
4. There are many famous airplane flights that have occurred since the first flight at Kitty Hawk. List at least five famous flights by naming either the pilot, the name of the airplane, the starting and stopping places, or another aspect that made the flight famous.
5. Most people think of aviation as flying airplanes. Name two other primary aspects of aviation that developed along with airplanes.
6. Name three missionary organizations that are committed to the spreading of the gospel with the help of the airplane.



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Aviation Weather Fundamentals

Required Study/Review:

- **Jeppesen Private Pilot Manual – Chapter 6 “Meteorology for Pilots”**
 - Section A (Basic Weather Theory)
 - Section B (Weather Patterns)
 - Section C (Weather Hazards)

- **Jeppesen Private Pilot Manual – Chapter 7 “Interpreting Weather Data”**
 - Section A (The Forecasting Process)
 - Section B (Printed Reports and Forecasts)
 - Section C (Graphic Weather Products)
 - Section D (Sources of Weather Information)

Answer the following Questions:

1. What are the basic causes of weather?
2. How is atmospheric pressure related to flight (including altitude and temperature)?
3. Identify on a cloud chart or photograph the following types of clouds. How do they relate to flight?
 - Stratus
 - Cumulus
 - Cirrus
 - Cumulonimbus
4. Diagram a cross-section of a cold front, warm front, occluded front, and stationary front. What type of weather is associated with each?
5. Write a report on thunderstorms as they relate to aviation. Include the stages, causes, and hazards.
6. How do temperature and dew point relate to fog?
7. Define these terms:

dew point	sublimation
upslope fog	wind shear
advection fog	rime ice
radiation fog	clear ice



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Basic Aerodynamics

Required Study/Review:

- Jeppesen Private Pilot Manual – Chapter 3 “Aerodynamic Principals”
 - Section A (Four Forces of Flight)
 - Section B (Stability)
 - Section C (Aerodynamics of Maneuvering Flight)

Answer the following Questions:

1. What are the four aerodynamic forces acting on an airplane during flight? Explain their relationship during: straight and level unaccelerated flight, climbs, turns, and descents.
2. What are two ways lift is generated?
3. What is static and dynamic stability?
4. Define the following:

Angle of Attack

Torque

Spiraling Slipstream

Bernoulli Effect

Aerodynamic stall

Angle of Incidence

P-factor

Ground Effect

Newton's Third Law

Gyroscopic Precession



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Federal Aviation Regulations

Required Study/Review:

- **Federal Aviation Regulations (FAR/AIM)**
 - **Part 61** (Certification: Pilots and Flight Instructors)
 - **Part 67** (Medical Standards and Certification)
 - **Part 71** (Designation of Class A, Class B, Class C, Class D, and Class E airspace areas.)
 - **Part 73** (Special Use Airspace)
 - **Part 91** (General Operating and Flight Rules)
 - **Part 119** (Certification: Air Carriers and Commercial Operators)

Note: Part 119 is not needed unless you wish go into further study about Air Taxi operations or flying for hire.

- **National Transportation Safety Board 830**
(Rules Pertaining to the Notification and Reporting of Aircraft Accidents or Incidents and Overdue Aircraft, and Preservation of Aircraft Wreckage, Mail, Cargo and Records.)

Answer the following Questions:

1. What are the eligibility requirements for a private pilots license.
2. What are the general limitations of a student pilot and private pilot?
3. What are the pilot-in-command flight experience requirements?
4. What is the responsibility of the PIC (Pilot-in-Command)?
5. What is required preflight action?
6. What are the right-of-way rules for aircraft?
7. What are the basic VFR minimums for various altitudes and airspace?
8. What are the VFR regulations? Include information on:
 - Instrument Flight Rules (IFR)
 - Controlled Airspace
 - Uncontrolled Airspace
 - Weather
 - Radio Communications
 - Equipment Required in Aircraft
9. What are the applicability of the following regulations:
 - FAR Part 61
 - FAR Part 91
 - NTSB 830
10. What is “aircraft accident” and “aircraft incident”?
11. List the situations in which immediate notifications of the nearest NTSB field office is required.



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Flight Physiology

Required Study/Review:

- Jeppesen Private Pilot Manual – Chapter 1 “Discovering Aviation”
 - Section C (Introduction to Human Factors)

- Jeppesen Private Pilot Manual – Chapter 10 “Applying Human Factors Principals”
 - Section A (Aviation Physiology)

Answer the following Questions:

1. Explain how pressure and varying pressure altitudes effect the human body.
2. Explain the dangers of Alcohol and Drug use and the resulting impairments during flight.
3. Explain the symptoms, causes and alleviation/prevention of:
 - Hypoxia
 - Hyperventilation
 - Carbon Monoxide Poisoning
 - Middle Ear Discomfort
 - Spatial Discomfort
 - Motion Sickness



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Flight Planning

Required Study/Review:

- **Jeppesen Private Pilot Manual – Chapter 4 “The Flight Environment”**
 - Section C (Aeronautical Charts)
 - Section D (Airspace)

- **Jeppesen Private Pilot Manual – Chapter 5 “Communication and Flight”**
 - Section C (Sources of Flight Information)

- **Jeppesen Private Pilot Manual – Chapter 8 “Airplane Performance”**
 - Section A (Predicting Performance)
 - Section B (Weight & Balance)
 - Section C (Flight Computers)

- **Jeppesen Private Pilot Manual – Chapter 9 “Navigation”**
 - Section A (Pilotage and Dead Reckoning)
 - Section B (VOR Navigation)
 - Section C (ADF Navigation)
 - Section D (Advanced Navigation)

- **Jeppesen Private Pilot Manual – Chapter 11 “Flying Cross-Country”**
 - Section A (The Flight Planning Process)

Answer the following Questions:

1. Plan an actual flight of over 200 miles for you and a friend that includes the following elements:
 - Plotting a course
 - Landing site selection
 - Weight and Balance
 - Fuel Management
 - Aircraft equipment requirements
 - Weather
 - Aircraft Performance
 - Filing a flight plan (including converting local time to/from Zulu time)
Assume a specific airplane, obtaining an operators manual, weight and balance information, etc., as required. Obtain an actual weather briefing and fill out a flight plan.

2. Write a report on two weather-related aviation accidents (include possible cause, inappropriate pilot action, and how the accidents could have been prevented).



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Flight Preparation

1. **Complete one of the following:**
 - Pass the FAA Written Exam for a Private Pilot or Recreational Pilot License.
 - Build and prepare for flight a radio-controlled model (powered airplane, glider, helicopter or jet).
2. **Give a presentation to your Wing on either:**
 - What you did to prepare for your test, where/how you took it, and the material covered in the examination.
 - Your radio controlled model (show the model, explain what was necessary to build it, and demonstrate the control system).

Flight Proficiency

1. **Complete one of the following:**
 - Complete the FAA requirement for solo cross-country flight as pertaining to a Private Pilot License.
Note: Must be done as non-Royal Ranger activity.
 - Compete in at least two Academy of Model Aeronautics (AMA) sanctioned competitions.
2. **Give a presentation to your Wing about your flight.**



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Introduction to Airplanes

Required Study/Review:

- Jeppesen Private Pilot Manual – Chapter 2 “Airplane Systems”
 - Section A (Airplanes)
 - Section B (The Powerplant and Related Systems)
 - Section C (Flight Instruments)

Answer the following Questions:

1. Locate, identify and explain the following:

Propeller	Aileron
Wing	Rudder
Vertical Stabilizer	Elevator
Horizontal Stabilizer	Flap
Empennage	Trim Tabs
Fuselage	

2. Explain what instrument uses both Pitot and Static pressure to operate and why.
3. Identify, Explain and Interrupt the following:

Magnetic Compass	Turn Coordinator
Heading Indicator	Altimeter
Attitude Indicator	Vertical Speed Indicator



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Navigation

Required Study/Review:

- **Jeppesen Private Pilot Manual – Chapter 4 “The Flight Environment”**
 - Section C (Aeronautical Charts)
 - Section D (Airspace)

- **Jeppesen Private Pilot Manual – Chapter 8 “Airplane Performance”**
 - Section C (Flight Computers)

- **Jeppesen Private Pilot Manual – Chapter 9 “Navigation”**
 - Section A (Pilotage and Dead Reckoning)
 - Section B (VOR Navigation)
 - Section C (ADF Navigation)
 - Section D (Advanced Navigation)

Answer the following Questions:

1. Define these terms:

True Course	Wind Correction Angle
True Heading	Magnetic Variation
Compass Deviation	Magnetic Heading
Magnetic Course	VOR
DME	NDB
GPS	

2. Give an oral presentation to your Wing explaining the following methods of navigation. (Include the advantages and disadvantages of each type).

Pilotage	Dead Reckoning
NDB	VOR
GPS	



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Rotorcraft

Required Study/Review:

- Rotorcraft Flying Handbook – FAA-H-8083-21
(U.S. Dept. of Transportation)
 - Chapter 1 – Introduction to the Helicopter
 - Chapter 2 – General Aerodynamics
 - Chapter 3 – Aerodynamics of Flight
 - Chapter 4 – Helicopter Flight Controls

Answer the following Questions:

1. Name the six main components of a helicopter
2. Explain the most common type of landing gear used on helicopters.
3. Name the three types of “Main Rotor Systems” found on helicopters.
4. Name the most commonly used airfoil on most modern helicopter main rotor blades.
5. Explain how helicopters overcome the torque factor of the main rotor.
6. Explain how a helicopter creates lift.
7. Name and describe the four basic helicopter flight controls.



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Solo Pilot

1. Complete one of the following:

- Complete the FAA requirement for solo flight as pertaining to obtaining a Private Pilot's License.

Note: Must be done as non-Royal Ranger activity.

- Join a RC flying club and earn your RC pilot rating by soloing a radio-controlled model (powered airplane, glider, helicopter or jet). If a local RC club is not available, join the national AMA (Academy of Model Aeronautics).

2. Give a presentation to your Wing about your flight.

Weight and Balance

Required Study/Review:

- Jeppesen Private Pilot Manual – Chapter 8 “Airplane Performance”
 - Section B (Weight and Balance)

Answer the following Questions:

1. Explain what the CG of an aircraft (or any object) is.
2. The wings of an airplane can lift only so much weight. Name two factors that limit the amount of total weight an airplane can carry.
3. The aircraft manufacturer publishes the maximum takeoff weight and the empty weight of an airplane. What is the difference between the two weights called?
4. In aircraft weight and balance calculations, the moment equals weight times arm. Explain what arm or what is sometimes called moment arm means.
5. In aircraft moment arm calculations, balance is achieved at about what axis (or attitude) of the aircraft?
6. An aircraft can be safely flown only if the weight and balance fall within the “center of gravity envelope”. Describe what the CG envelope is and what is generally on the vertical and horizontal scales of a CG envelope graph.
7. Obtain a loading graph or loading table and CG envelope graph for an airplane. Calculate the weight and balance of the loaded aircraft with you and one of your friends aboard. Plot the CG on the envelope and describe if you could safely fly the airplane. (Assume full fuel tanks).
8. Explain the danger in trying to control an airplane which is loaded outside the envelope either forward or aft.



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World War II Aircraft

Required Study/Review:

- **Warbird Legends – Author John M Dibbs**
 - Review the historical write-ups on each documented aircraft.
 - or
- **Jane’s Fighting Aircraft of World War II**
 - Review the historical write-ups on each documented aircraft.

Answer the following Questions:

1. Name two British-built single engine fighters used by the Royal Air Force (RAF) during World War II.
2. Provide the common name the British-built World War II bomber referred to as the “Type 142”.
3. Name the single-engine American / Curtis-built fighter famously used by the “Flying Tigers” over China prior to America entering World War II in the Pacific.
4. Provide the common name for the American-built Grumman F4F.
5. Name the North American built twin-engine bomber used during the carrier-based (USS Hornet) raid over Tokyo, Japan in 1942. The famous pilots who flew the aircraft during the raid were later called “Doolittle’s Raiders”.
6. Name the North American built single-engine fighter which was dubbed the most famous serving as long ranger bomber escort in the World War II European theater.
7. Dubbed the “Flying Fortress”, what was the designation of this Boeing-built aircraft and in what World War II theater did it primarily serve?
8. What was the name of the Japanese (Mitsubishi-built) single-engine carrier-launched fighter used during the raid on Pearl Harbor, December 7, 1941?
9. What was the common name for the German single-engine fighter designated the Bf 109?
10. What aircraft (built by Vought / America) won fame thru a World War II Pacific theater Marine squadron dubbed the “Black Sheep”?