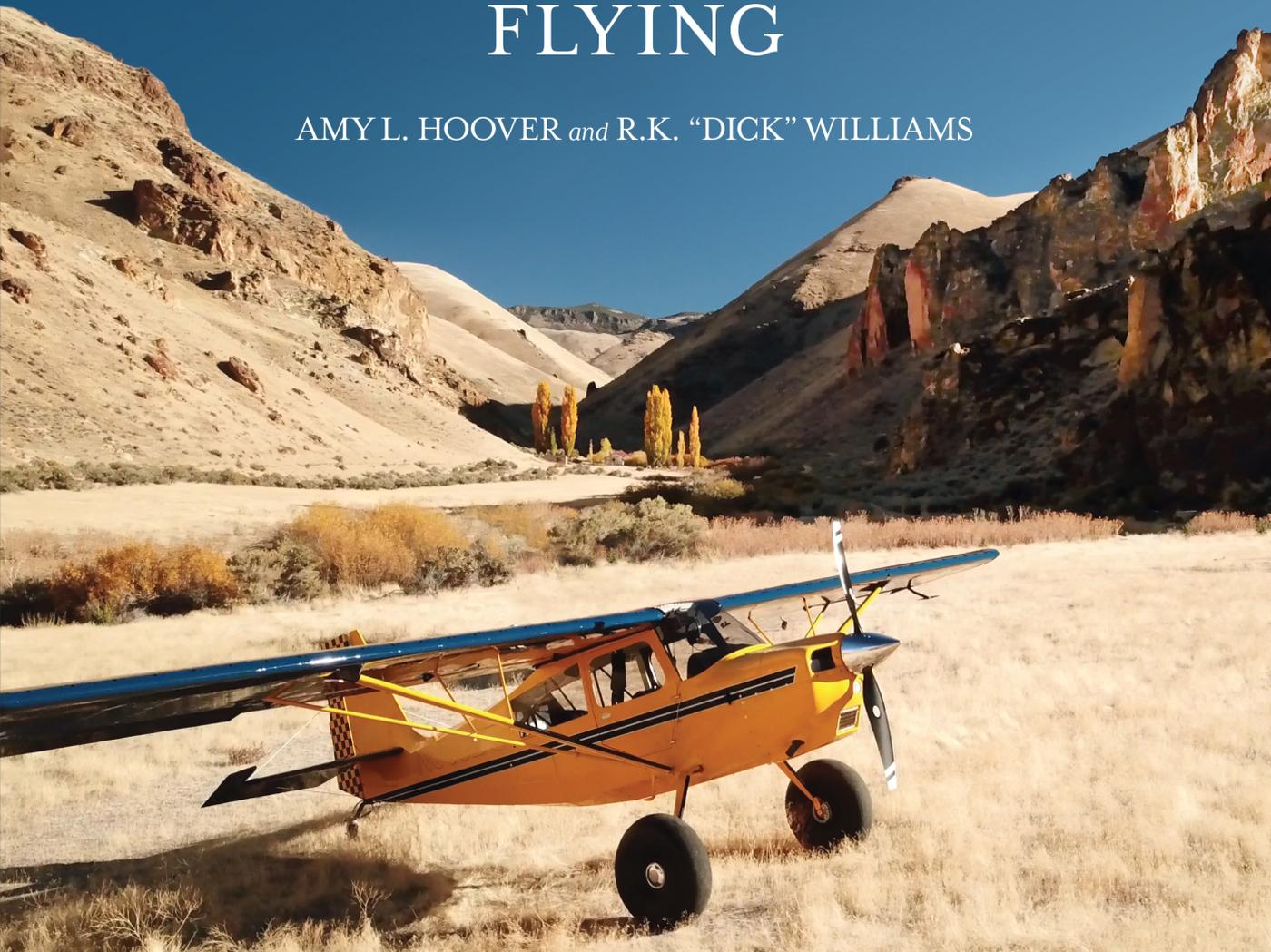




MOUNTAIN,
CANYON,
and
BACKCOUNTRY
FLYING

AMY L. HOOVER *and* R.K. "DICK" WILLIAMS



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AVIATION SUPPLIES & ACADEMICS
NEWCASTLE, WASHINGTON

Mountain, Canyon, and Backcountry Flying
by Amy L. Hoover and R.K. “Dick” Williams

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See ASA's website at www.asa2fly.com/reader/mountain for the Reader Resources page containing additional information and updates relating to this book.

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None of the material in this book supersedes any operational documents or procedures issued by the Federal Aviation Administration, aircraft and avionics manufacturers, flight schools, or the operators of aircraft.

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DEDICATION

This book is dedicated to one of our personal heroes, the late James Larkin. Jim's love for flying started as a young lad in 1927 when he got a ride with a passing barnstormer. He served as a U.S. Army Air Corps pilot during World War II, including time in the Himalayas as a Curtiss C-46 pilot flying "The Hump" over western China and Burma, and ferrying Lockheed P-38 Lightnings and other aircraft to South America and all over the world. After the war, Jim flew the Idaho backcountry for Johnson Flying Service and later formed his own company, Larkin

Air. Jim used his Cunningham Hall PT-6F freighter to haul supplies, deliver mail and medical supplies, support backcountry ranches, and launch rescue operations for downed pilots, logging thousands of hours on wheels and skis in all kinds of conditions. He was a Designated Pilot Examiner for the venerable Ford Trimotor.

As an airline transport pilot (ATP) rated in more than two-dozen fixed-wing types as well as helicopters, Jim's 67 years of flight experience made him one of the most experienced backcountry pilots of all time. He flew for the U.S. Forest Service and still holds the all-time longevity record (31 years) as a card-carrying smokejumper pilot. Jim later served as Director of Region 4 of Air Operations for the National Interagency Fire Center in Boise, Idaho. Even after retirement, Jim continued to fly the backcountry and could often be spotted helping carry supplies and people into



James Larkin with his Waco UPF-7. (Photo courtesy Bev Larkin)

ranches or giving flight instruction to aspiring mountain pilots. Some of our favorite memories of Jim include his time flying Harrah's Middle Fork Lodge de Havilland Twin Otter with Dick Williams and his time as the premier flight instructor for Amy Hoover's mountain and canyon flying school in McCall, Idaho.

Jim received numerous awards, including 2 Million Miles of Non-Accident Safe Flying; the Wright Brothers Master Pilot Award; FAA Safe Pilot Award; and induction into the Idaho Aviation Hall of Fame. Jim flew until the age of 84, shortly before his passing.

With all his vast experience, Jim could usually be seen attending aviation seminars and workshops, saying there is always more to learn. Our friend Jim was a master storyteller, and memories of his escapades live on through the vast knowledge, experience, and advice he gave about flying and life in general. A generous, humble, and thoughtful man, Jim's attitude and sense of humor have been a source of constant inspiration, as is his memory.



The de Havilland Twin Otter Jim Larkin flew with author Dick Williams. *(Photo by R.K. "Dick" Williams)*

FOREWORD

A confession: I love books. Several thousand of them rest on shelves throughout my home. Being intimately familiar with nearly all of them, I feel as if they are my children. At least that explains why I occasionally point to one and say, “Who’s your daddy?” That’s why I felt as if I had just adopted the brightest student on campus when I received a copy of Dr. Amy Hoover and R.K. “Dick” Williams’s book, *Mountain, Canyon, and Backcountry Flying*.

In my opinion, all pilots should own a copy of this wonderful book, especially if they intend to fly anywhere beyond the borders of Florida. Think about it: If the highest terrain in the state is 345 feet MSL, you don’t need to know about mountains, only molehills. Unfortunately, more than a few flatlander pilots have run their ships aground on craggy mountain slopes while unintentionally installing authentic, life-size, pine cone air fresheners in their cockpits. This should be a warning to any pilot who believes that a subscription to *Field & Stream* is sufficient education to set off on a flying adventure into the backcountry. It’s not.

The honest truth is that the steepness of the terrain often reveals the shallowness of one’s backcountry flying knowledge. While it’s who you know that determines your success in business, it’s what you know that ensures your safety in the mountains. Safety, however, shouldn’t be the only reason to inspire deeper and practical knowledge in this area. The fact is that you won’t have that much fun during your backcountry flying adventure unless you know how to behave properly in, near, and around that terrain. Herein lies the great value of *Mountain, Canyon, and Backcountry Flying*.

Packed with more general and specific knowledge than I’ve seen in most educational books, this volume can rightly be called the babushka doll of practical ideas on backcountry flying: It’s like one practical idea reveals another useful tool, tip, and technique. Within these pages, you’ll find valuable information on backcountry pre-flying, flight planning, navigation, terrain-specific meteorology, emergency operations, approaches, landings, departures, and much more. Without a doubt, it will be the recognized source for backcountry operations for years to come.

There were two things, however, that took this book over the top for me. First, I love axioms and rules of thumb. Despite being general in nature, they are concentrated bits of wisdom that help train our intuition and confirm our performance calculations. For example, one of Amy’s Axioms (which are sprinkled throughout the book) is: *If the rocks and trees are your enemies, keep them close!* While your untrained intuition might suggest staying as far away from the terrain as possible, certain situations require snuggling up to the side of a mountain or canyon. While it’s not possible to mention all the fantastic rules in this book, rest assured you won’t be opposed to using these rules of thumb.

Then there is the other feature that allows this volume to pack a punch beyond the weight class of most educational books. I'm speaking of its many educational, entertaining, and sometimes "eyebrow-raising" first-hand stories about backcountry flying. What a wonderful treasure this is for any pilot who wants to identify the physical risks and psychological traps of mountain and canyon operations. Read even a few of Amy's and Dick's sidebar stories—some personal, some about others, some by others—and you'll profit as if you were flying an airplane with a slow-running Hobbs meter. Go? No go? Commit? Abort? Fail to plan properly? Didn't see that coming? These are just a few of the many themes covered by these educational stories.

Pilots with a thirst for practical adventure and a soft spot for the esthetics of mountains and canyons will find immense pleasure in backcountry flying. But—flyer beware! You can do this safely only when the contours of your knowledge match the contours of the terrain. To obtain that knowledge, you need experience, and this is what Dr. Amy Hoover and R.K. "Dick" Williams bring to the table in *Mountain, Canyon, and Backcountry Flying*. Both of them have thousands of hours of flying in backcountry terrain that is so far back, you can almost see it coming around the other side. Feel confident in knowing that by studying this book and adding it to your collection, you'll have the tools to help you fly safer should you venture beyond the flatland.

Rod Machado
San Clemente, California
2018

ACKNOWLEDGMENTS

To plan and write a book can be a precarious and time-consuming venture. ””

Richard H. Holm, Jr.¹

We would like to thank all the dedicated mountain pilots and flight instructors around the world who are doing their part to improve awareness and promote flight safety in this specialized type of flying.

Nothing is created in a vacuum, and this book would not have been possible without the help, input, insight, and thoughtful contributions from many others.

Several experts contributed to the book through personal interviews and stories. A short introduction is provided here, and more detailed biographical information is located in the section or chapter where each person's primary contributions and stories occur.

- **Paul Claus** is an Alaska native and renowned glacier pilot whose life has been devoted to aviation. He owns the Ultima Thule Lodge (www.ultimathulelodge.com) with his wife and family and has a commercial flying operation with a dozen airplanes that provide access for skiers, climbers, outdoorsmen, as well as rescue operations on glaciers of the Alaska ranges.
- **Mike Dorris** was born and raised in central Idaho. He followed in his father's footsteps flying the backcountry, and he has more than 23,000 hours delivering the U.S. Mail, supporting backcountry ranches, and transporting hunters, rafters, and other users into the Frank Church Wilderness and other areas in the Idaho backcountry. He owns Sawtooth Flying Service (www.sawtoothflying-service.com).
- **Ron Hanks** served as a U.S. Naval Aviator. He is an ATP with a Ph.D. in Aviation Administration and is retired from the positions of National Aviation Manager for the U.S. Bureau of Land Management in Washington, D.C., and Chief of Aviation Operations for the U.S. Forest Service in Boise, Idaho. He flies fixed-wing aircraft, gliders, and helicopters. Ron is the director of the aviation program at Treasure Valley Community College (www.tvcc.cc/cte) in Ontario, Oregon.
- **Jeanne MacPherson** is a retired Chief of Safety and Education for Montana Department of Transportation Aeronautics Division and a Master CFI who teaches mountain flying and emergency maneuvers training in Helena, Montana. She owns and operates Mountain Air Dance flight school (mountainairdancellc.com).
- **John Reed** has been flying as a commercial pilot for forty years. He has approximately 18,000 hours, half of them flying float planes in Southeast Alaska and the other half on wheels in the Idaho backcountry and Pacific

¹ Holm, Richard H. Jr. (2012). *Bound for the Backcountry*. McCall, ID: Cold Mountain Press

Northwest. He served as Chief Pilot for several air taxi companies in both locations. His passion will always be safely flying in the mountains and continuing to learn new things with students and fellow aviators.

- **Lenny Skunberg** has owned and operated Lenny's Airmotive, a Certified 14 CFR Part 145 Repair Station in Salmon, Idaho, for 38 years. He is a past recipient of the FAA National Maintenance Technician of the Year Award, and he has extensive experience and expertise maintaining airplanes used for backcountry operations.
- **Michael Stockhill** is retired from many vocations, including test pilot in experimental airplanes, aviation magazine editor, airmail pilot, FAA Inspector, FBO owner, NTSB Investigator, and A&P mechanic with Inspection Authorization. He now flies gliders and splits his time between Montana and Arizona.
- **Michael Vivion** spent more than 30 years flying for the U.S. Fish and Wildlife Service as a wildlife biologist/airplane pilot in Alaska and has extensive experience operating on skis in the Alaska interior. Retired from teaching at a university flight program, Michael travels the country giving seminars on backcountry and short takeoff and landing (STOL) flying.

We also thank the following people for reviewing and critiquing all or parts of the book:

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These individuals contributed photography, concept drawings, and other input for this book:

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ABOUT THE AUTHORS



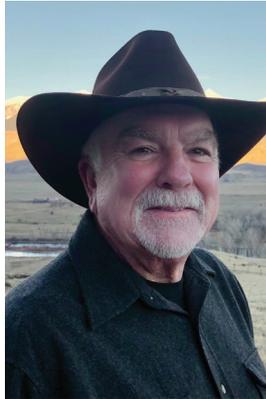
(Photo by kimberly millen brown)

Dr. Amy L. Hoover

Amy Hoover's journey into mountain and canyon flying started in the early 1980s when her work as a geologist and whitewater river guide entailed flights into the remote river canyons in central Idaho. She has been hooked ever since. Hoover obtained her private pilot license in 1989 in Salmon, Idaho. The following year, she bought a 1947 Cessna 120, which she flew from Idaho to Florida and back, stopping over to obtain her instrument/commercial and flight instructor certificates. In 1992 she landed a job as a commercial backcountry air taxi pilot and taught mountain flying seminars for the FAA. She received the Amelia Earhart Memorial Scholarship from the International 99s in 1994, which she used to complete her multi-engine commercial rating. Hoover combined her love of flying with that of teaching and began work as a full-time flight instructor in 1995. She is one of three original co-founders of McCall Mountain/Canyon Flying Seminars in McCall, Idaho, where she spent four years developing the curriculum and creating the company's training materials. Realizing her desire to reach out to a broader spectrum in aviation training, Hoover took the position as Director of Aviation at Mt. Hood Community College in Oregon before joining the faculty at Central Washington University (CWU), where she currently teaches. At CWU, she served eight years as Aviation Department Chair and achieved rank of Full Professor in 2012.

Hoover has B.S. and M.S. degrees in geology and a Ph.D. in education. She has published approximately 25 articles in technical and aviation journals and magazines, including *Pilot Getaways* and *Power Cruising*, and more than a dozen scholarly publications and book chapters on aviation human factors and research methods, including papers for the *International Journal of Aviation Psychology*, *Collegiate Aviation Review*, and *International Journal of Applied Aviation Studies (IJAAS)*. Hoover served as a reviewer and contributing editor for *IJAAS* and is a reviewer for the *Journal of Aviation and Education Research (JAER)*. She has given more than 100 presentations on mountain and canyon flying to various organizations and forums throughout the United States. Hoover has been nominated by students for "Who's Who in America's Teachers" every year for the past 18 years, and she is a past recipient of the National Residence Hall Association Outstanding Faculty Award. In 2011, she was selected for the "President's Faculty of the Year" Award at Central Washington University. She was awarded the Marquis Who's Who "Albert Nelson Lifetime Achievement Award" in 2018.

Hoover has approximately 7,000 flight hours, more than two-thirds of which were flying and teaching in the Idaho backcountry. She has given 1,000 hours of instruction in flight simulators. Hoover founded and operates Canyon Flying (canyonflying.com), a company specializing in tailwheel and backcountry flying in Idaho and the Northwest. She owns a 2011 American Champion 8GCBC Scout and can be found somewhere in the backcountry in the summers.



(Photo by Josi Barinaga)

R.K. “Dick” Williams

R.K. “Dick” Williams received a B.A. in psychology from the University of California, Berkeley, in 1972. He earned the Aviation Safety Certificate from the University of Southern California’s Institute of Safety and Systems Management, Human Factors emphasis, in 1997. He was also given the United States Department of Agriculture Award for Significant Contribution to Aviation Safety in 1995.

As a licensed pilot since 1972, Williams holds all fixed wing and instructor certificates, several turboprop and jet type ratings, and has flown more than 18,300 hours as an instructor, charter, government, and corporate pilot. He was an FAA Designated Pilot Examiner for 10 years, and an FAA Safety Counselor. Williams started one of the first mountain flying schools in Idaho in 1985 and has more than 8,000 hours flying and instructing in mountain and canyon terrain.

He is the author of *The Mountains to Canyons Flying Manual* (1986), *Aged in Saltwater* (2014), and *Notes from the Cockpit: A Mountain Pilot’s Perspective* (2015). His video *Mountain Flying with Dick Williams* was produced in 1996. He was the safety editor for the Super Cub Pilot’s Association Newsletter and wrote 44 columns between 1986 and 1992. Williams has given presentations at numerous aviation seminars, expositions, and flight instructor refresher courses around the region.

Williams is retired and lives in Salmon, Idaho. He flies his Super Cub for fun and enjoys river rafting and exploring the nearby mountains. As a sailor, he adventured in the South Pacific for 10 months in the early 1970s, and he still enjoys sailing in the Pacific and Caribbean Oceans as well as Lake Michigan.

INTRODUCTION

What is Mountain, Canyon, and Backcountry Flying?

For more than a century, pilots have been lured into and intrigued by the challenges of flight in the highest mountains and the deepest canyons on every continent. Mountain, canyon, and backcountry flying allows them to get off the beaten path and enjoy the outdoors. It opens up a whole new world of recreation, including activities such as airplane camping, hiking, fishing, and staying at guest lodges or bush camps in areas where there may not be roads or easy access either by land or water.

From the Australian Outback to the European Alps, from the high Andean deserts to the African bush, from canyons in the western United States to the Alaskan tundra, pilots will encounter varied topography, weather, heat, cold, wind, high density altitudes, and reduced aircraft performance. The challenges presented by those possibly harsh environments are numerous and diverse. Flying there often entails operations at high altitude over relatively inaccessible terrain and necessitates the proper mindset, discipline, and procedures to operate efficiently and safely in a challenging and sometimes unforgiving environment.

This specialized type of flying can be hazardous to a relative newcomer with only a few hundred hours as well as to a seasoned pilot with thousands of hours of flight time, depending on their training and willingness to apply various well-tested principles. Words are no substitute for actual experience. However, the observations, recommendations, and guidelines in this book represent many years and thousands of hours of experience that have been passed along by those who have “been there” themselves, who love aviation, and who are committed to safety. Hopefully, they will help promote best flying practices. This book is not about off-airport operations or extreme bush flying; it is meant to help all pilots develop skills to aviate off the beaten path in areas where there are established airstrips.

The authors and contributors all have experience flying and teaching mountain, canyon, backcountry, and bush flying, primarily in the western United States and Alaska. Examples and scenarios draw from lessons learned in those geographic regions with the hope that you will be able to use the insights for similar operations anywhere around the world. This work references and cites expertise from the literature, including books, articles, and public documents spanning decades of practice and research, to give readers additional information for further study.

How to Use This Book

This book's focus is to provide information to assist owners and pilots of fixed-wing **general aviation (GA)** aircraft who intend to fly into mountain, canyon and backcountry regions. Whether considering a route over high mountain terrain or planning for takeoff and landing at unimproved airstrips, pilots will find the content and techniques presented in this book useful. Mountain and backcountry flight instructors, as well as college and university professors, can use the text to supplement their classroom and flight instruction. Organizations that conduct mountain flying seminars may find it helpful to augment their curricula.

Key terms indicated in **bold text** are defined in Appendix C (Glossary). Questions and exercises at the end of each chapter are designed to enhance understanding and help pilots apply the material to their own flying. If used to supplement a college or university course, a seminar or workshop, ground school, or flight instruction, the end-of-chapter questions and exercises can help evaluate student progress. The text is organized into three sections, each with chapters relevant to a specific subject or application. Key concepts may appear in more than one section or chapter to frame them in context and emphasize their importance.

Section I is about planning and preparing for flights in mountain and canyon terrain. Chapter 1 addresses how to prepare the airplane and the pilot. Although information is applicable to many types of GA operations, it specifically addresses aircraft inspection and maintenance items relevant to operating on unimproved airstrips. It also introduces specific techniques to help prepare for backcountry flying. Chapter 2 delves into meteorological phenomena unique to mountains and canyon environments. Chapter 3 explores flight planning and navigation in mountainous terrain and in canyons.

Section II is primarily about operating in remote areas and on unimproved airstrips. Individual chapters are delineated with respect to specific types of operation, including enroute operations (Chapter 4), approach and landing (Chapter 5), and takeoff and departure (Chapter 6). Chapter 7 includes contributions from guest authors who have expertise in winter and ski flying in the Alaska bush, glacier flying, and flying in high Rocky Mountain terrain.

Section III pertains specifically to performance, both aircraft and human. Chapter 8 discusses density altitude and aircraft loading as they relate to performance. It includes some theory for readers who want to explore the mathematical as well as practical considerations. It also provides suggestions for common sense solutions to reductions in performance. Chapter 9 introduces risk management, human factors, backcountry etiquette, planning for emergencies, and post-crash survival strategies.

Although the most cohesive reading experience will be to study each section in sequence, the book was designed so that individual chapters and sections could stand alone. Content is cross-referenced throughout the text to help readers relate

different subject areas to one another, which instructors should find helpful should they choose to rearrange the order in which they teach subject areas.

Resources such as links to websites, videos, pdf documents, and online training courses are provided on the Reader Resources webpage for this book at www.asa2fly.com/reader/mountain.

References and Citations

The material in this book is based mainly on the authors' and contributors' personal experience, enhanced by references from the literature relevant to each topic. Citation style follows that recommended by the *Harvard System of Referencing* (6th edition) and the *Publication Manual of the American Psychological Association* (6th edition). The author–date method is used throughout to make it easy for the reader to find the book, paper, or other work without having to search through footnotes. In-text citations are placed in parentheses and the corresponding references are provided in Appendix D at the end of the book, divided by chapter. Examples of the two citation formats are as follows:

1. Hoover and Williams (2019) found that pilots who flew around the backcountry for many years developed a variety of ways to be safe and have fun.
2. Pilots can use specialized skills to ensure their mountain flying experience is enjoyable and safe (Hoover & Williams, 2019).

Applying Rules of Thumb to Performance Estimates

Merriam-Webster Dictionary (2018) defines a *rule of thumb* as “a general principle regarded as roughly correct but not intended to be scientifically accurate.” According to Wikipedia,¹

The English phrase *rule of thumb* refers to a principle with broad application that is not intended to be strictly accurate or reliable for every situation. It refers to an easily learned and easily applied procedure or standard, based on practical experience rather than theory. This usage of the phrase can be traced back to the seventeenth century.

The rules of thumb in this book are cited from various government publications and individual authors. The intention is to inspire a critical thinking process rather than a strict adherence to numbers and calculations. They are not meant to replace the aircraft manufacturer's operating procedures nor actual experience. Hopefully they will help readers explore their own practices in more depth and have fun.

¹ Rule of Thumb. (n.d.). In *Wikipedia*. Retrieved January 8, 2019, from https://en.wikipedia.org/wiki/Rule_of_thumb

The Literature

Learning a new skill involves much thought, study, and practice. Sometimes years' worth. During the process of writing this book, we recognized that our own practices were influenced through collaboration and sharing information with other pilots, from advice given by mentors and "old hands," and through careful and thoughtful study of books, manuals, and other resources. We are grateful to other authors who have contributed to the body of literature in the past, and we have cited their expertise in context with the intent of bringing their work forward. We believe this provides a richness and depth that enhances our own experience and gives the reader a broader scope from which to reflect and learn.

Some of the works cited are from prominent authors in the field, and others are from more obscure books. Listed below are several references we believe provide sound advice, techniques, and insight into mountain, backcountry, and bush flying. Full citations are provided in the references in Appendix D, and the authors are credited for their contributions throughout the text.

- ***Guide to Bush Flying*, by F.E. Potts** (1993), is a seminal work that gives excellent advice and in-depth descriptions of bush flying techniques, weather, aircraft operations, and mountain flying concepts.
- ***Flying the Mountains*, by Fletcher Anderson** (2003), has good descriptions of mountain weather phenomena as well as other mountain flying tips.
- ***Mountain Flying*, by Doug Geeting and Steve Woerner** (1988), provides a solid introduction to the basics of mountain flying.
- ***Mountain Flying Bible Revised*, by Sparky Imeson** (2005), is the latest version of his books that have been long-standing sources of information and tips on mountain flying for many years.
- ***Survival Flying: Bush flying tales and techniques as flown and taught in Alaska*, by C. J. Baldwin** (2010), is full of great stories as well as excellent advice on bush flying techniques.
- ***Fly the Wild and Stay Alive*, by Hal Terry** (2000), has many excellent insights into bush flying and backcountry flying, as well as some great stories from his experiences in the Alaskan bush.

SECTION I

Preparation and Planning



(Photo courtesy Andrew George, Idaho Aviation Association)

1

—

THE PILOT

and

THE AIRPLANE



*Do not let yourself be
forced into doing anything
before you are ready.* ””

Wilbur Wright¹

Mountain, canyon, and backcountry flying can lead to fun and exciting adventures. Whether you plan to spend the weekend at a mountain resort, camp at an airstrip on a remote lake, or venture into the canyons for some hiking and fishing, you can take measures to enhance the safety and enjoyment of both you and your passengers. Before heading over mountain ranges, through canyons, or over

large expanses of desert, tundra, or other inhospitable terrain, it is important to ensure that both you and your aircraft components and systems are operating properly and safely. Careful preflight planning, consideration of pilot currency and skill level, and a thorough inspection of the aircraft are essential. Preparing the aircraft, pilot, and passengers is the best insurance toward making a flight memorable for the right reasons.

There are many online resources for mountain flying, such as courses and publications provided by the Aircraft Owners and Pilots Association, the New Zealand Civil Aviation Authority, the Federal Aviation Administration, and Transport Canada (see links for these and other resources at www.asa2fly.com/reader/mountain). Hire a qualified flight instructor to help you work on your skills when planning to fly in a new area or a new flight regime, such as mountain and canyon backcountry operations. Guidance from a professional pilot or instructor familiar with the terrain and nuances of wind and weather patterns for the area in which you plan to operate is invaluable.

Evaluate your total flight time, type of experience, and time in make and model of aircraft you intend to use. Straight-and-level flight time, especially in large turbojet aircraft, does not transfer to the mountain and canyon or backcountry environment. Takeoff and landing practice, proficiency maneuvers, and preparing for emergencies is much more useful. Glider experience is helpful, especially ridge soaring; glider time will help you understand updrafts and downdrafts as well as other elements unique to mountain and canyon flying. Chapter 9 explores personal attitude and experience in more detail. This chapter describes several maneuvers to help prepare you for safe flight into the mountains and canyons.

Practicing for Mountain, Canyon, and Backcountry Flight

Canyon flying can be intimidating to “flatland” pilots, as they must maneuver in a confined space, close to terrain, and often with no discernable horizon or familiar visual cues. Pilots new to this can easily become disoriented and lose situational awareness, especially if their attention is focused on the aircraft instruments and not the visual environment outside the cockpit. Proximity to terrain can also add

¹ McCollough, David (2015). *The Wright Brothers*. New York, NY: Simon & Schuster.

an extra layer of stress, which may decrease **situational awareness** (SA) and cause errors such as tunnel vision, fixation, and loss of control. It is critical to be able to fly your airplane based solely on visual cues during turns, climbs, descents, and approaches, backed up by quick checks of the appropriate instruments. As long-time, highly experienced mountain pilot Carol Jarvis stated, “The ability to fly by feel, so the wings are your fingertips, the wheels are your feet, and the approach to stall is a whisper in your brain instead of a mechanical shout, is so old and fundamental...it is an ability that every pilot needs, whether or not he ever ventures into the hills” (Parfit, 1977).

A key element to canyon flying is slowing down to give your airplane more room and time to maneuver; turn radius decreases as the airplane slows and you can operate more safely in a confined space. Slowing down also allows for shallower banks to avoid overstressing the airplane. (Chapter 4 explores maneuvering, canyon turns, and emergency turns.)

Maneuvers

You can prepare for mountain and canyon flying by practicing maneuvers that enhance precise aircraft control. Be proficient in all phases of **slow flight**. Practice with different configurations and weight and load distributions and at different airspeeds. You should be able to use different flap (and gear, if applicable) settings and execute climbs, descents, and turns with precision, accuracy, and coordination. Try to make pitch and power changes, and transitions between different speed and flap/gear configurations, as smoothly as possible. It may help to go with an experienced mountain/canyon pilot or flight instructor who can help you determine power settings, flap settings, and indicated airspeeds in different configurations at various weight and **center of gravity** (CG) positions to help you become intimately familiar with the airplane.

A good exercise is to load your airplane to the weight and CG positions you plan to use, and practice flying at **density altitudes** (DA) similar to what you anticipate encountering. Consult the airplane owner’s manual or operating handbook for appropriate speeds at different weight or flap and gear settings. Fly at different speeds, including **maneuvering speed** (V_A), **maximum flap extended speed** (V_{FE}), **maximum gear extended speed** (V_{LE}), and **minimum controllable airspeed** (MCA). Although there is normally no reason to operate at MCA, practicing will give you an idea of “aircraft feel” and control responsiveness. Reduce power to idle at MCA and observe the amount of pitch down required to transition to best glide speed.

Load your airplane as light as possible to maximize performance (see Chapter 8). Remember that maneuvering speed decreases at lighter weight. Flying too fast in turbulence or maneuvering abruptly can overstress the airplane, so know the correct V_A for your operating weight. Machado (2017) gives the following rule of thumb to easily calculate V_A at your airplane’s current weight:

Rod's Rule:

For every 2% reduction in weight, reduce the max-weight maneuvering speed by 1%.

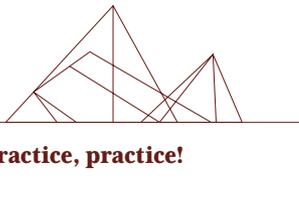
Stowell (2007) noted that “for airplanes certificated since 1993, the standards have made a clear distinction between the design maneuvering speed (V_A) and the placarded operating maneuvering speed (V_O).” Stowell presents a more in-depth discussion of the relationship between V_O and V_A , and notes that for airplanes which list both, choose the slower of the two speeds for maneuvering and turbulence (Stowell, 2007).

Perform climbs and descents in straight flight, while turning, and in various configurations. Note the power required and whether there is sufficient power at the DA to execute each maneuver. If there is not enough power available due to high DA, a heavy airplane might be able to climb during straight flight, but not while turning. You may need to add power (if available) to maintain altitude. Or you may need to descend (i.e., sacrifice altitude) to maintain airspeed while

turning. Excessively steep banks come with increased stall speeds, so medium-bank turns are recommended for most maneuvers (see Chapter 4). Learn the precise control pressures required to roll into and out of turns while level, climbing, and descending, and remain coordinated. Be able to do all maneuvers with outside visual cues as your primary reference.

R.K.'s Rule

Practice, practice, practice!



A great maneuver to help you develop a feel for aircraft control characteristics and inputs is the “**Dutch roll**” coordination exercise. Proper execution requires manipulating aileron, rudder, and elevator throughout the maneuver to keep the longitudinal axis of the airplane aligned with a fixed point. This maneuver will help develop a feel for the correct amount of rudder to compensate for adverse yaw caused by the ailerons when rolling into or out of a turn. It is essentially a “wing wag” around the longitudinal axis of the airplane. Visually align a spot on your windscreen to a point on the horizon and roll from level flight to 30–40 degrees of bank in one direction, reverse to roll 30–40 degrees in the other direction, then reverse again back to level flight, keeping aligned with the horizon point. Perform the Dutch roll coordination exercise at different airspeeds and configurations to improve your feel for the flight control characteristics and to develop more precise inputs.

Done correctly, the nose stays “on point” as the longitudinal axis of the airplane remains aligned with a point on the horizon (Figure 1-1A). If the nose of the airplane traces a “U” shape (Figure 1-1B), coordination needs improvement.

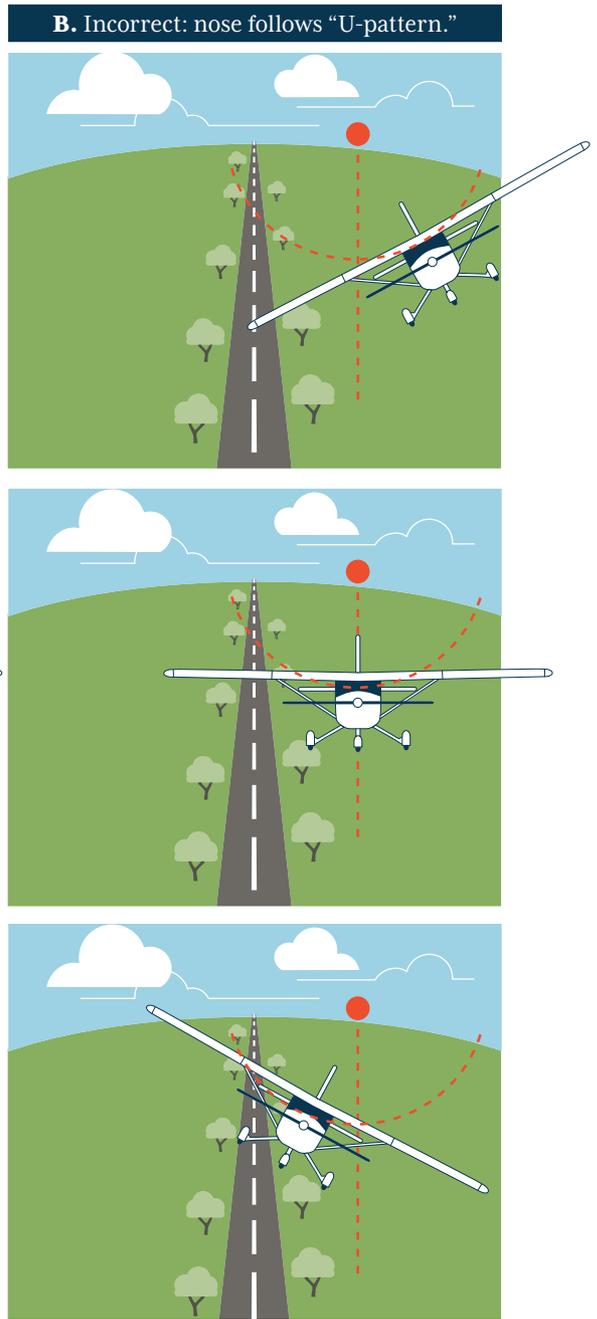
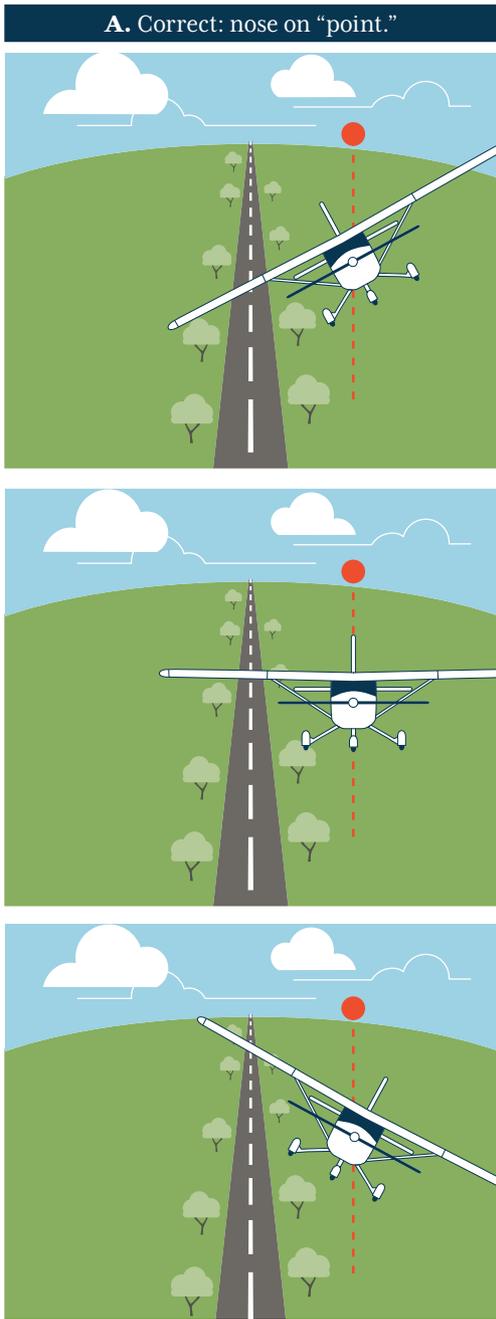


Figure 1-1. Dutch roll coordination exercise. (Courtesy Rich Stowell's Aviation Learning Center)

MOUNTAIN, CANYON, *and* BACKCOUNTRY FLYING

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and

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For more than a century, pilots have been intrigued by the challenges of flight in the highest mountains and the deepest canyons on every continent. Mountain, canyon, and backcountry flying allows pilots to get off the beaten path and enjoy the outdoors. It opens up a whole new world of recreation, including airplane camping, hiking, fishing, and staying at guest lodges or bush camps in areas without roads or easy access by land or water.

Flying in these enticing settings often entails operations over relatively inaccessible terrain in challenging and sometimes unforgiving environments. This necessitates the proper mindset, discipline, and procedures to operate efficiently and safely. Operating over mountains, navigating through canyons, taking off and landing on unimproved, high-altitude airstrips in confined areas, and maximizing airplane performance requires specialized skills. The authors and guest writers share information and tips gleaned from more than 150 years and 100,000 hours of collective experience as professional mountain and backcountry pilots and flight instructors.

Recreational pilots to mountain flying instructors will find this book useful, and college and university professors can use the text to supplement their classroom instruction. Fundamental concepts include preparing for and conducting mountain and canyon flights, airport operations, situational awareness, aircraft performance, risk management, and emergency operations. Analysis of accident scenarios, accounts from the authors' own experiences, and contributions from seasoned backcountry pilots and instructors expand on material detailed in the text. Each chapter includes exercises to help readers understand and apply the information to their own flying, and beautiful color illustrations will inspire pilots to seek out these awe-inspiring destinations.



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